ENCLOSURE 2
ATTACHMENT 3

SHINE MEDICAL TECHNOLOGIES, INC.

SHINE MEDICAL TECHNOLOGIES, INC. APPLICATION FOR CONSTRUCTION PERMIT RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

CALCULATION 2013-01989, REVISION 0
CONCEPTUAL DESIGN OF HARDENED SHINE FACILITY STRUCTURAL ELEMENTS

51,759 pages follow

TABLE OF CONTENTS

Section **Page No.**

1.0 PURPOSE

1.1 Objective

The objective of this calculation is to identify loading criteria and design representative areas of the reinforced concrete building structure for the SHINE Medical Technologies, Inc. Isotope Production Facility.

1.2 Scope

The scope of this calculation is to compile loads and corresponding load combinations to apply to the structure.

A structural model is created using SAP2000 Version 14.1.0. Major structural elements of the main facility, including walls, slabs, beams, and columns are modeled with appropriate mass and stiffness properties. Major openings within walls and slabs are modeled. Structures which have an interface with the main facility (i.e. seismic II/I structures) are excluded from the SAP2000 Design Model. The SAP2000 Design Model captures all load cases and load combinations to be used in design in accordance with this calculation.

The concrete thicknesses and reinforcement arrangements for the basemat, slabs and walls comprising the SHINE Facility's concrete building structure are determined using the resulting structural element stresses from the SAP2000 Design Model.

2.0 INPUTS

2.1 Design Inputs

2.1.1 Dimensions

Building dimensions for the SHINE Facility used as input to this analysis are taken from SHINE Drawing No. 7290-SK-005 [3.2.1] and Preliminary General Arrangements [3.2.2 through 3.2.5].

2.1.2 Concrete Properties

- Compressive Strength, f'_c = 5,000 psi
- Modulus of Elasticity, E_c = 4,031 ksi
- Poisson's Ratio, ν = 0.17
- Density, γ_c = 150 lb/ft^3

2.1.3 Steel Reinforcement Properties

All steel reinforcement within the SHINE Facility shall be ASTM A706, Grade 60 steel with the following material properties:

- Yield Strength, f_y = 60 ksi
- Modulus of Elasticity, E_s = 29,000 ksi

2.1.4 Load Inputs

2.1.4.1 Dead Load Inputs

Dead loads associated with structural concrete are calculated using applicable dimensions and the density of concrete, as are dead loads associated with cover blocks for tank basins and trenches. Cover block weights per SHINE Drawing No. 7290-SK-005, Sheet 1 [3.2.1] are also considered. Dead loads associated with equipment and tank weights are provided per SHINE Drawing No. 7290-SK-005, Sheet 1 [3.2.1]. Dead loads associated with the overhead cranes of the SHINE Facility are discussed in the Crane Load section below.

2.1.4.2 Live Load Inputs

A distributed live load of 125 psf is applied to the mezzanine and the catwalk area of the SHINE Facility in accordance with the IBC 2009 [3.1.1] recommendation for light manufacturing use. Live loads associated with the placement of cover blocks in the cover block laydown areas are calculated using cover block weights provided per SHINE Drawing No. 7290-SK-005, Sheet 1 [3.2.1]. A distributed live load of 250 psf is applied to all other areas of the SHINE Facility in accordance with the IBC 2009 [3.1.1] recommendation for heavy manufacturing use.

2.1.4.3 Snow Load Inputs

Information regarding the calculation of snow loads is provided per ASCE 7-05 [3.1.2], Chapter 7 in accordance with IBC 2009 [3.1.1], Section 1608:

- Ground snow load, p_g = 30 psf
- Exposure factor, C_e = 0.9
- Thermal factor, C_t = 1.0
- Importance factor, I = 1.2
- Warm roof slope factor, C_s = 1.0
- Sloped roof snow loads, p_s = 30 psf
- Factor for 100 year MRI, SF = 1.22 (per Table C7.3 of Reference 3.1.2)

Building dimensions used in the calculation of snow loads are provided per SHINE Drawing No. 7290-SK-005 [3.2.1] and Preliminary General Arrangements [3.2.2 through 3.2.5].

2.1.4.4 Wind Load Inputs

Information regarding the calculation of wind loads is provided per ASCE 7-05 [3.1.2], Chapter 6 in accordance with IBC 2009 [3.1.1], Section 1609:

- Importance factor, I = 1.15
- Wind directionality factor, K_d = 0.85
- Topographic factor, K_{zt} = 1.0
- Velocity pressure exposure coefficient, K_z = 1.13
- Basic wind speed, V = 90 mph
- Internal pressure factor, GC_{pi} = (+/-)0.18
- Gust effect factor, G = 0.85
- External pressure coefficients are provided per Ref. 3.1.2, Figure 6-6.
- Factor for 100 year MRI, SF = 1.07 (per Table C6.7 of Reference 3.1.2)

Building dimensions used in the calculation of wind loads are provided per SHINE Drawing No. 7290-SK-005 [3.2.1] and Preliminary General Arrangements [3.2.2 through 3.2.5].

2.1.4.5 Earthquake Load Inputs

Time-history inputs are taken from Reference 3.3.19. Loads are applied in the following manner according to NRC Standard Review Plan 3.7.2 [3.1.22]:

- Dead Load ………………100%
- Live Load…………………25%
- Snow Load……………….75%

- Parked Crane Load…….100%

2.1.4.6 Rain Load Inputs

The SHINE Facility's sloped roof and building configuration preclude accumulation of rainwater; therefore, rain loads are not considered in this evaluation.

2.1.4.7 Crane Load Inputs

Dimensions and weights associated with the components of Crane OC-0001 are estimated based on the Whiting Crane Handbook, Page 64 [3.3.1]. Dimensions and weights associated with the components of Crane OC-0002 and Crane OC-0003 are estimated based on Page 46 of the same handbook. The spans of the three, pendant-operated, overhead cranes in the SHINE Facility are taken per SHINE Drawing No. 7290-SK-005, Sheet 9 [3.2.1]:

Table 2.1-1 – Overhead Bridge Crane Spans

Crane	OC-0001	OC-0002	OC-0003
Span (ft.)	57	102.3	48.3

The required capacities for the three overhead cranes in the SHINE Facility are taken per RFI-SL-2013-0002 [3.3.8]:

Table 2.1-2 – Overhead Bridge Crane Capacities

Crane	OC-0001	OC-0002	OC-0003
Capacity (ton)	75	40	40

Live load impact force factors are obtained from Section 4.10 of ASCE 7-05 [3.1.2]:

- Vertical impact force factor, 10%
- Lateral force factor, 20%
- Longitudinal force factor, 10%

Crane speeds are estimated based on Page 13 of CMAA 77 [3.1.15]:

- Bridge load rated speed, V_B = 50 ft/min

Information regarding crane stop force calculations is provided in Reference 3.3.20:

- Stopping spring stroke, T = 0.15 ft.

2.1.4.8 Soil Spring Inputs

Site specific soil properties for the SHINE Facility are provided in the Preliminary Geotechnical Engineering Report [3.3.3]. Building dimensions used in the calculation of static soil springs are taken per SHINE Drawing No. 7290-SK-005 [3.2.1]. Dynamic soil springs are determined using ASCE 4-98 [3.1.4], Figure 3.3-3.

2.1.4.9 Soil Pressure Load Inputs

Sub-grade wall depth is based on SHINE RCA Layout, Drawing No. 7290-SK-005 [3.2.1].

- Friction angle of 34º per Reference 3.3.3
- Soil dry density value of 118 pcf per Reference 3.3.3
- Uniformly distributed live surcharge load of 250 psf per Table 4-1 of ASCE 7-05 [3.1.2]
- Horizontal ground acceleration of 0.20 g per Reference 3.3.2

Site-specific soil properties are provided in the Golder Report [3.3.3]

2.1.4.10 Fluid Load Inputs

Tank basin dimensions used in the calculation of fluid loads are taken per SHINE Drawing No. 7290-SK-005 [3.2.1] and Preliminary General Arrangements [3.2.2 through 3.2.5].

- Maximum water depth, $h = 12$ ft
- Weight of water, $\gamma_w = 62.4$ lb/ft^3

2.1.4.11 Flood Load Inputs

The topology of the SHINE Facility site precludes accumulation of flood water; therefore, flood loads are not considered in this calculation.

2.1.4.12 Tornado Load Inputs

Information regarding the calculation of tornado wind loads is provided per RG 1.76 [3.1.19] and SRP 3.3.2 [3.1.18]:

- Importance factor, $I = 1.15$
- Wind directionality factor, $K_d = 1.0$
- Topographic factor, $K_{zt} = 1.0$
- Velocity pressure exposure coefficient, $K_z = 0.87$
- Tornado wind speed, $V = 230$ mph
- Gust effect factor, $G = 1$

Building dimensions used in the calculation of tornado wind loads are provided per SHINE Drawing No. 7290-SK-005 [3.2.1] and Preliminary General Arrangements [3.2.2 through 3.2.5].

Tornado missile spectrum is provided per NRC Regulatory Guide 1.76 [3.1.19].

2.1.4.13 Thermal Load Inputs

Table A.1 of Reference 3.3.16 provides outside design conditions for Madison, Wisconsin (in close proximity to Janesville, Wisconsin):

- Design dry-bulb temperature in winter, -7 ºF
- Design dry-bulb temperature in summer, 88 ºF
- Mean daily temperature range, 22 ºF

2.1.4.14 Accidental Eccentricity Load Inputs

Inputs to the accidental eccentricity load analysis are nodal forces calculated from accelerations out of SAP2000; they are provided in Attachment H.

2.1.5 Design Model

All loads applied to the SAP2000 Design Model are calculated as described in Sections 4.3 through 4.16 and the associated attachments. Section 4.2 of this calculation defines load combinations applied to the SAP2000 Design Model.

2.2 Assumptions

This calculation is considered unverified since Ref. 3.3.21 is used as input and is also unverified. Any other minor assumptions are described within the body of the calculation.

3.0 REFERENCES

3.1 Codes and Standards

3.1.1 International Code Council, *International Building Code*, 2009.

3.1.2 Structural Engineering Institute of the American Society of Civil Engineers, *Minimum Design Loads for Buildings and Other Structures* (ASCE 7-05). Reston, VA: American Society of Civil Engineers (ASCE), 2006

3.1.3 Wisconsin Legislative Documents, *Buildings and Structures* (Chapter SPS 362). December, 2011.

3.1.4 American Society of Civil Engineers, *Seismic Analysis of Safety-Related Nuclear Structures and Commentary* (ASCE 4-98). Reston, VA: American Society of Civil Engineers, 2000.

3.1.5 Structural Engineering Institute of the American Society of Civil Engineers, *Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities* (ASCE/SEI 43-05). Reston, VA. 2005.

3.1.6 Not Used.

3.1.7 American Institute of Steel Construction, *Steel Construction Manual, 13th Edition.* (AISC 360-05). 2006.

3.1.8 Not Used.

3.1.9 American Concrete Institute, *Core Requirements for Nuclear Safety-Related Concrete Structures* (ACI 349-06). 2007.

3.1.10 U.S. Nuclear Regulatory Commission, *Design Response Spectra for Seismic Design of Nuclear Power Plants, Revision 1* (RG 1.60). 1973.

3.1.11 U.S. Nuclear Regulatory Commission, *Combining Modal Responses and Spatial Components in Seismic Response Analysis,* Revision 2 (RG 1.92). 2006.

3.1.12 Not Used.

3.1.13 Not Used.

3.1.14 Not Used.

3.1.15 Crane Manufacturers Association of America, *Specification for Electric Overhead Traveling Cranes* (CMAA 70).

3.1.16 Not Used.

3.1.17 ASTM International*, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement* (ASTM A706/A716M-09b), May 1. 2008.

3.1.18 U.S. Nuclear Regulatory Commission, *Tornado Loads* (SRP 3.3.2). 2007.

3.1.19 U.S. Nuclear Regulatory Commission, *Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants, Revision 1* (RG 1.76). 2007.

3.1.20 American Concrete Institute, *Reinforced Concrete Design for Thermal Effects on Nuclear Power Plant Structures* (349.1R-07). 2007.

3.1.21 U.S. Nuclear Regulatory Commission, *Foundations* (SRP 3.8.5). 2010.

3.1.22 U.S. Nuclear Regulatory Commission, *Seismic System Analysis* (SRP 3.7.2). 2007.

3.2 Drawings

3.2.1 SHINE Medical Technologies, *SHINE RCA Layout*, Drawing No. 7290-SK-005

3.2.2 SHINE Medical Technologies, *Production Building Subfloor Plans Preliminary Arrangement*, Rev. 2A. Drawing No. SA-11001.

3.2.3 SHINE Medical Technologies, *Production Building Floor Plan Preliminary Arrangement*, Rev. 2A. Drawing No. SA-21001.

3.2.4 SHINE Medical Technologies, *Production Building Elevations Preliminary Arrangement*, Rev. 2A. Drawing No. SA-22001.

3.2.5 SHINE Medical Technologies, *Production Building Elevations Preliminary Arrangement,* Rev. 2A. Drawing No. SA-23001.

3.3 Other References

3.3.1 Whiting Corporation, *Whiting Crane Handbook* (4th Edition), 1979.

3.3.2 Sargent & Lundy Report SL-011476, *Seismic Analysis Criteria for Shine Medical Isotope Production Facility*, Rev. 0, October 1, 2012.

3.3.3 Golder Report 6, *Preliminary Geotechnical Engineering Report Janesville, WI*, Rev. 3, August 3, 2012, Project Number 113-81051.

3.3.4 EERL 73-05, Wood, John. *Earthquake-Induced Soil Pressures On Structures, Earthquake Engineering Research Library, California Institute of Technology*, Pasadena, California, 1973.

3.3.5 TID-7024, *Nuclear Reactors and Earthquakes*, 1963, United States Atomic Energy Commission

3.3.6 NAVFAC 7.2, *Foundations & Earth Structures, Design Manual 7.02*, September 1986, Naval Facilities Engineering Command

3.3.7 SHINE Medical Technologies, RFI No. SL-2012-0140, Rev. 0

3.3.8 SHINE Medical Technologies, RFI No. SL-2013-0002, Rev. 03.

3.3.9 Winterkorn and Fang, *Foundation Engineering Handbook*, Van Nostrand Reinhold, 1975

3.3.10 Ingold, T.S., *Retaining Wall Performance During Backfilling, Journal of Geotechnical Engineering Division*, Vol. 105, No. 5, May 1979, pp 613-626.

3.3.11 U.S. Army Corps pf Engineering, EM-1110-5-2502, *Forces on Wall, Chapter 3*, September 29, 1989.

3.3.12 Simiu, E. and Scanlan, R. *Wind Effects on Structures*, Third Edition. 1996.

3.3.13 Biggs, J. *Introduction to Structural Dynamics*. 1964.

3.3.14 American Society of Civil Engineers. *Second ASCE Conference on Civil Engineering and Nuclear Power*, Vol. V: Report of the ASCE Committee on Impactive and Impulsive Loads. September 15 - 17, 1980.

3.3.15 Department of the Army. TM 5-855-1 *Technical Manual: Fundamentals of Protective Design for Conventional Weapons*. 1986.

3.3.16 Benjamin Stein and John S. Reynolds, *Mechanical and Electrical Equipment for Buildings*, 8th Edition.

3.3.17 Caterpillar Inc., *CP56 Vibratory Soil Compactor Specifications,* retrieved on February 27, 2013 from www.cat.com.

3.3.18 PCA, *PCA Engineering Bulletin: Analysis and Design of Small Reinforced Concrete Buildings for Earthquake Forces*, Chapter 3 – Distribution of Lateral Loads. 1974.

3.3.19 SHINE Medical Technologies, *Development of Response Spectra Consistent Time Histories for SHINE*, Rev, 0, 2012.

3.3.20 David T. Ricker, *Tips for Avoiding Crane Runway Problems*, AISC Journal, 1982.

3.3.21 Sargent & Lundy Calculation 2013-02413, *Soil-Structure Interaction Analysis of Shine Medical Isotope Production Facility for Design Seismic Event*, Rev. 0, April 2, 2013.

3.3.22 Sargent & Lundy Calculation 2013-01531, *Evaluation of Local Probable Maximum Precipitation (PMP)*, Rev. 0A, February 4, 2013.

4.0 METHODOLOGY AND ACCEPTANCE CRITERIA

4.1 Design Model Description

Complete descriptions of the methods used to create the SAP2000 Design Model of the SHINE Facility's main structure are presented herein. This section consists of an overview of modeling techniques and a discussion of properties assigned to columns, beams, walls, slabs, and trusses.

4.1.1 Modeling Techniques

A three-dimensional finite element model of the SHINE Facility structure is created using the computer program SAP2000 Version 14.1.0. The model utilizes shell elements to represent slabs and walls, and frame elements to represent columns and beams. Elements are modeled at the geometric centerline of the structural member they represent with the following exceptions:

- The basemat centerline is modeled at its actual top-of-slab elevation.
- The below grade mat sections are modeled at their bottom of slab elevation to maintain a uniform below grade mat mesh elevation.
- Minor adjustments are made to the dimensions and locations of the storage cells and wall openings to maximize mesh regularity in the model.
- Roof truss locations are adjusted to align with the roof shell element mesh.
- Some of the sub-grade trenches running throughout the facility are not explicitly modeled; however, the SAP2000 Design Model does incorporate concrete trench cover loads. The modeled trenches are modeled at the same location as the irradiation and storage cells to maintain a uniform below grade mat mesh elevation.

4.1.2 Wall Openings

Most of the door openings indicated on the GA drawings are included in the SAP2000 Design Model. Subtle adjustments are made to dimensions and/or locations of openings to maximize mesh regularity in the model. These adjustments are addressed on a case by case basis, and their effect on the overall structural response is negligible.

4.1.3 SAP2000 Design Model Coordinates

Table 4.1-1 summarizes the coordinate system used in the SAP2000 Design Model.

Table 4.1-1 – SAP2000 Model Coordinate Systems

Principal Direction	SAP2000 Model Coordinates
South	Positive X
East	Positive Y
Up	Positive Z

4.1.4 Element Material and Section Properties

4.1.4.1 Columns and Beams

All columns, beams, and trusses in the SAP2000 Design Model are represented by frame elements, each of which is assigned the mass, stiffness, and geometric properties of the section being represented.

Columns and beams are divided into a mesh to match the mesh of adjacent wall and slab shell elements, or are divided into a smaller mesh to capture bending effects. The locations of frames representing the columns and beams are adjusted to maximize mesh regularity in the model.

4.1.4.2 Walls

Walls in the SAP2000 Design Model are modeled using thick shell elements, which are assigned the mass, stiffness, and geometric properties of the wall represented. The concrete self-weight is considered and calculated automatically by the program. Concrete properties are discussed in Section 2.1.2.

4.1.4.3 Slabs

Slabs in the SAP2000 Design Model are modeled using shell elements, which are assigned the mass, stiffness, and geometric properties of the slab represented. Concrete unit weight properties are discussed in Section 2.1.2.

4.1.5 Additional Mass Sources

Mass is taken from the following load cases in the model for the time history seismic analysis:

1) 100% Dead Load
2) 25% Live Load
3) 75% Uniform Snow Load

Additional joint masses are applied to the model to represent the following:

4) Door masses
5) Crane masses
6) Hydrodynamic masses

4.1.6 SAP2000 Design Model General Description and Renderings

The SHINE main facility is a box type shear wall system of reinforced concrete with reinforced concrete floor slabs. The facility main floor is also populated with below grade reinforced concrete cells. Views of the SAP2000 Design Model are provided in Figure 4.1-1 through Figure 4.1-6, to show the finite element mesh and general layout of the structure.

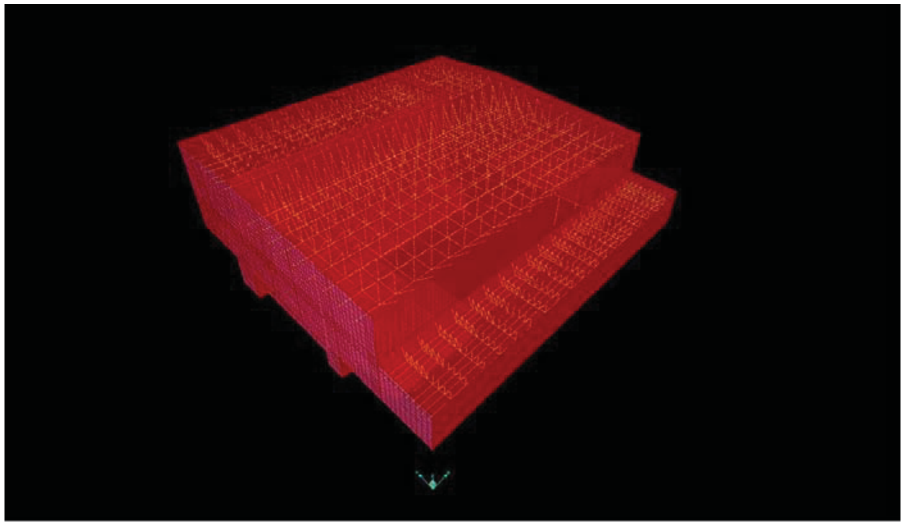


Figure 4.1-1 – Exterior view of the Design Model

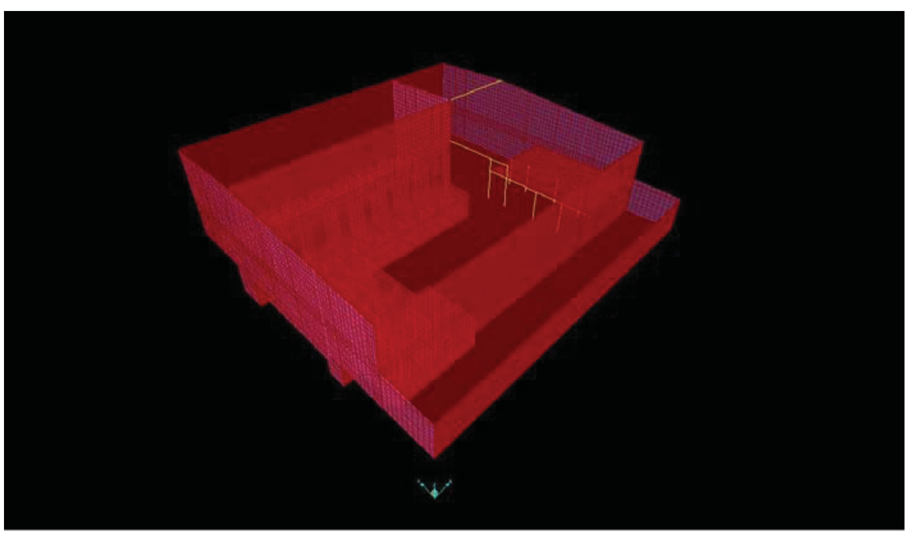


Figure 4.1-2 – View of the Design Model with Roof and Roof Trusses Removed

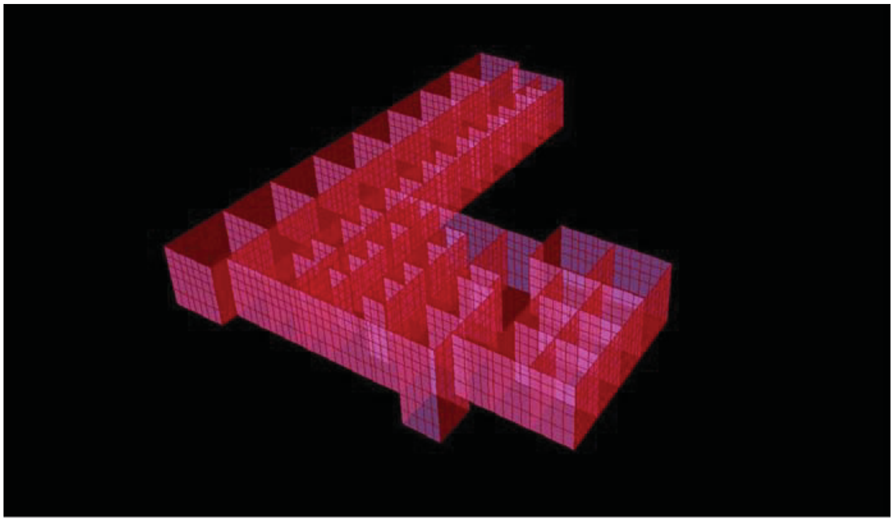


Figure 4.1-3 – View of Below Grade Sections in the Design Model

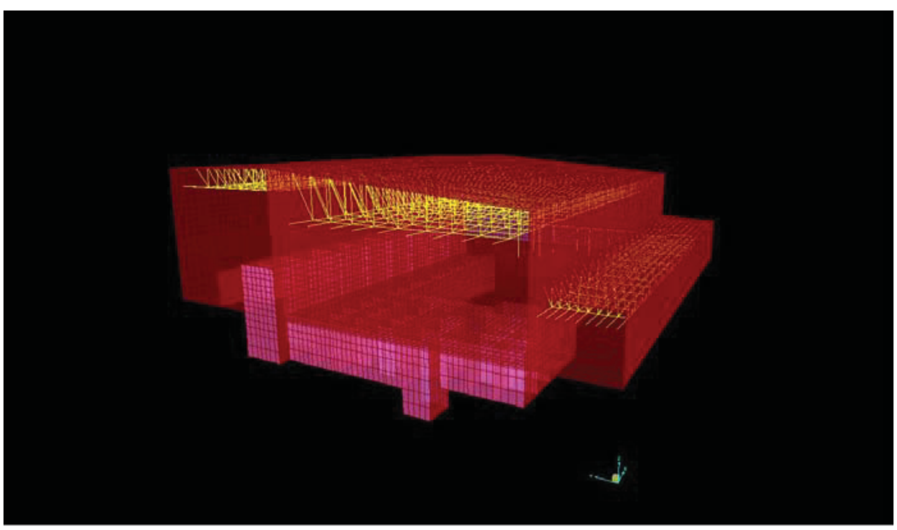


Figure 4.1-4 – 3D View w/ Exterior Wall Removed 1

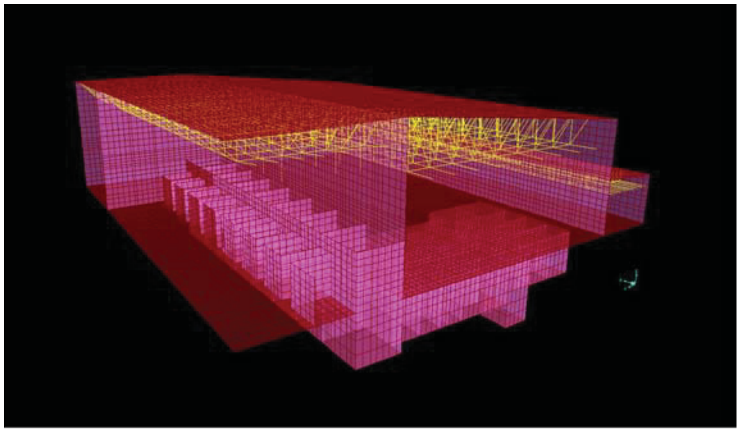


Figure 4.1-5 – 3D View of the Design Model with Exterior Wall Removed 2

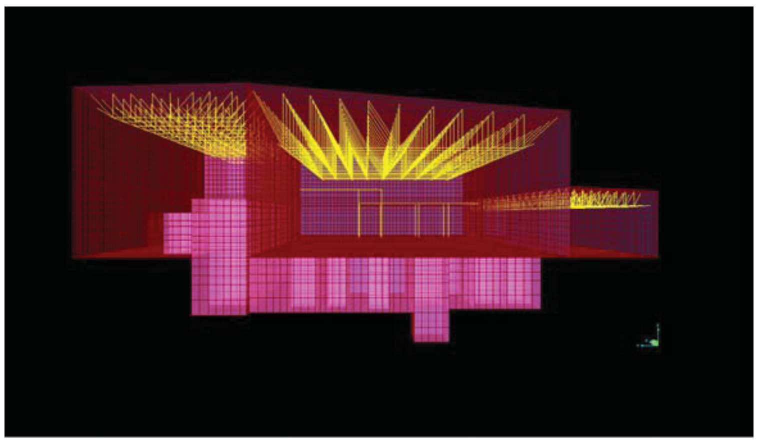


Figure 4.1-6 – Side View of the Design Model with Exterior Wall Removed

Table 4.1-2 describes the section thicknesses used in the model.

Table 4.1-2 – Section Thicknesses

Section	Thickness
Exterior Walls	2ft
Above Grade Interior Walls	2ft
Basemat	Varies 2ft-4ft
Irradiation Cell Walls and Slab	6ft
TSV-Off-Gas Cell Walls and Slab	4ft
Other Storage Cell Walls and Slab	3ft
Roof Slab	2ft
Mezzanine Slab	1ft

The roof of the facility is supported by a steel truss system. There are three (3) different truss sizes used in the model. Trusses are spaced at 10 ft. on center; however, they are constructed at approximate locations in the model. This is done to align the truss system with the roof shell element mesh. Figure 4.1-7 illustrates the truss locations and Table 4.1-3 describes the steel sections used for each truss.

Table 4.1-3 – Steel Sections for Trusses

Truss	Top Chords	Bottom Chords	Verticals	Diagonals	Horizontals (Out of Plane)
1	WT12x81	WT12x81	2L5x5x1/2	2L5x5x1/2	L8x8x5/8
2	W14x68	W14x68	2L8x8x5/8	2L5x5x3/4	L8x8x5/8
3	WT12x81	WT12x81	2L5x5x1/2	2L5x5x1/2	L8x8x5/8

A preliminary plate girder design supporting the roof trusses is modeled to accurately represent the distribution of loads from the roof trusses to the wall elements. The plate girder is preliminarily sized with the following properties:

- Area = 115 in^2
- Weak-Axis Moment of Inertia = 8,189 in^4
- Strong-Axis Moment of Inertia = 224,024 in^4

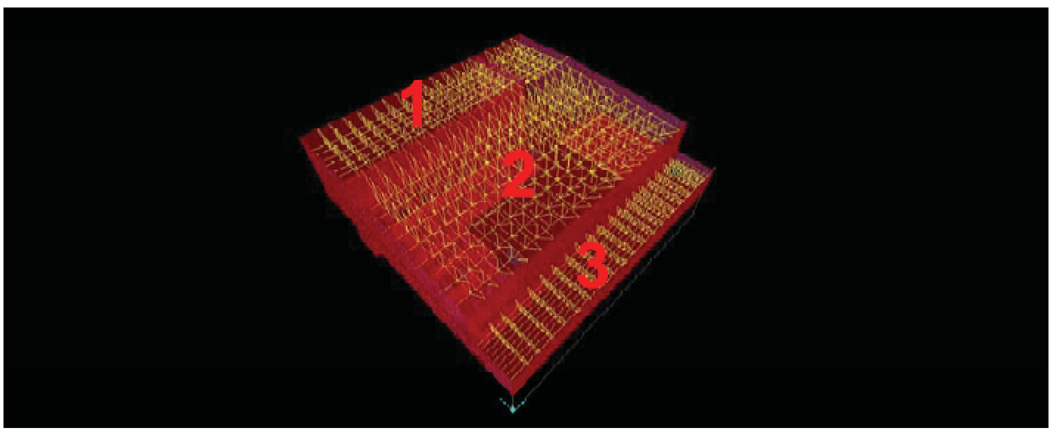


Figure 4.1-7 – Roof Truss Locations in the Design Model

4.1.7 Model Variations

Six versions of the SAP2000 Design Model are used to arrive at the final design forces. The variations in the model consist of different base restraint and mass conditions. The different models are as follows.

4.1.7.1 Accidental Eccentricity Model

The accidental eccentricity model is used to calculate the accidental eccentricity forces. This model serves as accidental eccentricity load input to the dynamic force model. The load case "SEISMICCRANE" is used for the crane mass source. This load case only considers the dead loads of the 3 cranes in their respective parked positions. This model uses a fixed base restraint condition. The model accepts a time history input.

4.1.7.2 Stability Model (2 Models)

The stability model is used to calculate base shear and overturning moments for the global stability analysis. The global axes are positioned at the critical edges of the structure for

overturning. The mass sources are the same as the accidental eccentricity model, and a fixed base restraint condition is used. The model accepts a time history input. Refer to Attachment I for a detailed stability evaluation of the SHINE facility.

4.1.7.3 Dynamic Force Time History (DFTH) Model

The DFTH model accepts time history input and a modal analysis is run. The result is seismic forces that are used as input to the dynamic force model. This model utilizes the crane masses applied at each of the 10 postulated crane positions. A fixed base restraint condition is also used in the model.

4.1.7.4 Equivalent Static (Dynamic) Model

The Dynamic Model is used to analyze all dynamic load cases. This model uses dynamic soil springs as a base restraint. This model accepts input from the accidental eccentricity and DFTH model.

4.1.7.5 Static Force Model

The static force model is used to analyze all static load cases. This model uses static soil springs as a base restraint.

Output from the dynamic and static force models is combined in order to attain final design forces. Table 4.1-4 summarizes all the model variations.

Table 4.1-4 – Model Variations

Model	Used For Input or Design	Base Restraint	Crane Mass Used
AE	Input	Fixed Base	"SEISMICCRANE"
Stability	Input	Fixed Base	"SEISMICCRANE"
DFTH	Input	Fixed Base	Mass 1-10
Dynamic	Design	Dynamic Soil Springs	None
Static	Design	Static Soil Springs	None

4.1.8 Model Constraints

The SAP2000 Design Model does not contain automatic edge constraints. The mesh between all shell elements in the model match node for node. For example, the nodes of a meshed slab coincided exactly with the nodes of a meshed wall along any line of intersection between the two components. The model contains no other types of body constraints, such as rigid links, that constrain joints to move together as a three-dimensional rigid body.

4.1.9 General Load Modeling Techniques

The following sections provide an overview of the load modeling techniques and a discussion on load combinations.

All loads in the SAP2000 Design Model have been assigned as area loads or joint loads. Area loads are used to apply uniformly distributed forces to the mid-surfaces of area objects. Joint loads are used to apply concentrated point loads to nodes as a force load, with specific forces, moments and directions to best match loading conditions. Joint patterns are used to apply area loads which aren't uniform, for a specified spatial distribution of forces that act upon the structure. The direction of the loading has been specified in a fixed global coordinate system.

Any area loads applied to the roof of the facility are applied using a slightly different method. The facility's roof is supported by a system of trusses; thus between trusses, the roof will behave as a one way slab. To replicate this behavior in the model, roof area loads are applied using the program specific "Uniform to Frame" command; this ensures the loads are transferred to the connected frame elements.

4.1.10 Load Cases

The following sections define the various load cases applied to the SAP2000 Design Model. Refer to Section 4.3 through Section 4.16 for detailed information regarding loading criteria. Table 4.1-5 summarizes all load cases, associated notations, and applied directions for the loads used in the SAP2000 Design Model.

Table 4.1-5 – SAP2000 Design Model Load Cases

SAP2000 Design Model Load Cases

SELFWEIGHT	Modeled Element's Self Weight Dead Load	Z-Dir
DEAD	Dead Load	Z-Dir
LIVE	Live Load	Z-Dir
D	Dead Load (all dead cases)	Z-Dir
L	Live Load (all live cases)	Z-Dir
F	Fluid Static Load	X-Dir, Y-Dir, and Z-Dir
ROOF LIVE	Roof Live Load	Z-Dir
S1	Snow Load Pattern 1	Z-Dir
S2	Snow Load Pattern 2	Z-Dir
S3	Snow Load Pattern 3	Z-Dir
DOORDEAD	Door Dead Load	Z-Dir
LIVELOADDOOR	Door Live Load	Z-Dir
MISCDEAD	Misc Dead Load	Z-Dir
H.rest.lat	At-rest Lateral Soil Load	X-Dir and Y-Dir
Hsur+X	Static Surcharge Soil Load	Positive X-Dir
Hsur-X	Static Surcharge Soil Load	Negative X-Dir
Hsur+Y	Static Surcharge Soil Load	Positive Y-Dir
Hsur-Y	Static Surcharge Soil Load	Negative Y-Dir
Hdyn+X_e	ASCE 4 Elastic Solution Soil Load	Positive X-Dir
Hdyn-X_e	ASCE 4 Elastic Solution Soil Load	Negative X-Dir
Hdyn+Y_e	ASCE 4 Elastic Solution Soil Load	Positive Y-Dir
Hdyn-Y_e	ASCE 4 Elastic Solution Soil Load	Negative Y-Dir
Hdynsur+X	Dynamic Surcharge Soil Load	Positive X-Dir
Hdynsur-X	Dynamic Surcharge Soil Load	Negative X-Dir
Hdynsur+Y	Dynamic Surcharge Soil Load	Positive Y-Dir
Hdynsur-Y	Dynamic Surcharge Soil Load	Negative Y-Dir
H.comp	Soil Compaction Load	X-Dir and Y-Dir
F.Stat	Hydrostatic Load	X-Dir, Y-Dir, and Z-Dir
W001	Wind Load	Positive X-Dir and Positive Z-Dir
W002	Wind Load	Negative X-Dir
W003	Wind Load	Negative Y-Dir and Positive Z-Dir
W004	Wind Load	Positive Y-Dir
W005	Wind Load	Positive X-Dir
W006	Wind Load	Negative X-Dir and Positive Z-Dir
W007	Wind Load	Negative Y-Dir
W008	Wind Load	Positive Y-Dir and Positive Z-Dir
W009	Wind Load	X-Dir and Y-Dir
W010	Wind Load	X-Dir, Y-Dir, and Z-Dir
W011	Wind Load	X-Dir, Y-Dir, and Z-Dir
W012	Wind Load	X-Dir and Y-Dir
W013	Wind Load	X-Dir and Y-Dir
W014	Wind Load	X-Dir and Y-Dir
W015	Wind Load	X-Dir and Y-Dir
W016	Wind Load	X-Dir, Y-Dir, and Z-Dir
W017	Tornado Missile, Pipe	X-Dir and Y-Dir
W018	Tornado Missile, Pipe	X-Dir and Y-Dir
W019	Tornado Missile, Pipe	X-Dir and Y-Dir
W020	Tornado Missile, Pipe	X-Dir and Y-Dir
W021	Tornado Missile, Pipe	X-Dir and Y-Dir
W022	Tornado Missile, Pipe	X-Dir and Y-Dir
W023	Tornado Missile, Pipe	X-Dir and Y-Dir
W024	Tornado Missile, Pipe	X-Dir and Y-Dir
W025	Tornado Missile, Car	X-Dir and Y-Dir
W026	Tornado Missile, Car	X-Dir and Y-Dir
W027	Tornado Missile, Car	X-Dir and Y-Dir
W028	Tornado Missile, Car	X-Dir and Y-Dir
W029	Tornado Missile, Car	X-Dir and Y-Dir
W030	Tornado Missile, Car	X-Dir and Y-Dir
W031	Tornado Missile, Car	X-Dir and Y-Dir
W032	Tornado Missile, Car	X-Dir and Y-Dir
W033	Tornado Missile, Pipe and Car	Negative Z-Dir

Table 4.1-5 – (Continued)

Crane1Live_Long	Crane Live Load Position 1	Positive X-Dir
Crane1Live_Lat	Crane Live Load Position 1	Positive Y-Dir
Crane1Live_Vert	Crane Live Load Position 1	Negative Z-Dir
Crane2Live_Long	Crane Live Load Position 2	Positive X-Dir
Crane2Live_Lat	Crane Live Load Position 2	Positive Y-Dir
Crane2Live_Vert	Crane Live Load Position 2	Negative Z-Dir
Crane3Live_Long	Crane Live Load Position 3	Positive X-Dir
Crane3Live_Lat	Crane Live Load Position 3	Positive Y-Dir
Crane3Live_Vert	Crane Live Load Position 3	Negative Z-Dir
Crane4Live_Long	Crane Live Load Position 4	Positive X-Dir
Crane4Live_Lat	Crane Live Load Position 4	Positive Y-Dir
Crane4Live_Vert	Crane Live Load Position 4	Negative Z-Dir
Crane5Live_Long	Crane Live Load Position 5	Positive X-Dir
Crane5Live_Lat	Crane Live Load Position 5	Positive Y-Dir
Crane5Live_Vert	Crane Live Load Position 5	Negative Z-Dir
Crane6Live_Long	Crane Live Load Position 6	Positive X-Dir
Crane6Live_Lat	Crane Live Load Position 6	Positive Y-Dir
Crane6Live_Vert	Crane Live Load Position 6	Negative Z-Dir
Crane7Live_Long	Crane Live Load Position 7	Positive Y-Dir
Crane7Live_Lat	Crane Live Load Position 7	Positive X-Dir
Crane7Live_Vert	Crane Live Load Position 7	Negative Z-Dir
Crane8Live_Long	Crane Live Load Position 8	Positive Y-Dir
Crane8Live_Lat	Crane Live Load Position 8	Positive X-Dir
Crane8Live_Vert	Crane Live Load Position 8	Negative Z-Dir
Crane9Live_Long	Crane Live Load Position 9	Positive Y-Dir
Crane9Live_Lat	Crane Live Load Position 9	Positive X-Dir
Crane9Live_Vert	Crane Live Load Position 9	Negative Z-Dir
Crane10Live_Long	Crane Live Load Position 10	Positive Y-Dir
Crane10Live_Lat	Crane Live Load Position 10	Positive X-Dir
Crane10Live_Vert	Crane Live Load Position 10	Negative Z-Dir
Crane1Stop	Crane Stop Load Position 1	Negative X-Dir
Crane3Stop	Crane Stop Load Position 3	Positive X-Dir
Crane4Stop	Crane Stop Load Position 4	Negative X-Dir
Crane6Stop	Crane Stop Load Position 6	Positive X-Dir
Crane7Stop	Crane Stop Load Position 7	Positive Y-Dir
Crane10Stop	Crane Stop Load Position 10	Negative Y-Dir
SEISMICCRANE	Crane Parked Load Position 1,4,7	Negative Z-Dir
AE	Accidental Eccentricity Load	X-Dir and Y-Dir
H1	Time History	X-Dir
H2	Time History	Y-Dir
V	Time History	Z-Dir
MODAL	Modal	X-Dir, Y-Dir, and Z-Dir
Xx	Accel due to Excitation in X-Dir	X-Dir
Xy	Accel due to Excitation in Y-Dir	X-Dir
Xz	Accel due to Excitation in Z-Dir	X-Dir
Yx	Accel due to Excitation in X-Dir	Y-Dir
Yy	Accel due to Excitation in Y-Dir	Y-Dir
Yz	Accel due to Excitation in Z-Dir	Y-Dir
Zx	Accel due to Excitation in X-Dir	Z-Dir
Zy	Accel due to Excitation in Y-Dir	Z-Dir
Zz	Accel due to Excitation in Z-Dir	Z-Dir

4.1.10.1 Dead Loads in Design Model

SAP2000 automatically calculates the self-weight of the structure based on defined material properties. Thus, the only dead loads applied to the SAP2000 Design Model are superimposed dead loads to account for commodities and specific equipment loading. All superimposed dead loads are calculated or given in Section 4.3. Smeared uniform loads are applied over appropriate facility areas to represent the equipment in those locations.

The storage cells and trench located on the main floor of the facility are enclosed with concrete cover blocks. The self weight of each cover block is applied as a series of joint loads around the

perimeter of the corresponding cell or trench (because the storage cells are modeled as openings and the trench is not modeled).

4.1.10.2 Live Loads in Design Model

All live loads are calculated or given in Section 4.4. Uniform loads are applied over appropriate facility areas to represent the live load requirements in those locations. Joint loads are applied around the perimeter of each of the storage cells to represent the live load over the cover blocks.

4.1.10.3 Snow Loads in Design Model

The snow loads, as calculated and illustrated in Section 4.5, are applied to all applicable roof areas. Snow loads are applied in three different cases to capture different distributions of snow. All snow is applied as uniform area loads distributed one way to the roof trusses, as described in Section 4.5 . A stair step pattern, as seen in Figure 4.1-8, is conservatively used to represent triangular load distributions. Joint patterns are typically used to apply triangular distributions; however, SAP2000 does not provide the option to use them while ensuring one way slab behavior.

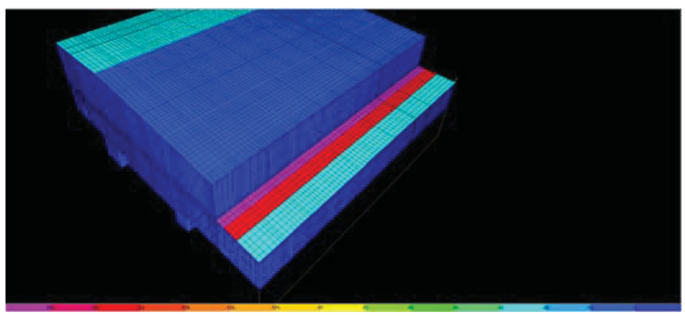


Figure 4.1-8 – Snow load step pattern

4.1.10.4 Static Lateral Soil Pressure Loads in Design Model

Static lateral soil pressure loads are applied to all below grade walls in the SAP2000 Design Model using joint pattern loading. Refer to Section 4.11 for the calculation of soil loads. The use of joint pattern loading matches the calculated values since these loads are linear.

4.1.10.5 Dynamic Lateral Soil Pressure Loads in Design Model

Dynamic lateral soil pressure loads are applied to the SAP2000 Design Model using joint pattern loading. Refer to Section 4.11 for the calculation of soil loads. The use of joint pattern loading matches the calculated values since these loads are linear.

4.1.10.6 Hydrostatic Pressure Loads in Design Model

Hydrostatic pressure loads are applied to the SAP2000 Design Model using joint pattern loading. Refer to Section 4.12 for the calculation of hydrostatic loads. The use of joint pattern loading matches the calculated values since these loads are linear.

4.1.10.7 Wind Loads in Design Model

Wind loads are applied to the SAP2000 Design Model using uniform area loading. Each wind case is calculated and illustrated in Section 4.6. Wind loads are applied only to the above grade sections of the exterior walls. Due to the limitations of SAP2000's "Uniform to Frame" application method, the roof wind loads are applied straight downward in the –Z direction rather than perpendicular to the element face of the sloped roof. The degree of slope in the roof is small enough to consider the difference in loading negligible.

4.1.10.8 Tornado Missile Loads in Design Model

Tornado missile loads are applied to the SAP2000 Design Model using joint loading on each case's respective exterior wall. Each case is calculated and illustrated in Attachment B.

4.1.10.9 Crane Loads in Design Model

Crane loads are applied to the SAP2000 Design Model using joint loading. The joint loads are applied in the 10 postulated crane positions shown in Figure 4.1-9.

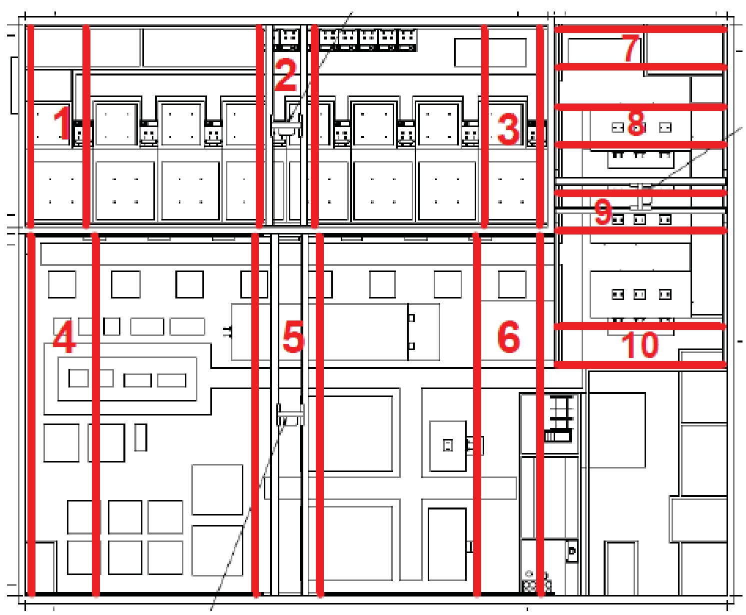


Figure 4.1-9 – Crane Positions Considered in the Design Model

4.1.10.10 Seismic Loads in Design Model

Seismic loads are accounted for in the SAP2000 Design Model by applying nodal acceleration values obtained from the earthquake analysis as equivalent static loads to account for earthquake effects. The equivalent static loads based on the accelerations from the Earthquake Model are scaled by the factors shown in Attachment AG so that the forces will envelope the results of the SASSI analysis. Refer to Section 4.7 for nodal accelerations and equivalent static loads.

4.1.10.11 Accidental Eccentricity Loads in Design Model

The torsional moment due to accidental eccentricity is calculated at the roof levels and applied as joint loads to all nodes at the shear wall to roof intersection. Refer to Section 4.16 for the calculation of accidental eccentricity loads.

4.2 Load Combinations for Concrete Members

4.2.1 Primary Load Combinations

Load combinations used for member strength evaluation are in compliance with the applicable requirements of Section 9.2 of ACI 349-06 [3.1.9].

(9-1) $U = 1.4(D + F + R_o) + T_o$

(9-2) $U = 1.2(D + F + T_o + R_o) + 1.6(L + H) + 1.4C_{cr} + 0.5(L_r \text{ or } S \text{ or } R)$

(9-3) $U = 1.2(D + F + R_o) + 0.8(L + H) + 1.4C_{cr} + 1.6(L_r \text{ or } S \text{ or } R)$

(9-4) $U = 1.2(D + F + R_o) + 1.6(L + H + E_o)$

(9-5) $U = 1.2(D + F + R_o) + 1.6(L + H + W)$

(9-6) $U = D + F + 0.8L + C_{cr} + H + T_o + R_o + E_{ss}$

(9-7) $U = D + F + 0.8L + H + T_o + R_o + W_t$

(9-8) $U = D + F + 0.8L + C_{cr} + H + (T_a + R_a + 1.2P_a)$

(9-9) $U = D + F + 0.8L + H + (T_a + R_a + P_a)+(Y_r + Y_j + Y_m)+ E_{ss}$

Where:

D	=	Dead loads
F	=	Loads due to weight and pressure of fluids
R_o	=	Piping and equipment reactions excluding dead load and earthquake reactions
T_o	=	Internal moments and forces caused by temperature distributions
L	=	Live loads
H	=	Loads due to weight and pressure of soil
C_{cr}	=	Rated capacity of crane including maximum wheel loads and vertical, lateral, and longitudinal forces induced by moving crane
L_r	=	Roof live load
S	=	Snow load
R	=	Rain load

E_o	=	Load effects of operating basis earthquake
W	=	Operating basis wind load
E_{ss}	=	Load effects of safe shutdown earthquake
W_t	=	Loads generated by the design basis tornado
T_a	=	Internal moments and forces caused by temperature distributions occurring as a result of accident conditions generated by a postulated pipe break
R_a	=	Piping and equipment reactions under thermal conditions generated by a postulated pipe break
P_a	=	Differential pressure load generated by a postulated pipe break accident
Y_r	=	Load generated by the reaction of the broken pipe during a postulated break
Y_j	=	Jet impingement load generated by a postulated pipe break
Y_m	=	Missile impact load generated by a postulated pipe break, such as pipe whip

The load combinations above shall also be evaluated with 0.9D to assess the adverse effects of reduced dead load. Also, for all load combinations, where any load reduces the effects of other loads, the corresponding factor for that load shall be taken as 0.9 of the assigned factor, if it can be demonstrated that the load is always present or occurs simultaneously with the other loads. Otherwise, the coefficient for that load shall be taken as zero.

The required strength of the walls, slabs, and foundation mat of the building shall be at least equal to the greatest of the following:

1) $U = 1.4(D + F)$
2) $U = 1.2(D + F) + 1.6(L + H) + 1.4C_{cr} + 0.5(S)$
3) $U = 1.2(D + F) + 0.8(L + H) + 1.4C_{cr} + 1.6(S)$
4) $U = 1.2(D + F) + 1.6(L + H + W)$
5) $U = D + F + 0.8L + C_{cr} + H + E_{ss}$
6) $U = D + F + 0.8L + H + W_t$
7) $U = 0.9D + 1.4F$
8) $U = 0.9D + 1.6H + 1.6W$
9) $U = 0.9D + H + E_{ss}$
10) $U = 0.9D + H + W_t$

The equations above represent the critical load combinations to be considered from ACI 349-06 [3.1.9]. The simplification of the equations is based on the following information:

Load combinations 1 through 3 above simplify ACI 349-06 combinations 9-1 through 9-3 by removing terms R_o and T_o. R_o loads (piping and equipment reactions, excluding dead load and earthquake reactions) are not considered for initial design. The anticipated temperature distribution is within the range considered negligible per ACI 349.1R-07 [3.1.9] so T_o (moments and forces due to temperature distribution) is also not considered. Section 1.3 of ACI 349.1R-07 [3.1.4] states that temperature gradients less than 100°F and uniform temperature changes less than 50°F need not be analyzed. In addition, snow load (S) governs over roof live load (L_r) and rain load (R), so the last terms of combinations 2 and 3 are reduced accordingly.

Load combination 9-4 from ACI 349-06 including operating basis earthquake (OBE) is excluded since OBE is not part of the design basis.

Load combination 4 above is load combination 9-5 from ACI 349-06 excluding the R_o term.

The postulated pipe break loads are not applicable to the design (loads T_a, R_a , P_a ,Y_r , Y_j , and Y_m). Therefore, load combination 5 above envelopes load combinations 9-6, 9-8, and 9-9 from ACI 349-06.

Load combination 6 above is load combination 9-7 from ACI 349-06 with terms T_o and R_o removed.

Load combinations 7 through 10 above are combinations 1, 4, 5, and 6 with the dead load factors reduced to 0.9 and the live load terms removed. Also, because the fluid pressure reduces the effects of the lateral soil pressures on the below grade walls of the irradiation cells, the fluid terms are removed from combinations 8, 9, and 10. Combination 9 also excludes the crane live load term because the crane will not always be operating.

See the individual load calculation sections for descriptions of the load components that go into each of the terms in the combinations above. See Attachment J of this calculation for a summary table of the load combinations applied to the SAP2000 model. The SAP2000 input files for the load combinations are also included in Attachment J of this calculation.

4.2.2 Secondary Load Combinations

Several of the load terms in the primary combinations presented in Section 4.2.1 require many permutations of the different components within that load. The terms with this requirement are listed below along with a description of the permutations. Permutations within an individual load term will be referred to as secondary load combinations.

4.2.2.1 Crane Live Load, C_{cr}

Load term C_{cr} includes the live load components for the overhead cranes. As described in Section 4.9, the crane live load includes a vertical component, a lateral component (with respect to the crane rail), and a longitudinal component (also with respect to the crane rail). These load components are applied at each crane wheel position for the 10 postulated crane positions considered for design. There are also horizontal loads which account for the cranes stopping at

the end of each crane rail. See Table 4.2-1 for a list of all the crane live load components in the design model. The vertical component always acts in the negative Z direction (downward) and the stop loads only act in one direction at the end of each rail, but the lateral and longitudinal components are reversible. Therefore, to capture all the possible crane load combinations, the secondary load combinations in Table 4.2-3 are considered for term C_{cr} in the primary combinations. The combinations in Table 4.2-3 are based on the load sets defined in Table 4.2-2 which group all of the vertical, lateral, and longitudinal loads for the ten crane positions.

Table 4.2-1 – Crane Live Load Cases

Crane1Live_Vert	Vertical Live Load at Crane 1
Crane2Live_Vert	Vertical Live Load at Crane 2
Crane3Live_Vert	Vertical Live Load at Crane 3
Crane4Live_Vert	Vertical Live Load at Crane 4
Crane5Live_Vert	Vertical Live Load at Crane 5
Crane6Live_Vert	Vertical Live Load at Crane 6
Crane7Live_Vert	Vertical Live Load at Crane 7
Crane8Live_Vert	Vertical Live Load at Crane 8
Crane9Live_Vert	Vertical Live Load at Crane 9
Crane10Live_Vert	Vertical Live Load at Crane 10
Crane1Live_Lat	Lateral Live Load at Crane 1
Crane2Live_Lat	Lateral Live Load at Crane 2
Crane3Live_Lat	Lateral Live Load at Crane 3
Crane4Live_Lat	Lateral Live Load at Crane 4
Crane5Live_Lat	Lateral Live Load at Crane 5
Crane6Live_Lat	Lateral Live Load at Crane 6
Crane7Live_Lat	Lateral Live Load at Crane 7
Crane8Live_Lat	Lateral Live Load at Crane 8
Crane9Live_Lat	Lateral Live Load at Crane 9
Crane10Live_Lat	Lateral Live Load at Crane 10
Crane1Live_Long	Longitudinal Live Load at Crane 1
Crane2Live_Long	Longitudinal Live Load at Crane 2
Crane3Live_Long	Longitudinal Live Load at Crane 3
Crane4Live_Long	Longitudinal Live Load at Crane 4
Crane5Live_Long	Longitudinal Live Load at Crane 5
Crane6Live_Long	Longitudinal Live Load at Crane 6
Crane7Live_Long	Longitudinal Live Load at Crane 7
Crane8Live_Long	Longitudinal Live Load at Crane 8
Crane9Live_Long	Longitudinal Live Load at Crane 9
Crane10Live_Long	Longitudinal Live Load at Crane 10
Crane1Stop	Stopping Load for Crane 1
Crane3Stop	Stopping Load for Crane 3
Crane4Stop	Stopping Load for Crane 4
Crane6Stop	Stopping Load for Crane 6
Crane7Stop	Stopping Load for Crane 7
Crane10Stop	Stopping Load for Crane 10

Table 4.2-2 – Crane Load Case Sets

CraneLive_Vert	Crane1Live_Vert + Crane2Live_Vert + Crane3Live_Vert + Crane4Live_Vert + Crane5Live_Vert + Crane6Live_Vert + Crane7Live_Vert + Crane8Live_Vert + Crane9Live_Vert + Crane10Live_Vert	Set of all vertical components
CraneLive_Lat	Crane1Live_Lat + Crane2Live_Lat + Crane3Live_Lat + Crane4Live_Lat + Crane5Live_Lat + Crane6Live_Lat + Crane7Live_Lat + Crane8Live_Lat + Crane9Live_Lat + Crane10Live_Lat	Set of all lateral components
CraneLive_Long	Crane1Live_Long + Crane2Live_Long + Crane3Live_Long + Crane4Live_Long + Crane5Live_Long + Crane6Live_Long + Crane7Live_Long + Crane8Live_Long + Crane9Live_Long + Crane10Live_Long	Set of all longitudinal components

Table 4.2-3 – Crane Secondary Load Combinations

		Lateral	Longitudinal	Stop
Crane1	CraneLive_Vert + CraneLive_Lat + CraneLive_Long + Crane3Stop + Crane6Stop + Crane7Stop	+	+	3, 6, 7
Crane2	CraneLive_Vert + CraneLive_Lat + (-)CraneLive_Long + Crane1Stop + Crane4Stop + Crane10Stop	+	-	1, 4, 10
Crane3	CraneLive_Vert + (-)CraneLive_Lat + CraneLive_Long + Crane3Stop + Crane6Stop + Crane7Stop	-	+	3, 6, 7
Crane4	CraneLive_Vert + (-)CraneLive_Lat + (-)CraneLive_Long + Crane1Stop + Crane4Stop + Crane10Stop	-	-	1, 4, 10

4.2.2.2 Wind Loads, W

Load term W includes the wind load components. As described in Attachment B, wind loads on the structure are calculated considering four different wind directions as well as a case with suction. The total wind load on the structure for each of those cases includes pressures on the exterior walls and the roof. As shown in Table 4.2-4, the individual wall and roof pressures are applied as separate load cases. There are also internal pressure load cases which consider internal pressures acting either inward or outward on the walls and roof and torsional wind cases which consider in-plane forces on the wall due to twisting of the structure. The scale factors shown in Table 4.2-4 scale the unit wind pressures applied to the model to the operating wind pressures and tornado wind pressures for their respective secondary combinations (see Attachment B). The load cases are combined into the secondary combinations shown in Table 4.2-5 to capture all of the possible wind conditions for design.

4.2.2.3 Tornado Loads, W_t

Load term W_t includes the tornado load components. As described in Attachment B, tornado loads on the structure are calculated by scaling the wind pressure loads. In addition, tornado load cases include a differential pressure case and tornado missile cases. Table 4.2-4 shows all of the individual tornado load cases which are applied to the model. The load cases are combined into the secondary combinations shown in Table 4.2-6 to capture all of the possible tornado load conditions for design.

Table 4.2-4 – Wind and Tornado Load Cases

Load Case Number in Model	Description	Scale Factor for Secondary Wind Combinations	Scale Factor for Secondary Tornado Combinations
W001	Unit wind pressure, north wall and roof due to north wind	0.95	3.61
W002	Unit wind pressure, north wall due to south wind	0.95	3.61
W003	Unit wind pressure, east wall and roof due to east wind	0.95	3.61
W004	Unit wind pressure, east wall due to west wind	0.95	3.61
W005	Unit wind pressure, south wall due to north wind	0.95	3.61
W006	Unit wind pressure, south wall and roof due to south wind	0.95	3.61
W007	Unit wind pressure, west wall due to east wind	0.95	3.61
W008	Unit wind pressure, west wall and roof due to west wind	0.95	3.61
W009	Unit wind pressure, suction	0.95	3.61
W010	Unit wind pressure, positive internal pressure	0.95	3.61
W011	Unit wind pressure, negative internal pressure	0.95	3.61
W012	Torsion due to wind (ASCE Case 2), clockwise	0.95	3.61
W013	Torsion due to wind (ASCE Case 2), counter-clockwise	0.95	3.61
W014	Torsion due to wind (ASCE Case 4), clockwise	0.95	3.61
W015	Torsion due to wind (ASCE Case 4), counter-clockwise	0.95	3.61
W016	Tornado pressure drop	---	0.5
W017	Tornado missile, pipe, horizontal, northeast, CW	---	1
W018	Tornado missile, pipe, horizontal, northeast, CCW	---	1
W019	Tornado missile, pipe, horizontal, southeast, CW	---	1
W020	Tornado missile, pipe, horizontal, southeast, CCW	---	1
W021	Tornado missile, pipe, horizontal, southwest, CW	---	1
W022	Tornado missile, pipe, horizontal, southwest, CCW	---	1
W023	Tornado missile, pipe, horizontal, northwest, CW	---	1
W024	Tornado missile, pipe, horizontal, northwest, CCW	---	1
W025	Tornado missile, auto, horizontal, northeast, CW	---	1
W026	Tornado missile, auto, horizontal, northeast, CCW	---	1
W027	Tornado missile, auto, horizontal, southeast, CW	---	1
W028	Tornado missile, auto, horizontal, southeast, CCW	---	1
W029	Tornado missile, auto, horizontal, southwest, CW	---	1
W030	Tornado missile, auto, horizontal, southwest, CCW	---	1
W031	Tornado missile, auto, horizontal, northwest, CW	---	1
W032	Tornado missile, auto, horizontal, northwest, CCW	---	1
W033	Tornado missile, pipe and auto, vertical	---	1

Table 4.2-5 – Wind Secondary Combinations

Combination	Load Cases	Wind Direction	Internal	Torsion
W1	W001 + W003 + W005 + W007 + W010 + W014	Northeast	+	CW
W2	W002 + W003 + W006 + W007 + W010 + W014	Southeast	+	CW
W3	W002 + W004 + W006 + W008 + W010 + W014	Southwest	+	CW
W4	W001 + W004 + W005 + W008 + W010 + W014	Northwest	+	CW
W5	W001 + W003 + W005 + W007 + W010 + W015	Northeast	+	CCW
W6	W002 + W003 + W006 + W007 + W010 + W015	Southeast	+	CCW
W7	W002 + W004 + W006 + W008 + W010 + W015	Southwest	+	CCW
W8	W001 + W004 + W005 + W008 + W010 + W015	Northwest	+	CCW
W9	W001 + W003 + W005 + W007 + W011 + W014	Northeast	-	CW
W10	W002 + W003 + W006 + W007 + W011 + W014	Southeast	-	CW
W11	W002 + W004 + W006 + W008 + W011 + W014	Southwest	-	CW
W12	W001 + W004 + W005 + W008 + W011 + W014	Northwest	-	CW
W13	W001 + W003 + W005 + W007 + W011 + W015	Northeast	-	CCW
W14	W002 + W003 + W006 + W007 + W011 + W015	Southeast	-	CCW
W15	W002 + W004 + W006 + W008 + W011 + W015	Southwest	-	CCW
W16	W001 + W004 + W005 + W008 + W011 + W015	Northwest	-	CCW
W17	W009 + W010 + W012	Suction	+	CW
W18	W009 + W011 + W012	Suction	-	CW
W19	W009 + W010 + W013	Suction	+	CCW
W20	W009 + W011 + W013	Suction	-	CCW
W21	---	No Wind	N/A	N/A

Table 4.2-6 – Tornado Secondary Combinations

Combination	Load Cases	Wind Direction	Internal	Torsion	Missiles?
W_t1	W001 + W003 + W005 + W007 + W010 + W014 + 0.5W016	Northeast	+	CW	No
W_t2	W002 + W003 + W006 + W007 + W010 + W014 + 0.5W016	Southeast	+	CW	No
W_t3	W002 + W004 + W006 + W008 + W010 + W014 + 0.5W016	Southwest	+	CW	No
W_t4	W001 + W004 + W005 + W008 + W010 + W014 + 0.5W016	Northwest	+	CW	No
W_t5	W001 + W003 + W005 + W007 + W010 + W015 + 0.5W016	Northeast	+	CCW	No
W_t6	W002 + W003 + W006 + W007 + W010 + W015 + 0.5W016	Southeast	+	CCW	No
W_t7	W002 + W004 + W006 + W008 + W010 + W015 + 0.5W016	Southwest	+	CCW	No
W_t8	W001 + W004 + W005 + W008 + W010 + W015 + 0.5W016	Northwest	+	CCW	No
W_t9	W001 + W003 + W005 + W007 + W011 + W014 + 0.5W016	Northeast	-	CW	No
W_t10	W002 + W003 + W006 + W007 + W011 + W014 + 0.5W016	Southeast	-	CW	No
W_t11	W002 + W004 + W006 + W008 + W011 + W014 + 0.5W016	Southwest	-	CW	No
W_t12	W001 + W004 + W005 + W008 + W011 + W014 + 0.5W016	Northwest	-	CW	No
W_t13	W001 + W003 + W005 + W007 + W011 + W015 + 0.5W016	Northeast	-	CCW	No
W_t14	W002 + W003 + W006 + W007 + W011 + W015 + 0.5W016	Southeast	-	CCW	No
W_t15	W002 + W004 + W006 + W008 + W011 + W015 + 0.5W016	Southwest	-	CCW	No
W_t16	W001 + W004 + W005 + W008 + W011 + W015 + 0.5W016	Northwest	-	CCW	No
W_t17	W009 + W010 + W012 + 0.5W016	Suction	+	CW	No
W_t18	W009 + W011 + W012 + 0.5W016	Suction	-	CW	No
W_t19	W009 + W010 + W013 + 0.5W016	Suction	+	CCW	No
W_t20	W009 + W011 + W013 + 0.5W016	Suction	-	CCW	No
W_t21	W001 + W003 + W005 + W007 + W011 + W014 + 0.5W016 + W017	Northeast	-	CW	Horizontal pipe
W_t22	W002 + W003 + W006 + W007 + W011 + W014 + 0.5W016 + W019	Southeast	-	CW	Horizontal pipe
W_t23	W002 + W004 + W006 + W008 + W011 + W014 + 0.5W016 + W021	Southwest	-	CW	Horizontal pipe
W_t24	W001 + W004 + W005 + W008 + W011 + W014 + 0.5W016 + W023	Northwest	-	CW	Horizontal pipe
W_t25	W001 + W003 + W005 + W007 + W011 + W015 + 0.5W016 + W018	Northeast	-	CCW	Horizontal pipe
W_t26	W002 + W003 + W006 + W007 + W011 + W015 + 0.5W016 + W020	Southeast	-	CCW	Horizontal pipe
W_t27	W002 + W004 + W006 + W008 + W011 + W015 + 0.5W016 + W022	Southwest	-	CCW	Horizontal pipe
W_t28	W001 + W004 + W005 + W008 + W011 + W015 + 0.5W016 + W024	Northwest	-	CCW	Horizontal pipe
W_t29	W001 + W003 + W005 + W007 + W011 + W014 + 0.5W016 + W025	Northeast	-	CW	Horizontal auto
W_t30	W002 + W003 + W006 + W007 + W011 + W014 + 0.5W016 + W027	Southeast	-	CW	Horizontal auto
W_t31	W002 + W004 + W006 + W008 + W011 + W014 + 0.5W016 + W029	Southwest	-	CW	Horizontal auto
W_t32	W001 + W004 + W005 + W008 + W011 + W014 + 0.5W016 + W031	Northwest	-	CW	Horizontal auto
W_t33	W001 + W003 + W005 + W007 + W011 + W015 + 0.5W016 + W026	Northeast	-	CCW	Horizontal auto
W_t34	W002 + W003 + W006 + W007 + W011 + W015 + 0.5W016 + W028	Southeast	-	CCW	Horizontal auto
W_t35	W002 + W004 + W006 + W008 + W011 + W015 + 0.5W016 + W030	Southwest	-	CCW	Horizontal auto
W_t36	W001 + W004 + W005 + W008 + W011 + W015 + 0.5W016 + W032	Northwest	-	CCW	Horizontal auto
W_t37	W001 + W003 + W005 + W007 + W011 + W014 + 0.5W016 + W033	Northeast	-	CW	Vertical
W_t38	W002 + W003 + W006 + W007 + W011 + W014 + 0.5W016 + W033	Southeast	-	CW	Vertical
W_t39	W002 + W004 + W006 + W008 + W011 + W014 + 0.5W016 + W033	Southwest	-	CW	Vertical
W_t40	W001 + W004 + W005 + W008 + W011 + W014 + 0.5W016 + W033	Northwest	-	CW	Vertical
W_t41	W001 + W003 + W005 + W007 + W011 + W015 + 0.5W016 + W033	Northeast	-	CCW	Vertical
W_t42	W002 + W003 + W006 + W007 + W011 + W015 + 0.5W016 + W033	Southeast	-	CCW	Vertical
W_t43	W002 + W004 + W006 + W008 + W011 + W015 + 0.5W016 + W033	Southwest	-	CCW	Vertical
W_t44	W001 + W004 + W005 + W008 + W011 + W015 + 0.5W016 + W033	Northwest	-	CCW	Vertical
W_t45	W016	Pressure Drop	N/A	N/A	N/A

4.2.2.4 Safe Shutdown Earthquake Load, E_{ss}

Load term E_{ss} includes the seismic load components (Xx, Xy, Xz, Yx, Yy, Yz, Zx, Zy, Zz). As described in Section 4.7, seismic loads on the structure are calculated based on mass and the acceleration at each node in the model due to excitation in each direction. Per ASCE 4-98 [3.1.4], loads due to three input motions can be combined using the 100-40-40 rule (100% excitation in one direction combined with 40% excitation in the other two directions). As shown in Table 4.2-7, the seismic loads for each direction and due to each excitation are applied as separate load cases. The load cases are combined into the secondary combinations shown in Table 4.2-8 to capture all of the possible seismic conditions for design.

Table 4.2-7 – Seismic Load Cases

Load Case	Description
Xx	Force in the X-direction due to X-excitation
Xy	Force in the X-direction due to Y-excitation
Xz	Force in the X-direction due to Z-excitation
Yx	Force in the Y-direction due to X-excitation
Yy	Force in the Y-direction due to Y-excitation
Yz	Force in the Y-direction due to Z-excitation
Zx	Force in the Z-direction due to X-excitation
Zy	Force in the Z-direction due to Y-excitation
Zz	Force in the Z-direction due to Z-excitation

Table 4.2-8 – Seismic Secondary Combinations

Seismic (E) - Using the 100/40/40 Method								
Xx	**Xy**	**Xz**	**Yx**	**Yy**	**Yz**	**Zx**	**Zy**	**Zz**
1	0.4	0.4	1	0.4	0.4	1	0.4	0.4
1	0.4	0.4	1	0.4	0.4	-1	-0.4	-0.4
1	0.4	0.4	-1	-0.4	-0.4	1	0.4	0.4
1	0.4	0.4	-1	-0.4	-0.4	-1	-0.4	-0.4
-1	-0.4	-0.4	1	0.4	0.4	1	0.4	0.4
-1	-0.4	-0.4	1	0.4	0.4	-1	-0.4	-0.4
-1	-0.4	-0.4	-1	-0.4	-0.4	1	0.4	0.4
-1	-0.4	-0.4	-1	-0.4	-0.4	-1	-0.4	-0.4
0.4	1	0.4	0.4	1	0.4	0.4	1	0.4
0.4	1	0.4	0.4	1	0.4	-0.4	-1	-0.4
0.4	1	0.4	-0.4	-1	-0.4	0.4	1	0.4
0.4	1	0.4	-0.4	-1	-0.4	-0.4	-1	-0.4
-0.4	-1	-0.4	0.4	1	0.4	0.4	1	0.4
-0.4	-1	-0.4	0.4	1	0.4	-0.4	-1	-0.4
-0.4	-1	-0.4	-0.4	-1	-0.4	0.4	1	0.4
-0.4	-1	-0.4	-0.4	-1	-0.4	-0.4	-1	-0.4
0.4	0.4	1	0.4	0.4	1	0.4	0.4	1
0.4	0.4	1	0.4	0.4	1	-0.4	-0.4	-1
0.4	0.4	1	-0.4	-0.4	-1	0.4	0.4	1
0.4	0.4	1	-0.4	-0.4	-1	-0.4	-0.4	-1
-0.4	-0.4	-1	0.4	0.4	1	0.4	0.4	1
-0.4	-0.4	-1	0.4	0.4	1	-0.4	-0.4	-1
-0.4	-0.4	-1	-0.4	-0.4	-1	0.4	0.4	1
-0.4	-0.4	-1	-0.4	-0.4	-1	-0.4	-0.4	-1

4.3 Dead Load Methods

Dead loads consist of the weight of all materials of construction incorporated into the building and fixed service equipment including the weight of the cranes. The self-weight of all of the modeled elements of the structure is accounted for by the elements of the design model. This includes the concrete walls and slabs, the steel beams and columns, and the steel trusses. The additional dead loads applied to the model include the following:

- Concrete cover blocks for below grade tanks and trenches
- Fixed equipment (includes tanks and hot cells)
- Partition walls
- Doors

Crane dead loads are described in Section 4.9 of this calculation.

The procedure for calculation and application of each of the loads listed above is detailed in the following sections. Detailed calculations and a diagram of all the dead loads applied to the model are located in Attachment A.

4.3.1 Concrete Cover Blocks for Below Grade Tanks and Trenches

The below grade tanks and trenches have concrete cover blocks at the level of the main basemat. The weights of the tank cover blocks are provided on Drawing 7290-SK-005 [3.2.1]. As a check, the weights were also calculated based on the expected volume of concrete; see Attachment A. In all cases but one, the calculated cover block weight was enveloped by the value provided on drawing 7290-SK-005 [3.2.1]. However, for cover block CB-0010, the calculated value was larger than the provided value. For conservatism, the larger calculated value was used when determining loads for those cover blocks. Table 4.3-1 below shows the calculated cover block joint loads for the tanks. Drawing 7290-SK-005 [3.2.1] provides a weight per foot for the cross-section of the trench cover block. For the model, the trench cover is considered in seven different sections. A total weight is calculated for each section based on the expected concrete volume, and the weight is divided evenly among the joints in the model corresponding to that section. See Attachment A for the calculation of the weights. Table 4.3-2 shows the calculated cover block joint loads for the trench. See Attachment A for the Excel formulas used in the tables and a diagram of the applied loads.

Table 4.3-1 – Tank Cover Block Joint Loads

Cover Block	Description	Quantity	Weight (lbs)	Number of Joints in Model	Joint Load (k)
CB-0001	Critically Safe Sump Catch Tank Cover Block	1	61500	20	3.08
CB-0002	Combined Rad Waste Holding Tank Cover Block	2	115000	26	4.43
CB-0003	Storage Hot Cell Cover Block	6	50500	18	2.81
CB-0010	Irradiation Hot Cell Cover Block	8	152700	28	5.46
CB-0011	Off-Gas Equipment Hot Cell Cover Block	8	40100	20	2.01
CB-0301	Target Solution Storage Cover Block	8	32300	16	2.02
CB-0601	Uranyl Nitrate Conversion Tank Cover Block	2	15000	12	1.25
CB-0602	Urex Feed Tank Cover Block	2	24300	16	1.52
CB-0604	Solvent Hold Tank Cover Block	1	13500	14	0.97
CB-0605	Raffinate Hold Tank Cover Block	2	16900	14	1.21
CB-0606	Recycle UN Hold Tank Cover Block	2	61500	20	3.08
CB-0609	Recycle Target Solution Tank Cover Block	3	13100	12	1.10
FP-0001	Service Trench Floor Plug 1	See Below			
FP-0002	Service Trench Floor Plug 2	See Below			

Calculated value, not from 7290-SK-005 [3.2.1]
Number of joints per block varies for blocks in this group; minimum number is used (conservative)

Table 4.3-2 – Trench Cover Block Joint Loads

Cover Block	Description	Quantity	Weight (k) (calculated)	Number of Joints in Model	Joint Load (k)
Trench	Trench Area 1	1	545.39	164	3.33
Trench	Trench Area 2	1	481.80	124	3.89
Trench	Trench Area 3	1	260.14	68	3.83
Trench	Trench Area 4	1	323.95	78	4.16
Trench	Trench Area 5	1	178.20	44	4.05
Trench	Trench Area 6	1	214.50	62	3.46
Trench	Trench Area 7	1	247.63	98	2.53

4.3.2 Fixed equipment (includes tanks and hot cells)

Drawing 7290-SK-005 [3.2.1] provides weights for the tanks and hot cells. The provided weights are divided by the area of the tank or hot cell and applied as uniform pressures in the model. For the Irradiation Hot Cells and the Off-gas Equipment Hot Cells, the concrete walls are modeled, so an estimated reduced weight is used to consider equipment within the cells only. Also, for the Irradiation Hot Cells, some equipment is located at elevation 0' (rather than at the bottom of the tank); an assumed value is used to consider the weight of equipment at that level. The load in the model at that level is applied as joint loads around the perimeter of the cells. Table 4.3-3 provides the calculated pressures for the tanks, Table 4.3-4 provides the calculated pressures for the hot cells, Table 4.3-5 provides the calculated joint loads for the Irradiation Hot Cells at elevation 0', Table 4.3-6 provides the calculated pressure for the shielded storage, and Table 4.3-7 provides the calculated pressure for the primary cooling. See Attachment A for the Excel formulas and a diagram of the applied loads.

Table 4.3-3 – Tank Surface Pressure Loads

Tank	Description	Weight (lbs) per SK-005 unless noted otherwise	Cell Interior Floor Area (ft^2)	Surface Pressure to Apply to Model (ksf)
TK-0001	Critically Safe Sump Catch Tank	46200	86.2	0.536
TK-0002	Combined Rad Waste Holding Tank	113000	169.0	0.669
TK-0101	Uranyl Sulfate Preparation Tank	1900	253.3	0.008
TK-0102	Uranium Metal Dissolution Tank	10000	--	Included with HC-0005
TK-0301	Target Solution Hold Tank	2500	42.3	0.060
TK-0303	TSV Dump Tank	3400	--	Included with HC-0010A/B
TK-0501	MO Extraction Feed Tank	50	--	Included with HC-0001/HC-0002
TK-0502	MO Extraction Column	10	--	
TK-0503	MO Eluate Hold Tank	100	--	
TK-0504	MO Eluate Concentration Column	10000	--	
TK-0601	Uranyl Nitrate Conversion Tank	3900	17.4	0.225
TK-0602	Urex Feed Tank	9100	29.9	0.304
TK-0603	TC Removal Column	10000	--	Included with HC-0003
TK-0604	Solvent Hold Tank	2400	14.4	0.167
TK-0605	Raffinate Hold Tank	4700	19.4	0.242
TK-0606	Recycle UN Hold Tank	35600	86.2	0.414
TK-0607	UN Evaporator Vessel	10000	--	Included with HC-0005
TK-0608	Thermal Denitrator	170	--	
TK-0609	Recycle Target Solution Tank	2300	14.7	0.157

(shaded) 'TBD' per 7290-SK-005 [3.2.1], assumed to be 10000 lbs

Table 4.3-4 – Hot Cell Surface Pressure Loads

Hot Cell	Description	Weight (lbs) per SK-005 unless noted otherwise	Additional Tank Weight (lbs) from above	Area (ft^2)	Surface Pressure to Apply to Model (ksf)
HC-0001	Supercell A	883000	10160	364.0	2.46
HC-0002	Supercell B	883000	10160	364.0	2.46
HC-0003	Urex Hot Cell	1845000	10000	930.7	2.00
HC-0004	Solid Waste Packing Hot Cell	261000	0	140.0	1.87
HC-0005	Thermal Denitration Hot Cell	190000	20170	374.0	0.57
HC-0006	Pump Transfer Hot Cell	694000	0	546.0	1.28
HC-0007	Noble Gas Hot Cell	532000	0	329.2	1.62
HC-0008	Waste Evaporation Hot Cell	694000	0	546.0	1.28
HC-0009	Cementation Hot Cell	214000	0	212.6	1.01
HC-0010-A	Irradiation Hot Cell A	6600	3400	144.0	0.07
HC-0010-B	Irradiation Hot Cell B	6600	3400	144.0	0.07
HC-0011	Off-Gas Equipment Hot Cell	5000	0	51.9	0.10

(shaded) Estimated equipment weight only, walls are modeled
(boxed) Applied over larger area due to uncertainty of location

Table 4.3-5 – Irradiation Cell Joint Loads (at Elevation 0')

Cell	Description	Weight (lbs)	Number of Joints in Model	Joint Load (k)
HC-0010-A	Irradiation Hot Cell A	6000	28	0.22
HC-0010-B	Irradiation Hot Cell B	6000	28	0.22

Assumed value

Table 4.3-6 – Shielded Storage Surface Pressure Loads

Tank	Description	Weight (lbs)	Cell Interior Floor Area (ft^2)	Surface Pressure to Apply to Model (ksf)
NA	Shielded Storage	10000	69.4	0.144

'TBD' per 7290-SK-005 [3.2.1], assumed to be 10000 lbs

Table 4.3-7 – Primary Cooling Surface Pressure Loads

Tank	Description	Weight (lbs)	Cell Interior Floor Area (ft^2)	Surface Pressure to Apply to Model (ksf)
NA	Primary Cooling	10000	37.5	0.267

'TBD' per 7290-SK-005 [3.2.1], assumed to be 10000 lbs

4.3.3 Partition Walls

There are a number of partition walls in the southwest corner of the RCA. For the model, a total weight is calculated and divided over the entire area as a uniform pressure. The total weight is calculated based on the lengths of all of the walls multiplied by an estimated thickness (1'-0") and height (19'-4"). Table 4.3-8 shows the wall dimensions considered and the resulting spread load for that area of the building. See Attachment A for the Excel formulas and a diagram of the applied loads.

Table 4.3-8 – Partition Wall Spread Load

Room	Wall Lengths	
FDA Lab	14.00	
	20.00	
Decon Room	16.00	
	12.00	
	16.00	
Health Physics	15.00	
	14.00	
Hot Lab	20.00	
Airlock	17.00	
	7.00	
Airlock	16.00	
	7.00	
Stair	16.00	
	7.00	
Uranyl Sulfate Prep and Storage	36.00	
	58.00	
	16.00	
	16.00	
	16.00	
Noble Gas Storage	22.00	
	17.00	
	22.00	
	17.00	
Total:	417	ft
Thickness:	1	ft
Height:	19.33	ft
Volume:	8062	ft^3
Unit Weight of Concrete:	150	pcf
	1209.3	kips
Floor Area:	3500	ft^2
	0.35	ksf

4.3.4 Doors

There are large concrete containment doors at the north and south ends of the Irradiation Hot Cell area. There are also large stepped concrete doors to access each Irradiation Hot Cell from the Tank Farm area. Weights are calculated for each door based on expected concrete volume, and the weight is divided between the joints at the bottom of each doorway for the design model. The weight is also distributed as lateral joint loads to be used as a mass source for the seismic model.

Table 4.3-9 – Containment Door Joint Loads

Door	Description	Quantity	Weight (lbs)	Number of Joints in Model	Vertical Joint Load (k)	Lateral Joint Load (k) at top and bottom
D-0001 (South)	Sliding Containment Door	1	87000	5	17.40	8.7
D-0001 (North)	Sliding Containment Door	1	87000	5	17.40	8.7

Table 4.3-10 – Neutron Driver Door Joint Loads

Door	Quantity	Area (ft^2)	Height (ft)	Concrete Volume (ft^3)	Weight (k)	Number of Joints in Model	Vertical Joint Load (k)
Neutron Driver Doors	8	33	10	330	49.5	3	16.5

Lateral joint loads for Neutron Driver Doors (applied to wall on both sides of each door opening, 10 joints total per door)	Weight (k)	Number of Joints in Model	Lateral Joint Load (k)
	49.5	10	4.95

4.4 Live Load Methods

4.4.1 Light Manufacturing

A distributed live load of 125 psf is applied to the areas of the SHINE Facility shown in Figure 4.4-1 and Figure 4.4-2 below in accordance with the IBC 2009 [3.1.1].

4.4.2 Heavy Manufacturing

A distributed live load of 250 psf is applied to the areas of the SHINE Facility shown in Figure 4.4-1 and Figure 4.4-2 below in accordance with the IBC 2009 [3.1.1].

4.4.3 Concrete Cover Block Laydown

A uniform live load is calculated for the cover block laydown area using the surface area dimension of the largest cover block and the corresponding block weight, which is determined using SHINE Drawing No. 7290-SK-005, Sheet 1 [3.2.1]. For the Irradiation Cell Area (conservatively assumed to be 13 ft. by 13 ft.) the live load is calculated as follows:

LL = 129,200 lb. / (13 ft. x 13 ft.) = 765 psf

For the Tank Farm Area (conservatively assumed to be 13.5 ft. by 13.5 ft.) the live load is calculated as follows:

LL = 115,000 lb. / (13.5 ft. x 13.5 ft) = 630 psf

Conservatively use 670 psf for the Tank Farm Area.

4.4.4 Shipping Container Live Load

There is also a live load associated with shipping containers that will be moving throughout the RCA. Shipping containers are considered with a 20ft. by 8 ft. footprint; therefore, the shipping container live load is calculated as follows:

LL = 60,000 lb. / (20 ft. x 8 ft.) = 375 psf

Conservatively use 380 psf for the shipping container live load.

Proprietary Information
Security-Related Information

Figure 4.4-1 – Main Floor Live Load Diagram

Proprietary Information
Security-Related Information

Figure 4.4-2 – Mezzanine Live Load Diagram

4.4.5 Roof Live Load

A roof live load of 20 psf is applied uniformly to all roof areas in the Design Model.

4.4.6 Cover Block Joint Live Load

Since there will be movement on top of the cover blocks, a 250 psf live load is taken to be on the cover blocks with the exception cover blocks CB-0010 and CB-0011. CB-0010 and CB-0011 will not have active movement on top of them, allowing them not to have a live load. The cover block weights from SHINE Drawing No. 7290-SK-005, Sheet 1 [3.2.1] are used as input to Table 4.4-1. These loads are then distributed to all the joints on which the cover blocks would be resting.

Table 4.4-1 – Cover Block Joint Live Load Distribution

Cover Block	Description	N-S Dimension	E-W Dimension	Quantity	Weight (lbs)	Number of Joints in Model	Joint Load (k)
CB-0001	Critically Safe Sump Catch Tank Cover Block	10	10.67	1	26667	20	1.34
CB-0002	Combined Rad Waste Holding Tank Cover Block	14	14	2	49000	26	1.89
CB-0003	Storage Hot Cell Cover Block	9.33	9.33	6	21762	18	1.21
CB-0010	Irradiation Hot Cell Cover Block			8	0	28	0.00
CB-0011	Off-Gas Equipment Hot Cell Cover Block			8	0	20	0.00
CB-0301	Target Solution Storage Cover Block	7.5	7.5	8	14063	14	1.01
CB-0601	Uranyl Nitrate Conversion Tank Cover Block	5.17	5.17	2	6674	12	0.56
CB-0602	Urex Feed Tank Cover Block	9.17	4.67	2	10694	16	0.67
CB-0604	Solvent Hold Tank Cover Block	3.17	7.67	1	6069	14	0.44
CB-0605	Raffinate Hold Tank Cover Block	7.67	4	2	7667	14	0.55
CB-0606	Recycle UN Hold Tank Cover Block	10	10.67	2	26667	20	1.34
CB-0609	Recycle Target Solution Tank Cover Block	4.83	4.83	3	5840	12	0.49

4.4.7 Door Live Load

The sliding door loads are also considered as live loads when in the open position. The door weights from Table 4.3-9 are used as live loads when in the open position. These loads are then distributed as joint loads to the location where the door will be. Live load for the irradiation cell doors is calculated to account for the heavy doors swinging open. The pressure due to the door weight from the dead load Table 4.3-10 is applied over a 10 foot area that can be seen highlighted in red in Figure 4.4-3.

Proprietary Information
Security-Related Information

Figure 4.4-3 - Irradiation Cell Door Live Load Diagram

4.5 Snow Load Methods

For a detailed description of the calculation of snow loads see Attachment C of this calculation. The following snow load conditions were analyzed for the SHINE facility:

- Uniform flat roof design snow load
- Sloped roof snow load
- Partial loading of snow load
- Unbalanced snow loads for hip and gable roofs
- Design snow drift surcharge load
- Sliding snow load
- Rain-on-snow surcharge load

Figure 4.5-1 through Figure 4.5-3 below illustrate the snow load cases that are applied to the roof of the structure. In addition, snow loads are increased by a factor to account for 100 year MRI as provided by ASCE 7-05 [3.1.2], Table C7-3.

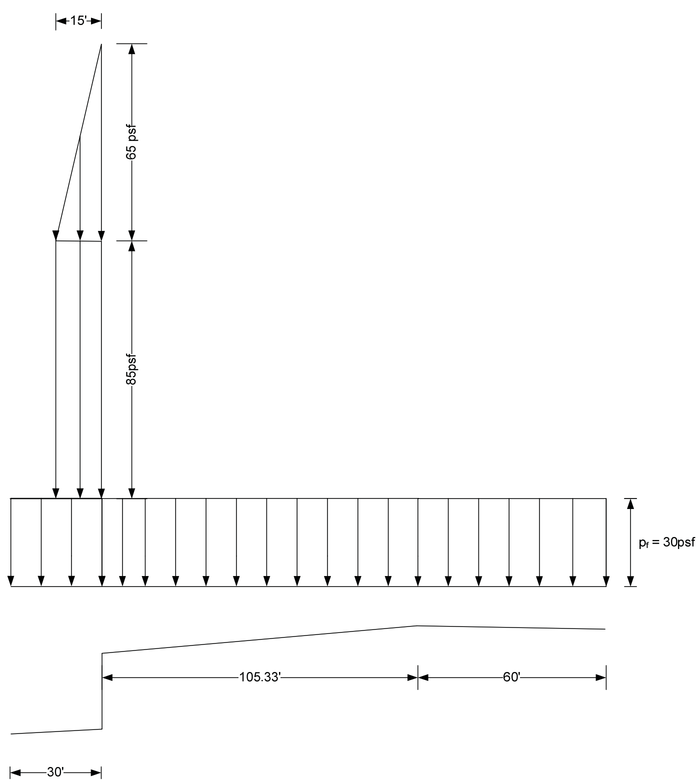


Figure 4.5-1 – Case 1: Flat Roof Snow Load

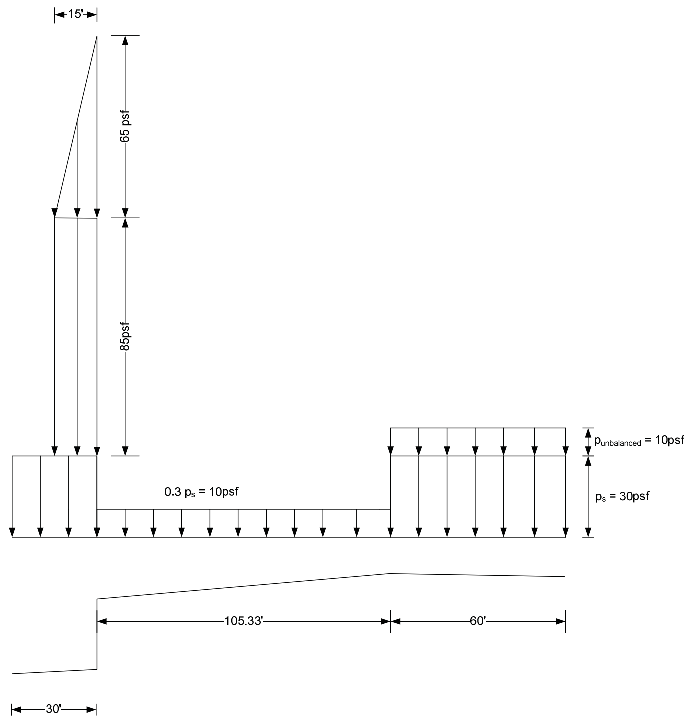


Figure 4.5-2 – Case 2: Unbalanced Snow Load for East Direction Sloping Roof with Drift Load and Sliding Load on Lower Roof

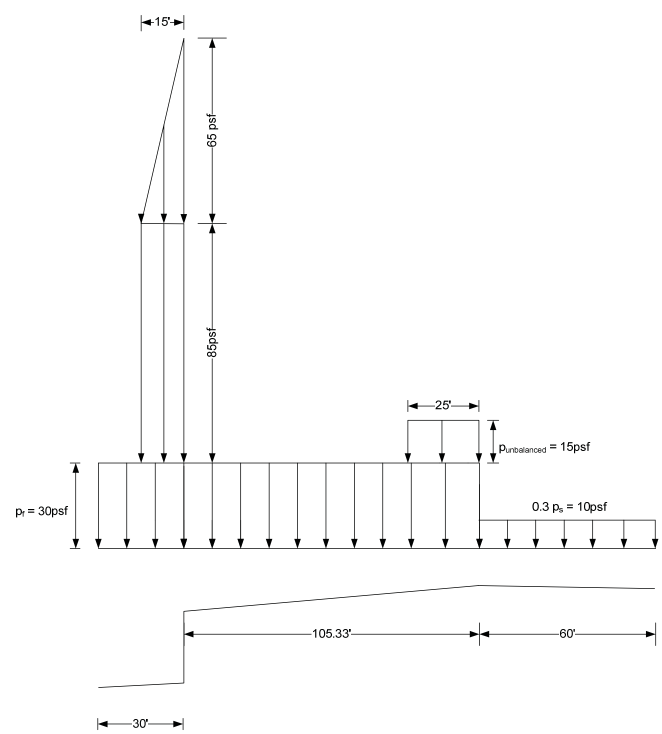


Figure 4.5-3 – Case 3: Unbalanced Snow Load for West Direction Sloping Roof with Drift Load and Sliding Load on Lower Roof

4.6 Wind Load Methods

The calculation of wind loads for the SHINE facility is described in detail in Attachment B of this calculation. The wind load for the SHINE Facility is calculated using Method 2 from Chapter 6 of ASCE 7-05 [3.1.2]. Wind loads are calculated based on the wind velocity pressure. The process for calculating the operating basis wind pressure starts by first calculating a unit wind pressure based on a unit velocity pressure. The unit velocity pressure is calculated with all factors within Equation 6-15 of Reference 3.1.2 equal to 1.0 and a wind velocity of 100 mph. Subsequently, the operating basis wind velocity pressure is calculated with the appropriate factors and wind speeds as determined per the corresponding figures and tables provided by Reference 3.1.2. In addition, a conversion factor for a mean recurrence interval of 100 years is provided per Table C6-7 of Reference 3.1.2. The wind load cases in the SAP model are applied using the unit wind pressure and then scaled by the ratio of the operating basis wind velocity pressure to unit wind velocity pressure in the load combinations.

The SHINE Facility is categorized as an enclosed building according to Section 6.2 of Reference 3.1.2 and, therefore, both external and internal pressures are applied to the structure. Positive and negative internal pressures are applied to the internal surface of the exterior walls, as well as the roof. No internal pressure is applied to the surfaces of the interior walls since the opposing forces on either surface negate each other.

Wind loads are applied to the SAP2000 Design Model using uniform area loading. Each wind case is calculated and illustrated in the Structural Loading Calculation. Wind loads are applied only to the above grade sections of the exterior walls. Due to the limitations of SAP2000's "Uniform to Frame" application method, the roof wind loads are applied straight downward in the -Z direction rather than perpendicular to the element face of the sloped roof. The degree of the roof slope is small enough to consider the difference in loading negligible.

4.7 Earthquake Load Methods

A time history analysis is conducted on a fixed-base model with a portion of the loads considered as mass sources in the following manner according to NRC Standard Review Plan 3.7.2 [3.1.22]:

- Dead Load ………………100%
- Live Load…………………25%
- Snow Load……………….75%
- Parked Crane Load…….100%

Directional masses and accelerations for each joint are extracted from the fixed-base model. The directional masses for each joint are multiplied by the corresponding accelerations in order to obtain nine (9) seismic force terms. Seismic loads are accounted for in the SAP2000 Design Model by applying nodal force values obtained from the SASSI analysis as equivalent static loads to account for earthquake effects. Seismic design forces are increased by a factor derived by a ratio of SSI accelerations to design accelerations in order to envelope the SSI seismic design forces. Factors are applied to all terms including the accidental eccentricity term.

4.8 Rain Load Methods

The SHINE Facility's sloped roof and building configuration preclude accumulation of rainwater. Snow loads or roof live loads are expected to govern, therefore, rain loads are not considered in this evaluation.

4.9 Crane Load Methods

A detailed description of the calculation of crane loads applied to the Design Model is included in Attachment D. There are three overhead cranes in the SHINE Facility. Crane loads are transmitted to the building structure through the crane rail at the point of contact with the crane wheels. There is a dead load associated with solely the components weights for each crane, as well as live loads that result from the movement of the cranes along their respective rails while carrying their rated capacity. In addition, loads caused by the crane impacting their respective bumpers and coming to a stop at the end of the rail are calculated. All loads occurring at their respective contact points are resolved into forces at the center of the wall, on which the crane corbel is attached. See Figure 4.9-1 below for an illustration of the eccentricity of the loads on the crane rail to the centerline of the wall.

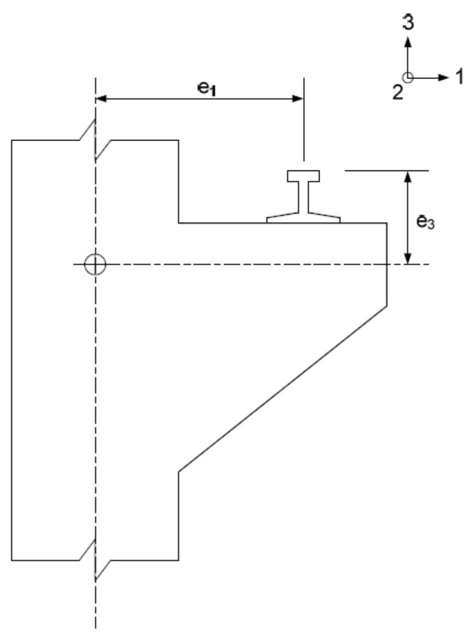


Figure 4.9-1 – Crane load eccentricities

The dead loads from the overhead cranes are calculated considering cranes unloaded with the trolley positioned entirely to one side of the crane bridge. Therefore, the dead load per wheel is calculated by taking a quarter of the crane bridge weight combined with a half of the trolley weight. The downward dead load is eccentric to the center of the wall, which results in a moment about an axis parallel to the crane rail.

The crane live load includes a vertical component, a lateral component (with respect to the crane rail), and a longitudinal component (also with respect to the crane rail). The maximum load per

wheel is calculated in order to find the vertical and longitudinal components of the live load. The maximum load per wheel considers the trolley along with a load equal to the crane capacity entirely to one side of the crane bridge. Therefore, the maximum load per wheel is taken as a quarter of the bridge weight, half of the trolley weight, and half of the crane capacity. The lateral component of the crane live load only considers the trolley and the crane capacity as these are the only laterally moving loads associated with the crane. Impact and force factors used in the calculation of crane live loads are provided by Section 4.10 of ASCE 7-05 [3.1.2].

Crane stop loads are horizontal loads which account for the crane being brought to a halt at the end of each crane rail by a bumper. The dimensions used for the calculation of crane stop loads are reasonable estimations based on information from Reference 3.3.20, page 189. The force applied to the bumper is considered to be the longitudinal inertia force at the center of mass of the bridge/trolley at 50% of the full load rated speed, assuming a linear energy absorber.

Crane loads are applied to the SAP2000 Design Model using joint loading. The joint loads are applied in the ten postulated crane positions shown in Figure 4.1-9 of this calculation.

4.10 Soil Spring Methods

Horizontal and vertical static and dynamic soil springs are to be applied to the foundation of the SHINE facility. In order to calculate the soil springs, the average shear modulus is found at a depth approximately equal to the length of the building. The plan areas for the three foundation elevations are calculated. The ratio of the length of the building basemat perpendicular to the direction of horizontal excitation to the length of the building parallel to the direction of horizontal excitation is used to find the constant for horizontal springs per Figure 3.3-3 of Reference 3.1.4. Lateral static spring loads are taken to be the same as the dynamic soil spring loads found in this analysis. A detailed description of the calculation of dynamic soil springs applied to the Design Model is included in Attachment F. Vertical static soil spring loads are provided in Attachment AF of this calculation.

Displacements and bearing pressures for normal loads are calculated in Attachment AL and are found to be acceptable.

4.11 Soil Pressure Load Methods

A detailed description of the calculation of soil pressure loads applied to the Design Model is included in Attachment E. Sub-grade walls of the SHINE facility are designed to resist static lateral earth pressure loads, compaction loads, static and dynamic surcharge loads, and elastic dynamic soil pressure loads. Application of active and passive earth pressures is not required because the building, as shown in Attachment I, is stable against sliding and overturning. Therefore, the static lateral soil pressure is based on the at-rest earth pressure. Calculation of soil pressure loading is based on the embedded depth of the sub-grade walls and on the soil properties of the site per the Golder Report [3.3.3]. Sub-grade wall depth is based on drawing SHINE RCA Layout, Drawing No. 7290-SK-005 [3.2.1].

The lateral static soil pressure is determined based on the at-rest earth pressure as the structure is stable against sliding and overturning. The at-rest earth pressure coefficient is derived using a friction angle of 30 degrees. Reference 3.3.3, Page 19, uses a friction angle value of 34 degrees;

however, for the purpose of this evaluation, a friction angle of 30 degrees is conservatively used. Further, as stated in the report, because the groundwater is 50-65 feet below grade, well below the lowest elevation of sub-grade wall, groundwater does not need to be accounted for in sub-grade wall design. Reference 3.3.3 uses a Soil Dry Density value of 118 pcf for analysis; however, for the purpose of this evaluation, a soil density of 125 pcf will conservatively be used to consider any moisture content in the soil.

A uniformly distributed live surcharge load of 250 psf, consistent with Table 4-1 of ASCE 7-05 [3.1.2] for heavy manufacturing equipment, is considered for areas adjacent to the sub-grade walls. In addition to live load, a uniformly distributed dead surcharge load is determined based on the dead weight of the above grade structure and applied to all areas of the sub-grade walls. Further, the soil pressure due to all dynamic surcharge loads is derived by applying the peak ground horizontal acceleration of 0.20g (Reference 1.3.2) to the static dead and live surcharge load. The design lateral earth pressures from surcharge loads are added to the lateral earth pressure loads.

The elastic dynamic soil pressure loads on the sub-grade walls are computed per Section 3.5.3.2 of ASCE 4-98 [3.1.4] and Chapter 2 of Earthquake-Induced Soil Pressures on Structures [3.3.4]. Per Section 3.5.3.2 of ASCE 4-98 [3.1.4], the elastic solution is a conservative approach for determining dynamic seismic soil pressures on embedded, sub-grade walls. The seismic soil pressures on sub-grade walls of the SHINE structure are computed based on the detailed numerical solution of the elastic solution as provided in Section 2.1 of Reference 3.3.4 using site-specific soil properties from the Golder Report. The results of the numerical solution are consistent with Figure 3.5-1 of ASCE 4-98 [3.1.4], which provides a variation of normal dynamic soil pressures for the elastic solution with 1.0 g horizontal earthquake acceleration. The dynamic soil pressure varies with depth, but for this calculation, the maximum value is conservatively applied as a constant pressure along the depth of the embedded walls. This load is linearly added to the static and surcharge pressure loads and it is assumed to act in the same direction as the inertial load in accordance with Reference 1.3.4.

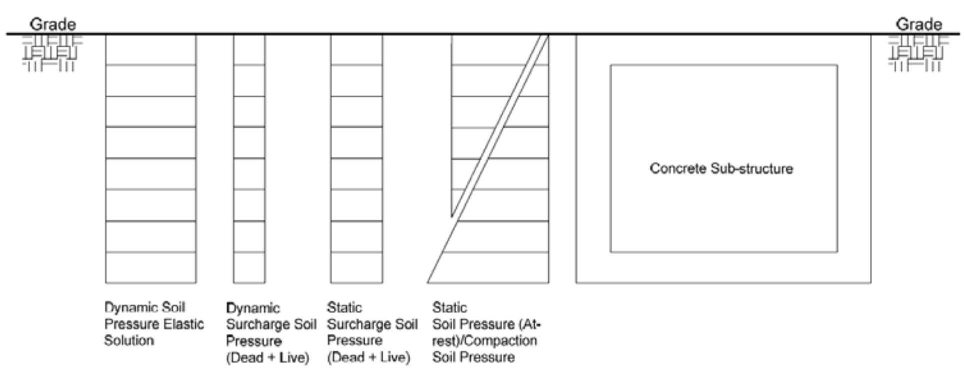


Figure 4.11-1 – Combination of Soil Pressure Loads on the SHINE Facility Sub-grade Walls

4.12 Fluid Load Methods

The Irradiation Hot Cells of the SHINE Medical Isotope Production Facility are designed to resist hydrostatic and hydrodynamic fluid loads. Detailed methodology and calculation of the

hydrostatic and hydrodynamic fluid loading applied to the SAP2000 model is included in Attachment G. The hydrostatic loading is calculated based on the actual dimensions of the hot cells and applied in the model as lateral hydrostatic pressure on the walls and vertical hydrostatic pressure on the bottom slabs. The hydrodynamic loading is applied to the model by considering hydrodynamic masses rigidly attached to the hot cells in accordance with ASCE 4-98 [3.1.4] and Chapter 6 of Nuclear Reactors and Earthquakes TID-7024 [3.3.5]. The provisions, as outlined in the referenced documents, require that the impulsive and convective masses are applied to the model to capture the dynamic effects due to seismic motion.

4.13 Flood Load Methods

The design basis flood level is at grade and the ground water level is at 50' below grade for the SHINE facility. Therefore, flooding is not anticipated for the SHINE facility and associated loading is not included as a design load.

4.14 Tornado Load Methods

Tornado wind pressures in the Design Model are based on the same unit wind pressures described in Section 4.6. A factor is used to modify the unit wind pressures and convert them to equivalent tornado wind pressures. The factor includes a size coefficient that accounts for the non-uniformity in space of the tornado wind field per Figure 16.1.1 of Reference 3.3.12. In addition, a differential pressure is calculated to account for the atmospheric pressure change caused by the differential pressure between the interior and exterior of the structure during a tornado event. The tornado differential pressure is provided per NRC Regulatory Guide 1.76 [3.1.19] and applied as an outward pressure to the North, South, East, and West walls as well as the roof because the structure is enclosed per NRC SRP 3.3.2 [3.1.18].

Per Reference 3.3.12, the NRC regulations require that nuclear power plant designs consider the impact of tornado-generated missiles in addition to the direct action of the tornado wind and the moving ambient pressure field. Forces due to these missile impacts are applied to the SHINE Design Model. See Attachment B for the detailed tornado wind and missile calculations.

4.15 Thermal Load Methods

4.15.1 Thermal Gradient

In accordance with Section 1.3 of ACI 349.1R-07 [3.1.20], thermal gradients less than approximately 100 ºF need not be analyzed because such gradients will not cause significant stress in the reinforcement or strength deterioration. For a location in close proximity to the SHINE Facility site (Madison, WI), Table A.1 of Reference 3.3.16 provides a minimum design dry-bulb temperature of -7 ºF and a maximum dry-bulb temperature of 88 ºF. Therefore, the air temperature inside the SHINE facility would have to reach 93 ºF (the working indoor temperature is assumed to be about 70 ºF) in order to experience minor loading effects, which is not anticipated.

4.15.2 Uniform Temperature Change

In accordance with Section 1.3 of ACI 349.1R-07 [3.1.20], uniform temperature changes less than approximately 50 ºF need not be analyzed because such temperature change may cause strains up to about 0.0003 in./in. which is only about 10% of the maximum design strain. Table A.1 of Reference 3.3.16 provides a minimum design dry-bulb temperature of -7 ºF and a maximum dry-bulb temperature of 88 ºF. Assuming that the concrete is poured at a atmospheric temperature of 60 ºF , the uniform temperature change is calculated as follows:

Δ_{min} = [60 ºF – (-7 ºF)] / 2 = 33.5 ºF

Δ_{max} = [88 ºF – 60 ºF] / 2 = 14 ºF

Both changes in temperature are less than 50 ºF; therefore, any loading effects due to uniform temperature change are considered negligible.

4.16 Accidental Eccentricity Loads

The analysis of accidental eccentricity loads is described in detail in Attachment H of this calculation.

4.17 SSI Comparison

SSI Model accelerations are compared with the Design Model accelerations in order to develop increase factors to apply to the Design Model so that it envelops the SSI results. A detailed description of the process used to compare SSI Model accelerations with Design Model accelerations is provided in Attachment AG of this calculation.

5.0 CALCULATIONS

Concrete walls and slabs in the SHINE Facility are designed for axial, flexural, and shear loads per provisions of ACI 349-06 (Ref. 3.1.9). Walls and slabs are modeled in SAP2000 using groups of shell elements. To determine the longitudinal and transverse reinforcement required within a wall or slab, a single shell element is selected for detailed analysis; the selected element is representative of a typical element within the group based on its location and loading. Using resultant loads obtained from SAP2000 model data, the element is designed in Mathcad modules as a reinforced concrete section per ACI 349-06 (Reference 3.1.9). The modules determine the required areas of steel for combined axial and flexural loads, in-plane shear loads, and out-of-plane shear loads. Using these results, reinforcement size and spacing is specified. The methodology for the reinforced concrete section design is discussed herein.

Representative elements are reported for the following areas:

- North Wall
- East Wall
- South Wall
- West Wall
- Control Building West Wall
- Interior N-S Wall
- Off-Gas Cell Wall
- Interior E-W Wall
- Roof
- Basemat
- Irradiation Cell Wall
- Below Grade Tank Room Wall

- Below Grade Tank Room Slab
- Irradiation Cell Slab

After selecting an element from a given group, the element is first evaluated for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams. The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. The user-specified reinforcement is increased until all load points fall within the P-M curve limits, ensuring section capacity is sufficient for combined axial and flexural loads. The compressive strength of steel is conservatively neglected in this design. The points summarized below are used to define each P-M diagram; see the figure below for an example PM curve.

1) Maximum compression with zero moment (accounts for accidental eccentricity)

2 & 12) Intersection of compression-controlled failure curve and horizontal extension of Point 1

3 & 11) Tension steel strain at 50% of yield strain

4 & 10) Lower bound of compression-controlled failure curve

5 & 9) Upper bound of tension-controlled failure curve

6 & 8) Pure flexure with zero axial load

7) Pure axial tension (considers no concrete tensile strength)

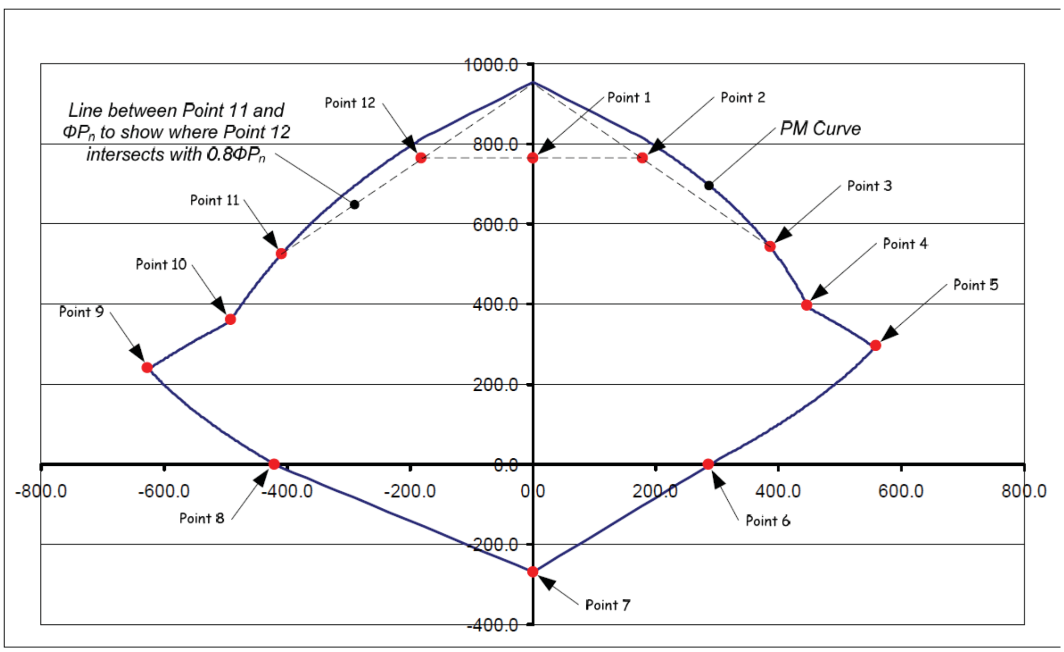


Figure 5-1 – P-M Curve Diagram

Following flexural design, the element is evaluated for shear loading effects. Four cases are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane horizontal shear, and (4) out-of-plane vertical shear. Like the flexural design cases, all shear design cases consider 12-in. wide concrete sections extending through the thickness of the wall or slab. However, unlike flexural design, only the governing load combination is considered for each shear design case. Applicable loads are obtained from SAP2000 model data, and a Mathcad module is used to determine the areas of steel reinforcement required for the four types of shear loading.

In-plane shear design requirements differ based on whether or not the governing load combination considers seismic effects. If a non-seismic load case governs, in-plane shear design follows provisions of Sections 11.10.2 through 11.10.9 of ACI 349-06 (Reference 3.1.9). If, however, a seismic load case governs, in-plane shear design follows the provisions of Chapter 21 of ACI 349-06. The area of in-plane shear steel calculated is the total for the section, not each face. Out-of-plane shear design follows provisions for slabs in Sections 11.1 through 11.5 of ACI 349-06, regardless of load case type.

For the selected element, the Mathcad design modules calculate six different required areas of steel (for the two flexural cases and four shear cases described above). The required area of horizontal flexural steel is added to the required area of horizontal in-plane shear steel per face (half of total in-plane shear reinforcement) to obtain a total required area of horizontal longitudinal reinforcement per face; the process is repeated for vertical longitudinal reinforcement. Then, the required areas of steel for horizontal and vertical out-of-plane shear are combined to calculate a total required area of out-of-plane reinforcement. Finally, reinforcement is selected to provide areas of steel exceeding those required. Attachment K through Attachment Z show the design calculations in detail.

6.0 RESULTS

Table 6-1 – Representative Element Reinforcement Summary (per Face of Walls / Slabs)

Location	Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
	(-)	(-)	(in²/ft)	(in²/ft)	(-)	(in²/ft)
North Wall[1]	Horizontal Longitudinal	Flexural	0.53	0.89	#9 @ 12″ on center	1.00
		In-Plane Shear	0.36			
	Vertical Longitudinal	Flexural	0.79	1.15	#10 @ 12″ on center	1.27
		In-Plane Shear	0.36			
East Wall[1]	Horizontal Longitudinal	Flexural	0.79	1.15	#10 @ 12″ on center	1.27
		In-Plane Shear	0.36			
	Vertical Longitudinal	Flexural	1.00	1.36	#10 @ 9″ on center	1.69
		In-Plane Shear	0.36			
South Wall[1]	Horizontal Longitudinal	Flexural	1.00	1.36	#10 @ 9″ on center	1.69
		In-Plane Shear	0.36			
	Vertical Longitudinal	Flexural	1.27	1.63	#10 @ 9″ on center	1.69
		In-Plane Shear	0.36			
West Wall[1]	Horizontal Longitudinal	Flexural	0.79	1.15	#10 @ 12″ on center	1.27
		In-Plane Shear	0.36			
	Vertical Longitudinal	Flexural	1.00	1.36	#10 @ 9″ on center	1.69
		In-Plane Shear	0.36			
Control Building West Wall[1]	Horizontal Longitudinal	Flexural	0.79	1.15	#10 @ 12″ on center	1.27
		In-Plane Shear	0.36			
	Vertical Longitudinal	Flexural	0.79	1.15	#10 @ 12″ on center	1.27
		In-Plane Shear	0.36			
Interior North-South Wall	Horizontal Longitudinal	Flexural	0.53	0.89	#9 @ 12″ on center	1.00
		In-Plane Shear	0.36			
	Vertical Longitudinal	Flexural	0.67	1.03	#10 @ 12″ on center	1.27
		In-Plane Shear	0.36			
Interior East-West Wall	Horizontal Longitudinal	Flexural	0.79	1.15	#10 @ 12″ on center	1.27
		In-Plane Shear	0.36			
	Vertical Longitudinal	Flexural	0.53	0.89	#9 @ 12″ on center	1.00
		In-Plane Shear	0.36			
Roof[1]	Horizontal Longitudinal	Flexural	1.00	1.00	#9 @ 12″ on center	1.00
		In-Plane Shear	0.00			
	Vertical Longitudinal	Flexural	0.53	0.67	#8 @ 12″ on center	0.79
		In-Plane Shear	0.14			
Basemat, Location 1	Horizontal Longitudinal	Flexural	1.69	1.69	#10 @ 9″ on center	1.69
		In-Plane Shear	0.00			
	Vertical Longitudinal	Flexural	1.00	1.00	#9 @ 12″ on center	1.00
		In-Plane Shear	0.00			
Basemat, Location 2	Horizontal Longitudinal	Flexural	1.00	1.00	#9 @ 12″ on center	1.00
		In-Plane Shear	0.00			
	Vertical Longitudinal	Flexural	1.27	1.27	#10 @ 12″ on center	1.27
		In-Plane Shear	0.00			
Irradiation Cell Wall	Horizontal Longitudinal	Flexural	1.56	2.64	#11 @ 6″ on center	3.12
		In-Plane Shear	1.08			
	Vertical Longitudinal	Flexural	1.56	2.64	#11 @ 6″ on center	3.12
		In-Plane Shear	1.08			

Table 6-4.17-1 (Continued)

Off-Gas Cell Wall	Horizontal Longitudinal	Flexural	1.04	1.76	#9 @ 6″ on center	2.00
		In-Plane Shear	0.72			
	Vertical Longitudinal	Flexural	1.04	1.76	#9 @ 6″ on center	2.00
		In-Plane Shear	0.72			
Irradiation Cell Slab	Horizontal Longitudinal	Flexural	1.56	1.56	#11 @ 12″ on center	1.56
		In-Plane Shear	0.00			
	Vertical Longitudinal	Flexural	1.56	1.56	#11 @ 12″ on center	1.56
		In-Plane Shear	0.00			
Below Grade Tank Room Wall, Location 1	Horizontal Longitudinal	Flexural	1.00	1.54	#11 @ 12″ on center	1.56
		In-Plane Shear	0.54			
	Vertical Longitudinal	Flexural	1.00	1.54	#11 @ 12″ on center	1.56
		In-Plane Shear	0.54			
Below Grade Tank Room Wall, Location 2	Horizontal Longitudinal	Flexural	1.00	1.54	#11 @ 12″ on center	1.56
		In-Plane Shear	0.54			
	Vertical Longitudinal	Flexural	1.00	1.54	#11 @ 12″ on center	1.56
		In-Plane Shear	0.54			
Below Grade Tank Room Slab	Horizontal Longitudinal	Flexural	1.00	1.00	#9 @ 12″ on center	1.00
		In-Plane Shear	0.00			
	Vertical Longitudinal	Flexural	1.00	1.00	#9 @ 12″ on center	1.00
		In-Plane Shear	0.00			

1. The steel reinforcement specified in this table for exterior above-grade structural concrete may be less than that required by aircraft impact analysis; if so, the reinforcement required by aircraft impact analysis shall govern.

7.0 IDENTIFICATION OF COMPUTER PROGRAMS

In addition to productivity software (i.e. Microsoft Office) the following programs have been used in the preparation of this calculation:

- SAP2000 Version 14.1, S&L Program No. 03.7.224-14.1/o
- Mathsoft MathCad Version 14.35, S&L Program No. 03.7.54814.35

The following PCs were used in the preparation of this calculation:

- PC#ZL2762
- PC#ZL6296
- PC#ZL8118
- PC#ZD6054
- PC#ZL8096
- PC#ZD6194
- PC#ZD6943
- PC#ZL6355

Table of Contents

Calculation of Trench and Tank Cover Block Weights

Weight of concrete,

$\gamma_c := 150\text{pcf}$

Trench Covers

Trench area 1,

$w_1 := 6\text{ft}$ $\quad l_1 := 130.5\text{ft}$

$w_2 := 4\text{ft}$ $\quad l_2 := 6.83\text{ft}$

$$W_{TA1} := \gamma_c \cdot \left[\left[\left(w_1\right)\cdot(2\text{ft}) + \left(w_1 - 1\text{ft}\right)(2\text{ft})\right]\cdot l_1 + 8\left[\left(w_2\right)\cdot(2\text{ft}) + \left(w_2 - 1\text{ft}\right)(2\text{ft})\right]\cdot l_2\right] = 545.394\cdot\text{kip}$$

Trench area 2,

$w := 6\text{ft}$ $\quad l := 146\text{ft}$

$$W_{TA2} := \gamma_c \cdot [(w)\cdot(2\text{ft}) + (w - 1\text{ft})(2\text{ft})]\cdot l = 481.8\cdot\text{kip}$$

Trench area 3,

$w := 6\text{ft}$ $\quad l := 78.83\text{ft}$

$$W_{TA3} := \gamma_c \cdot [(w)\cdot(2\text{ft}) + (w - 1\text{ft})(2\text{ft})]\cdot l = 260.139\cdot\text{kip}$$

Trench area 4,

$w := 6\text{ft}$ $\quad l := 98.167\text{ft}$

$$W_{TA4} := \gamma_c \cdot [(w)\cdot(2\text{ft}) + (w - 1\text{ft})(2\text{ft})]\cdot l = 323.951\cdot\text{kip}$$

Trench area 5,

$w := 6\text{ft}$ $\quad l := 54\text{ft}$

$$W_{TA5} := \gamma_c \cdot [(w)\cdot(2\text{ft}) + (w - 1\text{ft})(2\text{ft})]\cdot l = 178.2\cdot\text{kip}$$

Trench area 6,

$w := 6\text{ft}$ $\quad l := 65\text{ft}$

$$W_{TA6} := \gamma_c \cdot [(w)\cdot(2\text{ft}) + (w - 1\text{ft})(2\text{ft})]\cdot l = 214.5\cdot\text{kip}$$

Trench area 7,

$w_1 := 4\text{ft}$ $\quad l_1 := 46.792\text{ft}$

$w_2 := 4\text{ft}$ $\quad l_2 := 12.167\text{ft}$

$$W_{TA7} := \gamma_c \cdot \left[2\left[\left(w_1\right)\cdot(2\text{ft}) + \left(w_1 - 1\text{ft}\right)(2\text{ft})\right]\cdot l_1 + 2\left[\left(w_2\right)\cdot(2\text{ft}) + \left(w_2 - 1\text{ft}\right)(2\text{ft})\right]\cdot l_2\right] = 247.628\cdot\text{kip}$$

Neutron Driver

$w := 14ft$

$l := 14ft$

$W_{ND} := \gamma_c \cdot [(w)\cdot(l)\cdot(2ft) + (w - 1ft)(l - 1ft)\cdot(2ft) + (w - 2ft)(l - 2ft)\cdot(2ft)] = 152.7\cdot kip$

CB-0301 TK-0301

$w := 7.5ft$

$l := 7.5ft$

$W_{0301} := \gamma_c \cdot [(w)\cdot(l)\cdot(2ft) + (w - 1ft)(l - 1ft)\cdot(2ft)] = 29.55\cdot kip$

CB-0609 TK-0609

$w := 4.83ft$

$l := 4.83ft$

$W_{0609} := \gamma_c \cdot [(w)\cdot(l)\cdot(2ft) + (w - 1ft)(l - 1ft)\cdot(2ft)] = 11.399\cdot kip$

CB-0602 TK-0602

$w := 9.167ft$

$l := 4.67ft$

$W_{0602} := \gamma_c \cdot [(w)\cdot(l)\cdot(2ft) + (w - 1ft)(l - 1ft)\cdot(2ft)] = 21.835\cdot kip$

CB-0601 TK-0601

$w := 5.167ft$

$l := 5.167ft$

$W_{0601} := \gamma_c \cdot [(w)\cdot(l)\cdot(2ft) + (w - 1ft)(l - 1ft)\cdot(2ft)] = 13.219\cdot kip$

CB-0605 TK-0605

$w := 7.67ft$

$l := 3.917ft$

$W_{0605} := \gamma_c \cdot [(w)\cdot(l)\cdot(2ft) + (w - 1ft)(l - 1ft)\cdot(2ft)] = 14.85\cdot kip$

CB-0001 TK-0001

$w := 9.917ft$

$l := 10.67\,\text{ft}$

$W_{0001} := \gamma_c \cdot [(w)\cdot(l)\cdot(2\text{ft}) + (w - 1\text{ft})(l - 1\text{ft})\cdot(2\text{ft})] = 57.613\cdot\text{kip}$

CB-0606 TK-0606

$w := 9.917\,\text{ft}$

$l := 10.67\,\text{ft}$

$W_{0606} := \gamma_c \cdot [(w)\cdot(l)\cdot(2\text{ft}) + (w - 1\text{ft})(l - 1\text{ft})\cdot(2\text{ft})] = 57.613\cdot\text{kip}$

CB-0604 TK-0604

$w := 3.167\,\text{ft}$

$l := 7.67\,\text{ft}$

$W_{0604} := \gamma_c \cdot [(w)\cdot(l)\cdot(2\text{ft}) + (w - 1\text{ft})(l - 1\text{ft})\cdot(2\text{ft})] = 11.623\cdot\text{kip}$

CB-0003

$w := 9.33\,\text{ft}$

$l := 9.33\,\text{ft}$

$W_{0003} := \gamma_c \cdot [(w)\cdot(l)\cdot(2\text{ft}) + (w - 1\text{ft})(l - 1\text{ft})\cdot(2\text{ft})] = 46.931\cdot\text{kip}$

CB-0002 TK-0002

$w := 14\,\text{ft}$

$l := 14\,\text{ft}$

$W_{0002} := \gamma_c \cdot [(w)\cdot(l)\cdot(2\text{ft}) + (w - 1\text{ft})(l - 1\text{ft})\cdot(2\text{ft})] = 109.5\cdot\text{kip}$

Surface Pressures for Tanks

Tank	Description	Weight (lbs) per SK-005 unless noted otherwise	Cell Interior Floor Area (in^2)	Cell Interior Floor Area (ft^2)	Surface Pressure to Apply to Model (ksf)
TK-0001	Critically Safe Sump Catch Tank	46200	12412	86.2	0.536
TK-0002	Combined Rad Waste Holding Tank	113000	24336	169.0	0.669
TK-0101	Uranyl Sulfate Preparation Tank	1900	36480	253.3	0.008
TK-0102	Uranium Metal Dissolution Tank	10000	--	--	Included with HC-0005
TK-0301	Target Solution Hold Tank	2500	6084	42.3	0.060
TK-0303	TSV Dump Tank	3400	--	--	Included with HC-0010A/B
TK-0501	MO Extraction Feed Tank	50	--	--	Included with HC-0001/HC-0002
TK-0502	MO Extraction Column	10	--	--	
TK-0503	MO Eluate Hold Tank	100	--	--	
TK-0504	MO Eluate Concentration Column	10000	--	--	
TK-0601	Uranyl Nitrate Conversion Tank	3900	2500	17.4	0.225
TK-0602	Urex Feed Tank	9100	4312	29.9	0.304
TK-0603	TC Removal Column	10000	--	--	Included with HC-0003
TK-0604	Solvent Hold Tank	2400	2078	14.4	0.167
TK-0605	Raffinate Hold Tank	4700	2800	19.4	0.242
TK-0606	Recycle UN Hold Tank	35600	12412	86.2	0.414
TK-0607	UN Evaporator Vessel	10000	--	--	Included with HC-0005
TK-0608	Thermal Denitrator	170	--	--	
TK-0609	Recycle Target Solution Tank	2300	2116	14.7	0.157

'TBD' per 7290-SK-005 [3.2.1], assumed to be 10000 lbs

Surface Pressures for Hot Cells

Hot Cell	Description	Weight (lbs) per SK-005 unless noted otherwise	Additional Tank Weight (lbs) from above	Area (in^2)	Area (ft^2)	Surface Pressure to Apply to Model (ksf)
HC-0001	Supercell A	883000	10160	52412	364.0	2.46
HC-0002	Supercell B	883000	10160	52412	364.0	2.46
HC-0003	Urex Hot Cell	1845000	10000	134016	930.7	2.00
HC-0004	Solid Waste Packing Hot Cell	261000	0	20158	140.0	1.87
HC-0005	Thermal Denitration Hot Cell	190000	20170	53858	374.0	0.57
HC-0006	Pump Transfer Hot Cell	694000	0	78624	546.0	1.28
HC-0007	Noble Gas Hot Cell	532000	0	47400	329.2	1.62
HC-0008	Waste Evaporation Hot Cell	694000	0	78624	546.0	1.28
HC-0009	Cementation Hot Cell	214000	0	30612	212.6	1.01
HC-0010-A	Irradiation Hot Cell A	6600	3400	20736	144.0	0.07
HC-0010-B	Irradiation Hot Cell B	6600	3400	20736	144.0	0.07
HC-0011	Off-Gas Equipment Hot Cell	5000	0	7476	51.9	0.10

Estimated equipment weight only, walls are modeled
Applied over larger area due to uncertainty of location

Surface Pressures for Shielded Storage

Tank	Description	Weight (lbs)	Cell Interior Floor Area (in^2)	Cell Interior Floor Area (ft^2)	Surface Pressure to Apply to Model (ksf)
NA	Shielded Storage	10000	10000	69.4	0.144

'TBD' per 7290-SK-005 [3.2.1], assumed to be 10000 lbs

Surface Pressures for Primary Cooling

Tank	Description	Weight (lbs)	Cell Interior Floor Area (in^2)	Cell Interior Floor Area (ft^2)	Surface Pressure to Apply to Model (ksf)
NA	Primary Cooling	10000	5400	37.5	0.267

'TBD' per 7290-SK-005 [3.2.1], assumed to be 10000 lbs

Surface Pressures for Tanks (Formulas)

Tank	Description	Weight (lbs) per SK-005 unless noted otherwise	Cell Interior Floor Area (in^2)	Cell Interior Floor Area (ft^2)	Surface Pressure to Apply to Model (ksf)
TK-0001	Critically Safe Sump Catch Tank	46200	12412	=E5/144	=ROUNDUP(0.001*D5/F5,3)
TK-0002	Combined Rad Waste Holding Tank	113000	24336	=E6/144	=ROUNDUP(0.001*D6/F6,3)
TK-0101	Uranyl Sulfate Preparation Tank	1900	36480	=E7/144	=ROUNDUP(0.001*D7/F7,3)
TK-0102	Uranium Metal Dissolution Tank	10000	--	--	Included with HC-0005
TK-0301	Target Solution Hold Tank	2500	6084	=E9/144	=ROUNDUP(0.001*D9/F9,3)
TK-0303	TSV Dump Tank	3400	--	--	Included with HC-0010A/B
TK-0501	MO Extraction Feed Tank	50	--	--	Included with HC-0001/HC-0002
TK-0502	MO Extraction Column	10	--	--	
TK-0503	MO Eluate Hold Tank	100	--	--	
TK-0504	MO Eluate Concentration Column	10000	--	--	
TK-0601	Uranyl Nitrate Conversion Tank	3900	2500	=E15/144	=ROUNDUP(0.001*D15/F15,3)
TK-0602	Urex Feed Tank	9100	4312	=E16/144	=ROUNDUP(0.001*D16/F16,3)
TK-0603	TC Removal Column	10000	--	--	Included with HC-0003
TK-0604	Solvent Hold Tank	2400	2078	=E18/144	=ROUNDUP(0.001*D18/F18,3)
TK-0605	Raffinate Hold Tank	4700	2800	=E19/144	=ROUNDUP(0.001*D19/F19,3)
TK-0606	Recycle UN Hold Tank	35600	12412	=E20/144	=ROUNDUP(0.001*D20/F20,3)
TK-0607	UN Evaporator Vessel	10000	--	--	Included with HC-0005
TK-0608	Thermal Denitrator	170	--	--	
TK-0609	Recycle Target Solution Tank	2300	2116	=E23/144	=ROUNDUP(0.001*D23/F23,3)

'TBD' per 7290-SK-005 [3.2.1], assumed to be 10000 lbs

Surface Pressures for Hot Cells (Formulas)

Hot Cell	Description	Weight (lbs) per SK-005 unless noted otherwise	Additional Tank Weight (lbs) from above	Area (in^2)	Area (ft^2)	Surface Pressure to Apply to Model (ksf)
HC-0001	Supercell A	883000	=D11+D12+D13+D14	52412	=F32/144	=ROUNDUP(0.001*(D32+E32)/G32,2)
HC-0002	Supercell B	883000	=D11+D12+D13+D14	52412	=F33/144	=ROUNDUP(0.001*(D33+E33)/G33,2)
HC-0003	Urex Hot Cell	1845000	=D17	134016	=F34/144	=ROUNDUP(0.001*(D34+E34)/G34,2)
HC-0004	Solid Waste Packing Hot Cell	261000	0	20158	=F35/144	=ROUNDUP(0.001*(D35+E35)/G35,2)
HC-0005	Thermal Denitration Hot Cell	190000	=D8+D21+D22	53858	=F36/144	=ROUNDUP(0.001*(D36+E36)/G36,2)
HC-0006	Pump Transfer Hot Cell	694000	0	78624	=F37/144	=ROUNDUP(0.001*(D37+E37)/G37,2)
HC-0007	Noble Gas Hot Cell	532000	0	47400	=F38/144	=ROUNDUP(0.001*(D38+E38)/G38,2)
HC-0008	Waste Evaporation Hot Cell	694000	0	78624	=F39/144	=ROUNDUP(0.001*(D39+E39)/G39,2)
HC-0009	Cementation Hot Cell	214000	0	30612	=F40/144	=ROUNDUP(0.001*(D40+E40)/G40,2)
HC-0010-A	Irradiation Hot Cell A	=6600	=D10	20736	=F41/144	=ROUNDUP(0.001*(D41+E41)/G41,2)
HC-0010-B	Irradiation Hot Cell B	=6600	=D10	20736	=F43/144	=ROUNDUP(0.001*(D43+E43)/G43,2)
HC-0011	Off-Gas Equipment Hot Cell	5000	0	7476	=F45/144	=ROUNDUP(0.001*(D45+E45)/G45,2)

Estimated equipment weight only, walls are modeled

Applied over larger area due to uncertainty of location

Surface Pressures for Shielded Storage (Formulas)

Tank	Description	Weight (lbs)	Cell Interior Floor Area (in^2)	Cell Interior Floor Area (ft^2)	Surface Pressure to Apply to Model (ksf)
NA	Shielded Storage	10000	10000	=E59/144	=ROUNDUP(0.001*D59/F59,3)

'TBD' per 7290-SK-005 [3.2.1], assumed to be 10000 lbs

Surface Pressures (Formulas)

Tank	Description	Weight (lbs)	Cell Interior Floor Area (in^2)	Cell Interior Floor Area (ft^2)	Surface Pressure to Apply to Model (ksf)
NA	Primary Cooling	10000	5400	=E65/144	=ROUNDUP(0.001*D65/F65,3)

'TBD' per 7290-SK-005 [3.2.1], assumed to be 10000 lbs

Cover Block Joint Loads

Cover Block	Description	Quantity	Weight (lbs)	Number of Joints in Model	Joint Load (k)
CB-0001	Critically Safe Sump Catch Tank Cover Block	1	61500	20	3.08
CB-0002	Combined Rad Waste Holding Tank Cover Block	2	115000	26	4.43
CB-0003	Storage Hot Cell Cover Block	6	50500	18	2.81
CB-0010	Irradiation Hot Cell Cover Block	8	152700	28	5.46
CB-0011	Off-Gas Equipment Hot Cell Cover Block	8	40100	20	2.01
CB-0301	Target Solution Storage Cover Block	8	32300	16	2.02
CB-0601	Uranyl Nitrate Conversion Tank Cover Block	2	15000	12	1.25
CB-0602	Urex Feed Tank Cover Block	2	24300	16	1.52
CB-0604	Solvent Hold Tank Cover Block	1	13500	14	0.97
CB-0605	Raffinate Hold Tank Cover Block	2	16900	14	1.21
CB-0606	Recycle UN Hold Tank Cover Block	2	61500	20	3.08
CB-0609	Recycle Target Solution Tank Cover Block	3	13100	12	1.10
FP-0001	Service Trench Floor Plug 1	See Below			
FP-0002	Service Trench Floor Plug 2	See Below			

Calculated value, not from 7290-SK-005 [3.2.1]

Number of joints per block varies for blocks in this group; minimum number is used (conservative)

Joint Loads at Elevation 0' for Irradiation Hot Cells

Cell	Description	Weight (lbs)	Number of Joints in Model	Joint Load (k)
HC-0010-A	Irradiation Hot Cell A	6000	28	0.22
HC-0010-B	Irradiation Hot Cell B	6000	28	0.22

Assumed value

Door Joint Loads

Door	Description	Quantity	Weight (lbs)	Number of Joints in Model	Vertical Joint Load (k)	Lateral Joint Load (k) at top and bottom
D-0001 (South)	Sliding Containment Door	1	87000	5	17.40	8.7
D-0001 (North)	Sliding Containment Door	1	87000	5	17.40	8.7

Door	Door	Quantity	Area (in^2) from AutoCAD drawing	Area (ft^2)	Height (ft)	Concrete Volume (ft^3)	Weight (k)	Number of Joints in Model	Vertical Joint Load (k)
--	Neutron Driver Doors	8	4752	33	10	330	49.5	3	16.5

Lateral joint loads for Neutron Driver Doors (applied to wall on both sides of each door opening, 10 joints total per door)	Weight (k)	Number of Joints in Model	Lateral Joint Load (k)
	49.5	10	4.95

Trench Cover Block Joint Loads

Cover Block	Description	Quantity	Weight (k) (calculated)	Number of Joints in Model	Joint Load (k)
Trench	Trench Area 1	1	545.39	164	3.33
Trench	Trench Area 2	1	481.80	124	3.89
Trench	Trench Area 3	1	260.14	68	3.83
Trench	Trench Area 4	1	323.95	78	4.16
Trench	Trench Area 5	1	178.20	44	4.05
Trench	Trench Area 6	1	214.50	62	3.46
Trench	Trench Area 7	1	247.63	98	2.53

Cover Block Joint Loads (Formulas)

Cover Block	Description	Quantity	Weight (lbs)	Number of Joints in Model	Joint Load (k)
CB-0001	Critically Safe Sump Catch Tank Cover Block	1	61500	20	=ROUNDUP(0.001*E6/F6,2)
CB-0002	Combined Rad Waste Holding Tank Cover Block	2	115000	26	=ROUNDUP(0.001*E7/F7,2)
CB-0003	Storage Hot Cell Cover Block	6	50500	18	=ROUNDUP(0.001*E8/F8,2)
CB-0010	Irradiation Hot Cell Cover Block	8	152700	28	=ROUNDUP(0.001*E9/F9,2)
CB-0011	Off-Gas Equipment Hot Cell Cover Block	8	40100	20	=ROUNDUP(0.001*E10/F10,2)
CB-0301	Target Solution Storage Cover Block	8	32300	16	=ROUNDUP(0.001*E11/F11,2)
CB-0601	Uranyl Nitrate Conversion Tank Cover Block	2	15000	12	=ROUNDUP(0.001*E12/F12,2)
CB-0602	Urex Feed Tank Cover Block	2	24300	16	=ROUNDUP(0.001*E13/F13,2)
CB-0604	Solvent Hold Tank Cover Block	1	13500	14	=ROUNDUP(0.001*E14/F14,2)
CB-0605	Raffinate Hold Tank Cover Block	2	16900	14	=ROUNDUP(0.001*E15/F15,2)
CB-0606	Recycle UN Hold Tank Cover Block	2	61500	20	=ROUNDUP(0.001*E16/F16,2)
CB-0609	Recycle Target Solution Tank Cover Block	3	13100	12	=ROUNDUP(0.001*E17/F17,2)
FP-0001	Service Trench Floor Plug 1	See Below			
FP-0002	Service Trench Floor Plug 2	See Below			

Calculated value, not from 7290-SK-005 [3.2.1]
Number of joints per block varies for blocks in this group; minimum number is used (conservative)

Joint Loads at Elevation 0' for Irradiation Hot Cells (Formulas)

Cell	Description	Weight (lbs)	Number of Joints in Model	Joint Load (k)
HC-0010-A	Irradiation Hot Cell A	6000	28	=ROUNDUP(0.001
HC-0010-B	Irradiation Hot Cell B	6000	28	=ROUNDUP(0.001

Assumed value

Door Joint Loads (Formulas)

Door	Description	Quantity	Weight (lbs)	Number of Joints in Model	Vertical Joint Load (k)	Lateral Joint Load (k) at top and bottom
D-0001 (South)	Sliding Containment Door	1	='Tanks and Hot Cells'!D47	5	=ROUNDUP(0.001*E34/F34,2)	=G34/2
D-0001 (North)	Sliding Containment Door	1	='Tanks and Hot Cells'!D47	5	=ROUNDUP(0.001*E35/F35,2)	=G35/2

Door	Door	Quantity	Area (in^2) from AutoCAD drawing	Area (ft^2)	Height (ft)	Concrete Volume (ft^3)	Weight (k)	Number of Joints in Model	Vertical Joint Load (k)
--	Neutron Driver Doors	8	4752	=E38/144	10	=F38*G38	=0.001*H38*150	3	=I38/J38

Lateral joint loads for Neutron Driver Doors (applied to wall on both sides of each door opening, 10 joints total per door)	Weight (k)	Number of Joints in Model	Lateral Joint Load (k)
	=$I$38	10	=I41/J41

Trench Cover Block Joint Loads (Formulas)

Cover Block	Description	Quantity	Weight (k) (calculated)	Number of Joints in Model	Joint Load (k)
Trench	Trench Area 1	1	545.394	164	=ROUNDUP(E48/F48,2)
Trench	Trench Area 2	1	481.8	124	=ROUNDUP(E49/F49,2)
Trench	Trench Area 3	1	260.139	68	=ROUNDUP(E50/F50,2)
Trench	Trench Area 4	1	323.951	78	=ROUNDUP(E51/F51,2)
Trench	Trench Area 5	1	178.2	44	=ROUNDUP(E52/F52,2)
Trench	Trench Area 6	1	214.5	62	=ROUNDUP(E53/F53,2)
Trench	Trench Area 7	1	247.628	98	=ROUNDUP(E54/F54,2)

Room	Wall Lengths	
FDA Lab	14.00	
	20.00	
Decon Room	16.00	
	12.00	
	16.00	
Health Physics	15.00	
	14.00	
Hot Lab	20.00	
Airlock	17.00	
	7.00	
Airlock	16.00	
	7.00	
Stair	16.00	
	7.00	
Uranyl Sulfate Prep and Storage	36.00	
	58.00	
	16.00	
	16.00	
	16.00	
Noble Gas Storage	22.00	
	17.00	
	22.00	
	17.00	
Total:	417.00	ft
Thickness:	1	ft
Height:	19.33	ft
Volume:	8062	ft^3
Unit Weight of Concrete:	150	pcf
	1209.3	kips
Floor Area:	3500	ft^2
	$\boxed{0.35}$	ksf

Room	Wall Lengths		
FDA Lab	14.00		
	20.00		
Decon Room	16.00		
	12.00		
	16.00		
Health Physics	15.00		
	14.00		
Hot Lab	20.00		
Airlock	17.00		
	7.00		
Airlock	16.00		
	7.00		
Stair	16.00		
	7.00		
Uranyl Sulfate Prep and Storage	36.00		
	58.00		
	16.00		
	16.00		
	16.00		
Noble Gas Storage	22.00		
	17.00		
	22.00		
	17.00		
Total:	=SUM(I4:I26)	ft	(Formulas)
Thickness:	1	ft	
Height:	=19+4/12	ft	
Volume:	=I27*I28*I29	ft^3	
Unit Weight of Concrete:	150	pcf	
	=0.001*I30*I31	kips	
Floor Area:	3500	ft^2	
	=I32/I33	ksf	

Proprietary Information
Security-Related Information

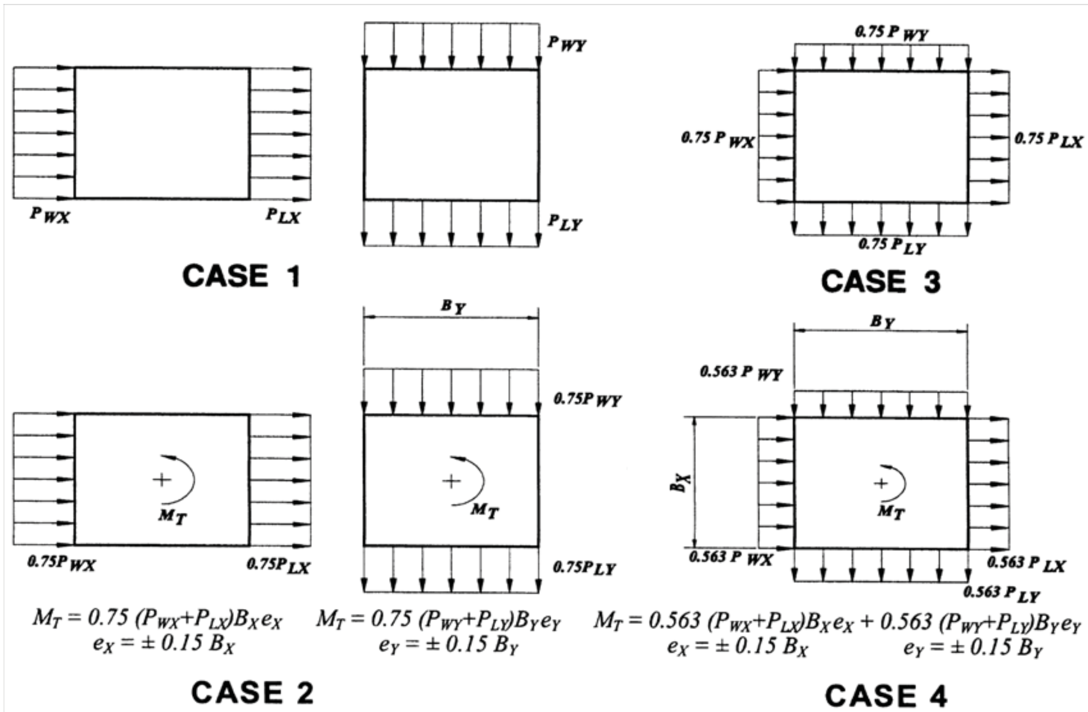
Table of Contents

B.1 Wind Loads

The SHINE Facility is designed for wind loads on its above grade walls and roof per ASCE 7-05 [3.1.2]. See Section B.1 for calculations of the wind loads on the structure. The SHINE Facility is also designed for tornado wind, differential pressure, and tornado missiles based on Regulatory Guide 1.76 [3.1.19]. See Section B.2 for calculations of the tornado wind loads and differential pressures on the structure, and see Section B.3 for the calculation of tornado missile loads.

The process for calculating the operating basis wind pressure starts by first calculating a unit wind pressure based on a unit velocity pressure (q_u). The unit velocity pressure is calculated with all factors equal to 1.0 and a wind velocity of 100 mph. Subsequently, the operating basis wind velocity pressure (q_o) is calculated with the appropriate factors and wind speeds as determined per ASCE 7-05 [3.1.2]. The wind load cases in the SAP model are applied using the unit wind pressure and then scaled by a factor (q_o/q_u) in the load combinations.

As described in the wind load provisions of ASCE 7-05 [3.1.2], four different scenarios are considered when applying the wind pressure loads on the structure (see Figure B.1-1). Case 1 takes into account wind loads originating either from the north, south, east, or west directions. Case 2 reduces the loading specified in Case 1, but it introduces a torsional moment on the structure. Case 3 accounts for oblique loads caused by winds acting at 45 degrees from the principal axis. Case 4 reduces the load specified in Case 3, but it introduces a torsional moment on the structure. The torsional moments specified for Cases 2 and 4 are produced by applying the reduced load from each case at an eccentricity equivalent to 15% the width of the walls.



Notation:

- P_{WX}, P_{WY}: Windward face design pressure acting in the x, y principal axis, respectively.
- P_{LX}, P_{LY}: Leeward face design pressure acting in the x, y principal axis, respectively.
- e (e_X, e_Y) : Eccentricity for the x, y principal axis of the structure, respectively.
- M_T: Torsional moment per unit height acting about a vertical axis of the building.

Figure B.1-1: Design wind load cases per ASCE 7-05 [3.1.2], Figure 6-9.

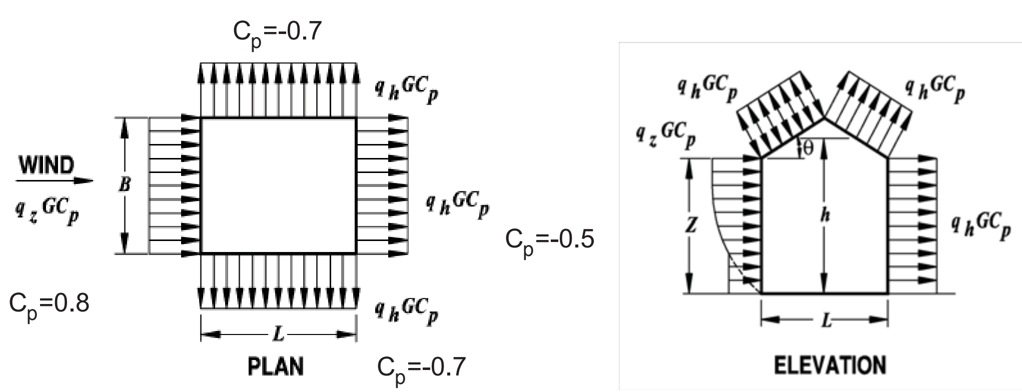
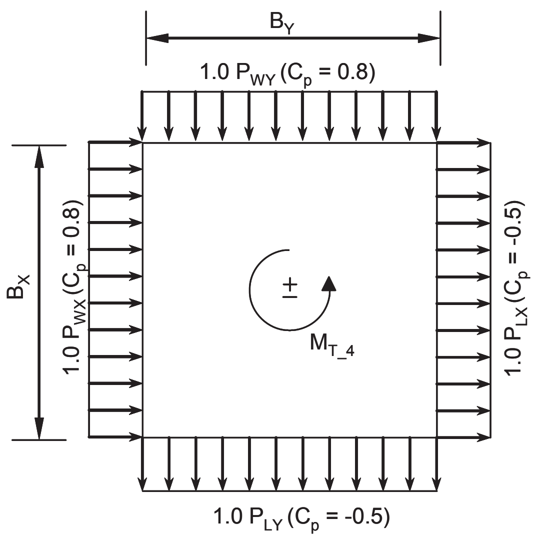


Figure B.1-2: Wind pressures acting on an enclosed structure due to a particular wind direction (ASCE 7-05 [3.1.2], Figure 6-6).

To reduce the number of possible load combinations in the SAP model, the four (4) load cases of ASCE 7-05 [3.1.2] are enveloped in two (2) new cases, as described below.

Case 5 uses the same wind direction and torsional moment magnitude as specified in case 4. However, the reduction factor of 0.563 for windward, leeward, and sidewall pressures is not used, a factor of 1.0 is applied instead (see Figure B.1-3) to envelop the wall pressures of cases 1, 2 and 3. Only case 4 requires a torsional moment, so that is the torsional moment considered for case 5 (including the 0.563 factors). Wall wind loading is based on simultaneous consideration of two wind directions, so roof wind loading per Figure 6-6 of ASCE 7-05 [3.1.2] is also applied for two directions simultaneously.



$M._{T\_4}$: Wind torsional moment per ASCE 7-05 [3.1.2], Figure 6-9, Case 4 (clockwise & counterclockwise)

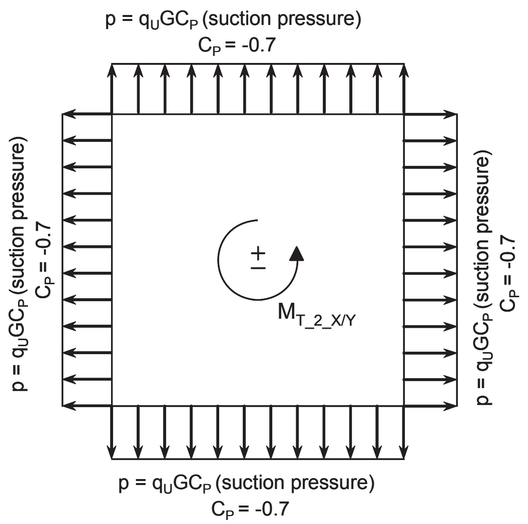
$$M_{T\_4}=0.563(P_{WX}+P_{LX})B_Xe_X + 0.563(P_{WY}+P_{LY})B_Ye_Y$$

$$e_X= + 0.15B_X \qquad e_Y= + 0.15B_Y$$

$$e_X= - 0.15B_X \qquad e_Y= - 0.15B_Y$$

Figure B.1-3: Case 5 applied to the SAP model.

Case 6 is added to account for the maximum tension on the walls produced by pure suction. This case uses side wall pressures with the same torsional moment magnitude specified for case 2 (see Figure B.1-4). A roof pressure load is not applied for this case.



M_{T_2} : Wind torsional moment in the X and Y direction per ASCE 7-05 [3.1.2], Figure 6-9, Case 2 (clockwise & counterclockwise)

$M_{T\_2\_X}=0.75(P_{WX}+P_{LX})B_Xe_X$

$e_X= + 0.15B_X$

$e_X= - 0.15B_X$

$M_{T\_2\_Y}=0.75(P_{WY}+P_{LY})B_Ye_Y$

$e_Y= + 0.15B_Y$

$e_Y= - 0.15B_Y$

Figure B.1-4: Case 6 applied to the SAP model.

B.1.1 Velocity pressure for operating basis wind (q_o)

$I := 1.15$ — Importance factor per Table 6-1 of ASCE 7-05 [3.1.2]. The SHINE facility is an Occupancy Category IV structure because it contains toxic substances.

$K_d := 0.85$ — Wind directionality factor per Table 6-4 of ASCE 7-05 [3.1.2].

Assume that structure is not located on a hill or escarpment that would cause wind speed-up effects.

$K_{zt} := 1.0$ — Topographic factor per Section 6.5.7.2 of ASCE 7-05 [3.1.2].

$h := 60ft$ — Approximate building height above grade (conservative) per Ref. 3.2.5.

Assume Exposure Category C.

$K_z := 1.13$ — Velocity pressure exposure coefficient at mean roof height of the building per Table 6-3 of ASCE 7-05 [3.1.2].

$V := 90mph$ — Basic wind speed in Wisconsin per Figure 6-1 of ASCE 7-05 [3.1.2].

$$q_o := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot \left(\frac{V}{mph}\right)^2 \cdot I \cdot psf$$

Wind velocity pressure per Eq. 6-15 of ASCE 7-05 [3.1.2].

$q_o = 22.9 \cdot psf$

B.1.2 Unit velocity pressure used in the SAP model (q_u)

Factors of 1.0 and a wind speed of 100 mph define the unit velocity pressure for the SAP model.

$I := 1.0$ — Importance factor

$K_{zt} := 1.0$ — Topographic factor

$K_z := 1.0$ — Velocity pressure exposure coefficient

$V := 100mph$ — Unit wind speed (mph)

$$q_u := 0.00256 \cdot K_z \cdot K_{zt} \cdot \left(\frac{V}{mph}\right)^2 \cdot I \cdot psf$$

Velocity pressure based on unit wind (ASCE 7-05 [3.1.2], Eq. 6-15)

$q_u = 25.60 \cdot psf$

B.1.3 Operating basis wind scale factor (q_o/q_u)

Operating basis wind scale factor scales the design unit wind pressure to the operating basis wind pressure. This factor is multiplied with the wind pressure terms in the applicable secondary load combinations (see Section 4.2.2 of the main calculation). An additional factor of 1.07 per Table C6-7 of ASCE 7-05 [3.1.2] is applied to the wind loads to consider a 100-year mean recurrance interval (MRI).

$\frac{q_o}{q_u} = 0.89$ — Operating basis wind scale factor

$SF_{100} := 1.07$ — Scale factor for 100-year MRI per Table C6-7 of ASCE 7-05 [3.1.2]

$SF_{100} \cdot (0.89) = 0.9523$ — Operating basis wind scale factor adjusted for 100-year MRI

B.1.4 Design unit wind pressures for walls and roof

The building is categorized as an enclosed building according to Section 6.2 of ASCE 7-05 [3.1.2] and as a result both external and internal pressures are applied to the structure. A positive and negative internal pressure (GCpi) are applied to the internal surfaces of the north, south, east, and west walls as well as the roof. No internal pressure is applied to the surfaces of the internal walls since the opposing forces on either surface cancel out.

The internal and external pressures are shown separately below because they are defined as separate load cases in the SAP model.

B.1.4.1 Internal Pressures

$L_{E\_W} := 195ft$ — Dimension of building in short (east-west) direction per Ref. 3.2.3

$L_{N\_S} := 200ft + 4in = 200.33 \cdot ft$ — Dimension of building in long (north-south) direction per Ref. 3.2.1

$GC_{pi} := 0.18$ — Positive internal pressure coefficient per Figure 6-5 of ASCE 7-05 [3.1.2]

$p_{pos\_int\_pres} := q_u \cdot GC_{pi}$ — Positive internal pressure per Section 6.5.11.1 of ASCE 7-05 [3.1.2]

$p_{pos\_int\_pres} = 4.61 \cdot psf$

$GC_{pi} := -0.18$ — Negative internal pressure coefficient per Figure 6-5 of ASCE 7-05 [3.1.2]

$p_{neg\_int\_pres} := q_u \cdot GC_{pi}$ — Negative internal pressure per Section 6.5.11.1 of ASCE 7-05 [3.1.2]

$p_{neg\_int\_pres} = -4.61 \cdot psf$

See Figures B.1.4.4-1 and 2 for diagrams of how this load is applied to the model.

B.1.4.2 External Pressures

Case 5

East/West Wind

$q_u = 25.6 \cdot psf$ — Unit wind velocity pressure

The fundamental frequency of the structure is > 1 Hz which classifies it as a rigid structure per the definitions in Section 6.2 of ASCE 7-05 [3.1.2].

$G := 0.85$ — Gust effect factor for a rigid structure per Section 6.5.8.1 of ASCE 7-05 [3.1.2]

Windward wall

$C_{p\_windward} := 0.8$ — External pressure coefficient (windward) per Figure 6-6 of ASCE 7-05 [3.1.2]

$p_{windward} := q_u \cdot G \cdot C_{p\_windward} = 17.41 \cdot psf$ — Windward wall pressure per Section 6.5.12.2.1 of ASCE 7-05 [3.1.2]

Leeward wall

$Ratio_{LB\_E\_W} := \frac{L_{E\_W}}{L_{N\_S}} = 0.97$ — Ratio L/B for wind approaching east or west side

$C_{p\_leeward} := -0.5$ — External pressure coefficient (leeward) per Figure 6-6 of ASCE 7-05 [3.1.2]

$p_{leeward} := q_u \cdot G \cdot C_{p\_leeward} = -10.88 \cdot psf$ — Leeward wall pressure per Section 6.5.12.2.1 of ASCE 7-05 [3.1.2]

Roof

$\theta_1 := \text{atan}\left[\frac{(57\text{ft} + 8\text{in}) - (56\text{ft} + 4\text{in})}{57\text{ft} + 3\text{ft}}\right] = 1.27\cdot\text{deg}$

Angle of slope for east side of main roof

$\theta_2 := \text{atan}\left[\frac{(57\text{ft} + 8\text{in}) - (48\text{ft} + 4\text{in})}{102.33\text{ft} + 3\text{ft}}\right] = 5.06\cdot\text{deg}$

Angle of slope for west side of main roof

$h_{eave} := 56\text{ft} + 4\text{in}$

Maximum eave height above grade per Ref. 3.2.5

$\frac{h_{eave}}{L_{E\_W}} = 0.29$

Ratio of height to horizontal dimension of the building parallel to the wind direction

$C_{p\_roof1} := -0.9$

Roof pressure coefficient per Figure 6-6 of ASCE 7-05 [3.1.2] for 0 to h from windward edge

$P_{roof1} := q_u \cdot G \cdot C_{p\_roof1} = -19.58\cdot\text{psf}$

$C_{p\_roof2} := -0.5$

Roof pressure coefficient per Figure 6-6 of ASCE 7-05 [3.1.2] for h to 2h from windward edge

$P_{roof2} := q_u \cdot G \cdot C_{p\_roof2} = -10.88\cdot\text{psf}$

$C_{p\_roof3} := -0.3$

Roof pressure coefficient per Figure 6-6 of ASCE 7-05 [3.1.2] for > 2h from windward edge

$P_{roof3} := q_u \cdot G \cdot C_{p\_roof3} = -6.53\cdot\text{psf}$

North/South Wind

$q_u = 25.6 \cdot psf$ — Unit wind velocity pressure

$G := 0.85$ — Gust effect factor for a rigid structure per Section 6.5.8.1 of ASCE 7-05 [3.1.2]

Windward wall

$C_{p\_windward} := 0.8$ — External pressure coefficient (windward) per Figure 6-6 of ASCE 7-05 [3.1.2]

$p_{windward} := q_u \cdot G \cdot C_{p\_windward} = 17.41 \cdot psf$ — Windward wall pressure per Section 6.5.12.2.1 of ASCE 7-05 [3.1.2]

Leeward wall

$Ratio_{LB\_short} := \dfrac{L_{N\_S}}{L_{E\_W}} = 1.03$ — Ratio L/B for wind approaching north or south side

$C_{p\_leeward} := -0.5$ — External pressure coefficient (leeward) per Figure 6-6 of ASCE 7-05 [3.1.2]

$p_{leeward} := q_u \cdot G \cdot C_{p\_leeward} = -10.88 \cdot psf$ — Leeward wall pressure per Section 6.5.12.2.1 of ASCE 7-05 [3.1.2]

Roof

$h_{eave} = 56.33 \cdot ft$ — Maximum eave height above grade per Ref. 3.2.5

$\dfrac{h}{L_{N\_S}} = 0.3$ — Ratio of height to horizontal dimension of the building parallel to the wind direction

$C_{p\_roof1} := -0.9$ — Roof pressure coefficient per Figure 6-6 of ASCE 7-05 [3.1.2] for 0 to h from windward edge

$P_{roof1} := q_u \cdot G \cdot C_{p\_roof1} = -19.58 \cdot psf$

$C_{p\_roof2} := -0.5$ — Roof pressure coefficient per Figure 6-6 of ASCE 7-05 [3.1.2] for h to 2h from windward edge

$P_{roof2} := q_u \cdot G \cdot C_{p\_roof2} = -10.88 \cdot psf$

$C_{p\_roof3} := -0.3$ — Roof pressure coefficient per Figure 6-6 of ASCE 7-05 [3.1.2] for > 2h from windward edge

$P_{roof3} := q_u \cdot G \cdot C_{p\_roof3} = -6.53 \cdot psf$

Case 6

Side walls

Side wall pressure is applied to all walls for Case 6.

$C_{p\_side} := -0.7$

External pressure coefficient (side walls) per Figure 6-6 of ASCE 7-05 [3.1.2]

$p_{side} := q_u \cdot G \cdot C_{p\_side} = -15.23 \cdot psf$

Side wall pressure per Section 6.5.12.2.1 of ASCE 7-05 [3.1.2]

Table B.1.4-1: Summary of Unit Wind Loads

<table>
<tr><th>Case</th><th>Wall</th><th colspan="2">Load (psf)</th><th colspan="2">Load Applied to Model (ksf)</th></tr>
<tr><td rowspan="5">Case 5</td><td>Windward</td><td colspan="2">17.4</td><td colspan="2">0.018</td></tr>
<tr><td>Leeward</td><td colspan="2">-10.9</td><td colspan="2">-0.011</td></tr>
<tr><td rowspan="3">Roof</td><td>-19.6</td><td>Zone 1: (0 to h)</td><td>-0.020</td><td>Zone 1: (0 to h)</td></tr>
<tr><td>-10.9</td><td>Zone 2: (h to 2h)</td><td>-0.011</td><td>Zone 2: (h to 2h)</td></tr>
<tr><td>-6.5</td><td>Zone 3: (> 2h)</td><td>-0.007</td><td>Zone 3: (> 2h)</td></tr>
<tr><td>Case 6</td><td>All except roof</td><td colspan="2">-15.2</td><td colspan="2">-0.016</td></tr>
</table>

Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.

See Figures B.1.4.4-3 through 7 for diagrams of how the wall pressure loads are applied to the model for each wind direction. See Figures B.1.4.4-8 through 11 for diagrams of the roof zones for each wind direction based on the SAP2000 model mesh lines.

B.1.4.3 Design unit wind torsional moments

M_T per Case 2 of ASCE 7-05 Figure 6-9 [3.1.2] (applied as part of Case 6 in this calculation)

$L_{E\_W} = 195 \cdot ft$ — Dimension of building in short (east-west) direction per Ref. 3.2.3

$L_{N\_S} = 200.33 \cdot ft$ — Dimension of building in long (north-south) direction per Ref. 3.2.1

$t_{wall} := 2ft$ — Exterior wall thickness

The building dimensions are similar in each direction, so consider maximum dimension to calculate a torsional moment that can be applied for all wind directions.

$B := \max\left(L_{E\_W}, L_{N\_S}\right) = 200.33 \cdot ft$ — Maximum building dimension

$h = 60 \cdot ft$ — Approximate building height (conservative) per Ref. 3.2.5

$p_{windward} = 17.41 \cdot psf$ — Windward wall pressure

$p_{leeward} = -10.88 \cdot psf$ — Leeward wall pressure

$$M_{T\_2} := 0.75 \cdot \left[p_{windward} + \left(-p_{leeward}\right)\right] \cdot B \cdot 0.15 \cdot B$$

$M_{T\_2} = 127.72 \cdot \frac{kip \cdot ft}{ft}$ — Wind torsional moment per unit height for ASCE Case 2 (ASCE 7-05 [3.1.2], Figure 6-9)

$M_{T\_2\_1} := M_{T\_2} \cdot (h - 23.5ft) = 4661.8 \cdot kip \cdot ft$ — Total wind torsional moment for upper portion of building (above height of Control Building)

$M_{T\_2\_2} := M_{T\_2} \cdot (23.5ft) = 3001.44 \cdot kip \cdot ft$ — Total wind torsional moment for lower portion of building (at level of Control Building)

The wind torsional moment will be distributed as a shear flow to the walls of the structure based on relative stiffnesses. The wall stiffness values and center of rigidity for the structure are already calculated in Attachment H for the application of accidental eccentricity loads. The methodology for calculating the stiffnesses and center of rigidity is provided in Attachment H. The methodology for determing a shear force in each wall due to a torsional moment is provided in Attachment H. The walls are labeled as shown in Figure B.1.4.3-1 below. The origin and axes considered for the calculation of the center of rigidity are also shown on Figure B.1.4.3-1. Tables B.1.4.3-1 and 2 show the distributed in-plane shear load in each wall resulting from the wind torsional moment.

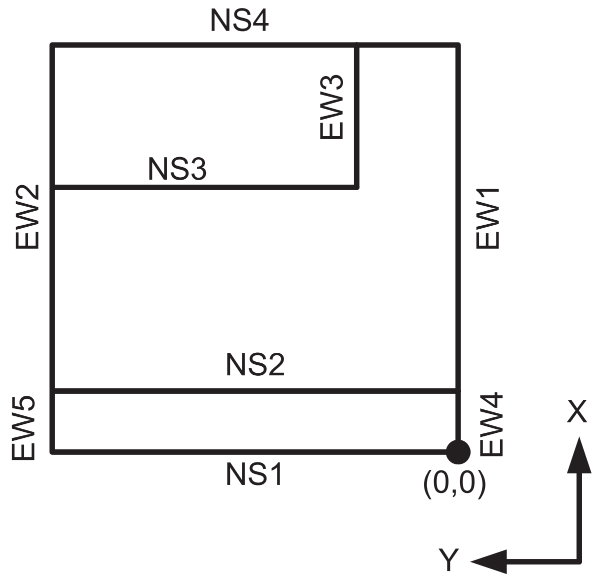


Figure B.1.4.3-1: Wall labels for distribution of shear due to wind torsional moment.

Table B.1.4.3-1: Calculation of distributed in-plane shear load in each wall due to M_{T_2} above 23.5 ft.

	Name	Min X	Max X	Min Y	Max Y	Length (ft)	Thickness (in)	Height (ft)
N-S Walls	NS2	29	29	0	198.33	198.33	24.00	24.83
	NS3	135.33	135.33	50.33	198.33	148.00	24.00	34.16
	NS4	192.33	192.33	0.00	198.33	198.33	24.00	32.83

	Name	CG X (ft)	CG Y (ft)	k (kip/ft)	k x X	k*(X-CR)^2	V (kips)	Uniform In-Plane Load (ksf)
N-S Walls	NS2	29.00	99.17	3.28E+06	9.52E+07	2.03E+10	-18.45	-0.0040
	NS3	135.33	124.33	1.76E+06	2.38E+08	1.35E+09	3.48	0.0010
	NS4	192.33	99.17	2.47E+06	4.76E+08	1.77E+10	14.97	0.0030

	Name	Min X	Max X	Min Y	Max Y	Length (ft)	Thickness (in)	Height (ft)
E-W Walls	EW1	29	192.33	0	0	163.33	24.00	29.94
	EW2	29	192.33	198.33	198.33	163.33	24.00	29.94
	EW3	135.33	192.33	50.33	50.33	57.00	24.00	33.27

	Name	CG X (ft)	CG Y (ft)	k (kip/ft)	k x Y	k*(Y-CR)^2	V (kips)	Uniform In-Plane Load (ksf)
E-W Walls	EW1	110.67	0.00	2.23E+06	0.00E+00	1.93E+10	14.83	0.0040
	EW2	110.67	198.33	2.23E+06	4.42E+08	2.47E+10	-16.76	-0.0040
	EW3	163.83	50.33	6.32E+05	3.18E+07	1.16E+09	1.93	0.0020

Table B.1.4.3-2: Calculation of distributed in-plane shear load in each wall due to M_{T_2} below 23.5 ft.

	Name	Min X	Max X	Min Y	Max Y	Length (ft)	Thickness (in)	Height (ft)
N-S Walls	NS1	0	0	0	198.33	198.33	24.00	22.00
	NS2	29	29	0	198.33	198.33	24.00	23.50
	NS3	135.33	135.33	50.33	198.33	148.00	24.00	23.50
	NS4	192.33	192.33	0.00	198.33	198.33	24.00	23.50

	Name	CG X (ft)	CG Y (ft)	k (kip/ft)	k x X	k*(X-CR)^2	V (kips)	Uniform In-Plane Load (ksf)
N-S Walls	NS1	0.00	99.17	3.71E+06	0.00E+00	2.65E+10	-9.40	-0.0030
	NS2	29.00	99.17	3.47E+06	1.01E+08	1.07E+10	-5.78	-0.0020
	NS3	135.33	124.33	2.58E+06	3.49E+08	6.68E+09	3.94	0.0020
	NS4	192.33	99.17	3.47E+06	6.68E+08	4.04E+10	11.24	0.0030

	Name	Min X	Max X	Min Y	Max Y	Length (ft)	Thickness (in)	Height (ft)
E-W Walls	EW1	29	192.33	0	0	163.33	24.00	23.50
	EW2	29	192.33	198.33	198.33	163.33	24.00	23.50
	EW3	135.33	192.33	50.33	50.33	57.00	24.00	23.50
	EW4	0.00	29	0.00	0	29.00	24.00	22.00
	EW5	0.00	29	198.33	198.33	29.00	24.00	22.00

	Name	CG X (ft)	CG Y (ft)	k (kip/ft)	k x Y	k*(Y-CR)^2	V (kips)	Uniform In-Plane Load (ksf)
E-W Walls	EW1	110.67	0.00	2.85E+06	0.00E+00	2.47E+10	7.96	0.0030
	EW2	110.67	198.33	2.85E+06	5.66E+08	3.16E+10	-9.01	-0.0030
	EW3	163.83	50.33	9.45E+05	4.76E+07	1.73E+09	1.21	0.0010
	EW4	14.50	0.00	4.52E+05	0.00E+00	3.92E+09	1.26	0.0020
	EW5	14.50	198.33	4.52E+05	8.97E+07	5.01E+09	-1.43	-0.0030

See Figures B.1.4.4-16 through 19 for diagrams of how these loads are applied to the model.

M_T per Case 4 of ASCE 7-05 Figure 6-9 [3.1.2] (applied as part of Case 5 in this calculation)

$B = 200.33 \cdot ft$ Maximum building dimension

$h = 60 \cdot ft$ Approximate building height (conservative)

$p_{windward} = 17.41 \cdot psf$ Windward wall pressure

$p_{leeward} = -10.88 \cdot psf$ Leeward wall pressure

$$M_{T\_4} := 2\left[0.563 \cdot \left[p_{windward} + \left(-p_{leeward}\right)\right] \cdot B \cdot 0.15 \cdot B\right]$$

$M_{T\_4} = 191.75 \cdot \frac{kip \cdot ft}{ft}$ Wind torsional moment per unit height for ASCE Case 4 (ASCE 7-05 [3.1.2], Figure 6-9)

$M_{T\_4\_1} := M_{T\_4} \cdot (h - 23.5ft) = 6998.92 \cdot kip \cdot ft$ Total wind torsional moment for upper portion of building (above height of Control Building)

$M_{T\_4\_2} := M_{T\_4} \cdot (23.5ft) = 4506.16 \cdot kip \cdot ft$ Total wind torsional moment for lower portion of building (at level of Control Building)

The wind torsional moment will be distributed as a shear flow to the walls of the structure based on relative stiffnesses. The wall stiffness values and center of rigidity for the structure are already calculated in Attachment H for the application of accidental eccentricity loads. The methodology for calculating the stiffnesses and center of rigidity is provided in Attachment H. The methodology for determing a shear force in each wall due to a torsional moment is provided in Attachment H. The walls are labeled as shown in Figure B.1.4.3-1. Tables B.1.4.3-3 and 4 show the distributed in-plane shear load in each wall resulting from the wind torsional moment.

Table B.1.4.3-3: Calculation of distributed in-plane shear load in each wall due to M_{T_4} above 23.5 ft.

	Name	Min X	Max X	Min Y	Max Y	Length (ft)	Thickness (in)	Height (ft)
N-S Walls	NS2	29	29	0	198.33	198.33	24.00	24.83
	NS3	135.33	135.33	50.33	198.33	148.00	24.00	34.16
	NS4	192.33	192.33	0.00	198.33	198.33	24.00	32.83

	Name	CG X (ft)	CG Y (ft)	k (kip/ft)	k x X	k*(X-CR)^2	V (kips)	Uniform In-Plane Load (ksf)
N-S Walls	NS2	29.00	99.17	3.28E+06	9.52E+07	2.03E+10	-27.70	-0.0060
	NS3	135.33	124.33	1.76E+06	2.38E+08	1.35E+09	5.23	0.0020
	NS4	192.33	99.17	2.47E+06	4.76E+08	1.77E+10	22.48	0.0040

	Name	Min X	Max X	Min Y	Max Y	Length (ft)	Thickness (in)	Height (ft)
E-W Walls	EW1	29	192.33	0	0	163.33	24.00	29.94
	EW2	29	192.33	198.33	198.33	163.33	24.00	29.94
	EW3	135.33	192.33	50.33	50.33	57.00	24.00	33.27

	Name	CG X (ft)	CG Y (ft)	k (kip/ft)	k x Y	k*(Y-CR)^2	V (kips)	Uniform In-Plane Load (ksf)
E-W Walls	EW1	110.67	0.00	2.23E+06	0.00E+00	1.93E+10	22.26	0.0050
	EW2	110.67	198.33	2.23E+06	4.42E+08	2.47E+10	-25.16	-0.0060
	EW3	163.83	50.33	6.32E+05	3.18E+07	1.16E+09	2.90	0.0020

Table B.1.4.3-4: Calculation of distributed in-plane shear load in each wall due to M_{T_4} below 23.5 ft.

	Name	Min X	Max X	Min Y	Max Y	Length (ft)	Thickness (in)	Height (ft)
N-S Walls	NS1	0	0	0	198.33	198.33	24.00	22.00
	NS2	29	29	0	198.33	198.33	24.00	23.50
	NS3	135.33	135.33	50.33	198.33	148.00	24.00	23.50
	NS4	192.33	192.33	0.00	198.33	198.33	24.00	23.50

	Name	CG X (ft)	CG Y (ft)	k (kip/ft)	k x X	k*(X-CR)^2	V (kips)	Uniform In-Plane Load (ksf)
N-S Walls	NS1	0.00	99.17	3.71E+06	0.00E+00	2.65E+10	-14.12	-0.0040
	NS2	29.00	99.17	3.47E+06	1.01E+08	1.07E+10	-8.67	-0.0020
	NS3	135.33	124.33	2.58E+06	3.49E+08	6.68E+09	5.91	0.0020
	NS4	192.33	99.17	3.47E+06	6.68E+08	4.04E+10	16.87	0.0040

	Name	Min X	Max X	Min Y	Max Y	Length (ft)	Thickness (in)	Height (ft)
E-W Walls	EW1	29	192.33	0	0	163.33	24.00	23.50
	EW2	29	192.33	198.33	198.33	163.33	24.00	23.50
	EW3	135.33	192.33	50.33	50.33	57.00	24.00	23.50
	EW4	0.00	29	0.00	0	29.00	24.00	22.00
	EW5	0.00	29	198.33	198.33	29.00	24.00	22.00

	Name	CG X (ft)	CG Y (ft)	k (kip/ft)	k x Y	k*(Y-CR)^2	V (kips)	Uniform In-Plane Load (ksf)
E-W Walls	EW1	110.67	0.00	2.85E+06	0.00E+00	2.47E+10	11.96	0.0040
	EW2	110.67	198.33	2.85E+06	5.66E+08	3.16E+10	-13.53	-0.0040
	EW3	163.83	50.33	9.45E+05	4.76E+07	1.73E+09	1.82	0.0020
	EW4	14.50	0.00	4.52E+05	0.00E+00	3.92E+09	1.90	0.0030
	EW5	14.50	198.33	4.52E+05	8.97E+07	5.01E+09	-2.14	-0.0040

See Figures B.1.4.4-12 through 15 for diagrams of how this load is applied to the model.

B.1.4.4 Summary sketches of wind loads applied to SAP model

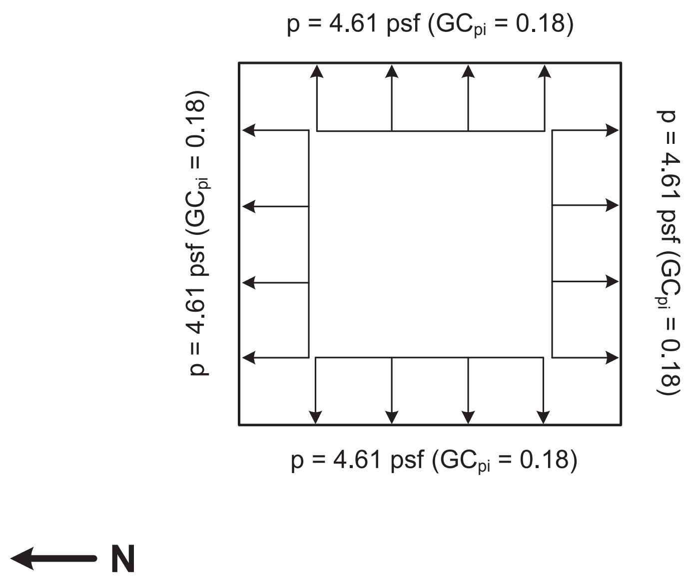


Figure B.1.4.4-1: Wind Loads applied to walls due to positive internal pressure

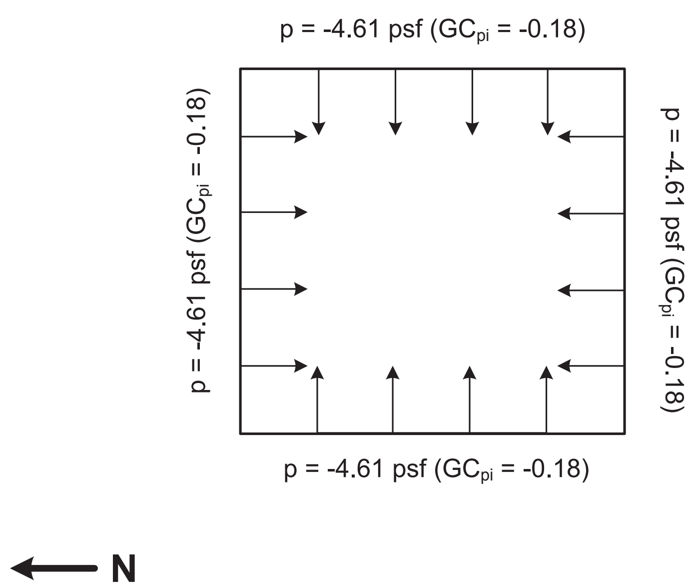


Figure B.1.4.4-2: Wind Loads applied to walls due to negative internal pressure

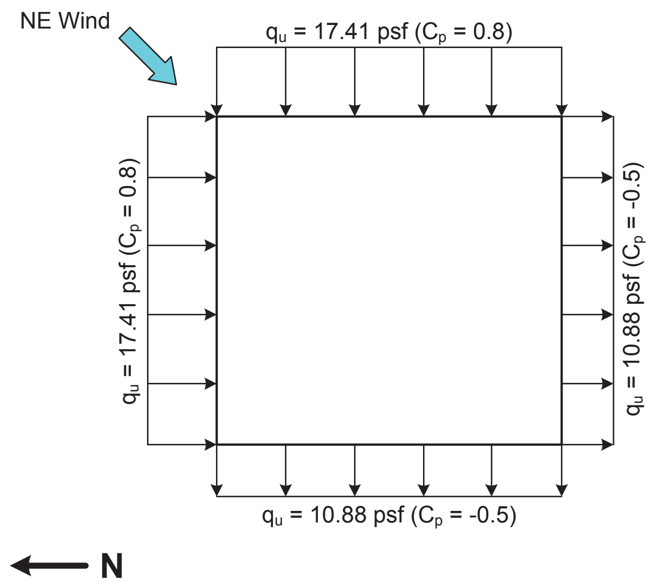


Figure B.1.4.4-3: Case 5 - Wind Loads applied to walls due to northeast wind.

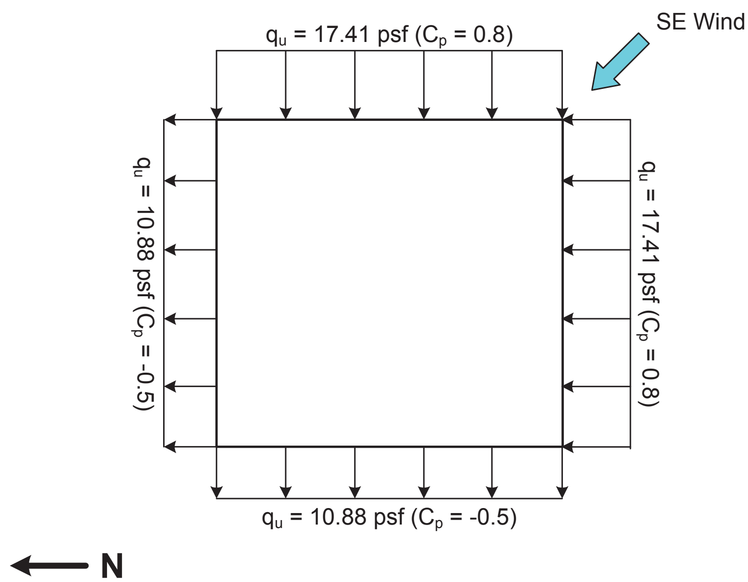


Figure B.1.4.4-4: Case 5 - Wind Loads applied to walls due to southeast wind.

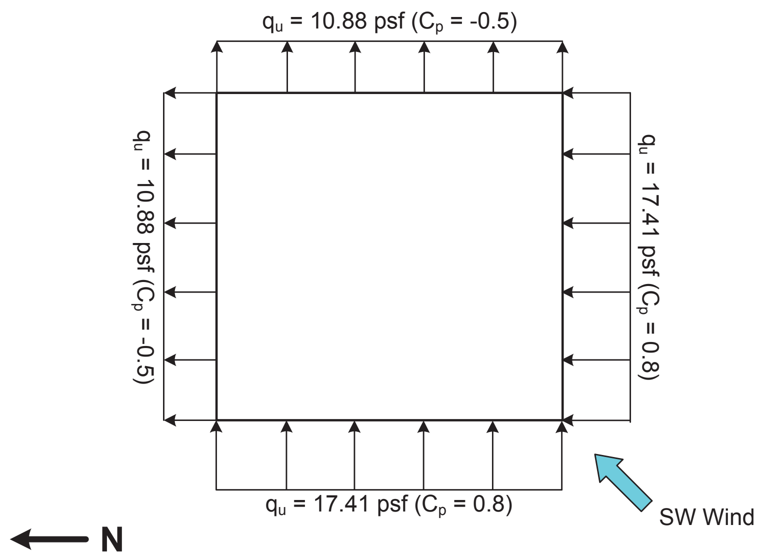


Figure B.1.4.4-5: Case 5 - Wind Loads applied to walls due to southwest wind.

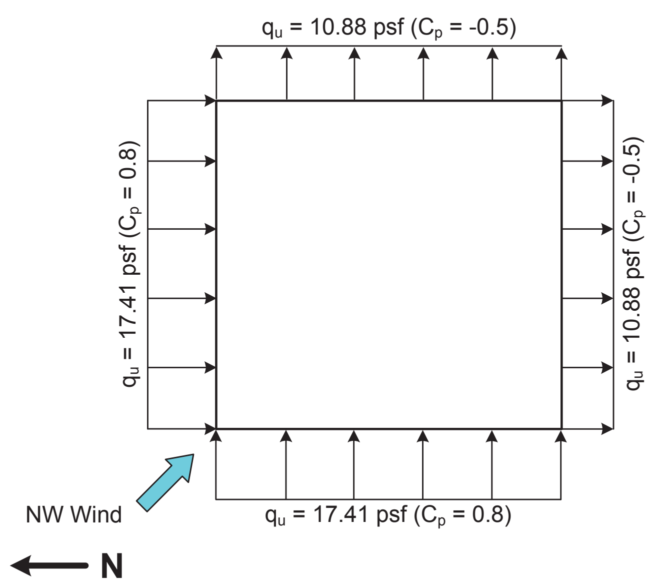


Figure B.1.4.4-6: Case 5 - Wind Loads applied to walls due to northwest wind.

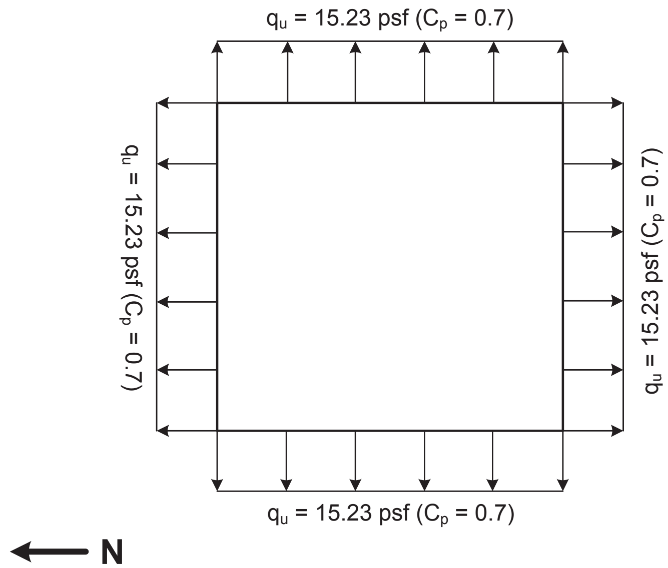


Figure B.1.4.4-7: Case 6 - Wind Loads applied to walls due to wind suction (for all directions).

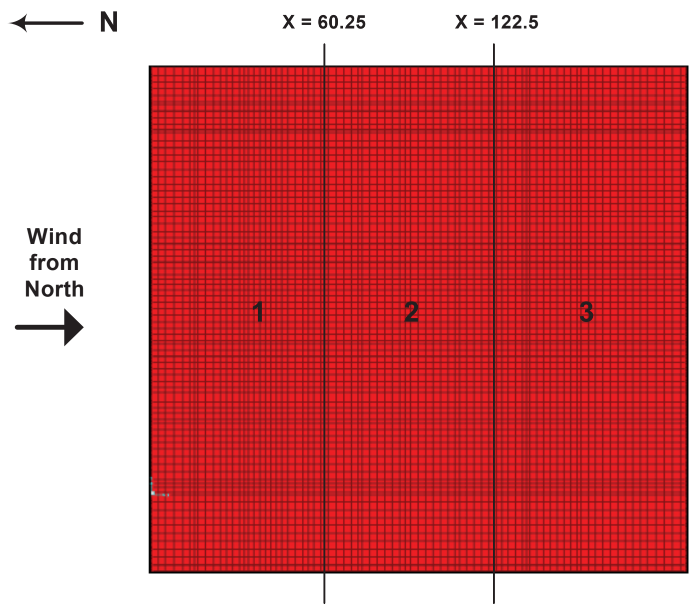


Figure B.1.4.4-8: Zones for wind loads applied to roof for wind from the north (coordinates refer to mesh lines in SAP2000 model).

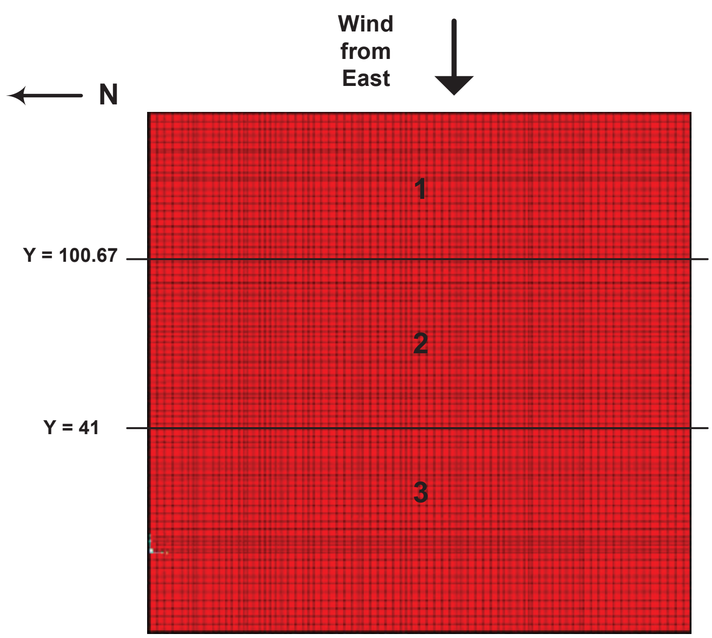


Figure B.1.4.4-9: Zones for wind loads applied to roof for wind from the east (coordinates refer to mesh lines in SAP2000 model).

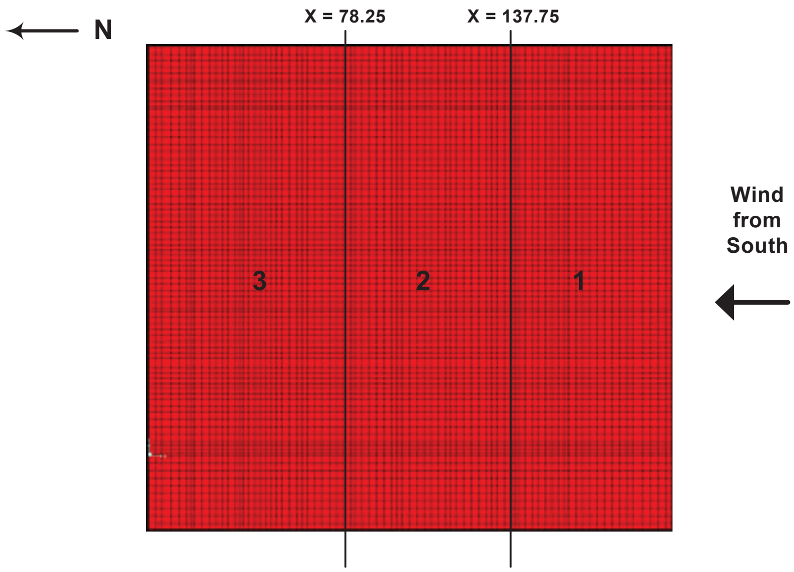


Figure B.1.4.4-10: Zones for wind loads applied to roof for wind from the south (coordinates refer to mesh lines in SAP2000 model).

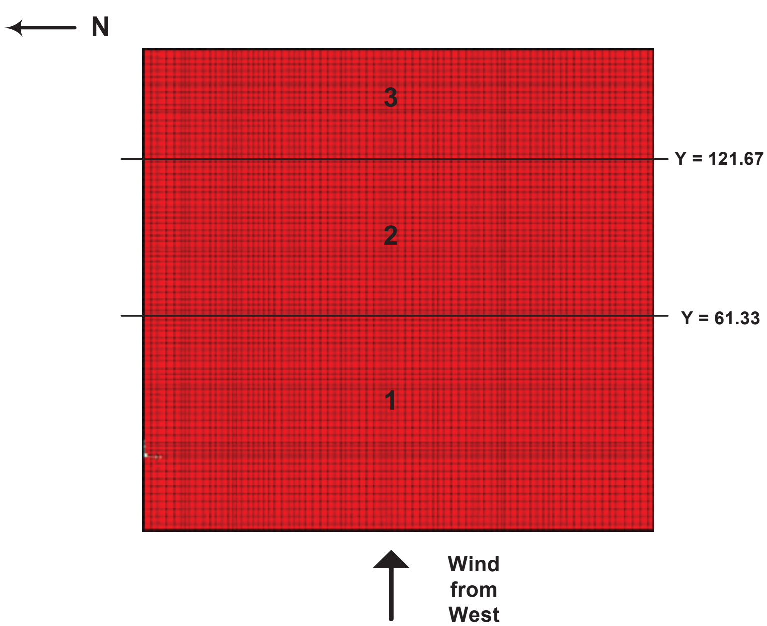


Figure B.1.4.4-11: Zones for wind loads applied to roof for wind from the west (coordinates refer to mesh lines in SAP2000 model).

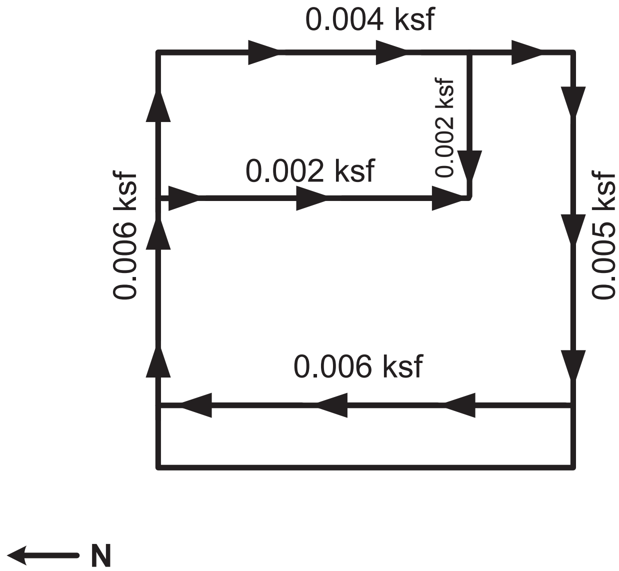


Figure B.1.4.4-12: Case 5 - Clockwise wind torsional moment, M_{T_4} (applied as an equivalent uniform load) above 23.5 ft

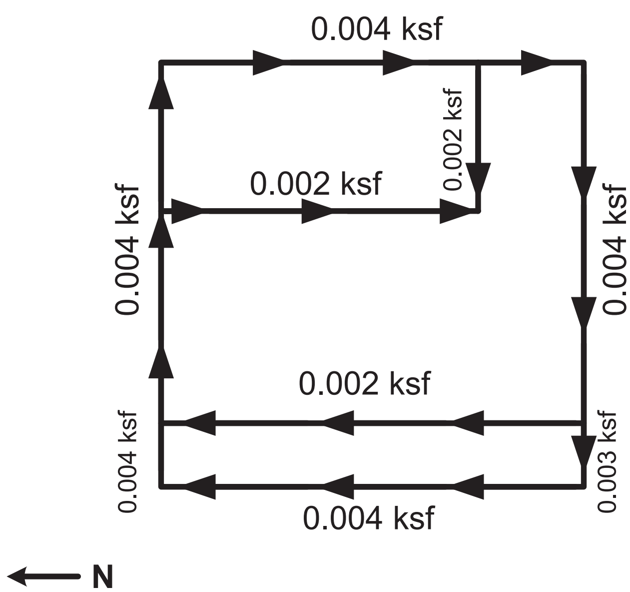


Figure B.1.4.4-13: Case 5 - Clockwise wind torsional moment, M_{T_4} (applied as an equivalent uniform load) below 23.5 ft

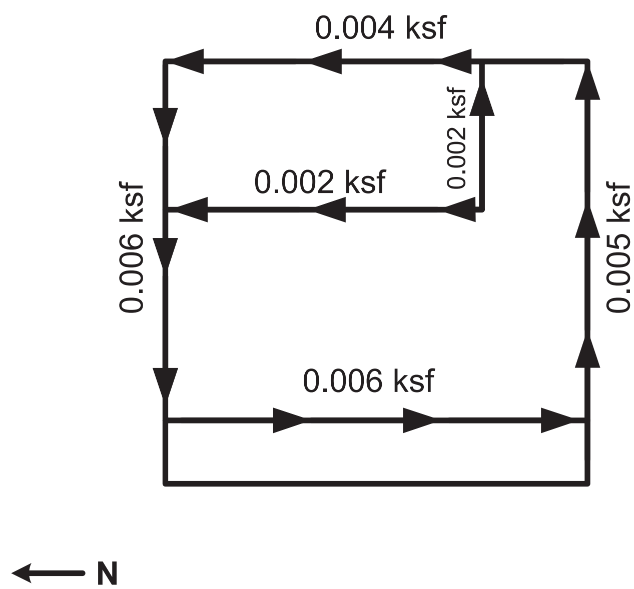


Figure B.1.4.4-14: Case 5 - Counter-clockwise wind torsional moment, M_{T_4} (applied as an equivalent uniform load) above 23.5 ft

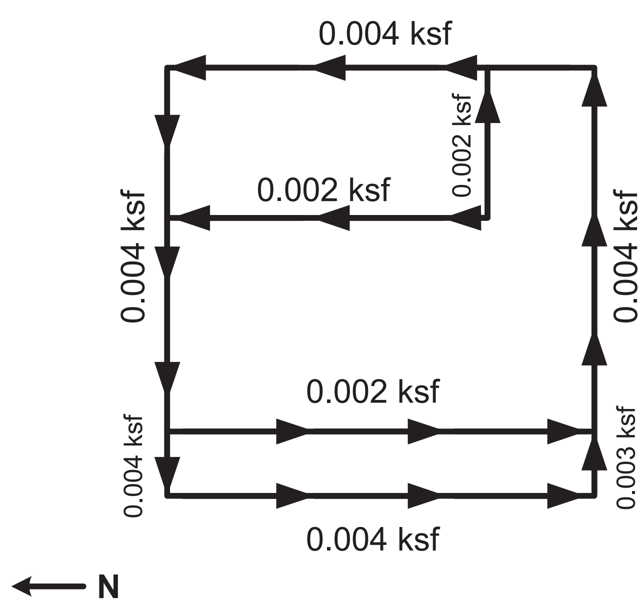


Figure B.1.4.4-15: Case 5 - Counter-clockwise wind torsional moment, M_{T_4} (applied as an equivalent uniform load) below 23.5 ft

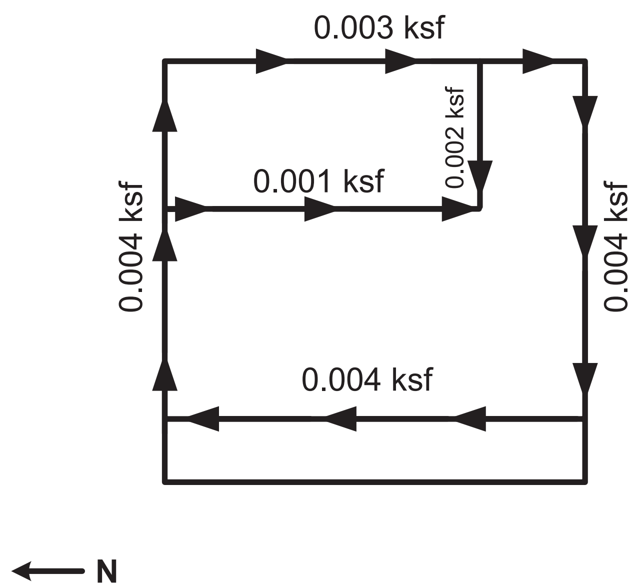


Figure B.1.4.4-16: Case 6 - Clockwise wind torsional moment, M_{T_2} (applied as an equivalent uniform load) above 23.5 ft

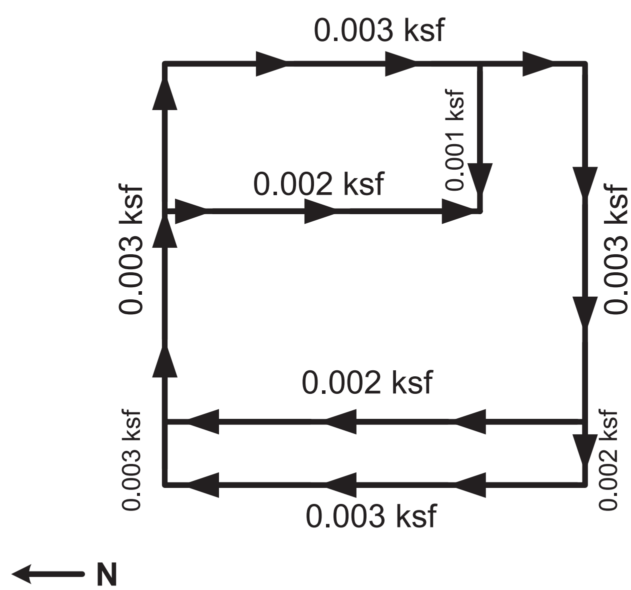
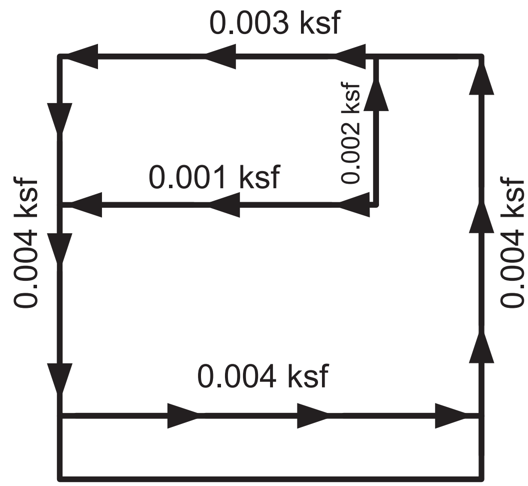
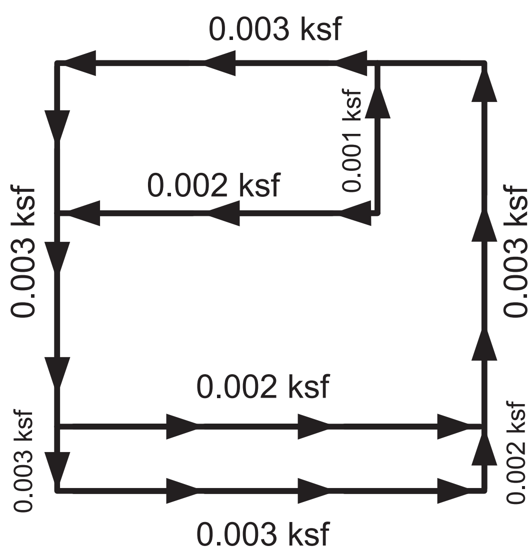


Figure B.1.4.4-17: Case 6 - Clockwise wind torsional moment, M_{T_2} (applied as an equivalent uniform load) below 23.5 ft



← N

Figure B.1.4.4-18: Case 6 - Counter-clockwise wind torsional moment, M_{T_2} (applied as an equivalent uniform load) above 23.5 ft



← N

Figure B.1.4.4-19: Case 6 - Counter-clockwise wind torsional moment, M_{T_2} (applied as an equivalent uniform load) below 23.5 ft

B.2 Tornado Wind and Differential Pressure Loads

The process for calculating the tornado wind pressure starts by applying the same unit wind pressures calculated in Section B.1.4. A factor, calculated below, is then used to modify the unit wind pressures and convert them to equivalent tornado wind pressures. In addition, a differential pressure is calculated to account for the atmospheric pressure change caused by the differential pressure between the interior and exterior of the structure during a tornado event.

B.2.1 Velocity pressure for tornado wind (q_t)

$I := 1.15$ — Importance factor per per SRP 3.3.2 [3.1.18].

$K_{d\_tornado} := 1$ — Wind directionality factor per SRP 3.3.2 [3.1.18].

$K_{zt\_tornado} := 1.0$ — Topographic factor per per SRP 3.3.2 [3.1.18].

Assume Exposure Category C.

$K_{z\_tornado} := 0.87$ — Velocity pressure exposure coefficient per SRP 3.3.2 [3.1.18].

$V_{tornado} := 230mph$ — Tornado wind speed in Region I per RG 1.76 [3.1.19].

$$q_t := 0.00256 \cdot K_{z\_tornado} \cdot K_{zt\_tornado} \cdot K_{d\_tornado} \cdot \left(\frac{V_{tornado}}{mph}\right)^2 \cdot I \cdot psf$$

Wind velocity pressure per Eq. 6-15 of ASCE 7-05 [3.1.2]

$q_t = 135.49 \cdot psf$

$R_m := 150ft$ — Radius of maximum rotational speed per RG 1.76 [3.1.19]

$\frac{L_{E\_W}}{R_m} = 1.3$ — Ratio of short side dimension to radius of maximum rotational speed

$\frac{L_{N\_S}}{R_m} = 1.34$ — Ratio of long side dimension to radius of maximum rotational speed

Per Section 16.1 of Reference 3.3.12, a reduction (or size) coefficient can be applied to tornado wind pressures. The size coefficient, $C^F{}_S$, accounts for the nonuniformity in space of the tornado wind field. Figure 16.1.1 of Reference 3.3.12 is used to determine $C^F{}_S$ as a function of the ratio L/Rm.

The ratio of the short side to the radius will result in a larger size coefficient. For conservatism, consider the larger size coefficient for both directions.

$C_{Fs} := 0.58$ — Tornado wind size coefficient per Figure 16.1.1 of Ref. 3.3.12.

$q_{t\_adj} := C_{Fs} \cdot q_t = 78.59 \cdot psf$ — Wind velocity pressure adjusted for size effect per Eq.16.1.5 of Ref. 3.3.12.

B.2.2 Tornado wind scale factor (q_t/q_u)

Tornado wind scale factor scales the design unit wind pressures to the tornado wind pressures. This factor scales the unit wind pressures in the applicable secondary load combinations. The tornado wind scale factor includes a gust effect scale factor to account for the different gust effect factors used for the unit wind and tornado wind pressures.

$q_u := 25.60psf$ — Unit wind pressure

$G = 0.85$ — Unit wind gust effect factor

$G_{\_t} := 1$ — Gust effect factor for tornado

$\frac{q_{t\_adj}}{q_u} \cdot \frac{G_{\_t}}{G} = 3.61$ — Tornado wind scale factor

B.2.3 Tornado differential pressure

The tornado differential pressure is defined as an individual load case within the SAP model. The tornado differential pressure is applied as an outward pressure to the north, south, east, and west walls as well as the roof because the structure is enclosed [3.1.18].

$\Delta P := 1.2psi = 172.8 \cdot psf$ — Tornado differential pressure from RG 1.76 [3.1.19]

B.3 Tornado missile loads

Per RG 1.76 [3.1.19], the NRC regulations require that nuclear power plant designs consider the impact of tornado-generated missiles (i.e., objects moving under the action of aerodynamic forces induced by the tornado wind), in addition to the direct action of the tornado wind and the moving ambient pressure field. Table 2 of RG 1.76 defines the spectrum of missiles which must be considered for design as well as their speeds. One of the missile types in Table 2, the solid steel sphere, is only for testing the configuration of openings in the protective barriers. The purpose of this section is to calculate the forces of the the other two missiles, the schedule 40 pipe and automobile, to be applied to the SAP2000 model.

B.3.1 Tornado missile spectrum

The tornado missile spectrum below is per Regulatory Guide 1.76 [3.1.19].

	Schedule 40 pipe	Automobile
Dimensions	$d_{pipe} := 6.625in$	16.4 ft x 6.6 ft x 4.3 ft
Weight	$W_{pipe} := 287lbf$	$W_{auto} := 4000lbf$
Maximum horizontal speed	$V_{pipe} := 135\frac{ft}{sec}$	$V_{auto} := 135\frac{ft}{sec}$
Maximum vertical speed (= 0.67 horizontal speed)	$V_{pipe\_v} := 0.67V_{pipe} = 90.45\cdot\frac{ft}{sec}$	$V_{auto\_v} := 0.67V_{auto} = 90.45\cdot\frac{ft}{sec}$

B.3.2 Schedule 40 pipe impact force

The overall response evaluation is based on considering a missile-wall interaction force of limited duration. To be conservative, a lower bound estimate of -15% is used for perforation so only 0.85x is used to calculate the overall displacement where x is calculated according to Equation 4-1. Assuming that the kinetic energy of the missile is equal to the work done by the missile as it penetrates the structure, the constant amplitude of the impact force F_{impact} can be conservatively calculated as

$$F_{impact} = 1/2 m v_{imp}^2 / 0.85x$$

where m is the mass of the missile and v_{imp} is the missile velocity. Moreover, it is conservatively assumed that the missile velocity decreases linearly from its initial value v_{imp} to zero over the duration t_d which is equal to

$$t_d = 2 \cdot (0.85x / v_{imp})$$

The force pulse is shown in Figure B.3.2-1. The development of the above equations is in accordance with Section 4.2.1.1.1 of *Analysis of Nuclear Power Plant Structures for Effects of Impulse and Impact Loads* [3.3.14].

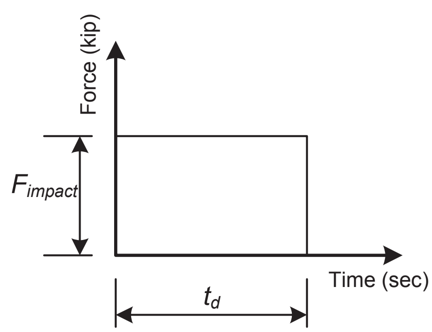


Figure B.3.1.1-1: Force pulse of schedule 40 pipe.

B.3.3 Automobile missile impact force

The force duration and amplitude for the automobile missile are based on Figure C.2.2-8 in *Analysis of Nuclear Power Plant Structures for Effects of Impulse and Impact Loads* [3.3.14]. From this graph a triangular force pulse is assumed with a load duration t_d = 0.1 seconds.

The peak amplitude of the force pulse from Figure C.2.2-8 acting on the impacted barrier is approximately 465 kips for a 4000 pound vehicle with a velocity of 60 mph. The force is modified proportionally by the relative velocity from that indicated in Figure C.2.2-8 to the velocity of the automobile missile, thus resulting in

$$F_{impact} = 465 \text{ kips} \cdot v_{impact} / 60\text{mph}.$$

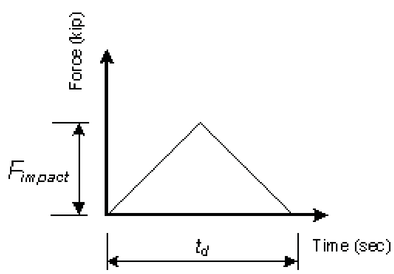


Figure B.3.3-1: Force pulse of automobile missile.

B.3.4 Elastic support response

For the overall evaluation an elastic response of the support due to the missile load is assumed. Based on the shape of the missile time-history load in Figures B.3.2-1 and B.3.3-1, the evaluation is made by using a dynamic load factor (DLF) on F_{impact}. The DLF is obtained from Figures 2.7(a) and 2.8(a) in Biggs's *Introduction to Structural Dynamics* [3.3.13] based on the ratio of the load duration t_d and period T of the panel, where $T = 2\pi/\omega$. The final amplified dynamic load P_{dyn} is obtained by multiplying F_{impact} by the DLF:

$$P_{dyn} = F_{impact} \cdot \text{DLF}$$

B.3.5 Dynamic force for schedule 40 pipe impact

$f_{prime\_c} := 4000psi$ — Concrete compressive strength

$W_{pipe} = 287 \cdot lbf$ — Weight of the schedule 40 pipe

$d_{pipe} = 6.62 \cdot in$ — Pipe diameter

$A_{pipe} := \frac{\pi}{4} \cdot d_{pipe}{}^2$ — Surface area of pipe

$A_{pipe} = 34.47 \cdot in^2$

$P_p := \frac{W_{pipe}}{A_{pipe}}$ — Sectional pressure of pipe

$P_p = 8.33 \cdot psi$

$V_p := \frac{V_{pipe}}{1000 \frac{ft}{sec}}$ — Horizontal striking velocity in units of 1,000 fps

$V_p = 0.14$

$$x_{pipe} := \frac{222 \cdot \frac{P_p}{psi} \cdot \left(\frac{d_{pipe}}{in}\right)^{0.215} \cdot V_p{}^{1.5}}{\left(\frac{f_{prime\_c}}{psi}\right)^{0.5}} \cdot in + 0.5 \cdot d_{pipe}$$

Penetration depth of pipe (Eq. 4-1, Ref. 3.3.15)

$x_{pipe} = 5.49 \cdot in$

$$F_{impact\_pipe} := \frac{\frac{W_{pipe}}{g}}{2 \cdot 0.85 x_{pipe}} \cdot V_{pipe}{}^2$$

Horizontal impact force of pipe

$F_{impact\_pipe} = 209 \cdot kip$

$DLF_{pipe} := 2$ — Maximum DLF from Figure 2.7(a) [3.3.13]

$P_{dyn\_pipe} := DLF_{pipe} \cdot F_{impact\_pipe}$

$P_{dyn\_pipe} = 418 \cdot kip$ — Horizontal dynamic force for pipe impact

Using a lower bound estimate of penetration depth, the vertical impact force of the pipe is calculated.

$V_{pipe\_v} = 90.45 \cdot \frac{ft}{sec}$ Maximum vertical velocity of pipe

$V_v := \frac{V_{pipe\_v}}{1000 \frac{ft}{sec}}$ Vertical striking velocity in units of 1,000 fps

$V_v = 0.09$

$x_{pipe\_vert} := \frac{222 \cdot \frac{P_p}{psi} \cdot \left(\frac{d_{pipe}}{in}\right)^{0.215} \cdot V_v^{1.5}}{\left(\frac{f_{prime\_c}}{psi}\right)^{0.5}} \cdot in + 0.5 \cdot d_{pipe}$ Penetration depth of pipe (Eq. 4-1, Ref. 3.3.15)

$x_{pipe\_vert} = 4.51 \cdot in$

$F_{impact\_pipe\_v} := \frac{\frac{W_{pipe}}{g}}{2 \cdot 0.85 x_{pipe\_vert}} \cdot V_{pipe\_v}^2$ Vertical impact force of pipe

$F_{impact\_pipe\_v} = 114 \cdot kip$

$DLF_{pipe} := 2$ Maximum DLF from Figure 2.7(a) [3.3.13]

$P_{dyn\_pipe\_v} := DLF_{pipe} \cdot F_{impact\_pipe\_v}$ Vertical dynamic force for pipe impact

$P_{dyn\_pipe\_v} = 229 \cdot kip$

B.3.6 Dynamic force for automobile impact

The impact force of the 4000 lbf automobile and load duration is determined from Figure C.2.2-8 per *Analysis of Nuclear Power Plant Structures for Effects of Impulse and Impact Loads* [3.3.14].

$t_d := 0.1sec$ — Load duration [3.3.14]

$F_{peak} := 465kip$ — Peak amplitude of the force pulse from Figure C.2.2-8 [3.3.14]

$F_{impact\_auto} := F_{peak} \cdot \frac{V_{auto}}{60mph}$ — Horizontal impact force of automobile

$F_{impact\_auto} = 713 \cdot kip$

$DLF_{auto} := 1.53$ — Maximum DLF from Figure 2.8(a) [3.3.13]

$P_{dyn\_auto} := DLF_{auto} \cdot F_{impact\_auto}$ — Horizontal dynamic force for automobile impact

$P_{dyn\_auto} = 1091 \cdot kip$

The vertical impact force of the automobile is calculated.

$F_{impact\_auto\_v} := F_{peak} \cdot \frac{V_{auto\_v}}{60mph}$ — Vertical impact force of automobile

$F_{impact\_auto\_v} = 478 \cdot kip$

$DLF_{auto} := 1.53$ — Maximum DLF from Figure 2.8(a) [3.3.13]

$P_{dyn\_auto\_v} := DLF_{auto} \cdot F_{impact\_auto\_v}$ — Vertical dynamic force for automobile impact

$P_{dyn\_auto\_v} = 731 \cdot kip$

B.3.7 Application of tornado missile loads to the SAP2000 static model

The missile loads are applied to the model to maximize the shear and moment on the structure. Since the panel shear and moments will be accounted for in a local evaluation, the full dynamic force is applied as a point load directly on the supports to ensure that the structure can absorb the missile strikes in the elastic range. Every critical support is hit with the maximum missile load in the SAP2000 model.

The pipe missile can hit the structure at any elevation, so the impact loads are applied at the top of each wall, which is the worst location for in-plane moment. Figures B.3.7-1 through B.3.7-8 indicate where the horizontal pipe missile loads are applied in the SAP2000 static model.

According to Regulatory Guide 1.76 [3.1.19], the height of the automobile missile strike is limited to 30 ft. above grade. Figures B.3.7-9 through B.3.7-16 show where the horizontal automobile missile loads are applied in the model.

The missile impact forces are combined with the Case 5 wind pressures described in Section B.1 multiplied by the tornado scale factor. To reduce the number of load combinations in the model, the missiles are only checked with the Case 5 permutations which consider negative internal pressure. Negative internal pressure creates the largest net pressure on the windward surfaces of the structure and will therefore be more critical for missile impacts than positive internal pressure. For each wind direction, horizontal missiles loads are applied which act in the same direction as the wind torsional moment.

Figures B.3.7-17 and 18 show the vertical missile loads due to both pipe and auto missile applied to the roof of the structure. The vertical missiles are all applied simultaneously and combined with the Case 5 load combination permutations.

$P_{dyn\_pipe} = 418 \cdot kip$ — Force applied to model for horizontal pipe missile impacts

$P_{dyn\_auto} = 1091 \cdot kip$ — Force applied to model for horizontal automobile missile impacts

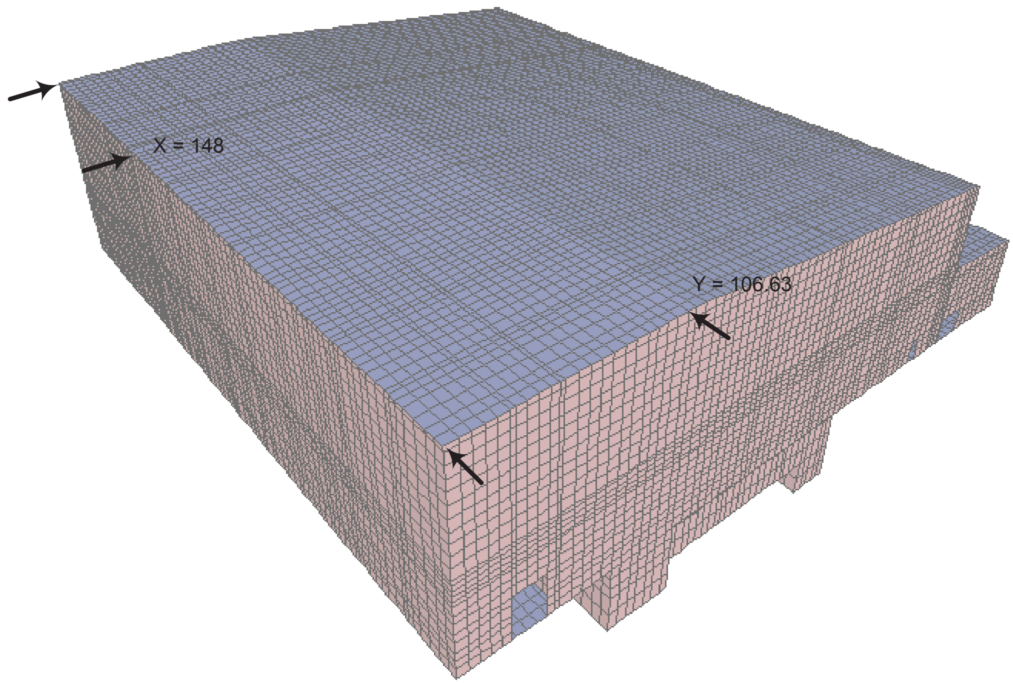


Figure B.3.7-1: Location of horizontal pipe missile impacts for wind from the northeast with CW torsion

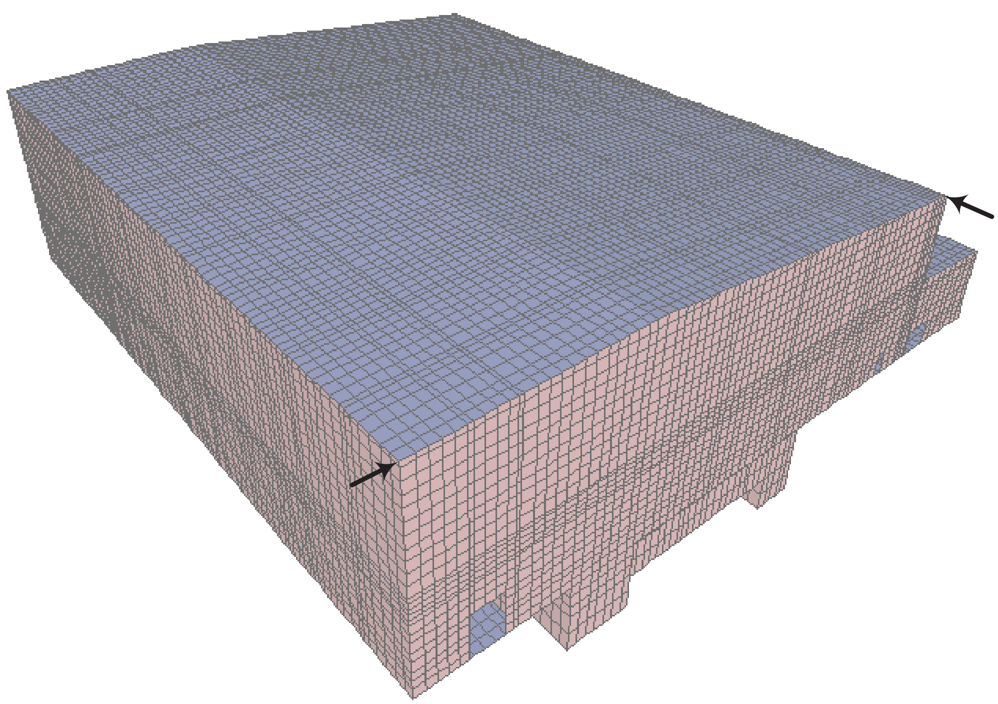


Figure B.3.7-2: Location of horizontal pipe missile impacts for wind from the northeast with CCW torsion

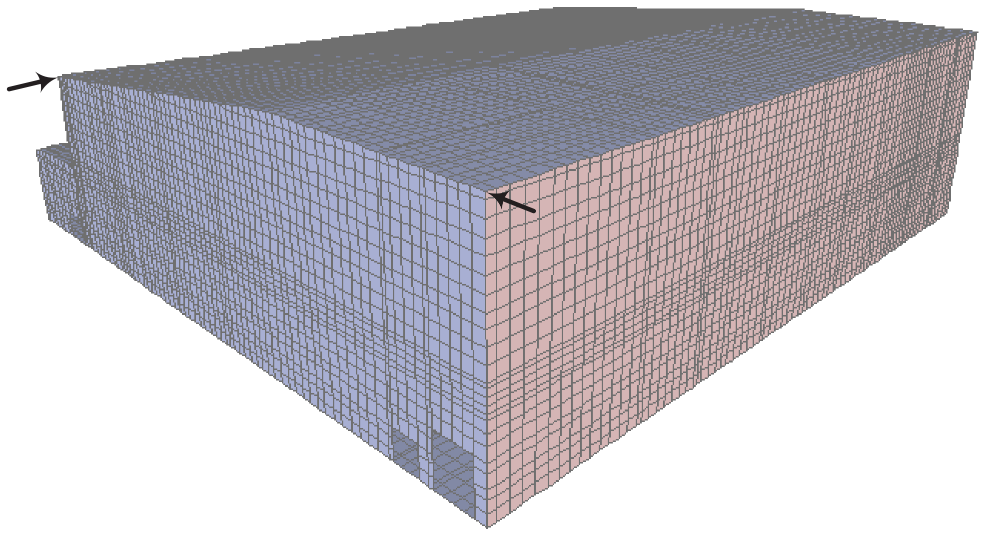


Figure B.3.7-3: Location of horizontal pipe missile impacts for southeast wind with CW torsion

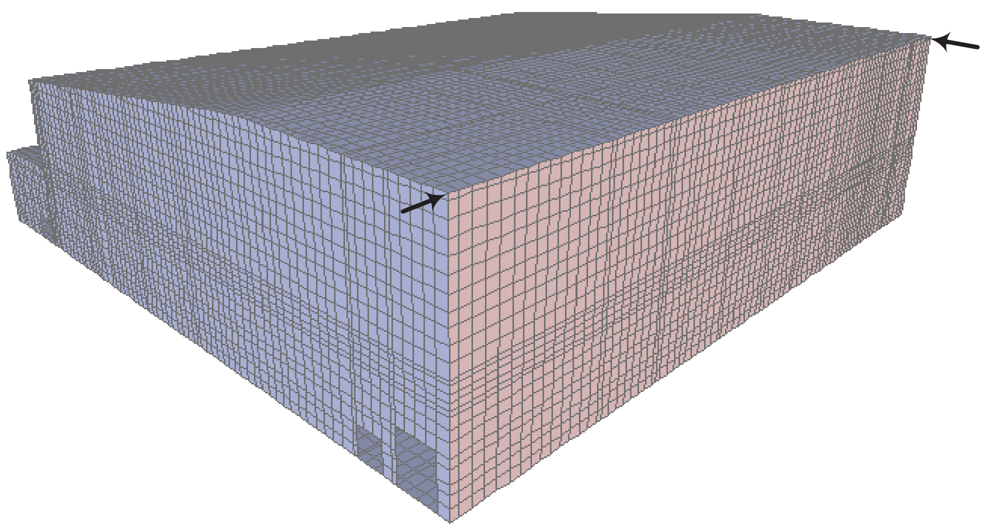


Figure B.3.7-4: Location of horizontal pipe missile impacts for southeast wind with CCW torsion

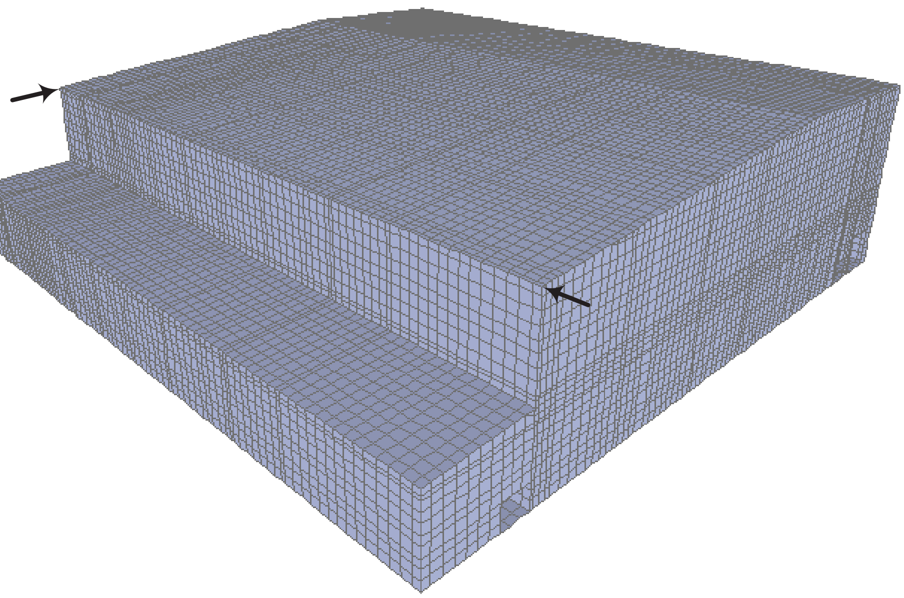


Figure B.3.7-5: Location of horizontal pipe missile impacts for southwest wind with CW torsion

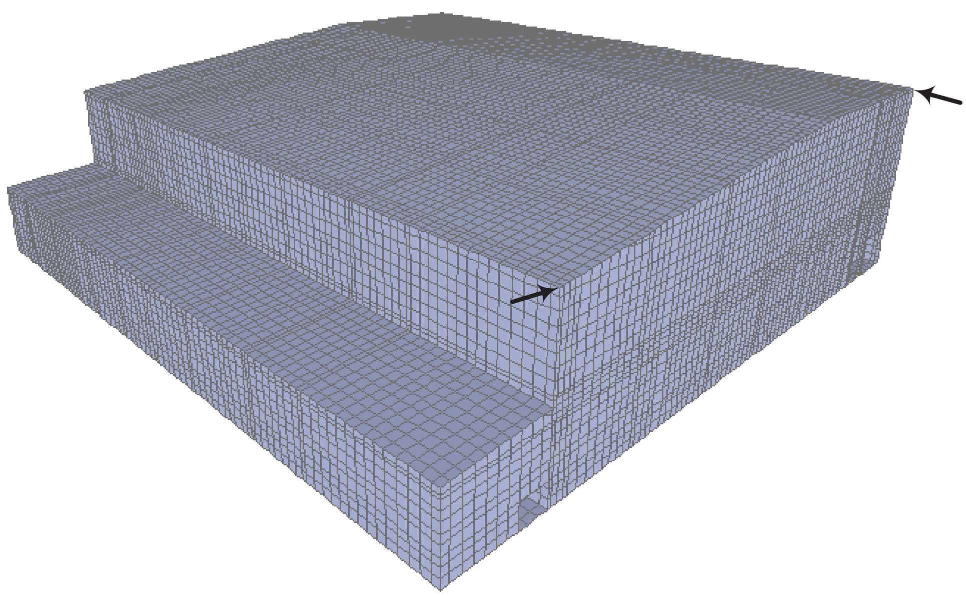


Figure B.3.7-6: Location of horizontal pipe missile impacts for southwest wind with CCW torsion

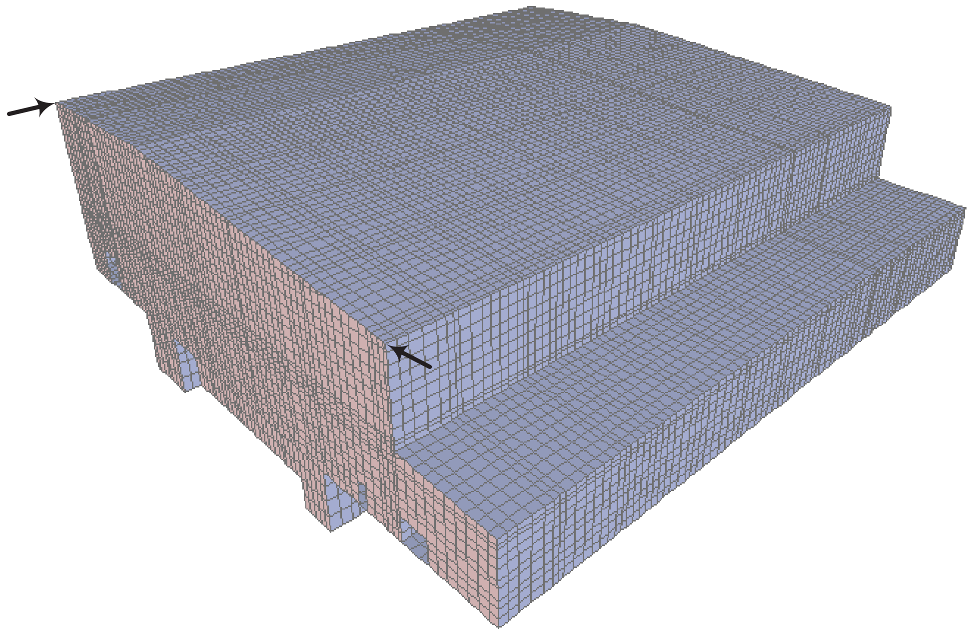


Figure B.3.7-7: Location of horizontal pipe missile impacts for northwest wind with CW torsion

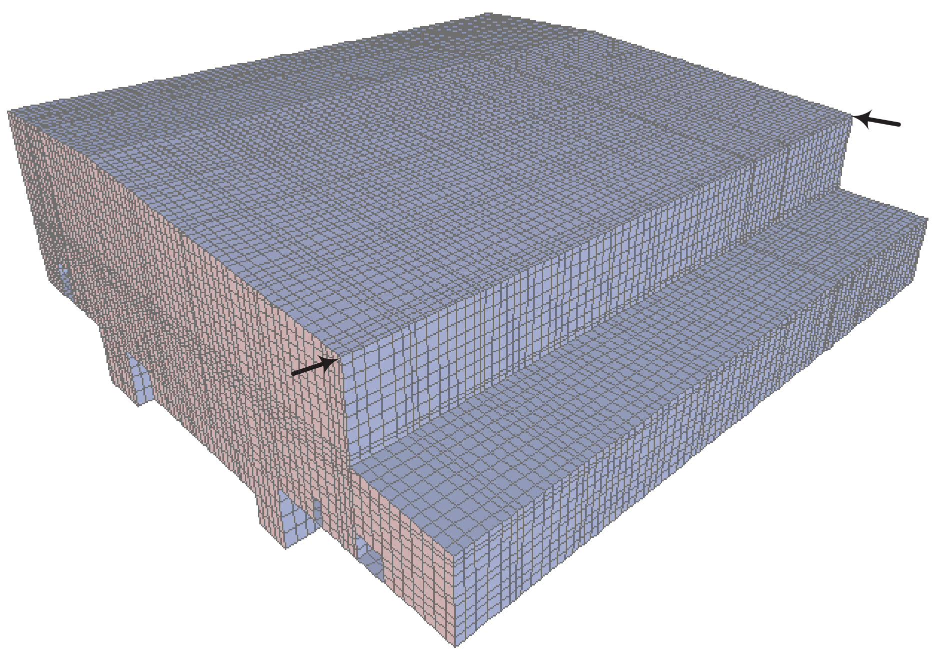


Figure B.3.7-8: Location of horizontal pipe missile impacts for northwest wind with CCW torsion

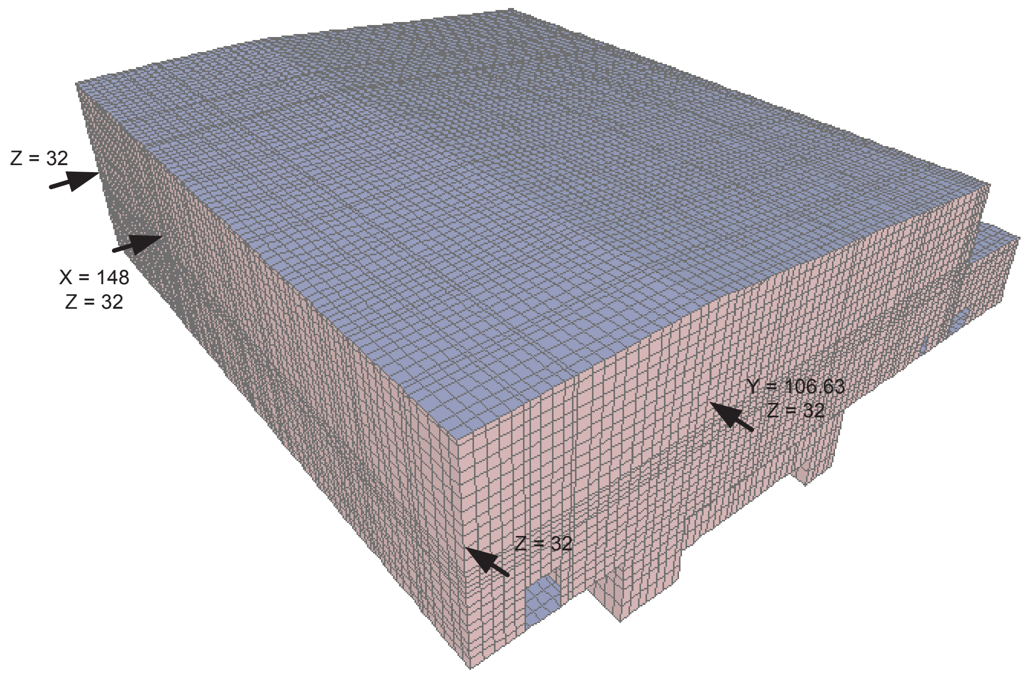


Figure B.3.7-9: Location of horizontal auto missile impacts for wind from the northeast with CW torsion

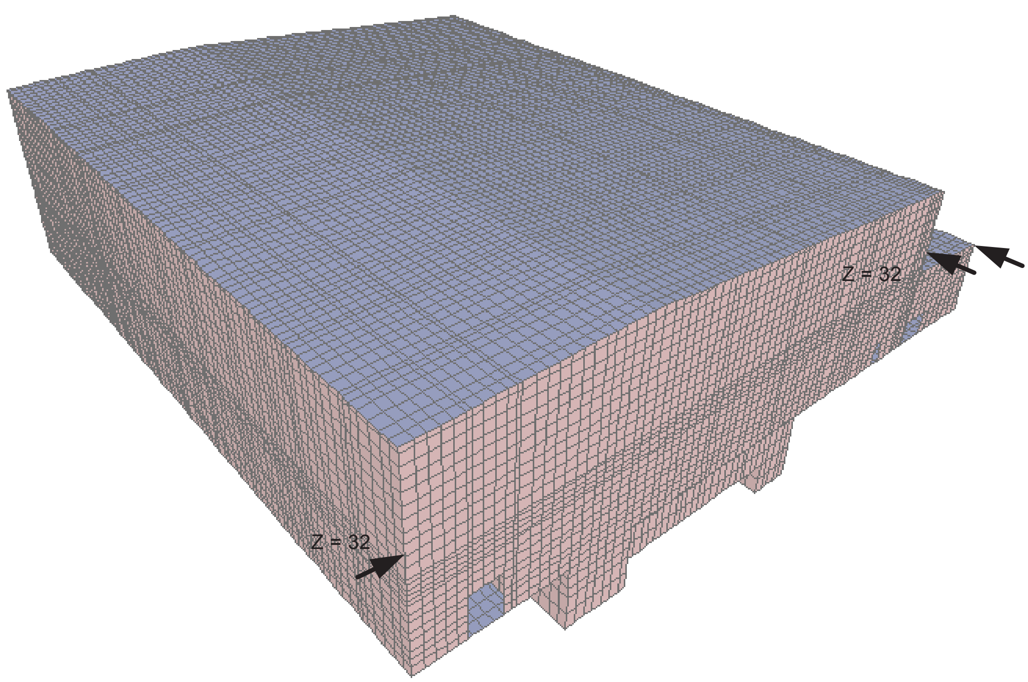


Figure B.3.7-10: Location of horizontal auto missile impacts for wind from the northeast with CCW torsion

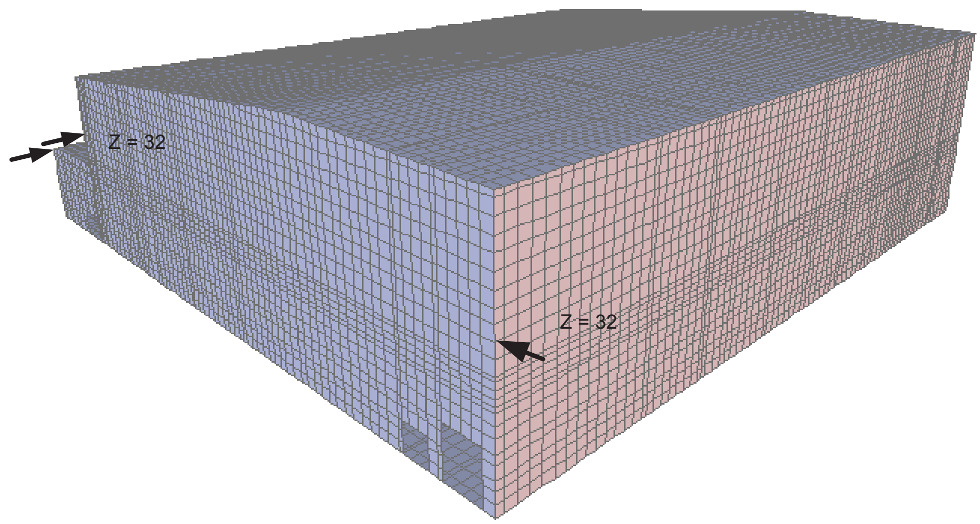


Figure B.3.7-11: Location of horizontal auto missile impacts for southeast wind with CW torsion

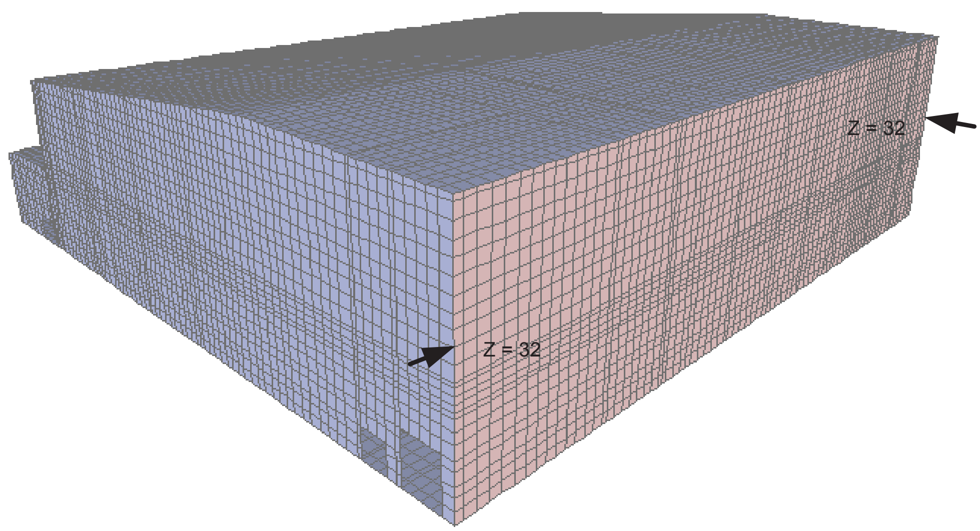


Figure B.3.7-12: Location of horizontal auto missile impacts for southeast wind with CCW torsion

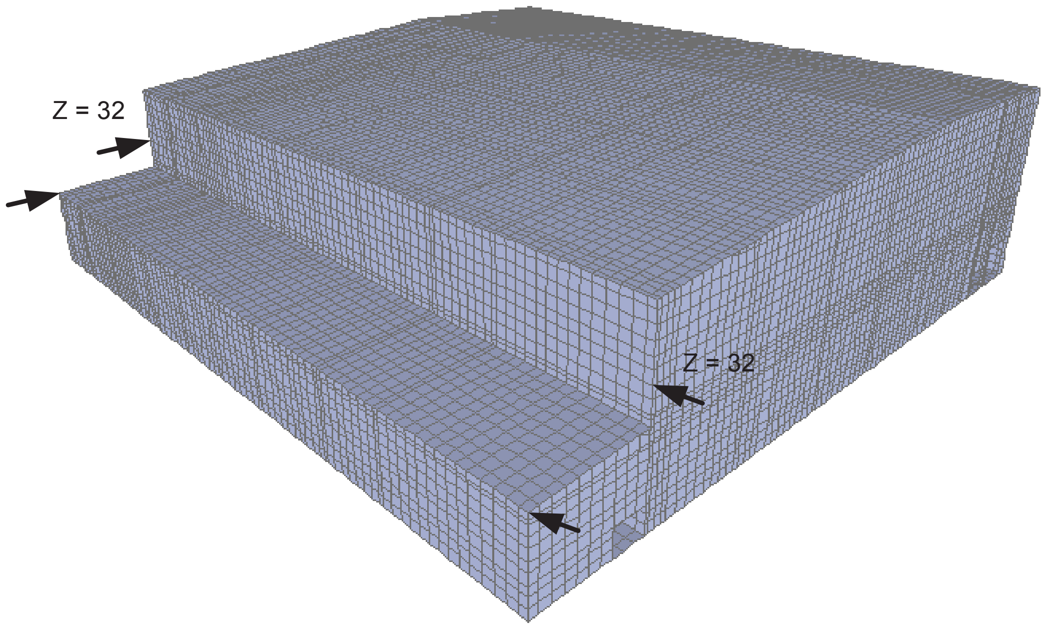


Figure B.3.7-13: Location of horizontal auto missile impacts for southwest wind with CW torsion

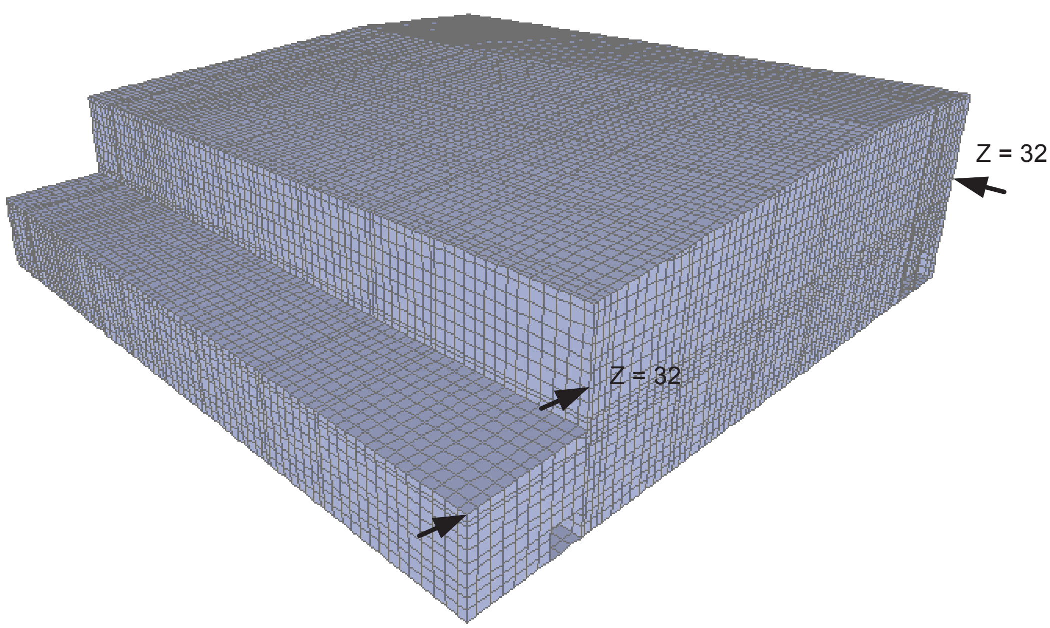


Figure B.3.7-14: Location of horizontal auto missile impacts for southwest wind with CCW torsion

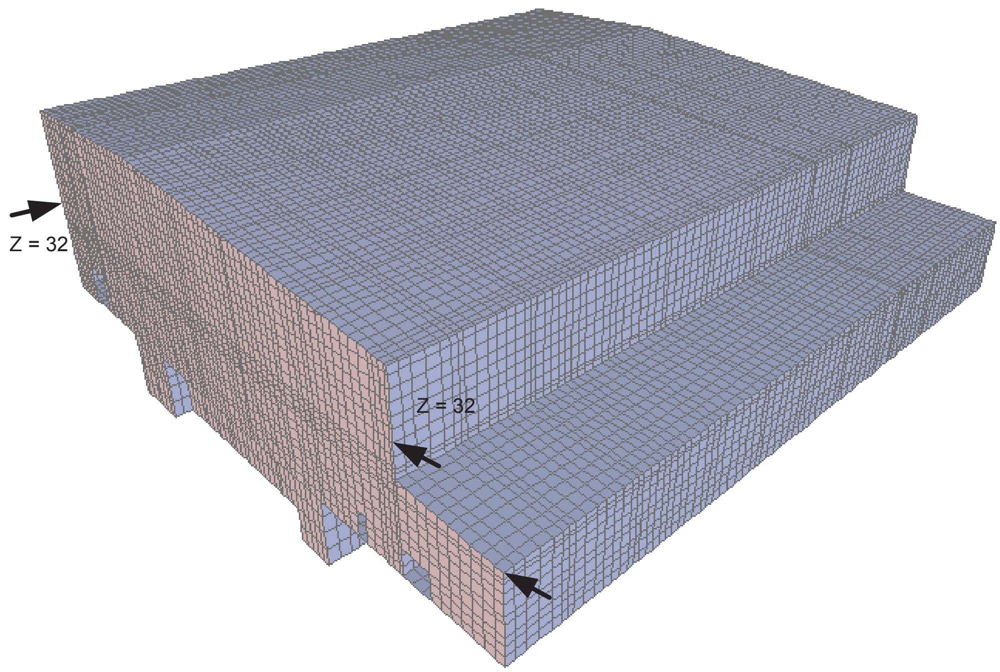


Figure B.3.7-15: Location of horizontal auto missile impacts for northwest wind with CW torsion

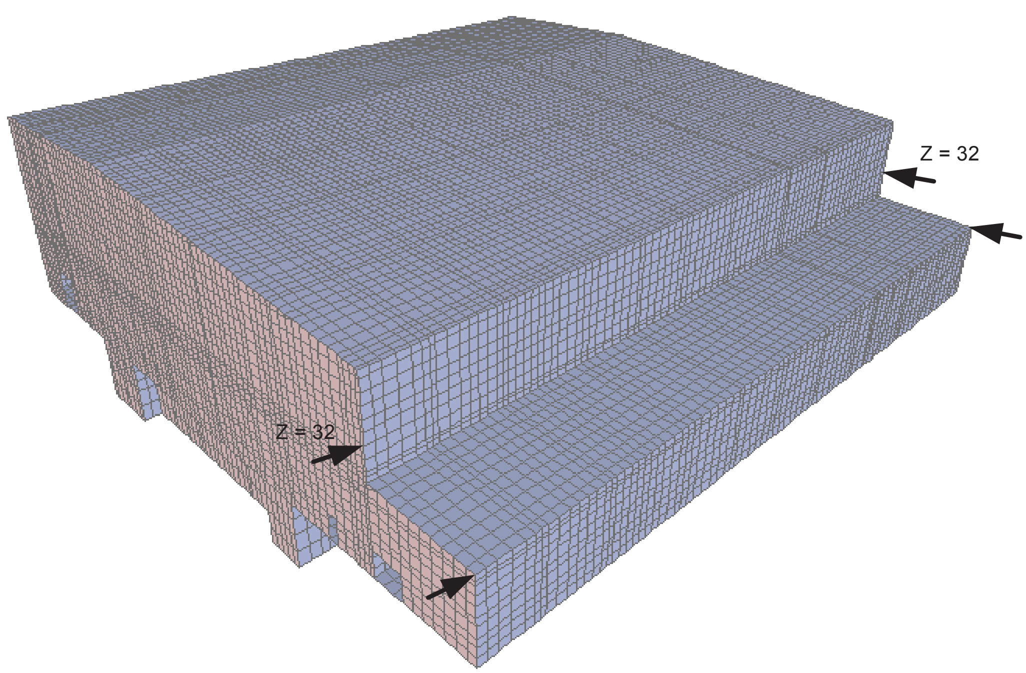


Figure B.3.7-16: Location of horizontal auto missile impacts for northwest wind with CCW torsion

Figures B.3.7-9 and 10 indicate where the vertical missile loads are applied in the SAP2000 static model.

$P_{dyn\_pipe\_v} = 229 \cdot kip$ — Force applied to model for vertical missile impacts on main roof

$P_{dyn\_auto\_v} = 731 \cdot kip$ — Force applied to model for vertical missile impacts on lower roof

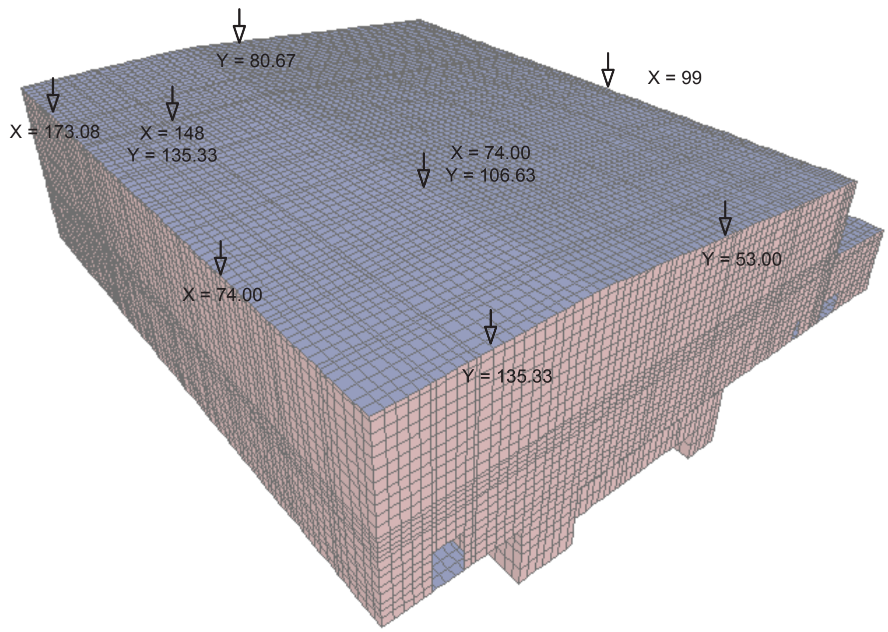


Figure B.3.7-8: Location of vertical pipe missile impacts for main roof (applied with all wind directions)

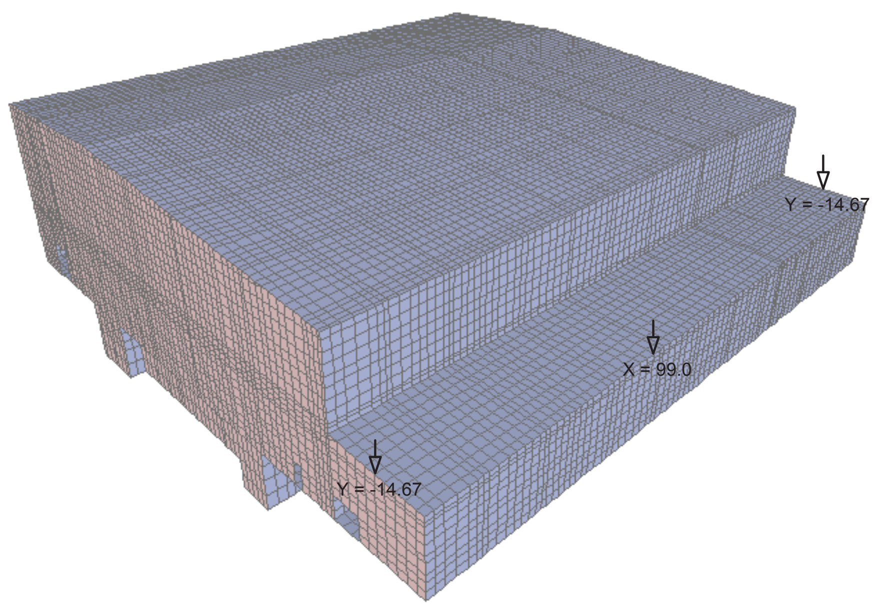


Figure B.3.7-8: Location of vertical auto missile impacts for lower roof (applied with all wind directions)

B.3.8 Tornado load combinations

Per SRP 3.3.2 [3.1.18], the combinations required for tornado are as follows:

1. $W_t = W_p$

2. $W_t = W_w + 0.5\ W_p + W_m$

where

W_t = total tornado load
W_w = load from tornado wind
W_p = load from tornado atmospheric pressure change
W_m = load from tornado missile impact

Per Section 9.2.6 of ACI 349-06 [3.1.9], the combinations including tornado should be satisfied first excluding the missile load, so the following case is also considered:

3. $W_t = W_w + 0.5\ W_p$

See Section 4.2.1 and 4.2.2 for the cases of W_t defined in the SAP2000 model as well as the primary load combinations including the W_t term.

C.1 SNOW LOADS

The following sections discuss the methodology used in developing design uniform snow and design snow drift loads for the roof of the SHINE Facility.

C.2 LIST OF VARIABLES, ASCE 7-05 [3.1.2]

C_e = Exposure Factor, Section 7.3.1

C_s = Slope Factor, Section 7.4

C_t = Thermal Factor, Section 7.3.2

h_b = Height of balanced snow load determined by dividing p_s by γ, (ft), Section 7.7.1

h_c = Clear height from top of balanced snow load to (1) closest point on adjacent upper roof, (2) top of parapet, or (3) top of a projection on the roof, (ft), Figure 7-8

h_d = Height of snow drift, (ft), Figure 7-8

I = Importance Factor, Section 7.3.3

l_u = Length of the roof upwind of the drift, (ft), Figure 7-8

p_d = Maximum intensity of drift surcharge load, (lb/ft^2), Section 7.7.1

p_f = Flat Roof Snow Load (lb/ft^2) ("flat" = roof slope ≤ 5°), Section 7.3

p_g = Ground Snow Load (lb/ft^2), Section 7.2

p_s = Sloped Roof Snow Load (lb/ft^2), Section 7.4

S = Roof slope run for a rise of one, Figure 7-5

w = Width of snow drift, (ft), Figure 7-8

W = Horizontal distance from eave to ridge, (ft), Figure 7-8

γ = Snow density, (lb/ft^3) Equation 7-3

C.3 SNOW LOAD CASES

C3.1.1 Uniform Flat Roof Design Snow Load Calculation

Since any roof slope for the facility is less than or equal to 5°, the snow load can be calculated in the following manner. The flat roof design snow load (p_f) can be calculated in accordance with equation 7-1 of ASCE 7-05 [3.1.2]. The required factors are tabulated in Table 1 below. Conservatively, 30 psf is used for p_f.

Table 1 – Flat Roof Snow Load (psf)

p_g (psf)	=	30	Section 7.2, Fig 7-1, ASCE 7-05
C_e	=	0.9	Section 7.3.1, Table 7-2, ASCE 7-05 (Fully Exposed, Terrain Category B/C)
C_t	=	1.0	Section 7.3.2, Table 7-3, ASCE 7-05
I	=	1.2	Section 7.3.3, Table 7-4, ASCE 7-05 (Category IV)
p_f (psf)	=	24.00	p_f =max[0.7 * Ce * Ct * I * p_g , 20 * I]= 24 psf; Section 7.3, Equation 7-1, ASCE 7-05
$p_{f\ applied}$ (psf)	=	30.00	Load Applied to SAP2000 Model

C3.1.2 Sloped Roof Snow Load (p_s) (psf)

The sloped snow load is calculated considering a warm roof slope factor. Using Equation 7-2 and Figure 7-2a of ASCE 7-05 [3.1.2], the value for p_s can be calculated. The sloped roof snow load is used later to calculate the unbalanced roof snow load.

Table 2 – Sloped Roof Snow Load (psf)

C_s	=	1.00	Section 7.4.1, Figure 7-2a, ASCE 7-05
p_s	=	30.00	$p_s = C_s \cdot p_f$; Section 7.4, Equation 7-2, ASCE 7-05

C3.1.3 Partial Loading of Snow Load

Partial loading is not considered since the most conservative truss member results from fully loading the roof.

C3.1.4 Unbalanced Snow Loads for Hip and Gable Roofs

Unbalanced snow loads are calculated for the upper roof of the SHINE Facility. The calculation is separated into two parts: (1) east direction sloping roof and (2) west direction sloping roof.

Table 3 – Unbalanced Snow Load Calculation for East Direction Sloping Roof

East Side of Building is Leeward Side			Section 7.6.1 ASCE 7-05
Roof Slope (deg)	=	1.3	
l_u (ft)	=	105.33	
W (ft)	=	105.33	
max. of 70/W+0.5 or 2.38°	=	2.38	
Unbalanced Snow Load Not Required, But Conservatively Applied			
S(ft)		44.63	
h_d (ft)	=	3.61	$h_d = 0.43 \times \sqrt[3]{l_u} \times \sqrt[4]{p_g + 10} - 1.5$,Drift Height, Figure 7-9
Unbalanced Snow Load (psf)	=	9.66	$h_d \cdot \gamma \ / \sqrt{S}$, Refer to Table 5 for γ
Unbalanced Snow Load distance (ft)	=	64	$8\sqrt{S} * h_d/3$
0.3 p_s (psf) (Windward Side)	=	9	

The following figure depicts the loading case considered for the unbalanced snow load calculated in Table 3. The unbalanced snow load calculated in Table 3 is rounded up for conservatism.

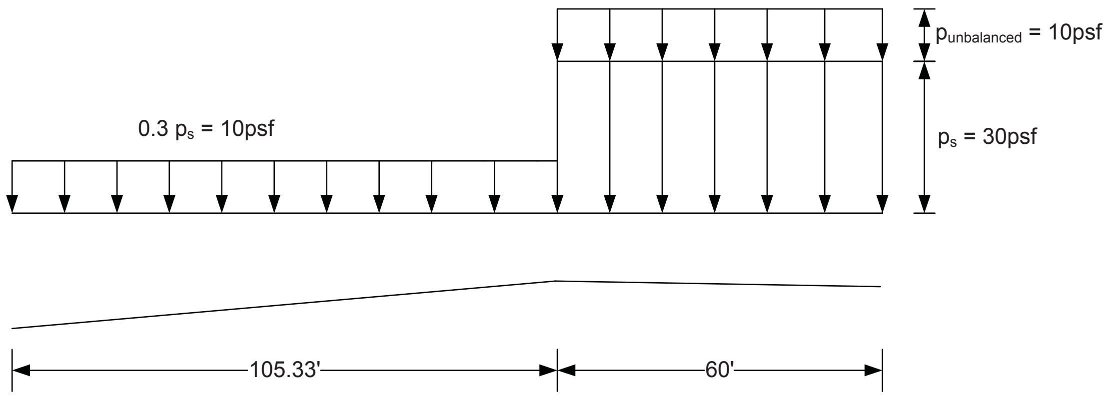


Figure 3.2-1. Snow Load Diagram for East Direction Sloping Roof

Table 4 – Unbalanced Snow Load Calculation for West Direction Sloping Roof

West Side of Building is Leeward Side			Section 7.6.1 ASCE 7-05
Roof Slope (deg)	=	5	
l_u (ft)	=	60.0	
W (ft)	=	60.0	
max. of 70/W+0.5 or 2.38°		2.38	
Unbalanced Snow Load Required			
S(ft)		11.44	
h_d (ft)	=	2.73	$h_d = 0.43 \times \sqrt[3]{l_u} \times \sqrt[4]{p_g + 10} - 1.5$,Drift Height, Figure 7-9
Unbalanced Snow Load (psf)	=	14.47	$h_d \cdot \gamma$ / √S, Refer to Table 5 for γ
Unbalanced Snow Load distance (ft)	=	25	8√S*h_d*/3
0.3 p_s (psf) (Windward Side)	=	9	

The following figure depicts the loading case considered for the unbalanced snow load calculated in Table 4.

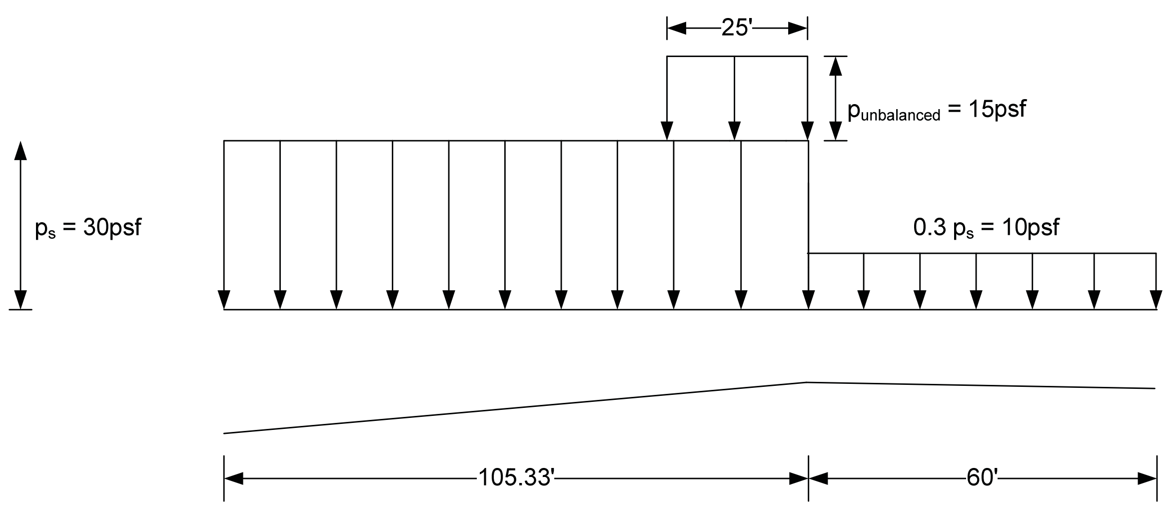


Figure 3.2-2 – Snow Load Diagram for West Direction Sloping Roof

C3.1.5 Design Snow Drift Surcharge Load Calculation

The design snow drift surcharge loads (p_d) are computed in accordance with Section 7.7.1 of ACSE 7-05 [3.1.2]. Table 5, shown below, computes the snow density (γ) and the height of balanced snow load (h_b), determined by dividing p_s by γ, required to determine the design drift height and the design snow drift surcharge load according to Section 7.7.1 of ACSE 7-05 [3.1.2]. Note that in accordance with Section 7.4 of ACSE 7-05 [3.1.2], ps is computed by multiplying pf by Cs. The design drift surcharge loads for those areas are tabulated in Table 6 below.

Table 5 – Snow Drift Surcharge Information

γ (pcf)	=	17.90	$\gamma = 0.13 * Pg + 14 \leq 30$ pcf; Equation 7-3 ASCE 7-05
h_b (ft)	=	1.68	$h_b = p_s / \gamma$; Section 7.7.1, ASCE 7-05 [3.1.2]

Table 6 – Snow Drift Surcharge Calculation

Area	Direction									
	Wind	Drift	l_u (ft) [1]	h_c (ft)	h_c/h_b	$h_c/h_b < 0.2$	h_d (ft) [2]	Design h_d (ft) [3]	w (ft) [4]	p_d (lb/ft^2) [5]
Lower Roof (West End of Building)	E-W	Leeward	105.8	22.70	13.54	NO	3.62	3.62	14.46	64.71
		Windward	29.0	22.70	13.54	NO	1.37			

1. If l_u < 25ft, 25ft is used for calculation of h_d (Fig 7-9, ASCE 7-05 [3.1.2])
2. Leeward $h_d = 0.43*l_u^{(1/3)}*(p_g+10)^{(1/4)} - 1.5$; Windward $h_d = (3/4)*(0.43*l_u^{(1/3)}*(p_g+10)^{(1/4)} - 1.5)$ (Section 7.7.1, ASCE 7-05 [3.1.2])
3. Design h_d = max (Leeward h_d, Windward h_d) (Section 7.7.1, ASCE 7-05 [3.1.2])

4. $w = 4*h_d$ if $h_d \leq h_c$; $w = 4*h_d^2/h_c$ if $h_d > h_c$; $w < 8*h_c$ (Section 7.7.1, ASCE 7-05 [3.1.2]); horizontal dimension perpendicular to facility wall.

5. p_d = Design h_d * γ (Section 7.7.1, ASCE 7-05 [3.1.2]); The drift loads are in addition to the uniform snow load. The drift surcharge load varies uniformly from the noted value at the wall to zero at a distance "w" from the wall. However, in accordance with Section 7.7.1 of ASCE 7-05 [3.1.2], if the drift width, w, exceeds the width of the lower roof, the drift shall be truncated at the far edge of the roof, not reduced to zero there.

Conservatively use a drift snow load, p_d, of 65 psf and a distance, W, of 15 ft. from the wall interface.

C3.1.6 Sliding Snow Load Calculation

The load caused by snow sliding off a sloped roof onto the lower roof can be determined on a per unit length by using the equation in Table 7:

Table 7 – Sliding Snow Load Calculation

$0.4*p_f*W$ (plf)	=	1270	Section 7.9, ASCE 7-05
Sliding Snow Smear Load (psf)	=	84.67	Section 7.9, Distributed over 15ft

Conservatively use a smear load of 85 psf over the 15-ft. span.

C3.1.7 Rain-on-Snow Surcharge Load

Rain-on-Snow load is not considered since the ground snow load is greater than 20 psf.

C3.2 Snow Loading Cases Considered in Design Model

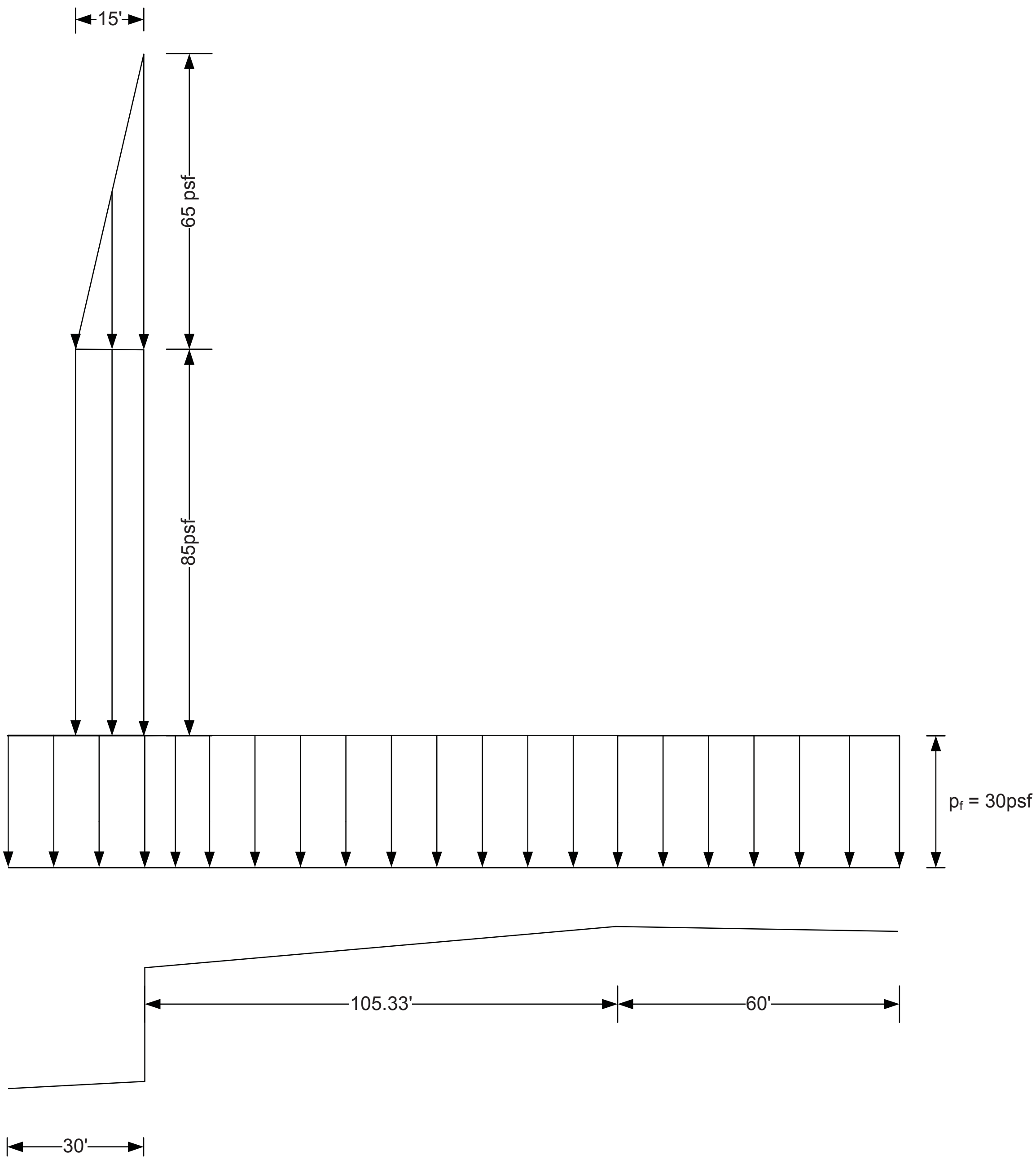


Figure 3.2-1 – Case 1: Flat Roof Snow Load

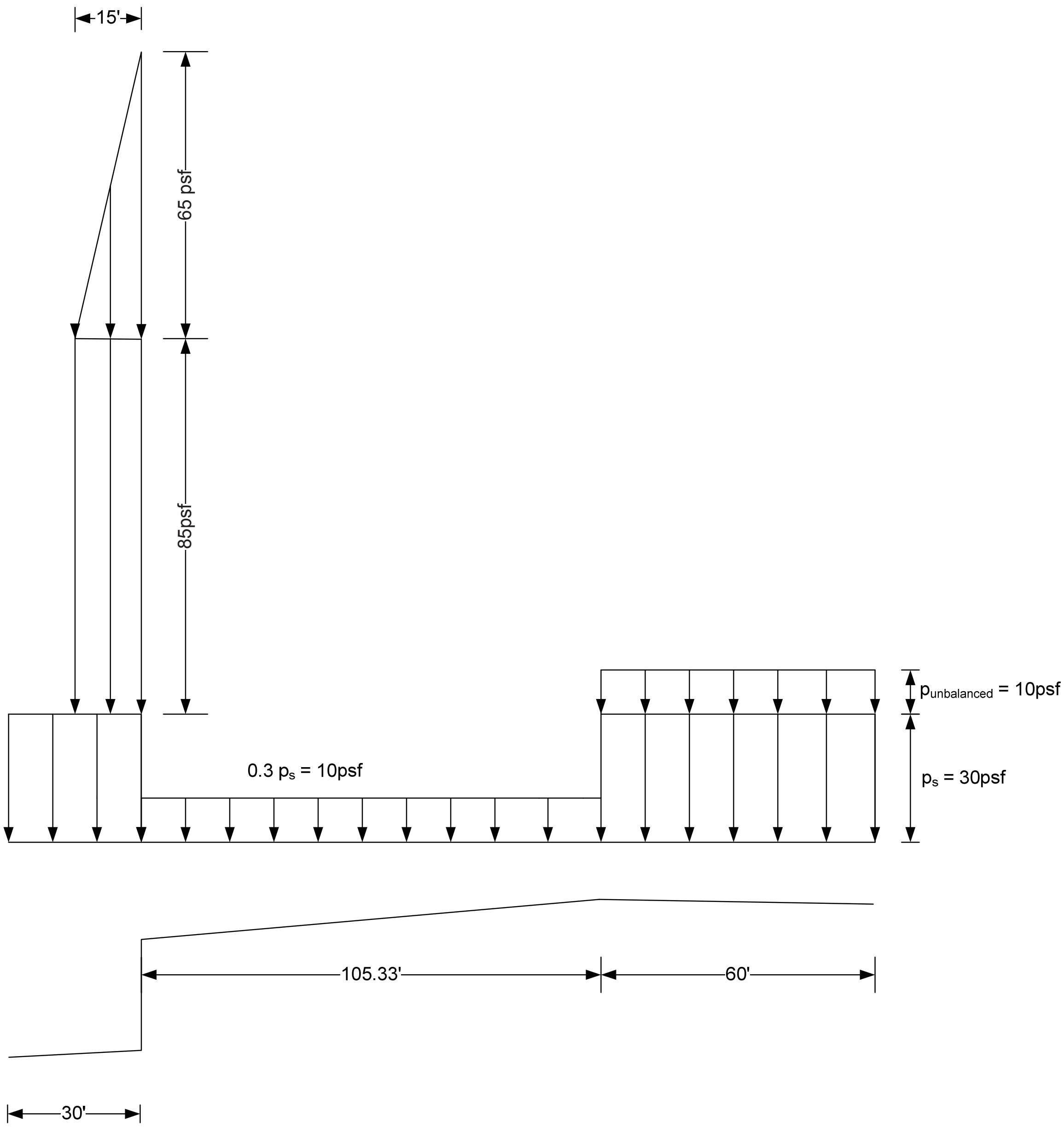


Figure 3.2-2 – Case 2: Unbalanced Snow Load for East Direction Sloping Roof with Drift Load and Sliding Load on Lower Roof

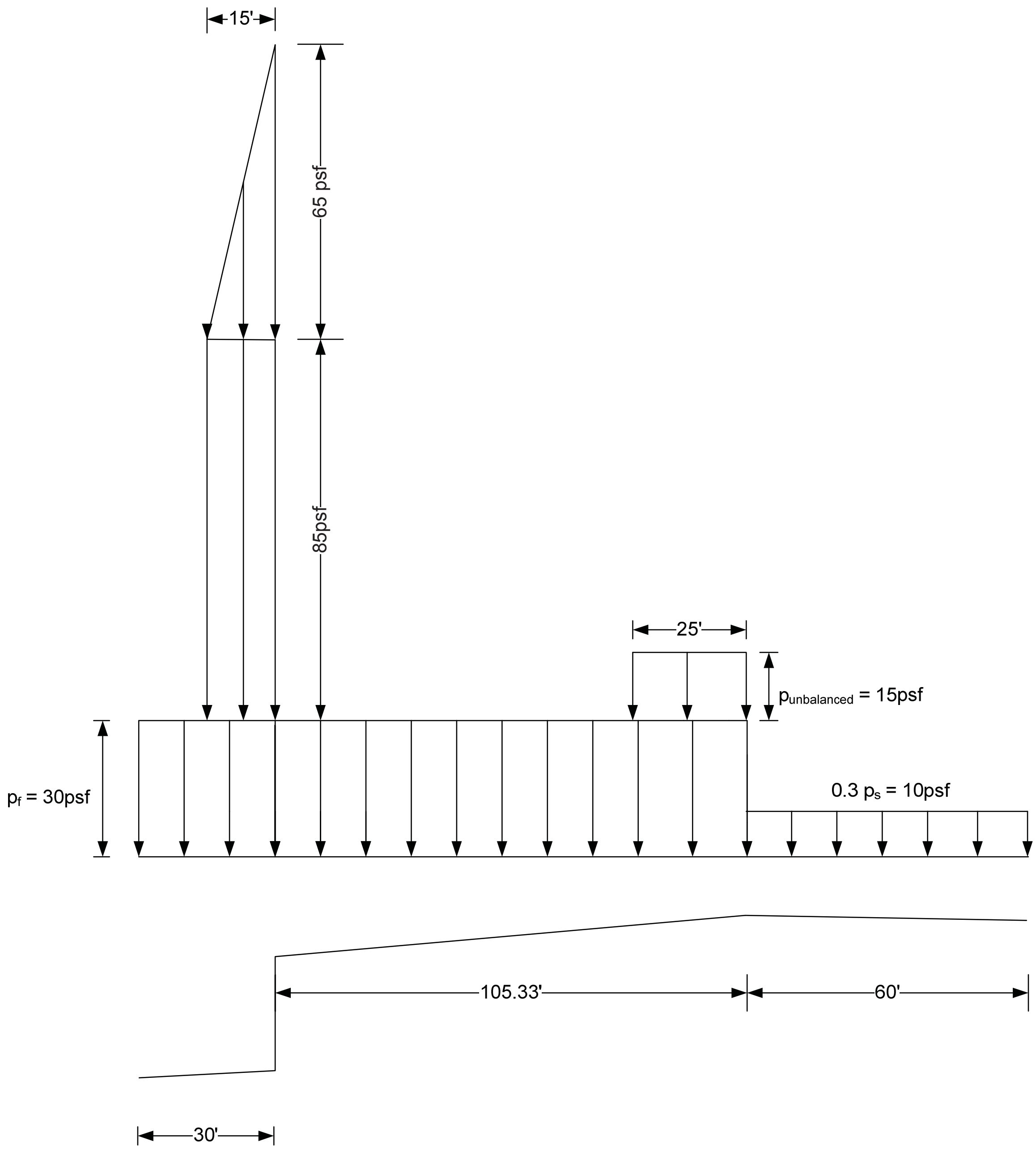


Figure 3.2-3 – Case 3: Unbalanced Snow Load for West Direction Sloping Roof with Drift Load and Sliding Load on Lower Roof

D.0 Crane Load

There are three overhead cranes in the SHINE Facility. Crane loads are transmitted to the building structure through the crane rail at the point of contact with the crane wheels. There is a dead load associated with solely the components weights for each crane, as well as live loads that result from the movement of the cranes along their respective rails while carrying their rated capacity. In addition, loads caused by the crane impacting their respective bumpers and coming to a stop at the end of the rail are calculated. Use the following local coordinate system for the calculation of crane loads,

X = Perpendicular to the crane rail
Y= Parallel to the crane rail
Z= Down

D.1 OC-0001 Irradiation Cell Area Crane

The OC-0001 crane is located in the Irradiation Cell Area of the SHINE Facility. Per Ref. 3.3.8, a capacity of 75 tons is used based on the estimated bounding lift of a multiplier in a cask (a weight to be confirmed in Final Design).

$Span := 57ft$ Span of the crane bridge (Ref. 3.2.1, Sheet No. 9)

Use the information provided in Ref. 3.3.1, Page 64-65 for a 75 ton capacity crane spanning 60 ft.

$Capacity := 150kip$

$W_{trolley} := 48200lbf$ Weight of the trolley

$W_{bridge} := 120000lbf$ Weight of the bridge

$d_{wheel} := 17ft$ Distance between crane wheels on the rail

$L_{wheel} := 112000lbf$ Wheel load for 75 ton, 60 ft. span crane

Use the following dimensions as a reasonably conservative estimation of the corbel and rail,

$h_{rail} := 6in$ Height of rail

$w_{corbel} := 2.5ft$ Width of corbel

The width of wall is consistent with what is being used in the design model,

$w_{wall} := 2ft$

Calculate the eccentricities for the crane loads. For the local X-direction, the eccentricity is equal to the distance from the rail to the center of the wall. In the local Z-direction, the eccentricity is taken as being from the top of the rail to 6 in. below the rail in order to account for rigidity in the corbel,

$e_{x.rail} := 2.5ft$

$e_{z.rail} := 1ft$

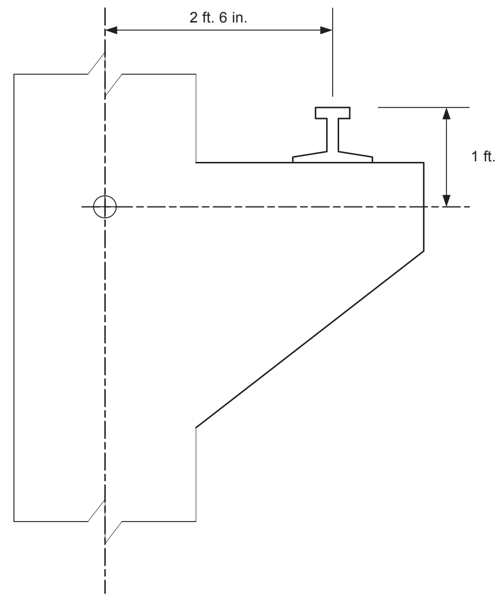


Figure D.1-1 - Eccentricity of crane loads on the rail

Force factors used in the calculation of crane live loads are provided per Ref. 3.1.2, Section 4.10,

$IF_{vert} := 10\%$ Vertical impact factor for pendant operated cranes

$IF_{lat} := 20\%$ Lateral force factor for moving crane trolleys

$IF_{long} := 10\%$ Longitudinal force factor

Conservatively calculate the maximum load per wheel based on the trolley positioned at one end of bridge and carrying maximum load capacity,

$$W_{per\_wheel} := \frac{\frac{W_{bridge}}{2} + W_{trolley} + Capacity}{2} = 129.1 \cdot kip$$

Use the maximum of the provided wheel load and the calculated wheel load,

$$W_{wheel} := \max\left(L_{wheel}, W_{per\_wheel}\right) = 129.1 \cdot kip$$

Dead Loads

The dead load per wheel is calculated at the contact point with the rail,

$$F_{z.D.rail} := \frac{\frac{W_{bridge}}{2} + W_{trolley}}{2} = 54.1 \cdot kip$$

The resultant loads at the centerline of the wall,

$$F_{z.D} := F_{z.D.rail} = 54.1 \cdot \text{kip}$$

$$M_{y.D} := F_{z.D} \cdot e_{x.rail} = 135.25 \cdot \text{kip} \cdot \text{ft}$$

Live Loads

The live loads per wheel are calculated at the contact point with the rail,

$$F_{x.L.rail} := IF_{lat} \cdot \left(\frac{W_{trolley} + \text{Capacity}}{2} \right) = 19.82 \cdot \text{kip}$$

$$F_{y.L.rail} := IF_{long} \cdot W_{wheel} = 12.91 \cdot \text{kip}$$

$$F_{z.L.rail} := IF_{vert} \cdot W_{wheel} + \frac{\text{Capacity}}{2} = 87.91 \cdot \text{kip}$$

The resultant loads at the centerline of the wall,

$$F_{x.L} := F_{x.L.rail} + \frac{F_{y.L.rail} \cdot e_{x.rail}}{d_{wheel}} = 21.719 \cdot \text{kip}$$

$$F_{y.L} := F_{y.L.rail} = 12.91 \cdot \text{kip}$$

$$F_{z.L} := F_{z.L.rail} + \frac{F_{y.L.rail} \cdot e_{z.rail}}{d_{wheel}} = 88.669 \cdot \text{kip}$$

$$M_{y.L} := F_{x.L} \cdot e_{z.rail} + F_{z.L} \cdot e_{x.rail} = 243.392 \cdot \text{kip} \cdot \text{ft}$$

Stop Loads

The dimensions used for the calculation of crane stop loads are reasonable estimations based on information from Ref. 3.3.20, page 189.

Bridge load rated speed (slow for light service, pendant controlled) per Ref. 3.1.15, Page 13,

$$V_B := 30 \frac{\text{ft}}{\text{min}}$$

Impact weight of crane

$$W_E := W_{bridge} + W_{trolley} = 168.2 \cdot \text{kip}$$

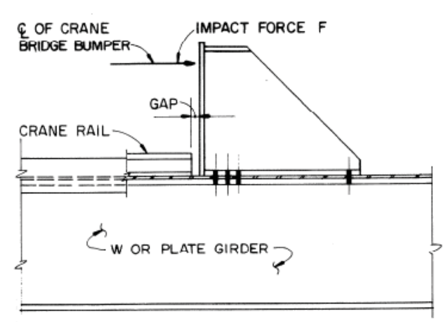


Figure D.1-2 - Crane bumper

Conservative stroke of spring at the point where the crane stopping energy is fully absorbed

$T := 0.15\text{ft}$

Longitudinal inertia force at the center of mass of the bridge/trolley on the bumper at 50% of the full load rated speed, assume a linear energy absorber,

$$F_{y.stop} := \frac{W_E \cdot \left(\frac{V_B}{2}\right)^2}{2g \cdot T} = 1.089 \cdot \text{kip}$$

$h_{stop} := 2.5\text{ft}$ Height of stop

$F_{y.S} := F_{y.stop} = 1.089 \cdot \text{kip}$

$M_{x.S} := F_{y.stop} \cdot \left(e_{z.rail} + h_{stop}\right) = 3.812 \cdot \text{kip} \cdot \text{ft}$ $M_{z.S} := F_{y.stop} \cdot e_{x.rail} = 2.723 \cdot \text{kip} \cdot \text{ft}$

Seismic Crane Masses

$$Mass_{hor} := \frac{F_{z.D}}{g} = 1.681 \cdot \text{kip} \cdot \frac{s^2}{\text{ft}}$$

$$Mass_{vert} := \frac{W_{wheel}}{g} = 4.013 \cdot \text{kip} \cdot \frac{s^2}{\text{ft}}$$

D.2 OC-0002 Tank Farm Area Crane

The OC-0002 crane is located in the Tank Farm Area of the SHINE Facility. Per Ref. 3.3.8, a capacity of 40 tons is used based on the estimated bounding lift due to cover block sections in this area.

$Span := 102.33\text{ft}$ Span of the crane bridge (Ref. 3.2.1, Sheet No. 9)

Use the information provided in Ref. 3.3.1, Page 46-47 for a 40 ton capacity pendant controlled crane spanning 100 ft.

$Capacity := 80\text{kip}$

$W_{trolley} := 15500\text{lbf}$ Weight of the trolley

$W_{bridge} := 115700\text{lbf}$ Weight of the bridge

$d_{wheel} := 15.5\text{ft}$ Distance between crane wheels along rail

$L_{wheel} := 72900\text{lbf}$ Wheel load for 40 ton, 100 ft. span

Use the following dimensions as a reasonably conservative estimation of the corbel and rail,

$h_{rail} := 6in$ Height of rail

$w_{corbel} := 2.5ft$ Width of corbel

The width of wall is consistent with what is being used in the design model,

$w_{wall} := 2ft$ Width of wall

Calculate the eccentricities for the crane loads. For the local X-direction, the eccentricity is equal to the distance from the rail to the center of the wall. In the local Z-direction, the eccentricity is taken as being from the top of the rail to 6 in. below the rail in order to account for rigidity in the corbel,

$e_{x.rail} := 2.5ft$

$e_{z.rail} := 1ft$

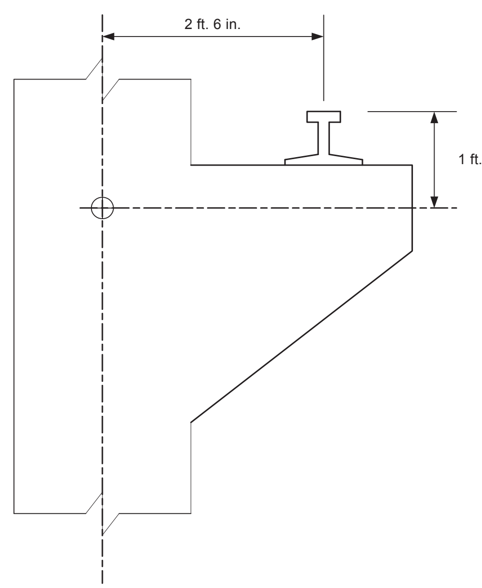


Figure D.2-1 - Eccentricity of crane loads on the rail

Force factors used in the calculation of crane live loads are provided per Ref. 3.1.2, Section 4.10,

$IF_{vert} := 10\%$ Vertical impact factor for pendant operated cranes

$IF_{lat} := 20\%$ Lateral force factor for moving crane trolleys

$IF_{long} := 10\%$ Longitudinal force factor

Conservatively calculate the maximum load per wheel based on the trolley positioned at one end of bridge and carrying maximum load capacity,

$$W_{per\_wheel} := \frac{\frac{W_{bridge}}{2} + W_{trolley} + Capacity}{2} = 76.675 \cdot kip$$

Use the maximum of the provided wheel load and the calculated wheel load,

$$W_{wheel} := \max\left(L_{wheel}, W_{per\_wheel}\right) = 76.675 \cdot kip$$

Dead Loads

The dead load per wheel is calculated at the contact point with the rail,

$$F_{z.D.rail} := \frac{\frac{W_{bridge}}{2} + W_{trolley}}{2} = 36.675 \cdot kip$$

The resultant loads at the centerline of the wall,

$$F_{z.D} := F_{z.D.rail} = 36.675 \cdot kip$$

$$M_{y.D} := F_{z.D} \cdot e_{x.rail} = 91.687 \cdot kip \cdot ft$$

Live Loads

The live loads per wheel are calculated at the contact point with the rail,

$$F_{x.L.rail} := IF_{lat} \cdot \left(\frac{W_{trolley} + Capacity}{2}\right) = 9.55 \cdot kip$$

$$F_{y.L.rail} := IF_{long} \cdot W_{wheel} = 7.668 \cdot kip$$

$$F_{z.L.rail} := IF_{vert} \cdot W_{wheel} + \frac{Capacity}{2} = 47.667 \cdot kip$$

The resultant loads at the centerline of the wall,

$$F_{x.L} := F_{x.L.rail} + \frac{F_{y.L.rail} \cdot e_{x.rail}}{d_{wheel}} = 10.787 \cdot kip$$

$$F_{y.L} := F_{y.L.rail} = 7.668 \cdot kip$$

$$F_{z.L} := F_{z.L.rail} + \frac{F_{y.L.rail} \cdot e_{z.rail}}{d_{wheel}} = 48.162 \cdot kip$$

$$M_{y.L} := F_{x.L} \cdot e_{z.rail} + F_{z.L} \cdot e_{x.rail} = 131.192 \cdot kip \cdot ft$$

Stop Loads

The dimensions used for the calculation of crane stop loads are reasonable estimations based on information from Ref. 3.3.20, page 189.

Bridge load rated speed (slow for light service, pendant controlled) per Ref. 3.1.15, Page 13,

$$V_B := 50\frac{ft}{min}$$

Impact weight of crane

$$W_E := W_{bridge} + W_{trolley} = 131.2 \cdot kip$$

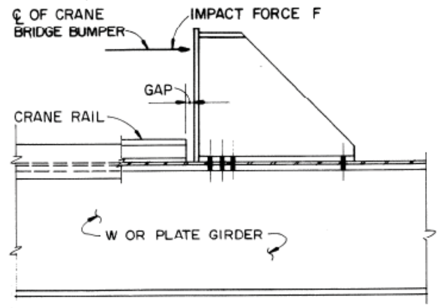


Figure D.2-2 - Crane bumper

Conservative stroke of spring at the point where the crane stopping energy is fully absorbed

$$T := 0.15ft$$

Longitudinal inertia force at the center of mass of the bridge/trolley on the bumper at 50% of the full load rated speed, assume a linear energy absorber,

$$F_{y.stop} := \frac{W_E \cdot \left(\frac{V_B}{2}\right)^2}{2g \cdot T} = 2.36 \cdot kip$$

$h_{stop} := 2.5ft$ Height of stop

$$F_{y.S} := F_{y.stop} = 2.36 \cdot kip$$

$$M_{x.S} := F_{y.stop} \cdot \left(e_{z.rail} + h_{stop}\right) = 8.259 \cdot kip \cdot ft$$

$$M_{z.S} := F_{y.stop} \cdot e_{x.rail} = 5.9 \cdot kip \cdot ft$$

Seismic Crane Masses

$$Mass_{hor} := \frac{F_{z.D}}{g} = 1.14 \cdot kip \cdot \frac{s^2}{ft}$$

$$Mass_{vert} := \frac{W_{wheel}}{g} = 2.383 \cdot kip \cdot \frac{s^2}{ft}$$

D.3 OC-0003 Super Cell Area Crane

The OC-0003 crane is located in the Super Cell Area of the SHINE Facility. Per Ref. 3.3.8, a 40 ton capacity pendant controlled crane is used based on the bounding lift of a shipping container.

$Span := 48ft + 4in$ Span of the crane bridge

Use the information provided in Ref. 3.3.1, Page 46-47 for a 40 ton capacity crane spanning 50 ft.

$Capacity := 80kip$

$W_{trolley} := 15000lbf$ Weight of the trolley

$W_{bridge} := 55400lbf$ Weight of the bridge

$d_{wheel} := 14ft$ Distance between crane wheels along the rail

$L_{wheel} := 55600lbf$ Wheel load for 50 ft. span

Use the following dimensions as a reasonably conservative estimation of the corbel and rail,

$h_{rail} := 6in$ Height of rail

$w_{corbel} := 2.5ft$ Width of corbel

The width of wall is consistent with what is being used in the design model,

$w_{wall} := 2ft$

Calculate the eccentricities for the crane loads. For the local X-direction, the eccentricity is equal to the distance from the rail to the center of the wall. In the local Z-direction, the eccentricity is taken as being from the top of the rail to 6 in. below the rail in order to account for rigidity in the corbel,

$e_{x.rail} := 2.5ft$

$e_{z.rail} := 1ft$

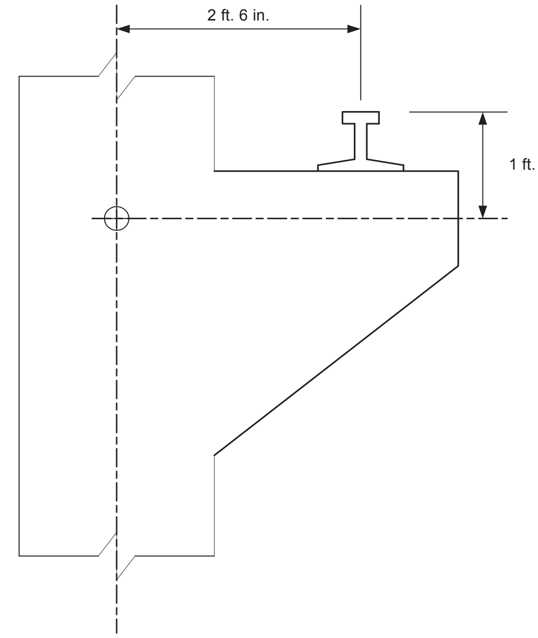


Figure D.3-1 - Eccentricity of crane loads on the rail

Force factors used in the calculation of crane live loads are provided per Ref. Ref. 3.1.2, Section 4.10,

$IF_{vert} := 10\%$ Vertical impact factor for pendant operated cranes

$IF_{lat} := 20\%$ Lateral force factor for moving crane trolleys

$IF_{long} := 10\%$ Longitudinal force factor

Conservatively calculate the maximum load per wheel based on the trolley positioned at one end of bridge and carrying maximum load capacity,

$$W_{per\_wheel} := \frac{\frac{W_{bridge}}{2} + W_{trolley} + Capacity}{2} = 61.35 \cdot kip$$

Use the maximum of the provided wheel load and the calculated wheel load,

$$W_{wheel} := \max\left(L_{wheel}, W_{per\_wheel}\right) = 61.35 \cdot kip$$

Dead Loads

The dead load per wheel is calculated at the contact point with the rail,

$$F_{z.D.rail} := \frac{\frac{W_{bridge}}{2} + W_{trolley}}{2} = 21.35 \cdot kip$$

The resultant loads at the centerline of the wall,

$$F_{z.D} := F_{z.D.rail} = 21.35 \cdot kip$$

$$M_{y.D} := F_{z.D} \cdot e_{x.rail} = 53.375 \cdot kip \cdot ft$$

Live Loads

The live loads per wheel are calculated at the contact point with the rail,

$$F_{x.L.rail} := IF_{lat} \cdot \left(\frac{W_{trolley} + Capacity}{2}\right) = 9.5 \cdot kip$$

$$F_{y.L.rail} := IF_{long} \cdot W_{wheel} = 6.135 \cdot kip$$

$$F_{z.L.rail} := IF_{vert} \cdot W_{wheel} + \frac{Capacity}{2} = 46.135 \cdot kip$$

The resultant loads at the centerline of the wall,

$$F_{x.L} := F_{x.L.rail} + \frac{F_{y.L.rail} \cdot e_{x.rail}}{d_{wheel}} = 10.596 \cdot kip$$

$$F_{y.L} := F_{y.L.rail} = 6.135 \cdot kip$$

$$F_{z.L} := F_{z.L.rail} + \frac{F_{y.L.rail} \cdot e_{z.rail}}{d_{wheel}} = 46.573 \cdot kip$$

$$M_{y.L} := F_{x.L} \cdot e_{z.rail} + F_{z.L} \cdot e_{x.rail} = 127.029 \cdot kip \cdot ft$$

Stop Loads

The dimensions used for the calculation of crane stop loads are reasonable estimations based on information from Ref. 3.3.20, page 189.

Bridge load rated speed (slow for light service, pendant controlled) per Ref. 3.1.15, Page 13,

$$V_B := 50 \frac{ft}{min}$$

Impact weight of crane

$$W_E := W_{bridge} + W_{trolley} = 70.4 \cdot kip$$

Conservative stroke of spring at the point where the crane stopping energy is fully absorbed

$$T := 0.15ft$$

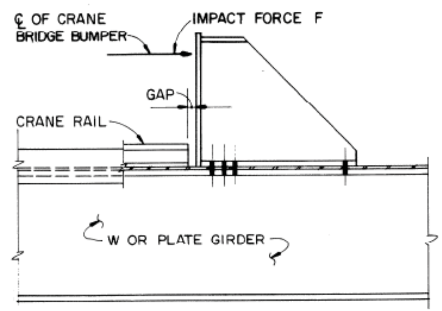


Figure D.3-2 - Crane bumper

Longitudinal inertia force at the center of mass of the bridge/trolley on the bumper at 50% of the full load rated speed, assume a linear energy absorber.

$$F_{y.stop} := \frac{W_E \cdot \left(\frac{V_B}{2}\right)^2}{2g \cdot T} = 1.266 \cdot kip$$

$$h_{stop} := 2.5ft$$

Height of stop

$$F_{y.S} := F_{y.stop} = 1.266 \cdot kip$$

$$M_{x.S} := F_{y.stop} \cdot \left(e_{z.rail} + h_{stop}\right) = 4.432 \cdot kip \cdot ft$$

$$M_{z.S} := F_{y.stop} \cdot e_{x.rail} = 3.166 \cdot kip \cdot ft$$

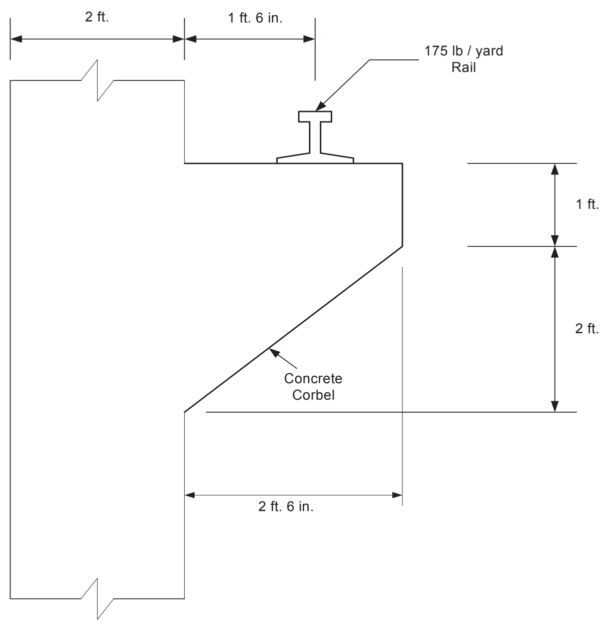
Seismic Crane Masses

$$Mass_{hor} := \frac{F_{z.D}}{g} = 0.664 \cdot kip \cdot \frac{s^2}{ft}$$

$$Mass_{vert} := \frac{W_{wheel}}{g} = 1.907 \cdot kip \cdot \frac{s^2}{ft}$$

D.4 Rail and Corbel Loading

Since the cranes are simultaneously applied at multiple locations in the SAP2000 Model and the resultant reinforcement is based on the maximum stress concentration in the wall, consider the load from the rail and corbel as a point load applied at the various point load locations for the crane wheels.



$$w_{rail} := 175\frac{lbf}{yd} = 58.333\cdot\frac{lbf}{ft}$$

$$A_{corbel} := 2.5ft\cdot 1ft + \frac{(2.5ft)(2ft)}{2} = 5\,ft^2$$

$$\gamma_c := 150pcf$$

$$w_{corbel} := \gamma_c\cdot A_{corbel} = 750\cdot\frac{lbf}{ft}$$

D.4-1. Preliminary corbel configuration

Take a tributary length of load applied to each wheel location as equal to the maximum spacing between wheels used for the three cranes (i.e. 17 ft. for OC-0001 Crane).

$L := 17ft$ $\qquad W_{RC} := \left(w_{rail} + w_{corbel}\right)\cdot L = 13.742\cdot kip$

Check preliminary corbel size using the maximum loads from the three cranes,

$$V_u := 1.2\cdot(54.1kip + 13.74kip) + 1.6\cdot(88.669kip) = 223.278\cdot kip$$

$f'_c := 4000psi$ $\qquad b := L$ $\qquad d := 3ft - 2.5in$ $\qquad \phi := 0.75$

$$\phi V_n := \min\left(0.2\cdot\phi\cdot f'_c\cdot b\cdot d, 0.8\cdot\phi\cdot\frac{b}{in}\cdot\frac{d}{in}\cdot kip\right) = 4100.4\cdot kip$$

Therefore, this corbel size is appropriate to use for loading purposes. Detailed concrete corbel design will be included in Final Design.

$$F_{z.RC} := W_{RC} = 13.742\cdot kip$$

$$M_{y.RC} := F_{z.RC}\cdot e_{x.rail} = 34.354\cdot kip\cdot ft$$

D.5 Input to the SAP2000 Model

Resultant crane loads (per wheel) are applied to the SAP2000 model at various positions along the length of their respective rails. The OC-0001 and OC-0002 cranes have three positions (centered and at both ends) along the rail. The OC-0003 crane has four positions including both ends of the rail, centered on the interior wall, and at the end of the interior wall. These placements are intended to simulate situations of maximum stress in the building structure due to crane loading. The loads in the following tables are converted to the global coordinate system used in the SAP2000 model,

Table D.5-1. Crane masses for seismic modelling

Crane	Crane Position	Seismic Masses	
		Horizontal (kip*s^2/ft)	Vertical (kip*s^2/ft)
OC-0001	1	1.68	4.01
	2	1.68	4.01
	3	1.68	4.01
OC-0002	1	1.14	2.38
	2	1.14	2.38
	3	1.14	2.38
OC-0003	1	0.66	1.91
	2	0.66	1.91
	3	0.66	1.91
	4	0.66	1.91

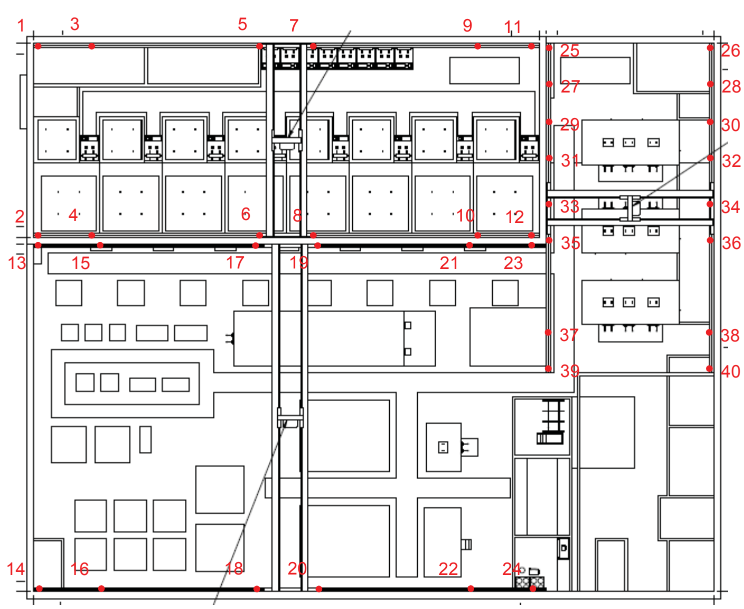


Figure D.5-1. Crane load locations in the Design Model

Table D.5-2. Crane loads for the Design Model

		Dead Load						Live Load						Stop Load					
Crane	Load Position	FX (kip)	FY (kip)	FZ (kip)	MX (kip-ft)	MY (kip-ft)	MZ (kip-ft)	FX (kip)	FY (kip)	FZ (kip)	MX (kip-ft)	MY (kip-ft)	MZ (kip-ft)	FX (kip)	FY (kip)	FZ (kip)	MX (kip-ft)	MY (kip-ft)	MZ (kip-ft)
OC-0001	1.0	0.0	0.0	-67.8	169.6	0.0	0.0	12.9	21.7	-88.7	243.4	0.0	0.0	-1.1	0.0	0.0	0.0	-3.8	-2.7
	2.0	0.0	0.0	-67.8	-169.6	0.0	0.0	12.9	21.7	-88.7	-243.4	0.0	0.0	-1.1	0.0	0.0	0.0	-3.8	2.7
	3.0	0.0	0.0	-67.8	169.6	0.0	0.0	12.9	21.7	-88.7	243.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4.0	0.0	0.0	-67.8	-169.6	0.0	0.0	12.9	21.7	-88.7	-243.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	5.0	0.0	0.0	-67.8	169.6	0.0	0.0	12.9	21.7	-88.7	243.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	6.0	0.0	0.0	-67.8	-169.6	0.0	0.0	12.9	21.7	-88.7	-243.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	7.0	0.0	0.0	-67.8	169.6	0.0	0.0	12.9	21.7	-88.7	243.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	8.0	0.0	0.0	-67.8	-169.6	0.0	0.0	12.9	21.7	-88.7	-243.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	9.0	0.0	0.0	-67.8	169.6	0.0	0.0	12.9	21.7	-88.7	243.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	10.0	0.0	0.0	-67.8	-169.6	0.0	0.0	12.9	21.7	-88.7	-243.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	11.0	0.0	0.0	-67.8	169.6	0.0	0.0	12.9	21.7	-88.7	243.4	0.0	0.0	1.1	0.0	0.0	0.0	3.8	2.7
	12.0	0.0	0.0	-67.8	-169.6	0.0	0.0	12.9	21.7	-88.7	-243.4	0.0	0.0	1.1	0.0	0.0	0.0	3.8	-2.7
OC-0002	13.0	0.0	0.0	-50.4	126.0	0.0	0.0	7.7	10.8	-48.2	131.2	0.0	0.0	-2.4	0.0	0.0	0.0	-8.3	-5.9
	14.0	0.0	0.0	-50.4	-126.0	0.0	0.0	7.7	10.8	-48.2	-131.2	0.0	0.0	-2.4	0.0	0.0	0.0	-8.3	5.9
	15.0	0.0	0.0	-50.4	126.0	0.0	0.0	7.7	10.8	-48.2	131.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	16.0	0.0	0.0	-50.4	-126.0	0.0	0.0	7.7	10.8	-48.2	-131.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	17.0	0.0	0.0	-50.4	126.0	0.0	0.0	7.7	10.8	-48.2	131.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	18.0	0.0	0.0	-50.4	-126.0	0.0	0.0	7.7	10.8	-48.2	-131.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	19.0	0.0	0.0	-50.4	126.0	0.0	0.0	7.7	10.8	-48.2	131.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	20.0	0.0	0.0	-50.4	-126.0	0.0	0.0	7.7	10.8	-48.2	-131.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	21.0	0.0	0.0	-50.4	126.0	0.0	0.0	7.7	10.8	-48.2	131.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	22.0	0.0	0.0	-50.4	-126.0	0.0	0.0	7.7	10.8	-48.2	-131.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23.0	0.0	0.0	-50.4	126.0	0.0	0.0	7.7	10.8	-48.2	131.2	0.0	0.0	2.4	0.0	0.0	0.0	8.3	5.9
	24.0	0.0	0.0	-50.4	-126.0	0.0	0.0	7.7	10.8	-48.2	-131.2	0.0	0.0	2.4	0.0	0.0	0.0	8.3	-5.9
OC-0003	25.0	0.0	0.0	-35.1	0.0	87.7	0.0	10.6	6.1	-46.6	0.0	127.0	0.0	0.0	1.3	0.0	-4.4	0.0	3.2
	26.0	0.0	0.0	-35.1	0.0	-87.7	0.0	10.6	6.1	-46.6	0.0	-127.0	0.0	0.0	1.3	0.0	-4.4	0.0	-3.2
	27.0	0.0	0.0	-35.1	0.0	87.7	0.0	10.6	6.1	-46.6	0.0	127.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	28.0	0.0	0.0	-35.1	0.0	-87.7	0.0	10.6	6.1	-46.6	0.0	-127.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	29.0	0.0	0.0	-35.1	0.0	87.7	0.0	10.6	6.1	-46.6	0.0	127.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	30.0	0.0	0.0	-35.1	0.0	-87.7	0.0	10.6	6.1	-46.6	0.0	-127.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	31.0	0.0	0.0	-35.1	0.0	87.7	0.0	10.6	6.1	-46.6	0.0	127.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	32.0	0.0	0.0	-35.1	0.0	-87.7	0.0	10.6	6.1	-46.6	0.0	-127.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	33.0	0.0	0.0	-35.1	0.0	87.7	0.0	10.6	6.1	-46.6	0.0	127.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	34.0	0.0	0.0	-35.1	0.0	-87.7	0.0	10.6	6.1	-46.6	0.0	-127.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	35.0	0.0	0.0	-35.1	0.0	87.7	0.0	10.6	6.1	-46.6	0.0	127.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	36.0	0.0	0.0	-35.1	0.0	-87.7	0.0	10.6	6.1	-46.6	0.0	-127.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	37.0	0.0	0.0	-35.1	0.0	87.7	0.0	10.6	6.1	-46.6	0.0	127.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	38.0	0.0	0.0	-35.1	0.0	-87.7	0.0	10.6	6.1	-46.6	0.0	-127.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	39.0	0.0	0.0	-35.1	0.0	87.7	0.0	10.6	6.1	-46.6	0.0	127.0	0.0	0.0	-1.3	0.0	4.4	0.0	-3.2
	40.0	0.0	0.0	-35.1	0.0	87.7	0.0	10.6	6.1	-46.6	0.0	-127.0	0.0	0.0	-1.3	0.0	4.4	0.0	3.2

Note: The shaded columns represent directionally reversible forces

E1.0 INTRODUCTION

E1.1 Purpose and Scope

Sub-grade walls shall be designed to resist static and dynamic lateral earth pressure loads. The purpose of this attachment is to compute the lateral soil pressures applied to the sub-grade embedded walls of the SHINE Medical Isotope Production Facility Building. The static lateral soil pressure is based on the at-rest earth pressure, and the dynamic lateral soil pressure is determined using the elastic solution provided in Chapter 2 of Reference 3.3.4. The scope of this attachment is to determine the at-rest static and dynamic seismic soil pressures, and the lateral soil pressure due to surcharge loads at incremental locations of the structure's sub-grade walls.

E2.0 BASIS

E2.1 Design Inputs

E2.1.1 Earthquake-Induced Soil Pressures On Structures (Ref. 3.3.4) is the basis for the computation of the elastic solution.

E2.1.2 The Golder Preliminary Geotechnical Engineering Report (Ref. 3.3.3) is the basis for the soil properties.

E2.1.3 S&L Report SL-011476 (Ref. 3.3.2) is the basis for the peak ground acceleration of the SHINE Production Facility.

E2.1.4 Surcharge loading is based on Table 4-1 of ASCE 7-05 (Ref. 3.1.2).

E2.2 General Design Methodology and Criteria

E2.2.1 Static Soil Pressure Load

The lateral soil pressure is determined based on the at-rest earth pressure as the structure is not expected to move laterally. The at-rest earth pressure coefficient is derived using a friction angle of 30 degrees. The Golder Report, reference 3.3.3, assumes a friction angle value of 34 degrees; however, for the purpose of this evaluation, a friction angle of 30 degrees is conservatively used. Further, as stated in the report, because the groundwater is 50-65 feet below grade, well below the lowest elevation of sub-grade wall, groundwater does not need to be accounted for sub-grade wall design.

E2.2.2 Dynamic Soil Pressure Load

Per Section 3.5.3.2 of ASCE 4-98 (Ref. 3.1.4), the elastic solution is a conservative approach for determining dynamic seismic soil pressures on sub-grade walls. The seismic soil pressures on sub-grade walls of the SHINE structure will be computed based on the detailed numerical solution of the elastic solution as provided in Section 2.1 of Reference 3.3.4 using site-specific soil properties based on the Golder Report. This calculation determines the exact numerical solution based on the embedded structure's geometry and site soil parameters. The results of the numerical solution are consistent with Figure 3.5-1 of ASCE 4-98 (Ref. 3.1.4), which provides a variation of normal dynamic soil pressures for the elastic solution with a 1.0g horizontal earthquake acceleration.

E2.2.3 Surcharge Load

A uniformly distributed live surcharge load of 250 psf, consistent with Table 4-1 of ASCE 7-05 for heavy manufacturing equipment, is considered for areas adjacent to the sub-grade walls. In addition to live load, a uniformly distributed dead surcharge load is determined based on the dead weight of the structure and applied to all areas of the sub-grade walls. Further, the soil pressure due to all dynamic surcharge load is derived by applying the peak ground horizontal acceleration of 0.20g (Ref. 3.3.2) to the static dead and live surcharge load. The design lateral earth pressures from surcharge loads are added to the lateral earth pressure loads.

E2.3 Assumptions

There are no assumptions in this attachment.

E2.4 Computer Programs

The following computer programs were used as technical aides in the preparation of the attachment:

- Mathcad (S&L Program No. 03.7.548-1435)

Computer PC# ZD6194 was used in the preparation of this attachment.

E3.0 CALCULATION AND ANALYSIS

The following variables are the input values required to compute the static and dynamic soil pressure load:

$v := 0.40$ Poisson's ratio. A range of Poisson's ratios are provided in Table A-1 of the Golder Report (Ref.3.3.3); however, for the purpose of this evaluation, a Poisson's ratio of 0.40, slightly greater than the maximum given for a layer depth range of 0 ft. to 29 ft., will conservatively be used.

$\gamma := 125$ Soil unit weight (pcf). The Golder Report, page 19, uses a Soil Dry Density value of 118 pcf for their analysis; however, for the purpose of this evaluation, a soil density of 125 pcf will conservatively be used to consider any moisture content in the soil.

$\phi := 30 \cdot deg$ Effective friction angle used. As stated in the criteria section, the Golder Report assumes a value of 34 degrees for their analysis; however, for the purpose of this evaluation, a friction angle of 30 degrees will conservatively be used.

$q := 250 \cdot psf$ Uniformly distributed live surcharge load, consistent with Table 4-1 of ASCE 7-05 for for heavy manufacturing equipment. This category of use is considered appropriate for the area around the SHINE facility.

Embedment height of the walls for two sub-grade levels

$H_{19} := 19 \cdot ft$ $H_{29} := 29 \cdot ft$

$ZPA := 0.20$ Peak ground acceleration (Ref. 3.3.2)

E3.1 Static Soil Pressure Load

The static soil pressure load at 1 ft increments of the height of the embedded walls is computed below for at-rest earth pressure.

$K_o := 1 - \sin(\phi) = 0.50$ At-Rest Earth Pressure Coefficient. At-rest pressure is used for immovable wall, e.g. concrete substructure walls. (eq. 12.12b of Ref. 3.3.9)

Find the Static Soil Pressure for two sub-grade elevations (eq. 12.12 of Ref. 3.3.9):

$$p_{static\_19} := K_o \cdot \gamma \cdot H_{19} \cdot pcf = 1187.5 \cdot psf$$

$$p_{static\_29} := K_o \cdot \gamma \cdot H_{29} \cdot pcf = 1812.5 \cdot psf$$

Find the Static Soil Pressure Distribution along depth of embedded walls from Grade to EL. -29 ft.

$$p_{static}(y) := K_o \cdot \gamma \cdot \frac{lb}{ft^3} \cdot y$$

$$SOILpress(y) := p_{static}(y)$$

From EL. -29 ft. to -20 ft.:

$$p_{static.29} := \begin{pmatrix} SOILpress(29 \cdot ft) \\ SOILpress(28 \cdot ft) \\ SOILpress(27 \cdot ft) \\ SOILpress(26 \cdot ft) \\ SOILpress(25 \cdot ft) \\ SOILpress(24 \cdot ft) \\ SOILpress(23 \cdot ft) \\ SOILpress(22 \cdot ft) \\ SOILpress(21 \cdot ft) \\ SOILpress(20 \cdot ft) \end{pmatrix} \qquad ES_{29} := p_{static.29} = \begin{array}{|c|} \hline 1812 \\ \hline 1750 \\ \hline 1687 \\ \hline 1625 \\ \hline 1562 \\ \hline 1500 \\ \hline 1437 \\ \hline 1375 \\ \hline 1312 \\ \hline 1250 \\ \hline \end{array} \; \frac{lb}{ft^2}$$

From EL. -19 ft. to Grade:

$$p_{static.19} := \begin{pmatrix} \text{SOILpress}(19 \cdot ft) \\ \text{SOILpress}(18 \cdot ft) \\ \text{SOILpress}(17 \cdot ft) \\ \text{SOILpress}(16 \cdot ft) \\ \text{SOILpress}(15 \cdot ft) \\ \text{SOILpress}(14 \cdot ft) \\ \text{SOILpress}(13 \cdot ft) \\ \text{SOILpress}(12 \cdot ft) \\ \text{SOILpress}(11 \cdot ft) \\ \text{SOILpress}(10 \cdot ft) \\ \text{SOILpress}(9 \cdot ft) \\ \text{SOILpress}(8 \cdot ft) \\ \text{SOILpress}(7 \cdot ft) \\ \text{SOILpress}(6 \cdot ft) \\ \text{SOILpress}(5 \cdot ft) \\ \text{SOILpress}(4 \cdot ft) \\ \text{SOILpress}(3 \cdot ft) \\ \text{SOILpress}(2 \cdot ft) \\ \text{SOILpress}(1 \cdot ft) \\ \text{SOILpress}(0 \cdot ft) \end{pmatrix} \qquad ES_{19} := p_{static.19} = \begin{array}{|r|} \hline 1187 \\ \hline 1125 \\ \hline 1062 \\ \hline 1000 \\ \hline 937 \\ \hline 875 \\ \hline 812 \\ \hline 750 \\ \hline 687 \\ \hline 625 \\ \hline 562 \\ \hline 500 \\ \hline 437 \\ \hline 375 \\ \hline 312 \\ \hline 250 \\ \hline 187 \\ \hline 125 \\ \hline 62 \\ \hline 0 \\ \hline \end{array} \frac{lb}{ft^2}$$

E3.2 Soil Pressure from Surcharge Load

A uniformly distributed surcharge live load of 250 psf, consistent with Table 4-1 of ASCE 7-05 for heavy manufacturing equipment, is considered for areas adjacent to the sub-grade walls. Further, the dead weight of the structure also induces a uniform surcharge load and, therefore, load output from the SAP2000 model is taken to calculate this load. The design lateral earth pressures from surcharge loads are added to the static lateral earth pressure loads, where applicable.

For Soil Pressure from all Surcharge Loads, the at-rest earth pressure coefficient is applied:

Live Load:

$$p_{surcharge.live} := q \cdot K_o = 125 \cdot psf$$

Dead Load (Dead load of structure above grade):

$Self_{wt} := 52400 \cdot kip$ $\quad Dead := 16700 \cdot kip$ $\quad Dead_{door} := 620 \cdot kip$

$Dead_{misc} := 1071 \cdot kip$ $\quad Snow := 1540 \cdot kip$ $\quad Crane_{seismic} := 370 \cdot kip$

$$Dead_{total} := Self_{wt} + Dead + Dead_{door} + Dead_{misc} + Snow + Crane_{seismic} = 72701 \cdot kip$$

$Area := 198.33 \cdot ft \cdot 163.33 \cdot ft = 32393.24 \cdot ft^2$ Area footprint of main SHINE Facility (conservatively excluding control building area)

Calculate total surcharge soil pressure due to Dead Load of the structure:

$$p_{surcharge.dead} := K_o \cdot \frac{Dead_{total}}{Area} = 1122 \cdot psf$$ Use 1125 psf

Soil Pressure from Dynamic Surcharge Load:

The dynamic soil pressure due to all surcharge load is derived by applying the peak ground acceleration of 0.20g (Ref. 3.3.2) to the static soil pressure due to surcharge load.

From Live Load:

$$p_{surcharge.d.live} := p_{surcharge.live} \cdot ZPA = 25 \cdot psf$$

From Dead Load:

$$p_{surcharge.d.dead} := p_{surcharge.dead} \cdot ZPA = 224 \cdot psf$$ Use 225 psf

E3.3 Dynamic Soil Pressure Load

The elastic solution for the dynamic soil pressure load at increments of 0.1 of the height of the embedded walls is computed below in accordance with Section 2.1 of reference 3.3.4. The pressure distribution is calculated for two different embedment depths; 19 ft. and 29 ft.

For $H_e := H_{19} = 19\,ft$

In accordance with Section 2.1 of Earthquake-Induced Soil Pressures On Structures (Ref. 3.3.4), the dynamic seismic soil pressures on embedded walls can be computed with the following equations.

$x := 0$ Boundary condition, rigid boundary

$H := \dfrac{H_e}{ft}$ Embedment height of the sub-grade wall

$L := 10 \cdot H$

$\dfrac{L}{H} = 10$

Length of homogeneous elastic soil. Ratio of length of homogeneous soil over embedment height of the sub-grade wall (L/H) greater than 10 do not exceed the L/H = 10 solutions by more than a few percent. Therefore, L/H is taken to be equal to 10.

$y := 0, 0.025 .. H$ Distance from the grade to the embedment height

$k' := 3 - 4 \cdot v$ $k' = 1.4$ Eq. 2.7 of Ref. 3.3.4

$n := 1, 3 .. 41$

$r(n) := \dfrac{n \cdot \pi}{L}$ Eq. 2.5 of Ref. 3.3.4

$V_d := \sqrt{2 \cdot (1 - v)}$ Dilatational wave speed Eq. 2.2 of Ref. 3.3.4

$V_s := \sqrt{1 - 2 \cdot v}$ Shear wave speed Eq. 2.2 of Ref. 3.3.4

$k_2 := \dfrac{V_d^{\,2}}{V_s^{\,2}}$ Wave speed ratio, squared

$k_2 := \dfrac{2(1 - v)}{(1 - 2v)}$ $k_2 = 6$

$$\Delta(n) := 2 \cdot \left[(1) + (2 \cdot r(n) \cdot H)^2 + k'^2 + 2 \cdot k' \cdot \left[(\sinh(r(n) \cdot H))^2 + (\cosh(r(n) \cdot H))^2 \right] \right]$$ Eq. 2.2 (Ref. 3.3.4)

Constants determined by satisfying the boundary condition at y = 0 and y = H:

$$C(n) := \frac{-1}{\Delta(n)} \cdot \left[\left(e^{-r(n)\cdot H}\right) \cdot \left[(2\cdot r(n)\cdot H - k' - 1)\cdot\left(k_2 - 2 + 2\cdot\cosh(r(n)\cdot H)\right) \ldots \atop + (2\cdot r(n)\cdot H - k' + 1)\cdot(2\cdot\sinh(r(n)\cdot H)) \right] \ldots \atop + -2\cdot\left(k_2 - 2\right)\cdot k'\cdot\sinh(r(n)\cdot H) \right]$$

Eq. 2.11 (Ref. 3.3.4)

$$D(n) := \frac{-1}{\Delta(n)} \cdot \left[\left(e^{r(n)\cdot H}\right) \cdot \left[(2\cdot r(n)\cdot H + k' + 1)\cdot\left(k_2 - 2 + 2\cdot\cosh(r(n)\cdot H)\right) \ldots \atop + -[(2\cdot r(n)\cdot H + k' - 1)\cdot(2\cdot\sinh(r(n)\cdot H))] \right] \ldots \atop + -2\cdot\left(k_2 - 2\right)\cdot k'\cdot\sinh(r(n)\cdot H) \right]$$

Eq. 2.12 (Ref. 3.3.4)

$$B(n) := \frac{-2}{\Delta(n)}\left[\left(k_2 - 2\right)\cdot k'\cdot[2\cdot r(n)\cdot H\cdot\sinh(r(n)\cdot H) + (k'+1)\cdot\cosh(r(n)\cdot H)] - \left[1 + (2\cdot r(n)\cdot H)^2 - k'^2\right]\right]$$

Lateral dynamic soil pressure against the retaining structure for 1.0g horizontal earthquake acceleration:

$$\sigma_x(y) := \left(\frac{4\cdot\gamma\cdot H}{\pi^2\cdot k_2}\cdot\frac{L}{H}\right)\cdot\sum_n \left[\frac{1}{n^2}\left[2\cdot B(n)\cdot\cosh[(r(n))\cdot y] + C(n)\cdot(2\cdot r(n)\cdot y + k' + 3)\cdot e^{r(n)\cdot y} \ldots \atop + D(n)\cdot(2\cdot r(n)\cdot y - k' - 3)\cdot e^{-r(n)\cdot y} - k_2 \right]\cdot\cos(r(n)\cdot x)\right]$$

Dimensionless normal stress for horizontal peak ground acceleration of 1.0g:

Eq. 2.14 (Ref. 3.3.4)

$$\text{SOILpress}(y) := \frac{-\sigma_x(y)}{\gamma\cdot H}$$

Figure E1 below illustrates the dynamic soil pressure distribution along the embedment height of the sub-grade walls of the SHINE Building. Figure E1a shows Figure 3.5-1 of ASCE 4-98 for comparison.

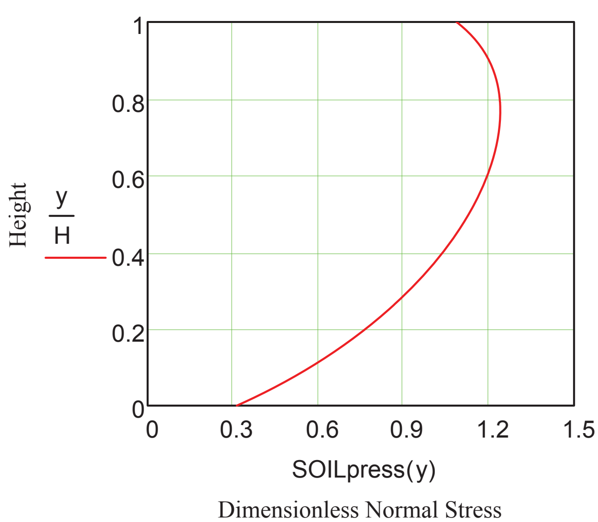


Figure E1 - Dynamic Soil Pressure on Embedded Walls SHINE Building

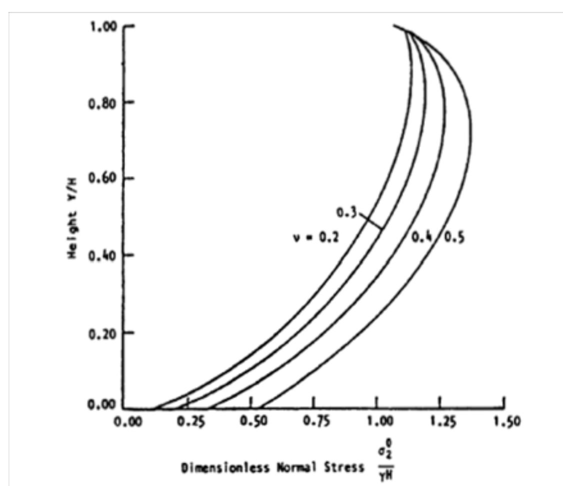


Figure E1a - ASCE 4-98 Fig 3.5-1: Dynamic Soil Pressure

Input increments of 0.1 of embedded height into the lateral dynamic soil pressure equation below to obtain the lateral dynamic soil pressure at 11 incremental points.

$$\blacksquare_x := \begin{pmatrix} \mathrm{SOILpress}(H) \\ \mathrm{SOILpress}(0.9\cdot H) \\ \mathrm{SOILpress}(0.8\cdot H) \\ \mathrm{SOILpress}(0.7\cdot H) \\ \mathrm{SOILpress}(0.6\cdot H) \\ \mathrm{SOILpress}(0.5\cdot H) \\ \mathrm{SOILpress}(0.4\cdot H) \\ \mathrm{SOILpress}(0.3\cdot H) \\ \mathrm{SOILpress}(0.2\cdot H) \\ \mathrm{SOILpress}(0.1\cdot H) \\ \mathrm{SOILpress}(0) \end{pmatrix} \begin{matrix} \text{bottom of wall} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \text{wall at grade} \end{matrix}$$

Lateral dynamic soil pressure against the retaining structure for 0.20g horizontal earthquake acceleration in specified y/H increments specified above:

For $H_e = 19\ \mathrm{ft}$

$$ES := \blacksquare_x \cdot H_e \cdot ZPA \cdot \blacksquare \cdot \frac{\mathrm{lb}}{\mathrm{ft}^3}$$

$$ES = \begin{pmatrix} 515.98 \\ 570.35 \\ 588.28 \\ 585.46 \\ 567.65 \\ 536.89 \\ 493.52 \\ 436.69 \\ 364.23 \\ 271.64 \\ 149.13 \end{pmatrix} \frac{\mathrm{lb}}{\mathrm{ft}^2}$$

Soil Pressures on the embedded wall at:		
- bottom of wall	19	ft.
- 0.9 of the height of wall	17.1	ft.
- 0.8 of the height of wall	15.2	ft.
- 0.7 of the height of wall	13.3	ft.
- 0.6 of the height of wall	11.4	ft.
- 0.5 of the height of wall	9.5	ft.
- 0.4 of the height of wall	7.6	ft.
- 0.3 of the height of wall	5.7	ft.
- 0.2 of the height of wall	3.8	ft.
- 0.1 of the height of wall	1.9	ft.
- grade	0	ft.

Max pressure @ 15.2 ft = 588.28 psf, Therefore, use 600 psf for walls extending to -19 ft.

For $H_e := H_{29} = 29\,ft$

$$ES := \sigma_x \cdot H_e \cdot ZPA \cdot \gamma \cdot \frac{lb}{ft^3}$$

$$ES = \begin{pmatrix} 787.56 \\ 870.54 \\ 897.91 \\ 893.6 \\ 866.41 \\ 819.46 \\ 753.27 \\ 666.53 \\ 555.93 \\ 414.62 \\ 227.62 \end{pmatrix} \frac{lb}{ft^2}$$

Soil Pressures on the embedded wall at:		
- bottom of wall	29	ft.
- 0.9 of the height of wall	26.1	ft.
- 0.8 of the height of wall	23.2	ft.
- 0.7 of the height of wall	20.3	ft.
- 0.6 of the height of wall	17.4	ft.
- 0.5 of the height of wall	14.5	ft.
- 0.4 of the height of wall	11.6	ft.
- 0.3 of the height of wall	8.7	ft.
- 0.2 of the height of wall	5.8	ft.
- 0.1 of the height of wall	2.9	ft.
- grade	0	ft.

Max pressure @ 23.2 ft = 897.91 psf, Therefore use 900 psf for walls extending to -29 ft.

E3.4 Soil Pressure from Compaction

The use of heavy rollers for compaction adjacent to sub-grade walls can induce high residual pressures against the walls. Although a reasonable degree of compaction is necessary to provide adequate shear strength and minimize settlement, excess backfill compaction should be avoided. Horizontal pressures due to compaction may exceed the at-rest pressure in only the upper few feet unless roller loads are particularly high. Compaction-induced pressures need to be considered only for the structural design of walls.

For stability check (i.e. overturning and sliding analyses), any wall movement due to compaction-induced pressures will be accompanied by a reduction in the pressures (i.e. equal to active pressure).

Ingold (Ref. 3.3.10) proposed a method to estimate the lateral pressure due to compaction for sub-grade walls designed for at-rest conditions. The roller is assumed to exert a line load of P (lb/ft) obtained from the roller weight and drum dimensions; double this value is recommended for vibratory rollers. For compacted backfill, the at-rest lateral pressure can be calculated based on Figure E2 and the associated equations (Figure 3-30 of Ref. 3.3.11):

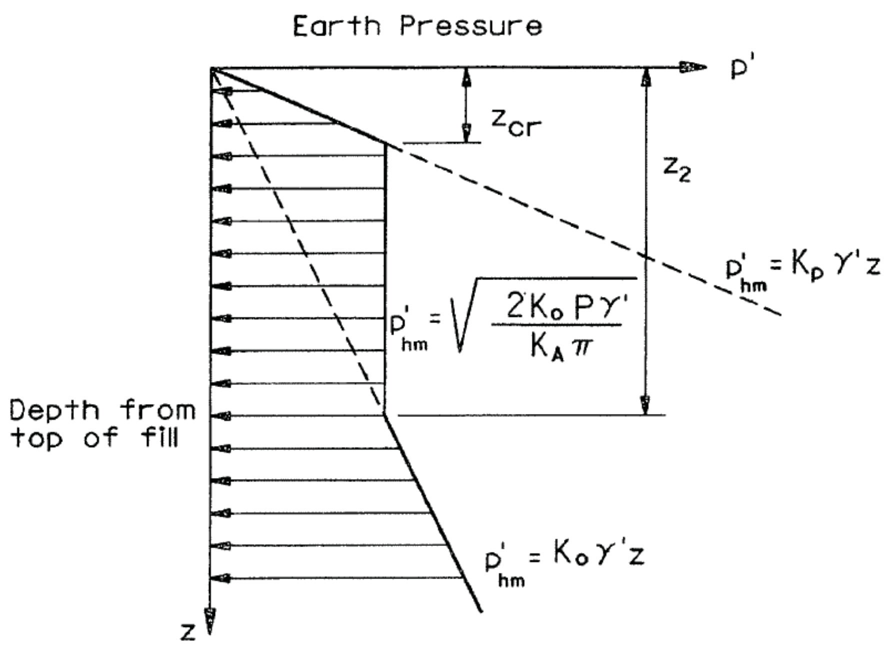


Figure E2 - Design pressure envelop for non-yielding walls with compacted backfill

$$z_{cr} := \sqrt{\frac{2 \cdot K_a \cdot K_o \cdot P}{\pi \cdot \gamma}} \qquad z_2 := \sqrt{\frac{2 \cdot P}{K_a \cdot K_o \pi \cdot \gamma}}$$

Where:

γ	=	The effective unit weight of soil which represents moist unit weight if above water table, buoyant or submerged unit weight if below the water table
P	=	Roller line load, lb/ft (use twice roller weight for vibratory rollers)
K_a	=	Effective active lateral pressure coefficient
Z_{cr}	=	Depth of critical soil for Passive portion of the Ingold pressure profile
Z_2	=	Depth of soil for At-rest portion of the Ingold pressure profile
Z	=	Depth from the surface of the backfill to the point where the lateral pressure is being calculated.
p_{hm}	=	effective soil pressure at depth Z_2
p'	=	effective soil pressure

Note: γ is used to represent γ', and p_{hm} is used to represent p'_{hm} in Figure E2.

The enveloped pressure profile, as shown in Figure 2, indicates a reduction of the soil pressure due to the passive portion near the top of the layer. However, the additional soil pressure due to compaction shall be conservatively applied up to the top of the soil profile. Therefore, Z_{cr}, is not considered in this evaluation.

$$K_a := \left(\frac{1 - \sin(\phi)}{1 + \sin(\phi)}\right) = 0.33$$

Use Caterpillar CP56 Vibratory Soil Compactor data for the purpose of estimating a compactor load. It is expected that this type of compactor or similar will likely be used at the site.

$W_{comp} := 27.452 \cdot kip$ Weight of Compactor (Ref. 3.3.17)

$width_{comp} := 84 \cdot in$ Compaction Width (Ref. 3.3.17)

Therefore, find equipment line load, P, using twice the unit weight for vibratory rollers:

$$P := \frac{W_{comp} \cdot 2}{width_{comp}} = 7.84 \cdot \frac{kip}{ft}$$

$$Z_2 := \sqrt{\frac{2 \cdot P}{K_a \cdot K_o \cdot \pi \cdot \gamma \cdot \frac{lbf}{ft^3}}} = 15.48\,ft$$

$$p_{hm} := \sqrt{\frac{2 \cdot K_o \cdot P \cdot \left(\gamma \cdot \frac{lbf}{ft^3}\right)}{K_a \cdot \pi}} = 967.6 \cdot psf$$

Verify against linear at-rest soil pressure at depth Z_2:

$$p_{static\_Z2} := K_o \cdot \gamma \cdot Z_2 \cdot pcf = 967.6 \cdot psf \quad = \quad p_{hm} = 967.6 \cdot psf \quad \text{OK}$$

For application in the SAP2000 model, element nodes are located at a depth of 14 ft. and 19 ft. below grade. Therefore, compaction load is conservatively applied from top of grade to 19 ft below grade.

Find pressure load at 19 ft below grade:

$$p_{static\_14} := K_o \cdot \gamma \cdot 19 \cdot ft \cdot pcf = 1188 \cdot psf$$

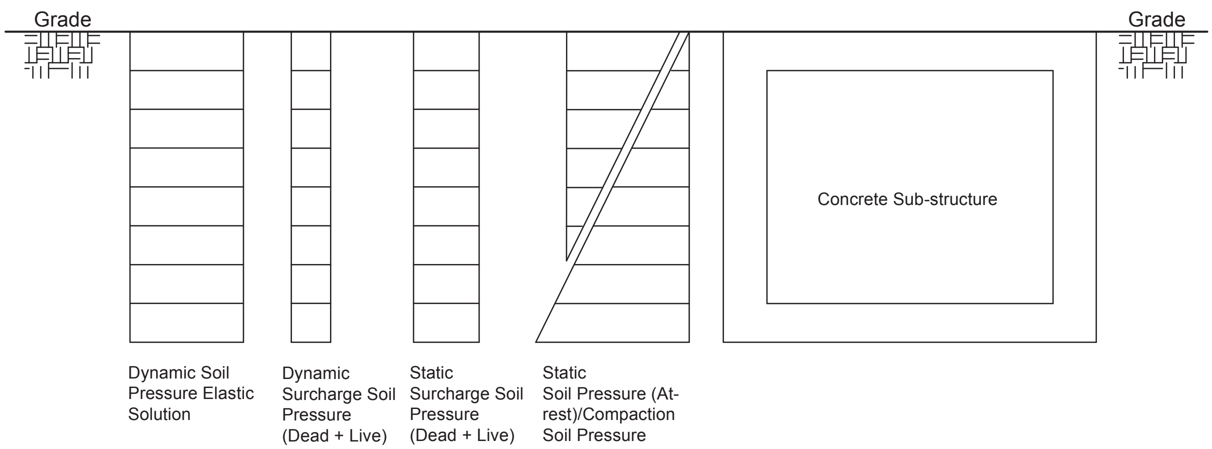


Figure E3 - Soil Pressure Profiles

E4.0 RESULTS

Static soil pressure at increments of 1 ft. along the height of embedded walls is summarized in Table E1 below.

Table E1. Static Soil Pressure Summary

Elevation (ft)	Pressure (psf)
Grade	0
-1	63
-2	125
-3	188
-4	250
-5	313
-6	375
-7	438
-8	500
-9	563
-10	625
-11	688
-12	750
-13	813
-14	875
-15	938
-16	1000
-17	1063
-18	1125
-19	1188
-20	1250
-21	1313
-22	1375
-23	1438
-24	1500
-25	1563
-26	1625
-27	1688
-28	1750
-29	1813

A uniformly distributed soil pressure due to surcharge load will be applied along the depth of the embedded walls. The total soil pressure from static and dynamic surcharge load is 125 psf + 1125 + 25 psf + 225 = 1500 psf. For the dynamic soil pressure, a maximum pressure value of 900 psf is applied as a constant pressure along the entire depth of the 29 ft. embedded walls. For the 19 ft. embedded walls of the structure, a constant pressure of 600 psf is applied along the entire depth of the wall.

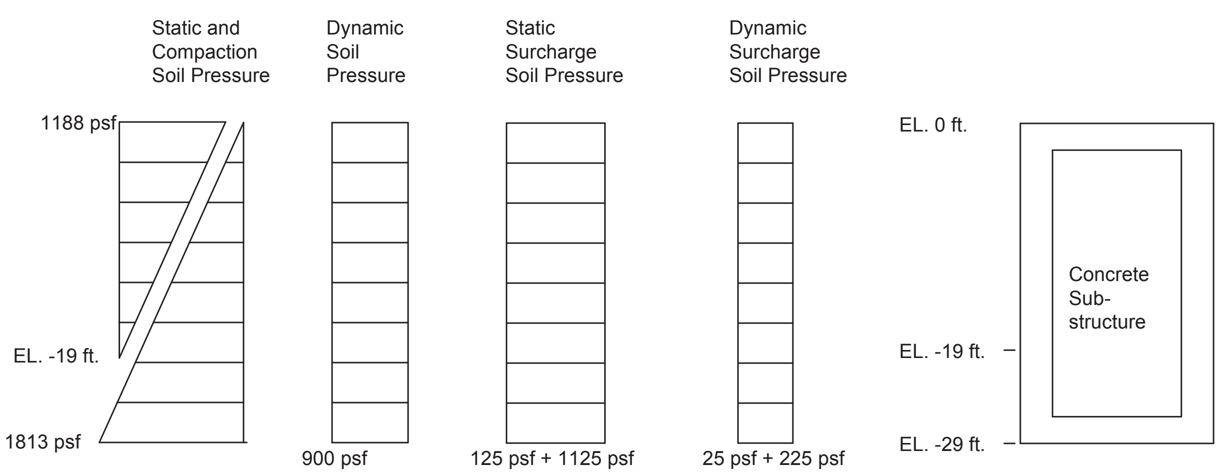


Figure E4 - Soil Pressure Profiles Summary

F.1 Introduction

The purpose of this attachment is to calculate the horizontal and vertical dynamic soil springs to be applied to the foundation of the Shine facility Design Model. Lateral static spring loads are taken to be the same as the dynamic soil spring loads found in this analysis. Vertical static soil spring loads are provided in Attachment AF of this calculation.

F.2 Average Shear Modulus

Calculate the weighted average shear modulus at a depth approximately equal to the length of the building. Shear Modulus values are provided to an elevation of 103.5 ft in Ref. 1.3.3, Table A-1. In order to calculate the weighted average for a length approximately 200 feet a 100 feet layer below 103.5 ft is considered with a Shear Modulus of 385 MPa.

Table 1 - Shear Modulus

Top El.	Bottom El.	Delta El.	% El.	Shear Modulus (MPa)	(Shear Modulus) * (% El.)
0	1.5	1.5	0.01	37	0.27
1.5	4.5	3	0.01	49	0.72
4.5	7.5	3	0.01	119	1.75
7.5	10.5	3	0.01	195	2.87
10.5	13.5	3	0.01	246	3.63
13.5	16.5	3	0.01	207	3.05
16.5	19.5	3	0.01	195	2.87
19.5	22.5	3	0.01	195	2.87
22.5	25.5	3	0.01	119	1.75
25.5	28.5	3	0.01	220	3.24
28.5	31.5	3	0.01	220	3.24
31.5	34.5	3	0.01	220	3.24
34.5	37.5	3	0.01	233	3.43
37.5	40.5	3	0.01	233	3.43
40.5	43.5	3	0.01	233	3.43
43.5	46.5	3	0.01	233	3.43
46.5	49.5	3	0.01	233	3.43
49.5	52.5	3	0.01	233	3.43
52.5	55.5	3	0.01	233	3.43
55.5	58.5	3	0.01	233	3.43
58.5	61.5	3	0.01	233	3.43
61.5	64.5	3	0.01	233	3.43
64.5	67.5	3	0.01	233	3.43
67.5	70.5	3	0.01	233	3.43
70.5	73.5	3	0.01	233	3.43
73.5	76.5	3	0.01	233	3.43
76.5	79.5	3	0.01	233	3.43
79.5	82.5	3	0.01	233	3.43
82.5	85.5	3	0.01	233	3.43
85.5	88.5	3	0.01	233	3.43
88.5	91.5	3	0.01	304	4.48
91.5	94.5	3	0.01	385	5.68
94.5	97.5	3	0.01	575	8.48
97.5	100.5	3	0.01	575	8.48
100.5	103.5	3	0.01	575	8.48
103.5	203.5	100	0.49	385	189.19
Weighted Average Shear Modulus (MPa)					316.14

The equation used to calculate the weighted average shear modulus:

$$\frac{\sum_{i=1}^{n}\left(\Delta EL_i \cdot G_i\right)}{\sum_{i=1}^{n}\Delta EL_i}$$

$G := 316\text{MPa} = 45.83\cdot\text{ksi}$ Weighted average shear modulus

F.3 Foundation Plan Dimensions

The pertinent dimensions for the soil spring analysis are at the elevations where the foundation of the Shine facility extend into the soil.

Building Plan Dimensions

$EW := 192.33ft$ East-West dimension of the Shine Facility foundation per Ref. 1.2.1

$NS := 198.33ft$ North-South dimension of the Shine Facility foundation per Ref. 1.2.1

Elevation -29 ft.

$A_{29} := 11.67ft \cdot 12.17ft$

$A_{29} = 142.02\ ft^2$

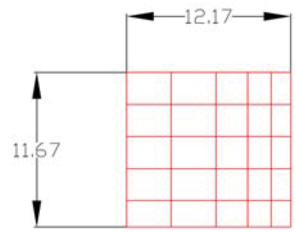


Figure 1 - Plan dimensions at Elevation -29

Elevation -19 ft.

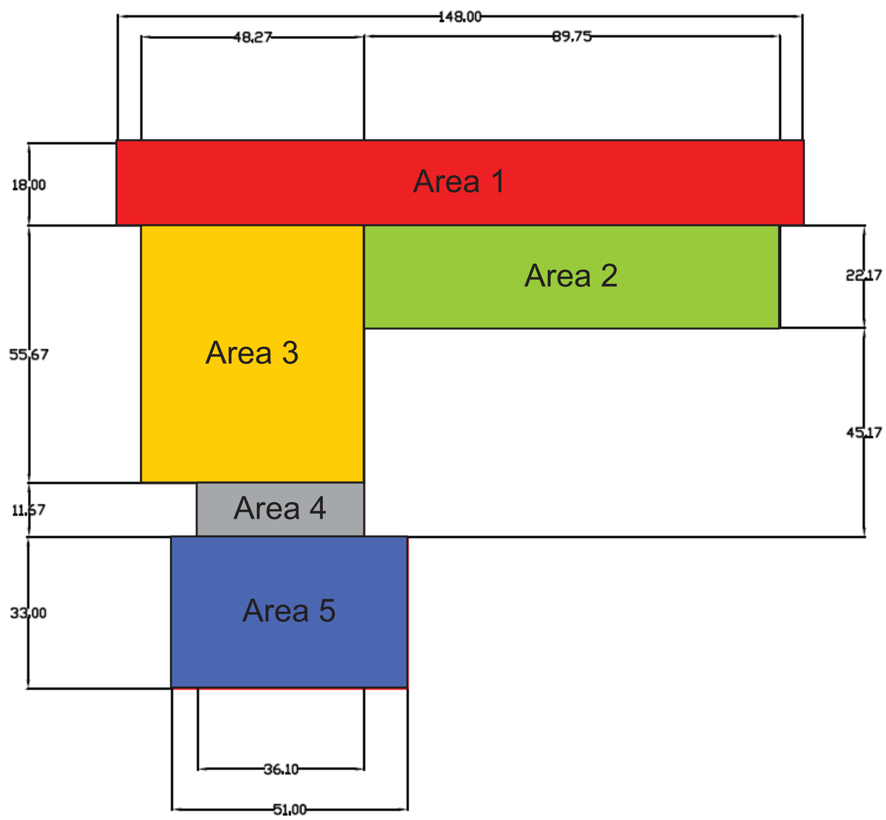


Figure 2 - Plan dimensions at Elevation -19

$A_{19_1} := 148ft \cdot 18ft = 2664\,ft^2$ $\quad A_{19_2} := 89.75ft \cdot 22.17ft = 1989.76\,ft^2$

$A_{19_3} := 55.67ft \cdot 48.27ft = 2687.19\,ft^2$ $\quad A_{19_4} := 36.1ft \cdot 11.67ft = 421.29\,ft^2$

$A_{19_5} := 51ft \cdot 33ft = 1683\,ft^2$

$A_{19} := \sum_{i=1}^{5} A_{19_i}$ $\quad A_{19} = 9445\,ft^2$

Elevation 0 ft.

$A_0 := EW \cdot NS - A_{19} - A_{29}$ $\quad A_0 = 28558\,ft^2$

F.4 Horizontal Dynamic Soil Springs

North - South Springs

$B := EW = 192.33\,ft$ Width of the basemat perpendicular to the direction of horizontal excitation

$L := NS = 198.33\,ft$ Length of the basemat in the direction of horizontal excitation

$\frac{L}{B} = 1.03$

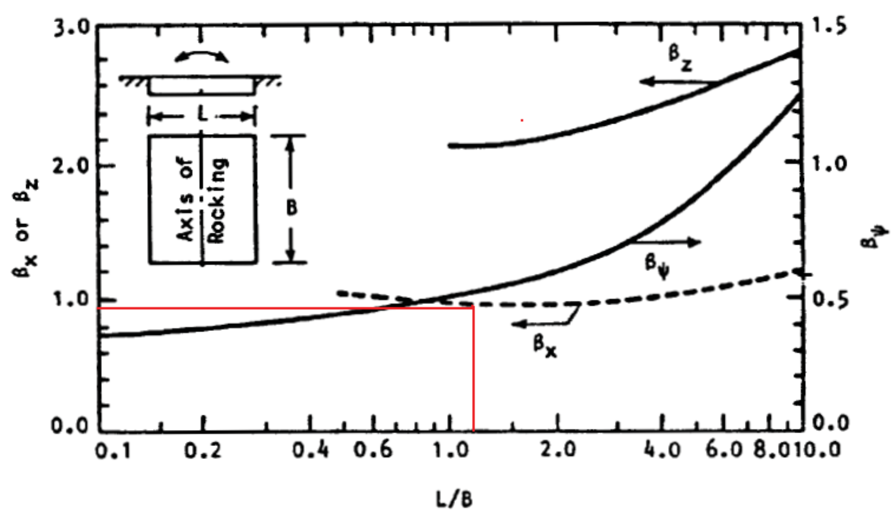


Figure 3 - Find the corresponding β constant for this L to B ratio using Figure 3.3-3 of Ref. 3.1.4

$\beta_x := 0.95$ Constant for horizontal spring

Elevation 0 ft.

Use Ref. 3.3.7, Table A-1 to find the corresponding Poisson's Ratio and Shear Modulus for soil at this elevation,

$\nu := 0.32$ Poisson's Ratio

Calculate the foundation area at this elevation,

$$k_x := 2(1+\nu)\cdot G\cdot \beta_x\cdot\sqrt{B\cdot L} = 3232783.58\cdot\frac{kip}{ft}$$

Calculate the soil spring per the area at this elevation,

$$\frac{k_x}{A_0} = 113.2\cdot\frac{\left(\frac{kip}{ft}\right)}{ft^2}$$

Elevation -19 ft.

Use Ref. 3.3.7, Table A-1 to find the corresponding Poisson's Ratio and Shear Modulus for soil at this elevation,

$\nu := 0.38$ Poisson's Ratio

Calculate the foundation area at this elevation,

$$k_x := 2(1+\nu)\cdot G\cdot \beta_x\cdot\sqrt{B\cdot L} = 3379728.28\cdot\frac{kip}{ft}$$

Calculate the soil spring per the area at this elevation,

$$\frac{k_x}{A_{19}} = 357.82\cdot\frac{\left(\frac{kip}{ft}\right)}{ft^2}$$

Elevation -29 ft.

Use Ref. 3.3.7, Table A-1 to find the corresponding Poisson's Ratio and Shear Modulus for soil at this elevation,

$\nu := 0.25$ For cohesionless soils, this is considered a reasonable assumption for a Poisson's Ratio

Calculate the foundation area at this elevation,

$$k_x := 2(1+\nu)\cdot G\cdot \beta_x\cdot\sqrt{B\cdot L} = 3061348.08\cdot\frac{kip}{ft}$$

Calculate the soil spring per the area at this elevation,

$$\frac{k_x}{A_{29}} = 21555.16\cdot\frac{\left(\frac{kip}{ft}\right)}{ft^2}$$

East - West Springs

$B := NS = 198.33\ \text{ft}$ — Width of the basemat perpendicular to the direction of horizontal excitation

$L := EW = 192.33\ \text{ft}$ — Length of the basemat in the direction of horizontal excitation

$$\frac{L}{B} = 0.97$$

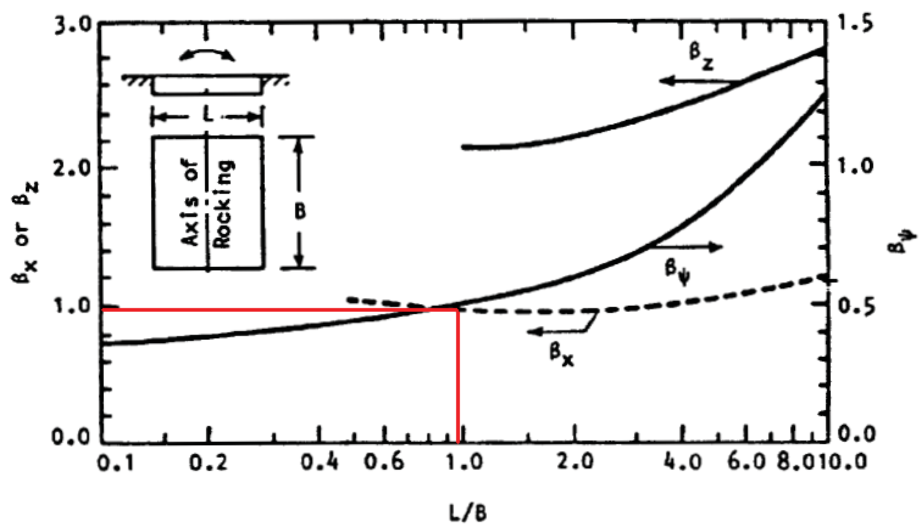


Figure 4 - Find the corresponding β constant for this L to B ratio using Figure 3.3-3 of Ref. 3.1.4

$\beta_x := 0.99$ — Constant for horizontal spring

Elevation 0 ft.

Use Ref. 3.3.7, Table A-1 to find the corresponding Poisson's Ratio and Shear Modulus for soil at this elevation,

$\nu := 0.32$ — Poisson's Ratio

Calculate the foundation area at this elevation,

$$k_x := 2(1+\nu)\cdot G\cdot \beta_x\cdot\sqrt{B\cdot L} = 3368900.78\cdot\frac{\text{kip}}{\text{ft}}$$

Calculate the soil spring per the area at this elevation,

$$\frac{k_x}{A_0} = 117.97\cdot\frac{\left(\frac{\text{kip}}{\text{ft}}\right)}{\text{ft}^2}$$

Elevation -19 ft.

Use Ref. 3.3.7, Table A-1 to find the corresponding Poisson's Ratio and Shear Modulus for soil at this elevation,

$\nu := 0.38$ Poisson's Ratio

Calculate the foundation area at this elevation,

$$k_x := 2(1+\nu)\cdot G\cdot \beta_x \cdot \sqrt{B\cdot L} = 3522032.63\cdot\frac{kip}{ft}$$

Calculate the soil spring per the area at this elevation,

$$\frac{k_x}{A_{19}} = 372.89\cdot\frac{\left(\frac{kip}{ft}\right)}{ft^2}$$

Elevation -29 ft.

Use Ref. 3.3.7, Table A-1 to find the corresponding Poisson's Ratio and Shear Modulus for soil at this elevation,

$\nu := 0.25$ For cohesionless soils, this is considered a reasonable assumption for a Poisson's Ratio

Calculate the foundation area at this elevation,

$$k_x := 2(1+\nu)\cdot G\cdot \beta_x \cdot \sqrt{B\cdot L} = 3190246.95\cdot\frac{kip}{ft}$$

Calculate the soil spring per the area at this elevation,

$$\frac{k_x}{A_{29}} = 22462.75\cdot\frac{\left(\frac{kip}{ft}\right)}{ft^2}$$

F.5 Vertical Dynamic Soil Springs

$B := EW = 192.33\ ft$ Width of the basemat perpendicular to the direction of horizontal excitation

$L := NS = 198.33\ ft$ Length of the basemat in the direction of horizontal excitation

$$\frac{L}{B} = 1.03$$

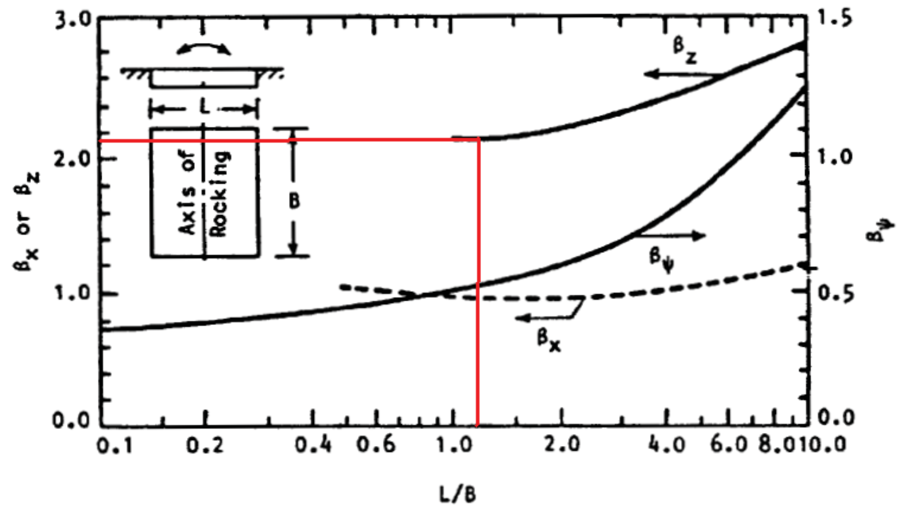


Figure 5 - Find the corresponding β constant for this L to B ratio using Figure 3.3-3 of Ref. 3.1.4

$\beta_z := 2.18$ Constant for horizontal spring

Elevation 0 ft.

Use Ref. 3.3.7, Table A-1 to find the corresponding Poisson's Ratio and Shear Modulus for soil at this elevation,

$\nu := 0.32$ Poisson's Ratio

Calculate the foundation area at this elevation,

$$k_z := \frac{G}{1-\nu} \cdot \beta_z \cdot \sqrt{B \cdot L} = 4132346.02 \cdot \frac{kip}{ft}$$

Calculate the soil spring per the area at this elevation,

$$\frac{k_z}{A_0} = 144.7 \cdot \frac{\left(\frac{kip}{ft}\right)}{ft^2}$$

Elevation -19 ft.

Use Ref. 3.3.7, Table A-1 to find the corresponding Poisson's Ratio and Shear Modulus for soil at this elevation,

$\nu := 0.38$ Poisson's Ratio

Calculate the foundation area at this elevation,

$$k_z := \frac{G}{1-\nu} \cdot \beta_z \cdot \sqrt{B \cdot L} = 4532250.47 \cdot \frac{kip}{ft}$$

Calculate the soil spring per the area at this elevation,

$$\frac{k_z}{A_{19}} = 479.85 \cdot \frac{\left(\frac{kip}{ft}\right)}{ft^2}$$

Elevation -29 ft.

Use Ref. 3.3.7, Table A-1 to find the corresponding Poisson's Ratio and Shear Modulus for soil at this elevation,

$\nu := 0.25$ For cohesionless soils, this is considered a reasonable assumption for a Poisson's Ratio

Calculate the foundation area at this elevation,

$$k_z := \frac{G}{1 - \nu} \cdot \beta_z \cdot \sqrt{B \cdot L} = 3746660.39 \cdot \frac{kip}{ft}$$

Calculate the soil spring per the area at this elevation,

$$\frac{k_z}{A_{29}} = 26380.49 \cdot \frac{\left(\frac{kip}{ft}\right)}{ft^2}$$

G1.0 Introduction

The Irradiation Hot Cells of the SHINE Medical Isotope Production Facility are designed to resist hydrostatic and hydrodynamic fluid loads. The following sections detail the methodology and calculation of the hydrostatic and hydrodynamic fluid loading applied to the SAP2000 model.

G2.0 Hydrostatic Fluid Loading

Inner dimensions of the Irradiation Hot Cells (Actual):

$L_x := 12ft$ — Length (Ref. 3.2.1)

$L_y := 12ft$ — Width (Ref. 3.2.1)

$h := 12 \cdot ft$ — Maximum water depth (design input)

$V := L_x \cdot L_y \cdot h = 1.293 \times 10^4 \, gal$ — Total volume of water without subtracting the volume of other objects within the Irradiation Hot Cells

$\gamma := 62.4 \cdot pcf$ — Specific weight of water

Find maximum lateral hydrostatic fluid pressure acting on Hot Cell walls:

$F_{hyd.sta} := \gamma \cdot h = 748.8 \cdot psf$ Use 750 psf in the model

The modeled depth of the Hot Cells is 19 ft. and, therefore, the hydrostatic pressure on the walls increases linearly from 0 psf at the top of fluid elevation, to 750 psf at a depth of 12 ft. From a depth of 12 ft. to 19 ft., the hydrostatic pressure is applied as a constant pressure of 750 psf.

Find constant vertical hydrostatic water pressure at bottom of Irradiation cells:

$W := V \cdot \gamma = 107.83 \cdot kips$ — Total weight of water

Conservatively use W = 135 kips in the model to account for geometrical differences between the model and actual dimensions of the irradiation cells.

$W_{model} := 135 \cdot kips$

$P_b := \dfrac{W_{model}}{18 \cdot ft \cdot 18 \cdot ft}$ $P_b = 0.42 \cdot ksf$ — Water pressure on the bottom of the Hot Cells in the global vertical (Z) direction

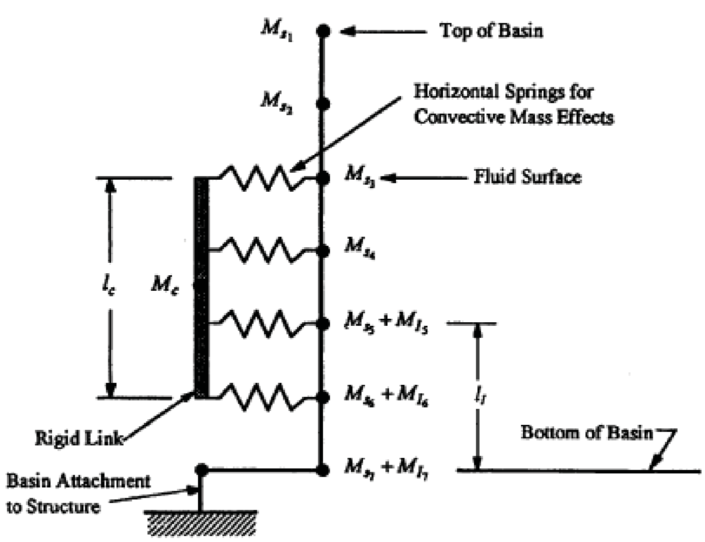
G3.0 Hydrodynamic Fluid Loading

The purpose of this section is to determine the hydrodynamic masses applied to the walls of the Irradiation Hot Cells in the SHINE Medical Isotope Production Facility. The hydrodynamic masses are used as input for the SAP2000 seismic model.

According to Section 3.1.6.3, "Building Model Hydrodynamic Mass Effects", of *ASCE 4-98* (Ref. 3.1.4), fluids contained in basins within a structure shall be modeled to represent both impulsive and convective (sloshing) effects. Because local stresses in the basin walls are of interest, the resulting impulsive mass shall be uniformly distributed over a height equal to twice the distance from the bottom of the basin to the center of mass as determined for the simplified case of a single impulsive mass. For the convective mass, the distribution shall be over a height that is twice the distance from the top of the fluid to the center of the equivalent oscillating mass. Chapter 6 of *Nuclear Reactors and Earthquakes TID-7024* (Ref. 3.3.5) outlines a methodology for creating a dynamic model of fluid motion in a tank type structure that determines the seismically induced fluid masses developed in a basin due to impulsive and convective behavior of the fluid.

When the fluid is accelerated in the horizontal direction, a certain portion of the fluid acts as if it were a solid mass in rigid contact with the walls. This portion, as defined in *TID-7024,* is the impulsive mass. When applying the calculated fluid masses to the model, the impulsive fluid mass shall be superimposed onto the existing mass of the modeled substructure at its specified locations.

The horizontal acceleration of the basin also causes the fluid to oscillate, contributing additional dynamic pressures on the basin walls and bottom, in which a certain portion of the fluid weight responds as if it were a solid oscillating mass flexibly connected to the walls. This portion, as defined in *TID-7024,* is the convective mass. For the purpose of applying fluid masses to the model, the convective (sloshing) fluid mass, although it responds as a solid oscillating mass flexibly connected to the walls, is directly added to the masses of the modeled substructure at its specified locations.



l_c = twice the distance from the top of the fluid to the center of the sloshing fluid mass

l_I = twice the distance from the bottom of the basin to the center of the impulsive fluid mass

Figure G1. Distribution of Fluid Mass for Horizontal Seismic Response Analysis (Ref. 3.1.4)

G3.1 Vertical mass calculation (global Z - vertical)

According to Section 3.1.6.3 (d) of *ASCE 4-98* (Ref. 3.1.4), the effects of water mass in the vertical direction shall be included in the building model. For depths less than 50 ft., as is the case in this calculation, the entire water mass, or pressure due to water weight, may be lumped at the bottom of the basin.

$W_{model} = 135 \cdot kip$ — Total weight of water used in model

As used in hydrostatic load derivation, conservatively use W = 135 kips in the model to account for geometrical differences between the model and actual dimensions of the Irradiation Hot Cells.

$n_{joints} := 36$ — Apply a mass (applied as a weight) at 36 joints at the bottom of the basin starting one node away from the basin walls

$F_{hyd.v.j} := \dfrac{W_{model}}{n_{joints}} = 3.75 \cdot kip$ — Water weight per joint on the bottom of the basin in the global vertical (Z) direction, normalized to 1 g

G3.2 Slenderness check

The methodology outlined in chapter 6 of *TID-7024* specifies two different procedures depending on the slenderness of the tank geometry. If $h/l > 1.5$, then the tank is considered slender and the procedure found in section 6.5 of *TID-7024* is applicable. If $h/l \leq 1.5$, then the tank is not considered slender and the procedure found in section 6.4 of *TID-7024* is applicable. A slenderness check is performed in the global X and Y directions to determine the appropriate methodology.

$l_x := \dfrac{L_x}{2} = 6\,ft \qquad l_y := \dfrac{L_y}{2} = 6\,ft$ — One-half length of rectangular tank wall, each direction

Slenderness check in the global X direction:

$\dfrac{h}{l_x} = 2.00 \qquad > 1.5$ — Therefore, Slender (*TID-7024,* Ref. 3.3.5)

Slenderness check in the global Y direction:

$\dfrac{h}{l_y} = 2.00 \qquad > 1.5$ — Therefore, Slender (*TID-7024,* Ref. 3.3.5)

The basin is slender in both the global X and Y directions and, therefore, the procedure outlined in section 6.5 of *TID-7024* is followed.

G3.3 Calculation of Impulsive Masses

According to Chapter 6 of TID-7024, for slender rectangular basins where the depth of the fluid exceeds three-fourths of the distance 2*l, the entire mass of fluid below this depth tends to respond as a rigid body for impulsive masses.

$h = 12\,ft \quad > \quad 0.75 \cdot 2 \cdot l_x = 9\,ft$

Therefore, the entire mass of fluid below this depth, measured from the surface, responds as a rigid body.

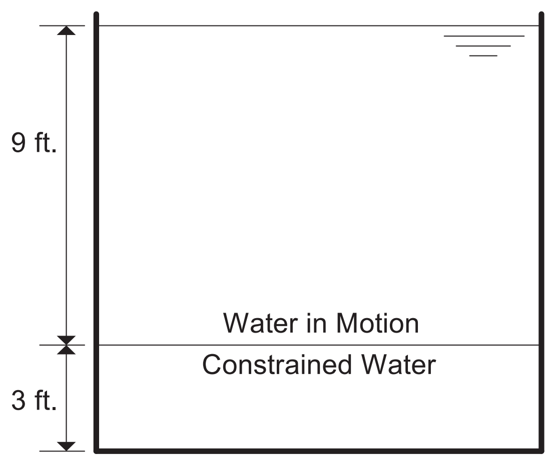
$h_m := 1.5 \cdot l_x = 9\,ft$

Depth from fluid surface to level of fluid that is considered constrained

For the purpose of evaluating the impulsive force, the basin can be regarded as a tank with a fictitious bottom at a datum 1.5*l = 9 ft. below the fluid surface and supported on a solid mass extending from the fictitious bottom to the actual bottom.

$h_c := h - h_m = 3\,ft$

Height of constrained fluid from bottom of basin



$W_m := L_x \cdot L_y \cdot h_m \cdot \gamma = 80.87 \cdot kips$

Total weight of water in motion

$W_c := L_x \cdot L_y \cdot h_c \cdot \gamma = 26.96 \cdot kips$

Total weight of constrained water

$$W_o := \frac{\tanh\left(\sqrt{3} \cdot \frac{l_y}{h_m}\right)}{\sqrt{3}\frac{l_y}{h_m}} \cdot W_m$$

Equivalent weight of fluid to produce the impulsive force on the basin walls

$W_o = 57.38 \cdot kips$

$W_{o.dpr} := W_o + W_c = 84.34 \cdot kip$

Gross equivalent weight to produce the impulsive force (includes weight of constrained water)

Find Location of Impulsive force

According to section 3.1.6.3 (c) of ASCE 4-98, when local stresses in the basin walls are of interest, the impulsive pressure may be uniformly distributed over a height equal to twice the distance from the bottom of the basin to the center of mass (as determined for the case of a single impulsive force).

The following calculates the vertical distance from basin bottom to the center of mass of the single impulsive force.

As stated in Section 6.2 of TID-7024, the vertical distances from the bottom of the basin to the resultant forces are calculated based on two distinct numerical values; the smaller (Excluding Bottom Pressure - EBP) being used to evaluate the bending moment on a plane just above the bottom of the basin, and the larger (Including Bottom Pressure - IBP) being used for determining the overturning moment on a plane just below the bottom of the basin. For the purpose of this calculation, the mass will be distributed across the greater calculated height.

Vertical distance for equivalent weight of fluid, W_o, to produce impulse force

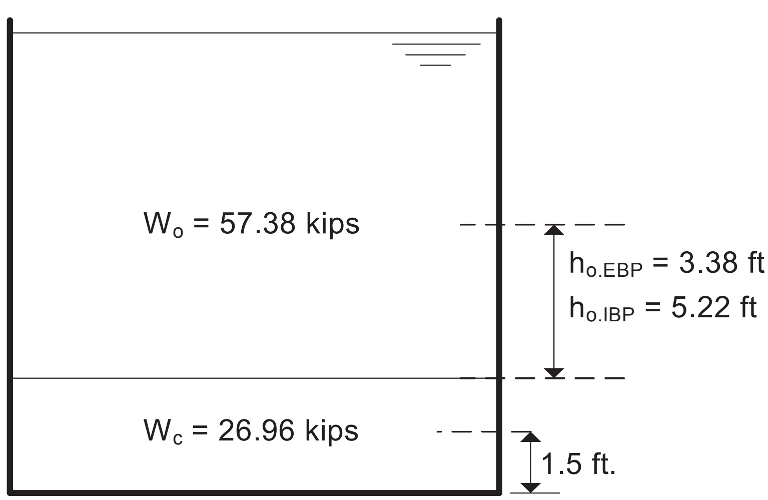
$$h_{o.EBP} := \frac{3}{8} \cdot h_m = 3.375\,ft$$

Vertical distance from the basin datum (location of constrained water surface) to W_0 excluding bottom pressure

$$h_{o.IBP} := \left(\frac{1}{8}\right) \cdot \left(\frac{4}{\dfrac{\tanh\left(\sqrt{3} \cdot \dfrac{l_y}{h_m}\right)}{\sqrt{3} \dfrac{l_y}{h_m}}} - 1 \right) \cdot h_m$$

Vertical distance from the basin datum (location of constrained water surface) to W_0 including bottom pressure

$$h_{o.IBP} = 5.22\,ft$$



Vertical distance for gross equivalent weight of fluid, $W_{o.dpr}$, to produce impulse force

$$h_{o.EBP.dpr} := \frac{W_o \cdot \left(h_c + h_{o.EBP}\right) + W_c \cdot \frac{h_c}{2}}{W_{o.dpr}}$$

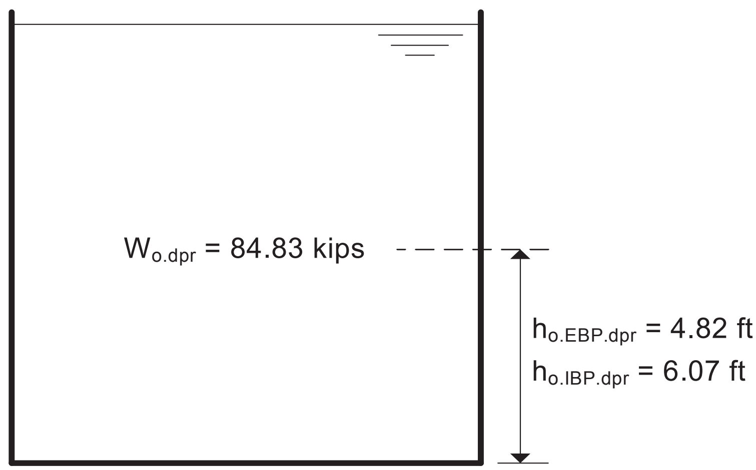
Vertical distance from the basin bottom to gross equivalent weight, $W_{0.dpr}$ excluding bottom pressure

$h_{o.EBP.dpr} = 4.82\,ft$

$$h_{o.IBP.dpr} := \frac{W_o \cdot \left(h_c + h_{o.IBP}\right) + W_c \cdot \frac{h_c}{2}}{W_{o.dpr}}$$

Vertical distance from the basin bottom to gross equivalent weight, $W_{0.dpr}$ including bottom pressure

$h_{o.IBP.dpr} = 6.07\,ft$



$W_{o.dpr} = 84.34 \cdot kip$

Impulsive mass (applied as weight) distributed onto the basin walls in the lateral directions (X,Y)

G3.4 Calculation of Convective Masses

$$W_1 := 0.527 \cdot \frac{l_y}{h} \cdot \tanh\left(1.58 \cdot \frac{h}{l_y}\right) \cdot W = 28.31 \cdot kips$$

Equivalent oscillating weight to produce convective force on basin walls (Eq. 6.5, Ref. 3.3.5)

$$h_{1.EBP} := \left(1 - \frac{\cosh\left(1.58 \cdot \frac{h}{l_y}\right) - 1}{1.58 \cdot \frac{h}{l_y} \cdot \sinh\left(1.58 \cdot \frac{h}{l_y}\right)}\right) \cdot h$$

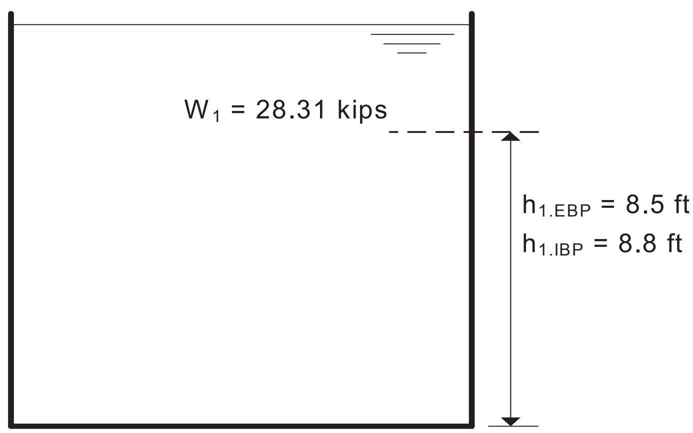
Vertical distance from the basin bottom to W_1 excluding bottom pressure (Eq. 6.6, Ref. 3.3.5)

$$h_{1.EBP} = 8.5 \cdot ft$$

$$h_{1.IBP} := \left(1 - \frac{\cosh\left(1.58 \cdot \frac{h}{l_y}\right) - 2}{1.58 \cdot \frac{h}{l_y} \cdot \sinh\left(1.58 \cdot \frac{h}{l_y}\right)}\right) \cdot h$$

Vertical distance from the basin bottom to W_1 including bottom pressure (Eq. 6.7, Ref. 3.3.5)

$$h_{1.IBP} = 8.8 \cdot ft$$



According to section 3.1.6.3 (c) of ASCE 4-98, when local stresses in the basin walls are of interest, the convective mass shall be distributed over a height that is twice the distance from the top of the fluid to the center of the equivalent oscillating mass.

$W_1 = 28.31 \cdot kip$ — Convective mass (applied as weight) distributed onto the basin walls in the lateral directions (X,Y)

$W_{o.1} := W_{o.dpr} + W_1 = 113 \cdot kips$ — Total impulsive and convective weight acting in the global X and Y direction

$W = 107.827 \cdot kips$ — Actual Water static weight (Actual) per Section G2.0

Since $W_{o.1} > W$, the impulsive and convective mass distribution is conservative. Therefore, the impulsive and convective mass distributions shall be applied to the Hot Cell walls.

G4.0 Conclusion

The purpose of this Attachment is to determine the hydrodynamic masses applied to the walls of the Irradiation Hot Cells found in the SHINE Medical Isotope Production Facility. Because time histories are applied to the Seismic fixed base SAP2000 model, impulsive and convective masses are applied to the structure as opposed to pressures. This results in a more accurate response of the structure to inertial forces due to seismic excitation. The following figures illustrate how the controlling impulsive and convective masses are applied to the SAP2000 model. Note that the masses in the model are specified as weights and, therefore, values indicated in the figures are weights/joint.

Total Impulsive Weight: $W_{o.dpr} = 84.34 \cdot kip$

Total Convective Weight: $W_1 = 28.31 \cdot kip$

Total Vertical Weight applied to Model: $W_{model} = 135 \cdot kip$

[Security-Related Information]

X

Figure G2. Load Application for Impulsive and Convective Hydrodynamic Loading

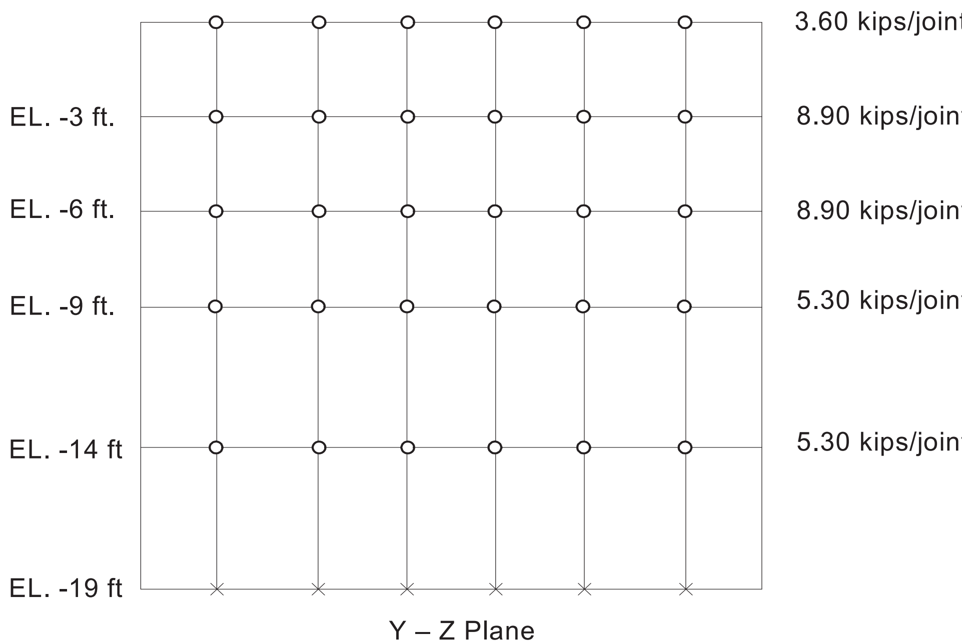
As illustrated in the figure, half of the hydrodynamic weight is applied to one wall in one direction, and the other half is applied to the other wall in the same direction. However, in the case of the interior walls (walls between adjacent Hot Cells), half the weight is applied to one side of the wall, and half from the adjacent cell is applied to the other side. Therefore, the interior walls experience the full load.

For interior walls in the Y-Z Plane:

Convective: 28.31 kips/8 joints = 3.54 kips/joint <u>USE 3.60 kips/joint</u>

Impulsive: 84.34 kips/16 joints = 5.27 kips/joint <u>USE 5.30 kips/joint</u>

(3.54 + 5.27) kips/joint = 8.81 kips/joint <u>USE (3.60 + 5.30) kips/joint 8.90 kips/joint</u>



For bottom of cell: 135 kips/36 joints = 3.75 kips/joint

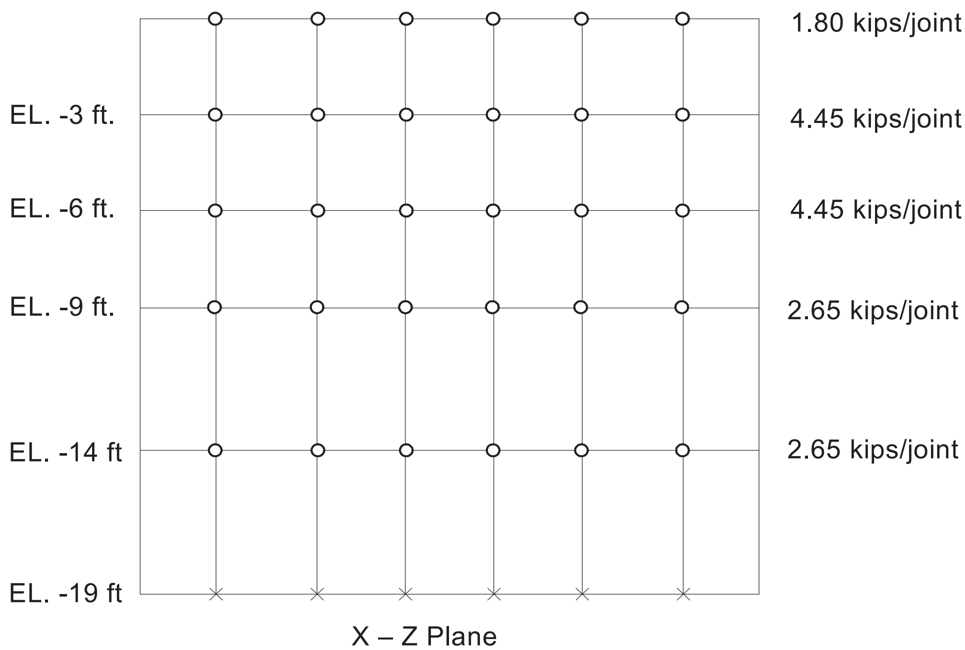
Figure G3. Distribution of Mass for Interior Walls

For outside walls in the Y-Z Plane and walls in the X-Z Plane:

Convective: 14.155 kips/8 joints = 1.77 kips/joint USE 1.80 kips/joint

Impulsive: 42.17 kips/16 joints = 2.64 kips/joint USE 2.65 kips/joint

(1.77 + 2.64) kips/joint = 4.41 kips/joint USE (1.80 + 2.65) kips/joint 4.45 kips/joint



For bottom of cell: 135 kips/36 joints = 3.75 kips/joint

Figure G4. Distribution of Mass for Exterior Walls

Table of Contents

H1.0 INTRODUCTION

H1.1 Purpose

The purpose of this attachment is to calculate the torsional moments on the SHINE RCA resulting from accidental eccentricity with respect to the center of rigidity of the structure and the effects of incoherent wave motion as required by section 3.1.1(e) of *ASCE 4-98* [3.1.4]. These scenarios are accounted for by applying a torsional moment resulting from an accidental eccentricity of 5% of the plan dimension between the center of mass and center of rigidity. Due to the directional nature of the load (clockwise or counterclockwise), the accidental eccentricity load is applied to the SAP2000 design model as a set of directional equivalent static loads. The calculations of the directional in-plane loads to account for the torsional moment produced by accidental eccentricity are presented in this attachment. The loads simulate the torsional load due to the accidental eccentricity and are applied to the SHINE RCA in the clockwise direction and counterclockwise direction in separate load combinations.

H1.2 Scope

Seismic excitations in the X, Y, and Z directions are considered when calculating the accidental eccentricity moment. The excitations for each direction (X, Y, and Z) are unique and independent of one another and are used in determining the seismic loads on the structure. An envelope of the worst cases for several soil/time-history combinations is used when determining the load on each section of the building and for this reason Z excitation causes net horizontal loads on the structure. Conservatively, these loads are included when calculating the accidental eccentricity and multiple combinations of these loads are used to determine the maximum moment. The resulting torsional moment is applied to the structure as in-plane shear loads on the walls. The additional in-plane shear load is applied to the SHINE RCA walls in the SAP2000 design model at the intersection with the roof slab. There are three major tasks in determining the additional load on each wall:

1. Determine total load in both X and Y directions from the three directions of seismic excitation on each level of the structure and find the maximum torsional moment due to accidental eccentricity
2. Calculate the location of the center of rigidity for the structure
3. Distribute the torsional moment in the form of applied in-plane loads to the roof slab-wall interface to simulate the moment due to accidental eccentricity.

The shear load is calculated for the entire length of the wall and is divided among the joints where the wall intersects the roof slab. The loads are applied such that they are additive in creating the largest moment, regardless of the sign of the distributed in-plane load. The loads are also applied such that the moment will be acting in the same direction (either clockwise or counterclockwise) in one load combination. To account for both the clockwise and counterclockwise accidental eccentricity moments, the coupled loads are reversed in separate load combinations.

H2.0 BASIS

H2.1 Design Inputs

H2.1.1 Geometry

The basis for the geometries used in this attachment is the SAP2000 design model and *SHINE RCA General Arrangement Drawings* [3.2.2]. The lengths, heights, and thicknesses of all the walls are pulled from these sources. These values are needed to calculate the stiffness of each wall.

Determining the geometry of each wall is done using the following set of rules:

- The height of each wall is considered to be the distance from the top of the slab below it to the bottom of the slab above it as shown in Figure 1.

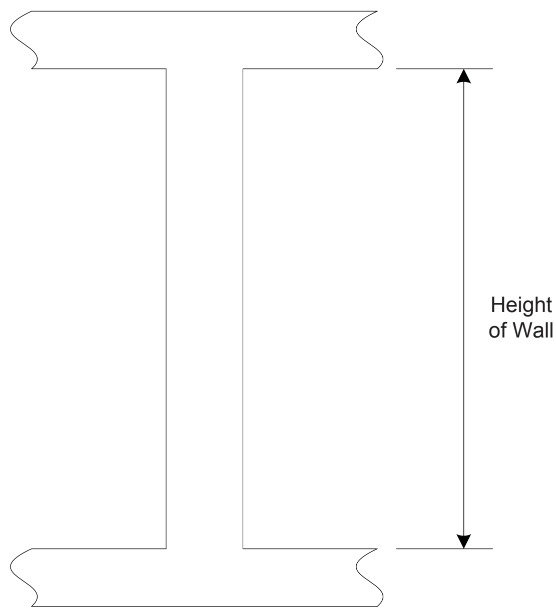


Figure 1: Typical wall height.

- When the top of a wall intersects two slabs at different elevations, the top of the wall is considered to be the bottom of the lower slab as shown in Figure 2.

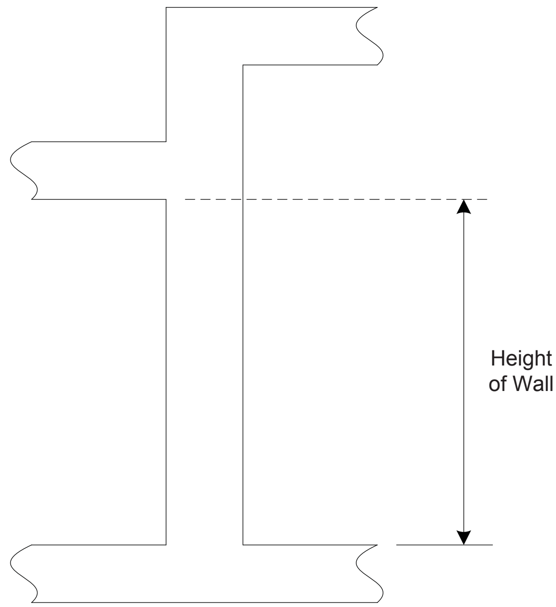


Figure 2: Wall height with varying slab elevations.

- All openings (including all door penetrations) in the walls are ignored.
- When a wall frames into the middle of another wall, the end of the wall is considered to be at the face of the other wall as shown in Figure 3.

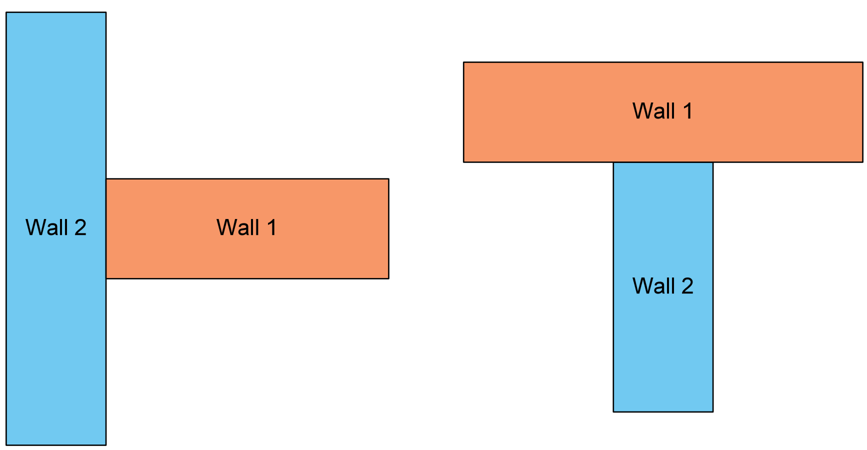


Figure 3: Location of end of walls (plan view).

- When a North-South and East-West wall frame into each other at a corner, the corner is considered to be part of the East-West wall, and the end of the North-South wall is considered to be at the face of the East-West wall as shown in Figure 4.

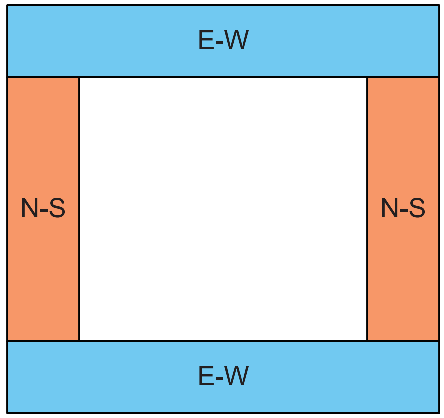


Figure 4: Corner wall intersections (plan view).

H2.1.2 Concrete Properties

The concrete properties used in the calculation of the wall stiffness are in accordance with the design input 2.1.2 and are summarized in Table 1 below.

Table 1 Concrete material properties

Compressive strength, f'_c (psi)	Modulus of elasticity, E_c (ksf)	Shear modulus, G_c (ksf)	Poisson's ratio ν
5000	580393	248031	0.17

The shear modulus of concrete, G_c, is calculated using

$$G_c = \frac{E_c}{2(1+\nu)}$$

H3.0 METHODS

H3.1 Determination of Total Seismic Forces

The seismic forces on a structure are the result of an earthquake exciting the structure and equipment/components located within the structure. Seismic excitations in each of the primary directions cause unique inertial forces in each of the three directions (X, Y, and Z) for a total of nine forces. These forces are referred to as X_x, X_y, X_z, Y_x, Y_y, Y_z, Z_x, Z_y, and Z_z and the notation for the forces is described below:

X_x = force in the X-direction due to X excitation
X_y = force in the X-direction due to Y excitation
X_z = force in the X-direction due to Z excitation

In the analysis of the SHINE RCA, seismic forces are calculated and applied to the equivalent static seismic SAP2000 model as joint loads. For the purpose of accidental eccentricity calculations, the total seismic force in both horizontal directions is required.

These forces are calculated by summing the joint seismic forces in the X and Y directions. The seismic forces are calculated for each story of the structure, from mid-height below the floor to mid-height above the floor. The region considered in the calculation of the total seismic force is shown shaded in Figure 5.

[Security-Related Information]

Figure 5: Elevation sketch of SHINE RCA showing the region used in calculating the total seismic force (not to scale).

The nine seismic forces are combined using the 100/40/40 method to determine the maximum seismic force in the X and Y directions. For example, the 100/40/40 case consists of 100% of the forces due to X excitation, 40% of the forces due to Y excitation, and 40% of the forces due to Z excitation. The accidental eccentricity accounts for eccentricities in the X-Y plane and therefore only 100/40/40 and 40/100/40 cases need be considered. These cases result in the largest X and Y forces (40/40/100 would result in the largest Z direction force which is not needed for this calculation).

The moment resulting from accidental eccentricity is calculated from the maximum seismic forces and a moment arm equal to 5% of the building dimension. The moments due to 100/40/40 and 40/100/40 excitations are calculated as:

$$M_{100/40/40} = 0.05 * L_y * F_{x_{100/40/40}} + 0.05 * L_x * F_{y_{100/40/40}}$$

$$M_{40/100/40} = 0.05 * L_y * F_{x_{40/100/40}} + 0.05 * L_x * F_{y_{40/100/40}}$$

$$M_{AE} = \max(M_{100/40/40}, M_{40/100/40})$$

The larger of these two moments is used in the analysis of the SHINE RCA. More detailed calculations for the seismic forces and accidental eccentricity moment are available in section H5.1 of this attachment.

H3.2 Determination of Wall Stiffness

The center of rigidity of the structure must be known to determine the additional load required at the top of each wall to account for accidental eccentricity. The walls are separated into North-South and East-West running walls, as shown in Figure 6.

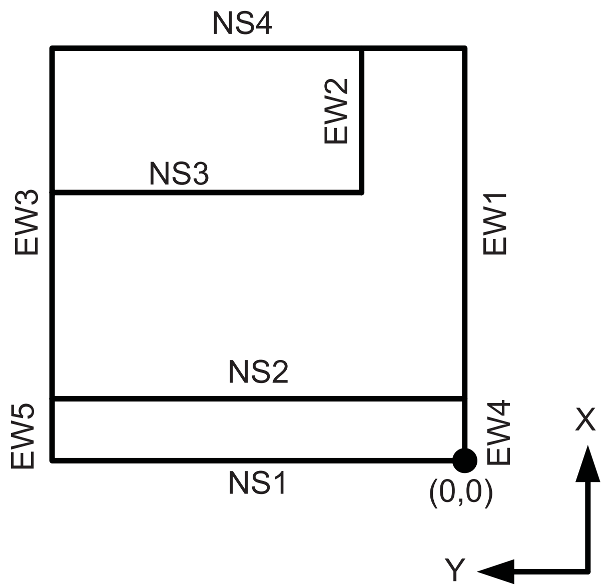


Figure 6: SHINE RCA wall locations and names.

The length (*L*), height (*h*), and thickness (*t*) of each wall are required to determine the stiffness of the wall. The equation used for the stiffness of the walls is shown below and is based on equation 7 from the *PCA Engineering Bulletin* [3.3.18]. The wall stiffness *k* is a combination of the shear stiffness and flexural stiffness of the wall.

$$k = \frac{1}{\dfrac{h^3}{E_c t L^3} + \dfrac{1.2h}{G_c t L}}$$

The above equation does not include the effect of "flanges" when determining the stiffness. However, based on the section properties of most of the walls (typically very long), the stiffness is dominated by the shear stiffness. In addition, the flanges contribute approximately equally to each of the walls. Furthermore, based on their relatively small effect, the flanges do not significantly alter the distribution of the forces associated with the accidental eccentricity. Therefore the exclusion of the flanges in the above equation is considered negligible.

The height, thickness, and length are calculated for each wall based on the *SHINE RCA General Arrangement Drawings* [3.2.2] and SAP2000 analysis model. The modulus of elasticity (E_c) and shear modulus (G_c) are shown in Table 1.

Wall stiffness calculations are presented in section H5.2 of this attachment.

H3.3 Determination of Center of Rigidity

Determining the center of rigidity of the structure is dependent upon the stiffness of each wall and its location within the structure. The *x* coordinate of the center of rigidity, x_r, with respect to the origin defined in Figure 6 is given by

$$x_r = \frac{\sum k_y x}{\sum k_y}$$

Where k_y is the in-plane stiffness of each wall in the Y-Z plane and x is the distance from the origin to the centerline of the wall. Similarly, the *y* coordinate of the center of rigidity, y_r, with respect to the origin defined in Figure 6 is given by

$$y_r = \frac{\sum k_x y}{\sum k_x}$$

Where k_x is the in-plane stiffness of each wall in the X-Z plane and y is the distance from the origin to the centerline of the wall.

In addition to the center of rigidity, it is necessary to calculate the rotational stiffness of the system. The rotational stiffness is given by the equation below based on equation 17 from the *PCA Engineering Bulletin* [3.3.18].

$$J_r = \sum [k_x (y - y_r)^2 + k_y (x - x_r)^2]$$

The calculations for the center of rigidity and rotational stiffness for the SHINE RCA are shown in section H5.3 of this calculation.

H3.4 Determination of Accidental Eccentricity Load on Each Wall

The in-plane loads on the SHINE RCA walls corresponding to the torsional moment resulting from accidental eccentricity are distributed according to the relative stiffness of each wall. Walls with higher in-plane stiffness located farther from the center of rigidity carry a larger portion of the load compared to walls with lower in-plane stiffness located near the center of rigidity. The horizontal load on each wall, V_x or V_y, is calculated using the following equations, based on equations 16a and 16b of the *PCA Engineering Bulletin* [3.3.18]. All variables are defined in sections H3.1-H3.3 of this attachment.

For North-South walls:

$$V_y = \frac{k_y (x - x_r) M_{AE}}{J_r}$$

For East-West walls:

$$V_x = -\frac{k_x (y - y_r) M_{AE}}{J_r}$$

The equation for East-West walls is negative so that the loads in all walls contribute to a counter clockwise torsional moment on the structure, as shown in Figure 7.

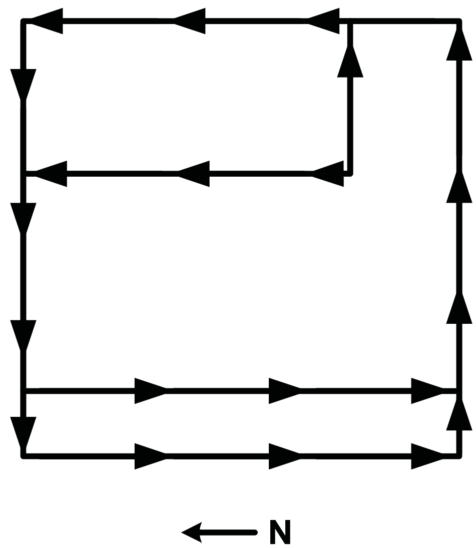


Figure 7: SHINE RCA counter clockwise accidental eccentricity load.

Detailed calculations of the in-plane wall loads resulting from accidental eccentricity are provided in section H5.4 of this attachment.

H3.5 Application of Loads

As shown in Figure 7, the accidental eccentricity loads are applied in a counter clockwise (or clockwise) direction about the center of rigidity of the entire structure. The main area loads and the control area loads are calculated separately since the height of the walls of each area is different. The loads of the main area are applied at the roof slab-wall interface. Similarly, the loads of the control area are applied at the roof slab-wall interface. Therefore, wall NS2 has accidental eccentricity loads applied at the main area roof slab-wall interface and at El. 22 ft, where the control area roof meets wall NS2. Although the control area calculation shows a local clockwise or counterclockwise load path about the control area center of rigidity, the loads are applied as shown in Figure 7.

H4.0 RESULTS AND CONCLUSIONS

H4.1 Accidental Eccentricity Wall Loads

The in-plane loads on the SHINE RCA walls due to accidental eccentricity are shown in Table 2. The absolute values of the loads are shown in terms of the total load per wall as well as on a nodal basis. Note that wall NS2 is broken into two walls, NS2a and NS2b in Table 2. NS2a is the wall from 0 to 22 ft, while NS2b is the total height of the wall for the main area.

Table 2 Accidental eccentricity in-plane loads for SHINE RCA walls

Wall	Min X	Max X	Min Y	Max Y	Length (ft)	Thickness (in)	Height (ft)	V (kips)	# of Joints	Load (kips/joint)
NS1	0	0	0	198.33	198.33	24	22	70	81	0.86
NS2a	29	29	0	198.33	198.33	24	22	70	81	0.86
NS2b	29	29	0	198.33	198.33	24	48.33	410	81	5.07
NS3	135.33	135.33	50.33	198.33	148	24	57.66	71	61	1.16
NS4	192.33	192.33	0	198.33	198.33	24	56.33	340	81	4.19
EW1	29	192.33	0	0	163.33	24	53.44	340	68	5.00
EW2	135.33	192.33	50.33	50.33	57	24	56.77	40	22	1.80
EW3	29	192.33	198.33	198.33	163.33	24	53.44	380	68	5.58
EW4	0	29	0	0	29	24	22	58	9	6.48
EW5	0	29	198.33	198.33	29	24	22	58	9	6.48

H5.0 CALCULATIONS

H5.1 Calculation of Total Seismic Forces

The calculation of the total seismic load applied to the SHINE RCA is based on the nine seismic force components described in section H3.1 of this attachment. These forces are assembled together and summed as shown below. Only joints in the upper portion of the structure (Z coordinate greater or equal to 23 ft for the main area and 10 ft for the control area) are considered, as discussed in section H3.1, and each force is summed and presented in Table 3.

Table 3 Seismic loads on SHINE RCA

Level	X Excitation			Y Excitation			Z Excitation		
	X (kips)	Y (kips)	Z (kips)	X (kips)	Y (kips)	Z (kips)	X (kips)	Y (kips)	Z (kips)
Main area	8524	1096	2717	1275	9713	2299	463	1284	7634
Control area	1143	518	66	86	1661	86	24	171	1130

The summed forces are then combined using the 100/40/40 method. For 100% X excitation the forces in each direction for the main area are

$$F_{X_{100/40/40}} = X_x + 0.4X_y + 0.4X_z$$

$$F_{X_{100/40/40}} = 8524kips + 0.4*1275kips + 0.4*463kips$$

$$F_{X_{100/40/40}} = 9219 kips$$

$$F_{Y_{100/40/40}} = Y_x + 0.4Y_y + 0.4Y_z$$
$$F_{Y_{100/40/40}} = 1096 kips + 0.4 * 9713 kips + 0.4 * 1284 kips$$
$$F_{Y_{100/40/40}} = 5495 kips$$

Similarly, for 100% Y excitation the forces in each direction are

$$F_{X_{40/100/40}} = 0.4X_x + X_y + 0.4X_z$$
$$F_{X_{40/100/40}} = 0.4 * 8524 kips + 1275 kips + 0.4 * 463 kips$$
$$F_{X_{40/100/40}} = 4869 kips$$

$$F_{Y_{40/100/40}} = 0.4Y_x + Y_y + 0.4Y_z$$
$$F_{Y_{40/100/40}} = 0.4 * 1096 kips + 9713 kips + 0.4 * 1284 kips$$
$$F_{Y_{40/100/40}} = 10665 kips$$

The total seismic loads on the SHINE RCA for the calculation of accidental eccentricity torsional moment are summarized in Table 4.

Table 4 Summary of total seismic loads on SHINE RCA used in the calculation of accidental eccentricity torsional moment

Level	100 40 40		40 100 40	
	X (kips)	Y (kips)	X (kips)	Y (kips)
Main area	9219	5495	4869	10665
Control area	1187	1251	553	1937

The torsional moments resulting from the seismic forces presented in Table 4 with an eccentricity of 5 % of the main area structure dimensions are calculated below.

$$M_{100/40/40} = 0.05 * L_y * F_{x_{100/40/40}} + 0.05 * L_x * F_{y_{100/40/40}}$$

$$M_{100/40/40} = 0.05 * 198.33 ft * 9219 kips + 0.05 * 163.33 ft * 5495 kips = 136{,}294 kip - ft$$

$$M_{40/100/40} = 0.05 * L_y * F_{x_{40/100/40}} + 0.05 * L_x * F_{y_{40/100/40}}$$

$$M_{40/100/40} = 0.05 * 198.33 ft * 4869 kips + 0.05 * 163.33 ft * 10665 kips = 135{,}385 kip - ft$$

The torsional moment on the main area resulting from an accidental eccentricity is the maximum of the moments. Therefore

$$M_{AE} = 136{,}294 kip - ft\ .$$

Similarly, for the control area, the maximum torsional moment resulting from an accidental eccentricity is

$$M_{AE} = 13{,}588 kip - ft$$

H5.2 Calculation of Wall Stiffness

The stiffness of each wall is required to distribute the accidental eccentricity load proportionately. The wall stiffness, *k*, is a combination of the shear stiffness and flexural stiffness of the wall, as described in section H3.2 of this attachment. The stiffness of wall NS1 (refer to Figure 6) is calculated to demonstrate the procedure.

$$L = y_{\max} - y_{\min} = 198.33\,ft - 0\,ft = 198.33\,ft$$

$$t = 2\,ft$$

$$h = 22\,ft$$

$$G_c = 221{,}846 ksf$$

$$E_c = 519{,}120 ksf$$

$$k_y = \frac{1}{\dfrac{1.2h}{G_c t L} + \dfrac{h^3}{E_c t L^3}}$$

$$k_y = 3{,}318{,}693 \frac{kip}{ft}$$

Similarly, the stiffness values for all walls are presented in Table 5.

Table 5 Stiffness values for North-South oriented SHINE RCA walls

Wall	Min X	Max X	Min Y	Max Y	Length (ft)	Thickness (in)	Height (ft)	V (kips)	k (kip/ft)
NS1	0	0 0		198.33	198.33	24	22	70	3318693
NS2a	29	29	0	198.33	198.33	24	22	70	3318693
NS2b	29	29	0	198.33	198.33	24	48.33	410	1485879
NS3	135.33	135.33	50.33	198.33	148	24	57.66	71	900377
NS4	192.33	192.33	0 198.33		198.33	24	56.33	340	1265460
EW1	29	192.33	0	0	163.33	24	53.44	340	1088555
EW2	135.33	192.33	50.33	50.33	57	24	56.77	40	274332
EW3	29	192.33	198.33	198.33	163.33	24	53.44	380	1088555
EW4	0	29 0		0	29	24	22	58	404488
EW5	0	29	198.33	198.33	29	24	22	58	404488

H5.3 Calculation of Center of Rigidity

The center of rigidity for the main area of the SHINE RCA is calculated with respect to the southwest corner of the structure, as shown in Figure 6. The *x* coordinate of the center of rigidity, x_r, is

$$x_r = \frac{\sum k_y x}{\sum k_y}$$

$$x_r = 111.82\,ft$$

Similarly, the *y* coordinate of the center of rigidity, y_r, is

$$y_r = \frac{\sum k_x y}{\sum k_x}$$

$$y_r = 93.7\,ft$$

The calculation of the rotational stiffness of the structure

$$J_r = \sum [k_x (y - y_r)^2 + k_y (x - x_r)^2]$$

is shown in Table 6.

Table 6 Center of rigidity and rotational stiffness of the RCA

Level	Center of Rigidity CR X (ft)	CR Y (ft)	Rotational Stiffness (kip-ft)
Main	111.8	93.7	4.09E+10
Control Area	14.5	99.2	9.35E+09

H5.4 Calculation of Accidental Eccentricity Load in Each Wall

The torsional moment resulting from an accidental eccentricity is applied to the SHINE RCA as in-plane shear loads, as described in section H3.4 of this calculation. The in-plane shear load for wall NS1 is calculated to demonstrate the procedure.

$$V_y = \frac{k_y (x - x_r) M_{AE}}{J_r}$$

Where

$$k_y = 3{,}318{,}693 \frac{kip}{ft}$$

$$x = 0\,ft$$

$$x_r = 14.5\,ft$$

$$M_{AE} = 13{,}588 kip - ft$$

$$J_r = 9.35E + 9 kip - ft$$

$$V_r = -69.93 kips$$

The in-plane shear forces for the remaining walls are shown in Table 2 in section H4.1 of this attachment. The spreadsheet and formulas used in the calculation of accidental eccentricity forces are documented in section H5.5.

H5.5 Accidental Eccentricity Forces

The spreadsheets below document the calculation of the accidental eccentricity forces applied to the design model. Only the main area spreadsheet is completely documented, as the formulas used in the calculation of the control area are identical.

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3	11046	0.403328	0.018555	0.007122		0.086859	0.371984	0.04677		0.024221	0.018616	0.28922
4	11047	0.339988	0.015619	0.006131		0.07529	0.315893	0.040563		0.020069	0.016122	0.241167
5	11048	0.547852	0.025134	0.010014		0.123046	0.511915	0.066523		0.032774	0.026426	0.386029
6	11049	6.508972	0.29747	0.123918		1.498907	6.21363	0.829481		0.472903	0.331071	4.507213
7	11050	0.848177	0.038679	0.016698		0.192787	0.831207	0.112593		0.055122	0.045213	0.580202
8	11051	0.798185	0.036116	0.016228		0.174239	0.804165	0.109833		0.047	0.044537	0.540319
9	11052	0.804248	0.036025	0.016788		0.166164	0.832899	0.113744		0.04274	0.046572	0.540666
10	11053	0.877822	0.038611	0.018693		0.16462	0.933776	0.126558		0.039861	0.052447	0.581416
11	11054	0.885578	0.039733	0.019291		0.150863	0.971917	0.130229		0.033242	0.054665	0.581765
12	11055	0.929975	0.035819	0.018778		0.183392	0.881269	0.111209		0.052087	0.049266	0.529835
13	11056	1.072826	0.035526	0.020173		0.226263	0.879135	0.104284		0.071868	0.048884	0.530712
14	11057	1.253387	0.035245	0.021731		0.261603	0.877148	0.097567		0.089231	0.048548	0.531485
15	11058	1.043337	0.025656	0.017199		0.210874	0.641876	0.066635		0.076579	0.035392	0.390233
16	11059	1.095993	0.02557	0.01783		0.21758	0.641273	0.064326		0.081693	0.035308	0.390426
17	11060	1.628477	0.034626	0.026567		0.311624	0.872786	0.080827		0.124247	0.047941	0.533087
18	11061	1.730109	0.034406	0.028983		0.318019	0.871206	0.07366		0.133288	0.047793	0.533728
19	11062	1.617213	0.030775	0.028408		0.284559	0.782762	0.059525		0.126338	0.042932	0.480648
20	11063	1.095307	0.020544	0.020266		0.185955	0.521182	0.035877		0.085411	0.028603	0.320475
21	11064	1.587695	0.029707	0.030285		0.264854	0.752363	0.048967		0.123075	0.041315	0.462896
22	11065	2.193839	0.041306	0.047021		0.341879	1.039792	0.053763		0.165295	0.057288	0.64064
23	11066	1.905766	0.036869	0.045874		0.280167	0.92307	0.037138		0.141775	0.051068	0.569291
24	11067	1.828654	0.037046	0.051236		0.25382	0.922057	0.025508		0.132859	0.051289	0.569251
25	11068	1.848292	0.039562	0.061429		0.239462	0.978845	0.014004		0.128352	0.054819	0.604763
26	11069	1.719133	0.039807	0.070427		0.204002	0.978198	0.014525		0.113929	0.055341	0.604682
27	11070	1.586507	0.04002	0.079557		0.172303	0.977929	0.024097		0.098977	0.055867	0.604637
28	11071	1.336911	0.037855	0.085872		0.133863	0.920471	0.042273		0.081057	0.053194	0.569084
29	11072	1.09445	0.034372	0.086561		0.10107	0.834439	0.054406		0.063909	0.048653	0.515786
30	11073	1.032188	0.035508	0.100352		0.079961	0.8637	0.075691		0.053517	0.050797	0.533653
31	11074	1.014152	0.038225	0.121838		0.056637	0.936409	0.10489		0.04178	0.055452	0.578126
32	11075	0.835075	0.034783	0.128498		0.022815	0.865373	0.123441		0.028352	0.05148	0.534083
33	11076	0.805386	0.033918	0.123278		0.021967	0.821747	0.12019		0.043558	0.047483	0.533618
34	11077	0.7175	0.030188	0.108764		0.019716	0.727882	0.107932		0.044123	0.040301	0.496166
35	11078	0.68641	0.028549	0.102708		0.017807	0.696778	0.103781		0.038273	0.036835	0.495796
36	11079	0.695603	0.028028	0.101563		0.015791	0.70896	0.105201		0.027285	0.035097	0.532266
37	11080	0.661193	0.024845	0.091286		0.011855	0.667971	0.097412		0.014113	0.030399	0.53165
38	11081	0.423751	0.014052	0.052938		0.006607	0.422095	0.05845		0.007585	0.016951	0.353855
39	11082	0.261571	0.008224	0.031272		0.003982	0.259392	0.034997		0.004284	0.009891	0.221015
40	11083	0.308349	0.008777	0.034071		0.004826	0.303204	0.039008		0.004309	0.010579	0.264932
41	11193	0.349199	0.013027	0.020626		0.027346	0.346694	0.003459		0.012772	0.012423	0.298678
42	11194	0.323223	0.011494	0.021577		0.018939	0.324732	0.009951		0.013041	0.011443	0.281292
43	11195	0.367981	0.013861	0.019172		0.038954	0.348498	0.003976		0.018482	0.012699	0.298653
44	11196	0.312937	0.011857	0.018826		0.031963	0.296246	0.003431		0.015753	0.011444	0.249252
45	11197	0.283837	0.010581	0.019827		0.021575	0.277688	0.009188		0.015314	0.0106	0.234717
46	11198	0.348114	0.012436	0.017295		0.044973	0.297597	0.002821		0.021447	0.011659	0.249237
47	11199	0.547059	0.019913	0.031791		0.061409	0.481713	0.006243		0.030952	0.019464	0.39915
48	11200	0.476755	0.017869	0.03361		0.041347	0.451694	0.015658		0.028193	0.018059	0.375852
49	11201	0.61991	0.020724	0.029035		0.085215	0.483641	0.00449		0.040694	0.019746	0.399128
50	11202	1.068112	0.033295	0.054725		0.138721	0.762108	0.012649		0.071338	0.03418	0.600084
51	11203	0.879156	0.030285	0.058355		0.093716	0.714468	0.027746		0.054454	0.031959	0.564991
52	11204	1.209444	0.034175	0.049378		0.182703	0.765442	0.007111		0.087523	0.034455	0.600072
53	11205	1.291769	0.03576	0.061098		0.176768	0.806283	0.015715		0.090038	0.038996	0.601185
54	11206	1.054913	0.032822	0.065504		0.12306	0.756826	0.031728		0.0682	0.03674	0.565973
55	11207	1.454305	0.036389	0.054728		0.224143	0.808778	0.008589		0.108912	0.039098	0.601193
56	11208	1.364121	0.03493	0.062186		0.186173	0.790635	0.017165		0.096776	0.040609	0.560235
57	11209	1.114863	0.032596	0.066888		0.133098	0.74286	0.032851		0.073677	0.038464	0.527393
58	11210	1.524362	0.035219	0.055441		0.229914	0.792311	0.009357		0.114288	0.040556	0.560276
59	11211	1.455533	0.036184	0.06629		0.191786	0.824825	0.019063		0.103785	0.044217	0.560759
60	11212	1.195829	0.03392	0.071422		0.139512	0.775482	0.035292		0.080567	0.041992	0.527862
61	11213	1.61413	0.036198	0.058933		0.232972	0.825993	0.010667		0.120166	0.04401	0.560829
62	11214	1.611539	0.039815	0.075736		0.196805	0.929771	0.02242		0.110735	0.05184	0.603251
63	11215	1.337987	0.037501	0.081694		0.145327	0.874555	0.040421		0.086552	0.049304	0.567737
64	11216	1.768397	0.039694	0.067171		0.235703	0.930675	0.013068		0.126988	0.051412	0.603318
65	11218	0.292243	0.009975	0.021602		0.013303	0.293538	0.014557		0.013581	0.010252	0.255111
66	11219	0.253981	0.009214	0.019879		0.014846	0.251059	0.013228		0.01533	0.009524	0.212855
67	11220	0.419432	0.015609	0.033733		0.028339	0.408487	0.022302		0.027406	0.016284	0.340829
68	11221	0.740895	0.026641	0.058732		0.06451	0.646033	0.038318		0.042825	0.029014	0.512279
69	11222	0.856065	0.029254	0.06604		0.084942	0.684921	0.042809		0.052194	0.033434	0.513139
70	11223	0.89534	0.029241	0.067485		0.09359	0.672688	0.043489		0.055588	0.035059	0.478132
71	11224	0.961523	0.030546	0.072063		0.099339	0.702505	0.046187		0.061434	0.038316	0.478552
72	11225	1.082861	0.03391	0.082396		0.104595	0.792506	0.052351		0.066137	0.045041	0.514633

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
73	11227	0.303194	0.009863	0.025199		0.009933	0.303186	0.021619		0.011351	0.010554	0.264166
74	11228	0.260254	0.009136	0.023184		0.010418	0.259334	0.019539		0.012401	0.009837	0.220394
75	11229	0.427395	0.015489	0.039348		0.019928	0.421983	0.032807		0.021501	0.016839	0.352884
76	11230	0.717858	0.026672	0.068512		0.04615	0.667375	0.055706		0.034104	0.030095	0.530352
77	11231	0.814247	0.029663	0.076997		0.061416	0.708027	0.061403		0.040679	0.034747	0.531182
78	11232	0.836178	0.029813	0.078591		0.068954	0.695712	0.061717		0.045593	0.036479	0.494924
79	11233	0.890333	0.031269	0.083819		0.074826	0.726743	0.065009		0.058605	0.039901	0.495352
80	11234	1.005161	0.034866	0.095693		0.080684	0.820086	0.073199		0.062107	0.046958	0.532725
81	11236	0.330693	0.010204	0.031133		0.009171	0.328303	0.031351		0.00788	0.01143	0.286514
82	11237	0.281534	0.009433	0.02863		0.008868	0.2808	0.028249		0.007697	0.010665	0.23903
83	11238	0.457639	0.016026	0.04856		0.014826	0.456971	0.047345		0.012866	0.018276	0.382714
84	11239	0.729801	0.028028	0.084348		0.03058	0.722798	0.07972		0.023845	0.032727	0.575097
85	11240	0.808395	0.031377	0.094496		0.042221	0.767144	0.087144		0.031022	0.037821	0.575948
86	11241	0.819136	0.03171	0.096158		0.048067	0.75397	0.086796		0.051297	0.03972	0.536576
87	11242	0.867775	0.033394	0.102296		0.052959	0.787688	0.090881		0.067209	0.043464	0.537025
88	11243	0.980385	0.037378	0.116464		0.057864	0.889051	0.101776		0.068401	0.05119	0.577574
89	11272	0.451615	0.014681	0.017801		0.065649	0.351048	0.009159		0.032062	0.013127	0.298834
90	11273	0.528829	0.014287	0.015572		0.094066	0.332911	0.012052		0.044838	0.012769	0.28145
91	11274	0.657171	0.014689	0.014376		0.130303	0.335715	0.01528		0.058936	0.013255	0.281605
92	11275	0.87091	0.016949	0.014897		0.186712	0.380831	0.021036		0.082253	0.015462	0.316926
93	11276	0.723592	0.012617	0.009746		0.167197	0.277826	0.018973		0.070717	0.011672	0.228959
94	11277	0.515929	0.00881	0.006595		0.121327	0.192901	0.013965		0.050681	0.008185	0.15852
95	11278	0.803618	0.013438	0.009476		0.195604	0.291453	0.023559		0.07965	0.012588	0.237797
96	11279	0.899975	0.015223	0.010013		0.229996	0.326733	0.029865		0.090058	0.014405	0.264214
97	11280	0.867096	0.015485	0.009546		0.234092	0.329238	0.03342		0.087515	0.0148	0.264142
98	11281	0.583424	0.011525	0.006666		0.167407	0.242981	0.026776		0.05935	0.011126	0.193588
99	11282	0.558887	0.011595	0.006504		0.162818	0.243589	0.027648		0.056219	0.011247	0.19351
100	11283	0.672207	0.016026	0.008358		0.200939	0.333808	0.039629		0.066066	0.015701	0.263584
101	11284	0.561485	0.016258	0.007782		0.169706	0.335263	0.040822		0.052644	0.016078	0.263319
102	11285	0.440544	0.016548	0.007146		0.128849	0.33675	0.041633		0.03762	0.016493	0.263153
103	11286	0.417811	0.012981	0.015846		0.068667	0.29937	0.007428		0.032834	0.01193	0.249343
104	11287	0.478966	0.012559	0.013769		0.091072	0.283587	0.010308		0.043068	0.01153	0.234807
105	11288	0.583071	0.012828	0.012665		0.120465	0.285578	0.013322		0.054732	0.01186	0.234926
106	11289	0.764702	0.014717	0.013086		0.168369	0.323812	0.018392		0.074538	0.013755	0.26439
107	11290	0.63497	0.010875	0.008533		0.148127	0.236821	0.016496		0.062964	0.010311	0.191003
108	11291	0.451513	0.007579	0.005767		0.107097	0.164551	0.012113		0.044957	0.007218	0.132239
109	11292	0.700366	0.011514	0.008261		0.17172	0.248553	0.020289		0.070254	0.011062	0.198372
110	11293	0.781335	0.012985	0.008692		0.200816	0.27834	0.025491		0.079029	0.012612	0.22041
111	11294	0.750248	0.013162	0.008242		0.203599	0.280236	0.028304		0.076492	0.012924	0.220326
112	11295	0.502967	0.009769	0.005723		0.145114	0.206675	0.022574		0.051689	0.009697	0.161448
113	11296	0.473543	0.009823	0.00557		0.140948	0.207163	0.023295		0.048838	0.009798	0.161363
114	11297	0.562862	0.013549	0.007131		0.173591	0.283745	0.033476		0.056844	0.013653	0.219751
115	11298	0.468932	0.013733	0.006637		0.146518	0.28493	0.034734		0.04511	0.013971	0.219555
116	11299	0.367221	0.013947	0.006114		0.11135	0.286043	0.035773		0.031706	0.014304	0.219421
117	11300	0.734978	0.021498	0.02642		0.124341	0.486285	0.011695		0.058762	0.020154	0.399272
118	11301	0.818445	0.020711	0.022862		0.158846	0.46027	0.01667		0.074339	0.019372	0.375969
119	11302	0.967917	0.021094	0.020974		0.204817	0.464107	0.021818		0.093313	0.019857	0.376148
120	11303	1.269775	0.024113	0.021625		0.281887	0.527042	0.030216		0.125216	0.022928	0.423319
121	11304	1.045644	0.017747	0.014077		0.245245	0.385074	0.027043		0.10461	0.017122	0.305818
122	11305	0.742262	0.012353	0.009505		0.17692	0.267483	0.019824		0.074526	0.011972	0.211726
123	11306	1.148146	0.018726	0.013591		0.282673	0.403795	0.033099		0.116034	0.018313	0.317602
124	11307	1.27804	0.021059	0.014264		0.329508	0.45196	0.041373		0.130139	0.020828	0.352905
125	11308	1.224861	0.021304	0.013485		0.333318	0.454748	0.04577		0.125672	0.021308	0.352748
126	11309	0.819165	0.015794	0.009335		0.237056	0.335291	0.036428		0.084721	0.015974	0.258458
127	11310	0.77028	0.015866	0.009071		0.230042	0.336011	0.037584		0.079961	0.016127	0.258286
128	11311	0.900197	0.021871	0.011591		0.282967	0.460151	0.0541		0.092423	0.022457	0.351706
129	11312	0.748971	0.022143	0.010785		0.238765	0.461947	0.056355		0.073129	0.022954	0.351422
130	11313	0.595944	0.022473	0.009952		0.181586	0.463732	0.058349		0.051239	0.023489	0.351212
131	11314	1.405119	0.034961	0.044264		0.244294	0.769877	0.016697		0.115437	0.03483	0.600226
132	11315	1.512878	0.033385	0.037902		0.289766	0.728946	0.025375		0.135153	0.03319	0.565136
133	11316	1.695204	0.033737	0.034503		0.353096	0.733778	0.034347		0.162018	0.03368	0.565364
134	11317	2.079646	0.038276	0.035356		0.467405	0.831314	0.048109		0.209752	0.038537	0.636253
135	11318	1.663014	0.027902	0.022997		0.394856	0.605688	0.04296		0.170294	0.028477	0.459621
136	11319	1.174585	0.019368	0.015478		0.283091	0.420405	0.031424		0.120573	0.019857	0.318214
137	11320	1.802093	0.029204	0.021965		0.447934	0.633749	0.052094		0.185869	0.030217	0.477299
138	11321	1.992042	0.032658	0.02289		0.517462	0.708259	0.064565		0.206671	0.03419	0.530238
139	11322	16.08937	0.27777	0.182284		4.404545	6.01771	0.597851		1.679574	0.294266	4.483096
140	11323	1.26173	0.024265	0.01476		0.367933	0.524293	0.05616		0.132834	0.025987	0.388152
141	11324	1.18263	0.024349	0.014304		0.356272	0.525227	0.057952		0.125015	0.026206	0.38787
142	11325	1.363589	0.033486	0.018207		0.437129	0.718816	0.083818		0.143257	0.036399	0.528088

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
143	11326	1.14781	0.033844	0.016926		0.368819	0.721347	0.088139		0.112097	0.037107	0.527753
144	11327	0.922356	0.034282	0.015672		0.281229	0.723904	0.09236		0.084606	0.037866	0.527386
145	11328	1.669332	0.03691	0.048596		0.285161	0.812207	0.015841		0.134431	0.039282	0.601352
146	11329	1.753732	0.035029	0.041273		0.324051	0.767757	0.025434		0.151345	0.037192	0.566182
147	11330	1.917834	0.035211	0.037313		0.380826	0.771476	0.035286		0.175607	0.037496	0.566408
148	11331	2.303265	0.039742	0.037999		0.489503	0.872374	0.049977		0.22175	0.042609	0.637415
149	11332	1.738687	0.028787	0.024764		0.403764	0.634179	0.044755		0.176094	0.031239	0.46046
150	11333	1.209436	0.019945	0.016633		0.28793	0.439898	0.032699		0.12404	0.021734	0.318775
151	11334	1.808674	0.029967	0.023493		0.451552	0.662336	0.054088		0.189522	0.032939	0.478122
152	11335	1.977617	0.033381	0.02427		0.516847	0.739196	0.066765		0.208717	0.037104	0.531136
153	11336	1.871418	0.033468	0.022649		0.516039	0.742124	0.073013		0.198776	0.037612	0.530705
154	11337	1.238703	0.024638	0.015489		0.363909	0.546258	0.057807		0.132593	0.027983	0.388665
155	11338	1.170578	0.024702	0.014981		0.352255	0.54711	0.059722		0.124652	0.028185	0.38831
156	11339	1.389016	0.033922	0.01901		0.432199	0.748473	0.086725		0.142505	0.039051	0.528794
157	11340	1.158242	0.034243	0.017666		0.365238	0.750842	0.091787		0.111726	0.03971	0.528388
158	11341	0.934631	0.034658	0.016394		0.279544	0.753271	0.096965		0.083747	0.040407	0.52796
159	11342	1.727217	0.035516	0.048905		0.283312	0.794657	0.013996		0.135336	0.040543	0.560451
160	11343	1.784868	0.033557	0.04128		0.313245	0.750236	0.023691		0.146734	0.038213	0.527697
161	11344	1.919134	0.033605	0.037094		0.359261	0.752823	0.033353		0.166159	0.038335	0.527921
162	11345	2.268705	0.037797	0.037784		0.453088	0.850067	0.047729		0.206273	0.043349	0.594127
163	11346	1.683563	0.027264	0.024559		0.365433	0.616861	0.042919		0.161115	0.031588	0.429181
164	11347	1.165883	0.018867	0.016476		0.259418	0.427668	0.031378		0.113019	0.021938	0.297125
165	11348	1.729403	0.028283	0.023202		0.403682	0.643302	0.05187		0.171388	0.033138	0.445623
166	11349	1.850849	0.031412	0.023795		0.45851	0.717178	0.063969		0.187156	0.037173	0.494877
167	11350	1.73213	0.031435	0.022063		0.455093	0.719469	0.069944		0.177075	0.03757	0.494396
168	11351	1.15084	0.023104	0.015038		0.320234	0.529195	0.055448		0.11766	0.027873	0.362006
169	11352	1.085746	0.023143	0.014533		0.310009	0.529919	0.057306		0.110501	0.028034	0.361699
170	11353	1.286369	0.031737	0.018412		0.380931	0.724673	0.083476		0.126108	0.038738	0.492738
171	11354	1.076612	0.032004	0.0171		0.32295	0.726734	0.088747		0.098355	0.039291	0.492276
172	11355	0.867609	0.032368	0.015881		0.248569	0.728827	0.09414		0.071852	0.039875	0.491756
173	11356	1.803581	0.036127	0.051767		0.281602	0.827709	0.013428		0.137241	0.043854	0.561046
174	11357	1.843848	0.033966	0.043508		0.306238	0.780742	0.023672		0.146122	0.041204	0.528289
175	11358	1.961132	0.033938	0.038925		0.345948	0.782696	0.033663		0.163176	0.041207	0.528549
176	11359	2.294692	0.038099	0.039775		0.431119	0.882912	0.048528		0.199029	0.046444	0.594858
177	11360	1.683625	0.027422	0.025765		0.342763	0.63992	0.043829		0.152093	0.033706	0.429728
178	11361	1.16246	0.018965	0.017266		0.242343	0.443497	0.032055		0.106391	0.023381	0.297498
179	11362	1.715055	0.028393	0.024269		0.374837	0.666667	0.053037		0.160497	0.035232	0.44616
180	11363	1.82572	0.031498	0.024833		0.423135	0.742691	0.065445		0.174278	0.039417	0.495433
181	11364	1.702798	0.031484	0.022857		0.418273	0.744597	0.071619		0.164144	0.039737	0.494888
182	11365	1.135517	0.023121	0.015547		0.29383	0.547407	0.056837		0.108694	0.029412	0.362333
183	11366	1.076632	0.023167	0.015013		0.284457	0.548038	0.0588		0.101958	0.029552	0.362089
184	11367	1.277089	0.031773	0.018999		0.350169	0.74963	0.085827		0.116157	0.040742	0.493301
185	11368	1.071813	0.032025	0.017639		0.298039	0.752027	0.091467		0.090805	0.041234	0.492761
186	11369	0.873049	0.032351	0.016393		0.230982	0.754541	0.097296		0.06609	0.041769	0.492158
187	11370	1.933262	0.039504	0.058775		0.280236	0.932107	0.013866		0.143009	0.051078	0.603476
188	11371	1.955619	0.036998	0.049194		0.300401	0.878786	0.02544		0.149072	0.047869	0.5683
189	11372	2.05917	0.036816	0.043816		0.33484	0.880529	0.036657		0.160812	0.047742	0.56863
190	11373	2.387456	0.041229	0.04501		0.412775	0.992785	0.052999		0.193806	0.05366	0.640026
191	11374	1.734805	0.029634	0.029062		0.323648	0.719142	0.04808		0.146268	0.0388	0.46239
192	11375	1.194845	0.020493	0.019459		0.227991	0.49833	0.035201		0.101326	0.026884	0.320115
193	11376	1.75547	0.030685	0.027305		0.350339	0.748908	0.058312		0.151386	0.040423	0.48008
194	11377	1.866482	0.034054	0.027889		0.392917	0.834129	0.072058		0.163508	0.045102	0.533078
195	11378	1.753727	0.034062	0.025585		0.386792	0.836179	0.078953		0.153292	0.045349	0.532454
196	11379	1.175502	0.02502	0.017296		0.271332	0.614742	0.062756		0.101136	0.033479	0.389843
197	11380	1.11589	0.025053	0.01669		0.262764	0.615477	0.064971		0.09474	0.033598	0.389677
198	11381	1.329266	0.034305	0.021103		0.324423	0.841494	0.095011		0.107708	0.046204	0.530805
199	11382	1.123724	0.034505	0.019589		0.277917	0.843815	0.101456		0.085918	0.046645	0.530133
200	11383	0.939594	0.034771	0.01822		0.217839	0.846267	0.108108		0.062465	0.047137	0.529374
201	11467	0.361724	0.015291	0.062108		0.081864	0.345426	0.068644		0.033297	0.013234	0.290276
202	11468	0.306113	0.014541	0.053002		0.070195	0.290674	0.059077		0.028391	0.011572	0.242044
203	11469	0.494688	0.025227	0.0861		0.113845	0.468138	0.096433		0.04801	0.019085	0.387422
204	11470	5.931135	0.367545	1.048063		1.34564	5.571492	1.186615		0.78872	0.28103	4.522759
205	11471	0.788832	0.056118	0.13973		0.168042	0.731279	0.15979		0.069666	0.034839	0.582068
206	11472	0.759693	0.060807	0.13429		0.14606	0.697304	0.154635		0.063049	0.032819	0.541847
207	11473	0.780513	0.06847	0.137636		0.133266	0.712685	0.159174		0.059901	0.034287	0.541966
208	11474	0.862202	0.083561	0.151641		0.124103	0.7851	0.176052		0.058672	0.038575	0.582496
209	11475	0.882258	0.094359	0.154877		0.105504	0.804314	0.180316		0.051539	0.040206	0.582502
210	11476	0.862087	0.085087	0.126464		0.15732	0.73021	0.154233		0.076911	0.036282	0.530752
211	11477	0.916866	0.084305	0.112941		0.227349	0.729415	0.145165		0.108092	0.036004	0.531905
212	11478	0.97114	0.083412	0.100235		0.301943	0.728779	0.136627		0.145374	0.035717	0.532975

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
213	11479	0.789171	0.060415	0.064788		0.276667	0.534068	0.094224		0.135934	0.025974	0.391552
214	11480	0.82404	0.060029	0.060929		0.30205	0.533924	0.091534		0.149344	0.025872	0.391852
215	11481	1.233998	0.080615	0.072413		0.483421	0.72771	0.11716		0.241334	0.034978	0.535121
216	11482	1.338572	0.079216	0.062538		0.551838	0.727387	0.109752		0.275904	0.034676	0.535766
217	11483	1.279368	0.069898	0.048108		0.551583	0.654362	0.092303		0.275095	0.030941	0.482644
218	11484	0.883142	0.045792	0.028041		0.393297	0.436081	0.058164		0.194773	0.020489	0.321945
219	11485	1.292942	0.065532	0.037754		0.584747	0.629768	0.08162		0.28788	0.029497	0.465133
220	11486	1.847638	0.087743	0.040592		0.869414	0.871327	0.102196		0.416365	0.04041	0.644321
221	11487	1.663284	0.075704	0.028711		0.79742	0.773937	0.083364		0.369812	0.035634	0.572774
222	11488	1.661127	0.073284	0.023018		0.813862	0.773264	0.076068		0.359191	0.035366	0.572692
223	11489	1.741488	0.075157	0.020018		0.868149	0.820774	0.073255		0.362244	0.037305	0.608281
224	11490	1.694701	0.071957	0.01572		0.855666	0.819763	0.064936		0.335837	0.037008	0.607934
225	11491	1.724538	0.068971	0.014182		0.830815	0.818809	0.057734		0.312637	0.03674	0.60754
226	11492	1.732752	0.061616	0.013172		0.749787	0.769637	0.046937		0.287235	0.034287	0.571319
227	11493	1.629023	0.053419	0.011649		0.650161	0.696782	0.03751		0.277398	0.030852	0.517386
228	11494	1.732074	0.052493	0.013881		0.635554	0.720075	0.033453		0.301502	0.031658	0.534791
229	11495	1.906857	0.053782	0.01677		0.65989	0.779335	0.030734		0.33629	0.034001	0.57886
230	11496	1.767613	0.046232	0.01706		0.577045	0.718676	0.023561		0.31469	0.031156	0.533765
231	11497	1.72442	0.043133	0.017734		0.540071	0.706263	0.020009		0.31016	0.030756	0.52445
232	11498	1.934263	0.046408	0.021677		0.586019	0.813434	0.02014		0.357646	0.035635	0.603756
233	11499	1.681856	0.039272	0.020811		0.495211	0.741275	0.015725		0.347541	0.032647	0.54983
234	11500	1.438631	0.033195	0.019999		0.444804	0.669329	0.012735		0.334916	0.029592	0.496123
235	11501	1.344262	0.030913	0.021087		0.481005	0.669186	0.012387		0.351723	0.029682	0.495634
236	11502	1.337276	0.030148	0.022323		0.519727	0.675059	0.011801		0.365487	0.030025	0.499573
237	11503	1.33026	0.030341	0.023623		0.565101	0.68098	0.010907		0.372893	0.030361	0.503517
238	11504	1.323097	0.030246	0.024627		0.59845	0.680953	0.009704		0.370543	0.03042	0.503061
239	11505	1.340081	0.03013	0.025507		0.630602	0.680976	0.00839		0.362415	0.030474	0.50263
240	11506	1.169185	0.026041	0.022808		0.574051	0.591421	0.007107		0.303553	0.026504	0.436144
241	11507	0.98892	0.022006	0.019691		0.503301	0.501864	0.006923		0.248829	0.022511	0.369854
242	11508	1.143868	0.025743	0.0233		0.610087	0.585589	0.009027		0.280219	0.026286	0.431269
243	11509	1.258626	0.03058	0.026504		0.711479	0.657451	0.011348		0.297992	0.029535	0.483755
244	11510	1.201178	0.032237	0.026205		0.716093	0.645688	0.012036		0.276417	0.029023	0.474677
245	11511	1.291838	0.037668	0.028661		0.793795	0.705721	0.01381		0.316825	0.031733	0.51834
246	11512	1.345157	0.042663	0.029923		0.838564	0.741974	0.014875		0.33848	0.033374	0.544365
247	11513	1.284149	0.044111	0.028546		0.810703	0.718425	0.01427		0.313188	0.032323	0.526528
248	11514	1.26305	0.046961	0.027912		0.806111	0.718866	0.014789		0.28092	0.032352	0.526277
249	11515	1.202333	0.048173	0.02614		0.767399	0.695375	0.01537		0.246407	0.031307	0.508516
250	11516	1.140083	0.049032	0.024289		0.724601	0.671863	0.016404		0.222789	0.03026	0.490804
251	11517	0.856798	0.040136	0.017774		0.540388	0.516272	0.013858		0.164717	0.023261	0.376746
252	11518	0.865554	0.042537	0.017788		0.543032	0.528487	0.014875		0.166203	0.023816	0.385445
253	11519	1.121877	0.059504	0.022006		0.676424	0.685197	0.02106		0.209163	0.030889	0.499174
254	11520	1.105571	0.062858	0.020441		0.637107	0.673703	0.022425		0.208561	0.030377	0.490269
255	11521	1.125056	0.068491	0.019402		0.619451	0.686299	0.024586		0.217827	0.030953	0.498858
256	11522	1.141146	0.07447	0.018012		0.598949	0.698949	0.026904		0.232163	0.031533	0.50741
257	11523	1.134508	0.079263	0.016124		0.567061	0.699568	0.028762		0.23658	0.031577	0.507177
258	11524	1.125172	0.084061	0.014634		0.534825	0.700209	0.030652		0.222455	0.031631	0.506914
259	11525	1.027988	0.081195	0.011783		0.459062	0.640448	0.029755		0.176188	0.028963	0.462953
260	11526	1.279095	0.105613	0.013505		0.541083	0.798182	0.038913		0.198364	0.036135	0.576227
261	11527	1.307767	0.116875	0.012625		0.502991	0.823556	0.04371		0.17073	0.037368	0.593188
262	11528	0.995706	0.09315	0.010903		0.359769	0.630354	0.035348		0.121848	0.028644	0.453394
263	11529	0.991099	0.096883	0.012905		0.335836	0.630946	0.037523		0.114061	0.028714	0.453194
264	11530	0.830773	0.085092	0.012739		0.264719	0.534397	0.033857		0.090714	0.02436	0.383324
265	11531	0.897875	0.095142	0.015363		0.274539	0.583385	0.038751		0.096671	0.026625	0.418076
266	11532	1.098769	0.123656	0.023402		0.314271	0.730141	0.052769		0.123013	0.0334	0.522433
267	11533	1.052618	0.126099	0.029237		0.28143	0.718942	0.056988		0.131298	0.03298	0.513617
268	11534	1.005386	0.12806	0.035489		0.251213	0.707702	0.061799		0.129092	0.032564	0.504864
269	11535	1.071256	0.145633	0.047436		0.250607	0.7821	0.07572		0.119635	0.036118	0.557135
270	11536	1.116071	0.164628	0.064209		0.25146	0.857072	0.094695		0.076315	0.039767	0.609759
271	11537	1.053362	0.169483	0.078281		0.232966	0.858787	0.109037		0.057495	0.040038	0.609986
272	11538	0.997269	0.17377	0.094476		0.221996	0.860564	0.126395		0.06719	0.040314	0.610138
273	11539	0.713645	0.134286	0.086619		0.162747	0.652911	0.111465		0.049773	0.030732	0.462378
274	11540	0.509527	0.099672	0.070063		0.118724	0.480945	0.088846		0.032744	0.022695	0.340429
275	11541	0.530047	0.108239	0.084014		0.1279	0.518566	0.105114		0.024611	0.024544	0.366885
276	11542	0.404663	0.085596	0.073335		0.102787	0.407939	0.090737		0.010991	0.019365	0.288508
277	11543	0.397785	0.07523	0.071559		0.089654	0.39264	0.088104		0.011878	0.01784	0.28844
278	11544	0.363314	0.061368	0.064264		0.072808	0.350886	0.078678		0.010321	0.015099	0.268298
279	11545	0.356959	0.054566	0.061734		0.064334	0.338127	0.075131		0.009161	0.013745	0.268163
280	11546	0.37504	0.050809	0.062483		0.063215	0.350022	0.07532		0.011118	0.013	0.287951
281	11547	0.365873	0.043509	0.057678		0.064144	0.336906	0.068471		0.011819	0.011111	0.287654
282	11548	0.237631	0.025244	0.034348		0.042751	0.216461	0.039602		0.007601	0.00681	0.191509

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
283	11549	0.147237	0.015335	0.020442		0.026571	0.134862	0.02318		0.004591	0.004181	0.119627
284	11550	0.174762	0.018799	0.022985		0.031186	0.161573	0.025681		0.005113	0.004872	0.143452
285	11610	0.520912	0.095078	0.081994		0.114857	0.499076	0.101993		0.031601	0.022606	0.366783
286	11611	0.503487	0.087556	0.068332		0.109843	0.462862	0.086085		0.041398	0.020898	0.340323
287	11612	0.710615	0.118016	0.084429		0.154666	0.628399	0.107879		0.062574	0.028294	0.462225
288	11613	1.007044	0.152978	0.091996		0.225826	0.828529	0.122037		0.076911	0.037114	0.609927
289	11614	1.095903	0.149601	0.076168		0.263956	0.827313	0.105076		0.063197	0.03688	0.609518
290	11615	1.171223	0.145778	0.062376		0.309278	0.826292	0.091081		0.080882	0.036664	0.609301
291	11616	1.133508	0.129414	0.046001		0.326756	0.754674	0.072732		0.120263	0.033339	0.556898
292	11617	1.077634	0.114145	0.034338		0.330253	0.683415	0.059295		0.128527	0.030089	0.504664
293	11618	1.137992	0.11272	0.028209		0.371439	0.694707	0.054615		0.129869	0.030491	0.513402
294	11619	1.189454	0.110885	0.022456		0.41598	0.70602	0.050484		0.130793	0.030899	0.5222
295	11620	0.968822	0.085576	0.014539		0.363752	0.564449	0.036978		0.103673	0.02464	0.417878
296	11621	0.894644	0.076672	0.01201		0.350564	0.51721	0.032272		0.095183	0.022545	0.383137
297	11622	1.07507	0.087521	0.012082		0.443927	0.610902	0.03567		0.118466	0.026577	0.45296
298	11623	1.08816	0.084362	0.010122		0.474494	0.610544	0.033519		0.125816	0.026512	0.453145
299	11624	1.433034	0.106113	0.011883		0.661914	0.79792	0.041327		0.175564	0.034586	0.592839
300	11625	1.394339	0.09628	0.012878		0.709387	0.773655	0.036636		0.19741	0.033443	0.575846
301	11626	1.11797	0.074194	0.011312		0.600205	0.620893	0.027954		0.172209	0.026801	0.462626
302	11627	1.224055	0.077035	0.014064		0.697079	0.67896	0.028731		0.204199	0.029266	0.506532
303	11628	1.220885	0.072851	0.015777		0.737187	0.678457	0.026926		0.215233	0.029211	0.506777
304	11629	1.229497	0.068656	0.01771		0.776677	0.677954	0.025127		0.220835	0.029165	0.506996
305	11630	1.217024	0.063345	0.019036		0.800738	0.665781	0.022954		0.218329	0.028625	0.498449
306	11631	1.201911	0.058326	0.020027		0.820666	0.653659	0.020898		0.214363	0.028095	0.489868
307	11632	1.235248	0.055401	0.021532		0.86824	0.664888	0.01962		0.219695	0.028572	0.49877
308	11633	0.973738	0.039882	0.017388		0.694689	0.512923	0.013847		0.173755	0.02204	0.385134
309	11634	0.968709	0.037699	0.017328		0.690217	0.501103	0.012885		0.173165	0.021532	0.376442
310	11635	1.300397	0.046514	0.023482		0.922812	0.652235	0.015258		0.235993	0.028028	0.490403
311	11636	1.382066	0.045831	0.025246		0.974518	0.675184	0.014272		0.263841	0.029018	0.508087
312	11637	1.461702	0.044824	0.026933		1.021044	0.698127	0.013538		0.304682	0.030012	0.525815
313	11638	1.485665	0.042249	0.027539		1.024878	0.697839	0.0134		0.330106	0.03001	0.526044
314	11639	1.577833	0.041014	0.02886		1.052161	0.720849	0.013943		0.354803	0.031012	0.543839
315	11640	1.580076	0.036366	0.027649		0.985071	0.685768	0.012933		0.336837	0.029513	0.517817
316	11641	1.497547	0.031248	0.025285		0.886209	0.627528	0.011266		0.308601	0.027013	0.47418
317	11642	1.565342	0.02977	0.025587		0.878096	0.639056	0.010626		0.338371	0.027511	0.483233
318	11643	1.419357	0.024664	0.022507		0.750803	0.569278	0.008461		0.323671	0.024503	0.430787
319	11644	1.22626	0.020818	0.019037		0.618007	0.487928	0.006504		0.290613	0.020996	0.369432
320	11645	1.449959	0.024609	0.022063		0.704455	0.575043	0.006697		0.356404	0.024734	0.435633
321	11646	1.662775	0.028436	0.02471		0.772373	0.662167	0.00819		0.428237	0.028456	0.502022
322	11647	1.638797	0.028513	0.023884		0.725004	0.662195	0.009347		0.440498	0.028424	0.502428
323	11648	1.599113	0.028574	0.02295		0.683159	0.662243	0.010382		0.446078	0.02838	0.502857
324	11649	1.548054	0.028362	0.021795		0.627801	0.656519	0.011125		0.440277	0.028078	0.498892
325	11650	1.550657	0.028175	0.020692		0.575473	0.65082	0.011577		0.42711	0.027765	0.494923
326	11651	1.661767	0.030179	0.019669		0.532081	0.65098	0.011814		0.411218	0.027688	0.495381
327	11652	1.946432	0.035615	0.020516		0.592191	0.720962	0.014957		0.435433	0.030556	0.548963
328	11653	2.245211	0.041968	0.020807		0.706341	0.791154	0.019079		0.441074	0.033362	0.602762
329	11654	2.009225	0.038895	0.016977		0.662311	0.68692	0.019532		0.361372	0.028805	0.523551
330	11655	2.065624	0.041379	0.016328		0.710067	0.698996	0.022905		0.369889	0.029183	0.532837
331	11656	2.237162	0.047856	0.016009		0.815118	0.758018	0.029908		0.40091	0.031936	0.577834
332	11657	2.036564	0.046639	0.01323		0.7848	0.700406	0.032482		0.362339	0.029738	0.533833
333	11658	1.917259	0.047396	0.011118		0.804921	0.677804	0.036387		0.334851	0.028987	0.516447
334	11659	2.039155	0.054603	0.01255		0.928219	0.748735	0.045534		0.347998	0.032221	0.570267
335	11660	2.027508	0.061045	0.01347		1.028305	0.796698	0.056054		0.363449	0.034548	0.606398
336	11661	1.981919	0.063616	0.014747		1.059069	0.797741	0.063143		0.394301	0.034818	0.606773
337	11662	2.037146	0.066378	0.018982		1.074344	0.79889	0.071377		0.427813	0.035125	0.607106
338	11663	1.945156	0.064667	0.022392		1.007171	0.752794	0.074272		0.423773	0.033325	0.571584
339	11664	1.95093	0.066752	0.028116		0.987139	0.753616	0.081542		0.435474	0.033607	0.571674
340	11665	2.171454	0.07731	0.039818		1.070087	0.848634	0.100119		0.489921	0.038147	0.643106
341	11666	1.511499	0.057694	0.037082		0.718841	0.613539	0.080064		0.339579	0.027883	0.464294
342	11667	1.02876	0.040305	0.027551		0.483973	0.424875	0.05707		0.230101	0.019376	0.321375
343	11668	1.477099	0.061496	0.047288		0.680003	0.637648	0.09059		0.326304	0.029288	0.48183
344	11669	1.522327	0.069661	0.061491		0.682362	0.708929	0.107704		0.329413	0.032867	0.534931
345	11670	1.390658	0.070871	0.071202		0.600193	0.709369	0.114917		0.290049	0.033204	0.534369
346	11671	0.914451	0.05277	0.059895		0.37481	0.520558	0.089697		0.180384	0.024603	0.391368
347	11672	0.860364	0.053114	0.063676		0.34314	0.520744	0.092299		0.164418	0.024722	0.391107
348	11673	1.018397	0.073357	0.098454		0.373547	0.710742	0.133675		0.175902	0.034059	0.532483
349	11674	0.900932	0.074255	0.110838		0.281737	0.711536	0.1419		0.128086	0.034405	0.531557
350	11675	0.847549	0.075157	0.123974		0.195996	0.712525	0.150644		0.089349	0.034742	0.530564
351	11676	0.477518	0.077455	0.073622		0.096086	0.445972	0.0909		0.026139	0.019125	0.341166
352	11677	0.459787	0.071276	0.061351		0.096802	0.413613	0.076604		0.033503	0.017677	0.31655

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
353	11678	0.651235	0.09606	0.075793		0.14668	0.561589	0.095882		0.049927	0.023933	0.429933
354	11679	0.934131	0.124646	0.082681		0.241889	0.740774	0.108372		0.062934	0.031414	0.567316
355	11680	1.101671	0.130749	0.073299		0.312666	0.792162	0.09984		0.063676	0.033451	0.606692
356	11681	1.106738	0.119416	0.05611		0.345759	0.740014	0.080896		0.073905	0.031129	0.566685
357	11682	1.082961	0.106376	0.041363		0.367507	0.676549	0.064599		0.089635	0.028359	0.517986
358	11683	1.032256	0.0941	0.030853		0.372555	0.61315	0.052649		0.095127	0.025631	0.469395
359	11684	1.184416	0.100965	0.027416		0.454212	0.675671	0.052485		0.112193	0.028171	0.51724
360	11685	1.138384	0.09196	0.02008		0.469865	0.634349	0.044721		0.11044	0.026379	0.485682
361	11686	0.933319	0.071182	0.012798		0.41012	0.507464	0.0327		0.091612	0.021051	0.388645
362	11687	0.867289	0.063888	0.010531		0.394511	0.46515	0.02849		0.087563	0.019269	0.356327
363	11688	1.042161	0.07311	0.01053		0.497836	0.549654	0.031428		0.108281	0.022724	0.421252
364	11689	1.155278	0.077311	0.009582		0.580493	0.601431	0.032233		0.123632	0.024816	0.46119
365	11690	1.385946	0.08908	0.010297		0.739571	0.718444	0.036221		0.15613	0.029588	0.5513
366	11691	1.357737	0.081148	0.011288		0.79055	0.696917	0.031978		0.168229	0.028617	0.535462
367	11692	1.093465	0.062676	0.009975		0.667626	0.559433	0.024348		0.141514	0.022937	0.430167
368	11693	1.297897	0.070774	0.01348		0.838544	0.663698	0.027086		0.177211	0.027168	0.510834
369	11694	1.207711	0.061893	0.014228		0.817263	0.611565	0.023346		0.172626	0.025002	0.471184
370	11695	1.225162	0.058503	0.015954		0.859955	0.611217	0.021762		0.180735	0.024963	0.471379
371	11696	1.219598	0.054144	0.017137		0.88514	0.600338	0.019842		0.184733	0.024502	0.463425
372	11697	1.211527	0.050006	0.018017		0.905514	0.589486	0.018055		0.187883	0.02405	0.455445
373	11698	1.352071	0.051755	0.021028		1.038155	0.651358	0.018389		0.218921	0.02657	0.503656
374	11699	0.993894	0.034667	0.015627		0.764014	0.46269	0.011938		0.166922	0.018876	0.358069
375	11700	0.987905	0.032859	0.01557		0.758635	0.452062	0.01111		0.168547	0.018445	0.349986
376	11701	1.324704	0.040909	0.020918		1.013216	0.588479	0.013145		0.231728	0.02402	0.455932
377	11702	1.407078	0.040418	0.022468		1.068987	0.609271	0.012305		0.250628	0.024883	0.472364
378	11703	1.609341	0.042893	0.025922		1.210059	0.681622	0.012406		0.290993	0.027858	0.528823
379	11704	1.547756	0.037485	0.024493		1.123296	0.629899	0.011569		0.283694	0.025767	0.489025
380	11705	1.683993	0.036507	0.025675		1.152848	0.650763	0.012012		0.309234	0.026644	0.505549
381	11706	1.686869	0.032495	0.024606		1.074207	0.619182	0.011125		0.307487	0.025375	0.481337
382	11707	1.749894	0.030564	0.024564		1.041165	0.61818	0.010574		0.331333	0.025352	0.480826
383	11708	1.673512	0.026798	0.022797		0.944455	0.577137	0.00914		0.338707	0.023682	0.449158
384	11709	1.518684	0.022283	0.020071		0.806043	0.514174	0.00729		0.327986	0.021106	0.400396
385	11710	1.314077	0.018274	0.016986		0.662434	0.440728	0.005616		0.296782	0.018093	0.34336
386	11711	1.557017	0.021573	0.019704		0.755316	0.519446	0.005807		0.366412	0.021323	0.404877
387	11712	1.94719	0.027024	0.023993		0.899234	0.649706	0.008031		0.481809	0.026662	0.506738
388	11713	1.769571	0.024922	0.021381		0.776877	0.598251	0.008314		0.459705	0.024529	0.466914
389	11714	1.731349	0.024944	0.020582		0.723624	0.598334	0.009129		0.468696	0.024503	0.467288
390	11715	1.665398	0.024734	0.019689		0.66494	0.593185	0.009682		0.465761	0.02425	0.463574
391	11716	1.730158	0.026649	0.020363		0.655961	0.639612	0.010873		0.494991	0.026091	0.50017
392	11717	1.685168	0.025328	0.017827		0.569263	0.588236	0.01026		0.444974	0.023927	0.460253
393	11718	1.976252	0.029818	0.018633		0.633583	0.651505	0.013111		0.474775	0.026411	0.510006
394	11719	2.283784	0.03503	0.018782		0.746467	0.71497	0.016684		0.486164	0.028846	0.559942
395	11720	2.048309	0.032375	0.015031		0.709765	0.620809	0.017555		0.397311	0.024911	0.486329
396	11721	2.109559	0.034374	0.014429		0.762925	0.631754	0.02053		0.391277	0.025354	0.494931
397	11722	2.289637	0.039382	0.014128		0.87837	0.685154	0.026875		0.419874	0.027759	0.536703
398	11723	2.087511	0.038179	0.011647		0.851532	0.633146	0.029142		0.379972	0.025853	0.495814
399	11724	1.964938	0.038742	0.009777		0.870824	0.612786	0.032631		0.353765	0.025208	0.47965
400	11725	2.088693	0.04458	0.011004		1.004328	0.677014	0.040846		0.371447	0.028034	0.529617
401	11726	2.07374	0.049767	0.011772		1.113263	0.720531	0.050354		0.370323	0.030079	0.56315
402	11727	2.076297	0.051811	0.012819		1.146526	0.721644	0.056821		0.407872	0.03034	0.56348
403	11728	2.126492	0.054001	0.016878		1.163212	0.722883	0.064394		0.444412	0.030638	0.563779
404	11729	2.022591	0.052569	0.020178		1.090754	0.681369	0.067156		0.440342	0.029097	0.530791
405	11730	2.019151	0.054223	0.025474		1.069576	0.68231	0.073899		0.452111	0.029374	0.530886
406	11731	2.246644	0.062761	0.036135		1.160316	0.768578	0.090907		0.508626	0.033379	0.597247
407	11732	1.567912	0.0468	0.033709		0.780363	0.555861	0.072835		0.353532	0.024432	0.43123
408	11733	1.067869	0.032688	0.025054		0.525614	0.384976	0.051936		0.239934	0.016986	0.2985
409	11734	1.534904	0.049853	0.043033		0.73913	0.577878	0.082487		0.341621	0.0257	0.447576
410	11735	1.583208	0.056449	0.055993		0.742384	0.642631	0.09809		0.346896	0.028878	0.496972
411	11736	1.43026	0.057406	0.064852		0.653443	0.643152	0.104609		0.307087	0.029216	0.496526
412	11737	0.919442	0.042736	0.05455		0.408135	0.472055	0.081578		0.191597	0.021683	0.363717
413	11738	0.864026	0.043014	0.057984		0.373584	0.472263	0.083883		0.174713	0.021806	0.363504
414	11739	1.003847	0.059665	0.089605		0.406171	0.644693	0.121317		0.186573	0.030101	0.495011
415	11740	0.836661	0.060596	0.100798		0.30929	0.645555	0.128571		0.135165	0.030463	0.494272
416	11741	0.768145	0.061455	0.112638		0.214186	0.646616	0.136326		0.092408	0.030824	0.493495
417	11742	0.469681	0.068779	0.070678		0.091589	0.429741	0.086559		0.016514	0.017402	0.340993
418	11743	0.452809	0.063235	0.058888		0.102161	0.39859	0.072804		0.019953	0.016083	0.316391
419	11744	0.636167	0.085205	0.072788		0.159997	0.541289	0.091088		0.029278	0.021783	0.42972
420	11745	0.910808	0.110659	0.079599		0.267206	0.714461	0.103046		0.046199	0.028633	0.567046
421	11746	1.004113	0.108707	0.066078		0.324999	0.714624	0.088906		0.059061	0.028555	0.566676
422	11747	1.085101	0.106557	0.054205		0.385585	0.715154	0.07723		0.073949	0.028508	0.566427

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
423	11748	1.060533	0.095206	0.03999		0.410506	0.654473	0.06174		0.081051	0.026033	0.517746
424	11749	1.01047	0.084429	0.029831		0.416637	0.593595	0.050332		0.083149	0.023568	0.469172
425	11750	1.067187	0.083826	0.024464		0.469673	0.60427	0.046299		0.094705	0.023947	0.477277
426	11751	1.122612	0.082913	0.019377		0.525861	0.614917	0.042691		0.10631	0.02432	0.485432
427	11752	0.922793	0.064333	0.012169		0.458805	0.492185	0.031164		0.091465	0.019426	0.388435
428	11753	0.857064	0.057823	0.009987		0.441244	0.451278	0.027129		0.086636	0.017789	0.356129
429	11754	1.028581	0.066305	0.009938		0.5567	0.533463	0.029866		0.107719	0.020991	0.421007
430	11755	1.039465	0.064201	0.008217		0.59263	0.533536	0.027934		0.121621	0.020955	0.421152
431	11756	1.369003	0.081117	0.009606		0.823531	0.697725	0.034278		0.172824	0.027354	0.550947
432	11757	1.344782	0.074137	0.010621		0.877579	0.677101	0.030161		0.176421	0.026471	0.535094
433	11758	1.083092	0.05737	0.009428		0.740318	0.543633	0.022925		0.142734	0.021222	0.42986
434	11759	1.200356	0.059875	0.011779		0.856834	0.594737	0.023457		0.15758	0.02318	0.470622
435	11760	1.222668	0.056921	0.013666		0.902986	0.59452	0.021894		0.161788	0.02314	0.470821
436	11761	1.24057	0.053935	0.015329		0.947758	0.594272	0.02037		0.170192	0.023107	0.471006
437	11762	1.234319	0.050042	0.016467		0.974314	0.583767	0.018553		0.17911	0.022682	0.463052
438	11763	1.225044	0.046338	0.017314		0.996203	0.573279	0.016859		0.188972	0.022265	0.455074
439	11764	1.289344	0.044658	0.018603		1.051548	0.583263	0.015793		0.211865	0.02265	0.46334
440	11765	1.029046	0.032603	0.015015		0.839666	0.450052	0.011127		0.175553	0.01748	0.357772
441	11766	1.022334	0.031152	0.014962		0.833561	0.439733	0.010351		0.174956	0.017083	0.349694
442	11767	1.370172	0.038864	0.020087		1.113314	0.572478	0.012248		0.229378	0.022254	0.455546
443	11768	1.455204	0.038473	0.021447		1.175305	0.592748	0.011465		0.238967	0.023061	0.471957
444	11769	1.545591	0.037823	0.022865		1.231607	0.613034	0.010577		0.255241	0.023876	0.488397
445	11770	1.638155	0.035843	0.023377		1.23662	0.612923	0.010742		0.270753	0.023901	0.488577
446	11771	1.78495	0.034997	0.024512		1.269416	0.633278	0.011129		0.297891	0.024726	0.505068
447	11772	1.789719	0.031237	0.023508		1.182999	0.602601	0.010291		0.302951	0.023559	0.480862
448	11773	1.701279	0.027005	0.021522		1.051067	0.551528	0.008957		0.305396	0.021585	0.440311
449	11774	1.785828	0.025902	0.021807		1.026697	0.561759	0.008453		0.344906	0.022005	0.448688
450	11775	1.629191	0.021611	0.019212		0.874094	0.500505	0.006749		0.33806	0.01962	0.399965
451	11776	1.413977	0.01759	0.016269		0.723336	0.429031	0.005211		0.308338	0.016825	0.342981
452	11777	1.679545	0.020429	0.018882		0.819199	0.505681	0.005581		0.383343	0.019836	0.40442
453	11778	1.939471	0.023531	0.021189		0.898156	0.58237	0.007156		0.467979	0.022843	0.466013
454	11779	1.927377	0.023528	0.020527		0.842917	0.582457	0.007954		0.488049	0.022836	0.466348
455	11780	1.898643	0.02352	0.01989		0.777511	0.58256	0.008643		0.500549	0.022818	0.466699
456	11781	1.839152	0.023294	0.019042		0.714175	0.577579	0.009089		0.500298	0.022589	0.462967
457	11782	1.770405	0.023064	0.018126		0.644287	0.572619	0.009304		0.493227	0.022349	0.459232
458	11783	1.742531	0.023024	0.017282		0.618372	0.572812	0.0097		0.485658	0.022298	0.4596
459	11784	2.044578	0.027032	0.018083		0.686575	0.634451	0.01236		0.520904	0.024619	0.509253
460	11785	2.385767	0.031673	0.01826		0.803697	0.696304	0.015851		0.537357	0.026895	0.559081
461	11786	2.158853	0.029195	0.014298		0.768463	0.604647	0.016884		0.446289	0.023231	0.48555
462	11787	2.233363	0.030944	0.013718		0.827463	0.615347	0.019707		0.440996	0.023787	0.49412
463	11788	2.433646	0.035371	0.013405		0.956291	0.66744	0.02588		0.453398	0.026046	0.535793
464	11789	2.221678	0.034064	0.011035		0.930771	0.616847	0.02804		0.398078	0.024263	0.494954
465	11790	2.092929	0.034334	0.009218		0.950596	0.597103	0.031395		0.372115	0.023667	0.478798
466	11791	2.223644	0.039461	0.010352		1.09652	0.65979	0.039329		0.394163	0.026333	0.52866
467	11792	2.203933	0.043997	0.011041		1.216614	0.702381	0.048557		0.392729	0.028277	0.56211
468	11793	2.229573	0.045756	0.012037		1.253065	0.703639	0.054904		0.428033	0.028544	0.562426
469	11794	2.284866	0.047648	0.016272		1.271589	0.705085	0.062378		0.46856	0.028855	0.562715
470	11795	2.175745	0.046348	0.019523		1.192826	0.664795	0.065217		0.464937	0.027429	0.529793
471	11796	2.175408	0.047778	0.024747		1.170302	0.665942	0.07193		0.477573	0.027718	0.529899
472	11797	2.411977	0.055268	0.035164		1.27052	0.750384	0.088683		0.537728	0.031529	0.596166
473	11798	1.668062	0.04119	0.032856		0.855509	0.542934	0.071203		0.374877	0.023109	0.430488
474	11799	1.13258	0.028764	0.024435		0.576476	0.376067	0.050803		0.25476	0.016073	0.298
475	11800	1.626396	0.043858	0.042009		0.811414	0.564642	0.080757		0.363902	0.024338	0.44687
476	11801	1.680079	0.049629	0.054713		0.81595	0.628048	0.09608		0.371109	0.027375	0.496252
477	11802	1.519419	0.050449	0.063411		0.718863	0.628697	0.102455		0.32958	0.027728	0.495881
478	11803	0.975081	0.037587	0.053345		0.449204	0.461518	0.079815		0.205824	0.020603	0.363293
479	11804	0.904318	0.037932	0.056703		0.411181	0.461754	0.082031		0.187577	0.020734	0.363109
480	11805	1.040756	0.052689	0.087594		0.447179	0.630442	0.118416		0.199492	0.028661	0.494548
481	11806	0.873383	0.053607	0.098486		0.342293	0.631376	0.125272		0.142855	0.029061	0.493915
482	11807	0.745664	0.054457	0.109981		0.236427	0.632526	0.132588		0.097843	0.02945	0.493255
483	11808	0.492813	0.063921	0.071425		0.102659	0.44507	0.08635		0.018536	0.016453	0.36616
484	11809	0.474461	0.058726	0.059553		0.116679	0.413056	0.072534		0.020526	0.015216	0.339752
485	11810	0.665793	0.079159	0.073726		0.183812	0.561292	0.090837		0.031101	0.020636	0.461464
486	11811	0.941237	0.103089	0.081069		0.308825	0.74193	0.103323		0.048604	0.027243	0.608969
487	11812	1.015709	0.10164	0.067547		0.376516	0.743106	0.089622		0.059668	0.027296	0.608591
488	11813	1.097571	0.099995	0.055549		0.446868	0.7445	0.078143		0.075337	0.02737	0.608329
489	11814	1.066545	0.089647	0.041039		0.475672	0.681959	0.06259		0.083276	0.025082	0.556044
490	11815	1.004955	0.079705	0.030633		0.482851	0.618914	0.051044		0.087333	0.022763	0.50387
491	11816	1.068637	0.079336	0.025132		0.544394	0.630402	0.046939		0.099422	0.023175	0.512564
492	11817	1.127135	0.078665	0.019867		0.609367	0.641837	0.043228		0.109802	0.023575	0.521309

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
493	11818	0.926453	0.061189	0.012423		0.531504	0.51398	0.031505		0.092732	0.018856	0.41713
494	11819	0.859976	0.055078	0.010037		0.51115	0.471389	0.027385		0.092022	0.017279	0.382429
495	11820	1.03081	0.063292	0.009946		0.644951	0.557447	0.030092		0.135517	0.020405	0.452085
496	11821	1.04111	0.061412	0.008176		0.686244	0.557728	0.028082		0.154176	0.020386	0.452228
497	11822	1.36989	0.077761	0.009679		0.952407	0.72962	0.034381		0.209822	0.026627	0.591582
498	11823	1.372175	0.071319	0.010528		1.012787	0.708441	0.030135		0.197123	0.025786	0.574533
499	11824	1.1198	0.055303	0.009383		0.854026	0.56896	0.02285		0.154169	0.02068	0.46153
500	11825	1.246217	0.057863	0.011842		0.988172	0.622655	0.023326		0.163184	0.022595	0.505281
501	11826	1.263702	0.055152	0.013805		1.04077	0.622613	0.021717		0.162808	0.022591	0.50548
502	11827	1.277859	0.052395	0.015503		1.091774	0.62252	0.020163		0.173088	0.02261	0.505666
503	11828	1.288252	0.048821	0.016669		1.120982	0.611656	0.018324		0.182332	0.022224	0.497116
504	11829	1.30855	0.045825	0.017537		1.144592	0.600768	0.016621		0.196548	0.021824	0.488544
505	11830	1.375557	0.044445	0.01885		1.206499	0.61132	0.015544		0.221434	0.022188	0.497411
506	11831	1.096714	0.032801	0.01522		0.961843	0.471743	0.010937		0.181368	0.017096	0.384076
507	11832	1.089187	0.031388	0.015166		0.95404	0.460944	0.010169		0.177298	0.016687	0.375402
508	11833	1.459481	0.039236	0.02037		1.27244	0.600111	0.012026		0.227419	0.021716	0.489029
509	11834	1.556034	0.038919	0.021621		1.344185	0.621361	0.011261		0.24082	0.022511	0.506634
510	11835	1.690384	0.03834	0.02304		1.411319	0.642603	0.010402		0.260273	0.023315	0.524266
511	11836	1.799983	0.036412	0.023566		1.419288	0.642442	0.010465		0.280248	0.023348	0.524441
512	11837	1.972539	0.035629	0.024729		1.458645	0.663719	0.010805		0.308006	0.024163	0.542122
513	11838	1.988408	0.031886	0.023737		1.360527	0.63149	0.009967		0.312607	0.023033	0.516119
514	11839	1.900174	0.02763	0.02175		1.208748	0.577914	0.008666		0.312731	0.021111	0.472578
515	11840	2.007811	0.026573	0.022056		1.17959	0.588575	0.008177		0.360287	0.021531	0.481553
516	11841	1.84363	0.022241	0.019448		0.997454	0.524355	0.006541		0.359312	0.019206	0.429245
517	11842	1.607306	0.018154	0.016479		0.827907	0.449453	0.005059		0.331337	0.016475	0.368079
518	11843	1.91712	0.020503	0.019138		0.937933	0.529732	0.005723		0.415824	0.01943	0.433999
519	11844	2.225563	0.023563	0.021493		1.01689	0.610054	0.007354		0.512999	0.022386	0.500073
520	11845	2.223028	0.023516	0.020921		0.954816	0.610144	0.00806		0.539546	0.022387	0.500406
521	11846	2.200979	0.023466	0.020339		0.880873	0.610271	0.008657		0.557374	0.022378	0.500755
522	11847	2.142718	0.02321	0.019488		0.799973	0.605083	0.009007		0.560871	0.02216	0.496719
523	11848	2.072267	0.022948	0.018566		0.72182	0.599934	0.009137		0.559046	0.021931	0.492681
524	11849	2.033266	0.022889	0.017717		0.700469	0.600188	0.009674		0.553222	0.021887	0.493043
525	11850	2.259848	0.025687	0.018561		0.775967	0.664838	0.012282		0.596444	0.02417	0.546274
526	11851	2.639461	0.029991	0.018766		0.904832	0.729736	0.016139		0.621208	0.026412	0.599676
527	11852	2.386733	0.027558	0.014706		0.867796	0.633745	0.01713		0.522395	0.023008	0.520768
528	11853	2.469338	0.029144	0.013772		0.936101	0.645002	0.019964		0.516588	0.023577	0.52993
529	11854	2.692262	0.033219	0.013439		1.089574	0.699648	0.026335		0.533104	0.025823	0.574585
530	11855	2.459317	0.031921	0.011039		1.061739	0.646639	0.028518		0.46744	0.024064	0.530758
531	11856	2.318092	0.032028	0.009163		1.083305	0.62595	0.03195		0.425767	0.023485	0.513408
532	11857	2.463936	0.036503	0.010229		1.249925	0.691677	0.040067		0.443836	0.026148	0.566848
533	11858	2.465986	0.040454	0.010873		1.388864	0.736331	0.049595		0.446979	0.028106	0.602687
534	11859	2.511888	0.042017	0.012062		1.430779	0.737676	0.056233		0.473477	0.028402	0.603007
535	11860	2.548156	0.043695	0.016635		1.452588	0.739228	0.064133		0.512562	0.028749	0.603311
536	11861	2.431209	0.042463	0.020037		1.363416	0.697059	0.067284		0.509923	0.027363	0.568018
537	11862	2.436272	0.043735	0.025505		1.338719	0.698347	0.074482		0.524664	0.027685	0.568154
538	11863	2.707658	0.050557	0.036316		1.454786	0.78705	0.092122		0.59195	0.031533	0.639243
539	11864	1.878622	0.037648	0.034025		0.981098	0.569613	0.074234		0.414328	0.023148	0.461655
540	11865	1.276889	0.026286	0.025317		0.66146	0.394584	0.053003		0.281992	0.016108	0.319586
541	11866	1.827043	0.040062	0.043598		0.93219	0.59255	0.084384		0.404167	0.024415	0.479293
542	11867	1.871133	0.045328	0.056918		0.939157	0.659278	0.100578		0.414035	0.0275	0.532388
543	11868	1.689654	0.046008	0.066056		0.828719	0.660009	0.10726		0.368751	0.027875	0.53208
544	11869	1.08613	0.034398	0.055614		0.518112	0.484564	0.083486		0.230081	0.020744	0.389878
545	11870	1.00778	0.034722	0.059105		0.474181	0.484807	0.085688		0.209295	0.020882	0.389688
546	11871	1.148011	0.048272	0.091298		0.518904	0.661852	0.123406		0.221146	0.028902	0.530831
547	11872	0.964455	0.049184	0.102612		0.396808	0.662695	0.130158		0.155994	0.029356	0.530262
548	11873	0.784777	0.050137	0.114526		0.273538	0.663687	0.137359		0.108332	0.029842	0.529721
549	11874	0.478917	0.054685	0.065913		0.105134	0.428616	0.07816		0.02138	0.014085	0.365802
550	11875	0.459263	0.050332	0.055183		0.119712	0.398203	0.065912		0.024998	0.01308	0.33945
551	11876	0.642306	0.06808	0.06866		0.188615	0.541794	0.083145		0.038809	0.017831	0.461088
552	11877	0.898046	0.089226	0.076067		0.316778	0.71781	0.095585		0.059686	0.023758	0.608524
553	11878	0.955285	0.088409	0.063649		0.385911	0.720274	0.083522		0.065679	0.023986	0.608167
554	11879	1.009209	0.087283	0.052468		0.457507	0.722611	0.073125		0.070122	0.024184	0.607911
555	11880	0.967241	0.078459	0.038814		0.486468	0.662591	0.058667		0.075727	0.022259	0.555658
556	11881	0.907111	0.06989	0.028993		0.493498	0.601743	0.047853		0.079917	0.020256	0.503514
557	11882	0.958356	0.069686	0.023802		0.556195	0.61325	0.043966		0.090687	0.020666	0.512193
558	11883	1.008349	0.069221	0.018806		0.622511	0.624672	0.040439		0.099224	0.021058	0.520918
559	11884	0.830895	0.05394	0.01173		0.543037	0.500433	0.029414		0.082883	0.016873	0.416804
560	11885	0.773944	0.048607	0.009303		0.522307	0.459061	0.025541		0.091036	0.015516	0.382123
561	11886	0.93441	0.055948	0.009186		0.659093	0.543014	0.028007		0.139095	0.018416	0.451709
562	11887	0.953014	0.054381	0.00752		0.701157	0.543417	0.026084		0.160478	0.018543	0.451839

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
563	11888	1.275707	0.06898	0.009072		0.972625	0.711039	0.031867		0.218381	0.024482	0.591059
564	11889	1.280616	0.063456	0.009612		1.033247	0.690582	0.02782		0.188946	0.024102	0.574004
565	11890	1.045464	0.049293	0.008589		0.87086	0.554684	0.021049		0.145106	0.019491	0.461096
566	11891	1.164272	0.051688	0.010912		1.007224	0.607098	0.021422		0.149478	0.021484	0.504793
567	11892	1.181858	0.049545	0.012759		1.06054	0.607106	0.019892		0.146457	0.021603	0.504978
568	11893	1.196876	0.047643	0.01436		1.112386	0.607046	0.018418		0.155242	0.021674	0.50515
569	11894	1.218834	0.0449	0.015467		1.142315	0.596465	0.016696		0.163383	0.021309	0.496598
570	11895	1.237043	0.042251	0.01629		1.166872	0.585851	0.015106		0.17469	0.020872	0.488024
571	11896	1.299271	0.041224	0.017523		1.230838	0.596124	0.014093		0.192736	0.021096	0.496874
572	11897	1.035515	0.030665	0.014154		0.982365	0.459998	0.009893		0.155648	0.01609	0.383655
573	11898	1.030561	0.02937	0.014109		0.975206	0.449453	0.009189		0.152968	0.015595	0.374988
574	11899	1.386039	0.036772	0.018956		1.303496	0.585114	0.010855		0.202628	0.020094	0.48848
575	11900	1.508672	0.036523	0.020135		1.378316	0.605789	0.010166		0.216671	0.020734	0.506056
576	11901	1.659255	0.03603	0.021348		1.446607	0.626452	0.009409		0.245734	0.021349	0.523652
577	11902	1.762736	0.034257	0.021854		1.45215	0.626255	0.009346		0.266154	0.021234	0.523807
578	11903	1.934881	0.033566	0.022958		1.491383	0.646953	0.009607		0.292395	0.021818	0.541443
579	11904	1.96107	0.030078	0.022065		1.393124	0.615512	0.008833		0.292701	0.020731	0.515451
580	11905	1.886263	0.026104	0.020238		1.238024	0.563267	0.007669		0.284161	0.019007	0.471952
581	11906	2.007705	0.025146	0.02054		1.207528	0.57365	0.007236		0.332026	0.019393	0.480899
582	11907	1.857575	0.021096	0.018124		1.017768	0.511049	0.005792		0.33862	0.017308	0.428647
583	11908	1.628107	0.017256	0.015365		0.844593	0.438046	0.004492		0.316423	0.014853	0.367555
584	11909	1.951463	0.019382	0.017852		0.956635	0.516287	0.005507		0.401434	0.017523	0.433367
585	11910	2.279232	0.021788	0.020113		1.030187	0.594569	0.006966		0.501094	0.020197	0.499318
586	11911	2.289308	0.021696	0.019661		0.963296	0.59466	0.007536		0.531937	0.020207	0.499623
587	11912	2.278389	0.02161	0.019122		0.888822	0.594787	0.007998		0.55373	0.020206	0.499939
588	11913	2.228888	0.021337	0.018331		0.799338	0.589738	0.008237		0.563928	0.020016	0.49588
589	11914	2.183239	0.02107	0.017473		0.721613	0.584727	0.008278		0.564827	0.019814	0.491814
590	11915	2.16076	0.020988	0.016686		0.70667	0.584987	0.008874		0.561492	0.019778	0.492144
591	11916	2.340456	0.023145	0.017491		0.781582	0.648016	0.011359		0.608122	0.021847	0.54524
592	11917	2.632549	0.02612	0.017702		0.908876	0.711302	0.015056		0.645731	0.024012	0.598493
593	11918	2.390969	0.023917	0.013882		0.874427	0.617771	0.015938		0.546177	0.02104	0.519697
594	11919	2.482473	0.025232	0.012879		0.944913	0.628778	0.018555		0.540913	0.021561	0.528811
595	11920	2.719518	0.028669	0.012395		1.106715	0.682124	0.024594		0.558878	0.023622	0.573378
596	11921	2.493301	0.027479	0.010167		1.079625	0.630517	0.026637		0.490939	0.022023	0.529607
597	11922	2.358507	0.027508	0.008419		1.100333	0.610442	0.029866		0.448141	0.021506	0.512222
598	11923	2.516769	0.031289	0.00926		1.26996	0.674658	0.037522		0.469439	0.023962	0.565513
599	11924	2.524733	0.03447	0.009811		1.413426	0.718428	0.046583		0.481725	0.025787	0.601236
600	11925	2.553823	0.035506	0.011303		1.456664	0.719955	0.053016		0.494507	0.02609	0.60154
601	11926	2.589377	0.036652	0.01567		1.479863	0.721772	0.060744		0.511029	0.026449	0.601836
602	11927	2.44495	0.035573	0.018946		1.390125	0.680863	0.064033		0.499596	0.025208	0.566642
603	11928	2.427277	0.0366	0.024202		1.36627	0.682422	0.071204		0.515441	0.025542	0.5668
604	11929	2.704745	0.042265	0.034556		1.486405	0.769428	0.088475		0.583318	0.029129	0.637773
605	11930	1.883086	0.031441	0.032476		1.004045	0.557178	0.071628		0.410082	0.021421	0.460652
606	11931	1.28133	0.021945	0.024198		0.677291	0.386031	0.051221		0.279471	0.014913	0.318914
607	11932	1.83777	0.033427	0.041748		0.955584	0.5799	0.081715		0.401572	0.022628	0.478336
608	11933	1.889148	0.037793	0.054633		0.964443	0.645455	0.097565		0.412665	0.025523	0.531392
609	11934	14.34349	0.32481	0.539089		7.211207	5.463896	0.883302		3.117781	0.219361	4.490592
610	11935	1.085374	0.028722	0.053622		0.533208	0.474667	0.081028		0.22934	0.019277	0.389289
611	11936	1.007894	0.028977	0.057036		0.487936	0.474922	0.083132		0.20825	0.019406	0.38914
612	11937	1.151303	0.040243	0.088186		0.537073	0.648391	0.119389		0.219082	0.02687	0.530186
613	11938	0.966854	0.041001	0.099091		0.410472	0.649273	0.125431		0.154133	0.027323	0.529692
614	11939	0.781925	0.041863	0.110489		0.282578	0.650312	0.131756		0.107934	0.027832	0.529226
615	11940	0.309438	0.031767	0.039765		0.069367	0.275366	0.045916		0.013916	0.008748	0.243589
616	11941	0.295082	0.029399	0.033735		0.078442	0.255722	0.039554		0.01652	0.008218	0.226082
617	11942	0.410548	0.039814	0.042239		0.123194	0.348587	0.050419		0.027758	0.011278	0.307122
618	11943	0.566625	0.052038	0.047104		0.206254	0.463334	0.058688		0.046373	0.015106	0.405359
619	11944	0.595529	0.051581	0.039534		0.250861	0.46582	0.051616		0.044637	0.01523	0.405132
620	11945	0.624256	0.051005	0.03263		0.296977	0.467919	0.045317		0.044349	0.015288	0.40496
621	11946	0.594842	0.045881	0.024153		0.315344	0.429429	0.03638		0.042722	0.014007	0.370148
622	11947	0.555396	0.040884	0.018046		0.319633	0.390206	0.029648		0.045211	0.012731	0.335411
623	11948	0.58071	0.040781	0.014822		0.360068	0.397843	0.027202		0.051343	0.013009	0.341188
624	11949	0.609019	0.040531	0.011726		0.402946	0.405402	0.02497		0.056205	0.013319	0.346991
625	11950	0.500648	0.031609	0.007287		0.351586	0.324874	0.018129		0.04701	0.010742	0.27763
626	11951	0.465864	0.028501	0.005782		0.338245	0.298063	0.015721		0.048921	0.009899	0.254524
627	11952	0.561889	0.032839	0.005585		0.426974	0.352649	0.017211		0.076288	0.011794	0.300865
628	11953	0.572745	0.031954	0.00456		0.454296	0.35297	0.015998		0.088911	0.011889	0.300944
629	11954	0.765546	0.040586	0.005586		0.630126	0.461922	0.019504		0.121728	0.015672	0.393662
630	11955	0.768448	0.037571	0.005903		0.669065	0.448715	0.016964		0.105267	0.015396	0.382296
631	11956	0.627602	0.029455	0.005188		0.56369	0.36044	0.012799		0.079604	0.01244	0.307094
632	11957	0.699504	0.031243	0.006576		0.651651	0.394524	0.012981		0.081495	0.013705	0.336189

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
633	11958	0.711019	0.030202	0.007716		0.685929	0.394538	0.012011		0.085263	0.013781	0.336302
634	11959	0.721445	0.02912	0.008715		0.719428	0.3945	0.011088		0.088288	0.013833	0.336407
635	11960	0.733464	0.027512	0.009414		0.738955	0.387614	0.010021		0.090676	0.013603	0.330702
636	11961	0.743994	0.025999	0.009932		0.755194	0.380696	0.009036		0.095373	0.013322	0.324985
637	11962	0.797957	0.025633	0.010691		0.797213	0.387347	0.008399		0.10337	0.013453	0.330871
638	11963	0.653802	0.019094	0.008639		0.637111	0.298862	0.005873		0.084247	0.010247	0.255473
639	11964	0.657699	0.0183	0.008613		0.633075	0.291993	0.005446		0.084294	0.009922	0.249699
640	11965	0.901467	0.022934	0.01158		0.84833	0.380074	0.006421		0.11399	0.012651	0.325266
641	11966	0.979911	0.022797	0.012308		0.900328	0.393445	0.006012		0.124437	0.012754	0.336962
642	11967	1.066442	0.022493	0.013029		0.949865	0.406801	0.005576		0.141	0.013084	0.348669
643	11968	1.123713	0.021388	0.013337		0.958919	0.406613	0.005458		0.152127	0.013003	0.348757
644	11969	1.228221	0.020943	0.014034		0.985649	0.420009	0.005574		0.167481	0.013337	0.360481
645	11970	1.244995	0.018766	0.013511		0.91366	0.399551	0.005108		0.169585	0.012592	0.343162
646	11971	1.200441	0.01628	0.012406		0.810297	0.365627	0.004429		0.167589	0.011443	0.314195
647	11972	1.283739	0.015692	0.012599		0.789885	0.37235	0.004178		0.193858	0.011579	0.320144
648	11973	1.198107	0.013179	0.011122		0.665053	0.331714	0.003349		0.202809	0.010266	0.285348
649	11974	1.056166	0.010797	0.009431		0.550168	0.284324	0.002773		0.192532	0.008814	0.244671
650	11975	1.272505	0.012153	0.010985		0.622649	0.335106	0.003488		0.247283	0.010403	0.288468
651	11976	1.495608	0.013294	0.012426		0.66979	0.385914	0.004351		0.312674	0.011997	0.33235
652	11977	1.510641	0.013207	0.01215		0.620014	0.38597	0.004646		0.33545	0.012008	0.332533
653	11978	1.511047	0.013126	0.011819		0.572068	0.386053	0.004876		0.353662	0.012012	0.332722
654	11979	1.485046	0.012939	0.011333		0.512288	0.382776	0.00497		0.362485	0.011902	0.329997
655	11980	1.466155	0.012757	0.010806		0.461252	0.379527	0.00495		0.364725	0.011786	0.32727
656	11981	1.460159	0.012693	0.010322		0.455252	0.379698	0.005433		0.364084	0.011767	0.327466
657	11982	1.592013	0.013981	0.010824		0.503211	0.420615	0.006945		0.395915	0.013093	0.36277
658	11983	1.730226	0.015239	0.010957		0.584129	0.461707	0.009203		0.42698	0.014485	0.398206
659	11984	1.564766	0.013641	0.008597		0.563953	0.401015	0.009721		0.362872	0.012692	0.345888
660	11985	1.62388	0.014352	0.007976		0.610544	0.408181	0.011346		0.360616	0.013008	0.351999
661	11986	1.779017	0.016247	0.007522		0.718811	0.442852	0.01506		0.374387	0.014256	0.38165
662	11987	1.632125	0.015527	0.006159		0.701925	0.409397	0.016317		0.330246	0.013298	0.352493
663	11988	1.54576	0.015501	0.00509		0.714177	0.396421	0.01832		0.302748	0.012995	0.340896
664	11989	1.658686	0.017591	0.005488		0.824558	0.438211	0.023061		0.315943	0.014491	0.376281
665	11990	1.687329	0.019325	0.005798		0.919229	0.46678	0.02874		0.32683	0.015615	0.399913
666	11991	1.67978	0.019865	0.006984		0.947921	0.467946	0.032852		0.336367	0.015822	0.399997
667	11992	1.677825	0.020444	0.009723		0.963922	0.469337	0.037874		0.342863	0.016066	0.400192
668	11993	1.585674	0.019704	0.011797		0.906418	0.442959	0.040162		0.323709	0.015339	0.376797
669	11994	1.574865	0.020141	0.015123		0.891956	0.44419	0.044945		0.326818	0.015566	0.376926
670	11995	1.735519	0.023124	0.02166		0.971701	0.501109	0.056175		0.370114	0.017783	0.424159
671	11996	1.205739	0.01709	0.020446		0.657527	0.363117	0.045787		0.261439	0.013099	0.306415
672	11997	0.821324	0.011923	0.01525		0.443771	0.251636	0.032791		0.178369	0.009125	0.212142
673	11998	1.180583	0.018141	0.026387		0.626705	0.378157	0.052487		0.256685	0.013856	0.318233
674	11999	1.216567	0.020476	0.034668		0.632974	0.421105	0.062888		0.263767	0.015643	0.353604
675	12000	1.094429	0.020736	0.040491		0.5598	0.421889	0.067286		0.235069	0.015873	0.353535
676	12001	0.696126	0.015546	0.034289		0.350613	0.309937	0.052386		0.146454	0.011824	0.259152
677	12002	0.647554	0.015667	0.03652		0.321075	0.310137	0.0537		0.133066	0.011906	0.259069
678	12003	0.749125	0.021714	0.056579		0.355687	0.423514	0.076896		0.141188	0.016489	0.353018
679	12004	0.630411	0.022053	0.063598		0.271797	0.42411	0.080349		0.100791	0.016758	0.352736
680	12005	0.509923	0.022441	0.070815		0.186811	0.424822	0.083826		0.071129	0.017053	0.352459
681	12006	0.191435	0.019145	0.024014		0.042747	0.171614	0.027522		0.008308	0.00542	0.152186
682	12007	0.182143	0.017748	0.02045		0.048201	0.159338	0.023869		0.009844	0.005121	0.141255
683	12008	0.252897	0.024051	0.02566		0.075621	0.216529	0.03053		0.016535	0.007036	0.191893
684	12009	0.347648	0.031416	0.028651		0.126477	0.287309	0.035662		0.027539	0.009435	0.253278
685	12010	0.363195	0.03093	0.024057		0.153769	0.288458	0.031411		0.026992	0.009497	0.253138
686	12011	0.379448	0.030572	0.019858		0.181963	0.289716	0.027593		0.026864	0.009502	0.25303
687	12012	0.360653	0.027485	0.014699		0.193127	0.265941	0.022147		0.02588	0.008688	0.231277
688	12013	0.336256	0.024482	0.010981		0.195702	0.241684	0.018039		0.026298	0.007882	0.209572
689	12014	0.350702	0.024412	0.009019		0.22042	0.246439	0.016539		0.029893	0.008048	0.213182
690	12015	0.36657	0.024257	0.007139		0.246645	0.251144	0.015171		0.032807	0.00823	0.216806
691	12016	0.301057	0.018918	0.004432		0.215215	0.201273	0.011006		0.027543	0.006634	0.173466
692	12017	0.28004	0.017059	0.003519		0.207066	0.184671	0.009541		0.026716	0.006111	0.159028
693	12018	0.33764	0.019656	0.003372		0.261422	0.218498	0.01044		0.041831	0.007272	0.187981
694	12019	0.34408	0.019133	0.002752		0.278172	0.218713	0.009699		0.048885	0.007326	0.188028
695	12020	0.458901	0.024306	0.003388		0.385836	0.286226	0.011816		0.067083	0.009648	0.245956
696	12021	0.460598	0.022739	0.003575		0.409632	0.278057	0.010265		0.058364	0.009471	0.238855
697	12022	0.376226	0.017841	0.003139		0.345075	0.22336	0.007736		0.044706	0.007649	0.191869
698	12023	0.419442	0.018937	0.00397		0.398852	0.24448	0.007835		0.048105	0.008426	0.210045
699	12024	0.426538	0.018326	0.004646		0.419777	0.244489	0.00724		0.050597	0.008476	0.210114
700	12025	0.433121	0.017682	0.005256		0.440271	0.244461	0.006676		0.052513	0.008511	0.210177
701	12026	0.447152	0.016721	0.005686		0.452265	0.240189	0.006027		0.05379	0.008373	0.20661
702	12027	0.464698	0.01587	0.006003		0.462285	0.235897	0.005428		0.056295	0.008199	0.203037

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
703	12028	0.498615	0.015653	0.006462		0.488142	0.240005	0.005036		0.060315	0.008276	0.206713
704	12029	0.406339	0.011666	0.005222		0.39029	0.185174	0.003515		0.048775	0.006298	0.159606
705	12030	0.407805	0.011181	0.005207		0.387951	0.180911	0.003257		0.048865	0.006097	0.155998
706	12031	0.556726	0.014018	0.007003		0.520322	0.235469	0.003837		0.066253	0.007764	0.203207
707	12032	0.603015	0.013933	0.007445		0.552954	0.243732	0.003592		0.072451	0.007824	0.210513
708	12033	0.654057	0.013748	0.007885		0.584582	0.251986	0.003334		0.081663	0.00794	0.217825
709	12034	0.687527	0.013061	0.008068		0.591577	0.251853	0.003246		0.087829	0.007882	0.217876
710	12035	0.751105	0.012789	0.008495		0.60922	0.260128	0.003306		0.096869	0.008085	0.225196
711	12036	0.762864	0.011442	0.008185		0.565062	0.247462	0.003027		0.098928	0.007621	0.214374
712	12037	0.73739	0.009926	0.007518		0.498538	0.226436	0.002624		0.099211	0.006922	0.196278
713	12038	0.789336	0.009562	0.007636		0.485849	0.230608	0.002475		0.115243	0.006998	0.199993
714	12039	0.734697	0.008034	0.006741		0.410184	0.205435	0.001985		0.121079	0.006194	0.178253
715	12040	0.648492	0.006584	0.005718		0.337865	0.176086	0.001704		0.115554	0.005288	0.152841
716	12041	0.782656	0.007416	0.00667		0.382234	0.207535	0.002137		0.149069	0.006236	0.180198
717	12042	0.921758	0.008044	0.007546		0.410966	0.239	0.002653		0.189337	0.007192	0.207605
718	12043	0.932699	0.007984	0.007378		0.379202	0.239035	0.002821		0.204333	0.0072	0.207715
719	12044	0.934452	0.007931	0.007178		0.349862	0.239084	0.00295		0.215908	0.007203	0.207829
720	12045	0.922424	0.007812	0.006883		0.313317	0.237055	0.002997		0.221687	0.007138	0.206122
721	12046	0.909064	0.007699	0.006563		0.281574	0.235042	0.002976		0.223384	0.007069	0.204414
722	12047	0.907078	0.007657	0.006269		0.278568	0.235149	0.00329		0.223284	0.007086	0.204531
723	12048	0.990947	0.008431	0.006574		0.308121	0.260489	0.0042		0.243107	0.007893	0.226576
724	12049	1.084107	0.009185	0.006655		0.357287	0.285939	0.005564		0.263346	0.008732	0.248759
725	12050	0.962214	0.008064	0.005221		0.345372	0.248355	0.005873		0.224119	0.007651	0.216067
726	12051	0.998422	0.008476	0.004844		0.374139	0.252795	0.006865		0.222945	0.007842	0.219879
727	12052	1.0938	0.009583	0.00454		0.441149	0.274277	0.009111		0.231775	0.008596	0.238393
728	12053	1.003653	0.009148	0.003716		0.430919	0.253563	0.009872		0.204687	0.008019	0.220176
729	12054	0.9558	0.009123	0.003068		0.438142	0.245542	0.011089		0.18787	0.007839	0.212928
730	12055	1.03179	0.010343	0.003283		0.505923	0.271437	0.01397		0.196288	0.008743	0.235026
731	12056	1.050646	0.011351	0.003465		0.564325	0.289172	0.017435		0.202618	0.009427	0.249782
732	12057	1.03736	0.011658	0.004243		0.582085	0.28992	0.019963		0.209133	0.009555	0.249817
733	12058	1.031152	0.01199	0.005915		0.592133	0.290845	0.023069		0.213349	0.009711	0.249898
734	12059	0.972253	0.011548	0.007184		0.55704	0.274533	0.024522		0.200785	0.009276	0.235292
735	12060	0.966092	0.011799	0.009221		0.548415	0.275365	0.027511		0.201552	0.009421	0.235377
736	12061	1.065315	0.013538	0.013223		0.59776	0.310694	0.03447		0.228107	0.010767	0.264882
737	12062	0.736606	0.01	0.012502		0.404759	0.225211	0.028168		0.161012	0.007938	0.191362
738	12063	0.501949	0.006966	0.00933		0.273227	0.156075	0.020189		0.109844	0.00553	0.13249
739	12064	0.722038	0.010573	0.016161		0.385986	0.234599	0.032357		0.158033	0.008402	0.198757
740	12065	0.744617	0.0119	0.021256		0.389932	0.261275	0.038812		0.162242	0.009483	0.220854
741	12066	0.670475	0.012035	0.024869		0.34493	0.261846	0.041573		0.144382	0.009633	0.220825
742	12067	0.426232	0.00901	0.021098		0.216142	0.192368	0.032385		0.089821	0.007173	0.161883
743	12068	0.396439	0.00909	0.022494		0.197987	0.192523	0.033207		0.081554	0.007225	0.161843
744	12069	0.461724	0.012581	0.034892		0.219808	0.262904	0.047504		0.08698	0.010002	0.220548
745	12070	0.389006	0.012754	0.03923		0.167956	0.263312	0.049531		0.06233	0.010164	0.220379
746	12071	0.315077	0.012948	0.043645		0.115367	0.263729	0.051514		0.043992	0.010334	0.220203
747	12072	0.226492	0.022555	0.027349		0.049574	0.205159	0.031111		0.009013	0.006449	0.182522
748	12073	0.214679	0.020436	0.023411		0.055746	0.190448	0.027192		0.010574	0.006128	0.169423
749	12074	0.297032	0.027648	0.029449		0.087358	0.258777	0.034926		0.016594	0.008446	0.230165
750	12075	0.405676	0.035989	0.032901		0.145943	0.342149	0.040963		0.027754	0.011313	0.303801
751	12076	0.4197	0.03523	0.027631		0.177386	0.343631	0.036143		0.029538	0.011342	0.303635
752	12077	0.436078	0.03455	0.022801		0.209809	0.344782	0.031762		0.030101	0.011304	0.303502
753	12078	0.412691	0.03101	0.016875		0.222518	0.316075	0.025479		0.029287	0.010287	0.277407
754	12079	0.383859	0.027586	0.012602		0.225389	0.286979	0.020732		0.028171	0.009317	0.251375
755	12080	0.399717	0.027481	0.010349		0.253786	0.292402	0.018983		0.031695	0.009498	0.255705
756	12081	0.415206	0.027287	0.008197		0.283907	0.297792	0.01739		0.035005	0.00971	0.260048
757	12082	0.339925	0.02127	0.005084		0.247722	0.23853	0.012604		0.030281	0.007815	0.20806
758	12083	0.316029	0.019178	0.004041		0.238377	0.218795	0.010919		0.029891	0.007191	0.190741
759	12084	0.380853	0.022101	0.003824		0.301033	0.258833	0.011943		0.038887	0.008548	0.225465
760	12085	0.387943	0.021634	0.003122		0.32036	0.259094	0.011085		0.044283	0.008589	0.225519
761	12086	0.516383	0.027762	0.003873		0.444339	0.3391	0.013492		0.060926	0.011296	0.294993
762	12087	0.516605	0.02602	0.004075		0.47167	0.329429	0.011698		0.058882	0.011068	0.286477
763	12088	0.422071	0.020432	0.003581		0.397266	0.264626	0.008801		0.048158	0.008936	0.230124
764	12089	0.477287	0.021718	0.004519		0.459029	0.289648	0.008889		0.053646	0.009848	0.251921
765	12090	0.500293	0.02104	0.005245		0.482997	0.289652	0.008195		0.056158	0.009914	0.251999
766	12091	0.528081	0.02033	0.005953		0.506574	0.289609	0.007543		0.058357	0.009969	0.25207
767	12092	0.546279	0.019258	0.006457		0.520466	0.284533	0.006802		0.060962	0.009814	0.247789
768	12093	0.563005	0.018392	0.006825		0.532153	0.279433	0.00611		0.063615	0.009609	0.2435
769	12094	0.599892	0.01815	0.007345		0.562157	0.284284	0.005652		0.068039	0.009692	0.247906
770	12095	0.483857	0.013531	0.005934		0.449796	0.219313	0.003931		0.054515	0.007364	0.19141
771	12096	0.483	0.012975	0.005918		0.447335	0.214257	0.003638		0.053989	0.00712	0.187082
772	12097	0.652906	0.016267	0.007967		0.600761	0.278838	0.004283		0.071339	0.009056	0.243693

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
773	12098	0.701179	0.01617	0.008475		0.639709	0.288589	0.004009		0.076255	0.009104	0.252451
774	12099	0.756657	0.015946	0.008982		0.678537	0.298303	0.003724		0.084927	0.009091	0.261218
775	12100	0.791889	0.015137	0.009191		0.689641	0.298104	0.00359		0.090616	0.009028	0.261274
776	12101	0.864118	0.01478	0.009687		0.712678	0.307874	0.003638		0.100352	0.00924	0.270042
777	12102	0.880992	0.013207	0.009344		0.661306	0.29284	0.003331		0.106538	0.0087	0.257063
778	12103	0.855246	0.011431	0.008586		0.580829	0.267981	0.002888		0.108945	0.007884	0.235363
779	12104	0.918804	0.011006	0.008721		0.565604	0.272905	0.002725		0.12972	0.007957	0.239815
780	12105	0.857759	0.009249	0.007698		0.477793	0.243117	0.00221		0.135124	0.007038	0.21374
781	12106	0.756722	0.007585	0.006547		0.391083	0.208382	0.001988		0.129735	0.006006	0.183265
782	12107	0.913031	0.008551	0.007638		0.442168	0.245597	0.002478		0.168336	0.007054	0.216063
783	12108	1.076515	0.009262	0.008641		0.475004	0.282831	0.003057		0.215554	0.008098	0.248918
784	12109	1.092377	0.009086	0.008449		0.436245	0.282869	0.003232		0.233737	0.008091	0.249041
785	12110	1.099289	0.009015	0.008219		0.402447	0.282927	0.003361		0.247794	0.008096	0.249169
786	12111	1.08829	0.008874	0.007881		0.360434	0.280523	0.003398		0.255091	0.008036	0.247114
787	12112	1.070329	0.008738	0.007515		0.32313	0.278141	0.003359		0.257593	0.007992	0.245057
788	12113	1.067608	0.008685	0.007178		0.320745	0.278266	0.003751		0.257967	0.008031	0.245189
789	12114	1.16957	0.009557	0.007527		0.355122	0.308253	0.004778		0.281366	0.008944	0.27165
790	12115	1.291761	0.010407	0.00762		0.411276	0.33837	0.006324		0.306631	0.009895	0.298284
791	12116	1.137442	0.008964	0.005977		0.3983	0.293896	0.006669		0.261459	0.00867	0.259068
792	12117	1.159257	0.009306	0.005545		0.432153	0.299156	0.007811		0.26044	0.008887	0.263628
793	12118	1.275808	0.010498	0.005152		0.510279	0.324585	0.010364		0.271254	0.009743	0.285811
794	12119	1.177906	0.010004	0.004213		0.498666	0.300089	0.011233		0.23993	0.009092	0.263961
795	12120	1.125419	0.009959	0.003475		0.506465	0.29061	0.012628		0.220575	0.008891	0.255264
796	12121	1.215792	0.011275	0.003672		0.584932	0.321295	0.015925		0.230828	0.009922	0.281748
797	12122	1.239659	0.012351	0.00387		0.653005	0.342329	0.019919		0.237445	0.010705	0.299429
798	12123	1.209932	0.012668	0.004867		0.673839	0.343295	0.022869		0.246168	0.010862	0.299465
799	12124	1.203274	0.01301	0.006793		0.685901	0.344463	0.02653		0.251517	0.011049	0.299481
800	12125	1.122794	0.01252	0.008265		0.645697	0.325258	0.028316		0.236911	0.010568	0.281971
801	12126	1.116612	0.012781	0.010627		0.636212	0.326321	0.031906		0.234672	0.010742	0.282082
802	12127	1.232588	0.014655	0.015272		0.694073	0.36834	0.040144		0.265886	0.012293	0.317459
803	12128	0.848711	0.010812	0.014479		0.47051	0.267093	0.03295		0.18804	0.009071	0.229367
804	12129	0.577282	0.00753	0.010814		0.317716	0.185136	0.023643		0.128324	0.006323	0.158808
805	12130	0.831375	0.011423	0.018761		0.449093	0.278344	0.037973		0.18464	0.00961	0.238253
806	12131	0.858607	0.012863	0.024726		0.453943	0.310144	0.045648		0.189423	0.010859	0.264759
807	12132	0.774428	0.013003	0.029013		0.40179	0.31091	0.049002		0.168461	0.011036	0.264752
808	12133	0.493358	0.00961	0.024699		0.251954	0.228501	0.038231		0.104861	0.008222	0.19411
809	12134	0.457599	0.009683	0.026377		0.230899	0.228687	0.039211		0.095299	0.008279	0.194075
810	12135	0.539761	0.013376	0.041024		0.257133	0.31238	0.056031		0.101539	0.011462	0.264503
811	12136	0.455744	0.013492	0.046154		0.196455	0.312843	0.058204		0.073271	0.011635	0.264311
812	12137	0.370322	0.013644	0.051273		0.134819	0.313404	0.0602		0.051599	0.011826	0.264092
813	17499	0.917569	0.060186	0.019918		0.031684	0.721567	0.022273		0.021131	0.034794	0.482085
814	17500	0.498412	0.088796	0.087553		0.100577	0.477581	0.102446		0.012487	0.025329	0.314185
815	17501	0.470297	0.081316	0.072646		0.086047	0.443231	0.089618		0.011197	0.02357	0.292211
816	17502	0.486702	0.081417	0.065931		0.081684	0.451671	0.085885		0.011569	0.024079	0.298342
817	17503	0.502896	0.081165	0.059485		0.078054	0.459996	0.082179		0.012179	0.024566	0.304426
818	17504	0.379351	0.058918	0.038975		0.05476	0.342343	0.057386		0.009335	0.018297	0.226986
819	17505	0.387041	0.058993	0.037154		0.054152	0.347194	0.056505		0.00961	0.018558	0.230416
820	17506	0.541863	0.079182	0.044776		0.070975	0.480178	0.073191		0.013876	0.025655	0.319207
821	17507	0.557278	0.077884	0.039353		0.068575	0.48824	0.069589		0.014687	0.026058	0.325052
822	17508	0.514678	0.069391	0.030812		0.059585	0.44614	0.059336		0.013821	0.023775	0.297383
823	17509	0.349919	0.045961	0.018234		0.038603	0.300921	0.037806		0.009426	0.016009	0.200741
824	17510	0.514086	0.066623	0.024937		0.05543	0.440438	0.053797		0.013808	0.023406	0.293926
825	17511	0.730781	0.090326	0.027494		0.072456	0.618618	0.068541		0.018976	0.032702	0.413143
826	17512	0.666711	0.079087	0.020682		0.061657	0.559541	0.057231		0.016453	0.029391	0.37382
827	17513	0.682756	0.077466	0.018009		0.058569	0.568448	0.053494		0.0159	0.029603	0.379817
828	17514	0.742742	0.080321	0.016609		0.058804	0.613863	0.052862		0.016674	0.031636	0.410108
829	17515	0.760479	0.077604	0.014066		0.054639	0.623735	0.048051		0.016566	0.031721	0.416516
830	17516	0.77784	0.075123	0.012364		0.050943	0.633946	0.043666		0.016718	0.031849	0.423103
831	17517	0.747896	0.067629	0.010703		0.043646	0.605442	0.036033		0.015993	0.030007	0.403764
832	17518	0.690867	0.059161	0.009619		0.036475	0.556389	0.029135		0.014783	0.0273	0.370912
833	17519	0.727799	0.058585	0.011583		0.034274	0.582876	0.026177		0.015588	0.028311	0.388551
834	17520	0.803693	0.06056	0.014663		0.033636	0.639902	0.024374		0.017218	0.030787	0.426907
835	17521	0.755896	0.052553	0.015121		0.027531	0.597891	0.019983		0.016744	0.028768	0.399349
836	17522	0.826342	0.049682	0.018025		0.029788	0.646693	0.016568		0.019079	0.03133	0.43269
837	17523	0.714729	0.038632	0.015961		0.02648	0.555246	0.011769		0.016816	0.02713	0.371879
838	17524	0.612226	0.030665	0.013643		0.022819	0.472845	0.009835		0.014751	0.023283	0.316984
839	17525	0.581092	0.026757	0.013296		0.021393	0.44628	0.008759		0.014243	0.022112	0.299525
840	17526	0.554351	0.023686	0.013178		0.019836	0.423575	0.007584		0.013659	0.021097	0.284563
841	17527	0.503956	0.020381	0.01262		0.017493	0.38334	0.006055		0.01225	0.019177	0.25772
842	17528	0.995957	0.038162	0.026088		0.034688	0.754767	0.010239		0.023461	0.037889	0.507631

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
843	17529	0.931718	0.035152	0.025414		0.033642	0.704062	0.007984		0.021011	0.035457	0.473539
844	17530	0.783034	0.029057	0.022065		0.02919	0.590254	0.007792		0.016954	0.029819	0.396927
845	17531	0.644154	0.02361	0.018493		0.024497	0.484783	0.00707		0.013747	0.024547	0.325904
846	17532	0.727898	0.02635	0.021204		0.028184	0.547086	0.00871		0.016012	0.027768	0.367651
847	17533	0.788171	0.028064	0.023231		0.031185	0.591606	0.010426		0.017733	0.030123	0.397335
848	17534	0.742875	0.027599	0.02199		0.031327	0.557157	0.010661		0.016792	0.028458	0.373942
849	17535	0.77581	0.030648	0.022921		0.034946	0.581657	0.011948		0.017402	0.029797	0.390088
850	17536	0.775857	0.033634	0.022688		0.037491	0.581819	0.012881		0.017063	0.029899	0.389819
851	17537	0.71104	0.033427	0.020435		0.036442	0.533616	0.012548		0.015235	0.027486	0.3572
852	17538	0.671786	0.034095	0.018826		0.036335	0.504795	0.012541		0.014173	0.026045	0.337633
853	17539	0.612035	0.033399	0.01656		0.034957	0.460658	0.012035		0.012795	0.023794	0.307938
854	17540	0.5556	0.032734	0.014404		0.033336	0.418991	0.011833		0.011517	0.021652	0.279983
855	17541	0.40398	0.025879	0.009916		0.025384	0.305349	0.009379		0.008337	0.015779	0.204017
856	17542	0.369885	0.024724	0.008757		0.023766	0.27994	0.008966		0.007623	0.014463	0.187046
857	17543	0.994824	0.071876	0.021814		0.066921	0.754996	0.026229		0.020593	0.038972	0.504633
858	17544	0.911832	0.071705	0.018836		0.064156	0.694168	0.02564		0.019155	0.035789	0.464157
859	17545	0.890358	0.075794	0.017358		0.065723	0.680224	0.0269		0.019146	0.034998	0.455039
860	17546	0.866744	0.079728	0.015977		0.067417	0.665023	0.028031		0.018903	0.034114	0.445049
861	17547	0.826865	0.081853	0.014172		0.067971	0.637607	0.028561		0.019269	0.032579	0.426824
862	17548	0.786793	0.083524	0.012362		0.068531	0.610245	0.028932		0.01799	0.031036	0.40857
863	17549	0.684031	0.077631	0.010158		0.06329	0.534119	0.026735		0.01414	0.027027	0.357612
864	17550	0.803666	0.096182	0.011226		0.078189	0.631478	0.032904		0.01597	0.03182	0.422753
865	17551	0.775267	0.101398	0.010431		0.082804	0.616961	0.034574		0.014221	0.030893	0.41292
866	17552	0.555142	0.076506	0.008767		0.062825	0.445778	0.02611		0.00971	0.022256	0.298235
867	17553	0.523148	0.075836	0.009613		0.06285	0.424259	0.026117		0.008789	0.021134	0.283705
868	17554	0.418045	0.063636	0.00885		0.053369	0.342708	0.022305		0.007073	0.017044	0.229039
869	17555	0.429698	0.0676	0.009984		0.057189	0.355107	0.024082		0.007587	0.017644	0.237207
870	17556	0.500079	0.082983	0.014042		0.071454	0.41927	0.030728		0.009591	0.020803	0.279821
871	17557	0.435954	0.076187	0.01542		0.066868	0.371302	0.029703		0.009093	0.0184	0.247571
872	17558	0.835566	0.153157	0.03653		0.137326	0.723404	0.06348		0.018655	0.035807	0.481949
873	17559	0.845856	0.162447	0.044969		0.149078	0.745407	0.071945		0.019876	0.036869	0.496429
874	17560	0.863994	0.175183	0.057472		0.165975	0.779184	0.085213		0.021184	0.038543	0.518834
875	17561	0.801034	0.171061	0.065922		0.168083	0.740734	0.092315		0.020346	0.036698	0.493023
876	17562	0.739101	0.165739	0.074771		0.169907	0.702059	0.100407		0.019795	0.034879	0.466992
877	17563	0.51865	0.121651	0.064861		0.131153	0.506771	0.083766		0.015179	0.025248	0.337158
878	17564	0.360347	0.086339	0.050119		0.095882	0.357439	0.063763		0.011178	0.017826	0.237979
879	17565	0.367696	0.0901	0.057779		0.104121	0.371261	0.072546		0.012291	0.01852	0.2475
880	17566	0.274243	0.068494	0.048572		0.082969	0.281899	0.060427		0.009897	0.014047	0.188267
881	17567	0.75179	0.103996	0.158168		0.149659	0.736654	0.175511		0.027855	0.037914	0.507358
882	17568	0.776892	0.121495	0.161876		0.164702	0.761258	0.179064		0.024403	0.039633	0.51246
883	17569	0.541539	0.094921	0.111334		0.122254	0.530616	0.122522		0.014077	0.027962	0.350016
884	17570	0.784852	0.088849	0.13616		0.211523	0.84518	0.238357		0.020959	0.041898	0.555317
885	17571	0.806435	0.100445	0.139372		0.24112	0.887858	0.245106		0.024035	0.045247	0.560934
886	17572	0.558115	0.077189	0.095671		0.184493	0.628427	0.168708		0.018634	0.033149	0.382973
887	17573	0.539804	0.075861	0.080002		0.163501	0.600112	0.142451		0.015956	0.0323	0.361871
888	17574	0.507532	0.068973	0.06669		0.139538	0.554963	0.120234		0.013622	0.030048	0.335062
889	17575	0.523391	0.068431	0.060897		0.131428	0.563778	0.111419		0.012782	0.030705	0.340648
890	17576	0.538834	0.067419	0.055422		0.124741	0.572534	0.103085		0.011926	0.031335	0.346103
891	17577	0.40509	0.048245	0.036823		0.086898	0.42512	0.069601		0.008031	0.023347	0.257064
892	17578	0.412258	0.047944	0.03537		0.085544	0.430275	0.067403		0.007724	0.023658	0.260226
893	17579	0.575148	0.063585	0.043776		0.1114	0.593767	0.084444		0.009594	0.032695	0.359236
894	17580	0.589191	0.061683	0.040017		0.106976	0.602178	0.077721		0.009041	0.033182	0.364537
895	17581	0.542033	0.053693	0.033184		0.092414	0.548935	0.064242		0.00777	0.03026	0.332554
896	17582	0.367346	0.034994	0.020901		0.059556	0.369579	0.039956		0.005078	0.020381	0.224041
897	17583	0.538334	0.050259	0.029709		0.085164	0.539957	0.056163		0.007386	0.029784	0.327431
898	17584	0.761072	0.06626	0.039494		0.110223	0.756803	0.068655		0.010283	0.041781	0.459252
899	17585	0.690364	0.056689	0.034918		0.092891	0.683019	0.055253		0.009444	0.037735	0.414517
900	17586	0.702463	0.054316	0.035435		0.087556	0.692638	0.049512		0.009697	0.038275	0.420223
901	17587	0.758559	0.055458	0.038997		0.087551	0.746652	0.046658		0.010527	0.041241	0.452728
902	17588	0.769612	0.053869	0.041354		0.081495	0.757417	0.040001		0.0107	0.041782	0.458913
903	17589	0.779931	0.0527	0.044559		0.076594	0.76854	0.034431		0.010824	0.042351	0.465378
904	17590	0.741809	0.048472	0.047225		0.066667	0.732956	0.026627		0.010259	0.040364	0.443581
905	17591	0.678841	0.043492	0.047494		0.05675	0.67277	0.020377		0.009352	0.037052	0.406944
906	17592	0.707837	0.044846	0.05486		0.054327	0.704284	0.016991		0.009817	0.038798	0.425709
907	17593	0.77315	0.049394	0.066192		0.054073	0.772835	0.014216		0.011294	0.042551	0.466694
908	17594	0.718975	0.047802	0.067905		0.04442	0.722398	0.008412		0.011089	0.03964	0.435784
909	17595	0.792585	0.057903	0.069874		0.039328	0.788676	0.007872		0.013107	0.042798	0.476698
910	17596	0.697246	0.050923	0.052473		0.033606	0.682732	0.010832		0.011925	0.036914	0.413598
911	17597	0.606411	0.043343	0.039184		0.02875	0.58581	0.012571		0.010593	0.03162	0.355474
912	17598	0.58411	0.040323	0.031868		0.02727	0.556914	0.014602		0.010294	0.030017	0.338453

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
913	17599	0.565642	0.037318	0.026042		0.026052	0.532604	0.016076		0.009965	0.028661	0.324576
914	17600	0.525568	0.032827	0.020768		0.023839	0.489028	0.016455		0.00923	0.026259	0.299072
915	17601	0.969075	0.05725	0.032607		0.043322	0.891058	0.032703		0.017003	0.047707	0.546853
916	17602	0.918037	0.05101	0.026118		0.041139	0.834717	0.03252		0.016215	0.044546	0.514042
917	17603	0.778453	0.040434	0.018527		0.034875	0.700652	0.029242		0.013973	0.037259	0.432942
918	17604	0.644629	0.032665	0.013818		0.028844	0.57631	0.024992		0.011774	0.030565	0.356976
919	17605	0.733128	0.0362	0.014593		0.032722	0.65143	0.029192		0.01366	0.034454	0.404466
920	17606	0.799861	0.0381	0.014452		0.035479	0.705599	0.032776		0.0153	0.037181	0.439421
921	17607	0.759623	0.035458	0.013166		0.033458	0.666102	0.031738		0.014851	0.034969	0.415935
922	17608	0.79955	0.036526	0.014869		0.034969	0.697553	0.033862		0.015874	0.036469	0.436619
923	17609	0.806702	0.035856	0.015902		0.036053	0.700256	0.034631		0.016136	0.036403	0.439373
924	17610	0.746167	0.033763	0.015116		0.033752	0.645194	0.032407		0.014891	0.033334	0.405597
925	17611	0.711832	0.034397	0.014423		0.032157	0.613517	0.031372		0.014071	0.031475	0.386304
926	17612	0.655169	0.03368	0.012946		0.0293	0.563139	0.029428		0.012766	0.028671	0.355094
927	17613	0.601057	0.032637	0.011387		0.026536	0.515551	0.027535		0.012578	0.026056	0.325485
928	17614	0.44133	0.025244	0.008442		0.019238	0.377902	0.02068		0.009627	0.018959	0.238874
929	17615	0.411233	0.024167	0.007874		0.017804	0.351888	0.019497		0.009073	0.017586	0.222571
930	17616	1.019073	0.064283	0.019383		0.043781	0.871158	0.049575		0.022556	0.043413	0.551704
931	17617	0.941318	0.064672	0.017663		0.040453	0.804496	0.046473		0.020524	0.040177	0.51003
932	17618	0.924131	0.069077	0.016994		0.039693	0.790163	0.046633		0.019693	0.039528	0.501446
933	17619	0.904829	0.073316	0.016015		0.03877	0.774593	0.046584		0.018739	0.03881	0.492038
934	17620	0.868521	0.075843	0.014478		0.037075	0.744967	0.04575		0.017406	0.037385	0.473647
935	17621	0.83187	0.077899	0.013685		0.035341	0.715438	0.045005		0.015962	0.035959	0.455274
936	17622	0.728123	0.072807	0.01196		0.030767	0.628346	0.040723		0.01365	0.031623	0.40019
937	17623	0.861945	0.090757	0.015047		0.037417	0.746347	0.04963		0.015785	0.037583	0.475891
938	17624	0.83944	0.09627	0.016687		0.041586	0.732282	0.051526		0.013996	0.036842	0.468023
939	17625	0.606474	0.073217	0.013131		0.032522	0.532033	0.038766		0.00978	0.026713	0.34038
940	17626	0.57629	0.073716	0.013685		0.034227	0.508865	0.038539		0.009979	0.025472	0.325754
941	17627	0.464766	0.062779	0.012159		0.030543	0.413041	0.032611		0.008534	0.020594	0.264447
942	17628	0.482236	0.067538	0.013499		0.03385	0.430609	0.035021		0.009132	0.021402	0.275623
943	17629	0.568148	0.084336	0.017935		0.044447	0.511857	0.044038		0.011355	0.02529	0.327337
944	17630	0.505408	0.079297	0.018623		0.044324	0.459883	0.042223		0.00999	0.022572	0.294296
945	17631	0.897742	0.148114	0.039412		0.088275	0.825612	0.081436		0.017314	0.040253	0.528713
946	17632	0.918688	0.159058	0.047778		0.101309	0.854861	0.091059		0.019101	0.041497	0.54775
947	17633	0.948173	0.173407	0.060392		0.120262	0.896147	0.106124		0.021583	0.043732	0.574476
948	17634	0.889315	0.171087	0.071011		0.129662	0.8551	0.113472		0.022057	0.041982	0.548295
949	17635	0.830993	0.167392	0.082378		0.138981	0.814127	0.122046		0.022216	0.040229	0.522107
950	17636	0.590609	0.123872	0.072013		0.113028	0.590247	0.100754		0.016779	0.029337	0.378715
951	17637	0.413994	0.088431	0.056027		0.084867	0.418157	0.076501		0.01205	0.020833	0.268414
952	17638	0.426332	0.092754	0.065051		0.094832	0.435989	0.086757		0.012747	0.021759	0.280091
953	17639	0.320954	0.070824	0.055122		0.077689	0.332264	0.072121		0.010182	0.01659	0.213704
954	17640	0.774766	0.035051	0.1332		0.026174	0.856342	0.133789		0.010574	0.052993	0.483185
955	17641	1.20868	0.059626	0.02703		0.175271	1.489217	0.209017		0.026335	0.083765	0.826636
956	17642	0.815126	0.037526	0.136229		0.027726	0.906791	0.136025		0.011421	0.056479	0.490975
957	17643	1.248329	0.062754	0.027805		0.193587	1.555007	0.213696		0.029677	0.088704	0.835605
958	17644	0.771621	0.037382	0.12252		0.025735	0.862019	0.122502		0.011083	0.053468	0.451037
959	17645	0.868607	0.044082	0.019189		0.142913	1.090925	0.146256		0.022417	0.0645	0.570476
960	17646	0.960528	0.047802	0.022212		0.148246	1.187735	0.145622		0.024213	0.071167	0.61827
961	17647	0.896345	0.043895	0.021825		0.128908	1.09204	0.12666		0.021932	0.065453	0.569632
962	17648	0.918595	0.044335	0.023729		0.122477	1.103733	0.12061		0.02193	0.066196	0.576649
963	17649	0.940562	0.044836	0.025925		0.115964	1.115468	0.114306		0.022001	0.066919	0.583472
964	17650	0.704353	0.033289	0.021152		0.080017	0.825306	0.078792		0.016177	0.049494	0.431991
965	17651	0.714037	0.033637	0.022272		0.078054	0.83209	0.076764		0.01629	0.04988	0.435631
966	17652	0.992943	0.046555	0.03347		0.099503	1.1448	0.097107		0.022294	0.068518	0.599268
967	17653	1.01336	0.047381	0.036827		0.092999	1.156935	0.089068		0.022415	0.069099	0.605244
968	17654	0.929306	0.043412	0.036393		0.078014	1.051702	0.072156		0.020232	0.062661	0.549621
969	17655	0.628397	0.029364	0.02615		0.048949	0.706716	0.043502		0.013489	0.042021	0.368962
970	17656	0.91789	0.04291	0.039398		0.068838	1.029249	0.059763		0.019564	0.061134	0.537069
971	17657	1.29554	0.060757	0.061804		0.084821	1.44074	0.066159		0.027291	0.085271	0.750191
972	17658	1.172245	0.055264	0.061081		0.06835	1.296853	0.045965		0.024519	0.076531	0.673993
973	17659	1.190968	0.056827	0.067992		0.061232	1.312598	0.031565		0.024262	0.077221	0.68062
974	17660	1.284679	0.062077	0.080594		0.057491	1.412536	0.0226		0.024971	0.082918	0.730345
975	17661	1.303503	0.06386	0.093879		0.048724	1.431786	0.023648		0.023566	0.08371	0.737247
976	17662	1.320863	0.065491	0.107739		0.042857	1.451543	0.035311		0.022439	0.084533	0.744109
977	17663	1.257869	0.063131	0.117644		0.039048	1.384981	0.05604		0.020822	0.080403	0.706071
978	17664	1.151464	0.058261	0.119432		0.034564	1.270963	0.072487		0.018973	0.073599	0.645225
979	17665	1.201605	0.061177	0.138731		0.035658	1.33115	0.100907		0.019856	0.076814	0.673272
980	17666	1.312864	0.066953	0.167683		0.040263	1.461201	0.139091		0.022092	0.083788	0.737685
981	17667	1.219455	0.061705	0.172614		0.041617	1.367903	0.161834		0.022903	0.077269	0.692237
982	17725	1.161022	0.068758	0.118416		0.057574	1.134399	0.011705		0.023163	0.058195	0.750869

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
983	17728	1.004588	0.052588	0.067748		0.099285	0.826369	0.02026		0.050327	0.042745	0.547597
984	17731	1.369861	0.062587	0.057616		0.141587	0.927693	0.043528		0.13681	0.048172	0.615664
985	17733	1.492552	0.066422	0.050925		0.171134	0.927808	0.061136		0.181759	0.048087	0.616206
986	17736	1.668729	0.07762	0.054126		0.213282	0.979153	0.094528		0.225781	0.050491	0.650352
987	17739	1.252185	0.065125	0.049088		0.174842	0.750751	0.094141		0.162579	0.038484	0.498255
988	17742	0.90586	0.059634	0.055417		0.143259	0.624006	0.104565		0.096774	0.031646	0.413392
989	17745	0.98604	0.083836	0.096249		0.176507	0.828258	0.174588		0.08072	0.041596	0.547241
990	17771	1.113437	0.073954	0.111116		0.059366	1.110583	0.011483		0.017545	0.05989	0.686751
991	17797	1.204925	0.075997	0.121903		0.061455	1.189096	0.012427		0.019908	0.062798	0.75949
992	17839	0.894815	0.039043	0.13634		0.024166	0.957272	0.128059		0.020636	0.059172	0.541111
993	17840	1.052502	0.041901	0.130038		0.048906	1.035914	0.108989		0.037879	0.063542	0.585948
994	17841	1.163985	0.042959	0.120707		0.072095	1.070854	0.088501		0.050128	0.064885	0.605955
995	17842	1.061891	0.036641	0.093242		0.075319	0.921777	0.057183		0.053255	0.055091	0.521953
996	17843	1.225328	0.040065	0.09261		0.096645	1.015789	0.044734		0.062659	0.060047	0.575786
997	17844	1.522532	0.046668	0.094755		0.133611	1.193082	0.02979		0.079438	0.06984	0.677344
998	17845	1.445603	0.041832	0.075633		0.130679	1.07658	0.016972		0.082198	0.062576	0.611871
999	17846	1.670065	0.046137	0.072501		0.155983	1.190792	0.017745		0.09976	0.068752	0.677557
1000	17847	1.461199	0.039224	0.054573		0.138572	1.011775	0.026055		0.090107	0.058117	0.575962
1001	17848	1.490464	0.039221	0.04951		0.148547	1.011387	0.03835		0.090175	0.057843	0.575917
1002	17849	1.865307	0.048578	0.055468		0.197622	1.252618	0.061568		0.109955	0.071377	0.713407
1003	17850	1.218206	0.031867	0.032542		0.136706	0.821603	0.05081		0.07107	0.046626	0.467703
1004	17851	0.838906	0.022064	0.02175		0.095943	0.568843	0.037296		0.048586	0.032245	0.323757
1005	17852	1.404046	0.037575	0.034363		0.166908	0.968526	0.070507		0.079694	0.054777	0.550989
1006	17853	1.329602	0.036825	0.031068		0.163484	0.948731	0.076969		0.074306	0.053507	0.53916
1007	17854	1.264577	0.03688	0.028476		0.162502	0.949346	0.084655		0.068863	0.053395	0.538681
1008	17855	1.009824	0.031589	0.02208		0.137647	0.812044	0.078738		0.052244	0.045556	0.459935
1009	17856	0.834477	0.027132	0.018212		0.11713	0.697068	0.069955		0.042017	0.039101	0.394387
1010	17857	1.0584	0.037103	0.022968		0.154435	0.951548	0.10246		0.048083	0.053383	0.53697
1011	17858	1.097022	0.041878	0.02378		0.164272	1.068339	0.122875		0.042379	0.059972	0.60102
1012	17859	0.891523	0.037654	0.019859		0.138924	0.954103	0.116648		0.027192	0.053604	0.534837
1013	17860	0.897289	0.04177	0.02044		0.141573	1.051295	0.13646		0.025021	0.059104	0.586902
1014	17861	0.914744	0.043995	0.021059		0.139953	1.097952	0.139598		0.019407	0.062828	0.593584
1015	17862	0.63801	0.03149	0.014749		0.097395	0.782056	0.097102		0.01503	0.046223	0.41126
1016	17863	0.602262	0.029018	0.014548		0.086078	0.721847	0.084601		0.013035	0.042649	0.380785
1017	17864	0.624376	0.029425	0.01587		0.083226	0.73219	0.080861		0.013187	0.043255	0.387235
1018	17865	0.646602	0.029876	0.017368		0.080244	0.742633	0.076874		0.013767	0.043868	0.393558
1019	17866	0.489066	0.022213	0.014185		0.056417	0.550967	0.05319		0.011411	0.032536	0.292433
1020	17867	0.498894	0.022497	0.014981		0.055575	0.557261	0.051883		0.012105	0.032902	0.295936
1021	17868	0.70275	0.031135	0.022596		0.072108	0.768648	0.06589		0.018337	0.045365	0.40853
1022	17869	0.726689	0.031707	0.024965		0.068556	0.779341	0.06065		0.020216	0.045959	0.414337
1023	17870	0.673948	0.029052	0.024769		0.058372	0.710518	0.049357		0.019854	0.041859	0.377712
1024	17871	0.459215	0.019654	0.017849		0.037111	0.478531	0.029891		0.014086	0.028161	0.254309
1025	17872	0.674244	0.028775	0.026972		0.052616	0.699023	0.041058		0.021079	0.041114	0.371406
1026	17873	0.959237	0.040681	0.04248		0.066857	0.980914	0.045751		0.031742	0.057585	0.520656
1027	17874	0.872382	0.03696	0.042153		0.055709	0.88599	0.031867		0.029681	0.051939	0.469765
1028	17875	0.888486	0.037714	0.047103		0.051878	0.899329	0.021947		0.030324	0.052664	0.476191
1029	17876	0.958808	0.040879	0.056287		0.050633	0.970505	0.015217		0.031806	0.056801	0.512969
1030	17877	0.970905	0.041847	0.066021		0.044567	0.986063	0.015935		0.030019	0.057703	0.51982
1031	17878	0.981017	0.042947	0.076019		0.041902	1.002233	0.024639		0.028579	0.058664	0.526795
1032	17879	0.928818	0.041415	0.083307		0.036675	0.958188	0.039656		0.029094	0.056123	0.501782
1033	17880	0.845268	0.038274	0.084876		0.030748	0.881336	0.051397		0.032155	0.051681	0.460238
1034	17881	0.87428	0.040277	0.098997		0.028335	0.92492	0.07164		0.033976	0.054398	0.481851
1035	17882	0.946634	0.044331	0.120271		0.026149	1.017501	0.099299		0.030894	0.060327	0.529563
1036	17883	0.870873	0.04144	0.125391		0.023006	0.953888	0.115981		0.016494	0.058054	0.497382
1037	17884	0.935949	0.042155	0.139384		0.023421	1.013769	0.129654		0.020535	0.062975	0.549593
1038	17885	0.867175	0.039817	0.02044		0.128333	0.996988	0.119525		0.020082	0.057148	0.5411
1039	17886	0.920951	0.039708	0.021946		0.128492	0.996178	0.11232		0.024823	0.057165	0.542399
1040	17887	0.971893	0.039649	0.023651		0.128237	0.995613	0.10522		0.029737	0.057189	0.543512
1041	17888	0.746811	0.029058	0.018933		0.093311	0.729803	0.071851		0.025445	0.04197	0.399251
1042	17889	0.761587	0.029054	0.019795		0.092681	0.729695	0.069327		0.027422	0.041988	0.399507
1043	17890	1.077775	0.039636	0.029536		0.123517	0.994842	0.086958		0.04265	0.05732	0.545403
1044	17891	1.111428	0.039683	0.032217		0.119444	0.994756	0.079035		0.047708	0.0574	0.545854
1045	17892	1.024997	0.035785	0.031593		0.102662	0.89539	0.063604		0.046997	0.051722	0.491551
1046	17893	0.693584	0.023905	0.022549		0.065524	0.597077	0.038181		0.033269	0.034516	0.327818
1047	17894	1.007765	0.034569	0.033719		0.092502	0.862589	0.052013		0.049346	0.049887	0.473585
1048	17895	1.413014	0.048068	0.052491		0.118655	1.195328	0.057111		0.073633	0.069213	0.656008
1049	17896	1.258851	0.042875	0.051359		0.099417	1.063493	0.039249		0.068129	0.061654	0.583275
1050	17897	1.252865	0.043019	0.056636		0.094737	1.064641	0.02663		0.068322	0.061842	0.583393
1051	17898	1.316763	0.045847	0.067498		0.096953	1.132622	0.017277		0.06952	0.065951	0.619902
1052	17899	1.293936	0.045992	0.077956		0.092741	1.13454	0.018165		0.063235	0.066301	0.619819

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1053	17900	1.268717	0.046129	0.08847		0.086073	1.13654	0.028238		0.056911	0.06668	0.619644
1054	17901	1.162292	0.043584	0.095682		0.071442	1.072189	0.045793		0.05638	0.063266	0.58306
1055	17902	1.026375	0.039637	0.096337		0.056999	0.973631	0.058482		0.060562	0.057811	0.528493
1056	17903	1.026324	0.041243	0.111156		0.049078	1.009549	0.080715		0.059428	0.060661	0.547197
1057	17904	1.066855	0.045364	0.133721		0.040459	1.096243	0.110703		0.049332	0.067029	0.593977
1058	17947	1.122366	0.066874	0.015501		0.356321	0.786468	0.036302		0.178448	0.036575	0.557309
1059	17950	1.275166	0.087745	0.015702		0.440239	0.886346	0.062259		0.199738	0.042092	0.627685
1060	17952	1.309226	0.096083	0.022566		0.468493	0.888144	0.078534		0.226789	0.04273	0.628514
1061	17955	1.363793	0.112382	0.042736		0.475731	0.93873	0.108103		0.26087	0.04601	0.663273
1062	17958	0.984726	0.091703	0.051498		0.311665	0.719165	0.099452		0.172112	0.0358	0.506981
1063	17961	0.768933	0.080405	0.066449		0.180306	0.597155	0.100693		0.091202	0.030209	0.418848
1064	17964	0.946112	0.109794	0.120299		0.158661	0.793597	0.155959		0.071329	0.040536	0.553113
1065	18060	0.70037	0.094755	0.143686		0.122085	0.582053	0.072941		0.076669	0.088524	0.381012
1066	18061	1.223713	0.109329	0.317614		0.276554	0.744171	0.173711		0.162496	0.090238	0.572997
1067	18062	1.249599	0.091481	0.464403		0.403193	0.762527	0.23656		0.258366	0.056573	0.664738
1068	18063	1.274166	0.072475	0.595914		0.511837	0.795133	0.291893		0.264053	0.047271	0.699626
1069	18064	1.872871	0.121687	0.784054		0.792045	1.033211	0.392453		0.398677	0.062822	0.892916
1070	18065	1.588684	0.128201	0.526391		0.658648	0.841014	0.290372		0.297521	0.083654	0.674212
1071	18066	1.690334	0.149905	0.511054		0.652062	0.858581	0.240916		0.25423	0.110095	0.651196
1072	18067	1.644836	0.159834	0.406575		0.496962	0.870063	0.161655		0.19032	0.128644	0.577305
1073	18068	1.002733	0.138496	0.183886		0.24681	0.747314	0.064479		0.107771	0.111652	0.441296
1074	18069	0.744788	0.126658	0.182704		0.118146	0.618792	0.113594		0.075279	0.123715	0.432364
1075	18070	1.301156	0.144729	0.432466		0.267411	0.797581	0.27695		0.155807	0.131145	0.742273
1076	18071	1.334196	0.116508	0.579798		0.386863	0.822237	0.378076		0.254234	0.07657	0.884831
1077	18072	1.298615	0.081775	0.714806		0.496658	0.863	0.457195		0.25106	0.04668	0.974885
1078	18073	1.946887	0.125864	0.978071		0.79159	1.126492	0.621666		0.399961	0.132155	1.204489
1079	18074	1.695547	0.13951	0.814617		0.654876	0.911915	0.460967		0.294943	0.16097	0.917612
1080	18075	1.793467	0.169508	0.776968		0.651155	0.92985	0.380272		0.24401	0.191049	0.821219
1081	18076	1.73739	0.186494	0.595235		0.502468	0.940237	0.253823		0.185088	0.206624	0.663026
1082	18077	1.103045	0.162688	0.2572		0.272065	0.805773	0.105115		0.114529	0.177942	0.46744
1083	18078	0.822604	0.139069	0.208552		0.117759	0.679775	0.131117		0.074588	0.152265	0.502183
1084	18079	1.427208	0.155809	0.530759		0.265282	0.87555	0.317747		0.154339	0.162194	0.889126
1085	18080	1.469427	0.120413	0.785247		0.38573	0.907123	0.43794		0.205711	0.102332	1.091117
1086	18081	1.364874	0.078335	0.972588		0.492735	0.957829	0.52249		0.240802	0.055967	1.251642
1087	18082	2.138535	0.122196	1.252328		0.80395	1.252314	0.684575		0.411347	0.134526	1.516171
1088	18083	1.865439	0.147837	0.903329		0.670814	1.013162	0.515683		0.297756	0.190843	1.194707
1089	18084	1.958154	0.185594	0.838503		0.658645	1.028896	0.434156		0.247852	0.245719	0.975205
1090	18085	1.883514	0.202995	0.624315		0.534394	1.037119	0.302005		0.195052	0.27418	0.739962
1091	18086	1.247025	0.177018	0.26094		0.305482	0.889321	0.128055		0.113663	0.236644	0.497161
1092	18087	0.880827	0.114475	0.193406		0.114777	0.725229	0.143299		0.072874	0.165604	0.508025
1093	18088	1.524289	0.12953	0.51576		0.257976	0.936735	0.313118		0.154238	0.173123	0.954682
1094	18089	1.576037	0.097914	0.785921		0.385118	0.976037	0.374307		0.18581	0.108128	1.214322
1095	18090	1.456772	0.068542	0.987347		0.481447	1.033601	0.382315		0.225521	0.061252	1.412485
1096	18091	2.323239	0.114242	1.290729		0.808369	1.351421	0.471707		0.415521	0.172293	1.79081
1097	18092	2.003172	0.145818	0.876884		0.676494	1.085683	0.354688		0.295357	0.209484	1.279773
1098	18093	2.102782	0.189737	0.651493		0.662808	1.091564	0.308858		0.252351	0.256838	1.042061
1099	18094	2.011504	0.21363	0.443183		0.563224	1.090775	0.23692		0.205486	0.279833	0.769379
1100	18095	1.361017	0.189559	0.18565		0.330687	0.930794	0.109813		0.134806	0.243618	0.521698
1101	18096	0.928106	0.095639	0.14421		0.110997	0.767069	0.130912		0.071246	0.177252	0.507354
1102	18097	1.603833	0.10448	0.361909		0.249326	0.989328	0.269854		0.147529	0.185035	0.987408
1103	18098	1.665625	0.081067	0.504389		0.377204	1.030144	0.305902		0.183721	0.109977	1.280295
1104	18099	1.552467	0.068677	0.585026		0.467568	1.090809	0.304871		0.206911	0.067264	1.49378
1105	18100	2.482335	0.122307	0.742905		0.808598	1.421848	0.373683		0.41517	0.177454	1.957233
1106	18101	2.123259	0.115126	0.525885		0.676299	1.132162	0.324037		0.290549	0.230444	1.300254
1107	18102	2.232596	0.142082	0.422892		0.661667	1.131638	0.317045		0.253961	0.286528	1.050803
1108	18103	2.188041	0.158891	0.302273		0.585713	1.125723	0.268582		0.220655	0.31868	0.950109
1109	18104	1.461217	0.141761	0.125309		0.35397	0.959158	0.123926		0.161672	0.274991	0.614337
1110	18105	0.973219	0.089436	0.178181		0.111601	0.802347	0.158461		0.070487	0.187636	0.478883
1111	18106	1.675714	0.096104	0.396928		0.244378	1.033608	0.346228		0.135702	0.193903	1.043564
1112	18107	1.746511	0.080739	0.475192		0.36351	1.076845	0.422672		0.159226	0.101857	1.392165
1113	18108	1.640033	0.079426	0.460683		0.458875	1.140038	0.445764		0.1998	0.07367	1.624313
1114	18109	2.618322	0.104076	0.559953		0.810798	1.482893	0.539404		0.414214	0.212746	2.045018
1115	18110	2.234511	0.099835	0.449387		0.684603	1.176435	0.492718		0.289844	0.255995	1.387733
1116	18111	2.353701	0.124267	0.413201		0.673566	1.169743	0.478329		0.257071	0.306728	1.277653
1117	18112	2.342378	0.145795	0.297992		0.600311	1.160071	0.344201		0.243716	0.324314	1.116599
1118	18113	1.605739	0.133749	0.117441		0.379505	0.98655	0.152298		0.189203	0.287249	0.68707
1119	18114	1.006299	0.122559	0.26961		0.109258	0.819943	0.172187		0.070147	0.190448	0.503773
1120	18115	1.728401	0.130873	0.609842		0.240594	1.056754	0.386607		0.13528	0.198698	1.030924
1121	18116	1.807303	0.109943	0.779674		0.342874	1.104353	0.463767		0.161053	0.106957	1.421878
1122	18117	1.710732	0.078972	0.872508		0.442537	1.17232	0.510334		0.200833	0.080877	1.67583

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1123	18118	2.725192	0.10849	1.08297		0.802491	1.531845	0.641617		0.407382	0.203982	2.159637
1124	18119	2.326504	0.131999	0.783728		0.686221	1.216466	0.532756		0.284625	0.252109	1.428844
1125	18120	2.457799	0.172912	0.643589		0.690272	1.209204	0.528213		0.258746	0.304661	1.394811
1126	18121	2.471622	0.199221	0.419038		0.611932	1.195299	0.387861		0.266891	0.329858	1.218672
1127	18122	1.734272	0.178564	0.163315		0.406224	1.013484	0.168741		0.216482	0.296343	0.718151
1128	18123	1.025597	0.150213	0.21636		0.105994	0.82277	0.161236		0.069121	0.182447	0.513797
1129	18124	1.758554	0.169897	0.515801		0.236972	1.063187	0.34305		0.132277	0.190925	1.011262
1130	18125	1.842631	0.126096	0.74552		0.333894	1.114589	0.397985		0.17045	0.115977	1.369109
1131	18126	1.754549	0.06726	0.908108		0.447303	1.188051	0.377581		0.199257	0.082032	1.629286
1132	18127	2.78588	0.100489	1.168844		0.787704	1.558333	0.465596		0.397111	0.208874	2.141721
1133	18128	2.389281	0.128525	0.822979		0.683782	1.243174	0.392872		0.276986	0.251686	1.425156
1134	18129	2.529094	0.166808	0.676825		0.701929	1.24065	0.410342		0.261422	0.315751	1.418317
1135	18130	2.555202	0.201046	0.471939		0.625781	1.229534	0.329368		0.285897	0.3683	1.225864
1136	18131	1.824647	0.185367	0.192479		0.426754	1.044025	0.157653		0.24147	0.333367	0.726979
1137	18132	1.035523	0.128345	0.188206		0.105581	0.821514	0.180546		0.067433	0.222299	0.528135
1138	18133	1.773877	0.139613	0.459972		0.235363	1.062362	0.371439		0.124929	0.237957	1.001139
1139	18134	1.861867	0.095115	0.628412		0.335783	1.115909	0.407971		0.145694	0.147934	1.365669
1140	18135	1.782219	0.067941	0.710534		0.454235	1.192085	0.380081		0.194355	0.078	1.699003
1141	18136	2.814065	0.108621	0.856276		0.79655	1.568143	0.435806		0.380449	0.196134	2.263802
1142	18137	2.435246	0.103638	0.573944		0.6902	1.256134	0.375963		0.265003	0.273361	1.627642
1143	18138	2.5826	0.114994	0.448268		0.726887	1.259281	0.359006		0.279941	0.365848	1.322303
1144	18139	2.613363	0.126576	0.284711		0.64173	1.252847	0.311552		0.305341	0.421554	1.147992
1145	18140	1.899609	0.116293	0.11336		0.443577	1.066487	0.143874		0.271454	0.375482	0.69774
1146	18141	1.032598	0.053941	0.115217		0.104767	0.822117	0.177889		0.065027	0.229705	0.54369
1147	18142	1.769278	0.065197	0.263917		0.230315	1.061914	0.37362		0.116216	0.247246	0.977617
1148	18143	1.85953	0.067248	0.317443		0.331428	1.111511	0.422434		0.12715	0.154882	1.422362
1149	18144	1.786627	0.075092	0.332482		0.458611	1.181658	0.480039		0.18806	0.076001	1.770973
1150	18145	2.800664	0.11393	0.450441		0.808538	1.548822	0.616673		0.361369	0.184201	2.369007
1151	18146	2.448624	0.085685	0.397335		0.714294	1.2422	0.493565		0.25178	0.281547	1.713059
1152	18147	2.602516	0.091693	0.38585		0.755891	1.245864	0.461036		0.293714	0.380358	1.359999
1153	18148	2.641599	0.104174	0.275792		0.674994	1.243119	0.367927		0.320262	0.440577	1.062075
1154	18149	1.940782	0.094291	0.106395		0.459293	1.059648	0.163952		0.297032	0.393156	0.65266
1155	18150	1.019384	0.103166	0.166694		0.105919	0.827406	0.128961		0.061476	0.20008	0.565223
1156	18151	1.747367	0.119945	0.415902		0.222726	1.062743	0.277469		0.106799	0.21524	0.907459
1157	18152	1.839446	0.091229	0.627126		0.324407	1.101343	0.363303		0.138186	0.13513	1.225306
1158	18153	1.773216	0.076759	0.800723		0.461649	1.160235	0.434337		0.180482	0.066997	1.531618
1159	18154	2.771265	0.118621	1.102361		0.837458	1.504719	0.621116		0.336485	0.178793	2.060065
1160	18155	2.437759	0.141161	0.81185		0.750777	1.201681	0.497619		0.235018	0.254296	1.540755
1161	18156	2.599812	0.188984	0.649662		0.785601	1.203983	0.453323		0.30712	0.340832	1.266649
1162	18157	2.645441	0.219914	0.418905		0.709467	1.200644	0.344606		0.336023	0.396907	0.99862
1163	18158	1.963744	0.197798	0.161926		0.483355	1.024511	0.15033		0.321682	0.35804	0.620304
1164	18159	0.983259	0.108765	0.204266		0.111804	0.815697	0.086323		0.057071	0.160309	0.567022
1165	18160	1.690855	0.124333	0.513636		0.231409	1.043602	0.197732		0.099065	0.172458	0.938148
1166	18161	1.785	0.102943	0.743969		0.333966	1.06937	0.259832		0.133863	0.109498	1.13503
1167	18162	1.723619	0.082476	0.921617		0.458002	1.114049	0.299997		0.171506	0.06484	1.447837
1168	18163	2.694314	0.149714	1.219659		0.887092	1.430545	0.406916		0.308496	0.162956	2.047747
1169	18164	2.378413	0.17509	0.856996		0.787926	1.137092	0.340064		0.218522	0.224458	1.450332
1170	18165	2.548634	0.219881	0.708259		0.808384	1.140658	0.329235		0.314223	0.29698	1.165517
1171	18166	2.591601	0.244313	0.489911		0.728923	1.138674	0.248028		0.344937	0.344397	0.936053
1172	18167	1.942871	0.214278	0.195864		0.496373	0.97201	0.111453		0.334082	0.30976	0.586479
1173	18168	0.934038	0.090201	0.187981		0.115838	0.787671	0.109677		0.052441	0.155869	0.552447
1174	18169	1.612224	0.102256	0.443614		0.242635	1.006857	0.243778		0.092438	0.171995	0.939128
1175	18170	1.698236	0.0985	0.563216		0.349327	1.022488	0.314216		0.103391	0.112217	1.169251
1176	18171	1.649546	0.086141	0.642193		0.474109	1.058035	0.375253		0.16108	0.062221	1.420626
1177	18172	2.581605	0.144101	0.942953		0.920629	1.355639	0.489591		0.283732	0.179233	1.986994
1178	18173	2.288118	0.147657	0.846153		0.81436	1.07635	0.382319		0.22137	0.21437	1.449811
1179	18174	2.46848	0.166703	0.801407		0.829954	1.080928	0.336057		0.318035	0.264732	1.189225
1180	18175	2.50009	0.173767	0.593863		0.74105	1.079958	0.241817		0.35223	0.301996	0.87505
1181	18176	1.899764	0.159393	0.243881		0.503614	0.919264	0.105626		0.339983	0.264487	0.544401
1182	18177	0.876611	0.07426	0.155132		0.117912	0.740207	0.128854		0.048004	0.151229	0.52703
1183	18178	1.520837	0.08483	0.35665		0.248433	0.950177	0.293331		0.0856	0.170312	0.923741
1184	18179	1.618501	0.072753	0.428974		0.363749	0.963122	0.403989		0.117528	0.112536	1.206609
1185	18180	1.559434	0.075194	0.477185		0.492656	0.99511	0.465208		0.149468	0.066932	1.471975
1186	18181	2.449455	0.115009	0.724599		0.937064	1.281836	0.569697		0.260344	0.183908	1.973992
1187	18182	2.177219	0.10161	0.695141		0.824365	1.023605	0.371933		0.222669	0.224025	1.43343
1188	18183	2.366776	0.103589	0.703174		0.838724	1.036292	0.298478		0.316863	0.27717	1.241862
1189	18184	2.382726	0.132566	0.545337		0.74298	1.041877	0.21174		0.363934	0.305954	0.886014
1190	18185	1.831282	0.129688	0.231118		0.50248	0.885559	0.103435		0.340382	0.270618	0.502935
1191	18186	0.857641	0.085764	0.152236		0.128142	0.723322	0.141283		0.045855	0.156099	0.510319
1192	18187	1.479874	0.086881	0.333404		0.265477	0.92282	0.316604		0.101266	0.17314	0.88157

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1193	18188	1.587582	0.060472	0.398613		0.396425	0.934626	0.405315		0.138854	0.117728	1.219314
1194	18189	1.519447	0.064731	0.420012		0.532781	0.967095	0.455648		0.142036	0.076604	1.50469
1195	18190	2.369981	0.103518	0.560971		0.974299	1.247916	0.564636		0.242414	0.178012	2.050074
1196	18191	2.128187	0.090999	0.523623		0.854832	1.009615	0.370824		0.229815	0.226535	1.429457
1197	18192	2.331471	0.102756	0.553124		0.868614	1.033291	0.266656		0.323664	0.275479	1.29209
1198	18193	2.328856	0.125946	0.471653		0.765652	1.047552	0.18515		0.383806	0.305405	0.996588
1199	18194	1.820018	0.117737	0.241726		0.517194	0.895862	0.098712		0.353388	0.273687	0.591198
1200	18195	0.825251	0.128513	0.242318		0.141733	0.685189	0.129418		0.041971	0.163734	0.461315
1201	18196	1.404391	0.135874	0.542939		0.29098	0.87119	0.288444		0.082535	0.184175	0.829718
1202	18197	1.520242	0.097759	0.693834		0.43328	0.88117	0.340937		0.111827	0.130476	1.179772
1203	18198	1.449815	0.081265	0.842325		0.581976	0.911745	0.34686		0.129364	0.101708	1.460131
1204	18199	2.225828	0.155681	1.196346		1.019505	1.175267	0.450383		0.238604	0.197554	2.014982
1205	18200	2.034814	0.161268	0.862483		0.90333	0.965947	0.335907		0.236447	0.208272	1.520335
1206	18201	2.255067	0.172165	0.736211		0.916627	0.998948	0.315216		0.329666	0.27043	1.393217
1207	18202	2.223326	0.188575	0.665708		0.794801	1.019341	0.310527		0.407485	0.311155	1.165927
1208	18203	1.779996	0.171407	0.422409		0.533774	0.876709	0.234053		0.373974	0.277361	0.747875
1209	18204	0.778366	0.123822	0.292475		0.151772	0.647361	0.087864		0.036828	0.168427	0.420585
1210	18205	1.303617	0.132284	0.687525		0.313052	0.819319	0.183361		0.070595	0.192718	0.732947
1211	18206	1.421305	0.109957	0.892216		0.459483	0.825091	0.236194		0.136008	0.140574	1.067365
1212	18207	1.355095	0.097949	1.007371		0.621546	0.849674	0.256834		0.135766	0.118682	1.324839
1213	18208	2.040972	0.216044	1.37833		1.055022	1.090834	0.427491		0.222462	0.192596	1.763911
1214	18209	1.910452	0.235971	1.043963		0.94262	0.90051	0.421379		0.239149	0.187531	1.441125
1215	18210	2.141031	0.27063	0.78064		0.953204	0.933281	0.437728		0.330702	0.236836	1.391528
1216	18211	2.09736	0.275448	0.669494		0.818637	0.956846	0.423911		0.424442	0.28091	1.20656
1217	18212	1.706962	0.230007	0.456925		0.541747	0.825929	0.339416		0.388672	0.259981	0.827785
1218	18213	0.700364	0.112497	0.285854		0.157489	0.591695	0.102349		0.032243	0.132269	0.374804
1219	18214	1.150771	0.098732	0.673719		0.331008	0.750457	0.232462		0.082845	0.15385	0.627828
1220	18215	1.263516	0.076065	0.852878		0.478682	0.75396	0.318227		0.225216	0.117816	0.839628
1221	18216	1.226539	0.098015	0.932054		0.653537	0.770932	0.379571		0.139073	0.100337	0.986413
1222	18217	1.775462	0.205389	1.072142		1.099275	0.980677	0.531638		0.218789	0.151584	1.399805
1223	18218	1.719395	0.218174	0.801018		0.980756	0.801118	0.480716		0.237219	0.13185	1.180056
1224	18219	1.985162	0.249908	0.741782		0.974528	0.825088	0.452594		0.324574	0.149821	1.175763
1225	18220	1.971363	0.257442	0.594484		0.827154	0.841403	0.407186		0.433894	0.178542	1.051484
1226	18221	1.576489	0.21718	0.504021		0.5388	0.723807	0.327179		0.395123	0.165738	0.740369
1227	18222	0.640438	0.08546	0.206122		0.161505	0.547569	0.092045		0.030445	0.085902	0.348697
1228	18223	1.02675	0.078221	0.459605		0.345436	0.694084	0.19597		0.080618	0.09602	0.513419
1229	18224	1.132738	0.060114	0.559629		0.497565	0.696886	0.267361		0.20853	0.075862	0.577067
1230	18225	1.168932	0.073417	0.582727		0.679936	0.713088	0.322674		0.138764	0.076498	0.668527
1231	18226	1.623125	0.142073	0.666913		1.129784	0.905807	0.446263		0.220283	0.115219	0.974764
1232	18227	1.566285	0.143818	0.547986		1.010268	0.731392	0.366712		0.236133	0.096154	0.836282
1233	18228	1.860391	0.159471	0.574179		0.991207	0.746801	0.35057		0.319556	0.098852	0.843571
1234	18229	1.891412	0.163659	0.50681		0.832581	0.757934	0.289187		0.441024	0.112709	0.778743
1235	18230	1.473249	0.138133	0.412027		0.536882	0.651649	0.220207		0.39921	0.103975	0.599715
1236	18286	0.414591	0.047037	0.126031		0.050649	0.422136	0.095152		0.025125	0.041418	0.311108
1237	18287	0.589053	0.055165	0.184502		0.085348	0.518228	0.121514		0.049998	0.047475	0.399413
1238	18288	0.645552	0.051831	0.216778		0.094279	0.509894	0.129562		0.040657	0.043015	0.404968
1239	18289	0.817318	0.055235	0.288539		0.111789	0.602751	0.171215		0.050105	0.045313	0.48769
1240	18290	0.674785	0.047811	0.223062		0.093085	0.51783	0.1451		0.040751	0.040081	0.396164
1241	18291	0.570369	0.051727	0.150843		0.083035	0.511557	0.120062		0.029853	0.043402	0.346407
1242	18292	0.368538	0.040601	0.060617		0.052868	0.387882	0.071463		0.037271	0.034237	0.231971
1243	18293	0.430852	0.064979	0.24084		0.071044	0.414675	0.157189		0.047418	0.051974	0.399456
1244	18294	0.582457	0.074901	0.338167		0.113801	0.509115	0.247816		0.077341	0.058738	0.572826
1245	18295	0.615016	0.069775	0.389695		0.122603	0.503172	0.289899		0.049998	0.051107	0.609993
1246	18296	0.783274	0.081247	0.471106		0.148378	0.599086	0.376604		0.063394	0.054805	0.722984
1247	18297	0.647355	0.065683	0.34129		0.116395	0.520586	0.305853		0.055752	0.058174	0.570917
1248	18298	0.55957	0.063639	0.214953		0.094557	0.520075	0.235288		0.041285	0.069955	0.461642
1249	18299	0.371723	0.051895	0.082601		0.055611	0.399053	0.117212		0.061925	0.057056	0.275066
1250	18300	0.431959	0.068742	0.291375		0.099131	0.385201	0.167408		0.062619	0.047888	0.406401
1251	18301	0.572258	0.082238	0.384173		0.143615	0.47493	0.279554		0.075519	0.054506	0.587316
1252	18302	0.590923	0.074719	0.372516		0.155382	0.46996	0.327532		0.070596	0.047603	0.624352
1253	18303	0.720849	0.085304	0.38926		0.186518	0.563309	0.422581		0.091365	0.053298	0.754006
1254	18304	0.599418	0.073691	0.289025		0.141825	0.490702	0.34023		0.076086	0.059717	0.598043
1255	18305	0.532711	0.070237	0.200008		0.105488	0.491365	0.260346		0.05291	0.07201	0.471855
1256	18306	0.359964	0.051427	0.076329		0.05746	0.376167	0.129532		0.059134	0.058516	0.276307
1257	18307	0.435078	0.06406	0.226221		0.123016	0.364091	0.116048		0.072998	0.036184	0.335012
1258	18308	0.566643	0.075632	0.301119		0.169909	0.449617	0.188772		0.089247	0.042042	0.450833
1259	18309	0.584128	0.070138	0.291897		0.185755	0.44516	0.223771		0.089797	0.037856	0.470718
1260	18310	0.695392	0.078398	0.298788		0.218191	0.53087	0.291756		0.116405	0.039552	0.56525
1261	18311	0.568051	0.067576	0.232935		0.162842	0.459727	0.23574		0.091459	0.040784	0.457233
1262	18312	0.515375	0.066163	0.153964		0.115593	0.457991	0.190426		0.06042	0.047836	0.387538

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1263	18313	0.353714	0.049869	0.05431		0.060006	0.34916	0.103878		0.034551	0.038655	0.244817
1264	18321	0.422015	0.030719	0.060166		0.026845	0.421498	0.032553		0.018635	0.034527	0.208482
1265	18322	0.618962	0.035545	0.124235		0.050602	0.525143	0.046456		0.036121	0.041606	0.280284
1266	18323	0.675118	0.029655	0.162548		0.061537	0.516832	0.055663		0.042553	0.038562	0.280591
1267	18324	0.863288	0.025534	0.221171		0.07742	0.617263	0.074654		0.051734	0.040724	0.338494
1268	18325	0.70118	0.023058	0.167523		0.071917	0.523396	0.059117		0.041385	0.030733	0.284056
1269	18326	0.583667	0.026653	0.109738		0.06544	0.513097	0.050757		0.034004	0.027232	0.270321
1270	18327	0.357423	0.021446	0.042854		0.043523	0.380274	0.035716		0.016672	0.019896	0.191284
1271	18328	0.452953	0.041995	0.073968		0.028268	0.468809	0.049652		0.023126	0.053196	0.236575
1272	18329	0.653814	0.045085	0.225573		0.055507	0.579847	0.119072		0.040034	0.061812	0.34098
1273	18330	0.716952	0.036867	0.30359		0.061728	0.570943	0.15248		0.048429	0.05339	0.366119
1274	18331	0.918577	0.029888	0.413631		0.07405	0.678825	0.203032		0.056853	0.046857	0.464338
1275	18332	0.741239	0.034668	0.315546		0.066679	0.579863	0.155191		0.046812	0.030562	0.376119
1276	18333	0.615789	0.045031	0.208251		0.0582	0.569944	0.108682		0.035686	0.030262	0.330269
1277	18334	0.384497	0.037512	0.079795		0.039569	0.427413	0.045872		0.020964	0.023034	0.219812
1278	18335	0.479098	0.046582	0.089667		0.028369	0.506042	0.084528		0.029282	0.076001	0.275181
1279	18336	0.684241	0.049153	0.264738		0.055477	0.624239	0.2221		0.041328	0.085299	0.427735
1280	18337	0.753416	0.038898	0.356416		0.060225	0.616583	0.288813		0.05314	0.070313	0.485869
1281	18338	0.965671	0.034625	0.483929		0.072185	0.734566	0.386498		0.062548	0.05418	0.620414
1282	18339	0.775972	0.042751	0.370938		0.060653	0.632872	0.301289		0.053774	0.033055	0.501061
1283	18340	0.64346	0.05539	0.246409		0.053045	0.625479	0.211708		0.035667	0.033936	0.410348
1284	18341	0.40801	0.046017	0.095843		0.037542	0.474041	0.086852		0.021438	0.028338	0.25921
1285	18342	0.498308	0.033415	0.052985		0.027049	0.530698	0.121391		0.035447	0.094784	0.306737
1286	18343	0.708682	0.038173	0.153178		0.048118	0.652973	0.328448		0.044945	0.105719	0.51318
1287	18344	0.780635	0.032359	0.20219		0.057007	0.647528	0.430607		0.056042	0.085507	0.584533
1288	18345	0.997317	0.03817	0.269708		0.06875	0.775626	0.578713		0.067491	0.060202	0.757462
1289	18346	0.803484	0.038831	0.209008		0.056353	0.673668	0.454232		0.058368	0.033939	0.600461
1290	18347	0.665649	0.045278	0.146919		0.049586	0.66947	0.321679		0.037864	0.039348	0.488507
1291	18348	0.426835	0.036608	0.060422		0.034979	0.511228	0.137122		0.020334	0.0339	0.295233
1292	18349	0.50403	0.045704	0.072363		0.023619	0.531528	0.15508		0.028795	0.103675	0.322508
1293	18350	0.719686	0.051563	0.202106		0.042695	0.657568	0.427813		0.049656	0.114099	0.568296
1294	18351	0.789818	0.044137	0.261074		0.051074	0.657609	0.564748		0.057242	0.09233	0.653765
1295	18352	1.004521	0.040397	0.33082		0.063004	0.798836	0.760347		0.072785	0.064164	0.873169
1296	18353	0.815533	0.029996	0.238158		0.052577	0.701364	0.596475		0.060482	0.034138	0.678911
1297	18354	0.675358	0.03353	0.146134		0.043586	0.702502	0.433745		0.044421	0.037568	0.540411
1298	18355	0.434976	0.027461	0.054534		0.028938	0.537491	0.185054		0.024487	0.03773	0.314374
1299	18356	0.50693	0.059148	0.111066		0.022726	0.527344	0.17804		0.028877	0.115825	0.342776
1300	18357	0.727422	0.065318	0.30938		0.043855	0.653812	0.49404		0.054482	0.12551	0.648296
1301	18358	0.794587	0.053872	0.402762		0.045506	0.658002	0.653417		0.061028	0.095912	0.76891
1302	18359	1.005571	0.043598	0.519819		0.058765	0.808571	0.881421		0.079367	0.065941	0.972569
1303	18360	0.82434	0.033859	0.385608		0.04994	0.715456	0.702818		0.062145	0.03325	0.759451
1304	18361	0.682623	0.044498	0.246972		0.042358	0.720798	0.527951		0.049756	0.042975	0.586872
1305	18362	0.441222	0.037499	0.093722		0.026486	0.553159	0.227475		0.028671	0.0428	0.333973
1306	18363	0.506208	0.045536	0.075306		0.025616	0.521222	0.192562		0.031665	0.116306	0.358826
1307	18364	0.730534	0.052461	0.203373		0.043695	0.647932	0.535596		0.058083	0.126019	0.737962
1308	18365	0.794722	0.046293	0.260335		0.040273	0.652841	0.718148		0.067785	0.096541	0.882613
1309	18366	1.002418	0.042935	0.334458		0.057518	0.809834	0.994031		0.08829	0.066155	1.118154
1310	18367	0.828703	0.035605	0.248212		0.048537	0.722054	0.809415		0.069628	0.037335	0.853623
1311	18368	0.685823	0.037346	0.162685		0.04185	0.73153	0.606705		0.054068	0.052866	0.622194
1312	18369	1.212853	0.058052	0.246109		0.042126	1.34645	0.193486		0.024896	0.075997	0.764999
1313	18370	1.261672	0.060072	0.329235		0.042071	1.379309	0.233885		0.025443	0.077178	0.856284
1314	18371	1.228682	0.058278	0.390171		0.040769	1.321628	0.27077		0.024927	0.074511	0.89579
1315	18372	1.278575	0.060678	0.462142		0.04385	1.355638	0.336292		0.025989	0.076613	0.986264
1316	18373	1.011093	0.047672	0.396203		0.03522	1.06359	0.287771		0.020543	0.060907	0.800832
1317	18374	1.368887	0.063883	0.641758		0.048918	1.41594	0.446027		0.027686	0.082129	1.137942
1318	18375	1.375418	0.066218	0.73932		0.050005	1.398401	0.495072		0.027542	0.081619	1.185864
1319	18376	1.757669	0.088358	1.048669		0.064542	1.755559	0.678684		0.034643	0.10173	1.553823
1320	18377	1.387162	0.073512	0.886936		0.051106	1.360684	0.554863		0.026782	0.0797	1.238139
1321	18378	1.392378	0.076411	0.92641		0.051213	1.340374	0.563279		0.027336	0.078315	1.240687
1322	18379	1.397166	0.078783	0.939289		0.051101	1.319084	0.557398		0.028037	0.076494	1.228812
1323	18380	1.78308	0.102235	1.189197		0.064674	1.650035	0.684205		0.036442	0.093865	1.531803
1324	18381	1.405254	0.082671	0.89649		0.050462	1.273404	0.500085		0.029334	0.07205	1.162856
1325	18382	1.536491	0.092039	0.904323		0.054618	1.362531	0.490312		0.033017	0.07584	1.211889
1326	18383	1.986839	0.121122	1.001015		0.069854	1.716335	0.525975		0.043873	0.092765	1.461156
1327	18384	1.541813	0.095872	0.612308		0.053746	1.298432	0.313454		0.034685	0.068565	1.049124
1328	18385	1.542921	0.097694	0.415978		0.053454	1.266188	0.207456		0.03515	0.064668	0.960838
1329	18386	1.285898	0.083016	0.157965		0.044385	1.028126	0.075909		0.02951	0.050403	0.725177
1330	18387	0.373746	0.074127	0.05682		0.090104	0.399879	0.071217		0.011846	0.020045	0.248956
1331	18388	0.432258	0.078713	0.057839		0.102849	0.478251	0.068818		0.013662	0.024243	0.288323
1332	18389	0.490391	0.082107	0.053858		0.113544	0.565839	0.060387		0.015601	0.02915	0.328039

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1333	18390	0.448728	0.071244	0.039499		0.100271	0.538473	0.04135		0.014313	0.028158	0.301428
1334	18391	0.301339	0.046258	0.025121		0.065463	0.370943	0.022086		0.009606	0.019763	0.203057
1335	18392	0.236493	0.035465	0.019032		0.050202	0.296535	0.014348		0.007541	0.01601	0.159795
1336	18393	0.312971	0.046063	0.024585		0.065118	0.39832	0.016796		0.009984	0.021706	0.211991
1337	18394	0.457006	0.064995	0.034441		0.091304	0.597735	0.020418		0.014542	0.033121	0.311088
1338	18395	0.394217	0.054034	0.027706		0.075269	0.529433	0.014173		0.012485	0.030166	0.269455
1339	18396	0.347795	0.046367	0.023136		0.063935	0.476437	0.010565		0.010954	0.027678	0.238509
1340	18397	0.347257	0.045077	0.021942		0.061388	0.484756	0.01004		0.010862	0.02861	0.238893
1341	18398	0.377786	0.047767	0.022605		0.064129	0.536971	0.011254		0.011691	0.032124	0.260649
1342	18399	0.30674	0.03782	0.017354		0.049976	0.443088	0.009414		0.00936	0.026969	0.211841
1343	18400	0.239657	0.029013	0.013041		0.037768	0.350437	0.007539		0.007226	0.021585	0.165603
1344	18401	0.266733	0.031835	0.013997		0.040929	0.393771	0.008607		0.007929	0.024453	0.184375
1345	18402	0.314853	0.036802	0.015448		0.046303	0.471476	0.010658		0.009165	0.029588	0.217716
1346	18403	0.339293	0.038949	0.015243		0.047813	0.514977	0.011991		0.009635	0.032583	0.235101
1347	18404	0.29602	0.033879	0.011328		0.039921	0.454701	0.010377		0.008184	0.028997	0.205284
1348	18405	0.283653	0.032361	0.009267		0.036621	0.440468	0.010446		0.007655	0.028429	0.196939
1349	18406	0.298445	0.033917	0.008654		0.036828	0.468432	0.011859		0.007832	0.030654	0.207563
1350	18407	0.313202	0.03541	0.008753		0.036614	0.497303	0.013619		0.007995	0.033006	0.218286
1351	18408	0.385731	0.04341	0.012445		0.042543	0.619404	0.018312		0.009564	0.04185	0.269342
1352	18409	0.396639	0.044651	0.013809		0.040389	0.644813	0.020088		0.009491	0.043853	0.278014
1353	18410	0.351139	0.039661	0.012952		0.033003	0.577673	0.018713		0.008118	0.039591	0.247247
1354	18411	0.305849	0.034595	0.011909		0.026956	0.507649	0.016806		0.006891	0.035099	0.216143
1355	18412	0.357121	0.040427	0.014744		0.029362	0.59785	0.019986		0.007831	0.041708	0.253152
1356	18413	0.383085	0.043426	0.016091		0.028929	0.646466	0.021024		0.008147	0.044912	0.271298
1357	18414	0.418483	0.047534	0.020142		0.028187	0.712677	0.022421		0.008563	0.049388	0.296069
1358	18415	0.406031	0.046188	0.021687		0.02429	0.697336	0.021889		0.00799	0.048478	0.287496
1359	18416	0.424104	0.048262	0.024252		0.022863	0.73375	0.023501		0.008021	0.051325	0.301047
1360	18417	0.387206	0.043806	0.021533		0.018579	0.673513	0.021703		0.007012	0.046862	0.274928
1361	18418	0.30345	0.034174	0.016018		0.012786	0.53039	0.017575		0.005248	0.036809	0.215906
1362	18419	0.309195	0.034742	0.015753		0.011941	0.541919	0.018392		0.005193	0.037631	0.220506
1363	18420	0.422338	0.047282	0.019879		0.014099	0.743561	0.026283		0.006702	0.051743	0.302667
1364	18421	0.391534	0.043274	0.016364		0.012039	0.691126	0.024433		0.005849	0.04782	0.280911
1365	18422	0.391088	0.042738	0.015421		0.011172	0.691944	0.024575		0.005527	0.047686	0.281173
1366	18423	0.39067	0.042298	0.015123		0.010977	0.692604	0.025127		0.005251	0.047669	0.281927
1367	18424	0.37609	0.040351	0.013853		0.010988	0.667908	0.024723		0.0049	0.046116	0.272694
1368	18425	0.30131	0.031858	0.009678		0.010201	0.535011	0.019436		0.003822	0.037212	0.218503
1369	18426	0.345335	0.036013	0.009965		0.013644	0.612994	0.021799		0.004263	0.042997	0.250615
1370	18427	0.389223	0.039969	0.009825		0.018194	0.690523	0.024023		0.004803	0.048984	0.283356
1371	18428	0.418953	0.042354	0.011177		0.022566	0.742765	0.025325		0.005152	0.053187	0.306477
1372	18429	0.388476	0.038228	0.010256		0.023894	0.687071	0.022005		0.004761	0.049517	0.284198
1373	18430	0.388111	0.037432	0.010474		0.026811	0.68466	0.02071		0.004736	0.04945	0.284453
1374	18431	0.381915	0.036256	0.011211		0.029271	0.671825	0.019462		0.004908	0.048431	0.281163
1375	18432	0.329523	0.031312	0.010965		0.027645	0.57768	0.016097		0.004442	0.041436	0.243793
1376	18433	0.305464	0.028781	0.010451		0.026961	0.533818	0.014166		0.004232	0.038106	0.225837
1377	18434	0.387742	0.035989	0.013987		0.037169	0.673844	0.016222		0.005634	0.047667	0.28637
1378	18435	0.387797	0.035937	0.015657		0.040136	0.669993	0.014409		0.005885	0.047068	0.286612
1379	18436	0.417879	0.038992	0.01815		0.046443	0.717545	0.01348		0.006596	0.051004	0.309288
1380	18437	0.387916	0.03541	0.016732		0.046147	0.661191	0.010272		0.006353	0.047033	0.285834
1381	18438	0.34389	0.030734	0.014909		0.04361	0.581481	0.008333		0.005819	0.041498	0.2526
1382	18439	0.299866	0.026477	0.013196		0.039863	0.503586	0.007633		0.005183	0.036171	0.220135
1383	18440	0.374067	0.032649	0.016962		0.052001	0.623632	0.010041		0.006583	0.045153	0.274647
1384	18441	0.388288	0.032464	0.016964		0.057085	0.640435	0.010736		0.006976	0.046212	0.283702
1385	18442	0.300138	0.024066	0.012681		0.046505	0.489363	0.008542		0.00554	0.035637	0.218608
1386	18443	0.194248	0.015266	0.008115		0.030935	0.314611	0.005642		0.003721	0.023138	0.141405
1387	18444	0.294947	0.022777	0.012143		0.04801	0.475027	0.008667		0.005779	0.035202	0.214561
1388	18445	0.353425	0.026071	0.013239		0.060059	0.56241	0.01025		0.007246	0.041686	0.25554
1389	18446	0.353592	0.025303	0.012925		0.062595	0.555745	0.01013		0.007687	0.041194	0.254429
1390	18447	0.383906	0.026846	0.015127		0.070634	0.595734	0.01113		0.008674	0.044129	0.275329
1391	18448	0.354021	0.025219	0.015851		0.067636	0.54201	0.010187		0.008288	0.039423	0.251938
1392	18449	0.366068	0.026936	0.018347		0.072499	0.552702	0.01046		0.008895	0.039395	0.258742
1393	18450	0.354575	0.027081	0.019936		0.072882	0.527038	0.01017		0.008954	0.036824	0.24929
1394	18451	0.290361	0.02297	0.017869		0.061556	0.425553	0.008304		0.007568	0.029366	0.203368
1395	18452	0.289938	0.023328	0.018271		0.06256	0.42133	0.007978		0.00769	0.028963	0.202932
1396	18453	0.390956	0.033054	0.025691		0.08735	0.557933	0.011268		0.010812	0.037966	0.27321
1397	18454	0.391429	0.034996	0.02726		0.090422	0.548124	0.012516		0.011257	0.036732	0.272991
1398	18455	0.422278	0.040683	0.031229		0.100675	0.579812	0.015458		0.012564	0.038085	0.293837
1399	18456	0.392457	0.040279	0.028863		0.096488	0.527781	0.015827		0.012032	0.034232	0.272314
1400	18457	0.393	0.042968	0.029307		0.099482	0.517141	0.017956		0.012356	0.032962	0.271981
1401	18458	0.393583	0.045919	0.030476		0.102466	0.506174	0.020716		0.012616	0.031472	0.271744
1402	18459	0.424679	0.052927	0.034312		0.113528	0.533311	0.026886		0.013857	0.032161	0.292703

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1403	18460	0.3947	0.052194	0.031469		0.108246	0.483431	0.029888		0.013087	0.028661	0.27168
1404	18461	0.431131	0.062183	0.040032		0.121107	0.514513	0.039123		0.014572	0.029825	0.296479
1405	18462	0.480357	0.077062	0.053385		0.138452	0.555164	0.054013		0.016528	0.031083	0.330062
1406	18463	0.432014	0.077306	0.0554		0.127138	0.483925	0.058801		0.015106	0.02647	0.296664
1407	18464	0.432167	0.086628	0.063382		0.129271	0.468328	0.070935		0.015345	0.024871	0.296687
1408	18465	0.360126	0.081779	0.059562		0.108785	0.377459	0.070872		0.012924	0.019318	0.247197
1409	18466	0.467023	0.104276	0.07141		0.132109	0.480894	0.083405		0.015609	0.024593	0.314857
1410	18467	0.441647	0.09658	0.063023		0.117428	0.446758	0.072121		0.013761	0.022798	0.292646
1411	18468	0.609323	0.1306	0.082397		0.153956	0.607195	0.092766		0.017947	0.030901	0.398015
1412	18469	0.827629	0.169818	0.101707		0.190212	0.801585	0.111968		0.022279	0.040531	0.526299
1413	18470	0.849475	0.166151	0.10262		0.178226	0.80075	0.104607		0.021462	0.040199	0.526795
1414	18471	0.870205	0.161782	0.117435		0.167147	0.7997	0.099491		0.020958	0.039894	0.528647
1415	18472	0.813471	0.143445	0.118695		0.14335	0.730172	0.087006		0.01863	0.036268	0.485066
1416	18473	0.749835	0.126402	0.114246		0.123162	0.661034	0.07606		0.01629	0.032781	0.440351
1417	18474	0.774912	0.124756	0.121189		0.118752	0.671795	0.074905		0.015778	0.03331	0.448278
1418	18475	0.80007	0.122717	0.127644		0.114163	0.682569	0.075542		0.015112	0.033889	0.45774
1419	18476	0.649076	0.094751	0.105099		0.086294	0.545601	0.062463		0.011399	0.027149	0.36774
1420	18477	0.599677	0.084939	0.097199		0.076388	0.499907	0.058366		0.010157	0.024921	0.337926
1421	18478	0.71634	0.097067	0.115156		0.085881	0.590452	0.070846		0.012123	0.029529	0.400919
1422	18479	0.723514	0.093704	0.114118		0.081691	0.590163	0.072672		0.012743	0.029633	0.402579
1423	18480	0.954908	0.118075	0.14823		0.101576	0.7715	0.097347		0.017597	0.038938	0.528197
1424	18481	0.939405	0.10751	0.140498		0.091119	0.748678	0.097964		0.018637	0.03817	0.514956
1425	18482	0.75957	0.083029	0.110215		0.069917	0.601287	0.080116		0.015615	0.030872	0.414763
1426	18483	0.837516	0.086456	0.116262		0.072586	0.658278	0.089469		0.017933	0.034097	0.455848
1427	18484	0.843162	0.082013	0.110945		0.068923	0.658752	0.091083		0.018461	0.034416	0.458229
1428	18485	0.848174	0.077537	0.109726		0.065574	0.659254	0.09249		0.01835	0.034713	0.460898
1429	18486	0.837883	0.071769	0.111964		0.061434	0.648359	0.092042		0.017923	0.034375	0.455582
1430	18487	0.826787	0.066265	0.113534		0.057746	0.637391	0.091265		0.017333	0.033981	0.450606
1431	18488	0.844754	0.063092	0.118803		0.05631	0.649147	0.093504		0.01753	0.034773	0.460833
1432	18489	0.654304	0.045188	0.09399		0.041659	0.501364	0.072486		0.013535	0.026972	0.356487
1433	18490	0.640422	0.042364	0.092845		0.039753	0.490097	0.070927		0.013248	0.02642	0.348382
1434	18491	0.83615	0.050763	0.122977		0.049561	0.638581	0.092336		0.017355	0.034548	0.452862
1435	18492	0.867833	0.047968	0.13238		0.048896	0.661715	0.095216		0.018117	0.035914	0.46865
1436	18493	0.899332	0.045556	0.144331		0.048042	0.684889	0.097551		0.018903	0.037271	0.484541
1437	18494	0.900434	0.042364	0.150753		0.045548	0.685232	0.096563		0.01904	0.037349	0.48444
1438	18495	0.931084	0.040413	0.161187		0.04436	0.708401	0.0989		0.020228	0.038612	0.500634
1439	18496	0.886158	0.034988	0.157355		0.039338	0.674462	0.092495		0.019609	0.036696	0.47637
1440	18497	0.810793	0.029289	0.145762		0.033654	0.617593	0.082811		0.018034	0.033503	0.435692
1441	18498	0.82523	0.027759	0.148907		0.032447	0.629403	0.081874		0.018222	0.034008	0.443043
1442	18499	0.734415	0.024206	0.131733		0.028261	0.561183	0.070066		0.015838	0.030172	0.393663
1443	18500	0.628859	0.020383	0.111529		0.02376	0.481368	0.057847		0.013183	0.025774	0.336591
1444	18501	0.740277	0.023564	0.129019		0.027406	0.567826	0.0652		0.015894	0.030267	0.395654
1445	18502	0.85085	0.027202	0.143416		0.03054	0.654776	0.069995		0.018938	0.034675	0.454098
1446	18503	0.849409	0.028291	0.136649		0.029407	0.655835	0.064764		0.019644	0.034478	0.452997
1447	18504	0.847584	0.031744	0.132336		0.029154	0.657018	0.060053		0.020158	0.034257	0.453343
1448	18505	0.838006	0.034877	0.12984		0.029682	0.6525	0.057214		0.0202	0.033703	0.450856
1449	18506	0.828239	0.037872	0.12575		0.030205	0.648044	0.054883		0.019934	0.033125	0.448634
1450	18507	0.825756	0.041124	0.120827		0.030543	0.649475	0.052933		0.019628	0.032803	0.450616
1451	18508	0.911398	0.049151	0.127227		0.033653	0.720746	0.057284		0.021313	0.035934	0.501313
1452	18509	0.996006	0.059215	0.129246		0.035946	0.792891	0.060287		0.022963	0.038861	0.55511
1453	18510	1.195179	0.070723	0.334528		0.043037	0.976996	0.164561		0.02728	0.05045	0.73684
1454	18511	1.194716	0.070511	0.48312		0.042905	1.002462	0.249541		0.0268	0.054175	0.807941
1455	18512	1.333325	0.078622	0.672712		0.047721	1.14765	0.363752		0.029263	0.064525	0.980805
1456	18513	1.191947	0.070396	0.696763		0.042557	1.053639	0.395274		0.025416	0.061561	0.948127
1457	18514	1.090708	0.064394	0.687042		0.038946	0.985424	0.405367		0.022679	0.059085	0.915069
1458	18515	1.177052	0.069312	0.773651		0.041933	1.086057	0.472861		0.024052	0.066512	1.029516
1459	18516	1.085629	0.063694	0.724938		0.038548	1.022222	0.456747		0.021754	0.063815	0.97819
1460	18517	1.08247	0.062912	0.713641		0.038294	1.03946	0.463869		0.021141	0.06579	0.993213
1461	18518	1.078922	0.061487	0.683697		0.037925	1.055939	0.458804		0.020537	0.06717	0.997832
1462	18519	1.162609	0.064383	0.689212		0.040377	1.158951	0.477727		0.02222	0.073707	1.073263
1463	18520	1.070741	0.057215	0.57662		0.036575	1.086621	0.413148		0.020501	0.068961	0.972397
1464	18521	1.066058	0.054267	0.504766		0.035651	1.100868	0.374839		0.020384	0.069424	0.939958
1465	18522	0.787676	0.037911	0.348235		0.025607	0.82729	0.244076		0.014985	0.051481	0.666221
1466	18523	0.790108	0.037021	0.333867		0.025242	0.836588	0.227221		0.014963	0.051719	0.652375
1467	18524	0.957691	0.043926	0.364741		0.030445	1.028371	0.235216		0.017957	0.062755	0.752336
1468	18525	0.983865	0.045347	0.318258		0.032397	1.073684	0.191565		0.018175	0.065621	0.722225
1469	18526	0.946358	0.043935	0.248622		0.032282	1.048642	0.162854		0.017146	0.064056	0.645241
1470	18527	1.023713	0.048071	0.206854		0.036337	1.154169	0.16267		0.017936	0.070504	0.649173
1471	18528	0.933664	0.044666	0.15039		0.034413	1.073835	0.145408		0.016095	0.065973	0.562461
1472	18529	0.927969	0.045517	0.134251		0.035014	1.089678	0.139623		0.015391	0.067569	0.545083

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1473	18530	0.773426	0.038986	0.102866		0.029568	0.926757	0.109316		0.012527	0.058049	0.448327
1474	18531	0.506356	0.025884	0.065337		0.019447	0.612616	0.068832		0.008123	0.038524	0.292051
1475	18532	0.780197	0.040549	0.096746		0.030086	0.954747	0.100592		0.012355	0.060379	0.447883
1476	18533	1.004223	0.053811	0.121091		0.038911	1.253881	0.116164		0.015544	0.079911	0.576358
1477	18534	0.966358	0.053324	0.115852		0.039051	1.229637	0.098955		0.014731	0.078873	0.566197
1478	18535	0.769019	0.043308	0.089517		0.032035	0.992029	0.070859		0.011614	0.063974	0.456918
1479	18536	0.878776	0.05046	0.09739		0.037495	1.148607	0.07245		0.013115	0.074458	0.529243
1480	18537	0.986719	0.058113	0.100597		0.04309	1.310728	0.072312		0.014529	0.085302	0.60494
1481	18538	1.062261	0.064083	0.097797		0.047107	1.432529	0.076666		0.015569	0.093506	0.662678
1482	18539	0.978017	0.060205	0.077192		0.043779	1.337375	0.069657		0.014308	0.087731	0.619404
1483	18540	0.973963	0.061093	0.064727		0.043848	1.349223	0.072439		0.014166	0.088888	0.626117
1484	18541	0.764333	0.048832	0.043921		0.034492	1.071688	0.062327		0.011095	0.07073	0.499073
1485	18542	0.825835	0.053281	0.047583		0.037251	1.165351	0.070256		0.012026	0.077016	0.54397
1486	18543	0.950094	0.06274	0.052723		0.042732	1.353956	0.086045		0.013918	0.089851	0.634781
1487	18544	0.961459	0.065006	0.049082		0.04308	1.382865	0.092396		0.014111	0.092113	0.651909
1488	18545	0.958391	0.066213	0.045571		0.042737	1.390063	0.096029		0.014111	0.092674	0.659768
1489	18546	1.033373	0.072777	0.0504		0.045744	1.509983	0.106317		0.01532	0.100669	0.722175
1490	18547	0.952892	0.068278	0.044926		0.041878	1.401177	0.100428		0.014213	0.093623	0.675446
1491	18548	0.842405	0.061152	0.049488		0.036848	1.245611	0.090791		0.01257	0.083351	0.605322
1492	18549	0.732996	0.053521	0.050299		0.03196	1.088082	0.079638		0.010925	0.072761	0.53208
1493	18550	0.915875	0.067369	0.070586		0.039733	1.36419	0.099683		0.013634	0.091174	0.671076
1494	18551	0.944781	0.070264	0.081368		0.040758	1.412043	0.103076		0.014009	0.0945	0.699317
1495	18552	0.942874	0.07076	0.086857		0.040602	1.412826	0.103803		0.013852	0.094635	0.703542
1496	18553	0.941106	0.07102	0.089029		0.040798	1.412891	0.105482		0.013656	0.094491	0.706454
1497	18554	1.016	0.076933	0.094826		0.044371	1.52682	0.116786		0.014528	0.101926	0.765357
1498	18555	0.739056	0.056138	0.065655		0.032531	1.110141	0.087761		0.010657	0.074178	0.557111
1499	18556	0.724277	0.055056	0.061839		0.032013	1.087139	0.087193		0.010386	0.072694	0.54579
1500	18557	0.922008	0.070097	0.072651		0.041043	1.381543	0.11249		0.012986	0.092293	0.694251
1501	18558	1.01136	0.076719	0.071673		0.045371	1.511496	0.123632		0.014296	0.100871	0.760726
1502	18559	0.962678	0.072746	0.064409		0.043538	1.433053	0.117316		0.013805	0.095814	0.722797
1503	18560	0.99029	0.074447	0.061213		0.045122	1.466383	0.11852		0.014009	0.098139	0.7417
1504	18561	0.904899	0.067897	0.054051		0.04155	1.3318	0.104489		0.012598	0.088827	0.675409
1505	18562	0.845508	0.063571	0.052007		0.039093	1.237061	0.093585		0.011863	0.082267	0.628095
1506	18563	0.720667	0.054187	0.044805		0.033536	1.047911	0.076582		0.010181	0.069662	0.532001
1507	18564	0.82654	0.062082	0.052099		0.038682	1.193592	0.083923		0.011523	0.079358	0.605151
1508	18565	0.932425	0.069907	0.05807		0.043957	1.33372	0.089361		0.012754	0.088268	0.673853
1509	18566	0.909007	0.067959	0.055107		0.043182	1.286931	0.082565		0.012542	0.08469	0.646792
1510	18567	0.73469	0.054713	0.042565		0.035126	1.030952	0.065369		0.010248	0.067699	0.515648
1511	18568	0.699458	0.051825	0.044461		0.033629	0.97228	0.061094		0.009715	0.063724	0.483749
1512	18569	0.66423	0.048942	0.049072		0.032096	0.915193	0.057323		0.009207	0.059683	0.453078
1513	18570	0.692619	0.050691	0.058569		0.033632	0.945587	0.058791		0.009614	0.061163	0.46577
1514	18571	0.796048	0.057811	0.076438		0.03887	1.075522	0.066127		0.011253	0.069	0.526885
1515	18572	0.73538	0.05295	0.079412		0.036113	0.982575	0.06039		0.010598	0.062644	0.479018
1516	18573	0.622434	0.044365	0.07408		0.030719	0.821539	0.050676		0.009022	0.052092	0.398709
1517	18574	0.558893	0.039514	0.070141		0.027669	0.731558	0.045708		0.00813	0.046135	0.354138
1518	18575	0.714728	0.04992	0.095047		0.035517	0.925464	0.058604		0.010448	0.05784	0.446834
1519	18576	0.88251	0.060627	0.125947		0.04406	1.126257	0.071788		0.013137	0.069606	0.542463
1520	18577	0.807291	0.054529	0.12052		0.040489	1.014686	0.06452		0.012244	0.06217	0.488423
1521	18578	0.807574	0.053522	0.123646		0.040646	0.998921	0.062349		0.012349	0.060699	0.483792
1522	18579	0.914114	0.059144	0.141155		0.046146	1.111963	0.06661		0.014094	0.06679	0.547549
1523	18580	1.061687	0.066347	0.161417		0.053753	1.263061	0.068582		0.016663	0.074663	0.636473
1524	18581	0.723082	0.043682	0.104922		0.036679	0.84143	0.03938		0.011531	0.04915	0.433322
1525	18582	0.545869	0.032352	0.076503		0.027698	0.627613	0.02641		0.008744	0.036452	0.32703
1526	18583	0.694713	0.04151	0.09258		0.035252	0.786882	0.028165		0.011187	0.045348	0.416163
1527	18584	1.036672	0.062858	0.127473		0.052555	1.150349	0.03372		0.016831	0.065619	0.621039
1528	18585	1.126319	0.070227	0.119973		0.05695	1.212405	0.024109		0.018468	0.068279	0.675627
1529	18586	0.990955	0.063934	0.087066		0.049867	1.033613	0.013122		0.01634	0.057438	0.59687
1530	18587	0.855881	0.05726	0.067323		0.042896	0.871488	0.010484		0.014159	0.047911	0.515495
1531	18588	0.791173	0.051627	0.069238		0.038486	0.792942	0.018322		0.013474	0.043559	0.469588
1532	18589	0.722762	0.045567	0.07177		0.03446	0.714817	0.021685		0.012525	0.039172	0.423926
1533	18590	0.730591	0.044007	0.0809		0.034262	0.713338	0.025579		0.012785	0.038956	0.425351
1534	18591	0.744518	0.043609	0.090166		0.034365	0.718174	0.028661		0.013073	0.039062	0.430623
1535	18592	0.758108	0.042868	0.106096		0.034435	0.722929	0.031376		0.013329	0.039161	0.435798
1536	18593	0.764941	0.041806	0.121779		0.034148	0.721238	0.034266		0.013489	0.038928	0.436993
1537	18594	0.771527	0.040587	0.134949		0.034388	0.719476	0.037918		0.013716	0.038713	0.438094
1538	18595	0.675106	0.033956	0.126097		0.030066	0.623228	0.03678		0.012185	0.033446	0.381448
1539	18596	0.575668	0.028319	0.111111		0.025584	0.5278	0.033885		0.010546	0.028271	0.324374
1540	18597	0.674609	0.032563	0.132934		0.029878	0.614624	0.042618		0.012565	0.032856	0.379378
1541	18598	0.761161	0.035684	0.151586		0.03352	0.688253	0.051903		0.0145	0.036679	0.427386
1542	18599	0.750518	0.034055	0.148446		0.032812	0.67432	0.053776		0.014567	0.035806	0.421207

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1543	18600	0.822964	0.036115	0.159235		0.035681	0.735389	0.060433		0.01619	0.038881	0.462965
1544	18601	0.867817	0.040813	0.160688		0.037832	0.7713	0.063928		0.017207	0.040549	0.488821
1545	18602	0.841963	0.043095	0.147898		0.037242	0.745236	0.061482		0.01668	0.038954	0.474084
1546	18603	0.843561	0.0478	0.152042		0.037396	0.744107	0.063257		0.016587	0.03867	0.474685
1547	18604	0.816478	0.050655	0.155612		0.035961	0.718195	0.062711		0.015855	0.037193	0.459729
1548	18605	0.78881	0.052839	0.157466		0.03439	0.692377	0.061707		0.016035	0.035905	0.444891
1549	18606	0.605724	0.0435	0.12661		0.026091	0.530811	0.04895		0.012856	0.027537	0.342121
1550	18607	0.619678	0.046075	0.132234		0.026541	0.5427	0.050917		0.013321	0.028153	0.350215
1551	18608	0.802026	0.063509	0.176664		0.034016	0.701907	0.067758		0.01738	0.036402	0.453543
1552	18609	0.786763	0.065861	0.176826		0.033371	0.688589	0.06743		0.016909	0.035697	0.444992
1553	18610	0.799084	0.070433	0.181296		0.033858	0.69998	0.068463		0.016841	0.036267	0.452092
1554	18611	0.810725	0.075091	0.183662		0.034274	0.711429	0.068659		0.016607	0.036806	0.459155
1555	18612	0.807778	0.07837	0.180597		0.034029	0.710673	0.067375		0.015937	0.036657	0.458505
1556	18613	0.804252	0.081484	0.175362		0.03373	0.709942	0.066482		0.015067	0.036436	0.458053
1557	18614	0.731167	0.077927	0.153609		0.030516	0.648037	0.060659		0.013405	0.033029	0.418121
1558	18615	0.906119	0.10068	0.182869		0.039137	0.806249	0.07621		0.016213	0.040813	0.519908
1559	18616	0.924418	0.11003	0.169911		0.045407	0.829352	0.080544		0.015144	0.041447	0.533301
1560	18617	0.701978	0.086988	0.119832		0.037416	0.633652	0.062466		0.011296	0.031432	0.406286
1561	18618	0.696578	0.089737	0.109025		0.041093	0.633212	0.062912		0.011939	0.031199	0.404739
1562	18619	0.585181	0.078176	0.082595		0.038172	0.535532	0.053195		0.010574	0.026225	0.341422
1563	18620	0.634942	0.087184	0.086735		0.044363	0.584093	0.057807		0.011804	0.028489	0.371949
1564	18621	0.785959	0.112804	0.107809		0.061254	0.730001	0.071658		0.015057	0.03537	0.464654
1565	18622	0.764585	0.114529	0.103254		0.066987	0.717825	0.070492		0.014766	0.034544	0.457226
1566	18623	0.743122	0.115831	0.096715		0.073118	0.705655	0.070696		0.014313	0.033733	0.449675
1567	18624	0.809952	0.131174	0.100558		0.089466	0.778607	0.081362		0.016798	0.037027	0.49551
1568	18625	0.871644	0.147523	0.101628		0.1106	0.85146	0.095776		0.019758	0.040894	0.539064
1569	18626	0.856399	0.151243	0.090831		0.124694	0.851237	0.10462		0.021117	0.041351	0.534469
1570	18627	0.840214	0.154479	0.089276		0.140109	0.850911	0.114759		0.022329	0.041816	0.532251
1571	18628	0.623268	0.118707	0.074511		0.118783	0.643884	0.09545		0.017631	0.031963	0.401558
1572	18629	0.453619	0.087727	0.058101		0.09264	0.473574	0.073861		0.01318	0.023609	0.295029
1573	18630	0.482117	0.094627	0.067054		0.106838	0.509593	0.084639		0.014443	0.025498	0.317255
1574	18631	0.915543	0.05651	0.111677		0.044762	0.940302	0.024268		0.015498	0.052365	0.543096
1575	18632	1.040336	0.061233	0.172701		0.051051	1.102686	0.046522		0.017437	0.062381	0.618132
1576	18633	0.953318	0.055498	0.197794		0.046879	1.041726	0.061529		0.0158	0.059872	0.568931
1577	18634	0.641679	0.038773	0.149852		0.031558	0.715776	0.051091		0.01054	0.041655	0.386641
1578	18635	0.50424	0.031383	0.126187		0.024797	0.570925	0.045633		0.008223	0.033568	0.30672
1579	18636	0.667996	0.042522	0.175098		0.032836	0.765518	0.066193		0.010819	0.045431	0.408792
1580	18637	0.976675	0.064538	0.272627		0.04794	1.144208	0.112696		0.015597	0.069253	0.601841
1581	18638	0.844759	0.057736	0.243464		0.041342	1.01188	0.109606		0.013292	0.062684	0.522514
1582	18639	0.746422	0.052121	0.215283		0.036436	0.90909	0.102724		0.011623	0.057341	0.468034
1583	18640	0.746282	0.053007	0.210873		0.036315	0.923418	0.106423		0.01149	0.059252	0.480105
1584	18641	0.812418	0.058485	0.219985		0.039391	1.020464	0.118776		0.012358	0.066571	0.53727
1585	18642	0.660875	0.048123	0.169755		0.031907	0.842046	0.099117		0.009939	0.055856	0.450094
1586	18643	0.516827	0.037907	0.125895		0.024873	0.665513	0.078495		0.007714	0.04468	0.360272
1587	18644	0.575623	0.042419	0.133048		0.027635	0.747278	0.087887		0.008556	0.050612	0.40876
1588	18645	0.68014	0.050389	0.142434		0.032515	0.893455	0.104009		0.010014	0.061247	0.496712
1589	18646	0.733183	0.054506	0.138728		0.034902	0.973536	0.111774		0.010694	0.067437	0.550114
1590	18647	0.640689	0.047754	0.107765		0.030357	0.859392	0.098831		0.009269	0.060137	0.493914
1591	18648	0.614472	0.04587	0.091534		0.028997	0.831628	0.095724		0.008844	0.058645	0.485441
1592	18649	0.647106	0.048444	0.085284		0.030426	0.883336	0.101443		0.009311	0.062637	0.523357
1593	18650	0.679758	0.050981	0.084192		0.031818	0.936365	0.107669		0.009757	0.066627	0.563382
1594	18651	0.837482	0.062743	0.106995		0.039024	1.163558	0.138905		0.011992	0.082915	0.710189
1595	18652	0.862842	0.064333	0.11273		0.03996	1.210945	0.15308		0.012353	0.086355	0.751394
1596	18653	0.764928	0.056532	0.098254		0.035235	1.083581	0.144283		0.010983	0.077126	0.68111
1597	18654	0.667003	0.049499	0.084351		0.03059	0.951099	0.131718		0.009596	0.067484	0.602051
1598	18655	0.779239	0.058229	0.094644		0.03558	1.117741	0.160838		0.011211	0.078978	0.71095
1599	18656	0.837596	0.063046	0.102718		0.038045	1.208466	0.180387		0.012044	0.084989	0.771345
1600	18657	0.916693	0.069532	0.117446		0.041416	1.33056	0.204878		0.013192	0.092951	0.850649
1601	18658	0.891215	0.068077	0.124919		0.040048	1.300107	0.202959		0.012796	0.090047	0.830761
1602	18659	0.932225	0.071658	0.136019		0.041667	1.365179	0.213277		0.013258	0.093729	0.871463
1603	18660	0.853567	0.06594	0.138559		0.037933	1.253547	0.194459		0.011963	0.085404	0.79981
1604	18661	0.670513	0.051953	0.117208		0.02966	0.98667	0.150535		0.009416	0.066779	0.629063
1605	18662	0.684194	0.053068	0.123973		0.03018	1.007606	0.151402		0.009703	0.067953	0.6418
1606	18663	0.936433	0.072721	0.174688		0.041094	1.379985	0.202753		0.01349	0.092572	0.876578
1607	18664	0.871127	0.067663	0.161007		0.038025	1.283112	0.183699		0.012714	0.085752	0.811519
1608	18665	0.872692	0.067643	0.15383		0.038054	1.28356	0.177683		0.012883	0.085535	0.806294
1609	18666	0.87441	0.067438	0.140739		0.038335	1.283119	0.17379		0.013012	0.085268	0.798313
1610	18667	0.843938	0.064578	0.118237		0.037233	1.234502	0.169238		0.012629	0.081847	0.759134
1611	18668	0.678298	0.05147	0.082039		0.030084	0.989127	0.136486		0.010175	0.065501	0.602345
1612	18669	0.779476	0.058451	0.077658		0.034768	1.132582	0.156564		0.011716	0.07494	0.682605

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1613	18670	0.881633	0.064758	0.083908		0.039608	1.274187	0.174697		0.013256	0.084244	0.757025
1614	18671	0.951848	0.068085	0.094323		0.043072	1.367282	0.186528		0.014286	0.090367	0.800564
1615	18672	0.88654	0.061703	0.08889		0.040385	1.264493	0.170156		0.013271	0.083597	0.730285
1616	18673	0.889228	0.060498	0.099464		0.040747	1.258289	0.164771		0.013294	0.083211	0.717541
1617	18674	0.878582	0.058943	0.107581		0.040406	1.232304	0.15439		0.013117	0.081483	0.694596
1618	18675	0.760318	0.050078	0.096119		0.035004	1.056442	0.125508		0.011337	0.06986	0.589497
1619	18676	0.706634	0.045945	0.088785		0.032511	0.975881	0.111921		0.010532	0.064567	0.541743
1620	18677	0.900199	0.056989	0.122758		0.041254	1.229113	0.130487		0.013435	0.081439	0.67692
1621	18678	0.903712	0.055398	0.1438		0.041065	1.218728	0.11686		0.013536	0.080905	0.666515
1622	18679	0.977031	0.05772	0.179488		0.043783	1.300156	0.118302		0.014705	0.086527	0.706175
1623	18680	0.911255	0.052587	0.187355		0.040022	1.195204	0.103702		0.013808	0.079821	0.644569
1624	18681	0.811268	0.045629	0.179173		0.034675	1.047722	0.087365		0.012412	0.070217	0.560848
1625	18682	0.70976	0.039072	0.161973		0.029514	0.905136	0.080277		0.010957	0.060808	0.481637
1626	18683	0.887843	0.04776	0.208725		0.035671	1.117421	0.108575		0.013841	0.075232	0.59068
1627	18684	0.926342	0.04824	0.219927		0.035846	1.145047	0.123793		0.014647	0.077302	0.599262
1628	18685	0.719434	0.036197	0.167393		0.02759	0.872561	0.103023		0.011558	0.059014	0.45115
1629	18686	0.466854	0.023043	0.106109		0.017785	0.560197	0.068664		0.00757	0.037928	0.291699
1630	18687	0.710016	0.034492	0.160519		0.026869	0.844274	0.105989		0.011603	0.057176	0.448606
1631	18688	0.855335	0.040314	0.191434		0.031774	0.998516	0.12886		0.014178	0.067691	0.557305
1632	18689	0.860106	0.03948	0.208465		0.031124	0.985638	0.126031		0.014399	0.06689	0.586088
1633	18690	0.938117	0.042208	0.258749		0.032913	1.056068	0.147794		0.01585	0.071813	0.676971
1634	18691	0.870066	0.039043	0.294677		0.029516	0.963573	0.149367		0.014803	0.065751	0.669228
1635	18692	0.903969	0.04243	0.362338		0.029704	0.985743	0.194634		0.015681	0.067334	0.740582
1636	18693	0.879462	0.044216	0.403695		0.028016	0.943897	0.234822		0.015584	0.064282	0.764655
1637	18694	0.722245	0.03819	0.3606		0.022441	0.764438	0.223811		0.012995	0.052117	0.655891
1638	18695	0.722943	0.039437	0.373883		0.022159	0.759063	0.240595		0.013104	0.052156	0.670633
1639	18696	0.978049	0.056165	0.53061		0.030828	1.009681	0.367589		0.017976	0.070259	0.940959
1640	18697	0.981981	0.058327	0.542066		0.031735	0.996186	0.403476		0.018263	0.069775	0.968423
1641	18698	1.061152	0.064269	0.619706		0.03502	1.057291	0.462857		0.019913	0.074065	1.058717
1642	18699	0.988717	0.060464	0.617219		0.033177	0.966953	0.445375		0.018793	0.067404	0.983952
1643	18700	0.991543	0.060711	0.646555		0.033744	0.951191	0.449003		0.019353	0.065514	0.970986
1644	18701	0.994026	0.060647	0.660531		0.034224	0.934695	0.44029		0.019889	0.06309	0.946297
1645	18702	1.072565	0.064679	0.707083		0.037323	0.987917	0.451547		0.021948	0.064891	0.982142
1646	18703	0.998081	0.059207	0.633432		0.035054	0.899602	0.386866		0.020848	0.057224	0.870188
1647	18704	1.090729	0.063412	0.643374		0.038656	0.961093	0.375057		0.023226	0.058872	0.89573
1648	18705	1.214741	0.068832	0.627389		0.043527	1.04118	0.343678		0.026641	0.060488	0.914711
1649	18706	1.09332	0.060666	0.46164		0.039589	0.912752	0.237764		0.0246	0.05022	0.746835
1650	18707	1.093729	0.059639	0.32717		0.040026	0.88884	0.157419		0.025165	0.046181	0.667918
1651	18708	0.836129	0.049263	0.125644		0.040019	0.847618	0.031884		0.014373	0.047084	0.492709
1652	18709	0.94972	0.055762	0.204499		0.045569	0.993907	0.060374		0.016146	0.056058	0.564866
1653	18710	0.870091	0.05181	0.24163		0.041772	0.938887	0.078587		0.014622	0.053809	0.536074
1654	18711	0.585622	0.036645	0.185004		0.028115	0.645081	0.064792		0.009753	0.037481	0.369868
1655	18712	0.460183	0.029761	0.156744		0.022084	0.51453	0.05757		0.007605	0.03026	0.294856
1656	18713	0.60964	0.040389	0.218405		0.02924	0.689915	0.083182		0.010006	0.041038	0.394241
1657	18714	0.891371	0.061477	0.342222		0.042651	1.031259	0.139137		0.014439	0.062882	0.583388
1658	18715	0.77102	0.055249	0.30743		0.036794	0.912039	0.133838		0.012317	0.057305	0.509185
1659	18716	0.681319	0.049983	0.272851		0.032438	0.819434	0.125416		0.010765	0.052737	0.45384
1660	18717	0.681248	0.050826	0.267974		0.032353	0.832408	0.130378		0.010647	0.054811	0.458688
1661	18718	0.74167	0.056007	0.28091		0.035088	0.919914	0.145248		0.011476	0.061931	0.511896
1662	18719	0.603371	0.046009	0.217809		0.028439	0.759041	0.119343		0.009249	0.05224	0.431299
1663	18720	0.47188	0.036178	0.161591		0.022188	0.599874	0.093144		0.007184	0.041956	0.346958
1664	18721	0.525586	0.040394	0.170767		0.02466	0.673528	0.103498		0.007956	0.047661	0.39561
1665	18722	0.621064	0.047771	0.182686		0.02905	0.805216	0.121217		0.009329	0.057871	0.48408
1666	18723	0.669525	0.051827	0.178496		0.031186	0.877282	0.128942		0.009992	0.063902	0.539881
1667	18724	0.585101	0.045563	0.138469		0.027147	0.774317	0.111086		0.008684	0.057109	0.488512
1668	18725	0.56118	0.043768	0.118508		0.025964	0.749191	0.106935		0.008296	0.055781	0.483595
1669	18726	0.591012	0.045977	0.110171		0.027263	0.795661	0.115235		0.008708	0.059608	0.524655
1670	18727	0.620873	0.047932	0.109863		0.028555	0.843327	0.127752		0.009122	0.063365	0.568108
1671	18728	0.764956	0.058457	0.138139		0.035033	1.047813	0.165611		0.011239	0.078743	0.720152
1672	18729	0.788166	0.059344	0.145068		0.035927	1.090252	0.18274		0.011586	0.081794	0.767647
1673	18730	0.698771	0.051881	0.125083		0.031736	0.975387	0.172275		0.01025	0.072773	0.700221
1674	18731	0.60935	0.045569	0.107193		0.027602	0.856077	0.155624		0.008919	0.063972	0.621104
1675	18732	0.711897	0.053628	0.11988		0.032121	1.006008	0.187566		0.010434	0.075234	0.73579
1676	18733	0.76523	0.058108	0.136697		0.034394	1.087546	0.211201		0.011222	0.081565	0.801516
1677	18734	0.837533	0.064163	0.158343		0.037515	1.19733	0.240759		0.012208	0.090032	0.8876
1678	18735	0.814283	0.062913	0.169429		0.036368	1.16997	0.238463		0.011764	0.087868	0.868788
1679	18736	0.85176	0.066336	0.184248		0.037873	1.22865	0.250215		0.012196	0.092021	0.912325
1680	18737	0.779882	0.061187	0.185433		0.034543	1.128239	0.228366		0.011021	0.08451	0.838268
1681	18738	0.612631	0.048602	0.155656		0.027067	0.88812	0.176706		0.008687	0.066392	0.659367
1682	18739	0.625125	0.049761	0.163356		0.027583	0.907072	0.178179		0.008939	0.067592	0.672253

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1683	18740	0.855552	0.068235	0.227019		0.037594	1.242543	0.238627		0.012403	0.092088	0.916575
1684	18741	0.795837	0.063421	0.205278		0.034846	1.155489	0.21661		0.011684	0.085634	0.847508
1685	18742	0.79723	0.063608	0.190947		0.035046	1.1561	0.209757		0.011816	0.08571	0.840778
1686	18743	0.798744	0.063571	0.16934		0.035395	1.155986	0.201261		0.011937	0.085436	0.830457
1687	18744	0.770867	0.060976	0.137905		0.0344	1.112459	0.194162		0.011582	0.081779	0.787703
1688	18745	0.619538	0.048647	0.094536		0.027807	0.891455	0.15788		0.009339	0.065338	0.624187
1689	18746	0.711903	0.05526	0.102701		0.032177	1.020846	0.182537		0.010757	0.07452	0.706444
1690	18747	0.80512	0.061111	0.111499		0.036724	1.148672	0.208294		0.012193	0.083064	0.781477
1691	18748	0.869176	0.064012	0.125269		0.039929	1.232773	0.223965		0.013157	0.088148	0.824027
1692	18749	0.80946	0.057445	0.120418		0.037429	1.140177	0.20556		0.012246	0.080851	0.750177
1693	18750	0.811813	0.056823	0.136061		0.037765	1.134684	0.199951		0.012284	0.079693	0.735686
1694	18751	0.801976	0.05585	0.149336		0.037463	1.111426	0.189261		0.012139	0.076981	0.710564
1695	18752	0.69394	0.047765	0.135125		0.032403	0.952985	0.154798		0.010505	0.064966	0.601921
1696	18753	0.644896	0.043968	0.125618		0.030058	0.880393	0.137999		0.009768	0.059509	0.552753
1697	18754	0.821393	0.05477	0.162111		0.038104	1.109033	0.160822		0.01247	0.074354	0.690124
1698	18755	0.824416	0.05329	0.190714		0.037898	1.099948	0.143681		0.012559	0.07334	0.67875
1699	18756	0.891135	0.055385	0.232845		0.040302	1.173775	0.144114		0.01365	0.078539	0.718082
1700	18757	0.830963	0.049352	0.243932		0.036744	1.079284	0.126277		0.012821	0.073071	0.654331
1701	18758	0.739606	0.042723	0.234448		0.031783	0.946399	0.10417		0.011504	0.064888	0.568021
1702	18759	0.646938	0.036811	0.211941		0.027029	0.817874	0.090287		0.010137	0.056612	0.486598
1703	18760	0.809117	0.045078	0.269144		0.032625	1.010079	0.116728		0.012792	0.070591	0.594971
1704	18761	0.844006	0.045414	0.285036		0.032636	1.035632	0.126091		0.013514	0.073347	0.600779
1705	18762	0.655327	0.033708	0.217754		0.025051	0.789791	0.100429		0.010615	0.056633	0.450085
1706	18763	0.425193	0.021236	0.138182		0.016123	0.507308	0.065188		0.006933	0.036577	0.288877
1707	18764	0.646583	0.031459	0.205012		0.024328	0.764946	0.098204		0.010606	0.05544	0.44628
1708	18765	0.778696	0.037116	0.241002		0.028735	0.905608	0.114138		0.012902	0.066329	0.559439
1709	18766	0.782636	0.037204	0.24265		0.02818	0.89482	0.109997		0.013058	0.066126	0.590933
1710	18767	0.853158	0.040776	0.290649		0.029864	0.959427	0.127826		0.014326	0.071381	0.681169
1711	18768	0.790811	0.038445	0.317406		0.026894	0.87551	0.143673		0.013362	0.065621	0.668637
1712	18769	0.821232	0.042164	0.381922		0.027136	0.895559	0.188249		0.013939	0.067386	0.734716
1713	18770	0.798756	0.044023	0.417639		0.02566	0.857294	0.224694		0.013762	0.064309	0.755481
1714	18771	0.655853	0.038333	0.368159		0.020613	0.694201	0.213109		0.011478	0.051717	0.646119
1715	18772	0.656428	0.039449	0.379106		0.020399	0.689254	0.228687		0.011582	0.051107	0.659601
1716	18773	0.8879	0.055706	0.530739		0.026977	0.91664	0.348558		0.015986	0.068771	0.922015
1717	18774	0.891297	0.057161	0.535121		0.027625	0.904113	0.381647		0.016355	0.068166	0.943718
1718	18775	0.963026	0.062133	0.572884		0.030517	0.959199	0.436835		0.017921	0.072145	1.024186
1719	18776	0.897132	0.058056	0.545975		0.028998	0.876856	0.419737		0.017095	0.065473	0.943998
1720	18777	0.899541	0.058025	0.57529		0.029595	0.862081	0.422446		0.017572	0.063385	0.927353
1721	18778	0.901633	0.057161	0.591748		0.030154	0.846572	0.413099		0.018036	0.060708	0.900245
1722	18779	0.972764	0.059998	0.638601		0.032982	0.894135	0.422178		0.019911	0.062043	0.930568
1723	18780	0.904901	0.054046	0.577883		0.031098	0.813628	0.361103		0.018935	0.054353	0.820901
1724	18781	0.988677	0.056867	0.593434		0.034461	0.868613	0.351696		0.02111	0.055458	0.840137
1725	18782	1.100864	0.060457	0.579231		0.038974	0.940245	0.321455		0.024167	0.056316	0.849929
1726	18783	0.990694	0.052376	0.432212		0.035594	0.823653	0.221519		0.02239	0.046175	0.686643
1727	18784	0.990965	0.050711	0.310096		0.036151	0.801496	0.14597		0.023004	0.041791	0.605978
1728	18785	0.845056	0.049629	0.149765		0.039706	0.845956	0.041563		0.014678	0.046747	0.496434
1729	18786	0.959574	0.05644	0.25309		0.045123	0.991892	0.078897		0.016503	0.055524	0.582962
1730	18787	1.313167	0.080266	0.452023		0.061712	1.399772	0.151519		0.022338	0.079561	0.842295
1731	18788	0.591499	0.038232	0.233302		0.027768	0.643631	0.083016		0.009972	0.037115	0.393499
1732	18789	0.464768	0.031136	0.198446		0.021797	0.513353	0.073411		0.00778	0.030016	0.315457
1733	18790	0.615691	0.042347	0.277238		0.028844	0.688303	0.105672		0.010241	0.040781	0.421992
1734	18791	1.334546	0.095814	0.646458		0.06238	1.525266	0.260032		0.021923	0.093049	0.925441
1735	18792	0.778682	0.058398	0.39369		0.036287	0.909927	0.167987		0.01262	0.05761	0.54785
1736	18793	0.6881	0.052874	0.350435		0.031985	0.817599	0.156747		0.011038	0.053327	0.491174
1737	18794	0.68806	0.05381	0.344914		0.031892	0.830589	0.16211		0.010929	0.055746	0.499809
1738	18795	1.183347	0.093336	0.57458		0.054688	1.450103	0.283028		0.018614	0.099895	0.874853
1739	18796	0.60947	0.048654	0.282419		0.028079	0.757451	0.146681		0.009505	0.053718	0.459965
1740	18797	0.476665	0.038198	0.209604		0.021907	0.598626	0.113894		0.007386	0.043305	0.37145
1741	18798	0.530932	0.042734	0.221494		0.024355	0.672124	0.125184		0.008191	0.049331	0.423682
1742	18799	0.627416	0.051052	0.236791		0.028695	0.803496	0.143182		0.009614	0.06013	0.517709
1743	18800	1.110428	0.090561	0.378952		0.050643	1.437164	0.245111		0.016918	0.109032	0.944797
1744	18801	0.591141	0.04842	0.178957		0.026884	0.772557	0.128051		0.008964	0.059644	0.522947
1745	18802	0.56699	0.046287	0.153537		0.025721	0.747424	0.125077		0.008567	0.058324	0.520811
1746	18803	0.597152	0.048349	0.142412		0.027025	0.793691	0.139013		0.009003	0.06236	0.568001
1747	18804	0.627349	0.050079	0.143064		0.028316	0.841106	0.153804		0.009437	0.066284	0.618046
1748	18805	1.207023	0.094429	0.278365		0.054349	1.631865	0.309408		0.01813	0.128142	1.226975
1749	18806	0.796468	0.060564	0.186917		0.035749	1.08696	0.219601		0.011937	0.086282	0.844093
1750	18807	0.706152	0.052831	0.160395		0.031608	0.97228	0.206988		0.010565	0.078447	0.773968
1751	18808	0.615804	0.046577	0.137006		0.027506	0.853245	0.186692		0.009198	0.069286	0.688652
1752	18809	1.153987	0.08797	0.252382		0.051448	1.608488	0.357851		0.017199	0.130501	1.310675

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1753	18810	0.773401	0.059615	0.18342		0.034404	1.083822	0.249426		0.011475	0.088881	0.895002
1754	18811	0.846478	0.066807	0.215576		0.037571	1.193281	0.285252		0.012478	0.098355	0.99536
1755	18812	0.822989	0.066035	0.228708		0.03645	1.166077	0.282704		0.01202	0.096239	0.976953
1756	18813	1.296676	0.104394	0.375898		0.05733	1.845006	0.444525		0.01871	0.151362	1.545783
1757	18814	0.788238	0.064717	0.248088		0.034783	1.124695	0.270662		0.01117	0.092793	0.945037
1758	18815	0.619172	0.051315	0.207003		0.027279	0.885433	0.209242		0.008863	0.072901	0.743245
1759	18816	0.63179	0.052479	0.215856		0.027808	0.904361	0.211654		0.009111	0.074252	0.757172
1760	18817	1.302354	0.107681	0.446882		0.057243	1.866519	0.42471		0.019016	0.151654	1.550387
1761	18818	0.804266	0.066251	0.265133		0.035292	1.152313	0.257394		0.011862	0.094032	0.951314
1762	18819	0.805619	0.066149	0.243387		0.03564	1.153147	0.249338		0.011992	0.094025	0.942307
1763	18820	0.807114	0.066293	0.211396		0.036022	1.153257	0.242862		0.012104	0.093691	0.929069
1764	18821	1.219691	0.099513	0.262513		0.054939	1.738625	0.353876		0.018408	0.139697	1.376155
1765	18822	0.625943	0.050835	0.124669		0.028404	0.889725	0.184209		0.009477	0.071503	0.69676
1766	18823	0.719214	0.05774	0.137293		0.032878	1.019037	0.21812		0.01092	0.081463	0.78828
1767	18824	0.813338	0.063795	0.147708		0.037519	1.146822	0.251514		0.01238	0.090715	0.871022
1768	18825	1.322387	0.100154	0.255863		0.06152	1.854278	0.40833		0.020166	0.144379	1.380014
1769	18826	0.817534	0.059475	0.163662		0.0383	1.138585	0.251075		0.01248	0.088167	0.834307
1770	18827	0.819817	0.059139	0.184317		0.038617	1.133181	0.248155		0.01253	0.086854	0.817493
1771	18828	0.809802	0.058729	0.204504		0.038259	1.109981	0.235994		0.012392	0.083913	0.788671
1772	18829	1.15014	0.082845	0.307409		0.054355	1.562728	0.315793		0.017629	0.115769	1.095025
1773	18830	0.651025	0.046737	0.174611		0.03071	0.879359	0.171704		0.009991	0.064816	0.612784
1774	18831	0.829056	0.058455	0.218503		0.038863	1.107842	0.199815		0.012762	0.08047	0.765075
1775	18832	0.83198	0.057024	0.253033		0.03858	1.098901	0.177897		0.01286	0.078551	0.752212
1776	18833	1.354275	0.089011	0.466909		0.061807	1.766922	0.269119		0.021044	0.125764	1.197856
1777	18834	0.838225	0.052664	0.318651		0.037383	1.078792	0.156905		0.013112	0.077208	0.724327
1778	18835	0.745918	0.045374	0.307357		0.032287	0.946351	0.129591		0.011762	0.067427	0.630951
1779	18836	0.652365	0.039167	0.278501		0.02744	0.818117	0.116766		0.010356	0.058742	0.543164
1780	18837	1.277415	0.074862	0.552423		0.051927	1.583056	0.23368		0.020426	0.114973	1.043285
1781	18838	0.850714	0.048878	0.371229		0.032891	1.037083	0.156856		0.013739	0.077024	0.673368
1782	18839	0.660384	0.036673	0.284444		0.025206	0.791543	0.120353		0.010772	0.060073	0.50324
1783	18840	0.428466	0.023166	0.180631		0.016212	0.508694	0.076792		0.007024	0.039031	0.328202
1784	18841	1.119694	0.058803	0.459929		0.042016	1.318755	0.196482		0.018425	0.101803	0.870785
1785	18842	0.784546	0.039811	0.310281		0.028874	0.909213	0.129014		0.013002	0.071807	0.634623
1786	18843	0.788383	0.040054	0.301586		0.028357	0.899086	0.117439		0.013136	0.072141	0.668252
1787	18844	1.334148	0.067833	0.545308		0.046798	1.49778	0.219308		0.022333	0.121085	1.188986
1788	18845	0.796087	0.04165	0.374062		0.027202	0.880367	0.159044		0.013381	0.072273	0.746763
1789	18846	0.826431	0.046432	0.433578		0.027541	0.90053	0.198397		0.013948	0.074299	0.812875
1790	18847	0.803523	0.048434	0.467607		0.026125	0.861981	0.234931		0.013618	0.071027	0.826197
1791	18848	1.143182	0.07236	0.706554		0.036461	1.209451	0.384141		0.019686	0.098395	1.214949
1792	18849	0.660075	0.043023	0.417725		0.020842	0.692889	0.237805		0.011495	0.056372	0.713876
1793	18850	0.892564	0.06032	0.578478		0.027666	0.921322	0.361798		0.015889	0.07391	0.993409
1794	18851	0.895774	0.061371	0.578574		0.02733	0.908552	0.395325		0.016279	0.073119	1.013121
1795	18852	1.457458	0.09915	0.925145		0.044425	1.451186	0.679578		0.027161	0.115845	1.650399
1796	18853	0.901201	0.061777	0.546585		0.028062	0.880525	0.433355		0.017216	0.069793	1.006863
1797	18854	0.903419	0.061052	0.568707		0.028691	0.8652	0.435512		0.017674	0.067267	0.982801
1798	18855	0.90535	0.059383	0.588627		0.029274	0.849072	0.424957		0.018124	0.064129	0.948913
1799	18856	1.470933	0.092197	0.963224		0.04839	1.349626	0.652465		0.030104	0.097927	1.471741
1800	18857	0.908244	0.054355	0.583969		0.03037	0.814785	0.37286		0.018996	0.05673	0.860809
1801	18858	0.991945	0.056174	0.60481		0.033711	0.86919	0.362517		0.021195	0.057447	0.875693
1802	18859	1.60062	0.08457	0.862579		0.055439	1.362511	0.47792		0.035149	0.083556	1.258866
1803	18860	0.993733	0.049771	0.442814		0.035026	0.822924	0.226348		0.022495	0.04685	0.694725
1804	18861	0.993986	0.047327	0.320751		0.035653	0.800257	0.149301		0.023208	0.042504	0.607605
1805	18862	0.861116	0.050189	0.183533		0.039773	0.851855	0.051664		0.015056	0.046761	0.504767
1806	18863	0.977631	0.058309	0.301145		0.045107	0.998836	0.098668		0.016973	0.05538	0.606955
1807	18864	0.895272	0.056373	0.363514		0.041226	0.943312	0.126221		0.015394	0.053031	0.601187
1808	18865	0.602446	0.040096	0.28134		0.02769	0.647993	0.101634		0.010276	0.036991	0.424496
1809	18866	0.473337	0.032742	0.23997		0.021718	0.516793	0.089516		0.008023	0.029956	0.341045
1810	18867	0.627011	0.04462	0.335983		0.028723	0.692903	0.128489		0.010567	0.040779	0.456946
1811	18868	0.916716	0.06858	0.530762		0.041881	1.035673	0.213716		0.015266	0.063097	0.675943
1812	18869	0.792963	0.061963	0.480549		0.036114	0.915997	0.204116		0.013039	0.058248	0.59245
1813	18870	0.700717	0.056194	0.428769		0.031815	0.823079	0.189912		0.011413	0.054208	0.533327
1814	18871	0.700679	0.057205	0.422939		0.031715	0.836225	0.195613		0.01131	0.056986	0.546932
1815	18872	0.762884	0.063028	0.448393		0.034448	0.924251	0.215058		0.012199	0.065107	0.611507
1816	18873	0.620692	0.051699	0.348278		0.027959	0.762685	0.173409		0.009839	0.055494	0.507955
1817	18874	0.485458	0.041007	0.25857		0.021814	0.60277	0.133619		0.007655	0.044903	0.400715
1818	18875	0.540738	0.046091	0.273265		0.024253	0.676782	0.146191		0.008491	0.05129	0.448562
1819	18876	0.639019	0.054881	0.292095		0.028581	0.809081	0.16606		0.009982	0.062743	0.5513
1820	18877	0.68894	0.059278	0.284104		0.030759	0.881426	0.170371		0.010698	0.06969	0.617492
1821	18878	0.602121	0.051657	0.219882		0.026838	0.777874	0.144837		0.009304	0.062549	0.562067
1822	18879	0.577544	0.04917	0.188716		0.025685	0.752497	0.144598		0.008903	0.061247	0.560467

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1823	18880	0.608284	0.051116	0.174699		0.026999	0.798995	0.160629		0.009357	0.065521	0.61331
1824	18881	0.639057	0.052603	0.176559		0.028305	0.846612	0.177744		0.00982	0.069622	0.670876
1825	18882	0.787425	0.063151	0.219397		0.034837	1.051546	0.229634		0.012052	0.086331	0.858584
1826	18883	0.811406	0.062518	0.229017		0.035852	1.093658	0.252952		0.012366	0.092171	0.923984
1827	18884	0.719415	0.055054	0.196108		0.031716	0.978056	0.238146		0.010951	0.084237	0.847855
1828	18885	0.627372	0.048976	0.167004		0.027619	0.858236	0.214974		0.009539	0.074658	0.754064
1829	18886	0.733002	0.058042	0.198474		0.032259	1.008417	0.25798		0.011073	0.088338	0.898581
1830	18887	0.787986	0.063089	0.231702		0.034669	1.090115	0.283758		0.011804	0.09627	0.985967
1831	18888	0.862451	0.070938	0.27852		0.037892	1.200281	0.323718		0.012841	0.106759	1.10055
1832	18889	0.838511	0.070386	0.294008		0.036799	1.173099	0.321638		0.012371	0.104574	1.084068
1833	18890	0.877113	0.074353	0.318976		0.038506	1.232208	0.337924		0.012723	0.109804	1.142881
1834	18891	0.80311	0.068895	0.313572		0.035268	1.131732	0.307883		0.011455	0.100957	1.051791
1835	18892	0.630838	0.054547	0.260601		0.027676	0.891022	0.237909		0.009106	0.079351	0.826807
1836	18893	0.643679	0.055664	0.270425		0.028226	0.910126	0.240933		0.009356	0.080802	0.841915
1837	18894	0.880877	0.075737	0.368391		0.038654	1.246942	0.323017		0.012933	0.110105	1.144215
1838	18895	0.81934	0.069648	0.326272		0.036077	1.159842	0.293005		0.012138	0.102291	1.05405
1839	18896	0.820677	0.069245	0.296318		0.036468	1.160826	0.285623		0.01226	0.102234	1.041997
1840	18897	0.822148	0.069517	0.253914		0.036889	1.161194	0.280171		0.012369	0.101744	1.026199
1841	18898	0.793318	0.066884	0.200013		0.036003	1.117993	0.262393		0.012008	0.097203	0.971977
1842	18899	0.637507	0.053422	0.158423		0.029188	0.896214	0.210348		0.009688	0.077503	0.769573
1843	18900	0.732468	0.060693	0.174447		0.033787	1.026644	0.250631		0.011163	0.088208	0.869386
1844	18901	0.828261	0.066975	0.187578		0.038557	1.15563	0.291487		0.012659	0.098117	0.960148
1845	18902	0.893946	0.069764	0.215678		0.042006	1.240574	0.318312		0.013706	0.104002	1.011003
1846	18903	0.832343	0.062009	0.208507		0.039419	1.147576	0.298841		0.012797	0.095316	0.92005
1847	18904	0.834589	0.063592	0.234666		0.039712	1.142143	0.295759		0.012853	0.093941	0.903785
1848	18905	0.824295	0.063978	0.262446		0.039307	1.118792	0.281567		0.012724	0.090791	0.873177
1849	18906	0.713019	0.055363	0.241222		0.034016	0.959351	0.230039		0.011036	0.076669	0.738234
1850	18907	0.662497	0.051086	0.226506		0.031564	0.886321	0.204706		0.010274	0.070242	0.676608
1851	18908	0.843561	0.06331	0.285743		0.039905	1.116639	0.237351		0.013129	0.08724	0.842224
1852	18909	0.846406	0.061484	0.317293		0.03956	1.107746	0.211488		0.013238	0.085551	0.828147
1853	18910	0.914516	0.063906	0.388921		0.042076	1.182545	0.213125		0.014377	0.091487	0.875687
1854	18911	0.852415	0.056709	0.395872		0.038369	1.087963	0.187222		0.013483	0.084608	0.802039
1855	18912	0.758411	0.048541	0.38133		0.03312	0.954742	0.16186		0.012089	0.07425	0.701706
1856	18913	0.663275	0.042201	0.346012		0.028151	0.825704	0.144721		0.010641	0.063826	0.6042
1857	18914	0.829458	0.051997	0.43887		0.034071	1.020659	0.182947		0.013381	0.078136	0.741244
1858	18915	0.8651	0.053528	0.457938		0.033819	1.047921	0.190017		0.014059	0.082491	0.749387
1859	18916	0.671583	0.040232	0.351403		0.025612	0.800414	0.143711		0.011007	0.064584	0.560911
1860	18917	0.435677	0.025404	0.223204		0.016469	0.514611	0.090935		0.00717	0.041976	0.370116
1861	18918	0.662403	0.037655	0.330683		0.024835	0.776566	0.134476		0.010931	0.064031	0.572079
1862	18919	0.797386	0.042834	0.378954		0.029341	0.920802	0.149621		0.013219	0.077911	0.715828
1863	18920	0.800977	0.043373	0.360169		0.028877	0.911094	0.135434		0.013351	0.078785	0.750679
1864	18921	0.872499	0.047506	0.410104		0.030749	0.977869	0.156753		0.014588	0.085987	0.854211
1865	18922	0.808144	0.046343	0.430039		0.027829	0.892744	0.174265		0.013552	0.079604	0.825041
1866	18923	0.838652	0.051652	0.489686		0.028258	0.913265	0.210719		0.01412	0.082064	0.889612
1867	18924	0.815112	0.052893	0.517114		0.026892	0.874142	0.245748		0.013786	0.078461	0.89682
1868	18925	0.668905	0.045573	0.447676		0.0217	0.707717	0.230614		0.011455	0.063087	0.757406
1869	18926	0.669305	0.046654	0.456617		0.021522	0.702605	0.24685		0.011623	0.062295	0.769242
1870	18927	0.904843	0.065045	0.626809		0.028656	0.934153	0.374542		0.016147	0.081554	1.066689
1871	18928	0.90788	0.065693	0.624142		0.028407	0.921043	0.408561		0.01662	0.078425	1.085258
1872	18929	0.980459	0.070952	0.658664		0.030387	0.97662	0.466068		0.018374	0.082492	1.171315
1873	18930	0.912979	0.065803	0.581312		0.0281	0.892085	0.44647		0.017495	0.074342	1.073768
1874	18931	0.915067	0.06444	0.563522		0.028052	0.876116	0.447969		0.01793	0.071396	1.04615
1875	18932	0.916862	0.061914	0.587281		0.028576	0.859197	0.436483		0.018361	0.067766	1.011816
1876	18933	0.988785	0.063069	0.643751		0.031404	0.906074	0.447357		0.020215	0.068541	1.035313
1877	18934	0.919472	0.055084	0.592529		0.029739	0.823185	0.384719		0.019184	0.059311	0.907513
1878	18935	1.004028	0.055972	0.619057		0.033016	0.877461	0.373649		0.021401	0.05965	0.917616
1879	18936	1.117423	0.056652	0.615627		0.03751	0.948232	0.339193		0.024465	0.059398	0.900922
1880	18937	1.005457	0.047404	0.457839		0.034389	0.829492	0.233208		0.022684	0.047765	0.706439
1881	18938	1.005684	0.044338	0.329666		0.035015	0.806157	0.155655		0.023437	0.04365	0.613076
1882	18939	0.876841	0.050447	0.219974		0.039804	0.857661	0.06231		0.015411	0.046759	0.51656
1883	18940	0.995411	0.060439	0.355621		0.045073	1.005715	0.118525		0.017431	0.055203	0.625982
1884	18941	0.911431	0.058775	0.420854		0.041124	0.949723	0.151331		0.015844	0.052789	0.628536
1885	18942	0.613254	0.041934	0.32691		0.027592	0.65236	0.121644		0.010587	0.037196	0.4449
1886	18943	0.48181	0.034319	0.279504		0.021631	0.520264	0.1062		0.008271	0.030434	0.358109
1887	18944	0.638211	0.046906	0.39212		0.028599	0.697536	0.152533		0.010898	0.041763	0.48068
1888	18945	0.933037	0.072378	0.621594		0.041661	1.042585	0.25344		0.015757	0.065742	0.714087
1889	18946	0.807042	0.065532	0.564436		0.035896	0.922158	0.241314		0.013464	0.06104	0.632467
1890	18947	0.713165	0.059486	0.504667		0.031628	0.828665	0.223937		0.011796	0.056604	0.5702
1891	18948	0.713125	0.060631	0.498855		0.031537	0.841934	0.230042		0.011693	0.059004	0.588588
1892	18949	0.77645	0.06684	0.530304		0.034243	0.930595	0.25205		0.012617	0.066868	0.662114

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1893	18950	0.631735	0.055532	0.412325		0.027787	0.767957	0.202264		0.010182	0.057255	0.552759
1894	18951	0.49411	0.04404	0.306301		0.021693	0.606955	0.154354		0.007921	0.04648	0.437368
1895	18952	0.550385	0.049424	0.323838		0.024131	0.681491	0.167093		0.008797	0.053231	0.488796
1896	18953	0.650434	0.058729	0.346288		0.02846	0.814697	0.186714		0.010338	0.065379	0.575349
1897	18954	0.701271	0.063258	0.335877		0.030632	0.887528	0.189916		0.011087	0.072838	0.643699
1898	18955	0.612909	0.054909	0.259765		0.02673	0.783234	0.163183		0.009645	0.065498	0.588876
1899	18956	0.587912	0.052044	0.222858		0.025608	0.757656	0.162386		0.009223	0.064186	0.589918
1900	18957	0.61922	0.053856	0.205975		0.026944	0.804397	0.179436		0.009704	0.068704	0.648912
1901	18958	0.650561	0.055127	0.209073		0.02828	0.852196	0.198596		0.010166	0.073026	0.714228
1902	18959	0.801623	0.065752	0.259821		0.034821	1.058287	0.25638		0.012481	0.090501	0.919282
1903	18960	0.826049	0.064464	0.270134		0.035858	1.100479	0.281998		0.012801	0.097343	0.994598
1904	18961	0.732429	0.057536	0.230923		0.031784	0.98401	0.265195		0.011315	0.089397	0.91683
1905	18962	0.638731	0.051409	0.196311		0.027717	0.86334	0.239583		0.009829	0.079571	0.818337
1906	18963	0.746285	0.061144	0.239406		0.032389	1.014346	0.287596		0.011412	0.094463	0.974154
1907	18964	0.802256	0.066623	0.283057		0.034831	1.096611	0.321458		0.012165	0.103086	1.067399
1908	18965	0.878099	0.075111	0.341111		0.03815	1.207634	0.368831		0.013189	0.114392	1.196016
1909	18966	0.853722	0.074844	0.359941		0.037127	1.180435	0.36597		0.01267	0.112202	1.182738
1910	18967	0.893017	0.079296	0.38933		0.038879	1.24004	0.381077		0.013143	0.117947	1.250377
1911	18968	0.817643	0.073199	0.37987		0.035642	1.139121	0.339541		0.011976	0.10834	1.151579
1912	18969	0.64225	0.057816	0.31476		0.028032	0.896937	0.261421		0.00934	0.085108	0.90497
1913	18970	0.655307	0.05892	0.325404		0.028624	0.916167	0.265017		0.009583	0.086727	0.921252
1914	18971	0.896762	0.079882	0.440261		0.039228	1.255226	0.355875		0.013233	0.118288	1.250658
1915	18972	0.834065	0.073059	0.386976		0.036742	1.167701	0.322142		0.012408	0.109758	1.149555
1916	18973	0.835392	0.07226	0.3483		0.037223	1.168878	0.316844		0.01252	0.109559	1.134038
1917	18974	0.83682	0.072686	0.295083		0.037728	1.169416	0.311654		0.012623	0.10901	1.119429
1918	18975	0.807434	0.070052	0.242485		0.036841	1.1261	0.293019		0.01225	0.10411	1.060515
1919	18976	0.648807	0.055976	0.191814		0.029873	0.902893	0.234951		0.00988	0.08288	0.837972
1920	18977	0.745407	0.063581	0.210943		0.034622	1.034498	0.27885		0.01139	0.094175	0.944997
1921	18978	0.842797	0.070133	0.229136		0.039556	1.164659	0.327213		0.012926	0.104717	1.041805
1922	18979	0.909567	0.072938	0.26302		0.043086	1.250385	0.36495		0.013999	0.111045	1.097841
1923	18980	0.846798	0.065762	0.253		0.040415	1.156769	0.343497		0.013074	0.10171	1.001343
1924	18981	0.848984	0.068818	0.285279		0.040739	1.151347	0.340387		0.01315	0.100236	0.985334
1925	18982	0.838384	0.069937	0.32141		0.040339	1.127788	0.324485		0.013027	0.097	0.954075
1926	18983	0.725131	0.060963	0.29717		0.034876	0.967025	0.265195		0.011306	0.082036	0.80793
1927	18984	0.673695	0.05641	0.281442		0.03234	0.893419	0.235858		0.010527	0.075177	0.740735
1928	18985	0.857688	0.070083	0.359408		0.0409	1.125624	0.274417		0.013462	0.093386	0.920994
1929	18986	0.860444	0.067351	0.38479		0.040575	1.116703	0.245692		0.013574	0.092911	0.903135
1930	18987	0.929849	0.068962	0.467283		0.043132	1.19223	0.246467		0.014745	0.099844	0.956334
1931	18988	0.866835	0.06143	0.476108		0.039328	1.097199	0.217427		0.013827	0.092197	0.876273
1932	18989	0.771338	0.053199	0.453366		0.034011	0.963241	0.194136		0.012388	0.080835	0.766752
1933	18990	0.674537	0.045974	0.411708		0.028957	0.833352	0.172594		0.010891	0.06976	0.660533
1934	18991	0.843402	0.056764	0.522652		0.035108	1.03055	0.216704		0.01369	0.085692	0.810868
1935	18992	0.879419	0.057973	0.541174		0.03514	1.058806	0.222977		0.014371	0.087957	0.820332
1936	18993	0.682513	0.043538	0.415396		0.026045	0.809312	0.166971		0.011227	0.069383	0.63035
1937	18994	0.442693	0.027497	0.263813		0.016748	0.520523	0.105095		0.007305	0.045318	0.414453
1938	18995	0.672987	0.04067	0.390673		0.025262	0.785734	0.154785		0.011132	0.069196	0.638087
1939	18996	0.809866	0.045806	0.443202		0.029883	0.932234	0.171159		0.013457	0.084184	0.790798
1940	18997	0.813239	0.046391	0.419339		0.029446	0.922886	0.153462		0.013561	0.085606	0.824426
1941	18998	0.885543	0.050914	0.461183		0.031435	0.990906	0.172797		0.014814	0.093916	0.933211
1942	18999	0.819937	0.050571	0.479247		0.028532	0.904862	0.187791		0.013756	0.087165	0.897942
1943	19000	0.850603	0.056229	0.540272		0.029041	0.925771	0.224312		0.014322	0.089979	0.96942
1944	19001	0.826451	0.057437	0.561486		0.0277	0.886155	0.256478		0.014019	0.086177	0.977984
1945	19002	0.67805	0.048898	0.483674		0.022408	0.717437	0.23838		0.011775	0.069317	0.823991
1946	19003	0.678359	0.050006	0.491875		0.022259	0.712245	0.253273		0.01193	0.068422	0.83435
1947	19004	0.916859	0.069379	0.670812		0.029709	0.946881	0.383199		0.016528	0.089364	1.147056
1948	19005	0.919714	0.069722	0.667279		0.029516	0.933489	0.417479		0.016969	0.08613	1.157826
1949	19006	0.993051	0.075716	0.700752		0.031659	0.989628	0.475704		0.018715	0.088812	1.245112
1950	19007	0.924531	0.069723	0.624638		0.02936	0.903644	0.454938		0.017779	0.078623	1.143348
1951	19008	0.926492	0.067649	0.595438		0.02938	0.887009	0.455766		0.018175	0.075195	1.118145
1952	19009	0.928143	0.064981	0.596693		0.029456	0.869289	0.443603		0.018566	0.071117	1.079013
1953	19010	1.000827	0.066493	0.656414		0.031856	0.915981	0.456931		0.020402	0.071656	1.102248
1954	19011	0.930557	0.057732	0.602338		0.029755	0.831461	0.393231		0.019331	0.061649	0.950653
1955	19012	1.015995	0.057827	0.626108		0.032677	0.885547	0.381858		0.02152	0.06162	0.955781
1956	19013	1.130475	0.056908	0.629378		0.036969	0.956127	0.347103		0.024554	0.060891	0.929973
1957	19014	1.016949	0.045091	0.472179		0.033883	0.835877	0.241942		0.022712	0.048561	0.71766
1958	19015	1.017184	0.041038	0.337428		0.034467	0.811956	0.163109		0.023417	0.044741	0.618665
1959	19016	0.884609	0.049942	0.250761		0.039423	0.855826	0.072119		0.015644	0.046384	0.522294
1960	19017	1.003994	0.061756	0.402608		0.04459	1.003645	0.136753		0.017751	0.054609	0.634602
1961	19018	0.919083	0.060334	0.467852		0.040619	0.947789	0.176035		0.01616	0.053392	0.638721
1962	19019	0.618366	0.043302	0.364911		0.027228	0.651018	0.141338		0.010805	0.038277	0.453116

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1963	19020	0.485808	0.035527	0.3128		0.021337	0.519191	0.123271		0.008447	0.03176	0.36555
1964	19021	0.643499	0.048655	0.439539		0.028205	0.696127	0.1754		0.011142	0.043931	0.499252
1965	19022	0.940718	0.075574	0.698581		0.041041	1.040575	0.289698		0.016109	0.069398	0.771799
1966	19023	0.81365	0.068784	0.636382		0.035336	0.920436	0.275267		0.013765	0.064673	0.694219
1967	19024	0.718993	0.062542	0.570229		0.031139	0.82715	0.254886		0.01207	0.060132	0.6263
1968	19025	0.718961	0.063709	0.564545		0.031059	0.840444	0.261062		0.011982	0.062793	0.635762
1969	19026	0.782807	0.07052	0.600019		0.033706	0.928975	0.284978		0.012921	0.071418	0.700893
1970	19027	0.636914	0.058759	0.46729		0.027346	0.766604	0.227698		0.010418	0.060577	0.584571
1971	19028	0.498162	0.046553	0.34757		0.021362	0.60587	0.173079		0.008116	0.048827	0.463382
1972	19029	0.554906	0.052191	0.367735		0.023772	0.680264	0.186682		0.009012	0.055601	0.51854
1973	19030	0.655794	0.061862	0.393473		0.028064	0.81325	0.206648		0.010612	0.067723	0.61148
1974	19031	0.707065	0.06646	0.380727		0.0302	0.885945	0.205175		0.011366	0.075305	0.65307
1975	19032	0.617987	0.057526	0.29449		0.026356	0.781805	0.176762		0.009874	0.067861	0.595656
1976	19033	0.592788	0.054353	0.252595		0.025276	0.756211	0.175642		0.009455	0.066608	0.600527
1977	19034	0.624368	0.056038	0.233872		0.026619	0.802811	0.193073		0.009937	0.071342	0.664616
1978	19035	0.65599	0.05706	0.237178		0.027973	0.850458	0.213494		0.010423	0.075806	0.736098
1979	19036	0.808323	0.067669	0.294777		0.034451	1.05603	0.275255		0.012777	0.093863	0.952981
1980	19037	0.83297	0.065771	0.306225		0.035498	1.097924	0.303192		0.01308	0.100796	1.038366
1981	19038	0.738572	0.059468	0.261525		0.031526	0.981571	0.285168		0.011554	0.093091	0.962701
1982	19039	0.644109	0.053305	0.222082		0.027531	0.861184	0.259011		0.010036	0.083099	0.862097
1983	19040	0.752564	0.063565	0.275755		0.032183	1.011825	0.32389		0.011632	0.098875	1.029017
1984	19041	0.809009	0.069466	0.329251		0.034629	1.093906	0.369415		0.012375	0.108138	1.128923
1985	19042	0.885479	0.078557	0.39667		0.038008	1.204766	0.423446		0.013574	0.120178	1.268486
1986	19043	0.860913	0.078508	0.419746		0.037063	1.17786	0.419408		0.013272	0.117865	1.258726
1987	19044	0.900519	0.083306	0.453425		0.038839	1.237578	0.435924		0.013864	0.123818	1.3337
1988	19045	0.824491	0.076896	0.441279		0.035635	1.136956	0.388058		0.012614	0.113755	1.230439
1989	19046	0.647605	0.061081	0.364454		0.028087	0.89529	0.290125		0.009816	0.089387	0.9674
1990	19047	0.660767	0.062208	0.375627		0.028715	0.914551	0.284377		0.009946	0.091058	0.984387
1991	19048	0.904197	0.083725	0.505342		0.039375	1.253145	0.376374		0.013395	0.124158	1.334521
1992	19049	0.84094	0.075641	0.44145		0.036994	1.165821	0.340637		0.012552	0.115265	1.225013
1993	19050	0.842213	0.07556	0.39436		0.037559	1.167095	0.338079		0.01265	0.115081	1.206608
1994	19051	0.84361	0.075609	0.330651		0.03814	1.16782	0.333049		0.012748	0.114413	1.189082
1995	19052	0.813932	0.072331	0.280508		0.037262	1.124765	0.31818		0.012361	0.109143	1.123664
1996	19053	0.653997	0.057844	0.221446		0.030224	0.901904	0.255839		0.009969	0.086857	0.886428
1997	19054	0.751303	0.065743	0.243006		0.035063	1.033443	0.299449		0.011495	0.09868	0.99854
1998	19055	0.849391	0.072493	0.266		0.040115	1.163633	0.359014		0.013054	0.10962	1.102321
1999	19056	0.916603	0.075286	0.305026		0.043685	1.249438	0.402122		0.014136	0.116675	1.160522
2000	19057	0.853271	0.069084	0.292573		0.040967	1.155911	0.379806		0.013206	0.107537	1.058125
2001	19058	0.855349	0.0733	0.331304		0.041324	1.150509	0.377222		0.013295	0.106104	1.043604
2002	19059	0.844661	0.075128	0.376157		0.040948	1.127043	0.359912		0.013183	0.102255	1.012484
2003	19060	0.730658	0.065882	0.349901		0.035373	0.966445	0.296272		0.011444	0.085961	0.858713
2004	19061	0.678893	0.06115	0.334559		0.032786	0.892885	0.264438		0.010657	0.078757	0.787922
2005	19062	0.864419	0.076314	0.430211		0.041495	1.124946	0.307118		0.013636	0.098103	0.980601
2006	19063	0.867312	0.073721	0.447662		0.041207	1.116147	0.275802		0.013753	0.098669	0.961491
2007	19064	0.937108	0.074616	0.536893		0.043802	1.191851	0.276332		0.014941	0.106362	1.017713
2008	19065	0.873446	0.067038	0.547396		0.039956	1.097063	0.247328		0.014011	0.098602	0.93287
2009	19066	0.777054	0.058082	0.51614		0.034633	0.963429	0.222589		0.012545	0.086638	0.816792
2010	19067	0.679436	0.04924	0.468727		0.029584	0.833823	0.197237		0.011023	0.074724	0.703923
2011	19068	0.849383	0.060861	0.595067		0.036077	1.031559	0.246611		0.013848	0.092003	0.864578
2012	19069	0.885454	0.061393	0.612314		0.036223	1.060403	0.252274		0.014527	0.093639	0.883212
2013	19070	0.687012	0.046058	0.46949		0.026911	0.811007	0.18774		0.011336	0.073335	0.699703
2014	19071	0.44555	0.029014	0.297873		0.016988	0.521804	0.117762		0.007373	0.048027	0.459654
2015	19072	0.677238	0.042838	0.440719		0.025503	0.787877	0.173003		0.011229	0.073539	0.707143
2016	19073	0.814761	0.047908	0.495599		0.030208	0.935216	0.190564		0.013561	0.089632	0.874728
2017	19074	0.817901	0.048538	0.466605		0.029806	0.926225	0.169625		0.013666	0.091565	0.906549
2018	19075	0.89035	0.053287	0.497086		0.03189	0.994855	0.184709		0.014915	0.100747	1.021806
2019	19076	0.824128	0.053509	0.514804		0.029024	0.908672	0.197268		0.013846	0.093797	0.980961
2020	19077	0.854687	0.05954	0.577424		0.029602	0.929799	0.234441		0.014503	0.097041	1.053293
2021	19078	0.830183	0.060708	0.593799		0.02829	0.89007	0.261486		0.014493	0.092941	1.055898
2022	19079	0.680956	0.051304	0.509962		0.022939	0.720612	0.242219		0.012139	0.07473	0.884977
2023	19080	0.68119	0.052441	0.517682		0.022821	0.715379	0.256987		0.012275	0.073738	0.893713
2024	19081	0.920449	0.072649	0.703153		0.030519	0.950983	0.383961		0.016955	0.096399	1.222716
2025	19082	0.92313	0.073053	0.700858		0.030373	0.937406	0.417952		0.017337	0.093108	1.228469
2026	19083	0.99656	0.079334	0.733093		0.032649	0.993573	0.475663		0.019035	0.095686	1.315458
2027	19084	0.927649	0.072694	0.660096		0.030347	0.906948	0.45454		0.017996	0.084205	1.206678
2028	19085	0.929456	0.070824	0.63807		0.030417	0.88982	0.454971		0.018306	0.079	1.18046
2029	19086	0.930996	0.0688	0.62252		0.030545	0.871482	0.443217		0.018606	0.073416	1.130637
2030	19087	1.003795	0.070036	0.662512		0.033084	0.917569	0.457856		0.020366	0.073669	1.152935
2031	19088	0.933223	0.060069	0.612578		0.030949	0.832188	0.394709		0.019252	0.063117	0.992179
2032	19089	1.018801	0.059302	0.638084		0.034026	0.885589	0.388151		0.021375	0.062773	0.982706

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2033	19090	1.1335	0.056983	0.629518		0.038206	0.955408	0.361435		0.024306	0.061613	0.949593
2034	19091	1.01946	0.045239	0.476753		0.034674	0.834744	0.253857		0.022376	0.049579	0.723945
2035	19092	1.019384	0.039256	0.343453		0.034987	0.810562	0.174031		0.022943	0.04538	0.620504
2036	19093	0.892292	0.050142	0.27673		0.039545	0.853841	0.08151		0.015929	0.046067	0.526881
2037	19094	1.012738	0.062756	0.442184		0.04455	1.001339	0.154112		0.01809	0.054127	0.64217
2038	19095	1.363733	0.090667	0.745795		0.059551	1.391296	0.293567		0.024257	0.080284	0.948832
2039	19096	0.623577	0.044558	0.397618		0.027101	0.64961	0.160151		0.011031	0.039817	0.460961
2040	19097	0.489817	0.036943	0.341713		0.021213	0.518113	0.139595		0.008622	0.033112	0.385336
2041	19098	0.648715	0.050987	0.480911		0.028016	0.694722	0.198477		0.011368	0.045877	0.531874
2042	19099	1.384313	0.115784	1.117436		0.059467	1.516553	0.4728		0.024029	0.105908	1.202467
2043	19100	0.819865	0.072383	0.700026		0.035034	0.91884	0.307399		0.014079	0.067915	0.744539
2044	19101	0.724389	0.065819	0.628491		0.030819	0.825784	0.284686		0.012335	0.063278	0.681739
2045	19102	0.724349	0.067061	0.623115		0.030687	0.839062	0.291542		0.012232	0.066494	0.690911
2046	19103	1.224562	0.114898	1.024787		0.051653	1.440139	0.492515		0.020517	0.117447	1.178896
2047	19104	0.641693	0.061741	0.515526		0.02695	0.765297	0.252021		0.010673	0.064514	0.628092
2048	19105	0.501903	0.048873	0.384001		0.021013	0.604823	0.190224		0.008305	0.052062	0.496524
2049	19106	0.559077	0.054738	0.406661		0.023383	0.679073	0.204326		0.009216	0.059345	0.556812
2050	19107	0.660738	0.064792	0.435599		0.027603	0.811782	0.224628		0.010835	0.072391	0.662457
2051	19108	1.148258	0.111728	0.677719		0.04793	1.42558	0.356164		0.018743	0.128801	1.153623
2052	19109	0.62266	0.059972	0.325786		0.025981	0.780351	0.18682		0.01012	0.071875	0.625482
2053	19110	0.597276	0.056519	0.279391		0.02492	0.754799	0.185405		0.009673	0.070282	0.601049
2054	19111	0.629104	0.058073	0.261251		0.026251	0.801281	0.202909		0.010154	0.07513	0.668548
2055	19112	0.660976	0.0589	0.262208		0.027598	0.848787	0.224257		0.010629	0.079863	0.74552
2056	19113	1.250566	0.106607	0.500306		0.052256	1.618441	0.446757		0.020033	0.151893	1.489764
2057	19114	0.839316	0.0676	0.339205		0.03513	1.095596	0.323829		0.013361	0.103615	1.066711
2058	19115	0.744213	0.061636	0.289579		0.03121	0.979451	0.306246		0.011766	0.096185	0.995237
2059	19116	0.649026	0.055124	0.245834		0.027271	0.859295	0.29012		0.010197	0.086131	0.894418
2060	19117	1.195007	0.103591	0.48593		0.050314	1.591318	0.570477		0.018729	0.161392	1.685593
2061	19118	0.815191	0.072203	0.370495		0.034416	1.09155	0.413012		0.012889	0.11256	1.178228
2062	19119	0.892245	0.081807	0.44658		0.037796	1.202313	0.47297		0.014216	0.125189	1.327806
2063	19120	0.867462	0.082016	0.474936		0.036891	1.175584	0.467661		0.013866	0.122809	1.322023
2064	19121	1.345342	0.128844	0.760156		0.057428	1.832023	0.718629		0.021493	0.190644	2.079581
2065	19122	0.830735	0.081187	0.500279		0.035607	1.135052	0.431439		0.013139	0.118455	1.297855
2066	19123	0.652494	0.064439	0.411426		0.028074	0.893915	0.322148		0.010194	0.093052	1.021272
2067	19124	0.665734	0.065604	0.422921		0.028715	0.913189	0.315396		0.010312	0.094817	1.039023
2068	19125	1.350672	0.130144	0.839235		0.058494	1.855782	0.583783		0.020573	0.191158	2.084558
2069	19126	0.847176	0.079097	0.492106		0.037191	1.164338	0.352482		0.012666	0.120121	1.290461
2070	19127	0.848427	0.078695	0.436789		0.037794	1.165757	0.352081		0.012753	0.119941	1.269196
2071	19128	0.849771	0.078838	0.375735		0.038413	1.166575	0.347456		0.012844	0.119289	1.245251
2072	19129	1.262225	0.115401	0.484943		0.057879	1.730279	0.518472		0.019175	0.17619	1.806047
2073	19130	0.658682	0.059485	0.248202		0.030527	0.901067	0.272246		0.010042	0.093138	0.925027
2074	19131	0.756648	0.067653	0.271595		0.03542	1.032518	0.318136		0.011574	0.10745	1.043938
2075	19132	0.85549	0.074636	0.299117		0.040526	1.162598	0.385059		0.013143	0.121354	1.151143
2076	19133	1.368958	0.114677	0.507819		0.065524	1.851247	0.641138		0.021118	0.191494	1.793802
2077	19134	0.859584	0.072246	0.32836		0.041477	1.154949	0.410303		0.013314	0.119777	1.102469
2078	19135	0.861814	0.077473	0.374031		0.041818	1.149645	0.408814		0.013435	0.118108	1.088633
2079	19136	0.851078	0.080146	0.428062		0.041425	1.12626	0.394242		0.01335	0.113926	1.057984
2080	19137	1.186514	0.113474	0.64668		0.057759	1.557127	0.522862		0.018719	0.153335	1.447317
2081	19138	0.683933	0.065795	0.386276		0.033232	0.89244	0.289669		0.010821	0.087387	0.825417
2082	19139	0.870709	0.082609	0.499864		0.042045	1.124503	0.336004		0.013842	0.107688	1.030067
2083	19140	0.873482	0.080153	0.506641		0.041759	1.115825	0.303439		0.013939	0.103743	1.016366
2084	19141	1.39912	0.119835	0.892548		0.065938	1.767226	0.450486		0.022407	0.165848	1.594795
2085	19142	0.879364	0.072459	0.612302		0.040633	1.097155	0.273122		0.014155	0.104353	0.98108
2086	19143	0.782188	0.062718	0.572289		0.035343	0.963803	0.24808		0.01267	0.09194	0.859639
2087	19144	0.683822	0.052379	0.51955		0.030322	0.834361	0.219483		0.011131	0.079433	0.74105
2088	19145	1.315979	0.099407	1.01414		0.057091	1.59	0.42131		0.021522	0.150344	1.423674
2089	19146	0.890824	0.065375	0.678554		0.03738	1.061885	0.279314		0.014655	0.100055	0.978258
2090	19147	0.691028	0.048095	0.516317		0.027888	0.812555	0.207119		0.011428	0.076915	0.771413
2091	19148	0.448098	0.030213	0.32706		0.017664	0.522948	0.129617		0.007431	0.050508	0.50506
2092	19149	1.147607	0.07486	0.81349		0.044302	1.33101	0.320173		0.019069	0.130274	1.304571
2093	19150	0.819097	0.049429	0.539314		0.030567	0.937837	0.208895		0.013662	0.09497	0.952624
2094	19151	0.822041	0.050212	0.50505		0.030209	0.929187	0.193289		0.013757	0.097366	0.980632
2095	19152	1.366241	0.084115	0.798308		0.049447	1.524719	0.305719		0.022936	0.163424	1.678557
2096	19153	0.827839	0.055629	0.541251		0.029515	0.912092	0.205468		0.014196	0.100228	1.052398
2097	19154	0.858313	0.062045	0.606099		0.030173	0.933461	0.241958		0.015098	0.103777	1.125557
2098	19155	0.833489	0.063292	0.619071		0.028916	0.893638	0.263163		0.015022	0.099488	1.123118
2099	19156	1.161374	0.090304	0.901371		0.039891	1.229188	0.412709		0.021326	0.135249	1.59217
2100	19157	0.683687	0.054472	0.538442		0.02337	0.718213	0.257745		0.012677	0.078837	0.945199
2101	19158	0.923617	0.0754	0.729582		0.031312	0.95464	0.383891		0.017438	0.103599	1.289095
2102	19159	0.926127	0.076272	0.73052		0.031234	0.940825	0.414251		0.017753	0.099927	1.290888

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2103	19160	1.482155	0.122039	1.137938		0.049847	1.478082	0.698002		0.028785	0.151328	2.042669
2104	19161	0.930356	0.075409	0.692454		0.031284	0.909718	0.450127		0.018282	0.089962	1.269917
2105	19162	0.932059	0.074551	0.677895		0.0314	0.892141	0.450526		0.018514	0.084098	1.240214
2106	19163	0.933498	0.072269	0.668158		0.031579	0.873215	0.441821		0.018732	0.077718	1.182562
2107	19164	1.492181	0.108268	1.044694		0.050766	1.362181	0.689052		0.030247	0.113081	1.774237
2108	19165	0.935548	0.063255	0.629493		0.032049	0.832577	0.406609		0.019178	0.0646	1.028979
2109	19166	1.021274	0.062834	0.654329		0.035261	0.885327	0.405417		0.021191	0.063677	1.008178
2110	19167	1.622964	0.085039	0.915341		0.05661	1.363376	0.539981		0.034229	0.089089	1.385297
2111	19168	1.021789	0.046979	0.48805		0.03598	0.833453	0.273074		0.021919	0.050585	0.732627
2112	19169	1.021546	0.040734	0.351802		0.036317	0.809153	0.187445		0.022299	0.045946	0.624857
2113	19170	0.780851	0.043576	0.25804		0.034548	0.739626	0.078498		0.014138	0.039771	0.460936
2114	19171	0.88633	0.05503	0.411357		0.038866	0.867445	0.148602		0.016038	0.047368	0.56516
2115	19172	0.81134	0.054737	0.469488		0.035308	0.819286	0.192693		0.014616	0.04884	0.56782
2116	19173	0.545786	0.040087	0.369004		0.023616	0.56286	0.154534		0.00978	0.035673	0.41875
2117	19174	0.428706	0.033396	0.317816		0.018476	0.448972	0.134625		0.007641	0.02971	0.350544
2118	19175	0.567775	0.046125	0.448117		0.024383	0.602088	0.19131		0.010067	0.041208	0.484506
2119	19176	0.829817	0.071972	0.71619		0.035456	0.900319	0.312443		0.014588	0.065408	0.753109
2120	19177	0.717584	0.065589	0.655713		0.030476	0.796616	0.294733		0.012494	0.061271	0.708838
2121	19178	0.633968	0.05967	0.589651		0.026798	0.715982	0.273338		0.010936	0.057402	0.650214
2122	19179	0.633838	0.060805	0.585736		0.026657	0.72752	0.279552		0.010833	0.060692	0.660991
2123	19180	0.690028	0.067268	0.619276		0.028919	0.804119	0.303716		0.011718	0.069436	0.722967
2124	19181	0.561379	0.055952	0.483763		0.023435	0.663507	0.240624		0.00948	0.059155	0.589295
2125	19182	0.439042	0.044262	0.360706		0.018259	0.524346	0.181193		0.007367	0.047818	0.463279
2126	19183	0.489024	0.049548	0.382389		0.02028	0.588695	0.193566		0.008172	0.054561	0.520473
2127	19184	0.577894	0.058574	0.410402		0.023857	0.703724	0.210229		0.00959	0.066624	0.620785
2128	19185	0.623033	0.062708	0.396564		0.025642	0.766585	0.203921		0.010308	0.073886	0.67238
2129	19186	0.544525	0.054041	0.307157		0.022337	0.676447	0.16811		0.008987	0.066232	0.590893
2130	19187	0.5223	0.050815	0.272989		0.021339	0.654282	0.166482		0.008574	0.064794	0.5694
2131	19188	0.550107	0.052085	0.258051		0.022447	0.694574	0.181538		0.008991	0.069272	0.599525
2132	19189	0.577955	0.05263	0.246863		0.0236	0.73576	0.201989		0.009391	0.073635	0.649134
2133	19190	0.712163	0.061828	0.307378		0.029156	0.913548	0.266727		0.011532	0.091535	0.851714
2134	19191	0.733908	0.060858	0.32063		0.030134	0.949708	0.296209		0.011821	0.095304	0.941973
2135	19192	0.650734	0.055606	0.273736		0.026788	0.849007	0.29162		0.010378	0.085825	0.884284
2136	19193	0.567507	0.049358	0.232606		0.023412	0.744864	0.276068		0.009072	0.07708	0.798197
2137	19194	0.663061	0.059138	0.293393		0.027464	0.875169	0.344546		0.010719	0.092146	0.958934
2138	19195	0.712813	0.064902	0.35308		0.029645	0.946232	0.392199		0.011628	0.101114	1.057905
2139	19196	0.780153	0.07367	0.42711		0.032589	1.042288	0.448455		0.012791	0.112567	1.193032
2140	19197	0.75849	0.074023	0.45583		0.031819	1.01922	0.442915		0.012436	0.110421	1.192169
2141	19198	0.793333	0.078821	0.492869		0.033489	1.071132	0.458994		0.012951	0.115948	1.269749
2142	19199	0.726345	0.073916	0.482919		0.03083	0.984288	0.40733		0.011737	0.10645	1.175546
2143	19200	0.570464	0.058672	0.395337		0.024327	0.775267	0.30354		0.009085	0.08363	0.925773
2144	19201	0.58204	0.059671	0.405534		0.024882	0.792066	0.29688		0.009168	0.085216	0.942187
2145	19202	0.796433	0.079957	0.540875		0.034268	1.085591	0.37043		0.012307	0.116315	1.276083
2146	19203	0.740718	0.071534	0.467897		0.032381	1.0102	0.311849		0.011171	0.108092	1.168667
2147	19204	0.741834	0.070745	0.412891		0.032943	1.011531	0.311971		0.011147	0.110229	1.147311
2148	19205	0.743081	0.070911	0.369436		0.033503	1.012329	0.311039		0.01121	0.112154	1.122121
2149	19206	0.716925	0.067565	0.307146		0.032848	0.975102	0.305264		0.010872	0.109373	1.056514
2150	19207	0.576064	0.053258	0.236013		0.026704	0.781924	0.247234		0.008762	0.088552	0.831592
2151	19208	0.661784	0.060172	0.257221		0.030997	0.895964	0.290948		0.010102	0.102238	0.936843
2152	19209	0.748219	0.066409	0.284838		0.035458	1.008806	0.352306		0.011465	0.115477	1.031857
2153	19210	0.807426	0.068903	0.326638		0.038718	1.083178	0.397833		0.012517	0.12372	1.085563
2154	19211	0.751675	0.065263	0.312523		0.036377	1.002144	0.379077		0.011784	0.114091	0.988462
2155	19212	0.753531	0.070597	0.366507		0.036681	0.997583	0.381989		0.011865	0.11261	0.976155
2156	19213	0.744082	0.073608	0.413703		0.036314	0.977436	0.368639		0.011769	0.108581	0.950192
2157	19214	0.643495	0.065361	0.391906		0.031449	0.838369	0.30369		0.010275	0.091297	0.80874
2158	19215	0.597829	0.061017	0.378645		0.029194	0.774689	0.270783		0.009605	0.083365	0.743598
2159	19216	0.76099	0.077114	0.492921		0.036957	0.976317	0.313449		0.012268	0.102662	0.935536
2160	19217	0.763327	0.075018	0.487235		0.036703	0.968969	0.284889		0.01235	0.098789	0.925341
2161	19218	0.824476	0.076212	0.575421		0.039154	1.035039	0.286054		0.013402	0.101961	0.981323
2162	19219	0.768227	0.067249	0.582029		0.03596	0.953113	0.256006		0.012546	0.095089	0.893357
2163	19220	0.683201	0.058237	0.543078		0.031394	0.837432	0.234872		0.011166	0.084014	0.799493
2164	19221	0.597209	0.048704	0.489867		0.02697	0.725117	0.207824		0.009769	0.072807	0.704228
2165	19222	0.746343	0.059469	0.621635		0.033071	0.897567	0.259195		0.012229	0.09001	0.887443
2166	19223	0.777723	0.059954	0.639053		0.033478	0.923408	0.263979		0.012812	0.092042	0.937138
2167	19224	0.603149	0.043739	0.48268		0.025088	0.706843	0.195359		0.00999	0.069572	0.738029
2168	19225	0.391059	0.027353	0.305532		0.015933	0.455008	0.122127		0.006494	0.045822	0.482876
2169	19226	0.594269	0.040096	0.450925		0.023782	0.687305	0.178915		0.009891	0.070464	0.739964
2170	19227	0.714606	0.044018	0.49897		0.02751	0.816487	0.199246		0.011939	0.08684	0.907007
2171	19228	0.717007	0.044715	0.464585		0.026815	0.809226	0.188084		0.012081	0.089289	0.930279
2172	19229	0.780096	0.049422	0.477222		0.028548	0.869746	0.187031		0.013527	0.098743	1.037279

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2173	19230	0.721717	0.049545	0.486238		0.02606	0.794787	0.183936		0.012846	0.092246	0.985056
2174	19231	0.748103	0.055425	0.544603		0.026706	0.813518	0.214431		0.013608	0.09563	1.045563
2175	19232	0.726307	0.056618	0.554138		0.025645	0.778859	0.231785		0.013485	0.091678	1.034207
2176	19233	0.595494	0.047698	0.475419		0.020849	0.630548	0.210015		0.011244	0.073688	0.856748
2177	19234	0.595576	0.048769	0.481955		0.020757	0.625913	0.222427		0.011344	0.072815	0.860045
2178	19235	0.804438	0.067431	0.654191		0.027875	0.831777	0.330556		0.015538	0.095859	1.169075
2179	19236	0.806509	0.068573	0.65664		0.027842	0.819526	0.363893		0.01576	0.092306	1.168408
2180	19237	0.870351	0.074105	0.69578		0.030011	0.868145	0.417511		0.017169	0.094522	1.250606
2181	19238	0.809953	0.067714	0.632528		0.027937	0.7919	0.400468		0.016104	0.082784	1.149235
2182	19239	0.811332	0.067597	0.620321		0.028086	0.776243	0.405011		0.016233	0.077206	1.120702
2183	19240	0.812524	0.065355	0.616314		0.028261	0.759383	0.393958		0.016355	0.071084	1.067581
2184	19241	0.875868	0.066606	0.652617		0.030665	0.798475	0.414282		0.017729	0.069699	1.0733
2185	19242	0.814168	0.057982	0.58101		0.028713	0.723115	0.364174		0.016576	0.058545	0.920835
2186	19243	0.88873	0.057251	0.601785		0.031609	0.7684	0.364212		0.018223	0.057377	0.900641
2187	19244	0.988641	0.054386	0.587077		0.035535	0.827814	0.348364		0.02047	0.05591	0.859721
2188	19245	0.88908	0.04209	0.443895		0.032276	0.72265	0.251688		0.018625	0.044711	0.645826
2189	19246	0.888831	0.036493	0.318356		0.032586	0.701495	0.172783		0.018855	0.040346	0.548393
2190	19247	0.665893	0.036841	0.227148		0.029379	0.626357	0.071159		0.012212	0.033609	0.393249
2191	19248	0.75591	0.046835	0.362262		0.033059	0.73459	0.134923		0.013834	0.040597	0.48444
2192	19249	0.691998	0.047099	0.412272		0.029989	0.693842	0.174937		0.012591	0.042121	0.490982
2193	19250	0.465504	0.034832	0.324963		0.020064	0.476738	0.140237		0.00842	0.030798	0.364787
2194	19251	0.365659	0.029039	0.280388		0.01569	0.38032	0.12212		0.006579	0.025666	0.305664
2195	19252	0.484276	0.04014	0.395981		0.020714	0.510059	0.174463		0.008672	0.035629	0.422924
2196	19253	0.7078	0.06271	0.634556		0.030079	0.762809	0.284892		0.012558	0.056642	0.6716
2197	19254	0.612042	0.057154	0.581896		0.025862	0.675053	0.266747		0.010748	0.053125	0.630781
2198	19255	0.540749	0.051996	0.523887		0.022728	0.606772	0.24721		0.009414	0.050128	0.578903
2199	19256	0.540623	0.05302	0.521216		0.022623	0.616554	0.252616		0.009335	0.053123	0.590111
2200	19257	0.588563	0.058711	0.551649		0.024517	0.681451	0.274129		0.010089	0.060912	0.647918
2201	19258	0.478811	0.048802	0.429714		0.019865	0.562285	0.216795		0.00815	0.051957	0.529946
2202	19259	0.374479	0.03858	0.320637		0.015484	0.444354	0.16297		0.006343	0.042027	0.416663
2203	19260	0.41711	0.043173	0.340189		0.017195	0.498878	0.173832		0.007032	0.047988	0.466704
2204	19261	0.492905	0.051024	0.3657		0.020243	0.596326	0.188279		0.008266	0.058682	0.557394
2205	19262	0.531414	0.054596	0.353494		0.021743	0.649573	0.181616		0.00887	0.065136	0.607641
2206	19263	0.464438	0.046993	0.284045		0.018936	0.573203	0.144736		0.007717	0.058392	0.536113
2207	19264	0.44549	0.04412	0.252597		0.018104	0.554446	0.143089		0.007374	0.057107	0.516874
2208	19265	0.469208	0.045148	0.238629		0.018997	0.588597	0.156036		0.007725	0.061068	0.544608
2209	19266	0.492945	0.045529	0.220009		0.019889	0.623492	0.176349		0.008078	0.06496	0.569414
2210	19267	0.607408	0.053346	0.274639		0.024445	0.774149	0.23256		0.009901	0.080798	0.724969
2211	19268	0.62589	0.052919	0.286925		0.025292	0.804853	0.258178		0.010128	0.084084	0.805738
2212	19269	0.554958	0.048401	0.245076		0.022503	0.719554	0.261398		0.008937	0.075141	0.759649
2213	19270	0.483949	0.042764	0.208546		0.019696	0.631274	0.247367		0.007888	0.066665	0.687929
2214	19271	0.565435	0.051324	0.262677		0.023097	0.741693	0.30859		0.0093	0.079846	0.828681
2215	19272	0.607811	0.056374	0.316518		0.024957	0.801954	0.350923		0.010067	0.087681	0.915953
2216	19273	0.665261	0.064011	0.38471		0.027459	0.883407	0.400782		0.011057	0.097639	1.030694
2217	19274	0.646751	0.064455	0.411134		0.026865	0.86384	0.395544		0.010735	0.095844	1.032695
2218	19275	0.676493	0.068743	0.449415		0.028268	0.907831	0.409587		0.011147	0.100692	1.1023
2219	19276	0.619337	0.064725	0.439392		0.02606	0.834335	0.362859		0.010087	0.092369	1.021589
2220	19277	0.486455	0.051342	0.35755		0.020582	0.657248	0.269917		0.007794	0.07254	0.805036
2221	19278	0.496318	0.052217	0.366313		0.021079	0.671518	0.263777		0.007868	0.073955	0.819645
2222	19279	0.679142	0.069911	0.487424		0.029023	0.920453	0.328572		0.010524	0.101043	1.110416
2223	19280	0.631584	0.062366	0.420371		0.027463	0.85668	0.271596		0.009544	0.096629	1.015995
2224	19281	0.632539	0.061332	0.376368		0.027973	0.857919	0.265479		0.009483	0.099046	0.996022
2225	19282	0.633545	0.061513	0.338668		0.028496	0.858611	0.2678		0.009543	0.100905	0.973914
2226	19283	0.611243	0.058631	0.281618		0.027945	0.827004	0.264081		0.009239	0.098541	0.916513
2227	19284	0.49111	0.04619	0.211261		0.022731	0.663166	0.216611		0.00747	0.079757	0.720232
2228	19285	0.564187	0.051794	0.229469		0.026399	0.759878	0.256146		0.008628	0.092032	0.808545
2229	19286	0.637814	0.057198	0.255063		0.030242	0.855501	0.307626		0.00983	0.104053	0.889775
2230	19287	0.688275	0.059615	0.292736		0.033011	0.918478	0.348757		0.01071	0.111635	0.956932
2231	19288	0.640678	0.056839	0.279963		0.031035	0.849796	0.335853		0.01007	0.102884	0.881099
2232	19289	0.64225	0.061762	0.337189		0.031304	0.845992	0.338618		0.010169	0.101509	0.86727
2233	19290	0.634116	0.064822	0.379574		0.031034	0.828955	0.326984		0.010112	0.097981	0.836745
2234	19291	0.548374	0.057857	0.358345		0.026863	0.711075	0.269425		0.008817	0.082465	0.702896
2235	19292	0.509414	0.054118	0.347098		0.024942	0.657129	0.240127		0.008227	0.075271	0.646494
2236	19293	0.648414	0.068674	0.453785		0.031602	0.828326	0.277531		0.010545	0.092573	0.815508
2237	19294	0.65031	0.067012	0.442773		0.031438	0.822188	0.25325		0.010619	0.089111	0.808243
2238	19295	0.702368	0.068264	0.518119		0.033632	0.878322	0.254726		0.011532	0.091778	0.858204
2239	19296	0.654346	0.059609	0.52276		0.030955	0.808936	0.227141		0.010782	0.083282	0.798185
2240	19297	0.581882	0.051589	0.486503		0.02707	0.710868	0.209981		0.009615	0.073682	0.716909
2241	19298	0.508573	0.043274	0.436486		0.023303	0.615578	0.185911		0.008411	0.064046	0.63207
2242	19299	0.635535	0.052346	0.553815		0.028611	0.762057	0.231936		0.010518	0.079302	0.797156

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2243	19300	0.662135	0.052726	0.568742		0.02904	0.784183	0.236099		0.010954	0.081142	0.841828
2244	19301	0.513446	0.038416	0.427237		0.021837	0.600422	0.174563		0.008507	0.061321	0.662675
2245	19302	0.332865	0.023865	0.270218		0.0139	0.386543	0.109069		0.005531	0.039989	0.433433
2246	19303	0.505807	0.034943	0.39838		0.020783	0.583956	0.15969		0.008422	0.061572	0.663812
2247	19304	0.608126	0.038554	0.438258		0.02414	0.693897	0.181572		0.010251	0.076288	0.812071
2248	19305	0.610069	0.038452	0.406161		0.023368	0.687903	0.171771		0.010579	0.078575	0.830887
2249	19306	0.663662	0.042742	0.414863		0.024818	0.739502	0.167891		0.011807	0.087059	0.923701
2250	19307	0.613878	0.042499	0.419155		0.022411	0.675889	0.160643		0.011188	0.081351	0.873519
2251	19308	0.636246	0.047663	0.470076		0.022965	0.691896	0.183454		0.011838	0.08433	0.923102
2252	19309	0.617585	0.048786	0.478242		0.022082	0.66244	0.198344		0.011711	0.080909	0.909412
2253	19310	0.506311	0.041181	0.410065		0.017969	0.536271	0.178238		0.00974	0.065058	0.751028
2254	19311	0.50633	0.04212	0.415673		0.017912	0.532296	0.186612		0.009809	0.064502	0.752663
2255	19312	0.683829	0.058174	0.566926		0.024057	0.707223	0.282942		0.013415	0.08476	1.018548
2256	19313	0.685476	0.059436	0.56882		0.024063	0.696637	0.313069		0.013568	0.081575	1.017127
2257	19314	0.739704	0.064191	0.606467		0.02594	0.737767	0.358851		0.014747	0.083502	1.0889
2258	19315	0.688279	0.059084	0.55535		0.024186	0.672777	0.345921		0.013786	0.072974	0.999667
2259	19316	0.689428	0.058898	0.54721		0.024306	0.65927	0.349674		0.01386	0.068124	0.973986
2260	19317	0.690365	0.057444	0.543211		0.02448	0.644732	0.339953		0.013915	0.06239	0.927273
2261	19318	0.744178	0.059066	0.575888		0.026558	0.677664	0.355685		0.015033	0.061034	0.928718
2262	19319	0.691708	0.050923	0.511442		0.024885	0.613454	0.315687		0.014007	0.051058	0.795608
2263	19320	0.755029	0.051439	0.527892		0.027392	0.651603	0.318183		0.015401	0.049834	0.777057
2264	19321	0.839891	0.049635	0.513315		0.0308	0.701688	0.30639		0.0173	0.048348	0.740582
2265	19322	0.755287	0.036917	0.386407		0.027977	0.612435	0.221359		0.01567	0.038396	0.554639
2266	19323	0.75507	0.03157	0.27617		0.028248	0.594517	0.151897		0.015738	0.034485	0.469517
2267	19324	0.78042	0.042677	0.271644		0.03432	0.729341	0.088034		0.014518	0.03905	0.461547
2268	19325	0.88602	0.054583	0.435639		0.038583	0.855356	0.167184		0.016409	0.047765	0.574571
2269	19326	0.811155	0.055944	0.492636		0.035012	0.807969	0.216716		0.014911	0.049727	0.588014
2270	19327	0.545684	0.041431	0.389656		0.023402	0.555215	0.173662		0.009965	0.036394	0.435084
2271	19328	0.428651	0.034572	0.336986		0.018306	0.442966	0.151683		0.007786	0.030349	0.364969
2272	19329	0.567718	0.047821	0.476729		0.024155	0.594121	0.21703		0.010263	0.042153	0.505502
2273	19330	0.82974	0.074788	0.766043		0.035083	0.888654	0.35428		0.014853	0.067095	0.810272
2274	19331	0.717508	0.068195	0.704054		0.030124	0.786527	0.329444		0.012704	0.063343	0.760251
2275	19332	0.63392	0.06206	0.634823		0.026496	0.707023	0.305123		0.011137	0.059895	0.698445
2276	19333	0.633791	0.06331	0.632489		0.026359	0.718448	0.311517		0.011047	0.063597	0.713811
2277	19334	0.689968	0.07018	0.670317		0.028567	0.794083	0.337635		0.011929	0.07306	0.786431
2278	19335	0.561318	0.058317	0.520423		0.023132	0.655228	0.266594		0.009633	0.062416	0.645475
2279	19336	0.439002	0.04609	0.388705		0.018032	0.517805	0.200091		0.007494	0.050535	0.508677
2280	19337	0.488981	0.051564	0.412765		0.020037	0.581341	0.213109		0.008322	0.057744	0.570673
2281	19338	0.577839	0.060925	0.444364		0.023582	0.694891	0.230168		0.009776	0.070679	0.682897
2282	19339	0.622972	0.065161	0.432164		0.025331	0.756938	0.221199		0.01048	0.078505	0.745439
2283	19340	0.544463	0.05604	0.359656		0.022056	0.667957	0.169758		0.00911	0.070399	0.658324
2284	19341	0.522244	0.052562	0.319311		0.021087	0.646113	0.167574		0.008695	0.068863	0.635191
2285	19342	0.550044	0.053714	0.30114		0.022146	0.685928	0.187416		0.009128	0.07366	0.669859
2286	19343	0.577875	0.054075	0.270671		0.023183	0.72661	0.211638		0.009535	0.078391	0.701158
2287	19344	0.712032	0.063213	0.335203		0.028474	0.902215	0.277976		0.011672	0.097542	0.857669
2288	19345	0.733719	0.06315	0.350647		0.029217	0.938063	0.315221		0.011916	0.101525	0.952058
2289	19346	0.65053	0.057817	0.299805		0.025977	0.838692	0.318901		0.010643	0.090726	0.89952
2290	19347	0.567302	0.051008	0.255584		0.022743	0.735807	0.301615		0.00938	0.079483	0.815173
2291	19348	0.662793	0.061104	0.320016		0.026697	0.864515	0.376054		0.011036	0.094763	0.981356
2292	19349	0.712484	0.067184	0.386438		0.028846	0.934765	0.42736		0.01191	0.104175	1.086787
2293	19350	0.779773	0.076304	0.471955		0.031801	1.029703	0.487654		0.013067	0.116094	1.222314
2294	19351	0.758085	0.076961	0.505143		0.03113	1.006878	0.480793		0.012661	0.11402	1.222554
2295	19352	0.792893	0.082394	0.559686		0.032803	1.058165	0.497265		0.013122	0.119806	1.307374
2296	19353	0.725915	0.077674	0.545386		0.03024	0.97258	0.439868		0.011831	0.109863	1.213256
2297	19354	0.57013	0.061596	0.441196		0.023929	0.766239	0.32661		0.009144	0.086266	0.956874
2298	19355	0.58169	0.062626	0.451499		0.024512	0.782931	0.318788		0.009216	0.087962	0.974528
2299	19356	0.795909	0.083757	0.599479		0.033801	1.073312	0.396078		0.01231	0.124012	1.32034
2300	19357	0.740179	0.074559	0.515671		0.032023	0.999101	0.326339		0.011114	0.118714	1.207311
2301	19358	0.74124	0.072889	0.474501		0.032661	1.000659	0.307593		0.011095	0.121727	1.182142
2302	19359	0.742413	0.073123	0.423122		0.033273	1.001513	0.313973		0.011144	0.124087	1.158066
2303	19360	0.716219	0.069699	0.351344		0.032658	0.964633	0.310993		0.010825	0.121251	1.089187
2304	19361	0.57545	0.054886	0.257291		0.026569	0.773513	0.259128		0.008745	0.098153	0.855454
2305	19362	0.661034	0.06114	0.278507		0.030887	0.886282	0.307395		0.010122	0.113271	0.974577
2306	19363	0.747284	0.067559	0.310649		0.035401	0.997732	0.36661		0.011555	0.128121	1.106563
2307	19364	0.806323	0.070941	0.356829		0.038679	1.071099	0.421114		0.012584	0.137527	1.190391
2308	19365	0.750548	0.067868	0.341321		0.036353	0.990994	0.406072		0.011814	0.126769	1.096511
2309	19366	0.752308	0.074021	0.422558		0.036718	0.986594	0.409712		0.01196	0.125101	1.079541
2310	19367	0.742757	0.078174	0.476277		0.036408	0.966793	0.395771		0.011919	0.120808	1.040936
2311	19368	0.642252	0.07011	0.446603		0.031543	0.829393	0.326053		0.010384	0.101713	0.874707
2312	19369	0.596611	0.065728	0.433714		0.029282	0.76653	0.290477		0.009688	0.092836	0.796478

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2313	19370	0.759314	0.083806	0.569486		0.037154	0.96637	0.335276		0.012415	0.114142	0.973722
2314	19371	0.761496	0.082007	0.55817		0.037086	0.95933	0.306732		0.012543	0.109863	0.965505
2315	19372	0.822337	0.083727	0.638421		0.039752	1.024937	0.308953		0.013605	0.113149	1.050061
2316	19373	0.766067	0.072297	0.640963		0.036615	0.944077	0.276694		0.012729	0.100114	0.98198
2317	19374	0.681129	0.062558	0.593834		0.032093	0.829721	0.25605		0.011354	0.088579	0.877548
2318	19375	0.59528	0.052539	0.529907		0.027667	0.718564	0.226826		0.009944	0.077151	0.772526
2319	19376	0.743793	0.063065	0.672033		0.034034	0.889642	0.283066		0.012432	0.095631	0.975699
2320	19377	0.774853	0.063488	0.689493		0.034619	0.915631	0.288123		0.012953	0.097945	1.033828
2321	19378	0.600749	0.046208	0.515138		0.026123	0.701211	0.212888		0.010036	0.074099	0.814124
2322	19379	0.389437	0.028558	0.32541		0.01666	0.451483	0.132936		0.0065	0.047795	0.531195
2323	19380	0.591726	0.041679	0.479135		0.024955	0.682133	0.194515		0.009944	0.073732	0.810521
2324	19381	0.711333	0.046212	0.524882		0.029093	0.810739	0.225866		0.012309	0.091836	0.988413
2325	19382	0.713504	0.045291	0.483287		0.028237	0.80392	0.214092		0.012679	0.094722	1.009062
2326	19383	0.776055	0.050441	0.491241		0.029815	0.864396	0.20986		0.014139	0.105067	1.118627
2327	19384	0.717755	0.049811	0.493147		0.026992	0.790164	0.201621		0.013365	0.098232	1.054398
2328	19385	0.743779	0.056044	0.554396		0.027394	0.808955	0.222612		0.014126	0.101857	1.11051
2329	19386	0.721885	0.05748	0.564598		0.026123	0.774531	0.234881		0.013955	0.097744	1.090498
2330	19387	0.591732	0.048652	0.483739		0.021289	0.62697	0.207926		0.011581	0.078887	0.898405
2331	19388	0.591733	0.049781	0.490431		0.021225	0.622271	0.219133		0.01165	0.07818	0.899318
2332	19389	0.799048	0.068724	0.672651		0.02855	0.826573	0.333322		0.015887	0.102623	1.214899
2333	19390	0.800919	0.070554	0.674708		0.028547	0.81397	0.368292		0.016048	0.098675	1.212506
2334	19391	0.864162	0.076131	0.723988		0.030824	0.861772	0.421574		0.017388	0.100904	1.297047
2335	19392	0.804058	0.070596	0.667573		0.028733	0.78562	0.408179		0.016217	0.08804	1.190362
2336	19393	0.805313	0.071264	0.660606		0.028904	0.769624	0.412569		0.016251	0.083496	1.159229
2337	19394	0.806386	0.070152	0.65486		0.029098	0.752435	0.401038		0.016268	0.076045	1.102909
2338	19395	0.86918	0.072192	0.693996		0.031595	0.790623	0.420285		0.017518	0.07314	1.101014
2339	19396	0.807887	0.062911	0.614838		0.029596	0.715462	0.376743		0.016402	0.060977	0.941868
2340	19397	0.881808	0.063737	0.632031		0.032588	0.759696	0.379861		0.018066	0.059296	0.91867
2341	19398	0.980896	0.061727	0.612424		0.03664	0.817825	0.368111		0.020276	0.057279	0.876453
2342	19399	0.882079	0.046164	0.459169		0.033279	0.713696	0.265932		0.018343	0.045279	0.654899
2343	19400	0.881814	0.037451	0.327258		0.033602	0.69286	0.183149		0.018406	0.040504	0.552725
2344	19401	0.880665	0.047179	0.309714		0.038484	0.816632	0.105726		0.016692	0.043575	0.526232
2345	19402	1.000009	0.060784	0.500336		0.043284	0.957722	0.201364		0.018815	0.054059	0.66133
2346	19403	0.915625	0.063902	0.568982		0.039233	0.904774	0.260874		0.017055	0.056415	0.687396
2347	19404	0.615994	0.047416	0.447705		0.02623	0.6218	0.208939		0.011384	0.041337	0.502143
2348	19405	0.483902	0.039614	0.388379		0.020511	0.496129	0.18355		0.008895	0.034498	0.420688
2349	19406	0.640913	0.054846	0.550839		0.027073	0.665484	0.262551		0.01173	0.047943	0.583591
2350	19407	0.93676	0.085895	0.888649		0.039269	0.995574	0.428273		0.016955	0.07641	0.934328
2351	19408	0.810036	0.078413	0.820042		0.033723	0.881275	0.396943		0.014489	0.072754	0.876936
2352	19409	0.71569	0.071407	0.741302		0.029645	0.792266	0.365456		0.012709	0.068954	0.807262
2353	1941	0.264963	0.036595	0.035541		0.040664	0.251945	0.040275		0.006259	0.007946	0.217464
2354	19410	0.715548	0.072872	0.739914		0.029512	0.805155	0.372637		0.012623	0.073369	0.827607
2355	19411	0.778986	0.080915	0.78541		0.03195	0.890007	0.403211		0.013612	0.084462	0.915333
2356	19412	0.633717	0.067238	0.608606		0.025864	0.73442	0.317775		0.010972	0.072323	0.754375
2357	19413	0.495627	0.053138	0.454323		0.020168	0.580405	0.238066		0.008548	0.058648	0.596125
2358	19414	0.55205	0.059449	0.483019		0.022408	0.651645	0.25307		0.009488	0.067069	0.66989
2359	19415	0.652372	0.070217	0.520837		0.026394	0.778971	0.272257		0.011169	0.082153	0.803007
2360	19416	0.703331	0.075067	0.537517		0.028333	0.848566	0.26031		0.011944	0.091294	0.877636
2361	19417	0.61468	0.064529	0.446187		0.024663	0.748832	0.194781		0.010354	0.08193	0.776089
2362	19418	0.589588	0.060471	0.395314		0.023594	0.72435	0.190132		0.009899	0.080202	0.749841
2363	19419	0.620969	0.061732	0.37149		0.02478	0.769011	0.215289		0.01038	0.085832	0.791883
2364	1942	0.427233	0.056582	0.059433		0.065	0.403091	0.068157		0.01019	0.013727	0.348103
2365	19420	0.65238	0.062019	0.33336		0.025965	0.814672	0.242823		0.010861	0.091374	0.830205
2366	19421	0.803847	0.072322	0.396559		0.031877	1.011639	0.318533		0.013257	0.113737	1.017263
2367	19422	0.828287	0.072839	0.414808		0.032719	1.051902	0.370273		0.013492	0.118498	1.090736
2368	19423	0.73437	0.066779	0.355848		0.028931	0.940534	0.374443		0.012171	0.105952	1.033821
2369	19424	0.640392	0.058931	0.303871		0.025186	0.825211	0.353787		0.010725	0.092791	0.938534
2370	19425	0.748195	0.070223	0.375044		0.029533	0.969598	0.440701		0.01256	0.109775	1.131537
2371	19426	0.804246	0.077324	0.454902		0.031952	1.048365	0.500654		0.013497	0.120465	1.249384
2372	19427	0.88018	0.087837	0.559222		0.035264	1.154781	0.57091		0.014776	0.134053	1.399712
2373	19428	0.855644	0.088738	0.599909		0.0346	1.129175	0.561847		0.014305	0.131222	1.388185
2374	19429	0.894938	0.095462	0.677527		0.036471	1.186738	0.579781		0.014743	0.137212	1.486302
2375	1943	0.655818	0.079951	0.099552		0.097267	0.607612	0.11691		0.015789	0.024655	0.522778
2376	19430	0.819282	0.090084	0.657846		0.033681	1.090821	0.511968		0.01325	0.12581	1.382199
2377	19431	0.643435	0.071451	0.52813		0.026681	0.859502	0.37922		0.010222	0.100294	1.091547
2378	19432	0.656456	0.072594	0.539739		0.027368	0.878326	0.369298		0.010313	0.104509	1.111905
2379	19433	0.898196	0.096925	0.714778		0.037787	1.204346	0.456644		0.013689	0.147787	1.506047
2380	19434	0.835236	0.086121	0.613111		0.035871	1.121262	0.374501		0.01242	0.141662	1.376387
2381	19435	0.836395	0.083476	0.583323		0.03663	1.123156	0.336919		0.012461	0.145405	1.34953
2382	19436	0.837658	0.083737	0.52163		0.037392	1.124224	0.34961		0.012581	0.148231	1.32518

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2383	19437	0.808079	0.079789	0.42533		0.036707	1.082865	0.352294		0.012188	0.144813	1.249953
2384	19438	0.649208	0.062804	0.301311		0.029878	0.868288	0.297238		0.00984	0.11732	1.016663
2385	19439	0.745728	0.069883	0.324628		0.034738	0.994818	0.356758		0.011412	0.135507	1.177744
2386	1944	0.670922	0.079391	0.108209		0.102414	0.629353	0.128613		0.01589	0.027433	0.523278
2387	19440	0.842957	0.076777	0.363705		0.039858	1.119847	0.423882		0.01308	0.153257	1.337226
2388	19441	0.909515	0.081373	0.418256		0.043556	1.202127	0.489805		0.014213	0.164448	1.438619
2389	19442	0.846498	0.07823	0.409941		0.040988	1.112155	0.473309		0.013328	0.151753	1.326001
2390	19443	0.848425	0.085645	0.515228		0.041421	1.107202	0.478112		0.013533	0.149893	1.306419
2391	19444	0.837565	0.091171	0.581964		0.041142	1.085056	0.461862		0.013525	0.144733	1.258034
2392	19445	0.724181	0.082261	0.540958		0.03569	0.930948	0.380222		0.011769	0.121815	1.057354
2393	19446	0.672661	0.077377	0.527234		0.033188	0.860428	0.338527		0.010962	0.111224	0.963049
2394	19447	0.856021	0.099379	0.696429		0.042237	1.084843	0.390139		0.014093	0.136856	1.178043
2395	19448	0.858368	0.097577	0.686681		0.04225	1.077096	0.357191		0.014257	0.131656	1.150715
2396	19449	0.926868	0.099861	0.761064		0.045332	1.150935	0.360187		0.015474	0.135472	1.247933
2397	1945	0.638193	0.076924	0.10734		0.113255	0.615662	0.128351		0.014817	0.027773	0.487319
2398	19450	0.863297	0.08557	0.759513		0.041848	1.060212	0.325358		0.014461	0.119878	1.166077
2399	19451	0.76749	0.073451	0.702407		0.036767	0.931881	0.3016		0.01293	0.102996	1.043096
2400	19452	0.670674	0.061641	0.619967		0.031771	0.807154	0.2673		0.011332	0.089787	0.91932
2401	19453	0.837917	0.073408	0.784711		0.039153	0.999473	0.333613		0.01417	0.111396	1.162617
2402	19454	0.872738	0.073868	0.804161		0.039969	1.028831	0.339617		0.014758	0.114291	1.233958
2403	19455	0.676537	0.053691	0.59648		0.030283	0.788075	0.250731		0.011454	0.086595	0.971975
2404	19456	0.438524	0.033135	0.37597		0.019361	0.507503	0.156405		0.007502	0.055247	0.633771
2405	19457	0.666256	0.047951	0.552471		0.029056	0.766865	0.230371		0.011555	0.085643	0.966351
2406	19458	0.800784	0.05314	0.602245		0.034031	0.911652	0.273398		0.014261	0.106904	1.16661
2407	19459	0.803086	0.05146	0.549029		0.033208	0.904207	0.259781		0.014712	0.110424	1.177304
2408	1946	0.649945	0.087485	0.112087		0.130793	0.643685	0.134381		0.015359	0.030521	0.487593
2409	19460	0.873348	0.056894	0.557192		0.035075	0.972476	0.262504		0.016356	0.122568	1.300875
2410	19461	0.807578	0.056141	0.556772		0.031567	0.889096	0.24805		0.015421	0.114715	1.222589
2411	19462	0.836727	0.063047	0.625516		0.032137	0.910319	0.266136		0.016279	0.119027	1.283957
2412	19463	0.811943	0.064852	0.638135		0.030634	0.87159	0.270604		0.016062	0.114184	1.256887
2413	19464	0.665476	0.055135	0.546818		0.024739	0.705463	0.232824		0.013291	0.092581	1.033184
2414	19465	0.665417	0.05645	0.554661		0.024553	0.700089	0.250239		0.013341	0.091705	1.033283
2415	19466	0.898426	0.077932	0.767061		0.032712	0.929612	0.381077		0.018165	0.120288	1.395862
2416	19467	0.900391	0.08057	0.769332		0.032747	0.915073	0.414805		0.018296	0.115455	1.392243
2417	19468	0.971418	0.088714	0.833447		0.035359	0.968417	0.473825		0.019769	0.117804	1.486873
2418	19469	0.903737	0.08396	0.776965		0.03301	0.882471	0.461241		0.018366	0.103718	1.364701
2419	1947	0.712925	0.11295	0.125251		0.164061	0.725377	0.150337		0.018772	0.035855	0.524263
2420	19470	0.905088	0.084295	0.773115		0.033193	0.864185	0.466405		0.018348	0.09884	1.328652
2421	19471	0.906221	0.083007	0.766139		0.033435	0.844621	0.456394		0.018292	0.089979	1.262836
2422	19472	0.976764	0.085427	0.80521		0.03629	0.887212	0.488461		0.019767	0.08519	1.255697
2423	19473	0.907834	0.075563	0.711107		0.034014	0.802559	0.435361		0.01853	0.070173	1.072344
2424	19474	0.990878	0.076702	0.726515		0.03744	0.851879	0.438419		0.020396	0.067951	1.044275
2425	19475	1.102196	0.074546	0.700425		0.042092	0.9168	0.4257		0.022855	0.065294	0.9999
2426	19476	0.99115	0.056144	0.522578		0.038231	0.799952	0.307495		0.020654	0.051433	0.745583
2427	19477	0.990843	0.044239	0.371362		0.038593	0.776716	0.213729		0.021142	0.045815	0.626948
2428	19478	0.868469	0.045373	0.303444		0.03768	0.800061	0.109695		0.016724	0.042513	0.524356
2429	19479	0.986305	0.059088	0.49433		0.042356	0.938312	0.2098		0.018788	0.053371	0.664723
2430	1948	0.727206	0.135594	0.12879		0.190507	0.757171	0.154584		0.021889	0.0382	0.524477
2431	19480	1.329779	0.093874	0.834565		0.056549	1.305221	0.399667		0.025056	0.082137	1.030653
2432	19481	0.607691	0.047362	0.449016		0.025665	0.609298	0.21833		0.011351	0.04094	0.514213
2433	19482	0.477391	0.039607	0.388101		0.020064	0.486179	0.191929		0.00886	0.034193	0.426959
2434	19483	0.632304	0.054862	0.549709		0.026468	0.652162	0.274413		0.011672	0.047549	0.58869
2435	19484	1.35046	0.12557	1.300611		0.056128	1.425807	0.653189		0.024679	0.110884	1.363173
2436	19485	0.799226	0.078514	0.825797		0.032969	0.863817	0.414104		0.014439	0.0727	0.877498
2437	19486	0.706132	0.071488	0.748552		0.028974	0.776664	0.378387		0.012648	0.069038	0.809636
2438	19487	0.706001	0.072937	0.748653		0.028816	0.789406	0.385365		0.012542	0.073612	0.832306
2439	19488	1.194444	0.126026	1.236018		0.048518	1.356318	0.646724		0.021059	0.131747	1.438984
2440	19489	0.625272	0.067419	0.617972		0.025278	0.72026	0.328093		0.010939	0.072832	0.769773
2441	1949	0.588712	0.126759	0.103716		0.173728	0.622351	0.124397		0.020379	0.031853	0.415325
2442	19490	0.489013	0.053297	0.459532		0.019702	0.569271	0.245982		0.008507	0.059117	0.610943
2443	19491	0.544681	0.059627	0.48907		0.021887	0.639189	0.26139		0.009435	0.067653	0.685342
2444	19492	0.643664	0.070438	0.546763		0.025765	0.76416	0.280502		0.011079	0.082926	0.815222
2445	19493	1.119562	0.121396	0.931002		0.044658	1.343116	0.430212		0.019159	0.148517	1.436804
2446	19494	0.606466	0.064702	0.477904		0.024109	0.734673	0.197961		0.010312	0.08279	0.788844
2447	19495	0.581698	0.060623	0.422705		0.023055	0.710668	0.187756		0.009833	0.081155	0.763149
2448	19496	0.612651	0.061831	0.396143		0.024216	0.754498	0.212698		0.010294	0.087016	0.807174
2449	19497	0.643643	0.062059	0.354287		0.025365	0.799331	0.239842		0.010738	0.092736	0.847825
2450	19498	1.218743	0.110945	0.64019		0.047903	1.525526	0.48253		0.020184	0.17697	1.598582
2451	19499	0.817158	0.073217	0.424588		0.032015	1.032204	0.374392		0.013434	0.120155	1.08313
2452	1950	0.706173	0.135815	0.108156		0.206307	0.77332	0.123957		0.024373	0.04251	0.497946

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2453	19500	0.724476	0.067181	0.366064		0.02831	0.922995	0.378623		0.012042	0.107464	1.029697
2454	19501	0.631768	0.059312	0.312823		0.024641	0.809872	0.357488		0.010564	0.094124	0.936394
2455	19502	1.164196	0.110793	0.596949		0.045344	1.501081	0.700991		0.019562	0.174282	1.782206
2456	19503	0.793362	0.077549	0.461025		0.030919	1.028926	0.505414		0.013294	0.121349	1.250288
2457	19504	0.868223	0.088029	0.571518		0.034172	1.133354	0.575926		0.014468	0.134963	1.399288
2458	19505	0.844012	0.089084	0.614781		0.033551	1.108218	0.565808		0.013916	0.132052	1.382908
2459	19506	1.309866	0.142513	1.05019		0.052595	1.728441	0.863361		0.021331	0.204602	2.173292
2460	19507	0.808063	0.090894	0.685514		0.032766	1.070678	0.513404		0.012865	0.126557	1.365706
2461	19508	0.634594	0.072075	0.546413		0.025987	0.843727	0.379228		0.009871	0.103593	1.07972
2462	19509	0.647428	0.073227	0.557833		0.026665	0.862284	0.368429		0.009917	0.108035	1.100041
2463	1951	0.705849	0.124067	0.093262		0.203013	0.801663	0.102292		0.02411	0.047505	0.497415
2464	19510	1.314426	0.144641	1.093466		0.054739	1.754824	0.67145		0.019601	0.226136	2.208435
2465	19511	0.823659	0.08665	0.647575		0.035065	1.101128	0.369621		0.01219	0.146626	1.360191
2466	19512	0.824747	0.08319	0.617949		0.035871	1.103115	0.321237		0.012228	0.150533	1.341373
2467	19513	0.82596	0.083431	0.553927		0.036658	1.104266	0.335779		0.012319	0.153589	1.324798
2468	19514	1.227773	0.12239	0.683217		0.055563	1.639197	0.543077		0.01849	0.230496	2.009702
2469	19515	0.640075	0.062501	0.303963		0.02937	0.852937	0.301193		0.009707	0.121609	1.061439
2470	19516	0.735186	0.069507	0.325802		0.034183	0.977217	0.362289		0.011238	0.140462	1.229771
2471	19517	0.830994	0.075995	0.366699		0.039241	1.100029	0.425809		0.012838	0.158947	1.396131
2472	19518	1.330371	0.120469	0.626118		0.063717	1.752241	0.731758		0.020788	0.252293	2.227462
2473	19519	0.834364	0.078464	0.429677		0.04043	1.092394	0.477824		0.01318	0.157465	1.384909
2474	1952	0.734704	0.118818	0.083231		0.20712	0.862654	0.087619		0.024846	0.053942	0.517553
2475	19520	0.836177	0.086089	0.541377		0.040922	1.087471	0.483154		0.013353	0.155531	1.365182
2476	19521	0.825416	0.092406	0.612954		0.040699	1.065685	0.468369		0.013322	0.150285	1.315034
2477	19522	1.151311	0.134997	0.913894		0.057079	1.475256	0.623228		0.018768	0.203365	1.77927
2478	19523	0.662823	0.079135	0.552854		0.03292	0.845076	0.344414		0.010865	0.115472	1.005294
2479	19524	0.84339	0.102283	0.734548		0.041951	1.065488	0.396683		0.013948	0.142114	1.230461
2480	19525	0.845626	0.100867	0.728341		0.042007	1.057908	0.358992		0.014101	0.136753	1.202211
2481	19526	1.354807	0.153109	1.161908		0.067053	1.67778	0.537015		0.022752	0.208119	1.939684
2482	19527	0.850297	0.089005	0.777077		0.041791	1.041467	0.330796		0.014365	0.124474	1.222472
2483	19528	0.755823	0.074796	0.718096		0.036796	0.915515	0.307113		0.012829	0.104761	1.084959
2484	19529	0.660424	0.06265	0.629383		0.03185	0.793049	0.272256		0.011244	0.090686	0.952762
2485	1953	0.704573	0.10454	0.066619		0.193689	0.855912	0.067742		0.023519	0.055904	0.496298
2486	19530	1.271345	0.114227	1.218278		0.060648	1.513635	0.523094		0.021695	0.173297	1.844962
2487	19531	0.859187	0.074667	0.809897		0.040301	1.011134	0.345826		0.014687	0.115749	1.270819
2488	19532	0.665925	0.054171	0.596561		0.03064	0.774693	0.255044		0.011448	0.088482	1.000405
2489	19533	0.431617	0.033386	0.375092		0.01963	0.498947	0.158897		0.007558	0.057135	0.651599
2490	19534	1.106083	0.081317	0.92692		0.049798	1.272011	0.405511		0.019662	0.145671	1.673334
2491	19535	0.787985	0.052833	0.596528		0.034717	0.896511	0.285936		0.014391	0.108165	1.196312
2492	19536	0.790129	0.050798	0.538483		0.034019	0.889348	0.272317		0.014795	0.11184	1.200345
2493	19537	1.313191	0.084968	0.838792		0.055196	1.462343	0.435767		0.025157	0.189529	1.996763
2494	19538	0.794309	0.05488	0.546478		0.032567	0.874706	0.26719		0.015502	0.116335	1.226636
2495	19539	0.822845	0.061545	0.611481		0.032907	0.895644	0.280761		0.016318	0.120724	1.286139
2496	1954	0.6452	0.088475	0.052225		0.173254	0.806225	0.051373		0.021108	0.053862	0.454529
2497	19540	0.798371	0.063511	0.625187		0.031422	0.857496	0.277005		0.016056	0.116424	1.256853
2498	19541	1.112814	0.092213	0.912278		0.043285	1.180395	0.39274		0.022597	0.16014	1.754068
2499	19542	0.654178	0.055574	0.54475		0.02528	0.688615	0.246729		0.013334	0.093413	1.031469
2500	19543	0.883113	0.077199	0.778255		0.033726	0.914097	0.376697		0.018097	0.122383	1.393584
2501	19544	0.884966	0.081832	0.823297		0.03345	0.899452	0.409986		0.018178	0.117277	1.389114
2502	19545	1.416642	0.136518	1.326644		0.053228	1.411978	0.692461		0.029082	0.176883	2.197739
2503	19546	0.888093	0.087363	0.833293		0.033242	0.866729	0.452911		0.018165	0.106103	1.360173
2504	19547	0.889348	0.087734	0.801371		0.033275	0.848506	0.458191		0.018086	0.10096	1.323519
2505	19548	0.89043	0.08645	0.782473		0.033502	0.829043	0.459937		0.017978	0.091832	1.256652
2506	19549	1.424104	0.130932	1.198722		0.053976	1.292014	0.731338		0.028975	0.127653	1.848014
2507	1955	0.644457	0.084968	0.044627		0.168752	0.828045	0.042141		0.020806	0.056345	0.454175
2508	19550	0.891945	0.078459	0.711695		0.034071	0.787341	0.441769		0.018295	0.070177	1.062237
2509	19551	0.973507	0.079731	0.72239		0.037506	0.835526	0.444999		0.020102	0.067729	1.036355
2510	19552	1.548004	0.111036	0.990122		0.060461	1.285236	0.609422		0.032158	0.09261	1.418937
2511	19553	0.97377	0.058923	0.514647		0.03872	0.784398	0.308031		0.020328	0.050941	0.739394
2512	19554	0.973484	0.046961	0.3648		0.039511	0.761784	0.215963		0.02097	0.045238	0.620018
2513	19555	0.952423	0.048286	0.326212		0.040972	0.87251	0.125566		0.018558	0.046129	0.579797
2514	19556	1.081803	0.066037	0.536338		0.046052	1.02338	0.241523		0.020801	0.058642	0.740029
2515	19557	0.990783	0.070995	0.624158		0.041754	0.966974	0.312316		0.018823	0.06143	0.78562
2516	19558	0.666668	0.052754	0.496729		0.027898	0.664614	0.252203		0.012558	0.045101	0.579208
2517	19559	0.523742	0.044123	0.430898		0.0218	0.530328	0.221562		0.009793	0.037696	0.482226
2518	1956	0.643697	0.082091	0.0377		0.164119	0.849718	0.034078		0.020463	0.058756	0.453976
2519	19560	0.693708	0.061139	0.610558		0.028749	0.711404	0.316621		0.01289	0.052455	0.666322
2520	19561	1.014013	0.095874	0.985785		0.04172	1.064427	0.515479		0.018662	0.084093	1.044387
2521	19562	0.876928	0.087608	0.917669		0.035814	0.942432	0.476753		0.015974	0.080639	0.978554
2522	19563	0.774788	0.079816	0.834171		0.031448	0.847451	0.432519		0.013974	0.076718	0.904929

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2523	19564	0.774633	0.08145	0.83644		0.031259	0.861496	0.440238		0.013835	0.081951	0.942167
2524	19565	0.84331	0.09018	0.891308		0.033879	0.952613	0.477687		0.014968	0.094684	1.059924
2525	19566	0.686069	0.074947	0.692986		0.027444	0.786354	0.376922		0.012106	0.081316	0.879012
2526	19567	0.536561	0.059249	0.514251		0.02138	0.621601	0.282248		0.0094	0.066059	0.698581
2527	19568	0.597638	0.066306	0.550632		0.023745	0.698018	0.299606		0.010414	0.075628	0.784758
2528	19569	0.706228	0.078352	0.648809		0.02794	0.834585	0.320907		0.0122	0.092983	0.933262
2529	1957	0.642899	0.07983	0.031768		0.159368	0.870662	0.027063		0.019952	0.060518	0.453881
2530	19570	0.761369	0.083774	0.683019		0.030035	0.909288	0.304513		0.013098	0.10383	1.014191
2531	19571	0.665403	0.072001	0.564691		0.026178	0.802497	0.225062		0.011398	0.093569	0.889834
2532	19572	0.638227	0.067439	0.498721		0.025029	0.776298	0.205672		0.010844	0.091885	0.860125
2533	19573	0.672181	0.068775	0.466734		0.026283	0.824188	0.23037		0.01133	0.098568	0.911134
2534	19574	0.706165	0.068961	0.415132		0.027528	0.873158	0.260173		0.011783	0.105106	0.959479
2535	19575	0.870066	0.080166	0.483439		0.033852	1.084334	0.344525		0.014425	0.130903	1.191579
2536	19576	0.896495	0.081639	0.479754		0.034805	1.127634	0.415925		0.014746	0.136295	1.241282
2537	19577	0.794807	0.074989	0.41572		0.030768	1.008396	0.420763		0.013127	0.12153	1.132293
2538	19578	0.693074	0.066233	0.355676		0.026784	0.884847	0.39743		0.011459	0.106064	1.031921
2539	19579	0.809677	0.078212	0.421602		0.03127	1.03976	0.494724		0.013421	0.123934	1.248103
2540	1958	0.642131	0.077598	0.02685		0.15455	0.890317	0.02091		0.019343	0.061388	0.453859
2541	19580	0.870289	0.086267	0.513894		0.033597	1.124305	0.56137		0.014418	0.135411	1.381877
2542	19581	0.952397	0.097847	0.643143		0.036765	1.238473	0.638817		0.015588	0.150516	1.547778
2543	19582	0.925794	0.099148	0.70268		0.036145	1.21104	0.626788		0.014903	0.147233	1.523219
2544	19583	0.968191	0.107515	0.8165		0.038243	1.272861	0.644326		0.015334	0.154512	1.612987
2545	19584	0.886272	0.101587	0.788488		0.03542	1.17016	0.566139		0.013743	0.144522	1.492363
2546	19585	0.695995	0.080586	0.623965		0.028114	0.922213	0.416715		0.010475	0.118418	1.180741
2547	19586	0.710048	0.081842	0.636539		0.028868	0.942549	0.403934		0.010485	0.123507	1.203278
2548	19587	0.971396	0.109116	0.840007		0.039973	1.292754	0.494497		0.014296	0.174899	1.628961
2549	19588	0.903219	0.096665	0.76117		0.038072	1.203885	0.400251		0.013295	0.167835	1.492051
2550	19589	0.904377	0.091895	0.721179		0.039003	1.206177	0.349114		0.013323	0.17245	1.486436
2551	1959	0.64138	0.07642	0.022707		0.149664	0.908549	0.017127		0.018862	0.061657	0.453887
2552	19590	0.905645	0.092125	0.647943		0.039922	1.207513	0.366809		0.013399	0.175977	1.527643
2553	19591	0.873542	0.087685	0.517118		0.039322	1.163224	0.392874		0.013092	0.17206	1.505012
2554	19592	0.701745	0.068934	0.341983		0.032074	0.932793	0.336027		0.01063	0.139442	1.224094
2555	19593	0.805992	0.076602	0.359259		0.03736	1.068779	0.404671		0.012279	0.161099	1.422802
2556	19594	0.910955	0.083418	0.406451		0.042943	1.203139	0.475357		0.013988	0.182261	1.624434
2557	19595	0.982722	0.089884	0.469581		0.047044	1.291513	0.549785		0.015314	0.195651	1.74824
2558	19596	0.914521	0.087239	0.495937		0.04437	1.194773	0.534192		0.014464	0.180607	1.602562
2559	19597	0.916446	0.095831	0.626527		0.044949	1.189313	0.544077		0.014622	0.178485	1.57427
2560	19598	0.904562	0.103648	0.711319		0.044759	1.16536	0.528143		0.014561	0.172452	1.517085
2561	19599	0.781965	0.094691	0.659502		0.038964	0.99972	0.435537		0.012757	0.145226	1.272587
2562	1960	0.640741	0.076295	0.019126		0.144761	0.925745	0.0139		0.018321	0.061902	0.453923
2563	19600	0.726274	0.089626	0.639229		0.036303	0.923946	0.387651		0.011945	0.13262	1.158422
2564	19601	0.924065	0.116558	0.853931		0.046315	1.164866	0.445231		0.015324	0.163196	1.417967
2565	19602	0.92641	0.115329	0.851402		0.046448	1.156556	0.397661		0.015471	0.157009	1.400369
2566	19603	1.000113	0.118833	0.89088		0.050063	1.235925	0.401678		0.016858	0.161593	1.52273
2567	19604	0.93134	0.102434	0.876626		0.046421	1.138654	0.370982		0.01583	0.142958	1.422838
2568	19605	0.827772	0.084269	0.809084		0.040947	1.00102	0.344824		0.01413	0.120273	1.26288
2569	19606	0.723211	0.070357	0.708178		0.035511	0.867209	0.305858		0.012379	0.101304	1.100457
2570	19607	0.903359	0.083178	0.882253		0.043979	1.074085	0.381702		0.01552	0.125987	1.383334
2571	19608	0.940665	0.083527	0.899185		0.04519	1.106018	0.392852		0.01622	0.131465	1.451369
2572	19609	0.728974	0.060517	0.657887		0.034461	0.847517	0.291056		0.012757	0.101995	1.135789
2573	1961	0.640233	0.075388	0.016735		0.139816	0.942468	0.012423		0.017539	0.062078	0.453954
2574	19610	0.472434	0.037261	0.412903		0.022122	0.545898	0.18058		0.008416	0.065906	0.739128
2575	19611	0.717672	0.053805	0.604135		0.033331	0.82502	0.277122		0.012987	0.099789	1.12488
2576	19612	0.862352	0.058009	0.651101		0.039348	0.981095	0.330072		0.016057	0.121176	1.352457
2577	19613	0.86458	0.05534	0.581881		0.038703	0.973348	0.315094		0.016462	0.125407	1.35469
2578	19614	0.939933	0.060443	0.59728		0.041255	1.047062	0.340833		0.018302	0.139378	1.474366
2579	19615	0.868918	0.059267	0.59188		0.037372	0.957408	0.316405		0.017248	0.13054	1.370011
2580	19616	0.900027	0.066395	0.659642		0.037921	0.980291	0.326166		0.018115	0.135694	1.428054
2581	19617	0.873131	0.068766	0.676442		0.036009	0.938486	0.313475		0.017775	0.13154	1.392942
2582	19618	0.715446	0.059045	0.602005		0.029223	0.759427	0.256154		0.0147	0.10655	1.143554
2583	19619	0.715301	0.060531	0.635906		0.029083	0.753487	0.268086		0.014761	0.105398	1.144487
2584	1962	0.47498	0.054208	0.011486		0.10014	0.712034	0.0089		0.012526	0.045915	0.33705
2585	19620	0.965554	0.087045	0.924199		0.038946	0.999951	0.41032		0.019994	0.137815	1.54059
2586	19621	0.967477	0.094273	0.976742		0.038803	0.983627	0.44761		0.020031	0.131811	1.534839
2587	19622	1.043581	0.10633	1.057394		0.041704	1.040185	0.510977		0.021554	0.133962	1.646474
2588	19623	0.970744	0.100411	0.981264		0.038735	0.947164	0.492853		0.019946	0.11974	1.507031
2589	19624	0.972073	0.101969	0.938943		0.038829	0.926919	0.498607		0.019809	0.113601	1.459506
2590	19625	0.973205	0.100238	0.889462		0.039025	0.905419	0.512148		0.019726	0.103197	1.384451
2591	19626	1.048861	0.102521	0.908478		0.042336	0.950605	0.550549		0.021437	0.09605	1.371355
2592	19627	0.974801	0.089875	0.785834		0.039689	0.859497	0.495131		0.020072	0.077736	1.166508

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2593	19628	1.063938	0.091439	0.791933		0.043802	0.91191	0.499408		0.02202	0.074823	1.139594
2594	19629	1.183443	0.089469	0.757084		0.049541	0.981071	0.472533		0.024629	0.071435	1.090223
2595	1963	0.42636	0.047889	0.009823		0.088326	0.644723	0.007975		0.011111	0.041256	0.302658
2596	19630	1.064227	0.068208	0.558776		0.04534	0.856017	0.343388		0.022248	0.055971	0.812478
2597	19631	1.063932	0.054949	0.395001		0.046224	0.831505	0.241016		0.022858	0.049593	0.680182
2598	19632	1.004466	0.056968	0.333035		0.042804	0.915185	0.138095		0.019716	0.048101	0.614778
2599	19633	1.141099	0.076184	0.5506		0.048016	1.073585	0.267727		0.022098	0.062017	0.788599
2600	19634	1.045226	0.076863	0.654235		0.04351	1.014514	0.345733		0.019982	0.065098	0.839043
2601	19635	0.703344	0.056454	0.524424		0.02906	0.697325	0.280487		0.013325	0.047843	0.619926
2602	19636	0.55259	0.047224	0.456997		0.022708	0.556445	0.246186		0.010396	0.040023	0.517016
2603	19637	0.731946	0.065455	0.649872		0.029947	0.746438	0.351591		0.013692	0.05574	0.7155
2604	19638	1.069958	0.102724	1.052171		0.043428	1.116881	0.57174		0.019811	0.089637	1.125061
2605	19639	0.925326	0.093936	0.974376		0.037253	0.989044	0.52795		0.016946	0.086108	1.06077
2606	19640	0.817576	0.08563	0.888813		0.03272	0.889536	0.479473		0.014836	0.082053	0.998319
2607	19641	0.817419	0.087475	0.894176		0.032531	0.904474	0.487358		0.014706	0.087834	1.052288
2608	19642	0.889893	0.09653	0.955446		0.03523	1.000391	0.52828		0.015891	0.101664	1.182378
2609	19643	0.723951	0.080002	0.744127		0.02852	0.826054	0.416149		0.012831	0.087578	0.9776
2610	19644	0.566191	0.063264	0.562233		0.022226	0.653129	0.311122		0.009974	0.071583	0.779931
2611	19645	0.630637	0.070816	0.632089		0.024692	0.733527	0.329798		0.011048	0.082311	0.881341
2612	19646	0.745211	0.083749	0.743669		0.029067	0.877176	0.352401		0.01296	0.101524	1.057003
2613	19647	0.803394	0.089617	0.780918		0.031231	0.955789	0.333352		0.01388	0.113417	1.148711
2614	19648	0.702109	0.077045	0.644278		0.027208	0.843607	0.24518		0.012046	0.102191	1.007742
2615	19649	0.673428	0.072187	0.568046		0.026027	0.816104	0.213762		0.011472	0.100336	0.977193
2616	1965	0.581064	0.063942	0.011828		0.116647	0.8919	0.010928		0.01477	0.056692	0.412688
2617	19650	0.709242	0.073602	0.53077		0.027348	0.866446	0.23846		0.011979	0.107683	1.034117
2618	19651	0.745077	0.073802	0.468473		0.028661	0.917891	0.271191		0.012468	0.114945	1.08674
2619	19652	0.918001	0.085725	0.541094		0.035241	1.139851	0.363886		0.015218	0.143292	1.336369
2620	19653	0.94585	0.087574	0.52792		0.03623	1.185457	0.440082		0.01547	0.149159	1.392967
2621	19654	0.838532	0.080505	0.452624		0.032066	1.060203	0.444163		0.013602	0.132925	1.255431
2622	19655	0.731173	0.071161	0.387884		0.027934	0.930347	0.419959		0.011847	0.116006	1.110173
2623	19656	0.854175	0.083648	0.446516		0.032614	1.093292	0.522969		0.013801	0.136514	1.329347
2624	19657	0.918081	0.092289	0.545023		0.035044	1.182359	0.592911		0.014727	0.147484	1.46792
2625	19658	1.004646	0.104475	0.691155		0.03836	1.302625	0.673627		0.015892	0.162073	1.643987
2626	19659	0.97652	0.106061	0.781064		0.037322	1.273871	0.659964		0.015136	0.159152	1.617329
2627	1966	0.739942	0.109357	0.094014		0.115358	0.711945	0.104771		0.017018	0.022688	0.613117
2628	19660	1.021202	0.115475	0.905843		0.039499	1.338982	0.677054		0.015471	0.167305	1.69724
2629	19661	0.934746	0.109137	0.872449		0.036641	1.231123	0.592531		0.013772	0.159098	1.563344
2630	19662	0.734017	0.086572	0.688149		0.029142	0.970364	0.434048		0.010744	0.130402	1.233389
2631	19663	0.748805	0.087962	0.697696		0.029955	0.991787	0.419479		0.010953	0.136129	1.257236
2632	19664	1.024368	0.117284	0.938802		0.041531	1.360314	0.510118		0.014976	0.193033	1.701587
2633	19665	0.952411	0.103746	0.863055		0.039601	1.266905	0.408532		0.013919	0.185205	1.595291
2634	19666	0.95357	0.097354	0.809888		0.040653	1.269399	0.363569		0.013929	0.190307	1.650917
2635	19667	0.954832	0.097522	0.729516		0.041687	1.27084	0.386697		0.014046	0.194419	1.696439
2636	19668	0.920928	0.092759	0.584531		0.041137	1.224285	0.416664		0.013688	0.190317	1.670989
2637	19669	0.739763	0.072867	0.376359		0.033601	0.981874	0.357196		0.011092	0.154184	1.373641
2638	1967	0.60004	0.064248	0.010385		0.116014	0.936468	0.012843		0.01459	0.059206	0.426438
2639	19670	0.849615	0.08089	0.375752		0.039197	1.125156	0.433177		0.012849	0.178024	1.604676
2640	19671	0.960178	0.087769	0.427916		0.045124	1.266734	0.513337		0.014687	0.201522	1.83105
2641	19672	1.035744	0.095438	0.49637		0.049511	1.359814	0.590401		0.016052	0.216507	1.968405
2642	19673	0.963771	0.093173	0.551282		0.04677	1.257974	0.577642		0.015136	0.199709	1.803435
2643	19674	0.965726	0.102346	0.69648		0.04747	1.252118	0.588192		0.015352	0.197273	1.755824
2644	19675	0.953111	0.111767	0.793552		0.04735	1.226635	0.570763		0.015332	0.190764	1.683686
2645	19676	0.823861	0.102891	0.738437		0.04128	1.052017	0.470244		0.013412	0.160795	1.413053
2646	19677	0.765132	0.097853	0.710446		0.038494	0.972183	0.418033		0.012543	0.146809	1.285487
2647	19678	0.973415	0.127884	0.955002		0.049228	1.225536	0.478565		0.016134	0.180523	1.571366
2648	19679	0.975782	0.127178	0.958231		0.049478	1.216629	0.421211		0.016329	0.173797	1.565717
2649	1968	0.580354	0.059642	0.009201		0.108183	0.919302	0.013951		0.01349	0.057604	0.412761
2650	19680	1.053297	0.131689	0.983519		0.053437	1.299993	0.424977		0.017788	0.179077	1.701776
2651	19681	0.980739	0.11388	0.946265		0.049666	1.197774	0.39718		0.016698	0.158368	1.589759
2652	19682	0.871579	0.091133	0.871703		0.04395	1.053128	0.369707		0.014939	0.133047	1.411502
2653	19683	0.761405	0.075765	0.762098		0.038204	0.912409	0.328138		0.013106	0.111073	1.228449
2654	19684	0.950974	0.089538	0.941795		0.047422	1.13017	0.413423		0.016429	0.139356	1.539875
2655	19685	0.990094	0.089735	0.95219		0.04889	1.164023	0.43174		0.017172	0.146075	1.61289
2656	19686	0.767171	0.064872	0.69143		0.037438	0.89214	0.321175		0.013628	0.11335	1.251219
2657	19687	0.497147	0.039906	0.432865		0.024085	0.574655	0.201369		0.008995	0.073338	0.809359
2658	19688	0.755168	0.057552	0.631609		0.036352	0.868526	0.307209		0.013868	0.111079	1.226212
2659	19689	0.907266	0.06078	0.67544		0.043085	1.032909	0.366685		0.017117	0.132695	1.464505
2660	1969	0.580028	0.056721	0.008869		0.104086	0.931828	0.015304		0.013056	0.057789	0.41289
2661	19690	0.90948	0.058202	0.596513		0.042563	1.024773	0.355971		0.017578	0.135094	1.464953
2662	19691	0.988618	0.06313	0.616964		0.045562	1.102293	0.392854		0.019509	0.150262	1.593974

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2663	19692	0.913787	0.060824	0.609359		0.041458	1.007847	0.359941		0.018349	0.141008	1.480446
2664	19693	0.946381	0.068162	0.676105		0.042268	1.031849	0.367949		0.019266	0.147621	1.549821
2665	19694	0.917966	0.070936	0.731257		0.040322	0.987717	0.347508		0.0189	0.14299	1.519159
2666	19695	0.75211	0.061307	0.686113		0.032574	0.799156	0.275562		0.015598	0.11571	1.250357
2667	19696	0.751905	0.064489	0.724		0.032421	0.792836	0.276009		0.015638	0.114342	1.249889
2668	19697	1.014852	0.096854	1.055132		0.043557	1.051946	0.424453		0.021166	0.149074	1.674819
2669	19698	1.016764	0.104759	1.113336		0.043505	1.034462	0.464052		0.021178	0.142284	1.649452
2670	19699	1.096663	0.118036	1.205338		0.046863	1.093534	0.5312		0.022745	0.144311	1.758706
2671	1970	0.579723	0.054307	0.00908		0.099995	0.943982	0.01652		0.012597	0.058316	0.412963
2672	19700	1.020045	0.112449	1.108296		0.043619	0.995345	0.512838		0.021004	0.129302	1.602565
2673	19701	1.021391	0.114088	1.059488		0.043809	0.973689	0.522933		0.02082	0.122086	1.540686
2674	19702	1.022523	0.111962	0.98247		0.044081	0.95076	0.545453		0.02084	0.110748	1.460203
2675	19703	1.101989	0.114386	0.976916		0.047849	0.997909	0.589333		0.022615	0.103015	1.446028
2676	19704	1.024157	0.09958	0.831741		0.044887	0.902069	0.530962		0.021141	0.082567	1.228357
2677	19705	1.117793	0.100778	0.825801		0.049556	0.95693	0.536263		0.023183	0.0793	1.200328
2678	19706	1.243354	0.099036	0.786216		0.056016	1.029356	0.506899		0.025903	0.075591	1.146567
2679	19707	1.118107	0.075991	0.575763		0.051241	0.898242	0.367239		0.023391	0.059074	0.855273
2680	19708	1.117838	0.061991	0.405704		0.0522	0.872818	0.257487		0.023616	0.052135	0.715922
2681	19709	0.974635	0.060944	0.309238		0.042077	0.884315	0.139361		0.019138	0.046824	0.597504
2682	1971	0.579406	0.053083	0.009652		0.09587	0.955926	0.017731		0.011776	0.059893	0.413113
2683	19710	1.107367	0.080399	0.540195		0.046288	1.037551	0.270096		0.021471	0.060268	0.768225
2684	19711	1.014427	0.079722	0.63468		0.041721	0.980611	0.349437		0.019427	0.063357	0.815401
2685	19712	0.682659	0.0554	0.505258		0.027828	0.674063	0.283647		0.012961	0.0466	0.602788
2686	19713	0.536359	0.046324	0.442314		0.021743	0.537903	0.248777		0.010115	0.039001	0.503035
2687	19714	0.710474	0.064202	0.630999		0.028678	0.721602	0.355061		0.013324	0.054357	0.70306
2688	19715	1.038605	0.100791	1.026844		0.041547	1.079855	0.576664		0.019279	0.09006	1.119865
2689	19716	0.898227	0.092211	0.953038		0.035618	0.956431	0.534315		0.016495	0.089543	1.070978
2690	19717	0.79364	0.084107	0.86398		0.031292	0.860379	0.485589		0.014449	0.085601	1.020888
2691	19718	0.793504	0.085977	0.871551		0.031122	0.875036	0.49063		0.014327	0.090177	1.074176
2692	19719	0.863852	0.095005	0.933375		0.033672	0.968091	0.531176		0.015472	0.101168	1.205025
2693	1972	0.43433	0.038717	0.007718		0.068806	0.725765	0.014205		0.008442	0.046146	0.309997
2694	19720	0.702757	0.078559	0.728626		0.027241	0.799596	0.417837		0.012489	0.087352	1.003567
2695	19721	0.549608	0.061867	0.585804		0.02124	0.632335	0.311962		0.009705	0.071409	0.803287
2696	19722	0.612163	0.069292	0.65758		0.023602	0.710266	0.330245		0.010757	0.082112	0.906924
2697	19723	0.723377	0.082019	0.772569		0.027801	0.849497	0.351936		0.012617	0.101295	1.086504
2698	19724	0.779842	0.087841	0.809508		0.02985	0.925733	0.33177		0.013493	0.113181	1.180465
2699	19725	0.681515	0.075589	0.666637		0.025992	0.817135	0.242871		0.011693	0.102007	1.037921
2700	19726	0.653658	0.070851	0.586886		0.024882	0.790523	0.204167		0.011129	0.100191	1.006165
2701	19727	0.688405	0.072297	0.547582		0.026158	0.839293	0.232843		0.011625	0.107559	1.064714
2702	19728	0.723177	0.072501	0.47922		0.027435	0.889106	0.266605		0.012098	0.114841	1.119228
2703	19729	0.890999	0.084225	0.551169		0.033723	1.1041	0.350542		0.014731	0.143189	1.379583
2704	1973	0.318436	0.028017	0.005653		0.049327	0.535399	0.01073		0.006065	0.034321	0.227373
2705	19730	0.917999	0.086073	0.537362		0.034666	1.148324	0.421317		0.01493	0.150578	1.443166
2706	19731	0.8138	0.079184	0.448359		0.03072	1.027077	0.425268		0.013028	0.136284	1.301517
2707	19732	0.709591	0.070018	0.384778		0.026785	0.901334	0.40237		0.011208	0.119882	1.15105
2708	19733	0.82894	0.082026	0.44223		0.031268	1.059291	0.501181		0.01292	0.140677	1.355945
2709	19734	0.890932	0.090467	0.529589		0.0336	1.145751	0.568375		0.01371	0.15146	1.46324
2710	19735	0.974871	0.102221	0.678133		0.036824	1.262521	0.645434		0.014736	0.165025	1.622618
2711	19736	0.947532	0.103876	0.789306		0.03587	1.23483	0.630972		0.014003	0.158475	1.593274
2712	19737	0.990845	0.113376	0.913945		0.03757	1.298093	0.645322		0.014487	0.166076	1.664693
2713	19738	0.906919	0.107241	0.878612		0.034866	1.193682	0.562907		0.013248	0.159813	1.509376
2714	19739	0.712113	0.085126	0.691546		0.027777	0.940933	0.410463		0.010365	0.131044	1.183773
2715	1974	0.491968	0.043117	0.008564		0.074112	0.833251	0.017109		0.008988	0.053979	0.351458
2716	19740	0.726438	0.086489	0.696198		0.028579	0.961709	0.395119		0.01055	0.136803	1.212093
2717	19741	0.993718	0.115312	0.962127		0.039688	1.319036	0.476308		0.014421	0.194033	1.66682
2718	19742	0.923865	0.101946	0.887359		0.037871	1.228452	0.385665		0.013406	0.186287	1.610598
2719	19743	0.924912	0.094496	0.834836		0.038944	1.230857	0.347332		0.01339	0.191546	1.667394
2720	19744	0.926084	0.094551	0.744923		0.040003	1.232233	0.378568		0.013523	0.195728	1.713631
2721	19745	0.893142	0.089866	0.598868		0.039561	1.187129	0.402725		0.013149	0.191632	1.706553
2722	19746	0.71741	0.070532	0.386718		0.032371	0.952154	0.350075		0.010642	0.155303	1.405143
2723	19747	0.823885	0.078233	0.366597		0.037801	1.091226	0.426455		0.012349	0.179396	1.640844
2724	19748	0.931045	0.084699	0.408737		0.043586	1.228668	0.505781		0.014157	0.20304	1.871154
2725	19749	1.004239	0.092831	0.475712		0.047905	1.319031	0.581615		0.015451	0.218081	2.008799
2726	1975	0.636295	0.055038	0.011206		0.090872	1.091549	0.023242		0.011149	0.072095	0.455089
2727	19750	0.934383	0.091132	0.559329		0.045338	1.220238	0.569447		0.014552	0.201206	1.839624
2728	19751	0.936194	0.100058	0.70299		0.046087	1.214437	0.57988		0.014797	0.198805	1.791011
2729	19752	0.923909	0.110173	0.803598		0.046055	1.189501	0.562326		0.014812	0.192217	1.698566
2730	19753	0.798546	0.102093	0.750209		0.040217	1.019954	0.462689		0.012947	0.16202	1.425649
2731	19754	0.741584	0.097536	0.717147		0.037546	0.942443	0.410869		0.012098	0.147952	1.297211
2732	19755	0.943366	0.128124	0.969677		0.048105	1.187836	0.469113		0.015586	0.182047	1.583573

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2733	19756	0.94559	0.127901	0.978377		0.04846	1.179065	0.407914		0.015813	0.175284	1.587322
2734	19757	1.020599	0.132911	1.010237		0.052446	1.259783	0.409971		0.017224	0.180635	1.724229
2735	19758	0.95019	0.115407	0.929309		0.04886	1.160719	0.385931		0.016163	0.159877	1.611207
2736	19759	0.84434	0.092427	0.854499		0.043351	1.020591	0.360063		0.014488	0.134294	1.431444
2737	1976	0.563697	0.048041	0.01033		0.076079	0.977952	0.02144		0.009684	0.065964	0.403627
2738	19760	0.73756	0.075232	0.745636		0.037772	0.884293	0.319688		0.01273	0.112096	1.246313
2739	19761	0.921101	0.088076	0.914613		0.046986	1.095437	0.411849		0.015955	0.141039	1.555734
2740	19762	0.958874	0.088117	0.918152		0.048589	1.128358	0.431852		0.016675	0.147908	1.62723
2741	19763	0.742893	0.063584	0.663496		0.037337	0.864874	0.322596		0.013277	0.115156	1.260226
2742	19764	0.481386	0.039064	0.41355		0.024069	0.557133	0.208594		0.008768	0.074665	0.814316
2743	19765	0.731177	0.056275	0.601708		0.036386	0.842038	0.31559		0.013509	0.113381	1.23278
2744	19766	0.878336	0.059252	0.638672		0.043266	1.00136	0.372994		0.016669	0.135739	1.469522
2745	19767	0.880385	0.056052	0.557985		0.042903	0.993363	0.371683		0.017127	0.134933	1.464286
2746	19768	0.956874	0.06053	0.581037		0.04609	1.068382	0.409043		0.018992	0.1486	1.590677
2747	19769	0.884343	0.057089	0.573044		0.042087	0.976649	0.372554		0.01784	0.140233	1.479417
2748	1977	0.491333	0.042692	0.00923		0.063333	0.858578	0.019181		0.008292	0.059107	0.351944
2749	19770	0.915778	0.064037	0.63601		0.04307	0.999723	0.377085		0.018731	0.146664	1.548167
2750	19771	0.888192	0.067077	0.755967		0.041258	0.956852	0.348697		0.018365	0.141857	1.512932
2751	19772	0.727648	0.06129	0.706784		0.033433	0.774111	0.273169		0.015141	0.114638	1.242821
2752	19773	0.727421	0.065245	0.745029		0.033223	0.767933	0.265163		0.015171	0.113173	1.24094
2753	19774	0.981701	0.098178	1.087507		0.044487	1.018694	0.400068		0.020508	0.147251	1.658685
2754	19775	0.983475	0.105881	1.144958		0.044537	1.001569	0.438053		0.020503	0.140212	1.62832
2755	19776	1.060692	0.118987	1.238335		0.048051	1.058494	0.502486		0.022002	0.141855	1.713808
2756	19777	0.986538	0.114564	1.129496		0.044795	0.963071	0.48852		0.020298	0.126906	1.555335
2757	19778	0.98778	0.115981	1.078767		0.045047	0.941733	0.505979		0.020093	0.119333	1.488918
2758	19779	0.988857	0.113564	0.982243		0.045375	0.919277	0.529555		0.02022	0.108115	1.410532
2759	1978	0.563501	0.049782	0.010771		0.069216	0.9907	0.022478		0.009305	0.069589	0.403834
2760	19780	1.065687	0.115789	0.964515		0.049267	0.964629	0.574199		0.021926	0.100789	1.397299
2761	19781	0.99041	0.101588	0.811432		0.046227	0.871778	0.518271		0.02048	0.080257	1.187286
2762	19782	1.080964	0.101204	0.793076		0.051045	0.924657	0.52403		0.022433	0.076981	1.159771
2763	19783	1.202388	0.09973	0.743249		0.057664	0.994653	0.495355		0.025055	0.07335	1.106695
2764	19784	1.081279	0.077492	0.540243		0.052709	0.868045	0.358455		0.02261	0.057311	0.826227
2765	19785	1.081024	0.063896	0.379773		0.053649	0.843755	0.251176		0.022695	0.050281	0.692879
2766	19786	0.976556	0.066633	0.330806		0.042394	0.883016	0.144316		0.019067	0.047035	0.599203
2767	19787	1.109637	0.086979	0.577426		0.046812	1.036155	0.279318		0.021437	0.060282	0.771854
2768	19788	1.434345	0.119589	0.94634		0.058807	1.381998	0.511098		0.027408	0.089565	1.153026
2769	19789	0.684159	0.059906	0.508264		0.027557	0.673367	0.293893		0.012962	0.046655	0.604181
2770	1979	0.635686	0.056789	0.012502		0.073125	1.124798	0.025898		0.010147	0.080693	0.456227
2771	19790	0.537549	0.049646	0.440868		0.02151	0.537413	0.257619		0.010121	0.039069	0.512612
2772	19791	0.712059	0.068927	0.628763		0.028344	0.721026	0.367477		0.013339	0.055816	0.718172
2773	19792	1.458673	0.150321	1.43984		0.057499	1.512274	0.835139		0.027071	0.134838	1.616048
2774	19793	0.900278	0.096729	0.958281		0.035141	0.956143	0.554598		0.016528	0.095266	1.114369
2775	19794	0.795457	0.086228	0.871092		0.030837	0.860318	0.503926		0.014484	0.090919	1.060761
2776	19795	0.795317	0.086957	0.872719		0.030647	0.875202	0.506279		0.014367	0.09568	1.114756
2777	19796	1.283224	0.142701	1.385512		0.049171	1.435284	0.811036		0.023005	0.15911	1.851747
2778	19797	0.704356	0.079556	0.778148		0.026855	0.800116	0.430039		0.012519	0.08961	1.048484
2779	19798	0.550849	0.062605	0.624425		0.020927	0.632833	0.320663		0.009727	0.073046	0.839025
2780	19799	0.613539	0.069813	0.699997		0.023247	0.710907	0.339001		0.010777	0.084041	0.947261
2781	1980	0.635578	0.057034	0.01263		0.068245	1.130759	0.026367		0.009813	0.082684	0.456655
2782	19800	0.724996	0.082719	0.821179		0.027369	0.850407	0.360274		0.012634	0.103719	1.135161
2783	19801	1.198669	0.136058	1.316655		0.045108	1.421312	0.518739		0.020726	0.177725	1.891996
2784	19802	0.683013	0.076385	0.705939		0.025633	0.818166	0.249532		0.011701	0.10456	1.091851
2785	19803	0.655076	0.071694	0.620644		0.024531	0.791548	0.209195		0.011125	0.102743	1.058391
2786	19804	0.689885	0.073208	0.578258		0.025785	0.840413	0.234053		0.011606	0.110331	1.120248
2787	19805	0.724718	0.073501	0.502967		0.02704	0.890345	0.268197		0.01206	0.118801	1.178245
2788	19806	1.309871	0.125254	0.844764		0.048804	1.621826	0.517041		0.021548	0.219867	2.140471
2789	19807	0.919883	0.087113	0.5612		0.034239	1.15001	0.410351		0.014873	0.159677	1.52118
2790	19808	0.815447	0.080194	0.455105		0.030335	1.028641	0.415474		0.012938	0.14445	1.379191
2791	19809	0.711009	0.070933	0.391141		0.026452	0.902803	0.39334		0.011105	0.127083	1.218828
2792	1981	0.63551	0.057448	0.011942		0.063444	1.136172	0.026923		0.009456	0.085282	0.456449
2793	19810	1.24777	0.124817	0.676571		0.046438	1.59389	0.73541		0.019168	0.223164	2.154091
2794	19811	0.892631	0.091334	0.544317		0.033254	1.147873	0.556399		0.013417	0.160613	1.546658
2795	19812	0.976689	0.102949	0.703273		0.036447	1.265041	0.631667		0.014308	0.17501	1.691514
2796	19813	0.949252	0.104692	0.817706		0.035513	1.237548	0.616159		0.013866	0.16818	1.654045
2797	19814	1.410513	0.162555	1.343408		0.052924	1.848672	0.891295		0.020543	0.245205	2.489777
2798	19815	0.908452	0.108388	0.907644		0.034211	1.196617	0.545846		0.013185	0.164936	1.615842
2799	19816	0.713287	0.086082	0.713167		0.027292	0.943283	0.395924		0.010319	0.135279	1.268606
2800	19817	0.727613	0.087491	0.712891		0.028118	0.964156	0.379402		0.010507	0.141208	1.289581
2801	19818	1.414314	0.165603	1.433909		0.055589	1.878795	0.658769		0.020363	0.284133	2.493284
2802	19819	0.925231	0.103122	0.933866		0.037293	1.231484	0.37973		0.013288	0.19238	1.665516

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2803	1982	0.635482	0.057558	0.011159		0.058664	1.141836	0.027873		0.009022	0.087623	0.456124
2804	19820	0.926231	0.095424	0.882151		0.038459	1.233772	0.349577		0.013276	0.197856	1.724824
2805	19821	0.927345	0.094292	0.78196		0.039615	1.235146	0.38204		0.013377	0.202273	1.774378
2806	19822	1.315264	0.131835	0.922966		0.057715	1.74974	0.593095		0.019167	0.290769	2.625107
2807	19823	0.718301	0.070195	0.406951		0.032141	0.954436	0.351987		0.010562	0.160567	1.469928
2808	19824	0.824863	0.077843	0.373116		0.037598	1.093865	0.429694		0.012243	0.185506	1.716128
2809	19825	0.932078	0.084154	0.403747		0.04345	1.23176	0.510201		0.014019	0.21	1.955939
2810	19826	1.428567	0.132133	0.660493		0.067981	1.878973	0.835569		0.021785	0.319894	2.980888
2811	19827	0.935291	0.091731	0.579746		0.04534	1.223337	0.576363		0.014467	0.208103	1.919319
2812	19828	0.937033	0.100638	0.726446		0.046182	1.217379	0.586946		0.014698	0.205603	1.868586
2813	19829	0.924657	0.111729	0.833167		0.046245	1.192238	0.568723		0.014706	0.198833	1.767805
2814	1983	0.501085	0.046049	0.008437		0.042487	0.904383	0.023172		0.006763	0.070325	0.359245
2815	19830	1.225629	0.15955	1.196182		0.062056	1.567549	0.716263		0.019752	0.256528	2.258395
2816	19831	0.742117	0.099934	0.741454		0.037812	0.944387	0.414413		0.012051	0.153042	1.340842
2817	19832	0.943947	0.131854	1.008196		0.048543	1.19011	0.473549		0.015526	0.188414	1.63799
2818	19833	0.946077	0.132202	1.022507		0.049008	1.181223	0.407387		0.015743	0.18151	1.64859
2819	19834	1.450958	0.19539	1.508228		0.075557	1.793371	0.576562		0.02441	0.265399	2.542297
2820	19835	0.950523	0.12019	0.939591		0.04965	1.162754	0.387767		0.016145	0.165741	1.673399
2821	19836	0.844548	0.096614	0.857813		0.044164	1.022373	0.359729		0.014469	0.1393	1.487429
2822	19837	0.737682	0.078492	0.746861		0.038561	0.885847	0.32414		0.012711	0.117227	1.295265
2823	19838	1.354806	0.133548	1.337039		0.070715	1.614041	0.618353		0.023469	0.216499	2.365074
2824	19839	0.958864	0.088966	0.906859		0.049875	1.13039	0.442952		0.016703	0.155202	1.675822
2825	1984	0.491674	0.045962	0.008091		0.039603	0.889596	0.023382		0.006474	0.069675	0.35223
2826	19840	0.742802	0.064057	0.653155		0.038443	0.866458	0.338789		0.013247	0.120874	1.296091
2827	19841	0.481304	0.039306	0.404875		0.024827	0.558155	0.221231		0.008751	0.078311	0.836659
2828	19842	1.167875	0.090405	0.937837		0.060058	1.347831	0.535963		0.021566	0.189476	2.021235
2829	19843	0.878045	0.059378	0.618571		0.044846	1.00305	0.390726		0.016651	0.142335	1.507701
2830	19844	0.879994	0.055544	0.534815		0.044606	0.99489	0.396736		0.017093	0.141421	1.505432
2831	19845	1.396148	0.087373	0.818083		0.070193	1.561931	0.634808		0.027699	0.221612	2.39775
2832	19846	0.883774	0.055568	0.552829		0.044056	0.977722	0.395913		0.017813	0.14323	1.524336
2833	19847	0.915099	0.061781	0.668561		0.045225	1.000619	0.394675		0.018685	0.14963	1.589994
2834	19848	0.887451	0.069135	0.798105		0.043461	0.957511	0.362667		0.018309	0.144494	1.546098
2835	19849	1.170305	0.102508	1.196026		0.056873	1.247086	0.450873		0.024306	0.187636	2.030375
2836	1985	0.627177	0.060382	0.00998		0.046035	1.138626	0.030761		0.007893	0.090841	0.448303
2837	19850	0.726736	0.068011	0.782781		0.035169	0.768338	0.269358		0.015116	0.114993	1.258474
2838	19851	0.980685	0.10202	1.143159		0.047077	1.019069	0.385646		0.020418	0.14935	1.678245
2839	19852	0.982394	0.109691	1.200657		0.046918	1.001729	0.424238		0.020405	0.141855	1.642636
2840	19853	1.505546	0.175113	1.840706		0.072066	1.504243	0.693967		0.031114	0.203478	2.432815
2841	19854	0.985342	0.119551	1.173201		0.047338	0.962628	0.483283		0.020176	0.127533	1.549439
2842	19855	0.986559	0.120725	1.119061		0.047636	0.940979	0.502221		0.020079	0.119522	1.480871
2843	19856	0.987615	0.117976	1.017553		0.048007	0.918192	0.526722		0.020232	0.108178	1.40287
2844	19857	1.512478	0.171728	1.39116		0.074127	1.369093	0.813269		0.031155	0.143637	1.976211
2845	19858	0.989156	0.106216	0.810736		0.048947	0.870369	0.517894		0.020466	0.080164	1.183243
2846	19859	1.079594	0.105714	0.791267		0.054022	0.923127	0.524219		0.022414	0.076862	1.154855
2847	1986	0.637442	0.06385	0.009667		0.04202	1.160476	0.032303		0.007563	0.09379	0.454722
2848	19860	1.649699	0.141625	1.001809		0.083809	1.364284	0.680194		0.034345	0.100706	1.513532
2849	19861	1.079951	0.080996	0.519252		0.055715	0.866794	0.359154		0.022543	0.057242	0.823446
2850	19862	1.0797	0.067778	0.363182		0.056649	0.842857	0.25152		0.022601	0.050143	0.692926
2851	19863	0.94524	0.069793	0.339012		0.040927	0.852254	0.143324		0.018259	0.045543	0.58143
2852	19864	1.07411	0.09016	0.589782		0.045383	1.000173	0.277093		0.020577	0.058047	0.751349
2853	19865	0.984089	0.08703	0.684096		0.040568	0.945651	0.360292		0.018666	0.060988	0.795758
2854	19866	0.662306	0.062547	0.507842		0.026821	0.650256	0.292033		0.012468	0.04487	0.592275
2855	19867	0.520387	0.052032	0.428874		0.020797	0.519065	0.255868		0.009744	0.0383	0.504257
2856	19868	0.689332	0.071889	0.608708		0.027246	0.696524	0.364861		0.01285	0.055966	0.707033
2857	19869	1.007736	0.111404	0.989201		0.039166	1.042917	0.591555		0.01862	0.096156	1.138315
2858	1987	0.638108	0.066481	0.009546		0.037269	1.164254	0.033802		0.007485	0.094063	0.454582
2859	19870	0.871578	0.099649	0.925346		0.033543	0.924297	0.55216		0.015946	0.095064	1.09252
2860	19871	0.770085	0.088587	0.843145		0.02941	0.831883	0.501555		0.013982	0.090625	1.039152
2861	19872	0.769942	0.087519	0.846559		0.029185	0.846447	0.50147		0.013872	0.09541	1.092296
2862	19873	0.838176	0.093962	0.921145		0.031602	0.936857	0.541668		0.014982	0.107219	1.226282
2863	19874	0.681869	0.077672	0.795379		0.025572	0.774093	0.424896		0.012088	0.089787	1.035198
2864	19875	0.533255	0.061117	0.637111		0.019905	0.612331	0.316376		0.00939	0.072311	0.828808
2865	19876	0.593934	0.068127	0.713386		0.022094	0.687931	0.334034		0.010401	0.082942	0.936604
2866	19877	0.701809	0.080436	0.835749		0.025974	0.823003	0.354803		0.012182	0.102009	1.124844
2867	19878	0.756546	0.086342	0.872338		0.027942	0.897058	0.335789		0.013023	0.114869	1.234185
2868	19879	0.661138	0.074473	0.715986		0.024374	0.791974	0.247114		0.01128	0.104443	1.098819
2869	1988	0.638708	0.069186	0.009301		0.032688	1.167293	0.035433		0.007543	0.09375	0.454719
2870	19880	0.634086	0.069964	0.628541		0.023318	0.766299	0.208442		0.010711	0.103454	1.065274
2871	19881	0.667763	0.071541	0.584773		0.024508	0.81368	0.225406		0.011163	0.111892	1.132957
2872	19882	0.701458	0.071894	0.507807		0.025694	0.862077	0.258685		0.011576	0.120619	1.204205

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2873	19883	0.864168	0.08467	0.577362		0.03165	1.070647	0.340556		0.014091	0.152743	1.493688
2874	19884	0.890302	0.084952	0.562665		0.032607	1.113686	0.380826		0.01427	0.162012	1.547922
2875	19885	0.789187	0.07825	0.443532		0.02889	0.996255	0.387077		0.012377	0.146589	1.396054
2876	19886	0.688092	0.069247	0.381889		0.025191	0.874411	0.367782		0.010595	0.128957	1.233026
2877	19887	0.803745	0.081182	0.440997		0.029475	1.027823	0.459214		0.012172	0.15136	1.450346
2878	19888	0.863788	0.08885	0.536363		0.03174	1.111972	0.521268		0.01281	0.163019	1.562869
2879	19889	0.945081	0.099847	0.699924		0.034801	1.225688	0.591224		0.013803	0.177735	1.722343
2880	1989	0.639347	0.071907	0.008502		0.028325	1.169139	0.036394		0.00759	0.094312	0.454617
2881	19890	0.918501	0.101613	0.813243		0.033909	1.199184	0.575849		0.013378	0.170824	1.704386
2882	19891	0.960348	0.11126	0.939446		0.035618	1.260957	0.585473		0.013914	0.176015	1.805485
2883	19892	0.878907	0.105417	0.900609		0.032748	1.159784	0.506281		0.012661	0.163493	1.663756
2884	19893	0.690053	0.083782	0.706594		0.02586	0.914329	0.376743		0.009914	0.134151	1.305518
2885	19894	0.703896	0.085172	0.71037		0.026674	0.934547	0.366254		0.010097	0.140043	1.326714
2886	19895	0.962736	0.113626	1.014979		0.037192	1.281755	0.445985		0.013741	0.198643	1.803171
2887	19896	0.89495	0.100429	0.941786		0.035406	1.193635	0.361306		0.012707	0.190785	1.670722
2888	19897	0.895861	0.092884	0.89294		0.036634	1.195839	0.336342		0.012707	0.196272	1.709989
2889	19898	0.896893	0.090615	0.795537		0.03784	1.197054	0.368967		0.012756	0.200694	1.779276
2890	19899	0.864852	0.085886	0.630334		0.037553	1.153186	0.388117		0.012461	0.196629	1.789955
2891	1990	0.567328	0.065948	0.007124		0.021126	1.03769	0.033146		0.006695	0.083766	0.402952
2892	19900	0.694616	0.067305	0.41018		0.030792	0.924948	0.339307		0.01011	0.159415	1.472615
2893	19901	0.797626	0.074596	0.363493		0.036094	1.060093	0.414944		0.011711	0.184196	1.718455
2894	19902	0.901247	0.080602	0.38504		0.041807	1.193689	0.493653		0.013387	0.208527	1.958069
2895	19903	0.971953	0.089579	0.435915		0.046115	1.281511	0.572294		0.014672	0.224003	2.10074
2896	19904	0.904234	0.088985	0.574963		0.043778	1.185468	0.56103		0.013872	0.206669	1.919345
2897	19905	0.905842	0.097477	0.71945		0.044696	1.179652	0.571201		0.014081	0.204213	1.86678
2898	19906	0.893812	0.10904	0.828141		0.044846	1.15517	0.553916		0.014078	0.197497	1.766251
2899	19907	0.772419	0.102266	0.778132		0.039316	0.990287	0.456333		0.012352	0.166541	1.460807
2900	19908	0.717275	0.098488	0.739965		0.036782	0.914922	0.405249		0.011577	0.152126	1.329658
2901	19909	0.912283	0.130472	1.004863		0.047329	1.152946	0.462008		0.014909	0.187301	1.649105
2902	1991	0.495043	0.0588	0.006471		0.015713	0.90561	0.029699		0.00596	0.072644	0.351382
2903	19910	0.914266	0.131259	1.024145		0.047885	1.144282	0.395539		0.015114	0.180503	1.669122
2904	19911	0.986621	0.137421	1.069014		0.052078	1.222504	0.387472		0.016509	0.186224	1.811859
2905	19912	0.918425	0.120214	0.917082		0.048752	1.126297	0.383151		0.015548	0.165026	1.686469
2906	19913	0.81594	0.097044	0.825885		0.043478	0.990262	0.356121		0.013926	0.138807	1.488276
2907	19914	0.712636	0.078757	0.717695		0.038037	0.857978	0.31676		0.012233	0.118193	1.292124
2908	19915	0.889842	0.091597	0.870033		0.047538	1.062807	0.412576		0.015375	0.148739	1.605392
2909	19916	0.926177	0.086445	0.860008		0.049462	1.094724	0.436258		0.016124	0.156246	1.656447
2910	19917	0.717391	0.062119	0.617079		0.038237	0.839064	0.343125		0.01267	0.121629	1.272905
2911	19918	0.464803	0.038069	0.380925		0.024734	0.540483	0.225003		0.008367	0.078805	0.821671
2912	19919	0.705924	0.054718	0.550943		0.037508	0.816829	0.341862		0.012906	0.119595	1.24665
2913	1992	0.568285	0.068857	0.007631		0.016112	1.039493	0.034861		0.007042	0.082912	0.403079
2914	19920	0.847859	0.057313	0.575351		0.044885	0.971189	0.400898		0.015945	0.143035	1.510987
2915	19921	0.849657	0.053096	0.492515		0.044769	0.96313	0.405263		0.016353	0.142069	1.525456
2916	19922	0.923291	0.057706	0.519824		0.048408	1.035433	0.442856		0.018144	0.152271	1.660278
2917	19923	0.853165	0.055002	0.512997		0.044492	0.946081	0.402704		0.017057	0.140578	1.534862
2918	19924	0.883328	0.060475	0.673071		0.0458	0.967981	0.397838		0.01788	0.146658	1.586415
2919	19925	0.856571	0.068922	0.80585		0.044136	0.926082	0.363505		0.017512	0.141435	1.524227
2920	19926	0.701628	0.064058	0.748252		0.035978	0.749001	0.275605		0.014425	0.113969	1.239292
2921	19927	0.701359	0.068066	0.786854		0.035868	0.742915	0.265033		0.014451	0.112313	1.2295
2922	19928	0.9464	0.101666	1.1472		0.048138	0.985211	0.355974		0.019521	0.145544	1.624184
2923	19929	0.948011	0.108949	1.202447		0.047987	0.968281	0.393823		0.019516	0.137969	1.586628
2924	1993	0.641833	0.079847	0.008451		0.017089	1.172366	0.03958		0.008484	0.094004	0.454357
2925	19930	1.022309	0.123897	1.297335		0.051588	1.022775	0.457468		0.02092	0.138912	1.648563
2926	19931	0.950771	0.119538	1.163314		0.048171	0.929935	0.459213		0.019295	0.123211	1.486482
2927	19932	0.951924	0.120451	1.107175		0.04851	0.908654	0.478573		0.019376	0.115176	1.42085
2928	19933	0.95294	0.117502	1.005676		0.048895	0.886399	0.502354		0.019526	0.10416	1.346257
2929	19934	1.026954	0.121566	0.952992		0.053154	0.929701	0.547918		0.02115	0.097435	1.335658
2930	19935	0.954429	0.10653	0.77859		0.049877	0.84	0.496195		0.019743	0.077351	1.137804
2931	19936	1.041704	0.105947	0.757461		0.055019	0.890895	0.502842		0.021623	0.073866	1.108803
2932	19937	1.158772	0.102259	0.706157		0.062093	0.958504	0.475788		0.024106	0.0704	1.058668
2933	19938	1.042107	0.081376	0.498495		0.056663	0.836821	0.346269		0.021706	0.055107	0.792588
2934	19939	1.041875	0.06902	0.341473		0.057575	0.813948	0.242719		0.021726	0.048355	0.670005
2935	1994	0.642575	0.082043	0.008225		0.017911	1.171132	0.039675		0.009004	0.09414	0.453771
2936	19940	0.913223	0.072043	0.341942		0.039248	0.821594	0.14096		0.01804	0.043915	0.564205
2937	19941	1.037739	0.092312	0.593467		0.043715	0.964263	0.27231		0.019749	0.055573	0.732556
2938	19942	0.950798	0.0893	0.687715		0.039208	0.911904	0.35463		0.017852	0.058255	0.779642
2939	19943	0.639895	0.064635	0.510472		0.025998	0.627225	0.287322		0.01194	0.042835	0.57959
2940	19944	0.502787	0.053638	0.419653		0.020199	0.500802	0.251665		0.009337	0.037259	0.49371
2941	19945	0.666017	0.073855	0.58882		0.026516	0.672154	0.358802		0.012319	0.054399	0.692468
2942	19946	0.973676	0.113864	0.952912		0.038101	1.006817	0.582184		0.017866	0.09333	1.111799

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2943	19947	0.842087	0.101365	0.887766		0.032374	0.892654	0.544279		0.015317	0.092185	1.05679
2944	19948	0.74404	0.08985	0.810553		0.028193	0.803602	0.494234		0.013436	0.087897	0.994639
2945	19949	0.74388	0.088632	0.815464		0.02781	0.817822	0.493189		0.013335	0.092685	1.047095
2946	1995	0.643345	0.083434	0.00834		0.019857	1.169636	0.040024		0.009465	0.093188	0.453166
2947	19950	0.809811	0.093694	0.930664		0.030066	0.905287	0.531306		0.014404	0.104479	1.180157
2948	19951	0.658761	0.075468	0.801699		0.024329	0.748083	0.416204		0.011621	0.089132	1.000634
2949	19952	0.515182	0.059402	0.641238		0.018947	0.591794	0.309493		0.009027	0.07265	0.802217
2950	19953	0.573797	0.066233	0.717319		0.021032	0.6649	0.32713		0.009997	0.083354	0.907996
2951	19954	0.677991	0.077912	0.839379		0.024749	0.795526	0.349541		0.011708	0.102542	1.108077
2952	19955	0.73087	0.083746	0.874754		0.026584	0.867202	0.330407		0.012508	0.115549	1.226479
2953	19956	0.638669	0.072331	0.716863		0.023161	0.765715	0.242633		0.010821	0.105042	1.091983
2954	19957	0.612528	0.068051	0.628416		0.022152	0.740983	0.206619		0.010273	0.103967	1.068775
2955	19958	0.645045	0.069664	0.583811		0.023258	0.786903	0.21513		0.010696	0.112449	1.144011
2956	19959	0.677563	0.070114	0.506078		0.024385	0.833829	0.247291		0.011091	0.121017	1.216128
2957	1996	0.644059	0.084478	0.008454		0.021516	1.167833	0.040285		0.009884	0.091779	0.452632
2958	19960	0.834732	0.083978	0.57335		0.030028	1.035692	0.325863		0.013478	0.153184	1.509323
2959	19961	0.859914	0.083526	0.558781		0.030949	1.077444	0.354762		0.013618	0.162327	1.574887
2960	19962	0.762235	0.075992	0.440682		0.027448	0.963907	0.357061		0.011803	0.14678	1.414199
2961	19963	0.664554	0.067286	0.370376		0.023957	0.846072	0.340484		0.010104	0.129232	1.241425
2962	19964	0.776252	0.078918	0.42815		0.028027	0.994559	0.426095		0.011578	0.151776	1.457868
2963	19965	0.834184	0.086041	0.52345		0.030198	1.076031	0.483983		0.012185	0.163415	1.575423
2964	19966	0.912669	0.096356	0.690297		0.033141	1.186145	0.548578		0.013279	0.178099	1.748591
2965	19967	0.88692	0.098135	0.802398		0.03234	1.1606	0.533669		0.012846	0.171339	1.729476
2966	19968	0.927318	0.107538	0.926845		0.033963	1.220495	0.560608		0.013356	0.176717	1.830837
2967	19969	0.848611	0.101961	0.886408		0.031255	1.122633	0.497569		0.012156	0.160737	1.686023
2968	1997	0.508031	0.067351	0.006792		0.019545	0.917992	0.031294		0.008324	0.071859	0.356348
2969	19970	0.66624	0.081084	0.694638		0.024665	0.885086	0.365382		0.009497	0.131902	1.322543
2970	19971	0.67957	0.082482	0.707975		0.025249	0.904701	0.354849		0.009662	0.137757	1.343992
2971	19972	0.929442	0.110116	1.009015		0.035263	1.240893	0.429155		0.013142	0.195487	1.83111
2972	19973	0.86393	0.097333	0.938699		0.033577	1.155595	0.342988		0.012163	0.187692	1.695912
2973	19974	0.864776	0.089981	0.892973		0.034813	1.15771	0.323095		0.012136	0.193047	1.679085
2974	19975	0.865695	0.086721	0.799153		0.036043	1.158865	0.355621		0.012186	0.197501	1.763006
2975	19976	0.834745	0.08205	0.635648		0.035857	1.116343	0.369474		0.011875	0.193608	1.772961
2976	19977	0.670389	0.064266	0.408627		0.029466	0.89534	0.324013		0.009636	0.156948	1.458007
2977	19978	0.76978	0.071221	0.350484		0.034581	1.026081	0.398493		0.01117	0.181297	1.700727
2978	19979	0.869712	0.07692	0.363708		0.040137	1.155309	0.482088		0.012794	0.205336	1.93758
2979	1998	0.498605	0.066321	0.006731		0.020914	0.899013	0.030391		0.008409	0.070124	0.349435
2980	19980	0.937913	0.086006	0.423281		0.044358	1.240218	0.554696		0.014007	0.220693	2.078727
2981	19981	0.872482	0.085934	0.563503		0.042214	1.147195	0.544882		0.013239	0.203555	1.898711
2982	19982	0.874002	0.093973	0.70522		0.043167	1.14151	0.556124		0.013457	0.201089	1.844138
2983	19983	0.862321	0.10586	0.814668		0.043407	1.117786	0.539901		0.013471	0.194581	1.745045
2984	19984	0.745174	0.099803	0.76789		0.038124	0.958226	0.443995		0.011816	0.164174	1.434422
2985	19985	0.691927	0.096412	0.731549		0.035714	0.885306	0.393717		0.011067	0.149971	1.30577
2986	19986	0.880005	0.128111	0.991172		0.046045	1.11565	0.447368		0.014276	0.184612	1.649023
2987	19987	0.881842	0.129361	1.014534		0.046696	1.107256	0.381429		0.014485	0.178038	1.669758
2988	19988	0.951586	0.135935	1.06385		0.050892	1.18289	0.370721		0.015829	0.183858	1.813419
2989	19989	0.885711	0.119245	0.916291		0.047757	1.089732	0.375193		0.014899	0.162961	1.688181
2990	1999	0.636217	0.084494	0.008675		0.030381	1.142841	0.038468		0.011233	0.087697	0.445445
2991	19990	0.78684	0.096554	0.789038		0.042691	0.958011	0.349348		0.013366	0.137119	1.489845
2992	19991	0.68717	0.078459	0.684296		0.037427	0.829924	0.308053		0.011751	0.117768	1.290127
2993	19992	0.858007	0.091431	0.827588		0.046867	1.027926	0.401441		0.01477	0.148197	1.595729
2994	19993	0.892935	0.085123	0.811778		0.048889	1.058684	0.428749		0.015484	0.155508	1.64363
2995	19994	0.691605	0.059922	0.579768		0.0379	0.811365	0.34461		0.012066	0.120966	1.265792
2996	19995	0.448074	0.036681	0.356863		0.024556	0.522595	0.226349		0.007949	0.0784	0.819443
2997	19996	0.680497	0.05267	0.51471		0.037287	0.789772	0.344449		0.012259	0.118957	1.248208
2998	19997	0.817234	0.055051	0.534194		0.044723	0.938954	0.406169		0.015135	0.142173	1.513782
2999	19998	0.818914	0.051697	0.47299		0.044734	0.931057	0.408368		0.015538	0.141158	1.527869
3000	19999	0.889837	0.05622	0.484436		0.048494	1.000754	0.445117		0.017233	0.151297	1.663208
3001	2000	0.646745	0.085919	0.008894		0.034603	1.156154	0.038877		0.01206	0.086718	0.452631
3002	20000	0.822172	0.054076	0.501545		0.044677	0.914229	0.404615		0.01619	0.137222	1.529443
3003	20001	0.851202	0.060001	0.670524		0.046104	0.935193	0.399881		0.016981	0.142632	1.580696
3004	20002	0.825345	0.068639	0.802264		0.044554	0.894461	0.36083		0.016625	0.137371	1.519208
3005	20003	0.676034	0.063572	0.742768		0.036388	0.723276	0.273185		0.013697	0.110552	1.225075
3006	20004	0.675744	0.067415	0.78015		0.036314	0.717334	0.258493		0.013717	0.10886	1.208728
3007	20005	0.911803	0.100245	1.134115		0.048842	0.951154	0.335994		0.018541	0.140798	1.579852
3008	20006	0.913294	0.107134	1.186475		0.048804	0.934591	0.363258		0.018532	0.133219	1.521682
3009	20007	0.984876	0.122951	1.278636		0.052686	0.986899	0.42736		0.019891	0.13386	1.580286
3010	20008	0.915915	0.118277	1.138242		0.049191	0.897086	0.433565		0.01846	0.118676	1.424048
3011	20009	0.917033	0.118898	1.07926		0.049476	0.876328	0.453123		0.018632	0.110774	1.36189
3012	2001	0.667118	0.089219	0.009307		0.039497	1.184181	0.039334		0.013089	0.087556	0.466844

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3013	20010	0.917992	0.115838	0.978862		0.049828	0.854635	0.475331		0.018774	0.100091	1.290599
3014	20011	0.989322	0.120859	0.914329		0.054102	0.896252	0.519992		0.020351	0.093627	1.280357
3015	20012	0.919449	0.105754	0.75291		0.050721	0.809819	0.471829		0.019	0.074439	1.090928
3016	20013	1.003557	0.105106	0.725674		0.055917	0.858996	0.478905		0.02081	0.07056	1.060708
3017	20014	1.116375	0.102587	0.68364		0.063063	0.924305	0.455636		0.023205	0.06727	1.014469
3018	20015	1.004	0.081252	0.479051		0.057533	0.807146	0.335219		0.020883	0.052753	0.76137
3019	20016	1.003823	0.070288	0.327139		0.058446	0.785273	0.23494		0.020866	0.04643	0.646568
3020	20017	0.701261	0.058754	0.271608		0.029857	0.629872	0.109631		0.014454	0.033602	0.435548
3021	20018	0.796888	0.074695	0.470514		0.033357	0.739337	0.211606		0.015803	0.042185	0.568814
3022	20019	0.730116	0.073168	0.544884		0.03004	0.699403	0.275821		0.013912	0.044083	0.610101
3023	2002	0.687572	0.091641	0.009643		0.045929	1.208885	0.03979		0.014062	0.087684	0.481177
3024	20020	0.491378	0.052645	0.404583		0.019967	0.481208	0.223428		0.009094	0.032377	0.453488
3025	20021	0.38609	0.043591	0.33275		0.015549	0.384318	0.195663		0.007092	0.028378	0.383569
3026	20022	0.511437	0.059825	0.450474		0.02044	0.515931	0.278894		0.009361	0.041415	0.538023
3027	20023	0.747668	0.09179	0.730721		0.02947	0.773139	0.453539		0.013594	0.071004	0.859863
3028	20024	0.646627	0.081402	0.676302		0.025104	0.68574	0.423941		0.011664	0.070117	0.816588
3029	20025	0.571317	0.071996	0.616879		0.021928	0.617474	0.38486		0.010237	0.066918	0.760372
3030	20026	0.571194	0.0709	0.623615		0.021659	0.628504	0.383861		0.010163	0.070734	0.790298
3031	20027	0.621793	0.074853	0.740813		0.023298	0.695795	0.412058		0.010982	0.081453	0.895369
3032	20028	0.505809	0.058164	0.636995		0.018718	0.575006	0.322385		0.008861	0.070426	0.76066
3033	20029	0.395554	0.045797	0.508947		0.014493	0.454902	0.240706		0.006882	0.05743	0.61925
3034	2003	0.629409	0.084055	0.00883		0.047061	1.094418	0.035986		0.013402	0.077198	0.440475
3035	20030	0.440551	0.051085	0.568867		0.016009	0.51112	0.255137		0.007621	0.06592	0.709608
3036	20031	0.52054	0.06007	0.664885		0.018741	0.611598	0.272327		0.008922	0.081165	0.868802
3037	20032	0.561118	0.064485	0.691754		0.020092	0.666784	0.257004		0.009525	0.091512	0.961481
3038	20033	0.490323	0.055785	0.566071		0.017503	0.588834	0.189036		0.008236	0.083204	0.867219
3039	20034	0.470238	0.05256	0.495572		0.016741	0.569904	0.16299		0.007813	0.082363	0.850594
3040	20035	0.495187	0.053889	0.459659		0.017591	0.605317	0.161969		0.008132	0.089085	0.910536
3041	20036	0.52014	0.054324	0.397497		0.018436	0.641529	0.186454		0.008422	0.095882	0.968192
3042	20037	0.64076	0.065951	0.450343		0.022678	0.796958	0.245904		0.010224	0.121086	1.202346
3043	20038	0.660081	0.065478	0.438988		0.023316	0.829197	0.26783		0.010312	0.128282	1.263072
3044	20039	0.585061	0.058528	0.346593		0.020695	0.741884	0.258604		0.008929	0.115994	1.134095
3045	2004	0.536538	0.071756	0.007445		0.043538	0.923606	0.030197		0.011863	0.063631	0.375398
3046	20040	0.510078	0.051847	0.284494		0.018072	0.65122	0.250649		0.007632	0.102141	0.995004
3047	20041	0.595779	0.060839	0.328579		0.02116	0.76553	0.320572		0.008736	0.119992	1.167823
3048	20042	0.640234	0.066057	0.403481		0.022802	0.828242	0.368257		0.00932	0.129214	1.261655
3049	20043	0.700413	0.073701	0.539448		0.025057	0.913002	0.417275		0.010144	0.140857	1.397663
3050	20044	0.680635	0.076166	0.628911		0.024466	0.893365	0.416337		0.009799	0.135551	1.381001
3051	20045	0.711581	0.082618	0.725146		0.025727	0.939508	0.435751		0.010185	0.139836	1.46031
3052	20046	0.65117	0.078111	0.69218		0.023677	0.864209	0.386546		0.009261	0.125942	1.344046
3053	20047	0.511192	0.062181	0.54074		0.01871	0.681386	0.282953		0.007228	0.102634	1.054021
3054	20048	0.52141	0.063284	0.556984		0.019154	0.696523	0.271669		0.007346	0.107208	1.070976
3055	20049	0.713075	0.084558	0.791747		0.026552	0.955453	0.327722		0.009992	0.152208	1.463454
3056	2005	0.502562	0.067433	0.006745		0.043564	0.856915	0.027401		0.011479	0.058216	0.351405
3057	20050	0.662794	0.074781	0.738625		0.025259	0.889843	0.257319		0.009238	0.146141	1.35557
3058	20051	0.663388	0.069147	0.705063		0.026268	0.891516	0.245165		0.009213	0.150317	1.342092
3059	20052	0.664068	0.065927	0.633702		0.027258	0.892417	0.27058		0.009229	0.153799	1.378893
3060	20053	0.640275	0.062181	0.507196		0.027195	0.859639	0.280843		0.009005	0.150789	1.385884
3061	20054	0.514195	0.048666	0.326398		0.022388	0.689403	0.246741		0.007299	0.122243	1.13944
3062	20055	0.590393	0.053921	0.272115		0.026328	0.789998	0.304549		0.008469	0.141222	1.328936
3063	20056	0.66701	0.05823	0.275407		0.030613	0.889383	0.371782		0.009699	0.159971	1.513607
3064	20057	0.719252	0.0655	0.324732		0.033916	0.954644	0.428789		0.010624	0.171969	1.623501
3065	20058	0.669051	0.065816	0.435508		0.03234	0.882954	0.421151		0.010039	0.158633	1.482961
3066	20059	0.670161	0.071822	0.54692		0.033153	0.878531	0.429506		0.010212	0.156736	1.439737
3067	2006	0.576981	0.077633	0.007367		0.053253	0.974413	0.030296		0.013527	0.066402	0.403105
3068	20060	0.661179	0.081431	0.63287		0.033392	0.860267	0.416338		0.010231	0.151696	1.361468
3069	20061	0.571308	0.077148	0.598372		0.029392	0.737485	0.341664		0.008974	0.128027	1.116532
3070	20062	0.530475	0.074711	0.571146		0.027566	0.681373	0.302533		0.008408	0.116966	1.014244
3071	20063	0.674611	0.099609	0.772382		0.03563	0.858676	0.342697		0.010847	0.14403	1.29898
3072	20064	0.675992	0.100892	0.793692		0.036204	0.852215	0.294572		0.011019	0.138962	1.315842
3073	20065	0.729384	0.106348	0.835642		0.039546	0.910383	0.284973		0.01204	0.143584	1.429327
3074	20066	0.678861	0.093565	0.72319		0.037198	0.838588	0.290432		0.011342	0.127334	1.331056
3075	20067	0.603027	0.076008	0.59562		0.033343	0.737094	0.270967		0.010179	0.107213	1.174652
3076	20068	0.526621	0.061888	0.515222		0.029282	0.638444	0.23922		0.008955	0.092587	1.01672
3077	20069	0.657492	0.072241	0.621287		0.036732	0.790636	0.30887		0.011256	0.116468	1.256807
3078	2007	0.651723	0.087832	0.009066		0.064832	1.08723	0.032582		0.015798	0.074554	0.454773
3079	20070	0.684221	0.0674	0.605748		0.038422	0.814144	0.337652		0.011808	0.122149	1.293735
3080	20071	0.529902	0.046187	0.430885		0.029871	0.623862	0.27372		0.009207	0.09498	0.995666
3081	20072	0.343299	0.02801	0.264807		0.019378	0.401805	0.180034		0.005984	0.061543	0.646417
3082	20073	0.521351	0.040182	0.380899		0.029452	0.607202	0.274321		0.009197	0.093371	0.986212

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3083	20074	0.626073	0.041916	0.398736		0.035427	0.721856	0.32499		0.011356	0.111556	1.195602
3084	20075	0.627317	0.039951	0.360211		0.035519	0.715716	0.324618		0.011655	0.111005	1.206505
3085	20076	0.681595	0.044057	0.362746		0.038585	0.769201	0.353114		0.012927	0.119385	1.313487
3086	20077	0.629737	0.042315	0.396068		0.035639	0.702572	0.321121		0.012143	0.108277	1.207627
3087	20078	0.651923	0.047326	0.528496		0.036873	0.718524	0.317553		0.012731	0.109734	1.24404
3088	20079	0.632097	0.053937	0.628853		0.035704	0.687046	0.283462		0.012469	0.10552	1.195841
3089	2008	0.583339	0.07892	0.009055		0.062671	0.960844	0.027451		0.014722	0.066514	0.406726
3090	20080	0.517714	0.049775	0.580535		0.029209	0.555432	0.214342		0.010273	0.0848	0.964275
3091	20081	0.517488	0.052681	0.609102		0.029182	0.550806	0.201831		0.010292	0.083432	0.951393
3092	20082	0.698224	0.078065	0.881881		0.039347	0.730178	0.251707		0.01391	0.107728	1.23564
3093	20083	0.699358	0.08407	0.920471		0.039427	0.71729	0.272355		0.013919	0.101735	1.176469
3094	20084	0.754139	0.096265	0.9901		0.042676	0.757239	0.31719		0.014987	0.102498	1.203083
3095	20085	0.701344	0.092401	0.880359		0.039871	0.688155	0.323367		0.014073	0.090937	1.086221
3096	20086	0.702185	0.092712	0.826762		0.040136	0.672086	0.339103		0.014206	0.084833	1.038496
3097	20087	0.702935	0.09072	0.748032		0.040406	0.655357	0.354939		0.014327	0.076557	0.984113
3098	20088	0.757554	0.094892	0.723428		0.043837	0.687252	0.389591		0.015538	0.071511	0.975934
3099	20089	0.704079	0.082949	0.584005		0.041077	0.621047	0.354531		0.014519	0.056851	0.829663
3100	2009	0.514668	0.070459	0.009356		0.058496	0.83832	0.022525		0.013413	0.05884	0.358591
3101	20090	0.768503	0.0824	0.557023		0.045238	0.658869	0.360645		0.01591	0.053303	0.806522
3102	20091	0.854933	0.081369	0.523777		0.050908	0.709115	0.349522		0.017753	0.050863	0.770917
3103	20092	0.768907	0.065167	0.364534		0.046373	0.619331	0.257093		0.015981	0.039981	0.580821
3104	20093	0.768805	0.057319	0.248167		0.047022	0.602626	0.180146		0.015958	0.035334	0.495148
3105	20094	0.717415	0.061935	0.281946		0.030373	0.643993	0.112738		0.014997	0.034301	0.446723
3106	20095	0.815239	0.078421	0.488025		0.034002	0.755994	0.21747		0.016402	0.042883	0.585205
3107	20096	0.746932	0.077224	0.565002		0.030671	0.715293	0.283531		0.014427	0.044727	0.630356
3108	20097	0.50269	0.055465	0.419675		0.020419	0.492224	0.229662		0.00942	0.03286	0.469087
3109	20098	0.394976	0.045823	0.34528		0.015913	0.393168	0.201104		0.00723	0.0289	0.394607
3110	20099	0.523203	0.062788	0.467522		0.020944	0.527876	0.286595		0.009515	0.042155	0.553514
3111	2010	0.490395	0.067773	0.010357		0.05882	0.789292	0.019747		0.01312	0.056091	0.341468
3112	20100	0.764871	0.096102	0.745483		0.030237	0.791213	0.46648		0.013822	0.072267	0.884685
3113	20101	0.661485	0.085082	0.690842		0.02581	0.701906	0.436044		0.011869	0.071363	0.837842
3114	20102	0.584446	0.075173	0.627278		0.022558	0.632104	0.395807		0.010419	0.068145	0.780451
3115	20103	0.584305	0.073962	0.648936		0.022319	0.643448	0.394628		0.010346	0.072568	0.810936
3116	20104	0.636065	0.078032	0.769865		0.024029	0.712378	0.422943		0.011181	0.084293	0.909411
3117	20105	0.517405	0.060609	0.661509		0.019322	0.588732	0.331441		0.009023	0.072912	0.784572
3118	20106	0.404619	0.047334	0.528328		0.014966	0.465774	0.247888		0.007007	0.059478	0.639346
3119	20107	0.450642	0.052805	0.590306		0.016538	0.52335	0.262677		0.007759	0.068287	0.732415
3120	20108	0.532455	0.061585	0.689478		0.019298	0.626271	0.280157		0.009081	0.084133	0.89638
3121	20109	0.573954	0.066045	0.716655		0.020537	0.682829	0.264111		0.009694	0.094871	0.998751
3122	2011	0.46606	0.064643	0.011062		0.058493	0.74161	0.017323		0.012779	0.053015	0.324352
3123	20110	0.501531	0.057184	0.586017		0.017793	0.603053	0.195523		0.00838	0.086278	0.900733
3124	20111	0.480978	0.053925	0.51271		0.016972	0.583712	0.168769		0.007946	0.08542	0.883713
3125	20112	0.506491	0.055336	0.47511		0.017834	0.620036	0.163457		0.008266	0.092396	0.946179
3126	20113	0.532002	0.056025	0.410192		0.018697	0.657194	0.188305		0.008558	0.099435	1.006179
3127	20114	0.65537	0.068189	0.465466		0.022993	0.816489	0.248453		0.010381	0.125445	1.252223
3128	20115	0.675103	0.067648	0.453818		0.023656	0.84958	0.270729		0.010468	0.132913	1.316651
3129	20116	0.598372	0.059921	0.358545		0.020946	0.760153	0.260767		0.009051	0.120195	1.18226
3130	20117	0.521667	0.053094	0.290696		0.018301	0.667273	0.254853		0.007733	0.105838	1.036741
3131	20118	0.609313	0.062317	0.335311		0.021426	0.784409	0.326208		0.008887	0.124337	1.216283
3132	20119	0.654749	0.067503	0.412613		0.023109	0.84866	0.375026		0.009511	0.13392	1.314059
3133	2012	0.486352	0.06775	0.012865		0.063744	0.76479	0.016611		0.013629	0.054716	0.338349
3134	20120	0.716287	0.075818	0.55781		0.025399	0.935494	0.427329		0.010344	0.146022	1.455126
3135	20121	0.696027	0.078595	0.649627		0.024825	0.915373	0.430501		0.009988	0.140518	1.436799
3136	20122	0.727671	0.085237	0.748263		0.026099	0.962663	0.447746		0.010376	0.144946	1.518104
3137	20123	0.66586	0.079704	0.713551		0.024045	0.885514	0.397096		0.009433	0.130562	1.396984
3138	20124	0.522717	0.06349	0.55649		0.019	0.698203	0.290593		0.007357	0.105576	1.095405
3139	20125	0.533151	0.064637	0.575689		0.019466	0.713738	0.278475		0.007477	0.110312	1.112782
3140	20126	0.729123	0.086405	0.817347		0.026845	0.979138	0.333561		0.010162	0.156627	1.521765
3141	20127	0.677676	0.076453	0.763549		0.025588	0.911953	0.259431		0.009398	0.150405	1.409946
3142	20128	0.678272	0.070718	0.73024		0.026602	0.91371	0.248239		0.009361	0.154716	1.396209
3143	20129	0.678937	0.067173	0.657761		0.027656	0.91466	0.274392		0.00938	0.15829	1.42108
3144	2013	0.506754	0.071398	0.014788		0.069344	0.786245	0.015484		0.014597	0.056273	0.352372
3145	20130	0.654602	0.063126	0.528095		0.027627	0.881058	0.28509		0.009142	0.155182	1.42768
3146	20131	0.525681	0.049383	0.341222		0.022773	0.706554	0.250829		0.007418	0.125815	1.173782
3147	20132	0.603572	0.054707	0.282582		0.0268	0.809607	0.310115		0.008601	0.145364	1.369045
3148	20133	0.681869	0.059077	0.280239		0.031213	0.911397	0.380316		0.009856	0.164666	1.558956
3149	20134	0.735267	0.066663	0.330778		0.034618	0.978212	0.439182		0.010793	0.177014	1.671726
3150	20135	0.683912	0.067188	0.44575		0.033055	0.904697	0.431426		0.010204	0.163317	1.527262
3151	20136	0.685034	0.073217	0.561405		0.033911	0.900131	0.439872		0.010379	0.161392	1.482968
3152	20137	0.675822	0.083286	0.649819		0.034212	0.881416	0.426021		0.010399	0.15621	1.40141

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3153	20138	0.583952	0.079098	0.615398		0.030147	0.755624	0.349204		0.009126	0.131843	1.149077
3154	20139	0.542197	0.07669	0.588031		0.028295	0.698133	0.308988		0.00855	0.120466	1.049763
3155	2014	0.517287	0.073724	0.016076		0.073754	0.791282	0.013456		0.015284	0.056988	0.359363
3156	20140	0.689503	0.102428	0.794577		0.036599	0.879791	0.349512		0.011034	0.148382	1.342019
3157	20141	0.69088	0.103906	0.818084		0.037249	0.873163	0.302855		0.011206	0.143186	1.359532
3158	20142	0.745439	0.109682	0.862966		0.040742	0.932729	0.291708		0.012253	0.147974	1.47658
3159	20143	0.693764	0.096655	0.748689		0.038367	0.8591	0.297784		0.011541	0.131279	1.37553
3160	20144	0.616252	0.078648	0.602393		0.034425	0.75504	0.278152		0.010363	0.110899	1.213976
3161	20145	0.53815	0.064139	0.520243		0.030273	0.65393	0.245703		0.009117	0.095855	1.05028
3162	20146	0.671877	0.074926	0.626209		0.038024	0.809741	0.315698		0.011464	0.120312	1.297694
3163	20147	0.699153	0.069994	0.609037		0.039816	0.833716	0.349475		0.012026	0.126164	1.335699
3164	20148	0.541451	0.047989	0.43242		0.030991	0.638804	0.284568		0.00938	0.098082	1.028063
3165	20149	0.350773	0.028872	0.265701		0.020127	0.411417	0.187275		0.006098	0.063543	0.66901
3166	2015	0.438205	0.062995	0.014378		0.065156	0.660418	0.009158		0.013188	0.047879	0.304151
3167	20150	0.532694	0.041017	0.381641		0.03062	0.621716	0.285532		0.009286	0.096396	1.02055
3168	20151	0.639671	0.042646	0.406852		0.036857	0.739085	0.339037		0.011448	0.115297	1.23718
3169	20152	0.640921	0.040992	0.366113		0.037003	0.732773	0.337348		0.011743	0.115199	1.248402
3170	20153	0.696358	0.045482	0.368574		0.040262	0.787494	0.366687		0.013023	0.123887	1.358986
3171	20154	0.64335	0.043958	0.410226		0.037217	0.71922	0.333569		0.012234	0.112383	1.249983
3172	20155	0.666003	0.048967	0.546226		0.038536	0.735466	0.330013		0.012827	0.113144	1.285922
3173	20156	0.645726	0.055704	0.648041		0.037377	0.703148	0.293981		0.012559	0.107769	1.235933
3174	20157	0.528873	0.051304	0.597321		0.030615	0.568378	0.221347		0.010351	0.086534	0.99632
3175	20158	0.528632	0.054248	0.626378		0.030596	0.563606	0.208327		0.01037	0.085101	0.982863
3176	20159	0.713253	0.080258	0.904577		0.041267	0.74704	0.253431		0.014024	0.109793	1.276247
3177	2016	0.393706	0.056764	0.013431		0.060111	0.587584	0.007771		0.01199	0.042647	0.273126
3178	20160	0.714392	0.086784	0.942819		0.041485	0.733759	0.274486		0.014031	0.103575	1.207725
3179	20161	0.77036	0.099233	1.012752		0.044937	0.774529	0.31823		0.015253	0.104762	1.230018
3180	20162	0.716414	0.095159	0.900015		0.041983	0.703784	0.324866		0.014324	0.092999	1.108418
3181	20163	0.717282	0.095399	0.840847		0.042245	0.687292	0.34138		0.014467	0.086744	1.058751
3182	20164	0.718048	0.093769	0.777044		0.042549	0.670165	0.356718		0.014593	0.078215	1.003153
3183	20165	0.773861	0.098002	0.750065		0.04617	0.702803	0.392375		0.015838	0.072966	0.994357
3184	20166	0.719238	0.08563	0.614493		0.043217	0.635149	0.357749		0.014805	0.05795	0.843572
3185	20167	0.785072	0.085056	0.568825		0.047561	0.673901	0.364429		0.016233	0.053952	0.820149
3186	20168	0.873384	0.084533	0.534257		0.053515	0.72538	0.356966		0.018124	0.051513	0.783311
3187	20169	0.785527	0.068104	0.370615		0.048665	0.633575	0.262531		0.016324	0.040559	0.59131
3188	2017	0.503866	0.072702	0.018125		0.079489	0.742826	0.009505		0.015516	0.053754	0.349375
3189	20170	0.785441	0.060425	0.251885		0.049274	0.616493	0.183945		0.016305	0.035938	0.505225
3190	20171	0.928518	0.084587	0.375853		0.038908	0.833071	0.146962		0.019644	0.044221	0.580015
3191	20172	1.055113	0.106319	0.644931		0.043642	0.978238	0.283186		0.021525	0.05488	0.763782
3192	20173	1.177993	0.128579	0.909082		0.048137	1.12834	0.449783		0.023073	0.069493	1.008985
3193	20174	0.650577	0.075531	0.554985		0.026365	0.637387	0.299042		0.012335	0.043116	0.617359
3194	20175	0.511164	0.062163	0.456907		0.020592	0.509242	0.261789		0.009448	0.038145	0.517945
3195	20176	0.677106	0.084941	0.618915		0.02714	0.683856	0.372936		0.012246	0.055238	0.723483
3196	20177	1.20111	0.157033	1.160487		0.047704	1.244251	0.737131		0.021424	0.113713	1.403507
3197	20178	0.856006	0.114259	0.888867		0.033652	0.909955	0.568092		0.015168	0.092595	1.092723
3198	20179	0.756282	0.100781	0.805663		0.029495	0.819627	0.515511		0.013326	0.089152	1.018647
3199	2018	0.569501	0.082098	0.021783		0.093511	0.82594	0.009947		0.017876	0.059435	0.394584
3200	20180	0.756087	0.099009	0.862569		0.029232	0.834462	0.513626		0.013239	0.095673	1.059552
3201	20181	1.034091	0.131044	1.281745		0.039625	1.160886	0.689952		0.017984	0.139501	1.506837
3202	20182	0.669472	0.080973	0.876404		0.025395	0.763661	0.433173		0.011548	0.09615	1.029127
3203	20183	0.52352	0.062672	0.699464		0.019695	0.604206	0.323798		0.008969	0.078483	0.838308
3204	20184	0.583056	0.069872	0.781005		0.021779	0.678943	0.342875		0.00993	0.090137	0.960071
3205	20185	0.688888	0.080789	0.911312		0.025437	0.812553	0.365084		0.01162	0.11119	1.179206
3206	20186	0.953355	0.109925	1.212851		0.034778	1.137597	0.440973		0.015918	0.160911	1.692962
3207	20187	0.648836	0.074269	0.771999		0.023349	0.782663	0.257215		0.010707	0.114069	1.191228
3208	20188	0.622226	0.070159	0.674448		0.022089	0.757673	0.226201		0.010147	0.112973	1.169633
3209	20189	0.655208	0.072122	0.623703		0.022946	0.804956	0.217593		0.01055	0.122205	1.253126
3210	2019	0.570316	0.082249	0.022616		0.097352	0.812449	0.00897		0.018191	0.058529	0.394552
3211	20190	0.688193	0.073938	0.536653		0.023902	0.853336	0.236466		0.010912	0.131486	1.333202
3212	20191	1.058357	0.112171	0.76455		0.036498	1.323755	0.389628		0.016509	0.206706	2.07443
3213	20192	0.873238	0.089035	0.59759		0.030082	1.103456	0.340659		0.013302	0.175562	1.750355
3214	20193	0.77394	0.077551	0.472761		0.026652	0.987391	0.344142		0.011492	0.158813	1.571568
3215	20194	0.674715	0.06875	0.374441		0.023233	0.866776	0.328729		0.009834	0.139831	1.377027
3216	20195	0.998605	0.102293	0.545037		0.034437	1.291228	0.526963		0.014501	0.208083	2.043105
3217	20196	0.846775	0.087031	0.531437		0.029324	1.102402	0.479126		0.012237	0.177004	1.744466
3218	20197	0.926291	0.09965	0.735802		0.032275	1.215168	0.562854		0.013298	0.193072	1.933452
3219	20198	0.900058	0.103234	0.855007		0.031565	1.189	0.56685		0.012829	0.185764	1.907232
3220	20199	1.151654	0.136933	1.20254		0.040677	1.530477	0.7195		0.016299	0.234374	2.460786
3221	2020	0.571129	0.08241	0.025541		0.101286	0.797979	0.007902		0.018348	0.057241	0.394472
3222	20200	0.860956	0.103961	0.935378		0.030631	1.150211	0.516503		0.012094	0.174007	1.850907

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3223	20201	0.675826	0.0817	0.727702		0.024235	0.906956	0.377725		0.009428	0.137871	1.450545
3224	20202	0.689302	0.08323	0.756475		0.024832	0.927185	0.361766		0.009576	0.144065	1.47286
3225	20203	1.153726	0.136306	1.318167		0.041929	1.557043	0.521388		0.015922	0.250318	2.460955
3226	20204	0.876057	0.098685	1.00379		0.032433	1.185007	0.327909		0.012015	0.196503	1.865279
3227	20205	0.876764	0.091372	0.96336		0.033743	1.187444	0.312663		0.011967	0.20217	1.847323
3228	20206	0.877584	0.08616	0.87137		0.035183	1.188772	0.346885		0.011973	0.20681	1.858549
3229	20207	1.057922	0.10056	0.879392		0.04409	1.431824	0.451284		0.014598	0.253395	2.331233
3230	20208	0.679417	0.062852	0.458128		0.029126	0.918258	0.32011		0.009465	0.164368	1.533817
3231	20209	0.780041	0.069602	0.384432		0.034357	1.052098	0.397974		0.010983	0.189943	1.789001
3232	2021	0.647242	0.093464	0.032766		0.119084	0.885654	0.014065		0.020895	0.062411	0.446383
3233	20210	0.881188	0.075167	0.357145		0.040108	1.184221	0.490331		0.012587	0.215158	2.036469
3234	20211	1.162928	0.104428	0.516237		0.054592	1.555519	0.694002		0.016871	0.283002	2.669922
3235	20212	0.883721	0.086488	0.574493		0.042687	1.175242	0.557542		0.013028	0.213459	1.994709
3236	20213	0.885106	0.093954	0.727896		0.043911	1.169228	0.568192		0.013261	0.211013	1.93719
3237	20214	0.873162	0.107531	0.843329		0.04439	1.14488	0.54954		0.013295	0.204253	1.82858
3238	20215	0.968583	0.131685	1.028042		0.050336	1.260102	0.576829		0.014975	0.221282	1.922788
3239	20216	0.700456	0.099651	0.767268		0.036847	0.906781	0.397283		0.010929	0.15756	1.376589
3240	20217	0.890685	0.133535	1.035246		0.047789	1.142672	0.448284		0.014107	0.194184	1.757169
3241	20218	0.892421	0.135837	1.069843		0.04874	1.133985	0.393978		0.01434	0.187443	1.780245
3242	20219	1.178468	0.175909	1.385232		0.065405	1.482504	0.460775		0.019187	0.237109	2.363351
3243	2022	0.698687	0.100666	0.041576		0.134289	0.929311	0.025482		0.022803	0.063336	0.48099
3244	20220	0.896031	0.127062	0.986857		0.050452	1.115413	0.385765		0.014773	0.172044	1.801606
3245	20221	0.795857	0.103699	0.78055		0.045391	0.980098	0.361153		0.013268	0.146476	1.59009
3246	20222	0.694967	0.084904	0.653731		0.039985	0.848697	0.319401		0.01168	0.126535	1.374806
3247	20223	1.084853	0.124174	0.979639		0.062911	1.313825	0.510741		0.018365	0.197507	2.120136
3248	20224	0.902776	0.093021	0.759758		0.052834	1.081568	0.461083		0.015415	0.165665	1.74746
3249	20225	0.699094	0.063832	0.537997		0.041235	0.828569	0.378537		0.012027	0.128749	1.352022
3250	20226	0.45289	0.038422	0.330722		0.026811	0.533605	0.249348		0.00782	0.083374	0.879249
3251	20227	0.906381	0.071956	0.62441		0.053806	1.062669	0.501281		0.015696	0.167168	1.765584
3252	20228	0.825808	0.05664	0.522089		0.049279	0.958474	0.453747		0.014374	0.15288	1.626078
3253	20229	0.827374	0.053464	0.468009		0.049583	0.950248	0.447997		0.014687	0.152677	1.640705
3254	2023	0.513565	0.073999	0.035695		0.102585	0.663789	0.027547		0.016902	0.044129	0.352778
3255	20230	1.118775	0.074322	0.585571		0.067278	1.270909	0.606207		0.02027	0.204149	2.220342
3256	20231	0.830422	0.058283	0.541329		0.050093	0.932457	0.442809		0.015285	0.14886	1.643515
3257	20232	0.859613	0.06443	0.716175		0.051988	0.953328	0.438393		0.016025	0.149892	1.688182
3258	20233	0.833415	0.073065	0.845339		0.050514	0.911199	0.39062		0.015698	0.139417	1.62198
3259	20234	0.903984	0.088745	1.027805		0.05488	0.975226	0.384587		0.017141	0.147455	1.728265
3260	20235	0.682258	0.070765	0.813832		0.041459	0.730084	0.273183		0.012965	0.109363	1.287964
3261	20236	0.920486	0.104395	1.16811		0.056228	0.967438	0.319115		0.017639	0.140624	1.6708
3262	20237	0.921951	0.113753	1.214244		0.056608	0.950008	0.343464		0.017881	0.132391	1.577011
3263	20238	1.216826	0.15873	1.590094		0.0751	1.227112	0.483222		0.023868	0.165863	1.956974
3264	20239	0.924555	0.124197	1.154153		0.05737	0.910845	0.405123		0.018323	0.120454	1.430421
3265	2024	0.38803	0.056123	0.029273		0.079026	0.493754	0.024748		0.012769	0.032293	0.266239
3266	20240	0.925675	0.124307	1.094466		0.05776	0.889413	0.427372		0.018519	0.112319	1.363217
3267	20241	0.92669	0.123297	1.027906		0.058148	0.867257	0.443928		0.018704	0.101065	1.288822
3268	20242	1.222435	0.157447	1.231866		0.077162	1.11331	0.60047		0.02487	0.115017	1.561377
3269	20243	0.92829	0.112353	0.832434		0.058988	0.822186	0.449376		0.019018	0.074347	1.076945
3270	20244	1.013295	0.111592	0.765538		0.06485	0.87254	0.464625		0.020882	0.068201	1.04725
3271	20245	1.35148	0.134679	0.821466		0.087275	1.126117	0.550893		0.028004	0.078183	1.196381
3272	20246	1.014015	0.091557	0.472869		0.06612	0.820543	0.337922		0.021072	0.051556	0.755905
3273	20247	1.013984	0.082577	0.320248		0.066824	0.798381	0.236703		0.021084	0.045944	0.648936
3274	20248	0.910834	0.086994	0.376032		0.038131	0.817544	0.14474		0.019186	0.043256	0.569203
3275	20249	1.034992	0.108614	0.640999		0.042612	0.960403	0.278623		0.02107	0.053392	0.751938
3276	2025	0.49435	0.071949	0.041819		0.102948	0.617121	0.03803		0.016273	0.039255	0.338789
3277	20250	0.948218	0.108472	0.742873		0.038564	0.909431	0.363439		0.018514	0.055305	0.817064
3278	20251	0.638127	0.077319	0.552445		0.025802	0.626192	0.294083		0.01205	0.043089	0.609908
3279	20252	0.501375	0.063414	0.454986		0.020185	0.500393	0.25731		0.009215	0.038101	0.511962
3280	20253	0.664124	0.086456	0.616633		0.026648	0.672073	0.366429		0.011922	0.055167	0.715832
3281	20254	0.970813	0.131306	0.928739		0.038696	1.00799	0.597867		0.017059	0.093608	1.14578
3282	20255	0.839523	0.115566	0.86409		0.033231	0.89474	0.558363		0.014671	0.092388	1.085035
3283	20256	0.7417	0.101774	0.783954		0.029177	0.806059	0.506431		0.012896	0.088911	1.012205
3284	20257	0.741474	0.099892	0.861859		0.028979	0.820769	0.50442		0.012818	0.095412	1.053642
3285	20258	0.807098	0.10518	1.019251		0.031306	0.908925	0.542517		0.013856	0.110624	1.188749
3286	20259	0.656484	0.081577	0.873628		0.025251	0.751333	0.427224		0.011181	0.095738	1.017399
3287	2026	0.684325	0.100849	0.067084		0.146477	0.83196	0.066111		0.022659	0.050503	0.46836
3288	20260	0.513352	0.062438	0.696607		0.019599	0.594515	0.319009		0.008684	0.07814	0.82865
3289	20261	0.571718	0.069572	0.777398		0.021689	0.668098	0.337496		0.009614	0.08975	0.949161
3290	20262	0.675465	0.080401	0.906931		0.02535	0.799669	0.35879		0.011247	0.110843	1.168776
3291	20263	0.728063	0.084112	0.939698		0.027007	0.872114	0.340922		0.01199	0.125011	1.309766
3292	20264	0.63615	0.073082	0.765815		0.023291	0.77045	0.256098		0.010348	0.113692	1.182142

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3293	20265	0.610045	0.069153	0.667625		0.02204	0.745948	0.229534		0.009803	0.112559	1.161218
3294	20266	0.642362	0.071213	0.615938		0.022872	0.792589	0.222017		0.010184	0.121754	1.245138
3295	20267	0.674671	0.073699	0.528246		0.023603	0.840326	0.224002		0.010527	0.131049	1.326317
3296	20268	0.831065	0.089488	0.6089		0.028649	1.044267	0.296352		0.012734	0.165038	1.654794
3297	20269	0.856013	0.088541	0.594087		0.029197	1.086859	0.324211		0.012794	0.174895	1.740317
3298	2027	0.804131	0.12385	0.095929		0.178146	0.938377	0.104107		0.026806	0.05289	0.549456
3299	20270	0.758648	0.075938	0.470548		0.025674	0.97261	0.342646		0.011047	0.158221	1.561944
3300	20271	0.66135	0.067374	0.36437		0.022395	0.853831	0.327007		0.009595	0.13937	1.368904
3301	20272	0.772407	0.07918	0.423951		0.026175	1.00376	0.404779		0.011159	0.163781	1.605199
3302	20273	0.829938	0.08491	0.51643		0.028186	1.086003	0.477067		0.011925	0.176445	1.73396
3303	20274	0.907842	0.098975	0.73393		0.031046	1.197109	0.559212		0.012952	0.192408	1.927228
3304	20275	0.882069	0.102477	0.85084		0.030407	1.171314	0.563207		0.012486	0.185154	1.901167
3305	20276	0.922073	0.11104	0.976047		0.032035	1.231785	0.584573		0.012949	0.190992	2.005722
3306	20277	0.843663	0.103101	0.926959		0.029567	1.13308	0.510798		0.011754	0.174659	1.842402
3307	20278	0.662225	0.080488	0.719593		0.023406	0.893473	0.370884		0.009156	0.136395	1.442272
3308	20279	0.675403	0.081547	0.748951		0.024003	0.913429	0.35506		0.009298	0.14223	1.463982
3309	2028	0.708769	0.118666	0.101414		0.161309	0.790044	0.119409		0.023653	0.041392	0.483772
3310	20280	0.923558	0.108686	1.07108		0.033129	1.253363	0.416759		0.01262	0.202056	1.994813
3311	20281	0.858299	0.096412	0.994449		0.031143	1.167692	0.315736		0.011652	0.19409	1.845965
3312	20282	0.858954	0.089372	0.957177		0.032415	1.170249	0.296183		0.011593	0.199677	1.826763
3313	20283	0.859699	0.083703	0.86933		0.03392	1.171659	0.330195		0.011608	0.204286	1.834133
3314	20284	0.828787	0.077681	0.706267		0.034098	1.128649	0.357174		0.011378	0.200261	1.841027
3315	20285	0.665503	0.060633	0.462871		0.028237	0.905044	0.314061		0.009307	0.162356	1.512821
3316	20286	0.764043	0.067106	0.392842		0.033377	1.036913	0.384977		0.010854	0.187582	1.76373
3317	20287	0.863058	0.072485	0.343261		0.039077	1.167018	0.480469		0.012463	0.212507	2.007487
3318	20288	0.930532	0.082734	0.409208		0.043562	1.252294	0.553062		0.013576	0.228489	2.152059
3319	20289	0.86544	0.084298	0.55792		0.041804	1.157981	0.543404		0.012678	0.210867	1.965861
3320	2029	0.612904	0.112391	0.10008		0.141425	0.65801	0.12434		0.020512	0.033075	0.418135
3321	20290	0.866759	0.091231	0.711224		0.043098	1.151991	0.553448		0.012848	0.208454	1.90877
3322	20291	0.855004	0.105022	0.825277		0.04368	1.127915	0.534867		0.012884	0.201844	1.800835
3323	20292	0.738688	0.10064	0.787199		0.038664	0.966833	0.437105		0.011303	0.17044	1.475916
3324	20293	0.685823	0.097871	0.755243		0.03639	0.893204	0.385911		0.010587	0.155784	1.353257
3325	20294	0.872045	0.131496	1.017067		0.047302	1.125447	0.435269		0.013674	0.192008	1.727278
3326	20295	0.873682	0.134122	1.054954		0.048362	1.116746	0.386748		0.0139	0.185434	1.750098
3327	20296	0.942559	0.142326	1.120875		0.053147	1.192624	0.367455		0.015201	0.191828	1.901012
3328	20297	0.877114	0.126076	0.979887		0.0503	1.098128	0.377307		0.01432	0.170393	1.771131
3329	20298	0.779017	0.103136	0.777943		0.045358	0.964739	0.353975		0.01287	0.145195	1.563083
3330	20299	0.680222	0.084887	0.62036		0.040033	0.835266	0.313547		0.01133	0.125499	1.352117
3331	2030	0.751569	0.11547	0.124184		0.145511	0.797648	0.15418		0.026152	0.039533	0.52821
3332	20300	0.849167	0.099476	0.743589		0.050472	1.03391	0.405477		0.014251	0.156646	1.670315
3333	20301	0.88353	0.093348	0.716758		0.053126	1.064051	0.458803		0.014956	0.164123	1.719037
3334	20302	0.684152	0.064087	0.50878		0.04156	0.815004	0.37941		0.011674	0.128079	1.335698
3335	20303	0.44319	0.038608	0.312034		0.027059	0.524824	0.250274		0.007591	0.08339	0.869092
3336	20304	0.673001	0.054901	0.448348		0.041255	0.793013	0.382385		0.011561	0.127033	1.325538
3337	20305	0.808067	0.05697	0.506185		0.049896	0.942587	0.457362		0.013956	0.152928	1.606444
3338	20306	0.809558	0.053458	0.453699		0.050308	0.934436	0.448206		0.014047	0.15263	1.62071
3339	20307	0.87949	0.059273	0.455432		0.054968	1.004042	0.488168		0.015443	0.163974	1.764354
3340	20308	0.812465	0.058166	0.538341		0.051036	0.916735	0.44269		0.014474	0.14863	1.623348
3341	20309	0.841	0.06428	0.705612		0.053063	0.937082	0.43829		0.015193	0.149561	1.666301
3342	2031	0.729181	0.099096	0.120622		0.115001	0.762726	0.149471		0.025633	0.040196	0.528233
3343	20310	0.815329	0.07222	0.829758		0.051658	0.895458	0.390676		0.014945	0.139054	1.600688
3344	20311	0.667743	0.066059	0.761016		0.04255	0.723486	0.287869		0.012383	0.110909	1.288448
3345	20312	0.667421	0.069609	0.796375		0.042678	0.717218	0.270181		0.012458	0.108803	1.269511
3346	20313	0.90047	0.103279	1.137401		0.057968	0.950166	0.307907		0.017033	0.139514	1.642838
3347	20314	0.901884	0.112363	1.175502		0.058432	0.932866	0.326396		0.017276	0.130202	1.547447
3348	20315	0.972528	0.127929	1.256821		0.063386	0.984338	0.370095		0.01885	0.132957	1.573905
3349	20316	0.904438	0.122194	1.111799		0.059295	0.894187	0.381466		0.017721	0.118262	1.400205
3350	20317	0.905558	0.122509	1.089854		0.059701	0.873126	0.403906		0.017933	0.110178	1.33335
3351	20318	0.906567	0.122249	1.025941		0.060105	0.851422	0.419009		0.018129	0.098923	1.252812
3352	20319	0.977095	0.127472	1.025107		0.065145	0.893103	0.469684		0.019719	0.091705	1.238899
3353	2032	0.657833	0.083071	0.107823		0.080417	0.677266	0.132953		0.022784	0.037074	0.491536
3354	20320	0.908204	0.111223	0.845233		0.060906	0.807423	0.434436		0.01848	0.072118	1.040352
3355	20321	0.99143	0.110488	0.775691		0.066891	0.857028	0.453012		0.02033	0.065231	1.011926
3356	20322	1.103103	0.112732	0.66622		0.075011	0.922799	0.447974		0.02279	0.062561	0.962111
3357	20323	0.992278	0.092873	0.457298		0.068012	0.806063	0.329049		0.020609	0.049656	0.730202
3358	20324	0.992327	0.085048	0.307917		0.068613	0.784188	0.230388		0.020694	0.044511	0.629923
3359	20325	0.92508	0.092245	0.385854		0.038689	0.83146	0.147166		0.019158	0.043841	0.57733
3360	20326	1.051141	0.11443	0.654801		0.043224	0.977261	0.282987		0.021054	0.053913	0.763577
3361	20327	0.962969	0.11477	0.760066		0.039025	0.925764	0.369105		0.018477	0.055697	0.828733
3362	20328	0.648033	0.081441	0.565493		0.026158	0.63758	0.29835		0.012005	0.044489	0.618768

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3363	20329	0.509143	0.066582	0.465908		0.0205	0.509566	0.26086		0.009168	0.039317	0.521569
3364	2033	0.643875	0.079125	0.103139		0.061563	0.649114	0.126204		0.021545	0.03435	0.49148
3365	20330	0.674399	0.090588	0.631781		0.027095	0.684459	0.371331		0.011846	0.057088	0.73276
3366	20331	0.98578	0.137172	0.930235		0.039459	1.026738	0.606207		0.017046	0.097809	1.174694
3367	20332	0.852431	0.120433	0.866776		0.03396	0.911551	0.565639		0.014668	0.096623	1.119917
3368	20333	0.753065	0.105916	0.788109		0.029883	0.821334	0.512728		0.012899	0.092308	1.045274
3369	20334	0.752808	0.103878	0.884563		0.029721	0.836461	0.510565		0.012821	0.098243	1.088285
3370	20335	0.819395	0.109329	1.045653		0.03216	0.926466	0.552477		0.013865	0.113694	1.222829
3371	20336	0.666463	0.084754	0.895365		0.025966	0.765977	0.434382		0.01119	0.098352	1.03575
3372	20337	0.521138	0.063977	0.71337		0.020173	0.606179	0.323892		0.008689	0.080246	0.844069
3373	20338	0.580375	0.07126	0.795959		0.022334	0.681274	0.342271		0.009618	0.092162	0.967426
3374	20339	0.685667	0.082308	0.928484		0.026121	0.815531	0.363794		0.011243	0.113822	1.185813
3375	2034	0.67733	0.081205	0.10388		0.049734	0.665098	0.125126		0.021385	0.030367	0.528025
3376	20340	0.739032	0.085925	0.960755		0.02784	0.889508	0.348025		0.011983	0.12836	1.330619
3377	20341	0.645712	0.074433	0.781386		0.024015	0.785897	0.267274		0.010337	0.116684	1.202193
3378	20342	0.619195	0.070553	0.679553		0.022728	0.76097	0.240328		0.009784	0.115474	1.181748
3379	20343	0.651975	0.072787	0.625221		0.023585	0.808606	0.234853		0.010157	0.124894	1.268417
3380	20344	0.684744	0.075816	0.534136		0.024333	0.85735	0.223916		0.010484	0.134467	1.352941
3381	20345	0.843438	0.091979	0.624355		0.02939	1.065475	0.289447		0.01269	0.169428	1.684701
3382	20346	0.868727	0.090903	0.609398		0.029623	1.109012	0.33871		0.01289	0.179546	1.769914
3383	20347	0.769873	0.076845	0.483267		0.02597	0.992504	0.351732		0.011264	0.162452	1.587989
3384	20348	0.671117	0.068238	0.368077		0.022445	0.871334	0.335447		0.009712	0.14315	1.392494
3385	20349	0.783779	0.08026	0.434464		0.026093	1.024393	0.418411		0.011259	0.168264	1.633869
3386	2035	0.662493	0.080866	0.095497		0.05221	0.630926	0.111997		0.019554	0.030666	0.527806
3387	20350	0.842131	0.086107	0.526603		0.028086	1.108421	0.492827		0.012029	0.181239	1.768552
3388	20351	0.921121	0.101505	0.756959		0.030883	1.221925	0.575342		0.013053	0.197559	1.971119
3389	20352	0.894935	0.10503	0.875136		0.030273	1.195627	0.577118		0.012573	0.190118	1.94609
3390	20353	0.935463	0.113766	1.001696		0.031941	1.257339	0.59927		0.013034	0.196717	2.053884
3391	20354	0.855881	0.10558	0.949092		0.029498	1.156593	0.523686		0.011824	0.180197	1.884543
3392	20355	0.671776	0.082378	0.735126		0.023384	0.912016	0.377631		0.009206	0.140579	1.473294
3393	20356	0.685127	0.083446	0.763478		0.023987	0.932387	0.359765		0.009387	0.145	1.494796
3394	20357	0.936798	0.111219	1.096113		0.033152	1.279412	0.421913		0.012864	0.206089	2.025071
3395	20358	0.870566	0.098145	1.021053		0.031133	1.192068	0.313867		0.011984	0.197974	1.870392
3396	20359	0.871177	0.090625	0.979281		0.032209	1.194798	0.308916		0.012048	0.203664	1.848435
3397	2036	0.431928	0.057222	0.057157		0.040481	0.412131	0.063974		0.01195	0.029741	0.352034
3398	20360	0.87189	0.084117	0.892979		0.033823	1.196315	0.343999		0.012186	0.208397	1.865898
3399	20361	0.840487	0.077662	0.729665		0.034127	1.15243	0.366982		0.012064	0.204309	1.872815
3400	20362	0.674874	0.060547	0.481217		0.028329	0.924125	0.322257		0.009855	0.165609	1.538229
3401	20363	0.774764	0.066968	0.412693		0.033571	1.058767	0.394627		0.011486	0.191302	1.792509
3402	20364	0.875126	0.07235	0.346589		0.039412	1.191566	0.490083		0.013173	0.216736	2.040151
3403	20365	0.943483	0.083007	0.407078		0.044067	1.278574	0.560834		0.014348	0.233075	2.187377
3404	20366	0.877447	0.084992	0.557343		0.042395	1.182262	0.545675		0.013396	0.215076	1.997271
3405	20367	0.878728	0.091566	0.715354		0.043827	1.1761	0.555408		0.01339	0.212607	1.938586
3406	20368	0.86677	0.105977	0.831726		0.04452	1.151397	0.536517		0.013104	0.20593	1.829282
3407	20369	0.748808	0.101972	0.796566		0.039507	0.986806	0.438191		0.011339	0.173954	1.497739
3408	2037	9.126877	1.263392	1.166651		0.910227	8.770837	1.27788		0.246959	0.760577	7.499233
3409	20370	0.695199	0.099226	0.765707		0.037233	0.911569	0.386601		0.010625	0.159013	1.362669
3410	20371	0.883912	0.13364	1.029421		0.048519	1.14839	0.439737		0.013716	0.196012	1.74214
3411	20372	0.885532	0.136652	1.07164		0.049721	1.1393	0.394663		0.013946	0.189396	1.764725
3412	20373	0.955279	0.145361	1.142527		0.054776	1.216504	0.369629		0.015245	0.196065	1.917366
3413	20374	0.88891	0.129027	1.001597		0.051962	1.119985	0.380566		0.01437	0.174248	1.785701
3414	20375	0.789444	0.105761	0.79758		0.046972	0.983828	0.357793		0.01291	0.147724	1.57621
3415	20376	0.6893	0.087607	0.616691		0.041532	0.85169	0.317458		0.011367	0.127798	1.364807
3416	20377	0.860458	0.102827	0.728505		0.052459	1.054096	0.414543		0.014297	0.160359	1.687726
3417	20378	0.895233	0.096688	0.697704		0.055347	1.084634	0.472061		0.01501	0.168774	1.738191
3418	20379	0.693171	0.066402	0.497693		0.043401	0.830614	0.391464		0.011714	0.132181	1.354916
3419	20380	0.44902	0.040025	0.304593		0.028294	0.534817	0.258583		0.007618	0.086046	0.882081
3420	20381	0.68184	0.056945	0.448292		0.043181	0.808054	0.395526		0.011603	0.13105	1.345581
3421	20382	0.818637	0.059114	0.506569		0.052333	0.960345	0.474647		0.014007	0.157659	1.630364
3422	20383	0.820112	0.05516	0.454154		0.052874	0.951937	0.465476		0.0141	0.157258	1.644513
3423	20384	0.890917	0.061041	0.458228		0.05788	1.02271	0.503238		0.015387	0.168853	1.790224
3424	20385	0.822993	0.059723	0.55143		0.053841	0.933645	0.455115		0.014419	0.152914	1.646049
3425	20386	0.851865	0.066209	0.718571		0.056123	0.954195	0.450389		0.015137	0.153742	1.689531
3426	20387	0.825842	0.073473	0.836922		0.05493	0.911612	0.401517		0.014885	0.142881	1.622223
3427	20388	0.676336	0.066995	0.766084		0.045335	0.736393	0.295441		0.01234	0.113329	1.304757
3428	20389	0.676004	0.070476	0.800792		0.045501	0.729941	0.274744		0.012418	0.111101	1.284561
3429	20390	0.912032	0.105213	1.141211		0.061892	0.966848	0.312246		0.01698	0.14218	1.658556
3430	20391	0.913467	0.114253	1.167724		0.062446	0.949117	0.320713		0.017231	0.132507	1.569931
3431	20392	0.985014	0.129861	1.245724		0.067802	1.0014	0.356417		0.018812	0.134795	1.598054
3432	20393	0.916069	0.123774	1.138464		0.063448	0.909661	0.369487		0.017706	0.119892	1.416201

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3433	20394	0.917221	0.125303	1.113307		0.06391	0.888254	0.392805		0.017926	0.111556	1.346627
3434	20395	0.918275	0.12491	1.07221		0.064338	0.866226	0.419061		0.018144	0.099945	1.256224
3435	20396	0.98975	0.130174	1.070145		0.069721	0.908731	0.470233		0.019757	0.092425	1.241288
3436	20397	0.920015	0.113546	0.880476		0.065146	0.821669	0.435116		0.01855	0.072165	1.038443
3437	20398	1.004376	0.112887	0.810192		0.071502	0.872258	0.456484		0.020439	0.064484	1.010716
3438	20399	1.117602	0.116798	0.704272		0.08009	0.939253	0.451111		0.023079	0.062065	0.958718
3439	20400	1.005395	0.097278	0.456277		0.072531	0.820404	0.331033		0.02103	0.049511	0.72867
3440	20401	1.005547	0.090425	0.305699		0.07309	0.797991	0.231651		0.021287	0.044654	0.631731
3441	20402	0.938536	0.097479	0.391594		0.039159	0.845541	0.148936		0.018875	0.044374	0.585096
3442	20403	1.066374	0.120095	0.663761		0.04377	0.99441	0.285957		0.020707	0.054423	0.773644
3443	20404	0.976879	0.120796	0.770227		0.039503	0.942384	0.372676		0.018123	0.057403	0.837482
3444	20405	0.657361	0.085245	0.573596		0.026539	0.649143	0.300904		0.01175	0.046389	0.624954
3445	20406	0.516455	0.069492	0.472871		0.020827	0.518853	0.262892		0.008959	0.041306	0.532453
3446	20407	0.684059	0.094357	0.641526		0.027568	0.696976	0.373991		0.011649	0.060218	0.748797
3447	20408	0.999856	0.142478	0.945285		0.04022	1.04562	0.610502		0.016982	0.103222	1.21023
3448	20409	0.864534	0.124838	0.868983		0.03471	0.928451	0.569257		0.014627	0.101939	1.155413
3449	20410	0.763731	0.109674	0.800851		0.030582	0.836693	0.515753		0.012859	0.097245	1.078522
3450	20411	0.763421	0.107492	0.89883		0.030468	0.852268	0.51722		0.012783	0.102792	1.127522
3451	20412	0.83092	0.113088	1.062361		0.032998	0.944187	0.559391		0.013826	0.116564	1.27539
3452	20413	0.675797	0.087656	0.909413		0.026673	0.780813	0.439022		0.011161	0.100385	1.068256
3453	20414	0.528422	0.065367	0.724333		0.020733	0.618024	0.326838		0.008665	0.081887	0.85411
3454	20415	0.588471	0.072395	0.80916		0.022966	0.694654	0.344917		0.009584	0.094024	0.980073
3455	20416	0.695198	0.083571	0.942547		0.026872	0.831652	0.369062		0.0112	0.115972	1.203085
3456	20417	0.749283	0.08782	0.973693		0.028645	0.907163	0.352635		0.011944	0.130743	1.335454
3457	20418	0.654639	0.075881	0.790257		0.024711	0.801557	0.277616		0.010395	0.118816	1.207554
3458	20419	0.627736	0.071884	0.685573		0.023384	0.776165	0.252275		0.009916	0.117558	1.188722
3459	20420	0.660947	0.074308	0.628708		0.024266	0.824764	0.248928		0.010366	0.12713	1.277459
3460	20421	0.694136	0.077664	0.534302		0.025027	0.874476	0.238659		0.01079	0.136874	1.364044
3461	20422	0.854986	0.094131	0.636845		0.030212	1.086757	0.295878		0.013158	0.172692	1.699682
3462	20423	0.880564	0.092942	0.622033		0.030249	1.131222	0.35138		0.013364	0.183068	1.77764
3463	20424	0.78034	0.078334	0.494033		0.026295	1.012448	0.359898		0.01167	0.165695	1.595259
3464	20425	0.680206	0.068878	0.377041		0.022727	0.888898	0.342138		0.010058	0.146032	1.399473
3465	20426	0.794376	0.081092	0.444792		0.0263	1.045129	0.430764		0.01162	0.171663	1.64319
3466	20427	0.853466	0.088205	0.538994		0.027973	1.131021	0.506134		0.012341	0.184889	1.788449
3467	20428	0.933489	0.103696	0.779152		0.030654	1.247041	0.590904		0.01333	0.201495	1.995888
3468	20429	0.906884	0.10721	0.897609		0.030054	1.220296	0.588149		0.012824	0.193845	1.972821
3469	20430	0.947924	0.116083	1.024637		0.03173	1.283303	0.610898		0.013308	0.201368	2.083061
3470	20431	0.867221	0.107688	0.968412		0.029349	1.180494	0.534041		0.012128	0.18442	1.910499
3471	20432	0.680651	0.083991	0.748323		0.023286	0.930843	0.385294		0.009499	0.143758	1.491945
3472	20433	0.694149	0.08509	0.772547		0.023911	0.951606	0.366025		0.009691	0.147162	1.512463
3473	20434	0.949097	0.113412	1.113415		0.033065	1.30572	0.424884		0.013272	0.209239	2.038685
3474	20435	0.881935	0.100061	1.041107		0.0311	1.216609	0.315438		0.012385	0.201038	1.874504
3475	20436	0.882518	0.092412	0.998425		0.031898	1.219448	0.323353		0.01244	0.206835	1.850009
3476	20437	0.883177	0.085602	0.911015		0.033641	1.22101	0.362444		0.012766	0.211646	1.885568
3477	20438	0.851332	0.078377	0.748423		0.034078	1.176225	0.381789		0.012615	0.207488	1.892048
3478	20439	0.683546	0.060354	0.496671		0.028379	0.943233	0.332349		0.010303	0.168168	1.553673
3479	20440	0.784695	0.066709	0.430346		0.033712	1.080692	0.408564		0.011999	0.194245	1.810132
3480	20441	0.886282	0.072096	0.352182		0.039705	1.216258	0.496398		0.013755	0.220059	2.05981
3481	20442	0.95547	0.083136	0.399447		0.044526	1.305079	0.572317		0.014983	0.236653	2.20813
3482	20443	0.888532	0.085511	0.551354		0.042979	1.206809	0.54606		0.013995	0.218375	2.015888
3483	20444	0.889797	0.092003	0.713605		0.044539	1.200506	0.553854		0.013996	0.21588	1.95635
3484	20445	0.877625	0.10654	0.831769		0.04537	1.175153	0.534747		0.013701	0.209136	1.845827
3485	20446	0.758153	0.102919	0.799905		0.040361	1.006972	0.436514		0.011694	0.176706	1.508984
3486	20447	0.703845	0.100163	0.770567		0.038101	0.930082	0.384954		0.010744	0.16155	1.356326
3487	20448	0.894868	0.135193	1.034749		0.049774	1.171454	0.445383		0.013743	0.199205	1.738023
3488	20449	0.896447	0.138542	1.080834		0.051135	1.161936	0.400113		0.013957	0.192573	1.759075
3489	20450	0.967012	0.14769	1.155784		0.05647	1.240474	0.369356		0.015265	0.199486	1.910556
3490	20451	0.899762	0.131351	1.015978		0.05371	1.141958	0.381493		0.014381	0.177422	1.779597
3491	20452	0.799053	0.107976	0.81115		0.048667	1.003077	0.359535		0.012924	0.150157	1.572007
3492	20453	0.697653	0.090048	0.628505		0.043112	0.868303	0.319509		0.011375	0.130891	1.362538
3493	20454	0.870856	0.105846	0.709185		0.054555	1.074555	0.420858		0.014307	0.164456	1.687005
3494	20455	0.90599	0.099746	0.675893		0.057699	1.105498	0.482416		0.015017	0.173044	1.743963
3495	20456	0.701472	0.068514	0.485245		0.045352	0.846409	0.400919		0.011723	0.135483	1.361146
3496	20457	0.454382	0.041323	0.300313		0.029602	0.544921	0.265195		0.007623	0.08818	0.886519
3497	20458	0.689968	0.058801	0.445805		0.045224	0.823229	0.406147		0.011609	0.134275	1.352645
3498	20459	0.828355	0.061076	0.504431		0.054924	0.978184	0.489224		0.014018	0.161473	1.639042
3499	20460	0.829811	0.05666	0.45252		0.055602	0.96944	0.480996		0.014108	0.16098	1.652792
3500	20461	0.901425	0.062712	0.468291		0.060982	1.04133	0.514735		0.01539	0.172746	1.798274
3501	20462	0.832661	0.060836	0.560943		0.056978	0.950455	0.463581		0.014309	0.156333	1.652283
3502	20463	0.861854	0.067543	0.727298		0.059665	0.97119	0.458451		0.015011	0.157068	1.696554

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3503	20464	0.835493	0.074166	0.835488		0.058505	0.927669	0.408512		0.014763	0.145854	1.627113
3504	20465	0.684234	0.067398	0.763139		0.048348	0.749255	0.300606		0.012241	0.114635	1.307212
3505	20466	0.683888	0.070799	0.796871		0.048561	0.742625	0.278179		0.012321	0.112305	1.286085
3506	20467	0.922669	0.106362	1.133453		0.066135	0.983526	0.313878		0.016855	0.14354	1.65813
3507	20468	0.924105	0.115275	1.145311		0.066821	0.965435	0.312378		0.017102	0.133648	1.58399
3508	20469	0.996508	0.130782	1.219495		0.072594	1.018616	0.34599		0.018693	0.137314	1.611822
3509	20470	0.926764	0.124405	1.153766		0.06798	0.925299	0.354125		0.017606	0.120768	1.424155
3510	20471	0.927966	0.127364	1.150924		0.068497	0.903541	0.382312		0.017841	0.112235	1.352025
3511	20472	0.929057	0.126867	1.109609		0.068983	0.881193	0.417728		0.018066	0.100403	1.251557
3512	20473	1.001424	0.132175	1.105589		0.07473	0.92451	0.469079		0.01976	0.092738	1.236499
3513	20474	0.930915	0.115334	0.907776		0.069812	0.836	0.437021		0.018636	0.071799	1.032551
3514	20475	1.016346	0.116299	0.849678		0.076582	0.887522	0.458284		0.020646	0.063515	1.00633
3515	20476	1.131008	0.120694	0.736712		0.085713	0.955716	0.452432		0.023376	0.061426	0.953157
3516	20477	1.017544	0.101672	0.482056		0.07756	0.834714	0.331671		0.021369	0.049291	0.725359
3517	20478	1.017792	0.095945	0.304184		0.078079	0.811737	0.231979		0.021707	0.04475	0.632168
3518	20479	0.935087	0.100794	0.386188		0.03889	0.845137	0.147359		0.01803	0.044037	0.583824
3519	20480	1.062408	0.124286	0.655695		0.043469	0.994521	0.282413		0.019694	0.053883	0.771562
3520	20481	0.973165	0.124231	0.759483		0.039412	0.942837	0.367457		0.01716	0.05861	0.834571
3521	20482	0.65484	0.087237	0.566446		0.026504	0.649551	0.296402		0.011094	0.047432	0.623389
3522	20483	0.514448	0.070824	0.467397		0.020832	0.519218	0.258774		0.008605	0.042301	0.533268
3523	20484	0.681381	0.095995	0.634365		0.027602	0.697496	0.367874		0.011379	0.061701	0.75058
3524	20485	0.99585	0.144583	0.935349		0.040363	1.046476	0.600222		0.016607	0.105838	1.218737
3525	20486	0.861035	0.12648	0.859761		0.034866	0.929343	0.559431		0.014313	0.104564	1.164589
3526	20487	0.760582	0.111021	0.791591		0.030771	0.83764	0.506659		0.012577	0.099634	1.097126
3527	20488	0.760246	0.108751	0.888726		0.030689	0.8534	0.512836		0.012489	0.105011	1.153914
3528	20489	0.8274	0.114386	1.050505		0.03327	0.945656	0.553594		0.013522	0.118716	1.301279
3529	20490	0.672919	0.088665	0.89962		0.026897	0.782238	0.433653		0.010922	0.09981	1.08726
3530	20491	0.526146	0.066138	0.716662		0.02092	0.619264	0.322344		0.008554	0.081425	0.868282
3531	20492	0.585919	0.071719	0.801778		0.023178	0.696127	0.339842		0.009537	0.093487	0.986518
3532	20493	0.692161	0.082692	0.932378		0.027133	0.833475	0.365711		0.011263	0.115056	1.194856
3533	20494	0.745964	0.088041	0.961303		0.028918	0.909198	0.353392		0.012123	0.129679	1.324716
3534	20495	0.651729	0.076203	0.778546		0.024936	0.803398	0.283293		0.010556	0.117858	1.185249
3535	20496	0.624918	0.071947	0.673751		0.023597	0.777985	0.259429		0.010059	0.116627	1.163194
3536	20497	0.657956	0.074456	0.615576		0.024478	0.826686	0.256771		0.010512	0.126118	1.251752
3537	20498	0.690977	0.077841	0.519707		0.025242	0.876448	0.247161		0.010934	0.135741	1.337789
3538	20499	0.851042	0.094259	0.634754		0.030446	1.089158	0.307471		0.013327	0.171612	1.667982
3539	20500	0.876491	0.092997	0.620631		0.030445	1.133808	0.355536		0.013528	0.182052	1.738962
3540	20501	0.776676	0.078775	0.49378		0.02614	1.014867	0.363212		0.011795	0.164867	1.561773
3541	20502	0.676999	0.068128	0.377655		0.022595	0.891037	0.346155		0.010154	0.145283	1.370598
3542	20503	0.790582	0.080297	0.450057		0.026124	1.047715	0.435517		0.011724	0.170753	1.611459
3543	20504	0.849381	0.088491	0.545766		0.027742	1.134051	0.507706		0.012442	0.183948	1.760204
3544	20505	0.928947	0.103699	0.786073		0.030021	1.250686	0.592909		0.013418	0.200486	1.968126
3545	20506	0.902447	0.107118	0.901782		0.029241	1.223955	0.588431		0.012889	0.192755	1.94752
3546	20507	0.943214	0.115931	1.026251		0.030922	1.287134	0.608432		0.013379	0.200876	2.057192
3547	20508	0.862896	0.107532	0.967448		0.028614	1.184121	0.532217		0.012175	0.184065	1.88731
3548	20509	0.677209	0.083835	0.745762		0.022747	0.933707	0.384233		0.009534	0.143435	1.472947
3549	20510	0.690625	0.084998	0.762709		0.023374	0.954446	0.365128		0.009718	0.146101	1.491789
3550	20511	0.944211	0.113299	1.10337		0.032373	1.309411	0.422569		0.01333	0.20777	2.006772
3551	20512	0.877373	0.09997	1.035984		0.030453	1.220061	0.342102		0.012429	0.199672	1.833054
3552	20513	0.877883	0.092336	0.997845		0.030987	1.222923	0.334715		0.012594	0.205454	1.807064
3553	20514	0.878509	0.085992	0.909258		0.032809	1.224387	0.372946		0.012936	0.210227	1.859465
3554	20515	0.846769	0.0789	0.748917		0.033414	1.179386	0.387988		0.012784	0.206072	1.865026
3555	20516	0.679869	0.060865	0.499995		0.027922	0.945828	0.334518		0.010435	0.16702	1.531511
3556	20517	0.780428	0.066986	0.437536		0.033249	1.083763	0.413138		0.012148	0.192913	1.784442
3557	20518	0.88143	0.071311	0.349369		0.039268	1.21973	0.499287		0.013922	0.218541	2.029963
3558	20519	0.950164	0.081804	0.392305		0.044215	1.308798	0.571123		0.015174	0.235006	2.175298
3559	20520	0.88357	0.084444	0.530898		0.042815	1.210392	0.544715		0.014191	0.21687	1.986105
3560	20521	0.884759	0.091205	0.693883		0.044488	1.204129	0.540081		0.014195	0.214414	1.927536
3561	20522	0.872635	0.104943	0.811516		0.045424	1.178552	0.521125		0.013915	0.207739	1.817929
3562	20523	0.75378	0.10173	0.783639		0.04054	1.009677	0.425134		0.011893	0.175554	1.485529
3563	20524	0.699774	0.099185	0.756605		0.038333	0.93248	0.374794		0.01095	0.160527	1.328048
3564	20525	0.889635	0.1338	1.01532		0.050195	1.174261	0.440595		0.013623	0.198026	1.687633
3565	20526	0.891182	0.137385	1.063751		0.051687	1.164474	0.396051		0.013718	0.191529	1.706068
3566	20527	0.96125	0.146713	1.140384		0.057241	1.243004	0.363183		0.014993	0.198529	1.851623
3567	20528	0.89437	0.130745	1.00506		0.054576	1.144259	0.373635		0.014132	0.176739	1.725589
3568	20529	0.794214	0.108497	0.804196		0.049567	1.005106	0.353051		0.012689	0.149697	1.526033
3569	20530	0.693416	0.090572	0.623814		0.043988	0.870039	0.314207		0.011171	0.130852	1.323914
3570	20531	0.865508	0.106578	0.696764		0.055771	1.076638	0.41696		0.014042	0.164369	1.641302
3571	20532	0.900395	0.100694	0.640784		0.059123	1.107462	0.480829		0.014735	0.172996	1.705267
3572	20533	0.697104	0.069193	0.464005		0.046575	0.847714	0.400531		0.011507	0.135456	1.333921

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3573	20534	0.451544	0.041726	0.29357		0.030439	0.545686	0.26529		0.007485	0.088141	0.870965
3574	20535	0.685631	0.059397	0.434022		0.046549	0.82428	0.40684		0.011394	0.134202	1.329638
3575	20536	0.823123	0.061731	0.491514		0.056639	0.979155	0.492066		0.013744	0.161371	1.606479
3576	20537	0.824548	0.056961	0.441316		0.05751	0.970177	0.485109		0.013857	0.160825	1.619427
3577	20538	0.895652	0.062811	0.469169		0.063414	1.041913	0.513313		0.015104	0.17247	1.760392
3578	20539	0.827315	0.060456	0.556788		0.059402	0.950759	0.46203		0.013991	0.156035	1.616254
3579	20540	0.856285	0.067096	0.718491		0.062325	0.971277	0.454245		0.014606	0.156697	1.659555
3580	20541	0.830088	0.073045	0.813184		0.061237	0.927641	0.404352		0.014333	0.145369	1.589216
3581	20542	0.679784	0.066138	0.739772		0.050662	0.749165	0.297448		0.011898	0.113402	1.275182
3582	20543	0.679448	0.069965	0.771689		0.050905	0.742495	0.275355		0.011984	0.110615	1.253947
3583	20544	0.916657	0.104887	1.0957		0.069442	0.983213	0.307362		0.016384	0.141273	1.624774
3584	20545	0.918098	0.113465	1.10229		0.070254	0.965162	0.296721		0.01662	0.133415	1.559641
3585	20546	0.99002	0.128497	1.203647		0.076393	1.018432	0.329025		0.018183	0.137159	1.601232
3586	20547	0.920771	0.123504	1.159691		0.071555	0.925105	0.330494		0.017172	0.119481	1.416158
3587	20548	0.921972	0.126462	1.1611		0.072164	0.903335	0.373174		0.017444	0.11032	1.327026
3588	20549	0.923112	0.125924	1.117318		0.072701	0.881054	0.408102		0.017727	0.098688	1.219024
3589	20550	0.995049	0.131241	1.110699		0.078771	0.924453	0.459644		0.019415	0.091236	1.205464
3590	20551	0.925052	0.114593	0.918076		0.073552	0.835929	0.430093		0.018349	0.069919	1.006143
3591	20552	1.010017	0.11756	0.866886		0.080693	0.887459	0.450625		0.020339	0.061728	0.982512
3592	20553	1.124052	0.122306	0.748923		0.090271	0.955686	0.444316		0.023075	0.059708	0.930801
3593	20554	1.011366	0.10417	0.499553		0.081621	0.834607	0.32539		0.021132	0.048195	0.70962
3594	20555	1.011696	0.09975	0.314385		0.082131	0.811451	0.22751		0.021496	0.044039	0.621918
3595	20556	0.930961	0.103852	0.376596		0.038557	0.844698	0.144931		0.016932	0.043572	0.584146
3596	20557	1.057632	0.128177	0.641354		0.043111	0.994542	0.277286		0.018355	0.053131	0.772099
3597	20558	1.344524	0.176501	1.029328		0.054695	1.308988	0.499413		0.022112	0.081025	1.162717
3598	20559	0.651801	0.088959	0.554641		0.026563	0.649889	0.290137		0.010709	0.047448	0.623985
3599	20560	0.512036	0.071813	0.458164		0.020893	0.519535	0.253148		0.008406	0.042378	0.533092
3600	20561	0.678159	0.097157	0.622204		0.027701	0.697967	0.359654		0.011124	0.061898	0.750734
3601	20562	1.366537	0.201315	1.265052		0.055901	1.443922	0.808308		0.02236	0.146252	1.677396
3602	20563	0.856824	0.127517	0.844684		0.035088	0.930213	0.546438		0.013966	0.105087	1.162908
3603	20564	0.756826	0.11188	0.77535		0.030978	0.838572	0.49685		0.012282	0.100045	1.104133
3604	20565	0.75645	0.109541	0.871288		0.030911	0.854536	0.506017		0.012259	0.105299	1.159031
3605	20566	1.197904	0.167588	1.497745		0.048793	1.377939	0.79291		0.019623	0.172335	1.896283
3606	20567	0.669488	0.089315	0.882931		0.027125	0.783631	0.426258		0.01104	0.099607	1.088254
3607	20568	0.523443	0.066623	0.704335		0.021093	0.620457	0.316367		0.00866	0.08035	0.874851
3608	20569	0.582891	0.071002	0.788412		0.023368	0.697529	0.335659		0.009656	0.092094	0.993907
3609	20570	0.688561	0.082213	0.915294		0.027346	0.835248	0.360705		0.011406	0.113309	1.203147
3610	20571	1.115922	0.132465	1.414994		0.043847	1.369864	0.529166		0.018447	0.191626	1.984384
3611	20572	0.648288	0.076399	0.760939		0.025135	0.805166	0.288389		0.010655	0.115945	1.170142
3612	20573	0.621593	0.072263	0.656672		0.023767	0.779691	0.26437		0.010148	0.114781	1.141288
3613	20574	0.654435	0.074516	0.597423		0.024637	0.828496	0.262409		0.010599	0.12413	1.217279
3614	20575	0.687257	0.077721	0.514267		0.025382	0.878366	0.257124		0.011017	0.133651	1.302488
3615	20576	1.219644	0.135455	0.906047		0.04411	1.572309	0.457327		0.019337	0.24376	2.340449
3616	20577	0.871689	0.092697	0.615838		0.030581	1.136349	0.36285		0.013582	0.179763	1.694819
3617	20578	0.772395	0.079076	0.490822		0.026213	1.01719	0.365065		0.011826	0.162866	1.532683
3618	20579	0.673246	0.067171	0.37982		0.022379	0.893147	0.350591		0.010172	0.143501	1.358388
3619	20580	1.159	0.11698	0.666916		0.038182	1.547788	0.646355		0.017293	0.248359	2.366034
3620	20581	0.844599	0.088495	0.54981		0.027541	1.136999	0.506434		0.012412	0.1817	1.739319
3621	20582	0.92368	0.103348	0.790445		0.029749	1.254125	0.591588		0.013363	0.198045	1.931701
3622	20583	0.897279	0.10664	0.902672		0.02855	1.227516	0.587312		0.012824	0.190327	1.907593
3623	20584	1.310544	0.161202	1.430523		0.041979	1.803369	0.842752		0.018585	0.277829	2.814733
3624	20585	0.857867	0.106974	0.962661		0.027861	1.187681	0.527541		0.012086	0.182526	1.850421
3625	20586	0.673237	0.083392	0.740218		0.022163	0.936456	0.381118		0.009458	0.14223	1.443943
3626	20587	0.686555	0.084635	0.748035		0.022789	0.957237	0.362289		0.009645	0.144406	1.461564
3627	20588	1.311694	0.157709	1.517196		0.044168	1.834311	0.59935		0.018478	0.286974	2.741069
3628	20589	0.8721	0.099604	1.024399		0.029796	1.223383	0.365933		0.012319	0.197361	1.788778
3629	20590	0.872572	0.092037	0.990948		0.030246	1.226121	0.346723		0.012577	0.203114	1.758665
3630	20591	0.873146	0.086314	0.907154		0.032008	1.227536	0.38086		0.012916	0.207796	1.82119
3631	20592	1.215545	0.114592	1.078839		0.047251	1.7071	0.569513		0.018449	0.294191	2.6356
3632	20593	0.675659	0.061355	0.50006		0.027408	0.948199	0.340563		0.010409	0.16508	1.499544
3633	20594	0.775562	0.067643	0.441738		0.032758	1.086495	0.415453		0.012118	0.190704	1.747418
3634	20595	0.875881	0.072204	0.350399		0.038868	1.222875	0.500287		0.013903	0.216003	1.987403
3635	20596	1.319438	0.112612	0.547521		0.061321	1.833227	0.792332		0.021223	0.324612	2.973277
3636	20597	0.877913	0.083219	0.506316		0.042609	1.213673	0.540828		0.014183	0.214361	1.943936
3637	20598	0.879052	0.090276	0.669095		0.044433	1.207399	0.533913		0.014215	0.211986	1.886571
3638	20599	0.866948	0.103035	0.786344		0.045527	1.18171	0.505565		0.013966	0.20538	1.778631
3639	20600	1.126135	0.150814	1.146104		0.061231	1.52183	0.619555		0.018011	0.261082	2.183119
3640	20601	0.695182	0.097837	0.737895		0.038551	0.934757	0.363169		0.011017	0.158771	1.297861
3641	20602	0.883733	0.131886	0.989723		0.050627	1.17693	0.433312		0.013745	0.195977	1.625726
3642	20603	0.885206	0.13564	1.040017		0.052285	1.166939	0.389649		0.013475	0.189633	1.641675

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3643	20604	1.334302	0.202686	1.560842		0.081096	1.740347	0.499778		0.020567	0.274853	2.486522
3644	20605	0.8883	0.129546	0.9873		0.055461	1.14656	0.363874		0.013857	0.175288	1.660166
3645	20606	0.788779	0.10863	0.791451		0.050499	1.007128	0.345449		0.012441	0.148416	1.46983
3646	20607	0.68864	0.09079	0.614396		0.044902	0.871779	0.308526		0.010945	0.129861	1.276395
3647	20608	1.241491	0.154212	1.003862		0.082362	1.557992	0.592695		0.019874	0.235366	2.28662
3648	20609	0.894124	0.101339	0.636895		0.060584	1.109437	0.476275		0.014438	0.171799	1.657811
3649	20610	0.692216	0.06966	0.448499		0.047833	0.849	0.397691		0.011265	0.134545	1.307873
3650	20611	0.448374	0.041999	0.285404		0.031298	0.54643	0.263736		0.007325	0.087528	0.85391
3651	20612	1.064901	0.093332	0.660334		0.074938	1.290935	0.633122		0.01745	0.208314	2.037975
3652	20613	0.817286	0.062256	0.476634		0.058544	0.980047	0.492002		0.013468	0.160282	1.575979
3653	20614	0.818661	0.057045	0.428399		0.059724	0.970777	0.486383		0.013559	0.159695	1.577407
3654	20615	1.275298	0.089563	0.671246		0.094647	1.495005	0.728653		0.021215	0.245283	2.454955
3655	20616	0.821362	0.059752	0.549		0.061954	0.950915	0.457824		0.013716	0.154807	1.571265
3656	20617	0.8501	0.066155	0.705091		0.065094	0.971276	0.447968		0.014289	0.155403	1.611508
3657	20618	0.824074	0.071483	0.795498		0.064042	0.927474	0.397037		0.013971	0.144027	1.541075
3658	20619	1.063363	0.10196	1.119336		0.083624	1.180409	0.459498		0.01822	0.17683	1.944916
3659	20620	0.674522	0.068706	0.740694		0.053387	0.742298	0.270286		0.011634	0.108631	1.214163
3660	20621	0.909989	0.102799	1.049636		0.072903	0.982876	0.298636		0.015919	0.13822	1.589811
3661	20622	0.91142	0.110933	1.053387		0.073816	0.964819	0.290665		0.016179	0.132409	1.525077
3662	20623	1.373512	0.175412	1.679436		0.112303	1.423166	0.433913		0.024758	0.189857	2.211613
3663	20624	0.914096	0.122068	1.161044		0.075378	0.924866	0.314721		0.016726	0.11843	1.398964
3664	20625	0.915324	0.124923	1.16126		0.076034	0.903149	0.363241		0.017013	0.108202	1.298602
3665	20626	0.916489	0.124326	1.115439		0.076618	0.880877	0.397858		0.017308	0.096802	1.191196
3666	20627	1.380685	0.181431	1.544237		0.116053	1.291927	0.630454		0.026513	0.125506	1.638479
3667	20628	0.918522	0.115052	0.930544		0.077592	0.835817	0.42181		0.017921	0.069024	0.977583
3668	20629	1.002941	0.118434	0.876696		0.085096	0.887357	0.4415		0.019892	0.06013	0.956784
3669	20630	1.510132	0.167551	1.034961		0.128742	1.292869	0.588005		0.030548	0.078571	1.228692
3670	20631	1.004463	0.106421	0.512732		0.086046	0.834513	0.318055		0.020659	0.047009	0.694533
3671	20632	1.004858	0.10346	0.323616		0.086527	0.811211	0.222347		0.021009	0.043307	0.612811
3672	20633	0.846295	0.097422	0.331806		0.034889	0.771391	0.129412		0.015078	0.039271	0.534871
3673	20634	0.961358	0.120317	0.567844		0.039428	0.908629	0.247243		0.016364	0.047717	0.707599
3674	20635	0.880434	0.118415	0.657909		0.036191	0.862016	0.320272		0.014217	0.052365	0.771701
3675	20636	0.59235	0.082571	0.492455		0.024416	0.594085	0.25792		0.009552	0.042416	0.575253
3676	20637	0.465312	0.066254	0.407243		0.019211	0.474982	0.224903		0.007502	0.037911	0.485869
3677	20638	0.616252	0.089511	0.553605		0.025474	0.63817	0.319396		0.009932	0.055414	0.684324
3678	20639	0.900533	0.134182	0.818402		0.03731	0.957733	0.520819		0.014461	0.095378	1.101821
3679	2064	0.747889	0.109223	0.090926		0.080382	0.725745	0.097127		0.020248	0.035966	0.620715
3680	20640	0.778478	0.117026	0.753725		0.032314	0.850833	0.484865		0.012511	0.094344	1.051463
3681	20641	0.687579	0.102603	0.688269		0.028533	0.767136	0.446442		0.011231	0.089842	0.994103
3682	20642	0.687197	0.100457	0.774873		0.028466	0.781874	0.454004		0.011376	0.094556	1.043242
3683	20643	0.747827	0.10564	0.917474		0.030878	0.866749	0.488377		0.012473	0.106744	1.173719
3684	20644	0.608128	0.081894	0.786317		0.02499	0.717244	0.381137		0.010187	0.090195	0.983598
3685	20645	0.475453	0.061113	0.628763		0.019426	0.567955	0.283837		0.00799	0.072992	0.792867
3686	20646	0.529436	0.065121	0.703279		0.021514	0.638551	0.301665		0.008904	0.083227	0.901302
3687	20647	0.625383	0.075184	0.815444		0.025157	0.764673	0.323915		0.01051	0.101283	1.092055
3688	20648	0.673952	0.080499	0.837546		0.026807	0.834226	0.327921		0.01127	0.11385	1.19916
3689	20649	0.58876	0.069869	0.674836		0.023113	0.737192	0.271494		0.009774	0.103538	1.062743
3690	20650	0.564503	0.066222	0.580236		0.021838	0.713897	0.24474		0.009302	0.102502	1.029714
3691	20651	0.594309	0.06835	0.525329		0.022617	0.758603	0.244761		0.009703	0.110886	1.094152
3692	20652	0.624091	0.070665	0.462974		0.023271	0.804296	0.242654		0.010072	0.119782	1.161703
3693	20653	0.768617	0.085428	0.566674		0.028037	0.999544	0.298484		0.012234	0.151844	1.45144
3694	20654	0.791512	0.084169	0.555141		0.027999	1.040632	0.342236		0.012358	0.161182	1.531263
3695	20655	0.701321	0.072383	0.446138		0.023957	0.931596	0.337982		0.010741	0.146039	1.392761
3696	20656	0.611273	0.061197	0.347033		0.020284	0.818028	0.322514		0.009223	0.128724	1.23536
3697	20657	0.713787	0.071314	0.41645		0.023427	0.962006	0.403293		0.010602	0.151305	1.461652
3698	20658	0.766798	0.080653	0.509401		0.024944	1.041483	0.460754		0.011197	0.162973	1.583799
3699	20659	0.838559	0.093823	0.723386		0.026902	1.148891	0.536368		0.012034	0.17757	1.736847
3700	20660	0.814558	0.096734	0.822326		0.025765	1.124586	0.532866		0.011525	0.170683	1.707944
3701	20661	0.851281	0.104569	0.929769		0.026656	1.182802	0.548154		0.011917	0.179287	1.793358
3702	20662	0.7787	0.096917	0.871646		0.024723	1.088192	0.476317		0.010828	0.164407	1.646322
3703	20663	0.611082	0.075524	0.668528		0.019687	0.858018	0.343539		0.008471	0.128146	1.284813
3704	20664	0.623156	0.076769	0.666156		0.020252	0.877011	0.330149		0.008637	0.130036	1.300747
3705	20665	0.851882	0.102422	0.972005		0.028136	1.202969	0.412523		0.011808	0.18472	1.747358
3706	20666	0.791482	0.090424	0.920032		0.026579	1.120677	0.353491		0.011012	0.177512	1.590392
3707	20667	0.791874	0.083596	0.893567		0.02701	1.12312	0.333328		0.011295	0.18264	1.560006
3708	20668	0.792357	0.079133	0.82209		0.028487	1.12431	0.3533		0.011594	0.186884	1.619173
3709	20669	0.763654	0.072924	0.681966		0.029231	1.082889	0.366115		0.011437	0.1832	1.623806
3710	20670	0.613078	0.056456	0.459148		0.02456	0.868413	0.316587		0.009337	0.148482	1.333296
3711	20671	0.703705	0.062386	0.408584		0.029476	0.995061	0.383635		0.010882	0.1715	1.553312
3712	20672	0.79469	0.066785	0.324233		0.035142	1.119953	0.455788		0.012504	0.194285	1.766687

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3713	20673	0.856579	0.07249	0.355921		0.039786	1.201849	0.512724		0.013639	0.208933	1.892696
3714	20674	0.79645	0.074896	0.44935		0.038747	1.111604	0.488439		0.012777	0.19282	1.727574
3715	20675	0.797439	0.081522	0.584607		0.040564	1.105917	0.482042		0.012837	0.190667	1.67603
3716	20676	0.78641	0.092234	0.691712		0.041706	1.082371	0.450307		0.012647	0.1848	1.580039
3717	20677	0.679249	0.089897	0.673926		0.03738	0.927121	0.363414		0.010844	0.156258	1.2905
3718	20678	0.63055	0.087903	0.65358		0.035438	0.856114	0.324013		0.009997	0.14294	1.152725
3719	20679	0.801536	0.118604	0.875858		0.046684	1.077786	0.387139		0.012519	0.176484	1.421948
3720	20680	0.802821	0.121912	0.923306		0.048349	1.068526	0.348365		0.012306	0.170895	1.434956
3721	20681	0.865881	0.130644	0.994811		0.053781	1.140403	0.323919		0.013193	0.177414	1.556159
3722	20682	0.805561	0.116807	0.880435		0.05152	1.049758	0.323108		0.012406	0.158235	1.45094
3723	20683	0.715262	0.099039	0.706886		0.047034	0.922093	0.308002		0.011132	0.134108	1.285523
3724	20684	0.624422	0.082907	0.551371		0.041896	0.798141	0.275763		0.009787	0.117089	1.117821
3725	20685	0.779353	0.09786	0.631203		0.05329	0.98753	0.367663		0.012304	0.147207	1.393306
3726	20686	0.810697	0.092865	0.58149		0.056743	1.015452	0.428941		0.012908	0.155072	1.474755
3727	20687	0.627585	0.064017	0.404822		0.044899	0.776885	0.359036		0.010061	0.121493	1.164478
3728	20688	0.406491	0.038568	0.252112		0.029452	0.499928	0.238527		0.006539	0.079069	0.760833
3729	20689	0.617207	0.054951	0.373219		0.045221	0.754947	0.366796		0.009964	0.120396	1.16201
3730	20690	0.740926	0.057183	0.420005		0.055475	0.896279	0.447186		0.012039	0.144744	1.404448
3731	20691	0.742139	0.052084	0.377935		0.056686	0.887584	0.443222		0.0121	0.14417	1.405013
3732	20692	0.806098	0.056828	0.424565		0.062764	0.952766	0.462886		0.013214	0.154473	1.517108
3733	20693	0.74455	0.053773	0.498045		0.059041	0.869059	0.412106		0.012264	0.139601	1.389719
3734	20694	0.77058	0.059229	0.628198		0.062123	0.887514	0.40328		0.012745	0.140031	1.421574
3735	20695	0.74697	0.063663	0.706717		0.061194	0.847391	0.354872		0.012438	0.129752	1.35847
3736	20696	0.6117	0.05791	0.62827		0.050794	0.684218	0.260512		0.010282	0.101111	1.088407
3737	20697	0.611385	0.061394	0.647013		0.051149	0.678069	0.241207		0.010333	0.097812	1.077677
3738	20698	0.824827	0.091591	0.911048		0.069935	0.897814	0.269785		0.014102	0.123135	1.41255
3739	20699	0.826131	0.098656	0.943705		0.070861	0.881337	0.266699		0.014342	0.118988	1.362493
3740	20700	0.890873	0.114173	1.094155		0.077246	0.930046	0.274515		0.015694	0.122165	1.419229
3741	20701	0.828578	0.110461	1.054072		0.072555	0.844899	0.278826		0.014818	0.106283	1.252176
3742	20702	0.829722	0.112255	1.05256		0.073224	0.825091	0.322627		0.015083	0.097058	1.160894
3743	20703	0.830812	0.11176	1.009692		0.073809	0.804804	0.356058		0.015358	0.086846	1.066681
3744	20704	0.895657	0.116926	1.018053		0.080051	0.844508	0.40337		0.016819	0.08084	1.040969
3745	20705	0.832749	0.105343	0.855333		0.074848	0.763711	0.376611		0.015884	0.062471	0.86528
3746	20706	0.909338	0.108757	0.803732		0.082083	0.810885	0.39372		0.01764	0.054707	0.848809
3747	20707	1.012189	0.113689	0.714908		0.091797	0.873323	0.387208		0.019987	0.051099	0.808049
3748	20708	0.910876	0.099221	0.477123		0.082999	0.762641	0.283011		0.018258	0.041872	0.621179
3749	20709	0.911288	0.097838	0.30764		0.083437	0.741207	0.197863		0.018526	0.038857	0.552864
3750	20710	1.048712	0.123725	0.397385		0.044909	0.959998	0.157298		0.018239	0.048274	0.666573
3751	20711	1.191162	0.152722	0.68369		0.050454	1.131163	0.300212		0.019794	0.058441	0.882536
3752	20712	1.090796	0.149357	0.793563		0.045649	1.07348	0.38809		0.01737	0.063363	0.967665
3753	20713	0.73383	0.103843	0.595063		0.030635	0.739979	0.312393		0.011671	0.051248	0.721756
3754	20714	0.576421	0.083009	0.492663		0.024109	0.591707	0.272305		0.009156	0.045801	0.604572
3755	20715	0.763366	0.111872	0.670433		0.031976	0.795083	0.386628		0.01211	0.067018	0.848239
3756	20716	1.115438	0.167405	0.992837		0.046846	1.193452	0.630418		0.01794	0.115569	1.365
3757	20717	0.964188	0.145816	0.917369		0.040553	1.060422	0.590438		0.015816	0.114367	1.292313
3758	20718	0.851561	0.127776	0.832937		0.035804	0.956209	0.545766		0.014162	0.108963	1.208694
3759	20719	0.851037	0.125081	0.937831		0.035719	0.974686	0.55441		0.014304	0.114853	1.269265
3760	20720	0.926086	0.131547	1.111665		0.03874	1.080609	0.595753		0.015672	0.129879	1.429235
3761	20721	0.753053	0.101996	0.954399		0.031326	0.894265	0.46432		0.012789	0.110394	1.200818
3762	20722	0.588743	0.076103	0.763573		0.024347	0.708152	0.347542		0.010008	0.089411	0.96903
3763	20723	0.655572	0.081131	0.853511		0.026951	0.796191	0.369225		0.011141	0.10204	1.102641
3764	20724	0.774349	0.093533	0.988602		0.031507	0.953527	0.396294		0.013118	0.124427	1.338116
3765	20725	0.834465	0.100278	1.013871		0.033552	1.040318	0.412207		0.014055	0.138407	1.471114
3766	20726	0.728958	0.086971	0.814874		0.028896	0.919343	0.345024		0.012174	0.125911	1.304564
3767	20727	0.698908	0.082531	0.698333		0.027289	0.890302	0.312432		0.011562	0.124673	1.264313
3768	20728	0.735792	0.085339	0.629477		0.02824	0.946116	0.309642		0.01204	0.13491	1.343707
3769	20729	0.772638	0.087397	0.566561		0.029039	1.003227	0.308674		0.01247	0.146151	1.427173
3770	20730	0.951546	0.105605	0.693769		0.034952	1.246917	0.378257		0.015125	0.18535	1.783485
3771	20731	0.979854	0.104068	0.682025		0.034843	1.298234	0.434971		0.015247	0.196702	1.880924
3772	20732	0.868173	0.090124	0.551083		0.029787	1.162228	0.428408		0.013214	0.178207	1.710715
3773	20733	0.756678	0.076207	0.429661		0.025205	1.020619	0.402543		0.01132	0.15713	1.518165
3774	20734	0.883562	0.087478	0.533368		0.028906	1.200301	0.501841		0.012996	0.184746	1.79736
3775	20735	0.949149	0.100021	0.643594		0.030735	1.299395	0.570988		0.013701	0.198931	1.948601
3776	20736	1.037941	0.115965	0.903558		0.033174	1.433322	0.660626		0.014678	0.216675	2.135545
3777	20737	1.00819	0.11943	1.017768		0.031803	1.403099	0.656756		0.014021	0.208369	2.091366
3778	20738	1.053615	0.129023	1.147735		0.032862	1.475881	0.676284		0.014487	0.219675	2.196719
3779	20739	0.963742	0.119502	1.073465		0.029962	1.357766	0.588203		0.013146	0.201415	2.004763
3780	20740	0.756266	0.093098	0.82162		0.023903	1.070532	0.430445		0.010268	0.157044	1.558989
3781	20741	0.771187	0.094693	0.808017		0.024615	1.094274	0.422563		0.010456	0.159407	1.577034
3782	20742	1.054219	0.126423	1.183239		0.034241	1.501048	0.530263		0.014309	0.226355	2.12038

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3783	20743	0.979429	0.111664	1.123578		0.032371	1.398223	0.457041		0.013349	0.217462	1.929989
3784	20744	0.979875	0.103318	1.094882		0.032947	1.401154	0.431579		0.01369	0.223706	1.896931
3785	20745	0.980429	0.09874	1.011549		0.034609	1.402655	0.443529		0.014042	0.228913	1.960675
3786	20746	0.944885	0.091178	0.843685		0.035716	1.351008	0.464604		0.013866	0.224433	1.966813
3787	20747	0.758543	0.070697	0.571046		0.030121	1.083342	0.397764		0.011324	0.181893	1.614732
3788	20748	0.870645	0.078248	0.512251		0.036234	1.241228	0.480356		0.013207	0.210091	1.880825
3789	20749	0.983169	0.083976	0.405633		0.043326	1.397023	0.563736		0.01518	0.238013	2.139359
3790	20750	1.059701	0.08926	0.442573		0.049246	1.499246	0.630086		0.016594	0.255986	2.292213
3791	20751	0.985262	0.091995	0.553234		0.048112	1.386598	0.599889		0.015573	0.236233	2.091493
3792	20752	0.986444	0.100438	0.696919		0.050482	1.379488	0.591859		0.015673	0.233608	2.028402
3793	20753	0.972762	0.112663	0.830265		0.052024	1.350204	0.553067		0.01546	0.226476	1.912226
3794	20754	0.840175	0.109984	0.812114		0.046767	1.156591	0.437544		0.013293	0.191568	1.561797
3795	20755	0.779903	0.107634	0.789023		0.044402	1.067986	0.394146		0.012275	0.175268	1.394767
3796	20756	0.991354	0.145493	1.056713		0.058596	1.344425	0.471808		0.015412	0.216472	1.716664
3797	20757	0.992907	0.149575	1.116901		0.06081	1.332834	0.428287		0.015166	0.209726	1.715734
3798	20758	1.070852	0.160231	1.206013		0.06781	1.422441	0.398274		0.016155	0.217881	1.860808
3799	20759	0.996193	0.143395	1.06884		0.065083	1.309291	0.391226		0.015192	0.19445	1.736357
3800	20760	0.884499	0.122768	0.859157		0.059517	1.149987	0.373894		0.013614	0.164941	1.54631
3801	20761	0.772143	0.102925	0.679017		0.053094	0.995343	0.336869		0.011966	0.143639	1.348337
3802	20762	0.963697	0.121695	0.778565		0.067646	1.231408	0.448307		0.015034	0.180752	1.681946
3803	20763	1.002394	0.115652	0.728825		0.072146	1.266018	0.52578		0.015763	0.190486	1.787989
3804	20764	0.775963	0.079892	0.509403		0.057367	0.968384	0.440893		0.012288	0.149289	1.412929
3805	20765	0.502587	0.048146	0.307922		0.037713	0.623079	0.293279		0.007988	0.097177	0.923619
3806	20766	0.763109	0.068594	0.449897		0.057957	0.940815	0.451429		0.012166	0.147974	1.410884
3807	20767	0.916029	0.071429	0.505151		0.07119	1.116747	0.5519		0.014682	0.17784	1.705102
3808	20768	0.91751	0.064631	0.464123		0.07288	1.105709	0.547954		0.014781	0.177056	1.705441
3809	20769	0.996562	0.070209	0.522388		0.080819	1.186702	0.573561		0.016127	0.189628	1.83471
3810	20770	0.920438	0.066056	0.616904		0.076097	1.08233	0.504446		0.014957	0.171221	1.679129
3811	20771	0.952607	0.072222	0.76225		0.080179	1.105233	0.493621		0.015531	0.171637	1.712899
3812	20772	0.923399	0.07734	0.855521		0.079123	1.055098	0.434753		0.015182	0.159009	1.636378
3813	20773	0.75618	0.070635	0.759603		0.06574	0.851827	0.316871		0.012528	0.123915	1.319883
3814	20774	0.755779	0.074787	0.781842		0.066209	0.844132	0.293302		0.012577	0.119853	1.306452
3815	20775	1.019629	0.111327	1.082692		0.090629	1.117707	0.335508		0.0171	0.150101	1.710385
3816	20776	1.021238	0.121237	1.163707		0.091966	1.097122	0.331856		0.017349	0.144985	1.658676
3817	20777	1.101291	0.14077	1.348578		0.100349	1.157692	0.341982		0.018994	0.148833	1.726448
3818	20778	1.024298	0.136051	1.297324		0.094278	1.051815	0.338546		0.017944	0.129412	1.521885
3819	20779	1.025743	0.137469	1.293588		0.095231	1.027277	0.394123		0.018254	0.118157	1.419058
3820	20780	1.027123	0.136887	1.252192		0.096079	1.002072	0.434452		0.018569	0.106596	1.307965
3821	20781	1.107343	0.145285	1.268364		0.104274	1.05154	0.491679		0.020342	0.099576	1.26713
3822	20782	1.029606	0.13109	1.063592		0.097485	0.951093	0.458569		0.019212	0.077221	1.051842
3823	20783	1.124372	0.135679	1.003999		0.106966	1.009976	0.47892		0.0213	0.067777	1.028882
3824	20784	1.251629	0.142132	0.900699		0.119683	1.087838	0.470553		0.024104	0.061666	0.982386
3825	20785	1.126399	0.125399	0.599715		0.108165	0.949998	0.343704		0.021975	0.050924	0.761153
3826	20786	1.126984	0.125162	0.392923		0.108703	0.923154	0.240394		0.022212	0.04764	0.681999
3827	20787	1.069755	0.132977	0.374624		0.052216	0.987964	0.156895		0.017094	0.048592	0.683119
3828	20788	1.214817	0.161772	0.651684		0.058699	1.164791	0.292613		0.018961	0.059215	0.904087
3829	20789	1.112253	0.156488	0.760218		0.053112	1.10611	0.376596		0.017717	0.061942	0.997198
3830	20790	0.748181	0.108184	0.572709		0.035395	0.762784	0.303071		0.012103	0.049619	0.743994
3831	20791	0.587631	0.086179	0.475526		0.027584	0.610121	0.26411		0.009607	0.04436	0.623024
3832	20792	0.778147	0.115296	0.648405		0.036268	0.820008	0.374849		0.012833	0.065013	0.864298
3833	20793	1.13688	0.172032	0.963255		0.052174	1.231307	0.615313		0.019043	0.112481	1.382056
3834	20794	0.982609	0.149426	0.896512		0.044231	1.094341	0.583188		0.016694	0.111433	1.3002
3835	20795	0.867769	0.13076	0.81307		0.038379	0.986903	0.538002		0.014871	0.106351	1.210424
3836	20796	0.867253	0.127986	0.905137		0.037594	1.006011	0.545518		0.014956	0.112461	1.255785
3837	20797	0.943727	0.134658	1.076675		0.040462	1.115327	0.585188		0.016328	0.127631	1.425501
3838	20798	0.767403	0.104398	0.928733		0.032681	0.923006	0.459366		0.013275	0.10815	1.196116
3839	20799	0.599947	0.077916	0.742308		0.025368	0.730907	0.344081		0.010354	0.087815	0.950213
3840	20800	0.66803	0.083076	0.828803		0.02806	0.821795	0.365417		0.011492	0.100465	1.080812
3841	20801	0.789016	0.09581	0.957718		0.032746	0.984194	0.405536		0.013478	0.12297	1.315902
3842	20802	0.8502	0.102911	0.979027		0.034814	1.07385	0.429223		0.014389	0.136281	1.450521
3843	20803	0.742658	0.089259	0.783383		0.029939	0.949093	0.361885		0.012421	0.123379	1.289055
3844	20804	0.711981	0.084894	0.667475		0.028226	0.919263	0.330669		0.011752	0.122154	1.25092
3845	20805	0.749479	0.087984	0.596577		0.029166	0.977077	0.326791		0.01219	0.132319	1.330224
3846	20806	0.78691	0.08984	0.56313		0.029936	1.03626	0.32589		0.012571	0.143994	1.412578
3847	20807	0.968989	0.106825	0.690753		0.035951	1.288224	0.397487		0.015187	0.182772	1.76429
3848	20808	0.997747	0.10677	0.681796		0.03575	1.341579	0.457636		0.015236	0.193788	1.860252
3849	20809	0.883984	0.092457	0.552215		0.030496	1.201176	0.449099		0.013127	0.175475	1.691712
3850	20810	0.770425	0.078243	0.452177		0.025761	1.054765	0.418899		0.011195	0.154857	1.501266
3851	20811	0.899563	0.088713	0.567045		0.029244	1.240325	0.515876		0.012807	0.182209	1.778179
3852	20812	0.966303	0.101811	0.673412		0.031055	1.342592	0.576203		0.013454	0.196048	1.930553

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3853	20813	1.056644	0.117315	0.93101		0.033529	1.480797	0.660552		0.01433	0.213426	2.120968
3854	20814	1.026294	0.120553	1.034219		0.03217	1.449437	0.656903		0.013688	0.207687	2.068647
3855	20815	1.072459	0.130048	1.153622		0.033196	1.524572	0.677231		0.014183	0.218171	2.174211
3856	20816	0.980933	0.12024	1.07512		0.029985	1.402656	0.601018		0.01286	0.199713	1.986225
3857	20817	0.769713	0.093541	0.820219		0.023454	1.105996	0.453184		0.009987	0.155811	1.545306
3858	20818	0.784871	0.095169	0.804998		0.024198	1.130527	0.446559		0.010121	0.158649	1.562795
3859	20819	1.072845	0.127203	1.154986		0.033748	1.550776	0.566053		0.013737	0.225334	2.098129
3860	20820	0.996682	0.112471	1.103668		0.031979	1.44464	0.493486		0.012835	0.216261	1.911221
3861	20821	0.997072	0.105564	1.082362		0.032625	1.447724	0.468139		0.013078	0.222326	1.875743
3862	20822	0.997562	0.101895	1.006907		0.034085	1.449252	0.494238		0.013425	0.227569	1.899102
3863	20823	0.96132	0.094447	0.846964		0.035518	1.395804	0.501832		0.013277	0.223237	1.905165
3864	20824	0.771706	0.073464	0.578522		0.030157	1.119239	0.41833		0.010864	0.180866	1.564463
3865	20825	0.885706	0.081557	0.526063		0.036471	1.282293	0.493371		0.012688	0.208819	1.822567
3866	20826	1.000098	0.087858	0.417096		0.043878	1.443056	0.575862		0.014619	0.236654	2.072747
3867	20827	1.077854	0.090324	0.45297		0.050184	1.548442	0.62659		0.016038	0.254666	2.220054
3868	20828	1.002075	0.092486	0.553098		0.049319	1.432077	0.596382		0.015115	0.234906	2.025355
3869	20829	1.003203	0.101307	0.667521		0.051988	1.424793	0.588411		0.015258	0.232264	1.963835
3870	20830	0.989211	0.111781	0.791481		0.053808	1.394656	0.549878		0.015106	0.225351	1.850525
3871	20831	0.8543	0.109351	0.77952		0.048583	1.194787	0.433174		0.013046	0.19081	1.510624
3872	20832	0.792988	0.107119	0.759886		0.046249	1.103337	0.391153		0.012087	0.174602	1.348752
3873	20833	1.007915	0.145006	1.017472		0.061273	1.389045	0.469659		0.015245	0.215679	1.676323
3874	20834	1.009418	0.149494	1.079904		0.063807	1.377015	0.426101		0.015075	0.209176	1.664656
3875	20835	1.088552	0.160619	1.169963		0.071402	1.469419	0.396007		0.016142	0.217622	1.796104
3876	20836	1.012585	0.144568	1.039759		0.068783	1.352371	0.378883		0.015178	0.194357	1.678679
3877	20837	0.898992	0.124627	0.837433		0.063104	1.187608	0.363642		0.013567	0.165063	1.493798
3878	20838	0.784752	0.104724	0.677335		0.056425	1.027706	0.331034		0.011905	0.142963	1.302355
3879	20839	0.979357	0.124127	0.77875		0.072119	1.271186	0.440959		0.014953	0.180275	1.655135
3880	20840	1.018615	0.118369	0.749794		0.077535	1.306537	0.5216		0.015673	0.190114	1.75793
3881	20841	0.788474	0.082104	0.529157		0.061942	0.999072	0.438563		0.012203	0.149071	1.381044
3882	20842	0.51067	0.049597	0.321584		0.040785	0.64272	0.292105		0.007929	0.097102	0.900532
3883	20843	0.775344	0.070698	0.459531		0.062752	0.970355	0.450574		0.012073	0.147853	1.375701
3884	20844	0.930674	0.073678	0.506224		0.077295	1.151525	0.552819		0.014571	0.177425	1.662031
3885	20845	0.932136	0.065923	0.493573		0.079354	1.139941	0.549869		0.01466	0.176409	1.660681
3886	20846	1.012382	0.070735	0.535255		0.088184	1.22325	0.576889		0.015993	0.188777	1.78283
3887	20847	0.935019	0.065844	0.622951		0.083227	1.115486	0.500857		0.014827	0.170105	1.627688
3888	20848	0.967666	0.071017	0.76309		0.087919	1.138874	0.491955		0.015394	0.17025	1.653146
3889	20849	0.937965	0.076026	0.832763		0.086959	1.087018	0.445844		0.015025	0.157768	1.585664
3890	20850	0.768082	0.069746	0.734096		0.072355	0.877442	0.334597		0.012391	0.12303	1.28384
3891	20851	0.767679	0.073669	0.754885		0.072942	0.869434	0.314045		0.012434	0.118984	1.269587
3892	20852	1.035678	0.109089	1.044165		0.100076	1.150989	0.359277		0.016912	0.148342	1.658512
3893	20853	1.037314	0.121216	1.159539		0.10176	1.129715	0.337547		0.01707	0.141094	1.613819
3894	20854	1.118634	0.140806	1.341624		0.111175	1.192144	0.348265		0.01853	0.144806	1.67674
3895	20855	1.040471	0.135914	1.293826		0.104609	1.083225	0.335492		0.017495	0.125885	1.478043
3896	20856	1.041985	0.137932	1.30589		0.105845	1.058167	0.389518		0.01776	0.117482	1.415047
3897	20857	1.043458	0.137898	1.27223		0.106931	1.032474	0.428323		0.018032	0.106729	1.309258
3898	20858	1.125021	0.148265	1.285702		0.116138	1.083785	0.483662		0.019745	0.100146	1.258048
3899	20859	1.046135	0.134147	1.079191		0.108687	0.980531	0.450308		0.018637	0.077905	1.044814
3900	20860	1.142547	0.139558	1.042303		0.119359	1.041575	0.469569		0.020593	0.06833	1.006409
3901	20861	1.271993	0.147477	0.93221		0.1336	1.122195	0.460597		0.023229	0.06231	0.96728
3902	20862	1.144836	0.132374	0.632572		0.120789	0.980033	0.336209		0.021091	0.050261	0.763267
3903	20863	1.145532	0.134803	0.416133		0.121377	0.951968	0.235567		0.021163	0.048199	0.691797
3904	20864	0.812252	0.104318	0.267353		0.042985	0.75508	0.117395		0.013125	0.03669	0.517742
3905	20865	0.922292	0.12541	0.46907		0.048326	0.890591	0.214691		0.015056	0.044863	0.683384
3906	20866	1.181046	0.168725	0.768887		0.061269	1.183483	0.385316		0.019542	0.065549	1.052174
3907	20867	0.567994	0.082946	0.415662		0.029242	0.583601	0.221696		0.009492	0.036766	0.56069
3908	20868	0.446159	0.065962	0.34586		0.022816	0.466885	0.194633		0.007513	0.032872	0.469151
3909	20869	0.590871	0.087918	0.472297		0.030024	0.627579	0.27847		0.010011	0.048176	0.650332
3910	20870	1.199639	0.181995	0.97678		0.060094	1.309507	0.631599		0.02056	0.116323	1.445345
3911	20871	0.746312	0.113372	0.657836		0.03667	0.837743	0.430876		0.012907	0.082849	0.983489
3912	20872	0.65911	0.099179	0.596739		0.031793	0.755501	0.39707		0.011463	0.079227	0.91499
3913	20873	0.658694	0.097023	0.658787		0.031085	0.770094	0.402231		0.011493	0.083878	0.948518
3914	20874	1.052077	0.150046	1.155484		0.048405	1.253015	0.632554		0.018379	0.140106	1.56704
3915	20875	0.582777	0.079153	0.679075		0.026094	0.706462	0.340082		0.010142	0.080398	0.895714
3916	20876	0.455581	0.059099	0.542445		0.019963	0.559426	0.254703		0.007893	0.064829	0.711381
3917	20877	0.507264	0.063053	0.605214		0.021819	0.628972	0.270441		0.008745	0.074261	0.804055
3918	20878	0.599113	0.072824	0.69826		0.025183	0.75328	0.308668		0.010229	0.09105	0.971493
3919	20879	0.9799	0.118849	1.080816		0.040594	1.247465	0.496736		0.016544	0.153565	1.62696
3920	20880	0.563852	0.067963	0.568253		0.022957	0.726493	0.27734		0.009372	0.090958	0.954162
3921	20881	0.540528	0.064697	0.482305		0.021619	0.703738	0.254816		0.008845	0.090128	0.927543
3922	20882	0.568972	0.067154	0.428574		0.022313	0.748088	0.253567		0.009151	0.097915	0.98872

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3923	20883	0.597372	0.068677	0.418702		0.022873	0.793522	0.251017		0.009413	0.106532	1.050779
3924	20884	1.068969	0.11857	0.74593		0.03988	1.433485	0.443346		0.016485	0.197064	1.903023
3925	20885	0.757259	0.081217	0.507305		0.027236	1.027611	0.351083		0.011323	0.143342	1.377108
3926	20886	0.670768	0.070363	0.411392		0.02319	0.920106	0.343848		0.009723	0.129848	1.251853
3927	20887	0.584516	0.059567	0.349812		0.01956	0.807938	0.319314		0.008272	0.114554	1.110569
3928	20888	1.015048	0.100117	0.649679		0.032851	1.412815	0.58382		0.014038	0.201118	1.955631
3929	20889	0.732854	0.076964	0.516109		0.023458	1.02824	0.438348		0.009878	0.145033	1.429096
3930	20890	0.801311	0.088475	0.707023		0.025313	1.133941	0.499733		0.010711	0.157989	1.572227
3931	20891	0.778281	0.090675	0.780859		0.024256	1.109844	0.493459		0.010309	0.154839	1.530635
3932	20892	1.14561	0.137794	1.215758		0.035277	1.644002	0.721062		0.015035	0.229417	2.265223
3933	20893	0.743838	0.090205	0.802986		0.022627	1.074007	0.459017		0.009672	0.148375	1.470912
3934	20894	0.583644	0.070145	0.611488		0.017555	0.846873	0.347307		0.00752	0.115878	1.144901
3935	20895	0.59513	0.071258	0.599471		0.017914	0.865679	0.343024		0.007627	0.118151	1.157915
3936	20896	1.145885	0.13441	1.191902		0.03527	1.672367	0.616634		0.014561	0.236901	2.187976
3937	20897	0.755685	0.084308	0.812042		0.023761	1.106279	0.384133		0.009651	0.161074	1.416498
3938	20898	0.755941	0.080543	0.799507		0.024293	1.108677	0.370589		0.009725	0.16561	1.390426
3939	20899	0.756294	0.077911	0.74689		0.025314	1.109895	0.39205		0.0098	0.169442	1.386275
3940	20900	1.061743	0.105425	0.919262		0.03867	1.556978	0.576175		0.013924	0.242608	2.02515
3941	20901	0.585021	0.056417	0.433559		0.022625	0.857162	0.329156		0.007822	0.134681	1.142239
3942	20902	0.671409	0.062744	0.397312		0.027476	0.982012	0.385277		0.009153	0.155535	1.330845
3943	20903	0.758099	0.067765	0.321277		0.033207	1.10505	0.435185		0.010575	0.176205	1.51335
3944	20904	1.150872	0.097738	0.493727		0.053709	1.669835	0.662517		0.016394	0.267564	2.281526
3945	20905	0.759525	0.069618	0.414487		0.03759	1.096507	0.443423		0.010978	0.174899	1.478134
3946	20906	0.760334	0.076385	0.496597		0.039764	1.090929	0.436635		0.011116	0.173011	1.432966
3947	20907	0.749702	0.083254	0.571832		0.04128	1.067923	0.408058		0.011045	0.167849	1.349864
3948	20908	0.982777	0.123978	0.858436		0.056723	1.388627	0.487727		0.014535	0.216233	1.671155
3949	20909	0.600954	0.079865	0.552555		0.035618	0.844975	0.290499		0.008879	0.130163	0.983234
3950	20910	0.76377	0.108219	0.740075		0.04731	1.063875	0.348681		0.011227	0.160869	1.231954
3951	20911	0.764876	0.111656	0.787435		0.049384	1.054682	0.316194		0.01115	0.156049	1.220771
3952	20912	1.16186	0.169466	1.203722		0.078015	1.58501	0.413529		0.01704	0.229155	1.848851
3953	20913	0.767202	0.108906	0.760849		0.053452	1.035631	0.276443		0.011348	0.145165	1.225673
3954	20914	0.681092	0.094027	0.61576		0.049138	0.909304	0.265953		0.010148	0.123424	1.0894
3955	20915	0.594527	0.079088	0.503378		0.044068	0.786768	0.243673		0.008908	0.106439	0.95889
3956	20916	1.080895	0.136799	0.843849		0.082408	1.417467	0.475273		0.016275	0.19615	1.776383
3957	20917	0.771638	0.089746	0.567063		0.060932	0.999949	0.386789		0.011695	0.141788	1.297476
3958	20918	0.597264	0.062417	0.40227		0.048766	0.76452	0.325602		0.009107	0.111249	1.019567
3959	20919	0.38683	0.037761	0.245097		0.032143	0.491794	0.216955		0.005917	0.072463	0.663164
3960	20920	0.927958	0.085138	0.554241		0.07821	1.173067	0.529731		0.01423	0.174676	1.594912
3961	20921	0.704929	0.056413	0.389181		0.061068	0.881	0.411842		0.010864	0.13222	1.219432
3962	20922	0.706007	0.050605	0.38111		0.062776	0.872047	0.409911		0.010932	0.131323	1.217358
3963	20923	1.109	0.076876	0.592627		0.101066	1.353407	0.622113		0.017243	0.203524	1.887474
3964	20924	0.708152	0.049031	0.467067		0.066047	0.853212	0.374472		0.011053	0.126362	1.19163
3965	20925	0.732847	0.052489	0.570212		0.069847	0.871028	0.375761		0.011475	0.126443	1.208479
3966	20926	0.71035	0.056485	0.621244		0.069169	0.831242	0.342193		0.011185	0.11709	1.162366
3967	20927	0.925962	0.0826	0.862183		0.091746	1.068069	0.410843		0.014684	0.14584	1.495425
3968	20928	0.581386	0.054549	0.553755		0.058141	0.664759	0.243582		0.009258	0.088363	0.92881
3969	20929	0.784316	0.080553	0.775837		0.079852	0.879929	0.282307		0.012588	0.110172	1.211548
3970	20930	0.785561	0.09022	0.865926		0.081269	0.863607	0.254099		0.012703	0.102922	1.178796
3971	20931	1.193346	0.148049	1.413098		0.125252	1.283944	0.369234		0.019428	0.14896	1.722084
3972	20932	0.787972	0.10138	0.972568		0.083748	0.828219	0.249013		0.012914	0.092219	1.0983
3973	20933	0.789129	0.103789	0.980848		0.084807	0.809225	0.288586		0.013063	0.087267	1.053966
3974	20934	0.790273	0.10422	0.954482		0.08574	0.789748	0.316834		0.013268	0.079478	0.976188
3975	20935	1.200299	0.158292	1.355931		0.131309	1.168097	0.50309		0.020425	0.104972	1.319893
3976	20936	0.792388	0.101792	0.821299		0.08729	0.750382	0.332291		0.013658	0.058018	0.778849
3977	20937	0.865449	0.106265	0.792608		0.09591	0.797247	0.34622		0.015087	0.051327	0.743667
3978	20938	1.313098	0.154507	0.964007		0.146373	1.170701	0.462328		0.023142	0.06564	0.979409
3979	20939	0.867322	0.102645	0.487248		0.097134	0.750275	0.24771		0.015366	0.037971	0.574023
3980	20940	0.867891	0.105793	0.320083		0.097594	0.728575	0.173902		0.01538	0.036548	0.523429
3981	20941	0.806182	0.106789	0.246537		0.04724	0.754834	0.113677		0.013749	0.036304	0.511477
3982	20942	0.915634	0.126945	0.437088		0.053186	0.890693	0.204838		0.015624	0.044445	0.671878
3983	20943	0.838421	0.120929	0.51575		0.048207	0.846468	0.263241		0.014364	0.046224	0.734146
3984	20944	0.563995	0.082982	0.391332		0.032166	0.584018	0.214268		0.009708	0.035852	0.546135
3985	20945	0.442998	0.065842	0.326364		0.025084	0.467281	0.188391		0.007659	0.032042	0.456315
3986	20946	0.586647	0.08767	0.446427		0.032999	0.628166	0.269481		0.01018	0.047001	0.638668
3987	20947	0.857156	0.129636	0.677526		0.047486	0.94349	0.439904		0.014964	0.081599	1.024626
3988	20948	0.740815	0.112217	0.630676		0.040243	0.838606	0.413481		0.013	0.081168	0.97486
3989	20949	0.654234	0.098064	0.575541		0.034859	0.756237	0.380652		0.011504	0.0777	0.906577
3990	20950	0.653759	0.095929	0.625434		0.034067	0.770787	0.385306		0.011499	0.082392	0.93927
3991	20951	0.71134	0.100916	0.747822		0.036115	0.854414	0.414622		0.012473	0.093763	1.050444
3992	20952	0.578335	0.078265	0.64445		0.028503	0.706991	0.327013		0.010082	0.079104	0.875614

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3993	20953	0.452097	0.058458	0.514381		0.021701	0.559818	0.244815		0.007828	0.063497	0.697863
3994	20954	0.503366	0.062389	0.573457		0.023616	0.629415	0.261654		0.008657	0.072174	0.789433
3995	20955	0.594475	0.072257	0.660608		0.026846	0.753811	0.305494		0.010096	0.087946	0.955802
3996	20956	0.64052	0.07771	0.672449		0.028021	0.822533	0.325096		0.010711	0.097717	1.052772
3997	20957	0.559423	0.067547	0.534782		0.023638	0.727076	0.276312		0.009189	0.087439	0.937304
3998	20958	0.536268	0.064355	0.451958		0.021876	0.704359	0.255036		0.008649	0.086622	0.911649
3999	20959	0.564465	0.066863	0.399071		0.022312	0.74883	0.255333		0.008925	0.094451	0.970937
4000	20960	0.59261	0.068512	0.404196		0.022838	0.794408	0.254299		0.009152	0.102793	1.030966
4001	20961	0.729665	0.081387	0.495911		0.027355	0.987817	0.304542		0.010982	0.130484	1.284754
4002	20962	0.751119	0.080666	0.490065		0.027115	1.028983	0.349373		0.010921	0.138311	1.346852
4003	20963	0.665313	0.069901	0.397848		0.023037	0.921391	0.341474		0.009343	0.125219	1.214817
4004	20964	0.579727	0.059227	0.350817		0.019403	0.809058	0.315982		0.007927	0.110514	1.070293
4005	20965	0.676764	0.066757	0.437269		0.021866	0.951279	0.388484		0.009097	0.130056	1.266783
4006	20966	0.726751	0.075862	0.51387		0.023162	1.029517	0.435462		0.009694	0.13994	1.376344
4007	20967	0.794459	0.086971	0.697624		0.024959	1.135234	0.49411		0.010528	0.153244	1.515276
4008	20968	0.77138	0.088982	0.766324		0.023903	1.111022	0.48685		0.010145	0.150176	1.473316
4009	20969	0.8059	0.095717	0.844117		0.024672	1.168551	0.505887		0.010497	0.15787	1.547236
4010	20970	0.737065	0.088277	0.780037		0.022318	1.075116	0.455684		0.009503	0.144007	1.414823
4011	20971	0.578317	0.06857	0.59299		0.017286	0.84776	0.345736		0.007399	0.112551	1.101567
4012	20972	0.589683	0.069555	0.580813		0.017499	0.866579	0.342223		0.007512	0.114772	1.114317
4013	20973	0.806001	0.093005	0.805486		0.024211	1.188759	0.440456		0.010255	0.163135	1.49641
4014	20974	0.748718	0.082504	0.775549		0.023051	1.107449	0.387494		0.009564	0.156457	1.36635
4015	20975	0.748951	0.080285	0.766411		0.023593	1.109888	0.381468		0.009651	0.160769	1.342613
4016	20976	0.749267	0.077848	0.719002		0.024555	1.111152	0.402173		0.009773	0.16454	1.320775
4017	20977	0.721994	0.072487	0.610952		0.025906	1.070252	0.404971		0.009441	0.161421	1.318827
4018	20978	0.579539	0.056583	0.421605		0.022185	0.858203	0.335717		0.007606	0.130772	1.083179
4019	20979	0.665104	0.063058	0.389042		0.027053	0.983194	0.392047		0.008818	0.150968	1.261912
4020	20980	0.750942	0.068277	0.320488		0.032869	1.106331	0.441987		0.010103	0.171074	1.434871
4021	20981	0.809262	0.070149	0.352189		0.037871	1.186964	0.463129		0.010953	0.184087	1.536211
4022	20982	0.752283	0.068557	0.402829		0.037482	1.097653	0.430983		0.010311	0.169784	1.400725
4023	20983	0.753053	0.075245	0.479748		0.039779	1.092072	0.423251		0.010485	0.167905	1.35741
4024	20984	0.742476	0.081007	0.536263		0.041438	1.069104	0.394307		0.010451	0.163007	1.278424
4025	20985	0.641167	0.079256	0.532919		0.037593	0.916078	0.310292		0.009082	0.138144	1.043001
4026	20986	0.595112	0.077663	0.521647		0.035888	0.846067	0.280313		0.008436	0.12647	0.954205
4027	20987	0.756319	0.105278	0.699109		0.047785	1.065338	0.336162		0.0108	0.156357	1.197636
4028	20988	0.757363	0.108759	0.745743		0.050008	1.056166	0.30471		0.010924	0.151788	1.175544
4029	20989	0.816671	0.11716	0.811099		0.056188	1.126928	0.285218		0.011856	0.158091	1.247865
4030	20990	0.75959	0.106941	0.723214		0.054343	1.036921	0.261827		0.011078	0.141359	1.162443
4031	20991	0.6743	0.09243	0.589388		0.050145	0.910304	0.252456		0.00992	0.120248	1.031572
4032	20992	0.588564	0.077863	0.485895		0.045145	0.78754	0.233916		0.008704	0.103618	0.917773
4033	20993	0.73448	0.092573	0.566266		0.058034	0.973889	0.314038		0.010906	0.130906	1.168947
4034	20994	0.763842	0.088691	0.557366		0.062632	1.000696	0.372501		0.011395	0.137843	1.244149
4035	20995	0.591199	0.061859	0.397163		0.050209	0.765017	0.313878		0.008877	0.108128	0.977909
4036	20996	0.382883	0.037501	0.242596		0.033125	0.492089	0.209293		0.005767	0.070417	0.63611
4037	20997	0.581313	0.053623	0.348134		0.051056	0.74287	0.324375		0.008775	0.107173	0.967212
4038	20998	0.697713	0.056298	0.388235		0.063088	0.881421	0.39826		0.01058	0.128394	1.163313
4039	20999	0.698749	0.050684	0.381689		0.064929	0.872403	0.396644		0.010646	0.127385	1.160287
4040	21000	0.75887	0.0528	0.408234		0.072386	0.936013	0.41703		0.01161	0.136026	1.243273
4041	21001	0.70083	0.047595	0.458897		0.06852	0.853404	0.369786		0.010761	0.122324	1.135224
4042	21002	0.725256	0.050537	0.553621		0.072539	0.871118	0.372365		0.011174	0.122268	1.150933
4043	21003	0.702965	0.05523	0.602306		0.071919	0.83124	0.340778		0.010873	0.113254	1.106441
4044	21004	0.575637	0.050008	0.525345		0.059998	0.670834	0.258834		0.008972	0.088338	0.893841
4045	21005	0.575322	0.052663	0.537018		0.060577	0.664634	0.245057		0.009004	0.08544	0.882564
4046	21006	0.776146	0.077931	0.758254		0.083277	0.879692	0.287023		0.012242	0.106543	1.148961
4047	21007	0.777367	0.087397	0.845726		0.084851	0.863374	0.248782		0.012343	0.097394	1.117331
4048	21008	0.838334	0.101545	0.980048		0.092927	0.911201	0.256862		0.013413	0.099899	1.158908
4049	21009	0.779769	0.099124	0.948266		0.087654	0.828211	0.240442		0.012554	0.088398	1.058649
4050	21010	0.780935	0.101505	0.955325		0.088819	0.809401	0.27807		0.012641	0.08381	1.01653
4051	21011	0.782083	0.102718	0.928882		0.089885	0.790135	0.304824		0.012739	0.076432	0.94131
4052	21012	0.843306	0.110798	0.945694		0.097794	0.82981	0.343326		0.013899	0.071731	0.909462
4053	21013	0.784261	0.100765	0.810503		0.091667	0.751103	0.318982		0.013056	0.055555	0.755128
4054	21014	0.856615	0.105611	0.781566		0.100768	0.798163	0.332078		0.01443	0.051741	0.718351
4055	21015	0.953828	0.113427	0.701131		0.112924	0.860201	0.325347		0.016202	0.048685	0.697886
4056	21016	0.858615	0.104092	0.48627		0.10215	0.751202	0.237589		0.014638	0.03768	0.56452
4057	21017	0.859236	0.108477	0.318865		0.102648	0.729272	0.167255		0.014641	0.036303	0.517232
4058	21018	0.677171	0.092347	0.189859		0.043908	0.638667	0.092027		0.012098	0.03047	0.427264
4059	21019	0.768998	0.108486	0.340886		0.049409	0.753936	0.165224		0.013622	0.037331	0.557687
4060	21020	0.704016	0.102472	0.405632		0.044765	0.716713	0.214424		0.012437	0.03859	0.602564
4061	21021	0.473557	0.070066	0.309028		0.029849	0.494578	0.174352		0.008363	0.029435	0.446757
4062	21022	0.371931	0.055486	0.25837		0.02327	0.395753	0.153196		0.006574	0.026337	0.378063

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4063	21023	0.492515	0.073756	0.354062		0.030592	0.532031	0.21906		0.008713	0.038669	0.529728
4064	21024	0.719501	0.108386	0.552008		0.043996	0.799097	0.35738		0.012752	0.0673	0.856946
4065	21025	0.621838	0.093685	0.5134		0.037235	0.710199	0.333353		0.01102	0.067204	0.815601
4066	21026	0.549097	0.081815	0.468469		0.032246	0.640378	0.306589		0.009722	0.064467	0.758345
4067	21027	0.548678	0.079984	0.498326		0.03148	0.652643	0.310106		0.009679	0.068418	0.785177
4068	21028	0.596928	0.084118	0.59597		0.033358	0.723406	0.335015		0.010471	0.077873	0.877033
4069	21029	0.485316	0.065277	0.513281		0.02631	0.598543	0.26403		0.008433	0.06568	0.729681
4070	21030	0.37936	0.048787	0.409335		0.020034	0.473931	0.19752		0.006532	0.052695	0.580611
4071	21031	0.422367	0.052102	0.455971		0.021799	0.532841	0.213906		0.007209	0.059849	0.655849
4072	21032	0.498786	0.060504	0.524435		0.024777	0.638173	0.254168		0.008378	0.072748	0.792112
4073	21033	0.537377	0.065091	0.532661		0.025624	0.696379	0.271248		0.008862	0.08036	0.870856
4074	21034	0.469335	0.056674	0.422211		0.021435	0.615576	0.231279		0.007578	0.071651	0.773892
4075	21035	0.449887	0.054025	0.355204		0.019848	0.596358	0.214249		0.007112	0.070363	0.751629
4076	21036	0.473523	0.056192	0.311506		0.020119	0.634046	0.216094		0.007316	0.076832	0.799785
4077	21037	0.497105	0.057676	0.327325		0.020195	0.672716	0.216916		0.007474	0.083577	0.848916
4078	21038	0.612022	0.068599	0.401778		0.023684	0.836589	0.25788		0.008937	0.106038	1.05763
4079	21039	0.630019	0.067662	0.397279		0.022819	0.871481	0.29139		0.008851	0.112468	1.107589
4080	21040	0.557996	0.058667	0.324528		0.019359	0.780372	0.284244		0.007537	0.101859	0.997971
4081	21041	0.486195	0.04974	0.29557		0.016279	0.685268	0.263856		0.006506	0.089851	0.878836
4082	21042	0.567529	0.056733	0.366432		0.018321	0.805746	0.323316		0.007553	0.105692	1.033093
4083	21043	0.609459	0.063045	0.429545		0.019306	0.871943	0.362854		0.008062	0.113874	1.114873
4084	21044	0.666167	0.07211	0.578102		0.020822	0.96139	0.4105		0.008746	0.125436	1.227385
4085	21045	0.646798	0.073641	0.631801		0.019927	0.940884	0.404187		0.008428	0.122434	1.194582
4086	21046	0.675611	0.079084	0.693579		0.020573	0.989636	0.42203		0.008725	0.128722	1.249244
4087	21047	0.617728	0.072874	0.637089		0.018575	0.910447	0.380634		0.007905	0.117911	1.142424
4088	21048	0.484535	0.05657	0.483527		0.014401	0.717878	0.289321		0.006155	0.092137	0.88955
4089	21049	0.494049	0.05724	0.473236		0.014573	0.733819	0.286826		0.006288	0.09399	0.90187
4090	21050	0.675249	0.076515	0.643525		0.019793	1.006647	0.3711		0.008638	0.13351	1.215274
4091	21051	0.627252	0.069387	0.621768		0.018855	0.937697	0.327151		0.008045	0.128054	1.109445
4092	21052	0.627431	0.067655	0.616587		0.019366	0.939719	0.327996		0.008118	0.131583	1.090487
4093	21053	0.627668	0.065747	0.580816		0.020102	0.940856	0.34486		0.008172	0.134628	1.075635
4094	21054	0.604787	0.061357	0.495988		0.021385	0.906327	0.346273		0.00793	0.132025	1.049587
4095	21055	0.48545	0.047973	0.343837		0.0184	0.726758	0.286429		0.006392	0.106981	0.862053
4096	21056	0.55711	0.053555	0.319302		0.022542	0.832594	0.333873		0.007391	0.12353	1.004178
4097	21057	0.62898	0.058131	0.267617		0.027507	0.936893	0.375982		0.008428	0.139933	1.141746
4098	21058	0.677783	0.059884	0.295463		0.03185	1.005196	0.39386		0.009155	0.150497	1.222227
4099	21059	0.630044	0.057181	0.32817		0.03163	0.929494	0.351696		0.008576	0.138844	1.113836
4100	21060	0.630661	0.062679	0.388975		0.033695	0.924748	0.345417		0.008673	0.137347	1.078859
4101	21061	0.621768	0.066586	0.431453		0.035188	0.905379	0.321992		0.008637	0.133351	1.015861
4102	21062	0.536889	0.065013	0.421383		0.032024	0.775893	0.253617		0.007509	0.113028	0.848224
4103	21063	0.498314	0.063705	0.413327		0.030612	0.716633	0.227131		0.007	0.103525	0.784024
4104	21064	0.633273	0.08641	0.554661		0.040867	0.902423	0.27214		0.008958	0.128102	0.983215
4105	21065	0.634112	0.089308	0.593157		0.042849	0.894719	0.247074		0.00905	0.124403	0.962974
4106	21066	0.683712	0.096271	0.646357		0.048258	0.954684	0.233271		0.009807	0.129595	1.011651
4107	21067	0.635903	0.088511	0.58046		0.046811	0.878338	0.208073		0.009176	0.115985	0.925231
4108	21068	0.564471	0.076603	0.475882		0.043418	0.770987	0.201104		0.008189	0.098791	0.842451
4109	21069	0.492677	0.064613	0.393756		0.039138	0.666961	0.188501		0.007181	0.085174	0.751519
4110	21070	0.61478	0.076943	0.468486		0.050388	0.824726	0.253518		0.008992	0.10764	0.955479
4111	21071	0.639335	0.073894	0.462961		0.05447	0.84736	0.300965		0.009398	0.113388	1.011891
4112	21072	0.494808	0.051699	0.331413		0.043749	0.647749	0.253797		0.007309	0.088519	0.7905
4113	21073	0.320446	0.031405	0.203081		0.028886	0.416637	0.16943		0.004748	0.057605	0.512766
4114	21074	0.486502	0.044986	0.292164		0.044552	0.62894	0.263092		0.007224	0.087643	0.779546
4115	21075	0.583898	0.047416	0.32469		0.055124	0.74618	0.323097		0.008709	0.104974	0.933004
4116	21076	0.584747	0.042834	0.320353		0.056825	0.738451	0.322047		0.00876	0.104055	0.929924
4117	21077	0.635021	0.044562	0.341255		0.063419	0.792184	0.339072		0.009553	0.110945	0.99579
4118	21078	0.586446	0.040202	0.381898		0.060103	0.722192	0.306696		0.008856	0.099734	0.910354
4119	21079	0.606871	0.042468	0.453157		0.063724	0.737112	0.309645		0.009193	0.099677	0.92339
4120	21080	0.588201	0.046308	0.490539		0.063254	0.703271	0.2847		0.008941	0.092269	0.88347
4121	21081	0.481641	0.040811	0.427821		0.052819	0.567497	0.217415		0.007374	0.071937	0.713055
4122	21082	0.481378	0.042906	0.437426		0.05335	0.562233	0.206575		0.007401	0.069591	0.703556
4123	21083	0.649408	0.063938	0.62136		0.073462	0.744148	0.24415		0.010058	0.086846	0.914351
4124	21084	0.650426	0.071191	0.692724		0.074919	0.730351	0.20489		0.010148	0.080039	0.888745
4125	21085	0.70142	0.082894	0.802428		0.082152	0.770874	0.211666		0.011013	0.079523	0.933547
4126	21086	0.652439	0.081474	0.775477		0.077544	0.700851	0.195209		0.010314	0.070663	0.852808
4127	21087	0.653431	0.083514	0.780342		0.078689	0.685144	0.225267		0.010379	0.067023	0.817907
4128	21088	0.654408	0.085358	0.761591		0.079687	0.66901	0.246584		0.010446	0.061103	0.756031
4129	21089	0.705654	0.092224	0.783092		0.086787	0.702745	0.277444		0.011308	0.057219	0.741026
4130	21090	0.65628	0.084157	0.670393		0.081401	0.636232	0.257518		0.010573	0.045896	0.61434
4131	21091	0.716879	0.088597	0.645923		0.08956	0.676187	0.267909		0.011652	0.04413	0.587684
4132	21092	0.798289	0.09616	0.586834		0.100413	0.728784	0.262465		0.013084	0.041461	0.575312

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4133	21093	0.71866	0.089259	0.406299		0.090876	0.636412	0.191844		0.011963	0.031662	0.469818
4134	21094	0.719252	0.094058	0.265862		0.091334	0.617694	0.135558		0.012131	0.030563	0.433144
4135	21095	0.734702	0.102167	0.192401		0.051	0.696791	0.09666		0.013462	0.033085	0.462508
4136	21096	0.834213	0.119062	0.348983		0.057417	0.822775	0.173515		0.015095	0.040531	0.600791
4137	21097	0.763685	0.111818	0.418215		0.052011	0.782276	0.226664		0.013715	0.041725	0.643523
4138	21098	0.51364	0.076244	0.31959		0.034667	0.539853	0.184161		0.009198	0.031119	0.478142
4139	21099	0.403396	0.060278	0.267691		0.027009	0.431988	0.161732		0.007214	0.027899	0.406243
4140	21100	0.534145	0.080036	0.367307		0.035507	0.58074	0.231176		0.009546	0.041031	0.568818
4141	21101	0.780322	0.117136	0.583276		0.051027	0.872205	0.376889		0.013919	0.071649	0.92241
4142	21102	0.674307	0.101101	0.542264		0.043162	0.775092	0.351372		0.011997	0.071759	0.878545
4143	21103	0.59543	0.088231	0.494997		0.037337	0.698831	0.321818		0.010554	0.068941	0.816861
4144	21104	0.59492	0.086226	0.518729		0.036451	0.712167	0.325304		0.010488	0.073215	0.845197
4145	21105	0.647252	0.090687	0.620419		0.038608	0.78935	0.352264		0.011314	0.083337	0.94296
4146	21106	0.526179	0.070392	0.534141		0.030439	0.653088	0.277429		0.009096	0.070256	0.783339
4147	21107	0.411297	0.052634	0.425745		0.023168	0.517116	0.208667		0.007031	0.056329	0.622506
4148	21108	0.457913	0.056231	0.473982		0.025206	0.581395	0.229026		0.00775	0.063935	0.702421
4149	21109	0.540741	0.065411	0.544514		0.028654	0.696331	0.272749		0.008986	0.077603	0.846591
4150	21110	0.582581	0.070383	0.552166		0.029643	0.75985	0.291579		0.009484	0.085605	0.929252
4151	21111	0.508779	0.061362	0.436632		0.024746	0.671683	0.249098		0.008091	0.076217	0.824806
4152	21112	0.487685	0.058515	0.366151		0.022692	0.650715	0.231237		0.007575	0.074522	0.799917
4153	21113	0.513291	0.060907	0.321298		0.023009	0.691845	0.234476		0.007778	0.08136	0.8489
4154	21114	0.538832	0.062589	0.344322		0.023105	0.734058	0.236073		0.007925	0.088498	0.900963
4155	21115	0.663407	0.074568	0.422791		0.027115	0.912901	0.279519		0.009456	0.112285	1.122776
4156	21116	0.682849	0.073467	0.418344		0.026101	0.950998	0.312649		0.009331	0.119099	1.176323
4157	21117	0.604778	0.063575	0.350769		0.021459	0.8516	0.306023		0.00807	0.107878	1.060057
4158	21118	0.526929	0.053932	0.319132		0.017657	0.747835	0.28385		0.007	0.095164	0.933288
4159	21119	0.615092	0.062018	0.394328		0.019844	0.879335	0.347572		0.008132	0.111947	1.096516
4160	21120	0.660474	0.068341	0.462166		0.020853	0.951579	0.38906		0.008678	0.120989	1.180839
4161	21121	0.721928	0.077406	0.618527		0.022469	1.049192	0.439979		0.009419	0.133301	1.29259
4162	21122	0.70087	0.078976	0.673617		0.021524	1.026825	0.433389		0.009071	0.130243	1.258051
4163	21123	0.732123	0.084741	0.737758		0.022188	1.080039	0.454016		0.009396	0.137228	1.314947
4164	21124	0.669321	0.078032	0.675219		0.020043	0.993588	0.409894		0.008515	0.125738	1.202806
4165	21125	0.524978	0.060545	0.511932		0.015527	0.783399	0.311804		0.006676	0.098249	0.94198
4166	21126	0.535164	0.061304	0.500771		0.015722	0.800772	0.309225		0.006829	0.099988	0.955876
4167	21127	0.731307	0.082733	0.671303		0.021219	1.098425	0.400842		0.00937	0.142004	1.287347
4168	21128	0.679292	0.075348	0.65014		0.02009	1.023107	0.353586		0.008761	0.13617	1.173919
4169	21129	0.679471	0.073557	0.646229		0.020634	1.025265	0.358939		0.008795	0.1399	1.155805
4170	21130	0.679715	0.07158	0.610302		0.021426	1.026522	0.376653		0.00886	0.14313	1.146046
4171	21131	0.654936	0.0669	0.522771		0.022913	0.988899	0.377161		0.00859	0.140358	1.101561
4172	21132	0.525681	0.052368	0.363494		0.019795	0.792994	0.311677		0.00694	0.113726	0.896159
4173	21133	0.603262	0.058527	0.338973		0.024316	0.9085	0.363057		0.008005	0.131308	1.043918
4174	21134	0.681067	0.063624	0.287197		0.029796	1.022341	0.408625		0.009104	0.148726	1.186815
4175	21135	0.733908	0.065652	0.317701		0.034593	1.096897	0.427969		0.009895	0.15994	1.270208
4176	21136	0.682175	0.062132	0.346507		0.034462	1.014284	0.376919		0.009281	0.147542	1.157208
4177	21137	0.682818	0.067608	0.409702		0.036777	1.009118	0.365709		0.009362	0.145957	1.120523
4178	21138	0.673166	0.071721	0.454646		0.03851	0.988034	0.341027		0.009296	0.141744	1.054794
4179	21139	0.581263	0.06935	0.436321		0.035105	0.846793	0.268755		0.00809	0.120185	0.898091
4180	21140	0.539476	0.067929	0.428604		0.033599	0.782154	0.239232		0.007539	0.110103	0.830528
4181	21141	0.685552	0.092124	0.575993		0.04491	0.985002	0.286508		0.009652	0.136292	1.041716
4182	21142	0.686433	0.095237	0.616984		0.047179	0.976648	0.261852		0.00971	0.132408	1.01918
4183	21143	0.740116	0.10272	0.674404		0.053205	1.042127	0.247213		0.010537	0.137994	1.068286
4184	21144	0.688313	0.094876	0.607533		0.051833	0.958767	0.216113		0.009845	0.123554	0.975186
4185	21145	0.610972	0.082179	0.500751		0.048123	0.841556	0.209277		0.008783	0.105366	0.893662
4186	21146	0.533247	0.06938	0.414681		0.043435	0.727992	0.197733		0.007689	0.090876	0.797316
4187	21147	0.665401	0.082715	0.499822		0.05597	0.900178	0.267479		0.009631	0.114872	1.013685
4188	21148	0.691929	0.079573	0.495262		0.060577	0.924862	0.31608		0.010059	0.120991	1.073277
4189	21149	0.535495	0.055795	0.35557		0.048698	0.706969	0.266684		0.007821	0.094294	0.83819
4190	21150	0.346792	0.033941	0.218276		0.032178	0.454715	0.178399		0.005078	0.061223	0.543072
4191	21151	0.526499	0.048681	0.314537		0.049655	0.686397	0.277049		0.007726	0.093142	0.822605
4192	21152	0.631869	0.051461	0.349093		0.061493	0.81428	0.340378		0.009313	0.111521	0.979077
4193	21153	0.632767	0.046613	0.345185		0.063442	0.805762	0.339516		0.009367	0.110496	0.97317
4194	21154	0.687169	0.04843	0.367082		0.070876	0.864294	0.357826		0.010214	0.117754	1.041834
4195	21155	0.63457	0.043723	0.409648		0.067215	0.787851	0.32823		0.009469	0.105812	0.95382
4196	21156	0.65666	0.046102	0.485528		0.071312	0.80406	0.332005		0.009831	0.105729	0.968267
4197	21157	0.636445	0.049982	0.520326		0.07087	0.76709	0.306089		0.009556	0.097862	0.923256
4198	21158	0.521149	0.043885	0.452244		0.05922	0.618966	0.234484		0.007881	0.076302	0.742467
4199	21159	0.52085	0.045586	0.462464		0.059837	0.613216	0.22328		0.007908	0.073811	0.732298
4200	21160	0.702647	0.068266	0.659066		0.082428	0.811631	0.265389		0.010753	0.092107	0.950911
4201	21161	0.703743	0.075401	0.73451		0.084172	0.796622	0.22446		0.010836	0.085717	0.923843
4202	21162	0.758934	0.08827	0.850479		0.092349	0.840915	0.225347		0.01177	0.085237	0.976205

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4203	21163	0.705919	0.086791	0.821447		0.08724	0.764669	0.206024		0.011012	0.073323	0.89087
4204	21164	0.707003	0.08937	0.82609		0.08856	0.747687	0.237425		0.011089	0.069509	0.853111
4205	21165	0.708076	0.091782	0.813464		0.089782	0.730216	0.259632		0.01115	0.063292	0.786719
4206	21166	0.763549	0.099319	0.835937		0.097831	0.767144	0.291912		0.01209	0.060115	0.782775
4207	21167	0.710136	0.090844	0.715206		0.09181	0.694608	0.270807		0.011288	0.050166	0.648151
4208	21168	0.77574	0.095948	0.688737		0.101051	0.738271	0.281663		0.012588	0.048275	0.627004
4209	21169	0.863895	0.10513	0.630529		0.113379	0.795704	0.275987		0.014426	0.045308	0.618088
4210	21170	0.777755	0.098296	0.436125		0.102618	0.694822	0.201938		0.013284	0.034399	0.506768
4211	21171	0.778443	0.104313	0.285041		0.103142	0.674302	0.143166		0.01352	0.033244	0.468913
4212	21172	0.909321	0.130525	0.21684		0.070558	0.871283	0.112067		0.01714	0.041076	0.574173
4213	21173	1.032312	0.150111	0.388478		0.079457	1.029187	0.201383		0.019137	0.050344	0.738631
4214	21174	0.944851	0.139693	0.470298		0.071957	0.978677	0.265703		0.017293	0.051457	0.780688
4215	21175	0.635449	0.094737	0.361332		0.047933	0.6754	0.215618		0.011545	0.037374	0.581132
4216	21176	0.499009	0.074651	0.303623		0.03733	0.54043	0.1892		0.009028	0.032268	0.493115
4217	21177	0.660713	0.098948	0.420413		0.049038	0.726473	0.2702		0.011917	0.047704	0.689584
4218	21178	0.965064	0.143904	0.68347		0.070403	1.090878	0.439824		0.017295	0.083994	1.109758
4219	21179	0.833927	0.123788	0.635174		0.059471	0.969195	0.410817		0.014821	0.084638	1.059471
4220	21180	0.736282	0.107839	0.580107		0.051411	0.873689	0.374746		0.012995	0.081556	0.985426
4221	21181	0.735626	0.10538	0.59335		0.050123	0.890262	0.378961		0.012865	0.086758	1.017899
4222	21182	0.800233	0.110874	0.709656		0.053053	0.986693	0.410071		0.013831	0.098791	1.132704
4223	21183	0.650535	0.086087	0.610598		0.041806	0.816362	0.322449		0.011071	0.083276	0.938781
4224	21184	0.50847	0.064379	0.486282		0.031808	0.646393	0.245518		0.008535	0.066716	0.744583
4225	21185	0.566079	0.068844	0.540868		0.034599	0.726755	0.274999		0.009384	0.075638	0.838532
4226	21186	0.668445	0.080267	0.620123		0.039319	0.870431	0.328298		0.010849	0.091637	1.007262
4227	21187	0.720096	0.086497	0.627048		0.040675	0.949823	0.351784		0.011399	0.100835	1.102727
4228	21188	0.628861	0.075496	0.493784		0.033976	0.839595	0.301359		0.009681	0.089565	0.977498
4229	21189	0.60276	0.072036	0.411735		0.031129	0.813345	0.28053		0.009037	0.088205	0.947685
4230	21190	0.634376	0.075052	0.373141		0.031194	0.864725	0.2866		0.009242	0.096275	1.005593
4231	21191	0.665917	0.0773	0.399972		0.03118	0.917448	0.289372		0.009384	0.104816	1.061677
4232	21192	0.819795	0.092429	0.491447		0.036607	1.140958	0.340522		0.011138	0.133086	1.31476
4233	21193	0.843806	0.091445	0.487095		0.035284	1.188603	0.375172		0.01128	0.141071	1.381775
4234	21194	0.747266	0.078435	0.425659		0.029054	1.064429	0.367239		0.009927	0.127727	1.247878
4235	21195	0.651055	0.066633	0.386416		0.023803	0.934785	0.340432		0.008607	0.112822	1.09855
4236	21196	0.759915	0.077636	0.475238		0.025987	1.099227	0.416943		0.009985	0.132812	1.28904
4237	21197	0.815982	0.085409	0.558307		0.02568	1.189632	0.46673		0.010647	0.144026	1.385081
4238	21198	0.891809	0.095431	0.740886		0.027598	1.311776	0.528257		0.01155	0.158661	1.508532
4239	21199	0.865768	0.09633	0.802145		0.026413	1.283874	0.523098		0.011131	0.156382	1.46425
4240	21200	0.904257	0.102558	0.875056		0.027232	1.350415	0.549109		0.011522	0.164952	1.529648
4241	21201	0.826692	0.094781	0.796837		0.024559	1.242282	0.496797		0.010544	0.151068	1.401175
4242	21202	0.648347	0.074532	0.603216		0.019031	0.979386	0.378153		0.008285	0.11794	1.099378
4243	21203	0.660919	0.07579	0.589505		0.019258	1.001019	0.374757		0.008448	0.119642	1.116749
4244	21204	0.9029	0.102403	0.771023		0.025988	1.372843	0.486002		0.011638	0.169427	1.507106
4245	21205	0.838343	0.093399	0.749546		0.024032	1.278486	0.428514		0.010879	0.162295	1.377945
4246	21206	0.838387	0.091336	0.747789		0.024784	1.281034	0.444384		0.010906	0.166602	1.359794
4247	21207	0.838663	0.089065	0.708868		0.02583	1.282565	0.464618		0.010914	0.170521	1.34973
4248	21208	0.808039	0.083434	0.609892		0.027775	1.235621	0.462196		0.010629	0.1673	1.297298
4249	21209	0.648558	0.065433	0.426073		0.02414	0.990915	0.381676		0.008598	0.135478	1.039735
4250	21210	0.744247	0.07326	0.399978		0.029841	1.135342	0.44457		0.009882	0.156292	1.189493
4251	21211	0.840194	0.079818	0.344337		0.036788	1.277727	0.500045		0.011168	0.17708	1.351979
4252	21212	0.905314	0.082565	0.382053		0.042949	1.370992	0.523465		0.012168	0.190534	1.446179
4253	21213	0.84147	0.076812	0.404824		0.042963	1.267814	0.46167		0.011436	0.175624	1.317018
4254	21214	0.842206	0.082852	0.477903		0.04606	1.261444	0.430687		0.011473	0.173656	1.274689
4255	21215	0.830251	0.0876	0.530065		0.048386	1.235202	0.401771		0.011343	0.168815	1.221254
4256	21216	0.716841	0.083359	0.494522		0.044252	1.05876	0.316845		0.009886	0.1433	1.045537
4257	21217	0.665296	0.081554	0.486981		0.042418	0.978026	0.281082		0.009235	0.131302	0.968315
4258	21218	0.84538	0.110402	0.656764		0.056875	1.231865	0.337816		0.011763	0.162502	1.216683
4259	21219	0.846409	0.114184	0.70581		0.059882	1.221562	0.308603		0.011804	0.158055	1.189427
4260	21220	0.912516	0.124166	0.777358		0.06795	1.303557	0.291215		0.012795	0.16496	1.269562
4261	21221	0.848607	0.11483	0.701651		0.066398	1.199354	0.245956		0.01197	0.147726	1.183274
4262	21222	0.753195	0.099421	0.583227		0.061795	1.052774	0.241725		0.010638	0.126174	1.063744
4263	21223	0.657345	0.084099	0.484338		0.055851	0.910731	0.229449		0.009302	0.109112	0.942446
4264	21224	0.820187	0.100479	0.593964		0.072077	1.126166	0.319271		0.011646	0.137988	1.196804
4265	21225	0.852849	0.096927	0.591187		0.078144	1.15706	0.369023		0.012169	0.145142	1.266718
4266	21226	0.659987	0.068207	0.42633		0.062946	0.884428	0.309302		0.009443	0.113006	0.988966
4267	21227	0.427397	0.041605	0.262301		0.041627	0.568824	0.207635		0.006128	0.073293	0.640661
4268	21228	0.648843	0.059817	0.378862		0.064277	0.85859	0.322556		0.009326	0.111121	0.970434
4269	21229	0.778671	0.063544	0.420381		0.079715	1.018362	0.396793		0.011245	0.132729	1.15091
4270	21230	0.779742	0.057852	0.416986		0.082379	1.007505	0.396419		0.011299	0.131452	1.128999
4271	21231	0.846713	0.059943	0.442956		0.092136	1.080446	0.42453		0.012325	0.140163	1.209909
4272	21232	0.781885	0.054195	0.492302		0.087491	0.984682	0.393211		0.011432	0.125822	1.107623

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4273	21233	0.809065	0.057484	0.582525		0.092971	1.004783	0.399015		0.011865	0.125586	1.125675
4274	21234	0.784139	0.060868	0.623764		0.092518	0.958521	0.369123		0.011535	0.116373	1.072055
4275	21235	0.64205	0.053104	0.541669		0.077388	0.773412	0.283916		0.009513	0.090795	0.854972
4276	21236	0.641682	0.054498	0.55436		0.078236	0.766226	0.271195		0.009554	0.087829	0.83749
4277	21237	0.865635	0.082087	0.787516		0.107957	1.014182	0.325139		0.012969	0.110502	1.086473
4278	21238	0.866983	0.090326	0.86852		0.110367	0.995583	0.277851		0.013064	0.103266	1.053902
4279	21239	0.93494	0.105285	1.001918		0.121248	1.051201	0.26715		0.014181	0.102855	1.117313
4280	21240	0.869643	0.103544	0.971078		0.114658	0.956171	0.243053		0.013282	0.088063	1.01703
4281	21241	0.870986	0.108425	0.985149		0.11657	0.935246	0.277674		0.013356	0.082249	0.970524
4282	21242	0.872342	0.111598	0.96912		0.118287	0.913667	0.303139		0.013571	0.075985	0.920665
4283	21243	0.940696	0.121183	0.994215		0.129038	0.960074	0.340393		0.015086	0.0747	0.915382
4284	21244	0.874935	0.111253	0.850023		0.12121	0.869387	0.315641		0.01445	0.062477	0.757506
4285	21245	0.955843	0.118198	0.819166		0.133534	0.924075	0.328307		0.016207	0.060252	0.756426
4286	21246	1.064543	0.132935	0.756816		0.149924	0.995912	0.321938		0.018627	0.056489	0.757041
4287	21247	0.958493	0.12489	0.522799		0.135781	0.869588	0.236196		0.017232	0.042761	0.621813
4288	21248	0.959441	0.133945	0.344449		0.136509	0.843792	0.168688		0.017686	0.041405	0.578037
4289	21249	0.884486	0.13093	0.208121		0.07724	0.857089	0.100947		0.016828	0.040139	0.563688
4290	21250	1.003956	0.148568	0.362501		0.087015	1.012695	0.181997		0.018758	0.049297	0.718652
4291	21251	1.227362	0.183319	0.579421		0.105113	1.286385	0.321442		0.022588	0.066975	1.00529
4292	21252	0.61781	0.092339	0.329677		0.052331	0.664543	0.195255		0.011248	0.036193	0.551985
4293	21253	0.485127	0.072536	0.278126		0.040691	0.531692	0.171206		0.00877	0.029957	0.467769
4294	21254	0.642298	0.095912	0.385418		0.053379	0.71465	0.244315		0.011548	0.042961	0.653298
4295	21255	1.245798	0.185067	0.823856		0.101423	1.424726	0.527002		0.022187	0.099559	1.374717
4296	21256	0.810492	0.118752	0.576621		0.06425	0.952938	0.371625		0.014251	0.075516	0.980834
4297	21257	0.715561	0.103345	0.526581		0.055462	0.858901	0.339053		0.012447	0.07314	0.912686
4298	21258	0.714868	0.100889	0.535345		0.054035	0.875083	0.343129		0.012283	0.078014	0.941427
4299	21259	1.084068	0.148454	0.877117		0.079647	1.352013	0.51633		0.018361	0.124145	1.454376
4300	21260	0.632107	0.082449	0.541031		0.044979	0.802409	0.290935		0.010501	0.075187	0.864442
4301	21261	0.494043	0.061741	0.430469		0.03421	0.635373	0.225517		0.008069	0.060288	0.684389
4302	21262	0.549997	0.066083	0.478306		0.037205	0.714365	0.256045		0.008851	0.068337	0.769341
4303	21263	0.649419	0.077145	0.547292		0.042277	0.855576	0.306447		0.01019	0.082644	0.921282
4304	21264	1.004766	0.119828	0.792556		0.062815	1.34082	0.471896		0.015347	0.130847	1.443284
4305	21265	0.610913	0.07276	0.432536		0.036534	0.82518	0.282402		0.009045	0.081846	0.890991
4306	21266	0.585523	0.069462	0.358415		0.033494	0.799339	0.263793		0.008406	0.081624	0.863789
4307	21267	0.616207	0.072481	0.334924		0.03359	0.849757	0.27085		0.008583	0.089052	0.916892
4308	21268	0.646811	0.074757	0.35923		0.033272	0.901482	0.273897		0.008971	0.096934	0.968679
4309	21269	1.100238	0.124358	0.609949		0.05358	1.548961	0.44505		0.015177	0.171129	1.654682
4310	21270	0.819505	0.089289	0.438652		0.037404	1.167865	0.348362		0.011214	0.130503	1.245744
4311	21271	0.725706	0.075967	0.398992		0.03084	1.045936	0.338885		0.009828	0.118287	1.129264
4312	21272	0.63224	0.064613	0.361442		0.025298	0.918594	0.314331		0.008482	0.104496	0.9948
4313	21273	1.040934	0.107532	0.62397		0.039025	1.52377	0.543213		0.013813	0.175126	1.643605
4314	21274	0.792312	0.083754	0.522855		0.027401	1.16927	0.433031		0.010368	0.133873	1.249167
4315	21275	0.865893	0.092705	0.688337		0.027328	1.289504	0.492268		0.011171	0.148614	1.358111
4316	21276	0.840539	0.092923	0.741169		0.025488	1.262154	0.489205		0.010757	0.146696	1.317701
4317	21277	1.180018	0.133822	1.08188		0.035288	1.784365	0.691018		0.015049	0.208983	1.847075
4318	21278	0.802493	0.092074	0.730683		0.02368	1.221232	0.466767		0.010278	0.141901	1.256424
4319	21279	0.629337	0.072404	0.551967		0.018328	0.962684	0.355292		0.00809	0.110769	0.981526
4320	21280	0.641508	0.073629	0.538974		0.018541	0.983824	0.351643		0.008268	0.11224	0.998276
4321	21281	1.17797	0.133972	0.92883		0.033594	1.813147	0.611669		0.015246	0.2129	1.813556
4322	21282	0.813606	0.09096	0.670391		0.022905	1.25598	0.404648		0.010575	0.151012	1.237533
4323	21283	0.813378	0.08911	0.671021		0.02332	1.258303	0.424935		0.010614	0.155029	1.223405
4324	21284	0.813245	0.087052	0.638258		0.024531	1.259683	0.442793		0.010663	0.158552	1.215206
4325	21285	1.085014	0.113149	0.762956		0.03662	1.680519	0.605685		0.014285	0.216326	1.629964
4326	21286	0.628866	0.0642	0.386763		0.023163	0.973329	0.360577		0.008306	0.125963	0.951804
4327	21287	0.721617	0.071997	0.365247		0.028793	1.115326	0.42014		0.009562	0.145327	1.092827
4328	21288	0.814608	0.078616	0.318906		0.035728	1.255343	0.47253		0.010845	0.164561	1.221292
4329	21289	1.179785	0.109488	0.478344		0.056381	1.810656	0.663777		0.015785	0.239	1.729721
4330	21290	0.815748	0.074286	0.365451		0.042177	1.245888	0.437036		0.010969	0.163183	1.162157
4331	21291	0.816409	0.079809	0.43149		0.045384	1.239781	0.405083		0.011033	0.161454	1.143743
4332	21292	0.804771	0.084072	0.478181		0.047852	1.214116	0.36747		0.010928	0.15694	1.114371
4333	21293	0.997903	0.114287	0.632938		0.063049	1.494806	0.416164		0.013611	0.192339	1.366588
4334	21294	0.644815	0.076938	0.428596		0.04216	0.961562	0.257049		0.008815	0.122267	0.879401
4335	21295	0.819282	0.103633	0.580992		0.056672	1.211359	0.308894		0.011241	0.151404	1.114578
4336	21296	0.820221	0.107425	0.629773		0.060026	1.201423	0.282049		0.011285	0.147331	1.1279
4337	21297	1.188551	0.158614	0.934167		0.091856	1.723406	0.35728		0.016398	0.207672	1.6408
4338	21298	0.82222	0.108887	0.628475		0.066943	1.179922	0.216497		0.011368	0.137958	1.13647
4339	21299	0.729718	0.094304	0.526647		0.062415	1.035852	0.217765		0.010113	0.118111	1.012264
4340	21300	0.636822	0.079713	0.444057		0.056495	0.896169	0.213345		0.008841	0.102532	0.891024
4341	21301	1.100259	0.132444	0.75494		0.101092	1.534594	0.407775		0.015306	0.180375	1.552383
4342	21302	0.826104	0.092344	0.54566		0.079298	1.138713	0.338922		0.011525	0.13616	1.173684

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4343	21303	0.639246	0.065264	0.395056		0.063968	0.870375	0.280458		0.00895	0.105998	0.907689
4344	21304	0.413957	0.039916	0.243453		0.042339	0.559749	0.187108		0.005808	0.068771	0.587569
4345	21305	0.935406	0.085744	0.523704		0.097383	1.257471	0.432637		0.013149	0.155915	1.324846
4346	21306	0.754099	0.061478	0.391698		0.081254	1.001828	0.358465		0.010644	0.123916	1.057199
4347	21307	0.755088	0.056251	0.389566		0.084065	0.990872	0.35886		0.010703	0.122328	1.037147
4348	21308	1.128123	0.080005	0.569174		0.129557	1.461722	0.540847		0.016111	0.180447	1.507778
4349	21309	0.75709	0.052864	0.458552		0.089541	0.967988	0.365468		0.010931	0.117035	1.002507
4350	21310	0.783367	0.056119	0.541613		0.095251	0.987633	0.371877		0.011424	0.116892	1.018292
4351	21311	0.759198	0.057673	0.579329		0.094905	0.942107	0.344897		0.011177	0.108284	0.968724
4352	21312	0.931482	0.075642	0.752842		0.11911	1.139212	0.397999		0.013816	0.127513	1.156478
4353	21313	0.621261	0.05276	0.515219		0.080422	0.753167	0.254724		0.009251	0.081828	0.756006
4354	21314	0.838039	0.077481	0.728789		0.111093	0.99699	0.307663		0.012571	0.10382	0.965801
4355	21315	0.839315	0.084951	0.803216		0.11372	0.978875	0.26512		0.012674	0.097081	0.932267
4356	21316	1.21662	0.13254	1.242176		0.168149	1.389705	0.329339		0.018598	0.130457	1.323909
4357	21317	0.841884	0.09789	0.896716		0.11846	0.940649	0.23058		0.013128	0.084841	0.894359
4358	21318	0.843175	0.103	0.909113		0.120559	0.920358	0.252182		0.013478	0.079394	0.875145
4359	21319	0.844488	0.106188	0.892979		0.122487	0.899375	0.274917		0.013887	0.073465	0.835034
4360	21320	1.224139	0.15602	1.227518		0.179803	1.270468	0.414327		0.020703	0.097207	1.11281
4361	21321	0.847075	0.106766	0.781079		0.125774	0.856024	0.285948		0.014739	0.060692	0.715121
4362	21322	0.925437	0.11653	0.760993		0.138679	0.909846	0.29759		0.016551	0.058684	0.717496
4363	21323	1.345678	0.172618	0.914133		0.203462	1.279957	0.381514		0.024857	0.071813	0.955517
4364	21324	0.928182	0.124837	0.486193		0.141214	0.856091	0.21535		0.017671	0.04185	0.600027
4365	21325	0.929185	0.135199	0.324074		0.141998	0.830609	0.155334		0.018272	0.04066	0.560179
4366	21326	0.859566	0.130985	0.196706		0.08441	0.842802	0.090387		0.01649	0.039236	0.552819
4367	21327	0.975534	0.146809	0.333208		0.095089	0.995948	0.162167		0.018518	0.048372	0.700914
4368	21328	0.892584	0.133896	0.397432		0.085927	0.947065	0.214698		0.016705	0.048926	0.728295
4369	21329	0.600143	0.089825	0.301036		0.057101	0.653476	0.173932		0.011092	0.035161	0.528243
4370	21330	0.47123	0.070329	0.251677		0.044369	0.522781	0.152424		0.008611	0.028988	0.439968
4371	21331	0.623875	0.092815	0.348691		0.058167	0.702602	0.217451		0.011285	0.039978	0.613712
4372	21332	0.911086	0.134011	0.556467		0.083109	1.054535	0.353632		0.01618	0.066421	0.971031
4373	21333	0.787086	0.113746	0.516324		0.069819	0.936435	0.331089		0.013693	0.066149	0.894827
4374	21334	0.694854	0.09878	0.470978		0.060077	0.843885	0.302129		0.011872	0.063273	0.824272
4375	21335	0.694141	0.096393	0.478863		0.058297	0.859715	0.306819		0.011649	0.067923	0.850325
4376	21336	0.755043	0.101405	0.550554		0.061352	0.952744	0.33073		0.01246	0.077958	0.944173
4377	21337	0.613714	0.078808	0.472979		0.048065	0.788259	0.26173		0.009966	0.066104	0.784851
4378	21338	0.479648	0.059041	0.37592		0.036544	0.624145	0.206521		0.00769	0.053102	0.622845
4379	21339	0.533953	0.063265	0.417227		0.039737	0.701739	0.234967		0.008476	0.060269	0.700787
4380	21340	0.630437	0.074143	0.476304		0.045147	0.840447	0.282078		0.009866	0.073859	0.838671
4381	21341	0.679114	0.080065	0.478703		0.046698	0.917026	0.303478		0.010467	0.083366	0.912781
4382	21342	0.593012	0.069907	0.373507		0.039019	0.810486	0.260717		0.009006	0.075727	0.803242
4383	21343	0.568344	0.066788	0.307484		0.035787	0.785018	0.245012		0.008571	0.07525	0.773247
4384	21344	0.598099	0.069737	0.297391		0.035919	0.834469	0.251852		0.008992	0.082084	0.819924
4385	21345	0.627773	0.072103	0.3175		0.035617	0.885219	0.255282		0.009408	0.089378	0.867732
4386	21346	0.772786	0.0873	0.390923		0.041215	1.100786	0.301709		0.011482	0.113569	1.076471
4387	21347	0.795314	0.086998	0.388462		0.039439	1.146747	0.31882		0.011676	0.120946	1.11931
4388	21348	0.704239	0.073447	0.367473		0.032557	1.02706	0.309475		0.010252	0.109863	1.001839
4389	21349	0.61351	0.062567	0.332617		0.026735	0.902102	0.285717		0.008856	0.097249	0.884011
4390	21350	0.71604	0.074731	0.406995		0.029281	1.060981	0.351246		0.010186	0.114703	1.035726
4391	21351	0.768768	0.081886	0.482808		0.029058	1.148464	0.395344		0.01074	0.124525	1.106301
4392	21352	0.84011	0.090549	0.630584		0.028567	1.266636	0.450845		0.011535	0.138118	1.207031
4393	21353	0.815465	0.090483	0.675947		0.02558	1.239864	0.449781		0.010979	0.13657	1.169185
4394	21354	0.851633	0.096649	0.732634		0.025318	1.304166	0.474888		0.011161	0.144398	1.22573
4395	21355	0.778452	0.089376	0.662915		0.022824	1.199606	0.431107		0.010001	0.132282	1.120657
4396	21356	0.610443	0.07027	0.498834		0.01765	0.945513	0.328101		0.007896	0.103164	0.872314
4397	21357	0.622228	0.071496	0.486876		0.017842	0.966213	0.324575		0.008082	0.104555	0.882946
4398	21358	0.849958	0.096766	0.612085		0.024034	1.324583	0.421304		0.011043	0.14632	1.189036
4399	21359	0.789049	0.088483	0.591939		0.022008	1.233026	0.382092		0.010256	0.13995	1.090846
4400	21360	0.788762	0.086818	0.594171		0.022052	1.235075	0.399421		0.010323	0.143498	1.104607
4401	21361	0.788534	0.084978	0.566951		0.023269	1.236361	0.415302		0.010398	0.146801	1.127665
4402	21362	0.759279	0.07991	0.491613		0.025158	1.191149	0.410555		0.009994	0.144004	1.100459
4403	21363	0.609308	0.062858	0.34611		0.022216	0.95536	0.335281		0.008004	0.11656	0.88732
4404	21364	0.699158	0.070608	0.328425		0.027785	1.094791	0.390356		0.009235	0.134414	1.01737
4405	21365	0.789213	0.077272	0.290386		0.034694	1.232423	0.439308		0.010509	0.152285	1.136112
4406	21366	0.850292	0.080313	0.327005		0.040971	1.322735	0.460523		0.011305	0.16388	1.198319
4407	21367	0.790226	0.07165	0.324281		0.041401	1.223469	0.407184		0.01049	0.151016	1.079958
4408	21368	0.790822	0.076836	0.382971		0.044727	1.217602	0.378023		0.010583	0.149349	1.035553
4409	21369	0.779491	0.080702	0.424568		0.047315	1.192601	0.335593		0.010507	0.145329	1.013971
4410	21370	0.672925	0.075563	0.392231		0.043542	1.02257	0.262353		0.009059	0.123542	0.88709
4411	21371	0.62448	0.073049	0.371931		0.041887	0.944788	0.232062		0.00839	0.113273	0.829958
4412	21372	0.7934	0.097965	0.510177		0.056614	1.190438	0.278579		0.010709	0.140371	1.068154

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4413	21373	0.794245	0.101571	0.554776		0.060195	1.180919	0.254332		0.010768	0.136782	1.078411
4414	21374	0.856148	0.111219	0.613574		0.068695	1.260626	0.239968		0.011598	0.14306	1.166656
4415	21375	0.79605	0.102879	0.555394		0.067419	1.160223	0.19371		0.01077	0.128346	1.08414
4416	21376	0.706437	0.089138	0.469132		0.062976	1.018734	0.20157		0.009588	0.110024	0.960428
4417	21377	0.616459	0.075465	0.401065		0.057071	0.881469	0.195982		0.008384	0.096202	0.839754
4418	21378	0.769085	0.09034	0.49445		0.073849	1.090173	0.269026		0.010464	0.121488	1.051793
4419	21379	0.799581	0.087663	0.495648		0.080335	1.120211	0.307318		0.010892	0.127531	1.098544
4420	21380	0.61867	0.062209	0.360158		0.064894	0.856209	0.25377		0.008464	0.09915	0.849008
4421	21381	0.400608	0.038156	0.222593		0.042982	0.550603	0.168285		0.005494	0.064295	0.547953
4422	21382	0.608138	0.055144	0.322839		0.066464	0.830958	0.259024		0.008351	0.097475	0.828262
4423	21383	0.729726	0.059269	0.359388		0.082651	0.985162	0.319613		0.010148	0.115986	0.980251
4424	21384	0.730636	0.054554	0.358219		0.0856	0.974164	0.322371		0.010295	0.114533	0.9595
4425	21385	0.793313	0.056174	0.383025		0.096003	1.04419	0.360415		0.011347	0.121932	1.008241
4426	21386	0.732498	0.051384	0.421044		0.091413	0.951288	0.335127		0.010623	0.109244	0.899575
4427	21387	0.757884	0.05451	0.496064		0.097344	0.970506	0.341475		0.011106	0.10871	0.910596
4428	21388	0.734458	0.054927	0.530396		0.097091	0.925782	0.317499		0.010875	0.100652	0.865875
4429	21389	0.601344	0.048869	0.460936		0.081413	0.747055	0.245639		0.008996	0.078559	0.690015
4430	21390	0.600982	0.051051	0.472299		0.08243	0.740175	0.235642		0.009055	0.07622	0.675756
4431	21391	0.810668	0.074786	0.665477		0.114008	0.979943	0.285794		0.012491	0.09699	0.863512
4432	21392	0.811866	0.0804	0.730645		0.116825	0.962307	0.248193		0.012804	0.090824	0.81547
4433	21393	0.87549	0.092739	0.841736		0.128673	1.016535	0.228955		0.014122	0.092321	0.864858
4434	21394	0.814333	0.092618	0.814516		0.122013	0.925156	0.214794		0.01346	0.081077	0.799707
4435	21395	0.815568	0.097485	0.824725		0.124322	0.905449	0.226233		0.013863	0.075951	0.784014
4436	21396	0.816823	0.100774	0.809479		0.126449	0.885024	0.246401		0.014285	0.070428	0.7472
4437	21397	0.880883	0.110236	0.828305		0.138233	0.93032	0.27635		0.01582	0.06955	0.762003
4438	21398	0.819378	0.102793	0.706162		0.130119	0.842598	0.256252		0.015106	0.058467	0.671849
4439	21399	0.895201	0.114694	0.694461		0.143607	0.895601	0.266937		0.016975	0.056686	0.688976
4440	21400	0.997168	0.13097	0.640729		0.161512	0.965102	0.263006		0.019504	0.053224	0.705489
4441	21401	0.898004	0.12471	0.448745		0.146443	0.842579	0.194858		0.018114	0.040953	0.578815
4442	21402	0.89905	0.136184	0.298677		0.147303	0.817433	0.142387		0.01878	0.040033	0.543278
4443	21403	0.936751	0.146839	0.203145		0.103243	0.930089	0.094453		0.019336	0.043129	0.607553
4444	21404	1.062954	0.162512	0.336985		0.116227	1.09916	0.15905		0.021706	0.053301	0.764759
4445	21405	0.972438	0.146611	0.400308		0.104904	1.045181	0.209609		0.01956	0.05368	0.788311
4446	21406	0.653785	0.097852	0.302524		0.069634	0.721123	0.169954		0.012985	0.03849	0.568832
4447	21407	0.513313	0.076376	0.252009		0.054059	0.576848	0.148988		0.010088	0.031657	0.465745
4448	21408	0.679549	0.100507	0.347495		0.070815	0.775201	0.212619		0.013233	0.043512	0.637768
4449	21409	0.992313	0.14449	0.549392		0.101047	1.16329	0.346452		0.018969	0.068069	1.00619
4450	21410	0.857207	0.121905	0.509017		0.084762	1.032787	0.324331		0.016052	0.06401	0.923678
4451	21411	0.75671	0.10571	0.463096		0.072845	0.93057	0.296778		0.013934	0.061202	0.845319
4452	21412	0.755888	0.102974	0.470905		0.070612	0.947886	0.301926		0.013686	0.064605	0.868673
4453	21413	0.822157	0.108269	0.52989		0.074268	1.050353	0.324884		0.014638	0.074631	0.966899
4454	21414	0.668234	0.084206	0.454822		0.058148	0.868935	0.259325		0.011705	0.064494	0.802672
4455	21415	0.52224	0.063185	0.361048		0.044032	0.687994	0.208283		0.009034	0.053162	0.635717
4456	21416	0.581352	0.067766	0.400224		0.047711	0.773489	0.237361		0.009962	0.06157	0.713537
4457	21417	0.686371	0.079661	0.455715		0.053929	0.926324	0.285677		0.011589	0.076785	0.853201
4458	21418	0.739324	0.086026	0.456408		0.055791	1.010677	0.307893		0.012305	0.086639	0.928275
4459	21419	0.645559	0.075134	0.35432		0.04663	0.893179	0.264909		0.01059	0.078675	0.816721
4460	21420	0.618684	0.071811	0.28958		0.042789	0.865063	0.250492		0.010081	0.077818	0.786266
4461	21421	0.651058	0.07508	0.291286		0.042962	0.919509	0.25784		0.010566	0.084938	0.829043
4462	21422	0.683326	0.078087	0.309844		0.042648	0.975414	0.262083		0.01102	0.092889	0.869734
4463	21423	0.841132	0.094913	0.379311		0.049424	1.212958	0.310866		0.013457	0.118406	1.068015
4464	21424	0.865606	0.0949	0.384118		0.046765	1.263622	0.321534		0.013687	0.126135	1.105455
4465	21425	0.766447	0.08047	0.371494		0.038486	1.131803	0.311656		0.011967	0.114638	0.988133
4466	21426	0.667674	0.068486	0.336049		0.031639	0.994158	0.286902		0.010304	0.101345	0.864847
4467	21427	0.779223	0.081952	0.410996		0.034695	1.169317	0.353039		0.01186	0.119472	1.013579
4468	21428	0.836565	0.089596	0.490852		0.03449	1.265743	0.397462		0.012515	0.129633	1.083811
4469	21429	0.914145	0.098983	0.636276		0.033994	1.395963	0.453493		0.013389	0.144115	1.183934
4470	21430	0.887272	0.098792	0.679323		0.0295	1.36646	0.453348		0.012696	0.14194	1.149545
4471	21431	0.926563	0.105271	0.734516		0.028747	1.437309	0.479863		0.012915	0.149563	1.213069
4472	21432	0.846897	0.097251	0.663168		0.024683	1.321961	0.436239		0.011474	0.137033	1.111565
4473	21433	0.664074	0.076457	0.497145		0.019071	1.041863	0.332358		0.008749	0.107264	0.86645
4474	21434	0.676867	0.077788	0.485102		0.019269	1.064616	0.329039		0.008812	0.10906	0.876796
4475	21435	0.924526	0.105351	0.596517		0.02593	1.459349	0.429117		0.012062	0.151177	1.175957
4476	21436	0.858216	0.096461	0.575539		0.023714	1.358271	0.397174		0.011214	0.144544	1.119011
4477	21437	0.857841	0.094799	0.579062		0.02355	1.360352	0.413366		0.011244	0.148165	1.144535
4478	21438	0.857528	0.092944	0.554177		0.024832	1.36168	0.429019		0.011271	0.151392	1.164123
4479	21439	0.825636	0.087556	0.482257		0.026833	1.31188	0.423715		0.010854	0.148364	1.134664
4480	21440	0.662301	0.068966	0.340604		0.023878	1.052199	0.343474		0.008705	0.120131	0.913521
4481	21441	0.759657	0.077576	0.324576		0.030075	1.205826	0.399451		0.009998	0.13864	1.045913
4482	21442	0.857466	0.085082	0.290166		0.037842	1.357575	0.449771		0.011306	0.15699	1.167264

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4483	21443	0.923778	0.088658	0.328607		0.044938	1.457293	0.472178		0.012177	0.168837	1.231157
4484	21444	0.858471	0.079294	0.323051		0.045615	1.348094	0.417798		0.011317	0.155725	1.10882
4485	21445	0.859057	0.082977	0.372295		0.049489	1.341821	0.388505		0.011354	0.154137	1.08803
4486	21446	0.846689	0.086733	0.413585		0.05255	1.314521	0.346273		0.011219	0.149949	1.08552
4487	21447	0.730885	0.080402	0.382832		0.0485	1.127353	0.263194		0.009687	0.12747	0.947836
4488	21448	0.678234	0.077514	0.363275		0.046818	1.041724	0.230579		0.008987	0.116945	0.88533
4489	21449	0.861623	0.103654	0.493428		0.063589	1.312858	0.276541		0.011422	0.145177	1.135834
4490	21450	0.862468	0.107202	0.537972		0.067788	1.302671	0.252467		0.011444	0.14152	1.144359
4491	21451	0.92961	0.117213	0.596017		0.077521	1.390937	0.240249		0.012325	0.148066	1.236456
4492	21452	0.864281	0.108443	0.540051		0.076221	1.280407	0.199541		0.011488	0.133113	1.147805
4493	21453	0.766916	0.094072	0.459934		0.071316	1.124458	0.20606		0.010256	0.117362	1.013835
4494	21454	0.669187	0.079708	0.397894		0.064715	0.973073	0.198958		0.008979	0.102896	0.885943
4495	21455	0.834813	0.095572	0.491865		0.083832	1.20358	0.271345		0.011222	0.128584	1.103807
4496	21456	0.867836	0.092874	0.494389		0.091316	1.236816	0.308101		0.011681	0.133501	1.14177
4497	21457	0.671423	0.066245	0.360429		0.073864	0.9453	0.253925		0.00905	0.103793	0.881489
4498	21458	0.434748	0.040748	0.223305		0.04896	0.607864	0.168516		0.005887	0.067198	0.569196
4499	21459	0.659943	0.059041	0.324478		0.075751	0.917302	0.259678		0.009002	0.101894	0.860862
4500	21460	0.791827	0.064004	0.36232		0.094299	1.087337	0.316065		0.011079	0.121375	1.020423
4501	21461	0.792763	0.059171	0.36178		0.097788	1.074965	0.324901		0.011359	0.119907	1.000888
4502	21462	0.860718	0.060677	0.390286		0.109788	1.152033	0.363633		0.012638	0.127543	1.054211
4503	21463	0.794684	0.055779	0.4253		0.104638	1.04943	0.338206		0.011937	0.114348	0.935337
4504	21464	0.822188	0.059152	0.499744		0.111557	1.070624	0.344729		0.012631	0.113901	0.923355
4505	21465	0.796735	0.059627	0.534116		0.111415	1.021307	0.321051		0.012519	0.104951	0.854217
4506	21466	0.652305	0.052876	0.464415		0.09351	0.82419	0.248922		0.01044	0.081529	0.681153
4507	21467	0.65189	0.055141	0.476046		0.094721	0.81664	0.239135		0.010539	0.079264	0.667318
4508	21468	0.879309	0.080572	0.671603		0.131171	1.081347	0.29112		0.01452	0.101034	0.853349
4509	21469	0.880586	0.086443	0.728981		0.134593	1.062007	0.25473		0.014876	0.095218	0.799315
4510	21470	0.949557	0.098684	0.839795		0.14842	1.121992	0.234216		0.016412	0.097956	0.855254
4511	21471	0.883194	0.097867	0.811548		0.140897	1.021362	0.219499		0.015641	0.086095	0.791004
4512	21472	0.884525	0.103158	0.820689		0.143745	0.999871	0.223806		0.016091	0.080728	0.775376
4513	21473	0.885883	0.106858	0.805226		0.146384	0.977579	0.24362		0.016567	0.075002	0.757948
4514	21474	0.955348	0.117415	0.823616		0.160222	1.027838	0.273307		0.018339	0.074263	0.791952
4515	21475	0.888636	0.112592	0.708108		0.150973	0.931078	0.253607		0.017503	0.062579	0.700113
4516	21476	0.970906	0.126312	0.695555		0.166784	0.989725	0.264647		0.019605	0.060842	0.737091
4517	21477	1.081554	0.145235	0.649237		0.187776	1.066519	0.261952		0.022498	0.05738	0.759572
4518	21478	0.97405	0.13977	0.453786		0.17036	0.931038	0.195673		0.020832	0.045114	0.6266
4519	21479	0.975272	0.153812	0.301468		0.171428	0.903143	0.145498		0.02153	0.044421	0.592643
4520	21480	1.007986	0.163271	0.195766		0.127485	1.017188	0.107271		0.0227	0.047897	0.657573
4521	21481	1.143566	0.178111	0.320406		0.143212	1.202127	0.147244		0.025474	0.058159	0.815798
4522	21482	1.046051	0.158737	0.378426		0.12899	1.143111	0.189607		0.022921	0.058279	0.825953
4523	21483	0.703223	0.105167	0.285362		0.085491	0.788658	0.154382		0.015206	0.041641	0.592089
4524	21484	0.552087	0.081692	0.23747		0.066278	0.630832	0.135642		0.011832	0.034166	0.483196
4525	21485	0.730834	0.107185	0.325054		0.08672	0.84771	0.193852		0.015544	0.046878	0.657877
4526	21486	1.067123	0.153352	0.508374		0.123512	1.271924	0.316678		0.022279	0.073097	1.009188
4527	21487	0.921764	0.128701	0.469872		0.103415	1.12894	0.296654		0.01884	0.067442	0.919078
4528	21488	0.813641	0.110945	0.424808		0.088733	1.016946	0.272979		0.016386	0.062497	0.84491
4529	21489	0.812705	0.107977	0.431953		0.085881	1.035669	0.277341		0.01612	0.065302	0.874724
4530	21490	0.883894	0.113475	0.478179		0.090257	1.147362	0.298001		0.01723	0.075575	0.978664
4531	21491	0.718368	0.088297	0.406688		0.070635	0.948982	0.242545		0.013761	0.065588	0.811129
4532	21492	0.5614	0.066257	0.322152		0.053453	0.751221	0.197891		0.010629	0.053953	0.639988
4533	21493	0.624926	0.071178	0.356509		0.057903	0.844499	0.225737		0.011721	0.062473	0.715856
4534	21494	0.737787	0.084059	0.404875		0.0654	1.011301	0.271998		0.013641	0.077985	0.848847
4535	21495	0.794649	0.090764	0.403749		0.067321	1.103302	0.293504		0.014477	0.087922	0.917263
4536	21496	0.693822	0.079282	0.311115		0.055971	0.97499	0.255226		0.012496	0.079777	0.803633
4537	21497	0.664921	0.075809	0.251496		0.051336	0.944215	0.241913		0.011902	0.079421	0.772048
4538	21498	0.699689	0.079875	0.265288		0.051583	1.003661	0.249661		0.01244	0.086955	0.812424
4539	21499	0.734348	0.083545	0.282296		0.051244	1.064795	0.254609		0.012948	0.095001	0.848757
4540	21500	0.903874	0.101732	0.345536		0.059506	1.324219	0.303684		0.01579	0.120943	1.03418
4541	21501	0.930101	0.10209	0.364573		0.056484	1.379613	0.308734		0.016028	0.128605	1.058049
4542	21502	0.823531	0.087015	0.351785		0.045676	1.235736	0.296035		0.013956	0.116712	0.933117
4543	21503	0.717376	0.074248	0.317758		0.03752	1.085552	0.273921		0.011984	0.103316	0.810983
4544	21504	0.837177	0.088552	0.388937		0.041217	1.276823	0.336241		0.013777	0.122068	0.945096
4545	21505	0.898724	0.096582	0.469918		0.041071	1.381977	0.377156		0.014519	0.132004	1.013535
4546	21506	0.98202	0.106818	0.604577		0.040582	1.523855	0.428404		0.015477	0.145017	1.105118
4547	21507	0.953077	0.106564	0.642307		0.035171	1.491528	0.427055		0.014625	0.143073	1.074088
4548	21508	0.99521	0.113208	0.692462		0.033027	1.568756	0.452083		0.014861	0.150968	1.13069
4549	21509	0.909568	0.104402	0.624291		0.027949	1.442654	0.412232		0.013184	0.13826	1.03414
4550	21510	0.713168	0.082016	0.466276		0.02033	1.136874	0.315504		0.010017	0.108192	0.803998
4551	21511	0.726868	0.083468	0.454811		0.020513	1.161748	0.314701		0.010007	0.110175	0.819062
4552	21512	0.992737	0.113146	0.554029		0.027583	1.592542	0.412818		0.013189	0.151871	1.158974

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4553	21513	0.921452	0.103744	0.524354		0.025198	1.482101	0.390839		0.012094	0.144827	1.107751
4554	21514	0.920965	0.102116	0.526385		0.024895	1.484185	0.405866		0.012081	0.148075	1.131278
4555	21515	0.920526	0.100313	0.505508		0.026223	1.485651	0.419839		0.012049	0.151326	1.144761
4556	21516	0.886197	0.094692	0.44163		0.028113	1.43132	0.413582		0.011606	0.148321	1.111387
4557	21517	0.710824	0.074711	0.312954		0.025261	1.147951	0.335004		0.009311	0.12002	0.893605
4558	21518	0.815146	0.08417	0.299551		0.032129	1.315482	0.387218		0.010644	0.138329	1.022038
4559	21519	0.91938	0.092532	0.27251		0.040836	1.48124	0.4356		0.011952	0.156823	1.139438
4560	21520	0.990394	0.096693	0.307376		0.048812	1.590359	0.457329		0.012873	0.168873	1.20128
4561	21521	0.920307	0.086774	0.299604		0.04981	1.471392	0.40558		0.011966	0.155678	1.112627
4562	21522	0.920859	0.088293	0.334232		0.054342	1.464782	0.378511		0.011936	0.153977	1.126498
4563	21523	0.907503	0.091678	0.373787		0.057963	1.435435	0.338782		0.011734	0.15005	1.121543
4564	21524	0.783314	0.083844	0.346998		0.053882	1.231442	0.259132		0.010132	0.127707	0.97691
4565	21525	0.726851	0.080513	0.329604		0.052155	1.138108	0.22064		0.009405	0.117213	0.911252
4566	21526	0.923284	0.106989	0.444821		0.071089	1.43469	0.25714		0.011916	0.145395	1.166593
4567	21527	0.924073	0.110362	0.486415		0.076007	1.424032	0.234745		0.012049	0.141998	1.172293
4568	21528	0.995909	0.120515	0.540105		0.08712	1.521022	0.226443		0.013065	0.148897	1.263897
4569	21529	0.92582	0.11138	0.489779		0.085826	1.400498	0.195963		0.012184	0.136938	1.172401
4570	21530	0.821419	0.09663	0.421191		0.080473	1.230167	0.199952		0.010882	0.122459	1.034729
4571	21531	0.716673	0.082088	0.368248		0.073123	1.064699	0.191587		0.009533	0.107289	0.903075
4572	21532	0.893971	0.098698	0.456417		0.094835	1.317051	0.259341		0.011915	0.133945	1.124354
4573	21533	0.929231	0.096266	0.460313		0.103448	1.353477	0.292788		0.012636	0.1388	1.162937
4574	21534	0.718839	0.068895	0.336761		0.083812	1.034428	0.240772		0.010177	0.106739	0.892577
4575	21535	0.46542	0.042578	0.209048		0.055598	0.665139	0.159764		0.006723	0.068849	0.574549
4576	21536	0.706466	0.061953	0.304317		0.08607	1.003684	0.246382		0.010333	0.104265	0.867209
4577	21537	0.847573	0.067766	0.342011		0.107277	1.189535	0.300766		0.012729	0.124157	1.025549
4578	21538	0.8485	0.063243	0.341992		0.111404	1.175841	0.308215		0.01318	0.122668	1.006086
4579	21539	0.921149	0.064763	0.372896		0.125217	1.259994	0.344675		0.014661	0.130542	1.062992
4580	21540	0.850411	0.059467	0.403334		0.11948	1.147734	0.320381		0.013847	0.116952	0.949312
4581	21541	0.879788	0.062948	0.472717		0.127558	1.170928	0.326402		0.014718	0.116316	0.945517
4582	21542	0.8525	0.063664	0.504579		0.12757	1.117097	0.303894		0.014643	0.107356	0.877319
4583	21543	0.697912	0.056117	0.438729		0.107185	0.901566	0.235892		0.012202	0.083518	0.692065
4584	21544	0.697445	0.058384	0.449916		0.108642	0.893353	0.226973		0.012307	0.0808	0.677778
4585	21545	0.940714	0.084878	0.63662		0.150671	1.18302	0.277937		0.016986	0.102019	0.878767
4586	21546	0.942049	0.090853	0.677431		0.154836	1.161942	0.245264		0.017423	0.097702	0.849182
4587	21547	1.01577	0.103569	0.77991		0.17099	1.22768	0.225094		0.019199	0.100712	0.89046
4588	21548	0.944722	0.101084	0.753137		0.162565	1.117773	0.210251		0.018275	0.088543	0.805652
4589	21549	0.946129	0.106753	0.761212		0.166116	1.094573	0.211876		0.018813	0.083035	0.782372
4590	21550	0.947565	0.11217	0.746632		0.169427	1.07053	0.226454		0.019373	0.077343	0.754726
4591	21551	1.021823	0.126078	0.763988		0.185728	1.125975	0.254315		0.021409	0.07683	0.787213
4592	21552	0.95044	0.12154	0.66394		0.175267	1.020306	0.236438		0.020376	0.064902	0.717739
4593	21553	1.038452	0.137248	0.658518		0.193867	1.084817	0.247716		0.022808	0.06334	0.76589
4594	21554	1.156818	0.159211	0.613689		0.218558	1.169008	0.247388		0.026018	0.060464	0.798155
4595	21555	1.041875	0.155753	0.428422		0.198489	1.020401	0.187469		0.023925	0.050206	0.670455
4596	21556	1.043244	0.172688	0.288837		0.199851	0.989588	0.144466		0.024511	0.04918	0.643991
4597	21557	0.990253	0.165439	0.161376		0.143432	1.016948	0.113225		0.024219	0.048758	0.644011
4598	21558	1.123323	0.178005	0.265047		0.160706	1.201927	0.136141		0.027121	0.057891	0.783636
4599	21559	1.300383	0.198779	0.39337		0.182693	1.446814	0.194214		0.03094	0.073061	0.969444
4600	21560	0.690626	0.103045	0.233847		0.095461	0.788579	0.122735		0.016248	0.041063	0.544442
4601	21561	0.542174	0.079644	0.194393		0.073904	0.630749	0.107295		0.01264	0.033604	0.442561
4602	21562	0.717695	0.104118	0.265642		0.09659	0.847554	0.153324		0.016601	0.046017	0.601123
4603	21563	1.319739	0.187266	0.516989		0.172842	1.601662	0.316478		0.030042	0.090185	1.157141
4604	21564	0.905035	0.123695	0.37719		0.114614	1.12827	0.235376		0.020222	0.065739	0.836426
4605	21565	0.798822	0.106083	0.337394		0.098204	1.016089	0.216927		0.017577	0.060757	0.766857
4606	21566	0.797865	0.103018	0.342607		0.094945	1.034449	0.220335		0.01728	0.063307	0.790168
4607	21567	1.13819	0.142598	0.494676		0.13071	1.503073	0.312324		0.024259	0.093975	1.152293
4608	21568	0.705173	0.084145	0.3181		0.077895	0.947222	0.201293		0.014785	0.061579	0.724054
4609	21569	0.551055	0.063249	0.249669		0.058934	0.74969	0.164119		0.011409	0.050381	0.568935
4610	21570	0.613385	0.068066	0.274566		0.063839	0.842649	0.187135		0.012572	0.058084	0.634597
4611	21571	0.724127	0.080636	0.310792		0.072129	1.008924	0.225392		0.014617	0.072149	0.750042
4612	21572	1.049052	0.117756	0.416343		0.099855	1.480876	0.329353		0.020947	0.110456	1.087912
4613	21573	0.680943	0.076841	0.235436		0.061731	0.972615	0.214538		0.01348	0.074714	0.709517
4614	21574	0.652536	0.073927	0.200906		0.056373	0.941979	0.204133		0.012812	0.074463	0.682799
4615	21575	0.68662	0.077877	0.207987		0.05639	1.001366	0.211556		0.013363	0.081267	0.720052
4616	21576	0.7206	0.081484	0.221347		0.056115	1.062491	0.216779		0.013873	0.08858	0.754183
4617	21577	1.154789	0.129722	0.352846		0.084929	1.721103	0.338512		0.021968	0.147597	1.199132
4618	21578	0.912653	0.100065	0.299175		0.062043	1.376982	0.267145		0.017055	0.119936	0.932518
4619	21579	0.808014	0.085785	0.288081		0.050365	1.233498	0.250526		0.014805	0.109088	0.809398
4620	21580	0.703834	0.073255	0.260537		0.04077	1.083594	0.231807		0.012683	0.096702	0.695479
4621	21581	1.088133	0.115473	0.422307		0.059118	1.688878	0.374246		0.019266	0.152287	1.067003
4622	21582	0.881706	0.094726	0.391629		0.044523	1.379212	0.314246		0.015274	0.123553	0.865823

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4623	21583	0.963329	0.105769	0.500368		0.044133	1.52046	0.352876		0.016234	0.135417	0.961779
4624	21584	0.934881	0.104934	0.529153		0.038405	1.487825	0.348754		0.015301	0.131477	0.944599
4625	21585	1.241897	0.141469	0.723371		0.045426	1.991192	0.468081		0.01974	0.1751	1.265681
4626	21586	0.89208	0.102225	0.512669		0.029247	1.438646	0.33703		0.013723	0.124858	0.919281
4627	21587	0.69939	0.080249	0.381943		0.021096	1.133697	0.260908		0.010404	0.097809	0.726808
4628	21588	0.712798	0.081655	0.372579		0.020502	1.1585	0.263129		0.010382	0.099693	0.743495
4629	21589	1.238447	0.141094	0.577862		0.034112	2.021295	0.443687		0.017356	0.176907	1.298177
4630	21590	0.90344	0.101696	0.413324		0.024418	1.478139	0.336138		0.012118	0.131186	0.968761
4631	21591	0.902855	0.100284	0.414415		0.024423	1.480261	0.349134		0.01185	0.133891	0.988191
4632	21592	0.902344	0.098678	0.399467		0.025276	1.48164	0.359893		0.0118	0.136615	0.998782
4633	21593	1.132962	0.1218	0.457514		0.035071	1.862573	0.45975		0.01475	0.176151	1.256512
4634	21594	0.696635	0.073749	0.249013		0.024478	1.144777	0.286142		0.009025	0.108311	0.770651
4635	21595	0.798788	0.083231	0.239145		0.031396	1.311814	0.329226		0.010298	0.124772	0.882558
4636	21596	0.900834	0.091701	0.221209		0.040245	1.477149	0.369631		0.011545	0.141476	1.006282
4637	21597	1.233575	0.122227	0.314514		0.061712	2.018694	0.492243		0.015727	0.195645	1.390536
4638	21598	0.90082	0.086499	0.239093		0.049827	1.467813	0.344831		0.01142	0.140591	1.028936
4639	21599	0.901268	0.085814	0.257045		0.054594	1.461619	0.323319		0.011373	0.139145	1.041081
4640	21600	0.888128	0.088275	0.290327		0.058649	1.432752	0.290858		0.011163	0.135652	1.034684
4641	21601	1.031015	0.107359	0.364725		0.073735	1.65426	0.300495		0.013057	0.156835	1.208166
4642	21602	0.711206	0.075958	0.257489		0.053186	1.136638	0.192048		0.009092	0.106235	0.838172
4643	21603	0.903293	0.100217	0.347674		0.072689	1.433295	0.20796		0.011709	0.131685	1.071899
4644	21604	0.903975	0.102887	0.381317		0.077897	1.423145	0.192391		0.011843	0.128731	1.074765
4645	21605	1.239328	0.14349	0.540916		0.113867	1.934755	0.236326		0.016362	0.175437	1.469453
4646	21606	0.905435	0.1035	0.38698		0.088373	1.400476	0.168622		0.011996	0.128813	1.07175
4647	21607	0.803227	0.089891	0.334304		0.082992	1.230408	0.170428		0.010661	0.114983	0.94583
4648	21608	0.700742	0.076505	0.294381		0.075498	1.065036	0.162287		0.009412	0.10061	0.823655
4649	21609	1.140025	0.121026	0.477191		0.127859	1.718618	0.284109		0.015829	0.164506	1.335773
4650	21610	0.908343	0.090409	0.369956		0.107089	1.35404	0.245194		0.013131	0.12993	1.060783
4651	21611	0.702593	0.065009	0.271431		0.086867	1.034831	0.200972		0.010574	0.099969	0.814654
4652	21612	0.454879	0.040389	0.168784		0.057664	0.665391	0.133122		0.006996	0.064562	0.524401
4653	21613	0.957225	0.08214	0.3411		0.12384	1.392008	0.284131		0.014989	0.136458	1.097032
4654	21614	0.828229	0.06513	0.279393		0.111471	1.189864	0.250512		0.01341	0.116073	0.938389
4655	21615	0.829053	0.061401	0.279571		0.115879	1.176076	0.25461		0.013868	0.114397	0.922675
4656	21616	1.167567	0.082265	0.399695		0.169183	1.635024	0.367902		0.020151	0.158685	1.267119
4657	21617	0.830777	0.057556	0.33227		0.124587	1.147945	0.263289		0.014758	0.108661	0.876955
4658	21618	0.859392	0.060868	0.388335		0.133148	1.171198	0.267749		0.015688	0.108081	0.877947
4659	21619	0.832679	0.06182	0.413819		0.133323	1.117415	0.248914		0.015612	0.099861	0.818829
4660	21620	0.95044	0.075613	0.501322		0.156376	1.257481	0.269192		0.018208	0.109528	0.903543
4661	21621	0.681189	0.056061	0.370981		0.113755	0.893675	0.186313		0.013198	0.075615	0.637218
4662	21622	0.918704	0.081029	0.526442		0.157971	1.183452	0.229788		0.018207	0.0955	0.832299
4663	21623	0.919948	0.086376	0.544367		0.162571	1.162365	0.204695		0.018648	0.09043	0.811284
4664	21624	1.261961	0.125624	0.793268		0.228777	1.562488	0.241492		0.026193	0.119423	1.08134
4665	21625	0.9225	0.097518	0.601892		0.171229	1.118385	0.175215		0.019628	0.081965	0.771643
4666	21626	0.923802	0.103383	0.608338		0.175252	1.095448	0.177162		0.020177	0.076838	0.751524
4667	21627	0.925156	0.108999	0.596953		0.179056	1.071791	0.184107		0.020746	0.071557	0.727518
4668	21628	1.269237	0.157109	0.785714		0.250156	1.434659	0.263908		0.029188	0.091181	0.958304
4669	21629	0.927906	0.119395	0.541736		0.18584	1.022411	0.193359		0.021825	0.060534	0.671718
4670	21630	1.013772	0.135715	0.537075		0.205887	1.087374	0.203953		0.02432	0.059646	0.715677
4671	21631	1.402196	0.198564	0.620355		0.288669	1.454899	0.256916		0.034298	0.073288	0.942616
4672	21632	1.017079	0.158514	0.348816		0.211364	1.022774	0.160107		0.025221	0.051511	0.657193
4673	21633	1.018409	0.176735	0.242555		0.213005	0.991488	0.136684		0.025521	0.05001	0.640865
4674	21634	0.971474	0.166985	0.128055		0.160815	1.016687	0.120902		0.025602	0.049666	0.626505
4675	21635	1.101923	0.177525	0.204787		0.179678	1.201866	0.131239		0.028666	0.058359	0.745467
4676	21636	1.007737	0.155563	0.237692		0.160844	1.14299	0.119746		0.025922	0.056975	0.714195
4677	21637	0.677362	0.101691	0.178169		0.10612	0.788549	0.0924		0.017277	0.040408	0.496333
4678	21638	0.53175	0.078178	0.147897		0.082015	0.630682	0.079992		0.013449	0.032986	0.399862
4679	21639	0.703877	0.101679	0.201999		0.107039	0.847398	0.113579		0.017667	0.04508	0.541258
4680	21640	1.027607	0.143215	0.310954		0.151633	1.270993	0.188068		0.025454	0.069792	0.825898
4681	21641	0.887452	0.118667	0.28116		0.126289	1.127501	0.17724		0.021646	0.063921	0.747115
4682	21642	0.783264	0.101234	0.250655		0.108028	1.015082	0.162171		0.01881	0.058898	0.680695
4683	21643	0.782259	0.097987	0.249689		0.104305	1.033093	0.164026		0.018488	0.061209	0.69665
4684	21644	0.850696	0.102734	0.272906		0.109317	1.143691	0.180291		0.0198	0.068911	0.769549
4685	21645	0.691301	0.079957	0.229548		0.085361	0.945287	0.156508		0.015844	0.057754	0.629995
4686	21646	0.540192	0.060775	0.179521		0.06457	0.747951	0.127149		0.012226	0.047219	0.493132
4687	21647	0.601271	0.066341	0.196764		0.06994	0.840579	0.145099		0.01351	0.054623	0.548904
4688	21648	0.709776	0.078744	0.22022		0.07905	1.006306	0.176274		0.01577	0.068207	0.647605
4689	21649	0.764453	0.085396	0.216017		0.081367	1.097724	0.192655		0.016796	0.077102	0.697811
4690	21650	0.667423	0.074973	0.16514		0.067682	0.970086	0.168916		0.014498	0.070282	0.610402
4691	21651	0.639553	0.072044	0.149498		0.061889	0.939595	0.161316		0.013741	0.069896	0.586179
4692	21652	0.672931	0.075839	0.151788		0.061945	0.998971	0.168157		0.014294	0.076284	0.617342

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4693	21653	0.706191	0.079384	0.158136		0.061284	1.060129	0.173851		0.014796	0.083096	0.646341
4694	21654	0.869207	0.096934	0.193789		0.071245	1.318795	0.211376		0.01792	0.105568	0.792545
4695	21655	0.894387	0.097943	0.226904		0.067893	1.374337	0.21833		0.018035	0.11211	0.805976
4696	21656	0.791804	0.084429	0.217916		0.05531	1.231185	0.201906		0.015599	0.101753	0.714329
4697	21657	0.689678	0.072076	0.198593		0.044915	1.081563	0.185829		0.013328	0.090139	0.630287
4698	21658	0.804824	0.085556	0.242633		0.048547	1.27201	0.224678		0.015226	0.106489	0.742797
4699	21659	0.86393	0.093724	0.304101		0.048121	1.376431	0.24642		0.015941	0.11525	0.80443
4700	21660	0.943852	0.104622	0.385199		0.047836	1.517077	0.27205		0.016898	0.126484	0.88583
4701	21661	0.915896	0.103221	0.405784		0.041776	1.484195	0.265597		0.015885	0.12313	0.864385
4702	21662	0.956269	0.108837	0.435703		0.038963	1.560448	0.27932		0.016046	0.128517	0.907399
4703	21663	0.87384	0.099905	0.392271		0.031319	1.434636	0.258121		0.014159	0.116802	0.835174
4704	21664	0.685039	0.078343	0.291961		0.022028	1.130451	0.203306		0.01071	0.090911	0.659694
4705	21665	0.698131	0.079726	0.285097		0.021335	1.155207	0.206406		0.010675	0.09239	0.675154
4706	21666	0.953315	0.108191	0.348965		0.027085	1.583769	0.284087		0.013949	0.125894	0.928822
4707	21667	0.884662	0.099422	0.299446		0.024075	1.474097	0.271705		0.012342	0.117649	0.869054
4708	21668	0.884002	0.098176	0.300554		0.023876	1.476211	0.282013		0.011724	0.119737	0.875777
4709	21669	0.883382	0.096799	0.290651		0.024351	1.477589	0.29019		0.011537	0.122055	0.882415
4710	21670	0.850239	0.091708	0.25582		0.025659	1.423392	0.284631		0.010971	0.119456	0.856983
4711	21671	0.681838	0.072562	0.182341		0.023705	1.141485	0.230075		0.008708	0.096565	0.692687
4712	21672	0.781753	0.082008	0.175807		0.030681	1.308016	0.263859		0.009914	0.111232	0.800576
4713	21673	0.881491	0.090572	0.165261		0.039685	1.472965	0.294694		0.011085	0.126228	0.911174
4714	21674	0.948661	0.095127	0.182212		0.048229	1.581902	0.309311		0.011771	0.136142	0.989653
4715	21675	0.880605	0.085875	0.174757		0.049879	1.464156	0.275429		0.010791	0.125595	0.928366
4716	21676	0.880885	0.083362	0.182833		0.054988	1.458342	0.25928		0.010758	0.124311	0.937731
4717	21677	0.867943	0.084867	0.205054		0.059462	1.430023	0.235233		0.010702	0.121345	0.931473
4718	21678	0.748991	0.074929	0.192218		0.055795	1.227626	0.183377		0.009406	0.103444	0.809344
4719	21679	0.694895	0.07119	0.183264		0.05425	1.135046	0.158402		0.008806	0.095007	0.753651
4720	21680	0.882481	0.093225	0.250475		0.074322	1.431878	0.175374		0.011352	0.117967	0.961698
4721	21681	0.883035	0.095244	0.275303		0.079827	1.422292	0.150091		0.011484	0.117683	0.96312
4722	21682	0.951411	0.10344	0.30689		0.091938	1.520221	0.142361		0.01249	0.128037	1.035204
4723	21683	0.884191	0.095385	0.283147		0.090963	1.400576	0.136491		0.011683	0.11981	0.958201
4724	21684	0.784277	0.082873	0.2462		0.085549	1.230767	0.136546		0.010561	0.106674	0.84507
4725	21685	0.684126	0.070688	0.216568		0.07791	1.065461	0.129513		0.009502	0.093237	0.732953
4726	21686	0.853175	0.08552	0.269739		0.101274	1.31817	0.173304		0.012353	0.116211	0.912458
4727	21687	0.886558	0.084327	0.273621		0.110778	1.354699	0.193301		0.013516	0.120287	0.94462
4728	21688	0.68565	0.061104	0.201356		0.089957	1.035325	0.157549		0.010905	0.09261	0.726204
4729	21689	0.443872	0.038008	0.125429		0.059754	0.665689	0.104168		0.007231	0.059984	0.468052
4730	21690	0.673678	0.055825	0.183129		0.092617	1.004469	0.160256		0.011227	0.090842	0.707389
4731	21691	0.808047	0.062295	0.21116		0.115703	1.190361	0.194739		0.014052	0.108036	0.83933
4732	21692	0.808762	0.059441	0.21132		0.120384	1.176572	0.195722		0.01452	0.106497	0.827363
4733	21693	0.877847	0.061535	0.236904		0.135631	1.26072	0.21729		0.016365	0.11303	0.879963
4734	21694	0.810289	0.055522	0.254664		0.129717	1.148381	0.200659		0.015654	0.101054	0.792545
4735	21695	0.838131	0.059346	0.29631		0.138764	1.171604	0.203419		0.016665	0.100506	0.797417
4736	21696	0.811993	0.060632	0.315246		0.139095	1.117775	0.189014		0.016611	0.093154	0.748814
4737	21697	0.664689	0.05197	0.275034		0.117138	0.902136	0.147116		0.013939	0.073043	0.597658
4738	21698	0.664213	0.05342	0.283478		0.118892	0.893924	0.14209		0.014119	0.0711	0.590431
4739	21699	0.895761	0.076761	0.402183		0.165328	1.18377	0.176444		0.019491	0.090786	0.778001
4740	21700	0.896906	0.081486	0.416337		0.170391	1.162679	0.159121		0.019959	0.085894	0.760146
4741	21701	0.967035	0.094487	0.457284		0.188764	1.228568	0.150301		0.022072	0.086739	0.799384
4742	21702	0.899339	0.093898	0.441322		0.180061	1.118877	0.135988		0.021084	0.075463	0.725769
4743	21703	0.900556	0.099757	0.446225		0.184619	1.096183	0.137423		0.02166	0.070804	0.708864
4744	21704	0.901807	0.105576	0.443034		0.188982	1.072861	0.140511		0.022257	0.066125	0.690085
4745	21705	0.972407	0.119846	0.464347		0.207909	1.129397	0.158813		0.024619	0.066078	0.720748
4746	21706	0.904405	0.116918	0.406845		0.196898	1.024315	0.149282		0.023417	0.056381	0.647238
4747	21707	0.988005	0.133808	0.403104		0.21856	1.089802	0.159309		0.026001	0.05784	0.680206
4748	21708	1.100488	0.161338	0.375178		0.24727	1.174698	0.165097		0.029434	0.06127	0.735565
4749	21709	0.991061	0.160874	0.26653		0.225149	1.025024	0.134132		0.026753	0.052985	0.647954
4750	21710	0.992293	0.180147	0.191255		0.227156	0.993188	0.132704		0.026827	0.050933	0.638087
4751	21711	0.720645	0.126978	0.084008		0.136152	0.769517	0.097182		0.020265	0.038232	0.468163
4752	21712	0.817397	0.133905	0.111784		0.151649	0.909946	0.093132		0.022811	0.045365	0.538979
4753	21713	0.747497	0.116694	0.123254		0.135249	0.865319	0.0791		0.020692	0.043499	0.506612
4754	21714	0.502434	0.076098	0.091714		0.088982	0.596904	0.050529		0.01382	0.03033	0.3484
4755	21715	0.394404	0.058444	0.075888		0.068609	0.477336	0.0403		0.010791	0.024545	0.278398
4756	21716	0.522045	0.075962	0.103608		0.089365	0.641262	0.057754		0.014212	0.033473	0.374021
4757	21717	0.76206	0.10699	0.160101		0.126188	0.961534	0.096134		0.020512	0.051611	0.561556
4758	21718	0.658083	0.088839	0.142665		0.104785	0.852737	0.089987		0.017457	0.047081	0.502245
4759	21719	0.580757	0.075962	0.128426		0.08943	0.767539	0.081812		0.015255	0.043255	0.453998
4760	21720	0.579966	0.073462	0.129461		0.086175	0.780913	0.082219		0.015081	0.045088	0.461585
4761	21721	0.630631	0.077301	0.139667		0.090219	0.864247	0.095102		0.016198	0.051188	0.507243
4762	21722	0.512449	0.060836	0.110533		0.070418	0.714091	0.082332		0.012981	0.043347	0.413711

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4763	21723	0.400422	0.046427	0.085919		0.053235	0.564933	0.067033		0.010041	0.034914	0.323233
4764	21724	0.445684	0.05074	0.093696		0.057653	0.634817	0.076595		0.011081	0.039757	0.359488
4765	21725	0.526096	0.058765	0.103908		0.065145	0.759882	0.093075		0.012902	0.049261	0.423998
4766	21726	0.566575	0.063341	0.104169		0.067119	0.828923	0.101913		0.013688	0.055471	0.457074
4767	21727	0.494644	0.055448	0.084845		0.05592	0.732576	0.089628		0.011761	0.050435	0.400241
4768	21728	0.473992	0.053221	0.075002		0.051175	0.709663	0.085956		0.011108	0.05004	0.384963
4769	21729	0.498721	0.055983	0.074427		0.051291	0.754599	0.090218		0.011516	0.054375	0.406419
4770	21730	0.523368	0.058573	0.077169		0.050808	0.800877	0.094244		0.01187	0.058951	0.427153
4771	21731	0.644134	0.071599	0.098399		0.05879	0.996392	0.115973		0.014318	0.074646	0.52728
4772	21732	0.662783	0.072591	0.114591		0.056106	1.038464	0.120427		0.014336	0.079084	0.553111
4773	21733	0.586765	0.062955	0.10969		0.045808	0.930385	0.110446		0.012349	0.071705	0.497283
4774	21734	0.51108	0.055006	0.101009		0.037272	0.817311	0.101104		0.010518	0.063411	0.436865
4775	21735	0.596373	0.064972	0.123558		0.040419	0.961245	0.121183		0.011983	0.074897	0.512613
4776	21736	0.640155	0.070639	0.157782		0.039634	1.040173	0.131132		0.012506	0.081137	0.552045
4777	21737	0.69935	0.078262	0.198018		0.039136	1.146458	0.142252		0.013221	0.089285	0.604009
4778	21738	0.678597	0.076758	0.207898		0.034246	1.121425	0.140844		0.012396	0.08707	0.586832
4779	21739	0.708428	0.080591	0.223048		0.032064	1.178803	0.146992		0.01248	0.091109	0.61428
4780	21740	0.647331	0.073768	0.200799		0.025903	1.083603	0.135427		0.010967	0.083149	0.563957
4781	21741	0.507419	0.057779	0.149683		0.017689	0.853769	0.107527		0.008274	0.064992	0.444853
4782	21742	0.517085	0.058775	0.146408		0.016887	0.872382	0.111106		0.008227	0.066091	0.455234
4783	21743	0.706	0.079765	0.180075		0.021291	1.195929	0.15598		0.010717	0.089868	0.626354
4784	21744	0.65511	0.073334	0.143307		0.018337	1.113124	0.148649		0.009431	0.082909	0.585651
4785	21745	0.654527	0.072503	0.144066		0.017642	1.114752	0.153913		0.00892	0.08278	0.589565
4786	21746	0.653976	0.071597	0.139798		0.018077	1.115687	0.158123		0.008492	0.083253	0.593526
4787	21747	0.629335	0.067936	0.123478		0.018518	1.074676	0.154933		0.008052	0.080656	0.575488
4788	21748	0.504651	0.053802	0.088289		0.017327	0.861811	0.124994		0.006367	0.06494	0.464105
4789	21749	0.578532	0.060881	0.085458		0.022702	0.987599	0.143099		0.007201	0.074697	0.535056
4790	21750	0.652243	0.067373	0.081826		0.029704	1.112171	0.159195		0.007975	0.084476	0.60764
4791	21751	0.701812	0.07092	0.088599		0.036353	1.194574	0.166702		0.008572	0.090955	0.658768
4792	21752	0.6514	0.06415	0.084699		0.03779	1.105932	0.148436		0.007954	0.084145	0.616309
4793	21753	0.650984	0.062286	0.0894		0.042101	1.101875	0.140297		0.00796	0.083638	0.621147
4794	21754	0.641328	0.061717	0.095381		0.045721	1.080754	0.128544		0.00784	0.08187	0.616578
4795	21755	0.553361	0.053935	0.089119		0.043006	0.928073	0.101759		0.006782	0.070253	0.535455
4796	21756	0.513364	0.050308	0.086361		0.041861	0.858249	0.089045		0.006411	0.064988	0.498244
4797	21757	0.651859	0.065352	0.119501		0.057524	1.083137	0.100734		0.008431	0.082256	0.634697
4798	21758	0.652148	0.066303	0.131644		0.061933	1.076296	0.088182		0.008731	0.082656	0.635243
4799	21759	0.702532	0.071702	0.146972		0.071464	1.150856	0.085405		0.009707	0.089714	0.682675
4800	21760	0.652813	0.066042	0.139247		0.070822	1.060683	0.075838		0.009275	0.083715	0.631437
4801	21761	0.578941	0.057465	0.124113		0.066732	0.932344	0.073511		0.008442	0.074355	0.556794
4802	21762	0.504934	0.049082	0.106785		0.060841	0.807217	0.069413		0.007496	0.064842	0.483359
4803	21763	0.629618	0.059588	0.131958		0.07916	0.998744	0.092415		0.009505	0.080724	0.599768
4804	21764	0.654167	0.059175	0.134306		0.086696	1.02646	0.102233		0.010371	0.083558	0.618757
4805	21765	0.505837	0.043281	0.099178		0.070491	0.78445	0.082669		0.008492	0.064674	0.475878
4806	21766	0.327433	0.027066	0.06189		0.046849	0.504371	0.054466		0.005663	0.041826	0.307083
4807	21767	0.496919	0.039842	0.090494		0.072641	0.761039	0.083529		0.008797	0.063379	0.464545
4808	21768	0.595965	0.045041	0.106327		0.090826	0.901869	0.100857		0.01101	0.075423	0.552419
4809	21769	0.596419	0.04339	0.106349		0.094597	0.891357	0.10108		0.011515	0.074422	0.546255
4810	21770	0.64728	0.045221	0.122775		0.106645	0.955043	0.110794		0.012972	0.079051	0.583487
4811	21771	0.597414	0.041112	0.130897		0.102081	0.869853	0.101844		0.012419	0.070845	0.528121
4812	21772	0.617886	0.04434	0.151501		0.109312	0.887345	0.102961		0.013318	0.070753	0.535536
4813	21773	0.598565	0.044971	0.160902		0.109689	0.846452	0.095761		0.013357	0.065763	0.510094
4814	21774	0.489929	0.038345	0.139902		0.092455	0.683102	0.074802		0.011214	0.051767	0.411064
4815	21775	0.489561	0.039196	0.14417		0.093896	0.676863	0.072476		0.01135	0.050484	0.406946
4816	21776	0.660206	0.055703	0.204549		0.130772	0.896321	0.090831		0.015737	0.064721	0.537874
4817	21777	0.661024	0.059141	0.212089		0.134979	0.880394	0.083154		0.01619	0.061455	0.527446
4818	21778	0.712658	0.068671	0.233354		0.149773	0.930376	0.080073		0.017908	0.062293	0.556799
4819	21779	0.662747	0.068335	0.218285		0.143124	0.847421	0.070876		0.017085	0.053889	0.507078
4820	21780	0.663639	0.072804	0.219579		0.147039	0.830363	0.071762		0.017598	0.051098	0.4973
4821	21781	0.664543	0.077308	0.220227		0.150817	0.812888	0.074144		0.018109	0.048437	0.48742
4822	21782	0.716516	0.088172	0.231294		0.166289	0.855963	0.084596		0.019995	0.049465	0.513527
4823	21783	0.666358	0.086571	0.202735		0.15786	0.776575	0.080752		0.01896	0.043722	0.465443
4824	21784	0.727903	0.099716	0.200831		0.175639	0.826453	0.088108		0.021075	0.045515	0.494149
4825	21785	0.810632	0.123082	0.189779		0.199232	0.890988	0.095208		0.023814	0.048016	0.544202
4826	21786	0.729914	0.123191	0.140835		0.181803	0.777334	0.089633		0.021604	0.041201	0.483691
4827	21787	0.730699	0.138275	0.10498		0.183713	0.752791	0.100483		0.021654	0.039209	0.480802
4828	21788	0.524503	0.093472	0.059544		0.106079	0.566086	0.073858		0.015195	0.028336	0.343158
4829	21789	0.594924	0.098209	0.071974		0.117936	0.669501	0.066737		0.017166	0.033772	0.393462
4830	21790	0.54408	0.0854	0.073427		0.104956	0.636629	0.053605		0.015616	0.032482	0.364693
4831	21791	0.365685	0.055626	0.053064		0.068918	0.439093	0.033279		0.010446	0.02268	0.249053
4832	21792	0.287047	0.042697	0.043725		0.05306	0.351102	0.025196		0.008169	0.018336	0.198113

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4833	21793	0.379927	0.055484	0.059973		0.069034	0.471645	0.033238		0.010786	0.024882	0.265202
4834	21794	0.554587	0.078152	0.092324		0.097299	0.707116	0.053352		0.015637	0.038136	0.395381
4835	21795	0.478857	0.064949	0.082377		0.080645	0.627013	0.04957		0.013376	0.034791	0.348484
4836	21796	0.422574	0.055609	0.073295		0.068731	0.56431	0.044827		0.011724	0.032058	0.312882
4837	21797	0.421966	0.053877	0.073301		0.066164	0.574106	0.045817		0.011606	0.033368	0.316925
4838	21798	0.458828	0.05681	0.078788		0.069239	0.635314	0.053564		0.012451	0.037748	0.347435
4839	21799	0.372813	0.044813	0.062169		0.054019	0.524864	0.046353		0.009966	0.031866	0.282989
4840	21800	0.291307	0.034261	0.046909		0.040832	0.415192	0.037663		0.0077	0.025608	0.221011
4841	21801	0.324233	0.0375	0.050407		0.044206	0.466541	0.043007		0.0085	0.029111	0.245811
4842	21802	0.382723	0.043219	0.056748		0.049966	0.558465	0.052287		0.00988	0.035531	0.290296
4843	21803	0.412178	0.046315	0.058228		0.051517	0.609235	0.057325		0.010453	0.039879	0.312991
4844	21804	0.359831	0.040384	0.047563		0.042947	0.538435	0.050485		0.008952	0.036142	0.273988
4845	21805	0.3448	0.038727	0.041952		0.039335	0.521603	0.048516		0.008434	0.035758	0.263585
4846	21806	0.362796	0.040718	0.040208		0.039434	0.554662	0.0511		0.00873	0.038777	0.278439
4847	21807	0.380723	0.042608	0.041462		0.03911	0.588722	0.053735		0.008978	0.041975	0.295946
4848	21808	0.468587	0.052114	0.054204		0.045321	0.732483	0.066425		0.010795	0.053084	0.369333
4849	21809	0.482118	0.052916	0.062873		0.043128	0.763402	0.068735		0.010776	0.056138	0.385945
4850	21810	0.42683	0.046217	0.060044		0.035251	0.683957	0.063435		0.009266	0.050845	0.345829
4851	21811	0.371778	0.040651	0.055617		0.028713	0.600873	0.05797		0.007887	0.04497	0.303201
4852	21812	0.433833	0.047841	0.068873		0.031191	0.70674	0.069255		0.008967	0.05313	0.35518
4853	21813	0.465654	0.05182	0.087403		0.030642	0.764801	0.074487		0.00934	0.057553	0.381826
4854	21814	0.508701	0.057199	0.109204		0.029932	0.842972	0.080278		0.009866	0.063355	0.417017
4855	21815	0.493588	0.055939	0.114548		0.026217	0.824587	0.079356		0.009247	0.061887	0.404685
4856	21816	0.515298	0.058607	0.122949		0.024603	0.866751	0.08318		0.009284	0.064892	0.423243
4857	21817	0.470804	0.053551	0.110673		0.019919	0.796651	0.076455		0.008139	0.059317	0.388152
4858	21818	0.369031	0.041906	0.082664		0.013624	0.627607	0.061471		0.006133	0.046443	0.305886
4859	21819	0.376045	0.042624	0.080935		0.01278	0.641271	0.063644		0.0061	0.047292	0.312888
4860	21820	0.513429	0.057846	0.099871		0.015965	0.87907	0.089223		0.007915	0.064451	0.430168
4861	21821	0.476366	0.053171	0.079791		0.013648	0.818138	0.085118		0.006945	0.059558	0.401754
4862	21822	0.47591	0.052576	0.076615		0.013014	0.819285	0.087907		0.00655	0.059233	0.40395
4863	21823	0.475461	0.051959	0.074549		0.013182	0.819976	0.09023		0.006208	0.059443	0.406245
4864	21824	0.457544	0.049341	0.066035		0.013343	0.789844	0.088365		0.005849	0.057635	0.393418
4865	21825	0.36686	0.039081	0.047265		0.012528	0.633377	0.071212		0.004605	0.046415	0.316875
4866	21826	0.420537	0.044234	0.045985		0.016512	0.725806	0.081454		0.00518	0.053394	0.364852
4867	21827	0.474063	0.048997	0.044398		0.021744	0.817411	0.09065		0.005807	0.060416	0.413808
4868	21828	0.510089	0.051635	0.047637		0.026709	0.878081	0.09506		0.006238	0.06527	0.448094
4869	21829	0.473382	0.046733	0.045497		0.027895	0.812988	0.084707		0.005778	0.060633	0.418567
4870	21830	0.473044	0.045423	0.048619		0.03117	0.81008	0.080173		0.005782	0.060373	0.42127
4871	21831	0.465798	0.044546	0.051912		0.033926	0.794667	0.073807		0.0057	0.058994	0.417841
4872	21832	0.401899	0.038733	0.048399		0.031949	0.682508	0.058827		0.005044	0.050384	0.362651
4873	21833	0.372829	0.035964	0.04694		0.031118	0.631207	0.051659		0.004791	0.046494	0.337286
4874	21834	0.473348	0.046189	0.064175		0.042795	0.796711	0.058853		0.006334	0.058753	0.429336
4875	21835	0.473522	0.046724	0.070242		0.046145	0.791835	0.051995		0.006587	0.058675	0.429634
4876	21836	0.510083	0.050453	0.079846		0.053294	0.846884	0.050806		0.007328	0.063434	0.461817
4877	21837	0.473922	0.046394	0.076474		0.052857	0.780682	0.045119		0.007012	0.059025	0.427194
4878	21838	0.420248	0.040363	0.068208		0.049843	0.686324	0.041312		0.006392	0.052332	0.376829
4879	21839	0.366505	0.034535	0.05878		0.04548	0.594261	0.038945		0.005688	0.045601	0.327339
4880	21840	0.456991	0.042034	0.071612		0.059211	0.735295	0.051729		0.007212	0.05675	0.406493
4881	21841	0.474744	0.041869	0.072717		0.064881	0.755708	0.056971		0.007667	0.058833	0.419798
4882	21842	0.367066	0.03076	0.053812		0.052784	0.577519	0.045871		0.006324	0.045519	0.322368
4883	21843	0.2376	0.0193	0.033633		0.035095	0.371314	0.030162		0.004227	0.029458	0.207762
4884	21844	0.360579	0.028489	0.049239		0.05443	0.560266	0.046186		0.006562	0.044647	0.314019
4885	21845	0.432402	0.032383	0.058196		0.068073	0.663918	0.055582		0.008253	0.053135	0.37325
4886	21846	0.432701	0.03132	0.05854		0.07092	0.656145	0.055878		0.008634	0.052465	0.369808
4887	21847	0.469586	0.032765	0.06843		0.079991	0.702977	0.061006		0.009759	0.055814	0.396287
4888	21848	0.433366	0.030138	0.072585		0.076579	0.640219	0.0557		0.00933	0.050068	0.361243
4889	21849	0.448192	0.032396	0.083798		0.082035	0.653026	0.056262		0.01004	0.050069	0.368853
4890	21850	0.434156	0.032754	0.088994		0.082366	0.622869	0.052423		0.01011	0.04667	0.35235
4891	21851	0.35536	0.027855	0.077436		0.069467	0.502638	0.041086		0.008488	0.036826	0.284659
4892	21852	0.355079	0.028432	0.079528		0.070568	0.498041	0.039894		0.00859	0.03595	0.282166
4893	21853	0.478816	0.04027	0.112465		0.098335	0.659518	0.050301		0.011938	0.046001	0.373879
4894	21854	0.47941	0.042719	0.116818		0.101598	0.647827	0.046486		0.012338	0.043711	0.367624
4895	21855	0.516866	0.049585	0.128775		0.11284	0.684653	0.045935		0.013649	0.044859	0.389187
4896	21856	0.480644	0.04934	0.12045		0.107922	0.623647	0.039806		0.013014	0.039847	0.355359
4897	21857	0.481291	0.05261	0.119666		0.110985	0.61112	0.040931		0.013417	0.03801	0.349524
4898	21858	0.48195	0.055976	0.119633		0.113974	0.598278	0.043155		0.013822	0.036142	0.343896
4899	21859	0.519654	0.064017	0.125946		0.125836	0.630013	0.049758		0.015225	0.03698	0.363995
4900	21860	0.483251	0.063021	0.110447		0.119609	0.571626	0.04817		0.014427	0.032744	0.331581
4901	21861	0.527852	0.073268	0.109702		0.133271	0.608391	0.053602		0.016031	0.03409	0.356892
4902	21862	0.587819	0.09084	0.107762		0.151461	0.655935	0.062675		0.018137	0.035866	0.395196

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4903	21863	0.529195	0.091023	0.081332		0.138395	0.572238	0.065306		0.016463	0.030672	0.354239
4904	21864	0.529689	0.102202	0.073608		0.140012	0.554041	0.075584		0.016538	0.029061	0.352812
4905	21865	0.55751	0.100589	0.068512		0.122213	0.609288	0.082991		0.016741	0.030722	0.368142
4906	21866	0.632422	0.105222	0.067952		0.135489	0.720744	0.073738		0.019096	0.036784	0.420344
4907	21867	0.578346	0.09132	0.064015		0.12015	0.685308	0.052102		0.017452	0.035473	0.38763
4908	21868	0.388699	0.059407	0.044108		0.078704	0.472574	0.031024		0.011707	0.024826	0.26227
4909	21869	0.30509	0.04557	0.035275		0.06048	0.377823	0.022584		0.009199	0.020086	0.206966
4910	21870	0.40378	0.05921	0.047408		0.07856	0.507518	0.028661		0.01218	0.027245	0.275226
4911	21871	0.589327	0.083417	0.070695		0.110455	0.760864	0.038819		0.017665	0.041666	0.407165
4912	21872	0.50881	0.069375	0.061212		0.091347	0.674556	0.033914		0.015108	0.037952	0.356068
4913	21873	0.448954	0.059476	0.053479		0.07772	0.607049	0.029898		0.013279	0.034887	0.317002
4914	21874	0.448277	0.057733	0.05236		0.074702	0.617597	0.030992		0.013172	0.036177	0.318966
4915	21875	0.487395	0.061012	0.055534		0.078118	0.683449	0.036351		0.014118	0.040762	0.348736
4916	21876	0.396013	0.048241	0.043402		0.060934	0.564535	0.031271		0.011277	0.034305	0.284164
4917	21877	0.309426	0.036958	0.032543		0.046049	0.446527	0.025318		0.008716	0.027508	0.222317
4918	21878	0.344396	0.040503	0.034869		0.049858	0.501741	0.0289		0.009613	0.031214	0.247695
4919	21879	0.406522	0.046766	0.038529		0.056359	0.600672	0.035246		0.011156	0.037852	0.292928
4920	21880	0.437791	0.04963	0.039563		0.058159	0.655366	0.038767		0.011749	0.04183	0.316054
4921	21881	0.382187	0.043225	0.032321		0.048544	0.579194	0.034148		0.010013	0.037751	0.276303
4922	21882	0.366229	0.041307	0.028489		0.044491	0.561078	0.03283		0.009407	0.037217	0.265046
4923	21883	0.385343	0.043348	0.026894		0.04465	0.596664	0.034718		0.009708	0.040266	0.281295
4924	21884	0.404388	0.045377	0.026772		0.044321	0.633381	0.036778		0.009954	0.043548	0.298399
4925	21885	0.497696	0.055553	0.036286		0.051447	0.788114	0.045694		0.011922	0.055047	0.371045
4926	21886	0.512083	0.056479	0.041708		0.048834	0.821295	0.047133		0.011842	0.058037	0.385849
4927	21887	0.453363	0.05017	0.039726		0.03996	0.735806	0.04454		0.010182	0.052479	0.344418
4928	21888	0.394883	0.043946	0.036926		0.032576	0.646512	0.040762		0.00866	0.046461	0.301436
4929	21889	0.460782	0.051505	0.045458		0.035452	0.76055	0.04868		0.009823	0.054959	0.352717
4930	21890	0.494587	0.055562	0.057347		0.034915	0.823065	0.052011		0.010201	0.059463	0.378684
4931	21891	0.540313	0.06107	0.071329		0.033918	0.907249	0.055513		0.010776	0.065432	0.413188
4932	21892	0.524237	0.059537	0.075016		0.029536	0.887572	0.053811		0.010102	0.064073	0.400909
4933	21893	0.547248	0.062239	0.080852		0.027784	0.933007	0.056944		0.010109	0.067414	0.419189
4934	21894	0.499992	0.056726	0.072602		0.022567	0.857362	0.052841		0.008822	0.061679	0.383891
4935	21895	0.391872	0.044327	0.054425		0.015456	0.675311	0.042167		0.006655	0.048373	0.302061
4936	21896	0.399297	0.04509	0.053381		0.014391	0.690001	0.04341		0.006614	0.04935	0.308765
4937	21897	0.545128	0.06121	0.066239		0.017561	0.945873	0.06094		0.008543	0.067484	0.423941
4938	21898	0.505762	0.056206	0.052969		0.015055	0.880143	0.058433		0.007449	0.062439	0.395054
4939	21899	0.505224	0.055555	0.050332		0.014112	0.881274	0.060067		0.007023	0.062184	0.396372
4940	21900	0.504694	0.054957	0.047625		0.014057	0.882062	0.061694		0.006676	0.062034	0.398061
4941	21901	0.485617	0.052252	0.042463		0.01416	0.849731	0.060511		0.006261	0.060033	0.384976
4942	21902	0.389355	0.041365	0.030349		0.013214	0.681337	0.048612		0.004903	0.048337	0.309518
4943	21903	0.446287	0.046807	0.029954		0.017562	0.780712	0.055429		0.005486	0.055831	0.355744
4944	21904	0.503026	0.051905	0.029144		0.023297	0.87935	0.061742		0.006195	0.063536	0.40289
4945	21905	0.541182	0.054791	0.031215		0.028733	0.944821	0.064945		0.006636	0.068831	0.435733
4946	21906	0.502222	0.049583	0.029641		0.030187	0.87479	0.057724		0.006124	0.064036	0.406003
4947	21907	0.501794	0.04822	0.031739		0.033845	0.871701	0.054575		0.006132	0.06385	0.407675
4948	21908	0.493827	0.046994	0.034049		0.036909	0.855257	0.050484		0.006159	0.062454	0.40384
4949	21909	0.426041	0.040654	0.032187		0.034793	0.734684	0.040601		0.005546	0.053347	0.350179
4950	21910	0.395205	0.037602	0.031144		0.033899	0.679482	0.036133		0.005265	0.04913	0.325369
4951	21911	0.501731	0.04749	0.042506		0.046705	0.857713	0.04204		0.006995	0.061573	0.413564
4952	21912	0.50183	0.047907	0.046411		0.050407	0.85265	0.037909		0.007303	0.061495	0.413884
4953	21913	0.540509	0.051727	0.053186		0.058269	0.91219	0.036129		0.00814	0.066491	0.445303
4954	21914	0.502154	0.047386	0.050827		0.057843	0.841064	0.03098		0.007797	0.061671	0.411996
4955	21915	0.445222	0.041183	0.04535		0.054616	0.739537	0.027214		0.007136	0.054549	0.363677
4956	21916	0.388233	0.035349	0.039259		0.049866	0.640399	0.025419		0.006355	0.047533	0.316328
4957	21917	0.484049	0.043209	0.047824		0.06497	0.792427	0.033797		0.008063	0.059138	0.39336
4958	21918	0.502828	0.043119	0.048185		0.07126	0.814425	0.037035		0.008534	0.060873	0.406635
4959	21919	0.388722	0.031828	0.03568		0.058018	0.622358	0.029714		0.006928	0.046899	0.312804
4960	21920	0.251592	0.020067	0.022394		0.038579	0.40013	0.019541		0.004638	0.030385	0.201902
4961	21921	0.381802	0.029742	0.032894		0.059846	0.603729	0.029909		0.007179	0.046083	0.305542
4962	21922	0.457833	0.03399	0.038322		0.074879	0.715381	0.035843		0.008995	0.054821	0.36379
4963	21923	0.4581	0.032967	0.038828		0.078037	0.706947	0.035937		0.009552	0.054176	0.361172
4964	21924	0.497094	0.034675	0.04613		0.088024	0.757334	0.039284		0.010761	0.057759	0.388726
4965	21925	0.45873	0.032293	0.048607		0.084297	0.68964	0.035887		0.010247	0.051812	0.35526
4966	21926	0.474398	0.034593	0.055978		0.09035	0.703338	0.036223		0.01109	0.05179	0.363746
4967	21927	0.459506	0.034865	0.059703		0.090762	0.670768	0.033982		0.011222	0.048292	0.348825
4968	21928	0.37608	0.029577	0.052175		0.076584	0.541253	0.026864		0.009406	0.038161	0.28282
4969	21929	0.375771	0.030129	0.05361		0.077822	0.536291	0.026176		0.009509	0.03726	0.280831
4970	21930	0.506732	0.04261	0.075383		0.108571	0.710172	0.033266		0.0133	0.048524	0.373399
4971	21931	0.507343	0.045159	0.07799		0.112272	0.697627	0.031581		0.013849	0.046777	0.368762
4972	21932	0.546962	0.052413	0.086309		0.124819	0.737352	0.03222		0.015322	0.048395	0.392243

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
4973	21933	0.508643	0.052098	0.080619		0.11952	0.671687	0.030325		0.014587	0.04324	0.359484
4974	21934	0.509347	0.05557	0.08012		0.123082	0.658192	0.032168		0.015071	0.041458	0.35498
4975	21935	0.510052	0.059271	0.079241		0.126568	0.64433	0.034462		0.015514	0.039514	0.351009
4976	21936	0.549951	0.068007	0.083304		0.139945	0.678474	0.040413		0.01703	0.040453	0.376055
4977	21937	0.511438	0.067102	0.075139		0.133257	0.61559	0.040763		0.016091	0.035912	0.348881
4978	21938	0.558633	0.079018	0.077749		0.148779	0.655196	0.048821		0.017937	0.037386	0.380325
4979	21939	0.622011	0.09804	0.078761		0.169475	0.706429	0.066451		0.020294	0.039171	0.422506
4980	21940	0.559899	0.098322	0.071045		0.155227	0.616273	0.071449		0.018461	0.033402	0.379412
4981	21941	0.560276	0.110344	0.079394		0.157348	0.59653	0.084908		0.018651	0.03151	0.378699
4982	21942	0.745069	0.049759	0.066762		0.045816	0.767573	0.010739		0.01146	0.04232	0.455119
4983	21943	0.862553	0.056884	0.076408		0.053004	0.910919	0.013011		0.013257	0.05059	0.531973
4984	21944	0.980205	0.063402	0.087252		0.060038	1.068615	0.020501		0.014996	0.059908	0.612871
4985	21945	0.914472	0.057815	0.080398		0.055818	1.02777	0.028858		0.01394	0.058088	0.579568
4986	21946	0.60432	0.038243	0.051144		0.036691	0.693262	0.024021		0.009178	0.039487	0.386113
4987	21947	0.474792	0.030144	0.03862		0.028721	0.552875	0.022239		0.007176	0.031652	0.305084
4988	21948	0.628876	0.040074	0.049223		0.037919	0.741177	0.03324		0.009458	0.04255	0.405986
4989	21949	0.935667	0.060088	0.067133		0.05609	1.127524	0.060164		0.014011	0.065049	0.609015
4990	21950	0.794641	0.05135	0.050608		0.047236	0.979289	0.06037		0.011792	0.057121	0.520717
4991	21951	0.701933	0.045654	0.04727		0.041466	0.879788	0.059795		0.010262	0.051652	0.462505
4992	21952	0.701603	0.046027	0.047889		0.041202	0.893781	0.066201		0.01006	0.052575	0.465006
4993	21953	0.779311	0.051809	0.05378		0.04549	1.008319	0.080453		0.01106	0.0594	0.519324
4994	21954	0.621012	0.042203	0.043183		0.035936	0.815433	0.068936		0.008714	0.048459	0.415138
4995	21955	0.485582	0.033537	0.034002		0.027908	0.644676	0.056741		0.006695	0.038561	0.325225
4996	21956	0.540765	0.03777	0.03752		0.030882	0.724076	0.065722		0.007372	0.04344	0.362721
4997	21957	0.63885	0.04529	0.043833		0.036126	0.866222	0.082149		0.008523	0.052028	0.430456
4998	21958	0.703893	0.050535	0.047701		0.039358	0.965417	0.095104		0.009357	0.058064	0.476841
4999	21959	0.60162	0.043741	0.041546		0.033184	0.833972	0.084471		0.007979	0.050609	0.409197
5000	21960	0.576931	0.042404	0.042649		0.031551	0.807301	0.08368		0.007536	0.049401	0.394532
5001	21961	0.6075	0.045082	0.047372		0.032908	0.857803	0.090965		0.007865	0.052745	0.417783
5002	21962	0.638064	0.04781	0.05344		0.034223	0.909745	0.098891		0.008144	0.05601	0.441633
5003	21963	0.801815	0.060567	0.071213		0.042498	1.15372	0.12823		0.010312	0.071115	0.558187
5004	21964	0.809673	0.061606	0.073298		0.042166	1.177101	0.132967		0.010529	0.07338	0.565764
5005	21965	0.717692	0.05493	0.06333		0.036766	1.053445	0.120769		0.009266	0.066279	0.503098
5006	21966	0.625746	0.048099	0.055143		0.031633	0.924946	0.107378		0.008063	0.058342	0.439957
5007	21967	0.746495	0.057735	0.064014		0.037134	1.110497	0.130402		0.009809	0.070222	0.52641
5008	21968	0.78562	0.060945	0.062655		0.038307	1.175613	0.138663		0.010559	0.075077	0.55478
5009	21969	0.859752	0.066835	0.061068		0.04103	1.294431	0.153362		0.011824	0.083543	0.608478
5010	21970	0.835817	0.065119	0.049265		0.039168	1.265147	0.150925		0.011702	0.08199	0.593762
5011	21971	0.890543	0.069448	0.040315		0.041154	1.353566	0.162391		0.012915	0.087872	0.634939
5012	21972	0.80047	0.062208	0.027063		0.036454	1.219566	0.145674		0.011929	0.079765	0.570935
5013	21973	0.628844	0.048622	0.02418		0.028209	0.959476	0.114011		0.009314	0.063105	0.448322
5014	21974	0.641706	0.049445	0.032204		0.028531	0.97969	0.116131		0.009446	0.064497	0.457357
5015	21975	0.894722	0.068451	0.06078		0.039201	1.366388	0.161111		0.013262	0.090039	0.636886
5016	21976	0.817161	0.061925	0.066998		0.035284	1.246229	0.144681		0.012096	0.082583	0.57877
5017	21977	0.818755	0.061342	0.075315		0.034825	1.245799	0.142172		0.011832	0.082889	0.576463
5018	21978	0.820488	0.060637	0.080053		0.034391	1.244868	0.139798		0.01192	0.082783	0.574243
5019	21979	0.808051	0.058805	0.079435		0.033557	1.221602	0.134771		0.011794	0.081067	0.561665
5020	21980	0.636649	0.045771	0.060447		0.026313	0.958925	0.103514		0.00931	0.063739	0.439049
5021	21981	0.731727	0.052057	0.065117		0.030169	1.097518	0.115708		0.010686	0.073042	0.500336
5022	21982	0.827789	0.058622	0.064683		0.034012	1.234289	0.126295		0.012023	0.081944	0.559989
5023	21983	0.910595	0.063975	0.058529		0.037217	1.348752	0.133989		0.013182	0.089167	0.609571
5024	21984	0.832798	0.058074	0.040409		0.033871	1.223763	0.116853		0.01201	0.080922	0.550887
5025	21985	0.835552	0.057732	0.030663		0.033826	1.216946	0.111343		0.011963	0.08036	0.548181
5026	21986	0.825773	0.056435	0.030245		0.033216	1.19104	0.10434		0.011735	0.078169	0.539325
5027	21987	0.730775	0.049303	0.032982		0.029137	1.043095	0.087388		0.010379	0.067956	0.474655
5028	21988	0.664526	0.044347	0.032827		0.026365	0.942139	0.076459		0.009451	0.061266	0.429656
5029	21989	0.846885	0.055369	0.047136		0.033265	1.185597	0.090844		0.01202	0.076859	0.542833
5030	21990	0.850532	0.054616	0.055137		0.032952	1.174653	0.084936		0.012065	0.075597	0.539469
5031	21991	0.937148	0.059069	0.066003		0.035611	1.275531	0.087		0.013398	0.081325	0.586816
5032	21992	0.858506	0.052505	0.061102		0.031833	1.150202	0.073592		0.01241	0.072958	0.528895
5033	21993	0.764718	0.045364	0.051703		0.02832	1.007439	0.060726		0.011144	0.06346	0.462618
5034	21994	0.669314	0.038945	0.046341		0.024752	0.869718	0.054607		0.009844	0.054315	0.39922
5035	21995	0.854586	0.048772	0.065213		0.031544	1.094552	0.075637		0.012748	0.067701	0.502944
5036	21996	0.87444	0.048399	0.074593		0.032154	1.097966	0.088135		0.013319	0.067267	0.505938
5037	21997	0.679461	0.036476	0.064418		0.02479	0.835275	0.076183		0.010547	0.050562	0.386926
5038	21998	0.441016	0.023294	0.044163		0.016002	0.535603	0.051874		0.007016	0.03214	0.249144
5039	21999	0.687159	0.035795	0.07184		0.024806	0.825905	0.083599		0.011197	0.049199	0.385891
5040	220	0.393819	0.009642	0.033896		0.010743	0.358682	0.00341		0.007626	0.010193	0.324646
5041	22000	0.808367	0.040947	0.098215		0.028803	0.950459	0.104395		0.013885	0.055791	0.449377
5042	22001	0.813065	0.040575	0.112318		0.02841	0.933779	0.109619		0.014814	0.053868	0.451115

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5043	22002	0.824234	0.039662	0.143071		0.026777	0.911335	0.116437		0.015339	0.051623	0.501189
5044	22003	0.857306	0.040694	0.197095		0.027067	0.93437	0.145334		0.016171	0.052763	0.56458
5045	22004	0.834699	0.039284	0.238345		0.027497	0.895765	0.167406		0.015941	0.051101	0.592279
5046	22005	0.702851	0.032816	0.232393		0.023901	0.744056	0.169565		0.013507	0.042823	0.529236
5047	22006	0.686745	0.031874	0.256174		0.023712	0.721333	0.181162		0.013229	0.041782	0.533561
5048	22007	0.929592	0.042535	0.425256		0.032978	0.960545	0.28449		0.017961	0.05629	0.764463
5049	22008	0.933822	0.045229	0.497911		0.033823	0.948818	0.318285		0.018008	0.055856	0.802855
5050	22009	1.028531	0.052614	0.613539		0.037762	1.027151	0.380445		0.019723	0.060454	0.912317
5051	22010	0.941282	0.050644	0.606094		0.034851	0.923463	0.366745		0.017988	0.05452	0.851621
5052	22011	0.944526	0.052923	0.63627		0.035167	0.909777	0.376321		0.018488	0.053622	0.862002
5053	22012	0.947457	0.054766	0.648197		0.035365	0.895453	0.375213		0.018939	0.052297	0.859053
5054	22013	1.042058	0.061804	0.708934		0.038852	0.96578	0.398164		0.021263	0.055615	0.924351
5055	22014	0.952275	0.057993	0.622514		0.03539	0.864787	0.339337		0.019773	0.049201	0.813905
5056	22015	1.040846	0.064857	0.628703		0.038592	0.925519	0.333196		0.021847	0.051779	0.845971
5057	22016	1.17932	0.07529	0.608481		0.043519	1.022153	0.312385		0.025324	0.055655	0.88868
5058	22017	1.043714	0.068224	0.425021		0.038328	0.882662	0.212389		0.022758	0.046788	0.723023
5059	22018	1.044193	0.069867	0.288201		0.038202	0.861177	0.140186		0.022969	0.044164	0.657876
5060	22019	0.870008	0.059593	0.108937		0.031734	0.699599	0.051443		0.019241	0.034452	0.493303
5061	22020	0.936944	0.069329	0.129445		0.03931	0.758437	0.059601		0.020116	0.037629	0.533895
5062	22021	0.860685	0.067846	0.127123		0.040536	0.700395	0.06436		0.018448	0.035017	0.494202
5063	22022	0.827896	0.069315	0.128461		0.04365	0.677207	0.072967		0.017748	0.03415	0.480097
5064	22023	0.909231	0.080295	0.144655		0.052945	0.747328	0.091453		0.019518	0.038004	0.532647
5065	22024	0.959831	0.090419	0.15422		0.062634	0.794009	0.112058		0.020754	0.040821	0.569609
5066	22025	0.953908	0.094823	0.151617		0.068287	0.793939	0.123937		0.020936	0.041206	0.572047
5067	22026	0.946711	0.099597	0.145852		0.074611	0.793848	0.1349		0.021382	0.041606	0.573506
5068	22027	0.884519	0.097532	0.130519		0.075525	0.747093	0.134346		0.020657	0.039462	0.539886
5069	22028	0.877537	0.101109	0.127757		0.08075	0.747044	0.140383		0.021603	0.039721	0.539043
5070	22029	0.978746	0.117491	0.138038		0.096678	0.840393	0.163654		0.025241	0.044929	0.604494
5071	22030	0.698481	0.087945	0.093327		0.074971	0.606901	0.122514		0.018623	0.032612	0.433953
5072	22031	0.481708	0.061473	0.063326		0.053022	0.420149	0.085638		0.012898	0.022603	0.29969
5073	22032	0.716744	0.093877	0.092717		0.082817	0.630193	0.130588		0.019173	0.03397	0.447039
5074	22033	0.787742	0.106428	0.099086		0.096809	0.700132	0.147374		0.020775	0.037804	0.492561
5075	22034	0.778484	0.108316	0.092937		0.101948	0.700016	0.148763		0.02004	0.037836	0.487614
5076	22035	0.563641	0.080647	0.066058		0.078845	0.513224	0.109466		0.014094	0.02775	0.353489
5077	22036	0.560107	0.08115	0.064888		0.080948	0.513152	0.109455		0.013847	0.027747	0.351419
5078	22037	0.75294	0.111936	0.091568		0.116996	0.699496	0.148914		0.018301	0.037811	0.473136
5079	22038	0.741434	0.113793	0.098862		0.124644	0.699142	0.148425		0.017666	0.037765	0.46709
5080	22039	0.729206	0.115234	0.107419		0.133666	0.698699	0.148069		0.01736	0.037703	0.461326
5081	22040	0.787938	0.127693	0.130506		0.159114	0.767984	0.16237		0.01967	0.041398	0.501468
5082	22041	0.94511	0.142425	0.138142		0.190099	0.946996	0.204868		0.023431	0.052149	0.613835
5083	22042	0.944619	0.134582	0.11654		0.188088	0.971101	0.221442		0.023206	0.054682	0.628659
5084	22043	1.070451	0.143532	0.126291		0.209641	1.127024	0.272021		0.026021	0.065205	0.730578
5085	22044	0.943095	0.117683	0.107988		0.1806	1.017386	0.257287		0.02258	0.060213	0.659407
5086	22045	0.863694	0.100881	0.096555		0.162031	0.949275	0.245663		0.020283	0.05715	0.61443
5087	22046	0.948759	0.103146	0.102993		0.173536	1.060699	0.276331		0.021913	0.064724	0.684518
5088	22047	0.861852	0.086613	0.08957		0.15343	0.979243	0.25313		0.019791	0.060088	0.623764
5089	22048	0.860794	0.079492	0.089949		0.149304	0.99256	0.250259		0.01987	0.060984	0.62118
5090	22049	0.859689	0.072635	0.090293		0.145232	1.003939	0.243844		0.019993	0.061715	0.617741
5091	22050	0.944121	0.072569	0.098199		0.155095	1.114853	0.25647		0.022139	0.068306	0.672893
5092	22051	0.857477	0.05963	0.084711		0.137197	1.022844	0.218112		0.020313	0.062035	0.603716
5093	22052	0.856285	0.054343	0.078545		0.13415	1.030431	0.199016		0.020538	0.061698	0.593775
5094	22053	0.634821	0.03731	0.054065		0.097755	0.769305	0.132215		0.015395	0.045505	0.432708
5095	22054	0.652517	0.03688	0.052254		0.099792	0.793006	0.128282		0.015899	0.046609	0.440817
5096	22055	0.775882	0.040976	0.053802		0.117778	0.946875	0.138374		0.019063	0.055083	0.516032
5097	22056	0.800622	0.039832	0.043985		0.121602	0.980949	0.130407		0.01987	0.057375	0.523856
5098	22057	0.773736	0.038509	0.02882		0.118385	0.95148	0.12007		0.019374	0.056187	0.500416
5099	22058	0.771747	0.042085	0.023744		0.120075	0.973892	0.109114		0.019631	0.059808	0.497101
5100	22059	0.770771	0.045185	0.032105		0.120444	0.995623	0.100081		0.019695	0.062778	0.498818
5101	22060	0.659468	0.040722	0.038045		0.102628	0.871903	0.079223		0.016852	0.056505	0.430286
5102	22061	0.423025	0.02659	0.02776		0.065468	0.565631	0.049082		0.010791	0.037165	0.277475
5103	22062	0.653194	0.041716	0.048842		0.100102	0.885003	0.073253		0.016588	0.059241	0.431591
5104	22063	0.843874	0.05488	0.076056		0.125993	1.170189	0.094653		0.02114	0.081361	0.566531
5105	22064	0.82973	0.054374	0.086157		0.119464	1.175874	0.095135		0.020431	0.084713	0.567584
5106	22065	0.649886	0.042623	0.073851		0.09042	0.935531	0.076866		0.015746	0.069018	0.45198
5107	22066	0.744293	0.049466	0.089803		0.099564	1.087214	0.093065		0.017668	0.081997	0.527977
5108	22067	0.837937	0.056935	0.105611		0.105732	1.245406	0.112277		0.019304	0.096801	0.608896
5109	22068	0.91933	0.064132	0.117624		0.108259	1.388068	0.135913		0.020509	0.110749	0.682783
5110	22069	0.834102	0.060124	0.102252		0.090731	1.277673	0.144123		0.017956	0.103722	0.631352
5111	22070	0.832121	0.062121	0.092907		0.082754	1.291582	0.162947		0.017192	0.106498	0.641272
5112	22071	0.654007	0.050539	0.063167		0.058656	1.027488	0.14234		0.012964	0.086326	0.512902

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5113	22072	0.721589	0.056918	0.065291		0.060436	1.141179	0.165469		0.014124	0.096616	0.571116
5114	22073	0.814385	0.066484	0.062775		0.059958	1.301668	0.202181		0.015795	0.110831	0.652647
5115	22074	0.824859	0.069714	0.052224		0.052108	1.331662	0.221295		0.015412	0.113823	0.667861
5116	22075	0.822794	0.072244	0.044661		0.043274	1.339881	0.239046		0.01512	0.115679	0.671991
5117	22076	0.902523	0.082402	0.056575		0.037554	1.480717	0.283042		0.016432	0.128888	0.742181
5118	22077	0.818774	0.07694	0.065171		0.025198	1.352077	0.275133		0.014724	0.11752	0.677474
5119	22078	0.723985	0.069488	0.067843		0.016435	1.201881	0.259397		0.012786	0.104218	0.605778
5120	22079	0.63002	0.061274	0.066129		0.013878	1.04909	0.236919		0.010925	0.091244	0.532001
5121	22080	0.801777	0.078501	0.09048		0.019261	1.338477	0.314803		0.013748	0.116519	0.682656
5122	22081	0.812214	0.079181	0.093772		0.021986	1.359837	0.334399		0.013653	0.117614	0.698573
5123	22082	0.810559	0.077951	0.089901		0.024965	1.360068	0.34756		0.013152	0.116848	0.702748
5124	22083	0.809019	0.076511	0.080909		0.031854	1.358885	0.360006		0.012643	0.116958	0.70388
5125	22084	0.888094	0.082147	0.073133		0.042549	1.492264	0.406562		0.013505	0.12878	0.771927
5126	22085	0.635351	0.056957	0.037345		0.035825	1.067823	0.295559		0.009377	0.091765	0.551444
5127	22086	0.622614	0.054684	0.029823		0.038327	1.046291	0.291173		0.008939	0.089662	0.539902
5128	22087	0.792548	0.067178	0.029848		0.056507	1.33001	0.373489		0.010835	0.114325	0.686596
5129	22088	0.883947	0.072359	0.044693		0.072264	1.479947	0.417843		0.011683	0.127802	0.764594
5130	22089	0.827514	0.067515	0.054778		0.076343	1.381683	0.389526		0.010574	0.119078	0.712643
5131	22090	0.851247	0.069489	0.07172		0.087724	1.415721	0.397549		0.011414	0.121956	0.729694
5132	22091	0.77789	0.063423	0.081714		0.088637	1.286577	0.36037		0.011337	0.11191	0.665304
5133	22092	0.740958	0.060368	0.087547		0.091607	1.219295	0.339005		0.011359	0.106865	0.633342
5134	22093	0.619519	0.050488	0.077238		0.081958	1.014879	0.278367		0.009913	0.089039	0.529139
5135	22094	0.710556	0.057905	0.091711		0.099918	1.158405	0.311396		0.011883	0.101521	0.606706
5136	22095	0.80164	0.06513	0.10386		0.12133	1.297249	0.338789		0.014204	0.114377	0.685217
5137	22096	0.79581	0.064444	0.098562		0.129221	1.277191	0.321907		0.014773	0.113194	0.680387
5138	22097	0.631653	0.051107	0.072213		0.108061	1.006696	0.245237		0.012164	0.088925	0.538451
5139	22098	0.601399	0.048619	0.061002		0.10789	0.951083	0.223117		0.012145	0.083466	0.510778
5140	22099	0.571142	0.046076	0.050151		0.106762	0.896101	0.20335		0.011953	0.078458	0.484814
5141	221	0.240707	0.007211	0.032498		0.004107	0.237992	0.039451		0.005732	0.009101	0.202941
5142	22100	0.595595	0.048577	0.049235		0.115754	0.926218	0.203456		0.012921	0.081177	0.50494
5143	22101	0.698571	0.058349	0.055647		0.141508	1.07527	0.226911		0.015562	0.094016	0.590513
5144	22102	0.632444	0.054123	0.050879		0.133271	0.963051	0.19388		0.014436	0.083441	0.531833
5145	22103	0.535359	0.046965	0.042887		0.117129	0.805566	0.152782		0.012621	0.068874	0.447031
5146	22104	0.48074	0.042882	0.039257		0.107717	0.717398	0.130181		0.011539	0.060932	0.399403
5147	22105	0.614845	0.055984	0.05394		0.141761	0.907484	0.154862		0.015098	0.076659	0.507396
5148	22106	0.773578	0.072011	0.075427		0.18485	1.124882	0.174841		0.019418	0.094092	0.631975
5149	22107	0.694745	0.065646	0.071774		0.171667	0.994731	0.138955		0.017795	0.081759	0.560717
5150	22108	0.695108	0.066749	0.073617		0.177055	0.979125	0.139055		0.018216	0.07878	0.553914
5151	22109	0.786948	0.078419	0.086656		0.206171	1.089339	0.156415		0.021037	0.086096	0.619653
5152	22110	0.929075	0.096507	0.106569		0.2515	1.255997	0.180909		0.025374	0.096846	0.721036
5153	22111	0.622896	0.066649	0.078188		0.173273	0.822596	0.119897		0.017313	0.061358	0.476115
5154	22112	0.470287	0.051148	0.06141		0.132495	0.613203	0.091231		0.013193	0.044828	0.356303
5155	22113	0.598613	0.066422	0.081486		0.171056	0.768247	0.117169		0.016961	0.054857	0.448378
5156	22114	0.908297	0.103336	0.128972		0.264007	1.140356	0.185463		0.026035	0.078714	0.66845
5157	22115	0.971404	0.114138	0.141177		0.288046	1.180665	0.209524		0.028219	0.076921	0.693306
5158	22116	0.855227	0.10392	0.125962		0.257125	1.004569	0.196022		0.025079	0.061294	0.594777
5159	22117	0.739107	0.092555	0.11009		0.223508	0.844808	0.180049		0.021746	0.048796	0.504133
5160	22118	0.683204	0.083692	0.103657		0.187821	0.768392	0.154205		0.018217	0.044471	0.464879
5161	22119	0.693777	0.08295	0.11488		0.174312	0.768632	0.144492		0.016775	0.044643	0.471099
5162	22120	0.703558	0.081886	0.128915		0.163042	0.768773	0.134585		0.015353	0.04483	0.47656
5163	22121	0.522574	0.059031	0.104079		0.112287	0.563794	0.091556		0.010189	0.032999	0.352914
5164	22122	0.525469	0.058475	0.10799		0.109123	0.563789	0.08837		0.009667	0.033049	0.354402
5165	22123	0.724506	0.07789	0.162095		0.140443	0.768718	0.111941		0.011876	0.045169	0.487236
5166	22124	0.731738	0.075762	0.17771		0.132786	0.768569	0.104506		0.011182	0.045214	0.490891
5167	22125	0.664412	0.066052	0.170574		0.113101	0.691554	0.088266		0.009486	0.040687	0.444721
5168	22126	0.445732	0.042813	0.117413		0.072122	0.460947	0.055998		0.006073	0.027102	0.297758
5169	22127	0.645669	0.060924	0.171317		0.101751	0.66576	0.078825		0.008719	0.039125	0.430831
5170	22128	0.901302	0.079926	0.238771		0.13024	0.921626	0.099329		0.012162	0.054018	0.598108
5171	22129	0.80507	0.067799	0.207493		0.108131	0.819118	0.080226		0.010995	0.047867	0.530863
5172	22130	0.807789	0.064531	0.197726		0.10069	0.819043	0.071184		0.011128	0.047685	0.528429
5173	22131	0.859894	0.065838	0.194717		0.099342	0.870171	0.065568		0.011908	0.050423	0.557838
5174	22132	0.860229	0.063093	0.171978		0.091258	0.870088	0.054999		0.011935	0.050097	0.552708
5175	22133	0.859311	0.060838	0.147691		0.084382	0.870033	0.046962		0.011909	0.049755	0.546896
5176	22134	0.806652	0.055187	0.119726		0.072456	0.818796	0.036056		0.011143	0.04644	0.508667
5177	22135	0.72891	0.048864	0.09569		0.060749	0.742011	0.027097		0.010036	0.041799	0.456258
5178	22136	0.751199	0.049691	0.084914		0.057463	0.767587	0.022768		0.010324	0.042925	0.466398
5179	22137	0.810454	0.053468	0.079159		0.05632	0.83158	0.019015		0.011748	0.046184	0.499146
5180	22138	0.790113	0.094243	0.137899		0.216436	0.913554	0.175087		0.020882	0.055938	0.555728
5181	22139	0.896674	0.103878	0.173535		0.243155	1.073443	0.198749		0.023358	0.070402	0.664813
5182	22140	0.831819	0.093703	0.163546		0.221982	1.029065	0.187261		0.021334	0.071694	0.648082

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5183	22141	0.552006	0.060788	0.11626		0.145191	0.698189	0.128386		0.014004	0.050415	0.442971
5184	22142	0.433555	0.046881	0.09419		0.112633	0.557218	0.102878		0.010903	0.041256	0.354697
5185	22143	0.574136	0.061128	0.127454		0.147472	0.747479	0.140751		0.014331	0.05648	0.476562
5186	22144	0.849998	0.087892	0.197783		0.213131	1.132967	0.222482		0.020833	0.088642	0.72326
5187	22145	0.725135	0.071999	0.171862		0.176535	0.98973	0.200834		0.017387	0.079598	0.632595
5188	22146	0.640434	0.061348	0.146694		0.151915	0.88958	0.193101		0.015083	0.073007	0.569759
5189	22147	0.640058	0.060544	0.135703		0.147553	0.90376	0.217151		0.014807	0.075772	0.580428
5190	22148	0.707605	0.065798	0.140107		0.158174	1.014686	0.271656		0.015996	0.086655	0.653209
5191	22149	0.56642	0.051397	0.103994		0.12247	0.824344	0.24289		0.012487	0.071222	0.531106
5192	22150	0.442862	0.039309	0.077767		0.093167	0.651586	0.204457		0.009591	0.056713	0.419597
5193	22151	0.493168	0.042973	0.083467		0.10143	0.731617	0.239672		0.010504	0.064128	0.470689
5194	22152	0.582601	0.049334	0.092219		0.115544	0.874564	0.302723		0.012127	0.0776	0.561334
5195	22153	0.638976	0.052593	0.098149		0.122173	0.969491	0.35111		0.012899	0.086801	0.620052
5196	22154	0.548614	0.043897	0.084033		0.100924	0.840874	0.317262		0.010713	0.075526	0.535052
5197	22155	0.526089	0.041474	0.082891		0.093206	0.813392	0.317967		0.009998	0.073109	0.51454
5198	22156	0.553948	0.043725	0.100743		0.094384	0.863246	0.348974		0.010179	0.077781	0.545631
5199	22157	0.581823	0.045966	0.12003		0.094651	0.913761	0.382645		0.010345	0.082723	0.577577
5200	22158	0.727768	0.057552	0.163198		0.112781	1.15104	0.498463		0.012539	0.104483	0.726115
5201	22159	0.738318	0.058575	0.17441		0.107076	1.177464	0.53023		0.012161	0.106423	0.743936
5202	22160	0.654452	0.052093	0.157114		0.088284	1.051376	0.488541		0.010342	0.094564	0.663533
5203	22161	0.570622	0.045496	0.134294		0.072456	0.921201	0.435557		0.008674	0.082772	0.580632
5204	22162	0.67764	0.054098	0.150782		0.080717	1.098893	0.525973		0.009803	0.098555	0.691581
5205	22163	0.716465	0.057331	0.141511		0.07906	1.167673	0.56388		0.009822	0.103979	0.733178
5206	22164	0.78408	0.062938	0.124777		0.078288	1.284604	0.623286		0.010125	0.113458	0.80484
5207	22165	0.762232	0.061309	0.091166		0.068148	1.25376	0.608137		0.009951	0.110532	0.785112
5208	22166	0.808358	0.065051	0.070604		0.064416	1.333282	0.644952		0.010894	0.117595	0.834935
5209	22167	0.730008	0.061169	0.04772		0.051085	1.206855	0.581403		0.010152	0.106018	0.755557
5210	22168	0.573463	0.04999	0.052343		0.034652	0.949381	0.45381		0.008172	0.083236	0.595321
5211	22169	0.585164	0.052165	0.065982		0.032338	0.969071	0.459715		0.008459	0.085077	0.608971
5212	22170	0.812021	0.07486	0.130684		0.03842	1.344719	0.626355		0.012084	0.11844	0.848658
5213	22171	0.745037	0.07041	0.146877		0.029279	1.233485	0.560526		0.011399	0.108462	0.77909
5214	22172	0.74637	0.071855	0.164575		0.0235	1.234535	0.543143		0.011675	0.108536	0.776033
5215	22173	0.747806	0.072933	0.172682		0.021233	1.234505	0.521637		0.011961	0.109088	0.767129
5216	22174	0.732906	0.071719	0.166541		0.01856	1.206539	0.486588		0.011979	0.107218	0.735784
5217	22175	0.580007	0.056352	0.124212		0.01332	0.952456	0.369461		0.009627	0.084599	0.572661
5218	22176	0.666459	0.063893	0.128727		0.014866	1.091097	0.405924		0.011183	0.096773	0.649995
5219	22177	0.753673	0.07058	0.123397		0.019413	1.227572	0.430286		0.012834	0.109018	0.723054
5220	22178	0.824778	0.074811	0.105088		0.0292	1.33488	0.438833		0.014229	0.118633	0.780377
5221	22179	0.757369	0.065817	0.072951		0.034285	1.216835	0.374682		0.013219	0.107325	0.710225
5222	22180	0.759266	0.063405	0.08657		0.041784	1.209526	0.348482		0.013372	0.105739	0.70305
5223	22181	0.74966	0.060372	0.102351		0.04844	1.182559	0.317161		0.013585	0.102785	0.682406
5224	22182	0.659616	0.051242	0.105827		0.048632	1.029634	0.256798		0.012503	0.08886	0.588043
5225	22183	0.602078	0.04579	0.105692		0.047572	0.933644	0.222223		0.011714	0.079916	0.529177
5226	22184	0.766112	0.056199	0.15836		0.067369	1.173562	0.254775		0.015552	0.098618	0.655659
5227	22185	0.768045	0.054354	0.175664		0.074029	1.160916	0.224431		0.016192	0.095843	0.639054
5228	22186	0.84054	0.057509	0.201542		0.087713	1.25216	0.209012		0.018334	0.101375	0.678967
5229	22187	0.771785	0.05141	0.187264		0.086241	1.131599	0.158117		0.017333	0.089116	0.603674
5230	22188	0.685681	0.044648	0.160427		0.081244	0.987916	0.119521		0.015783	0.075409	0.517352
5231	22189	0.598822	0.038642	0.131966		0.073777	0.85019	0.095789		0.01401	0.063335	0.438246
5232	22190	0.759237	0.048974	0.152629		0.096799	1.061177	0.110652		0.018032	0.077046	0.53815
5233	22191	0.777911	0.049728	0.133168		0.102922	1.063838	0.103199		0.018773	0.074375	0.532655
5234	22192	0.602346	0.037765	0.084942		0.082035	0.804754	0.075729		0.014695	0.054072	0.401228
5235	22193	0.390176	0.024077	0.047915		0.053805	0.514409	0.048134		0.009561	0.033951	0.256586
5236	22194	0.604152	0.036594	0.064632		0.084049	0.787593	0.074254		0.014848	0.051219	0.393612
5237	22195	0.711252	0.040878	0.056917		0.100352	0.906038	0.091498		0.017525	0.057219	0.456718
5238	22196	0.712373	0.038083	0.035426		0.101624	0.886776	0.096538		0.017517	0.054466	0.453542
5239	22197	0.714373	0.035059	0.042682		0.103116	0.86604	0.106573		0.017408	0.051186	0.458748
5240	22198	0.739175	0.036126	0.070706		0.107294	0.892181	0.123015		0.017934	0.0523	0.484865
5241	22199	0.716285	0.037243	0.090433		0.104742	0.86055	0.139963		0.017286	0.050285	0.487048
5242	222	0.636608	0.016383	0.056381		0.018392	0.580875	0.005149		0.012808	0.017362	0.519507
5243	22200	0.59824	0.033338	0.088403		0.088246	0.715351	0.136477		0.014349	0.042267	0.419859
5244	22201	0.58606	0.03398	0.091923		0.086982	0.698573	0.145573		0.014004	0.04157	0.418207
5245	22202	0.790505	0.049667	0.13281		0.119102	0.935118	0.229485		0.018755	0.056424	0.58431
5246	22203	0.791627	0.054013	0.143124		0.121469	0.928017	0.259672		0.018664	0.056757	0.607578
5247	22204	0.865425	0.06529	0.166882		0.13557	1.004095	0.310939		0.020262	0.062057	0.683673
5248	22205	0.793812	0.065856	0.15432		0.127105	0.910421	0.304399		0.018493	0.056472	0.638675
5249	22206	0.794883	0.072085	0.148617		0.130075	0.899829	0.316454		0.018491	0.055803	0.64444
5250	22207	0.795931	0.078517	0.154235		0.133078	0.887901	0.319608		0.018518	0.054941	0.643568
5251	22208	0.870004	0.092824	0.168194		0.148551	0.955054	0.343103		0.020222	0.05873	0.694301
5252	22209	0.797866	0.091429	0.145527		0.138899	0.860898	0.301509		0.018528	0.052213	0.621982

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5253	22210	0.871395	0.10664	0.140697		0.154348	0.922808	0.306428		0.020267	0.054984	0.65771
5254	22211	0.982187	0.129171	0.143764		0.176846	1.015509	0.307019		0.022927	0.059054	0.706701
5255	22212	0.873431	0.121972	0.120562		0.159013	0.881928	0.238645		0.020598	0.049849	0.601649
5256	22213	0.874322	0.129055	0.115392		0.160151	0.860655	0.204903		0.02075	0.047447	0.575588
5257	22214	0.802053	0.093767	0.170385		0.201066	0.913675	0.169898		0.019173	0.056217	0.570274
5258	22215	0.909802	0.103776	0.234211		0.226316	1.073345	0.202137		0.02138	0.070809	0.693928
5259	22216	0.946605	0.105946	0.295955		0.232406	1.154387	0.230137		0.0218	0.081432	0.770995
5260	22217	0.559625	0.061156	0.187642		0.13571	0.697872	0.144579		0.012688	0.050947	0.474642
5261	22218	0.439445	0.047235	0.155026		0.10542	0.556915	0.117856		0.00988	0.041737	0.382819
5262	22219	0.581846	0.06162	0.212187		0.13819	0.747027	0.164035		0.012981	0.057168	0.517258
5263	22220	0.963941	0.099526	0.361688		0.22404	1.267131	0.299139		0.02115	0.101196	0.887545
5264	22221	0.73453	0.072535	0.27875		0.166199	0.988937	0.277949		0.015793	0.080929	0.701053
5265	22222	0.648657	0.062369	0.237363		0.143302	0.888815	0.279609		0.013709	0.074393	0.636085
5266	22223	0.648217	0.061441	0.222439		0.139482	0.902959	0.312352		0.013446	0.077246	0.652034
5267	22224	0.819017	0.076508	0.268276		0.171233	1.158388	0.434401		0.016645	0.101842	0.843021
5268	22225	0.573567	0.051909	0.172352		0.116234	0.823474	0.338133		0.0114	0.072768	0.60216
5269	22226	0.448432	0.039621	0.126211		0.088574	0.650824	0.284108		0.008752	0.058038	0.476894
5270	22227	0.499356	0.043232	0.134127		0.09654	0.730712	0.332505		0.009601	0.065645	0.535738
5271	22228	0.589885	0.04943	0.1445		0.110221	0.873412	0.418964		0.011196	0.079378	0.63987
5272	22229	0.749157	0.060736	0.176245		0.135198	1.1207	0.561062		0.014057	0.103684	0.819312
5273	22230	0.555443	0.043598	0.128251		0.09663	0.839562	0.438625		0.010256	0.077281	0.611082
5274	22231	0.532618	0.041038	0.125308		0.089426	0.81201	0.439964		0.009655	0.074877	0.589924
5275	22232	0.560817	0.043248	0.149636		0.090699	0.861723	0.483119		0.009954	0.079654	0.628595
5276	22233	0.589023	0.045458	0.178666		0.091181	0.912154	0.529781		0.010159	0.084606	0.667225
5277	22234	0.838855	0.06468	0.27963		0.123937	1.307661	0.784854		0.014001	0.122508	0.957723
5278	22235	0.747436	0.05797	0.267423		0.103615	1.175377	0.735245		0.011898	0.10876	0.865629
5279	22236	0.662527	0.051584	0.241282		0.085684	1.049463	0.677851		0.010012	0.096697	0.777509
5280	22237	0.577667	0.045102	0.20575		0.070505	0.919549	0.604185		0.008342	0.084565	0.68379
5281	22238	0.788126	0.061628	0.265149		0.090463	1.25954	0.837021		0.010858	0.116381	0.940263
5282	22239	0.725317	0.057015	0.216904		0.07733	1.165498	0.782735		0.009606	0.106141	0.871153
5283	22240	0.793758	0.062705	0.197522		0.076805	1.282029	0.865731		0.010421	0.115872	0.9595
5284	22241	0.771656	0.061213	0.139926		0.067084	1.251288	0.843897		0.010346	0.112701	0.936541
5285	22242	0.920729	0.073256	0.114975		0.071537	1.496332	1.004031		0.012593	0.135559	1.119351
5286	22243	0.739019	0.061179	0.072885		0.050582	1.204515	0.804931		0.010304	0.107993	0.897618
5287	22244	0.580518	0.050194	0.078997		0.034499	0.947554	0.627682		0.00824	0.084829	0.705179
5288	22245	0.592354	0.052466	0.100717		0.032187	0.967309	0.635309		0.008498	0.086652	0.720109
5289	22246	0.924789	0.085209	0.226294		0.043307	1.509627	0.971375		0.013521	0.136509	1.126082
5290	22247	0.754113	0.071212	0.227292		0.029619	1.231484	0.774087		0.011233	0.110536	0.916607
5291	22248	0.755414	0.072807	0.256497		0.024396	1.232526	0.750835		0.011458	0.110756	0.910611
5292	22249	0.756829	0.073865	0.270929		0.02229	1.232636	0.721455		0.01168	0.111222	0.896781
5293	22250	0.845281	0.083153	0.300822		0.022518	1.372426	0.766223		0.013265	0.125416	0.975702
5294	22251	0.586956	0.057029	0.198069		0.014378	0.951049	0.511928		0.009318	0.086308	0.664673
5295	22252	0.674419	0.064618	0.207473		0.015085	1.089478	0.563376		0.010822	0.098795	0.752679
5296	22253	0.762645	0.07121	0.198028		0.018394	1.225863	0.597883		0.012395	0.111236	0.8343
5297	22254	0.938995	0.084894	0.192468		0.027637	1.499541	0.685331		0.01545	0.137158	1.006832
5298	22255	0.766375	0.065945	0.112289		0.02948	1.215478	0.522986		0.012755	0.109563	0.81252
5299	22256	0.768314	0.063385	0.128797		0.036387	1.208349	0.486743		0.013136	0.108058	0.801029
5300	22257	0.758629	0.060274	0.149519		0.042553	1.18166	0.442374		0.013569	0.104885	0.772514
5301	22258	0.773024	0.059042	0.178997		0.04976	1.191417	0.411961		0.014436	0.105671	0.764697
5302	22259	0.609362	0.045546	0.156951		0.042152	0.933117	0.307188		0.011665	0.081497	0.591239
5303	22260	0.775444	0.055807	0.23735		0.059891	1.172944	0.350712		0.015454	0.100441	0.725759
5304	22261	0.77749	0.053923	0.264883		0.066001	1.160319	0.309081		0.016063	0.097423	0.701038
5305	22262	0.957475	0.063914	0.349462		0.088166	1.408046	0.326161		0.020414	0.11634	0.829705
5306	22263	0.781536	0.050941	0.289429		0.07718	1.131057	0.227077		0.017114	0.090243	0.650193
5307	22264	0.694483	0.044235	0.248839		0.072832	0.987507	0.169628		0.015554	0.076269	0.552299
5308	22265	0.606621	0.038669	0.205093		0.066249	0.849928	0.127543		0.013792	0.063946	0.464379
5309	22266	0.876693	0.056064	0.271216		0.099248	1.209145	0.158219		0.020197	0.088783	0.644684
5310	22267	0.788414	0.049722	0.206392		0.092915	1.063925	0.116831		0.018421	0.074776	0.550707
5311	22268	0.610662	0.037761	0.130747		0.074455	0.805061	0.083316		0.014428	0.054466	0.410353
5312	22269	0.395636	0.02408	0.073663		0.049029	0.514717	0.051957		0.009392	0.034169	0.261058
5313	22270	0.720869	0.043211	0.118192		0.090458	0.927372	0.092168		0.017167	0.060678	0.469331
5314	22271	0.721519	0.040801	0.089201		0.092638	0.907226	0.092231		0.017248	0.057411	0.45998
5315	22272	0.722933	0.038032	0.053512		0.094752	0.888155	0.093728		0.017296	0.054588	0.455019
5316	22273	0.725143	0.035132	0.061603		0.097943	0.867129	0.102528		0.01727	0.051305	0.462406
5317	22274	0.750204	0.036092	0.104739		0.102643	0.892923	0.125377		0.017828	0.052471	0.498022
5318	22275	0.726975	0.037186	0.13767		0.100833	0.860638	0.152664		0.017233	0.050525	0.509394
5319	22276	0.716495	0.0394	0.158747		0.100569	0.843732	0.181623		0.016939	0.050261	0.526023
5320	22277	0.594799	0.03401	0.139492		0.08407	0.698007	0.166977		0.014037	0.041837	0.447378
5321	22278	0.802286	0.049813	0.200528		0.115135	0.933883	0.269367		0.018867	0.056816	0.641853
5322	22279	0.803449	0.054093	0.216125		0.117229	0.926515	0.309028		0.018839	0.057166	0.677208

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5323	22280	0.988292	0.073176	0.286196		0.146785	1.127576	0.418981		0.02313	0.070574	0.867013
5324	22281	0.805774	0.065606	0.236723		0.121876	0.908517	0.368337		0.018851	0.056916	0.724921
5325	22282	0.806922	0.071867	0.229755		0.124274	0.897773	0.384861		0.018908	0.056261	0.733922
5326	22283	0.808062	0.078272	0.234272		0.126659	0.885876	0.389417		0.018988	0.055348	0.732498
5327	22284	0.993895	0.104362	0.291619		0.158433	1.072023	0.468971		0.023428	0.066767	0.88555
5328	22285	0.810267	0.091096	0.228565		0.131172	0.85902	0.366441		0.019161	0.052524	0.699424
5329	22286	0.885092	0.106232	0.226856		0.145207	0.92093	0.370106		0.020996	0.055263	0.731332
5330	22287	1.108872	0.143195	0.231145		0.184206	1.126505	0.4013		0.026385	0.066005	0.857917
5331	22288	0.887651	0.121374	0.151365		0.148601	0.880977	0.270731		0.021158	0.049974	0.637888
5332	22289	0.88877	0.128388	0.128325		0.149339	0.860324	0.221532		0.021198	0.047472	0.593009
5333	22290	0.813248	0.092983	0.207151		0.18815	0.913688	0.162581		0.017489	0.056516	0.583205
5334	22291	0.922244	0.103565	0.324506		0.211941	1.073158	0.206143		0.019425	0.071227	0.715455
5335	22292	0.854831	0.094297	0.365964		0.194131	1.028387	0.217516		0.017649	0.07292	0.718024
5336	22293	0.56694	0.061462	0.263797		0.127318	0.697507	0.15592		0.011525	0.051434	0.500451
5337	22294	0.445115	0.047532	0.219057		0.098971	0.556565	0.12863		0.008927	0.042182	0.406342
5338	22295	0.58927	0.062115	0.298786		0.12982	0.74649	0.190146		0.011725	0.057881	0.552078
5339	22296	0.871978	0.089155	0.450057		0.188256	1.131198	0.349691		0.017093	0.091242	0.855391
5340	22297	0.743555	0.072968	0.388469		0.156544	0.987957	0.360773		0.014307	0.082264	0.764011
5341	22298	0.656547	0.063336	0.334816		0.135184	0.887882	0.361349		0.012425	0.075661	0.698165
5342	22299	0.656023	0.062365	0.315278		0.131836	0.90194	0.402332		0.012323	0.078757	0.719832
5343	223	0.389284	0.012435	0.054848		0.007133	0.387418	0.065537		0.00958	0.015622	0.324887
5344	22300	0.725147	0.067514	0.332098		0.141852	1.012515	0.488613		0.013649	0.090298	0.817931
5345	22301	0.580376	0.052453	0.243564		0.110265	0.822418	0.42477		0.010934	0.074355	0.670036
5346	22302	0.453736	0.039916	0.17682		0.084164	0.649965	0.355403		0.008515	0.05926	0.531602
5347	22303	0.505245	0.043446	0.186815		0.091854	0.729704	0.415342		0.009461	0.067048	0.597739
5348	22304	0.596803	0.049493	0.198463		0.10509	0.872089	0.522896		0.011059	0.081199	0.714385
5349	22305	0.654517	0.052314	0.206814		0.111506	0.966535	0.605721		0.01203	0.090856	0.790086
5350	22306	0.561922	0.04327	0.173532		0.092449	0.838107	0.547591		0.010194	0.079062	0.682494
5351	22307	0.53882	0.04061	0.169543		0.085719	0.810568	0.549496		0.009556	0.076506	0.662606
5352	22308	0.567335	0.042775	0.20134		0.087096	0.860134	0.603882		0.009837	0.081362	0.707482
5353	22309	0.595852	0.044949	0.240747		0.087753	0.910378	0.662903		0.009983	0.086488	0.752594
5354	22310	0.745311	0.056293	0.33319		0.104946	1.146729	0.864299		0.012091	0.109168	0.950892
5355	22311	0.756097	0.057355	0.363206		0.100138	1.173045	0.920085		0.011709	0.111092	0.981578
5356	22312	0.670203	0.05117	0.327223		0.083075	1.047452	0.84803		0.009785	0.098615	0.887945
5357	22313	0.584349	0.044793	0.278305		0.068594	0.917733	0.756249		0.00812	0.086283	0.784751
5358	22314	0.693953	0.053321	0.310869		0.076795	1.0947	0.91379		0.009272	0.102673	0.943085
5359	22315	0.733715	0.056688	0.29848		0.075562	1.163108	0.980876		0.009755	0.108241	1.008354
5360	22316	0.802956	0.062476	0.272748		0.075307	1.279429	1.085641		0.010835	0.117988	1.113723
5361	22317	0.78059	0.061112	0.193526		0.066019	1.248595	1.058959		0.010693	0.114805	1.086685
5362	22318	0.82783	0.065111	0.133671		0.062744	1.327769	1.121259		0.011449	0.122009	1.151128
5363	22319	0.747561	0.06108	0.099244		0.050081	1.20199	1.008417		0.010434	0.109913	1.035748
5364	22320	0.587217	0.050335	0.105544		0.03436	0.945712	0.785006		0.008305	0.086265	0.810898
5365	22321	0.599176	0.052747	0.135353		0.032066	0.965408	0.793992		0.008541	0.088202	0.826334
5366	22322	0.831408	0.076171	0.271023		0.038619	1.33989	1.079557		0.011972	0.122853	1.144506
5367	22323	0.762744	0.071973	0.308685		0.030026	1.229288	0.965683		0.011096	0.112583	1.045618
5368	22324	0.764041	0.073654	0.350461		0.025285	1.23051	0.936692		0.011279	0.112741	1.036457
5369	22325	0.765442	0.074839	0.371901		0.023307	1.230587	0.901151		0.011455	0.113385	1.018171
5370	22326	0.750133	0.073567	0.36339		0.020943	1.202786	0.842725		0.011356	0.111499	0.969112
5371	22327	0.593598	0.057724	0.275035		0.015433	0.949532	0.64148		0.009058	0.088004	0.753551
5372	22328	0.68205	0.065299	0.290551		0.016383	1.087817	0.70666		0.010515	0.100693	0.852242
5373	22329	0.771256	0.071844	0.275805		0.018047	1.224028	0.751189		0.012032	0.113537	0.942393
5374	22330	0.844013	0.075714	0.239057		0.021583	1.331329	0.768603		0.013318	0.12366	1.005439
5375	22331	0.775035	0.066104	0.155491		0.024834	1.213983	0.658919		0.01255	0.111904	0.911253
5376	22332	0.777034	0.063326	0.170887		0.031194	1.207144	0.612655		0.013149	0.110232	0.895286
5377	22333	0.76727	0.060099	0.195273		0.036904	1.180688	0.556083		0.013561	0.10708	0.858479
5378	22334	0.675215	0.050771	0.201598		0.037579	1.028346	0.447175		0.012433	0.092437	0.728515
5379	22335	0.616379	0.045259	0.207445		0.037008	0.932585	0.385411		0.011618	0.083024	0.650039
5380	22336	0.784472	0.055342	0.31579		0.052845	1.172361	0.439686		0.015357	0.102167	0.798146
5381	22337	0.786628	0.053359	0.356065		0.058468	1.159782	0.390835		0.01593	0.099024	0.765635
5382	22338	0.86115	0.056341	0.41983		0.069671	1.251002	0.373239		0.017956	0.104413	0.796217
5383	22339	0.790986	0.050357	0.393261		0.068863	1.130608	0.293313		0.016912	0.09142	0.691162
5384	22340	0.703025	0.044222	0.339052		0.0652	0.987197	0.218689		0.015356	0.077048	0.581903
5385	22341	0.614179	0.038774	0.279577		0.059472	0.849757	0.163483		0.013609	0.064528	0.486745
5386	22342	0.779011	0.049118	0.32393		0.07843	1.060977	0.17596		0.01747	0.078253	0.594326
5387	22343	0.798604	0.049854	0.281566		0.084113	1.064165	0.143041		0.018149	0.075402	0.577778
5388	22344	0.618725	0.037826	0.176959		0.067817	0.805521	0.088386		0.014226	0.054894	0.422736
5389	22345	0.400915	0.024106	0.099785		0.044829	0.515125	0.054424		0.009265	0.034389	0.26738
5390	22346	0.620955	0.036632	0.137905		0.070546	0.789001	0.081092		0.014399	0.05178	0.406371
5391	22347	0.731462	0.040865	0.121908		0.085642	0.908457	0.091945		0.017049	0.05764	0.463429
5392	22348	0.733067	0.038018	0.071959		0.088198	0.889472	0.090237		0.01714	0.05471	0.456196

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5393	22349	0.735485	0.03523	0.08064		0.092407	0.868213	0.097964		0.017173	0.051407	0.466272
5394	22350	0.760928	0.036083	0.140513		0.097371	0.89375	0.127224		0.017763	0.052643	0.509359
5395	22351	0.737343	0.037069	0.185172		0.096084	0.860941	0.161513		0.017204	0.050826	0.528899
5396	22352	0.615821	0.033266	0.180517		0.081468	0.714849	0.167318		0.01437	0.042839	0.469705
5397	22353	0.603286	0.033971	0.187204		0.080466	0.697665	0.182907		0.014078	0.04215	0.479405
5398	22354	0.813767	0.049857	0.268675		0.110343	0.932982	0.298944		0.018989	0.057262	0.698602
5399	22355	0.814967	0.054283	0.293138		0.112309	0.925305	0.34937		0.019023	0.057669	0.745972
5400	22356	0.891039	0.064618	0.344751		0.124839	1.000727	0.427389		0.020848	0.063129	0.85614
5401	22357	0.817418	0.065312	0.321219		0.116398	0.906906	0.425832		0.019194	0.057463	0.81529
5402	22358	0.818645	0.071585	0.313322		0.118393	0.896042	0.445945		0.019306	0.056772	0.830544
5403	22359	0.819867	0.078028	0.310692		0.120327	0.884072	0.449146		0.019435	0.055873	0.825011
5404	22360	0.89639	0.092246	0.346712		0.13342	0.951005	0.477539		0.021387	0.059669	0.878621
5405	22361	0.822307	0.09076	0.309163		0.123956	0.857282	0.418698		0.019749	0.052925	0.77631
5406	22362	0.898366	0.105752	0.311012		0.136844	0.919185	0.421945		0.021678	0.055593	0.804433
5407	22363	1.013042	0.127958	0.291453		0.155834	1.012323	0.409725		0.024587	0.05954	0.836398
5408	22364	0.901262	0.120622	0.192904		0.139533	0.880022	0.300103		0.021945	0.050116	0.679088
5409	22365	0.902512	0.127431	0.150129		0.140193	0.859987	0.236256		0.02199	0.047483	0.613211
5410	22366	0.603999	0.067385	0.188617		0.12959	0.669991	0.112973		0.011565	0.041659	0.435901
5411	22367	0.684854	0.075471	0.303153		0.146074	0.786809	0.151765		0.01284	0.052596	0.539371
5412	22368	0.634648	0.069127	0.339629		0.133956	0.753854	0.164069		0.011646	0.053826	0.543662
5413	22369	0.420848	0.04513	0.248083		0.087914	0.511222	0.120698		0.007609	0.037975	0.381909
5414	22370	0.33036	0.03496	0.205657		0.068385	0.407879	0.113347		0.005906	0.031174	0.31193
5415	22371	0.437302	0.045728	0.280059		0.089754	0.547021	0.17079		0.007761	0.042809	0.425891
5416	22372	0.646954	0.065821	0.421837		0.130356	0.828786	0.311923		0.011482	0.067718	0.666157
5417	22373	0.551582	0.053912	0.367097		0.108556	0.723737	0.320416		0.009858	0.061069	0.60117
5418	22374	0.486956	0.047063	0.316381		0.093842	0.650373	0.320073		0.008761	0.056256	0.552476
5419	22375	0.486523	0.046282	0.297996		0.091597	0.660653	0.355566		0.008836	0.058599	0.572534
5420	22376	0.537724	0.050073	0.313736		0.0987	0.741598	0.430944		0.009788	0.067404	0.65306
5421	22377	0.430347	0.038765	0.229648		0.076824	0.602338	0.374186		0.007834	0.055424	0.536642
5422	22378	0.336419	0.029442	0.166004		0.058691	0.475997	0.309269		0.006145	0.04422	0.426448
5423	22379	0.374594	0.031988	0.174818		0.064118	0.534366	0.358393		0.006819	0.050043	0.479856
5424	22380	0.442468	0.036309	0.184178		0.073446	0.638602	0.448215		0.00805	0.060581	0.573703
5425	22381	0.485221	0.038232	0.190887		0.078092	0.707647	0.519454		0.008702	0.067964	0.634425
5426	22382	0.416566	0.0315	0.159366		0.064872	0.613597	0.470392		0.007322	0.058991	0.548078
5427	22383	0.399429	0.029478	0.155547		0.060223	0.593368	0.472673		0.006923	0.057111	0.534762
5428	22384	0.420557	0.031045	0.184436		0.061311	0.629613	0.520018		0.007096	0.060724	0.57185
5429	22385	0.441703	0.032627	0.221876		0.06186	0.666387	0.571229		0.007267	0.064486	0.60934
5430	22386	0.552475	0.040852	0.306606		0.074196	0.839283	0.744618		0.008737	0.081538	0.771378
5431	22387	0.56047	0.04189	0.33412		0.071041	0.858639	0.79244		0.008382	0.082768	0.800477
5432	22388	0.496791	0.037496	0.300765		0.059096	0.766702	0.730014		0.007062	0.073473	0.728392
5433	22389	0.433165	0.032853	0.255367		0.048859	0.671775	0.651014		0.005908	0.064247	0.646313
5434	22390	0.5144	0.03909	0.287601		0.054868	0.801205	0.786855		0.007005	0.076571	0.782574
5435	22391	0.543875	0.041359	0.277117		0.054163	0.851347	0.845868		0.007461	0.080549	0.844594
5436	22392	0.595194	0.045651	0.253555		0.0541	0.936408	0.937753		0.008209	0.087806	0.939781
5437	22393	0.578625	0.044725	0.181355		0.047536	0.913855	0.915764		0.008013	0.085361	0.919999
5438	22394	0.613633	0.047725	0.124161		0.045392	0.971674	0.969472		0.008558	0.090814	0.974297
5439	22395	0.554131	0.044699	0.092225		0.036432	0.879802	0.871271		0.007782	0.081668	0.873951
5440	22396	0.435262	0.036963	0.095834		0.025084	0.692255	0.677187		0.006126	0.064111	0.679605
5441	22397	0.444126	0.0388	0.123477		0.023451	0.706725	0.684275		0.006261	0.065538	0.688481
5442	22398	0.616247	0.056228	0.248046		0.028444	0.980826	0.928773		0.008752	0.091455	0.941351
5443	22399	0.565351	0.053208	0.283894		0.022373	0.900045	0.830264		0.008102	0.083717	0.855672
5444	224	0.992427	0.041399	0.101249		0.042358	0.942884	0.008659		0.027638	0.040332	0.725913
5445	22400	0.566285	0.054541	0.323784		0.019176	0.900958	0.805254		0.008159	0.083903	0.846852
5446	22401	0.567323	0.055432	0.344811		0.017874	0.901077	0.775291		0.008241	0.084372	0.830659
5447	22402	0.555965	0.054559	0.338231		0.016198	0.880659	0.725792		0.008155	0.083148	0.789387
5448	22403	0.439953	0.042731	0.257203		0.012016	0.695313	0.553303		0.00651	0.065531	0.613339
5449	22404	0.505489	0.048308	0.273319		0.012927	0.796579	0.610275		0.007521	0.075025	0.693093
5450	22405	0.571618	0.053043	0.261294		0.01341	0.896391	0.649515		0.008595	0.084599	0.765004
5451	22406	0.625541	0.055793	0.224512		0.015508	0.975021	0.666066		0.009612	0.092347	0.813954
5452	22407	0.574441	0.048521	0.149369		0.01537	0.889264	0.570986		0.009225	0.083439	0.735262
5453	22408	0.575928	0.046382	0.154218		0.019213	0.884392	0.530289		0.00965	0.082234	0.720412
5454	22409	0.568749	0.043925	0.173892		0.023117	0.865185	0.482312		0.00993	0.079813	0.687538
5455	22410	0.500542	0.037013	0.17935		0.023794	0.753671	0.39028		0.009091	0.068992	0.581008
5456	22411	0.456953	0.032957	0.186738		0.023542	0.683554	0.337528		0.008485	0.061813	0.520445
5457	22412	0.581616	0.040219	0.285643		0.033871	0.85937	0.387353		0.011184	0.075995	0.635642
5458	22413	0.583314	0.038729	0.325693		0.037705	0.850195	0.345051		0.011571	0.073548	0.605632
5459	22414	0.638661	0.040813	0.38455		0.045173	0.917106	0.329872		0.013033	0.077557	0.624803
5460	22415	0.586724	0.036549	0.361166		0.044854	0.828888	0.259782		0.012264	0.067687	0.537761
5461	22416	0.521571	0.032462	0.31197		0.042679	0.723816	0.193215		0.01112	0.056969	0.446839
5462	22417	0.455745	0.028493	0.257312		0.03909	0.62312	0.14464		0.009848	0.047645	0.376141

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5463	22418	0.578154	0.036127	0.298127		0.051777	0.77815	0.154756		0.012649	0.057915	0.458555
5464	22419	0.592829	0.036605	0.259008		0.05584	0.780709	0.124369		0.013149	0.055793	0.442043
5465	22420	0.45941	0.02778	0.162434		0.04531	0.591161	0.072628		0.010304	0.040544	0.31941
5466	22421	0.297733	0.017704	0.092544		0.030069	0.378123	0.040382		0.006715	0.025372	0.200879
5467	22422	0.461193	0.02692	0.127507		0.047474	0.579265	0.059552		0.010446	0.038179	0.304529
5468	22423	0.543378	0.029981	0.11232		0.057969	0.667133	0.065977		0.012395	0.042405	0.345173
5469	22424	0.544726	0.027878	0.065611		0.060095	0.653218	0.062977		0.012486	0.040189	0.336151
5470	22425	0.546661	0.025922	0.07234		0.06361	0.637477	0.06833		0.012554	0.037757	0.344349
5471	22426	0.565549	0.026478	0.128007		0.0673	0.656055	0.0931		0.012992	0.038715	0.379417
5472	22427	0.548053	0.027022	0.168637		0.066673	0.631683	0.122196		0.012622	0.03756	0.399077
5473	22428	0.457745	0.024295	0.164223		0.056673	0.524276	0.128937		0.010556	0.031686	0.363355
5474	22429	0.448435	0.024824	0.170299		0.056054	0.511536	0.142026		0.010351	0.03116	0.373503
5475	22430	0.604896	0.036503	0.244308		0.076999	0.683758	0.242758		0.01401	0.042334	0.55122
5476	22431	0.605825	0.039804	0.274284		0.078444	0.677915	0.287534		0.0141	0.042641	0.594202
5477	22432	0.662412	0.04722	0.32335		0.08716	0.733025	0.354178		0.015485	0.046742	0.687131
5478	22433	0.607711	0.047607	0.302245		0.081193	0.664117	0.35652		0.014289	0.042519	0.66302
5479	22434	0.608652	0.052226	0.293072		0.082472	0.656033	0.374329		0.01442	0.042021	0.679281
5480	22435	0.609617	0.056932	0.278873		0.083704	0.647208	0.375654		0.014571	0.041334	0.675479
5481	22436	0.666575	0.067344	0.312993		0.092639	0.696187	0.398105		0.01606	0.044162	0.713285
5482	22437	0.611533	0.066172	0.281235		0.08591	0.627577	0.34251		0.014843	0.039071	0.622202
5483	22438	0.668161	0.077038	0.28531		0.094783	0.67296	0.339619		0.016368	0.040978	0.640275
5484	22439	0.753529	0.093151	0.270735		0.107859	0.741389	0.328842		0.018615	0.043834	0.657639
5485	22440	0.670423	0.087671	0.183076		0.096497	0.644747	0.238958		0.016637	0.036816	0.526281
5486	22441	0.671363	0.092535	0.131201		0.096932	0.630424	0.18244		0.01666	0.03482	0.46663
5487	22442	0.607348	0.066927	0.204334		0.125987	0.669947	0.111145		0.010973	0.041747	0.439416
5488	22443	0.688617	0.075127	0.33145		0.142018	0.786714	0.15118		0.012168	0.052724	0.546407
5489	22444	0.750573	0.081302	0.435821		0.153199	0.886556	0.193806		0.013003	0.06358	0.650499
5490	22445	0.423092	0.045086	0.271995		0.085517	0.511089	0.130883		0.007291	0.038052	0.389016
5491	22446	0.332111	0.034968	0.225361		0.066541	0.407751	0.122548		0.005699	0.031264	0.318519
5492	22447	0.439595	0.04573	0.306798		0.087354	0.546832	0.184332		0.007514	0.042912	0.436075
5493	22448	0.762279	0.077432	0.542975		0.148757	0.971043	0.393484		0.01314	0.079891	0.803644
5494	22449	0.554375	0.054149	0.403301		0.105769	0.723383	0.344451		0.009673	0.061316	0.620961
5495	22450	0.489407	0.047308	0.347547		0.091494	0.650027	0.343734		0.008616	0.056561	0.571626
5496	22451	0.488935	0.046475	0.327897		0.089363	0.6603	0.381562		0.008677	0.058881	0.591582
5497	22452	0.651872	0.060757	0.415894		0.116214	0.89405	0.557174		0.011672	0.082083	0.814627
5498	22453	0.432446	0.038861	0.252289		0.075048	0.601994	0.401071		0.007784	0.055734	0.555813
5499	22454	0.338057	0.029504	0.182121		0.057382	0.475704	0.331367		0.006082	0.044518	0.441982
5500	22455	0.376412	0.03203	0.191629		0.062714	0.534027	0.383912		0.006766	0.050386	0.497526
5501	22456	0.444593	0.036305	0.201384		0.071908	0.638191	0.47847		0.007936	0.060942	0.595029
5502	22457	0.598729	0.046862	0.255855		0.093926	0.868285	0.674668		0.010605	0.08435	0.807895
5503	22458	0.41856	0.031397	0.173563		0.06358	0.613149	0.498424		0.007309	0.059344	0.569178
5504	22459	0.401339	0.029345	0.169201		0.059091	0.592895	0.501204		0.00686	0.057502	0.555803
5505	22460	0.422567	0.030905	0.200621		0.060188	0.629094	0.55171		0.007054	0.061135	0.594717
5506	22461	0.443797	0.032487	0.241844		0.060807	0.665858	0.60623		0.007165	0.064855	0.634171
5507	22462	0.666115	0.048855	0.400772		0.087531	1.006086	0.94747		0.010405	0.09878	0.963907
5508	22463	0.563131	0.041856	0.364018		0.069904	0.857964	0.840615		0.00837	0.083207	0.836871
5509	22464	0.499158	0.037487	0.327583		0.058246	0.766065	0.774096		0.007005	0.073925	0.763094
5510	22465	0.435214	0.03285	0.278025		0.048226	0.671262	0.690338		0.005987	0.064577	0.683226
5511	22466	0.627881	0.047548	0.381297		0.065805	0.972319	1.013113		0.008659	0.093843	1.008866
5512	22467	0.546457	0.041271	0.302896		0.053507	0.850684	0.897778		0.007559	0.080945	0.897668
5513	22468	0.598029	0.045576	0.277211		0.053565	0.935592	0.996117		0.008315	0.08831	0.999856
5514	22469	0.581368	0.044678	0.198895		0.04718	0.913126	0.973464		0.00812	0.085758	0.979078
5515	22470	0.727857	0.05632	0.160198		0.053224	1.145856	1.215915		0.010183	0.108024	1.223374
5516	22471	0.556753	0.044654	0.100826		0.036222	0.87913	0.925989		0.007799	0.082026	0.929191
5517	22472	0.437328	0.036971	0.103836		0.02504	0.691698	0.719214		0.006148	0.064442	0.721914
5518	22473	0.446227	0.038824	0.134186		0.023479	0.706225	0.726476		0.006287	0.065822	0.730905
5519	22474	0.730944	0.066598	0.318557		0.03364	1.156817	1.162442		0.010326	0.108803	1.178278
5520	22475	0.568012	0.053356	0.309382		0.02251	0.899465	0.88048		0.008051	0.084115	0.89799
5521	22476	0.568964	0.054751	0.353396		0.019462	0.900332	0.853779		0.008119	0.084396	0.886273
5522	22477	0.569992	0.05562	0.376881		0.018188	0.900523	0.822214		0.008195	0.084793	0.868895
5523	22478	0.671148	0.065946	0.444781		0.019913	1.057264	0.924414		0.00972	0.100791	0.991577
5524	22479	0.442016	0.042867	0.282006		0.012365	0.6949	0.587207		0.006435	0.065881	0.6399
5525	22480	0.507877	0.048471	0.300271		0.013341	0.796078	0.647898		0.007447	0.075502	0.722788
5526	22481	0.574304	0.053161	0.28806		0.013859	0.895885	0.690035		0.008504	0.08507	0.797161
5527	22482	0.741964	0.066033	0.292345		0.018114	1.150302	0.835726		0.011356	0.110058	0.999957
5528	22483	0.577155	0.048514	0.1664		0.015219	0.888857	0.607227		0.009224	0.083929	0.764171
5529	22484	0.57868	0.04634	0.166586		0.01755	0.884022	0.564239		0.009648	0.082809	0.747888
5530	22485	0.57146	0.043848	0.186839		0.021323	0.864911	0.516672		0.009925	0.080269	0.712525
5531	22486	0.617636	0.045305	0.236469		0.027126	0.925245	0.513295		0.011138	0.08554	0.74039
5532	22487	0.459165	0.032847	0.201641		0.02193	0.683413	0.361765		0.008457	0.062152	0.539613

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5533	22488	0.58448	0.040046	0.308983		0.03169	0.859225	0.415365		0.011141	0.076429	0.657643
5534	22489	0.586197	0.038556	0.353891		0.035397	0.850079	0.370173		0.011524	0.073876	0.624912
5535	22490	0.757758	0.047852	0.493425		0.050199	1.082549	0.417767		0.015303	0.092195	0.764138
5536	22491	0.58972	0.036459	0.392981		0.042358	0.828822	0.279026		0.012186	0.067899	0.555954
5537	22492	0.52429	0.032472	0.339626		0.040423	0.723793	0.207536		0.011054	0.057155	0.461424
5538	22493	0.458138	0.028502	0.280189		0.037095	0.62314	0.155238		0.00979	0.047797	0.384808
5539	22494	0.698373	0.043557	0.389955		0.059146	0.935077	0.199183		0.015105	0.070015	0.562394
5540	22495	0.596059	0.036595	0.282072		0.053265	0.780908	0.133189		0.013066	0.055977	0.449825
5541	22496	0.461967	0.027789	0.17686		0.043362	0.591406	0.077353		0.010249	0.040665	0.323759
5542	22497	0.299399	0.017708	0.100946		0.028815	0.37831	0.041637		0.006681	0.025432	0.202731
5543	22498	0.581984	0.033853	0.174266		0.05715	0.727299	0.073927		0.013045	0.048043	0.385242
5544	22499	0.546512	0.029966	0.12238		0.055782	0.66757	0.064847		0.012342	0.042451	0.347251
5545	225	0.626001	0.027217	0.109934		0.017867	0.667948	0.116465		0.019639	0.037021	0.455042
5546	22500	0.547885	0.027876	0.071197		0.057931	0.653663	0.061264		0.012443	0.040214	0.337274
5547	22501	0.549897	0.025971	0.078051		0.061658	0.637848	0.066808		0.012531	0.037778	0.345136
5548	22502	0.568954	0.02649	0.138804		0.065346	0.656368	0.092522		0.012984	0.038761	0.381379
5549	22503	0.551351	0.026922	0.182891		0.064838	0.631865	0.123059		0.012611	0.037689	0.405195
5550	22504	0.580198	0.030545	0.22413		0.069533	0.660648	0.164604		0.013313	0.040118	0.468017
5551	22505	0.451149	0.024758	0.18462		0.054607	0.511548	0.147731		0.010371	0.031273	0.382988
5552	22506	0.608589	0.036443	0.264782		0.075088	0.683648	0.254859		0.01405	0.042496	0.568016
5553	22507	0.609525	0.039749	0.301023		0.076532	0.677697	0.301584		0.014144	0.042787	0.614557
5554	22508	0.786802	0.055809	0.419258		0.100411	0.865026	0.439576		0.01838	0.055482	0.843407
5555	22509	0.611451	0.047442	0.332473		0.079215	0.663746	0.375456		0.014391	0.042676	0.691693
5556	22510	0.612429	0.052072	0.32292		0.080448	0.655611	0.394478		0.014531	0.042201	0.710171
5557	22511	0.613407	0.056751	0.300658		0.081603	0.646757	0.396155		0.014684	0.04148	0.706632
5558	22512	0.791838	0.079345	0.398754		0.106621	0.821279	0.49322		0.019155	0.052414	0.879637
5559	22513	0.615374	0.065934	0.30448		0.083773	0.627129	0.359987		0.015061	0.03917	0.645065
5560	22514	0.672377	0.076734	0.309835		0.092372	0.67251	0.354001		0.016626	0.04106	0.662082
5561	22515	0.880008	0.107711	0.342509		0.121914	0.859907	0.394088		0.021985	0.050985	0.785394
5562	22516	0.674672	0.087222	0.201104		0.093987	0.644503	0.246393		0.016948	0.036832	0.538599
5563	22517	0.675623	0.092034	0.140146		0.094427	0.630326	0.186038		0.016987	0.034817	0.474005
5564	22518	0.837375	0.089644	0.319487		0.162021	0.913401	0.145744		0.013661	0.057105	0.608608
5565	22519	0.949361	0.101307	0.526601		0.182609	1.072485	0.202137		0.015389	0.072259	0.763873
5566	22520	0.879602	0.093308	0.587831		0.167527	1.027345	0.235004		0.014203	0.073926	0.781362
5567	22521	0.583151	0.061253	0.434657		0.11003	0.696548	0.205455		0.009388	0.052131	0.553938
5568	22522	0.457708	0.047574	0.3599		0.085649	0.555655	0.191419		0.007343	0.042823	0.456005
5569	22523	0.605797	0.062324	0.489806		0.112489	0.745116	0.287097		0.009687	0.058853	0.626555
5570	22524	0.896042	0.08972	0.743495		0.163582	1.128698	0.521299		0.014446	0.093055	0.988455
5571	22525	0.763732	0.07449	0.646918		0.136482	0.9854	0.532957		0.012606	0.084309	0.899371
5572	22526	0.674154	0.065038	0.55741		0.118196	0.885426	0.530944		0.011284	0.077785	0.831181
5573	22527	0.673442	0.063875	0.527574		0.115607	0.899384	0.588645		0.011398	0.081086	0.862939
5574	22528	0.744244	0.068851	0.554332		0.124804	1.009595	0.712395		0.012807	0.0931	0.983165
5575	22529	0.595543	0.05325	0.405073		0.09736	0.819908	0.6175		0.010366	0.076864	0.807169
5576	22530	0.46553	0.040353	0.291887		0.074533	0.64788	0.509849		0.008104	0.061378	0.642836
5577	22531	0.518329	0.043744	0.306905		0.081551	0.727281	0.590469		0.009009	0.06948	0.724331
5578	22532	0.612188	0.04946	0.321437		0.093668	0.869059	0.735648		0.010556	0.084083	0.867303
5579	22533	0.671332	0.051855	0.332043		0.099776	0.96299	0.844415		0.011535	0.094034	0.960089
5580	22534	0.576309	0.042515	0.27509		0.083054	0.8348	0.755302		0.009809	0.081875	0.832218
5581	22535	0.552581	0.039977	0.267208		0.077303	0.807172	0.754713		0.009195	0.079292	0.813627
5582	22536	0.581795	0.041766	0.317142		0.078872	0.856414	0.831774		0.009431	0.084283	0.871678
5583	22537	0.611019	0.043912	0.383462		0.079831	0.906425	0.914582		0.00956	0.089418	0.930856
5584	22538	0.764274	0.055366	0.529735		0.095908	1.141785	1.192125		0.011611	0.112683	1.182434
5585	22539	0.775313	0.057	0.577153		0.092072	1.167951	1.266045		0.01129	0.114676	1.24348
5586	22540	0.687224	0.0511	0.519341		0.076936	1.042936	1.164661		0.009691	0.10178	1.154032
5587	22541	0.59919	0.044815	0.441154		0.063854	0.913867	1.03884		0.008474	0.088923	1.036849
5588	22542	0.711585	0.053336	0.499244		0.071841	1.090137	1.257307		0.010036	0.10568	1.263015
5589	22543	0.752355	0.056226	0.482981		0.071095	1.158092	1.353571		0.010583	0.111435	1.367082
5590	22544	0.823349	0.061936	0.442175		0.071438	1.273681	1.504476		0.011612	0.121491	1.525122
5591	22545	0.800412	0.060787	0.318873		0.063202	1.243019	1.472707		0.011317	0.118005	1.494569
5592	22546	0.848849	0.064963	0.216342		0.060576	1.322012	1.560826		0.011934	0.125456	1.582492
5593	22547	0.766515	0.060704	0.160611		0.048843	1.196829	1.400682		0.010715	0.112819	1.417826
5594	22548	0.602089	0.050401	0.162798		0.033998	0.941775	1.086496		0.008435	0.088592	1.100627
5595	22549	0.614342	0.053013	0.212275		0.032039	0.961543	1.096732		0.008618	0.090555	1.113625
5596	22550	0.852432	0.077005	0.427769		0.039027	1.334905	1.486503		0.011912	0.126101	1.519295
5597	22551	0.781995	0.07315	0.491495		0.031126	1.224816	1.326394		0.01089	0.115792	1.365154
5598	22552	0.783303	0.075118	0.562742		0.02734	1.226104	1.285424		0.010967	0.116158	1.32983
5599	22553	0.784725	0.07638	0.601488		0.025716	1.226361	1.238016		0.011052	0.116816	1.294462
5600	22554	0.769026	0.075014	0.59249		0.023666	1.198835	1.16029		0.010862	0.114843	1.228092
5601	22555	0.608536	0.058817	0.452356		0.017808	0.946422	0.88463		0.008612	0.090773	0.944127
5602	22556	0.69921	0.066441	0.483202		0.019357	1.08427	0.976215		0.009961	0.104026	1.065176

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5603	22557	0.790681	0.072788	0.467248		0.020289	1.220248	1.043896		0.011484	0.117332	1.172667
5604	22558	0.865326	0.076243	0.403501		0.020781	1.327611	1.072502		0.013125	0.127764	1.243742
5605	22559	0.794658	0.06613	0.273997		0.020268	1.210922	0.92458		0.012566	0.115832	1.118194
5606	22560	0.796793	0.063006	0.25925		0.021705	1.204528	0.867308		0.013131	0.11422	1.092156
5607	22561	0.786908	0.05951	0.287784		0.024017	1.178667	0.794769		0.013491	0.11077	1.037626
5608	22562	0.692643	0.05003	0.297135		0.025355	1.027035	0.643972		0.012295	0.095383	0.881668
5609	22563	0.63237	0.044468	0.314258		0.025385	0.931556	0.557157		0.011445	0.085601	0.787509
5610	22564	0.805027	0.054118	0.482927		0.037101	1.171311	0.639975		0.015052	0.105222	0.956039
5611	22565	0.807496	0.052015	0.557767		0.041832	1.158928	0.570815		0.01555	0.10167	0.916532
5612	22566	0.884333	0.054839	0.659979		0.050678	1.250266	0.546646		0.017456	0.10677	0.948417
5613	22567	0.812606	0.049438	0.620811		0.050848	1.130111	0.43111		0.016388	0.09323	0.811399
5614	22568	0.722563	0.044267	0.536931		0.048855	0.987029	0.321221		0.014866	0.07844	0.669551
5615	22569	0.631492	0.038893	0.443161		0.045078	0.8499	0.240793		0.01317	0.06576	0.552088
5616	22570	0.801308	0.049288	0.513726		0.060148	1.061636	0.255743		0.016909	0.079817	0.662751
5617	22571	0.821903	0.049892	0.446012		0.065503	1.065598	0.204675		0.01758	0.076845	0.633265
5618	22572	0.637131	0.037866	0.279401		0.053674	0.807269	0.117783		0.01381	0.055724	0.452708
5619	22573	0.412974	0.024116	0.159844		0.035802	0.516482	0.063299		0.009011	0.03482	0.280569
5620	22574	0.639807	0.036638	0.219435		0.056757	0.791355	0.082038		0.01403	0.052313	0.424352
5621	22575	0.754047	0.040862	0.193898		0.069867	0.911655	0.083509		0.016682	0.058007	0.477902
5622	22576	0.75611	0.037956	0.111804		0.072992	0.892698	0.077642		0.01687	0.054877	0.462061
5623	22577	0.759077	0.035575	0.121501		0.078358	0.870899	0.086078		0.017049	0.051549	0.473553
5624	22578	0.785402	0.036184	0.217702		0.083333	0.896018	0.122963		0.017676	0.052964	0.523537
5625	22579	0.761167	0.036368	0.287062		0.082964	0.862316	0.167723		0.017188	0.051801	0.570501
5626	22580	0.635798	0.032746	0.27965		0.070789	0.715319	0.191915		0.014433	0.043668	0.528521
5627	22581	0.622894	0.033512	0.289819		0.070133	0.697754	0.218922		0.014186	0.042972	0.547535
5628	22582	0.840313	0.049407	0.419398		0.096644	0.932176	0.376422		0.019255	0.058396	0.819021
5629	22583	0.841666	0.05398	0.484429		0.098643	0.923782	0.445192		0.019416	0.058815	0.891745
5630	22584	0.920355	0.064073	0.572429		0.109798	0.998451	0.55524		0.021438	0.064404	1.048248
5631	22585	0.844417	0.064172	0.536983		0.10236	0.904268	0.560195		0.019875	0.05869	1.019834
5632	22586	0.845806	0.070449	0.52291		0.104026	0.89299	0.589091		0.020154	0.058016	1.050886
5633	22587	0.847206	0.076799	0.48512		0.105554	0.880816	0.592379		0.02045	0.05703	1.047005
5634	22588	0.926433	0.090721	0.525621		0.116791	0.947432	0.623498		0.022696	0.060751	1.102495
5635	22589	0.849993	0.089145	0.475533		0.108241	0.854053	0.535115		0.021125	0.053733	0.947677
5636	22590	0.928758	0.103639	0.486384		0.119282	0.915954	0.527022		0.023352	0.056235	0.960486
5637	22591	1.047454	0.124976	0.467525		0.135626	1.009464	0.492431		0.026671	0.059932	0.974398
5638	22592	0.931923	0.117506	0.321647		0.121335	0.878273	0.353408		0.023933	0.050287	0.767075
5639	22593	0.933195	0.123803	0.214025		0.121951	0.859304	0.263412		0.02406	0.047452	0.665771
5640	22594	0.845716	0.087695	0.354924		0.15308	0.913186	0.139319		0.012866	0.057187	0.618127
5641	22595	0.958768	0.099693	0.588172		0.172421	1.072134	0.195651		0.014519	0.072376	0.786154
5642	22596	0.88821	0.092209	0.659497		0.158157	1.026881	0.262932		0.013399	0.074054	0.811952
5643	22597	0.588834	0.06073	0.488078		0.103902	0.696152	0.228168		0.008866	0.052286	0.57896
5644	22598	0.462134	0.047268	0.404084		0.080903	0.555289	0.211822		0.006948	0.042909	0.478463
5645	22599	0.611618	0.06197	0.549828		0.106286	0.744584	0.316974		0.009187	0.058961	0.659283
5646	22600	0.90451	0.089287	0.837421		0.154674	1.127772	0.573803		0.013574	0.093221	1.04495
5647	22601	0.770898	0.074762	0.728646		0.129187	0.984453	0.585544		0.011954	0.084621	0.946503
5648	22602	0.68041	0.065321	0.627819		0.111992	0.884513	0.582634		0.010787	0.078162	0.874579
5649	22603	0.679643	0.064085	0.595548		0.109656	0.898461	0.645174		0.011008	0.081434	0.909977
5650	22604	0.751014	0.068976	0.62523		0.11854	1.008565	0.780075		0.012362	0.093465	1.038597
5651	22605	0.600947	0.053309	0.456865		0.092605	0.819015	0.675821		0.010009	0.077263	0.850961
5652	22606	0.469734	0.040378	0.329043		0.070973	0.647129	0.557852		0.007874	0.061769	0.67467
5653	22607	0.522994	0.043725	0.346108		0.077728	0.726404	0.645888		0.008765	0.069931	0.761147
5654	22608	0.61768	0.049351	0.362187		0.089391	0.867986	0.804297		0.010347	0.084526	0.912836
5655	22609	0.677304	0.051636	0.373625		0.095379	0.961739	0.922917		0.011256	0.094466	1.026852
5656	22610	0.581438	0.042397	0.308015		0.079523	0.833619	0.825427		0.009528	0.082302	0.907031
5657	22611	0.557491	0.040071	0.298875		0.074108	0.805944	0.818618		0.008987	0.079793	0.889431
5658	22612	0.586957	0.041819	0.35447		0.075714	0.855076	0.893088		0.009233	0.084805	0.953672
5659	22613	0.616438	0.043596	0.429047		0.076726	0.905067	0.982067		0.009427	0.089853	1.0173
5660	22614	0.771016	0.05527	0.592811		0.092367	1.140156	1.279158		0.011403	0.113115	1.287904
5661	22615	0.782177	0.056946	0.646411		0.088905	1.166263	1.356727		0.011259	0.115217	1.350746
5662	22616	0.693303	0.051082	0.581999		0.074425	1.041437	1.246821		0.009983	0.102323	1.25548
5663	22617	0.604494	0.044817	0.494429		0.061854	0.912651	1.111853		0.00869	0.089293	1.128463
5664	22618	0.717861	0.053354	0.55923		0.069778	1.088758	1.346307		0.010299	0.106033	1.375303
5665	22619	0.75901	0.056268	0.543217		0.069275	1.156537	1.451342		0.010852	0.111893	1.489948
5666	22620	0.830632	0.061728	0.497599		0.069786	1.271851	1.616218		0.011837	0.122098	1.664071
5667	22621	0.807498	0.060635	0.359978		0.0619	1.241327	1.583935		0.011457	0.118667	1.631996
5668	22622	0.856336	0.064849	0.242758		0.05962	1.320383	1.679082		0.012076	0.126204	1.729127
5669	22623	0.773305	0.060513	0.180107		0.04836	1.195297	1.506404		0.010836	0.113573	1.550647
5670	22624	0.607416	0.050336	0.180372		0.033808	0.940566	1.167681		0.00847	0.08899	1.204871
5671	22625	0.619776	0.052989	0.238223		0.031966	0.960396	1.178011		0.00862	0.090907	1.218775
5672	22626	0.859944	0.077067	0.480287		0.039171	1.333496	1.595238		0.011897	0.126501	1.662589

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5673	22627	0.788923	0.073337	0.552596		0.031587	1.223464	1.42286		0.010878	0.116321	1.49405
5674	22628	0.790233	0.075392	0.633539		0.028089	1.224711	1.378413		0.010887	0.11682	1.454846
5675	22629	0.791679	0.076631	0.677817		0.02663	1.225081	1.326586		0.010927	0.117402	1.401228
5676	22630	0.775821	0.075189	0.668501		0.024666	1.197717	1.242347		0.010721	0.115322	1.324606
5677	22631	0.613943	0.05896	0.511266		0.018655	0.945527	0.948691		0.008615	0.091238	1.015587
5678	22632	0.705429	0.066604	0.547457		0.020442	1.083216	1.048894		0.010277	0.104688	1.132985
5679	22633	0.797744	0.072865	0.532986		0.021677	1.219167	1.12705		0.012185	0.118023	1.244757
5680	22634	0.873042	0.076176	0.460907		0.022265	1.3266	1.169309		0.013945	0.128398	1.328582
5681	22635	0.801813	0.065988	0.315658		0.019728	1.210033	1.011629		0.013363	0.116578	1.183563
5682	22636	0.804004	0.062742	0.284801		0.021077	1.20372	0.948412		0.013949	0.115076	1.151413
5683	22637	0.794099	0.059191	0.314781		0.022093	1.17805	0.869368		0.014303	0.11148	1.092045
5684	22638	0.698994	0.049702	0.324862		0.020857	1.026652	0.704611		0.013005	0.095869	0.932352
5685	22639	0.638215	0.04414	0.34631		0.021128	0.93126	0.609809		0.01208	0.086053	0.831809
5686	22640	0.812562	0.053645	0.53646		0.031396	1.171017	0.700968		0.015799	0.105868	1.008044
5687	22641	0.815168	0.051532	0.620805		0.035856	1.158748	0.625537		0.016182	0.102179	0.970152
5688	22642	0.892812	0.054333	0.73508		0.043911	1.250202	0.599341		0.018009	0.107123	1.002188
5689	22643	0.820546	0.049105	0.69211		0.044483	1.130154	0.473156		0.016712	0.093542	0.85579
5690	22644	0.729746	0.044193	0.598968		0.043108	0.987209	0.353416		0.014936	0.078909	0.704607
5691	22645	0.63786	0.038835	0.494351		0.040019	0.850203	0.265298		0.013065	0.066081	0.579681
5692	22646	0.809477	0.049221	0.572956		0.053718	1.062236	0.282267		0.016644	0.08012	0.687276
5693	22647	0.830462	0.049767	0.496511		0.058953	1.066503	0.223573		0.017328	0.07711	0.648821
5694	22648	0.643893	0.037757	0.310608		0.048635	0.808191	0.12781		0.013622	0.055883	0.461613
5695	22649	0.417401	0.024041	0.177961		0.032552	0.517146	0.068588		0.008895	0.034889	0.284916
5696	22650	0.646709	0.036524	0.243784		0.051754	0.792458	0.088756		0.013862	0.05239	0.42705
5697	22651	0.762322	0.040762	0.216801		0.064083	0.913053	0.076615		0.016526	0.058045	0.479626
5698	22652	0.764529	0.038049	0.12407		0.067259	0.894088	0.070705		0.016748	0.054875	0.462538
5699	22653	0.767728	0.035766	0.133952		0.072858	0.872092	0.080133		0.016999	0.05156	0.476264
5700	22654	0.794439	0.036281	0.241082		0.077775	0.897113	0.117635		0.01764	0.053278	0.531751
5701	22655	0.770006	0.035927	0.317958		0.077685	0.863187	0.17272		0.017188	0.052163	0.585816
5702	22656	0.643219	0.032385	0.309784		0.066483	0.715881	0.201643		0.014436	0.043966	0.547027
5703	22657	0.630196	0.033167	0.321078		0.065981	0.698198	0.2299		0.014194	0.043264	0.568911
5704	22658	0.850239	0.048984	0.476384		0.091156	0.932447	0.395438		0.019313	0.058797	0.856476
5705	22659	0.851669	0.053546	0.550326		0.09324	0.923774	0.46963		0.019555	0.059197	0.936531
5706	22660	0.93134	0.063574	0.650807		0.103899	0.998167	0.593145		0.021667	0.064801	1.11093
5707	22661	0.854558	0.063537	0.611588		0.096954	0.903731	0.598487		0.020157	0.059082	1.084068
5708	22662	0.855997	0.069754	0.596759		0.098537	0.892239	0.629539		0.020485	0.058417	1.119621
5709	22663	0.857442	0.076001	0.55461		0.09999	0.879977	0.633677		0.020832	0.057377	1.116426
5710	22664	0.937644	0.089705	0.576655		0.110618	0.946524	0.668237		0.023136	0.061036	1.174634
5711	22665	0.860307	0.088127	0.523824		0.102536	0.853226	0.569881		0.021545	0.053946	1.007173
5712	22666	0.940012	0.102365	0.538046		0.112979	0.915145	0.562215		0.023879	0.056396	1.008712
5713	22667	1.060108	0.123235	0.520093		0.128488	1.008797	0.526209		0.027317	0.059994	1.017422
5714	22668	0.943143	0.115757	0.360683		0.115026	0.877869	0.364967		0.02457	0.050297	0.794619
5715	22669	0.94436	0.121821	0.240104		0.115701	0.859142	0.270287		0.024809	0.047407	0.682176
5716	22670	0.767876	0.076888	0.34535		0.130255	0.821646	0.119195		0.010921	0.051439	0.562848
5717	22671	0.870459	0.087918	0.571697		0.146598	0.964579	0.171058		0.012331	0.065065	0.720589
5718	22672	0.919753	0.093238	0.733925		0.153357	1.053631	0.292564		0.013001	0.075951	0.853799
5719	22673	0.534535	0.053966	0.476832		0.088337	0.626178	0.221603		0.007549	0.047014	0.536754
5720	22674	0.419498	0.042077	0.394849		0.068794	0.499443	0.205174		0.005923	0.038576	0.445183
5721	22675	0.555167	0.055212	0.537206		0.0904	0.669659	0.306446		0.007837	0.053001	0.615086
5722	22676	0.933756	0.09071	0.932071		0.14973	1.153537	0.628582		0.013181	0.095432	1.11322
5723	22677	0.699633	0.067232	0.713836		0.110061	0.885212	0.563892		0.010166	0.076133	0.891098
5724	22678	0.617478	0.058778	0.615042		0.095488	0.795317	0.560595		0.009241	0.070362	0.817565
5725	22679	0.616746	0.057638	0.584364		0.093592	0.807837	0.620087		0.009474	0.073286	0.851818
5726	22680	0.793657	0.072232	0.713224		0.117969	1.056099	0.871371		0.012466	0.098078	1.132737
5727	22681	0.545283	0.047895	0.448215		0.079244	0.736351	0.648867		0.008694	0.06956	0.798592
5728	22682	0.426211	0.036258	0.322851		0.060793	0.581784	0.53557		0.006845	0.055642	0.632331
5729	22683	0.474528	0.039254	0.339895		0.066631	0.653035	0.619977		0.007644	0.062993	0.714842
5730	22684	0.560423	0.044251	0.356413		0.076738	0.780264	0.771621		0.009026	0.0761	0.872402
5731	22685	0.726291	0.054641	0.433037		0.096901	1.021713	1.044861		0.01164	0.100613	1.16707
5732	22686	0.527519	0.038174	0.301144		0.068459	0.749262	0.791686		0.008352	0.074094	0.873861
5733	22687	0.505785	0.036153	0.293998		0.063879	0.724341	0.785277		0.007873	0.071863	0.857531
5734	22688	0.532515	0.037715	0.3463		0.065341	0.768496	0.851388		0.008114	0.076377	0.919863
5735	22689	0.559258	0.039156	0.418993		0.066322	0.813455	0.926764		0.008282	0.080866	0.981375
5736	22690	0.81109	0.057645	0.670706		0.092725	1.18822	1.39646		0.011884	0.118127	1.43936
5737	22691	0.709607	0.051206	0.632071		0.077139	1.048326	1.27763		0.010391	0.10368	1.297905
5738	22692	0.628987	0.045955	0.56954		0.064716	0.936175	1.173154		0.00919	0.092103	1.206172
5739	22693	0.548418	0.040319	0.483184		0.053889	0.820462	1.045637		0.007989	0.08034	1.083619
5740	22694	0.762887	0.056303	0.63874		0.071353	1.146459	1.481523		0.01107	0.111826	1.545221
5741	22695	0.688596	0.050644	0.532816		0.060622	1.039742	1.367025		0.009942	0.100676	1.430742
5742	22696	0.753579	0.055379	0.488343		0.061263	1.143372	1.524763		0.01081	0.109908	1.599088

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5743	22697	0.732592	0.05442	0.354014		0.054541	1.116011	1.495043		0.01043	0.106968	1.569462
5744	22698	0.888809	0.066634	0.27195		0.060451	1.358025	1.810198		0.012549	0.130292	1.902784
5745	22699	0.701571	0.054271	0.175839		0.043159	1.074731	1.421388		0.00982	0.102419	1.496378
5746	22700	0.551075	0.045199	0.1745		0.030421	0.845706	1.101551		0.007652	0.080092	1.163443
5747	22701	0.56229	0.047606	0.234206		0.028933	0.863577	1.110922		0.007774	0.081805	1.177544
5748	22702	0.892566	0.079319	0.539363		0.040442	1.371701	1.718103		0.012253	0.130315	1.837152
5749	22703	0.715752	0.066003	0.543118		0.028781	1.100166	1.341764		0.009767	0.104733	1.445171
5750	22704	0.716952	0.067897	0.622925		0.025898	1.101262	1.299732		0.009749	0.105251	1.407001
5751	22705	0.71827	0.06898	0.666544		0.024712	1.101664	1.250041		0.009755	0.105741	1.353297
5752	22706	0.817069	0.078576	0.762567		0.026734	1.250202	1.358475		0.011541	0.120646	1.469416
5753	22707	0.557041	0.053033	0.503575		0.017511	0.850354	0.898276		0.008195	0.082191	0.970317
5754	22708	0.640059	0.059899	0.541487		0.019307	0.974198	1.001418		0.009793	0.094356	1.082431
5755	22709	0.723833	0.065468	0.528844		0.020659	1.096521	1.081436		0.011629	0.106354	1.200013
5756	22710	0.906306	0.078246	0.524521		0.02442	1.365072	1.282332		0.015254	0.132483	1.462626
5757	22711	0.727591	0.059181	0.315463		0.018621	1.088412	0.971574		0.012772	0.105101	1.140052
5758	22712	0.729624	0.056147	0.27424		0.018395	1.082786	0.9106		0.013314	0.103818	1.100021
5759	22713	0.720677	0.052944	0.30071		0.019226	1.059786	0.834383		0.013618	0.100519	1.034543
5760	22714	0.749824	0.052479	0.368116		0.02107	1.091701	0.798292		0.014612	0.102248	1.034244
5761	22715	0.579292	0.039427	0.333319		0.016769	0.83791	0.585354		0.011464	0.077572	0.780712
5762	22716	0.737609	0.047887	0.520743		0.023829	1.053725	0.6735		0.014937	0.095459	0.946902
5763	22717	0.740053	0.045998	0.603141		0.02761	1.042776	0.601222		0.015256	0.09208	0.909684
5764	22718	0.927423	0.055426	0.816401		0.039123	1.287312	0.658424		0.019371	0.110499	1.072641
5765	22719	0.745137	0.043889	0.67322		0.034985	1.017297	0.455356		0.01567	0.08423	0.800448
5766	22720	0.662786	0.039633	0.582881		0.034215	0.888785	0.340459		0.013976	0.071157	0.659345
5767	22721	0.579406	0.034837	0.480934		0.031973	0.765565	0.255809		0.012212	0.059563	0.542092
5768	22722	0.853622	0.051343	0.646008		0.050113	1.110534	0.316734		0.017959	0.08384	0.744491
5769	22723	0.754583	0.044666	0.48241		0.047715	0.960799	0.215807		0.015787	0.06946	0.595979
5770	22724	0.58517	0.03381	0.301363		0.039635	0.728286	0.121925		0.012164	0.050323	0.421322
5771	22725	0.379374	0.021539	0.172308		0.026622	0.466078	0.065303		0.007885	0.03141	0.259453
5772	22726	0.707322	0.039415	0.285918		0.051068	0.859477	0.101438		0.014803	0.056748	0.463556
5773	22727	0.693036	0.036542	0.21143		0.05282	0.823062	0.063477		0.014697	0.052223	0.431002
5774	22728	0.695144	0.034521	0.120318		0.055713	0.805999	0.056686		0.014939	0.049352	0.415308
5775	22729	0.698237	0.03239	0.129123		0.060865	0.786067	0.065888		0.015231	0.0464	0.43095
5776	22730	0.72262	0.032781	0.232998		0.065208	0.808538	0.099224		0.015823	0.048244	0.485497
5777	22731	0.700471	0.031874	0.30734		0.06536	0.777811	0.158216		0.015428	0.047229	0.538599
5778	22732	0.706523	0.034715	0.360879		0.067685	0.778825	0.222828		0.015668	0.048103	0.610509
5779	22733	0.573384	0.029469	0.310427		0.055696	0.628975	0.210936		0.012768	0.039166	0.52762
5780	22734	0.773658	0.043572	0.472506		0.077128	0.839743	0.364417		0.01744	0.053214	0.797987
5781	22735	0.775023	0.047664	0.545742		0.079054	0.831655	0.443847		0.017715	0.053549	0.877486
5782	22736	0.969665	0.064726	0.738078		0.100917	1.02791	0.63989		0.022498	0.067149	1.195703
5783	22737	0.777748	0.056523	0.607614		0.08238	0.813111	0.5643		0.018315	0.05344	1.02172
5784	22738	0.779095	0.06203	0.593818		0.083809	0.802602	0.593483		0.018634	0.05285	1.056205
5785	22739	0.780432	0.067535	0.552582		0.085108	0.791452	0.597875		0.018965	0.051858	1.053472
5786	22740	0.976355	0.091145	0.630483		0.10776	0.974004	0.722082		0.024115	0.063134	1.266878
5787	22741	0.78303	0.078191	0.503234		0.08733	0.767396	0.539083		0.019636	0.048663	0.949592
5788	22742	0.855558	0.090759	0.518832		0.096287	0.823146	0.52962		0.02177	0.050822	0.945971
5789	22743	1.088337	0.123117	0.567307		0.123608	1.023796	0.559431		0.028147	0.060981	1.067247
5790	22744	0.858286	0.102358	0.351524		0.098166	0.789857	0.342973		0.022482	0.045239	0.735074
5791	22745	0.85932	0.107599	0.235062		0.098858	0.773145	0.246377		0.022774	0.042611	0.625803
5792	22746	0.515113	0.050051	0.23978		0.082975	0.547655	0.075938		0.006952	0.034235	0.377744
5793	22747	0.583907	0.057514	0.397024		0.093354	0.642867	0.118731		0.007853	0.043271	0.484487
5794	22748	0.540891	0.053656	0.449237		0.085624	0.615606	0.179527		0.00727	0.044248	0.505624
5795	22749	0.358536	0.035512	0.33257		0.056253	0.417271	0.154309		0.004818	0.031248	0.363378
5796	22750	0.281371	0.027721	0.275402		0.043814	0.332801	0.142577		0.003782	0.025636	0.30205
5797	22751	0.37236	0.036416	0.374765		0.057585	0.446211	0.21271		0.005006	0.035225	0.41813
5798	22752	0.550641	0.052629	0.573745		0.083917	0.675736	0.383484		0.00748	0.055703	0.66823
5799	22753	0.469222	0.044666	0.498984		0.0702	0.58976	0.390343		0.00646	0.050601	0.609769
5800	22754	0.414113	0.039053	0.429886		0.06094	0.529843	0.387788		0.005902	0.046754	0.560331
5801	22755	0.413608	0.038304	0.409024		0.059777	0.538171	0.428786		0.006067	0.048705	0.580507
5802	22756	0.45703	0.041195	0.429164		0.064765	0.604097	0.517842		0.006888	0.0559	0.663859
5803	22757	0.365667	0.031817	0.313774		0.050711	0.490513	0.448395		0.00562	0.04623	0.545925
5804	22758	0.285814	0.024086	0.226022		0.038931	0.387538	0.370008		0.004427	0.036972	0.437981
5805	22759	0.318211	0.026068	0.238111		0.042698	0.434982	0.428275		0.00495	0.041855	0.496128
5806	22760	0.375805	0.029384	0.250116		0.049226	0.519708	0.533049		0.005843	0.050567	0.604316
5807	22761	0.412084	0.030697	0.257132		0.052652	0.575782	0.611427		0.006393	0.056496	0.685015
5808	22762	0.353734	0.025451	0.210625		0.044007	0.499015	0.546819		0.00544	0.04923	0.605638
5809	22763	0.339158	0.024146	0.206259		0.041103	0.482414	0.542272		0.005127	0.047742	0.594399
5810	22764	0.357081	0.025186	0.242163		0.042086	0.51182	0.587862		0.005287	0.050738	0.637776
5811	22765	0.375012	0.026142	0.292776		0.042773	0.541782	0.634623		0.005557	0.053726	0.680731
5812	22766	0.469064	0.033091	0.404678		0.051635	0.68258	0.822687		0.006944	0.06761	0.862345

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5813	22767	0.475827	0.034119	0.441846		0.049887	0.698285	0.870677		0.007034	0.068879	0.899973
5814	22768	0.421769	0.030622	0.398258		0.041927	0.623625	0.798977		0.006212	0.061179	0.83602
5815	22769	0.367744	0.026872	0.337994		0.034971	0.546561	0.7123		0.005398	0.053374	0.750909
5816	22770	0.436726	0.032001	0.381313		0.039586	0.65207	0.863029		0.006375	0.063367	0.914651
5817	22771	0.461742	0.033754	0.373164		0.039466	0.692666	0.93197		0.006699	0.066887	0.990959
5818	22772	0.50532	0.036831	0.342033		0.039987	0.761732	1.039853		0.007271	0.073018	1.107656
5819	22773	0.49125	0.036201	0.248341		0.035787	0.743528	1.019754		0.007007	0.071141	1.088101
5820	22774	0.520983	0.038741	0.168014		0.034821	0.790981	1.080463		0.007355	0.075668	1.156251
5821	22775	0.470449	0.036071	0.122596		0.028587	0.716092	0.968825		0.006571	0.068147	1.040061
5822	22776	0.369535	0.030055	0.120968		0.020268	0.563514	0.750664		0.005115	0.053223	0.808861
5823	22777	0.377057	0.031663	0.164675		0.019357	0.575418	0.757218		0.005192	0.054372	0.819335
5824	22778	0.523196	0.04611	0.331493		0.023682	0.799004	1.025616		0.007143	0.07567	1.119162
5825	22779	0.479969	0.043929	0.381363		0.019347	0.733057	0.915428		0.006499	0.069635	1.00644
5826	22780	0.480782	0.045181	0.437258		0.017566	0.733793	0.886616		0.006481	0.069982	0.979507
5827	22781	0.48167	0.045899	0.467842		0.01684	0.734068	0.853381		0.006602	0.070322	0.941299
5828	22782	0.472064	0.044996	0.461763		0.015765	0.717753	0.805511		0.006859	0.069067	0.875184
5829	22783	0.373564	0.035266	0.354523		0.012034	0.566657	0.62044		0.005665	0.054665	0.669609
5830	22784	0.429246	0.039817	0.381505		0.013324	0.649205	0.691666		0.006774	0.062753	0.750623
5831	22785	0.485438	0.043512	0.373336		0.014344	0.730743	0.747159		0.008044	0.070751	0.831977
5832	22786	0.531329	0.045426	0.325207		0.014913	0.795209	0.775562		0.00923	0.076972	0.887209
5833	22787	0.487996	0.039309	0.223685		0.013023	0.725371	0.671664		0.008848	0.069938	0.790015
5834	22788	0.489382	0.037223	0.190691		0.012498	0.721638	0.629683		0.009206	0.069083	0.762027
5835	22789	0.483403	0.035091	0.206301		0.012467	0.706342	0.576397		0.009398	0.066907	0.71651
5836	22790	0.425591	0.029439	0.215874		0.011528	0.615673	0.467298		0.008516	0.057515	0.603593
5837	22791	0.388609	0.026129	0.230271		0.01083	0.55852	0.404603		0.007896	0.051625	0.534974
5838	22792	0.49485	0.03173	0.361857		0.014454	0.702428	0.465505		0.010258	0.063531	0.646857
5839	22793	0.49653	0.030472	0.419453		0.016012	0.695195	0.415723		0.010455	0.061296	0.620545
5840	22794	0.543975	0.032135	0.497143		0.02007	0.750231	0.398617		0.01157	0.064217	0.639397
5841	22795	0.500045	0.029137	0.468551		0.020727	0.678362	0.315173		0.0107	0.056101	0.54505
5842	22796	0.444829	0.026307	0.405693		0.020448	0.592753	0.235619		0.009524	0.047395	0.449457
5843	22797	0.388905	0.023129	0.334781		0.01923	0.510647	0.177198		0.008315	0.03968	0.369598
5844	22798	0.493672	0.029332	0.387806		0.026114	0.638229	0.190004		0.010519	0.048093	0.437452
5845	22799	0.506605	0.029681	0.335211		0.029035	0.641104	0.150491		0.010735	0.046272	0.405744
5846	228	0.465435	0.010507	0.03805		0.011539	0.423955	0.004862		0.008616	0.011047	0.389622
5847	22800	0.392915	0.022417	0.209216		0.024264	0.48605	0.084173		0.008267	0.033524	0.283038
5848	22801	0.254752	0.014283	0.119321		0.016352	0.311083	0.044916		0.00534	0.020925	0.174099
5849	22802	0.394772	0.021715	0.165894		0.026135	0.476776	0.058032		0.008251	0.031413	0.258276
5850	22803	0.465463	0.024284	0.147378		0.032648	0.549449	0.043381		0.00968	0.034786	0.286267
5851	22804	0.466949	0.023183	0.083665		0.034604	0.538074	0.033901		0.009868	0.032875	0.275857
5852	22805	0.469134	0.021716	0.089324		0.038087	0.524745	0.040194		0.010101	0.030992	0.288519
5853	22806	0.485547	0.021938	0.161327		0.040937	0.539706	0.064582		0.010499	0.032299	0.328642
5854	22807	0.470722	0.020975	0.213046		0.041154	0.519151	0.105068		0.010243	0.031619	0.365304
5855	22808	0.393299	0.018942	0.207736		0.035366	0.430432	0.12302		0.008631	0.026643	0.343124
5856	22809	0.385374	0.019416	0.215428		0.035163	0.419706	0.14067		0.008511	0.026211	0.358441
5857	22810	0.520023	0.028719	0.334223		0.048803	0.560242	0.249002		0.011639	0.035604	0.543289
5858	22811	0.520986	0.031425	0.385933		0.050114	0.554723	0.304371		0.011829	0.035827	0.601577
5859	22812	0.569806	0.037335	0.456767		0.055996	0.599061	0.383233		0.013143	0.039212	0.717085
5860	22813	0.522874	0.037312	0.430118		0.052334	0.542083	0.385753		0.012255	0.035749	0.700503
5861	22814	0.523794	0.040904	0.420713		0.053307	0.534971	0.40551		0.012471	0.035335	0.723971
5862	22815	0.52471	0.0445	0.391902		0.054181	0.527495	0.40887		0.012697	0.034661	0.721994
5863	22816	0.573793	0.05245	0.379721		0.060008	0.567359	0.432866		0.01411	0.036809	0.759424
5864	22817	0.526436	0.051455	0.346689		0.055649	0.511453	0.370237		0.013149	0.032476	0.650938
5865	22818	0.575184	0.059673	0.358347		0.061407	0.548637	0.36186		0.014571	0.033896	0.648713
5866	22819	0.648595	0.071671	0.349149		0.069944	0.604919	0.339807		0.0167	0.035997	0.643921
5867	22820	0.576937	0.067164	0.2446		0.062693	0.526519	0.234992		0.015064	0.030137	0.498268
5868	22821	0.577584	0.070519	0.168834		0.063194	0.515419	0.164504		0.015275	0.02837	0.422049
5869	22822	0.746162	0.071375	0.351115		0.11714	0.790984	0.107015		0.009921	0.049393	0.54729
5870	22823	0.845793	0.082216	0.581632		0.131755	0.928457	0.174849		0.011215	0.062392	0.701808
5871	22824	0.783448	0.076835	0.659504		0.1208	0.889048	0.264081		0.010443	0.063774	0.733549
5872	22825	0.519325	0.050907	0.488244		0.079396	0.602601	0.226559		0.006962	0.045032	0.527711
5873	22826	0.40755	0.039765	0.404351		0.061852	0.480605	0.209145		0.005491	0.036941	0.439018
5874	22827	0.539344	0.052259	0.550318		0.081295	0.644368	0.311865		0.007302	0.050744	0.60821
5875	22828	0.797535	0.075564	0.843639		0.118462	0.975784	0.561933		0.010912	0.080218	0.973523
5876	22829	0.679633	0.064329	0.733533		0.099159	0.851613	0.571594		0.009415	0.072882	0.889429
5877	22830	0.599797	0.056257	0.63195		0.086121	0.765079	0.567671		0.008392	0.067343	0.817894
5878	22831	0.599068	0.055181	0.601698		0.084494	0.777086	0.627591		0.008597	0.070138	0.845095
5879	22832	0.66193	0.059344	0.631423		0.091562	0.872258	0.75794		0.009763	0.08048	0.96678
5880	22833	0.529623	0.04584	0.46163		0.07174	0.708245	0.656116		0.007975	0.066568	0.800772
5881	22834	0.413963	0.034703	0.332563		0.055105	0.559554	0.541355		0.006294	0.053241	0.642451
5882	22835	0.460885	0.037561	0.350428		0.060457	0.62805	0.626578		0.007035	0.060271	0.727771

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5883	22836	0.544299	0.042342	0.368322		0.069721	0.750368	0.779878		0.008326	0.072805	0.885265
5884	22837	0.596823	0.044235	0.378559		0.0746	0.831317	0.894648		0.009105	0.081324	1.003726
5885	22838	0.512329	0.036756	0.31007		0.062393	0.720472	0.799965		0.007744	0.070876	0.887388
5886	22839	0.491219	0.034907	0.303713		0.058311	0.696506	0.79324		0.007314	0.068742	0.870976
5887	22840	0.517176	0.03641	0.356314		0.059741	0.738968	0.859892		0.00769	0.073056	0.934652
5888	22841	0.543147	0.03779	0.430516		0.060735	0.782246	0.9283		0.008081	0.077351	0.9978
5889	22842	0.679341	0.047772	0.595115		0.073362	0.985568	1.196845		0.010104	0.097324	1.264383
5890	22843	0.689167	0.049266	0.649706		0.070941	1.00827	1.26594		0.010221	0.099172	1.319839
5891	22844	0.610866	0.04422	0.585634		0.059686	0.900492	1.161464		0.009028	0.088095	1.225893
5892	22845	0.532621	0.038801	0.497057		0.049804	0.789236	1.03564		0.007835	0.07685	1.100994
5893	22846	0.63251	0.046199	0.561132		0.056421	0.941617	1.255215		0.009257	0.091229	1.341047
5894	22847	0.668767	0.048737	0.549087		0.05631	1.000241	1.355475		0.009717	0.096314	1.452644
5895	22848	0.731883	0.05314	0.503292		0.057182	1.099989	1.512343		0.010544	0.105159	1.623736
5896	22849	0.71151	0.052232	0.365716		0.051263	1.07374	1.48298		0.010149	0.102475	1.596775
5897	22850	0.754545	0.055894	0.248302		0.049978	1.142319	1.571148		0.010649	0.108983	1.69733
5898	22851	0.681387	0.05202	0.179989		0.041138	1.034174	1.40816		0.00951	0.098186	1.526893
5899	22852	0.535224	0.043344	0.17717		0.029256	0.813825	1.090987		0.007396	0.076664	1.187626
5900	22853	0.546122	0.045662	0.24291		0.027999	0.831023	1.100723		0.007505	0.078318	1.203264
5901	22854	0.757757	0.066492	0.488734		0.034396	1.153937	1.494039		0.010312	0.108988	1.644126
5902	22855	0.695187	0.06335	0.562015		0.028052	1.058667	1.334424		0.009388	0.100317	1.478389
5903	22856	0.696362	0.065152	0.644229		0.025579	1.059716	1.290772		0.009346	0.10083	1.43852
5904	22857	0.697661	0.066174	0.689218		0.024566	1.060125	1.241594		0.009671	0.101316	1.381855
5905	22858	0.683718	0.064853	0.681056		0.023054	1.036591	1.178629		0.010047	0.099494	1.281516
5906	22859	0.541083	0.05083	0.522969		0.017627	0.818382	0.907758		0.008303	0.078758	0.979018
5907	22860	0.62174	0.05739	0.562984		0.019558	0.937608	1.011968		0.009936	0.090423	1.100161
5908	22861	0.703149	0.06271	0.551418		0.021107	1.055381	1.093307		0.011807	0.101943	1.219282
5909	22862	0.769587	0.065463	0.481184		0.022019	1.148493	1.135189		0.013542	0.110892	1.300283
5910	22863	0.706877	0.056655	0.331003		0.019236	1.047635	0.983095		0.012974	0.100784	1.157541
5911	22864	0.708896	0.053599	0.279593		0.018503	1.042253	0.921751		0.013498	0.099569	1.116384
5912	22865	0.700258	0.050531	0.300491		0.017745	1.020177	0.843302		0.013769	0.096428	1.049667
5913	22866	0.616496	0.042398	0.317116		0.016395	0.889244	0.683863		0.012465	0.082879	0.884788
5914	22867	0.562957	0.037632	0.336593		0.015388	0.806713	0.592085		0.011543	0.074404	0.783997
5915	22868	0.716898	0.045698	0.53052		0.020529	1.014615	0.681231		0.014997	0.091587	0.942998
5916	22869	0.719363	0.043893	0.615197		0.021517	1.004212	0.608504		0.015257	0.088364	0.904007
5917	22870	0.788093	0.046308	0.729425		0.027034	1.08376	0.583685		0.01688	0.092558	0.931072
5918	22871	0.724523	0.041973	0.687443		0.028103	0.980012	0.461551		0.015583	0.080928	0.793324
5919	22872	0.644556	0.037898	0.595217		0.027873	0.856404	0.345172		0.01387	0.068382	0.654527
5920	22873	0.563543	0.033315	0.491191		0.026285	0.737823	0.259583		0.012098	0.057254	0.538264
5921	22874	0.715359	0.042244	0.569017		0.035784	0.922219	0.278846		0.015305	0.069394	0.637095
5922	22875	0.734181	0.042768	0.491275		0.039967	0.926472	0.221083		0.015606	0.066779	0.590691
5923	22876	0.569459	0.032283	0.306452		0.033515	0.702468	0.123883		0.012022	0.048389	0.410402
5924	22877	0.369223	0.020569	0.174464		0.022608	0.449614	0.065586		0.007766	0.030203	0.252046
5925	22878	0.572162	0.031277	0.243624		0.036166	0.68911	0.084739		0.012	0.045344	0.373757
5926	22879	0.674688	0.035059	0.216325		0.045336	0.794194	0.063283		0.014081	0.050217	0.412547
5927	22880	0.676847	0.033621	0.122782		0.048095	0.777782	0.046105		0.014162	0.047464	0.397581
5928	22881	0.680095	0.031463	0.130699		0.053246	0.758505	0.055168		0.014535	0.044849	0.417644
5929	22882	0.70397	0.031757	0.236108		0.057312	0.780108	0.092303		0.015115	0.046742	0.477712
5930	22883	0.6825	0.030087	0.312025		0.057698	0.750347	0.151229		0.014755	0.045751	0.532297
5931	22884	0.570262	0.027182	0.304418		0.049639	0.622066	0.178826		0.012449	0.038543	0.499414
5932	22885	0.558793	0.027865	0.315683		0.049393	0.606547	0.205898		0.012276	0.037918	0.52171
5933	22886	0.754094	0.041221	0.494534		0.068612	0.809591	0.363769		0.016797	0.051509	0.791385
5934	22887	0.75551	0.045109	0.570922		0.070522	0.801512	0.444267		0.01708	0.051822	0.879181
5935	22888	0.82632	0.053602	0.67582		0.078839	0.865439	0.558894		0.01898	0.056698	1.048071
5936	22889	0.758295	0.053613	0.636496		0.073762	0.783061	0.562096		0.017702	0.051699	1.023516
5937	22890	0.759653	0.058743	0.622809		0.075162	0.772733	0.590754		0.018023	0.051098	1.057436
5938	22891	0.760975	0.063872	0.580426		0.076431	0.76189	0.595936		0.018347	0.050102	1.054298
5939	22892	0.832147	0.075247	0.562693		0.084656	0.819435	0.631586		0.020389	0.053174	1.108983
5940	22893	0.763475	0.073795	0.506018		0.078572	0.73871	0.540741		0.018992	0.046911	0.950689
5941	22894	0.834153	0.085544	0.523693		0.086719	0.792431	0.528355		0.021047	0.048953	0.947904
5942	22895	0.940574	0.102684	0.511223		0.098783	0.873718	0.495563		0.024111	0.051963	0.937638
5943	22896	0.836637	0.096183	0.35869		0.088615	0.760507	0.342837		0.021741	0.043502	0.724477
5944	22897	0.83754	0.100926	0.252619		0.089372	0.744497	0.237681		0.022052	0.040943	0.612406
5945	22898	1.041501	0.094344	0.493869		0.149843	1.094913	0.136796		0.014051	0.068024	0.761553
5946	22899	1.180472	0.109473	0.820265		0.16862	1.285036	0.253466		0.015957	0.085696	0.97654
5947	229	0.2843	0.007624	0.035569		0.004375	0.278234	0.044294		0.006364	0.009742	0.243282
5948	22900	1.145854	0.10781	0.979448		0.162147	1.28931	0.395659		0.015571	0.0916	1.070489
5949	22901	0.724803	0.068382	0.693484		0.101713	0.833883	0.322796		0.009904	0.061671	0.736386
5950	22902	0.568804	0.053523	0.574823		0.079261	0.665021	0.297323		0.007811	0.050561	0.613546
5951	22903	0.75274	0.070418	0.782662		0.104226	0.891571	0.442646		0.010386	0.069251	0.85111
5952	22904	1.165238	0.107483	1.259871		0.159161	1.413185	0.832308		0.01624	0.114431	1.429108

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
5953	22905	0.948551	0.087718	1.048112		0.127375	1.178084	0.808531		0.013377	0.099311	1.251595
5954	22906	0.837148	0.076783	0.903419		0.110731	1.058293	0.802445		0.011918	0.09174	1.152807
5955	22907	0.836126	0.075351	0.86215		0.108791	1.074824	0.886537		0.012016	0.095469	1.185411
5956	22908	0.975713	0.085619	0.954517		0.124691	1.274053	1.129056		0.014149	0.115594	1.443536
5957	22909	0.739209	0.062686	0.661649		0.092619	0.9795	0.926221		0.010812	0.09055	1.140609
5958	22910	0.577784	0.047489	0.47719		0.071221	0.773826	0.76417		0.008501	0.072427	0.915391
5959	22911	0.643276	0.051436	0.502855		0.078212	0.868539	0.884387		0.009504	0.08198	1.037123
5960	22912	0.759701	0.058033	0.52872		0.090358	1.037671	1.100448		0.011287	0.098966	1.253552
5961	22913	0.884667	0.064453	0.575973		0.10285	1.220886	1.339062		0.013199	0.11734	1.508173
5962	22914	0.715084	0.050873	0.444512		0.081117	0.996345	1.128576		0.010704	0.096332	1.257333
5963	22915	0.685622	0.048433	0.435726		0.075921	0.963217	1.119145		0.010284	0.093471	1.234689
5964	22916	0.721856	0.050538	0.512121		0.077901	1.022016	1.213082		0.010837	0.099345	1.325461
5965	22917	0.758106	0.052469	0.616849		0.079362	1.081982	1.309274		0.011379	0.105158	1.415415
5966	22918	0.999783	0.069651	0.897382		0.101277	1.43751	1.766932		0.01498	0.139463	1.889925
5967	22919	0.961925	0.068127	0.929637		0.093122	1.394921	1.753344		0.014365	0.134875	1.88144
5968	22920	0.852652	0.06114	0.837616		0.078544	1.245924	1.609235		0.012662	0.119863	1.748199
5969	22921	0.743438	0.053626	0.710519		0.065705	1.092093	1.435651		0.010983	0.104545	1.56984
5970	22922	0.934457	0.06756	0.851534		0.078989	1.379171	1.841198		0.013715	0.131328	2.021936
5971	22923	0.933486	0.067343	0.786631		0.074751	1.38424	1.881338		0.013593	0.131081	2.071025
5972	22924	1.021603	0.073333	0.721237		0.076422	1.522395	2.098356		0.014721	0.143205	2.318722
5973	22925	0.993164	0.072047	0.525554		0.068953	1.486293	2.054612		0.01415	0.139549	2.281975
5974	22926	1.104982	0.080852	0.378599		0.071015	1.659105	2.277562		0.015555	0.155666	2.543407
5975	22927	0.951143	0.071621	0.256161		0.056164	1.431818	1.954551		0.013225	0.133819	2.183998
5976	22928	0.747129	0.059612	0.250494		0.040326	1.126753	1.524565		0.010269	0.104739	1.69924
5977	22929	0.762343	0.062754	0.351505		0.038852	1.150575	1.542567		0.010409	0.106949	1.720558
5978	22930	1.109747	0.095769	0.739177		0.050777	1.676061	2.197243		0.01499	0.155898	2.463448
5979	22931	0.970465	0.086927	0.809943		0.039387	1.465581	1.872259		0.01298	0.136778	2.11257
5980	22932	0.97214	0.089343	0.927621		0.036254	1.466927	1.811161		0.012995	0.137526	2.054167
5981	22933	0.97397	0.090659	0.991788		0.035038	1.467512	1.751823		0.01386	0.138166	1.97097
5982	22934	1.00687	0.09365	1.035825		0.034914	1.51365	1.753307		0.015222	0.143053	1.923651
5983	22935	0.755431	0.069595	0.755486		0.025452	1.132965	1.281713		0.011932	0.107406	1.376564
5984	22936	0.868073	0.078602	0.814457		0.0284	1.298035	1.429377		0.014291	0.123355	1.56093
5985	22937	0.981774	0.085912	0.799631		0.030902	1.461117	1.54451		0.016993	0.139053	1.729068
5986	22938	1.127393	0.09414	0.734515		0.034101	1.668093	1.68111		0.020435	0.158619	1.931669
5987	22939	0.987096	0.077759	0.482446		0.028668	1.45039	1.389788		0.018627	0.137515	1.640538
5988	22940	0.990001	0.073341	0.396026		0.027561	1.442945	1.303768		0.019345	0.13593	1.582554
5989	22941	0.978013	0.06919	0.420765		0.026271	1.41245	1.191136		0.019693	0.13164	1.502016
5990	22942	0.914517	0.061711	0.479171		0.023738	1.307604	1.024322		0.018873	0.120132	1.336366
5991	22943	0.786377	0.051599	0.471824		0.020156	1.117074	0.836035		0.016424	0.101605	1.115644
5992	22944	1.001521	0.062705	0.751867		0.026784	1.405153	0.962647		0.021258	0.125193	1.333537
5993	22945	1.00509	0.060303	0.872767		0.02802	1.390971	0.860243		0.021576	0.120825	1.269794
5994	22946	1.155378	0.066849	1.085147		0.033526	1.575125	0.865298		0.024959	0.132766	1.369028
5995	22947	1.012598	0.057438	0.976272		0.030709	1.357995	0.6535		0.021907	0.111153	1.111528
5996	22948	0.900996	0.051856	0.845414		0.031086	1.187004	0.489353		0.019444	0.094022	0.91779
5997	22949	0.787866	0.045563	0.697408		0.029741	1.022852	0.36865		0.016941	0.078769	0.754344
5998	22950	1.055098	0.06093	0.850914		0.043276	1.348797	0.417938		0.022577	0.10075	0.940728
5999	22951	1.026783	0.058544	0.695376		0.046465	1.285011	0.315441		0.021802	0.092018	0.827026
6000	22952	0.796586	0.044242	0.431965		0.039454	0.974593	0.177539		0.016789	0.066739	0.574218
6001	22953	0.516557	0.02815	0.244715		0.026801	0.623875	0.092823		0.010851	0.041677	0.35017
6002	22954	0.856025	0.045812	0.370346		0.046097	1.022526	0.126846		0.017944	0.066919	0.554237
6003	22955	0.944176	0.049016	0.30739		0.054526	1.102312	0.088525		0.019738	0.069362	0.566528
6004	22956	0.947421	0.047218	0.175505		0.058434	1.079714	0.051396		0.019835	0.065605	0.546046
6005	22957	0.952331	0.044035	0.184512		0.065583	1.05298	0.062074		0.019782	0.062429	0.582134
6006	22958	0.985932	0.044357	0.333023		0.071056	1.082832	0.12695		0.0206	0.065056	0.670722
6007	22959	0.956095	0.041235	0.441039		0.071923	1.041309	0.213505		0.020172	0.063639	0.751273
6008	22960	0.85548	0.039322	0.460807		0.066539	0.924084	0.271654		0.018247	0.057365	0.757009
6009	22961	0.783024	0.037653	0.447077		0.061972	0.841478	0.292717		0.016813	0.052704	0.738741
6010	22962	1.056876	0.055703	0.724373		0.08643	1.122866	0.515427		0.023034	0.071582	1.125216
6011	22963	1.059044	0.06095	0.8353		0.08912	1.111241	0.625614		0.023457	0.07198	1.252574
6012	22964	1.215339	0.075958	1.036208		0.104873	1.258233	0.822517		0.027378	0.082561	1.566181
6013	22965	1.063191	0.072858	0.931614		0.093755	1.084872	0.787427		0.024354	0.071756	1.457202
6014	22966	1.065149	0.079648	0.912582		0.095744	1.070322	0.827426		0.024804	0.070881	1.50291
6015	22967	1.067035	0.086404	0.851442		0.097534	1.055141	0.8361		0.025251	0.0694	1.49573
6016	22968	1.224118	0.106579	0.866088		0.113565	1.190434	0.931798		0.029416	0.077139	1.648145
6017	22969	1.070495	0.099473	0.705525		0.100598	1.022949	0.763467		0.026083	0.06483	1.348096
6018	22970	1.169503	0.115141	0.733407		0.111168	1.097331	0.747845		0.028852	0.06762	1.347086
6019	22971	1.376108	0.14395	0.750225		0.132395	1.262602	0.725469		0.034404	0.074859	1.392003
6020	22972	1.172691	0.128964	0.532109		0.11391	1.053044	0.482155		0.029627	0.060039	1.028967
6021	22973	1.173775	0.135086	0.381135		0.115016	1.030905	0.329372		0.029958	0.056467	0.867297
6022	22974	0.930279	0.080478	0.430493		0.124594	0.973107	0.111728		0.012697	0.060117	0.675264

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6023	22975	1.054423	0.093903	0.717387		0.140352	1.142011	0.226462		0.014417	0.075521	0.866746
6024	22976	0.976704	0.088584	0.822003		0.128878	1.09334	0.335328		0.013419	0.076864	0.905864
6025	22977	0.647448	0.058998	0.610094		0.08478	0.740987	0.285489		0.008943	0.054155	0.651776
6026	22978	0.508114	0.046223	0.506053		0.066098	0.590916	0.262529		0.007051	0.044356	0.542539
6027	22979	0.672449	0.060876	0.689578		0.086946	0.792193	0.390566		0.009373	0.060712	0.752264
6028	22980	0.99443	0.089491	1.065713		0.126909	1.199426	0.701504		0.013995	0.095312	1.206686
6029	22981	0.847474	0.076535	0.927992		0.106428	1.046596	0.711778		0.012059	0.08649	1.10477
6030	22982	0.747962	0.06705	0.800362		0.092611	0.940119	0.706009		0.010737	0.079841	1.017223
6031	22983	0.747088	0.065864	0.766126		0.091067	0.954755	0.780063		0.010816	0.083044	1.046183
6032	22984	0.825519	0.07094	0.804313		0.098917	1.071591	0.941606		0.012054	0.095166	1.212051
6033	22985	0.660532	0.054921	0.588136		0.077687	0.870029	0.814604		0.009719	0.078697	1.010389
6034	22986	0.516295	0.041659	0.42474		0.059794	0.687348	0.671832		0.007638	0.062929	0.810817
6035	22987	0.574824	0.045163	0.447241		0.065723	0.771477	0.777478		0.008535	0.071213	0.918805
6036	22988	0.678876	0.051047	0.469796		0.07601	0.921739	0.967729		0.010127	0.085955	1.108993
6037	22989	0.744404	0.053496	0.482318		0.081558	1.021234	1.11005		0.011145	0.095952	1.253317
6038	22990	0.639024	0.045229	0.395521		0.068399	0.885118	0.99229		0.009591	0.083659	1.108574
6039	22991	0.612701	0.043086	0.386071		0.064093	0.855759	0.983603		0.009209	0.081176	1.088489
6040	22992	0.645085	0.044989	0.456525		0.065863	0.908062	1.066121		0.009702	0.086289	1.168805
6041	22993	0.67749	0.046746	0.548719		0.067184	0.961446	1.151081		0.010178	0.091349	1.248978
6042	22994	0.847392	0.058668	0.756821		0.081432	1.211614	1.475047		0.012705	0.114925	1.584015
6043	22995	0.859661	0.060478	0.824149		0.079097	1.23976	1.537351		0.012828	0.117212	1.673051
6044	22996	0.761999	0.054246	0.741349		0.066874	1.107434	1.396561		0.011311	0.104187	1.556025
6045	22997	0.664405	0.047565	0.628522		0.05604	0.970755	1.247699		0.009802	0.090897	1.398661
6046	22998	0.78903	0.056602	0.714643		0.06377	1.158359	1.514779		0.011561	0.107913	1.704426
6047	22999	0.83427	0.059707	0.697427		0.06417	1.230608	1.636646		0.012115	0.114028	1.84659
6048	230	0.983186	0.028848	0.093099		0.032557	0.900954	0.008523		0.014997	0.030675	0.778378
6049	23000	0.913018	0.065044	0.640181		0.065901	1.353573	1.823374		0.013124	0.124905	2.066348
6050	23001	0.88762	0.063853	0.467264		0.059766	1.321645	1.782893		0.012612	0.121547	2.034135
6051	23002	0.941339	0.068258	0.324958		0.058975	1.406443	1.892997		0.013206	0.129121	2.163483
6052	23003	0.850087	0.063342	0.226294		0.04924	1.273429	1.710075		0.011771	0.116618	1.946692
6053	23004	0.667752	0.052603	0.221073		0.035626	1.002127	1.333657		0.009141	0.091723	1.514111
6054	23005	0.681359	0.055314	0.314456		0.034506	1.023296	1.349645		0.009266	0.093659	1.531241
6055	23006	0.945445	0.080323	0.629502		0.043421	1.420836	1.834454		0.012704	0.130136	2.089814
6056	23007	0.867406	0.076386	0.7217		0.035789	1.303292	1.637292		0.011536	0.119624	1.875853
6057	23008	0.868911	0.078421	0.82575		0.03299	1.3044	1.584917		0.011722	0.120019	1.822197
6058	23009	0.870582	0.07952	0.884213		0.031752	1.304877	1.541668		0.012519	0.120409	1.748592
6059	23010	0.853244	0.077852	0.877559		0.030148	1.275987	1.464927		0.013037	0.118204	1.620446
6060	23011	0.675271	0.06104	0.674761		0.023276	1.007396	1.128418		0.010783	0.093606	1.218524
6061	23012	0.775977	0.068968	0.727776		0.026078	1.154167	1.258042		0.012911	0.107507	1.376819
6062	23013	0.877664	0.075466	0.715872		0.028517	1.299154	1.359853		0.015345	0.121191	1.524989
6063	23014	0.960697	0.078933	0.629575		0.030183	1.413768	1.412955		0.017567	0.131792	1.625671
6064	23015	0.882501	0.068528	0.433314		0.026783	1.289572	1.224191		0.01678	0.119877	1.44636
6065	23016	0.885134	0.064483	0.348048		0.025917	1.282953	1.148364		0.017396	0.118527	1.405898
6066	23017	0.874484	0.060909	0.3711		0.024668	1.255885	1.049808		0.017667	0.114817	1.33531
6067	23018	0.770012	0.051219	0.399085		0.021063	1.094873	0.850128		0.015907	0.098702	1.11966
6068	23019	0.703205	0.045516	0.411379		0.018901	0.993371	0.736334		0.01468	0.088675	0.99136
6069	23020	0.895666	0.055397	0.661204		0.023335	1.249682	0.847651		0.018964	0.109325	1.184682
6070	23021	0.898951	0.053358	0.768458		0.023634	1.237226	0.757955		0.019195	0.105587	1.123731
6071	23022	0.985091	0.056472	0.91241		0.026934	1.335666	0.728099		0.021127	0.111175	1.155469
6072	23023	0.905861	0.050573	0.860244		0.025744	1.208254	0.576583		0.019414	0.0978	0.983092
6073	23024	0.806114	0.045485	0.74477		0.023798	1.056294	0.432033		0.017208	0.08283	0.810545
6074	23025	0.704974	0.03996	0.614495		0.021819	0.910343	0.3257		0.014972	0.069461	0.665612
6075	23026	0.895136	0.05066	0.71138		0.030514	1.138251	0.350817		0.018899	0.084314	0.786781
6076	23027	0.919005	0.05137	0.611799		0.035124	1.144046	0.279313		0.019232	0.081321	0.728538
6077	23028	0.713082	0.038861	0.377387		0.030236	0.867844	0.157504		0.014806	0.059057	0.506096
6078	23029	0.462447	0.024745	0.215903		0.020672	0.555595	0.082561		0.009569	0.036902	0.310146
6079	23030	0.716758	0.038064	0.305657		0.033419	0.851705	0.104133		0.0148	0.055451	0.459447
6080	23031	0.845482	0.043942	0.270773		0.042714	0.981932	0.077379		0.017433	0.061511	0.501368
6081	23032	0.848498	0.042502	0.156607		0.046158	0.961955	0.038051		0.017564	0.058236	0.482818
6082	23033	0.853188	0.039516	0.162552		0.052666	0.938201	0.049982		0.017397	0.05567	0.520014
6083	23034	0.883488	0.039753	0.292369		0.057369	0.964646	0.109888		0.017968	0.057998	0.599279
6084	23035	0.856932	0.03694	0.388272		0.058377	0.927502	0.18785		0.017604	0.056703	0.670497
6085	23036	0.716275	0.032221	0.380067		0.050636	0.768653	0.224725		0.014875	0.047717	0.632216
6086	23037	0.702001	0.03289	0.394687		0.0506	0.749324	0.25937		0.01469	0.046925	0.660975
6087	23038	0.947697	0.048404	0.656773		0.070822	0.999682	0.456801		0.020165	0.063705	1.009017
6088	23039	0.949784	0.052922	0.756621		0.073265	0.989101	0.553544		0.020563	0.064037	1.125803
6089	23040	1.039078	0.063298	0.895147		0.082404	1.067292	0.69154		0.022899	0.06999	1.344026
6090	23041	0.953709	0.063735	0.843419		0.0775	0.965206	0.693644		0.021387	0.063779	1.310688
6091	23042	0.95552	0.069507	0.826369		0.079294	0.952117	0.729203		0.021786	0.062947	1.349611
6092	23043	0.957233	0.075232	0.771779		0.08092	0.938522	0.738158		0.02217	0.061565	1.340629

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6093	23044	1.046764	0.088269	0.756659		0.089946	1.009255	0.786339		0.024598	0.065163	1.406494
6094	23045	0.960304	0.086272	0.650923		0.083719	0.909757	0.676346		0.022847	0.057412	1.205557
6095	23046	1.049061	0.099698	0.656573		0.092624	0.975797	0.662749		0.025219	0.059869	1.205731
6096	23047	1.182651	0.119226	0.641984		0.10578	1.075664	0.613626		0.028699	0.063516	1.197739
6097	23048	1.0517	0.111299	0.490171		0.095082	0.936186	0.425537		0.02568	0.053156	0.924718
6098	23049	1.052541	0.116395	0.352232		0.096064	0.916447	0.289645		0.025813	0.05001	0.778372
6099	23050	0.933448	0.077238	0.41002		0.11616	0.972998	0.099481		0.012848	0.059692	0.671895
6100	23051	1.058066	0.090716	0.685983		0.131069	1.141873	0.220978		0.014578	0.074706	0.860774
6101	23052	0.980183	0.085602	0.788871		0.120488	1.093199	0.32542		0.01357	0.075784	0.89478
6102	23053	0.649792	0.05694	0.586659		0.079304	0.740853	0.276465		0.00904	0.053309	0.641338
6103	23054	0.509989	0.044671	0.487189		0.061865	0.590786	0.253965		0.007124	0.043616	0.532441
6104	23055	0.674967	0.058843	0.664459		0.081424	0.792014	0.377587		0.009465	0.059625	0.736786
6105	23056	0.998278	0.08715	1.031046		0.118934	1.199113	0.677599		0.014127	0.093415	1.177861
6106	23057	0.850815	0.074649	0.899492		0.099819	1.046207	0.687038		0.012167	0.084275	1.075226
6107	23058	0.750981	0.0655	0.776649		0.086945	0.939704	0.681242		0.010821	0.077637	0.988387
6108	23059	0.750144	0.064395	0.746122		0.085595	0.954353	0.752587		0.010889	0.080627	1.022349
6109	23060	0.828963	0.069447	0.783598		0.093047	1.071154	0.908306		0.012126	0.092302	1.178185
6110	23061	0.663308	0.053889	0.57301		0.073135	0.869669	0.785639		0.009774	0.07632	0.98134
6111	23062	0.518485	0.04096	0.414933		0.056353	0.687049	0.64785		0.007673	0.061051	0.787633
6112	23063	0.577276	0.044488	0.436395		0.061985	0.771175	0.749686		0.008569	0.069073	0.892731
6113	23064	0.681786	0.050404	0.457538		0.071796	0.921495	0.933145		0.01016	0.083273	1.078029
6114	23065	0.747631	0.053397	0.469472		0.077098	1.021063	1.070347		0.011171	0.092925	1.211773
6115	23066	0.641802	0.045196	0.386106		0.064715	0.885044	0.956732		0.009609	0.08104	1.072077
6116	23067	0.615373	0.043088	0.37814		0.060732	0.855712	0.948279		0.009222	0.078712	1.052834
6117	23068	0.647908	0.045038	0.446293		0.062483	0.908117	1.027849		0.009709	0.083683	1.130797
6118	23069	0.680456	0.046862	0.535303		0.063857	0.961666	1.109895		0.010188	0.088535	1.208776
6119	23070	0.851136	0.058625	0.736695		0.077475	1.212063	1.422416		0.012698	0.111368	1.539287
6120	23071	0.863456	0.06037	0.800083		0.075373	1.24029	1.48258		0.012819	0.113693	1.641662
6121	23072	0.765376	0.054104	0.718002		0.063889	1.107967	1.344029		0.011301	0.101161	1.529017
6122	23073	0.667344	0.047421	0.607827		0.053655	0.971355	1.189695		0.009807	0.088218	1.375812
6123	23074	0.792545	0.056415	0.692855		0.061245	1.159195	1.445905		0.011547	0.105027	1.67795
6124	23075	0.837986	0.059488	0.676437		0.061815	1.231551	1.562709		0.012091	0.111418	1.818947
6125	23076	0.917096	0.064926	0.622012		0.063791	1.35469	1.73955		0.013111	0.122336	2.033962
6126	23077	0.891579	0.063672	0.454773		0.058184	1.322981	1.699344		0.012626	0.119049	1.999054
6127	23078	0.945574	0.068422	0.320449		0.057681	1.408097	1.815471		0.013203	0.126302	2.124467
6128	23079	0.853907	0.06325	0.219039		0.048418	1.274923	1.640347		0.011753	0.114282	1.910964
6129	23080	0.670766	0.052139	0.21733		0.035326	1.003265	1.279291		0.009147	0.089929	1.485874
6130	23081	0.684437	0.054714	0.308108		0.034407	1.024493	1.294634		0.009285	0.09179	1.502243
6131	23082	0.949753	0.079229	0.615085		0.043691	1.4225	1.759504		0.012718	0.127459	2.045669
6132	23083	0.871353	0.075207	0.704128		0.036406	1.304643	1.570772		0.011524	0.117213	1.833556
6133	23084	0.872898	0.077122	0.805091		0.033849	1.305583	1.523925		0.011791	0.117634	1.780071
6134	23085	0.87459	0.078096	0.863692		0.032241	1.306042	1.488911		0.01259	0.117805	1.709389
6135	23086	0.857217	0.076424	0.857572		0.030767	1.277123	1.415026		0.013112	0.115267	1.587106
6136	23087	0.678416	0.059954	0.659768		0.023858	1.008223	1.090023		0.010839	0.091121	1.195798
6137	23088	0.779622	0.067839	0.712157		0.026803	1.155009	1.215266		0.012969	0.104707	1.332331
6138	23089	0.881807	0.074335	0.701542		0.029433	1.300078	1.313831		0.015383	0.117972	1.475376
6139	23090	0.965301	0.077905	0.618429		0.031325	1.414782	1.365464		0.017594	0.128204	1.572598
6140	23091	0.886745	0.067832	0.42564		0.027973	1.290409	1.183214		0.016782	0.116712	1.404272
6141	23092	0.889452	0.06391	0.334979		0.027193	1.283741	1.110102		0.017352	0.115501	1.369721
6142	23093	0.878786	0.060288	0.35834		0.026024	1.256752	1.015151		0.017578	0.11185	1.301782
6143	23094	0.773867	0.050796	0.385933		0.022231	1.095737	0.821624		0.015795	0.096145	1.092949
6144	23095	0.706743	0.045194	0.393528		0.019938	0.99419	0.711798		0.014566	0.086422	0.968708
6145	23096	0.900247	0.055117	0.636653		0.024697	1.25077	0.819675		0.018766	0.106956	1.158733
6146	23097	0.90361	0.053213	0.740725		0.024092	1.238461	0.733328		0.01896	0.103787	1.100336
6147	23098	0.990315	0.056436	0.880058		0.02626	1.337205	0.704944		0.020823	0.109418	1.132673
6148	23099	0.910738	0.050605	0.829889		0.024339	1.209767	0.558654		0.019119	0.096438	0.964315
6149	231	0.711875	0.025992	0.110832		0.016044	0.724037	0.127066		0.019642	0.033084	0.576109
6150	23100	0.810555	0.044731	0.718447		0.022488	1.057747	0.418989		0.016915	0.081842	0.793148
6151	23101	0.708921	0.039266	0.592691		0.020256	0.911727	0.315693		0.014704	0.068706	0.65052
6152	23102	0.900258	0.049777	0.685849		0.026509	1.140146	0.340284		0.01854	0.083494	0.768125
6153	23103	0.924385	0.050512	0.589079		0.029039	1.146122	0.271164		0.018855	0.080687	0.710866
6154	23104	0.717377	0.038483	0.360328		0.025458	0.869561	0.153118		0.014497	0.058709	0.500972
6155	23105	0.465275	0.024847	0.208413		0.017565	0.556756	0.080392		0.009365	0.036721	0.307731
6156	23106	0.721203	0.038292	0.294979		0.028605	0.853566	0.10163		0.014481	0.055215	0.456127
6157	23107	0.85085	0.04432	0.261127		0.037026	0.984267	0.074043		0.017058	0.061349	0.500772
6158	23108	0.854023	0.043049	0.154426		0.040518	0.964457	0.036069		0.017195	0.058157	0.482311
6159	23109	0.859061	0.039915	0.157858		0.047143	0.940669	0.04606		0.017051	0.055801	0.522089
6160	23110	0.889784	0.040131	0.282038		0.051703	0.966981	0.103846		0.01752	0.058107	0.600313
6161	23111	0.863262	0.037295	0.375622		0.052906	0.929577	0.180855		0.01721	0.05677	0.667097
6162	23112	0.721719	0.031765	0.368516		0.04612	0.770263	0.21798		0.014575	0.047738	0.628784

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6163	23113	0.707416	0.032403	0.391839		0.0462	0.750823	0.252226		0.014398	0.046929	0.65772
6164	23114	0.955207	0.047444	0.655407		0.064935	1.001452	0.445578		0.019767	0.063667	1.006266
6165	23115	0.957481	0.051672	0.754167		0.06739	0.990707	0.540799		0.020162	0.063962	1.125717
6166	23116	1.047649	0.062381	0.891656		0.076088	1.068895	0.675598		0.022474	0.069869	1.346386
6167	23117	0.961677	0.062659	0.83993		0.071766	0.966476	0.67617		0.021009	0.063624	1.313364
6168	23118	0.96357	0.068148	0.823163		0.073588	0.953217	0.71171		0.021412	0.062736	1.350813
6169	23119	0.965326	0.073538	0.774966		0.075217	0.939571	0.721704		0.02178	0.061286	1.339083
6170	23120	1.055622	0.086054	0.775359		0.08379	1.010331	0.769923		0.024141	0.064798	1.40176
6171	23121	0.968411	0.083928	0.692861		0.078116	0.910555	0.662403		0.022395	0.057066	1.199567
6172	23122	1.057842	0.096798	0.697737		0.086475	0.976443	0.648415		0.024652	0.059509	1.199352
6173	23123	1.192452	0.115493	0.686191		0.098886	1.076167	0.600396		0.027939	0.063152	1.192889
6174	23124	1.060314	0.10766	0.496642		0.088923	0.936436	0.414621		0.024885	0.052859	0.922463
6175	23125	1.061038	0.112434	0.358056		0.089839	0.916564	0.282048		0.024873	0.04979	0.777406
6176	23126	0.993718	0.079155	0.402238		0.114772	1.033722	0.098814		0.013745	0.062873	0.707724
6177	23127	1.126523	0.093059	0.675992		0.129651	1.213138	0.221997		0.015599	0.078325	0.8996
6178	23128	1.170178	0.098151	0.873128		0.133788	1.302225	0.36463		0.016267	0.088589	1.038752
6179	23129	0.692036	0.05838	0.581183		0.078607	0.78709	0.276265		0.009663	0.055537	0.660607
6180	23130	0.543192	0.045673	0.483449		0.061348	0.627643	0.253645		0.007614	0.045365	0.546283
6181	23131	0.718969	0.0601	0.659989		0.080767	0.8414	0.376889		0.010115	0.061946	0.753555
6182	23132	1.189332	0.099987	1.148789		0.132071	1.424792	0.75513		0.016865	0.108026	1.339262
6183	23133	0.906558	0.076911	0.899188		0.099231	1.111354	0.685145		0.01297	0.08721	1.089036
6184	23134	0.800255	0.067544	0.777531		0.086495	0.998226	0.679286		0.011529	0.08002	1.00145
6185	23135	0.799447	0.066529	0.750081		0.085208	1.013783	0.750062		0.011594	0.082729	1.041929
6186	23136	1.008751	0.081877	0.898901		0.105889	1.299501	1.032399		0.014723	0.107475	1.365538
6187	23137	0.707005	0.055942	0.576463		0.072989	0.923886	0.782805		0.010378	0.078132	0.991142
6188	23138	0.552662	0.042638	0.419224		0.056276	0.729943	0.6456		0.008143	0.062458	0.791638
6189	23139	0.615348	0.046399	0.440431		0.061947	0.819359	0.747041		0.009089	0.070644	0.89729
6190	23140	0.726792	0.052788	0.462027		0.071806	0.979167	0.929512		0.010767	0.085149	1.083702
6191	23141	0.921859	0.065872	0.546208		0.089325	1.255444	1.232003		0.013685	0.109346	1.40094
6192	23142	0.684202	0.048254	0.389853		0.064918	0.940633	0.953021		0.010168	0.082855	1.072864
6193	23143	0.656041	0.045772	0.382915		0.06097	0.909585	0.944903		0.009753	0.080478	1.054148
6194	23144	0.690739	0.047893	0.450802		0.062805	0.965385	1.024261		0.010264	0.085576	1.132479
6195	23145	0.725463	0.049914	0.539738		0.064242	1.022452	1.105798		0.010758	0.090566	1.218327
6196	23146	1.032108	0.070827	0.841748		0.088823	1.46639	1.610564		0.015261	0.129037	1.79098
6197	23147	0.92058	0.06398	0.801987		0.076155	1.318994	1.477759		0.013544	0.116486	1.68101
6198	23148	0.816021	0.057281	0.717675		0.064658	1.178459	1.340141		0.011936	0.10405	1.567525
6199	23149	0.71152	0.050227	0.606128		0.054411	1.033264	1.184916		0.010346	0.091055	1.411207
6200	23150	0.969726	0.068659	0.793893		0.071594	1.415647	1.63336		0.014006	0.124051	1.974791
6201	23151	0.89345	0.063074	0.676767		0.063202	1.310281	1.54033		0.012798	0.115168	1.867968
6202	23152	0.977805	0.06888	0.623492		0.065453	1.441469	1.714359		0.013874	0.126562	2.089618
6203	23153	0.950625	0.067461	0.457047		0.059941	1.407872	1.682808		0.013348	0.123244	2.052594
6204	23154	1.133261	0.082317	0.36702		0.067207	1.685066	2.019525		0.01573	0.146558	2.4466
6205	23155	0.910474	0.067488	0.21876		0.050555	1.356907	1.625207		0.012491	0.118385	1.955403
6206	23156	0.715209	0.054826	0.221199		0.037102	1.067802	1.268378		0.00971	0.093167	1.518239
6207	23157	0.729797	0.0574	0.312186		0.036283	1.09036	1.283637		0.009849	0.09511	1.534336
6208	23158	1.13833	0.092946	0.697441		0.052335	1.702243	1.959333		0.0152	0.147954	2.343293
6209	23159	0.929138	0.078414	0.709883		0.039291	1.388369	1.557507		0.012288	0.121431	1.868025
6210	23160	0.930795	0.080232	0.811202		0.036791	1.389269	1.521994		0.012496	0.121833	1.813688
6211	23161	0.932631	0.08118	0.871368		0.034726	1.389621	1.486806		0.013331	0.121986	1.743626
6212	23162	1.040697	0.090171	0.984075		0.037837	1.547312	1.607052		0.01579	0.135342	1.846636
6213	23163	0.723485	0.062343	0.666026		0.025825	1.072602	1.088483		0.011452	0.094285	1.226596
6214	23164	0.831425	0.070613	0.719671		0.029132	1.228653	1.214035		0.013684	0.108138	1.343089
6215	23165	0.940444	0.077566	0.709703		0.032157	1.382826	1.312489		0.016206	0.121602	1.477455
6216	23166	1.157228	0.091514	0.703498		0.038621	1.69181	1.531913		0.020785	0.14785	1.768179
6217	23167	0.94579	0.07124	0.431188		0.030795	1.372408	1.182421		0.017582	0.120101	1.41464
6218	23168	0.948708	0.067423	0.332679		0.030112	1.365328	1.109866		0.018142	0.118915	1.38078
6219	23169	0.937395	0.063375	0.35713		0.02898	1.336655	1.014944		0.018341	0.115393	1.312942
6220	23170	0.954846	0.061937	0.445747		0.028764	1.348349	0.949385		0.019024	0.11464	1.278135
6221	23171	0.75395	0.047718	0.393203		0.022357	1.057541	0.711803		0.015139	0.089531	0.980901
6222	23172	0.960433	0.058355	0.632598		0.027685	1.330521	0.820477		0.019474	0.111078	1.175814
6223	23173	0.964107	0.056473	0.736689		0.026995	1.317515	0.734393		0.019638	0.107951	1.123631
6224	23174	1.187776	0.067571	0.983534		0.032444	1.599463	0.793302		0.024223	0.127809	1.302768
6225	23175	0.971881	0.053901	0.826194		0.026343	1.287259	0.560376		0.019751	0.100653	0.989535
6226	23176	0.865058	0.047209	0.715368		0.023373	1.125669	0.420882		0.017467	0.085592	0.812588
6227	23177	0.756666	0.040992	0.589844		0.020382	0.970393	0.316624		0.015173	0.071976	0.666059
6228	23178	1.094037	0.059116	0.775905		0.030281	1.381862	0.388364		0.021772	0.099612	0.894817
6229	23179	0.986877	0.053098	0.585051		0.028473	1.220232	0.272425		0.019418	0.084873	0.742139
6230	23180	0.765996	0.041049	0.354673		0.023039	0.925973	0.154128		0.014912	0.061907	0.524716
6231	23181	0.496859	0.026518	0.207604		0.015394	0.592949	0.081033		0.009625	0.038768	0.32274
6232	23182	0.905062	0.048049	0.345163		0.029746	1.068317	0.120568		0.017473	0.068557	0.564015

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6233	23183	0.908827	0.047477	0.26009		0.033375	1.048571	0.074253		0.017474	0.064972	0.532513
6234	23184	0.912357	0.046268	0.158995		0.037096	1.027748	0.036581		0.017578	0.061718	0.512173
6235	23185	0.918131	0.04286	0.159915		0.044304	1.002394	0.046219		0.017447	0.059367	0.556087
6236	23186	0.951243	0.043085	0.282439		0.048998	1.030145	0.10471		0.018036	0.061788	0.636943
6237	23187	0.923165	0.040095	0.377234		0.050531	0.990076	0.181494		0.017795	0.060301	0.702102
6238	23188	0.909849	0.039185	0.436961		0.052182	0.96688	0.258385		0.017813	0.059714	0.776323
6239	23189	0.756794	0.033902	0.40667		0.04447	0.799504	0.254775		0.014953	0.049779	0.688881
6240	23190	1.022118	0.049515	0.679698		0.062833	1.066189	0.452504		0.020587	0.067465	1.05495
6241	23191	1.024761	0.054164	0.781264		0.065532	1.054589	0.55088		0.021051	0.067711	1.18236
6242	23192	1.260571	0.073371	1.036805		0.083435	1.279145	0.775114		0.02641	0.083067	1.591669
6243	23193	1.029546	0.065373	0.869472		0.070217	1.028559	0.691605		0.021977	0.067241	1.382857
6244	23194	1.031662	0.070882	0.857136		0.072213	1.014388	0.727482		0.022403	0.066244	1.421605
6245	23195	1.0336	0.076255	0.815769		0.07401	0.999737	0.73717		0.022793	0.064652	1.406901
6246	23196	1.270508	0.099854	0.969378		0.092798	1.208598	0.884269		0.028401	0.076716	1.651364
6247	23197	1.036879	0.086527	0.768742		0.077048	0.968544	0.676723		0.023428	0.060126	1.255296
6248	23198	1.132596	0.099533	0.77264		0.085429	1.038408	0.661995		0.02579	0.062715	1.253763
6249	23199	1.417398	0.131407	0.849527		0.108521	1.27045	0.679015		0.032431	0.073913	1.38399
6250	232	1.011636	0.03304	0.099959		0.037316	0.936384	0.00908		0.019914	0.035209	0.779123
6251	23200	1.135034	0.110255	0.54875		0.087916	0.99532	0.420643		0.025965	0.055752	0.966154
6252	23201	1.135718	0.11497	0.378686		0.08882	0.974051	0.286069		0.025861	0.052627	0.821612
6253	23202	0.994238	0.075924	0.352581		0.105437	1.033626	0.088491		0.013782	0.062123	0.693991
6254	23203	1.127354	0.089093	0.596476		0.119209	1.21308	0.200192		0.015641	0.076846	0.870371
6255	23204	1.044793	0.083922	0.689543		0.109831	1.161415	0.292877		0.014546	0.077176	0.888771
6256	23205	0.692861	0.055806	0.516035		0.0724	0.787058	0.248299		0.009684	0.054006	0.629264
6257	23206	0.543923	0.043691	0.430128		0.056534	0.627612	0.227847		0.007627	0.044028	0.51745
6258	23207	0.720023	0.057427	0.588073		0.074466	0.841378	0.338464		0.010128	0.059978	0.710641
6259	23208	1.065289	0.085743	0.92042		0.109001	1.273831	0.606662		0.015084	0.093426	1.123421
6260	23209	0.908276	0.073636	0.806742		0.091692	1.111332	0.614814		0.012956	0.083984	1.021973
6261	23210	0.801889	0.064832	0.698513		0.079993	0.998192	0.609408		0.011502	0.076984	0.943671
6262	23211	0.801175	0.063945	0.677876		0.078893	1.01386	0.672796		0.011551	0.079373	0.979093
6263	23212	0.885503	0.0693	0.712776		0.085966	1.138087	0.811625		0.01283	0.090337	1.115519
6264	23213	0.708674	0.054171	0.521824		0.067737	0.924113	0.701941		0.010311	0.074428	0.921479
6265	23214	0.554002	0.041459	0.381802		0.052279	0.730121	0.578844		0.008082	0.059441	0.734278
6266	23215	0.616867	0.045295	0.400951		0.057588	0.819629	0.669763		0.009014	0.067164	0.827256
6267	23216	0.728621	0.052479	0.421843		0.066849	0.979684	0.833385		0.010667	0.080789	0.990671
6268	23217	0.799035	0.057093	0.430349		0.071982	1.085828	0.955831		0.011709	0.090079	1.119765
6269	23218	0.68598	0.048579	0.355716		0.060586	0.9414	0.854541		0.010054	0.078601	0.991538
6270	23219	0.657767	0.04618	0.349762		0.056977	0.910355	0.847299		0.009636	0.07647	0.972966
6271	23220	0.692575	0.048272	0.410331		0.058759	0.966357	0.918572		0.010135	0.081391	1.050456
6272	23221	0.727404	0.050372	0.490882		0.060205	1.023723	0.991905		0.010623	0.086222	1.142557
6273	23222	0.909866	0.062676	0.67129		0.073304	1.290695	1.271447		0.013245	0.108736	1.4769
6274	23223	0.923076	0.063762	0.723812		0.071632	1.32111	1.326102		0.013366	0.11162	1.578701
6275	23224	0.818246	0.057359	0.645235		0.060969	1.180488	1.202911		0.011784	0.099908	1.47186
6276	23225	0.713464	0.050391	0.543534		0.051577	1.03529	1.063877		0.010224	0.087413	1.324963
6277	23226	0.847305	0.060017	0.623484		0.059306	1.235853	1.278965		0.012068	0.104163	1.61656
6278	23227	0.895896	0.063302	0.608962		0.060294	1.31322	1.368687		0.012667	0.110767	1.753265
6279	23228	0.980496	0.06886	0.562291		0.062732	1.44475	1.516963		0.013751	0.12198	1.960886
6280	23229	0.953254	0.068309	0.418447		0.057755	1.411374	1.497988		0.013256	0.118761	1.92539
6281	23230	1.01099	0.073864	0.301799		0.057972	1.502538	1.600714		0.013921	0.126002	2.042113
6282	23231	0.913016	0.067863	0.196008		0.049368	1.360396	1.447998		0.012445	0.114196	1.832153
6283	23232	0.717218	0.054116	0.204354		0.036513	1.070449	1.130262		0.009696	0.089962	1.421247
6284	23233	0.731854	0.056441	0.286529		0.035891	1.093141	1.143916		0.009847	0.091776	1.435368
6285	23234	1.015573	0.081007	0.566842		0.046542	1.517822	1.554698		0.013539	0.127336	1.949337
6286	23235	0.931794	0.076418	0.646202		0.039764	1.39176	1.392355		0.012411	0.117186	1.744443
6287	23236	0.933481	0.078029	0.737325		0.037606	1.3924	1.369111		0.012493	0.117662	1.694428
6288	23237	0.935345	0.078752	0.792814		0.035761	1.392718	1.337567		0.01313	0.117646	1.631713
6289	23238	0.916814	0.077002	0.787139		0.033717	1.361669	1.271142		0.013639	0.114934	1.523814
6290	23239	0.725636	0.060516	0.606151		0.026278	1.07471	0.979506		0.011254	0.090873	1.155733
6291	23240	0.833923	0.068713	0.655285		0.02974	1.230836	1.092572		0.013404	0.104297	1.266514
6292	23241	0.943302	0.075668	0.646917		0.032978	1.385161	1.181442		0.015807	0.117165	1.370813
6293	23242	1.032684	0.07983	0.572935		0.035394	1.507205	1.228062		0.01798	0.127054	1.450282
6294	23243	0.948748	0.070148	0.393308		0.031869	1.374511	1.064848		0.01706	0.115753	1.300282
6295	23244	0.951724	0.066834	0.296246		0.031317	1.367315	0.999778		0.017536	0.114789	1.268331
6296	23245	0.940421	0.062602	0.320084		0.030297	1.338694	0.914583		0.017662	0.11134	1.206012
6297	23246	0.82823	0.053102	0.349297		0.026131	1.167318	0.741324		0.015807	0.095984	1.022319
6298	23247	0.756458	0.04743	0.355967		0.023564	1.059192	0.642649		0.014545	0.086527	0.913389
6299	23248	0.963701	0.058219	0.564253		0.029337	1.332622	0.741219		0.018658	0.107605	1.109583
6300	23249	0.967457	0.056565	0.658103		0.028743	1.319702	0.664055		0.018779	0.104699	1.050964
6301	23250	1.060452	0.060294	0.782994		0.03071	1.425207	0.639369		0.020594	0.110702	1.08983
6302	23251	0.975442	0.054186	0.739077		0.027482	1.289674	0.507988		0.018885	0.098069	0.934467

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6303	23252	0.868321	0.047441	0.639953		0.024034	1.127943	0.382263		0.016694	0.083691	0.768265
6304	23253	0.75959	0.0412	0.527544		0.020987	0.972522	0.288131		0.014504	0.070505	0.63096
6305	23254	0.964789	0.052082	0.609572		0.02661	1.21655	0.309666		0.018277	0.086011	0.759219
6306	23255	0.990954	0.053277	0.521803		0.027246	1.223419	0.247764		0.018554	0.083631	0.721462
6307	23256	0.769298	0.041168	0.313193		0.021705	0.928609	0.140747		0.014228	0.06124	0.512483
6308	23257	0.499052	0.026602	0.185986		0.014443	0.59472	0.074436		0.009169	0.038426	0.319389
6309	23258	0.773692	0.041054	0.263325		0.022879	0.911971	0.095546		0.014141	0.057931	0.479802
6310	23259	0.913118	0.047769	0.236538		0.028189	1.052121	0.071302		0.016552	0.064705	0.532286
6311	23260	0.91686	0.046792	0.150997		0.030605	1.031558	0.038285		0.016546	0.061622	0.511682
6312	23261	0.923182	0.043371	0.148682		0.037824	1.006064	0.047945		0.016441	0.059378	0.556337
6313	23262	0.956837	0.043645	0.260553		0.042386	1.033591	0.100168		0.017306	0.061748	0.636615
6314	23263	0.928955	0.040711	0.344916		0.044209	0.993127	0.174879		0.017176	0.060185	0.697024
6315	23264	0.777071	0.032771	0.342508		0.03904	0.822633	0.20977		0.014653	0.050492	0.646887
6316	23265	0.761899	0.033346	0.38522		0.039365	0.801732	0.24179		0.014529	0.049574	0.674808
6317	23266	1.029337	0.048531	0.643563		0.056037	1.068989	0.423192		0.020079	0.067094	1.028586
6318	23267	1.032267	0.053373	0.739528		0.058806	1.057254	0.514652		0.020583	0.067221	1.152317
6319	23268	1.129895	0.064081	0.873584		0.066924	1.140451	0.646077		0.023039	0.073239	1.381192
6320	23269	1.037471	0.063968	0.827134		0.063555	1.030944	0.649388		0.021603	0.06659	1.348981
6321	23270	1.03973	0.069103	0.825814		0.065599	1.016563	0.684506		0.022042	0.065561	1.386674
6322	23271	1.041769	0.074005	0.803642		0.06743	1.001804	0.694469		0.02244	0.063905	1.371386
6323	23272	1.139248	0.085965	0.890932		0.075364	1.076918	0.739717		0.024886	0.06745	1.430867
6324	23273	1.04509	0.083318	0.790534		0.070432	0.970124	0.633329		0.02308	0.059407	1.220894
6325	23274	1.14154	0.095568	0.798201		0.078189	1.039754	0.61983		0.025384	0.061996	1.218703
6326	23275	1.286584	0.113352	0.793548		0.089534	1.145209	0.571198		0.02873	0.065851	1.21293
6327	23276	1.14381	0.105288	0.568036		0.080533	0.995946	0.389349		0.025516	0.055193	0.944419
6328	23277	1.144415	0.10965	0.392334		0.081328	0.97436	0.264668		0.025368	0.052267	0.809922
6329	23278	0.993325	0.07312	0.299771		0.097487	1.033528	0.077235		0.013759	0.061334	0.678106
6330	23279	1.126602	0.085686	0.511262		0.11021	1.212939	0.175207		0.01562	0.075371	0.844426
6331	23280	1.16397	0.089406	0.659694		0.113215	1.294272	0.2852		0.016188	0.083615	0.953887
6332	23281	0.692774	0.053479	0.445027		0.067007	0.78698	0.217128		0.009666	0.052451	0.602423
6333	23282	0.543942	0.041832	0.371794		0.052347	0.62756	0.199236		0.007611	0.042654	0.493192
6334	23283	0.720139	0.055039	0.509097		0.06898	0.841293	0.295931		0.010103	0.058032	0.674855
6335	23284	1.18487	0.090815	0.889219		0.112343	1.41631	0.589075		0.016709	0.099779	1.177801
6336	23285	0.90882	0.070465	0.702275		0.085095	1.111317	0.537239		0.012888	0.08079	0.957827
6337	23286	0.80249	0.062065	0.608533		0.0743	0.99828	0.532415		0.011429	0.07387	0.882668
6338	23287	0.80187	0.06141	0.594113		0.073342	1.013962	0.587669		0.011464	0.076109	0.918038
6339	23288	1.005111	0.075465	0.708488		0.090721	1.29108	0.803076		0.014414	0.097574	1.191343
6340	23289	0.709424	0.05244	0.458406		0.063119	0.924351	0.612933		0.0102	0.071226	0.866451
6341	23290	0.554622	0.040297	0.337772		0.04876	0.730425	0.505429		0.007985	0.056801	0.689397
6342	23291	0.617582	0.044537	0.355		0.053741	0.820016	0.58481		0.008899	0.064143	0.775769
6343	23292	0.729504	0.052446	0.375523		0.062452	0.980193	0.72765		0.010519	0.077165	0.926278
6344	23293	0.91848	0.065757	0.438824		0.077296	1.24778	0.957332		0.013241	0.09814	1.17591
6345	23294	0.68686	0.048849	0.316289		0.056747	0.942106	0.74624		0.009897	0.07506	0.90691
6346	23295	0.658627	0.046599	0.310835		0.053431	0.91124	0.740055		0.009479	0.073002	0.893158
6347	23296	0.693499	0.048822	0.363821		0.055146	0.967412	0.802447		0.009962	0.077757	0.971364
6348	23297	0.728387	0.051075	0.434256		0.056579	1.024939	0.866656		0.010439	0.082482	1.054851
6349	23298	1.029411	0.07211	0.668196		0.077947	1.46077	1.254372		0.014703	0.116948	1.537539
6350	23299	0.92434	0.064361	0.63581		0.067576	1.323195	1.159297		0.013147	0.10693	1.460281
6351	233	0.622693	0.025048	0.103683		0.015234	0.650745	0.11506		0.019235	0.032269	0.488372
6352	23300	0.819382	0.057516	0.564793		0.057806	1.182719	1.051883		0.011586	0.095726	1.358694
6353	23301	0.714456	0.050502	0.476571		0.049013	1.037366	0.930393		0.01006	0.083877	1.221151
6354	23302	0.96684	0.06844	0.621816		0.064381	1.411874	1.273632		0.013549	0.113427	1.693926
6355	23303	0.897145	0.063461	0.532922		0.057641	1.316238	1.197469		0.012508	0.106482	1.612068
6356	23304	0.981872	0.069958	0.493665		0.060222	1.448374	1.324818		0.013594	0.117295	1.801675
6357	23305	0.954595	0.069144	0.372944		0.055711	1.414894	1.298986		0.013123	0.114381	1.768703
6358	23306	1.131111	0.083317	0.303053		0.06282	1.683587	1.549684		0.015446	0.135078	2.094589
6359	23307	0.914318	0.068217	0.17021		0.048195	1.363821	1.255598		0.0124	0.110105	1.684601
6360	23308	0.718252	0.05418	0.184888		0.035887	1.073202	0.98005		0.009673	0.086726	1.307526
6361	23309	0.732913	0.055573	0.257161		0.035435	1.095854	0.991924		0.009831	0.088549	1.320712
6362	23310	1.136293	0.088445	0.563929		0.051806	1.700569	1.505411		0.015151	0.136699	2.002465
6363	23311	0.933174	0.07452	0.573641		0.040036	1.395104	1.220246		0.01247	0.11309	1.606003
6364	23312	0.934888	0.075819	0.653084		0.038222	1.395747	1.199939		0.012569	0.11345	1.561089
6365	23313	0.936771	0.076458	0.702122		0.036622	1.395788	1.172404		0.012896	0.113502	1.505264
6366	23314	1.038389	0.084211	0.787065		0.038756	1.543548	1.259044		0.015069	0.124756	1.591704
6367	23315	0.72678	0.058775	0.536366		0.026586	1.076801	0.858816		0.010942	0.087597	1.071154
6368	23316	0.83526	0.066794	0.579972		0.030168	1.233131	0.95822		0.01301	0.100455	1.177485
6369	23317	0.944837	0.073817	0.572849		0.033583	1.387473	1.036406		0.015305	0.112905	1.279365
6370	23318	1.155669	0.087217	0.568481		0.040405	1.686907	1.202841		0.019364	0.136143	1.514729
6371	23319	0.950357	0.069104	0.348211		0.032686	1.376559	0.934585		0.016364	0.111564	1.219886
6372	23320	0.953387	0.066254	0.259374		0.032248	1.36938	0.877732		0.016784	0.110584	1.193069

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6373	23321	0.942101	0.062258	0.279213		0.031335	1.340619	0.803262		0.016875	0.107421	1.138063
6374	23322	0.95259	0.060571	0.352127		0.031149	1.342305	0.748614		0.017276	0.105868	1.101247
6375	23323	0.75787	0.047225	0.312706		0.024528	1.060729	0.565996		0.013815	0.083563	0.852446
6376	23324	0.965558	0.0582	0.48941		0.03067	1.334603	0.653525		0.017701	0.104051	1.039435
6377	23325	0.96938	0.056707	0.571781		0.030202	1.321669	0.586113		0.017825	0.101473	0.987529
6378	23326	1.187209	0.067837	0.760269		0.036219	1.594899	0.630813		0.021827	0.119677	1.133389
6379	23327	0.977522	0.054499	0.643134		0.029156	1.29186	0.449849		0.017928	0.095496	0.875512
6380	23328	0.87026	0.047713	0.556936		0.025321	1.130104	0.339361		0.015878	0.081684	0.723556
6381	23329	0.761346	0.041373	0.458964		0.021697	0.974533	0.256405		0.013817	0.069004	0.601573
6382	23330	1.093645	0.059163	0.598884		0.030773	1.378905	0.311824		0.019715	0.095212	0.824671
6383	23331	0.993459	0.053356	0.45276		0.027921	1.226498	0.220988		0.017726	0.082383	0.697131
6384	23332	0.771373	0.041191	0.269878		0.021621	0.931215	0.126943		0.013591	0.060545	0.504888
6385	23333	0.500452	0.026612	0.162133		0.013999	0.596482	0.06786		0.008752	0.038064	0.316499
6386	23334	0.904292	0.047865	0.267759		0.025358	1.066145	0.102307		0.015714	0.066956	0.554864
6387	23335	0.915941	0.047925	0.21436		0.026954	1.055609	0.067676		0.015713	0.064432	0.529551
6388	23336	0.91989	0.047121	0.145467		0.028409	1.035303	0.039531		0.015608	0.061551	0.510919
6389	23337	0.926806	0.043816	0.137456		0.032489	1.009694	0.052411		0.0159	0.059294	0.5554
6390	23338	0.960969	0.044168	0.239957		0.036553	1.037003	0.103612		0.016662	0.061625	0.634541
6391	23339	0.933329	0.041343	0.311103		0.038635	0.996155	0.169633		0.016624	0.059992	0.692242
6392	23340	0.912756	0.039063	0.370412		0.040281	0.964257	0.235542		0.016646	0.058707	0.748199
6393	23341	0.765858	0.032918	0.357069		0.034919	0.803973	0.23151		0.014149	0.049306	0.662156
6394	23342	1.034991	0.04776	0.597392		0.050118	1.071841	0.402881		0.019627	0.06662	0.999592
6395	23343	1.038202	0.052742	0.687004		0.052926	1.059884	0.481789		0.020187	0.066632	1.115219
6396	23344	1.269866	0.070436	0.909105		0.067659	1.277303	0.667606		0.025293	0.08083	1.489654
6397	23345	1.043834	0.062726	0.780965		0.057747	1.033258	0.601392		0.021251	0.065829	1.30153
6398	23346	1.046238	0.06747	0.781188		0.059805	1.01878	0.634361		0.021726	0.064752	1.338019
6399	23347	1.048378	0.071982	0.815444		0.061627	1.00375	0.643804		0.022146	0.063108	1.324155
6400	23348	1.280941	0.09287	1.005068		0.077111	1.205436	0.765592		0.027451	0.074262	1.544516
6401	23349	1.051811	0.080418	0.796062		0.064602	0.971588	0.586641		0.022796	0.05868	1.181407
6402	23350	1.148852	0.091914	0.812438		0.071769	1.041108	0.572383		0.025091	0.061278	1.180873
6403	23351	1.429706	0.119848	0.887569		0.0908	1.265877	0.581078		0.031361	0.071833	1.30016
6404	23352	1.151029	0.100747	0.575347		0.073964	0.996607	0.35468		0.025227	0.054821	0.923562
6405	23353	1.151575	0.104705	0.399906		0.074664	0.974744	0.240964		0.025108	0.051906	0.796678
6406	23354	0.932657	0.066148	0.222734		0.083576	0.97261	0.058518		0.012878	0.056809	0.623724
6407	23355	1.05819	0.07702	0.379466		0.094449	1.141408	0.133837		0.014634	0.069144	0.766053
6408	23356	0.981406	0.072057	0.440966		0.087107	1.092761	0.196066		0.013604	0.068499	0.771513
6409	23357	0.651173	0.047767	0.333211		0.057485	0.740555	0.166254		0.009049	0.047537	0.54072
6410	23358	0.511384	0.037352	0.279268		0.044924	0.59055	0.152573		0.007123	0.038535	0.440247
6411	23359	0.677144	0.04912	0.383309		0.059215	0.791705	0.226681		0.009452	0.052286	0.598977
6412	23360	1.002334	0.072834	0.606254		0.086845	1.198698	0.406204		0.014038	0.080885	0.929333
6413	23361	0.855003	0.062559	0.531849		0.07321	1.045957	0.411175		0.012013	0.072263	0.831202
6414	23362	0.755079	0.055235	0.460963		0.063984	0.939628	0.407326		0.010636	0.06596	0.761293
6415	23363	0.754604	0.054799	0.453868		0.063214	0.954498	0.449701		0.01065	0.067785	0.787586
6416	23364	0.8342	0.059882	0.478627		0.069068	1.071619	0.54242		0.011784	0.076939	0.898342
6417	23365	0.667744	0.047594	0.351534		0.054573	0.870326	0.468808		0.009432	0.063264	0.738134
6418	23366	0.522067	0.037348	0.261558		0.042186	0.687767	0.386438		0.007376	0.050459	0.586322
6419	23367	0.581355	0.04167	0.275568		0.046548	0.772198	0.447145		0.00821	0.056959	0.659284
6420	23368	0.686755	0.049272	0.294577		0.054133	0.923175	0.556655		0.009687	0.068447	0.786949
6421	23369	0.753174	0.054001	0.300186		0.05847	1.023447	0.63869		0.01061	0.076277	0.868831
6422	23370	0.646655	0.046285	0.24784		0.04936	0.88757	0.570994		0.009091	0.066584	0.754666
6423	23371	0.620096	0.044294	0.243024		0.046504	0.858585	0.566137		0.008699	0.06482	0.747325
6424	23372	0.652937	0.046574	0.283783		0.048085	0.911681	0.614024		0.009142	0.069077	0.811292
6425	23373	0.685803	0.048876	0.337156		0.04937	0.966116	0.66368		0.009565	0.073264	0.879508
6426	23374	0.857838	0.061094	0.457747		0.060338	1.218509	0.851407		0.011937	0.092515	1.13918
6427	23375	0.870318	0.061904	0.489243		0.059362	1.247916	0.888237		0.012061	0.095154	1.218109
6428	23376	0.771491	0.054892	0.432675		0.051027	1.115739	0.805995		0.010646	0.085351	1.128006
6429	23377	0.672704	0.047969	0.366191		0.043356	0.978867	0.713354		0.009238	0.074841	1.010967
6430	23378	0.79889	0.057104	0.419073		0.050159	1.168904	0.858095		0.010951	0.08936	1.228629
6431	23379	0.844713	0.06067	0.409073		0.051375	1.24252	0.918402		0.011549	0.095217	1.327335
6432	23380	0.924489	0.067099	0.379647		0.053924	1.367397	1.01599		0.012584	0.105089	1.480328
6433	23381	0.898818	0.066058	0.292481		0.050154	1.335968	0.993405		0.012171	0.102529	1.453571
6434	23382	0.953258	0.070888	0.215908		0.050961	1.422272	1.055141		0.012881	0.108961	1.544443
6435	23383	0.860904	0.064635	0.135475		0.04401	1.287728	0.951494		0.011607	0.098859	1.388631
6436	23384	0.676298	0.051129	0.148915		0.033009	1.013247	0.743929		0.009072	0.077946	1.079685
6437	23385	0.690109	0.052323	0.204668		0.032749	1.034655	0.755626		0.00923	0.079574	1.091988
6438	23386	0.957665	0.072818	0.397627		0.043302	1.436472	1.037259		0.01285	0.110486	1.486217
6439	23387	0.878709	0.067921	0.448453		0.037826	1.317047	0.938158		0.011887	0.101681	1.331559
6440	23388	0.880331	0.068869	0.509045		0.036503	1.317434	0.922216		0.011972	0.102061	1.295159
6441	23389	0.882136	0.069247	0.545973		0.035245	1.317335	0.901562		0.012074	0.10201	1.250692
6442	23390	0.864692	0.067666	0.541046		0.033267	1.287498	0.857597		0.012104	0.099601	1.172931

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6443	23391	0.684419	0.053264	0.416208		0.025556	1.015902	0.661014		0.009886	0.07869	0.893145
6444	23392	0.786588	0.060672	0.449689		0.02874	1.163197	0.73744		0.011712	0.090236	0.983534
6445	23393	0.889824	0.067293	0.44423		0.032114	1.308589	0.798105		0.013718	0.10133	1.082034
6446	23394	0.974188	0.071697	0.395455		0.034712	1.423505	0.830442		0.015429	0.109883	1.150559
6447	23395	0.895085	0.063788	0.26981		0.03148	1.298014	0.72025		0.014487	0.10012	1.035796
6448	23396	0.89796	0.061695	0.199264		0.031202	1.291112	0.676484		0.014806	0.099348	1.016515
6449	23397	0.887388	0.058543	0.212984		0.030446	1.263948	0.621406		0.014839	0.096503	0.975329
6450	23398	0.781587	0.049677	0.235862		0.02647	1.102059	0.505972		0.013171	0.083355	0.828491
6451	23399	0.713903	0.044556	0.239932		0.023983	0.999977	0.439119		0.012063	0.07525	0.738026
6452	234	0.967497	0.036186	0.098118		0.038915	0.910254	0.008956		0.024267	0.036846	0.725598
6453	23400	0.909598	0.055017	0.36981		0.030155	1.258183	0.507469		0.015461	0.093855	0.894797
6454	23401	0.913277	0.053744	0.433234		0.029832	1.246044	0.456042		0.015567	0.091695	0.854793
6455	23402	1.001198	0.057485	0.516947		0.03219	1.345856	0.440962		0.017093	0.097427	0.885564
6456	23403	0.921097	0.051747	0.488442		0.029098	1.218295	0.352071		0.015721	0.086792	0.764633
6457	23404	0.820101	0.045245	0.422973		0.025425	1.066006	0.266674		0.013999	0.074551	0.635756
6458	23405	0.717529	0.039178	0.348596		0.021881	0.919469	0.202435		0.012223	0.063169	0.531431
6459	23406	0.911526	0.04936	0.402311		0.027302	1.150679	0.219174		0.015489	0.077535	0.648381
6460	23407	0.936512	0.050262	0.342723		0.027321	1.157907	0.1772		0.01582	0.076035	0.626922
6461	23408	0.72728	0.038701	0.204935		0.020895	0.879443	0.103273		0.012182	0.056181	0.463384
6462	23409	0.471897	0.024986	0.125309		0.013547	0.563416	0.05589		0.007852	0.035427	0.291404
6463	23410	0.731739	0.03857	0.181695		0.020981	0.864201	0.07334		0.012096	0.053624	0.439645
6464	23411	0.863997	0.045072	0.176338		0.024683	0.997561	0.059154		0.014069	0.060342	0.491916
6465	23412	0.867997	0.044552	0.129617		0.025532	0.978698	0.038434		0.014246	0.057848	0.479712
6466	23413	0.875243	0.041666	0.123601		0.028299	0.954481	0.053564		0.01457	0.055609	0.523596
6467	23414	0.907963	0.042139	0.203141		0.030455	0.980011	0.101099		0.01538	0.057763	0.597489
6468	23415	0.882291	0.039638	0.265562		0.031297	0.94115	0.159157		0.015222	0.056166	0.644833
6469	23416	0.738557	0.032165	0.264467		0.028037	0.779285	0.185831		0.012999	0.046989	0.592003
6470	23417	0.724399	0.030982	0.298359		0.028472	0.75934	0.211348		0.012943	0.046052	0.610555
6471	23418	0.979335	0.044685	0.500492		0.041038	1.012139	0.360621		0.018025	0.06207	0.907995
6472	23419	0.982675	0.04911	0.57874		0.043754	1.000673	0.423122		0.018608	0.061914	1.003058
6473	23420	1.076131	0.058412	0.696991		0.050387	1.079054	0.514421		0.020906	0.067196	1.192024
6474	23421	0.988477	0.057748	0.669974		0.048309	0.975207	0.506372		0.019667	0.060947	1.159303
6475	23422	0.990931	0.06178	0.727516		0.050234	0.961335	0.531847		0.020143	0.059923	1.191276
6476	23423	0.993087	0.065532	0.764942		0.05194	0.946963	0.539637		0.020565	0.058373	1.181536
6477	23424	1.086191	0.075421	0.840385		0.058289	1.017467	0.574859		0.022846	0.061625	1.238797
6478	23425	0.996497	0.072479	0.74061		0.054627	0.916172	0.491997		0.021214	0.054344	1.062858
6479	23426	1.088467	0.082523	0.764281		0.060774	0.981456	0.47961		0.023391	0.05681	1.067095
6480	23427	1.226701	0.097201	0.753372		0.06964	1.08026	0.441917		0.026503	0.060632	1.071554
6481	23428	1.090456	0.089826	0.537681		0.062619	0.938861	0.297645		0.023578	0.051212	0.845934
6482	23429	1.090909	0.093177	0.375759		0.06317	0.917857	0.197699		0.023534	0.048442	0.735404
6483	23430	0.842931	0.058325	0.158537		0.07007	0.881322	0.042145		0.011608	0.050824	0.553905
6484	23431	0.956745	0.067448	0.267386		0.079177	1.034203	0.097229		0.013183	0.061396	0.671708
6485	23432	0.887682	0.062702	0.311666		0.073027	0.990099	0.143065		0.012269	0.060387	0.671817
6486	23433	0.589107	0.04151	0.237007		0.048211	0.670978	0.121432		0.008162	0.041772	0.466601
6487	23434	0.462724	0.032444	0.199325		0.0377	0.535075	0.111491		0.006417	0.033788	0.37736
6488	23435	0.612788	0.042654	0.27432		0.049726	0.717348	0.165735		0.008502	0.045729	0.510648
6489	23436	0.907281	0.062761	0.436628		0.072927	1.086178	0.297092		0.012623	0.070424	0.784109
6490	23437	0.77401	0.053963	0.38282		0.061525	0.94781	0.30041		0.010794	0.062807	0.69371
6491	23438	0.683646	0.047736	0.332823		0.053833	0.851503	0.297476		0.00953	0.057247	0.630831
6492	23439	0.683271	0.047471	0.329475		0.05328	0.865038	0.328566		0.009515	0.05868	0.649232
6493	23440	0.755424	0.052724	0.34809		0.058217	0.971275	0.396367		0.010516	0.066436	0.73772
6494	23441	0.604704	0.04265	0.25743		0.046019	0.788868	0.342354		0.008411	0.054638	0.604413
6495	23442	0.472803	0.033573	0.192474		0.035637	0.623441	0.282063		0.006561	0.043589	0.479423
6496	23443	0.526512	0.03754	0.203338		0.039346	0.700018	0.326389		0.007294	0.049189	0.538859
6497	23444	0.621979	0.044548	0.219843		0.04587	0.836998	0.406609		0.008595	0.059032	0.643461
6498	23445	0.682181	0.048994	0.224185		0.049519	0.928058	0.466702		0.009396	0.065711	0.710832
6499	23446	0.585708	0.042129	0.184999		0.041802	0.804919	0.417151		0.008042	0.057429	0.61484
6500	23447	0.561655	0.040437	0.181182		0.039476	0.778732	0.413449		0.007692	0.055977	0.600463
6501	23448	0.59141	0.042626	0.210696		0.040855	0.827005	0.448533		0.008077	0.059678	0.650803
6502	23449	0.621167	0.04486	0.249215		0.042079	0.876565	0.48526		0.00847	0.063275	0.704193
6503	23450	0.77703	0.056207	0.337115		0.051401	1.105823	0.622933		0.010539	0.079867	0.914271
6504	23451	0.788323	0.057033	0.358601		0.050787	1.132713	0.64975		0.010639	0.082343	0.972561
6505	23452	0.698801	0.050615	0.315838		0.04384	1.012969	0.589555		0.009419	0.073995	0.896178
6506	23453	0.609303	0.044255	0.267994		0.037402	0.888919	0.522165		0.008222	0.064886	0.800639
6507	23454	0.723625	0.052694	0.306722		0.043276	1.061746	0.628415		0.009712	0.077473	0.970224
6508	23455	0.76512	0.055965	0.299404		0.044369	1.128698	0.672432		0.010221	0.082732	1.045239
6509	23456	0.83737	0.061721	0.280945		0.046858	1.242235	0.743696		0.011212	0.091496	1.163252
6510	23457	0.814099	0.060587	0.218219		0.043888	1.213809	0.727957		0.010948	0.08931	1.142219
6511	23458	0.86344	0.064825	0.163229		0.04471	1.292354	0.774108		0.011557	0.094888	1.215131
6512	23459	0.779773	0.058897	0.104815		0.038739	1.169967	0.698053		0.01049	0.086249	1.09422

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6513	23460	0.612569	0.046442	0.114252		0.029329	0.920522	0.545773		0.008252	0.06808	0.852329
6514	23461	0.62508	0.047446	0.155183		0.029271	0.939989	0.554597		0.008409	0.06948	0.863122
6515	23462	0.867456	0.065849	0.29805		0.038903	1.305092	0.761794		0.011816	0.0964	1.177067
6516	23463	0.795916	0.060278	0.333763		0.034344	1.196404	0.688643		0.010897	0.088823	1.055748
6517	23464	0.797415	0.060592	0.377601		0.033364	1.196585	0.676635		0.010975	0.089201	1.02768
6518	23465	0.799055	0.060978	0.403948		0.032402	1.196367	0.661958		0.011076	0.089086	0.993526
6519	23466	0.783288	0.059659	0.399665		0.030762	1.169162	0.630267		0.010912	0.086862	0.932929
6520	23467	0.619974	0.047081	0.307049		0.023748	0.922369	0.48582		0.008675	0.068668	0.71105
6521	23468	0.712548	0.053763	0.331362		0.026613	1.055943	0.541906		0.010197	0.078782	0.796446
6522	23469	0.80607	0.059802	0.327248		0.029315	1.18781	0.586904		0.011823	0.088396	0.880148
6523	23470	0.882544	0.06391	0.290859		0.031825	1.292062	0.611276		0.013276	0.095728	0.938133
6524	23471	0.810871	0.057116	0.19859		0.029006	1.178017	0.530144		0.012443	0.087327	0.844489
6525	23472	0.813519	0.055495	0.145339		0.028773	1.171656	0.498831		0.012616	0.086725	0.831389
6526	23473	0.803942	0.053003	0.15488		0.028128	1.146945	0.459633		0.012549	0.084226	0.802274
6527	23474	0.708143	0.045418	0.172209		0.02457	1.000016	0.374893		0.011149	0.072729	0.686328
6528	23475	0.646829	0.040836	0.174911		0.022338	0.90736	0.325634		0.010233	0.065742	0.614117
6529	23476	0.82418	0.050618	0.268581		0.028137	1.141647	0.376774		0.013055	0.082195	0.75057
6530	23477	0.827531	0.049608	0.31372		0.027921	1.130691	0.339407		0.013136	0.080407	0.718106
6531	23478	0.907292	0.053197	0.373891		0.030264	1.221397	0.329316		0.014481	0.08553	0.749107
6532	23479	0.834753	0.047761	0.35335		0.027502	1.105813	0.263915		0.013417	0.076473	0.652457
6533	23480	0.743282	0.041595	0.305942		0.024103	0.967799	0.200912		0.011981	0.06592	0.547519
6534	23481	0.65035	0.035892	0.252202		0.020814	0.834924	0.153389		0.01052	0.055977	0.456918
6535	23482	0.826267	0.045002	0.290955		0.026071	1.045103	0.167286		0.013404	0.068874	0.558379
6536	23483	0.849	0.045552	0.247117		0.026232	1.051984	0.136896		0.013807	0.067862	0.54971
6537	23484	0.659401	0.034973	0.152561		0.019856	0.799239	0.081209		0.010701	0.050368	0.408209
6538	23485	0.427887	0.022557	0.094421		0.012685	0.512117	0.044565		0.006924	0.031823	0.257556
6539	23486	0.663553	0.034802	0.139525		0.019423	0.785624	0.059389		0.010693	0.048255	0.389822
6540	23487	0.783667	0.040703	0.143605		0.022897	0.907082	0.051874		0.012697	0.054479	0.439237
6541	23488	0.787489	0.040391	0.111588		0.022898	0.890165	0.049266		0.012876	0.052381	0.433925
6542	23489	0.794705	0.038255	0.109713		0.024907	0.86817	0.055822		0.013191	0.050168	0.476012
6543	23490	0.824803	0.038563	0.173826		0.026892	0.891197	0.094085		0.013898	0.052112	0.542078
6544	23491	0.801824	0.036448	0.222303		0.027167	0.855671	0.147712		0.013783	0.050627	0.581681
6545	23492	0.671419	0.029718	0.217229		0.02344	0.708378	0.16804		0.011745	0.042305	0.528226
6546	23493	0.658659	0.028696	0.239628		0.023354	0.690178	0.188833		0.011629	0.041431	0.542626
6547	23494	0.890727	0.040437	0.403321		0.033779	0.919762	0.31596		0.016075	0.055758	0.800097
6548	23495	0.894006	0.044236	0.474018		0.035975	0.909182	0.365236		0.016597	0.055487	0.873537
6549	23496	0.979222	0.052342	0.57251		0.041442	0.980257	0.437638		0.018716	0.060069	1.03009
6550	23497	0.89964	0.051492	0.597183		0.039714	0.885771	0.423879		0.017651	0.054448	0.997145
6551	23498	0.902017	0.054812	0.652046		0.041324	0.873027	0.434846		0.018078	0.053521	1.023431
6552	23499	0.904116	0.057847	0.681907		0.042795	0.859812	0.435183		0.018461	0.052115	1.017237
6553	235	0.602485	0.025664	0.104248		0.016074	0.639442	0.1126		0.01967	0.033838	0.454767
6554	23500	0.988968	0.066244	0.746338		0.048135	0.923665	0.463857		0.020553	0.05501	1.07134
6555	23501	0.907384	0.063437	0.661839		0.045189	0.831531	0.397545		0.019135	0.048586	0.924307
6556	23502	0.991191	0.071965	0.681915		0.050234	0.890614	0.388137		0.021079	0.05101	0.933409
6557	23503	1.117085	0.084445	0.669012		0.057592	0.980046	0.358708		0.023942	0.054622	0.945094
6558	23504	0.992995	0.077864	0.476593		0.051782	0.851487	0.246145		0.02135	0.046131	0.750684
6559	23505	0.993383	0.080593	0.333487		0.052157	0.832114	0.163603		0.021337	0.043604	0.657054
6560	23506	0.86896	0.058866	0.13182		0.066214	0.911579	0.0314		0.011929	0.051861	0.559502
6561	23507	0.986755	0.067467	0.190156		0.074871	1.069547	0.072907		0.013568	0.062243	0.668058
6562	23508	1.0443	0.070496	0.255913		0.07881	1.167513	0.123551		0.014386	0.06891	0.749908
6563	23509	0.60801	0.041083	0.171127		0.045644	0.6939	0.092084		0.008386	0.041862	0.451619
6564	23510	0.477635	0.032068	0.144804		0.0357	0.553359	0.084635		0.006592	0.033757	0.362319
6565	23511	0.632602	0.042175	0.200202		0.047093	0.741855	0.125922		0.008735	0.045626	0.487174
6566	23512	1.065024	0.069322	0.366236		0.078627	1.27733	0.257068		0.014705	0.078859	0.840645
6567	23513	0.799299	0.052867	0.282226		0.058391	0.980258	0.228089		0.011025	0.062205	0.646042
6568	23514	0.706026	0.047016	0.24817		0.051131	0.880703	0.225765		0.00972	0.056503	0.582596
6569	23515	0.705699	0.047831	0.246125		0.050632	0.894705	0.249487		0.009688	0.057859	0.595637
6570	23516	0.908263	0.062263	0.303679		0.064534	1.169834	0.350864		0.012422	0.075255	0.784416
6571	23517	0.624623	0.043564	0.195381		0.043895	0.816041	0.259779		0.008505	0.053728	0.549587
6572	23518	0.488388	0.034389	0.146633		0.034008	0.645003	0.213908		0.006626	0.042784	0.435112
6573	23519	0.543878	0.038542	0.155446		0.037578	0.724287	0.247541		0.007356	0.048259	0.488725
6574	23520	0.642525	0.045914	0.170787		0.043818	0.866105	0.308646		0.008648	0.057946	0.583676
6575	23521	0.832488	0.059909	0.205869		0.056006	1.135123	0.41927		0.011152	0.075238	0.762635
6576	23522	0.605069	0.04373	0.1442		0.040092	0.833179	0.316718		0.008068	0.056374	0.558148
6577	23523	0.580228	0.042114	0.141496		0.037871	0.806241	0.313776		0.007706	0.054923	0.542194
6578	23524	0.61097	0.044517	0.163171		0.039241	0.856364	0.340519		0.008085	0.058579	0.578199
6579	23525	0.641731	0.046965	0.19172		0.040425	0.907813	0.36884		0.008459	0.062202	0.615618
6580	23526	0.930373	0.068608	0.299314		0.057648	1.328345	0.549926		0.012226	0.090055	0.924339
6581	23527	0.81439	0.059952	0.272571		0.049312	1.173598	0.494183		0.010665	0.081141	0.842861
6582	23528	0.7219	0.053297	0.238715		0.042644	1.049875	0.448424		0.00944	0.072932	0.771836

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6583	23529	0.629455	0.046605	0.203269		0.036423	0.921444	0.397541		0.008226	0.064061	0.686641
6584	23530	0.87523	0.06529	0.272805		0.049557	1.289752	0.561192		0.011443	0.088748	0.970617
6585	23531	0.790385	0.058933	0.226982		0.043603	1.170373	0.512157		0.010347	0.081909	0.890175
6586	23532	0.865006	0.064871	0.216953		0.046189	1.288388	0.56634		0.011358	0.090648	0.988163
6587	23533	0.840978	0.06347	0.169877		0.043405	1.258883	0.555095		0.011089	0.088703	0.969667
6588	23534	1.019976	0.077544	0.14882		0.050936	1.533914	0.676735		0.013812	0.106925	1.180537
6589	23535	0.805503	0.061287	0.085917		0.038909	1.213419	0.533127		0.011117	0.085833	0.930962
6590	23536	0.63278	0.048183	0.092066		0.029592	0.954755	0.416873		0.008838	0.067738	0.726524
6591	23537	0.645712	0.049147	0.123161		0.029624	0.974843	0.423837		0.009056	0.069219	0.736614
6592	23538	1.024738	0.077687	0.266403		0.045477	1.548761	0.666973		0.014418	0.108901	1.151051
6593	23539	0.822215	0.062119	0.258445		0.035561	1.240575	0.526442		0.011504	0.088518	0.904416
6594	23540	0.823759	0.061747	0.291236		0.034733	1.240706	0.517073		0.011489	0.088791	0.881751
6595	23541	0.825477	0.061597	0.310378		0.033921	1.24017	0.506312		0.01159	0.088764	0.853989
6596	23542	0.938866	0.069415	0.355676		0.037596	1.406759	0.560581		0.013248	0.099441	0.938577
6597	23543	0.640502	0.047549	0.23489		0.025139	0.955886	0.372125		0.009065	0.068343	0.631441
6598	23544	0.736134	0.054374	0.253079		0.028318	1.09424	0.415057		0.01044	0.07835	0.714728
6599	23545	0.832778	0.060732	0.249761		0.03121	1.2307	0.449958		0.011842	0.087978	0.791424
6600	23546	1.042696	0.074329	0.253593		0.038071	1.531402	0.537154		0.014857	0.107905	0.968362
6601	23547	0.83778	0.058703	0.151436		0.030331	1.220369	0.407976		0.011963	0.0869	0.761927
6602	23548	0.840517	0.05745	0.109546		0.030226	1.21376	0.385134		0.012074	0.086216	0.753097
6603	23549	0.83067	0.055232	0.116389		0.029669	1.188032	0.355608		0.011967	0.083869	0.731551
6604	23550	0.864364	0.056107	0.153467		0.030678	1.223881	0.343792		0.012476	0.084748	0.745756
6605	23551	0.668368	0.042708	0.131489		0.023632	0.939837	0.25298		0.00966	0.065472	0.567814
6606	23552	0.851658	0.053166	0.201752		0.029911	1.182537	0.293435		0.012352	0.082006	0.701188
6607	23553	0.855202	0.052231	0.236403		0.029816	1.171273	0.265412		0.012472	0.080433	0.678414
6608	23554	1.072299	0.064532	0.323315		0.037094	1.447218	0.296335		0.015784	0.097308	0.81545
6609	23555	0.862784	0.050398	0.266627		0.029579	1.145892	0.208972		0.012858	0.076906	0.627578
6610	23556	0.768314	0.043882	0.230524		0.026069	1.003139	0.160558		0.011616	0.066454	0.532916
6611	23557	0.67232	0.037791	0.189698		0.022601	0.865594	0.123787		0.010279	0.056611	0.448992
6612	23558	0.991124	0.055106	0.253273		0.032967	1.257489	0.158691		0.015327	0.080676	0.637276
6613	23559	0.877836	0.047462	0.184016		0.028726	1.091261	0.114294		0.013767	0.069178	0.544888
6614	23560	0.681889	0.03604	0.122835		0.021877	0.829394	0.069909		0.010811	0.051549	0.407407
6615	23561	0.442523	0.023198	0.07903		0.014018	0.531547	0.03966		0.007042	0.032639	0.25824
6616	23562	0.825353	0.042991	0.144689		0.02584	0.980835	0.074248		0.013195	0.059545	0.472008
6617	23563	0.810671	0.041826	0.129673		0.024698	0.941914	0.071802		0.013124	0.056179	0.448309
6618	23564	0.814935	0.041636	0.10878		0.024335	0.924637	0.069205		0.01333	0.054125	0.448286
6619	23565	0.823251	0.039975	0.113491		0.025214	0.901852	0.075251		0.013739	0.051632	0.494006
6620	23566	0.854889	0.040261	0.17532		0.027356	0.925564	0.104653		0.014581	0.053571	0.561494
6621	23567	0.831534	0.038247	0.223621		0.02771	0.888402	0.156148		0.014481	0.052026	0.599209
6622	23568	0.840513	0.03795	0.262987		0.02888	0.887314	0.207058		0.014868	0.052298	0.65131
6623	23569	0.683443	0.030387	0.226398		0.023848	0.7163	0.189936		0.012191	0.042482	0.550595
6624	23570	0.924538	0.041866	0.379579		0.033188	0.95434	0.310027		0.016749	0.057097	0.803472
6625	23571	0.92819	0.045572	0.468794		0.034127	0.943146	0.351746		0.017051	0.056742	0.864938
6626	23572	1.162942	0.061214	0.682405		0.044509	1.162845	0.474847		0.021905	0.069933	1.151975
6627	23573	0.934493	0.052407	0.609221		0.0374	0.918539	0.397678		0.018075	0.05546	0.968282
6628	23574	0.937154	0.055447	0.659286		0.038931	0.905196	0.404918		0.018558	0.054467	0.991424
6629	23575	0.939497	0.058201	0.685096		0.040254	0.891294	0.404167		0.018994	0.05316	0.98753
6630	23576	1.175434	0.075554	0.853876		0.051669	1.09491	0.492217		0.024196	0.064246	1.196212
6631	23577	0.943196	0.063173	0.668997		0.04231	0.861606	0.371253		0.019703	0.04992	0.909318
6632	23578	1.030406	0.071367	0.684611		0.046991	0.922624	0.366546		0.02177	0.052462	0.925834
6633	23579	1.30962	0.093787	0.752171		0.060631	1.14472	0.387345		0.027917	0.063236	1.069992
6634	23580	1.032394	0.076643	0.473867		0.048235	0.881496	0.237516		0.022107	0.047422	0.759596
6635	23581	1.032731	0.079082	0.330602		0.048535	0.86108	0.157868		0.022153	0.044784	0.670358
6636	23582	0.937912	0.062586	0.111199		0.064985	0.98732	0.024396		0.013517	0.055498	0.591324
6637	23583	1.06558	0.070729	0.146346		0.073552	1.158267	0.049629		0.015287	0.066078	0.694144
6638	23584	0.989428	0.064756	0.142975		0.067951	1.108831	0.07481		0.01412	0.064136	0.667586
6639	23585	0.656912	0.042604	0.106836		0.044932	0.751456	0.063957		0.009341	0.043997	0.453033
6640	23586	0.5161	0.03322	0.091702		0.035148	0.59926	0.058911		0.007323	0.03538	0.360568
6641	23587	0.683585	0.043741	0.127961		0.046365	0.803413	0.087756		0.009686	0.047664	0.481874
6642	23588	1.012367	0.065122	0.208391		0.06812	1.216529	0.157469		0.01425	0.072817	0.725061
6643	23589	0.863868	0.055906	0.183985		0.057631	1.061596	0.158918		0.012044	0.064511	0.629685
6644	23590	0.763093	0.049799	0.164992		0.050497	0.953761	0.157259		0.010551	0.058527	0.563632
6645	23591	0.762753	0.050755	0.164204		0.050042	0.968974	0.173802		0.010462	0.059711	0.570622
6646	23592	0.843364	0.057097	0.174513		0.054882	1.088086	0.209679		0.01139	0.067346	0.637841
6647	23593	0.675157	0.04652	0.133838		0.043566	0.88391	0.180848		0.008976	0.05526	0.517893
6648	23594	0.527914	0.036839	0.100868		0.033773	0.698682	0.148873		0.006979	0.044039	0.408942
6649	23595	0.587905	0.041396	0.107324		0.037337	0.784652	0.172304		0.007736	0.049649	0.458674
6650	23596	0.694546	0.049484	0.12082		0.043555	0.938491	0.214936		0.00907	0.05949	0.54711
6651	23597	0.761776	0.054807	0.124038		0.0472	1.040944	0.246929		0.00988	0.066184	0.604477
6652	23598	0.654059	0.047463	0.103367		0.04001	0.90315	0.220654		0.008427	0.057881	0.522569

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6653	23599	0.62722	0.04584	0.102685		0.037812	0.874055	0.218625		0.008035	0.056495	0.506297
6654	236	1.104121	0.051235	0.113084		0.049575	1.051586	0.00973		0.030263	0.047752	0.780383
6655	23600	0.660459	0.0486	0.11662		0.039246	0.928569	0.237383		0.008419	0.06029	0.538519
6656	23601	0.69371	0.051419	0.135642		0.040626	0.9846	0.257381		0.008793	0.063967	0.571759
6657	23602	0.867731	0.064706	0.181082		0.050119	1.242591	0.330985		0.010979	0.08084	0.721884
6658	23603	0.880309	0.065933	0.189663		0.049908	1.273419	0.345307		0.011127	0.083603	0.738807
6659	23604	0.780339	0.058666	0.164867		0.043239	1.139363	0.313473		0.009838	0.075378	0.659816
6660	23605	0.680395	0.051341	0.140937		0.036989	1.000219	0.278107		0.008574	0.066234	0.584246
6661	23606	0.808	0.061231	0.161224		0.043158	1.195102	0.335149		0.010242	0.079256	0.702641
6662	23607	0.85429	0.064972	0.158752		0.044693	1.270856	0.358639		0.010918	0.084918	0.751604
6663	23608	0.93495	0.071332	0.154129		0.047488	1.399069	0.396733		0.012408	0.094286	0.831642
6664	23609	0.908958	0.069629	0.122038		0.04479	1.367301	0.389398		0.012519	0.092294	0.814848
6665	23610	0.963999	0.074053	0.096928		0.046302	1.455883	0.415267		0.013499	0.098259	0.867306
6666	23611	0.870578	0.066843	0.06574		0.040783	1.317968	0.374724		0.012317	0.089512	0.782513
6667	23612	0.683914	0.052382	0.0678		0.031176	1.0369	0.293143		0.009855	0.070769	0.611405
6668	23613	0.697889	0.053332	0.089338		0.031431	1.058782	0.298189		0.010133	0.072262	0.620603
6669	23614	0.968508	0.073631	0.166236		0.042758	1.469854	0.410232		0.013987	0.100304	0.850784
6670	23615	0.888681	0.067097	0.182497		0.038456	1.347135	0.370658		0.012668	0.09246	0.776099
6671	23616	0.890374	0.066595	0.205076		0.037747	1.346917	0.36408		0.012608	0.092856	0.771183
6672	23617	0.892233	0.065896	0.217585		0.037057	1.346212	0.356874		0.0127	0.092681	0.765411
6673	23618	0.874649	0.063645	0.214061		0.035609	1.315155	0.34064		0.012522	0.090298	0.741436
6674	23619	0.692319	0.05026	0.163805		0.027757	1.037296	0.262767		0.009943	0.07136	0.580154
6675	23620	0.7957	0.057627	0.17622		0.031414	1.187276	0.293255		0.011428	0.081849	0.658162
6676	23621	0.900164	0.064597	0.173821		0.034845	1.335301	0.318367		0.012924	0.09178	0.731461
6677	23622	0.985586	0.069764	0.15434		0.037588	1.452315	0.333737		0.014143	0.09934	0.785959
6678	23623	0.905602	0.063182	0.105363		0.033991	1.32396	0.291186		0.012984	0.090642	0.708777
6679	23624	0.908585	0.062342	0.07698		0.033444	1.316623	0.275458		0.013006	0.090064	0.703595
6680	23625	0.897956	0.060448	0.079606		0.032647	1.288674	0.25522		0.012852	0.087523	0.687831
6681	23626	0.79099	0.052143	0.088286		0.028638	1.123486	0.20961		0.011317	0.075673	0.598197
6682	23627	0.72254	0.046944	0.089144		0.02609	1.019382	0.182806		0.01034	0.068495	0.541221
6683	23628	0.920761	0.058364	0.137008		0.033165	1.282692	0.213241		0.013223	0.085906	0.675876
6684	23629	0.924658	0.057546	0.16104		0.03321	1.270626	0.194361		0.013351	0.084334	0.662178
6685	23630	1.013912	0.061916	0.192884		0.036263	1.372981	0.191609		0.014732	0.090101	0.70532
6686	23631	0.933018	0.055635	0.182328		0.033199	1.243579	0.156633		0.01367	0.081029	0.628075
6687	23632	0.830968	0.048359	0.157705		0.02941	1.088905	0.122454		0.012322	0.07031	0.540738
6688	23633	0.727209	0.041601	0.129738		0.0256	0.939808	0.096099		0.010895	0.060032	0.460624
6689	23634	0.924062	0.051936	0.149014		0.032312	1.176949	0.108545		0.013997	0.074308	0.5697
6690	23635	0.949706	0.051982	0.124877		0.032841	1.185559	0.094304		0.014613	0.073864	0.565839
6691	23636	0.737824	0.039301	0.100777		0.02516	0.901417	0.075258		0.011561	0.055308	0.425842
6692	23637	0.478853	0.025141	0.066456		0.016178	0.577844	0.050489		0.007594	0.035108	0.272136
6693	23638	0.742695	0.038533	0.103645		0.02487	0.886748	0.079795		0.011909	0.053414	0.417228
6694	23639	0.877443	0.044846	0.120341		0.028752	1.024489	0.095936		0.01433	0.060666	0.484484
6695	23640	0.882209	0.044713	0.115696		0.028116	1.006063	0.095038		0.014613	0.058549	0.486181
6696	23641	0.892424	0.043477	0.130228		0.027041	0.981393	0.101465		0.015418	0.055915	0.537164
6697	23642	0.927496	0.043915	0.191294		0.029311	1.006941	0.131505		0.016365	0.057588	0.609669
6698	23643	0.902631	0.041977	0.240701		0.029787	0.966089	0.173467		0.016225	0.055928	0.646287
6699	23644	0.756372	0.03464	0.233934		0.025756	0.799295	0.181451		0.013762	0.046718	0.577836
6700	23645	0.742261	0.033669	0.252927		0.025673	0.778538	0.196348		0.013582	0.045739	0.586484
6701	23646	1.00442	0.04546	0.436862		0.035732	1.036987	0.311239		0.018584	0.061481	0.847098
6702	23647	1.008664	0.049216	0.524951		0.036713	1.024627	0.346897		0.018843	0.06105	0.899993
6703	23648	1.105397	0.057497	0.655847		0.040957	1.104318	0.417142		0.020725	0.065913	1.034535
6704	23649	1.016052	0.055881	0.659597		0.038178	0.997581	0.4057		0.019461	0.059619	0.982752
6705	23650	1.019187	0.058775	0.698431		0.038726	0.982912	0.420741		0.020021	0.058585	0.999819
6706	23651	1.021973	0.061279	0.717186		0.03948	0.96766	0.422602		0.020527	0.057156	0.997334
6707	23652	1.118352	0.069361	0.788831		0.044231	1.039064	0.448621		0.02288	0.060554	1.06249
6708	23653	1.026456	0.065766	0.70167		0.041374	0.935016	0.385924		0.021321	0.053708	0.932561
6709	23654	1.121549	0.073971	0.713008		0.045908	1.000998	0.38016		0.023609	0.05647	0.96171
6710	23655	1.264327	0.086002	0.69044		0.052392	1.100788	0.355667		0.026879	0.060455	0.996055
6711	23656	1.124007	0.078743	0.48759		0.046936	0.955638	0.243577		0.02404	0.051031	0.804591
6712	23657	1.124351	0.08105	0.335433		0.047144	0.932985	0.160405		0.024133	0.048188	0.718772
6713	237	0.701719	0.030632	0.124125		0.021346	0.754153	0.129066		0.018824	0.043601	0.489369
6714	238	1.140322	0.058143	0.116985		0.053245	1.093554	0.010603		0.029524	0.052169	0.780514
6715	239	0.730646	0.031516	0.129001		0.023381	0.794075	0.13215		0.015631	0.047283	0.489766
6716	240	1.133955	0.062782	0.116135		0.054713	1.097925	0.011053		0.026703	0.054537	0.75302
6717	241	0.740734	0.032958	0.12952		0.024593	0.812783	0.131145		0.011055	0.049503	0.47793
6718	242	1.09035	0.073986	0.096423		0.060045	1.124093	0.012467		0.017472	0.061651	0.663223
6719	243	1.261862	0.083381	0.102226		0.069403	1.334384	0.017052		0.020232	0.073606	0.769808
6720	244	1.43355	0.091702	0.10348		0.078594	1.565135	0.023987		0.022899	0.087001	0.878028
6721	245	1.546952	0.097813	0.096816		0.084369	1.74115	0.031095		0.024563	0.097013	0.951662
6722	246	0.883632	0.055949	0.048927		0.048056	1.015295	0.020381		0.013969	0.057051	0.544667

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6723	247	0.694154	0.044097	0.035573		0.037669	0.809667	0.017465		0.010934	0.04566	0.428598
6724	248	0.919349	0.058617	0.044224		0.049801	1.085541	0.024666		0.014431	0.061343	0.568514
6725	249	1.576841	0.101686	0.067119		0.085092	1.903475	0.046878		0.024515	0.107242	0.978216
6726	250	1.161437	0.075155	0.042764		0.062453	1.433938	0.038061		0.01781	0.081925	0.721378
6727	251	1.025816	0.066867	0.033721		0.054953	1.288226	0.035674		0.01552	0.073897	0.638194
6728	252	1.025274	0.067415	0.03009		0.05467	1.308654	0.037418		0.01527	0.075129	0.639322
6729	2527	0.309528	0.056038	0.035688		0.030413	0.307905	0.038415		0.008333	0.018586	0.254097
6730	2528	0.499045	0.087863	0.059065		0.04625	0.493595	0.064123		0.013712	0.032423	0.406695
6731	2529	0.351073	0.082632	0.034738		0.033511	0.370407	0.036042		0.009264	0.026151	0.288405
6732	253	1.350207	0.08995	0.035439		0.071573	1.750519	0.051192		0.019741	0.099626	0.844077
6733	2530	0.565999	0.130795	0.057265		0.050973	0.600516	0.059688		0.015318	0.043096	0.461567
6734	2531	0.298887	0.085065	0.025043		0.027585	0.335652	0.024695		0.007788	0.026803	0.245658
6735	2532	0.481881	0.136425	0.041197		0.041939	0.545576	0.040551		0.012862	0.044857	0.393173
6736	2533	0.216067	0.068328	0.015967		0.019447	0.252543	0.015035		0.00559	0.021708	0.177637
6737	2534	0.348348	0.110211	0.026249		0.029547	0.411144	0.024568		0.009218	0.036626	0.284305
6738	2535	0.169733	0.057498	0.01138		0.014985	0.204083	0.010271		0.004366	0.018466	0.139565
6739	2536	0.273641	0.093034	0.018706		0.022757	0.332567	0.016737		0.007194	0.031295	0.223383
6740	2537	9.043029	3.222719	0.563387		0.785929	11.1233	0.486548		0.232786	1.053263	7.435173
6741	2538	0.362383	0.130162	0.023022		0.029637	0.450595	0.019528		0.009466	0.044065	0.295934
6742	2539	0.305996	0.119966	0.016406		0.025712	0.390453	0.012219		0.007674	0.038145	0.251813
6743	254	0.907444	0.061107	0.021246		0.047785	1.194046	0.035774		0.013029	0.069044	0.56726
6744	2540	0.493442	0.195214	0.027032		0.039033	0.637277	0.019728		0.01268	0.065137	0.403064
6745	2541	0.283767	0.121032	0.012926		0.023009	0.375702	0.007563		0.006981	0.038273	0.233652
6746	2542	0.45751	0.197429	0.021262		0.034884	0.61334	0.012107		0.011485	0.065381	0.373965
6747	2543	0.250616	0.113101	0.010018		0.019751	0.341551	0.004352		0.006047	0.035886	0.206472
6748	2544	0.404087	0.184517	0.016495		0.029932	0.557966	0.006894		0.009947	0.061416	0.330466
6749	2545	0.250489	0.11869	0.008791		0.019184	0.350977	0.003671		0.005922	0.037959	0.206484
6750	2546	0.403876	0.193465	0.014468		0.029047	0.573437	0.005959		0.009733	0.065076	0.330474
6751	2547	0.250364	0.123796	0.007712		0.018606	0.360026	0.003871		0.005797	0.039999	0.206503
6752	2548	0.403684	0.201488	0.012698		0.028195	0.588261	0.006297		0.009522	0.068688	0.330491
6753	2549	0.221712	0.113865	0.005988		0.015974	0.326649	0.003617		0.005017	0.037166	0.182951
6754	255	0.709519	0.04862	0.015223		0.037122	0.9441	0.028635		0.010067	0.054861	0.44369
6755	2550	0.357479	0.18504	0.009867		0.024512	0.53374	0.005883		0.008237	0.06392	0.292799
6756	2551	0.173354	0.091455	0.004232		0.01219	0.259964	0.002934		0.003838	0.030059	0.143097
6757	2552	0.279511	0.148467	0.006978		0.018883	0.424758	0.004774		0.006309	0.051732	0.229015
6758	2553	0.193049	0.103906	0.004344		0.013304	0.293412	0.003349		0.004195	0.03431	0.159396
6759	2554	0.311266	0.168579	0.007175		0.02077	0.479383	0.005452		0.006901	0.059059	0.255099
6760	2555	0.864368	0.16189	0.095458		0.091507	0.865995	0.100979		0.022532	0.050942	0.717013
6761	2556	0.228049	0.126274	0.00467		0.015269	0.353384	0.004169		0.004802	0.041908	0.188375
6762	2557	0.367703	0.204756	0.007775		0.02406	0.577296	0.007109		0.007921	0.072121	0.301469
6763	2558	0.980237	0.233764	0.093474		0.100935	1.026813	0.096249		0.024993	0.070424	0.813271
6764	2559	0.223565	0.126916	0.004225		0.014615	0.352556	0.004947		0.004566	0.042239	0.184746
6765	256	0.790139	0.054831	0.015947		0.041107	1.060537	0.032371		0.011104	0.061776	0.49431
6766	2560	0.360476	0.205763	0.007034		0.023123	0.575871	0.008413		0.007542	0.072633	0.29565
6767	2561	0.86309	0.245422	0.069869		0.086154	0.958604	0.069188		0.021975	0.072991	0.716493
6768	2562	0.214702	0.124675	0.003716		0.013744	0.344206	0.005584		0.004239	0.041538	0.177469
6769	2563	0.346186	0.202135	0.006192		0.021747	0.562163	0.009408		0.007016	0.071345	0.284011
6770	2564	0.603158	0.18939	0.043099		0.058774	0.695514	0.040942		0.015313	0.056406	0.500905
6771	2565	0.205852	0.121825	0.003264		0.012915	0.334794	0.006024		0.003922	0.040588	0.170194
6772	2566	0.331918	0.197511	0.005443		0.020437	0.546721	0.010102		0.006506	0.069625	0.27237
6773	2567	0.473759	0.158817	0.030751		0.045303	0.560977	0.028145		0.01196	0.047475	0.393554
6774	2568	0.21671	0.130478	0.003132		0.013315	0.35728	0.006959		0.003992	0.043456	0.179217
6775	2569	0.349426	0.211516	0.005222		0.021071	0.583365	0.011643		0.006604	0.074444	0.286806
6776	257	0.933465	0.06587	0.019078		0.048102	1.268853	0.03888		0.012939	0.073965	0.584478
6777	2570	0.627329	0.221168	0.037688		0.058995	0.758629	0.032962		0.015671	0.066193	0.521303
6778	2571	0.227544	0.139372	0.00295		0.013653	0.380508	0.007916		0.004033	0.046408	0.188234
6779	2572	0.366897	0.225871	0.004912		0.0216	0.621203	0.013238		0.006652	0.079383	0.301229
6780	2573	0.881983	0.339379	0.045657		0.080347	1.106429	0.035311		0.021641	0.100761	0.733141
6781	2574	0.258044	0.160492	0.002967		0.015103	0.437298	0.009571		0.004396	0.053453	0.213578
6782	2575	0.416082	0.260011	0.004937		0.023887	0.713827	0.016028		0.007235	0.091314	0.341708
6783	2576	0.791956	0.330568	0.0348		0.069712	1.030377	0.021168		0.019189	0.097596	0.658825
6784	2577	0.288468	0.182508	0.002798		0.016329	0.496595	0.011557		0.004658	0.060834	0.238879
6785	2578	0.465146	0.295595	0.004653		0.025819	0.810526	0.019263		0.007644	0.103795	0.382212
6786	2579	0.69936	0.308847	0.026992		0.059929	0.935472	0.012466		0.01676	0.091262	0.582213
6787	258	1.240835	0.088632	0.028456		0.06332	1.706679	0.052101		0.016938	0.098542	0.777973
6788	2580	0.255509	0.164085	0.002052		0.013958	0.446266	0.010888		0.003884	0.054785	0.211648
6789	2581	0.412001	0.265752	0.003431		0.022069	0.728289	0.018097		0.006366	0.093362	0.338663
6790	2582	0.698848	0.324501	0.02366		0.058257	0.961017	0.010127		0.016525	0.096275	0.582254
6791	2583	0.222627	0.144404	0.001655		0.011814	0.392866	0.009793		0.003372	0.048307	0.184441
6792	2584	0.358982	0.23393	0.002837		0.018677	0.641079	0.016298		0.005507	0.082242	0.295142

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6793	2585	0.732075	0.355435	0.021792		0.059315	1.033138	0.011151		0.017037	0.10611	0.610421
6794	2586	0.23777	0.155541	0.001824		0.012236	0.42362	0.010703		0.003601	0.052161	0.19702
6795	2587	0.383406	0.252076	0.003132		0.019347	0.691208	0.017868		0.005863	0.088715	0.315281
6796	2588	0.618511	0.312428	0.016065		0.048593	0.894115	0.009948		0.014084	0.093841	0.515923
6797	2589	0.279033	0.183953	0.00223		0.013844	0.502126	0.012962		0.004213	0.061901	0.231271
6798	259	0.879044	0.063863	0.020739		0.044566	1.221988	0.037256		0.01183	0.071911	0.550317
6799	2590	0.449958	0.29828	0.003809		0.021895	0.819264	0.021592		0.006834	0.10519	0.370098
6800	2591	0.483612	0.251213	0.011342		0.037084	0.711551	0.008056		0.010779	0.075817	0.403545
6801	2592	0.304953	0.202361	0.002518		0.014448	0.554782	0.014595		0.004558	0.068512	0.252855
6802	25928	0.444716	0.029664	0.063632		0.030824	0.562776	0.263065		0.031705	0.048037	0.3466
6803	25929	0.503376	0.030922	0.041499		0.029464	0.514311	0.195475		0.034536	0.117302	0.366135
6804	2593	0.491769	0.328244	0.00429		0.022856	0.905142	0.024301		0.007366	0.116343	0.40464
6805	25930	0.728704	0.036118	0.108615		0.0408	0.640066	0.547138		0.05948	0.126836	0.771362
6806	25931	0.792451	0.034316	0.137212		0.039078	0.646068	0.739969		0.073118	0.097736	0.925149
6807	25932	1.000228	0.040698	0.171174		0.057854	0.802259	1.03301		0.095907	0.065765	1.156917
6808	25933	0.828094	0.039513	0.12472		0.048557	0.717644	0.852475		0.075358	0.037935	0.88733
6809	25934	0.684291	0.043367	0.081005		0.041749	0.728522	0.632018		0.056294	0.055292	0.642878
6810	25935	0.445006	0.034294	0.033099		0.029536	0.560742	0.270887		0.032478	0.050159	0.344442
6811	25936	0.49811	0.046501	0.091174		0.028655	0.50539	0.18862		0.033312	0.124525	0.350935
6812	25937	0.721521	0.050069	0.256861		0.036433	0.628025	0.528131		0.061464	0.134763	0.728049
6813	25938	0.787708	0.037951	0.341211		0.040759	0.632887	0.70149		0.078228	0.102942	0.869913
6814	25939	0.998786	0.039453	0.452787		0.057815	0.784644	0.984067		0.10215	0.063395	1.088358
6815	2594	0.538552	0.285628	0.011692		0.040482	0.803145	0.00919		0.01177	0.086513	0.449517
6816	25940	0.822142	0.04843	0.341562		0.048572	0.699845	0.810847		0.080635	0.034738	0.838634
6817	25941	0.677657	0.060954	0.222539		0.041843	0.709775	0.610645		0.057532	0.050225	0.615178
6818	25942	0.441969	0.050626	0.087166		0.029522	0.546271	0.26362		0.031497	0.047358	0.337951
6819	25943	0.486638	0.041636	0.092305		0.023135	0.490296	0.172272		0.030655	0.117171	0.328094
6820	25944	0.705198	0.044326	0.257745		0.039851	0.609059	0.484146		0.066085	0.127725	0.619303
6821	25945	0.774425	0.033387	0.33808		0.045429	0.613433	0.643992		0.081274	0.098009	0.734097
6822	25946	0.98838	0.037966	0.443997		0.06075	0.756102	0.875255		0.105897	0.060604	0.93534
6823	25947	0.805517	0.04628	0.335095		0.053173	0.67003	0.712922		0.084557	0.029865	0.72384
6824	25948	0.662531	0.057652	0.219983		0.049633	0.676298	0.532572		0.060826	0.042539	0.563343
6825	25949	0.431395	0.047756	0.085573		0.035084	0.518022	0.228393		0.029877	0.04379	0.322559
6826	2595	0.296001	0.197073	0.00248		0.013361	0.543724	0.014493		0.004345	0.067324	0.245554
6827	25950	0.479557	0.034394	0.069839		0.025866	0.482228	0.147608		0.028761	0.099348	0.311743
6828	25951	0.695069	0.038648	0.192131		0.045886	0.596612	0.415858		0.071059	0.10954	0.538775
6829	25952	0.766112	0.033487	0.247652		0.051308	0.596192	0.554052		0.084877	0.086787	0.639935
6830	25953	0.981319	0.038966	0.323368		0.069201	0.724814	0.752862		0.114421	0.05631	0.847684
6831	25954	0.793309	0.040108	0.242195		0.062018	0.636144	0.592102		0.089646	0.02635	0.659923
6832	25955	0.652159	0.046695	0.156868		0.058474	0.637801	0.424263		0.065549	0.0371	0.530482
6833	25956	0.424378	0.037814	0.060706		0.042679	0.487877	0.183586		0.032621	0.036845	0.311934
6834	25957	0.466112	0.049285	0.093614		0.028838	0.46298	0.112943		0.035303	0.085424	0.295408
6835	25958	0.678374	0.057086	0.280566		0.056402	0.570635	0.318643		0.073947	0.094648	0.502826
6836	25959	0.74795	0.048883	0.371303		0.057956	0.566865	0.424282		0.087509	0.075509	0.57317
6837	2596	0.477349	0.31961	0.004224		0.021135	0.887094	0.02413		0.007001	0.114297	0.392954
6838	25960	0.958859	0.040998	0.486799		0.076304	0.682461	0.575976		0.121913	0.050887	0.739357
6839	25961	0.772282	0.037568	0.364595		0.069483	0.594215	0.451681		0.09404	0.025632	0.599345
6840	25962	0.635997	0.045678	0.231529		0.06609	0.592271	0.318917		0.068643	0.032785	0.493272
6841	25963	0.411262	0.037446	0.083111		0.054057	0.451183	0.131262		0.034122	0.031009	0.294256
6842	25964	0.438636	0.055935	0.094679		0.030063	0.424645	0.068624		0.046485	0.062567	0.267283
6843	25965	0.6458	0.063884	0.292771		0.059261	0.524872	0.194478		0.07373	0.070576	0.418432
6844	25966	0.709935	0.053131	0.393527		0.062632	0.518302	0.2584		0.088496	0.057998	0.468894
6845	25967	0.909475	0.041686	0.529899		0.084475	0.619199	0.350409		0.126841	0.043174	0.610077
6846	25968	0.732915	0.033042	0.398554		0.075309	0.532383	0.271615		0.096613	0.024969	0.491397
6847	25969	0.605945	0.037585	0.25369		0.072228	0.525718	0.188153		0.069398	0.027585	0.410424
6848	2597	0.63619	0.347359	0.012338		0.046348	0.967378	0.01117		0.013444	0.105708	0.531237
6849	25970	0.385532	0.032397	0.092251		0.058697	0.396	0.075469		0.033445	0.025068	0.258681
6850	25971	0.4348	0.054078	0.07174		0.033	0.403733	0.034443		0.044024	0.04447	0.255453
6851	25972	0.642519	0.062698	0.225578		0.060205	0.496686	0.097839		0.075417	0.051501	0.361056
6852	25973	0.703627	0.053729	0.310808		0.06799	0.489989	0.129868		0.093257	0.044136	0.385404
6853	25974	0.892345	0.044908	0.429489		0.094984	0.581522	0.172873		0.133139	0.03752	0.480948
6854	25975	0.727291	0.034281	0.328776		0.084498	0.499117	0.13086		0.102545	0.024188	0.396154
6855	25976	0.60468	0.040839	0.214157		0.080598	0.491347	0.10491		0.072508	0.024413	0.354118
6856	25977	0.384037	0.033448	0.080042		0.061753	0.372522	0.067272		0.033623	0.019015	0.240995
6857	2598	0.287074	0.191173	0.002409		0.012343	0.531553	0.014301		0.004214	0.066005	0.238266
6858	2599	0.462967	0.309859	0.004111		0.019516	0.867251	0.023834		0.006755	0.112076	0.381296
6859	260	0.842945	0.062017	0.020623		0.042449	1.183065	0.035824		0.011244	0.070174	0.527731
6860	2600	0.660101	0.369729	0.01187		0.04667	1.021657	0.013163		0.013466	0.112912	0.551519
6861	2601	0.282507	0.187698	0.002385		0.011525	0.526697	0.014425		0.004162	0.065537	0.234603
6862	2602	0.455617	0.304007	0.004058		0.018216	0.859381	0.023933		0.006664	0.111319	0.375436

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6863	2603	0.598955	0.343224	0.009808		0.041078	0.942432	0.014524		0.011748	0.10506	0.50049
6864	2604	0.221492	0.146531	0.001869		0.008552	0.415284	0.011464		0.003273	0.051684	0.184039
6865	2605	0.357226	0.2372	0.003174		0.013514	0.677628	0.018985		0.00523	0.087787	0.294525
6866	2606	0.574264	0.335473	0.008614		0.038277	0.916722	0.015709		0.010823	0.102844	0.479988
6867	2607	0.225736	0.148819	0.001894		0.008443	0.424455	0.011695		0.003338	0.052769	0.187635
6868	2608	0.364081	0.240863	0.003218		0.013336	0.692611	0.019375		0.005329	0.089608	0.300282
6869	2609	0.604547	0.359427	0.008271		0.039119	0.978394	0.018212		0.010925	0.110337	0.505444
6870	261	0.887595	0.066038	0.022518		0.044382	1.25723	0.037685		0.011752	0.074938	0.556907
6871	2610	0.286299	0.187306	0.002374		0.010104	0.540557	0.01473		0.004413	0.066921	0.238151
6872	2611	0.461783	0.303151	0.004033		0.015953	0.882103	0.024471		0.006723	0.11354	0.381125
6873	2612	0.634763	0.384078	0.007783		0.039691	1.042149	0.020822		0.010961	0.118104	0.530953
6874	2613	0.286085	0.185318	0.002348		0.009475	0.541807	0.014676		0.005303	0.066641	0.238178
6875	2614	0.461465	0.299943	0.003976		0.01495	0.884216	0.024348		0.007884	0.112942	0.381163
6876	2615	0.752362	0.462469	0.008234		0.045392	1.252063	0.025985		0.012479	0.142507	0.629861
6877	2616	0.285884	0.182876	0.002297		0.008826	0.542525	0.01456		0.006044	0.066227	0.238219
6878	2617	0.461158	0.295804	0.003886		0.013919	0.885471	0.024153		0.009023	0.112146	0.381224
6879	2618	0.804693	0.503209	0.007394		0.046855	1.360384	0.030611		0.012725	0.155426	0.673902
6880	2619	0.285684	0.181651	0.002219		0.008159	0.542712	0.014403		0.00663	0.065767	0.23826
6881	262	0.932255	0.070136	0.024948		0.04622	1.333463	0.039414		0.01229	0.07964	0.586616
6882	2620	0.460862	0.291638	0.003758		0.012857	0.88588	0.023891		0.009951	0.111348	0.381289
6883	2621	0.712749	0.452401	0.005401		0.040077	1.222622	0.028833		0.010687	0.140231	0.597042
6884	2622	0.253047	0.159514	0.001881		0.006619	0.48074	0.012611		0.006284	0.057882	0.211225
6885	2623	0.408226	0.255874	0.003192		0.010422	0.784818	0.020932		0.009485	0.098056	0.338024
6886	2624	0.621021	0.398111	0.004354		0.033921	1.076463	0.02597		0.00921	0.123864	0.520261
6887	2625	0.220491	0.137835	0.001584		0.005373	0.418605	0.010968		0.005684	0.050165	0.184178
6888	2626	0.355718	0.220899	0.002683		0.008412	0.68346	0.018135		0.008618	0.085064	0.29474
6889	2627	0.697827	0.451139	0.004856		0.036972	1.221439	0.029443		0.010406	0.141017	0.584679
6890	2628	0.252797	0.156515	0.001787		0.005689	0.479294	0.012497		0.006672	0.057166	0.211315
6891	2629	0.407849	0.250585	0.003032		0.008861	0.782625	0.020613		0.010168	0.097083	0.338164
6892	263	1.381801	0.10503	0.0395		0.06791	1.995696	0.057975		0.018166	0.118234	0.872579
6893	2630	0.778324	0.506962	0.005649		0.039729	1.375997	0.034296		0.011645	0.159282	0.652299
6894	2631	0.285036	0.17403	0.001976		0.005689	0.538963	0.013804		0.007634	0.063852	0.238509
6895	2632	0.459889	0.278279	0.003345		0.008863	0.880139	0.022759		0.011695	0.108771	0.381672
6896	2633	0.85057	0.557582	0.006379		0.041426	1.520238	0.038504		0.012697	0.17657	0.713168
6897	2634	0.284876	0.171301	0.001955		0.004927	0.536623	0.013347		0.007629	0.06307	0.23863
6898	2635	0.459648	0.273637	0.00334		0.00769	0.876352	0.022069		0.01174	0.107561	0.381856
6899	2636	0.825557	0.543071	0.00631		0.038282	1.489929	0.038342		0.01219	0.173639	0.692574
6900	2637	0.284728	0.16841	0.002041		0.004127	0.533698	0.012966		0.007489	0.062126	0.238763
6901	2638	0.459426	0.268827	0.003487		0.006519	0.871606	0.021412		0.011577	0.105928	0.382059
6902	2639	0.829638	0.54613	0.006284		0.036656	1.509418	0.0389		0.012316	0.176412	0.696353
6903	264	1.182871	0.09065	0.032431		0.057449	1.725766	0.04975		0.015589	0.104553	0.746392
6904	2640	0.284592	0.165345	0.002076		0.003699	0.530235	0.01254		0.007225	0.061076	0.238883
6905	2641	0.459223	0.263775	0.003543		0.006149	0.865966	0.020719		0.01122	0.104009	0.382253
6906	2642	0.78784	0.517684	0.006082		0.033052	1.443039	0.038398		0.011744	0.168913	0.661646
6907	2643	0.280155	0.161851	0.002075		0.003747	0.518297	0.011902		0.006821	0.059052	0.235365
6908	2644	0.452082	0.25737	0.003537		0.006539	0.846482	0.019694		0.010632	0.100396	0.376636
6909	2645	0.617662	0.404363	0.004758		0.024557	1.13766	0.030536		0.00924	0.133213	0.519022
6910	2646	0.219728	0.126506	0.001663		0.003572	0.403351	0.009007		0.005157	0.045448	0.184744
6911	2647	0.354581	0.201306	0.002835		0.005771	0.658763	0.014939		0.008048	0.07723	0.295641
6912	2648	0.629477	0.410822	0.004848		0.024273	1.162766	0.031224		0.009432	0.136091	0.529152
6913	2649	0.223991	0.128597	0.001752		0.004024	0.409092	0.009054		0.005153	0.045766	0.188414
6914	265	1.048458	0.080944	0.027852		0.050256	1.544766	0.044007		0.013938	0.094469	0.661436
6915	2650	0.36147	0.204725	0.00297		0.006487	0.668163	0.014982		0.008045	0.077748	0.301517
6916	2651	0.827229	0.536028	0.006246		0.030139	1.534511	0.040325		0.014134	0.179194	0.695967
6917	2652	0.28422	0.162141	0.002388		0.005979	0.514069	0.011197		0.006306	0.056726	0.239245
6918	2653	0.458682	0.258339	0.004064		0.009573	0.839683	0.018467		0.009848	0.096294	0.382859
6919	2654	0.797644	0.511887	0.006033		0.027286	1.483957	0.039074		0.016307	0.172539	0.671713
6920	2655	0.284158	0.16081	0.002529		0.006985	0.508468	0.010744		0.006081	0.055243	0.239323
6921	2656	0.458605	0.256453	0.004287		0.011146	0.830602	0.017731		0.009474	0.094246	0.382972
6922	2657	0.797006	0.509666	0.005891		0.025446	1.48567	0.038648		0.018637	0.17169	0.671856
6923	2658	0.284129	0.159918	0.002634		0.008009	0.502457	0.010168		0.005834	0.053757	0.239338
6924	2659	0.458569	0.254219	0.00449		0.01276	0.820846	0.016848		0.00908	0.093208	0.382982
6925	266	0.914139	0.070968	0.023708		0.043471	1.356491	0.038204		0.01227	0.083271	0.576758
6926	2660	0.796387	0.506399	0.005706		0.023755	1.485977	0.038354		0.020455	0.170488	0.671982
6927	2661	0.284128	0.159332	0.002752		0.009108	0.496013	0.009688		0.005579	0.052836	0.239243
6928	2662	0.458585	0.253398	0.0047		0.014424	0.81043	0.016012		0.008669	0.092145	0.382837
6929	2663	0.737732	0.465549	0.00501		0.020521	1.376585	0.034854		0.020133	0.156698	0.62309
6930	2664	0.25187	0.140452	0.002515		0.0091	0.433594	0.008227		0.004733	0.04614	0.211898
6931	2665	0.406526	0.223553	0.00429		0.014531	0.708584	0.013679		0.007334	0.080255	0.339088
6932	2666	0.614589	0.384995	0.004071		0.016069	1.14578	0.029386		0.017233	0.129534	0.519454

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
6933	2667	0.219616	0.12178	0.00223		0.008641	0.37375	0.006944		0.004002	0.039672	0.184597
6934	2668	0.354475	0.193955	0.003794		0.013885	0.610918	0.011573		0.006178	0.068727	0.295405
6935	2669	0.704595	0.437716	0.004561		0.017184	1.311661	0.03353		0.020039	0.147268	0.596009
6936	267	1.301841	0.102025	0.034391		0.061383	1.945313	0.053959		0.01767	0.118878	0.822004
6937	2670	0.251982	0.138779	0.002579		0.010743	0.423697	0.00768		0.004462	0.044773	0.21158
6938	2671	0.406726	0.221169	0.004379		0.017363	0.692708	0.012852		0.006865	0.07714	0.338607
6939	2672	0.794407	0.487545	0.00509		0.017448	1.474804	0.037168		0.022632	0.164141	0.672738
6940	2673	0.284433	0.154971	0.002894		0.013367	0.470876	0.008385		0.004852	0.04927	0.238643
6941	2674	0.459119	0.247184	0.004916		0.021786	0.769373	0.013974		0.007405	0.084247	0.381927
6942	2675	0.822687	0.498074	0.005191		0.015954	1.521676	0.036849		0.023149	0.167898	0.697503
6943	2676	0.219942	0.118285	0.002212		0.01132	0.358056	0.006193		0.003576	0.037164	0.184371
6944	2677	0.355018	0.188819	0.003758		0.018641	0.584825	0.010304		0.005585	0.063033	0.295065
6945	2678	0.79345	0.472984	0.005176		0.013201	1.460257	0.034813		0.02176	0.159532	0.673512
6946	2679	0.142381	0.07615	0.001429		0.007686	0.229564	0.003861		0.002238	0.023769	0.119291
6947	268	1.147576	0.089989	0.028874		0.0536	1.724453	0.047527		0.015765	0.10746	0.722529
6948	2680	0.229826	0.121308	0.002421		0.012729	0.374914	0.006446		0.003676	0.040145	0.190906
6949	2681	0.793014	0.465092	0.005262		0.010898	1.450718	0.033511		0.020966	0.156876	0.673836
6950	2682	0.194247	0.104492	0.001966		0.010925	0.310578	0.005096		0.003099	0.032115	0.16266
6951	2683	0.313542	0.164352	0.003287		0.018139	0.507197	0.008534		0.005091	0.054077	0.260306
6952	2684	0.780607	0.456445	0.005291		0.010367	1.418076	0.031856		0.019792	0.151733	0.663876
6953	2685	0.259285	0.140918	0.002753		0.015936	0.407271	0.006459		0.004258	0.042064	0.216844
6954	2686	0.418522	0.219646	0.004518		0.02642	0.665131	0.010739		0.006958	0.070532	0.347013
6955	2687	0.647953	0.377203	0.004558		0.01055	1.168108	0.025125		0.015773	0.123661	0.551477
6956	2688	0.259662	0.142312	0.00293		0.017628	0.400721	0.006001		0.004314	0.041381	0.216812
6957	2689	0.419081	0.220661	0.004803		0.028971	0.653776	0.009962		0.007082	0.069178	0.346954
6958	269	1.255763	0.098726	0.030066		0.058027	1.898987	0.051722		0.017493	0.1197	0.789113
6959	2690	0.624071	0.361997	0.004508		0.011254	1.11921	0.024248		0.014839	0.117636	0.531404
6960	2691	0.260111	0.143088	0.003149		0.019454	0.395762	0.005411		0.004406	0.040664	0.216785
6961	2692	0.419715	0.221132	0.005146		0.031693	0.642193	0.009036		0.007203	0.06784	0.346899
6962	2693	0.791816	0.455844	0.006228		0.017143	1.406223	0.029983		0.018095	0.1459	0.674774
6963	2694	0.260603	0.142961	0.00336		0.021355	0.390223	0.004894		0.00448	0.039746	0.216742
6964	2695	0.420401	0.220649	0.005562		0.0345	0.630376	0.008103		0.007303	0.066265	0.346832
6965	2696	0.791607	0.452593	0.006652		0.0201	1.390783	0.028858		0.017447	0.142878	0.675014
6966	2697	0.269795	0.146512	0.003814		0.02401	0.396867	0.004367		0.004645	0.039922	0.223925
6967	2698	0.435139	0.226448	0.006307		0.038559	0.638969	0.007218		0.007582	0.066532	0.358327
6968	2699	0.82016	0.467553	0.007245		0.024259	1.424124	0.027882		0.017446	0.145779	0.699602
6969	270	1.220755	0.09615	0.027519		0.055794	1.856	0.049971		0.017624	0.117747	0.766776
6970	2700	0.261559	0.139754	0.004199		0.02507	0.377005	0.003391		0.004497	0.037304	0.21667
6971	2701	0.4218	0.216704	0.006882		0.040143	0.605607	0.005645		0.007366	0.062087	0.346718
6972	2702	0.791435	0.448934	0.007069		0.026774	1.356299	0.025974		0.016261	0.138236	0.674816
6973	2703	0.192069	0.10087	0.003436		0.019429	0.271667	0.00227		0.003334	0.0264	0.15888
6974	2704	0.309717	0.156963	0.005679		0.03109	0.436551	0.003847		0.005443	0.043865	0.254239
6975	2705	0.701543	0.395261	0.006409		0.026767	1.186462	0.021855		0.013952	0.120053	0.597667
6976	2706	0.214048	0.111199	0.004145		0.02226	0.299345	0.002456		0.003733	0.028726	0.176927
6977	2707	0.345151	0.173376	0.006824		0.035612	0.48146	0.004184		0.00609	0.047697	0.28312
6978	2708	0.611691	0.3424	0.005688		0.025425	1.023616	0.018398		0.011863	0.102802	0.52064
6979	2709	0.288724	0.146185	0.006492		0.031674	0.393686	0.003163		0.004996	0.036672	0.238297
6980	271	1.509922	0.11922	0.032102		0.068235	2.306484	0.061422		0.022421	0.145958	0.949484
6981	2710	0.465528	0.22887	0.010723		0.050621	0.634439	0.005427		0.008187	0.060813	0.381329
6982	2711	0.73402	0.40777	0.006901		0.033076	1.214613	0.020871		0.013865	0.120916	0.624138
6983	2712	0.289091	0.141783	0.007634		0.033261	0.386397	0.003707		0.005122	0.034543	0.238303
6984	2713	0.466097	0.222922	0.012587		0.053121	0.618743	0.006242		0.00841	0.057209	0.381338
6985	2714	0.792165	0.43483	0.007378		0.039333	1.290096	0.022192		0.014445	0.12689	0.672981
6986	2715	0.289417	0.136629	0.008993		0.034706	0.378627	0.005087		0.005379	0.032336	0.23832
6987	2716	0.466598	0.215674	0.014808		0.055426	0.604369	0.008443		0.008795	0.053988	0.381362
6988	2717	0.612534	0.337289	0.005682		0.033296	0.983656	0.016324		0.01075	0.095516	0.519953
6989	2718	0.289711	0.130856	0.010541		0.036051	0.370456	0.006914		0.005572	0.030126	0.238325
6990	2719	0.467051	0.207228	0.017366		0.057578	0.591787	0.011512		0.009086	0.050363	0.381383
6991	272	1.169032	0.091723	0.019876		0.052232	1.789174	0.048154		0.017664	0.114844	0.733164
6992	2720	0.396526	0.220606	0.003766		0.022601	0.633824	0.010189		0.006789	0.06093	0.336426
6993	2721	0.289986	0.124361	0.01234		0.037319	0.361916	0.009328		0.005647	0.02789	0.238343
6994	2722	0.46747	0.197539	0.02033		0.059604	0.578567	0.015483		0.009238	0.046565	0.381421
6995	2723	0.579558	0.325203	0.005745		0.034337	0.922728	0.014141		0.009688	0.087906	0.491529
6996	2724	0.290231	0.117199	0.014412		0.038475	0.353072	0.012269		0.005707	0.025766	0.238381
6997	2725	0.467847	0.186639	0.02374		0.061465	0.564831	0.020248		0.009362	0.042906	0.38149
6998	2726	0.722089	0.412717	0.007463		0.046226	1.140214	0.017165		0.011573	0.106866	0.61158
6999	2727	0.290446	0.109422	0.016771		0.039508	0.343976	0.015638		0.005841	0.023775	0.238444
7000	2728	0.46818	0.174579	0.027615		0.063143	0.550645	0.025677		0.009568	0.039852	0.381596
7001	2729	0.723264	0.421326	0.007913		0.050219	1.13174	0.016037		0.011789	0.10589	0.611522
7002	273	0.91835	0.07165	0.012674		0.040616	1.407658	0.038175		0.013985	0.090892	0.575001

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7003	2730	0.290639	0.101011	0.019383		0.040449	0.334597	0.01917		0.006003	0.021843	0.238527
7004	2731	0.468477	0.161283	0.031945		0.064679	0.535947	0.031521		0.009811	0.036486	0.381735
7005	2732	0.75652	0.445777	0.009007		0.057319	1.16973	0.014709		0.012593	0.109282	0.638279
7006	2733	0.317254	0.100259	0.024365		0.045097	0.354441	0.025112		0.006674	0.021853	0.260333
7007	2734	0.511367	0.159974	0.040165		0.072134	0.567961	0.041349		0.010942	0.036796	0.416634
7008	2735	0.726536	0.428282	0.009079		0.0598	1.105988	0.013217		0.012308	0.102457	0.611359
7009	2736	0.330676	0.091137	0.029843		0.048111	0.355623	0.031859		0.007163	0.020264	0.271358
7010	2737	0.53299	0.144765	0.0492		0.076972	0.570185	0.052548		0.011711	0.034513	0.434275
7011	2738	0.7524	0.437478	0.010357		0.067586	1.1265	0.011688		0.012826	0.102816	0.631615
7012	2739	0.3176	0.074401	0.033022		0.047157	0.329395	0.036113		0.007064	0.01669	0.260663
7013	274	0.937142	0.072827	0.012222		0.041193	1.437247	0.039104		0.014266	0.092982	0.586367
7014	2740	0.511935	0.117219	0.054505		0.075443	0.528107	0.059819		0.011532	0.028687	0.417166
7015	2741	0.72955	0.41496	0.011361		0.070756	1.070975	0.009095		0.012451	0.095908	0.611139
7016	2742	0.317773	0.059841	0.037764		0.048085	0.316648	0.042124		0.007253	0.013125	0.260817
7017	2743	0.512187	0.093043	0.062432		0.076833	0.506931	0.070035		0.011835	0.022581	0.417429
7018	2744	0.575364	0.319472	0.010074		0.058976	0.828771	0.006342		0.009854	0.072843	0.481285
7019	2745	0.765456	0.123448	0.097134		0.059851	0.768998	0.108595		0.022447	0.048468	0.610425
7020	2746	0.86817	0.189063	0.093244		0.066371	0.941045	0.098241		0.025134	0.077791	0.692869
7021	2747	0.597113	0.327055	0.011001		0.062944	0.850763	0.006225		0.010232	0.073692	0.499038
7022	2748	0.739126	0.201347	0.066673		0.055119	0.859818	0.065436		0.021072	0.087182	0.590228
7023	2749	0.534266	0.165973	0.042366		0.039302	0.650071	0.038991		0.015052	0.074615	0.426817
7024	275	1.516998	0.11699	0.019602		0.065908	2.328041	0.063311		0.022828	0.150172	0.948734
7025	2750	0.805485	0.426852	0.01742		0.089665	1.119846	0.007918		0.013577	0.093955	0.67215
7026	2751	0.4196	0.141787	0.030236		0.030546	0.526545	0.026263		0.011708	0.065124	0.335327
7027	2752	0.555646	0.199965	0.037089		0.0401	0.714001	0.030197		0.015378	0.092442	0.444152
7028	2753	0.806588	0.41104	0.020446		0.094228	1.094205	0.009527		0.013958	0.088475	0.672155
7029	2754	0.756766	0.302631	0.043566		0.053691	1.013102	0.030117		0.02059	0.137865	0.605151
7030	2755	0.701865	0.307538	0.034341		0.048815	0.976937	0.018094		0.018663	0.135353	0.561496
7031	2756	0.836828	0.407546	0.025107		0.101949	1.109293	0.01416		0.015168	0.085871	0.696597
7032	2757	0.61993	0.287387	0.026619		0.042404	0.889284	0.009915		0.016143	0.123885	0.496161
7033	2758	0.619631	0.300317	0.023377		0.041659	0.914013	0.009353		0.015787	0.128098	0.496145
7034	2759	0.808438	0.374524	0.028307		0.102128	1.046032	0.01819		0.015176	0.076722	0.672183
7035	276	1.193509	0.091016	0.014744		0.051261	1.828005	0.050003		0.017559	0.119153	0.742917
7036	2760	0.619341	0.311163	0.020527		0.040899	0.937529	0.009976		0.01543	0.132452	0.49613
7037	2761	0.548466	0.284225	0.015989		0.035548	0.850388	0.009308		0.013353	0.128058	0.439535
7038	2762	0.809252	0.353846	0.033188		0.105635	1.020676	0.024812		0.01545	0.070749	0.672215
7039	2763	0.428849	0.227268	0.011327		0.027381	0.676508	0.007504		0.010247	0.108098	0.343777
7040	2764	0.477571	0.25755	0.011897		0.030117	0.763241	0.008575		0.011237	0.126402	0.382922
7041	2765	0.80997	0.331699	0.038755		0.108809	0.994632	0.032832		0.015654	0.065246	0.672286
7042	2766	0.564155	0.312345	0.013004		0.034891	0.918585	0.012496		0.012953	0.157044	0.452499
7043	2767	0.553072	0.313832	0.011774		0.033538	0.915749	0.014602		0.012387	0.157025	0.44374
7044	2768	0.839975	0.319487	0.046831		0.115719	1.003136	0.04399		0.016541	0.062358	0.696841
7045	2769	0.531152	0.308438	0.010371		0.031547	0.893377	0.016087		0.011581	0.149875	0.426268
7046	277	1.195821	0.090072	0.016425		0.050868	1.827275	0.049862		0.017555	0.119553	0.741452
7047	2770	0.509265	0.301471	0.009121		0.029648	0.868313	0.017093		0.010806	0.140381	0.408795
7048	2771	0.811166	0.283693	0.052117		0.11425	0.940729	0.051706		0.016274	0.054929	0.67267
7049	2772	0.536128	0.322773	0.008742		0.030565	0.925967	0.019589		0.011047	0.142944	0.43045
7050	2773	0.562938	0.344367	0.008194		0.031323	0.985435	0.022229		0.011205	0.144342	0.452071
7051	2774	0.885483	0.281197	0.065478		0.127297	0.995768	0.067633		0.01801	0.053987	0.734167
7052	2775	0.638404	0.395901	0.008203		0.034629	1.131759	0.026886		0.012248	0.161761	0.512764
7053	2776	0.713685	0.449476	0.007684		0.037417	1.284302	0.032116		0.013013	0.183405	0.573358
7054	2777	0.948094	0.263385	0.082475		0.139465	1.026034	0.087968		0.019755	0.050381	0.786105
7055	2778	0.632172	0.404069	0.005799		0.031971	1.153355	0.029997		0.010891	0.164565	0.508123
7056	2779	0.550842	0.35608	0.005055		0.027055	1.014846	0.027078		0.009046	0.14465	0.442878
7057	278	1.198372	0.088978	0.018068		0.050755	1.825597	0.049433		0.017696	0.1195	0.740508
7058	2780	0.886526	0.211046	0.088678		0.133029	0.924605	0.096358		0.018994	0.040042	0.735093
7059	2781	0.588338	0.384442	0.005578		0.028031	1.093832	0.029778		0.009277	0.155677	0.473139
7060	2782	0.690482	0.455998	0.00674		0.031729	1.296083	0.035929		0.010738	0.184141	0.555426
7061	2783	0.887057	0.173149	0.101024		0.135825	0.890921	0.111466		0.019604	0.03303	0.735485
7062	2784	0.754682	0.502699	0.007549		0.033119	1.431571	0.040369		0.011486	0.2032	0.60726
7063	2785	0.732612	0.489267	0.007422		0.030607	1.402861	0.040064		0.010853	0.200619	0.589704
7064	2786	0.710605	0.473282	0.007229		0.028241	1.371489	0.039535		0.010239	0.206742	0.5722
7065	2787	0.69939	0.463009	0.007105		0.026426	1.359173	0.03944		0.010056	0.213665	0.563408
7066	2788	0.548426	0.360486	0.005537		0.019718	1.071846	0.03117		0.007848	0.170524	0.441998
7067	2789	0.558984	0.365825	0.005613		0.019483	1.095633	0.031831		0.007962	0.172439	0.450648
7068	279	1.393902	0.101711	0.023723		0.059105	2.116318	0.056553		0.020675	0.13769	0.859011
7069	2790	0.709053	0.460382	0.007027		0.023344	1.395613	0.040334		0.009973	0.208498	0.571985
7070	2791	0.708653	0.455483	0.006898		0.021953	1.399258	0.040105		0.009774	0.196684	0.572041
7071	2792	0.708269	0.448389	0.006732		0.020555	1.40163	0.039763		0.010518	0.195046	0.57213
7072	2793	0.707896	0.438157	0.00652		0.019138	1.402766	0.039326		0.011868	0.194617	0.572234

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7073	2794	0.627139	0.37649	0.005553		0.015675	1.243229	0.034408		0.011545	0.172551	0.507309
7074	2795	0.546531	0.323675	0.004686		0.012775	1.083013	0.029648		0.010644	0.1505	0.442347
7075	2796	0.626674	0.365984	0.005285		0.013611	1.240516	0.033539		0.012741	0.172481	0.507506
7076	2797	0.7067	0.404879	0.005805		0.013797	1.395511	0.036986		0.014909	0.193591	0.572766
7077	2798	0.706411	0.396952	0.00597		0.012202	1.389785	0.035976		0.015149	0.191877	0.573005
7078	2799	0.706145	0.389123	0.006221		0.011412	1.382446	0.034888		0.015087	0.19142	0.573278
7079	280	0.929898	0.067077	0.014989		0.039494	1.406069	0.037561		0.01381	0.092017	0.569981
7080	2800	0.705906	0.381035	0.006323		0.011988	1.373647	0.03378		0.014769	0.190031	0.573572
7081	2801	0.695	0.366651	0.006291		0.013292	1.3429	0.032183		0.014094	0.18504	0.565177
7082	2802	0.545181	0.287175	0.005016		0.011603	1.04525	0.024449		0.010693	0.142656	0.443668
7083	2803	0.555804	0.292387	0.00526		0.012567	1.060288	0.024455		0.010683	0.142971	0.452493
7084	2804	0.705328	0.36978	0.007195		0.017657	1.3328	0.029976		0.013063	0.177512	0.574558
7085	2805	0.705275	0.368056	0.007573		0.019603	1.318749	0.028795		0.012531	0.173138	0.574697
7086	2806	0.705285	0.366072	0.008051		0.022453	1.303648	0.027489		0.011953	0.16814	0.57468
7087	2807	0.705361	0.363894	0.008389		0.025398	1.287625	0.026322		0.011345	0.167168	0.574471
7088	2808	0.625346	0.320382	0.007617		0.025215	1.126453	0.02267		0.009514	0.145759	0.508844
7089	2809	0.545311	0.27764	0.006699		0.023862	0.97177	0.019263		0.008072	0.123632	0.443298
7090	281	1.068717	0.076049	0.016228		0.045486	1.60927	0.042821		0.015842	0.105429	0.65195
7091	2810	0.625706	0.316273	0.007691		0.029589	1.1027	0.021486		0.0096	0.136186	0.508277
7092	2811	0.70631	0.354567	0.008607		0.036748	1.226281	0.023272		0.011276	0.16014	0.573297
7093	2812	0.546178	0.271724	0.006549		0.031122	0.933595	0.017132		0.009003	0.134964	0.442887
7094	2813	0.353572	0.174872	0.004194		0.021135	0.599086	0.010753		0.005918	0.089728	0.286533
7095	2814	0.482344	0.237247	0.005663		0.029978	0.811179	0.014263		0.008166	0.123669	0.39068
7096	2815	0.64372	0.312505	0.007431		0.04315	1.06589	0.01784		0.011116	0.163553	0.520786
7097	2816	0.644396	0.307975	0.007826		0.046436	1.049756	0.016527		0.0113	0.157068	0.520667
7098	2817	0.64513	0.305815	0.008422		0.049976	1.033154	0.015059		0.011458	0.148235	0.520554
7099	2818	0.645909	0.303347	0.009053		0.0536	1.016077	0.013429		0.011582	0.142005	0.520449
7100	2819	0.668266	0.310742	0.010263		0.059137	1.031757	0.012124		0.012064	0.145376	0.537702
7101	282	1.208996	0.085244	0.017089		0.051639	1.809784	0.047676		0.017817	0.118345	0.733575
7102	2820	0.647552	0.297658	0.011081		0.060999	0.979001	0.009646		0.01177	0.137398	0.52028
7103	2821	0.475392	0.216485	0.009209		0.047041	0.704957	0.006737		0.008703	0.097548	0.381506
7104	2822	0.529726	0.240321	0.011032		0.053799	0.77658	0.007347		0.009734	0.106131	0.424844
7105	2823	0.714324	0.320523	0.017373		0.076239	1.02145	0.009693		0.013173	0.134779	0.572223
7106	2824	0.715078	0.315359	0.020366		0.079819	0.995751	0.010662		0.013682	0.128265	0.572235
7107	2825	0.715759	0.307878	0.023919		0.083197	0.968888	0.014073		0.014217	0.125109	0.572273
7108	2826	0.716376	0.298035	0.028079		0.086386	0.940842	0.019036		0.014629	0.123424	0.572333
7109	2827	0.71694	0.285876	0.032897		0.089393	0.911592	0.025454		0.014921	0.124765	0.572423
7110	2828	0.717453	0.27142	0.038435		0.09219	0.881072	0.032915		0.015175	0.122659	0.572555
7111	2829	0.717917	0.254553	0.044734		0.094762	0.849127	0.041397		0.01547	0.115244	0.572736
7112	283	1.543936	0.108073	0.023272		0.066192	2.296369	0.059347		0.022548	0.148899	0.934802
7113	2830	0.718342	0.235011	0.05185		0.097132	0.815593	0.050879		0.015795	0.101893	0.572968
7114	2831	0.784077	0.231756	0.065274		0.108369	0.853784	0.066973		0.017567	0.091064	0.625361
7115	2832	0.817275	0.206272	0.080108		0.115637	0.858132	0.085653		0.018672	0.065977	0.65185
7116	2833	0.785095	0.162849	0.088997		0.113231	0.793368	0.098408		0.018218	0.047615	0.626201
7117	2834	0.785802	0.126222	0.10278		0.115182	0.759852	0.117046		0.018533	0.038441	0.626687
7118	2835	0.759963	0.108619	0.109067		0.091164	0.818854	0.127622		0.025954	0.057569	0.568573
7119	2836	0.842647	0.119133	0.122006		0.130823	0.921493	0.143476		0.029184	0.060229	0.611083
7120	2837	0.743998	0.108441	0.104323		0.069693	0.784386	0.121117		0.024587	0.053688	0.568464
7121	2838	0.861697	0.152208	0.103216		0.100974	0.986386	0.111604		0.028813	0.087446	0.645591
7122	2839	0.955645	0.158556	0.115499		0.144977	1.106746	0.125133		0.032403	0.088651	0.693931
7123	284	1.21631	0.085056	0.016586		0.052341	1.794408	0.045604		0.017582	0.116868	0.733505
7124	2840	0.843764	0.159253	0.098924		0.077464	0.949349	0.106377		0.027346	0.082958	0.645406
7125	2841	0.733391	0.159142	0.072766		0.084309	0.887842	0.071453		0.023983	0.092157	0.550108
7126	2842	0.813388	0.155709	0.081196		0.120269	0.992093	0.079673		0.027016	0.09299	0.591361
7127	2843	0.718284	0.170945	0.069998		0.065076	0.868487	0.068639		0.02279	0.099556	0.549903
7128	2844	0.530033	0.134046	0.045827		0.06015	0.669779	0.041369		0.017061	0.084842	0.397852
7129	2845	0.587792	0.125066	0.050913		0.085248	0.741944	0.045893		0.019253	0.078105	0.427723
7130	2846	0.519175	0.144177	0.044215		0.046732	0.656925	0.040005		0.016217	0.089469	0.397679
7131	2847	0.416244	0.115823	0.032466		0.046778	0.541762	0.027072		0.01324	0.077225	0.312598
7132	2848	0.461562	0.107296	0.035912		0.065924	0.597816	0.029901		0.01496	0.071685	0.336089
7133	2849	0.407758	0.124656	0.031399		0.036534	0.532178	0.026326		0.012584	0.080288	0.312447
7134	285	1.220281	0.084868	0.016831		0.052729	1.784477	0.044041		0.017481	0.115979	0.732079
7135	2850	0.551169	0.164296	0.039697		0.06142	0.734475	0.030395		0.017357	0.113411	0.414092
7136	2851	0.611116	0.151429	0.043868		0.086133	0.809901	0.033407		0.019631	0.105874	0.445235
7137	2852	0.539975	0.176938	0.03843		0.048184	0.721749	0.029764		0.016494	0.116758	0.413878
7138	2853	0.750523	0.24938	0.046401		0.082172	1.047728	0.02895		0.02317	0.180405	0.564307
7139	2854	0.83201	0.227883	0.051205		0.114131	1.150117	0.031437		0.026271	0.169746	0.606801
7140	2855	0.735449	0.269099	0.044981		0.065018	1.024387	0.028696		0.022012	0.182964	0.563977
7141	2856	0.695959	0.252001	0.036519		0.074566	1.016193	0.016252		0.021015	0.186973	0.523702
7142	2857	0.771317	0.228346	0.040287		0.102478	1.111055	0.017359		0.023885	0.176549	0.563179

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7143	2858	0.682147	0.272871	0.035426		0.059497	0.987537	0.016412		0.019941	0.187781	0.523368
7144	2859	0.614598	0.233545	0.02836		0.064567	0.925114	0.008873		0.018217	0.174468	0.462786
7145	286	1.206028	0.083264	0.018259		0.052272	1.746461	0.04134		0.017147	0.112898	0.718961
7146	2860	0.681024	0.210245	0.031305		0.088019	1.009173	0.009749		0.020748	0.164525	0.49769
7147	2861	0.602568	0.253833	0.027499		0.05184	0.896873	0.008665		0.017273	0.174792	0.462481
7148	2862	0.614146	0.241462	0.024966		0.063112	0.948387	0.009833		0.017858	0.180397	0.462748
7149	2863	0.680384	0.215931	0.027599		0.085357	1.032992	0.010885		0.020369	0.169256	0.497652
7150	2864	0.602299	0.263617	0.024188		0.050956	0.920038	0.009539		0.016915	0.181123	0.462442
7151	2865	0.613663	0.247011	0.022031		0.06153	0.968165	0.010673		0.017495	0.184024	0.462686
7152	2866	0.679727	0.219403	0.02453		0.082577	1.053545	0.011891		0.019979	0.172759	0.497577
7153	2867	0.602029	0.271024	0.021305		0.049934	0.941127	0.010294		0.016558	0.185891	0.462392
7154	2868	0.54324	0.222331	0.017859		0.053006	0.873188	0.010073		0.015182	0.16512	0.409849
7155	2869	0.601616	0.196146	0.02049		0.070597	0.949567	0.011282		0.01735	0.155318	0.440732
7156	287	1.287636	0.088511	0.021329		0.055852	1.845512	0.044279		0.018197	0.117873	0.765764
7157	2870	0.533131	0.245229	0.016786		0.043218	0.852015	0.009677		0.014357	0.168254	0.409605
7158	2871	0.424632	0.175553	0.013263		0.040498	0.691824	0.008176		0.011687	0.132199	0.320521
7159	2872	0.470206	0.154067	0.015258		0.053622	0.751964	0.009185		0.013362	0.121779	0.344655
7160	2873	0.416854	0.194424	0.012434		0.033131	0.676741	0.007833		0.011044	0.137805	0.320342
7161	2874	0.472755	0.196828	0.014136		0.044225	0.778487	0.010325		0.012853	0.149177	0.356982
7162	2875	0.523447	0.172016	0.016294		0.058285	0.845753	0.011593		0.014701	0.135078	0.383846
7163	2876	0.464209	0.218687	0.013236		0.036272	0.762524	0.00972		0.012139	0.15781	0.356795
7164	2877	0.558357	0.234621	0.015539		0.050618	0.934523	0.015049		0.014897	0.177269	0.421783
7165	2878	0.618029	0.203734	0.017938		0.066242	1.014317	0.016808		0.017049	0.15695	0.453493
7166	2879	0.548366	0.261946	0.014521		0.041664	0.915902	0.014273		0.014055	0.191081	0.421582
7167	288	0.97057	0.065881	0.015674		0.04207	1.381519	0.035077		0.01368	0.088468	0.575786
7168	2880	0.547374	0.231607	0.014091		0.048027	0.930763	0.017183		0.014331	0.172475	0.413563
7169	2881	0.605585	0.199851	0.01629		0.062421	1.009092	0.019142		0.016407	0.15379	0.444635
7170	2882	0.537587	0.259915	0.013166		0.039657	0.911323	0.016372		0.013507	0.188147	0.413385
7171	2883	0.525672	0.223395	0.0124		0.044535	0.908086	0.018628		0.013492	0.167092	0.397235
7172	2884	0.581302	0.191523	0.014316		0.057631	0.983255	0.020705		0.01545	0.148765	0.427056
7173	2885	0.516276	0.255528	0.011589		0.036883	0.887372	0.017798		0.012701	0.179014	0.397078
7174	2886	0.504004	0.217457	0.010853		0.041253	0.882883	0.019575		0.012686	0.161795	0.380917
7175	2887	0.557108	0.182674	0.012499		0.053273	0.954863	0.02174		0.014532	0.144069	0.409498
7176	2888	0.494999	0.249692	0.010165		0.034253	0.86138	0.018738		0.011927	0.1694	0.38078
7177	2889	0.530589	0.232152	0.010316		0.041868	0.941502	0.022267		0.013074	0.172078	0.401063
7178	289	1.236942	0.08254	0.025352		0.053607	1.738691	0.049394		0.017409	0.111045	0.73108
7179	2890	0.586251	0.192979	0.011823		0.05396	1.017219	0.024724		0.014985	0.153648	0.431141
7180	2891	0.521109	0.266932	0.009692		0.034849	0.919351	0.021338		0.012277	0.179121	0.400928
7181	2892	0.557123	0.246383	0.009532		0.04211	1.001223	0.025136		0.01338	0.182772	0.421175
7182	2893	0.615289	0.204267	0.010847		0.054155	1.080789	0.027913		0.015344	0.164095	0.452749
7183	2894	0.547169	0.283878	0.009002		0.03514	0.978468	0.024104		0.012545	0.189148	0.421042
7184	2895	0.631819	0.281463	0.009345		0.045615	1.148164	0.030296		0.014749	0.209586	0.477694
7185	2896	0.697467	0.232749	0.010541		0.058546	1.2387	0.033666		0.016926	0.189489	0.513497
7186	2897	0.620529	0.325025	0.008893		0.03816	1.122789	0.029061		0.013806	0.215411	0.477551
7187	2898	0.706351	0.317439	0.00872		0.047909	1.299875	0.036091		0.015838	0.244195	0.534091
7188	2899	0.779295	0.261908	0.010069		0.061328	1.401907	0.04013		0.018207	0.228249	0.574104
7189	290	1.242397	0.081622	0.032916		0.05379	1.722808	0.05645		0.017511	0.109318	0.731716
7190	2900	0.693723	0.367391	0.008145		0.040202	1.271804	0.03462		0.014793	0.247097	0.533942
7191	2901	0.625701	0.285031	0.007119		0.039658	1.165496	0.033614		0.013414	0.226133	0.473262
7192	2902	0.689919	0.235202	0.008232		0.050627	1.256949	0.037392		0.015457	0.214324	0.508788
7193	2903	0.614509	0.33	0.0066		0.033388	1.140512	0.032246		0.012494	0.225553	0.473117
7194	2904	0.545228	0.252204	0.006452		0.032661	1.025422	0.030261		0.011254	0.199664	0.41257
7195	2905	0.600919	0.208566	0.007466		0.041596	1.105981	0.033634		0.013003	0.189871	0.443537
7196	2906	0.535468	0.291574	0.00598		0.027732	1.00334	0.029057		0.010455	0.198665	0.412432
7197	2907	0.582376	0.274401	0.007101		0.032834	1.10616	0.033272		0.01154	0.211452	0.440795
7198	2908	0.641578	0.227786	0.008217		0.041707	1.193228	0.036958		0.01338	0.20048	0.47386
7199	2909	0.571944	0.316371	0.006584		0.02828	1.082051	0.031961		0.010688	0.21149	0.440651
7200	291	1.589369	0.103681	0.053318		0.068468	2.172294	0.084529		0.022504	0.136004	0.932937
7201	2910	0.68354	0.32901	0.008539		0.036001	1.312654	0.040094		0.012889	0.240297	0.517434
7202	2911	0.752645	0.274633	0.009866		0.045265	1.417075	0.044481		0.015013	0.225362	0.556198
7203	2912	0.671284	0.377827	0.007926		0.031365	1.28346	0.038541		0.011886	0.243943	0.517289
7204	2913	0.747175	0.366864	0.009494		0.036356	1.451572	0.044906		0.013203	0.248849	0.565608
7205	2914	0.822212	0.308341	0.010945		0.044849	1.571389	0.049731		0.015488	0.228167	0.607882
7206	2915	0.733762	0.419335	0.008829		0.031821	1.418365	0.043214		0.012103	0.2599	0.565504
7207	2916	0.725418	0.359035	0.009275		0.032326	1.421152	0.044397		0.011946	0.237082	0.549099
7208	2917	0.79778	0.303404	0.010662		0.039689	1.542514	0.049104		0.014123	0.225031	0.590033
7209	2918	0.712374	0.40909	0.008643		0.028448	1.387824	0.042772		0.011054	0.249687	0.549064
7210	2919	0.70373	0.346898	0.008982		0.028595	1.38525	0.043629		0.010871	0.229508	0.53267
7211	292	1.254353	0.078869	0.052126		0.053474	1.687556	0.077325		0.01789	0.105666	0.732054
7212	2920	0.773473	0.294032	0.010299		0.034928	1.506242	0.048228		0.012857	0.226336	0.572291

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7213	2921	0.691056	0.394851	0.008387		0.025427	1.352296	0.042065		0.010399	0.244889	0.532689
7214	2922	0.692745	0.337482	0.008779		0.025395	1.368977	0.043357		0.010368	0.226958	0.524408
7215	2923	0.760929	0.286292	0.010046		0.030826	1.488186	0.047937		0.011828	0.228345	0.563363
7216	2924	0.680243	0.384396	0.008211		0.023584	1.334798	0.041817		0.009892	0.24601	0.524461
7217	2925	0.543308	0.260981	0.006811		0.017803	1.077113	0.034206		0.007854	0.180499	0.411399
7218	2926	0.596412	0.221159	0.007785		0.021455	1.170062	0.03785		0.008971	0.181925	0.441955
7219	2927	0.533485	0.297781	0.006378		0.01769	1.049492	0.032985		0.007472	0.194971	0.411443
7220	2928	0.553831	0.263878	0.006889		0.017311	1.100458	0.034938		0.007824	0.185339	0.419475
7221	2929	0.607733	0.223313	0.007871		0.020218	1.194675	0.03869		0.008959	0.186719	0.450649
7222	293	1.117478	0.068318	0.056843		0.04691	1.478475	0.081005		0.016102	0.091941	0.647949
7223	2930	0.543804	0.301473	0.006453		0.017541	1.072386	0.033683		0.007517	0.198	0.41951
7224	2931	0.702666	0.3302	0.008605		0.020942	1.403213	0.04436		0.009483	0.237895	0.532527
7225	2932	0.770816	0.278528	0.009831		0.023673	1.521297	0.049189		0.010907	0.238938	0.572182
7226	2933	0.689918	0.378195	0.008063		0.02117	1.366496	0.042734		0.009282	0.244923	0.532523
7227	2934	0.702414	0.32467	0.008442		0.019924	1.410667	0.044198		0.009033	0.239923	0.532729
7228	2935	0.770557	0.272754	0.009653		0.021795	1.527487	0.049068		0.010367	0.239864	0.572521
7229	2936	0.68964	0.372924	0.007907		0.020073	1.371151	0.042546		0.008963	0.243783	0.532656
7230	2937	0.702179	0.316625	0.008252		0.018905	1.416772	0.043862		0.008603	0.240565	0.532972
7231	2938	0.770317	0.266189	0.009454		0.020233	1.533163	0.048742		0.009752	0.239366	0.572915
7232	2939	0.689382	0.36495	0.007721		0.018972	1.37562	0.042199		0.008591	0.242633	0.532824
7233	294	0.978204	0.058617	0.057685		0.040303	1.276612	0.080074		0.014246	0.078764	0.564074
7234	2940	0.701964	0.305113	0.008029		0.017886	1.419258	0.043349		0.008126	0.243752	0.533204
7235	2941	0.770102	0.256287	0.009221		0.019237	1.536349	0.048207		0.00907	0.239592	0.573272
7236	2942	0.689139	0.352957	0.007498		0.017865	1.376491	0.041699		0.008173	0.242092	0.532995
7237	2943	0.622024	0.258229	0.006878		0.014948	1.256313	0.037808		0.006745	0.216676	0.472777
7238	2944	0.682425	0.215431	0.008093		0.017326	1.361567	0.042052		0.007389	0.212586	0.508353
7239	2945	0.610629	0.299094	0.00641		0.014843	1.220097	0.036382		0.006902	0.214576	0.472562
7240	2946	0.542173	0.215713	0.005861		0.013147	1.092368	0.032455		0.00564	0.188303	0.412247
7241	2947	0.594842	0.1789	0.006939		0.015521	1.18534	0.036081		0.005984	0.184833	0.443269
7242	2948	0.532218	0.251142	0.005414		0.012263	1.063451	0.031249		0.006211	0.186992	0.412055
7243	2949	0.621795	0.237259	0.006571		0.015234	1.248968	0.036565		0.006695	0.214781	0.472943
7244	295	1.475238	0.087371	0.100351		0.05912	1.897873	0.135803		0.021797	0.115564	0.845923
7245	2950	0.682228	0.196353	0.007711		0.019522	1.356927	0.040615		0.006728	0.211192	0.508512
7246	2951	0.610352	0.276683	0.006121		0.013792	1.218788	0.035235		0.007319	0.21394	0.472734
7247	2952	0.701374	0.254645	0.007527		0.019918	1.403584	0.040167		0.007823	0.240309	0.533672
7248	2953	0.769583	0.209048	0.008959		0.026103	1.526736	0.04455		0.007584	0.23709	0.573754
7249	2954	0.688422	0.302147	0.00683		0.016162	1.372038	0.03875		0.008482	0.23939	0.533468
7250	2955	0.701256	0.245905	0.008097		0.023043	1.399456	0.038982		0.008018	0.238161	0.533792
7251	2956	0.769502	0.197243	0.009671		0.030191	1.52302	0.043166		0.007787	0.235805	0.573824
7252	2957	0.688264	0.295029	0.00733		0.018706	1.367335	0.037651		0.00863	0.236141	0.533625
7253	2958	0.701164	0.239951	0.008467		0.026198	1.395906	0.037744		0.00814	0.235123	0.533971
7254	2959	0.769456	0.192467	0.010118		0.034288	1.519057	0.041719		0.007959	0.23348	0.573971
7255	296	1.278334	0.071982	0.102838		0.049166	1.612572	0.133089		0.019283	0.097816	0.727696
7256	2960	0.688126	0.288245	0.007652		0.021292	1.361015	0.036494		0.008707	0.232321	0.533831
7257	2961	0.701095	0.233652	0.008625		0.029384	1.390812	0.036488		0.008201	0.229978	0.534225
7258	2962	0.769443	0.187722	0.01032		0.038475	1.513267	0.040264		0.008073	0.228768	0.574236
7259	2963	0.688015	0.281146	0.007788		0.023921	1.35326	0.035316		0.008724	0.228758	0.534093
7260	2964	0.690433	0.223126	0.008634		0.032206	1.361267	0.0347		0.008092	0.218549	0.526447
7261	2965	0.757799	0.179765	0.010378		0.042389	1.481569	0.03824		0.008014	0.217447	0.565903
7262	2966	0.677505	0.269081	0.007772		0.026192	1.323892	0.033618		0.008565	0.222319	0.526302
7263	2967	0.541718	0.169288	0.006859		0.027978	1.058725	0.02628		0.006334	0.163461	0.413319
7264	2968	0.594617	0.136852	0.008277		0.036695	1.15354	0.028929		0.006373	0.162422	0.444338
7265	2969	0.531541	0.204633	0.006167		0.022666	1.031175	0.025488		0.006675	0.172169	0.413185
7266	297	0.993472	0.053787	0.094031		0.038136	1.22731	0.115968		0.015316	0.073598	0.562168
7267	2970	0.552348	0.169127	0.007221		0.030182	1.072894	0.026217		0.006438	0.164442	0.421573
7268	2971	0.606314	0.137025	0.008688		0.039503	1.170181	0.028835		0.006672	0.160019	0.453235
7269	2972	0.541951	0.204663	0.006494		0.024509	1.046443	0.025446		0.006767	0.173857	0.421421
7270	2973	0.701107	0.219485	0.009826		0.041997	1.346451	0.031975		0.008097	0.209793	0.535348
7271	2974	0.769671	0.175696	0.011807		0.054782	1.472033	0.035096		0.008838	0.206727	0.575605
7272	2975	0.687866	0.259501	0.008851		0.034237	1.316351	0.031077		0.008482	0.215537	0.535128
7273	2976	0.701202	0.223777	0.010524		0.045745	1.332553	0.030609		0.00864	0.216569	0.535501
7274	2977	0.76983	0.18081	0.012624		0.059489	1.460804	0.03352		0.009351	0.211482	0.575803
7275	2978	0.687917	0.262778	0.009467		0.037433	1.303413	0.029791		0.008464	0.208469	0.535261
7276	2979	0.701342	0.227269	0.011043		0.049557	1.321303	0.029677		0.009365	0.219988	0.535479
7277	298	0.644909	0.034272	0.066421		0.024703	0.787189	0.079765		0.010184	0.0468	0.364085
7278	2980	0.770032	0.18517	0.013191		0.064265	1.45231	0.032816		0.010159	0.212548	0.575793
7279	2981	0.688019	0.265246	0.009975		0.040695	1.289446	0.028626		0.009154	0.211452	0.535235
7280	2982	0.701529	0.230006	0.011327		0.053433	1.311886	0.029071		0.010034	0.220487	0.535255
7281	2983	0.770282	0.188782	0.013445		0.069105	1.445289	0.03217		0.0109	0.210668	0.575529
7282	2984	0.688174	0.266979	0.010282		0.044028	1.274661	0.028015		0.009798	0.220705	0.535025

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7283	2985	0.622022	0.205635	0.010097		0.050855	1.154037	0.025143		0.009438	0.19571	0.474051
7284	2986	0.683007	0.169836	0.011896		0.065597	1.273803	0.027851		0.010256	0.183845	0.509672
7285	2987	0.610161	0.238932	0.00922		0.042044	1.116251	0.024208		0.009209	0.20288	0.473877
7286	2988	0.542446	0.18001	0.008738		0.046724	0.998767	0.021437		0.008562	0.174971	0.413148
7287	2989	0.595641	0.149268	0.010231		0.060147	1.103733	0.023758		0.00931	0.158431	0.444203
7288	299	1.238211	0.06514	0.136779		0.04731	1.495785	0.160558		0.02006	0.088001	0.698072
7289	2990	0.532094	0.209415	0.008021		0.038728	0.963898	0.020624		0.008352	0.180351	0.412948
7290	2991	0.622439	0.206757	0.009863		0.056369	1.135303	0.023963		0.010171	0.204398	0.473795
7291	2992	0.683486	0.172002	0.01147		0.072417	1.255823	0.026571		0.011071	0.18013	0.509398
7292	2993	0.610559	0.241038	0.009105		0.046846	1.095017	0.023045		0.009916	0.209209	0.473576
7293	2994	0.702607	0.232434	0.010771		0.067703	1.262957	0.025985		0.011919	0.234004	0.534348
7294	2995	0.771516	0.193952	0.012404		0.086746	1.398169	0.028816		0.013006	0.205788	0.574478
7295	2996	0.689205	0.272255	0.010027		0.056463	1.219848	0.024981		0.011621	0.237182	0.534118
7296	2997	0.543247	0.179087	0.007965		0.055538	0.961218	0.019135		0.009508	0.182306	0.412743
7297	2998	0.596508	0.148491	0.009233		0.070961	1.064293	0.021216		0.010385	0.161915	0.44372
7298	2999	0.5329	0.209547	0.007486		0.046486	0.930537	0.018395		0.009259	0.183253	0.412581
7299	300	1.182271	0.059968	0.147918		0.044858	1.398158	0.165716		0.020422	0.081528	0.665384
7300	3000	0.351636	0.115423	0.005009		0.037084	0.61701	0.012012		0.006243	0.11832	0.26701
7301	3001	0.386104	0.095207	0.005933		0.047312	0.683018	0.013315		0.006832	0.105469	0.287042
7302	3002	0.344947	0.134918	0.004737		0.031103	0.597824	0.011546		0.006078	0.118577	0.266911
7303	3003	0.47965	0.15656	0.006749		0.051882	0.836072	0.015933		0.008608	0.161672	0.364038
7304	3004	0.526657	0.128539	0.008009		0.066107	0.925183	0.017661		0.00944	0.144386	0.391343
7305	3005	0.470538	0.182896	0.00633		0.043588	0.810295	0.015316		0.008377	0.161769	0.363909
7306	3006	0.639945	0.205301	0.00874		0.072692	1.101757	0.019952		0.011708	0.215987	0.485211
7307	3007	0.70263	0.173766	0.010345		0.092398	1.217862	0.02211		0.012888	0.193041	0.521591
7308	3008	0.627823	0.239748	0.008072		0.061278	1.066997	0.019174		0.011383	0.216014	0.485054
7309	3009	0.640381	0.20615	0.008601		0.076223	1.089662	0.018511		0.011928	0.215116	0.485054
7310	301	1.189019	0.058673	0.167857		0.044731	1.374186	0.179236		0.022641	0.078495	0.671037
7311	3010	0.703067	0.176918	0.009861		0.096653	1.203083	0.020523		0.013167	0.19157	0.521411
7312	3011	0.628293	0.234151	0.008239		0.064468	1.053217	0.01778		0.011571	0.215851	0.484907
7313	3012	0.640835	0.207046	0.009041		0.079752	1.076849	0.016927		0.012146	0.211979	0.484917
7314	3013	0.703522	0.180963	0.010034		0.100898	1.188107	0.018856		0.013483	0.187346	0.521259
7315	3014	0.628787	0.231773	0.008753		0.067672	1.039001	0.016225		0.011753	0.214119	0.484777
7316	3015	0.641305	0.212288	0.009765		0.083264	1.061531	0.015348		0.012381	0.205899	0.484804
7317	3016	0.70399	0.189344	0.010869		0.105118	1.171554	0.017129		0.014186	0.180008	0.521136
7318	3017	0.6293	0.235041	0.009419		0.070871	1.024309	0.014659		0.011935	0.209902	0.484666
7319	3018	0.663178	0.223754	0.011017		0.089634	1.077424	0.014		0.013059	0.203521	0.500874
7320	3019	0.727952	0.203546	0.012286		0.11294	1.190991	0.01567		0.015373	0.175595	0.538417
7321	3020	0.650821	0.245786	0.01065		0.076516	1.042721	0.013337		0.012529	0.209697	0.50073
7322	3021	0.642305	0.22261	0.012107		0.090403	1.018933	0.011478		0.01312	0.185286	0.484652
7323	3022	0.70499	0.204085	0.013671		0.113701	1.129817	0.012988		0.015596	0.160971	0.520988
7324	3023	0.630393	0.239523	0.011567		0.077385	0.992134	0.010828		0.012333	0.193095	0.484508
7325	3024	0.471358	0.166427	0.009884		0.068605	0.730752	0.008252		0.010015	0.131831	0.355384
7326	3025	0.51733	0.153479	0.011167		0.08617	0.81309	0.009359		0.01187	0.125161	0.382036
7327	3026	0.46265	0.177049	0.009457		0.058848	0.716171	0.00776		0.009176	0.134555	0.355277
7328	3027	0.525133	0.186984	0.011655		0.077851	0.803262	0.009113		0.011389	0.148754	0.395757
7329	3028	0.576335	0.172962	0.013157		0.097721	0.895636	0.010402		0.013472	0.141684	0.425439
7330	3029	0.51545	0.198322	0.011329		0.066845	0.790033	0.008528		0.010443	0.149716	0.395636
7331	3030	0.707898	0.255112	0.018316		0.108816	1.05354	0.012351		0.015934	0.198607	0.533043
7332	3031	0.776888	0.237316	0.020107		0.136461	1.17964	0.014228		0.018783	0.18863	0.573022
7333	3032	0.69489	0.269076	0.017843		0.093588	1.042125	0.011472		0.014677	0.199612	0.532881
7334	3033	0.708456	0.256238	0.021529		0.112665	1.031466	0.013094		0.016451	0.18729	0.533044
7335	3034	0.777481	0.239511	0.02366		0.141219	1.153974	0.015222		0.019329	0.175086	0.573012
7336	3035	0.695471	0.269008	0.020949		0.097006	1.018631	0.012161		0.015208	0.190795	0.532888
7337	3036	0.708988	0.254693	0.025375		0.116381	1.007825	0.016537		0.016893	0.170209	0.533068
7338	3037	0.778059	0.239077	0.02793		0.145874	1.128129	0.018969		0.019806	0.154427	0.57302
7339	3038	0.696015	0.266386	0.024656		0.100265	0.993549	0.015557		0.015662	0.178251	0.53292
7340	3039	0.70949	0.249871	0.029928		0.119933	0.982545	0.021282		0.017277	0.164396	0.533124
7341	3040	0.778617	0.235492	0.033011		0.150393	1.099962	0.024024		0.020223	0.146134	0.57306
7342	3041	0.696521	0.260608	0.029029		0.103336	0.966829	0.020322		0.016044	0.172039	0.532985
7343	3042	0.709961	0.241228	0.035263		0.123286	0.955521	0.028129		0.017611	0.158258	0.533225
7344	3043	0.779151	0.228244	0.03899		0.154734	1.067797	0.031594		0.020603	0.137643	0.573152
7345	3044	0.696991	0.251109	0.034133		0.106183	0.938396	0.026951		0.016367	0.1688	0.533089
7346	3045	0.710406	0.228373	0.041453		0.126403	0.926571	0.035957		0.017894	0.149908	0.533382
7347	3046	0.779662	0.217014	0.045957		0.158859	1.031616	0.040234		0.020937	0.127654	0.573318
7348	3047	0.697428	0.238238	0.040035		0.109085	0.908098	0.034546		0.016642	0.16257	0.533242
7349	3048	0.710833	0.21366	0.04857		0.129259	0.896772	0.044921		0.018111	0.13799	0.533602
7350	3049	0.780153	0.202814	0.053994		0.162733	0.993267	0.050134		0.021188	0.115498	0.57357
7351	3050	0.697843	0.224595	0.046796		0.111713	0.875708	0.043223		0.016866	0.151402	0.533448
7352	3051	0.711259	0.195657	0.056681		0.131897	0.865303	0.055195		0.018238	0.121887	0.533886

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7353	3052	0.780636	0.187122	0.063187		0.166323	0.955539	0.061529		0.021317	0.100988	0.573909
7354	3053	0.698252	0.205396	0.054485		0.114036	0.841007	0.053128		0.017031	0.134411	0.533708
7355	3054	0.776408	0.187684	0.071866		0.146692	0.907059	0.073108		0.019915	0.111518	0.582791
7356	3055	0.852148	0.181536	0.08032		0.185039	1.004303	0.081491		0.023463	0.096624	0.626531
7357	3056	0.762196	0.196807	0.068914		0.126648	0.878843	0.07029		0.018665	0.122534	0.582562
7358	3057	0.809456	0.156813	0.088929		0.155933	0.896471	0.094705		0.020565	0.087139	0.607598
7359	3058	0.888385	0.15505	0.099652		0.196717	1.003698	0.105687		0.024529	0.085567	0.653267
7360	3059	0.794618	0.164076	0.085066		0.134427	0.867018	0.090822		0.019399	0.09379	0.607312
7361	3060	0.777839	0.121847	0.099631		0.152251	0.817528	0.110679		0.01939	0.058711	0.583814
7362	3061	0.853599	0.127503	0.111762		0.191944	0.931863	0.123679		0.023417	0.067344	0.627746
7363	3062	0.763586	0.127816	0.095153		0.131216	0.788982	0.10584		0.018437	0.060435	0.583501
7364	3063	0.778786	0.103198	0.115919		0.154675	0.792619	0.134018		0.018855	0.045457	0.584406
7365	3064	0.854482	0.117941	0.129906		0.194626	0.900133	0.149919		0.023068	0.053536	0.628397
7366	3065	0.764573	0.103164	0.110721		0.133499	0.750931	0.12792		0.018138	0.04223	0.584068
7367	3265	0.782547	0.117888	0.105097		0.05697	0.801657	0.12024		0.024464	0.046157	0.610682
7368	3266	0.887474	0.180503	0.10011		0.063855	0.982807	0.106662		0.027317	0.087902	0.693268
7369	3267	0.755492	0.192651	0.071188		0.053628	0.899966	0.069764		0.022828	0.105778	0.590625
7370	3268	0.54607	0.161277	0.045126		0.038374	0.681234	0.041086		0.016269	0.092149	0.427105
7371	3269	0.428878	0.138879	0.032126		0.029911	0.552162	0.027287		0.012638	0.081208	0.335553
7372	3270	0.567946	0.197097	0.039369		0.039355	0.749165	0.031134		0.016577	0.116535	0.44447
7373	3271	0.773511	0.300538	0.04616		0.052895	1.064081	0.030494		0.022135	0.178446	0.605622
7374	3272	0.717456	0.306041	0.036375		0.048294	1.026648	0.017884		0.020059	0.179837	0.561982
7375	3274	0.633741	0.285442	0.028234		0.042054	0.933778	0.009578		0.017362	0.166203	0.496594
7376	3276	0.633453	0.297017	0.024799		0.041378	0.959331	0.009828		0.016988	0.172143	0.496557
7377	3278	0.633167	0.306038	0.021815		0.040656	0.983406	0.010546		0.016613	0.177541	0.496521
7378	3280	0.56071	0.278021	0.01702		0.035343	0.891329	0.009869		0.014389	0.165592	0.439859
7379	3282	0.438421	0.221566	0.012306		0.027215	0.708613	0.007972		0.011058	0.138332	0.344018
7380	3284	0.48823	0.250629	0.013072		0.029923	0.799018	0.009457		0.012143	0.160535	0.383178
7381	3286	0.576748	0.303545	0.01432		0.034632	0.960792	0.014066		0.014035	0.197609	0.452779
7382	3288	0.565415	0.304972	0.012971		0.033247	0.956987	0.016258		0.01346	0.196527	0.443996
7383	3290	0.543005	0.299855	0.011427		0.031224	0.932783	0.017769		0.012648	0.187486	0.4265
7384	3292	0.520628	0.293125	0.010037		0.029292	0.90589	0.018771		0.011829	0.176514	0.409006
7385	3294	0.548092	0.313692	0.0096		0.030138	0.965304	0.021429		0.012145	0.181755	0.43066
7386	3296	0.575501	0.334241	0.008963		0.030811	1.02649	0.024251		0.012374	0.187	0.452277
7387	3298	0.652656	0.383575	0.008919		0.033993	1.178062	0.029272		0.01358	0.210065	0.512988
7388	3300	0.729633	0.434641	0.008269		0.036767	1.335731	0.0349		0.014496	0.235726	0.573573
7389	3302	0.646307	0.390615	0.006428		0.031425	1.198637	0.032516		0.012195	0.211456	0.508265
7390	3304	0.563169	0.344665	0.005776		0.026585	1.05414	0.029347		0.010169	0.185766	0.443044
7391	3306	0.60152	0.372987	0.006365		0.027517	1.135653	0.032284		0.010356	0.199167	0.473345
7392	3308	0.70598	0.443774	0.007673		0.031088	1.345024	0.038949		0.011458	0.234119	0.555678
7393	3309	0.771658	0.490572	0.008567		0.032329	1.485008	0.043717		0.012015	0.258127	0.607514
7394	3310	0.749133	0.477668	0.008406		0.029723	1.454861	0.04333		0.011326	0.257272	0.589912
7395	3311	0.726677	0.46125	0.008173		0.027519	1.422198	0.042672		0.010645	0.259141	0.572369
7396	3312	0.715269	0.449955	0.008017		0.025877	1.409454	0.042467		0.010187	0.263858	0.563557
7397	3313	0.560917	0.349441	0.006236		0.019359	1.111601	0.033514		0.007901	0.209174	0.442117
7398	3314	0.571745	0.35426	0.006315		0.019162	1.136365	0.03422		0.007983	0.211365	0.450776
7399	3315	0.725317	0.445372	0.007896		0.023045	1.447752	0.043394		0.009925	0.256534	0.572172
7400	3316	0.724973	0.440168	0.007744		0.021762	1.451852	0.043174		0.009654	0.242619	0.572258
7401	3317	0.724648	0.432188	0.007555		0.020472	1.454705	0.042808		0.009322	0.238371	0.572378
7402	3318	0.724341	0.42011	0.007326		0.019168	1.456357	0.042312		0.009003	0.234978	0.572509
7403	3319	0.641769	0.358101	0.00625		0.015812	1.291195	0.036953		0.008697	0.206597	0.507569
7404	3320	0.559324	0.301658	0.005283		0.012977	1.125123	0.031775		0.008184	0.179687	0.442577
7405	3321	0.641395	0.338864	0.005962		0.01394	1.289114	0.03587		0.009962	0.206034	0.50776
7406	3322	0.723376	0.373682	0.006544		0.014319	1.45067	0.039503		0.011849	0.237241	0.573024
7407	3323	0.723147	0.365494	0.006921		0.014673	1.445143	0.038418		0.012175	0.238693	0.573229
7408	3324	0.722943	0.357612	0.007218		0.016742	1.437888	0.037263		0.012226	0.235617	0.573478
7409	3325	0.722764	0.349459	0.007338		0.01887	1.429099	0.036081		0.01205	0.231074	0.573767
7410	3326	0.711669	0.335355	0.007305		0.020741	1.397489	0.034375		0.011546	0.225648	0.565385
7411	3327	0.558297	0.25775	0.005798		0.01796	1.088049	0.026093		0.008758	0.174437	0.443849
7412	3328	0.569206	0.262629	0.006106		0.019357	1.103895	0.026071		0.008736	0.175394	0.452687
7413	3329	0.722405	0.33272	0.008329		0.027063	1.388054	0.031889		0.01064	0.214797	0.574808
7414	3330	0.722406	0.331983	0.008865		0.029792	1.373869	0.030608		0.010166	0.204435	0.574941
7415	3331	0.722467	0.331329	0.009382		0.032604	1.358605	0.029225		0.00966	0.199753	0.574913
7416	3332	0.722593	0.330846	0.009725		0.0355	1.342447	0.028413		0.01007	0.209085	0.5747
7417	3333	0.640653	0.292869	0.008778		0.034111	1.17502	0.024514		0.009465	0.191665	0.50904
7418	3334	0.558674	0.254959	0.007679		0.031572	1.014182	0.020867		0.008585	0.169554	0.443492
7419	3335	0.641053	0.291771	0.008771		0.038379	1.151534	0.023297		0.010196	0.19545	0.508614
7420	3336	0.723639	0.327708	0.009745		0.046567	1.281808	0.025242		0.011952	0.219638	0.573657
7421	3337	0.559549	0.25156	0.007352		0.038606	0.976947	0.018583		0.009532	0.168483	0.443143
7422	3338	0.362211	0.16181	0.004681		0.025933	0.627319	0.011665		0.006258	0.111391	0.28669

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7423	3339	0.494106	0.219239	0.006292		0.036466	0.849897	0.015469		0.008626	0.153457	0.390884
7424	3340	0.659334	0.288289	0.008115		0.05162	1.118113	0.019359		0.011719	0.202937	0.521031
7425	3341	0.659903	0.283888	0.008363		0.054678	1.102589	0.017939		0.011909	0.198976	0.52089
7426	3342	0.660511	0.278885	0.008972		0.057786	1.086566	0.016351		0.012071	0.199015	0.520761
7427	3343	0.661148	0.277091	0.009629		0.060918	1.069995	0.014689		0.012219	0.197219	0.520648
7428	3344	0.683862	0.28483	0.010907		0.066177	1.087909	0.013316		0.012774	0.199464	0.537905
7429	3345	0.662504	0.274051	0.01175		0.067323	1.033691	0.010692		0.012516	0.186065	0.520477
7430	3346	0.486276	0.199679	0.009747		0.051415	0.745213	0.007605		0.009274	0.130842	0.38165
7431	3347	0.541808	0.22131	0.011684		0.058526	0.821454	0.00831		0.010385	0.14192	0.425006
7432	3348	0.730509	0.29413	0.018387		0.082265	1.081853	0.011087		0.014323	0.187955	0.57244
7433	3349	0.731183	0.29006	0.02157		0.08598	1.055781	0.011869		0.014928	0.181651	0.572451
7434	3350	0.731806	0.284978	0.025349		0.089484	1.028171	0.015438		0.015432	0.174258	0.57249
7435	3351	0.732377	0.277625	0.02979		0.092762	0.998998	0.020527		0.01584	0.167985	0.57256
7436	3352	0.7329	0.271418	0.034957		0.095794	0.968216	0.027332		0.016173	0.167744	0.572668
7437	3353	0.733381	0.261125	0.040906		0.098563	0.93571	0.035149		0.016461	0.163858	0.572819
7438	3354	0.733826	0.246069	0.047702		0.101056	0.901288	0.044067		0.016728	0.153834	0.573022
7439	3355	0.73425	0.225604	0.055396		0.103278	0.864758	0.054152		0.016973	0.136688	0.573275
7440	3356	0.801462	0.217582	0.069893		0.114824	0.901187	0.071501		0.018738	0.123614	0.625719
7441	3357	0.835482	0.190655	0.086001		0.121975	0.886749	0.091949		0.019688	0.092125	0.652254
7442	3358	0.802758	0.148678	0.095912		0.119023	0.808036	0.106534		0.018966	0.056413	0.626633
7443	3359	0.803744	0.116047	0.111395		0.120952	0.768506	0.128111		0.018998	0.042828	0.627195
7444	3360	0.868771	0.127394	0.125657		0.165847	0.961802	0.147988		0.029858	0.057111	0.611108
7445	3361	0.985475	0.151226	0.118971		0.183646	1.149607	0.128903		0.03336	0.083047	0.694027
7446	3362	0.838754	0.140362	0.083394		0.151776	1.024735	0.081882		0.02795	0.084354	0.591501
7447	3363	0.606061	0.106759	0.052132		0.10712	0.763057	0.047057		0.019988	0.066995	0.427858
7448	3364	0.475836	0.087035	0.036596		0.082526	0.612373	0.030586		0.015594	0.055844	0.336224
7449	3365	0.629925	0.11869	0.044666		0.10746	0.825385	0.034096		0.020532	0.07801	0.445446
7450	3366	0.857346	0.172717	0.052087		0.141489	1.161619	0.031791		0.027557	0.12848	0.607162
7451	3367	0.79457	0.170498	0.04099		0.126205	1.113045	0.017428		0.02513	0.134144	0.563542
7452	3368	0.701375	0.155467	0.031891		0.107831	1.006799	0.009902		0.021938	0.124466	0.498029
7453	3369	0.700545	0.158236	0.028166		0.104069	1.028349	0.011144		0.021626	0.127291	0.498024
7454	3370	0.699711	0.15947	0.025943		0.100293	1.047534	0.012253		0.021212	0.128003	0.497949
7455	3371	0.619191	0.141537	0.021748		0.085461	0.943507	0.011684		0.018406	0.112608	0.441029
7456	3372	0.483884	0.110594	0.016199		0.064752	0.746852	0.009541		0.014185	0.086884	0.344853
7457	3373	0.53863	0.122949	0.017318		0.070238	0.839702	0.011769		0.015635	0.095181	0.384045
7458	3374	0.635871	0.144592	0.019155		0.079634	1.006315	0.017093		0.018132	0.108697	0.453719
7459	3375	0.622992	0.140885	0.017423		0.074922	1.000133	0.019452		0.017409	0.103933	0.444834
7460	3376	0.59795	0.134156	0.015308		0.068894	0.973383	0.021028		0.016348	0.100198	0.427226
7461	3377	0.573029	0.127246	0.013297		0.063291	0.944634	0.022045		0.015357	0.096998	0.409628
7462	3378	0.602987	0.132048	0.01249		0.063651	1.006955	0.025082		0.015849	0.103545	0.431254
7463	3379	0.63282	0.137525	0.011371		0.063371	1.070514	0.028405		0.01622	0.110837	0.452866
7464	3380	0.717292	0.156315	0.010955		0.068309	1.227386	0.034317		0.017859	0.13165	0.513629
7465	3381	0.801392	0.175627	0.010745		0.071452	1.389395	0.040937		0.019191	0.16186	0.574238
7466	3382	0.70948	0.157779	0.008754		0.058827	1.245897	0.038155		0.016363	0.153521	0.509013
7467	3383	0.61795	0.14015	0.007945		0.048226	1.096497	0.034328		0.013817	0.136521	0.443713
7468	3384	0.659742	0.153541	0.008739		0.048278	1.183454	0.037709		0.014245	0.144379	0.474021
7469	3385	0.773923	0.186043	0.01047		0.052287	1.405651	0.045282		0.01603	0.162331	0.556316
7470	3386	0.84544	0.210265	0.011598		0.051209	1.55687	0.050451		0.016684	0.173066	0.607881
7471	3387	0.8203	0.208037	0.011257		0.044716	1.527215	0.049784		0.015373	0.177165	0.589899
7472	3388	0.795289	0.202391	0.010835		0.039246	1.49108	0.048918		0.014065	0.178406	0.572057
7473	3389	0.782372	0.197592	0.010552		0.034521	1.473202	0.048621		0.013017	0.180336	0.563063
7474	3390	0.613194	0.152722	0.008173		0.023866	1.158026	0.038443		0.009643	0.143767	0.441713
7475	3391	0.624813	0.154062	0.00826		0.022385	1.181979	0.03936		0.009551	0.147451	0.450425
7476	3392	0.792167	0.191823	0.010313		0.025407	1.503462	0.050192		0.011681	0.188338	0.572004
7477	3393	0.791301	0.189199	0.010139		0.023424	1.507323	0.050105		0.011162	0.188883	0.572495
7478	3394	0.790407	0.184278	0.009958		0.021131	1.511008	0.049789		0.010542	0.188352	0.573069
7479	3395	0.789512	0.176482	0.009922		0.019919	1.513428	0.049362		0.009851	0.187213	0.57359
7480	3396	0.699058	0.147439	0.00883		0.018754	1.341744	0.043121		0.008083	0.165689	0.508695
7481	3397	0.608943	0.121849	0.007573		0.017188	1.168851	0.036964		0.006662	0.144078	0.443552
7482	3398	0.69791	0.132304	0.008403		0.023053	1.339079	0.041531		0.007561	0.164829	0.508789
7483	3399	0.786521	0.139849	0.009857		0.030882	1.507991	0.045506		0.008561	0.185328	0.574017
7484	3400	0.78573	0.132772	0.01066		0.035678	1.505063	0.044049		0.008539	0.184632	0.574031
7485	3401	0.785041	0.129432	0.011122		0.040453	1.501386	0.042448		0.008507	0.183335	0.5741
7486	3402	0.785097	0.126158	0.011328		0.045713	1.496147	0.040834		0.008516	0.180226	0.574332
7487	3403	0.773281	0.12079	0.011506		0.05023	1.466301	0.038764		0.008855	0.17483	0.566081
7488	3404	0.606818	0.092038	0.009214		0.043337	1.143643	0.029317		0.007277	0.133329	0.444544
7489	3405	0.618783	0.092262	0.009642		0.046565	1.161596	0.029196		0.007609	0.132971	0.453476
7490	3406	0.785582	0.117419	0.013036		0.064411	1.464698	0.035403		0.010102	0.161235	0.575926
7491	3407	0.785816	0.12037	0.013913		0.069798	1.456582	0.033902		0.010547	0.154948	0.576185
7492	3408	0.786073	0.123219	0.014507		0.075233	1.450247	0.033305		0.010927	0.159142	0.576217

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7493	3409	0.786369	0.125638	0.014675		0.080734	1.444443	0.032666		0.011275	0.157835	0.575909
7494	3410	0.697327	0.112668	0.012851		0.076508	1.273785	0.028309		0.010307	0.135487	0.509927
7495	3411	0.608147	0.098418	0.010992		0.07006	1.104319	0.024164		0.00926	0.114361	0.444399
7496	3412	0.697841	0.112872	0.012268		0.084237	1.257445	0.027022		0.010972	0.126745	0.509613
7497	3413	0.787714	0.127899	0.013139		0.100721	1.401669	0.029305		0.012887	0.13615	0.574694
7498	3414	0.609038	0.098285	0.010136		0.082249	1.068103	0.02157		0.010399	0.09904	0.443865
7499	3415	0.394208	0.06312	0.006502		0.05478	0.685703	0.01353		0.006862	0.063667	0.287129
7500	3416	0.537704	0.085939	0.008774		0.076478	0.928927	0.017932		0.009622	0.086163	0.391455
7501	3417	0.717337	0.118768	0.011322		0.106709	1.222501	0.02244		0.013588	0.114713	0.521732
7502	3418	0.71775	0.124294	0.010744		0.111444	1.206893	0.020831		0.01431	0.113335	0.521547
7503	3419	0.718177	0.131728	0.010418		0.116162	1.191198	0.019237		0.014972	0.109806	0.52139
7504	3420	0.718614	0.138848	0.0112		0.120854	1.174678	0.017509		0.015602	0.105368	0.521271
7505	3421	0.743039	0.150149	0.012812		0.129709	1.195441	0.016065		0.016904	0.112861	0.538558
7506	3422	0.719565	0.151228	0.014324		0.130458	1.136617	0.013476		0.017148	0.120395	0.521144
7507	3423	0.528007	0.114158	0.011717		0.098804	0.820143	0.009754		0.012984	0.093601	0.382165
7508	3424	0.588217	0.12895	0.013795		0.112014	0.904849	0.010881		0.014693	0.105835	0.425589
7509	3425	0.792891	0.177782	0.020589		0.156377	1.195593	0.015036		0.020465	0.140159	0.573222
7510	3426	0.793493	0.18009	0.023992		0.161839	1.172742	0.016391		0.021116	0.128836	0.573196
7511	3427	0.794105	0.180505	0.028376		0.167241	1.149147	0.020198		0.021572	0.113358	0.573179
7512	3428	0.794711	0.178979	0.033582		0.172549	1.123259	0.025186		0.021956	0.11327	0.573188
7513	3429	0.795306	0.174894	0.039742		0.177734	1.094029	0.0329		0.02251	0.110598	0.573252
7514	3430	0.795879	0.167788	0.046986		0.182745	1.061692	0.041687		0.023155	0.10501	0.573401
7515	3431	0.79644	0.158013	0.055343		0.187552	1.027773	0.05176		0.023611	0.097132	0.573666
7516	3432	0.796973	0.148228	0.064897		0.19211	0.994288	0.063364		0.023981	0.089077	0.574043
7517	3433	0.869979	0.147737	0.082682		0.214207	1.050168	0.0838		0.026515	0.088363	0.626735
7518	3434	0.906909	0.139898	0.102819		0.228283	1.053932	0.108591		0.027863	0.079861	0.653546
7519	3435	0.871251	0.137788	0.115408		0.223073	0.976279	0.127046		0.026752	0.065615	0.628062
7520	3436	0.871903	0.144822	0.133977		0.226247	0.942619	0.15406		0.026609	0.055578	0.628726
7521	3498	0.309746	0.012182	0.031915		0.004515	0.303993	0.040758		0.006929	0.010202	0.265786
7522	3499	0.262281	0.013082	0.029308		0.004286	0.26093	0.036562		0.006224	0.009654	0.221693
7523	3500	0.424135	0.024249	0.049644		0.007445	0.425631	0.061063		0.010474	0.016738	0.354901
7524	3501	0.657048	0.051401	0.085836		0.013803	0.689782	0.101719		0.017861	0.031803	0.533046
7525	3502	0.678437	0.064747	0.095753		0.016174	0.740359	0.11007		0.019887	0.039687	0.533487
7526	3503	0.65594	0.070587	0.097003		0.017176	0.732944	0.108891		0.019657	0.043987	0.496646
7527	3504	0.681452	0.076901	0.102855		0.019096	0.771558	0.113551		0.019709	0.04928	0.496696
7528	3505	0.764058	0.086313	0.116702		0.022871	0.877855	0.126899		0.019657	0.058603	0.533773
7529	3506	0.795748	0.084962	0.121737		0.025096	0.92184	0.130914		0.016511	0.063863	0.533861
7530	3507	0.798765	0.076023	0.121163		0.026152	0.928043	0.129452		0.011836	0.065567	0.515398
7531	3508	0.82618	0.066779	0.123228		0.027694	0.959197	0.131471		0.011365	0.068204	0.514728
7532	3509	0.869183	0.056059	0.12568		0.029459	1.006721	0.135029		0.012311	0.072114	0.52241
7533	3510	0.820862	0.040313	0.114713		0.028486	0.94913	0.125063		0.012267	0.06494	0.476435
7534	3511	0.815267	0.047015	0.102611		0.029369	0.974495	0.116325		0.012375	0.071255	0.471465
7535	3512	0.608163	0.040134	0.067216		0.022257	0.748133	0.079702		0.009206	0.057269	0.352171
7536	3513	0.44487	0.030945	0.045956		0.016358	0.554426	0.055803		0.006716	0.043463	0.257927
7537	3514	0.685496	0.050356	0.06499		0.025305	0.867026	0.081176		0.010269	0.070142	0.398283
7538	3515	0.882453	0.069711	0.071139		0.032718	1.143708	0.093232		0.013001	0.096989	0.515326
7539	3516	0.778254	0.064573	0.052787		0.028875	1.030291	0.072355		0.01133	0.092406	0.457332
7540	3517	0.67594	0.057582	0.039772		0.025063	0.90804	0.056304		0.009765	0.086131	0.399218
7541	3518	0.772497	0.066731	0.039121		0.028945	1.052027	0.057181		0.011042	0.104904	0.458441
7542	3519	0.867541	0.074687	0.035839		0.03322	1.201348	0.054805		0.012248	0.126342	0.517789
7543	3520	0.863772	0.072511	0.028639		0.033521	1.215314	0.046483		0.012089	0.133636	0.517934
7544	3521	0.860196	0.070689	0.022454		0.033672	1.228836	0.039872		0.011965	0.140749	0.517506
7545	3522	0.856744	0.068232	0.017177		0.033778	1.241728	0.034555		0.011858	0.146811	0.517027
7546	3523	0.672448	0.051589	0.010142		0.026588	0.98746	0.024453		0.009283	0.119063	0.407173
7547	3524	0.658146	0.052286	0.009816		0.025989	0.972872	0.022552		0.009075	0.118247	0.399203
7548	3525	0.836007	0.071149	0.011894		0.032928	1.247557	0.028533		0.011515	0.153107	0.508445
7549	3526	0.846061	0.078155	0.0111		0.033299	1.272158	0.030431		0.011655	0.156508	0.516798
7550	3527	0.843433	0.084048	0.010546		0.033167	1.275027	0.031545		0.011621	0.155892	0.517731
7551	3528	0.841026	0.088676	0.011105		0.033001	1.277514	0.032391		0.011576	0.155944	0.518048
7552	3529	0.83879	0.092097	0.010814		0.032847	1.278987	0.033065		0.01153	0.161154	0.518605
7553	3530	0.741573	0.084316	0.010258		0.029247	1.13416	0.02974		0.010344	0.147761	0.460752
7554	3531	0.645305	0.075081	0.009403		0.025659	0.988871	0.02612		0.009196	0.131449	0.402631
7555	3532	0.738924	0.087136	0.010842		0.029576	1.134139	0.030162		0.010657	0.153358	0.462797
7556	3533	0.831937	0.098987	0.01133		0.033607	1.278675	0.034347		0.012139	0.176384	0.523014
7557	3534	0.830322	0.09832	0.010315		0.03394	1.277097	0.034599		0.012277	0.178532	0.523719
7558	3535	0.828864	0.09597	0.009303		0.034292	1.274667	0.03467		0.012352	0.179184	0.524685
7559	3536	0.827549	0.092734	0.010156		0.034596	1.270944	0.034596		0.012336	0.183319	0.525479
7560	3537	0.651098	0.071428	0.008548		0.027509	0.997201	0.027143		0.009661	0.148207	0.414157
7561	3538	0.638095	0.068796	0.008903		0.027154	0.9754	0.026533		0.009431	0.147125	0.406185
7562	3539	0.812311	0.085883	0.013243		0.034994	1.237608	0.033538		0.011891	0.189641	0.517951

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7563	3540	0.823891	0.087398	0.015982		0.035893	1.251089	0.033838		0.01194	0.193106	0.526151
7564	3541	0.848044	0.091661	0.01812		0.037356	1.283201	0.034878		0.012137	0.198637	0.54191
7565	3542	0.872286	0.097386	0.019794		0.038925	1.3147	0.03607		0.012228	0.201736	0.557809
7566	3543	0.797021	0.090239	0.018927		0.036021	1.196088	0.033125		0.010911	0.179152	0.510582
7567	3544	0.678392	0.076721	0.016372		0.030949	1.013721	0.028327		0.009176	0.148058	0.43522
7568	3545	0.634622	0.071514	0.015584		0.029185	0.943947	0.026629		0.008621	0.138676	0.407373
7569	3546	0.727807	0.08354	0.018393		0.033761	1.076813	0.030679		0.009891	0.158551	0.467204
7570	3547	0.821002	0.096888	0.021399		0.038506	1.205916	0.034712		0.011163	0.175283	0.527118
7571	3548	0.733848	0.087975	0.019229		0.03476	1.070037	0.031107		0.009999	0.150629	0.470875
7572	3549	0.646776	0.077937	0.016483		0.030862	0.937415	0.027506		0.008828	0.129506	0.414296
7573	3550	0.615735	0.074057	0.014926		0.029668	0.886655	0.026261		0.008417	0.120662	0.39347
7574	3551	0.584717	0.069726	0.013712		0.028406	0.836661	0.024935		0.008012	0.111973	0.372909
7575	3552	0.609708	0.071637	0.0138		0.029842	0.866277	0.025908		0.008383	0.113791	0.388698
7576	3553	0.634733	0.072985	0.013594		0.031299	0.895122	0.026774		0.008758	0.115218	0.404811
7577	3554	0.647361	0.073054	0.012825		0.032131	0.906131	0.026998		0.008979	0.114456	0.412768
7578	3555	0.547952	0.060768	0.011081		0.02736	0.759873	0.02247		0.007665	0.094215	0.349142
7579	3556	0.492033	0.053703	0.01061		0.024656	0.677729	0.019879		0.006925	0.082846	0.313392
7580	3557	0.629259	0.066988	0.014821		0.031698	0.859002	0.024844		0.008928	0.102781	0.400647
7581	3558	0.710567	0.075977	0.018745		0.036065	0.958369	0.027071		0.010167	0.110957	0.452026
7582	3559	0.710907	0.077662	0.021009		0.03633	0.946951	0.025982		0.010252	0.105501	0.451542
7583	3560	0.711232	0.078361	0.023533		0.03658	0.935002	0.02475		0.010347	0.099407	0.450936
7584	3561	0.805191	0.088038	0.029867		0.041648	1.043243	0.026386		0.011826	0.104977	0.509759
7585	3562	0.868119	0.09192	0.037067		0.045207	1.100623	0.025908		0.012908	0.103286	0.548547
7586	3563	0.637412	0.064146	0.03084		0.033371	0.788286	0.017127		0.009596	0.068599	0.401745
7587	3564	0.481321	0.046703	0.024845		0.025267	0.586441	0.012152		0.007293	0.048757	0.302911
7588	3565	0.612802	0.056298	0.034398		0.032259	0.732241	0.014216		0.009357	0.057168	0.384976
7589	3566	0.847717	0.071172	0.053487		0.044757	0.984826	0.017374		0.013063	0.069771	0.531165
7590	3567	0.995507	0.073291	0.072483		0.052707	1.107969	0.016865		0.015491	0.069692	0.621001
7591	3568	0.877298	0.061476	0.071833		0.046566	0.933766	0.012077		0.013738	0.054233	0.544667
7592	3569	0.758893	0.051045	0.068472		0.040345	0.780333	0.008873		0.01193	0.04296	0.469391
7593	3570	0.815347	0.053776	0.074491		0.041487	0.836339	0.009698		0.013045	0.04429	0.515862
7594	3571	0.785478	0.050338	0.072252		0.038787	0.805475	0.009377		0.014914	0.039665	0.51007
7595	3572	0.767035	0.050023	0.070657		0.036736	0.787114	0.009033		0.016529	0.039255	0.511292
7596	3573	0.771214	0.056271	0.070793		0.035605	0.791856	0.008805		0.018729	0.040238	0.529744
7597	3574	0.746562	0.058978	0.067895		0.032994	0.767864	0.008133		0.019178	0.038292	0.529505
7598	3575	13.42326	1.121208	1.202405		0.562921	13.88674	0.165284		0.397058	0.668728	9.84784
7599	3576	0.654634	0.058879	0.056828		0.025641	0.66533	0.006956		0.015227	0.029671	0.492089
7600	3577	0.684669	0.061619	0.0566		0.024551	0.677079	0.006928		0.012662	0.0275	0.528272
7601	3578	0.665586	0.055403	0.051592		0.021353	0.639223	0.006583		0.010172	0.02203	0.527755
7602	3579	0.431048	0.0305	0.030671		0.012034	0.407845	0.004449		0.008623	0.01158	0.352874
7603	3580	9.089053	0.597767	0.62377		0.242113	8.555326	0.098537		0.223185	0.312675	7.520175
7604	3581	0.315186	0.016333	0.020165		0.007509	0.29292	0.003366		0.006193	0.006931	0.264739
7605	3583	0.3081	0.028627	0.017341		0.007835	0.294811	0.003061		0.005594	0.009551	0.255171
7606	3584	0.497998	0.052457	0.029429		0.013458	0.482292	0.00517		0.00864	0.01792	0.40813
7607	3585	0.36417	0.026463	0.018792		0.008397	0.342115	0.003722		0.00717	0.009272	0.306488
7608	3586	0.349281	0.036523	0.015679		0.00859	0.338534	0.003845		0.005338	0.019017	0.290321
7609	3587	0.564452	0.068196	0.026715		0.014684	0.558197	0.006329		0.008413	0.036072	0.464274
7610	3588	0.4127	0.032802	0.016876		0.009214	0.389467	0.004365		0.006272	0.017333	0.348583
7611	3589	0.297245	0.031637	0.010951		0.007129	0.28969	0.003874		0.004129	0.0217	0.24806
7612	3590	0.480397	0.060607	0.018659		0.01218	0.489174	0.006338		0.00685	0.042162	0.396735
7613	3591	0.351274	0.027209	0.011844		0.007691	0.32983	0.004702		0.004634	0.018411	0.297852
7614	3592	0.214893	0.022803	0.006948		0.005103	0.211033	0.003358		0.002939	0.017533	0.179845
7615	3593	0.347245	0.043923	0.011809		0.008699	0.358647	0.005509		0.004888	0.034703	0.287624
7616	3594	0.253966	0.019392	0.00756		0.005526	0.236524	0.004258		0.003275	0.014368	0.215906
7617	3595	0.168832	0.017765	0.004941		0.003991	0.166406	0.002994		0.002298	0.014752	0.141633
7618	3596	0.272783	0.034762	0.008387		0.006794	0.284005	0.004963		0.003831	0.029374	0.226607
7619	3597	0.199551	0.015011	0.005408		0.004334	0.186749	0.003919		0.00254	0.011855	0.170045
7620	3598	8.997605	0.996443	0.24409		0.21208	8.890745	0.193068		0.125798	0.881827	7.579703
7621	3599	0.361238	0.048467	0.010316		0.00895	0.378006	0.007194		0.004989	0.043251	0.300922
7622	3601	0.26426	0.020211	0.00647		0.005715	0.248954	0.005808		0.003343	0.017243	0.225673
7623	3602	0.304323	0.035799	0.006816		0.007062	0.300248	0.006366		0.003934	0.033812	0.256043
7624	3603	0.491808	0.07079	0.011876		0.012031	0.516761	0.010412		0.006504	0.067721	0.409726
7625	3604	0.359877	0.029086	0.007098		0.007679	0.335331	0.008418		0.004514	0.026745	0.307503
7626	3605	0.28215	0.034831	0.00531		0.006444	0.279302	0.006375		0.003503	0.034933	0.237942
7627	3606	0.455834	0.068946	0.009255		0.010975	0.480934	0.010409		0.005779	0.069944	0.380565
7628	3607	0.333536	0.028381	0.005441		0.007051	0.311206	0.007891		0.003955	0.02773	0.285585
7629	3608	0.24912	0.031382	0.004263		0.005647	0.24833	0.005862		0.002948	0.033023	0.210513
7630	3609	0.402545	0.062186	0.007417		0.009583	0.425656	0.009591		0.004885	0.066038	0.336732
7631	3610	0.294503	0.025591	0.004395		0.006196	0.276698	0.00698		0.003333	0.026401	0.252714
7632	3611	0.248988	0.031448	0.004043		0.005652	0.248565	0.006045		0.002785	0.034833	0.210778

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7633	3612	0.402319	0.062497	0.00693		0.009575	0.425104	0.009886		0.004619	0.069586	0.337147
7634	3613	0.29431	0.025494	0.00431		0.006187	0.27724	0.006997		0.003124	0.027963	0.253034
7635	3614	0.248917	0.031565	0.003933		0.005675	0.247422	0.006178		0.002856	0.036259	0.21101
7636	3615	0.402212	0.062913	0.006624		0.009601	0.422866	0.010094		0.004738	0.072473	0.337529
7637	3616	0.294247	0.025387	0.004362		0.006222	0.27638	0.007165		0.003238	0.029082	0.253305
7638	3617	0.220535	0.028256	0.003376		0.005048	0.217182	0.005548		0.00285	0.033082	0.187112
7639	3618	0.356318	0.056519	0.005611		0.00853	0.371187	0.009051		0.00449	0.06627	0.299321
7640	3619	0.260724	0.022508	0.003853		0.005551	0.243012	0.00645		0.003612	0.026376	0.224593
7641	3620	0.172511	0.02223	0.002531		0.003957	0.168331	0.004358		0.002554	0.026349	0.146431
7642	3621	0.278715	0.044566	0.004194		0.006677	0.287695	0.007102		0.00394	0.052906	0.234259
7643	3622	0.20398	0.01759	0.002905		0.00436	0.188608	0.005079		0.003257	0.020864	0.175741
7644	3623	0.192178	0.024885	0.002685		0.004407	0.186087	0.00485		0.003081	0.029746	0.163165
7645	3624	0.310472	0.049932	0.004462		0.007434	0.317971	0.007899		0.004746	0.059832	0.261047
7646	3625	0.227246	0.019631	0.003057		0.004862	0.209632	0.005662		0.003923	0.023425	0.195805
7647	3626	0.227109	0.029663	0.002888		0.005193	0.217578	0.005674		0.003948	0.035902	0.192906
7648	3627	0.366907	0.059465	0.004857		0.008756	0.371448	0.009243		0.006103	0.072344	0.308655
7649	3628	0.268572	0.023526	0.00319		0.005726	0.248721	0.006627		0.005004	0.02812	0.231461
7650	3629	0.222702	0.029766	0.002582		0.005066	0.211705	0.005464		0.004065	0.036035	0.189253
7651	3630	0.359791	0.059348	0.004406		0.008545	0.360809	0.009147		0.006293	0.072628	0.302827
7652	3631	0.263328	0.023882	0.002752		0.005584	0.245069	0.00636		0.005098	0.028256	0.227057
7653	3632	0.213899	0.029031	0.00232		0.004843	0.204765	0.00533		0.004013	0.035684	0.181869
7654	3633	0.345602	0.057715	0.003991		0.008164	0.343996	0.008888		0.006228	0.072296	0.291024
7655	3634	0.252887	0.023496	0.002421		0.005341	0.236688	0.006157		0.005016	0.027973	0.218189
7656	3635	0.205109	0.027906	0.002173		0.004626	0.197622	0.005305		0.003899	0.035402	0.17446
7657	3636	0.331421	0.055446	0.003727		0.007791	0.328036	0.008683		0.006042	0.071635	0.279178
7658	3637	0.242454	0.022631	0.002286		0.005125	0.228114	0.006127		0.004875	0.027875	0.209293
7659	3638	0.215972	0.029078	0.002308		0.004853	0.209356	0.005777		0.004105	0.038489	0.183728
7660	3639	0.348998	0.057861	0.003913		0.008163	0.345017	0.00946		0.006342	0.077808	0.294021
7661	3640	0.255269	0.023517	0.0025		0.005431	0.241292	0.00667		0.005159	0.030354	0.2204
7662	3641	0.226866	0.030496	0.002485		0.005073	0.221214	0.006271		0.004226	0.041722	0.192956
7663	3642	0.366606	0.060772	0.004148		0.008519	0.365026	0.010276		0.006493	0.084317	0.308809
7664	3643	0.26813	0.024491	0.002797		0.005741	0.254484	0.007233		0.005359	0.032817	0.231448
7665	3644	0.257428	0.034142	0.002849		0.005715	0.252241	0.00732		0.004563	0.048638	0.218834
7666	3645	0.415994	0.06829	0.004705		0.009582	0.416792	0.012003		0.006971	0.098336	0.350254
7667	3646	0.304271	0.027148	0.003289		0.006547	0.289589	0.008432		0.005845	0.038093	0.262451
7668	3647	0.288038	0.037015	0.00307		0.006316	0.283622	0.008443		0.004525	0.056074	0.244624
7669	3648	0.465428	0.074272	0.005083		0.01054	0.469472	0.013856		0.006871	0.113488	0.391575
7670	3649	0.340473	0.029169	0.003532		0.007319	0.324746	0.009712		0.00585	0.043711	0.293319
7671	3650	0.255328	0.031476	0.002471		0.005513	0.252511	0.007677		0.003282	0.051214	0.216679
7672	3651	0.412585	0.063097	0.004176		0.009118	0.418605	0.012602		0.00496	0.103638	0.34687
7673	3652	0.301832	0.024893	0.002711		0.006417	0.288473	0.008828		0.004252	0.039872	0.259775
7674	3653	0.22258	0.026378	0.001975		0.004724	0.220869	0.006803		0.002298	0.045769	0.188822
7675	3654	0.359674	0.052692	0.003408		0.00776	0.366455	0.011165		0.003509	0.092465	0.302278
7676	3655	0.263085	0.021106	0.00206		0.00553	0.252053	0.007828		0.002987	0.035811	0.226376
7677	3656	0.237804	0.026728	0.001982		0.004932	0.236771	0.007366		0.002108	0.050131	0.201713
7678	3657	0.384315	0.0532	0.003465		0.008076	0.39307	0.012081		0.003351	0.101042	0.32291
7679	3658	0.281044	0.021615	0.001999		0.005796	0.270022	0.008485		0.002596	0.039511	0.241842
7680	3659	0.279194	0.028828	0.002292		0.005616	0.278909	0.008737		0.002153	0.060298	0.236788
7681	3660	0.451242	0.057272	0.003995		0.009201	0.463256	0.014321		0.003606	0.121293	0.37905
7682	3661	0.32989	0.023456	0.002337		0.006576	0.317893	0.01008		0.002689	0.047817	0.283912
7683	3662	0.305338	0.028146	0.002608		0.005868	0.305908	0.009603		0.002241	0.067181	0.258861
7684	3663	0.493538	0.056125	0.004442		0.009644	0.508358	0.015729		0.003826	0.135121	0.414373
7685	3664	0.360735	0.02262	0.002822		0.006821	0.348427	0.011092		0.002483	0.053322	0.310393
7686	3665	0.296672	0.025113	0.002604		0.005414	0.297655	0.0093		0.002108	0.065658	0.251321
7687	3666	0.479532	0.050125	0.004348		0.008909	0.49488	0.015225		0.003594	0.132372	0.4023
7688	3667	0.350504	0.020077	0.002959		0.006221	0.338765	0.010748		0.002277	0.051781	0.301353
7689	3668	0.288045	0.022667	0.002429		0.00496	0.289087	0.008946		0.001973	0.063658	0.243788
7690	3669	0.465566	0.045479	0.004089		0.00841	0.480815	0.014637		0.003363	0.128729	0.390244
7691	3670	0.340338	0.017904	0.002745		0.00567	0.328768	0.010344		0.002136	0.049735	0.292315
7692	3671	0.283747	0.021173	0.002161		0.004801	0.28474	0.00869		0.002106	0.062723	0.239973
7693	3672	0.458624	0.042515	0.003712		0.008167	0.473627	0.014205		0.003679	0.126971	0.384131
7694	3673	0.335285	0.016704	0.002308		0.005213	0.323722	0.010063		0.002187	0.048901	0.28774
7695	3674	0.22264	0.016382	0.001493		0.003706	0.223343	0.006697		0.002227	0.049553	0.188219
7696	3675	0.359867	0.032791	0.002635		0.006314	0.371361	0.010934		0.003788	0.100059	0.301276
7697	3676	0.263047	0.012984	0.001483		0.004015	0.254083	0.00777		0.002422	0.039749	0.225702
7698	3677	0.226983	0.016831	0.001435		0.003744	0.227576	0.006738		0.002566	0.050803	0.19188
7699	3678	0.366915	0.033589	0.002559		0.006382	0.378257	0.010996		0.00434	0.102353	0.307125
7700	3679	0.268157	0.013443	0.001388		0.004052	0.259069	0.007824		0.002824	0.040864	0.230107
7701	3680	0.288052	0.021383	0.001767		0.004682	0.28824	0.008321		0.003793	0.064999	0.24349
7702	3681	0.465669	0.043092	0.003107		0.007986	0.478876	0.013572		0.006383	0.130459	0.38971

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7703	3682	0.340227	0.017273	0.001777		0.005063	0.328521	0.009668		0.004187	0.051747	0.292028
7704	3683	0.288043	0.024931	0.00181		0.00462	0.287463	0.008067		0.004194	0.064915	0.243446
7705	3684	0.46569	0.05037	0.00312		0.007882	0.477263	0.013156		0.007062	0.1301	0.389624
7706	3685	0.340186	0.019532	0.00192		0.004994	0.327796	0.009375		0.004621	0.051832	0.291993
7707	3686	0.288101	0.02772	0.001816		0.004562	0.286266	0.007815		0.004521	0.06397	0.24341
7708	3687	0.465783	0.055998	0.003073		0.007784	0.474988	0.012743		0.007591	0.128391	0.389559
7709	3688	0.340263	0.021681	0.002015		0.004932	0.3267	0.00908		0.004972	0.050841	0.291953
7710	3689	0.288195	0.029668	0.001691		0.004501	0.284838	0.007585		0.004798	0.062265	0.243399
7711	3690	0.465911	0.059938	0.002855		0.007681	0.472331	0.012366		0.008024	0.125393	0.389537
7712	3691	0.340403	0.023125	0.001889		0.004866	0.325298	0.008813		0.005339	0.048995	0.291937
7713	3692	0.255497	0.02738	0.00129		0.003926	0.251244	0.006555		0.004465	0.053388	0.215772
7714	3693	0.41305	0.055582	0.002197		0.006708	0.416283	0.010679		0.007382	0.10782	0.345312
7715	3694	0.301812	0.021348	0.001424		0.004236	0.287227	0.007625		0.005052	0.041691	0.258808
7716	3695	0.222743	0.02443	0.000971		0.003379	0.218311	0.005625		0.003976	0.045378	0.188159
7717	3696	0.360101	0.049447	0.001704		0.005788	0.361396	0.009155		0.00653	0.091674	0.301109
7718	3697	0.263102	0.01901	0.001001		0.003634	0.249912	0.006554		0.004584	0.035473	0.2257
7719	3698	0.255459	0.028312	0.000947		0.003845	0.249637	0.00637		0.004589	0.050787	0.215906
7720	3699	0.413024	0.057063	0.001701		0.006593	0.412823	0.010358		0.00747	0.102515	0.3455
7721	3700	0.301718	0.022138	0.000918		0.004122	0.286236	0.007437		0.005354	0.039889	0.259001
7722	3701	0.28814	0.031723	0.001008		0.004298	0.280411	0.007097		0.005071	0.055469	0.243718
7723	3702	0.465898	0.063588	0.001753		0.007375	0.463052	0.011522		0.0082	0.111817	0.38999
7724	3703	0.340252	0.025191	0.001048		0.004601	0.322202	0.008302		0.006011	0.043809	0.292383
7725	3704	0.288096	0.030722	0.000997		0.004262	0.278903	0.007035		0.004853	0.053543	0.243857
7726	3705	0.465855	0.061378	0.001734		0.007318	0.466042	0.011404		0.007762	0.10791	0.390208
7727	3706	0.340174	0.024624	0.001046		0.004558	0.321092	0.00825		0.00582	0.042343	0.292554
7728	3707	0.28811	0.029222	0.001003		0.00423	0.277114	0.006993		0.004542	0.051452	0.244
7729	3708	0.465873	0.058602	0.001745		0.007264	0.468209	0.011318		0.007201	0.103812	0.390443
7730	3709	0.340203	0.023286	0.001054		0.004521	0.319584	0.008225		0.005569	0.040546	0.292712
7731	3710	0.288154	0.027978	0.001173		0.004196	0.275196	0.006957		0.004213	0.0492	0.244159
7732	3711	0.465919	0.056101	0.002037		0.00721	0.469359	0.011238		0.006534	0.099423	0.390709
7733	3712	0.340294	0.022157	0.001204		0.004486	0.31787	0.008209		0.005285	0.038529	0.292879
7734	3713	0.283798	0.026551	0.001467		0.004095	0.269817	0.007132		0.003744	0.047192	0.240652
7735	3714	0.458868	0.053316	0.002491		0.007041	0.463614	0.011749		0.00575	0.094952	0.385105
7736	3715	0.335191	0.020912	0.001593		0.004373	0.311533	0.008169		0.004931	0.037206	0.28866
7737	3716	0.222631	0.020362	0.00174		0.003182	0.213222	0.00619		0.002668	0.036052	0.188999
7738	3717	0.359972	0.040795	0.002867		0.005477	0.36524	0.010244		0.004383	0.072061	0.302441
7739	3718	0.262932	0.016098	0.002015		0.003392	0.243606	0.007029		0.003485	0.028908	0.226716
7740	3719	0.226942	0.020664	0.002159		0.003226	0.218385	0.006701		0.002656	0.035872	0.192821
7741	3720	0.366965	0.04143	0.003553		0.005556	0.373265	0.011121		0.004361	0.071425	0.308549
7742	3721	0.26801	0.016385	0.00251		0.003436	0.248007	0.007574		0.003224	0.029086	0.231314
7743	3722	0.287922	0.02692	0.00355		0.004059	0.278952	0.009463		0.003183	0.042959	0.24498
7744	3723	0.465598	0.053672	0.00591		0.006997	0.474592	0.015761		0.005219	0.085105	0.392
7745	3724	0.339963	0.021516	0.004028		0.004316	0.314476	0.010632		0.003677	0.035218	0.293907
7746	3725	0.287834	0.027448	0.004376		0.004031	0.279622	0.010562		0.002946	0.039222	0.245173
7747	3726	0.465483	0.054377	0.007416		0.006957	0.473196	0.017639		0.004831	0.077792	0.392308
7748	3727	0.339841	0.022283	0.004771		0.004361	0.315399	0.011819		0.003398	0.032203	0.294141
7749	3728	0.287824	0.027627	0.005489		0.004018	0.279122	0.011819		0.002683	0.034657	0.245294
7750	3729	0.465458	0.054449	0.009411		0.006937	0.46966	0.019779		0.004398	0.069245	0.392514
7751	3730	0.339847	0.022673	0.005831		0.004397	0.315133	0.013179		0.003103	0.028259	0.294267
7752	3731	0.287877	0.027939	0.007005		0.004023	0.278132	0.013258		0.002638	0.03081	0.245348
7753	3732	0.465509	0.055825	0.012028		0.006945	0.465556	0.022223		0.004716	0.062222	0.392618
7754	3733	0.339958	0.022598	0.00741		0.004399	0.314445	0.014742		0.002856	0.024147	0.294303
7755	3734	0.255213	0.025845	0.007974		0.003588	0.246286	0.013289		0.002912	0.02612	0.217472
7756	3735	0.412671	0.051536	0.013608		0.006188	0.410669	0.022441		0.005142	0.049416	0.348023
7757	3736	0.301446	0.020535	0.008553		0.003864	0.279132	0.01468		0.002891	0.021542	0.260849
7758	3737	0.222508	0.023019	0.008385		0.003151	0.215389	0.013006		0.0029	0.020571	0.189575
7759	3738	0.359776	0.045746	0.014227		0.005429	0.358557	0.021941		0.005112	0.038822	0.303381
7760	3739	0.262818	0.018445	0.009128		0.003359	0.244913	0.014296		0.002909	0.016999	0.227389
7761	3740	0.255205	0.026586	0.011453		0.003645	0.24869	0.016765		0.003778	0.019766	0.217412
7762	3741	0.41267	0.0526	0.019358		0.006279	0.413832	0.028237		0.006598	0.039689	0.347927
7763	3742	0.301429	0.02155	0.012582		0.003894	0.283882	0.018504		0.003839	0.015717	0.260785
7764	3743	0.287884	0.029337	0.015853		0.004172	0.283741	0.022032		0.004957	0.01998	0.24516
7765	3744	0.465542	0.057706	0.026772		0.007183	0.472426	0.037		0.008566	0.039272	0.392335
7766	3745	0.339962	0.024134	0.017436		0.004457	0.325479	0.024413		0.005193	0.016805	0.294075
7767	3746	0.22246	0.021117	0.014774		0.003282	0.22145	0.019821		0.004369	0.013476	0.189275
7768	3747	0.359776	0.04132	0.024997		0.00566	0.368535	0.033231		0.007453	0.02584	0.302912
7769	3748	0.262684	0.017582	0.016167		0.003505	0.255126	0.02203		0.004694	0.011905	0.22703
7770	3749	0.143969	0.012787	0.010556		0.002152	0.143786	0.013935		0.002997	0.007872	0.122391
7771	3750	0.232838	0.024955	0.017881		0.003712	0.238888	0.023346		0.005087	0.014968	0.195881
7772	3751	0.169998	0.010713	0.011515		0.002293	0.166017	0.015508		0.00326	0.007607	0.146796

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7773	3752	0.196368	0.016312	0.015636		0.002971	0.19638	0.020375		0.004254	0.009922	0.166789
7774	3753	0.317582	0.031473	0.026508		0.005134	0.325497	0.034123		0.007195	0.01877	0.266951
7775	3754	0.231874	0.014279	0.017026		0.003163	0.22715	0.022687		0.004665	0.010138	0.200032
7776	3755	0.262008	0.018757	0.024659		0.004101	0.261797	0.031352		0.005987	0.01108	0.222051
7777	3756	0.423741	0.035374	0.04182		0.007093	0.430683	0.052458		0.010074	0.02042	0.355441
7778	3757	0.309414	0.016862	0.026803		0.004335	0.303933	0.034921		0.006635	0.011701	0.266259
7779	3758	0.769004	0.102666	0.050769		0.023961	0.778461	0.008364		0.011766	0.040485	0.611144
7780	3759	0.871818	0.144083	0.046931		0.026247	0.945305	0.010293		0.013257	0.080354	0.695313
7781	3760	0.741817	0.133564	0.032908		0.021688	0.850754	0.010101		0.011098	0.097376	0.594203
7782	3761	0.536046	0.09829	0.020877		0.015491	0.633966	0.008772		0.007869	0.083413	0.430826
7783	3762	0.420909	0.0814	0.014922		0.012065	0.507131	0.007709		0.006067	0.072462	0.339099
7784	3763	0.557305	0.114278	0.018287		0.015869	0.680007	0.010956		0.007889	0.105326	0.449653
7785	3764	0.758836	0.169595	0.021491		0.021334	0.942659	0.01661		0.010413	0.16695	0.613758
7786	3765	0.703609	0.166645	0.017081		0.019509	0.884477	0.016614		0.009314	0.173505	0.570278
7787	3766	0.621382	0.150951	0.013514		0.017046	0.784631	0.015306		0.007911	0.163742	0.504578
7788	3767	0.621086	0.152592	0.012345		0.01687	0.78413	0.015741		0.007877	0.172418	0.505234
7789	3768	0.620882	0.154421	0.011432		0.016768	0.779911	0.016		0.007915	0.179733	0.505862
7790	3769	0.549985	0.139437	0.009452		0.014848	0.684126	0.0143		0.007113	0.164836	0.448672
7791	3770	0.430154	0.110299	0.007012		0.011598	0.529621	0.01151		0.005657	0.131986	0.351204
7792	3771	0.47914	0.12375	0.007485		0.012894	0.58442	0.013101		0.006387	0.149591	0.391419
7793	3772	0.566214	0.14737	0.008295		0.015171	0.679989	0.015903		0.008188	0.182636	0.462899
7794	3773	0.555277	0.145465	0.007682		0.014793	0.656783	0.015897		0.008453	0.185474	0.454237
7795	3774	0.533444	0.141002	0.007046		0.014115	0.621943	0.015478		0.00835	0.184448	0.436597
7796	3775	0.511628	0.13543	0.006552		0.013443	0.589446	0.014962		0.008062	0.182474	0.418879
7797	3776	0.538818	0.141726	0.006765		0.014047	0.614369	0.015829		0.008382	0.197928	0.441212
7798	3777	0.566041	0.148803	0.006999		0.01461	0.645505	0.016653		0.008463	0.214328	0.46349
7799	3778	0.642289	0.168213	0.007821		0.016379	0.735279	0.019154		0.008938	0.249997	0.525806
7800	3779	0.718603	0.183965	0.008497		0.017979	0.826167	0.022156		0.008617	0.288656	0.587993
7801	3780	0.637028	0.156311	0.007234		0.01556	0.735815	0.020172		0.006488	0.263344	0.520956
7802	3781	0.555397	0.130058	0.006098		0.013275	0.645547	0.017868		0.005307	0.234416	0.454009
7803	3782	0.593538	0.130745	0.00634		0.013845	0.694048	0.019321		0.005572	0.25543	0.484991
7804	3783	0.697043	0.140624	0.007288		0.015769	0.820133	0.022875		0.006397	0.305935	0.569283
7805	3784	0.762502	0.13809	0.007931		0.016768	0.902465	0.025084		0.006784	0.340974	0.622299
7806	3785	0.740902	0.123376	0.007601		0.015919	0.880328	0.024238		0.006366	0.33528	0.604148
7807	3786	0.71932	0.11312	0.007156		0.015089	0.856596	0.023253		0.005958	0.32733	0.586029
7808	3787	0.708612	0.105877	0.006695		0.014478	0.845133	0.022502		0.006853	0.323084	0.57682
7809	3788	0.5561	0.081045	0.004949		0.011196	0.66404	0.017268		0.006696	0.253584	0.452354
7810	3789	0.567054	0.082303	0.004873		0.011332	0.677489	0.01734		0.007537	0.258444	0.4611
7811	3790	0.719832	0.109727	0.005856		0.014206	0.86031	0.021363		0.010922	0.327308	0.585001
7812	3791	0.719966	0.127841	0.005666		0.014038	0.859589	0.020685		0.011993	0.325361	0.584798
7813	3792	0.720143	0.141825	0.005425		0.013877	0.857465	0.020018		0.012801	0.32152	0.584644
7814	3793	0.720336	0.152071	0.00503		0.013716	0.854081	0.019403		0.013339	0.315483	0.584558
7815	3794	0.63862	0.140939	0.003949		0.012013	0.753279	0.016721		0.012049	0.272575	0.518129
7816	3795	0.556808	0.124695	0.003185		0.010415	0.653921	0.014304		0.010477	0.232209	0.451751
7817	3796	0.638727	0.14296	0.003299		0.011885	0.746662	0.01614		0.011802	0.259787	0.518289
7818	3797	0.720643	0.158038	0.003246		0.013322	0.853683	0.017891		0.012678	0.283301	0.58496
7819	3798	0.720676	0.151856	0.003255		0.013241	0.859945	0.017909		0.011736	0.273515	0.585253
7820	3799	0.720734	0.145495	0.003283		0.013163	0.861065	0.017976		0.010536	0.2635	0.585611
7821	3800	0.720796	0.138878	0.003718		0.013085	0.860183	0.018006		0.009852	0.252688	0.586039
7822	3801	0.709893	0.132508	0.004368		0.012808	0.848058	0.019048		0.009432	0.239336	0.577648
7823	3802	0.556959	0.100847	0.004729		0.009989	0.669202	0.016806		0.007122	0.179771	0.453641
7824	3803	0.567835	0.101971	0.005859		0.010151	0.68449	0.018364		0.007054	0.177254	0.462788
7825	3804	0.720606	0.130841	0.009968		0.012819	0.871144	0.02628		0.00841	0.20923	0.587925
7826	3805	0.720526	0.131024	0.012892		0.012774	0.868024	0.029625		0.007768	0.19219	0.588387
7827	3806	0.720513	0.129766	0.016729		0.012757	0.858748	0.033404		0.007195	0.174097	0.588733
7828	3807	0.720563	0.136165	0.021405		0.012774	0.845695	0.037673		0.009007	0.157304	0.588948
7829	3808	0.638746	0.124982	0.023986		0.011372	0.738406	0.038687		0.009597	0.124527	0.522097
7830	3809	0.5569	0.110238	0.024836		0.009971	0.638202	0.037744		0.009419	0.098698	0.455146
7831	3810	0.638844	0.125834	0.033575		0.011527	0.728144	0.04841		0.012005	0.101225	0.52199
7832	3811	0.720859	0.136759	0.04633		0.013193	0.818111	0.063039		0.015263	0.09646	0.58866
7833	3812	0.5572	0.097142	0.04335		0.010406	0.628055	0.056345		0.013036	0.060373	0.45456
7834	3813	0.360639	0.058435	0.031056		0.006832	0.403578	0.039495		0.008824	0.033847	0.293986
7835	3814	0.491923	0.073448	0.046063		0.00945	0.54583	0.057616		0.01242	0.041851	0.400705
7836	3815	0.656395	0.077627	0.072645		0.013099	0.711113	0.088152		0.017333	0.043794	0.533702
7837	3816	0.774528	0.111198	0.061138		0.03183	0.867732	0.009542		0.019111	0.063059	0.570196
7838	3817	0.861831	0.107386	0.069911		0.037526	0.963118	0.011189		0.021084	0.074587	0.613348
7839	3818	0.756122	0.11458	0.057356		0.028965	0.833146	0.00874		0.016538	0.056433	0.569699
7840	3819	0.876957	0.173101	0.05852		0.03523	1.089369	0.013272		0.01849	0.125308	0.64838
7841	3820	0.97594	0.175285	0.067353		0.041687	1.215539	0.015601		0.020717	0.146627	0.697644
7842	3821	0.856896	0.174947	0.054482		0.032017	1.042558	0.012045		0.016526	0.10973	0.647659

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7843	3822	0.745504	0.177695	0.041969		0.029367	1.022917	0.01349		0.013779	0.159575	0.553321
7844	3823	0.829648	0.190995	0.048514		0.03483	1.144527	0.015908		0.015624	0.184454	0.59552
7845	3824	0.728937	0.170689	0.038902		0.026661	0.967569	0.012241		0.012505	0.140797	0.552602
7846	3825	0.538427	0.14536	0.026887		0.020954	0.785751	0.010946		0.009514	0.14334	0.400588
7847	3826	0.59917	0.156788	0.03109		0.024877	0.881288	0.012889		0.010752	0.164098	0.431207
7848	3827	0.526655	0.136009	0.02489		0.019013	0.736961	0.009906		0.008695	0.127081	0.400022
7849	3828	0.422704	0.124283	0.019297		0.016315	0.642372	0.009317		0.007295	0.12888	0.314979
7850	3829	0.470341	0.132957	0.022307		0.019379	0.721456	0.010988		0.008189	0.146694	0.33909
7851	3830	0.41353	0.117885	0.017871		0.014797	0.599891	0.008452		0.006685	0.114409	0.314509
7852	3831	0.559711	0.177484	0.023727		0.021464	0.876111	0.013147		0.00954	0.188027	0.41749
7853	3832	0.622628	0.188092	0.027367		0.025499	0.984331	0.01561		0.010624	0.213363	0.449492
7854	3833	0.547542	0.167625	0.022064		0.019459	0.815262	0.012021		0.008732	0.167211	0.416847
7855	3834	13.3712	4.807562	0.498438		0.508043	21.89643	0.372905		0.233488	5.252546	9.986777
7856	3835	0.847388	0.288354	0.032471		0.034303	1.399566	0.023494		0.013564	0.336821	0.613252
7857	3836	0.745392	0.253538	0.025982		0.026142	1.152614	0.018349		0.011622	0.265932	0.568994
7858	3837	0.706603	0.269468	0.022325		0.026426	1.181281	0.019936		0.011148	0.309806	0.529036
7859	3838	0.78573	0.288135	0.025962		0.031459	1.332323	0.023516		0.012003	0.351652	0.569727
7860	3839	0.691197	0.251178	0.020556		0.023936	1.092065	0.018361		0.010673	0.275876	0.529183
7861	3840	0.623992	0.245016	0.017551		0.023104	1.053468	0.018543		0.00946	0.29312	0.468103
7862	3841	0.693783	0.264003	0.020231		0.027535	1.190924	0.021759		0.010237	0.334066	0.503825
7863	3842	0.610425	0.228521	0.016226		0.020921	0.973209	0.016927		0.009102	0.260225	0.468495
7864	3843	0.623661	0.252488	0.015702		0.022878	1.061675	0.019418		0.009166	0.31031	0.468864
7865	3844	0.693352	0.275635	0.01804		0.027289	1.202275	0.022786		0.009925	0.354548	0.504124
7866	3845	0.610113	0.232611	0.014587		0.02071	0.979179	0.017759		0.008866	0.275287	0.469217
7867	3846	0.623416	0.260518	0.014175		0.022668	1.069975	0.020244		0.008932	0.325392	0.469578
7868	3847	0.693038	0.285432	0.016209		0.027057	1.214326	0.023751		0.009668	0.372295	0.504368
7869	3848	0.609877	0.238961	0.013228		0.020511	0.984324	0.018547		0.00867	0.288538	0.469897
7870	3849	0.552165	0.236659	0.011444		0.019906	0.955121	0.018611		0.007735	0.300012	0.41662
7871	3850	0.613822	0.260099	0.013047		0.023775	1.087144	0.021799		0.008369	0.343347	0.447444
7872	3851	0.540183	0.216641	0.010729		0.018004	0.875634	0.017073		0.007536	0.266064	0.416875
7873	3852	0.431822	0.187982	0.008396		0.015466	0.750451	0.014915		0.005951	0.241061	0.32621
7874	3853	0.480048	0.207042	0.009598		0.01848	0.856457	0.017459		0.006434	0.275784	0.350367
7875	3854	0.422456	0.171841	0.007888		0.013983	0.685948	0.013703		0.00581	0.214143	0.326384
7876	3855	0.480971	0.211477	0.008929		0.017137	0.837654	0.0169		0.00654	0.273884	0.363654
7877	3856	0.534701	0.233277	0.010253		0.020484	0.958109	0.019763		0.007068	0.31318	0.390614
7878	3857	0.470543	0.193123	0.008401		0.015489	0.763843	0.015537		0.006396	0.244601	0.363827
7879	3858	0.568363	0.252637	0.009923		0.02009	0.989459	0.020407		0.007562	0.334755	0.430242
7880	3859	0.631902	0.27927	0.011486		0.024026	1.135484	0.023842		0.008294	0.380434	0.462191
7881	3860	0.556043	0.230396	0.009342		0.018149	0.89932	0.018786		0.00741	0.299863	0.430399
7882	3861	0.557403	0.249141	0.00926		0.019549	0.965272	0.020345		0.007241	0.33956	0.422364
7883	3862	0.619785	0.275902	0.010824		0.023391	1.110667	0.023744		0.00817	0.382833	0.453785
7884	3863	0.545323	0.22695	0.008714		0.017652	0.875313	0.018743		0.007106	0.304348	0.422472
7885	3864	0.535537	0.239438	0.008543		0.018632	0.918278	0.019786		0.006793	0.3373	0.406133
7886	3865	0.595554	0.265584	0.010096		0.022305	1.058511	0.023075		0.007869	0.380104	0.436403
7887	3866	0.523927	0.217889	0.008032		0.016814	0.831716	0.01824		0.006643	0.302402	0.406188
7888	3867	0.513688	0.228655	0.008012		0.017736	0.870183	0.019129		0.006513	0.333478	0.389803
7889	3868	0.571348	0.253877	0.009552		0.021242	1.003871	0.022295		0.00755	0.375982	0.418906
7890	3869	0.502549	0.209133	0.007468		0.015998	0.788126	0.01764		0.006183	0.298949	0.389813
7891	3870	0.541039	0.241527	0.008406		0.018533	0.904215	0.020247		0.006839	0.361708	0.410747
7892	3871	0.601879	0.266914	0.010244		0.022208	1.047463	0.02359		0.007936	0.408146	0.441464
7893	3872	0.529302	0.220379	0.007674		0.016708	0.819621	0.018676		0.006359	0.324138	0.410713
7894	3873	0.568446	0.253015	0.008915		0.019293	0.938196	0.021327		0.007137	0.391917	0.431671
7895	3874	0.632479	0.280044	0.010905		0.023132	1.094338	0.024839		0.008293	0.442732	0.464007
7896	3875	0.55608	0.230612	0.007906		0.017383	0.849925	0.019671		0.0066	0.350994	0.431587
7897	3876	0.64522	0.286251	0.010131		0.021684	1.075795	0.0242		0.008059	0.457593	0.489906
7898	3877	0.717891	0.316902	0.012429		0.026014	1.247371	0.028183		0.009328	0.517505	0.526654
7899	3878	0.631009	0.261211	0.008967		0.019525	0.973679	0.022318		0.00748	0.409532	0.489762
7900	3879	0.722175	0.31607	0.011203		0.02395	1.218531	0.026996		0.008974	0.528934	0.548086
7901	3880	0.803514	0.351038	0.013777		0.028758	1.413495	0.031442		0.010366	0.598867	0.589251
7902	3881	0.706009	0.287634	0.009895		0.021547	1.102124	0.024887		0.00832	0.473022	0.547872
7903	3882	0.640508	0.270182	0.009647		0.020943	1.092419	0.023808		0.007879	0.482678	0.485744
7904	3883	0.712655	0.300796	0.011879		0.025171	1.267628	0.027739		0.009116	0.547932	0.522401
7905	3884	0.62592	0.245375	0.008601		0.018822	0.987533	0.021934		0.007295	0.431453	0.485523
7906	3885	0.558675	0.225179	0.008229		0.018058	0.960049	0.020656		0.006796	0.429517	0.423372
7907	3886	0.62162	0.251002	0.010078		0.021721	1.11424	0.024077		0.007873	0.492267	0.455493
7908	3887	0.545779	0.204309	0.007437		0.016215	0.867593	0.01902		0.006285	0.383866	0.423169
7909	3890	0.597334	0.22631	0.008723		0.019076	1.033548	0.021962		0.007166	0.467862	0.45228
7910	3891	0.664655	0.252433	0.010699		0.022965	1.19973	0.02561		0.008313	0.539539	0.486756
7911	3893	0.583356	0.205247	0.007876		0.017115	0.933764	0.020209		0.006619	0.418091	0.45206
7912	3895	0.701896	0.243748	0.010092		0.022096	1.222959	0.025643		0.00826	0.56053	0.530879

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7913	3897	0.781039	0.271545	0.012305		0.026629	1.419827	0.029921		0.009601	0.648518	0.571529
7914	3899	0.685223	0.221138	0.009128		0.019804	1.104581	0.023581		0.00762	0.500823	0.530619
7915	3901	0.768304	0.239762	0.010796		0.023752	1.348211	0.027875		0.008798	0.625953	0.580476
7916	3903	0.85499	0.268697	0.012867		0.028664	1.565568	0.032549		0.010252	0.723947	0.624917
7917	3905	0.749729	0.217165	0.00979		0.021261	1.217287	0.025613		0.008102	0.559066	0.579997
7918	3907	0.746955	0.213821	0.010187		0.022657	1.31799	0.026945		0.00848	0.617444	0.563656
7919	3909	0.831296	0.24026	0.01207		0.027384	1.530821	0.031488		0.010334	0.711909	0.6068
7920	3911	0.7286	0.193244	0.009258		0.020251	1.189574	0.02474		0.007621	0.551172	0.563035
7921	3913	0.725545	0.197997	0.009544		0.021599	1.284901	0.026063		0.008753	0.604176	0.546816
7922	3915	0.807531	0.220474	0.011274		0.026148	1.492675	0.030484		0.010515	0.694531	0.588664
7923	3917	0.707457	0.179431	0.008695		0.019275	1.159365	0.023911		0.007735	0.539108	0.546102
7924	3919	0.715101	0.186817	0.009005		0.020876	1.269191	0.025607		0.00914	0.597723	0.538236
7925	3921	0.795978	0.20975	0.010598		0.02532	1.474612	0.02998		0.010842	0.689468	0.579417
7926	3923	0.697029	0.168538	0.008216		0.018595	1.144975	0.023474		0.008256	0.531924	0.537455
7927	3925	0.561494	0.142224	0.006726		0.016072	0.997374	0.020057		0.007844	0.466923	0.422059
7928	3927	0.625061	0.159105	0.007887		0.019535	1.158844	0.023505		0.008884	0.539623	0.454336
7929	3929	0.547123	0.128587	0.006149		0.014288	0.899723	0.018371		0.007603	0.416215	0.421429
7930	3931	0.572753	0.143614	0.006639		0.016199	1.017266	0.020431		0.008582	0.473622	0.430173
7931	3933	0.637637	0.161084	0.007763		0.019715	1.181939	0.023958		0.009287	0.546541	0.463057
7932	3935	0.557985	0.12963	0.006076		0.014382	0.917698	0.018705		0.00837	0.423035	0.429547
7933	3937	0.72751	0.206645	0.007937		0.020223	1.290574	0.025881		0.012049	0.595877	0.54561
7934	3939	0.810025	0.238393	0.009307		0.024602	1.499397	0.030378		0.012714	0.679246	0.587272
7935	3941	0.708512	0.182573	0.007264		0.01793	1.164405	0.023675		0.011833	0.532864	0.544859
7936	3943	0.728077	0.238807	0.007605		0.0199	1.288289	0.025803		0.013002	0.589223	0.545206
7937	3945	0.810767	0.274625	0.008885		0.024253	1.496658	0.030314		0.013704	0.666359	0.58677
7938	3947	0.708818	0.211501	0.006962		0.017616	1.162519	0.023586		0.012808	0.527533	0.544515
7939	3949	0.728664	0.262886	0.007181		0.019565	1.284214	0.025676		0.013701	0.581048	0.544787
7940	3951	0.811543	0.301526	0.008368		0.02389	1.491916	0.030192		0.014472	0.656509	0.586228
7941	3953	0.709129	0.233332	0.006587		0.017289	1.158983	0.023452		0.013515	0.520635	0.54417
7942	3955	0.729277	0.279339	0.006647		0.019215	1.278313	0.025479		0.014103	0.570891	0.544366
7943	3957	0.812364	0.320272	0.007735		0.023512	1.485134	0.029991		0.014946	0.6446	0.585661
7944	3959	0.70944	0.248555	0.006103		0.016953	1.153764	0.023252		0.01391	0.511677	0.543904
7945	3961	0.646973	0.256389	0.005303		0.016707	1.126255	0.022331		0.012546	0.494964	0.482147
7946	3963	0.720823	0.292764	0.00623		0.020491	1.308565	0.026316		0.013355	0.558603	0.518605
7947	3965	0.629091	0.22878	0.004863		0.014916	1.016626	0.020357		0.012377	0.443563	0.481928
7948	3967	0.564425	0.225218	0.004418		0.014383	0.976434	0.019241		0.010771	0.422906	0.42011
7949	3969	0.628959	0.25641	0.00523		0.01762	1.13453	0.022701		0.0115	0.477106	0.451792
7950	3971	0.548613	0.201362	0.004007		0.012945	0.881497	0.017522		0.010627	0.378906	0.420071
7951	3973	0.647902	0.256489	0.004713		0.016446	1.117686	0.021745		0.011956	0.474307	0.481665
7952	3975	0.722114	0.291135	0.005611		0.019926	1.310001	0.025688		0.012801	0.534842	0.517888
7953	3977	0.629483	0.229749	0.00425		0.014808	1.01363	0.019777		0.011804	0.424892	0.481815
7954	3979	0.731687	0.281336	0.004559		0.018495	1.276899	0.023935		0.012569	0.518312	0.543164
7955	3981	0.81571	0.317937	0.005469		0.022295	1.487767	0.028332		0.013743	0.583973	0.583857
7956	3983	0.710455	0.252634	0.004099		0.016651	1.158511	0.021729		0.012427	0.464324	0.543634
7957	3985	0.732444	0.268461	0.004839		0.018452	1.284332	0.023183		0.011975	0.500803	0.543254
7958	3987	0.816785	0.301706	0.005864		0.022289	1.490261	0.027505		0.013488	0.563703	0.583544
7959	3989	0.710715	0.241792	0.004295		0.0166	1.164916	0.021001		0.01133	0.448764	0.543792
7960	3991	0.733234	0.251999	0.005097		0.018423	1.284156	0.022257		0.011676	0.482501	0.543479
7961	3993	0.817917	0.281398	0.00635		0.022302	1.486518	0.026478		0.013109	0.542707	0.583365
7962	3995	0.710967	0.228627	0.004439		0.016555	1.164211	0.020114		0.011084	0.432491	0.544064
7963	3997	0.734055	0.241633	0.005363		0.018406	1.280068	0.02114		0.01128	0.463624	0.543833
7964	3999	0.8191	0.26933	0.006754		0.022328	1.482956	0.025226		0.01263	0.523711	0.583574
7965	4001	0.711208	0.218902	0.004672		0.016513	1.160559	0.019985		0.010743	0.414755	0.544441
7966	4003	0.723763	0.229932	0.005833		0.01812	1.256779	0.020711		0.01064	0.43966	0.536043
7967	4005	0.807901	0.255398	0.007022		0.022028	1.454721	0.023833		0.011891	0.497317	0.575215
7968	4007	0.700653	0.20881	0.005271		0.016228	1.140582	0.019944		0.010158	0.39274	0.536646
7969	4009	0.568522	0.173513	0.005666		0.01422	0.984508	0.018742		0.007942	0.329654	0.420978
7970	4010	0.634846	0.19207	0.006581		0.01732	1.136859	0.021012		0.008873	0.373693	0.451757
7971	4011	0.549899	0.15793	0.00528		0.01271	0.89506	0.017927		0.007594	0.294074	0.421444
7972	4012	0.580069	0.172517	0.007038		0.014504	1.003096	0.020755		0.007833	0.325707	0.429475
7973	4013	0.647886	0.190551	0.008149		0.017685	1.156246	0.02335		0.008757	0.369777	0.460889
7974	4014	0.56077	0.157239	0.006562		0.012949	0.913031	0.019782		0.007491	0.290157	0.429944
7975	4015	0.73714	0.214288	0.012148		0.018431	1.269757	0.030298		0.009313	0.38826	0.545629
7976	4016	0.823658	0.233546	0.014201		0.022511	1.459108	0.034267		0.010445	0.44198	0.585567
7977	4017	0.711942	0.197987	0.01132		0.016422	1.157813	0.028731		0.008896	0.344767	0.546208
7978	4018	0.738071	0.211325	0.016375		0.01847	1.259883	0.034701		0.008904	0.361711	0.546093
7979	4019	0.825049	0.230516	0.019079		0.022587	1.44504	0.039414		0.010395	0.412526	0.586088
7980	4020	0.712283	0.195819	0.015122		0.016424	1.149794	0.032769		0.008231	0.320063	0.54666
7981	4021	0.739043	0.215018	0.021369		0.018532	1.240395	0.039594		0.009119	0.334736	0.546461
7982	4022	0.826493	0.237929	0.024839		0.022679	1.422729	0.045345		0.010652	0.381828	0.586486

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
7983	4023	0.712978	0.196346	0.019762		0.016447	1.131698	0.037271		0.008402	0.295389	0.547019
7984	4024	0.740059	0.218611	0.027255		0.018623	1.211243	0.046186		0.010091	0.307087	0.546711
7985	4025	0.827997	0.241028	0.031598		0.022794	1.391745	0.053063		0.010858	0.349662	0.586743
7986	4026	0.713714	0.203708	0.025242		0.016496	1.104066	0.043127		0.010202	0.270708	0.547267
7987	4027	0.656905	0.198614	0.030268		0.016623	1.041502	0.047474		0.010473	0.245777	0.484706
7988	4028	0.735294	0.213568	0.035013		0.020333	1.199694	0.054599		0.010333	0.278981	0.520173
7989	4029	0.633298	0.185468	0.028094		0.014694	0.948788	0.044312		0.010623	0.216839	0.485194
7990	4030	0.573348	0.173914	0.031115		0.014596	0.884278	0.046204		0.01015	0.194477	0.422591
7991	4031	0.641993	0.186677	0.035913		0.017834	1.020146	0.053134		0.010019	0.220757	0.453508
7992	4032	0.552592	0.16262	0.028919		0.012886	0.806016	0.04314		0.01031	0.171833	0.423014
7993	4033	0.658453	0.197264	0.041789		0.016892	0.985784	0.058962		0.012801	0.197878	0.484734
7994	4034	0.737543	0.211604	0.048149		0.020606	1.137906	0.067757		0.012646	0.227738	0.520193
7995	4035	0.63444	0.184639	0.038907		0.014931	0.90025	0.055116		0.013014	0.175138	0.485198
7996	4036	0.74408	0.21304	0.057337		0.019338	1.067693	0.076035		0.016111	0.182629	0.546826
7997	4037	0.833799	0.229018	0.065873		0.023517	1.231161	0.087151		0.015934	0.214634	0.586883
7998	4038	0.716698	0.19956	0.053479		0.017134	0.979633	0.071255		0.016376	0.161926	0.547302
7999	4039	0.575965	0.150764	0.053417		0.01522	0.786847	0.066911		0.013696	0.110221	0.422492
8000	4040	0.645633	0.162499	0.06121		0.018432	0.904693	0.076329		0.013569	0.13061	0.453521
8001	4041	0.554609	0.141241	0.049928		0.013528	0.726856	0.063005		0.013902	0.096251	0.422785
8002	4042	0.373054	0.090605	0.038168		0.009961	0.494311	0.046527		0.009284	0.060533	0.273351
8003	4043	0.418236	0.09751	0.043654		0.012034	0.567182	0.052895		0.009208	0.07208	0.293483
8004	4044	0.359175	0.084865	0.035714		0.008875	0.458541	0.043919		0.009407	0.052674	0.273512
8005	4045	0.509147	0.114311	0.056455		0.013723	0.656118	0.067334		0.013122	0.071732	0.372725
8006	4046	0.570862	0.122967	0.064489		0.016541	0.751486	0.076344		0.013029	0.084524	0.400228
8007	4047	0.490166	0.106623	0.05289		0.012251	0.610867	0.063723		0.013271	0.063492	0.372897
8008	4048	0.680119	0.118616	0.088247		0.018688	0.823701	0.101003		0.018664	0.070809	0.496859
8009	4049	0.762574	0.128661	0.100495		0.02245	0.939969	0.113758		0.018573	0.083125	0.53372
8010	4050	0.654666	0.110443	0.08292		0.016767	0.772604	0.096154		0.018758	0.062915	0.496961
8011	4109	0.790926	0.117869	0.056532		0.027594	0.841018	0.008748		0.013667	0.0516	0.61152
8012	4110	0.896541	0.174077	0.053012		0.030285	1.042346	0.011263		0.014158	0.101208	0.695074
8013	4111	0.762749	0.166293	0.037561		0.025191	0.955955	0.011409		0.011532	0.124985	0.593258
8014	4112	0.551089	0.125434	0.023953		0.017965	0.721062	0.009248		0.008152	0.109784	0.429984
8015	4113	0.432706	0.1079	0.017176		0.01398	0.581559	0.008002		0.006272	0.099385	0.338339
8016	4114	0.572882	0.152401	0.021053		0.018376	0.784585	0.01153		0.008187	0.145813	0.448694
8017	4115	0.779966	0.228288	0.024826		0.024693	1.097893	0.017673		0.011028	0.231496	0.612563
8018	4116	0.723238	0.225762	0.019771		0.022593	1.036469	0.01771		0.010209	0.240977	0.569524
8019	4117	0.638784	0.20518	0.015594		0.019756	0.921738	0.016223		0.00896	0.227356	0.503998
8020	4118	0.638477	0.20814	0.014097		0.019552	0.922539	0.016871		0.008833	0.239255	0.504726
8021	4119	0.638254	0.211854	0.012885		0.019361	0.918855	0.01769		0.008735	0.249398	0.505408
8022	4120	0.565333	0.191716	0.010521		0.016989	0.810169	0.016338		0.007655	0.22881	0.448329
8023	4121	0.442137	0.151871	0.007767		0.013224	0.632369	0.01314		0.005934	0.184392	0.350978
8024	4122	0.492471	0.170527	0.008285		0.014685	0.702256	0.014924		0.006555	0.210685	0.391208
8025	4123	0.581963	0.203209	0.009215		0.017255	0.823965	0.018073		0.007627	0.258443	0.462726
8026	4124	0.570736	0.200001	0.008586		0.016808	0.8004	0.018052		0.007392	0.262464	0.454138
8027	4125	0.548332	0.192801	0.007901		0.016019	0.760277	0.017576		0.007259	0.260905	0.43657
8028	4126	0.525941	0.185393	0.007345		0.015236	0.721189	0.017001		0.006953	0.257978	0.418912
8029	4127	0.553926	0.194654	0.007546		0.015895	0.751513	0.017996		0.007154	0.279706	0.441312
8030	4128	0.581934	0.203646	0.00776		0.016502	0.781388	0.018951		0.007114	0.302804	0.463673
8031	4129	0.660337	0.230985	0.00864		0.018474	0.893524	0.02149		0.007642	0.353175	0.526101
8032	4130	0.738801	0.253525	0.009437		0.02026	1.010162	0.023941		0.008045	0.407757	0.588436
8033	4131	0.654967	0.215791	0.008147		0.017606	0.904257	0.021211		0.007042	0.371844	0.521418
8034	4132	0.571077	0.179528	0.006995		0.015149	0.793978	0.018799		0.006059	0.330816	0.454435
8035	4133	0.610359	0.180326	0.007391		0.015969	0.854139	0.020326		0.006372	0.360287	0.485453
8036	4134	0.716883	0.194206	0.008582		0.018454	1.009906	0.024056		0.007324	0.431462	0.569818
8037	4135	0.784301	0.190579	0.009234		0.01978	1.112264	0.026347		0.007775	0.481279	0.622861
8038	4136	0.762138	0.169949	0.008774		0.018808	1.086203	0.025414		0.007302	0.474013	0.604669
8039	4137	0.739971	0.157098	0.008249		0.017865	1.058009	0.024325		0.006912	0.463336	0.58651
8040	4138	0.729006	0.147165	0.00779		0.017193	1.0445	0.023475		0.008009	0.45723	0.577256
8041	4139	0.572166	0.112474	0.005819		0.013175	0.820716	0.017967		0.007557	0.358168	0.452657
8042	4140	0.583487	0.113214	0.005752		0.013239	0.837179	0.018014		0.008401	0.364408	0.461379
8043	4141	0.740803	0.155848	0.006895		0.016444	1.062528	0.022531		0.012004	0.459982	0.585281
8044	4142	0.741036	0.181046	0.006604		0.016271	1.061131	0.02243		0.013079	0.456193	0.585
8045	4143	0.741281	0.200272	0.006272		0.016107	1.058182	0.022287		0.013859	0.450615	0.584767
8046	4144	0.741527	0.214222	0.00581		0.01595	1.053682	0.022078		0.014326	0.442757	0.584595
8047	4145	0.657465	0.197798	0.004614		0.014004	0.928757	0.019303		0.012801	0.383417	0.518081
8048	4146	0.573293	0.174478	0.003762		0.012162	0.805616	0.016592		0.011035	0.327203	0.45165
8049	4147	0.657721	0.199467	0.003957		0.013897	0.92668	0.018698		0.01231	0.366582	0.518109
8050	4148	0.742198	0.219827	0.003842		0.015603	1.060257	0.020493		0.013055	0.400274	0.584678
8051	4149	0.742345	0.210831	0.00393		0.015533	1.06685	0.019875		0.011883	0.386736	0.584919
8052	4150	0.742488	0.201027	0.004001		0.015466	1.066822	0.019914		0.011032	0.372711	0.585254

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8053	4151	0.742618	0.191688	0.004353		0.015402	1.06435	0.019908		0.010746	0.357415	0.585678
8054	4152	0.731468	0.18336	0.005002		0.015107	1.047287	0.020322		0.010211	0.337832	0.577296
8055	4153	0.573971	0.139051	0.005196		0.011809	0.822955	0.018107		0.00766	0.25294	0.453363
8056	4154	0.585245	0.139153	0.006454		0.012017	0.840093	0.019891		0.007566	0.249285	0.462503
8057	4155	0.742847	0.17748	0.011085		0.015211	1.06623	0.028692		0.008992	0.294982	0.58756
8058	4156	0.742897	0.176449	0.014608		0.015187	1.059115	0.03255		0.008298	0.272152	0.588032
8059	4157	0.742981	0.175473	0.019076		0.015189	1.042419	0.036869		0.008408	0.249489	0.588402
8060	4165	0.743102	0.183927	0.024405		0.015222	1.017521	0.042182		0.010354	0.227459	0.588649
8061	4166	0.658796	0.16804	0.027224		0.013555	0.876454	0.043331		0.010868	0.181806	0.521865
8062	4167	0.574443	0.147684	0.02809		0.011883	0.747355	0.042222		0.010592	0.144166	0.454965
8063	4168	0.659067	0.168003	0.037858		0.013738	0.839582	0.054029		0.013407	0.147291	0.521817
8064	4169	0.743842	0.181897	0.052143		0.015716	0.925644	0.070088		0.016914	0.136876	0.588531
8065	4170	0.575094	0.128843	0.048762		0.012414	0.700649	0.062306		0.014357	0.083176	0.454549
8066	4171	0.37226	0.077418	0.034918		0.008165	0.44679	0.043561		0.009703	0.045861	0.294018
8067	4172	0.507816	0.097243	0.051771		0.011305	0.600452	0.063383		0.013657	0.055408	0.400806
8068	4173	0.677702	0.10059	0.081431		0.015592	0.772406	0.096325		0.019149	0.056324	0.533996
8069	4174	0.890346	0.0972	0.073268		0.040631	0.987486	0.012097		0.01987	0.076384	0.613821
8070	4175	1.00851	0.161165	0.071185		0.04534	1.241255	0.016774		0.019998	0.146849	0.698509
8071	4176	0.857428	0.175959	0.051486		0.037991	1.165804	0.017095		0.015715	0.182015	0.596441
8072	4177	0.619243	0.14464	0.033089		0.027174	0.896263	0.013856		0.010755	0.160639	0.43195
8073	4178	0.486082	0.122711	0.023727		0.021184	0.732665	0.011786		0.008122	0.14288	0.339712
8074	4179	0.643434	0.172969	0.029194		0.027885	0.998136	0.016544		0.010393	0.20708	0.450341
8075	4180	0.875826	0.26273	0.034473		0.037578	1.416602	0.024893		0.013354	0.326213	0.614492
8076	4181	0.812005	0.263342	0.027823		0.03449	1.349984	0.025114		0.01173	0.342435	0.570957
8077	4182	0.717148	0.245084	0.022013		0.030232	1.208394	0.023429		0.010021	0.327106	0.504964
8078	4183	0.716755	0.257351	0.019602		0.029992	1.220873	0.024547		0.009749	0.348529	0.505297
8079	4184	0.71645	0.267742	0.01748		0.029761	1.234033	0.02557		0.009514	0.366864	0.505567
8080	4185	0.634549	0.244957	0.014046		0.026168	1.106077	0.023462		0.008446	0.338737	0.448094
8081	4186	0.496246	0.195525	0.010341		0.02035	0.872493	0.018772		0.006639	0.272155	0.350564
8082	4187	0.552729	0.220743	0.011045		0.022563	0.977258	0.021242		0.007424	0.309051	0.390543
8083	4188	0.65318	0.265004	0.012394		0.026476	1.16064	0.025597		0.008821	0.375347	0.462112
8084	4189	0.640623	0.26244	0.011702		0.025787	1.137642	0.025473		0.008688	0.377705	0.453761
8085	4190	0.61555	0.253176	0.010941		0.0246	1.0906	0.024732		0.00837	0.372433	0.436434
8086	4191	0.590505	0.242452	0.010683		0.023436	1.04583	0.023881		0.008035	0.365903	0.418983
8087	4192	0.622036	0.25434	0.011512		0.024511	1.098387	0.025252		0.008453	0.396192	0.441593
8088	4193	0.653635	0.266759	0.012308		0.025542	1.148207	0.026577		0.008845	0.430372	0.46419
8089	4194	0.741881	0.301828	0.014073		0.028739	1.295647	0.030145		0.009965	0.503708	0.527131
8090	4195	0.830335	0.335486	0.015643		0.031792	1.465814	0.033627		0.010995	0.590235	0.590165
8091	4196	0.736431	0.288195	0.0135		0.027848	1.314617	0.02967		0.009659	0.549348	0.523353
8092	4197	0.642354	0.240812	0.011383		0.024047	1.155552	0.025758		0.008355	0.494499	0.456328
8093	4198	0.686829	0.242391	0.012096		0.025442	1.244204	0.027406		0.008838	0.543185	0.487642
8094	4199	0.807109	0.260276	0.013914		0.029527	1.472452	0.03203		0.01023	0.65464	0.572556
8095	4200	0.883561	0.260614	0.014515		0.031822	1.623629	0.034861		0.011252	0.732941	0.626023
8096	4201	0.859119	0.235773	0.013156		0.030441	1.587683	0.033749		0.011364	0.722124	0.607869
8097	4202	0.834612	0.212835	0.012238		0.02911	1.54823	0.0327		0.011425	0.704336	0.589704
8098	4203	0.822736	0.202892	0.01145		0.028235	1.529591	0.032191		0.011655	0.691905	0.580446
8099	4204	0.646128	0.15373	0.008473		0.021823	1.2021	0.025267		0.009466	0.538154	0.455142
8100	4205	0.659166	0.163981	0.008313		0.02205	1.226078	0.025769		0.009852	0.544399	0.463872
8101	4206	0.837472	0.240542	0.009981		0.027544	1.555445	0.032709		0.01295	0.678187	0.588275
8102	4207	0.838347	0.274679	0.009487		0.027111	1.552716	0.03267		0.013382	0.660993	0.587714
8103	4208	0.839277	0.300966	0.008905		0.026753	1.548012	0.032565		0.013769	0.638955	0.587085
8104	4209	0.840272	0.318384	0.008212		0.026379	1.541299	0.032376		0.014197	0.625465	0.586403
8105	4210	0.745735	0.289458	0.006722		0.023036	1.358393	0.028438		0.0128	0.54151	0.519138
8106	4211	0.650809	0.252463	0.005676		0.019842	1.188808	0.024555		0.0111	0.462131	0.452163
8107	4212	0.747342	0.285387	0.006122		0.02248	1.373238	0.02782		0.012704	0.517567	0.518201
8108	4213	0.844434	0.309586	0.006135		0.024947	1.559872	0.03074		0.014174	0.564312	0.584048
8109	4214	0.845796	0.291324	0.0065		0.024769	1.564688	0.029909		0.013872	0.543954	0.583589
8110	4215	0.847239	0.270974	0.007277		0.024826	1.563308	0.028864		0.013446	0.523452	0.583293
8111	4216	0.848757	0.257921	0.00783		0.0249	1.557001	0.027579		0.012925	0.507973	0.583175
8112	4217	0.837464	0.243347	0.007959		0.024607	1.524293	0.025634		0.012153	0.483297	0.574381
8113	4218	0.658328	0.182067	0.007091		0.019378	1.187856	0.022055		0.009072	0.363954	0.451129
8114	4219	0.672011	0.180024	0.008739		0.019804	1.2057	0.024209		0.008965	0.360574	0.460268
8115	4220	0.854697	0.218362	0.015315		0.025241	1.51607	0.035682		0.010862	0.43161	0.584825
8116	4221	0.856523	0.221507	0.020487		0.025351	1.49732	0.041197		0.011159	0.40283	0.585371
8117	4222	0.858422	0.224521	0.026577		0.025468	1.472276	0.047777		0.011404	0.372103	0.585768
8118	4223	0.860396	0.228948	0.033718		0.025596	1.440067	0.056032		0.011596	0.343595	0.585986
8119	4224	0.764443	0.205223	0.03725		0.022816	1.241508	0.057742		0.010402	0.277678	0.519454
8120	4225	0.667702	0.178376	0.038137		0.019989	1.058207	0.056232		0.009124	0.222474	0.452836
8121	4226	0.767375	0.200388	0.051		0.023056	1.183567	0.071689		0.010715	0.229932	0.519399
8122	4227	0.867943	0.214666	0.069574		0.026226	1.284025	0.092063		0.013541	0.218334	0.585985

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8123	4228	0.672345	0.152507	0.064408		0.020466	0.945238	0.080323		0.011544	0.134775	0.452933
8124	4229	0.43561	0.091531	0.045873		0.013326	0.593058	0.055461		0.007832	0.07517	0.293147
8125	4230	0.594628	0.114665	0.067637		0.018279	0.786262	0.079828		0.011071	0.089049	0.399875
8126	4231	0.794389	0.12476	0.105097		0.024698	0.985003	0.118207		0.015718	0.086722	0.533525
8127	4232	0.885696	0.081876	0.073446		0.04208	0.972276	0.012349		0.017689	0.070751	0.592655
8128	4233	1.003456	0.131632	0.071999		0.047135	1.20995	0.017105		0.018601	0.131388	0.674715
8129	4234	0.853312	0.143397	0.052687		0.03962	1.127355	0.017432		0.014642	0.159811	0.576334
8130	4235	0.616335	0.117936	0.033954		0.028389	0.862434	0.014121		0.010007	0.139886	0.41747
8131	4236	0.483835	0.100157	0.02442		0.022157	0.702695	0.011976		0.007534	0.124078	0.328362
8132	4237	0.640503	0.140663	0.029977		0.029195	0.955126	0.016834		0.009649	0.179807	0.435334
8133	4238	0.871911	0.213973	0.035709		0.039404	1.35137	0.025315		0.012388	0.282316	0.594095
8134	4239	0.808437	0.218749	0.028822		0.036219	1.285678	0.025644		0.01089	0.297485	0.552075
8135	4240	0.714014	0.204439	0.022753		0.031776	1.150226	0.023996		0.009597	0.285393	0.488307
8136	4241	0.713668	0.213071	0.020326		0.031554	1.161597	0.02519		0.009623	0.30531	0.488667
8137	4242	0.713376	0.222045	0.01811		0.031334	1.173432	0.026248		0.009658	0.32233	0.488956
8138	4243	0.63182	0.204123	0.0143		0.027568	1.051287	0.024071		0.008595	0.298205	0.433389
8139	4244	0.494098	0.16349	0.010523		0.021446	0.829252	0.019254		0.006747	0.239823	0.339065
8140	4245	0.55032	0.185052	0.011261		0.023785	0.929068	0.021773		0.007538	0.272482	0.377735
8141	4246	0.650295	0.222965	0.012671		0.02792	1.107298	0.02622		0.008946	0.331139	0.446437
8142	4247	0.637756	0.221521	0.012007		0.027201	1.094654	0.026068		0.008805	0.333421	0.437863
8143	4248	0.612755	0.214328	0.011521		0.025955	1.056438	0.02529		0.008483	0.329019	0.421192
8144	4249	0.58779	0.205755	0.011436		0.024734	1.014326	0.024398		0.008146	0.323548	0.404395
8145	4250	0.619139	0.215627	0.012388		0.025875	1.066745	0.025781		0.008576	0.349182	0.426473
8146	4251	0.650551	0.226975	0.013309		0.026973	1.116912	0.027114		0.008985	0.376187	0.44859
8147	4252	0.738337	0.255113	0.015274		0.03036	1.262433	0.03074		0.010139	0.442714	0.509504
8148	4253	0.826317	0.284627	0.017025		0.033602	1.413568	0.034281		0.011214	0.525403	0.570482
8149	4254	0.732826	0.245228	0.014708		0.029452	1.26749	0.030247		0.00978	0.489773	0.505908
8150	4255	0.63919	0.205249	0.012359		0.025445	1.113945	0.026262		0.008422	0.441656	0.441105
8151	4256	0.68343	0.206836	0.013102		0.026938	1.199216	0.027945		0.008926	0.486169	0.471352
8152	4257	0.803106	0.223873	0.015068		0.031287	1.418986	0.032667		0.01044	0.587427	0.553397
8153	4258	0.879182	0.232277	0.015686		0.033751	1.564444	0.035565		0.011779	0.659504	0.605046
8154	4259	0.854885	0.211534	0.014237		0.032325	1.529681	0.034448		0.011763	0.650845	0.587501
8155	4260	0.830536	0.188573	0.012686		0.03095	1.491639	0.033404		0.011707	0.634853	0.569965
8156	4261	0.818768	0.177349	0.011799		0.030064	1.473727	0.032921		0.011832	0.622727	0.561044
8157	4262	0.643062	0.142333	0.008675		0.023273	1.158276	0.025872		0.009535	0.483108	0.439944
8158	4263	0.656073	0.151722	0.00847		0.02354	1.181449	0.026405		0.009883	0.48786	0.448386
8159	4264	0.833627	0.219214	0.010167		0.029462	1.499039	0.033554		0.012913	0.605947	0.568622
8160	4265	0.834606	0.248182	0.00961		0.029049	1.496719	0.033542		0.013275	0.589368	0.568038
8161	4266	0.835657	0.26979	0.008982		0.028639	1.492614	0.033456		0.013604	0.569354	0.567355
8162	4267	0.836796	0.283307	0.00826		0.028233	1.486689	0.033281		0.013865	0.545673	0.56659
8163	4268	0.742801	0.255738	0.00691		0.024671	1.322808	0.029256		0.012432	0.46521	0.501475
8164	4269	0.648364	0.221792	0.006008		0.021275	1.16042	0.025282		0.010868	0.396627	0.436682
8165	4270	0.744676	0.249169	0.006694		0.024141	1.339182	0.028674		0.012425	0.443727	0.500337
8166	4271	0.841651	0.267772	0.007054		0.026866	1.52102	0.03174		0.013824	0.483074	0.563735
8167	4272	0.843258	0.249059	0.007227		0.02651	1.527332	0.030946		0.013493	0.464983	0.563129
8168	4273	0.84497	0.232094	0.007963		0.026387	1.528574	0.029937		0.013044	0.450788	0.562717
8169	4274	0.846782	0.219278	0.008672		0.026499	1.524737	0.028679		0.012511	0.438147	0.56252
8170	4275	0.835832	0.205356	0.008889		0.026223	1.493721	0.026734		0.011751	0.417708	0.554002
8171	4276	0.657306	0.152468	0.007364		0.020677	1.163606	0.022339		0.008778	0.31518	0.434795
8172	4277	0.671132	0.150029	0.009011		0.021147	1.180423	0.02429		0.008686	0.312543	0.443544
8173	4278	0.853957	0.1873	0.015826		0.026983	1.482563	0.035489		0.011123	0.379146	0.563637
8174	4279	0.856182	0.191561	0.021053		0.027123	1.463437	0.041096		0.011388	0.35983	0.564203
8175	4280	0.858496	0.195756	0.027208		0.027261	1.440131	0.047983		0.011604	0.337117	0.564577
8176	4281	0.860907	0.198517	0.0344		0.027398	1.412035	0.056409		0.011772	0.311371	0.564733
8177	4282	0.765301	0.176906	0.037901		0.024409	1.221871	0.058267		0.010542	0.250905	0.500518
8178	4283	0.668735	0.153633	0.038704		0.021365	1.041962	0.056814		0.009239	0.201245	0.436261
8179	4284	0.768896	0.172512	0.051651		0.024606	1.164619	0.07249		0.010678	0.208954	0.500297
8180	4285	0.870163	0.183798	0.070195		0.027905	1.262153	0.093037		0.012231	0.200963	0.564387
8181	4286	0.67445	0.130354	0.064759		0.021675	0.934276	0.080984		0.009542	0.126739	0.436278
8182	4287	0.437104	0.078691	0.045974		0.014067	0.588046	0.055703		0.006189	0.071754	0.282461
8183	4288	0.596789	0.099521	0.067702		0.019238	0.781783	0.079994		0.008439	0.086224	0.385392
8184	4289	0.79739	0.108731	0.104829		0.025867	0.985214	0.117732		0.011475	0.084558	0.514634
8185	4290	0.907191	0.075712	0.075324		0.044556	0.985386	0.012749		0.016389	0.065096	0.591455
8186	4291	1.028109	0.117244	0.074614		0.050074	1.210381	0.017681		0.017355	0.114945	0.673635
8187	4292	0.874502	0.123718	0.054855		0.042211	1.113974	0.018062		0.01374	0.136187	0.575616
8188	4293	0.63175	0.099153	0.035421		0.030302	0.845915	0.014643		0.009407	0.117949	0.417036
8189	4294	0.495997	0.082741	0.025438		0.023681	0.68609	0.01244		0.007096	0.104239	0.328062
8190	4295	0.656662	0.11434	0.031288		0.031233	0.929678	0.017483		0.009189	0.150747	0.434973
8191	4296	0.894021	0.170302	0.037532		0.042225	1.309934	0.02635		0.012391	0.23607	0.593679
8192	4297	0.829031	0.174684	0.030275		0.038868	1.243563	0.026742		0.011427	0.248803	0.551747

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8193	4298	0.732232	0.163978	0.02391		0.034131	1.111697	0.025062		0.010075	0.239222	0.488057
8194	4299	0.731892	0.171828	0.021333		0.033916	1.122021	0.026333		0.010073	0.256556	0.488456
8195	4300	0.731596	0.177982	0.019032		0.0337	1.132574	0.02745		0.010085	0.271493	0.488778
8196	4301	0.647939	0.162518	0.015019		0.029662	1.013721	0.025173		0.00895	0.251668	0.433251
8197	4302	0.506686	0.13067	0.01084		0.02308	0.800747	0.020127		0.007011	0.202646	0.338965
8198	4303	0.564321	0.148346	0.011622		0.025601	0.899114	0.022757		0.007819	0.230434	0.377625
8199	4304	0.6668	0.179517	0.013137		0.030058	1.074449	0.027385		0.00926	0.280347	0.446302
8200	4305	0.653897	0.179056	0.012507		0.029289	1.062662	0.027207		0.009101	0.282536	0.437668
8201	4306	0.628217	0.173882	0.012534		0.027952	1.026562	0.02637		0.008761	0.279046	0.4204
8202	4307	0.602578	0.167451	0.012483		0.02664	0.987021	0.025419		0.008413	0.27461	0.403909
8203	4308	0.634673	0.175995	0.013596		0.027872	1.039908	0.026836		0.008861	0.296573	0.426035
8204	4309	0.666822	0.184657	0.014678		0.02906	1.091371	0.028203		0.009292	0.319734	0.448199
8205	4310	0.75675	0.208331	0.016909		0.032716	1.236657	0.031957		0.010501	0.373726	0.509122
8206	4311	0.846847	0.230223	0.0189		0.036222	1.382151	0.035628		0.011645	0.443685	0.570093
8207	4312	0.750969	0.199092	0.01634		0.031762	1.22626	0.031436		0.010188	0.414055	0.50555
8208	4313	0.654976	0.167009	0.013725		0.027452	1.077389	0.027296		0.008769	0.373859	0.440764
8209	4314	0.700275	0.168688	0.014471		0.029075	1.15955	0.029049		0.009234	0.41217	0.470946
8210	4315	0.822869	0.192183	0.016642		0.033789	1.371681	0.033957		0.011097	0.498924	0.552865
8211	4316	0.900793	0.200294	0.017457		0.036479	1.51189	0.036972		0.012424	0.561196	0.604421
8212	4317	0.875894	0.183827	0.015881		0.03497	1.478026	0.035818		0.012309	0.554402	0.586903
8213	4318	0.850967	0.165336	0.013967		0.033517	1.441159	0.034756		0.012159	0.540756	0.569428
8214	4319	0.838949	0.157944	0.012406		0.032595	1.423886	0.034294		0.012199	0.529882	0.560567
8215	4320	0.658952	0.128776	0.00905		0.025266	1.11923	0.026988		0.009766	0.410364	0.439602
8216	4321	0.672314	0.135834	0.008796		0.025577	1.14174	0.027567		0.010087	0.413896	0.448051
8217	4322	0.854345	0.191356	0.010527		0.032062	1.449013	0.03507		0.013101	0.512996	0.568203
8218	4323	0.855447	0.214729	0.009885		0.031668	1.447249	0.035083		0.013394	0.498164	0.567589
8219	4324	0.856647	0.231478	0.009198		0.031278	1.452494	0.035004		0.013655	0.480853	0.566846
8220	4325	0.857961	0.241106	0.008654		0.030897	1.460386	0.034828		0.013856	0.460768	0.565993
8221	4326	0.761735	0.215865	0.008194		0.02706	1.301611	0.030628		0.012379	0.387924	0.500839
8222	4327	0.665	0.185964	0.00719		0.023378	1.139985	0.026483		0.010795	0.323371	0.436032
8223	4328	0.763922	0.207384	0.007992		0.02658	1.313864	0.030065		0.012311	0.361494	0.499466
8224	4329	0.863619	0.220386	0.008407		0.029661	1.49076	0.033331		0.013658	0.393174	0.562562
8225	4330	0.865502	0.204852	0.008574		0.029353	1.496775	0.032559		0.013291	0.381112	0.561785
8226	4331	0.867513	0.19194	0.008848		0.029064	1.498839	0.031563		0.01282	0.371104	0.56124
8227	4332	0.869656	0.179088	0.00975		0.028796	1.496256	0.030306		0.012273	0.361331	0.560963
8228	4333	0.858714	0.165685	0.010091		0.028421	1.466602	0.028321		0.011515	0.351152	0.552446
8229	4334	0.675547	0.121839	0.008274		0.022432	1.142538	0.023122		0.008604	0.269872	0.433588
8230	4335	0.689917	0.119716	0.009587		0.022956	1.158872	0.025131		0.008896	0.270562	0.442203
8231	4336	0.878231	0.154275	0.016735		0.029318	1.455008	0.036094		0.011562	0.330364	0.56176
8232	4337	0.880907	0.161277	0.022142		0.029493	1.43638	0.041984		0.011791	0.313852	0.56237
8233	4338	0.8837	0.165692	0.028493		0.029656	1.415028	0.049143		0.011977	0.294298	0.56274
8234	4339	0.886615	0.166999	0.035915		0.029814	1.390664	0.057921		0.012132	0.272185	0.56282
8235	4340	0.788559	0.148963	0.039453		0.026558	1.207723	0.059992		0.010858	0.220221	0.498706
8236	4341	0.689346	0.128763	0.040218		0.023236	1.033532	0.058616		0.009519	0.177267	0.434568
8237	4342	0.792948	0.144224	0.053538		0.026739	1.159986	0.074893		0.010959	0.185345	0.498234
8238	4343	0.897936	0.153551	0.07256		0.030267	1.264452	0.096212		0.01248	0.181084	0.561884
8239	4344	0.696456	0.109627	0.066658		0.023425	0.940804	0.083661		0.009744	0.117008	0.434337
8240	4345	0.451554	0.066546	0.047253		0.015157	0.594872	0.057466		0.006322	0.067363	0.281213
8241	4346	0.61676	0.084655	0.069309		0.020657	0.794135	0.082288		0.008619	0.082226	0.383869
8242	4347	0.824662	0.092132	0.106844		0.027535	1.0096	0.120445		0.011425	0.085317	0.513292
8243	4348	0.941972	0.068001	0.077901		0.04777	1.011908	0.013163		0.014592	0.058774	0.598406
8244	4349	1.068013	0.099918	0.077907		0.053873	1.221864	0.018314		0.01615	0.095174	0.681889
8245	4350	0.908852	0.102775	0.057454		0.045656	1.105306	0.018795		0.013536	0.109152	0.582919
8246	4351	0.656751	0.082436	0.037054		0.032887	0.830635	0.015291		0.009671	0.09335	0.422425
8247	4352	0.515719	0.069364	0.026579		0.025744	0.669468	0.013012		0.00753	0.081583	0.332353
8248	4353	0.682857	0.096158	0.032987		0.033986	0.90346	0.018326		0.009901	0.116821	0.440705
8249	4354	0.929863	0.139187	0.039593		0.045964	1.26678	0.027673		0.013331	0.180519	0.601585
8250	4355	0.862358	0.133084	0.031932		0.042345	1.200709	0.028135		0.012244	0.186446	0.559131
8251	4356	0.76172	0.117582	0.025193		0.037212	1.073822	0.026384		0.010759	0.178622	0.494633
8252	4357	0.761374	0.123398	0.022481		0.037002	1.084592	0.027729		0.010717	0.191444	0.495105
8253	4358	0.761052	0.128624	0.020051		**0.036784**	**1.095166**	**0.028907**		**0.010686**	**0.20266**	**0.495491**
8254	4359	0.674001	0.117657	0.015843		0.032392	0.980055	0.026511		0.009439	0.188072	0.439216
8255	4360	0.527042	0.09374	0.011325		0.025211	0.772698	0.021199		0.007365	0.151601	0.343632
8256	4361	0.586968	0.105627	0.011995		0.027966	0.867432	0.023961		0.008188	0.172522	0.382829
8257	4362	0.693504	0.128529	0.01364		0.032824	1.036376	0.028819		0.009656	0.210093	0.452464
8258	4363	0.68003	0.128878	0.01373		0.031963	1.025398	0.028607		0.009462	0.211894	0.443702
8259	4364	0.653267	0.125804	0.01392		0.030505	0.991782	0.027702		0.00909	0.2094	0.426142
8260	4365	0.626552	0.12172	0.013881		0.029072	0.955432	0.026676		0.00872	0.206136	0.409147
8261	4366	0.659858	0.128504	0.015131		0.030413	1.00927	0.028131		0.00918	0.222614	0.431636
8262	4367	0.693211	0.134306	0.016455		0.03171	1.0628	0.029528		0.009631	0.239912	0.454205

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8263	4368	0.786618	0.150334	0.019043		0.035705	1.208501	0.033434		0.010899	0.278374	0.516033
8264	4369	0.880157	0.163833	0.021318		0.039542	1.356335	0.037273		0.012128	0.32362	0.57784
8265	4370	0.780403	0.141189	0.018436		0.034679	1.207016	0.032897		0.010666	0.302242	0.512372
8266	4371	0.680583	0.122221	0.015486		0.029982	1.055603	0.028569		0.009219	0.273073	0.446666
8267	4372	0.727594	0.129825	0.016253		0.031771	1.131284	0.030403		0.009812	0.301272	0.477195
8268	4373	0.854901	0.148511	0.018714		0.036945	1.33202	0.03554		0.011748	0.365031	0.560089
8269	4374	0.93578	0.157146	0.019791		0.039911	1.460738	0.038688		0.013104	0.410943	0.612216
8270	4375	0.909865	0.145799	0.017986		0.038289	1.423179	0.03747		0.012938	0.405975	0.594527
8271	4376	0.883974	0.133581	0.015764		0.03674	1.386843	0.036376		0.012719	0.395824	0.57693
8272	4377	0.871532	0.129943	0.013321		0.035772	1.373425	0.035951		0.012686	0.387711	0.568018
8273	4378	0.684589	0.106547	0.009514		0.027754	1.084663	0.028349		0.010094	0.300047	0.445494
8274	4379	0.698498	0.111185	0.009193		0.028114	1.11041	0.028988		0.010388	0.302437	0.454084
8275	438	0.294393	0.013258	0.046405		0.028038	0.272561	0.069353		0.004646	0.009866	0.240031
8276	4380	0.887703	0.152031	0.010938		0.0353	1.418776	0.036922		0.013396	0.374385	0.575907
8277	4381	0.888963	0.162981	0.010187		0.034927	1.426528	0.036961		0.013579	0.363235	0.575238
8278	4382	0.890367	0.173972	0.009696		0.034546	1.432429	0.03688		0.013709	0.350339	0.574403
8279	4383	0.891903	0.179412	0.010549		0.034182	1.437165	0.036677		0.013791	0.335317	0.573489
8280	4384	0.792041	0.159018	0.009994		0.030006	1.277808	0.03225		0.012241	0.281905	0.507389
8281	4385	0.691579	0.135901	0.008744		0.025973	1.116803	0.027902		0.01063	0.234305	0.441617
8282	4386	0.79461	0.150243	0.009688		0.029581	1.284399	0.031708		0.012071	0.257202	0.505695
8283	4387	0.898542	0.162392	0.010163		0.033084	1.453673	0.035213		0.013318	0.282989	0.569341
8284	4388	0.900741	0.154727	0.010346		0.032841	1.456828	0.034461		0.012925	0.281739	0.568362
8285	4389	0.9031	0.143697	0.010179		0.032621	1.457289	0.033479		0.01245	0.280471	0.567636
8286	439	0.268973	0.013662	0.053857		0.02995	0.264931	0.057334		0.005989	0.010743	0.220536
8287	4390	0.905637	0.13288	0.01109		0.032399	1.454253	0.032218		0.011908	0.278496	0.567246
8288	4391	0.894575	0.120769	0.011628		0.031719	1.425581	0.030176		0.011789	0.271191	0.558636
8289	4392	0.704028	0.08739	0.009527		0.024781	1.110909	0.024148		0.009337	0.209718	0.438492
8290	4393	0.719175	0.087436	0.010374		0.025213	1.127025	0.026227		0.009574	0.210761	0.447232
8291	4394	0.915889	0.11636	0.017941		0.03218	1.415761	0.03722		0.012279	0.257985	0.567954
8292	4395	0.919123	0.121897	0.023573		0.032387	1.398921	0.04333		0.012412	0.245555	0.568563
8293	4396	0.922503	0.125533	0.030207		0.032595	1.38034	0.050555		0.01256	0.231078	0.568947
8294	4397	0.926045	0.12695	0.037928		0.032796	1.360042	0.059739		0.012725	0.215296	0.568936
8295	4398	0.82411	0.113743	0.041553		0.029228	1.1855	0.062112		0.011436	0.175866	0.503948
8296	4399	0.720763	0.098529	0.042267		0.025574	1.018359	0.060863		0.010067	0.142624	0.438988
8297	440	0.474163	0.022371	0.075727		0.047605	0.439697	0.114244		0.007332	0.016364	0.384163
8298	4400	0.829487	0.110697	0.056176		0.029432	1.148397	0.077957		0.011651	0.15071	0.503094
8299	4401	0.939966	0.118646	0.075884		0.033301	1.267109	0.100324		0.013366	0.150267	0.567083
8300	4402	0.729647	0.084134	0.069525		0.025736	0.953398	0.087311		0.010483	0.100021	0.43836
8301	4403	0.473323	0.050974	0.049127		0.016621	0.606422	0.059931		0.006824	0.058787	0.283933
8302	4404	0.646824	0.064909	0.07204		0.0226	0.813973	0.085676		0.009341	0.073417	0.387628
8303	4405	0.866214	0.072763	0.109922		0.029796	1.047401	0.12503		0.012466	0.084566	0.519187
8304	441	0.433276	0.023768	0.087566		0.050015	0.426721	0.093819		0.012733	0.018562	0.352787
8305	442	0.709409	0.056218	0.121254		0.125059	0.705223	0.2033		0.01129	0.031788	0.537479
8306	443	0.658542	0.063137	0.140653		0.104687	0.649692	0.156013		0.028179	0.031562	0.491746
8307	446	0.349736	0.01464	0.053887		0.030741	0.323138	0.07946		0.00586	0.011197	0.287902
8308	4461	0.427849	0.023219	0.008022		0.027493	0.461468	0.062927		0.00649	0.024113	0.350424
8309	4462	0.689337	0.037358	0.013185		0.046721	0.747984	0.103685		0.009881	0.039515	0.560909
8310	4463	0.508075	0.027636	0.009211		0.030088	0.543585	0.071925		0.00867	0.027892	0.420235
8311	447	0.319438	0.014401	0.062978		0.03356	0.314895	0.066296		0.005761	0.012284	0.264634
8312	448	0.724901	0.040014	0.119481		0.085152	0.678688	0.1855		0.010097	0.02709	0.576717
8313	449	0.662721	0.044027	0.137177		0.084492	0.653043	0.149274		0.029739	0.0341	0.528378
8314	4496	0.319042	0.075182	0.057004		0.032744	0.332801	0.060658		0.005603	0.022459	0.263512
8315	4497	0.268673	0.065116	0.048985		0.029286	0.281808	0.052617		0.005235	0.019523	0.219621
8316	4498	0.432806	0.10635	0.079867		0.049006	0.455709	0.086271		0.011092	0.031971	0.351535
8317	4499	0.662135	0.165824	0.125976		0.08309	0.704689	0.137955		0.026112	0.051456	0.52785
8318	450	0.738283	0.04693	0.124264		0.100867	0.705419	0.198466		0.009393	0.029596	0.577114
8319	4500	0.674723	0.166936	0.13146		0.092841	0.724611	0.14538		0.029821	0.053468	0.52821
8320	4501	0.642136	0.151834	0.126917		0.095557	0.690949	0.14129		0.028272	0.049124	0.4917
8321	4502	0.657842	0.145447	0.130487		0.103528	0.704325	0.145786		0.028571	0.046003	0.491751
8322	4503	0.72627	0.147936	0.144252		0.121381	0.771049	0.161498		0.031461	0.042583	0.528432
8323	4504	0.745258	0.138376	0.147815		0.131944	0.782522	0.165528		0.031894	0.041846	0.528335
8324	4505	0.736944	0.124129	0.145581		0.138198	0.764056	0.162804		0.030052	0.040829	0.50956
8325	4506	0.751153	0.121299	0.147471		0.148909	0.769243	0.164484		0.02784	0.041061	0.507965
8326	4507	0.776471	0.122376	0.150986		0.1639	0.785455	0.167737		0.024459	0.041884	0.513333
8327	4508	0.539672	0.086192	0.103627		0.121293	0.540088	0.114725		0.01404	0.028952	0.349606
8328	4509	0.64775	0.099797	0.111604		0.143898	0.674268	0.125273		0.016754	0.036986	0.420634
8329	451	0.675266	0.052149	0.142524		0.094197	0.666365	0.156653		0.031652	0.034344	0.528492
8330	4510	0.647817	0.095974	0.099411		0.141468	0.701301	0.114772		0.016591	0.039421	0.42175
8331	4511	0.674696	0.095816	0.091585		0.144047	0.757711	0.110528		0.01704	0.04364	0.440517
8332	4512	0.647405	0.086898	0.076418		0.134216	0.753795	0.097345		0.015915	0.044379	0.423623

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8333	4513	0.593097	0.075222	0.061848		0.119726	0.708501	0.084143		0.014243	0.042458	0.388903
8334	4514	0.592651	0.070248	0.05434		0.116036	0.723022	0.080585		0.013897	0.043943	0.389441
8335	4515	0.592138	0.064591	0.047782		0.112229	0.735913	0.076695		0.013592	0.044921	0.389225
8336	4516	0.591573	0.058732	0.041871		0.108472	0.745994	0.074255		0.013375	0.045687	0.388961
8337	4517	0.590979	0.053042	0.03653		0.10477	0.752792	0.073571		0.013564	0.045586	0.388815
8338	4518	0.590368	0.048213	0.031629		0.10116	0.756545	0.074236		0.01374	0.045438	0.388671
8339	4519	0.589728	0.043389	0.027446		0.097833	0.75835	0.074576		0.013909	0.044993	0.387968
8340	452	0.699191	0.050383	0.119139		0.110244	0.682655	0.195413		0.009795	0.02986	0.537327
8341	4520	0.589047	0.038524	0.024752		0.09503	0.757268	0.076176		0.014089	0.044474	0.387281
8342	4521	0.4368	0.02516	0.016529		0.068863	0.559446	0.058844		0.010587	0.032616	0.287099
8343	4522	0.391994	0.021403	0.014051		0.061268	0.500617	0.054114		0.009561	0.029068	0.257616
8344	4523	0.53394	0.027873	0.01728		0.082744	0.678297	0.077012		0.013176	0.039036	0.350711
8345	4524	0.551013	0.028513	0.015792		0.085779	0.695481	0.084302		0.013797	0.039589	0.361793
8346	4525	0.532572	0.027314	0.013528		0.084625	0.668849	0.086434		0.013529	0.038277	0.349736
8347	4526	0.531405	0.031448	0.01145		0.0904	0.680201	0.082879		0.013834	0.041166	0.349572
8348	4527	0.530888	0.035166	0.011055		0.091942	0.696493	0.07453		0.013877	0.042935	0.349815
8349	4528	0.397739	0.028248	0.007816		0.068979	0.535227	0.049559		0.010386	0.033451	0.262614
8350	4529	0.291513	0.021238	0.005797		0.050334	0.39722	0.034065		0.007638	0.024962	0.192681
8351	453	0.642779	0.056228	0.13711		0.096805	0.635835	0.151627		0.028343	0.030263	0.491793
8352	4530	0.4502	0.033544	0.009314		0.077026	0.622629	0.048558		0.011821	0.039423	0.297981
8353	4531	0.581805	0.044773	0.01299		0.097014	0.826242	0.053756		0.01518	0.052951	0.386298
8354	4532	0.514881	0.042521	0.012306		0.082753	0.74996	0.040359		0.013276	0.049168	0.343173
8355	4533	0.448279	0.039063	0.010509		0.069547	0.665092	0.030629		0.011389	0.044546	0.299554
8356	4534	0.513489	0.046713	0.011635		0.076474	0.774998	0.030449		0.012752	0.053034	0.344114
8357	4535	0.578231	0.054382	0.01266		0.081062	0.890181	0.028552		0.014407	0.062671	0.389285
8358	4536	0.577063	0.054995	0.012755		0.075412	0.903853	0.023703		0.014475	0.065533	0.390501
8359	4537	0.575834	0.055439	0.011263		0.069489	0.915902	0.018934		0.014411	0.068268	0.390912
8360	4538	0.574564	0.055044	0.010015		0.063416	0.926485	0.015353		0.014131	0.070757	0.391482
8361	4539	0.451656	0.042692	0.00764		0.045074	0.737491	0.013103		0.010774	0.057365	0.30921
8362	454	0.774744	0.067642	0.133555		0.153422	0.784116	0.227295		0.014274	0.036424	0.577741
8363	4540	0.44237	0.041286	0.007401		0.041345	0.727397	0.013452		0.010415	0.057012	0.303701
8364	4541	0.562491	0.051406	0.008612		0.046462	0.936029	0.0188		0.012901	0.073874	0.387507
8365	4542	0.569769	0.050569	0.00819		0.040597	0.959262	0.020441		0.012595	0.075816	0.394145
8366	4543	0.568389	0.049663	0.008282		0.033928	0.966882	0.021082		0.012053	0.07628	0.395305
8367	4544	0.56702	0.049035	0.008566		0.027109	0.973086	0.022254		0.01217	0.076579	0.396593
8368	4545	0.565662	0.049343	0.008547		0.020349	0.978472	0.023188		0.012318	0.076892	0.396412
8369	4546	0.500198	0.044293	0.007819		0.012426	0.87065	0.021289		0.010837	0.068568	0.351419
8370	4547	0.435285	0.038984	0.007099		0.009486	0.760241	0.019274		0.009232	0.060028	0.30678
8371	4548	0.498424	0.044975	0.008494		0.011428	0.872995	0.02289		0.010222	0.069062	0.352403
8372	4549	0.56109	0.050389	0.008926		0.014602	0.986749	0.025399		0.010649	0.077986	0.396742
8373	455	0.727042	0.076833	0.155177		0.122538	0.715438	0.172417		0.031003	0.035442	0.528295
8374	4550	0.559912	0.049594	0.00792		0.016912	0.988018	0.025262		0.009459	0.077755	0.39603
8375	4551	0.558832	0.048625	0.00678		0.021869	0.988352	0.025995		0.009004	0.077226	0.395878
8376	4552	0.557854	0.047658	0.005841		0.026801	0.988054	0.027221		0.008584	0.076433	0.395916
8377	4553	0.438835	0.037531	0.004331		0.024974	0.77865	0.021016		0.006455	0.059433	0.310781
8378	4554	0.430038	0.036825	0.004444		0.026639	0.763407	0.020469		0.006128	0.057831	0.304259
8379	4555	0.547424	0.047055	0.006089		0.039464	0.970887	0.026657		0.007373	0.072768	0.387633
8380	4556	0.555258	0.049169	0.007661		0.046092	0.982116	0.027997		0.007115	0.072885	0.393971
8381	4557	0.571572	0.052614	0.009695		0.0537	1.008059	0.027612		0.007184	0.075099	0.405418
8382	4558	0.587933	0.055492	0.011598		0.061951	1.031923	0.027407		0.008116	0.077376	0.417183
8383	4559	0.537254	0.05142	0.01191		0.062747	0.936539	0.024991		0.008934	0.070255	0.381892
8384	456	0.786822	0.075202	0.136582		0.173896	0.814478	0.23525		0.016644	0.038686	0.577664
8385	4560	0.457342	0.044065	0.010913		0.058021	0.792178	0.021456		0.008439	0.059297	0.325732
8386	4561	0.427865	0.041337	0.010582		0.058134	0.737443	0.019163		0.008315	0.0553	0.304713
8387	4562	0.49071	0.047073	0.012547		0.070991	0.841296	0.021031		0.009824	0.063142	0.349504
8388	4563	0.553556	0.053416	0.014863		0.08645	0.941474	0.023124		0.010923	0.070415	0.394846
8389	4564	0.494811	0.047456	0.014054		0.083127	0.833947	0.020312		0.009866	0.062003	0.354223
8390	4565	0.436101	0.041487	0.012377		0.077357	0.729917	0.016617		0.009064	0.054207	0.312086
8391	4566	0.415169	0.038902	0.01213		0.077453	0.689321	0.014806		0.009041	0.051083	0.296936
8392	4567	0.394244	0.036176	0.01184		0.076861	0.649006	0.013361		0.008878	0.047889	0.281932
8393	4568	0.411093	0.036722	0.012914		0.083524	0.670125	0.013418		0.009588	0.049126	0.29405
8394	4569	0.42797	0.037277	0.014236		0.090808	0.689535	0.013918		0.010276	0.050146	0.306445
8395	457	0.746052	0.086488	0.158778		0.132962	0.732622	0.176502		0.031676	0.036859	0.528051
8396	4570	0.436484	0.037801	0.015547		0.096483	0.694933	0.014823		0.010776	0.050833	0.312097
8397	4571	0.369465	0.031689	0.014196		0.084934	0.58045	0.013849		0.00943	0.042823	0.2638
8398	4572	0.331763	0.028226	0.013453		0.078199	0.516352	0.013646		0.008624	0.038271	0.236753
8399	4573	0.42429	0.03565	0.018457		0.103034	0.652211	0.020195		0.011291	0.048533	0.302729
8400	4574	1.054677	0.056785	0.021192		0.082388	1.166896	0.167649		0.014503	0.063263	0.842211
8401	4575	0.47912	0.039402	0.023069		0.120761	0.724241	0.02733		0.013071	0.053958	0.341794
8402	4576	0.479343	0.038233	0.025756		0.125115	0.712482	0.03178		0.013383	0.052869	0.340997

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8403	4577	0.479555	0.038302	0.028805		0.129293	0.70024	0.036978		0.013716	0.051458	0.340265
8404	4578	0.542882	0.045791	0.036592		0.150901	0.778337	0.04888		0.015848	0.056262	0.38456
8405	4579	0.585236	0.053117	0.045615		0.168605	0.818753	0.063852		0.017477	0.057516	0.413886
8406	458	0.773786	0.080636	0.134404		0.189573	0.817352	0.23374		0.018546	0.039648	0.55714
8407	4580	0.429583	0.0412	0.038281		0.127553	0.586325	0.055096		0.013078	0.040051	0.302702
8408	4581	0.324306	0.032009	0.030941		0.097686	0.436553	0.045153		0.009972	0.029316	0.228102
8409	4582	0.412736	0.04224	0.042641		0.12635	0.545918	0.063331		0.012831	0.035845	0.289791
8410	4583	0.570573	0.061198	0.065189		0.178156	0.73614	0.099176		0.017975	0.046624	0.399684
8411	4584	0.6691	0.075774	0.08682		0.213986	0.831608	0.136954		0.021438	0.051192	0.466389
8412	4585	0.588537	0.07024	0.086176		0.191715	0.703566	0.140987		0.019125	0.041818	0.408138
8413	4586	0.508272	0.062809	0.080987		0.167165	0.589519	0.136981		0.016793	0.033543	0.350913
8414	4587	0.73582	0.088558	0.117695		0.219034	0.83856	0.199449		0.021805	0.049425	0.514994
8415	4588	0.715759	0.090739	0.114696		0.192055	0.80084	0.194413		0.018982	0.055299	0.509329
8416	4589	0.705425	0.10013	0.113025		0.171842	0.777018	0.191129		0.016761	0.063819	0.510666
8417	459	0.73768	0.093594	0.156219		0.139063	0.723354	0.173578		0.030032	0.03685	0.509123
8418	4590	0.717571	0.119555	0.114589		0.157282	0.776865	0.192713		0.015019	0.074712	0.529201
8419	4591	0.706508	0.134196	0.111722		0.138312	0.748002	0.186262		0.012861	0.081885	0.529044
8420	4592	12.93405	2.758561	2.022918		2.252895	13.42111	3.331223		0.205432	1.647972	9.841676
8421	4593	0.63754	0.14047	0.09789		0.098809	0.650982	0.159357		0.008778	0.083834	0.491784
8422	4594	0.673182	0.14961	0.100938		0.090373	0.673104	0.161651		0.008484	0.090153	0.527995
8423	4595	0.660965	0.143737	0.096192		0.076087	0.645859	0.151177		0.009033	0.087636	0.52749
8424	4596	0.432261	0.088977	0.06054		0.04236	0.41207	0.093229		0.006582	0.054855	0.351303
8425	4597	0.268392	0.053815	0.037024		0.024877	0.253653	0.056616		0.004182	0.033282	0.219486
8426	4598	0.318817	0.060969	0.042887		0.02717	0.297396	0.064888		0.005258	0.037879	0.263238
8427	460	0.538776	0.069055	0.085626		0.184434	0.628666	0.144767		0.019011	0.036287	0.370275
8428	461	0.624539	0.077519	0.091181		0.211301	0.747701	0.149098		0.021443	0.045585	0.430741
8429	462	0.710582	0.08482	0.091833		0.235463	0.879124	0.144951		0.023654	0.05687	0.492231
8430	463	0.699555	0.081001	0.079615		0.226101	0.893181	0.121418		0.022902	0.061469	0.486997
8431	464	0.438689	0.049184	0.045068		0.138933	0.572424	0.06712		0.014177	0.040461	0.305887
8432	465	0.344678	0.037825	0.032692		0.107317	0.456957	0.047874		0.011029	0.033035	0.240788
8433	466	0.456523	0.049234	0.040435		0.139992	0.613083	0.058404		0.014483	0.045181	0.319505
8434	467	0.715044	0.07514	0.05531		0.212639	0.982695	0.07813		0.022225	0.075442	0.502669
8435	468	0.576914	0.057597	0.038588		0.165364	0.811878	0.051841		0.017532	0.063124	0.405905
8436	469	0.509535	0.049014	0.030404		0.1414	0.729716	0.039309		0.015234	0.057688	0.359211
8437	470	0.509242	0.048182	0.027234		0.136563	0.741332	0.033814		0.014945	0.05977	0.359949
8438	471	0.603076	0.056748	0.028968		0.156236	0.891322	0.034969		0.017183	0.073964	0.428014
8439	472	0.450738	0.041254	0.019461		0.112573	0.676425	0.021621		0.012442	0.055865	0.319567
8440	473	0.352419	0.031662	0.014187		0.085327	0.534796	0.014682		0.009558	0.044368	0.249954
8441	474	0.39245	0.034751	0.015001		0.092604	0.600615	0.014939		0.010488	0.050124	0.27851
8442	475	0.463611	0.04018	0.016423		0.105011	0.718137	0.016038		0.012089	0.060722	0.329472
8443	476	0.548982	0.046613	0.018197		0.119544	0.859311	0.018755		0.013734	0.074372	0.391256
8444	4769	1.043989	0.053342	0.022837		0.110854	1.21693	0.180093		0.01738	0.068882	0.78523
8445	477	0.436551	0.036372	0.013682		0.091137	0.690934	0.014335		0.010458	0.059031	0.310482
8446	4770	1.15154	0.056915	0.025492		0.133367	1.36354	0.200078		0.020517	0.077409	0.844071
8447	4771	1.01965	0.053604	0.021985		0.099988	1.174079	0.173973		0.015914	0.065976	0.784921
8448	478	0.418658	0.034665	0.012586		0.083674	0.668553	0.014261		0.00979	0.057006	0.297729
8449	479	0.440882	0.03664	0.012923		0.084143	0.70964	0.015809		0.010057	0.060627	0.313579
8450	480	0.463132	0.038548	0.013205		0.083773	0.751131	0.017703		0.010242	0.064606	0.329547
8451	481	0.619076	0.051366	0.018156		0.106243	1.010316	0.026007		0.013033	0.088438	0.441333
8452	482	0.587761	0.049185	0.015943		0.093946	0.967935	0.024417		0.013068	0.082956	0.416826
8453	483	0.521061	0.043676	0.013507		0.07685	0.864283	0.022276		0.012059	0.07366	0.368953
8454	484	0.454333	0.038031	0.011375		0.062758	0.757188	0.020242		0.010342	0.064656	0.321638
8455	485	0.579671	0.048282	0.014375		0.075083	0.969744	0.028231		0.012109	0.083921	0.410891
8456	486	0.570311	0.047609	0.012714		0.068318	0.960098	0.026413		0.010286	0.081277	0.403095
8457	487	0.62411	0.051989	0.012404		0.067166	1.056638	0.029083		0.009195	0.08861	0.440391
8458	488	0.606726	0.050312	0.010315		0.05783	1.03141	0.02921		0.007956	0.086568	0.427924
8459	489	0.68265	0.056764	0.009433		0.057752	1.162562	0.035314		0.00874	0.099136	0.482212
8460	490	0.581105	0.049859	0.006424		0.042959	0.992925	0.028182		0.008071	0.083202	0.409164
8461	491	0.45651	0.040373	0.004618		0.028786	0.781022	0.021712		0.006583	0.06529	0.321328
8462	492	0.465846	0.042003	0.004509		0.026937	0.797072	0.022179		0.00686	0.066817	0.328135
8463	493	0.68598	0.064006	0.007085		0.033576	1.171969	0.034513		0.010866	0.099993	0.485026
8464	494	0.593416	0.056182	0.007368		0.023748	1.014022	0.027427		0.01011	0.085209	0.418076
8465	495	0.594607	0.057239	0.008632		0.018326	1.014759	0.026754		0.010728	0.085173	0.418319
8466	496	0.595895	0.058161	0.009688		0.016004	1.014549	0.026827		0.011719	0.085739	0.41896
8467	497	0.624663	0.061777	0.011258		0.014418	1.059305	0.029264		0.01325	0.091364	0.439734
8468	498	0.462451	0.045119	0.007707		0.009999	0.782661	0.020412		0.010174	0.066633	0.323939
8469	499	0.531437	0.051209	0.008376		0.01356	0.896684	0.022598		0.011675	0.076083	0.371099
8470	50	0.184767	0.046548	0.034953		0.05818	0.191874	0.043375		0.006962	0.00955	0.128303
8471	500	0.601011	0.0568	0.009124		0.022607	1.008722	0.024567		0.012857	0.085778	0.418517
8472	501	0.697808	0.064532	0.010721		0.034499	1.162766	0.027831		0.014812	0.100343	0.48562

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8473	502	0.604	0.053695	0.008798		0.037122	0.999326	0.02242		0.013613	0.08447	0.417344
8474	503	0.605499	0.051875	0.008731		0.044749	0.992951	0.021672		0.013711	0.083159	0.416185
8475	5036	1.074712	0.057379	0.022457		0.094695	1.213946	0.178073		0.015302	0.067135	0.842967
8476	504	0.597818	0.049572	0.009154		0.051422	0.970384	0.019875		0.013705	0.080987	0.409088
8477	505	0.567902	0.045435	0.009897		0.055055	0.91165	0.01689		0.013754	0.076682	0.38774
8478	506	0.480063	0.03768	0.008218		0.049535	0.765817	0.013715		0.012075	0.063283	0.326465
8479	507	0.610758	0.046333	0.010798		0.069814	0.962753	0.016191		0.01576	0.078022	0.413313
8480	508	0.612164	0.044874	0.01215		0.076682	0.952471	0.0204		0.015911	0.076083	0.412646
8481	5086	0.309996	0.109308	0.038049		0.028038	0.326762	0.058119		0.004777	0.071996	0.254321
8482	5087	0.499308	0.18009	0.06237		0.047822	0.529984	0.09573		0.007504	0.118409	0.407089
8483	5088	0.36822	0.124473	0.043891		0.030495	0.386612	0.066563		0.006	0.082162	0.304984
8484	5089	0.351306	0.178177	0.036961		0.030798	0.465354	0.055978		0.005328	0.136948	0.289395
8485	509	0.710525	0.050255	0.016517		0.09636	1.089689	0.029718		0.018663	0.086498	0.477781
8486	5090	0.565871	0.292686	0.060759		0.052654	0.750703	0.092277		0.008395	0.224957	0.463278
8487	5091	0.417252	0.203747	0.042444		0.033338	0.548657	0.064017		0.006777	0.156447	0.346994
8488	5092	0.298798	0.189686	0.026954		0.025414	0.474903	0.040091		0.004553	0.164447	0.24709
8489	5093	0.481313	0.311165	0.044411		0.043541	0.766522	0.066143		0.007017	0.269841	0.395593
8490	5094	0.354869	0.217384	0.030841		0.027407	0.558887	0.045784		0.005791	0.188217	0.296225
8491	5095	0.215844	0.150225	0.017476		0.017986	0.384451	0.025508		0.00334	0.142226	0.178935
8492	5096	0.347692	0.246313	0.028825		0.030842	0.620843	0.042105		0.005128	0.233252	0.286496
8493	5097	0.256343	0.172277	0.019959		0.019356	0.45204	0.029105		0.004222	0.162955	0.214496
8494	5098	0.169455	0.1225	0.012655		0.013909	0.32467	0.018145		0.002662	0.124695	0.14072
8495	5099	0.27297	0.200805	0.020892		0.023868	0.525835	0.029961		0.004104	0.204431	0.225319
8496	51	0.228497	0.05069	0.041918		0.058148	0.238156	0.054381		0.0075	0.011886	0.1533
8497	510	0.614712	0.042537	0.013663		0.089452	0.928459	0.030443		0.016098	0.071249	0.410875
8498	5100	0.20125	0.140533	0.014438		0.014955	0.381597	0.020693		0.003338	0.142963	0.168674
8499	5101	0.224337	0.164337	0.015665		0.018192	0.453502	0.022073		0.003565	0.178626	0.186542
8500	5102	0.361381	0.269339	0.025866		0.031223	0.742648	0.036455		0.005521	0.292768	0.298699
8501	5103	0.266432	0.188909	0.017861		0.019547	0.532923	0.025164		0.004447	0.204897	0.223587
8502	5104	0.30542	0.229583	0.018759		0.024208	0.689026	0.025375		0.004954	0.27522	0.254529
8503	5105	0.491983	0.375713	0.030993		0.041565	1.126987	0.041924		0.007732	0.45082	0.407589
8504	5106	0.362727	0.264059	0.021374		0.026	0.794298	0.028915		0.006116	0.315965	0.305049
8505	5107	0.283216	0.217533	0.015159		0.021924	0.707884	0.019366		0.004668	0.282136	0.236493
8506	5108	0.456221	0.354465	0.025048		0.037635	1.157704	0.032001		0.007339	0.461822	0.378724
8507	5109	0.336371	0.251737	0.017268		0.023549	0.815978	0.022063		0.005709	0.324174	0.283412
8508	511	0.545932	0.036976	0.012614		0.084686	0.810422	0.0324		0.014355	0.060495	0.363211
8509	5110	0.250169	0.191806	0.012016		0.019012	0.668019	0.014494		0.004154	0.264568	0.209156
8510	5111	0.402975	0.31245	0.019851		0.032625	1.092294	0.02395		0.006562	0.432813	0.334956
8511	5112	0.297123	0.222033	0.013689		0.020435	0.770117	0.016512		0.005041	0.304169	0.250641
8512	5113	1.180485	0.058373	0.026304		0.14833	1.418421	0.205582		0.022344	0.080421	0.844178
8513	5114	0.250081	0.182986	0.010792		0.018659	0.705452	0.012122		0.004155	0.276753	0.209292
8514	5115	0.402832	0.297778	0.01783		0.032004	1.153235	0.020029		0.006601	0.452506	0.33518
8515	5116	0.29703	0.212206	0.012298		0.020074	0.813431	0.013812		0.005011	0.31834	0.250795
8516	5117	0.250024	0.171109	0.009708		0.01831	0.737852	0.009985		0.004131	0.285914	0.209403
8517	5118	0.402731	0.278248	0.016035		0.031381	1.20593	0.016497		0.006588	0.46729	0.335363
8518	5119	0.296968	0.19854	0.011066		0.019721	0.850975	0.011379		0.004947	0.329016	0.250922
8519	512	0.476619	0.032173	0.011355		0.077176	0.69722	0.03252		0.012759	0.050999	0.316145
8520	5120	0.221481	0.136765	0.007753		0.015909	0.678082	0.007145		0.003609	0.258831	0.185602
8521	5121	0.35675	0.221007	0.012806		0.027245	1.108021	0.011804		0.005783	0.422899	0.297249
8522	5122	0.263074	0.160089	0.008839		0.017158	0.782199	0.008144		0.0043	0.297946	0.222397
8523	5123	0.173229	0.099514	0.005605		0.01225	0.542868	0.004658		0.002779	0.204473	0.14521
8524	5124	0.279023	0.160308	0.009257		0.020964	0.886961	0.007696		0.004464	0.334035	0.232562
8525	5125	0.205764	0.117002	0.006391		0.013227	0.627635	0.00531		0.003296	0.235418	0.173997
8526	5126	0.192961	0.109655	0.005872		0.013469	0.61574	0.00444		0.003046	0.228731	0.161779
8527	5127	0.310804	0.176557	0.009698		0.023037	1.003619	0.007353		0.004903	0.373636	0.259099
8528	5128	0.229207	0.128998	0.006695		0.014558	0.712826	0.005048		0.003603	0.263378	0.193849
8529	5129	0.228051	0.124928	0.006335		0.01559	0.746211	0.004473		0.003495	0.270628	0.191226
8530	513	0.645861	0.04358	0.016082		0.108492	0.930061	0.050605		0.01766	0.066883	0.427439
8531	5130	0.367317	0.200254	0.010462		0.026639	1.215871	0.007414		0.005639	0.442052	0.306261
8532	5131	0.270894	0.147851	0.007223		0.016877	0.863984	0.005075		0.004115	0.311663	0.229132
8533	5132	0.223681	0.123032	0.005703		0.014965	0.746673	0.004131		0.00331	0.264475	0.187566
8534	5133	0.360272	0.197242	0.00942		0.025546	1.216495	0.006811		0.005353	0.431996	0.3004
8535	5134	0.265709	0.145572	0.006503		0.016226	0.864614	0.00472		0.003886	0.3046	0.224746
8536	5135	0.214931	0.120564	0.005042		0.014048	0.729354	0.004092		0.003057	0.252412	0.180216
8537	5136	0.346175	0.193964	0.008329		0.023957	1.188169	0.006745		0.004951	0.412297	0.288627
8538	5137	0.255322	0.142006	0.005748		0.015256	0.844637	0.004677		0.003579	0.290717	0.215939
8539	5138	0.206184	0.119799	0.004489		0.013166	0.708436	0.004038		0.002817	0.248661	0.172855
8540	5139	0.332082	0.193198	0.007416		0.022432	1.15401	0.006657		0.004568	0.405708	0.276838
8541	514	0.618517	0.041419	0.013963		0.107931	0.871669	0.056939		0.017218	0.060302	0.407638
8542	5140	0.244936	0.140651	0.005117		0.01432	0.820474	0.004616		0.003293	0.286985	0.207121

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8543	5141	0.217183	0.143306	0.004397		0.013525	0.75393	0.00444		0.002845	0.272806	0.182036
8544	5142	0.349792	0.231254	0.007265		0.023021	1.228042	0.007402		0.004615	0.445087	0.29154
8545	5143	0.258006	0.168095	0.005011		0.014732	0.873218	0.005003		0.003322	0.314871	0.218124
8546	5144	0.228193	0.166482	0.004272		0.013788	0.799525	0.00508		0.002851	0.298452	0.191206
8547	5145	0.36752	0.268751	0.007062		0.023444	1.302236	0.008463		0.004626	0.48653	0.306224
8548	5146	0.271092	0.195174	0.004868		0.015044	0.926085	0.005719		0.003328	0.34476	0.229114
8549	5147	0.258964	0.204076	0.004495		0.01514	0.914175	0.006177		0.003092	0.355327	0.21691
8550	5148	0.417071	0.330533	0.007431		0.025715	1.488901	0.010285		0.005013	0.579324	0.347385
8551	5149	0.307652	0.238183	0.00512		0.016547	1.059031	0.006959		0.003609	0.410369	0.259917
8552	515	0.478597	0.031518	0.010035		0.08584	0.659117	0.05141		0.013297	0.044016	0.314449
8553	5150	0.289768	0.246624	0.004583		0.016175	1.055507	0.007409		0.003283	0.418772	0.242583
8554	5151	0.466676	0.399442	0.007579		0.027437	1.715637	0.012331		0.005317	0.682835	0.388497
8555	5152	0.344256	0.287833	0.00522		0.017717	1.225535	0.008361		0.003841	0.484858	0.290687
8556	5153	0.256916	0.227627	0.003739		0.013627	0.962938	0.006983		0.002792	0.39222	0.214956
8557	5154	0.41376	0.368109	0.006181		0.02308	1.565253	0.011607		0.004512	0.637835	0.344247
8558	5155	0.305232	0.266245	0.004261		0.014962	1.117954	0.007886		0.003276	0.455938	0.257587
8559	5156	0.224031	0.202933	0.00313		0.011405	0.855473	0.006323		0.002378	0.354303	0.187355
8560	5157	0.360796	0.328252	0.00516		0.019295	1.390602	0.010507		0.003835	0.576246	0.300041
8561	5158	0.266166	0.237296	0.003581		0.012543	0.993142	0.007144		0.002799	0.411822	0.224515
8562	5159	0.239464	0.214989	0.003287		0.011658	0.929017	0.00697		0.002503	0.389307	0.200167
8563	516	0.309881	0.020101	0.006234		0.056126	0.421216	0.036046		0.008574	0.027606	0.203325
8564	5160	0.385646	0.347814	0.00542		0.019701	1.510495	0.011579		0.004026	0.63326	0.320555
8565	5161	0.284505	0.251342	0.003762		0.012843	1.078407	0.007878		0.002957	0.452118	0.239872
8566	5162	0.281284	0.240375	0.003763		0.012953	1.109652	0.008419		0.002915	0.467689	0.234999
8567	5163	0.452992	0.388947	0.006201		0.021863	1.804256	0.013983		0.004676	0.760885	0.376333
8568	5164	0.334196	0.280963	0.004308		0.014299	1.287871	0.00952		0.003461	0.542239	0.281618
8569	5165	0.307759	0.232867	0.003947		0.013155	1.231333	0.009449		0.003184	0.519492	0.256957
8570	5166	0.495624	0.376356	0.006499		0.022167	2.002155	0.01569		0.005097	0.845341	0.411492
8571	5167	0.365656	0.272932	0.004524		0.014558	1.429043	0.010689		0.003806	0.601766	0.307937
8572	5168	0.299068	0.187745	0.003623		0.011759	1.205654	0.009379		0.003102	0.506024	0.249552
8573	5169	0.481624	0.305587	0.005958		0.01978	1.960397	0.01552		0.004927	0.823581	0.399631
8574	517	0.522943	0.033361	0.010442		0.095199	0.702968	0.064815		0.014404	0.045548	0.342802
8575	5170	0.355333	0.22012	0.004161		0.01305	1.399244	0.010685		0.003737	0.586011	0.299067
8576	5171	0.290364	0.146503	0.003282		0.010455	1.172015	0.009296		0.00301	0.487206	0.242162
8577	5172	0.467604	0.238687	0.005387		0.017551	1.905638	0.01536		0.004749	0.794336	0.387795
8578	5173	0.344993	0.169559	0.003777		0.011635	1.360268	0.010592		0.003657	0.563593	0.290214
8579	5174	0.286053	0.10884	0.002965		0.009414	1.151354	0.009274		0.002938	0.477718	0.238452
8580	5175	0.460661	0.17756	0.004857		0.015731	1.871188	0.015322		0.004619	0.778904	0.381852
8581	5176	0.339873	0.125719	0.003423		0.010552	1.336964	0.010568		0.003605	0.551972	0.285768
8582	5177	0.224508	0.063768	0.002102		0.00678	0.898455	0.007314		0.002252	0.370454	0.187066
8583	5178	0.361548	0.104515	0.003434		0.011305	1.460059	0.012083		0.003564	0.603886	0.299564
8584	5179	0.266749	0.073155	0.002436		0.007624	1.043415	0.008335		0.002796	0.428165	0.224187
8585	518	0.564109	0.034208	0.011865		0.102547	0.741122	0.078748		0.015326	0.046708	0.369117
8586	5180	0.228949	0.06738	0.002103		0.006543	0.911269	0.007455		0.002246	0.373775	0.19072
8587	5181	0.3687	0.108258	0.003456		0.010895	1.480807	0.012316		0.003589	0.609155	0.305415
8588	5182	0.272026	0.079517	0.002415		0.007374	1.05838	0.008496		0.00281	0.432149	0.228566
8589	5183	0.290675	0.116803	0.002648		0.007491	1.141891	0.009402		0.002746	0.463213	0.24204
8590	5184	0.468104	0.187624	0.004357		0.012436	1.855376	0.015532		0.004433	0.754487	0.387597
8591	5185	0.345364	0.138586	0.003036		0.00848	1.326434	0.010715		0.003422	0.535822	0.290069
8592	5186	0.290759	0.159757	0.002608		0.00668	1.122009	0.009269		0.002662	0.449891	0.242013
8593	5187	0.468239	0.260535	0.004297		0.011048	1.822849	0.015313		0.004285	0.732489	0.387555
8594	5188	0.345462	0.18626	0.002985		0.007603	1.303577	0.010564		0.003203	0.520717	0.290038
8595	5189	0.290841	0.205175	0.002546		0.005876	1.115084	0.009063		0.002566	0.433291	0.241986
8596	519	0.564509	0.031676	0.01215		0.100387	0.724625	0.087482		0.015226	0.044541	0.36885
8597	5190	1.176144	0.058301	0.026289		0.159527	1.432506	0.204449		0.023705	0.080882	0.821442
8598	5191	0.468375	0.331871	0.004198		0.009672	1.811811	0.014971		0.004116	0.705213	0.387512
8599	5192	0.345557	0.239865	0.00291		0.006735	1.29562	0.010328		0.003053	0.501768	0.290006
8600	5193	0.290924	0.240391	0.002458		0.005502	1.108572	0.008801		0.002461	0.413805	0.242013
8601	5194	0.46851	0.388949	0.004057		0.009079	1.804352	0.01461		0.003934	0.673321	0.387553
8602	5195	0.345652	0.280937	0.002807		0.006283	1.288066	0.010006		0.002943	0.479401	0.290048
8603	5196	0.257938	0.234276	0.002077		0.004674	0.97939	0.007585		0.002148	0.350867	0.214602
8604	5197	0.415393	0.379508	0.00343		0.007694	1.59475	0.012592		0.003514	0.572602	0.343663
8605	5198	0.306456	0.27331	0.00237		0.005357	1.134795	0.008583		0.002507	0.40405	0.257189
8606	5199	0.224919	0.213457	0.001841		0.003939	0.849732	0.006432		0.001909	0.30334	0.187132
8607	52	0.356421	0.051629	0.060849		0.12258	0.405132	0.107382		0.012892	0.021708	0.24371
8608	5200	0.362221	0.345842	0.003062		0.006471	1.38361	0.010679		0.003136	0.495463	0.299675
8609	5201	0.267224	0.24897	0.002079		0.004528	0.984596	0.007277		0.002192	0.349571	0.224266
8610	5202	0.258054	0.247781	0.002168		0.004363	0.96745	0.007133		0.00232	0.348019	0.21468
8611	5203	0.415587	0.401534	0.003607		0.007151	1.575272	0.011845		0.003811	0.568491	0.34379
8612	5204	0.306587	0.288926	0.002447		0.00503	1.121037	0.00807		0.002665	0.401603	0.257279

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8613	5205	0.291227	0.270977	0.002503		0.004695	1.076136	0.007622		0.002795	0.394231	0.242204
8614	5206	0.469016	0.439271	0.004164		0.007674	1.752227	0.012657		0.004588	0.642966	0.387864
8615	5207	0.345992	0.315823	0.002823		0.005437	1.247031	0.008622		0.003212	0.455433	0.290268
8616	5208	0.29132	0.248521	0.002526		0.004469	1.05492	0.007113		0.002952	0.393952	0.242155
8617	5209	0.469173	0.403042	0.004205		0.00728	1.717678	0.011812		0.004845	0.64243	0.387778
8618	5210	0.346096	0.289471	0.002849		0.005199	1.222493	0.008046		0.003396	0.455155	0.290218
8619	5211	0.291418	0.213614	0.002515		0.004349	1.027394	0.006756		0.003088	0.391039	0.242055
8620	5212	0.469337	0.34661	0.004186		0.007104	1.672861	0.01124		0.005064	0.637554	0.387605
8621	5213	0.346204	0.248629	0.002835		0.005039	1.190645	0.007621		0.003553	0.451856	0.290111
8622	5214	0.291521	0.201283	0.002505		0.004277	0.994019	0.006856		0.003198	0.385088	0.241904
8623	5215	0.469512	0.326093	0.004171		0.006974	1.622913	0.011397		0.005244	0.627762	0.387347
8624	5216	0.34632	0.23482	0.002822		0.004969	1.151164	0.007743		0.003683	0.444992	0.289948
8625	5217	0.287214	0.179723	0.002495		0.004138	0.945365	0.006765		0.003233	0.369916	0.238044
8626	5218	0.462582	0.291168	0.004157		0.007016	1.543456	0.011234		0.005298	0.60304	0.381147
8627	5219	0.341193	0.209715	0.002808		0.00482	1.091754	0.007652		0.003724	0.427365	0.285344
8628	522	0.661961	0.033564	0.014569		0.111026	0.83356	0.110479		0.017594	0.050047	0.432164
8629	5220	0.225441	0.128734	0.001957		0.003699	0.710714	0.005255		0.002579	0.280208	0.186596
8630	5221	0.363099	0.209236	0.003262		0.006618	1.160335	0.008717		0.004226	0.456896	0.298753
8631	5222	0.267805	0.149478	0.0022		0.00372	0.820843	0.005954		0.002972	0.32357	0.223692
8632	5223	0.229919	0.137523	0.001983		0.004162	0.703324	0.005298		0.002646	0.27817	0.190136
8633	5224	0.370314	0.223616	0.003307		0.007417	1.148258	0.008782		0.004335	0.453662	0.304414
8634	5225	0.273119	0.159588	0.002228		0.004192	0.812361	0.006009		0.003049	0.321097	0.227948
8635	5226	0.291953	0.190141	0.00249		0.006141	0.839969	0.006532		0.003372	0.333145	0.241187
8636	5227	0.470236	0.307482	0.004164		0.010887	1.371312	0.010813		0.005524	0.543561	0.386177
8637	5228	0.346799	0.222407	0.002788		0.006245	0.970322	0.007422		0.003887	0.384274	0.28911
8638	5229	0.292096	0.215327	0.002511		0.007007	0.780637	0.006275		0.00336	0.309392	0.24107
8639	5230	0.470475	0.348561	0.004203		0.012366	1.274396	0.010373		0.005505	0.505027	0.385979
8640	5231	0.346959	0.251332	0.002808		0.00718	0.90195	0.007145		0.003872	0.356642	0.288982
8641	5232	0.292249	0.237731	0.002499		0.007889	0.715473	0.007928		0.003323	0.282372	0.240956
8642	5233	0.470732	0.384179	0.004185		0.013868	1.167933	0.013167		0.005446	0.461064	0.385783
8643	5234	0.347131	0.278274	0.002791		0.008139	0.826878	0.008963		0.003827	0.32579	0.288858
8644	5235	0.292415	0.25407	0.002624		0.008798	0.648215	0.010221		0.003263	0.252973	0.240848
8645	5236	0.471007	0.409564	0.004409		0.015407	1.061203	0.016962		0.005352	0.412705	0.385598
8646	5237	0.347317	0.298492	0.002914		0.009133	0.746498	0.01157		0.003755	0.292146	0.288742
8647	5238	0.259342	0.235085	0.002501		0.008637	0.514317	0.011342		0.002822	0.19618	0.213394
8648	5239	0.417744	0.378698	0.004203		0.015072	0.841803	0.018808		0.004632	0.319931	0.341633
8649	524	0.565842	0.028685	0.014395		0.089395	0.708326	0.091192		0.014713	0.041845	0.369009
8650	5240	0.308026	0.276517	0.002777		0.009022	0.592683	0.012851		0.003242	0.226679	0.25584
8651	5241	0.226205	0.205115	0.002289		0.008122	0.406619	0.011586		0.002403	0.151182	0.185987
8652	5242	0.364373	0.330335	0.003847		0.014131	0.665327	0.019203		0.003949	0.246721	0.29775
8653	5243	0.268661	0.241387	0.002542		0.008523	0.478117	0.013138		0.002921	0.174784	0.222989
8654	5244	0.259605	0.228664	0.002744		0.010026	0.426403	0.015412		0.002872	0.150287	0.213295
8655	5245	0.41818	0.368241	0.004609		0.017397	0.686717	0.025531		0.004497	0.245212	0.341458
8656	5246	0.308323	0.269151	0.003047		0.010572	0.503423	0.01749		0.003543	0.173551	0.255738
8657	5247	0.293093	0.238755	0.003281		0.012411	0.424024	0.020798		0.00347	0.135547	0.2406
8658	5248	0.472132	0.382848	0.005508		0.021453	0.682971	0.034428		0.00543	0.221001	0.38516
8659	5249	0.348085	0.282913	0.00365		0.013166	0.501014	0.023631		0.004286	0.156557	0.288487
8660	5250	0.226647	0.164927	0.00271		0.0105	0.284827	0.019001		0.002856	0.08056	0.18591
8661	5251	0.365104	0.264586	0.00454		0.018085	0.458231	0.031427		0.004465	0.130836	0.297604
8662	5252	0.269165	0.195361	0.003034		0.011208	0.337305	0.021617		0.003534	0.093653	0.22292
8663	5253	0.146715	0.096901	0.001846		0.007134	0.169524	0.013417		0.001908	0.044262	0.120299
8664	5254	0.236343	0.155421	0.003082		0.012263	0.272548	0.022182		0.00298	0.07191	0.192572
8665	5255	0.174235	0.114844	0.00207		0.007639	0.201043	0.015276		0.002364	0.051439	0.14425
8666	5256	0.200135	0.118927	0.002625		0.010129	0.215228	0.019646		0.002667	0.051503	0.164056
8667	5257	0.3224	0.190698	0.00438		0.017383	0.351042	0.032467		0.004161	0.083706	0.262613
8668	5258	0.237672	0.141093	0.002946		0.010877	0.255264	0.022381		0.00331	0.059835	0.19672
8669	5259	0.267033	0.119962	0.003803		0.014642	0.268328	0.030088		0.003722	0.045843	0.218794
8670	526	0.585639	0.029816	0.016766		0.090334	0.730918	0.088845		0.01498	0.042667	0.38175
8671	5260	0.430179	0.193419	0.006336		0.02504	0.435833	0.049683		0.00579	0.074592	0.35023
8672	5261	0.317116	0.14103	0.004277		0.015804	0.31493	0.034313		0.004642	0.053205	0.262365
8673	5262	0.267234	0.070701	0.004129		0.015869	0.266779	0.03445		0.00388	0.02577	0.218879
8674	5263	0.430477	0.114058	0.006867		0.027059	0.432584	0.056826		0.005998	0.041948	0.350354
8675	5264	0.317329	0.083111	0.004656		0.017231	0.314368	0.039335		0.0049	0.02995	0.262479
8676	5265	0.267188	0.063025	0.005782		0.018373	0.324024	0.036386		0.004168	0.02067	0.218947
8677	5266	0.430415	0.10147	0.009477		0.03096	0.526773	0.060004		0.006477	0.033532	0.350463
8678	5267	0.317262	0.074274	0.00666		0.020268	0.379391	0.041546		0.005645	0.024096	0.262553
8679	5268	0.275858	0.123701	0.006506		0.020032	0.394045	0.034846		0.004418	0.046211	0.226171
8680	5269	0.444428	0.199668	0.010673		0.033712	0.641393	0.057506		0.006909	0.075226	0.362038
8681	5270	0.327565	0.145204	0.007496		0.022233	0.459884	0.039765		0.006023	0.053571	0.271208
8682	5271	0.266753	0.172231	0.006977		0.020346	0.451144	0.031442		0.004347	0.073455	0.218824

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8683	5272	0.429766	0.278652	0.011465		0.034167	0.73639	0.051926		0.00689	0.11977	0.350289
8684	5273	0.316731	0.201423	0.008018		0.022632	0.523511	0.035848		0.005973	0.084943	0.262387
8685	5274	0.195497	0.154138	0.00562		0.015457	0.381561	0.021874		0.003239	0.072841	0.16045
8686	5275	0.314976	0.249781	0.009245		0.025935	0.623741	0.036143		0.005221	0.118871	0.256852
8687	5276	0.232117	0.179804	0.006448		0.017221	0.441409	0.024922		0.004396	0.084122	0.192386
8688	5277	0.217643	0.186327	0.006616		0.017525	0.456521	0.023731		0.003658	0.092968	0.178675
8689	5278	0.350662	0.302179	0.010891		0.029394	0.746826	0.03922		0.005904	0.151773	0.28603
8690	5279	0.258404	0.217085	0.007583		0.019534	0.527347	0.027028		0.004878	0.107304	0.214233
8691	528	0.567666	0.030459	0.018364		0.087425	0.706069	0.081211		0.014315	0.040941	0.37008
8692	5280	0.292981	0.282055	0.010032		0.024385	0.696998	0.030578		0.005045	0.156293	0.240651
8693	5281	0.472061	0.458061	0.016532		0.040883	1.141591	0.050555		0.008149	0.255304	0.385255
8694	5282	0.347836	0.327906	0.011477		0.027199	0.803244	0.034805		0.006417	0.180236	0.288532
8695	5283	0.292847	0.304812	0.011359		0.025067	0.766395	0.029652		0.005127	0.183222	0.240646
8696	5284	0.471859	0.496602	0.018748		0.04202	1.256176	0.049035		0.008282	0.299412	0.385259
8697	5285	0.34766	0.352778	0.012967		0.027962	0.881933	0.03374		0.006139	0.211163	0.288518
8698	5286	0.292753	0.316897	0.013115		0.025666	0.818124	0.029184		0.005176	0.204322	0.240647
8699	5287	0.471723	0.517431	0.021654		0.04303	1.341428	0.048264		0.008356	0.333977	0.385268
8700	5288	0.347534	0.366006	0.01496		0.028625	0.940764	0.033205		0.00611	0.235393	0.288511
8701	5289	0.292707	0.351783	0.015098		0.026205	0.848466	0.029177		0.005196	0.218201	0.240649
8702	5290	0.47166	0.572667	0.024935		0.043943	1.391298	0.048249		0.008377	0.356704	0.385278
8703	5291	0.347463	0.407471	0.017214		0.029209	0.975407	0.0332		0.006145	0.251341	0.288507
8704	5292	0.292713	0.381406	0.01734		0.026702	0.855267	0.029642		0.005188	0.22387	0.240652
8705	5293	0.471683	0.620409	0.028641		0.044794	1.402402	0.049009		0.00835	0.36597	0.385287
8706	5294	0.347457	0.442328	0.019768		0.029746	0.983222	0.033738		0.006152	0.257875	0.288506
8707	5295	0.292782	0.396301	0.01988		0.027185	0.838136	0.030601		0.005156	0.220886	0.240656
8708	5296	0.471803	0.644157	0.032833		0.045617	1.374241	0.05058		0.008279	0.361055	0.385295
8709	5297	0.347525	0.460137	0.022666		0.03026	0.963614	0.034845		0.006137	0.254476	0.28851
8710	5298	0.29292	0.395	0.022763		0.027671	0.798422	0.032085		0.005103	0.209424	0.240665
8711	5299	0.472032	0.64155	0.03758		0.046449	1.309066	0.053012		0.00817	0.342264	0.385308
8712	53	0.323388	0.05928	0.06605		0.074814	0.316694	0.072531		0.008879	0.016762	0.207539
8713	530	0.517952	0.029846	0.01862		0.080582	0.641627	0.071216		0.012903	0.037614	0.337885
8714	5300	0.34768	0.459168	0.025965		0.030788	0.918096	0.036558		0.006101	0.241329	0.288521
8715	5301	0.293136	0.377013	0.026041		0.028189	0.738987	0.034134		0.00503	0.190251	0.240685
8716	5302	0.47238	0.611817	0.042963		0.047322	1.211481	0.056364		0.008025	0.310864	0.385336
8717	5303	0.34793	0.438816	0.029733		0.03135	0.850062	0.038926		0.006048	0.219299	0.288548
8718	5304	0.320109	0.374047	0.032487		0.031366	0.72425	0.040145		0.005388	0.179569	0.262608
8719	5305	0.515841	0.606408	0.053544		0.052658	1.1869	0.066239		0.008559	0.293338	0.420429
8720	5306	0.379948	0.436001	0.03715		0.034888	0.833848	0.045837		0.006523	0.207056	0.314839
8721	5307	0.333968	0.3229	0.039643		0.033529	0.638476	0.046382		0.005459	0.1456	0.273652
8722	5308	0.538151	0.522211	0.065223		0.056266	1.04522	0.076437		0.00864	0.237752	0.438098
8723	5309	0.396413	0.378813	0.045458		0.037305	0.736791	0.053059		0.006682	0.167984	0.32809
8724	5310	0.321169	0.238105	0.044037		0.03305	0.505307	0.049577		0.00528	0.099491	0.262866
8725	5311	0.517494	0.383622	0.072287		0.055437	0.825612	0.08159		0.00858	0.162358	0.420816
8726	5312	0.381256	0.280107	0.050678		0.036807	0.585433	0.056837		0.006293	0.114901	0.315171
8727	5313	0.321789	0.159044	0.050934		0.034039	0.408861	0.055723		0.005447	0.059194	0.263127
8728	5314	0.518442	0.258544	0.083357		0.057032	0.665236	0.091555		0.010194	0.096483	0.421213
8729	5315	0.382048	0.184703	0.058897		0.037952	0.477571	0.064044		0.006457	0.0685	0.315503
8730	5316	0.763544	0.287531	0.099759		0.086265	0.839313	0.15533		0.010351	0.187737	0.6114
8731	5317	0.865463	0.462738	0.097913		0.095419	1.148134	0.149972		0.011645	0.354638	0.695992
8732	5318	0.73623	0.489514	0.071996		0.079189	1.188465	0.107706		0.009828	0.42428	0.594486
8733	5319	0.531879	0.386949	0.046904		0.056214	0.971526	0.068655		0.00703	0.366427	0.430627
8734	532	0.464523	0.027661	0.017576		0.072961	0.574212	0.062159		0.011493	0.033782	0.303001
8735	5320	0.417583	0.315232	0.034037		0.043547	0.832167	0.048898		0.00546	0.320968	0.338723
8736	5321	0.552841	0.422616	0.04222		0.057005	1.175522	0.05954		0.007285	0.459392	0.449091
8737	5322	0.752656	0.587682	0.050633		0.075914	1.780415	0.068536		0.010479	0.706139	0.612915
8738	5323	0.697925	0.546674	0.040925		0.068706	1.813283	0.052346		0.010199	0.72119	0.569592
8739	5324	0.616458	0.481124	0.032437		0.059507	1.708868	0.039168		0.009285	0.674054	0.503797
8740	5325	0.616217	0.457654	0.02911		0.058291	1.802079	0.032756		0.009487	0.702944	0.504163
8741	5326	0.616035	0.425693	0.026189		0.057065	1.882401	0.026969		0.009621	0.724464	0.504457
8742	5327	0.545671	0.33351	0.020906		0.049438	1.728036	0.019301		0.008555	0.654792	0.447141
8743	5328	0.426766	0.237902	0.015118		0.037972	1.382505	0.012591		0.006664	0.516906	0.349843
8744	5329	0.475358	0.261436	0.015834		0.04166	1.563756	0.012118		0.007365	0.578052	0.389767
8745	5330	0.561764	0.293277	0.017089		0.048053	1.883963	0.012262		0.008538	0.683844	0.46072
8746	5331	0.550963	0.287546	0.015393		0.045962	1.876807	0.011035		0.008154	0.668364	0.451903
8747	5332	0.529377	0.286556	0.01362		0.042988	1.83237	0.010929		0.007575	0.640571	0.43419
8748	5333	0.507803	0.287794	0.012134		0.040152	1.779131	0.010787		0.007005	0.626458	0.416449
8749	5334	0.534861	0.345145	0.011898		0.0411	1.892756	0.012439		0.007086	0.687206	0.438559
8750	5335	0.561941	0.401542	0.011575		0.041735	2.006606	0.014196		0.007099	0.751023	0.460634
8751	5336	0.637677	0.499681	0.012193		0.045645	2.293756	0.017225		0.007676	0.891521	0.522535
8752	5337	0.71348	0.603724	0.012449		0.048519	2.62117	0.020617		0.0081	1.05116	0.584349

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8753	5338	0.632547	0.553573	0.010148		0.040642	2.391687	0.019334		0.006841	0.97389	0.517769
8754	5339	0.551557	0.494106	0.00842		0.033875	2.124915	0.017485		0.005939	0.880271	0.451265
8755	534	0.626477	0.040184	0.02633		0.101147	0.769696	0.080577		0.01531	0.045719	0.408746
8756	5340	0.589527	0.523923	0.008839		0.034482	2.310734	0.019252		0.006322	0.967838	0.482103
8757	5341	0.692454	0.586248	0.0101		0.038125	2.760399	0.023232		0.007389	1.163567	0.565972
8758	5342	0.757597	0.567684	0.010552		0.038476	3.063386	0.026048		0.008028	1.293626	0.61883
8759	5343	0.736176	0.469655	0.009627		0.034156	2.999471	0.025752		0.007728	1.261084	0.600979
8760	5344	0.714732	0.367837	0.00865		0.030142	2.915365	0.025268		0.007408	1.224628	0.583173
8761	5345	0.70411	0.274634	0.007734		0.026678	2.858426	0.025039		0.007169	1.201047	0.574233
8762	5346	0.552613	0.164012	0.005453		0.019042	2.228746	0.01974		0.005497	0.930577	0.450488
8763	5347	0.563545	0.159317	0.005566		0.018273	2.260043	0.020121		0.005511	0.938024	0.459288
8764	5348	0.715479	0.29408	0.007047		0.020672	2.830813	0.025375		0.006751	1.159239	0.582879
8765	5349	0.715693	0.405519	0.006975		0.018158	2.780133	0.025096		0.006465	1.122805	0.582819
8766	5350	0.715909	0.499102	0.006837		0.015662	2.776229	0.024738		0.006153	1.079896	0.582757
8767	5351	0.716131	0.585617	0.006624		0.014803	2.777269	0.024239		0.006197	1.030333	0.582857
8768	5352	0.634955	0.573432	0.00566		0.01245	2.454704	0.0209		0.005584	0.879291	0.516875
8769	5353	0.553691	0.522894	0.005112		0.010404	2.129744	0.01773		0.00503	0.768253	0.450725
8770	5354	0.635284	0.607527	0.006028		0.01142	2.424834	0.01967		0.006102	0.881804	0.517075
8771	5355	0.716986	0.665371	0.006966		0.012137	2.697419	0.021023		0.007334	0.993134	0.583345
8772	5356	0.717256	0.61135	0.007036		0.011483	2.644534	0.019619		0.007733	0.99158	0.583176
8773	5357	0.717541	0.531859	0.007004		0.011216	2.5911	0.01878		0.008073	0.982961	0.582857
8774	5358	0.717844	0.493455	0.006982		0.011915	2.523294	0.01899		0.008347	0.966858	0.582392
8775	5359	0.707285	0.441194	0.006973		0.014454	2.400099	0.018659		0.008424	0.928257	0.572977
8776	536	0.627209	0.044406	0.029154		0.104743	0.764451	0.078874		0.015147	0.04593	0.409469
8777	5360	0.555203	0.319774	0.005482		0.013376	1.804657	0.014428		0.006713	0.703359	0.449032
8778	5361	0.566252	0.342197	0.005563		0.014859	1.786081	0.014502		0.006883	0.698616	0.457639
8779	5362	0.719084	0.46246	0.007061		0.02153	2.13353	0.017785		0.008769	0.837876	0.580506
8780	5363	0.719488	0.524311	0.007142		0.024191	1.985606	0.01699		0.008739	0.779387	0.580153
8781	5364	0.719919	0.57573	0.007123		0.02686	1.834912	0.021852		0.008654	0.712259	0.5798
8782	5365	0.72038	0.609168	0.007574		0.029561	1.670314	0.02808		0.008518	0.637919	0.57946
8783	5366	0.638951	0.562512	0.007214		0.028647	1.325297	0.031076		0.007392	0.494509	0.513337
8784	5367	0.557341	0.490564	0.006597		0.026666	1.047467	0.031683		0.006318	0.38118	0.447361
8785	5368	0.639669	0.547106	0.007895		0.032584	1.086693	0.042063		0.007158	0.378538	0.512993
8786	5369	0.722235	0.567627	0.009417		0.039798	1.06287	0.056605		0.00839	0.340621	0.578594
8787	5370	0.558537	0.389926	0.007739		0.03322	0.713631	0.051552		0.006729	0.200985	0.447028
8788	5371	0.361568	0.229512	0.005186		0.022404	0.428503	0.036336		0.004456	0.110172	0.289249
8789	5372	0.493234	0.28437	0.007357		0.031612	0.556131	0.053121		0.006205	0.128146	0.39444
8790	5373	0.658148	0.288702	0.010594		0.045103	0.684168	0.081057		0.008598	0.114838	0.526004
8791	5374	0.658672	0.17159	0.011453		0.048215	0.678639	0.092417		0.008874	0.065041	0.526169
8792	5375	0.65865	0.150976	0.015123		0.054001	0.826028	0.097377		0.009539	0.050945	0.526267
8793	5376	0.680112	0.299249	0.017103		0.058261	1.00581	0.093633		0.010236	0.115701	0.543714
8794	5377	0.657743	0.420296	0.018447		0.058759	1.159606	0.084764		0.010501	0.185207	0.526132
8795	5378	0.482105	0.378416	0.014924		0.044483	0.984378	0.059096		0.007994	0.184325	0.385829
8796	5379	0.536753	0.458789	0.017613		0.050363	1.180039	0.064174		0.009052	0.23562	0.429682
8797	538	0.727298	0.057096	0.038703		0.125488	0.877105	0.091658		0.017267	0.053513	0.475343
8798	5380	0.722652	0.698171	0.026832		0.069953	1.807377	0.08281		0.01251	0.397057	0.578802
8799	5381	0.722412	0.765258	0.030563		0.071857	1.991048	0.080365		0.012704	0.466223	0.578862
8800	5382	0.722265	0.802524	0.035338		0.073583	2.126892	0.079112		0.012787	0.520442	0.578922
8801	5383	0.722224	0.879013	0.040717		0.075176	2.205591	0.079067		0.012769	0.556057	0.578972
8802	5384	0.722302	0.95033	0.046773		0.076678	2.222523	0.080268		0.012661	0.570502	0.579007
8803	5385	0.722515	0.984688	0.053593		0.07814	2.17761	0.08277		0.012472	0.562673	0.579028
8804	5386	0.722874	0.978553	0.061272		0.079604	2.074639	0.086642		0.012211	0.533112	0.579042
8805	5387	0.723392	0.930883	0.069914		0.081117	1.920485	0.091972		0.011887	0.483878	0.579064
8806	5388	0.789895	0.919916	0.086878		0.090236	1.881437	0.10785		0.013165	0.456224	0.631762
8807	5389	0.823936	0.788646	0.105311		0.096324	1.654847	0.124047		0.01655	0.369296	0.658245
8808	5390	0.792139	0.570888	0.115996		0.094727	1.303224	0.131906		0.020317	0.251693	0.632193
8809	5391	0.793371	0.396043	0.13272		0.097171	1.042258	0.147307		0.02536	0.150142	0.632673
8810	5392	0.747425	0.259008	0.106043		0.127866	0.868179	0.171099		0.011549	0.165881	0.570717
8811	5393	0.816384	0.248685	0.117957		0.157941	0.947619	0.191926		0.014656	0.161365	0.613837
8812	5394	0.736576	0.271585	0.102498		0.11227	0.848387	0.163883		0.009955	0.174194	0.570285
8813	5395	0.847409	0.398579	0.105559		0.141891	1.157564	0.165498		0.012849	0.301624	0.650261
8814	5396	0.925662	0.376702	0.117684		0.175771	1.240899	0.185615		0.016338	0.287945	0.699674
8815	5397	0.835087	0.424591	0.101708		0.124509	1.146997	0.158445		0.01101	0.321627	0.649518
8816	5398	0.721122	0.405892	0.078417		0.118133	1.158332	0.119079		0.010694	0.355771	0.555919
8817	5399	0.787759	0.375081	0.087535		0.146555	1.224272	0.133562		0.013627	0.335457	0.598381
8818	54	0.88597	0.062143	0.086513		0.048857	0.891735	0.008899		0.014142	0.048677	0.537993
8819	540	0.628683	0.054181	0.038681		0.112273	0.750808	0.077869		0.014655	0.045734	0.410389
8820	5400	0.710581	0.439195	0.075423		0.103576	1.161535	0.113999		0.009131	0.381886	0.555129
8821	5401	0.521115	0.319182	0.051341		0.083984	0.931698	0.07602		0.007598	0.306514	0.402939
8822	5402	0.569281	0.293413	0.057298		0.104236	0.969967	0.085258		0.009692	0.287206	0.433796

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8823	5403	0.513465	0.346192	0.049361		0.073621	0.943042	0.072761		0.006474	0.329686	0.402288
8824	5404	0.409242	0.259766	0.037391		0.065102	0.788424	0.054214		0.005888	0.268672	0.317087
8825	5405	0.447061	0.237963	0.041711		0.08081	0.810591	0.060808		0.007514	0.250745	0.341417
8826	5406	0.40321	0.281966	0.035949		0.057074	0.799674	0.051888		0.005045	0.289121	0.316542
8827	5407	0.541946	0.348607	0.046468		0.085225	1.104262	0.066089		0.00771	0.385168	0.420554
8828	5408	0.591988	0.318303	0.05178		0.105788	1.131054	0.074204		0.009838	0.358213	0.452914
8829	5409	0.533914	0.378288	0.04477		0.074751	1.121354	0.0633		0.006692	0.41428	0.419838
8830	5410	12.95073	8.622564	0.987616		1.985135	28.91477	1.350719		0.189224	10.40785	10.07967
8831	5411	0.806059	0.442928	0.062463		0.140984	1.67631	0.085569		0.013074	0.546951	0.618558
8832	5412	0.726869	0.528461	0.053752		0.099513	1.688681	0.073118		0.009204	0.635572	0.573298
8833	5413	0.684296	0.431299	0.045236		0.102622	1.646713	0.058213		0.009763	0.59358	0.533842
8834	5414	0.747656	0.390284	0.050684		0.127397	1.665476	0.065347		0.011853	0.553126	0.575048
8835	5415	0.674065	0.473919	0.04331		0.089895	1.705321	0.055824		0.008894	0.641955	0.532825
8836	5416	0.604282	0.37318	0.035841		0.088733	1.529114	0.043558		0.008608	0.546968	0.47225
8837	5417	0.660285	0.336715	0.040022		0.109982	1.533922	0.048886		0.010307	0.511918	0.50869
8838	5418	0.595291	0.413288	0.034354		0.077824	1.587859	0.041668		0.00782	0.593866	0.47125
8839	5419	0.603941	0.351092	0.032157		0.086667	1.5926	0.036452		0.008579	0.564381	0.472658
8840	542	0.629345	0.059382	0.04431		0.116848	0.742374	0.078687		0.014466	0.045248	0.410583
8841	5420	0.659933	0.31364	0.035895		0.107264	1.585691	0.040974		0.010233	0.530706	0.50917
8842	5421	0.59498	0.390068	0.030838		0.076095	1.65706	0.034847		0.007814	0.614289	0.471634
8843	5422	0.603673	0.322079	0.028908		0.084493	1.646187	0.030085		0.008533	0.578689	0.473001
8844	5423	0.659632	0.285741	0.032259		0.104408	1.63203	0.033899		0.010154	0.546216	0.509574
8845	5424	0.594734	0.359099	0.027738		0.074285	1.715475	0.028726		0.008071	0.629499	0.471956
8846	5425	0.534642	0.250007	0.023088		0.07284	1.497683	0.021625		0.007492	0.522417	0.419309
8847	5426	0.584185	0.220886	0.025772		0.089853	1.482743	0.02444		0.008904	0.4949	0.451746
8848	5427	0.526747	0.279626	0.022147		0.064132	1.562924	0.020603		0.007385	0.566921	0.418364
8849	5428	0.418091	0.168794	0.016704		0.055705	1.190942	0.014177		0.005803	0.413781	0.328087
8850	5429	0.456817	0.1485	0.018661		0.06862	1.178026	0.016082		0.006891	0.392462	0.353479
8851	5430	0.41193	0.189324	0.016021		0.049107	1.248297	0.01348		0.005861	0.44683	0.327344
8852	5431	0.465649	0.176725	0.017521		0.060895	1.341146	0.013972		0.006399	0.465125	0.365543
8853	5432	0.508763	0.155768	0.019588		0.074925	1.325822	0.015968		0.007596	0.44116	0.393834
8854	5433	0.458801	0.204705	0.016793		0.053737	1.410343	0.013188		0.006562	0.500349	0.364708
8855	5434	0.550203	0.195984	0.018956		0.069831	1.605919	0.014333		0.007581	0.555751	0.432097
8856	5435	0.60111	0.178987	0.021233		0.085765	1.586435	0.016484		0.008799	0.527237	0.465546
8857	5436	0.542137	0.226474	0.01815		0.061723	1.696667	0.013466		0.007731	0.595264	0.43111
8858	5437	0.539537	0.189911	0.017136		0.066402	1.589579	0.012543		0.007365	0.552284	0.423828
8859	5438	0.58942	0.164247	0.019237		0.081408	1.569515	0.014656		0.008421	0.524574	0.456631
8860	5439	0.531656	0.219115	0.016383		0.058787	1.686476	0.011598		0.00747	0.589678	0.422858
8861	544	0.629984	0.064777	0.050463		0.121494	0.73241	0.081182		0.014713	0.044611	0.410842
8862	5440	0.518313	0.19359	0.015227		0.061729	1.541205	0.012865		0.006919	0.537289	0.407201
8863	5441	0.566194	0.163657	0.01714		0.075541	1.516975	0.014996		0.007849	0.510528	0.438714
8864	5442	0.510769	0.223751	0.014532		0.054741	1.637034	0.01192		0.006993	0.573688	0.406277
8865	5443	0.497111	0.202242	0.01363		0.057327	1.48817	0.013121		0.006433	0.520678	0.390545
8866	5444	0.542996	0.176707	0.015383		0.070036	1.46006	0.015246		0.007465	0.494915	0.420756
8867	5445	0.489902	0.2299	0.012984		0.050916	1.581345	0.012205		0.006491	0.555958	0.389663
8868	5446	0.523515	0.243881	0.013429		0.05834	1.574863	0.015054		0.006602	0.55349	0.411251
8869	5447	0.571797	0.219677	0.0152		0.071152	1.540479	0.017412		0.007798	0.526254	0.443051
8870	5448	0.51595	0.276806	0.012769		0.051898	1.674041	0.01403		0.006569	0.594675	0.410333
8871	5449	0.549923	0.297076	0.013137		0.058855	1.660273	0.017081		0.006885	0.595646	0.431912
8872	5450	0.600594	0.267785	0.014913		0.071645	1.619002	0.019719		0.008097	0.55822	0.465291
8873	5451	0.54201	0.330436	0.012464		0.052449	1.765391	0.015947		0.006559	0.64983	0.430961
8874	5452	0.62393	0.373009	0.013908		0.063944	1.887757	0.020628		0.007732	0.699169	0.489902
8875	5453	0.681367	0.336043	0.015832		0.07769	1.835514	0.023773		0.009057	0.647312	0.527739
8876	5454	0.614988	0.414963	0.013171		0.057085	2.007804	0.019285		0.007117	0.763757	0.48884
8877	5455	0.697949	0.449749	0.014278		0.067389	2.114472	0.024564		0.0085	0.824795	0.547778
8878	5456	0.762128	0.404699	0.016298		0.081675	2.048882	0.028257		0.009912	0.761857	0.590049
8879	5457	0.687997	0.500746	0.013493		0.060301	2.255879	0.023002		0.007857	0.902276	0.546616
8880	5458	0.618655	0.408475	0.011656		0.055951	1.875141	0.022842		0.007368	0.765165	0.485293
8881	5459	0.675482	0.377577	0.013314		0.06764	1.811084	0.026233		0.008557	0.708651	0.522712
8882	546	0.73037	0.081481	0.066349		0.145473	0.834576	0.099531		0.017631	0.050841	0.476369
8883	5460	0.609875	0.455325	0.011008		0.050185	2.025726	0.021416		0.006838	0.835743	0.484287
8884	5461	0.539367	0.359895	0.009685		0.046236	1.645532	0.020514		0.006292	0.68631	0.422915
8885	5462	0.588874	0.332301	0.011164		0.055741	1.575647	0.023525		0.007286	0.636653	0.455505
8886	5463	0.531738	0.404839	0.00911		0.041574	1.806376	0.019304		0.005928	0.748847	0.422053
8887	5464	0.576423	0.383111	0.010144		0.046715	1.792239	0.022538		0.006564	0.750604	0.451773
8888	5465	0.629296	0.348045	0.011682		0.056197	1.69935	0.025752		0.007579	0.697145	0.486569
8889	5466	0.568296	0.430294	0.009549		0.04209	1.967593	0.021221		0.006297	0.818285	0.450865
8890	5467	0.676972	0.430259	0.011516		0.051202	2.139602	0.02714		0.007481	0.90109	0.530319
8891	5468	0.739026	0.393744	0.013225		0.061439	2.032097	0.030994		0.008596	0.836497	0.571145
8892	5469	0.667457	0.482518	0.010865		0.046243	2.350728	0.025571		0.007339	0.984011	0.529267

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8893	5470	0.740558	0.438571	0.011868		0.051098	2.371643	0.030373		0.008079	1.008506	0.579803
8894	5471	0.80839	0.404984	0.013542		0.061123	2.253969	0.03467		0.009093	0.932419	0.624426
8895	5472	0.730183	0.478509	0.011251		0.046289	2.608766	0.028629		0.007935	1.10092	0.578665
8896	5473	0.719537	0.373019	0.010598		0.044806	2.321322	0.029982		0.007748	0.994313	0.563058
8897	5474	0.785406	0.350089	0.011969		0.053415	2.202842	0.034216		0.00887	0.919006	0.606392
8898	5475	0.709485	0.406386	0.010125		0.040723	2.553915	0.028273		0.007588	1.085254	0.561956
8899	5476	0.69852	0.297621	0.009254		0.039016	2.254823	0.029388		0.0075	0.970226	0.546378
8900	5477	0.762435	0.285815	0.010304		0.046345	2.136086	0.033529		0.008633	0.896347	0.588438
8901	5478	0.688781	0.319874	0.008934		0.035589	2.481412	0.027719		0.007215	1.059	0.545304
8902	5479	0.688096	0.22148	0.007965		0.033984	2.20873	0.029095		0.007361	0.951402	0.538019
8903	548	0.631167	0.075507	0.065326		0.129534	0.709708	0.089065		0.015716	0.04244	0.410497
8904	5480	0.751036	0.215295	0.008691		0.040189	2.086348	0.033184		0.008518	0.878525	0.579454
8905	5481	0.678517	0.239935	0.007799		0.031134	2.43152	0.027451		0.00691	1.038694	0.536952
8906	5482	0.540023	0.137794	0.005898		0.023529	1.713793	0.022853		0.005754	0.736056	0.422098
8907	5483	0.58941	0.133228	0.006582		0.027597	1.621553	0.026053		0.006693	0.679323	0.454624
8908	5484	0.532513	0.147833	0.005665		0.021732	1.887421	0.021567		0.005346	0.803927	0.421252
8909	5485	0.550698	0.125949	0.006017		0.022325	1.732343	0.023275		0.005855	0.740898	0.430359
8910	5486	0.601058	0.121716	0.006698		0.026097	1.661562	0.026529		0.006831	0.68355	0.463531
8911	5487	0.543042	0.136039	0.005787		0.020686	1.907814	0.021969		0.005427	0.809483	0.429489
8912	5488	0.699167	0.23702	0.007649		0.024655	2.213014	0.029398		0.007409	0.912847	0.546198
8913	5489	0.763219	0.215719	0.008519		0.028605	2.127748	0.033496		0.008691	0.841556	0.588323
8914	5490	0.689447	0.259212	0.007364		0.023003	2.396275	0.027752		0.006839	0.998022	0.545081
8915	5491	0.699388	0.322545	0.007671		0.020972	2.230187	0.029138		0.007394	0.879171	0.546173
8916	5492	0.764011	0.293123	0.008592		0.024078	2.146382	0.033198		0.008719	0.809632	0.588315
8917	5493	0.689661	0.353701	0.007353		0.019754	2.408613	0.027504		0.006798	0.961951	0.545043
8918	5494	0.699629	0.392085	0.007608		0.01774	2.247654	0.028751		0.007391	0.841227	0.54632
8919	5495	0.764849	0.356416	0.008566		0.020174	2.163289	0.032768		0.00876	0.773449	0.588831
8920	5496	0.689889	0.43026	0.007263		0.016808	2.416462	0.02713		0.006768	0.921245	0.544999
8921	5497	0.69989	0.441655	0.007458		0.016508	2.261412	0.028214		0.0074	0.802735	0.546775
8922	5498	0.765741	0.40186	0.00879		0.018614	2.180215	0.032182		0.008812	0.760662	0.589364
8923	5499	0.690132	0.484576	0.007083		0.01575	2.418195	0.026609		0.006751	0.876979	0.545397
8924	55	1.62315	0.079885	0.237292		0.059168	1.829691	0.24345		0.034368	0.101939	0.941312
8925	550	0.688998	0.088017	0.080713		0.145903	0.760259	0.103036		0.017467	0.044704	0.447122
8926	5500	0.620609	0.419929	0.006918		0.013545	2.011659	0.024373		0.006581	0.709991	0.48494
8927	5501	0.679565	0.378226	0.008164		0.015122	1.947766	0.027829		0.00787	0.672037	0.522728
8928	5502	0.611938	0.471888	0.006358		0.013026	2.141731	0.02297		0.005984	0.769889	0.483701
8929	5503	0.541226	0.384182	0.006135		0.01108	1.754725	0.020706		0.005761	0.621243	0.422888
8930	5504	0.593037	0.339954	0.007239		0.012262	1.705353	0.023662		0.007398	0.58468	0.455839
8931	5505	0.533649	0.431143	0.005715		0.010731	1.8679	0.019504		0.005226	0.673534	0.421807
8932	5506	0.62104	0.447761	0.007237		0.011879	2.009158	0.022999		0.007097	0.713411	0.485123
8933	5507	0.680961	0.397005	0.008374		0.013075	1.960565	0.026301		0.009768	0.667406	0.522907
8934	5508	0.612326	0.501892	0.006751		0.011595	2.138323	0.021653		0.006088	0.773472	0.483891
8935	5509	0.701005	0.492547	0.008374		0.012788	2.252246	0.024607		0.00956	0.802404	0.547219
8936	5510	0.769351	0.437824	0.009694		0.015225	2.210278	0.028157		0.012742	0.747518	0.589796
8937	5511	0.691137	0.551208	0.00781		0.012154	2.396234	0.023158		0.007404	0.870156	0.545858
8938	5512	0.701372	0.455008	0.008457		0.01428	2.227847	0.022967		0.010943	0.795481	0.546927
8939	5513	0.770485	0.408125	0.009786		0.019177	2.197874	0.026281		0.014249	0.741255	0.589417
8940	5514	0.691464	0.508207	0.007889		0.012339	2.367185	0.021614		0.008723	0.862941	0.545612
8941	5515	0.70176	0.414622	0.008405		0.018598	2.201291	0.022325		0.012116	0.784043	0.54644
8942	552	0.817016	0.112348	0.110106		0.1783	0.879038	0.133502		0.021221	0.050785	0.529175
8943	554	0.689263	0.10045	0.105053		0.153908	0.724286	0.121305		0.018341	0.040718	0.445036
8944	556	0.689003	0.106278	0.11795		0.156928	0.705427	0.132336		0.018594	0.038802	0.443826
8945	558	0.573672	0.095255	0.109487		0.132388	0.571422	0.121095		0.015658	0.030766	0.368845
8946	693	0.187376	0.019314	0.027141		0.018542	0.173446	0.030758		0.005202	0.006573	0.153507
8947	694	0.159179	0.017069	0.023697		0.02458	0.147205	0.027309		0.003848	0.004545	0.130565
8948	695	0.30214	0.03088	0.045775		0.028067	0.27793	0.053488		0.008425	0.010642	0.245723
8949	6956	0.771659	0.394949	0.009717		0.024557	2.173226	0.025663		0.015501	0.731112	0.588812
8950	6957	0.691811	0.455204	0.007846		0.015219	2.323861	0.02092		0.009854	0.85111	0.545187
8951	6958	0.702168	0.390601	0.008372		0.022843	2.160435	0.022366		0.013051	0.76795	0.54577
8952	6959	0.772864	0.370532	0.009672		0.029846	2.135149	0.025605		0.016478	0.716811	0.587994
8953	696	0.256652	0.027819	0.039923		0.039226	0.23625	0.046641		0.006252	0.00739	0.209029
8954	6960	0.692177	0.425963	0.007818		0.01893	2.26511	0.021024		0.010766	0.834304	0.544591
8955	6961	0.692085	0.350302	0.008412		0.026597	2.072534	0.021733		0.013531	0.735387	0.536675
8956	6962	0.762365	0.349038	0.009746		0.034506	2.051184	0.024754		0.016916	0.687048	0.578091
8957	6963	0.682069	0.373402	0.007841		0.022226	2.164579	0.020504		0.011268	0.798698	0.5356
8958	6964	0.543797	0.261478	0.006644		0.023923	1.572587	0.016605		0.010954	0.556667	0.420488
8959	6965	0.599097	0.253227	0.00771		0.030882	1.566328	0.018814		0.013602	0.520335	0.452869
8960	6966	0.535464	0.282362	0.006183		0.020111	1.640671	0.01573		0.009172	0.604521	0.419683
8961	6967	0.554936	0.265574	0.006756		0.026209	1.565476	0.016571		0.011293	0.552946	0.428536
8962	6968	0.611414	0.249108	0.0079		0.03375	1.567265	0.018716		0.013986	0.51687	0.461516

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
8963	6969	0.546154	0.291512	0.006285		0.022098	1.63201	0.015734		0.00947	0.600598	0.427734
8964	697	0.460209	0.06739	0.085902		0.057312	0.459178	0.110631		0.016105	0.020891	0.343391
8965	6970	0.705403	0.369351	0.008818		0.037192	1.890695	0.020068		0.014448	0.663833	0.543441
8966	6971	0.77729	0.359642	0.010364		0.047707	1.911413	0.022555		0.017857	0.62029	0.585204
8967	6972	0.693631	0.38799	0.008127		0.0315	1.967912	0.019131		0.012113	0.721325	0.54247
8968	6973	0.706478	0.402309	0.008943		0.041011	1.783615	0.019129		0.014381	0.618657	0.542935
8969	6974	0.778563	0.388676	0.010513		0.052415	1.81865	0.021875		0.0178	0.577735	0.584583
8970	6975	0.69409	0.422209	0.008239		0.034883	1.848161	0.018121		0.012007	0.672444	0.542022
8971	6976	0.707566	0.418236	0.00893		0.044724	1.672413	0.025276		0.014156	0.566786	0.542407
8972	6977	0.779842	0.405644	0.010804		0.056941	1.711873	0.028729		0.017611	0.529197	0.583923
8973	6978	0.694572	0.462164	0.008224		0.038201	1.713434	0.023905		0.011725	0.616024	0.541561
8974	6979	0.708662	0.438202	0.009678		0.048333	1.548268	0.032225		0.013792	0.509128	0.541875
8975	698	0.390404	0.06724	0.074268		0.079166	0.383102	0.090717		0.009058	0.016518	0.292854
8976	6980	0.781127	0.423738	0.01142		0.06128	1.592625	0.036494		0.017298	0.475835	0.583248
8977	6981	0.695079	0.483636	0.008876		0.041469	1.57449	0.030557		0.011289	0.552919	0.541102
8978	6982	0.629114	0.393181	0.009139		0.045962	1.252847	0.035473		0.011788	0.395998	0.479842
8979	6983	0.693506	0.375343	0.010723		0.057999	1.30724	0.040087		0.014943	0.371168	0.516382
8980	6984	0.616566	0.447809	0.008412		0.039623	1.269122	0.033691		0.009505	0.429257	0.479226
8981	6985	0.549122	0.344659	0.008286		0.042135	1.007665	0.03605		0.009922	0.30611	0.418037
8982	6986	0.605368	0.317198	0.009674		0.052956	1.067627	0.0407		0.012692	0.288015	0.449803
8983	6987	0.537851	0.391628	0.007654		0.03647	1.017073	0.034268		0.007894	0.331058	0.417548
8984	6988	0.63064	0.386639	0.009824		0.050679	1.067741	0.047714		0.010921	0.304967	0.479215
8985	6989	0.69528	0.347388	0.011446		0.063411	1.138854	0.053835		0.014099	0.288511	0.515555
8986	6990	0.617339	0.438338	0.00911		0.044049	1.061823	0.04539		0.008598	0.328808	0.478707
8987	6991	0.712607	0.404522	0.011667		0.060583	1.075323	0.063931		0.011583	0.27661	0.540286
8988	6992	0.785719	0.366533	0.013513		0.075334	1.157459	0.072077		0.015116	0.263626	0.58115
8989	6993	0.69708	0.457281	0.010836		0.052967	1.060821	0.060879		0.009909	0.297406	0.539788
8990	6994	0.551512	0.282039	0.009454		0.049444	0.738095	0.057899		0.008669	0.167016	0.417279
8991	6995	0.608147	0.250541	0.010877		0.06107	0.8111	0.065201		0.010995	0.15862	0.448763
8992	6996	0.539125	0.317052	0.008825		0.043494	0.719787	0.055215		0.007819	0.179333	0.41695
8993	6997	0.357162	0.167667	0.006272		0.03292	0.450603	0.040654		0.005664	0.091871	0.26995
8994	6998	0.393859	0.148578	0.007187		0.040507	0.497304	0.045737		0.006861	0.087533	0.290291
8995	6999	0.349015	0.18801	0.005872		0.02906	0.437324	0.038811		0.005117	0.098506	0.269755
8996	7000	0.48738	0.208113	0.008731		0.045942	0.585914	0.059207		0.007786	0.10727	0.368068
8997	7001	0.537477	0.185074	0.009972		0.056349	0.648844	0.066541		0.009292	0.102627	0.395777
8998	7002	0.476159	0.232829	0.008197		0.040677	0.567686	0.056585		0.007045	0.114784	0.367822
8999	7003	0.650735	0.211074	0.012264		0.06403	0.729861	0.089504		0.010544	0.097246	0.490699
9000	7004	0.717685	0.191453	0.013821		0.078031	0.834221	0.100295		0.012541	0.095909	0.527569
9001	7005	0.635701	0.234528	0.011641		0.057043	0.695376	0.085784		0.009574	0.10318	0.490421
9002	7006	0.65161	0.130932	0.013089		0.06673	0.728716	0.100795		0.010704	0.061653	0.490714
9003	7007	0.718716	0.121996	0.014666		0.080789	0.826481	0.112501		0.012685	0.065531	0.527528
9004	7008	0.636517	0.143524	0.012481		0.059815	0.697394	0.096971		0.00976	0.061656	0.490488
9005	7009	0.652266	0.113521	0.016166		0.071599	0.847047	0.105979		0.010826	0.046565	0.490766
9006	701	0.500311	0.054716	0.064847		0.053179	0.468341	0.067154		0.014039	0.018096	0.414269
9007	7010	0.719592	0.103692	0.018022		0.085742	0.933201	0.118274		0.012769	0.049099	0.527621
9008	7011	0.637039	0.125309	0.015601		0.064896	0.826253	0.101946		0.010024	0.047213	0.490513
9009	7012	0.673824	0.219088	0.018365		0.07637	1.005254	0.102987		0.011372	0.094138	0.507223
9010	7013	0.743464	0.196658	0.020606		0.091045	1.08889	0.115318		0.013315	0.090275	0.545397
9011	7014	0.65801	0.245001	0.017698		0.069428	0.991943	0.098772		0.010594	0.100709	0.506904
9012	7015	0.651924	0.313227	0.019866		0.076253	1.133663	0.093953		0.011173	0.151945	0.491028
9013	7016	0.719401	0.283759	0.022251		0.090563	1.206023	0.105414		0.013021	0.146852	0.528072
9014	7017	0.636555	0.348137	0.019114		0.069521	1.132165	0.089915		0.010474	0.163466	0.490655
9015	7018	0.477995	0.285575	0.016117		0.057345	0.950416	0.065791		0.008273	0.152761	0.360223
9016	7019	0.527537	0.260267	0.017985		0.067924	0.997665	0.073882		0.009606	0.147156	0.387459
9017	702	0.421826	0.048081	0.056075		0.066185	0.394174	0.061412		0.009995	0.011666	0.349006
9018	7020	0.466682	0.316061	0.015511		0.052389	0.955639	0.062895		0.007914	0.16374	0.359905
9019	7021	0.532272	0.348459	0.019046		0.06473	1.13316	0.071567		0.009283	0.196037	0.401252
9020	7022	0.587482	0.320638	0.021267		0.076572	1.183099	0.080387		0.010719	0.188679	0.431628
9021	7023	0.519646	0.384825	0.018367		0.059194	1.142911	0.06839		0.008932	0.209834	0.400869
9022	7024	0.71687	0.552987	0.029291		0.08949	1.720619	0.092544		0.012683	0.332182	0.540732
9023	7025	0.79134	0.513388	0.032657		0.105645	1.780538	0.103963		0.014452	0.319994	0.581774
9024	7026	0.699786	0.60222	0.028168		0.081966	1.744164	0.0884		0.012265	0.354886	0.54014
9025	7027	0.716865	0.613746	0.03374		0.091665	1.883064	0.089872		0.012746	0.391412	0.540994
9026	7028	0.791443	0.572092	0.037752		0.108072	1.936194	0.100954		0.01442	0.378769	0.582152
9027	7029	0.699705	0.665959	0.032347		0.084044	1.91581	0.085846		0.012376	0.417663	0.540332
9028	703	0.463477	0.047947	0.077071		0.036427	0.433879	0.094712		0.013755	0.016392	0.368812
9029	7030	0.716934	0.650637	0.039081		0.09374	2.001115	0.088447		0.012697	0.439556	0.541225
9030	7031	0.791614	0.6055	0.043736		0.110455	2.048545	0.099327		0.014379	0.426562	0.582481
9031	7032	0.699704	0.70501	0.037452		0.085993	2.041226	0.084498		0.01237	0.466909	0.540502
9032	7033	0.717084	0.709775	0.045059		0.095745	2.067304	0.088308		0.012544	0.472972	0.541405

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9033	7034	0.791856	0.660383	0.050429		0.112812	2.110695	0.099144		0.014984	0.459183	0.582737
9034	7035	0.699796	0.769651	0.043178		0.087847	2.112277	0.084395		0.012257	0.499263	0.540637
9035	7036	0.717328	0.743307	0.051744		0.097704	2.079097	0.089508		0.013021	0.486949	0.541523
9036	7037	0.792177	0.691397	0.057902		0.115157	2.120572	0.100445		0.017416	0.473121	0.582902
9037	7038	0.699995	0.811171	0.04959		0.089635	2.125877	0.085578		0.012049	0.512997	0.540725
9038	7039	0.717674	0.762461	0.059202		0.099637	2.037791	0.092091		0.015582	0.479967	0.541571
9039	704	0.394011	0.047874	0.067012		0.058686	0.367728	0.080056		0.009642	0.012167	0.313984
9040	7040	0.792586	0.697942	0.066224		0.117495	2.079633	0.103289		0.02013	0.466754	0.582967
9041	7041	0.700314	0.838037	0.05676		0.091391	2.083068	0.088102		0.012096	0.505713	0.540765
9042	7042	0.718136	0.754313	0.067494		0.101559	1.947038	0.096116		0.018352	0.453099	0.541553
9043	7043	0.793093	0.690089	0.075458		0.11982	1.991299	0.107717		0.023012	0.440944	0.582927
9044	7044	0.700764	0.829899	0.064755		0.093135	1.987689	0.092023		0.014858	0.478336	0.540759
9045	7045	0.718717	0.713402	0.076677		0.103477	1.811933	0.101635		0.02122	0.409489	0.541474
9046	7046	0.793708	0.65188	0.085653		0.122125	1.860081	0.113788		0.025915	0.398621	0.582789
9047	7047	0.701353	0.786033	0.073642		0.094894	1.845434	0.097408		0.017787	0.433667	0.540719
9048	7048	0.784822	0.699617	0.09469		0.114981	1.788178	0.118605		0.026246	0.385239	0.590568
9049	7049	0.866658	0.638017	0.105651		0.135696	1.845742	0.132611		0.031282	0.374893	0.635528
9050	705	0.473786	0.054045	0.083395		0.035008	0.455201	0.105093		0.015065	0.018511	0.368949
9051	7050	0.765903	0.77245	0.091074		0.105469	1.8151	0.113816		0.022686	0.40822	0.589813
9052	7051	0.81863	0.592358	0.113643		0.122351	1.590178	0.135428		0.030883	0.312729	0.614987
9053	7052	0.903912	0.538219	0.126562		0.144307	1.65645	0.151129		0.035802	0.303932	0.661624
9054	7053	0.798963	0.65636	0.109553		0.112329	1.605264	0.130205		0.027622	0.330263	0.614327
9055	7054	0.786991	0.430222	0.123712		0.119744	1.268178	0.142794		0.032241	0.214925	0.590237
9056	7055	0.868909	0.39696	0.137476		0.141044	1.336953	0.159018		0.036506	0.208395	0.634785
9057	7056	0.768146	0.471436	0.119575		0.110081	1.271297	0.13758		0.029799	0.22721	0.589757
9058	7057	0.788182	0.322303	0.139583		0.122013	1.03391	0.157777		0.033926	0.129105	0.590136
9059	7058	0.870173	0.309346	0.154721		0.143429	1.112244	0.175278		0.037677	0.124715	0.634421
9060	7059	0.769347	0.343854	0.135324		0.112376	1.02422	0.152411		0.032467	0.136672	0.58985
9061	706	0.403092	0.055793	0.072387		0.062039	0.382078	0.087406		0.009574	0.014233	0.314308
9062	707	0.450315	0.059074	0.082423		0.044022	0.442883	0.10536		0.015204	0.019257	0.343388
9063	708	0.38339	0.059848	0.071404		0.068744	0.369184	0.086824		0.00878	0.015042	0.292709
9064	709	0.509937	0.083957	0.095979		0.081528	0.514548	0.124193		0.01813	0.024364	0.368977
9065	710	0.428143	0.08236	0.082697		0.099075	0.428667	0.101456		0.011051	0.019511	0.314834
9066	711	0.525411	0.097095	0.09887		0.102786	0.537503	0.12819		0.01848	0.026149	0.368906
9067	712	0.436609	0.093645	0.084821		0.114877	0.445336	0.104473		0.012971	0.021173	0.314904
9068	713	0.429006	0.089011	0.079822		0.099752	0.444319	0.103541		0.014387	0.022034	0.292496
9069	714	0.354096	0.084361	0.068137		0.104864	0.366284	0.084306		0.012238	0.018004	0.249811
9070	715	0.364518	0.072573	0.058778		0.092441	0.392588	0.073123		0.012013	0.019686	0.244505
9071	716	0.421686	0.077043	0.059671		0.105287	0.469627	0.070322		0.0139	0.023846	0.282893
9072	717	0.478428	0.080308	0.05639		0.115873	0.55569	0.061427		0.015655	0.028752	0.3213
9073	718	0.542587	0.08635	0.052539		0.126495	0.655483	0.051987		0.01784	0.034393	0.365138
9074	719	0.293927	0.045205	0.024535		0.066455	0.364285	0.022508		0.009718	0.019541	0.198126
9075	720	0.23067	0.034653	0.017154		0.050936	0.291219	0.014655		0.007581	0.01583	0.155708
9076	721	0.305247	0.045015	0.020944		0.066031	0.39118	0.016357		0.009972	0.021481	0.206318
9077	7212	0.777727	0.295145	0.105264		0.102603	0.878716	0.166163		0.009783	0.190893	0.612129
9078	7213	0.881644	0.469194	0.103935		0.113691	1.199766	0.160591		0.011053	0.357474	0.69703
9079	7214	0.750109	0.492047	0.076813		0.094521	1.232461	0.115464		0.009331	0.42643	0.595537
9080	7215	0.54196	0.388444	0.050172		0.067158	1.00244	0.073669		0.006711	0.368255	0.431484
9081	7216	0.425529	0.316355	0.036516		0.052059	0.853796	0.052514		0.005244	0.32267	0.339461
9082	7217	0.563368	0.424047	0.045288		0.068164	1.205712	0.063986		0.006908	0.461798	0.450125
9083	7218	0.767012	0.589616	0.054393		0.090769	1.823876	0.073747		0.009532	0.708615	0.614464
9084	7219	0.711235	0.539657	0.043952		0.0821	1.849343	0.056334		0.009192	0.720579	0.571087
9085	722	0.549873	0.078393	0.032228		0.114054	0.724373	0.019916		0.018088	0.040322	0.372763
9086	7220	0.62821	0.473434	0.034791		0.071042	1.727574	0.042151		0.008521	0.670596	0.505143
9087	7221	0.627932	0.448813	0.031256		0.069537	1.813457	0.035222		0.008905	0.696629	0.505515
9088	7222	0.627712	0.415318	0.028106		0.067975	1.891344	0.029012		0.009183	0.715945	0.505835
9089	7223	0.555983	0.32449	0.022447		0.058786	1.734096	0.020779		0.008287	0.645951	0.44838
9090	7224	0.434812	0.224736	0.016228		0.045079	1.386285	0.013568		0.006515	0.509542	0.350819
9091	7225	0.484304	0.24612	0.017008		0.049391	1.567222	0.013165		0.007247	0.569646	0.390861
9092	7226	0.572305	0.274582	0.018362		0.056844	1.886907	0.013376		0.008469	0.673842	0.462016
9093	7227	0.561271	0.265208	0.016556		0.05425	1.876757	0.011728		0.008136	0.661634	0.453176
9094	7228	0.539253	0.269211	0.014662		0.050621	1.822685	0.011627		0.007587	0.638087	0.435408
9095	7229	0.51725	0.273058	0.01308		0.047177	1.761384	0.01195		0.007031	0.618509	0.417613
9096	723	0.384345	0.052816	0.019218		0.075966	0.520002	0.008425		0.012705	0.029827	0.261087
9097	7230	0.544784	0.328123	0.01284		0.048183	1.870998	0.013768		0.007115	0.677335	0.439774
9098	7231	0.572335	0.384296	0.01251		0.048804	1.982814	0.01568		0.007118	0.740178	0.461897
9099	7232	0.649437	0.482558	0.013194		0.05324	2.265855	0.018996		0.007672	0.874569	0.52395
9100	7233	0.72659	0.582751	0.013492		0.056406	2.557286	0.022696		0.008095	1.031848	0.585905
9101	7234	0.644131	0.531016	0.011		0.047086	2.333558	0.021197		0.007131	0.954675	0.519122
9102	7235	0.561633	0.474606	0.009098		0.039123	2.074178	0.01915		0.006186	0.85683	0.452429

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9103	7236	0.600274	0.503758	0.009545		0.039712	2.259145	0.02107		0.006576	0.942654	0.483331
9104	7237	0.705048	0.564188	0.010885		0.043762	2.698969	0.025406		0.007673	1.134056	0.567396
9105	7238	0.771344	0.54686	0.011327		0.043976	2.995325	0.028466		0.008313	1.261742	0.620369
9106	7239	0.749509	0.462361	0.01027		0.038855	2.932699	0.028124		0.007973	1.236753	0.602463
9107	724	0.339098	0.045354	0.015		0.064527	0.468004	0.004631		0.011067	0.027328	0.230749
9108	7240	0.727659	0.363036	0.009153		0.034114	2.850048	0.027586		0.00761	1.206346	0.58461
9109	7241	0.716831	0.271835	0.008099		0.030011	2.793636	0.027327		0.007326	1.183265	0.57565
9110	7242	0.562591	0.164861	0.005765		0.021171	2.171758	0.021475		0.005582	0.916277	0.451603
9111	7243	0.573717	0.152856	0.005902		0.020231	2.201839	0.021877		0.005572	0.923048	0.460428
9112	7244	0.728394	0.293423	0.007506		0.022689	2.756908	0.027637		0.006769	1.139179	0.584334
9113	7245	0.728616	0.402219	0.007461		0.019705	2.730392	0.027386		0.006584	1.099132	0.584282
9114	7246	0.728846	0.490113	0.00734		0.016843	2.738759	0.027004		0.006527	1.054095	0.584225
9115	7247	0.729086	0.562111	0.007132		0.015905	2.740129	0.026471		0.006605	1.005075	0.584444
9116	7248	0.646459	0.552273	0.006223		0.013269	2.422183	0.022837		0.005919	0.871103	0.518308
9117	7249	0.563738	0.504023	0.005629		0.011012	2.101765	0.019381		0.005272	0.761707	0.451981
9118	725	0.338544	0.04412	0.013352		0.061946	0.476167	0.005272		0.010898	0.028221	0.230785
9119	7250	0.64683	0.586107	0.006644		0.011998	2.393309	0.021508		0.006385	0.874574	0.518513
9120	7251	0.730047	0.642733	0.007682		0.012638	2.672723	0.022994		0.007658	0.98419	0.584943
9121	7252	0.730356	0.591488	0.00776		0.011986	2.639385	0.021459		0.008061	0.97869	0.58473
9122	7253	0.730682	0.52187	0.007722		0.012516	2.589896	0.020659		0.008402	0.96858	0.584345
9123	7254	0.731028	0.483894	0.007698		0.01589	2.52296	0.020828		0.008675	0.951099	0.583795
9124	7255	0.720313	0.428522	0.007704		0.018908	2.400783	0.020393		0.008982	0.911906	0.574258
9125	7256	0.565458	0.318165	0.006066		0.017271	1.806063	0.015709		0.007359	0.69046	0.449996
9126	7257	0.576729	0.334576	0.006161		0.019065	1.788073	0.015754		0.007605	0.685696	0.458649
9127	7258	0.732426	0.448707	0.00789		0.027368	2.151009	0.019239		0.009687	0.822524	0.581735
9128	7259	0.732875	0.499709	0.007991		0.030498	2.016806	0.018302		0.009496	0.765555	0.58132
9129	726	0.471922	0.059949	0.018579		0.082835	0.675901	0.008236		0.015188	0.040476	0.322377
9130	7260	0.733351	0.548492	0.007977		0.033604	1.866011	0.023839		0.0091	0.700469	0.5809
9131	7261	0.733855	0.576669	0.00855		0.036704	1.701007	0.030554		0.008837	0.628213	0.580488
9132	7262	0.650934	0.532708	0.008128		0.035299	1.353218	0.03375		0.007754	0.487041	0.514183
9133	7263	0.567814	0.46497	0.007418		0.032659	1.081523	0.034367		0.006884	0.375664	0.448056
9134	7264	0.651712	0.519282	0.008858		0.039662	1.125618	0.045568		0.008041	0.373288	0.513742
9135	7265	0.735864	0.540015	0.010552		0.048043	1.105873	0.061212		0.009286	0.336165	0.579373
9136	7266	0.569102	0.371869	0.008637		0.03976	0.74755	0.055627		0.007348	0.201078	0.447583
9137	7267	0.368415	0.219984	0.005765		0.026684	0.450313	0.039154		0.004819	0.110335	0.289593
9138	7268	0.502583	0.27187	0.008096		0.037493	0.584282	0.057164		0.006666	0.128372	0.394893
9139	7269	0.670644	0.27553	0.011607		0.053008	0.715662	0.086951		0.009127	0.114657	0.526567
9140	727	0.299036	0.037076	0.010793		0.050268	0.435236	0.005614		0.009583	0.026528	0.204352
9141	7270	0.671171	0.165953	0.012507		0.056098	0.712908	0.098739		0.009344	0.065709	0.526696
9142	7271	0.671246	0.145018	0.01596		0.061702	0.858756	0.103844		0.009892	0.050524	0.526723
9143	7272	0.693222	0.286858	0.018062		0.066277	1.04066	0.100245		0.010548	0.114151	0.544267
9144	7273	0.670501	0.405219	0.019543		0.06658	1.197404	0.091009		0.010788	0.183869	0.52674
9145	7274	0.491504	0.366328	0.015858		0.050285	1.015298	0.063558		0.0082	0.183541	0.386322
9146	7275	0.547248	0.445055	0.018748		0.056875	1.216654	0.06907		0.009279	0.234899	0.430261
9147	7276	0.736861	0.685957	0.02866		0.078883	1.862524	0.089213		0.012801	0.396541	0.579656
9148	7277	0.736689	0.755282	0.032782		0.080965	2.050661	0.086615		0.012968	0.466149	0.579783
9149	7278	0.736601	0.796442	0.037935		0.082887	2.188978	0.085266		0.013011	0.520727	0.5799
9150	7279	0.736608	0.870544	0.043724		0.084685	2.268249	0.085191		0.012941	0.556561	0.579993
9151	728	0.233637	0.028461	0.008032		0.038046	0.344242	0.004597		0.00734	0.021205	0.159758
9152	7280	0.736721	0.930226	0.050226		0.086402	2.284462	0.086436		0.012771	0.571047	0.580057
9153	7281	0.736952	0.962226	0.057517		0.088076	2.238206	0.089053		0.012513	0.563087	0.580088
9154	7282	0.737312	0.954386	0.065685		0.089748	2.133554	0.093115		0.012268	0.533266	0.580094
9155	7283	0.737804	0.90579	0.074814		0.091449	1.977131	0.098693		0.013773	0.483709	0.580088
9156	7284	0.805559	0.892538	0.092725		0.101689	1.939508	0.115513		0.018595	0.455685	0.632827
9157	7285	0.840137	0.761734	0.111922		0.108423	1.708456	0.132477		0.024008	0.368358	0.659257
9158	7286	0.807552	0.546867	0.122652		0.106437	1.34674	0.140392		0.027318	0.251499	0.633048
9159	7287	0.808625	0.389013	0.139466		0.108898	1.077159	0.1561		0.031679	0.15129	0.633362
9160	7288	0.829196	0.207843	0.121232		0.179985	0.968409	0.19856		0.017161	0.141058	0.614285
9161	7289	0.94032	0.3081	0.12136		0.200987	1.231774	0.192186		0.019134	0.246077	0.700554
9162	729	0.260026	0.031317	0.008617		0.041258	0.386823	0.005272		0.008028	0.024006	0.1779
9163	7290	0.800288	0.298414	0.090451		0.167817	1.191605	0.138288		0.015975	0.282924	0.599338
9164	7291	0.578349	0.231439	0.059332		0.119419	0.932481	0.088271		0.011366	0.24044	0.434567
9165	7292	0.454175	0.186547	0.043204		0.092602	0.774186	0.062944		0.008813	0.208849	0.342052
9166	7293	0.601383	0.248189	0.053704		0.121273	1.071982	0.076682		0.011537	0.297212	0.453709
9167	7294	0.818981	0.340899	0.064573		0.161407	1.567127	0.088393		0.015348	0.45247	0.619694
9168	7295	0.759565	0.30689	0.052235		0.145665	1.537485	0.067607		0.013851	0.457845	0.576223
9169	7296	0.67094	0.26794	0.041382		0.125635	1.401915	0.050715		0.011956	0.425286	0.509851
9170	7297	0.670617	0.250962	0.037054		0.122353	1.44597	0.042597		0.011679	0.441711	0.510369
9171	7298	0.670317	0.221663	0.03327		0.11891	1.482885	0.035349		0.011468	0.454808	0.510805
9172	7299	0.593629	0.165482	0.026545		0.10216	1.340016	0.025602		0.009973	0.412158	0.45286

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9173	730	0.306908	0.036426	0.009621		0.046773	0.463147	0.007718		0.009192	0.029018	0.210181
9174	7300	0.464183	0.110537	0.01921		0.07791	1.060815	0.01692		0.007688	0.326876	0.354356
9175	7301	0.516947	0.122493	0.020184		0.084973	1.1909	0.016911		0.008462	0.367466	0.394821
9176	7302	0.610739	0.142813	0.021932		0.097092	1.420315	0.017576		0.009818	0.439216	0.466709
9177	7303	0.598818	0.133319	0.019929		0.092	1.401512	0.015821		0.00945	0.436672	0.457773
9178	7304	0.575177	0.121538	0.017815		0.085222	1.35174	0.016142		0.008902	0.425397	0.439796
9179	7305	0.551569	0.13893	0.016045		0.078884	1.298987	0.016408		0.008377	0.412739	0.421785
9180	7306	0.580779	0.172002	0.015907		0.080016	1.368811	0.018583		0.008646	0.439197	0.444116
9181	7307	0.609975	0.209459	0.015666		0.080427	1.436999	0.021007		0.008876	0.466172	0.466389
9182	7308	0.691949	0.262545	0.016685		0.087061	1.627755	0.025286		0.00983	0.534073	0.52896
9183	7309	0.77432	0.326008	0.017229		0.091317	1.815382	0.029995		0.010649	0.615525	0.591376
9184	731	0.433841	0.050538	0.013119		0.063331	0.663634	0.013161		0.012737	0.041859	0.297448
9185	7310	0.686642	0.305733	0.014082		0.075449	1.605008	0.027804		0.009159	0.574656	0.523855
9186	7311	0.598857	0.269093	0.011968		0.062022	1.396968	0.024906		0.007779	0.517428	0.456479
9187	7312	0.64025	0.282016	0.012514		0.062389	1.490927	0.027212		0.008074	0.567513	0.48759
9188	7313	0.752287	0.320721	0.014124		0.068056	1.749584	0.032658		0.009133	0.681723	0.572324
9189	7314	0.823446	0.335427	0.014363		0.067524	1.921265	0.036526		0.009537	0.759492	0.625702
9190	7315	0.800585	0.293015	0.012549		0.058845	1.884344	0.036049		0.009368	0.744422	0.607636
9191	7316	0.777694	0.240769	0.010623		0.050904	1.838651	0.035325		0.009175	0.722594	0.589663
9192	7317	0.766598	0.18368	0.008742		0.043983	1.81378	0.034948		0.009111	0.707812	0.580688
9193	7318	0.60204	0.121288	0.006769		0.029996	1.42567	0.027422		0.007203	0.54702	0.455614
9194	7319	0.614198	0.111597	0.006863		0.028281	1.461254	0.027911		0.007378	0.550212	0.464556
9195	732	0.28861	0.033593	0.007698		0.04023	0.446721	0.009571		0.008285	0.028399	0.197879
9196	7320	0.78038	0.167633	0.00875		0.030793	1.872961	0.035219		0.009444	0.676761	0.589651
9197	7321	0.781257	0.228016	0.008882		0.025669	1.892223	0.034894		0.009533	0.650027	0.589945
9198	7322	0.782197	0.277769	0.008911		0.021232	1.911267	0.034451		0.009632	0.640482	0.590643
9199	7323	0.783202	0.313833	0.009599		0.019415	1.928699	0.033866		0.009742	0.633626	0.591212
9200	7324	0.695153	0.295936	0.008926		0.015607	1.722169	0.029326		0.00901	0.560237	0.524375
9201	7325	0.606707	0.260852	0.007911		0.012534	1.507407	0.024963		0.009057	0.486578	0.457267
9202	7326	0.69674	0.301372	0.009066		0.013673	1.736473	0.027775		0.011676	0.554523	0.524523
9203	7327	0.787303	0.334267	0.010371		0.01714	1.964357	0.029756		0.014864	0.617692	0.591568
9204	7328	0.788591	0.333142	0.010466		0.023298	1.961962	0.027864		0.016307	0.606759	0.591117
9205	7329	0.789921	0.32549	0.01038		0.029478	1.95061	0.027226		0.017476	0.597725	0.590424
9206	733	0.276543	0.032067	0.006633		0.03699	0.43278	0.010006		0.007676	0.027883	0.189696
9207	7330	0.791278	0.316536	0.010331		0.035565	1.929024	0.027036		0.018357	0.587482	0.589507
9208	7331	0.780646	0.303187	0.010442		0.04092	1.867278	0.025979		0.018664	0.5644	0.579473
9209	7332	0.613546	0.22419	0.008279		0.0365	1.4312	0.019619		0.014896	0.428107	0.453869
9210	7333	0.626207	0.223743	0.008585		0.039825	1.434515	0.019447		0.015263	0.42544	0.462514
9211	7334	0.796194	0.305534	0.011287		0.056156	1.762513	0.023306		0.019407	0.51057	0.58641
9212	7335	0.797585	0.32754	0.011642		0.061547	1.692429	0.023135		0.019328	0.475299	0.585705
9213	7336	0.798974	0.345244	0.012116		0.066688	1.618602	0.030152		0.019169	0.435304	0.584944
9214	7337	0.800358	0.357833	0.012578		0.071547	1.530999	0.038119		0.018936	0.391926	0.584152
9215	7338	0.710632	0.315401	0.011783		0.067467	1.26858	0.04176		0.016483	0.306889	0.517073
9216	7339	0.620349	0.266005	0.010594		0.061393	1.04138	0.042354		0.014091	0.239366	0.45033
9217	734	0.290956	0.033593	0.006194		0.037251	0.460273	0.011421		0.007807	0.030031	0.199701
9218	7340	0.712522	0.293851	0.012303		0.073232	1.121667	0.055995		0.01575	0.241568	0.516073
9219	7341	0.80525	0.310449	0.014416		0.086506	1.171494	0.074949		0.017003	0.223779	0.581614
9220	7342	0.623304	0.21309	0.011519		0.069683	0.835113	0.067772		0.012433	0.135768	0.449035
9221	7343	0.403689	0.12572	0.00758		0.046051	0.517729	0.047516		0.007779	0.075646	0.29044
9222	7344	0.550909	0.156768	0.010477		0.063861	0.686435	0.069082		0.010302	0.089981	0.395948
9223	7345	0.735658	0.166836	0.014331		0.087872	0.882678	0.103897		0.013748	0.088316	0.52773
9224	7346	0.73675	0.108014	0.015084		0.090417	0.869511	0.116115		0.013862	0.063892	0.527632
9225	7347	0.737796	0.08251	0.018686		0.094852	0.953081	0.122038		0.01395	0.050996	0.527764
9226	7348	0.762396	0.153779	0.02145		0.10025	1.089788	0.119305		0.014557	0.075135	0.545633
9227	7349	0.737848	0.224696	0.023227		0.099285	1.18345	0.109209		0.014178	0.124057	0.528401
9228	735	0.305311	0.035045	0.00559		0.037121	0.48863	0.013045		0.007887	0.032188	0.209713
9229	7350	0.54114	0.207658	0.01873		0.074228	0.957854	0.076566		0.010421	0.125014	0.387767
9230	7351	0.602681	0.258412	0.021999		0.083556	1.127378	0.083306		0.011607	0.160582	0.432015
9231	7352	0.81195	0.416341	0.033605		0.11502	1.675397	0.107729		0.015598	0.272911	0.58241
9232	7353	0.812183	0.465636	0.038976		0.117527	1.805304	0.104594		0.015514	0.323467	0.582893
9233	7354	0.812471	0.493552	0.045159		0.120085	1.898303	0.102901		0.01543	0.364806	0.58331
9234	7355	0.81281	0.534757	0.052064		0.122698	1.94885	0.102691		0.017428	0.39343	0.583632
9235	7356	0.813202	0.5602	0.05977		0.12535	1.955429	0.10402		0.019754	0.40626	0.583841
9236	7357	0.813652	0.564279	0.068345		0.128022	1.919335	0.10692		0.022332	0.401687	0.583919
9237	7358	0.814171	0.549412	0.077852		0.13069	1.843259	0.111442		0.025033	0.380186	0.583859
9238	7359	0.814771	0.518772	0.088334		0.133314	1.730622	0.117617		0.027693	0.344073	0.58366
9239	736	0.478546	0.054396	0.007772		0.054858	0.774485	0.022341		0.012082	0.051479	0.328878
9240	7360	0.889599	0.50708	0.108893		0.148212	1.730216	0.136911		0.032869	0.323573	0.636366
9241	7361	0.92775	0.426519	0.130306		0.157608	1.572633	0.155757		0.036928	0.261828	0.662298
9242	7362	0.891741	0.330152	0.141352		0.153924	1.299687	0.163588		0.037125	0.178824	0.635204

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9243	7363	0.89297	0.263568	0.158823		0.156269	1.102963	0.179979		0.038065	0.106311	0.634578
9244	7364	0.814898	0.155107	0.119768		0.197061	0.956254	0.196815		0.019177	0.113996	0.593062
9245	7365	0.923759	0.221479	0.120055		0.220396	1.202512	0.19051		0.021413	0.191955	0.676705
9246	7366	0.786011	0.206964	0.09005		0.184185	1.127448	0.137148		0.017886	0.21616	0.579138
9247	7367	0.567974	0.158382	0.059104		0.131061	0.87189	0.087545		0.012732	0.181808	0.419981
9248	7368	0.446015	0.126536	0.043063		0.101608	0.717789	0.062401		0.009876	0.156952	0.330582
9249	7369	0.590589	0.167242	0.053459		0.133001	0.984469	0.076031		0.012933	0.22249	0.438525
9250	737	0.386724	0.044105	0.005474		0.040834	0.633547	0.018921		0.009478	0.042223	0.265983
9251	7370	0.804321	0.225923	0.064183		0.176819	1.419251	0.087625		0.017215	0.33715	0.598987
9252	7371	0.746065	0.209642	0.051815		0.15934	1.379446	0.06711		0.015541	0.3407	0.557047
9253	7372	0.659094	0.184561	0.040962		0.137247	1.252959	0.050451		0.013418	0.316684	0.492938
9254	7373	0.658911	0.173917	0.036694		0.133484	1.279336	0.042518		0.013094	0.329252	0.493501
9255	7374	0.658744	0.154175	0.032928		0.129522	1.299401	0.035434		0.012764	0.33926	0.493955
9256	7375	0.583504	0.113013	0.02629		0.111088	1.164486	0.025815		0.01101	0.307586	0.437946
9257	7376	0.456347	0.084621	0.019037		0.084603	0.916849	0.017164		0.008434	0.244004	0.342695
9258	7377	0.508296	0.090496	0.019998		0.092166	1.025458	0.017229		0.009273	0.274358	0.38183
9259	7378	0.600666	0.101677	0.021718		0.105128	1.217363	0.018042		0.010735	0.330486	0.451362
9260	7379	0.589095	0.097181	0.019767		0.099443	1.197087	0.016356		0.010312	0.33095	0.442706
9261	738	0.34234	0.03906	0.004469		0.033419	0.567617	0.017652		0.008024	0.038099	0.235781
9262	7380	0.565996	0.091168	0.017745		0.091959	1.15142	0.016648		0.009689	0.323723	0.425316
9263	7381	0.542916	0.103299	0.016045		0.084992	1.104162	0.016916		0.009091	0.31398	0.407876
9264	7382	0.571837	0.12226	0.015975		0.086078	1.162897	0.01898		0.009358	0.332185	0.429455
9265	7383	0.600792	0.145805	0.015801		0.08638	1.222169	0.021426		0.00957	0.349251	0.450971
9266	7384	0.681787	0.188785	0.017006		0.093349	1.386174	0.025745		0.010561	0.400469	0.511446
9267	7385	0.762906	0.235481	0.017721		0.097703	1.548691	0.030481		0.011388	0.461644	0.571761
9268	7386	0.676479	0.220583	0.014796		0.080553	1.370361	0.0282		0.009708	0.42206	0.506443
9269	7387	0.589971	0.195846	0.012375		0.066107	1.193064	0.02524		0.008197	0.376821	0.441286
9270	7388	0.630731	0.209874	0.012927		0.066305	1.273504	0.027556		0.008465	0.411217	0.47134
9271	7389	0.741088	0.238619	0.014549		0.072187	1.494379	0.033008		0.009529	0.494308	0.553228
9272	739	0.298162	0.034015	0.00409		0.02737	0.498814	0.015943		0.006763	0.03375	0.205522
9273	7390	0.811175	0.249363	0.014685		0.071464	1.634909	0.036837		0.009846	0.551296	0.604811
9274	7391	0.788658	0.218773	0.012668		0.062143	1.591257	0.03638		0.00946	0.540573	0.587359
9275	7392	0.766121	0.181118	0.010522		0.053637	1.549998	0.035661		0.009339	0.524448	0.570014
9276	7393	0.755217	0.147146	0.00855		0.046212	1.534731	0.03527		0.009344	0.511517	0.561372
9277	7394	0.593135	0.099909	0.006647		0.031347	1.212406	0.027648		0.007443	0.399212	0.440489
9278	7395	0.605139	0.094105	0.006702		0.029481	1.241998	0.028122		0.007657	0.4038	0.44915
9279	7396	0.768935	0.116554	0.008589		0.031917	1.590737	0.035445		0.009872	0.502225	0.57013
9280	7397	0.769884	0.151546	0.008782		0.026382	1.606323	0.03509		0.010033	0.487679	0.570924
9281	7398	0.770907	0.186817	0.009262		0.021463	1.622163	0.034646		0.010205	0.478629	0.571648
9282	7399	0.772008	0.214894	0.010068		0.019441	1.637155	0.034097		0.01039	0.474401	0.572221
9283	740	0.450265	0.051276	0.006741		0.038517	0.759781	0.025154		0.010034	0.052112	0.310523
9284	7400	0.685324	0.204286	0.009371		0.015451	1.471074	0.029582		0.010364	0.418891	0.50753
9285	7401	0.598205	0.180495	0.008301		0.012281	1.297764	0.02522		0.010165	0.363084	0.442563
9286	7402	0.687067	0.203072	0.009495		0.014354	1.503952	0.028095		0.012831	0.413017	0.507627
9287	7403	0.776511	0.232081	0.010634		0.01985	1.714141	0.030228		0.015966	0.459177	0.572454
9288	7404	0.777922	0.23714	0.010727		0.026681	1.724385	0.028347		0.017196	0.450516	0.571943
9289	7405	0.779371	0.234725	0.010628		0.033489	1.72631	0.027655		0.018161	0.439988	0.571183
9290	7406	0.780843	0.239559	0.010579		0.040209	1.71928	0.027305		0.018854	0.431833	0.570198
9291	7407	0.770472	0.233991	0.010738		0.04612	1.677312	0.02604		0.018983	0.416311	0.5604
9292	7408	0.605637	0.181258	0.008536		0.04106	1.297204	0.019509		0.015027	0.316578	0.438843
9293	7409	0.618183	0.184103	0.008972		0.044762	1.308028	0.019251		0.01533	0.314897	0.447187
9294	741	0.373499	0.04253	0.005341		0.02926	0.635333	0.020882		0.008138	0.043182	0.257579
9295	7410	0.786088	0.230809	0.01182		0.063034	1.620338	0.022929		0.019381	0.378213	0.566916
9296	7411	0.787548	0.245151	0.012503		0.069002	1.570243	0.023527		0.019246	0.352186	0.566151
9297	7412	0.788991	0.26169	0.013151		0.074656	1.509239	0.030355		0.019105	0.322818	0.565308
9298	7413	0.790418	0.26884	0.013689		0.07995	1.437205	0.038132		0.018954	0.291434	0.564421
9299	7414	0.701846	0.235698	0.012834		0.075205	1.209149	0.041621		0.016609	0.229545	0.499488
9300	7415	0.612699	0.198426	0.011495		0.068267	1.010177	0.042152		0.014281	0.180358	0.434935
9301	7416	0.703751	0.221574	0.01328		0.081184	1.104408	0.055696		0.016048	0.183908	0.498341
9302	7417	0.795358	0.234669	0.01476		0.095427	1.163779	0.074553		0.017417	0.173621	0.561505
9303	7418	0.615661	0.162133	0.011662		0.0764	0.837492	0.067437		0.012782	0.108229	0.433422
9304	7419	0.398744	0.096235	0.00764		0.0503	0.523274	0.047288		0.008009	0.061212	0.280312
9305	742	0.408011	0.046452	0.005788		0.028627	0.700526	0.023071		0.008482	0.047533	0.281356
9306	7420	0.544167	0.122866	0.010522		0.069525	0.698189	0.06874		0.010754	0.073992	0.382112
9307	7421	0.726682	0.133309	0.01428		0.095026	0.897787	0.103244		0.014423	0.076482	0.509217
9308	7422	0.72777	0.089937	0.014769		0.097088	0.880361	0.115027		0.014556	0.059391	0.509072
9309	7423	0.728943	0.064136	0.018581		0.100508	0.936052	0.120792		0.014828	0.050613	0.509233
9310	7424	0.753391	0.108483	0.021426		0.105615	1.045972	0.118322		0.015408	0.061389	0.526564
9311	7425	0.729266	0.157381	0.023257		0.104039	1.109074	0.108339		0.014937	0.092484	0.510039
9312	7426	0.534941	0.146863	0.018776		0.077497	0.878034	0.075931		0.010939	0.094246	0.374364

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9313	7427	0.595836	0.183796	0.022069		0.087091	1.017899	0.0826		0.01216	0.121557	0.417128
9314	7428	0.802889	0.298175	0.033162		0.119628	1.487318	0.106799		0.016289	0.207736	0.562462
9315	7429	0.803272	0.334528	0.038536		0.122153	1.58285	0.103714		0.016166	0.247184	0.563035
9316	743	0.395852	0.045045	0.005565		0.024587	0.685469	0.022746		0.007808	0.046659	0.27294
9317	7430	0.803687	0.35468	0.044636		0.124877	1.650415	0.102054		0.016418	0.279757	0.563525
9318	7431	0.804129	0.380959	0.05145		0.127749	1.686061	0.101861		0.01817	0.302793	0.563903
9319	7432	0.804592	0.399856	0.059052		0.130717	1.688774	0.103169		0.020203	0.313808	0.564146
9320	7433	0.805079	0.403366	0.067515		0.133736	1.659484	0.106039		0.022456	0.311331	0.564242
9321	7434	0.805595	0.390786	0.076901		0.136759	1.600023	0.110481		0.024819	0.295472	0.564168
9322	7435	0.806158	0.363226	0.087254		0.139734	1.51263	0.11652		0.027115	0.267823	0.563917
9323	7436	0.880126	0.354995	0.107555		0.155533	1.527758	0.135478		0.031791	0.251842	0.614724
9324	7437	0.917754	0.300901	0.128667		0.165535	1.418103	0.153862		0.035224	0.20323	0.63957
9325	7438	0.882016	0.248969	0.139488		0.161662	1.202977	0.161316		0.035046	0.138024	0.613179
9326	7439	0.883109	0.204934	0.156579		0.163976	1.047244	0.177193		0.035745	0.081482	0.61231
9327	744	0.514989	0.058606	0.00707		0.028758	0.898361	0.030536		0.009884	0.061818	0.355046
9328	7440	0.827074	0.120193	0.12169		0.220434	0.970821	0.200056		0.021745	0.091866	0.591825
9329	7441	0.937934	0.155982	0.122302		0.246646	1.20182	0.193713		0.024306	0.147176	0.675632
9330	7442	0.798383	0.14108	0.09188		0.206043	1.111778	0.139545		0.020322	0.161023	0.578389
9331	7443	0.577063	0.101445	0.060311		0.146533	0.846191	0.089108		0.014473	0.133608	0.41949
9332	7444	0.453227	0.07915	0.043889		0.113526	0.687565	0.063531		0.011232	0.114469	0.330223
9333	7445	0.600208	0.105027	0.054459		0.148508	0.933623	0.077404		0.014717	0.161469	0.438061
9334	7446	0.817543	0.137477	0.065237		0.197166	1.325811	0.089243		0.019606	0.243056	0.598394
9335	7447	0.758412	0.131816	0.05254		0.177378	1.283539	0.068429		0.017708	0.244788	0.556525
9336	7448	0.670022	0.116969	0.041484		0.152582	1.164557	0.051569		0.015289	0.227336	0.492528
9337	7449	0.669836	0.110872	0.03711		0.148177	1.189485	0.043625		0.014927	0.236344	0.493137
9338	745	0.377454	0.042606	0.00517		0.018681	0.662011	0.022276		0.007015	0.045203	0.260375
9339	7450	0.669662	0.10334	0.03331		0.143558	1.209974	0.036559		0.014558	0.243595	0.493643
9340	7451	0.593152	0.085298	0.026609		0.122924	1.08698	0.02681		0.012557	0.220933	0.437677
9341	7452	0.463874	0.065891	0.019296		0.093498	0.857839	0.017949		0.009607	0.175323	0.342495
9342	7453	0.516663	0.071586	0.020292		0.101756	0.961477	0.018054		0.010507	0.198186	0.381615
9343	7454	0.610523	0.079491	0.022089		0.115875	1.145432	0.019047		0.012074	0.241657	0.451108
9344	7455	0.59873	0.073597	0.02012		0.10943	1.130478	0.0173		0.011511	0.242431	0.442471
9345	7456	0.57522	0.075318	0.018124		0.101031	1.094693	0.017544		0.010766	0.236864	0.425054
9346	7457	0.55173	0.081883	0.016463		0.093245	1.058426	0.017836		0.010076	0.2299	0.40761
9347	7458	0.581085	0.094158	0.016466		0.094319	1.121583	0.019818		0.010332	0.243392	0.42915
9348	7459	0.610469	0.105347	0.016515		0.094504	1.183775	0.02235		0.010537	0.255454	0.45063
9349	746	0.295828	0.033207	0.004011		0.012962	0.521314	0.017662		0.00516	0.035575	0.204251
9350	7460	0.692727	0.131211	0.017899		0.101964	1.346981	0.026826		0.011599	0.294816	0.51105
9351	7461	0.775087	0.16764	0.018873		0.106524	1.509848	0.031672		0.01245	0.33961	0.571272
9352	7462	0.687231	0.161216	0.015967		0.087669	1.340472	0.029258		0.010559	0.309135	0.505979
9353	7463	0.599319	0.144957	0.013217		0.071848	1.170769	0.026164		0.008878	0.27495	0.440861
9354	7464	0.640702	0.155575	0.013731		0.071863	1.254537	0.02856		0.009134	0.299513	0.470869
9355	7465	0.752781	0.177678	0.01541		0.078113	1.479475	0.034192		0.01023	0.358612	0.552646
9356	7466	0.823958	0.17862	0.015433		0.077217	1.628274	0.038111		0.010481	0.399056	0.604154
9357	7467	0.801073	0.158448	0.013144		0.067057	1.591874	0.037607		0.00976	0.390827	0.586743
9358	7468	0.77819	0.137137	0.010717		0.05778	1.553283	0.03691		0.009718	0.378996	0.569456
9359	7469	0.767147	0.1146	0.008681		0.049688	1.536246	0.036479		0.00981	0.374146	0.56086
9360	747	0.301422	0.033749	0.00405		0.012187	0.532591	0.018169		0.005045	0.036375	0.2083
9361	7470	0.602541	0.079863	0.006668		0.033582	1.209123	0.028556		0.007883	0.291152	0.440119
9362	7471	0.614763	0.078212	0.006673		0.031528	1.234744	0.029018		0.008153	0.293847	0.448795
9363	7472	0.781245	0.093591	0.008621		0.033987	1.571134	0.036532		0.010595	0.364363	0.570201
9364	7473	0.782305	0.113022	0.008877		0.027912	1.575877	0.036109		0.010841	0.351936	0.571071
9365	7474	0.783464	0.128232	0.009899		0.022284	1.582274	0.035625		0.01114	0.343871	0.571809
9366	7475	0.784712	0.144154	0.010797		0.019989	1.590532	0.035113		0.011452	0.342414	0.572398
9367	7476	0.69672	0.13616	0.01006		0.015719	1.41815	0.03055		0.011803	0.301519	0.507684
9368	7477	0.608234	0.119865	0.008902		0.012439	1.241787	0.026131		0.011309	0.260808	0.44267
9369	7478	0.698684	0.134733	0.010165		0.015299	1.429443	0.029226		0.013982	0.296116	0.50771
9370	7479	0.789788	0.151477	0.011155		0.022966	1.618239	0.031493		0.016997	0.328567	0.572487
9371	748	0.51274	0.057284	0.006724		0.017597	0.910195	0.031902		0.008195	0.062531	0.355065
9372	7480	0.79137	0.155671	0.011252		0.030655	1.620279	0.029538		0.017958	0.321975	0.571916
9373	7481	0.792982	0.164627	0.01113		0.038317	1.615833	0.028739		0.018676	0.31432	0.571064
9374	7482	0.794612	0.171676	0.01109		0.045882	1.60466	0.028199		0.01917	0.307357	0.569979
9375	7483	0.784183	0.173616	0.011315		0.052538	1.562864	0.026656		0.019137	0.297403	0.560104
9376	7484	0.616499	0.14181	0.009107		0.046735	1.208308	0.019781		0.015035	0.226848	0.438552
9377	7485	0.629319	0.14575	0.00961		0.05094	1.218987	0.019423		0.015273	0.225971	0.446873
9378	7486	0.800348	0.184791	0.012687		0.071721	1.513294	0.022977		0.019181	0.272028	0.566455
9379	7487	0.801916	0.188464	0.013714		0.078487	1.476499	0.02463		0.018979	0.253932	0.565601
9380	7488	0.803456	0.189488	0.014614		0.084896	1.441148	0.03141		0.018829	0.233614	0.564662
9381	7489	0.804959	0.192735	0.01518		0.090883	1.397108	0.039145		0.018723	0.212211	0.563651
9382	749	0.381568	0.041986	0.004972		0.011854	0.67918	0.023326		0.005801	0.046332	0.264978

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9383	7490	0.714785	0.168021	0.014218		0.085417	1.19084	0.042518		0.01649	0.168827	0.498682
9384	7491	0.624001	0.142569	0.012684		0.077445	1.001664	0.042973		0.01425	0.134118	0.43415
9385	7492	0.716734	0.160121	0.0146		0.09194	1.103816	0.056733		0.016095	0.13877	0.497356
9386	7493	0.810016	0.170197	0.016088		0.107709	1.176803	0.075936		0.017568	0.134444	0.560283
9387	7494	0.626986	0.118719	0.012075		0.085799	0.861817	0.068729		0.013178	0.086901	0.432391
9388	7495	0.406072	0.0723	0.007877		0.056285	0.544087	0.048218		0.008609	0.050411	0.279618
9389	7496	0.554159	0.093104	0.010808		0.077529	0.727583	0.07013		0.011826	0.062427	0.381133
9390	7497	0.740011	0.103821	0.014566		0.105169	0.937303	0.105332		0.015962	0.068279	0.507848
9391	7498	0.741131	0.074289	0.01527		0.106616	0.915987	0.117069		0.0161	0.057154	0.507654
9392	7499	0.742453	0.053393	0.018986		0.108545	0.946813	0.122788		0.016232	0.051657	0.507844
9393	750	0.381176	0.041474	0.004909		0.011031	0.680021	0.023193		0.005472	0.046265	0.265391
9394	7500	0.767485	0.080869	0.021958		0.113249	1.033735	0.120361		0.016779	0.059191	0.525213
9395	7501	0.743071	0.108606	0.023891		0.110863	1.068509	0.110111		0.016188	0.07088	0.508838
9396	7502	0.545174	0.100575	0.019324		0.08225	0.828822	0.077109		0.011811	0.06652	0.373552
9397	7503	0.607303	0.123978	0.022711		0.092296	0.950881	0.083859		0.013106	0.086457	0.416267
9398	7504	0.818532	0.198582	0.0341		0.126602	1.350888	0.108481		0.017503	0.149304	0.56142
9399	7505	0.819089	0.223418	0.039077		0.129347	1.412561	0.105439		0.01734	0.178911	0.562101
9400	7506	0.819658	0.24348	0.045241		0.132464	1.457562	0.103834		0.017166	0.203636	0.562673
9401	7507	0.820226	0.256499	0.052127		0.135823	1.479892	0.103649		0.018527	0.221527	0.5631
9402	7508	0.82079	0.265629	0.059815		0.139311	1.478835	0.104995		0.020232	0.230635	0.563384
9403	7509	0.821344	0.268842	0.068377		0.142878	1.454985	0.107928		0.022159	0.229691	0.563507
9404	751	0.380779	0.041023	0.005102		0.010805	0.680632	0.023113		0.005242	0.046273	0.265759
9405	7510	0.821888	0.261152	0.077886		0.146473	1.409515	0.112461		0.024217	0.218603	0.563436
9406	7511	0.822433	0.242708	0.088398		0.149997	1.343834	0.118534		0.026219	0.198438	0.563129
9407	7512	0.897821	0.233924	0.10901		0.167294	1.380946	0.137659		0.030468	0.186522	0.613747
9408	7513	0.936058	0.204833	0.130454		0.178322	1.316342	0.15608		0.033352	0.150004	0.638356
9409	7514	0.899429	0.188043	0.141428		0.174298	1.143206	0.163366		0.032835	0.10165	0.611802
9410	7515	0.900347	0.171005	0.158695		0.176836	1.024044	0.179163		0.033237	0.05997	0.610687
9411	7516	0.850787	0.10383	0.125082		0.251388	1.008753	0.205209		0.02501	0.070502	0.598759
9412	7517	0.965701	0.115454	0.125949		0.281098	1.210884	0.198909		0.027997	0.10373	0.683912
9413	7518	0.822625	0.093215	0.094603		0.234489	1.098581	0.143517		0.023437	0.1078	0.585672
9414	7519	0.594807	0.064104	0.062009		0.166547	0.826857	0.091695		0.016707	0.08731	0.424797
9415	752	0.467189	0.050003	0.006547		0.013701	0.836715	0.028687		0.006145	0.05719	0.326887
9416	7520	0.467276	0.048001	0.045075		0.128919	0.667366	0.065393		0.012971	0.073774	0.334419
9417	7521	0.618905	0.060252	0.055837		0.168505	0.902157	0.07971		0.017004	0.103104	0.443673
9418	7522	0.843135	0.077638	0.066727		0.223241	1.271638	0.091985		0.022698	0.153115	0.606144
9419	7523	0.782162	0.077741	0.053611		0.200358	1.216085	0.070592		0.020535	0.152861	0.563672
9420	7524	0.69101	0.070605	0.042254		0.172085	1.096638	0.053326		0.017721	0.141394	0.498847
9421	7525	0.690791	0.073001	0.037752		0.166857	1.116786	0.045418		0.017293	0.146604	0.499629
9422	7526	0.690551	0.073634	0.033866		0.161315	1.136129	0.038366		0.0169	0.150888	0.50023
9423	7527	0.611599	0.064388	0.027094		0.137849	1.023585	0.02837		0.014601	0.136817	0.443503
9424	7528	0.478267	0.049511	0.019683		0.104728	0.810845	0.019097		0.011155	0.10861	0.346987
9425	7529	0.532664	0.055667	0.020745		0.113895	0.912142	0.019265		0.012167	0.122208	0.386624
9426	753	0.293576	0.030891	0.00391		0.009999	0.525773	0.017365		0.003755	0.036184	0.205536
9427	7530	0.629372	0.066242	0.022644		0.129514	1.093572	0.020474		0.013951	0.146333	0.457162
9428	7531	0.617168	0.06483	0.020684		0.122054	1.086498	0.018587		0.013334	0.145782	0.448417
9429	7532	0.592892	0.063808	0.018695		0.112443	1.056213	0.018772		0.012456	0.143174	0.430734
9430	7533	0.568638	0.066224	0.01706		0.103629	1.02271	0.018946		0.011553	0.139134	0.412921
9431	7534	0.598842	0.07387	0.017271		0.10472	1.085623	0.021003		0.011686	0.14768	0.434883
9432	7535	0.629072	0.080795	0.017514		0.104772	1.148385	0.023605		0.011765	0.157316	0.456799
9433	7536	0.713795	0.093377	0.019048		0.112778	1.310124	0.028309		0.012972	0.18146	0.517873
9434	7537	0.798604	0.110642	0.020555		0.117494	1.473891	0.033197		0.013933	0.208545	0.57868
9435	7538	0.708001	0.106777	0.017412		0.096645	1.312909	0.030518		0.011651	0.189275	0.512435
9436	7539	0.617382	0.0968	0.014499		0.079167	1.148945	0.027413		0.009701	0.167824	0.446541
9437	754	0.336498	0.034936	0.004327		0.013363	0.602442	0.019399		0.00419	0.041834	0.235699
9438	7540	0.659981	0.10523	0.014847		0.079021	1.232951	0.02998		0.009989	0.182322	0.476959
9439	7541	0.775398	0.122758	0.016605		0.085555	1.4557	0.035793		0.011204	0.217907	0.559714
9440	7542	0.84865	0.128162	0.016409		0.084568	1.603166	0.039699		0.0113	0.242124	0.611732
9441	7543	0.825049	0.113424	0.013801		0.073475	1.56717	0.039467		0.010168	0.236655	0.594236
9442	7544	0.801488	0.096122	0.011049		0.063118	1.528613	0.038852		0.010187	0.232755	0.576853
9443	7545	0.790154	0.085352	0.008894		0.054096	1.511311	0.038133		0.010359	0.229452	0.568104
9444	7546	0.620672	0.063596	0.006689		0.036559	1.188779	0.029674		0.008492	0.178007	0.445799
9445	7547	0.633305	0.063654	0.006613		0.034289	1.213222	0.030217		0.008876	0.179225	0.454904
9446	7548	0.804908	0.077199	0.008679		0.036833	1.541495	0.038173		0.011601	0.220892	0.578505
9447	7549	0.806132	0.079224	0.009356		0.030084	1.543189	0.037493		0.011965	0.213602	0.579304
9448	755	0.37928	0.038752	0.005161		0.017793	0.678616	0.021228		0.004648	0.047689	0.265871
9449	7550	0.807505	0.085504	0.010665		0.023456	1.545304	0.036754		0.012492	0.213356	0.579887
9450	7551	0.808982	0.088667	0.011842		0.020705	1.54771	0.036526		0.013525	0.21214	0.580631
9451	7552	0.718421	0.077824	0.01095		0.016213	1.3741	0.032081		0.013491	0.186185	0.515057
9452	7553	0.627283	0.067092	0.00966		0.013324	1.199195	0.027476		0.012531	0.160731	0.448996

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9453	7554	0.720694	0.079053	0.010973		0.016374	1.375918	0.030652		0.015131	0.182206	0.51478
9454	7555	0.814849	0.090197	0.011954		0.026578	1.549538	0.03313		0.01791	0.201779	0.580483
9455	7556	0.816644	0.090886	0.011953		0.035463	1.542216	0.031182		0.01836	0.19747	0.579969
9456	7557	0.818468	0.097262	0.011768		0.044346	1.530346	0.030142		0.018635	0.194605	0.578914
9457	7558	0.820304	0.108577	0.011708		0.052964	1.514361	0.029376		0.018902	0.193271	0.577575
9458	7559	0.809682	0.116839	0.012103		0.060549	1.472703	0.02741		0.018744	0.187685	0.567616
9459	756	0.508396	0.051291	0.00777		0.027732	0.909259	0.028137		0.006277	0.064546	0.357055
9460	7560	0.636655	0.096878	0.009921		0.053912	1.140195	0.020073		0.014627	0.143762	0.444429
9461	7561	0.649955	0.1006	0.010479		0.0588	1.153082	0.019577		0.01481	0.143626	0.452846
9462	7562	0.826702	0.134967	0.013854		0.082765	1.441808	0.023012		0.018564	0.174066	0.573808
9463	7563	0.828412	0.137991	0.015278		0.090556	1.417638	0.026294		0.018812	0.163972	0.572894
9464	7564	0.830091	0.13597	0.016549		0.098089	1.38928	0.033089		0.018947	0.152735	0.571912
9465	7565	0.831713	0.129491	0.017069		0.105167	1.35534	0.040748		0.019016	0.141075	0.570703
9466	7566	0.738563	0.107783	0.015869		0.098909	1.165719	0.043898		0.016963	0.114742	0.50472
9467	7567	0.644756	0.090174	0.01418		0.089704	0.989245	0.044249		0.01483	0.093116	0.439339
9468	7568	0.740562	0.101235	0.016295		0.106503	1.105828	0.058344		0.016967	0.098893	0.503237
9469	7569	0.836894	0.108408	0.01776		0.124626	1.20508	0.078016		0.019203	0.100046	0.566774
9470	757	0.378383	0.037435	0.005783		0.023689	0.675279	0.019662		0.004697	0.048299	0.265828
9471	7570	0.647716	0.077523	0.012923		0.098929	0.898416	0.070589		0.01511	0.068453	0.437296
9472	7571	0.419463	0.048314	0.008185		0.064691	0.570133	0.049544		0.009857	0.041224	0.28276
9473	7572	0.5724	0.063068	0.0112		0.088793	0.765172	0.072095		0.013514	0.052871	0.385394
9474	7573	0.764268	0.073693	0.015429		0.119234	0.989957	0.10846		0.018155	0.062607	0.513447
9475	7574	0.765372	0.05825	0.016146		0.119352	0.965674	0.120437		0.018224	0.057473	0.513183
9476	7575	0.766881	0.043344	0.019587		0.118239	0.970353	0.126012		0.018142	0.053761	0.513403
9477	7576	0.79294	0.056305	0.022727		0.121891	1.032557	0.12336		0.018625	0.057743	0.531055
9478	7577	0.767983	0.068441	0.024832		0.11826	1.03588	0.112662		0.017865	0.061926	0.514632
9479	7578	0.563607	0.059389	0.020108		0.08746	0.783726	0.078866		0.012989	0.05143	0.377886
9480	7579	0.62793	0.072323	0.023659		0.098111	0.887566	0.085797		0.014392	0.061817	0.42114
9481	758	0.378091	0.036757	0.005893		0.02653	0.672962	0.018806		0.004702	0.048284	0.265943
9482	7580	0.846575	0.113534	0.035498		0.134658	1.231683	0.111081		0.019166	0.099382	0.568096
9483	7581	0.847369	0.124837	0.039992		0.137866	1.259118	0.108289		0.018946	0.110497	0.568938
9484	7582	0.848121	0.131065	0.046237		0.141795	1.27579	0.106868		0.018749	0.118841	0.56963
9485	7583	0.848851	0.138702	0.053266		0.146077	1.281055	0.106617		0.018544	0.131048	0.570073
9486	7584	0.849569	0.141239	0.061124		0.150336	1.274776	0.107871		0.019671	0.138193	0.570351
9487	7585	0.850247	0.138535	0.069831		0.154686	1.257248	0.111089		0.021063	0.138834	0.57058
9488	7586	0.850858	0.13388	0.079533		0.159267	1.229116	0.115867		0.022732	0.13281	0.570554
9489	7587	0.851418	0.136635	0.09033		0.163708	1.19058	0.121962		0.024352	0.120908	0.570155
9490	7588	0.929391	0.156142	0.111499		0.182975	1.245187	0.141381		0.027917	0.113638	0.621237
9491	7589	0.968776	0.166232	0.133538		0.195593	1.217384	0.160084		0.030155	0.091012	0.645957
9492	759	0.372062	0.035467	0.006047		0.028916	0.660318	0.017867		0.004816	0.04732	0.26217
9493	7590	0.93057	0.158664	0.144844		0.19161	1.090203	0.167193		0.029387	0.068498	0.618851
9494	7591	0.931116	0.15444	0.162549		0.194543	1.011605	0.182944		0.029438	0.056154	0.617447
9495	7593	0.810442	0.006153	0.010084		0.72943	0.16909	0.004645		0.271988	0.008241	0.134604
9496	7594	0.250176	0.002302	0.012138		0.155383	0.059067	0.004287		0.121422	0.002952	0.054364
9497	760	0.420927	0.040008	0.007359		0.035958	0.744707	0.019849		0.005792	0.053135	0.297455
9498	761	0.297443	0.027914	0.005137		0.026765	0.524681	0.013471		0.004251	0.037241	0.210133
9499	762	0.377556	0.03482	0.006809		0.036868	0.66234	0.01616		0.005629	0.046554	0.266807
9500	763	0.3776	0.034446	0.007206		0.039763	0.658581	0.015704		0.005838	0.045874	0.266982
9501	764	0.506726	0.046817	0.010561		0.057401	0.878468	0.020523		0.008238	0.061641	0.358665
9502	765	0.37756	0.033869	0.007516		0.0458	0.650076	0.015078		0.006421	0.045443	0.266846
9503	766	0.334754	0.029436	0.006493		0.043304	0.571775	0.013071		0.005852	0.040084	0.236207
9504	767	0.291896	0.025349	0.005526		0.039599	0.495199	0.011159		0.005203	0.034897	0.20583
9505	768	0.464102	0.040174	0.008992		0.065961	0.781519	0.017272		0.008448	0.055736	0.327211
9506	769	0.377848	0.031164	0.006691		0.056813	0.629757	0.013518		0.007032	0.044566	0.26614
9507	770	0.292106	0.0232	0.005183		0.046304	0.481181	0.009934		0.005521	0.034522	0.205544
9508	771	0.189053	0.014736	0.00342		0.030805	0.309339	0.006232		0.003616	0.022414	0.132975
9509	772	0.38724	0.029852	0.007437		0.06455	0.629955	0.012431		0.007776	0.046184	0.272317
9510	773	0.343863	0.025287	0.005766		0.059807	0.552944	0.010274		0.007417	0.040367	0.241589
9511	7734	0.104479	0.019168	0.002049		0.081482	0.041941	0.00093		0.022489	0.002817	0.027443
9512	7735	0.133673	0.007281	0.002054		0.110651	0.033731	0.000939		0.03735	0.001768	0.027464
9513	7737	0.093048	0.018644	0.007021		0.068785	0.042584	0.002308		0.033699	0.003209	0.031676
9514	7738	0.118288	0.007351	0.007051		0.078656	0.033882	0.002408		0.051859	0.001743	0.031695
9515	774	0.344036	0.024534	0.005431		0.062296	0.546363	0.009619		0.007564	0.039892	0.241504
9516	7741	0.544254	0.08359	0.019975		0.050291	0.495108	0.045625		0.02543	0.024118	0.320222
9517	7742	0.45767	0.027583	0.009218		0.034235	0.404189	0.022377		0.022545	0.020026	0.258401
9518	7743	0.581034	0.034393	0.022906		0.032819	0.536802	0.017991		0.013499	0.028487	0.332232
9519	7744	0.953759	0.047079	0.031735		0.10174	0.85689	0.030566		0.062465	0.044072	0.547819
9520	7745	0.864222	0.044534	0.033834		0.084679	0.780367	0.025514		0.050198	0.040203	0.498753
9521	7746	0.902352	0.059363	0.019346		0.176308	0.815885	0.045402		0.141371	0.039563	0.53808
9522	7747	0.644348	0.039325	0.013874		0.13391	0.582597	0.031699		0.101726	0.028117	0.384837

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9523	7748	0.590481	0.085596	0.01845		0.05131	0.531989	0.045881		0.033476	0.026034	0.344615
9524	7749	0.497667	0.068058	0.013745		0.041815	0.445454	0.036304		0.031663	0.021886	0.289337
9525	7750	0.47679	0.062969	0.012258		0.03953	0.425815	0.033612		0.031469	0.020961	0.277005
9526	7751	0.585878	0.073552	0.013653		0.050789	0.522586	0.039569		0.040029	0.025778	0.340594
9527	7752	0.609419	0.07271	0.012935		0.057438	0.544254	0.039629		0.0464	0.026881	0.355218
9528	7753	0.832318	0.094824	0.016168		0.085131	0.746011	0.052308		0.070334	0.036864	0.487416
9529	7754	0.83838	0.088836	0.014403		0.098623	0.756389	0.050327		0.083555	0.037357	0.494696
9530	7755	0.704231	0.071021	0.012265		0.088937	0.634528	0.040984		0.076696	0.031314	0.41532
9531	7756	0.799467	0.075764	0.014051		0.109694	0.719887	0.045159		0.096518	0.035476	0.47181
9532	7757	0.829321	0.073634	0.015232		0.123117	0.746949	0.045609		0.109704	0.036738	0.490165
9533	7758	0.858619	0.07116	0.016786		0.137127	0.773969	0.04616		0.122202	0.037967	0.508535
9534	7759	0.871893	0.067148	0.017764		0.149164	0.786795	0.045844		0.130662	0.038466	0.517627
9535	7760	0.883735	0.06309	0.018561		0.161708	0.798375	0.0456		0.136475	0.03888	0.52589
9536	7761	0.611774	0.036064	0.013088		0.130268	0.551632	0.029697		0.096903	0.026615	0.364608
9537	7762	0.80209	0.044716	0.016857		0.177031	0.71795	0.037686		0.126856	0.034743	0.474991
9538	7763	0.836792	0.044016	0.017953		0.189509	0.743132	0.038147		0.13095	0.036065	0.492042
9539	7764	0.872301	0.043036	0.018814		0.205804	0.768266	0.038525		0.133191	0.037394	0.50901
9540	7765	0.87822	0.040599	0.018664		0.219752	0.767763	0.037691		0.128599	0.037474	0.508905
9541	7766	0.917035	0.039509	0.018707		0.237877	0.792832	0.03812		0.131882	0.038802	0.525655
9542	7767	0.904969	0.035654	0.016807		0.230513	0.753929	0.035411		0.122122	0.037002	0.499909
9543	7768	0.85167	0.032991	0.014362		0.208409	0.689625	0.031653		0.110383	0.033924	0.457254
9544	7769	0.888106	0.033921	0.013406		0.203835	0.701991	0.031327		0.109561	0.034608	0.465398
9545	777	0.473731	0.033205	0.007684		0.089233	0.742599	0.012269		0.011122	0.054392	0.332351
9546	7770	0.805716	0.030473	0.013047		0.169685	0.625065	0.026909		0.095755	0.03088	0.414317
9547	7771	0.696444	0.026257	0.012165		0.136527	0.535561	0.022286		0.080019	0.026497	0.354929
9548	7772	0.823381	0.031082	0.016461		0.150098	0.630973	0.025261		0.090801	0.031261	0.418078
9549	7773	0.943016	0.036333	0.022808		0.157269	0.726233	0.027319		0.096977	0.036047	0.481068
9550	7774	0.926208	0.036913	0.027081		0.144398	0.725885	0.025449		0.087117	0.036103	0.480723
9551	7775	0.897191	0.037421	0.031781		0.130524	0.725649	0.023209		0.075266	0.036175	0.480391
9552	7776	0.849139	0.038259	0.036576		0.113589	0.718962	0.020373		0.062289	0.035942	0.475866
9553	7777	0.793298	0.039054	0.042935		0.096157	0.712318	0.017201		0.053148	0.03573	0.471388
9554	7778	0.769182	0.040084	0.050138		0.076939	0.712075	0.013676		0.047328	0.03586	0.471174
9555	7779	0.830559	0.045449	0.063595		0.06182	0.788159	0.010764		0.046605	0.039875	0.521512
9556	7780	0.884604	0.051192	0.080352		0.046352	0.864267	0.00829		0.034161	0.04401	0.57195
9557	7781	0.801652	0.046776	0.075281		0.058195	0.762394	0.008679		0.019967	0.03921	0.504771
9558	7782	0.924449	0.051644	0.074129		0.086481	0.825727	0.014998		0.034727	0.042603	0.546929
9559	7783	0.961037	0.047699	0.055037		0.096531	0.73656	0.022956		0.065235	0.038175	0.488331
9560	7784	1.124489	0.053541	0.055686		0.111344	0.812672	0.030728		0.093642	0.042174	0.539038
9561	7785	1.333088	0.059541	0.050131		0.145169	0.863424	0.047963		0.148919	0.044807	0.57325
9562	7786	1.343969	0.060223	0.043652		0.161731	0.81285	0.061383		0.173144	0.042062	0.539943
9563	7787	1.368483	0.06233	0.043711		0.171104	0.813012	0.069682		0.182862	0.041999	0.54006
9564	7788	1.125005	0.054804	0.039247		0.150648	0.660858	0.073381		0.150957	0.033982	0.43879
9565	7789	0.77524	0.03853	0.027994		0.105335	0.457546	0.052923		0.103183	0.023505	0.303757
9566	7790	1.231106	0.068523	0.054909		0.179244	0.762791	0.1055		0.153231	0.038977	0.505997
9567	7791	1.175697	0.070791	0.060888		0.178313	0.762933	0.116233		0.137307	0.038844	0.505794
9568	7792	0.785753	0.054164	0.05233		0.127439	0.5597	0.097993		0.081961	0.028333	0.370638
9569	7793	0.986842	0.075706	0.079664		0.169252	0.763494	0.14676		0.094958	0.038497	0.505077
9570	7794	0.827365	0.078621	0.098779		0.1582	0.76419	0.176467		0.051381	0.038223	0.504159
9571	7795	0.843614	0.087588	0.120551		0.184698	0.841119	0.212655		0.032784	0.041887	0.553948
9572	7796	0.847336	0.099026	0.122979		0.213724	0.88368	0.218337		0.030336	0.045359	0.560025
9573	7797	0.581179	0.07704	0.085634		0.167851	0.634184	0.152522		0.016292	0.033643	0.387911
9574	7798	0.551219	0.069886	0.071262		0.143585	0.585353	0.128489		0.016855	0.031197	0.358714
9575	7799	0.573654	0.069185	0.064975		0.135792	0.593575	0.11892		0.018646	0.03178	0.36431
9576	780	0.344394	0.024686	0.005462		0.067334	0.532804	0.008134		0.008552	0.038156	0.241392
9577	7800	0.595657	0.068153	0.059064		0.128972	0.60176	0.109878		0.018398	0.032351	0.369772
9578	7801	0.451241	0.048958	0.039204		0.090081	0.446169	0.074164		0.015084	0.024067	0.274439
9579	7802	0.460538	0.0487	0.037643		0.088824	0.451109	0.071704		0.016911	0.024365	0.2776
9580	7803	0.646561	0.064605	0.046538		0.117166	0.6217	0.089817		0.028061	0.033665	0.382944
9581	7804	0.665946	0.062722	0.0425		0.114629	0.629681	0.082558		0.032928	0.034159	0.388247
9582	7805	0.615585	0.054535	0.0352		0.101336	0.573329	0.068164		0.033591	0.031146	0.353884
9583	7806	0.418578	0.035532	0.022151		0.066503	0.385667	0.042372		0.024185	0.020966	0.238257
9584	7807	0.614257	0.051048	0.031387		0.095713	0.562993	0.059376		0.036265	0.030614	0.347952
9585	7808	0.871638	0.067565	0.041577		0.12623	0.788066	0.072555		0.054053	0.042894	0.48764
9586	7809	0.790454	0.058039	0.036719		0.106365	0.710225	0.05822		0.049357	0.038675	0.43975
9587	7810	0.802954	0.055913	0.03722		0.099243	0.719191	0.0521		0.049137	0.039178	0.445456
9588	7811	0.863593	0.057228	0.04093		0.097925	0.774141	0.048998		0.050517	0.042189	0.47955
9589	7812	0.869852	0.055845	0.043409		0.090523	0.78414	0.041998		0.046846	0.042752	0.485732
9590	7813	0.873553	0.05494	0.046982		0.085493	0.794645	0.036032		0.042181	0.043329	0.492198
9591	7814	0.820511	0.05087	0.049711		0.075621	0.756992	0.027862		0.033113	0.041258	0.468798
9592	7815	0.742196	0.04587	0.049928		0.065119	0.69419	0.021193		0.024621	0.0378	0.429811

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9593	7816	0.76322	0.047448	0.057664		0.062834	0.72608	0.017639		0.018973	0.039465	0.449382
9594	7817	0.821327	0.051906	0.06951		0.062158	0.796024	0.014551		0.016055	0.043148	0.49241
9595	7818	0.751506	0.048884	0.071286		0.048888	0.743288	0.008531		0.01099	0.04014	0.459449
9596	7819	0.821851	0.054793	0.073411		0.039969	0.811954	0.008029		0.014983	0.043504	0.502488
9597	782	0.356125	0.026335	0.006155		0.072184	0.543273	0.007506		0.008954	0.038154	0.249402
9598	7820	0.725504	0.048124	0.055334		0.036505	0.706437	0.010617		0.015393	0.037695	0.43709
9599	7821	0.635683	0.041404	0.041438		0.033707	0.609238	0.012664		0.014442	0.032432	0.376741
9600	7822	0.616058	0.039107	0.033784		0.033933	0.58221	0.014967		0.014297	0.030947	0.359765
9601	7823	0.599635	0.036864	0.027626		0.033625	0.559888	0.016695		0.013734	0.029733	0.346136
9602	7824	0.957632	0.04617	0.026737		0.10651	0.854494	0.032849		0.068841	0.043894	0.546653
9603	7825	0.809581	0.03823	0.018878		0.091268	0.720595	0.029403		0.061259	0.036967	0.461304
9604	7826	0.668105	0.031084	0.013843		0.07641	0.594972	0.025308		0.05165	0.030488	0.381062
9605	7827	0.75649	0.034868	0.014543		0.091777	0.67511	0.029694		0.059271	0.03455	0.432582
9606	7828	0.819375	0.037587	0.014349		0.105479	0.734692	0.033487		0.064756	0.037526	0.471
9607	7829	0.772714	0.03527	0.014164		0.102331	0.696906	0.032638		0.060791	0.035519	0.44695
9608	7830	0.808907	0.036658	0.016006		0.10653	0.73347	0.035112		0.062106	0.037294	0.470517
9609	7831	0.816617	0.036427	0.017146		0.101793	0.740444	0.036183		0.059743	0.037531	0.475021
9610	7832	0.758129	0.036091	0.016367		0.086696	0.686182	0.034166		0.053068	0.034667	0.440121
9611	7833	0.727831	0.036815	0.015717		0.074696	0.656436	0.03335		0.049169	0.03304	0.420859
9612	7834	0.675768	0.036166	0.01422		0.062215	0.606417	0.031498		0.042808	0.030393	0.388525
9613	7835	0.626415	0.035214	0.012615		0.053433	0.558872	0.029728		0.036431	0.027888	0.357784
9614	7836	0.465099	0.027381	0.009393		0.036385	0.412261	0.022442		0.02424	0.020477	0.263684
9615	7837	0.823668	0.051227	0.077933		0.056585	0.799175	0.009199		0.016332	0.042268	0.510328
9616	7838	0.921259	0.057302	0.083281		0.044951	0.90597	0.008897		0.023792	0.047489	0.578898
9617	7839	0.810315	0.088789	0.100729		0.180911	0.802988	0.181143		0.040053	0.041432	0.509867
9618	784	0.344903	0.026427	0.006978		0.072553	0.518004	0.006451		0.008797	0.035837	0.241365
9619	7840	0.850045	0.087127	0.090525		0.170478	0.802701	0.165219		0.046942	0.041605	0.510459
9620	7841	0.897923	0.085096	0.081157		0.162013	0.80243	0.150573		0.059827	0.041766	0.510918
9621	7842	0.693133	0.060684	0.053285		0.114152	0.588256	0.100485		0.052683	0.030741	0.37493
9622	7843	0.708264	0.059809	0.050612		0.112637	0.588166	0.096124		0.057562	0.030793	0.375028
9623	7844	1.006544	0.07885	0.061913		0.15112	0.801793	0.119078		0.091939	0.042129	0.511656
9624	7845	1.042	0.075963	0.055801		0.151459	0.801528	0.108042		0.103765	0.042255	0.511874
9625	7846	0.963904	0.065649	0.045652		0.137254	0.721137	0.088096		0.101991	0.038115	0.46086
9626	7847	0.653195	0.042284	0.028441		0.0914	0.480617	0.054189		0.071363	0.025444	0.307316
9627	7848	0.949406	0.060166	0.039871		0.13133	0.694114	0.075157		0.104846	0.036775	0.443944
9628	7849	1.330042	0.079406	0.051699		0.173395	0.960546	0.090515		0.148588	0.050982	0.614788
9629	7850	1.181483	0.067785	0.044985		0.143466	0.853428	0.071525		0.129847	0.045349	0.546434
9630	7851	1.171761	0.065035	0.044986		0.131208	0.853052	0.063071		0.123832	0.045385	0.546297
9631	7852	1.22633	0.066283	0.048811		0.129383	0.906014	0.058497		0.121915	0.048257	0.580223
9632	7853	1.195758	0.06387	0.051247		0.117897	0.905713	0.049408		0.107979	0.048297	0.579932
9633	7854	1.160382	0.0623	0.054996		0.108498	0.905509	0.041805		0.093091	0.048311	0.579654
9634	7855	1.046218	0.057233	0.057293		0.09791	0.852125	0.031808		0.06947	0.045445	0.545259
9635	7856	0.91064	0.051064	0.056779		0.084708	0.772204	0.023878		0.049129	0.041133	0.493927
9636	7857	0.895966	0.052128	0.064722		0.081192	0.79885	0.019516		0.035419	0.042461	0.510729
9637	7858	0.928462	0.055917	0.076892		0.078051	0.865506	0.01582		0.027245	0.045887	0.553066
9638	7859	0.860813	0.051518	0.065983		0.050451	0.826154	0.011666		0.033035	0.043051	0.527922
9639	786	0.383091	0.030448	0.009224		0.083232	0.567133	0.007162		0.010212	0.038903	0.267887
9640	7860	0.794039	0.045879	0.05189		0.055291	0.746402	0.014837		0.034144	0.038747	0.476755
9641	7861	0.80827	0.045033	0.044326		0.065334	0.74659	0.018523		0.038818	0.038634	0.476659
9642	7862	0.826625	0.04435	0.037853		0.074577	0.753392	0.021936		0.044709	0.03889	0.481248
9643	7863	0.566216	0.095396	0.019619		0.094266	0.474592	0.037977		0.016916	0.023305	0.319268
9644	7864	0.494466	0.033409	0.012088		0.057279	0.381604	0.012121		0.02457	0.019454	0.257177
9645	7865	0.631741	0.025774	0.016463		0.050125	0.496627	0.007946		0.044255	0.024681	0.336352
9646	7866	0.962593	0.03896	0.028321		0.198219	0.802367	0.011291		0.180636	0.039224	0.553199
9647	7867	0.87538	0.035667	0.024642		0.182333	0.730871	0.011908		0.177141	0.035562	0.504561
9648	7868	1.018431	0.071787	0.023747		0.296061	0.776018	0.025607		0.139612	0.038061	0.535807
9649	7869	0.72618	0.047278	0.018046		0.224652	0.553944	0.016841		0.106362	0.027136	0.383117
9650	7870	0.618798	0.098461	0.016885		0.100031	0.509522	0.037287		0.021305	0.02499	0.343673
9651	7871	0.525865	0.078959	0.011817		0.083344	0.426317	0.028844		0.02094	0.020886	0.288299
9652	7872	0.506595	0.073455	0.010317		0.079807	0.407348	0.026373		0.02217	0.019949	0.275876
9653	7873	0.627888	0.086519	0.011028		0.099088	0.499633	0.030561		0.03136	0.024457	0.339073
9654	7874	0.659329	0.086293	0.009886		0.107285	0.520058	0.030194		0.037462	0.025452	0.353622
9655	7875	0.914557	0.113021	0.011476		0.15452	0.712456	0.039355		0.060715	0.03487	0.48536
9656	7876	0.941346	0.105946	0.012745		0.170947	0.721729	0.037038		0.091568	0.035332	0.493119
9657	7877	0.794377	0.084741	0.011436		0.151074	0.605154	0.029652		0.093908	0.029636	0.41411
9658	7878	0.905682	0.090492	0.014125		0.183234	0.686181	0.03182		0.125864	0.033625	0.470405
9659	7879	0.941987	0.088067	0.016183		0.205496	0.711615	0.03108		0.141224	0.034893	0.488648
9660	788	0.282046	0.022864	0.006812		0.062364	0.414074	0.005281		0.00778	0.028353	0.197139
9661	7880	0.976043	0.085268	0.018107		0.229468	0.737025	0.030221		0.144842	0.036159	0.50686
9662	7881	0.989962	0.080658	0.019924		0.250701	0.748936	0.028667		0.134365	0.036756	0.515775

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9663	7882	1.000283	0.076009	0.021822		0.271955	0.759665	0.027167		0.130179	0.037279	0.523837
9664	7883	0.686306	0.043061	0.017665		0.218951	0.524372	0.01527		0.103876	0.025667	0.362953
9665	7884	0.888527	0.051945	0.024266		0.299176	0.682127	0.018086		0.142438	0.033333	0.472844
9666	7885	0.912655	0.050425	0.026197		0.323428	0.70568	0.017121		0.153879	0.034422	0.489937
9667	7886	0.93337	0.048814	0.028035		0.348747	0.729147	0.016692		0.168494	0.035496	0.507098
9668	7887	0.939533	0.045511	0.028716		0.360213	0.728309	0.015651		0.180155	0.035385	0.507399
9669	7888	0.976049	0.043663	0.030136		0.380702	0.751781	0.015609		0.193831	0.036454	0.524644
9670	7889	0.93274	0.03819	0.028894		0.366781	0.714653	0.014511		0.184847	0.034579	0.499613
9671	7890	0.855168	0.0324	0.02643		0.335679	0.653573	0.012654		0.168102	0.031562	0.457559
9672	7891	0.87042	0.031173	0.02673		0.338224	0.665214	0.01194		0.170571	0.032055	0.466338
9673	7892	0.772368	0.027152	0.023481		0.296458	0.592294	0.009505		0.157813	0.028472	0.415768
9674	7893	0.658329	0.023428	0.019821		0.249782	0.507495	0.007288		0.139467	0.024347	0.356578
9675	7894	0.769804	0.027777	0.022922		0.286941	0.597953	0.007465		0.168548	0.028628	0.420513
9676	7895	0.874173	0.032213	0.025568		0.314325	0.688365	0.008288		0.211298	0.032857	0.484651
9677	7896	0.859452	0.032391	0.024616		0.303109	0.688249	0.009808		0.235817	0.032747	0.485108
9678	7897	0.843355	0.032544	0.023537		0.289023	0.688284	0.011255		0.249159	0.032651	0.485591
9679	7898	0.826927	0.032598	0.022181		0.273018	0.682286	0.012403		0.242945	0.032258	0.481842
9680	7899	0.830721	0.034881	0.020784		0.261065	0.676366	0.013228		0.219684	0.03187	0.478108
9681	790	0.380282	0.032367	0.009925		0.087096	0.54834	0.007421		0.010871	0.037236	0.265518
9682	7900	0.860393	0.037629	0.01985		0.253221	0.676556	0.013791		0.194122	0.031758	0.47866
9683	7901	0.991927	0.044719	0.021142		0.273437	0.749356	0.016224		0.206859	0.03502	0.530581
9684	7902	1.132236	0.053245	0.022252		0.309077	0.822432	0.021056		0.216189	0.03819	0.58274
9685	7903	1.010186	0.050305	0.018276		0.279487	0.714237	0.020916		0.180518	0.032926	0.506256
9686	7904	1.040477	0.054212	0.017606		0.299348	0.726914	0.02344		0.179551	0.033335	0.51525
9687	7905	1.133199	0.063291	0.01736		0.344084	0.788388	0.030849		0.187775	0.036377	0.558747
9688	7906	0.999025	0.063174	0.012152		0.334366	0.704894	0.037744		0.150299	0.033018	0.499362
9689	7907	1.103239	0.073022	0.013559		0.379052	0.778538	0.047259		0.163741	0.036697	0.551429
9690	7908	1.209902	0.085727	0.016989		0.425182	0.829008	0.065184		0.199169	0.039615	0.586853
9691	7909	1.152739	0.087704	0.023842		0.417952	0.781641	0.075815		0.212356	0.037832	0.552858
9692	7910	1.147841	0.090767	0.028493		0.41209	0.782129	0.082818		0.219293	0.038089	0.552925
9693	7911	0.900175	0.07886	0.037218		0.302671	0.636066	0.080748		0.168945	0.031431	0.448933
9694	7912	0.617112	0.055136	0.027624		0.203987	0.440401	0.05754		0.113758	0.021816	0.310718
9695	7913	0.982095	0.095592	0.061526		0.289842	0.734285	0.10862		0.156727	0.036765	0.516891
9696	7914	0.963775	0.097365	0.071242		0.257019	0.734419	0.116078		0.134873	0.036971	0.516124
9697	7915	0.686885	0.073004	0.063779		0.151282	0.538735	0.093547		0.074939	0.02731	0.377466
9698	7916	0.910615	0.100747	0.098779		0.17434	0.734825	0.135818		0.083766	0.037401	0.513584
9699	7917	0.832183	0.102431	0.125032		0.129017	0.735432	0.15349		0.048119	0.037675	0.510898
9700	7918	0.873988	0.113504	0.153539		0.137768	0.8095	0.179377		0.034524	0.041567	0.560294
9701	7919	0.890403	0.132585	0.156711		0.160069	0.836835	0.183357		0.026889	0.043553	0.566389
9702	792	0.380702	0.034201	0.011189		0.090175	0.538709	0.008395		0.011147	0.036115	0.265495
9703	7920	0.620322	0.104908	0.109143		0.122618	0.591512	0.127832		0.01496	0.031198	0.392279
9704	7921	0.58522	0.095628	0.090186		0.107277	0.546362	0.111267		0.015951	0.028847	0.363423
9705	7922	0.605086	0.095325	0.08153		0.105774	0.554442	0.106251		0.019406	0.029301	0.369768
9706	7923	0.623783	0.094624	0.073285		0.106155	0.562457	0.101275		0.022892	0.029736	0.376025
9707	7924	0.468918	0.068446	0.047873		0.078879	0.41727	0.07054		0.0194	0.022053	0.279615
9708	7925	0.477029	0.068332	0.045513		0.080098	0.421996	0.069218		0.020818	0.022293	0.283076
9709	7926	0.667583	0.091429	0.054687		0.111697	0.581871	0.089449		0.032543	0.030691	0.39115
9710	7927	0.684642	0.090033	0.047896		0.1147	0.589625	0.084772		0.037209	0.031029	0.397089
9711	7928	0.6294	0.080221	0.037369		0.105777	0.537111	0.072091		0.037776	0.028179	0.362286
9712	7929	0.425774	0.052946	0.022051		0.071725	0.361432	0.045857		0.027285	0.018904	0.24404
9713	7930	0.622821	0.076513	0.030056		0.105043	0.527705	0.065032		0.041008	0.027553	0.356462
9714	7931	0.875597	0.103255	0.03298		0.147319	0.739048	0.082683		0.061273	0.038327	0.499788
9715	7932	0.789812	0.090038	0.024466		0.131496	0.666219	0.068748		0.056143	0.034321	0.450823
9716	7933	0.802426	0.087908	0.021162		0.130168	0.674718	0.064008		0.056559	0.034495	0.456788
9717	7934	0.873599	0.090906	0.019317		0.134966	0.726227	0.062953		0.059227	0.036812	0.491829
9718	7935	0.89489	0.087622	0.016148		0.129956	0.735417	0.057004		0.057401	0.036897	0.498161
9719	7936	0.914588	0.084627	0.013962		0.124305	0.74496	0.051576		0.05573	0.037019	0.504661
9720	7937	0.878134	0.076014	0.012305		0.108223	0.709193	0.042501		0.051809	0.034862	0.480457
9721	7938	0.8091	0.066368	0.011269		0.090436	0.649926	0.034276		0.046704	0.031686	0.44035
9722	7939	0.849289	0.065629	0.013618		0.085636	0.679173	0.030775		0.047293	0.032832	0.460351
9723	794	0.511582	0.049596	0.017929		0.125218	0.709621	0.014107		0.015794	0.046588	0.356209
9724	7940	0.932721	0.067764	0.016689		0.08675	0.743772	0.028571		0.05338	0.035671	0.504492
9725	7941	0.870309	0.058633	0.016934		0.073487	0.693262	0.022822		0.052259	0.032964	0.47072
9726	7942	0.8547	0.054317	0.017746		0.07304	0.680868	0.020596		0.052688	0.032598	0.462645
9727	7943	0.947024	0.055225	0.020665		0.084528	0.754495	0.01953		0.059573	0.036475	0.512756
9728	7944	0.82225	0.043735	0.018684		0.07708	0.655428	0.014062		0.052219	0.03193	0.444997
9729	7945	0.708384	0.034772	0.016527		0.066703	0.56461	0.011797		0.049172	0.027642	0.383039
9730	7946	0.677268	0.030951	0.016198		0.061985	0.539076	0.010671		0.051504	0.026529	0.365519
9731	7947	0.652816	0.028089	0.016282		0.056182	0.518104	0.009379		0.050079	0.025628	0.351109
9732	7948	0.962848	0.038573	0.02939		0.197662	0.800166	0.009419		0.157617	0.039268	0.551081

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9733	7949	0.815728	0.032249	0.02562		0.169495	0.67496	0.008512		0.114912	0.033249	0.464248
9734	7950	0.676411	0.026431	0.021577		0.141064	0.557459	0.008058		0.090126	0.027537	0.38303
9735	7951	0.774832	0.029752	0.024859		0.15984	0.632777	0.010183		0.097648	0.031342	0.434295
9736	7952	0.85328	0.032509	0.027428		0.171262	0.689009	0.01236		0.101181	0.034247	0.472123
9737	7953	0.8177	0.032251	0.026172		0.159698	0.653964	0.012633		0.092513	0.032612	0.447362
9738	7954	0.868257	0.036609	0.027523		0.16347	0.688717	0.013947		0.093857	0.034453	0.470301
9739	7955	0.884059	0.040396	0.027521		0.157266	0.695826	0.014767		0.089154	0.034931	0.474097
9740	7956	0.82434	0.040473	0.025066		0.137407	0.645356	0.014653		0.075622	0.032502	0.438751
9741	7957	0.792107	0.041674	0.02336		0.122343	0.61791	0.014901		0.064722	0.031218	0.419169
9742	7958	0.733838	0.041279	0.020815		0.10391	0.571337	0.014546		0.05336	0.028952	0.386735
9743	7959	0.677947	0.040898	0.018346		0.089262	0.526988	0.014607		0.043939	0.026774	0.356046
9744	796	0.38174	0.039306	0.015727		0.096374	0.51872	0.012569		0.012313	0.033793	0.265436
9745	7960	0.502981	0.032713	0.012791		0.060995	0.389061	0.011754		0.027982	0.019812	0.262408
9746	7961	0.929749	0.055647	0.019002		0.168802	0.739653	0.022023		0.120352	0.034846	0.512789
9747	7962	1.060315	0.05881	0.023196		0.190298	0.851493	0.021985		0.145155	0.040443	0.590222
9748	7963	0.953044	0.060047	0.018376		0.181277	0.752917	0.024337		0.118617	0.035258	0.52188
9749	7964	0.835728	0.119253	0.127513		0.144436	0.760586	0.157067		0.034949	0.039557	0.516649
9750	7965	0.862626	0.117512	0.113615		0.151999	0.760534	0.147808		0.046561	0.039511	0.518194
9751	7966	0.890197	0.115346	0.100679		0.16492	0.760539	0.138949		0.057941	0.03945	0.519586
9752	7967	0.668924	0.082727	0.065006		0.132592	0.557728	0.095664		0.050274	0.028867	0.381947
9753	7968	0.674848	0.081811	0.061116		0.138492	0.55772	0.092846		0.053718	0.028832	0.382335
9754	7969	0.933429	0.109736	0.072603		0.206164	0.760489	0.118636		0.087869	0.039194	0.522394
9755	7970	0.941097	0.107651	0.062714		0.222593	0.760398	0.110985		0.102586	0.039036	0.52325
9756	7971	0.848654	0.09481	0.048295		0.21353	0.684258	0.093258		0.104634	0.034969	0.471528
9757	7972	0.564017	0.06201	0.028193		0.148397	0.456101	0.058757		0.075319	0.023215	0.314593
9758	7973	0.812202	0.088665	0.037999		0.218137	0.65875	0.082477		0.112111	0.033458	0.454549
9759	7974	1.137999	0.118336	0.041066		0.314202	0.911753	0.103509		0.164886	0.045958	0.629769
9760	7975	1.022447	0.101822	0.029497		0.282547	0.810108	0.084748		0.147805	0.040577	0.559879
9761	7976	1.031305	0.09826	0.025043		0.279638	0.80964	0.077714		0.143986	0.040286	0.559822
9762	7977	1.103464	0.100418	0.022379		0.287715	0.859645	0.075261		0.145502	0.042486	0.594621
9763	7978	1.109282	0.095727	0.0182		0.271328	0.858837	0.067096		0.136546	0.04211	0.594258
9764	7979	1.111448	0.091376	0.015318		0.256206	0.858019	0.059839		0.129042	0.041762	0.593812
9765	798	0.382297	0.041948	0.018635		0.099459	0.508219	0.016181		0.012443	0.032571	0.265438
9766	7980	1.044918	0.081254	0.014054		0.229571	0.806632	0.04869		0.113361	0.038925	0.558332
9767	7981	0.943868	0.070195	0.012702		0.200889	0.730329	0.038852		0.097896	0.034997	0.505607
9768	7982	0.97102	0.068743	0.015043		0.200456	0.754754	0.034528		0.108264	0.035896	0.522653
9769	7983	1.043745	0.070194	0.018102		0.208491	0.816795	0.031695		0.123138	0.038541	0.565836
9770	7984	0.956786	0.048885	0.021932		0.178959	0.775624	0.016762		0.139788	0.037106	0.537264
9771	7985	0.856336	0.041064	0.020486		0.169322	0.700191	0.014561		0.13519	0.03366	0.484613
9772	7986	0.847916	0.037963	0.021389		0.172921	0.699881	0.013865		0.157204	0.033782	0.483994
9773	7987	0.847034	0.035939	0.022572		0.175017	0.705874	0.012904		0.171239	0.034205	0.487752
9774	7988	0.709687	0.007454	0.024422		1.694416	0.220215	0.021658		0.298782	0.010542	0.190375
9775	7989	0.926503	0.007539	0.03274		2.133079	0.220473	0.041805		0.287079	0.010438	0.207551
9776	7990	0.830975	0.00769	0.034829		1.665878	0.220803	0.06074		0.286039	0.010344	0.204649
9777	7991	0.393332	0.007828	0.036101		0.635144	0.221239	0.064113		0.145392	0.010241	0.182336
9778	7992	0.443728	0.003101	0.005373		0.285758	0.083841	0.005055		0.149335	0.004109	0.066848
9779	7993	0.461465	0.003147	0.00687		0.24781	0.083815	0.009387		0.161765	0.00413	0.069964
9780	7994	0.449514	0.003189	0.009284		0.23714	0.08378	0.010793		0.166615	0.004149	0.071927
9781	7995	0.410266	0.003227	0.012547		0.232555	0.083736	0.00871		0.167053	0.004167	0.074639
9782	800	0.382854	0.044831	0.022112		0.102507	0.497369	0.020279		0.012538	0.031157	0.265492
9783	802	0.514565	0.064518	0.035373		0.141653	0.652455	0.033587		0.017245	0.039499	0.356366
9784	804	0.383988	0.05107	0.030677		0.108494	0.474879	0.030399		0.013182	0.028388	0.265828
9785	806	0.41946	0.061142	0.039139		0.121517	0.50536	0.040001		0.014483	0.029517	0.290268
9786	808	0.569059	0.09205	0.063963		0.169514	0.663876	0.06724		0.02013	0.037291	0.393712
9787	810	0.420239	0.075911	0.054848		0.128074	0.475285	0.060208		0.01521	0.026115	0.290936
9788	812	0.420343	0.084941	0.063628		0.130565	0.459919	0.07288		0.015428	0.024471	0.291239
9789	814	0.350091	0.080118	0.060899		0.110064	0.370635	0.073084		0.013081	0.018964	0.242896
9790	8376	0.789869	0.042987	0.073475		0.060313	0.737872	0.008278		0.022093	0.036774	0.506135
9791	8377	0.927843	0.047805	0.072105		0.095847	0.799048	0.014301		0.037155	0.03998	0.548313
9792	8378	0.942938	0.045119	0.060848		0.104757	0.737375	0.017968		0.052497	0.036999	0.506209
9793	8379	0.994708	0.044563	0.053654		0.110491	0.712605	0.022288		0.07549	0.035835	0.489455
9794	8380	1.178936	0.050143	0.054438		0.129291	0.786145	0.029969		0.109412	0.039589	0.540245
9795	8381	1.35472	0.054598	0.052743		0.155644	0.835081	0.039689		0.150147	0.042082	0.574246
9796	8382	1.455397	0.055995	0.049363		0.171885	0.834964	0.047114		0.1768	0.042062	0.574464
9797	8391	0.845843	0.079378	0.119398		0.165429	0.813075	0.208986		0.040701	0.039522	0.555525
9798	8393	0.858439	0.071233	0.097947		0.163108	0.738516	0.173518		0.068056	0.035985	0.505444
9799	8395	0.980125	0.070089	0.088117		0.183814	0.737982	0.158354		0.097322	0.03606	0.505858
9800	8397	1.103874	0.068733	0.079094		0.202515	0.737549	0.144408		0.122947	0.036147	0.506227
9801	8399	0.891934	0.049271	0.052007		0.15763	0.540627	0.096487		0.105656	0.026579	0.371466
9802	8401	0.926684	0.048704	0.049435		0.160477	0.540537	0.092352		0.111771	0.026617	0.371558

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9803	8403	1.353165	0.064668	0.06057		0.223407	0.736905	0.114574		0.172124	0.036409	0.506906
9804	8405	1.437563	0.062811	0.054661		0.223455	0.736794	0.104083		0.190398	0.036522	0.507096
9805	8407	1.352384	0.054794	0.044742		0.197799	0.66306	0.084926		0.183271	0.032969	0.456516
9806	8409	0.920409	0.035579	0.027875		0.128881	0.442024	0.052251		0.126146	0.022028	0.304393
9807	8410	1.337367	0.050696	0.039067		0.183546	0.638473	0.072449		0.183888	0.03185	0.439703
9808	8412	1.852878	0.067066	0.050337		0.239727	0.884015	0.087143		0.25462	0.044235	0.608855
9809	8414	1.615334	0.057931	0.043393		0.20259	0.785776	0.068722		0.219381	0.039404	0.541154
9810	8416	1.558278	0.056233	0.043194		0.191402	0.785773	0.060485		0.207048	0.039473	0.541043
9811	8418	1.568971	0.057965	0.04688		0.189493	0.834894	0.055961		0.202034	0.042007	0.574692
9812	8420	0.861856	0.046358	0.078335		0.049339	0.836552	0.007771		0.037878	0.041254	0.573584
9813	8422	0.810446	0.040824	0.061825		0.082079	0.762907	0.010274		0.049877	0.037378	0.52296
9814	8424	0.777013	0.035761	0.048752		0.105917	0.689289	0.01305		0.049269	0.03361	0.472442
9815	8426	0.849842	0.034613	0.041815		0.136448	0.689571	0.016344		0.065457	0.033481	0.472606
9816	8428	0.923778	0.033837	0.035563		0.165917	0.696079	0.019395		0.081499	0.03367	0.477051
9817	8430	0.995428	0.03371	0.030898		0.193158	0.702625	0.022092		0.096742	0.033873	0.481545
9818	8432	1.054978	0.033235	0.026286		0.21701	0.703086	0.024223		0.112137	0.033799	0.481848
9819	8434	1.09486	0.032907	0.022074		0.240525	0.70354	0.025996		0.124098	0.033736	0.48217
9820	8436	0.968023	0.028472	0.015865		0.229711	0.611412	0.023953		0.116286	0.029251	0.419017
9821	8438	0.823131	0.024071	0.011583		0.207948	0.519061	0.021165		0.102842	0.024793	0.355714
9822	8440	0.954282	0.027961	0.01229		0.257194	0.605913	0.025524		0.124834	0.028896	0.415216
9823	8442	1.049799	0.031165	0.013247		0.307754	0.68063	0.029747		0.146882	0.03239	0.466377
9824	8444	0.999913	0.030352	0.014149		0.31503	0.668749	0.030077		0.149609	0.031759	0.458183
9825	8446	1.050462	0.034647	0.016515		0.350859	0.731206	0.033693		0.167355	0.034654	0.500887
9826	8448	1.044473	0.038609	0.018349		0.366866	0.769025	0.036344		0.182379	0.03636	0.526641
9827	8450	0.954318	0.039438	0.018313		0.346073	0.744772	0.035982		0.183412	0.035139	0.509832
9828	8452	0.928833	0.041579	0.018515		0.332139	0.745302	0.036829		0.187188	0.035094	0.509924
9829	8454	0.893015	0.042319	0.017772		0.313225	0.720967	0.036453		0.187	0.033882	0.492926
9830	8456	0.858742	0.042816	0.016817		0.297031	0.69657	0.036046		0.184147	0.032677	0.475855
9831	8458	0.656593	0.034455	0.013047		0.221708	0.535249	0.028311		0.143262	0.025174	0.365282
9832	8460	0.670373	0.036586	0.013426		0.222507	0.547918	0.029352		0.147573	0.025833	0.373702
9833	8462	0.86478	0.05106	0.017371		0.276157	0.710258	0.038989		0.195204	0.033639	0.483886
9834	8464	0.846279	0.054146	0.016804		0.259745	0.698316	0.039247		0.193886	0.033214	0.475145
9835	8466	0.861279	0.059202	0.016594		0.252106	0.711264	0.040964		0.196553	0.033958	0.483347
9836	8468	0.879698	0.064581	0.01615		0.242625	0.724187	0.042719		0.195268	0.034687	0.491507
9837	8470	0.883538	0.068948	0.015237		0.228462	0.724609	0.043891		0.186805	0.034791	0.491173
9838	8472	0.886848	0.073332	0.014353		0.215446	0.725006	0.045161		0.175804	0.034866	0.490828
9839	8474	0.812085	0.071024	0.013022		0.184843	0.662873	0.042623		0.149806	0.031905	0.448195
9840	8476	1.011219	0.092582	0.016005		0.217776	0.825867	0.054626		0.176193	0.03976	0.557799
9841	8478	1.036621	0.102829	0.01733		0.202161	0.85175	0.059537		0.165945	0.040984	0.57466
9842	8480	0.787864	0.082842	0.014668		0.145244	0.651813	0.047306		0.119494	0.031336	0.439307
9843	8482	0.781097	0.087078	0.016283		0.136461	0.652349	0.049312		0.111844	0.031317	0.439058
9844	8484	0.656721	0.077241	0.015336		0.107432	0.552477	0.043647		0.088547	0.026468	0.371205
9845	8486	0.71399	0.086933	0.018036		0.110757	0.603101	0.049233		0.091792	0.028842	0.404656
9846	8488	0.885105	0.114158	0.025639		0.124521	0.754754	0.065466		0.108572	0.035969	0.505679
9847	8490	0.881288	0.119995	0.030327		0.111013	0.758421	0.070315		0.096076	0.036006	0.507411
9848	8492	0.91945	0.132375	0.038225		0.103977	0.803643	0.080098		0.083153	0.038252	0.536769
9849	8494	0.983372	0.150136	0.049397		0.109592	0.878216	0.094968		0.081157	0.042027	0.585725
9850	8496	1.014769	0.164754	0.063071		0.124839	0.925485	0.111221		0.075172	0.044592	0.616031
9851	8498	0.950064	0.163856	0.075024		0.133255	0.888241	0.119811		0.061821	0.043093	0.589906
9852	8500	0.891145	0.161794	0.087749		0.141759	0.850882	0.129897		0.048988	0.04155	0.563775
9853	8502	0.633942	0.12093	0.077267		0.113394	0.620623	0.107988		0.028758	0.030486	0.410276
9854	8504	0.444816	0.08692	0.060396		0.084418	0.441646	0.082462		0.018246	0.021754	0.291649
9855	8506	0.458126	0.091878	0.070428		0.093433	0.462574	0.093965		0.016903	0.02285	0.305113
9856	8508	0.345063	0.070798	0.059936		0.076229	0.354219	0.078468		0.011801	0.017542	0.233369
9857	8524	1.349804	0.049598	0.017119		0.417163	0.711942	0.023193		0.240147	0.031858	0.515838
9858	8526	1.44715	0.0578	0.016828		0.482637	0.772073	0.030382		0.253505	0.034739	0.55942
9859	8528	1.309695	0.056504	0.013961		0.468485	0.713364	0.033062		0.225198	0.03235	0.516828
9860	8530	1.230964	0.057578	0.011754		0.47347	0.69028	0.037112		0.20535	0.031528	0.500005
9861	8532	1.312158	0.066477	0.013212		0.539389	0.762401	0.046455		0.211245	0.035029	0.552134
9862	8534	1.349845	0.074522	0.014262		0.597957	0.811053	0.057111		0.243691	0.037533	0.587166
9863	8536	1.385664	0.077837	0.01611		0.615831	0.811911	0.064166		0.260273	0.037796	0.587568
9864	8545	0.866427	0.102336	0.152034		0.119683	0.794493	0.177373		0.04204	0.040295	0.561922
9865	8547	0.837446	0.092434	0.123964		0.117352	0.721571	0.1517		0.060918	0.036445	0.512193
9866	8549	0.887669	0.091688	0.110586		0.166806	0.721007	0.142752		0.085025	0.036245	0.513468
9867	8551	0.926352	0.090782	0.098066		0.21924	0.720566	0.134269		0.109045	0.036031	0.514631
9868	8553	0.711298	0.065783	0.063347		0.200615	0.528166	0.092537		0.101842	0.026258	0.378162
9869	8555	0.725739	0.065363	0.059564		0.21978	0.528068	0.089848		0.112059	0.026177	0.378481
9870	8557	1.053377	0.087763	0.070771		0.354441	0.719847	0.114919		0.182069	0.035453	0.516953
9871	8559	1.112504	0.086214	0.061116		0.404746	0.719638	0.107601		0.209476	0.035205	0.517655
9872	8561	1.043103	0.076031	0.047023		0.404214	0.647483	0.090471		0.210109	0.031455	0.466384

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9873	8563	0.717275	0.049783	0.027419		0.287854	0.431543	0.057014		0.149465	0.020847	0.311122
9874	8565	1.050129	0.071227	0.036926		0.427473	0.623257	0.080019		0.221489	0.030027	0.449512
9875	8567	1.498155	0.095274	0.039754		0.63664	0.862479	0.100293		0.32166	0.041181	0.622726
9876	8569	1.344531	0.082136	0.02817		0.585605	0.766202	0.081908		0.285925	0.03634	0.553589
9877	8571	1.343803	0.07944	0.023023		0.592211	0.765659	0.074873		0.277113	0.03609	0.553515
9878	8573	1.414497	0.081395	0.020286		0.625049	0.812809	0.07224		0.279136	0.038085	0.587915
9879	8575	1.32232	0.046085	0.017751		0.396518	0.699614	0.020144		0.239182	0.03146	0.506824
9880	8577	1.490503	0.049152	0.021683		0.434769	0.805722	0.020348		0.280831	0.036464	0.583438
9881	8579	1.301575	0.04147	0.020626		0.374491	0.734204	0.01581		0.262006	0.033422	0.531272
9882	8581	1.116193	0.034973	0.019513		0.335284	0.662934	0.013127		0.243416	0.030303	0.479342
9883	8583	1.053281	0.032488	0.020593		0.358238	0.662782	0.012673		0.25856	0.030403	0.478826
9884	8585	1.055806	0.030817	0.021962		0.385665	0.668611	0.011976		0.276164	0.030765	0.482602
9885	8587	1.04977	0.030992	0.023289		0.416021	0.67447	0.010961		0.286079	0.031119	0.486381
9886	8589	1.026015	0.030874	0.024307		0.439154	0.674485	0.009648		0.278032	0.031201	0.485917
9887	8591	0.994384	0.030721	0.02522		0.456677	0.67453	0.008233		0.274226	0.031275	0.485481
9888	8593	0.86289	0.026524	0.022575		0.416397	0.585882	0.007202		0.232556	0.027224	0.421245
9889	8595	0.741182	0.022392	0.01951		0.364886	0.497208	0.007034		0.192421	0.023138	0.357212
9890	8597	0.872989	0.025977	0.023096		0.437981	0.580217	0.009178		0.217725	0.027037	0.416514
9891	8599	0.988065	0.030242	0.026289		0.508219	0.651531	0.011544		0.232935	0.030408	0.467191
9892	8601	0.973408	0.0319	0.025996		0.50899	0.639989	0.012241		0.218684	0.029908	0.458407
9893	8603	1.062699	0.037437	0.028434		0.561402	0.699638	0.014042		0.252384	0.032732	0.500556
9894	8605	1.110254	0.042602	0.029674		0.589526	0.735764	0.015111		0.270777	0.034462	0.525662
9895	8607	1.064061	0.044226	0.028301		0.564142	0.712592	0.014512		0.24908	0.033412	0.508411
9896	8609	1.049827	0.047261	0.02765		0.553258	0.713202	0.015531		0.227298	0.033477	0.508142
9897	8611	0.997666	0.04865	0.025873		0.523665	0.690067	0.015957		0.203347	0.032427	0.490971
9898	8613	0.960939	0.049723	0.023998		0.491562	0.666876	0.017013		0.190285	0.031371	0.473858
9899	8615	0.74391	0.041059	0.017529		0.364293	0.512559	0.01432		0.141578	0.024136	0.363733
9900	8617	0.763425	0.043605	0.017379		0.364824	0.524757	0.015374		0.142106	0.024722	0.372132
9901	8619	0.991553	0.061215	0.021425		0.45138	0.680429	0.021736		0.176913	0.032075	0.481941
9902	8621	0.973158	0.064907	0.019862		0.422279	0.669149	0.023107		0.171323	0.031556	0.473351
9903	8623	0.98663	0.07096	0.018796		0.407832	0.681747	0.025343		0.180361	0.032153	0.481653
9904	8625	0.997341	0.077405	0.017396		0.391794	0.694374	0.027647		0.203417	0.032749	0.489907
9905	8627	0.988727	0.082644	0.015989		0.368715	0.695059	0.029543		0.209709	0.032782	0.489672
9906	8629	0.99434	0.087909	0.01451		0.345773	0.695766	0.031413		0.197883	0.03282	0.489395
9907	8631	0.911357	0.085159	0.011838		0.295162	0.636466	0.030452		0.156038	0.030036	0.446928
9908	8633	1.135034	0.111034	0.013784		0.346377	0.793321	0.039736		0.161492	0.03746	0.556252
9909	8635	1.163233	0.123377	0.012802		0.319839	0.8188	0.044435		0.130848	0.03871	0.572581
9910	8637	0.883647	0.098584	0.011359		0.227974	0.626877	0.035826		0.092177	0.029663	0.437626
9911	8639	0.875413	0.102797	0.013327		0.212272	0.627663	0.037917		0.085062	0.029727	0.437422
9912	8641	0.731813	0.090514	0.013058		0.167123	0.531805	0.034126		0.066631	0.025213	0.369975
9913	8643	0.790386	0.101387	0.01567		0.173364	0.58072	0.038977		0.069163	0.027555	0.403512
9914	8645	0.968531	0.132154	0.023647		0.204334	0.727165	0.053008		0.085449	0.034559	0.504222
9915	8647	0.948992	0.13796	0.029892		0.196352	0.731147	0.05828		0.091598	0.034825	0.505857
9916	8649	0.977311	0.151268	0.038849		0.20228	0.7752	0.067869		0.093642	0.037037	0.535051
9917	8651	1.036439	0.17063	0.051211		0.215687	0.847705	0.082161		0.0832	0.040632	0.583991
9918	8653	1.059155	0.186143	0.06638		0.222281	0.893992	0.098436		0.052701	0.043038	0.614656
9919	8655	0.98111	0.184182	0.077273		0.211221	0.858509	0.108207		0.036668	0.041521	0.588895
9920	8657	0.90317	0.181091	0.088916		0.203574	0.822718	0.119456		0.036743	0.039967	0.562912
9921	8659	0.631454	0.134906	0.078122		0.152474	0.600208	0.100887		0.021889	0.029281	0.40992
9922	8661	0.439513	0.09684	0.060968		0.110726	0.427147	0.077582		0.013079	0.02088	0.291561
9923	8663	0.448797	0.102253	0.070914		0.119594	0.447411	0.089028		0.012402	0.021918	0.305255
9924	8665	0.335458	0.078742	0.060168		0.095341	0.342612	0.074767		0.010857	0.01682	0.233695
9925	8674	1.476007	0.039429	0.081606		0.145239	1.012081	0.025274		0.085529	0.05876	0.597967
9926	8675	1.268188	0.037482	0.088145		0.11616	0.953248	0.043005		0.071365	0.055969	0.562815
9927	8676	1.067278	0.03424	0.088784		0.08903	0.864571	0.055075		0.057157	0.051314	0.510175
9928	8677	1.025454	0.03574	0.102741		0.071544	0.895197	0.076389		0.047724	0.053722	0.527981
9929	8678	1.021205	0.039034	0.124409		0.050458	0.97067	0.105596		0.037493	0.058747	0.572183
9930	8679	0.851003	0.03627	0.130842		0.023863	0.896968	0.124128		0.019677	0.05455	0.528038
9931	8680	1.575756	0.03913	0.072114		0.161518	1.011686	0.015624		0.094165	0.05822	0.598021
9932	8682	1.670143	0.03886	0.062726		0.185983	1.011522	0.014704		0.105131	0.057698	0.598091
9933	8684	1.635194	0.036395	0.052166		0.193365	0.952124	0.025333		0.107818	0.053933	0.562939
9934	8686	1.682469	0.036274	0.047033		0.210231	0.952392	0.037125		0.11394	0.053629	0.56294
9935	8688	1.924525	0.040842	0.048114		0.254384	1.071974	0.053862		0.13153	0.060034	0.633268
9936	8690	1.391634	0.029723	0.030944		0.19533	0.774885	0.049126		0.094356	0.043208	0.457248
9937	8692	0.959142	0.020634	0.020696		0.137146	0.536625	0.036019		0.064941	0.029895	0.316578
9938	8694	1.415206	0.031103	0.028996		0.209569	0.805509	0.059836		0.096667	0.04481	0.474858
9939	8696	1.516234	0.034777	0.029571		0.233607	0.895945	0.074166		0.102841	0.04979	0.527357
9940	8698	1.433155	0.03503	0.027096		0.228844	0.897002	0.081467		0.094868	0.049839	0.526732
9941	8700	0.971805	0.025865	0.018148		0.160334	0.658699	0.064904		0.062545	0.036622	0.385873
9942	8702	0.929602	0.025949	0.017415		0.155472	0.659158	0.067273		0.058794	0.036669	0.385666

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
9943	8704	1.132406	0.035661	0.021998		0.193809	0.900268	0.098532		0.068038	0.050177	0.525175
9944	8706	1.009366	0.035948	0.020424		0.172992	0.901851	0.105344		0.054368	0.050388	0.52431
9945	8708	0.898577	0.036251	0.019024		0.15008	0.903605	0.112314		0.039215	0.050633	0.523314
9946	8710	0.876159	0.040228	0.019575		0.143369	0.99605	0.131489		0.029221	0.055996	0.574429
9947	8842	0.382459	0.013965	0.046462		0.070273	0.32136	0.070278		0.028182	0.010885	0.286973
9948	8843	0.323517	0.012707	0.040107		0.061245	0.271115	0.061446		0.02472	0.009606	0.239241
9949	8844	0.522669	0.02151	0.065562		0.100824	0.437401	0.101293		0.040833	0.015931	0.382884
9950	8845	0.805502	0.038556	0.103907		0.1621	0.674774	0.164599		0.066157	0.026447	0.574726
9951	8846	0.825077	0.04546	0.10854		0.169715	0.701181	0.176131		0.067978	0.028983	0.575074
9952	8847	0.784165	0.049004	0.104873		0.160943	0.678092	0.173648		0.062177	0.02931	0.535418
9953	8848	0.796845	0.054876	0.107805		0.159726	0.700119	0.181348		0.059537	0.031279	0.535628
9954	8849	0.864716	0.066266	0.118986		0.167168	0.779287	0.203419		0.058947	0.03601	0.575767
9955	8850	0.869569	0.073904	0.121612		0.165935	0.809703	0.210639		0.051829	0.038424	0.575839
9956	8851	0.924233	0.066237	0.099882		0.187934	0.735047	0.174989		0.084846	0.034879	0.523798
9957	8852	1.08688	0.065125	0.089938		0.224013	0.734199	0.159754		0.120057	0.03486	0.524137
9958	8853	1.242373	0.063878	0.080794		0.250443	0.733543	0.145788		0.150814	0.034869	0.524464
9959	8854	1.01412	0.045847	0.05317		0.196638	0.537578	0.09749		0.129251	0.025597	0.384821
9960	8855	1.057256	0.045356	0.05056		0.200684	0.537454	0.093365		0.136615	0.025614	0.38491
9961	8856	1.564288	0.060355	0.062003		0.280289	0.73263	0.115964		0.206197	0.034992	0.525102
9962	8857	1.679035	0.058792	0.05599		0.280686	0.732485	0.105455		0.226005	0.03507	0.525278
9963	8858	1.582172	0.051451	0.045845		0.248393	0.659182	0.086133		0.215522	0.031636	0.472864
9964	8859	1.07709	0.033501	0.028556		0.161598	0.439452	0.053016		0.147269	0.02113	0.315282
9965	8860	1.564577	0.047805	0.040011		0.229865	0.634769	0.073533		0.213948	0.030549	0.455424
9966	8861	2.16163	0.063439	0.051372		0.298549	0.878974	0.088448		0.293484	0.042421	0.630595
9967	8862	1.876883	0.054838	0.044169		0.24905	0.781378	0.069728		0.251632	0.037784	0.560468
9968	8863	1.798721	0.053419	0.043831		0.232605	0.781462	0.061301		0.236849	0.037853	0.560356
9969	8864	1.794302	0.055215	0.047405		0.2277	0.830423	0.056627		0.230628	0.040276	0.595217
9970	8865	1.625107	0.053442	0.049721		0.203801	0.830608	0.047548		0.200913	0.040321	0.595005
9971	8866	1.459804	0.051913	0.052954		0.182645	0.830832	0.039914		0.169489	0.040333	0.594812
9972	8867	1.236475	0.047578	0.0544		0.14897	0.782262	0.029963		0.12224	0.037938	0.559634
9973	8868	1.033681	0.042166	0.053452		0.127272	0.709182	0.022119		0.083499	0.034338	0.507063
9974	8869	0.969998	0.042516	0.060576		0.119179	0.733962	0.017659		0.059423	0.035446	0.524472
9975	8870	0.94573	0.044826	0.07188		0.106647	0.795535	0.01385		0.044181	0.038291	0.568164
9976	8871	0.8003	0.040036	0.073604		0.063552	0.734806	0.008045		0.023572	0.035198	0.524546
9977	8872	0.864405	0.042635	0.078384		0.055989	0.833242	0.00745		0.037952	0.039483	0.594526
9978	8873	0.826669	0.037291	0.061603		0.10489	0.759881	0.010357		0.046263	0.035792	0.54202
9979	8874	0.838283	0.032471	0.048513		0.139314	0.686565	0.01299		0.060153	0.032189	0.489625
9980	8875	0.933562	0.031251	0.041618		0.18428	0.686899	0.016184		0.080789	0.032066	0.489754
9981	8876	1.058103	0.031138	0.035348		0.230662	0.69346	0.019097		0.101622	0.032244	0.494315
9982	8877	1.17008	0.030988	0.030694		0.274857	0.700136	0.021697		0.121869	0.032437	0.49893
9983	8878	1.250311	0.030838	0.026089		0.313218	0.700721	0.023727		0.140224	0.03236	0.499205
9984	8879	1.30508	0.030794	0.021863		0.348619	0.701377	0.025406		0.154517	0.032297	0.499505
9985	8880	1.157965	0.026675	0.015653		0.331524	0.609677	0.023356		0.145401	0.028002	0.434053
9986	8881	0.987243	0.022576	0.011381		0.298208	0.517682	0.020599		0.129621	0.023736	0.368461
9987	8882	1.153945	0.026255	0.011872		0.366236	0.60441	0.024859		0.157962	0.027666	0.430073
9988	8883	1.280204	0.029737	0.013396		0.434855	0.679082	0.02896		0.186884	0.031019	0.483029
9989	8884	1.225773	0.030539	0.014267		0.443822	0.66735	0.029307		0.19202	0.030426	0.474506
9990	8885	1.290629	0.034891	0.016615		0.495694	0.729784	0.032866		0.21912	0.033215	0.518693
9991	8886	1.281702	0.03864	0.018438		0.523194	0.76765	0.035498		0.244823	0.034875	0.545321
9992	8887	1.165539	0.039251	0.018415		0.500657	0.74353	0.035199		0.247344	0.03373	0.527889
9993	8888	1.096505	0.041169	0.018676		0.490878	0.744139	0.036043		0.24886	0.033717	0.527969
9994	8889	1.045064	0.041701	0.018024		0.472569	0.7199	0.035709		0.250776	0.032586	0.510369
9995	8890	1.012243	0.042019	0.017174		0.450229	0.695579	0.035271		0.249939	0.03162	0.492701
9996	8891	0.779807	0.033963	0.013251		0.339187	0.534485	0.027747		0.195278	0.024415	0.378227
9997	8892	0.797523	0.035946	0.013655		0.342453	0.547114	0.028753		0.19934	0.025055	0.386953
9998	8893	1.033776	0.050086	0.017716		0.428859	0.709293	0.038212		0.25655	0.032635	0.501067
9999	8894	1.015217	0.052715	0.017173		0.40863	0.697301	0.038505		0.257629	0.032216	0.492037
10000	8895	1.031751	0.057263	0.016997		0.400931	0.710219	0.040194		0.26405	0.032931	0.500551
10001	8896	1.046742	0.062093	0.016514		0.390692	0.723137	0.04205		0.265376	0.033631	0.509024
10002	8897	1.041722	0.065935	0.0155		0.375876	0.723557	0.043251		0.25698	0.033723	0.5087
10003	8898	1.042676	0.069783	0.014448		0.359048	0.723959	0.044611		0.245015	0.033785	0.508368
10004	8899	0.952755	0.06728	0.013127		0.311818	0.661907	0.042141		0.212836	0.030905	0.464239
10005	8900	1.184514	0.087392	0.016153		0.371215	0.82465	0.054071		0.255378	0.038498	0.577801
10006	8901	1.210541	0.096969	0.016174		0.351006	0.850379	0.059033		0.245152	0.039652	0.59489
10007	8902	0.91718	0.077875	0.013837		0.252697	0.650672	0.046964		0.178523	0.030299	0.454759
10008	8903	0.923088	0.081563	0.015522		0.235923	0.65108	0.049034		0.16892	0.030265	0.454497
10009	8904	0.783259	0.072093	0.014756		0.184439	0.55128	0.043478		0.133989	0.025569	0.384402
10010	8905	0.853427	0.080939	0.017473		0.19139	0.601682	0.049128		0.138786	0.027858	0.419278
10011	8906	1.057762	0.105864	0.025052		0.217321	0.752749	0.065417		0.15678	0.034767	0.524001
10012	8907	1.020213	0.108576	0.029556		0.191323	0.740886	0.06903		0.140259	0.034383	0.515223

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
10013	8908	0.973805	0.110815	0.034842		0.167287	0.728971	0.073202		0.123468	0.033997	0.506479
10014	8909	1.032293	0.126593	0.045694		0.16317	0.805262	0.087784		0.120248	0.037758	0.558875
10015	8910	1.07542	0.143792	0.061144		0.152965	0.882045	0.107155		0.11516	0.041636	0.611273
10016	8911	1.021681	0.148637	0.076128		0.131893	0.883495	0.120706		0.097246	0.041983	0.611271
10017	8912	0.96643	0.152893	0.093371		0.141674	0.885131	0.137245		0.078317	0.042332	0.611272
10018	8913	0.707736	0.118425	0.085694		0.113103	0.671477	0.11908		0.044667	0.03231	0.462826
10019	8914	0.51168	0.087969	0.069377		0.084991	0.49461	0.094254		0.027678	0.023871	0.340571
10020	8915	0.539229	0.095586	0.083295		0.094021	0.533294	0.110752		0.024077	0.025825	0.366763
10021	8916	0.414835	0.075612	0.072795		0.077158	0.419528	0.095087		0.015563	0.020379	0.288156
10022	8917	0.403714	0.065328	0.070795		0.061192	0.401559	0.092107		0.015849	0.018985	0.288177
10023	8918	0.36524	0.052378	0.063411		0.043285	0.358343	0.081939		0.014542	0.016274	0.268161
10024	8919	0.358231	0.045849	0.060813		0.033456	0.345577	0.077852		0.014121	0.014995	0.26813
10025	8920	0.377132	0.041862	0.061471		0.034455	0.355137	0.077348		0.014493	0.014406	0.288058
10026	8921	0.368647	0.037021	0.05669		0.036732	0.33844	0.069287		0.01375	0.012713	0.287898
10027	8922	0.239749	0.023656	0.033725		0.027283	0.216927	0.039043		0.008684	0.008185	0.191773
10028	8923	0.148553	0.014757	0.020073		0.017676	0.135365	0.022585		0.005325	0.005068	0.119877
10029	8924	0.176168	0.018049	0.022494		0.021532	0.162279	0.024362		0.006166	0.006051	0.143862
10030	8954	0.527629	0.082525	0.081152		0.075654	0.510366	0.10719		0.026472	0.024054	0.366734
10031	8955	0.503474	0.075951	0.067639		0.07027	0.473295	0.091095		0.032397	0.02223	0.340509
10032	8956	0.702014	0.102302	0.083576		0.096144	0.642528	0.114976		0.053977	0.030084	0.462713
10033	8957	0.995919	0.132362	0.091067		0.149715	0.847117	0.132293		0.097801	0.039416	0.611073
10034	8958	1.082269	0.129107	0.074228		0.184399	0.845913	0.116265		0.123472	0.03911	0.61104
10035	8959	1.185182	0.125399	0.059564		0.21986	0.844985	0.103155		0.147022	0.03882	0.611023
10036	8960	1.180356	0.110889	0.044261		0.235481	0.771912	0.084499		0.156997	0.03524	0.558643
10037	8961	1.133648	0.097447	0.033642		0.240937	0.69918	0.070437		0.161906	0.03176	0.506275
10038	8962	1.201618	0.095836	0.028415		0.274107	0.710893	0.066367		0.182819	0.032137	0.515025
10039	8963	1.252063	0.093833	0.023655		0.309131	0.722636	0.062796		0.203218	0.032516	0.523805
10040	8964	1.010207	0.072037	0.016336		0.275059	0.577856	0.04705		0.175094	0.025888	0.419116
10041	8965	0.925118	0.064321	0.013718		0.266714	0.529558	0.041602		0.166785	0.023678	0.384247
10042	8966	1.083413	0.073031	0.014284		0.338417	0.625595	0.046825		0.207072	0.028041	0.454235
10043	8967	1.062371	0.069987	0.0126		0.359886	0.625341	0.04478		0.218455	0.02809	0.454391
10044	8968	1.384756	0.08747	0.015467		0.496889	0.817418	0.056191		0.299046	0.03678	0.594447
10045	8969	1.371087	0.078867	0.01556		0.520623	0.792835	0.051353		0.308912	0.035739	0.577402
10046	8970	1.110234	0.060954	0.012639		0.434535	0.636448	0.039971		0.255749	0.0287	0.46389
10047	8971	1.223089	0.063533	0.014212		0.496242	0.696181	0.042239		0.288837	0.031386	0.507952
10048	8972	1.226587	0.060344	0.01509		0.515252	0.695858	0.040902		0.2995	0.031338	0.508253
10049	8973	1.231585	0.05715	0.016104		0.531284	0.695503	0.039668		0.306531	0.03126	0.508549
10050	8974	1.216038	0.05303	0.016549		0.540931	0.683132	0.037888		0.302595	0.030617	0.500059
10051	8975	1.219759	0.049139	0.016697		0.547552	0.670767	0.036231		0.301718	0.029958	0.49153
10052	8976	1.293585	0.047022	0.017192		0.570753	0.682317	0.035941		0.315864	0.030347	0.500528
10053	8977	1.021976	0.03393	0.013226		0.452835	0.526359	0.02703		0.247696	0.023298	0.386521
10054	8978	1.003393	0.032071	0.012821		0.447848	0.51421	0.026063		0.241847	0.022699	0.377797
10055	8979	1.301679	0.039549	0.016761		0.592585	0.669211	0.03314		0.308148	0.029386	0.492128
10056	8980	1.322123	0.039401	0.017495		0.618243	0.692615	0.033514		0.303897	0.030244	0.509768
10057	8981	1.352794	0.039067	0.018045		0.638576	0.71592	0.033829		0.297765	0.031079	0.527351
10058	8982	1.376959	0.03742	0.017744		0.637165	0.715309	0.033002		0.291085	0.031064	0.527284
10059	8983	1.488348	0.037013	0.017747		0.658421	0.738477	0.033257		0.292801	0.032093	0.544721
10060	8984	1.472634	0.033598	0.016004		0.618503	0.702008	0.030754		0.269203	0.030543	0.518158
10061	8985	1.395101	0.029537	0.013764		0.552587	0.64191	0.027406		0.234458	0.027963	0.474048
10062	8986	1.457175	0.02889	0.012953		0.542676	0.653153	0.02708		0.224609	0.028496	0.482597
10063	8987	1.31226	0.02467	0.011007		0.459712	0.581284	0.023242		0.186889	0.025407	0.42972
10064	8988	1.122115	0.02048	0.010707		0.376273	0.497841	0.019287		0.15208	0.021793	0.368179
10065	8989	1.306258	0.024003	0.01478		0.420148	0.586268	0.021881		0.169947	0.025707	0.433745
10066	8990	1.450988	0.027667	0.020708		0.442693	0.674364	0.02391		0.180526	0.029645	0.499187
10067	8991	1.36903	0.027672	0.024754		0.395611	0.673674	0.022407		0.162498	0.0297	0.498926
10068	8992	1.274521	0.027661	0.029151		0.342458	0.673024	0.020585		0.139898	0.029767	0.498688
10069	8993	1.145911	0.027445	0.033654		0.281613	0.666563	0.01825		0.11354	0.029588	0.494115
10070	8994	1.002661	0.027573	0.039618		0.219611	0.660208	0.015598		0.089551	0.029419	0.489593
10071	8995	0.859944	0.028136	0.04622		0.16199	0.659879	0.012706		0.066069	0.029525	0.489498
10072	8996	0.834683	0.032492	0.058834		0.118556	0.730364	0.010356		0.048116	0.032818	0.541908
10073	8997	0.835294	0.037378	0.075272		0.061782	0.801029	0.006884		0.034685	0.036183	0.594424
10074	8998	0.778006	0.035468	0.070735		0.06189	0.706376	0.007393		0.023112	0.032229	0.524399
10075	8999	0.922735	0.039978	0.068612		0.10662	0.764461	0.012762		0.044777	0.035078	0.567926
10076	9000	0.940115	0.038113	0.057643		0.120886	0.705179	0.016541		0.060852	0.032479	0.524195
10077	9001	1.005724	0.037951	0.050835		0.131226	0.681305	0.020985		0.082378	0.031468	0.506747
10078	9002	1.20881	0.042946	0.051959		0.158375	0.751489	0.02866		0.122116	0.034772	0.559247
10079	9003	1.470778	0.047009	0.050691		0.196503	0.798147	0.038478		0.171495	0.036979	0.594357
10080	9004	1.66984	0.048518	0.047759		0.220798	0.797959	0.046045		0.204915	0.03698	0.594523
10081	9005	1.863719	0.050105	0.045745		0.247794	0.797817	0.05502		0.236566	0.036958	0.594715
10082	9006	1.883917	0.048403	0.042475		0.255486	0.750825	0.059676		0.243788	0.034748	0.559878

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
10083	9007	1.979026	0.049586	0.042972		0.277104	0.750796	0.067943		0.259921	0.034703	0.559994
10084	9008	2.290445	0.057364	0.05014		0.334543	0.844651	0.086222		0.304662	0.038983	0.630077
10085	9009	1.663742	0.043083	0.039268		0.25939	0.610063	0.071642		0.224099	0.028099	0.455074
10086	9010	1.146075	0.030161	0.02804		0.182645	0.422367	0.051647		0.154744	0.019442	0.315045
10087	9011	1.68462	0.046225	0.04504		0.281451	0.633616	0.083828		0.228384	0.029132	0.472527
10088	9012	1.787271	0.052688	0.055011		0.318679	0.704162	0.10251		0.24218	0.032332	0.524928
10089	9013	1.662965	0.053979	0.060891		0.318436	0.704393	0.112556		0.224241	0.032312	0.524777
10090	9014	1.115534	0.040502	0.049616		0.227802	0.516804	0.090485		0.150293	0.023695	0.38469
10091	9015	1.068375	0.040921	0.052158		0.222992	0.516954	0.094425		0.14235	0.023702	0.384612
10092	9016	1.301892	0.056994	0.079191		0.282859	0.705493	0.141018		0.166605	0.032365	0.524212
10093	9017	1.129215	0.058142	0.088086		0.250993	0.706239	0.154389		0.133323	0.032445	0.523935
10094	9018	0.947885	0.059237	0.097764		0.207294	0.70721	0.168995		0.095081	0.032569	0.523659
10095	9019	0.479559	0.066044	0.072758		0.055319	0.45543	0.095173		0.025885	0.020611	0.341208
10096	9020	0.461608	0.060713	0.060712		0.060259	0.422367	0.080782		0.032693	0.019043	0.316772
10097	9021	0.656016	0.081747	0.075079		0.099033	0.573457	0.10188		0.055402	0.025769	0.430428
10098	9022	0.943929	0.105856	0.081953		0.175074	0.756389	0.117251		0.102463	0.033773	0.568395
10099	9023	1.161982	0.111212	0.071876		0.235433	0.812033	0.11083		0.140667	0.036041	0.610615
10100	9024	1.222785	0.100887	0.053746		0.264033	0.755555	0.091667		0.157273	0.033339	0.56832
10101	9025	1.231283	0.089583	0.039763		0.283686	0.69075	0.075168		0.172777	0.030311	0.5196
10102	9026	1.186803	0.079006	0.03017		0.289577	0.626023	0.062681		0.177593	0.027349	0.470894
10103	9027	1.374072	0.08488	0.02765		0.356528	0.69308	0.064246		0.217496	0.030148	0.521305
10104	9028	1.30762	0.076668	0.02094		0.374256	0.647702	0.055792		0.222136	0.028049	0.487199
10105	9029	1.049409	0.0591	0.01422		0.330738	0.518169	0.041739		0.19116	0.022342	0.38982
10106	9030	0.960041	0.0529	0.011864		0.319311	0.474979	0.036853		0.181877	0.020427	0.357381
10107	9031	1.127342	0.060279	0.012237		0.402968	0.561301	0.041415		0.225063	0.024051	0.42246
10108	9032	1.221266	0.063773	0.011741		0.469045	0.617434	0.043482		0.25695	0.026471	0.464892
10109	9033	1.459403	0.072744	0.013714		0.587348	0.733802	0.049509		0.314466	0.031527	0.552802
10110	9034	1.441031	0.06568	0.013796		0.612313	0.711972	0.045119		0.321226	0.030661	0.536895
10111	9035	1.177401	0.050908	0.011455		0.509091	0.571599	0.035065		0.264634	0.024631	0.43132
10112	9036	1.447098	0.058125	0.014219		0.629738	0.681458	0.040315		0.326457	0.029363	0.514647
10113	9037	1.363884	0.050946	0.013512		0.597308	0.625079	0.035746		0.310437	0.026913	0.472505
10114	9038	1.387738	0.048534	0.014407		0.612748	0.624807	0.034626		0.320084	0.026853	0.472752
10115	9039	1.374948	0.04532	0.01479		0.622336	0.613742	0.033009		0.324307	0.026307	0.464833
10116	9040	1.399625	0.042271	0.014904		0.627025	0.602666	0.031542		0.327679	0.025742	0.456882
10117	9041	1.615458	0.044463	0.016727		0.711478	0.669099	0.034108		0.371576	0.02846	0.507717
10118	9042	1.165162	0.029633	0.011772		0.515417	0.472967	0.023484		0.264957	0.020017	0.359244
10119	9043	1.142361	0.028048	0.011452		0.508325	0.462061	0.022643		0.25766	0.0195	0.35113
10120	9044	1.478873	0.034534	0.015077		0.669301	0.60135	0.028762		0.326336	0.025234	0.45738
10121	9045	1.499436	0.034401	0.015668		0.69515	0.622384	0.029082		0.321092	0.025958	0.473769
10122	9046	1.653242	0.037227	0.017502		0.77679	0.699139	0.031869		0.347585	0.028957	0.53264
10123	9047	1.489254	0.032937	0.015792		0.709186	0.64273	0.028591		0.310245	0.026452	0.490061
10124	9048	1.548402	0.032714	0.015777		0.724618	0.663498	0.028785		0.311846	0.027307	0.506288
10125	9049	1.519635	0.029832	0.01423		0.675313	0.63067	0.026601		0.287283	0.025968	0.481628
10126	9050	1.562991	0.028871	0.013438		0.659709	0.632216	0.02598		0.274518	0.026053	0.48314
10127	9051	1.458648	0.025841	0.01155		0.590415	0.586639	0.02341		0.24021	0.024201	0.448632
10128	9052	1.313394	0.022144	0.009444		0.501224	0.522002	0.020113		0.199559	0.021567	0.399506
10129	9053	1.123226	0.018429	0.009299		0.411139	0.447007	0.016703		0.161905	0.018493	0.342311
10130	9054	1.308111	0.02108	0.012876		0.459735	0.526322	0.018991		0.180189	0.021809	0.403293
10131	9055	1.589379	0.025726	0.01974		0.528197	0.660566	0.022763		0.207692	0.02744	0.506573
10132	9056	1.362703	0.023596	0.021654		0.429303	0.604494	0.019643		0.170844	0.025178	0.463967
10133	9057	1.24298	0.023621	0.025528		0.366515	0.60376	0.01818		0.14745	0.025227	0.463781
10134	9058	1.110168	0.023445	0.029545		0.295608	0.5978	0.016275		0.119009	0.025065	0.45956
10135	9059	1.061321	0.025443	0.038029		0.24788	0.647006	0.015429		0.097509	0.027231	0.497719
10136	9060	0.821806	0.023329	0.040654		0.162309	0.591548	0.011725		0.063787	0.024993	0.455318
10137	9061	0.774304	0.025949	0.051899		0.11549	0.654643	0.009883		0.046046	0.027768	0.504089
10138	9062	0.753851	0.030056	0.066803		0.061756	0.717919	0.006323		0.029115	0.030594	0.552959
10139	9063	0.69864	0.028796	0.062798		0.052359	0.632946	0.0061		0.020434	0.027216	0.487761
10140	9064	0.826296	0.032718	0.060377		0.090318	0.684724	0.010695		0.036856	0.029616	0.528184
10141	9065	0.828934	0.031345	0.050515		0.103226	0.631494	0.014194		0.051393	0.027419	0.487468
10142	9066	0.885446	0.031338	0.044614		0.114042	0.610046	0.018289		0.070246	0.026565	0.471206
10143	9067	1.06489	0.035568	0.045603		0.146526	0.672848	0.025256		0.105318	0.029359	0.519989
10144	9068	1.316572	0.039093	0.044576		0.183209	0.714628	0.034236		0.150466	0.031234	0.5526
10145	9069	1.50675	0.04041	0.042147		0.207593	0.714489	0.041208		0.181802	0.031253	0.552732
10146	9070	1.698154	0.04175	0.04058		0.235505	0.714446	0.049448		0.211775	0.031258	0.552899
10147	9071	1.731303	0.040316	0.037867		0.245253	0.67245	0.053748		0.219562	0.029415	0.520511
10148	9072	1.832749	0.041258	0.038491		0.268586	0.672537	0.061275		0.23542	0.029406	0.520629
10149	9073	2.134524	0.047687	0.045116		0.327102	0.756741	0.077782		0.28108	0.033071	0.585805
10150	9074	1.559246	0.035731	0.035573		0.255921	0.546696	0.064608		0.210467	0.023878	0.423124
10151	9075	1.07543	0.024994	0.02542		0.180614	0.378522	0.046549		0.145943	0.01653	0.292933
10152	9076	1.583799	0.038244	0.040876		0.27942	0.567918	0.075495		0.21664	0.024799	0.439381

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
10153	9077	1.682928	0.04351	0.049949		0.317596	0.631266	0.092166		0.23134	0.027573	0.488135
10154	9078	1.567229	0.0445	0.05528		0.318215	0.631593	0.101013		0.217207	0.02761	0.488021
10155	9079	1.053073	0.033352	0.04502		0.227996	0.463499	0.081052		0.146313	0.020295	0.357766
10156	9080	1.008498	0.033686	0.047309		0.223241	0.463687	0.084504		0.138896	0.020325	0.357702
10157	9081	1.227083	0.046915	0.07178		0.282965	0.632984	0.126005		0.163412	0.02783	0.487564
10158	9082	1.060261	0.047902	0.079795		0.250226	0.633869	0.137768		0.131643	0.027986	0.487336
10159	9083	0.883972	0.048891	0.088541		0.204822	0.635009	0.150696		0.094772	0.028186	0.487115
10160	9084	0.472917	0.057692	0.069789		0.054716	0.439115	0.090202		0.026125	0.01898	0.341125
10161	9085	0.457363	0.05295	0.058278		0.06754	0.407198	0.076465		0.033549	0.017531	0.316665
10162	9086	0.652465	0.071242	0.072157		0.111908	0.552879	0.096459		0.057346	0.023724	0.430262
10163	9087	0.94699	0.092273	0.078982		0.200744	0.729492	0.111259		0.107154	0.031119	0.568149
10164	9088	1.123831	0.0904	0.064658		0.254287	0.72937	0.098215		0.13776	0.030958	0.56809
10165	9089	1.284799	0.088371	0.052062		0.308378	0.729616	0.087523		0.170796	0.030831	0.568061
10166	9090	1.299254	0.078732	0.038427		0.331854	0.667456	0.071912		0.188516	0.028084	0.519361
10167	9091	1.252187	0.069647	0.029136		0.338108	0.605202	0.060013		0.193802	0.025374	0.470676
10168	9092	1.327059	0.068969	0.024498		0.386161	0.615939	0.056521		0.218419	0.02573	0.478811
10169	9093	1.390519	0.068019	0.020136		0.438182	0.626658	0.053376		0.242441	0.026076	0.486967
10170	9094	1.123681	0.05261	0.013405		0.385118	0.501496	0.039874		0.208472	0.020784	0.389626
10171	9095	1.0282	0.04719	0.011131		0.370896	0.459775	0.035176		0.1983	0.019007	0.357197
10172	9096	1.200329	0.053942	0.011383		0.466951	0.543454	0.039459		0.245617	0.022384	0.422228
10173	9097	1.175769	0.052054	0.010176		0.493595	0.543493	0.037595		0.254452	0.022301	0.422335
10174	9098	1.564788	0.065527	0.013184		0.678108	0.710725	0.047004		0.34094	0.029193	0.552451
10175	9099	1.60308	0.059504	0.013452		0.704748	0.689728	0.04272		0.345178	0.028412	0.536508
10176	9100	1.337674	0.046008	0.011218		0.584906	0.553795	0.033153		0.286783	0.022833	0.430988
10177	9101	1.518711	0.04844	0.012769		0.662575	0.605896	0.03491		0.324344	0.024988	0.471865
10178	9102	1.564605	0.046496	0.01321		0.681819	0.605718	0.033684		0.337382	0.024964	0.472087
10179	9103	1.601583	0.044528	0.013771		0.699028	0.605501	0.032574		0.35024	0.024914	0.472308
10180	9104	1.592359	0.04181	0.01413		0.707891	0.594812	0.031021		0.355796	0.02441	0.464373
10181	9105	1.603364	0.03922	0.014229		0.711355	0.584112	0.029605		0.35807	0.023889	0.456409
10182	9106	1.68916	0.038028	0.014619		0.739119	0.594233	0.029308		0.368951	0.024199	0.464725
10183	9107	1.327215	0.027849	0.011253		0.582057	0.45844	0.022004		0.284557	0.018572	0.358846
10184	9108	1.300023	0.026457	0.011068		0.572931	0.447872	0.021205		0.275627	0.01809	0.350736
10185	9109	1.680172	0.032625	0.014523		0.751792	0.582893	0.026925		0.352441	0.023403	0.456858
10186	9110	1.700664	0.032354	0.015047		0.77856	0.603272	0.0272		0.357231	0.024063	0.473225
10187	9111	1.702341	0.032311	0.015422		0.80083	0.623541	0.027412		0.355999	0.024686	0.489551
10188	9112	1.639394	0.031178	0.015099		0.794702	0.622949	0.026701		0.345443	0.024469	0.489509
10189	9113	1.658261	0.03107	0.01507		0.805293	0.643035	0.026867		0.345707	0.025133	0.505733
10190	9114	1.588246	0.028428	0.013592		0.744345	0.611156	0.024813		0.31348	0.023884	0.481123
10191	9115	1.478594	0.025157	0.01171		0.660057	0.558716	0.022096		0.273746	0.021842	0.440214
10192	9116	1.517785	0.024762	0.011051		0.646601	0.568354	0.021834		0.26222	0.022235	0.448207
10193	9117	1.342436	0.021276	0.008926		0.548469	0.505653	0.018771		0.216608	0.019804	0.399151
10194	9118	1.147823	0.017738	0.008698		0.449657	0.432945	0.015611		0.174265	0.016976	0.342023
10195	9119	1.335748	0.020323	0.012077		0.502259	0.509685	0.017803		0.193049	0.020011	0.402973
10196	9120	1.481539	0.022496	0.017		0.526774	0.585994	0.019631		0.202445	0.023057	0.463836
10197	9121	1.389215	0.021863	0.02038		0.464373	0.585081	0.018586		0.180236	0.023079	0.463656
10198	9122	1.266273	0.021866	0.024055		0.392127	0.584186	0.017331		0.15452	0.02311	0.463497
10199	9123	1.110887	0.021679	0.027893		0.3109	0.578237	0.015692		0.124214	0.022949	0.459303
10200	9124	0.964573	0.021498	0.032869		0.232355	0.572402	0.013811		0.09282	0.022795	0.455148
10201	9125	0.817539	0.021518	0.038459		0.163947	0.571819	0.011736		0.064792	0.022856	0.4551
10202	9126	0.761727	0.023858	0.049224		0.123113	0.632617	0.010232		0.046073	0.025381	0.503858
10203	9127	0.73903	0.026235	0.063675		0.067927	0.693562	0.00696		0.026146	0.027953	0.552706
10204	9128	0.672876	0.025334	0.060093		0.044965	0.611173	0.005418		0.019099	0.024833	0.487492
10205	9129	0.78793	0.028931	0.057218		0.076484	0.661085	0.009499		0.031474	0.026986	0.527852
10206	9130	0.782431	0.027837	0.047678		0.089328	0.609654	0.012977		0.045885	0.024971	0.48713
10207	9131	0.825994	0.027925	0.041967		0.106417	0.588921	0.017055		0.063761	0.024189	0.47085
10208	9132	0.990515	0.031776	0.042862		0.137179	0.649567	0.02384		0.092456	0.026735	0.519573
10209	9133	1.21425	0.035031	0.041965		0.17269	0.689957	0.032669		0.134616	0.028457	0.55213
10210	9134	1.397078	0.036275	0.039815		0.197349	0.689939	0.039567		0.16478	0.028494	0.552247
10211	9135	1.587631	0.037519	0.038527		0.226491	0.690052	0.047686		0.194159	0.02853	0.552407
10212	9136	1.632033	0.036243	0.036128		0.238463	0.649669	0.05196		0.204659	0.02688	0.520052
10213	9137	1.741674	0.037088	0.036895		0.263942	0.64994	0.059309		0.224586	0.026909	0.520182
10214	9138	2.043261	0.042793	0.043571		0.324567	0.731541	0.075346		0.269704	0.030309	0.585327
10215	9139	1.509828	0.032021	0.034503		0.256589	0.528679	0.062563		0.203001	0.02193	0.422807
10216	9140	1.044123	0.022387	0.02468		0.181576	0.366083	0.045075		0.140987	0.015192	0.292719
10217	9141	1.544447	0.034216	0.039739		0.2823	0.549363	0.073026		0.209992	0.022824	0.439082
10218	9142	1.647347	0.038865	0.048605		0.322566	0.610767	0.089022		0.227112	0.025424	0.48783
10219	9143	1.537182	0.039697	0.053801		0.324601	0.611221	0.097376		0.216499	0.025514	0.487744
10220	9144	1.035221	0.029721	0.043801		0.233359	0.448641	0.077972		0.146919	0.018797	0.35758
10221	9145	0.992362	0.03001	0.04602		0.228775	0.448872	0.081225		0.139924	0.018847	0.357524
10222	9146	1.208928	0.041791	0.069786		0.290461	0.61289	0.120896		0.165757	0.025874	0.487341

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
10223	9147	1.044465	0.042694	0.077558		0.256795	0.61387	0.132028		0.134539	0.026089	0.487131
10224	9148	0.869351	0.043626	0.08607		0.209367	0.615047	0.144307		0.097746	0.026346	0.486924
10225	9149	0.498514	0.052496	0.070497		0.063803	0.451185	0.089275		0.027515	0.01822	0.366422
10226	9150	0.482258	0.048077	0.058962		0.079138	0.418416	0.075687		0.035794	0.016826	0.340124
10227	9151	0.689498	0.064643	0.073167		0.131797	0.568269	0.095695		0.061559	0.022784	0.462125
10228	9152	1.017322	0.08382	0.08052		0.239146	0.750511	0.111186		0.115855	0.029974	0.610213
10229	9153	1.217673	0.082341	0.066223		0.30601	0.751181	0.098818		0.156577	0.029929	0.610142
10230	9154	1.401017	0.080756	0.053515		0.373233	0.752152	0.088505		0.195753	0.02991	0.610105
10231	9155	1.421888	0.072208	0.039448		0.401968	0.688625	0.072943		0.214617	0.027328	0.557793
10232	9156	1.384557	0.064074	0.029908		0.41138	0.624735	0.060947		0.220297	0.024741	0.5055
10233	9157	1.478899	0.063661	0.025121		0.469857	0.636119	0.057411		0.249044	0.02513	0.514228
10234	9158	1.54667	0.063007	0.020599		0.530126	0.647447	0.054169		0.277872	0.025501	0.522976
10235	9159	1.246117	0.048919	0.013404		0.463818	0.518313	0.040402		0.240123	0.020345	0.418426
10236	9160	1.136627	0.043982	0.011067		0.44587	0.475278	0.035591		0.228782	0.018613	0.383592
10237	9161	1.318466	0.050455	0.011219		0.56046	0.561906	0.039845		0.284508	0.021928	0.45341
10238	9162	1.327923	0.048869	0.01048		0.591836	0.562058	0.037873		0.298215	0.02185	0.453504
10239	9163	1.813515	0.061762	0.013574		0.812194	0.735123	0.047247		0.405011	0.028462	0.593192
10240	9164	1.911166	0.056467	0.013946		0.84236	0.713567	0.042785		0.410019	0.027723	0.576021
10241	9165	1.592199	0.043707	0.011622		0.698145	0.572993	0.033136		0.338538	0.022289	0.462704
10242	9166	1.822961	0.046077	0.013219		0.788965	0.626972	0.034819		0.380209	0.024403	0.506555
10243	9167	1.887848	0.044499	0.013664		0.809243	0.626845	0.033526		0.395663	0.024387	0.50676
10244	9168	1.930795	0.042885	0.014063		0.829735	0.626672	0.032366		0.411643	0.024345	0.506965
10245	9169	1.917312	0.040534	0.014218		0.838128	0.615655	0.030768		0.416418	0.023856	0.498419
10246	9170	1.930575	0.038277	0.01431		0.84034	0.604609	0.029326		0.416082	0.023348	0.489846
10247	9171	2.026109	0.037378	0.01472		0.872537	0.615121	0.028995		0.424892	0.023651	0.498748
10248	9172	1.587566	0.027583	0.011515		0.684694	0.474565	0.021745		0.323788	0.018149	0.385103
10249	9173	1.553305	0.026314	0.011307		0.672737	0.463633	0.020946		0.317447	0.017675	0.376394
10250	9174	2.003642	0.032712	0.014791		0.882589	0.603407	0.026565		0.411435	0.022858	0.490268
10251	9175	2.024346	0.032275	0.015281		0.916934	0.624499	0.026815		0.418027	0.023491	0.507826
10252	9176	2.004745	0.032182	0.015621		0.9422	0.645458	0.026992		0.41661	0.024083	0.525347
10253	9177	1.917352	0.031161	0.015267		0.932061	0.644808	0.02627		0.402092	0.023854	0.525312
10254	9178	1.891939	0.031162	0.015223		0.939634	0.665543	0.026404		0.401352	0.024404	0.542742
10255	9179	1.754876	0.028615	0.013725		0.859537	0.632472	0.024365		0.362273	0.023109	0.516356
10256	9180	1.596057	0.025398	0.01183		0.757074	0.578127	0.021689		0.31339	0.021118	0.472475
10257	9181	1.631978	0.025068	0.011174		0.73838	0.588003	0.021434		0.301183	0.021483	0.481081
10258	9182	1.445146	0.021597	0.009036		0.624028	0.523025	0.018444		0.249302	0.01912	0.428455
10259	9183	1.219169	0.018039	0.008575		0.510274	0.447737	0.015355		0.200526	0.01638	0.367151
10260	9184	1.410481	0.020703	0.011936		0.568331	0.526985	0.017596		0.220027	0.019297	0.4326
10261	9185	1.563219	0.022963	0.01685		0.593145	0.605684	0.019483		0.226271	0.022215	0.497973
10262	9186	1.466126	0.022078	0.020239		0.519361	0.604495	0.018567		0.196951	0.022215	0.497812
10263	9187	1.33638	0.02126	0.023921		0.434286	0.603296	0.017487		0.166009	0.022221	0.497672
10264	9188	1.169817	0.021037	0.027794		0.339373	0.596835	0.016056		0.132947	0.02204	0.493193
10265	9189	1.001432	0.020816	0.03278		0.24812	0.590484	0.01443		0.101954	0.021866	0.488752
10266	9190	0.849801	0.020784	0.038408		0.176986	0.589528	0.012622		0.073249	0.021898	0.488711
10267	9191	0.790936	0.022986	0.049268		0.136929	0.651821	0.0115		0.05196	0.02429	0.541076
10268	9192	0.775851	0.025186	0.064469		0.076134	0.714016	0.008565		0.024549	0.02672	0.59353
10269	9193	0.688003	0.023012	0.060718		0.037335	0.628677	0.005509		0.018074	0.023673	0.523448
10270	9194	0.788717	0.026489	0.05704		0.068429	0.680066	0.008381		0.032511	0.025673	0.566736
10271	9195	0.770448	0.025608	0.04716		0.082636	0.627121	0.012173		0.041737	0.02373	0.522982
10272	9196	0.797856	0.025793	0.041332		0.097299	0.605815	0.016522		0.056281	0.022978	0.505473
10273	9197	0.949094	0.029439	0.042173		0.125699	0.668259	0.023565		0.080041	0.025401	0.55775
10274	9198	1.144637	0.032556	0.041395		0.159622	0.710013	0.032824		0.117097	0.027059	0.592669
10275	9199	1.296523	0.033804	0.039459		0.184755	0.710225	0.040124		0.146226	0.027128	0.592781
10276	9200	1.496716	0.03504	0.038446		0.215978	0.710724	0.048667		0.176737	0.027217	0.592951
10277	9201	1.56389	0.033891	0.03628		0.231434	0.669485	0.053194		0.191816	0.025699	0.558232
10278	9202	1.696201	0.034713	0.037307		0.26053	0.670177	0.060863		0.213886	0.025792	0.558393
10279	9203	2.018999	0.03994	0.044465		0.325298	0.754771	0.077421		0.25984	0.029128	0.628358
10280	9204	1.508404	0.029858	0.035449		0.261448	0.545836	0.064361		0.197609	0.021148	0.453934
10281	9205	1.046265	0.020865	0.025392		0.185837	0.37803	0.046348		0.137625	0.014666	0.31428
10282	9206	1.556309	0.031848	0.040988		0.291315	0.567462	0.075056		0.208248	0.022078	0.471455
10283	9207	1.670715	0.03611	0.050222		0.335964	0.631112	0.091309		0.229456	0.024662	0.523842
10284	9208	1.568146	0.036807	0.055623		0.340828	0.631758	0.099606		0.221683	0.024818	0.523788
10285	9209	1.05579	0.027515	0.045276		0.246704	0.463857	0.079517		0.152259	0.018341	0.38403
10286	9210	1.014396	0.027769	0.047554		0.242512	0.464153	0.082714		0.145766	0.018417	0.383977
10287	9211	1.240913	0.038655	0.072078		0.309327	0.633921	0.122827		0.174536	0.025366	0.52342
10288	9212	1.07553	0.03951	0.080089		0.274968	0.635029	0.133911		0.143193	0.025659	0.523205
10289	9213	0.897436	0.040417	0.088929		0.224432	0.636234	0.146297		0.105267	0.025989	0.522987
10290	9214	0.486754	0.046222	0.065061		0.066959	0.430028	0.079841		0.026256	0.015977	0.366197
10291	9215	0.470396	0.04215	0.054672		0.082756	0.399102	0.068144		0.034502	0.014671	0.33992
10292	9216	0.671492	0.056423	0.068186		0.137904	0.542605	0.086902		0.060781	0.019938	0.461858

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
10293	9217	0.989792	0.0723	0.075589		0.251683	0.717939	0.102273		0.120775	0.026422	0.609862
10294	9218	1.188334	0.070054	0.062498		0.324054	0.719594	0.09174		0.161807	0.026549	0.609783
10295	9219	1.377032	0.068112	0.050698		0.396579	0.721244	0.082659		0.200957	0.026662	0.60973
10296	9220	1.418414	0.061059	0.037368		0.427067	0.660809	0.068363		0.219337	0.024451	0.557436
10297	9221	1.378681	0.054313	0.028339		0.440032	0.599783	0.057197		0.225541	0.022191	0.505165
10298	9222	1.468921	0.054104	0.02379		0.500585	0.610941	0.05388		0.25532	0.022583	0.513875
10299	9223	1.531418	0.053715	0.019483		0.562663	0.622022	0.050787		0.287541	0.022951	0.522602
10300	9224	1.229003	0.041845	0.012419		0.490958	0.498087	0.037801		0.250989	0.01833	0.418112
10301	9225	1.117716	0.037706	0.010194		0.471491	0.456793	0.033254		0.240537	0.016777	0.383294
10302	9226	1.31179	0.043402	0.010247		0.592214	0.540142	0.037134		0.300421	0.019774	0.453041
10303	9227	1.374575	0.042191	0.009903		0.625162	0.540367	0.03521		0.314405	0.019709	0.453115
10304	9228	1.912652	0.053531	0.012829		0.857701	0.706844	0.043809		0.426374	0.025674	0.592654
10305	9229	2.013257	0.049283	0.013254		0.888718	0.686236	0.039513		0.430882	0.024925	0.575448
10306	9230	1.695605	0.03831	0.011041		0.735747	0.551094	0.030537		0.352585	0.020047	0.46222
10307	9231	1.94353	0.040293	0.012549		0.829868	0.603066	0.032009		0.394834	0.021958	0.505992
10308	9232	2.010592	0.039165	0.012961		0.849218	0.602993	0.030757		0.413296	0.021951	0.506165
10309	9233	2.054764	0.037996	0.013324		0.870056	0.602872	0.029632		0.428879	0.021919	0.506339
10310	9234	2.053586	0.036159	0.013406		0.877222	0.592309	0.028123		0.431538	0.021482	0.497775
10311	9235	2.089151	0.03438	0.013422		0.878009	0.581716	0.026761		0.42808	0.021027	0.489189
10312	9236	2.165824	0.03381	0.013868		0.91125	0.59185	0.026424		0.433887	0.021299	0.498057
10313	9237	1.692357	0.025141	0.010822		0.713255	0.456628	0.019791		0.341165	0.016341	0.384555
10314	9238	1.653971	0.024082	0.010612		0.701468	0.446112	0.01905		0.334627	0.015913	0.375853
10315	9239	2.129712	0.030172	0.013847		0.924664	0.58061	0.024134		0.43407	0.020571	0.489553
10316	9240	2.148806	0.030011	0.014272		0.960474	0.600897	0.024328		0.441416	0.021132	0.50708
10317	9241	2.126167	0.029672	0.01456		0.984949	0.621047	0.024461		0.440423	0.021652	0.524576
10318	9242	1.999889	0.028681	0.014209		0.967869	0.620386	0.023773		0.417317	0.02143	0.524549
10319	9243	1.959781	0.028775	0.014155		0.973161	0.640286	0.023866		0.414771	0.021906	0.541969
10320	9244	1.769077	0.026512	0.012759		0.886315	0.608396	0.021996		0.37381	0.020606	0.515642
10321	9245	1.573427	0.023594	0.010999		0.774722	0.556047	0.019567		0.322791	0.018816	0.471844
10322	9246	1.573711	0.023346	0.010395		0.749849	0.56545	0.019331		0.31261	0.019125	0.480463
10323	9247	1.389407	0.020162	0.008412		0.630325	0.502856	0.016638		0.260089	0.017007	0.42793
10324	9248	1.17231	0.016868	0.007783		0.51344	0.430414	0.013865		0.209361	0.014559	0.366718
10325	9249	1.345163	0.019387	0.010867		0.569761	0.506735	0.015961		0.229238	0.017139	0.432109
10326	9250	1.479907	0.021542	0.015382		0.591873	0.582621	0.017738		0.234283	0.019706	0.497438
10327	9251	1.389079	0.020742	0.018516		0.516007	0.581683	0.017008		0.202616	0.019678	0.497307
10328	9252	1.267049	0.019921	0.021921		0.429635	0.580703	0.01617		0.169727	0.019651	0.497192
10329	9253	1.110071	0.018913	0.025525		0.334249	0.574619	0.015072		0.135274	0.019454	0.492739
10330	9254	0.944311	0.018491	0.030123		0.242878	0.568572	0.013835		0.102628	0.01926	0.488314
10331	9255	0.80461	0.018396	0.035319		0.173621	0.567653	0.012507		0.073268	0.019243	0.488279
10332	9256	0.753406	0.020261	0.045448		0.127907	0.627549	0.011936		0.051624	0.021295	0.540587
10333	9257	0.756947	0.022095	0.059726		0.069799	0.687283	0.009737		0.02426	0.023361	0.592968
10334	9258	0.663022	0.01941	0.055887		0.029877	0.605117	0.004946		0.014315	0.020587	0.522904
10335	9259	0.730206	0.021983	0.051788		0.054064	0.654715	0.006249		0.029614	0.022265	0.566123
10336	9260	0.6934	0.021371	0.042455		0.064468	0.603855	0.010104		0.037093	0.020552	0.52239
10337	9261	0.697194	0.021611	0.037047		0.074591	0.583404	0.014426		0.043397	0.01989	0.504874
10338	9262	0.817286	0.024748	0.037785		0.095661	0.643622	0.021137		0.061471	0.021996	0.557061
10339	9263	0.961571	0.027444	0.037238		0.122621	0.683925	0.030118		0.087183	0.023466	0.59191
10340	9264	1.073888	0.028623	0.035729		0.144518	0.684234	0.037285		0.108615	0.023579	0.592012
10341	9265	1.237987	0.029778	0.035098		0.173844	0.68479	0.045571		0.135479	0.023732	0.592189
10342	9266	1.312866	0.028879	0.033364		0.191467	0.645158	0.050008		0.152071	0.022491	0.557532
10343	9267	1.445442	0.02965	0.034651		0.221072	0.645901	0.057367		0.174155	0.022664	0.557719
10344	9268	1.744044	0.034157	0.041646		0.282136	0.727489	0.073239		0.215887	0.025703	0.627643
10345	9269	1.322716	0.025428	0.033497		0.232159	0.526078	0.061078		0.167398	0.018753	0.453471
10346	9270	0.921264	0.017762	0.024053		0.166073	0.364325	0.044029		0.117897	0.013023	0.313972
10347	9271	1.381408	0.02708	0.038967		0.263533	0.54681	0.07128		0.181533	0.019658	0.471036
10348	9272	1.497202	0.030619	0.047888		0.308253	0.607964	0.086567		0.203709	0.022028	0.523434
10349	9273	1.418099	0.031121	0.053096		0.316707	0.608404	0.094084		0.200202	0.022243	0.523429
10350	9274	0.968654	0.023202	0.043205		0.231757	0.446537	0.074777		0.139654	0.016495	0.383791
10351	9275	0.934119	0.023397	0.045366		0.228819	0.446744	0.077645		0.134587	0.016592	0.383747
10352	9276	1.151043	0.032545	0.068698		0.295794	0.609864	0.114906		0.163314	0.022934	0.523118
10353	9277	1.004432	0.033297	0.076318		0.265573	0.611105	0.125076		0.135681	0.023279	0.522906
10354	9278	0.844172	0.034142	0.084811		0.21712	0.61231	0.136607		0.101019	0.02365	0.522683
10355	9279	0.315646	0.029194	0.039236		0.045891	0.276125	0.046027		0.016285	0.010183	0.243958
10356	9280	0.304431	0.026364	0.03338		0.055252	0.256917	0.040246		0.02204	0.009271	0.226476
10357	9281	0.432637	0.034984	0.041883		0.091904	0.349787	0.051966		0.039552	0.012401	0.307726
10358	9282	0.630603	0.044194	0.046789		0.168119	0.463518	0.062151		0.078562	0.015932	0.406334
10359	9283	0.75534	0.04234	0.038867		0.217169	0.464839	0.056298		0.105209	0.015546	0.406266
10360	9284	0.885998	0.040611	0.031632		0.266144	0.465971	0.051035		0.130895	0.015645	0.406215
10361	9285	0.910296	0.035634	0.023336		0.288167	0.426915	0.042362		0.142046	0.014405	0.371362
10362	9286	0.882431	0.03121	0.017702		0.296651	0.38746	0.035485		0.148132	0.013106	0.336528

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
10363	9287	0.937295	0.030671	0.014858		0.33667	0.394636	0.033421		0.170887	0.013363	0.342319
10364	9288	0.973702	0.030147	0.012156		0.377692	0.401758	0.031453		0.193267	0.013601	0.348121
10365	9289	0.780313	0.023553	0.007659		0.329201	0.321687	0.023354		0.168576	0.010874	0.278506
10366	9290	0.715651	0.021264	0.006271		0.316061	0.295006	0.020505		0.161439	0.009958	0.255307
10367	9291	0.862553	0.024553	0.006247		0.396968	0.34882	0.022835		0.201369	0.011742	0.301753
10368	9292	0.923074	0.023952	0.006139		0.419095	0.348957	0.021586		0.210443	0.011706	0.301789
10369	9293	1.283795	0.030509	0.007955		0.574963	0.456459	0.026782		0.284993	0.01525	0.394708
10370	9294	1.366947	0.028285	0.008257		0.595329	0.443158	0.024052		0.287494	0.014766	0.383218
10371	9295	1.149979	0.022085	0.006876		0.49241	0.355894	0.018545		0.233706	0.011881	0.307799
10372	9296	1.316522	0.023319	0.007813		0.554578	0.38947	0.019392		0.267668	0.013019	0.336928
10373	9297	1.360811	0.022669	0.008063		0.566534	0.389441	0.01859		0.279775	0.013019	0.337023
10374	9298	1.389901	0.022146	0.008281		0.578806	0.389381	0.017874		0.289291	0.013003	0.337119
10375	9299	1.428762	0.021227	0.00832		0.582766	0.382584	0.016931		0.290317	0.012747	0.331399
10376	9300	1.44907	0.020324	0.008317		0.582966	0.375765	0.016086		0.287232	0.012477	0.325667
10377	9301	1.498964	0.020131	0.008578		0.604435	0.382343	0.015858		0.290727	0.012639	0.331557
10378	9302	1.157592	0.015083	0.00668		0.473364	0.295014	0.011859		0.228727	0.009695	0.25599
10379	9303	1.126039	0.014506	0.006543		0.466794	0.288236	0.011407		0.224393	0.00944	0.250193
10380	9304	1.447855	0.018313	0.008521		0.614654	0.375179	0.014429		0.291174	0.0122	0.325873
10381	9305	1.45944	0.018359	0.008767		0.637912	0.388344	0.014525		0.296219	0.012528	0.337536
10382	9306	1.443397	0.018307	0.008929		0.653698	0.401438	0.014579		0.295787	0.012829	0.349182
10383	9307	1.357623	0.017614	0.008702		0.638933	0.401103	0.014146		0.282517	0.012689	0.349169
10384	9308	1.310104	0.017498	0.008663		0.63933	0.414079	0.014177		0.277987	0.01296	0.360773
10385	9309	1.161221	0.016173	0.007806		0.581176	0.393593	0.013044		0.247735	0.012175	0.343261
10386	9310	1.015136	0.014429	0.00673		0.506484	0.359849	0.011588		0.215502	0.011048	0.314117
10387	9311	0.997404	0.014311	0.006363		0.487242	0.366078	0.011436		0.208714	0.01122	0.31987
10388	9312	0.860366	0.012386	0.005151		0.405862	0.325698	0.009838		0.173669	0.009967	0.28491
10389	9313	0.725687	0.010377	0.004654		0.329188	0.278862	0.00822		0.139775	0.008525	0.244166
10390	9314	0.83314	0.011942	0.006515		0.363869	0.328268	0.009477		0.152955	0.010026	0.287716
10391	9315	0.908203	0.013288	0.009251		0.376472	0.37735	0.010555		0.156041	0.011509	0.331233
10392	9316	0.85026	0.012807	0.011162		0.32765	0.376635	0.010166		0.13451	0.011471	0.331162
10393	9317	0.777384	0.012309	0.013242		0.273143	0.375866	0.009741		0.112127	0.011429	0.3311
10394	9318	0.683114	0.011688	0.015459		0.213446	0.371753	0.009194		0.088774	0.011282	0.328146
10395	9319	0.582548	0.011069	0.018263		0.156212	0.367628	0.008615		0.066756	0.011131	0.325206
10396	9320	0.498895	0.01067	0.021414		0.107429	0.366771	0.008041		0.046863	0.011077	0.325181
10397	9321	0.47249	0.011683	0.027583		0.075478	0.405146	0.008093		0.032383	0.012201	0.360007
10398	9322	0.491359	0.012636	0.036151		0.036897	0.443249	0.007331		0.014957	0.013301	0.394844
10399	9323	0.426027	0.011023	0.033358		0.017818	0.389781	0.002822		0.007557	0.011602	0.348844
10400	9324	0.460923	0.011972	0.030426		0.028736	0.421512	0.002972		0.013028	0.01251	0.377635
10401	9325	0.427762	0.011433	0.024735		0.028806	0.388622	0.005237		0.019712	0.01152	0.348475
10402	9326	0.419555	0.011607	0.021491		0.032791	0.375422	0.008019		0.026748	0.01114	0.336818
10403	9327	0.474008	0.013346	0.021923		0.04134	0.414221	0.012173		0.032986	0.012327	0.371653
10404	9328	0.523456	0.01489	0.021759		0.053271	0.440394	0.017903		0.037682	0.013189	0.39488
10405	9329	0.560463	0.015605	0.021095		0.064445	0.440862	0.022602		0.048098	0.013303	0.394853
10406	9330	0.637116	0.01636	0.020947		0.081603	0.441644	0.0279		0.062315	0.01347	0.394773
10407	9331	0.678027	0.015941	0.020052		0.094355	0.416477	0.03069		0.071632	0.012845	0.371453
10408	9332	0.762794	0.01645	0.021048		0.113438	0.417409	0.035351		0.084965	0.013033	0.371336
10409	9333	0.936923	0.01905	0.025552		0.149442	0.470606	0.045438		0.108853	0.014877	0.417896
10410	9334	0.724669	0.014199	0.020825		0.127174	0.340651	0.03827		0.087772	0.010932	0.301973
10411	9335	0.507627	0.009913	0.015004		0.091837	0.235968	0.027631		0.062519	0.007606	0.20909
10412	9336	0.769966	0.015083	0.024456		0.148454	0.354281	0.044842		0.098093	0.01152	0.313725
10413	9337	0.846624	0.017014	0.030201		0.177524	0.394058	0.054372		0.112706	0.012961	0.348677
10414	9338	0.816478	0.017233	0.033539		0.186044	0.394447	0.05878		0.113261	0.013136	0.348715
10415	9339	0.573037	0.012821	0.027269		0.139017	0.289623	0.046388		0.080592	0.009782	0.255704
10416	9340	0.555632	0.01292	0.028607		0.138857	0.289808	0.048014		0.078315	0.009858	0.255678
10417	9341	0.692131	0.017979	0.043241		0.182255	0.395819	0.070712		0.096572	0.013684	0.348536
10418	9342	0.612757	0.018432	0.047994		0.164818	0.396468	0.076809		0.081398	0.013941	0.348387
10419	9343	0.528415	0.018967	0.053379		0.135282	0.397098	0.083937		0.061444	0.014211	0.348227
10420	9344	0.195402	0.018111	0.023667		0.028751	0.172074	0.027328		0.009874	0.006285	0.15244
10421	9345	0.188272	0.016219	0.020207		0.034165	0.159597	0.024095		0.013436	0.005693	0.141519
10422	9346	0.266982	0.021426	0.025408		0.056808	0.216709	0.031256		0.024138	0.007597	0.192291
10423	9347	0.388231	0.026879	0.028448		0.103984	0.286791	0.037585		0.048021	0.009723	0.253906
10424	9348	0.463952	0.025625	0.023661		0.13441	0.287656	0.03415		0.064426	0.009463	0.253859
10425	9349	0.543564	0.02449	0.019275		0.164747	0.288381	0.031022		0.080317	0.009346	0.253824
10426	9350	0.557786	0.021428	0.014227		0.178709	0.264222	0.025782		0.08701	0.008615	0.232042
10427	9351	0.540129	0.018737	0.010793		0.183877	0.239812	0.021605		0.091782	0.007844	0.210274
10428	9352	0.573063	0.018389	0.009058		0.208595	0.244258	0.020345		0.105904	0.008003	0.21389
10429	9353	0.594578	0.018014	0.00741		0.233954	0.248671	0.019135		0.11978	0.00815	0.217512
10430	9354	0.479181	0.013872	0.004654		0.203907	0.199112	0.014193		0.104459	0.006518	0.174013
10431	9355	0.439157	0.012527	0.003805		0.195773	0.182598	0.012453		0.100017	0.005969	0.159517
10432	9356	0.533385	0.014478	0.003786		0.245906	0.215909	0.013853		0.12471	0.007039	0.188534

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
10433	9357	0.572577	0.01414	0.00373		0.259622	0.215995	0.013082		0.130274	0.007018	0.188554
10434	9358	0.7962	0.018034	0.004834		0.35616	0.28254	0.016214		0.176349	0.009143	0.246605
10435	9359	0.850668	0.016759	0.005024		0.368663	0.274311	0.014539		0.177794	0.008847	0.239421
10436	9360	0.715352	0.013105	0.004184		0.30484	0.220298	0.011202		0.144748	0.007119	0.192299
10437	9361	0.81865	0.013865	0.004753		0.343184	0.241086	0.011703		0.166969	0.007802	0.210493
10438	9362	0.845978	0.01347	0.004905		0.35043	0.241071	0.011211		0.174411	0.007803	0.210548
10439	9363	0.867084	0.013192	0.005036		0.357532	0.24104	0.010771		0.180302	0.007794	0.210605
10440	9364	0.89479	0.012674	0.005058		0.359839	0.236835	0.010197		0.180979	0.00764	0.207028
10441	9365	0.906766	0.012165	0.005054		0.36105	0.232619	0.009682		0.179149	0.007479	0.203444
10442	9366	0.937438	0.012078	0.005209		0.374143	0.236693	0.00954		0.181253	0.007576	0.207121
10443	9367	0.723672	0.009073	0.004054		0.29264	0.182634	0.00713		0.141717	0.005812	0.159912
10444	9368	0.702724	0.008737	0.00397		0.288471	0.178439	0.006856		0.139037	0.005658	0.15629
10445	9369	0.902403	0.011058	0.005167		0.379604	0.232266	0.008668		0.180423	0.007312	0.203565
10446	9370	0.909418	0.011113	0.005313		0.393772	0.240417	0.008721		0.183563	0.007507	0.21085
10447	9371	0.899377	0.011113	0.005409		0.403374	0.248527	0.008748		0.183337	0.007687	0.218125
10448	9372	0.846082	0.010721	0.00527		0.394189	0.248318	0.008482		0.17568	0.007601	0.218117
10449	9373	0.812651	0.010667	0.005245		0.39311	0.256352	0.008495		0.172865	0.007762	0.225367
10450	9374	0.720477	0.009783	0.004726		0.35733	0.243666	0.00781		0.154185	0.007289	0.214431
10451	9375	0.624902	0.008735	0.004075		0.311242	0.222775	0.006934		0.133369	0.0066	0.196227
10452	9376	0.608391	0.00867	0.003852		0.299092	0.226625	0.006839		0.129165	0.0067	0.199824
10453	9377	0.524896	0.007509	0.003119		0.248538	0.201624	0.005881		0.107478	0.00595	0.177987
10454	9378	0.439377	0.006294	0.002796		0.201118	0.172623	0.004919		0.086497	0.005087	0.152535
10455	9379	0.504596	0.007246	0.003918		0.22202	0.203201	0.00567		0.094638	0.005981	0.179744
10456	9380	0.550339	0.008066	0.005569		0.229422	0.233567	0.006317		0.096497	0.006862	0.206934
10457	9381	0.513282	0.007776	0.006725		0.199622	0.233106	0.006089		0.083101	0.006834	0.206892
10458	9382	0.469818	0.007473	0.007985		0.166596	0.232601	0.005846		0.069165	0.006803	0.206857
10459	9383	0.413436	0.007095	0.009332		0.130521	0.230022	0.005537		0.054638	0.006707	0.205013
10460	9384	0.353257	0.006717	0.011031		0.095879	0.227422	0.005219		0.040959	0.006608	0.203177
10461	9385	0.303304	0.006391	0.012935		0.065365	0.226831	0.004921		0.028625	0.006563	0.203162
10462	9386	0.288614	0.006925	0.016651		0.04505	0.250469	0.005046		0.019604	0.007213	0.224916
10463	9387	0.304217	0.007469	0.021764		0.021597	0.273933	0.00475		0.00895	0.007843	0.246731
10464	9388	0.263109	0.006492	0.019931		0.009892	0.240743	0.001662		0.004694	0.006808	0.218099
10465	9389	0.283416	0.007038	0.01808		0.015435	0.260227	0.001749		0.006729	0.007321	0.236089
10466	9390	0.262089	0.006557	0.014658		0.015061	0.23989	0.002953		0.010472	0.006735	0.217857
10467	9391	0.254886	0.006661	0.012716		0.01701	0.231713	0.004655		0.014918	0.006509	0.210563
10468	9392	0.285192	0.007674	0.012973		0.021305	0.255689	0.007159		0.018989	0.007206	0.232333
10469	9393	0.312289	0.008592	0.012918		0.027374	0.271891	0.010671		0.020258	0.007719	0.246845
10470	9394	0.325182	0.00903	0.012589		0.033466	0.272288	0.013601		0.024838	0.007804	0.246819
10471	9395	0.36217	0.009494	0.012554		0.043551	0.272856	0.016853		0.033104	0.007922	0.246753
10472	9396	0.388299	0.009281	0.012043		0.051648	0.257446	0.01854		0.038951	0.007581	0.232167
10473	9397	0.433338	0.009598	0.012685		0.063273	0.258133	0.021388		0.04649	0.007715	0.23209
10474	9398	0.535788	0.011144	0.015462		0.084476	0.291162	0.027596		0.06041	0.008835	0.261066
10475	9399	0.417563	0.008334	0.012672		0.072923	0.21085	0.023364		0.049606	0.006511	0.188656
10476	9400	0.293169	0.00582	0.009145		0.052874	0.146064	0.016893		0.035463	0.004533	0.130631
10477	9401	0.446889	0.008869	0.014947		0.086188	0.219346	0.027451		0.056078	0.006877	0.196013
10478	9402	0.49451	0.009992	0.018499		0.104101	0.243975	0.033277		0.065071	0.007745	0.217865
10479	9403	0.484177	0.010122	0.020558		0.110071	0.24427	0.035887		0.066	0.007865	0.217899
10480	9404	0.341677	0.007519	0.016705		0.083297	0.179363	0.028227		0.047342	0.005863	0.159783
10481	9405	0.332047	0.00758	0.017517		0.083417	0.179504	0.029175		0.046153	0.005914	0.159767
10482	9406	0.416811	0.010552	0.026449		0.109975	0.245201	0.042869		0.057261	0.00822	0.21779
10483	9407	0.372986	0.01084	0.02934		0.099755	0.245665	0.046531		0.048514	0.008388	0.217694
10484	9408	0.323371	0.01118	0.032641		0.082022	0.24609	0.050871		0.036825	0.008558	0.217591
10485	9409	0.231202	0.021554	0.026852		0.034341	0.205978	0.030305		0.011306	0.007379	0.182933
10486	9410	0.222342	0.019065	0.02305		0.039864	0.190928	0.02704		0.015325	0.006643	0.16977
10487	9411	0.314004	0.024983	0.029065		0.066314	0.259161	0.035319		0.027568	0.008827	0.230676
10488	9412	0.454427	0.030983	0.032642		0.121538	0.341664	0.042801		0.055043	0.011236	0.304586
10489	9413	0.53953	0.029299	0.027196		0.157208	0.341181	0.039074		0.074162	0.010892	0.304522
10490	9414	0.630605	0.027825	0.022184		0.192685	0.341067	0.03561		0.092837	0.0106	0.304473
10491	9415	0.64568	0.024238	0.016388		0.209525	0.312495	0.029655		0.101649	0.009651	0.278339
10492	9416	0.624126	0.021131	0.012435		0.215471	0.283622	0.024866		0.107543	0.008796	0.252224
10493	9417	0.660989	0.020694	0.010436		0.244363	0.28888	0.023407		0.124135	0.008982	0.256557
10494	9418	0.685826	0.020235	0.008534		0.274063	0.294095	0.021989		0.140414	0.009152	0.260896
10495	9419	0.55596	0.015599	0.005357		0.238908	0.23548	0.016282		0.122431	0.007322	0.208716
10496	9420	0.508991	0.014006	0.004352		0.229408	0.215948	0.014269		0.117197	0.006707	0.191327
10497	9421	0.627138	0.016061	0.004323		0.288199	0.25534	0.015846		0.146059	0.00791	0.226126
10498	9422	0.672969	0.015642	0.004271		0.304278	0.255441	0.014939		0.152487	0.007887	0.226146
10499	9423	0.936008	0.019955	0.005537		0.417347	0.334138	0.018487		0.206294	0.010275	0.295764
10500	9424	1.004239	0.018595	0.005766		0.431738	0.324412	0.016541		0.207811	0.009932	0.287136
10501	9425	0.843991	0.014582	0.004802		0.356832	0.260537	0.012729		0.171295	0.007994	0.230618
10502	9426	0.965348	0.015499	0.005455		0.401488	0.285127	0.013281		0.197456	0.008762	0.252431

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
10503	9427	0.997221	0.015045	0.005628		0.40975	0.285118	0.012708		0.206198	0.008765	0.252491
10504	9428	1.033247	0.014676	0.005776		0.417087	0.285086	0.012197		0.213211	0.008756	0.252552
10505	9429	1.064689	0.014154	0.005798		0.42046	0.280121	0.011535		0.214161	0.008584	0.248256
10506	9430	1.077764	0.013634	0.00579		0.423066	0.275139	0.010943		0.212192	0.008403	0.243953
10507	9431	1.11335	0.013586	0.005964		0.438042	0.279966	0.010773		0.214885	0.008512	0.248357
10508	9432	0.859048	0.010244	0.004637		0.341984	0.216027	0.008045		0.16614	0.006529	0.191746
10509	9433	0.834071	0.009885	0.004539		0.336878	0.211068	0.007732		0.163003	0.006357	0.187402
10510	9434	1.068773	0.012557	0.005903		0.442755	0.274741	0.009767		0.211525	0.008214	0.244085
10511	9435	1.076818	0.012668	0.006066		0.458824	0.284389	0.009817		0.215223	0.008432	0.252818
10512	9436	1.064956	0.012718	0.006172		0.469701	0.293982	0.009838		0.215423	0.008631	0.261541
10513	9437	1.002221	0.012321	0.00601		0.458886	0.293739	0.009529		0.207139	0.008532	0.261533
10514	9438	0.959685	0.012309	0.00598		0.457	0.303242	0.009532		0.203818	0.008709	0.27023
10515	9439	0.84838	0.011269	0.005388		0.41404	0.288236	0.008752		0.181964	0.008175	0.25712
10516	9440	0.727582	0.009959	0.004645		0.360539	0.263518	0.007762		0.156111	0.007393	0.235296
10517	9441	0.704844	0.009895	0.004393		0.346031	0.268069	0.007648		0.151172	0.007486	0.239614
10518	9442	0.6034	0.008579	0.003557		0.286893	0.238486	0.006568		0.125786	0.006644	0.213434
10519	9443	0.50011	0.007196	0.003152		0.231149	0.204178	0.005501		0.101223	0.005678	0.182916
10520	9444	0.574063	0.008288	0.004423		0.254601	0.240333	0.006338		0.110724	0.006671	0.215548
10521	9445	0.626721	0.009231	0.006296		0.262565	0.276226	0.007061		0.112819	0.007647	0.248159
10522	9446	0.581466	0.008901	0.007614		0.228382	0.275646	0.006811		0.097026	0.007607	0.248115
10523	9447	0.533303	0.008553	0.009051		0.190974	0.275007	0.006551		0.080579	0.007561	0.248076
10524	9448	0.470495	0.008116	0.010597		0.150291	0.271895	0.00623		0.063446	0.007441	0.245869
10525	9449	0.403399	0.007676	0.012539		0.111124	0.268745	0.005914		0.047341	0.007312	0.243669
10526	9450	0.348188	0.007293	0.014713		0.075778	0.267932	0.005649		0.032844	0.007239	0.24365
10527	9451	0.334328	0.007643	0.018923		0.05182	0.295688	0.005955		0.022216	0.007919	0.269737
10528	9452	0.359795	0.008188	0.024564		0.024486	0.323438	0.005938		0.009851	0.008553	0.296092
10529	9453	0.31034	0.00706	0.022133		0.00856	0.284781	0.001778		0.005485	0.007352	0.261781
10530	9454	0.332679	0.007635	0.019926		0.012769	0.308233	0.001886		0.005466	0.007877	0.283398
10531	9455	0.305832	0.007036	0.01609		0.013109	0.284359	0.002986		0.008506	0.00723	0.261506
10532	9456	0.295487	0.00691	0.013916		0.0147	0.274804	0.004924		0.013536	0.00698	0.252742
10533	9457	0.326594	0.007985	0.014193		0.018135	0.303243	0.007715		0.01827	0.007729	0.278864
10534	9458	0.349717	0.009009	0.014223		0.022885	0.322366	0.011771		0.020723	0.008305	0.296273
10535	9459	0.360269	0.009503	0.014011		0.028328	0.322608	0.015304		0.02064	0.008427	0.296229
10536	9460	0.382396	0.010101	0.014073		0.039155	0.322992	0.01908		0.029499	0.008614	0.296118
10537	9461	0.407567	0.009908	0.013528		0.049009	0.304357	0.020951		0.036584	0.00829	0.278593
10538	9462	0.457138	0.010302	0.014323		0.062142	0.304848	0.02424		0.04499	0.008493	0.278495
10539	9463	0.560186	0.012027	0.017579		0.08485	0.344102	0.031526		0.05895	0.009773	0.313206
10540	9464	0.436113	0.009044	0.014554		0.075069	0.249359	0.026997		0.049902	0.007242	0.226242
10541	9465	0.307457	0.006329	0.010534		0.054846	0.172778	0.019565		0.035912	0.00505	0.156663
10542	9466	0.472797	0.009647	0.017308		0.090792	0.259496	0.031912		0.057593	0.007675	0.235095
10543	9467	0.532602	0.010882	0.021513		0.111754	0.288734	0.038676		0.068061	0.00867	0.261333
10544	9468	0.532797	0.01098	0.023934		0.120893	0.289076	0.04152		0.070202	0.008817	0.261395
10545	9469	0.381191	0.008154	0.019424		0.09287	0.212342	0.032446		0.051064	0.006593	0.191684
10546	9470	0.373283	0.008212	0.020346		0.093435	0.212517	0.033437		0.050055	0.006655	0.191664
10547	9471	0.475178	0.011453	0.030651		0.124127	0.290415	0.048926		0.06272	0.009276	0.261265
10548	9472	0.429134	0.011803	0.033958		0.113177	0.291042	0.053041		0.05358	0.009482	0.261141
10549	9473	0.375314	0.012229	0.037792		0.093334	0.291639	0.058058		0.041634	0.009691	0.261009
10550	TOTAL	8523.827	1096.025	2716.79		1274.504	9713.256	2299.42		462.7351	1283.987	7633.757

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	oir	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
10550	TOTAL	=SUM(C3:C10549)	=SUM(D3:D10549)	=SUM(E3:E10549)		=SUM(G3:G10549)	=SUM(H3:H10549)	=SUM(I3:I10549)		=SUM(K3:K10549)	=SUM(L3:L10549)	=SUM(M3:M10549)

	A	B	C	D
1	**Summary Table: Center of Rigidity**			
2	**Level**	**Center of Rigidity**		**Rotational Stiffness (kip-ft)**
3		**CR X (ft)**	**CR Y (ft)**	
4	**Main**	**111.82**	**93.70**	**4.5708E+10**
5	**Total**	**111.82 ft**	**93.70 ft**	

	A	B	C	D
1	Summary Table: Center of Rigidity			
2	Level	Center of Rigidity		Rotational Stiffness (kip-ft)
3		CR X (ft)	CR Y (ft)	
4	Main	=SUM('N-S Walls'!M7:M30)/SUM('N-S Walls'!L7:L30)	=SUM('E-W Walls'!M7:M51)/SUM('E-W Walls'!L7:L51)	=SUM('N-S Walls'!N7:N30)+SUM('E-W Walls'!N7:N51)
5	Total	=SUM('N-S Walls'!M7:M118)/SUM('N-S Walls'!L7:L118)	=SUM('E-W Walls'!M7:M153)/SUM('E-W Walls'!L7:L153)	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2							G_{int} =	248031									
3																	
4							E_{int} =	580393									
5		**Wall Center of Gravity Calculation**															
6		**Name**	**Min X**	**Max X**	**Min Y**	**Max Y**	**Length (ft)**	**Thickness (in)**	**Height (ft)**	**CG X (ft)**	**CG Y (ft)**	**k (kip/ft)**	**k x Y**	**k*(Y-CR)^2**	**V (kips)**	**# of Joints**	**Load per Joint (kips)**
7	**E-W Walls**	EW1	29	192.33	0	0	163.33	24.00	53.44	110.67	0.00	1.22E+06	0.00E+00	1.07E+10	340.04	68	5.0010
8		EW2	135.33	192.33	50.33	50.33	57.00	24.00	56.77	163.83	50.33	3.07E+05	1.54E+07	5.77E+08	39.67	22	1.8030
9		EW3	29.00	192.33	198.33	198.33	163.33	24.00	53.44	110.67	198.33	1.22E+06	2.41E+08	1.33E+10	-379.71	68	-5.5840
10																	
11																	
12																	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2							G_{int} =	=H4/2/1.17									
3																	
4							E_{int} =	=57000*SQRT(5000)/1000*144									
5		**Wall C**															
6		**Name**	**Min X**	**Max X**	**Min Y**	**Max Y**	**Length (ft)**	**Thickness (in)**	**Height (ft)**	**CG X (ft)**	**CG Y (ft)**	**k (kip/ft)**	**k x Y**	**k*(Y-CR)^2**	**V (kips)**	**# of Joints**	**Load per Joint (kips)**
7	**E-W Walls**	EW1	29	192.33	0	0	=(D7-C7)	24	53.44	=(D7+C7)/2	=(F7+E7)/2	=1/(((1.2*I7)/($H$2*(H7/12)*G7))+((I7^3)/($H$4*(H7/12)*(G7^3))))	=K7*L7	=L7*(K7-CR!$C$4)^2	=-L7*(K7-CR!$C$4)*Moment!$F$8/CR!$D$4	68	=ROUNDUP(O7/P7,3)
8		EW2	135.33	192.33	50.33	50.33	=(D8-C8)	24	56.77	=(D8+C8)/2	=(F8+E8)/2	=1/(((1.2*I8)/($H$2*(H8/12)*G8))+((I8^3)/($H$4*(H8/12)*(G8^3))))	=K8*L8	=L8*(K8-CR!$C$4)^2	=-L8*(K8-CR!$C$4)*Moment!$F$8/CR!$D$4	22	=ROUNDUP(O8/P8,3)
9		EW3	29	192.33	198.33	198.33	=(D9-C9)	24	53.44	=(D9+C9)/2	=(F9+E9)/2	=1/(((1.2*I9)/($H$2*(H9/12)*G9))+((I9^3)/($H$4*(H9/12)*(G9^3))))	=K9*L9	=L9*(K9-CR!$C$4)^2	=-L9*(K9-CR!$C$4)*Moment!$F$8/CR!$D$4	68	=ROUNDUP(O9/P9,3)
10																	
11																	
12																	

Level	X Excitation			Y Excitation			Z Excitation		
	X (kips)	Y (kips)	Z (kips)	X (kips)	Y (kips)	Z (kips)	X (kips)	Y (kips)	Z (kips)
Main	8523.83	1096.03	2716.79	1274.50	9713.26	2299.42	462.74	1283.99	7633.76

Level	100 40 40		40 100 40	
	X (kips)	Y (kips)	X (kips)	Y (kips)
Main	9219	5495	4869	10665

Main area AE
Force Summary

Level	X Excitation			Y Excitation			Z Excitation		
	X (kips)	Y (kips)	Z (kips)	X (kips)	Y (kips)	Z (kips)	X (kips)	Y (kips)	Z (kips)
Main	=SeismicForces!C10550	=SeismicForces!D10550	=SeismicForces!E10550	=SeismicForces!G10550	=SeismicForces!H10550	=SeismicForces!I10550	=SeismicForces!K10550	=SeismicForces!L10550	=SeismicForces!M10550

Level	100 40 40		40 100 40	
	X (kips)	Y (kips)	X (kips)	Y (kips)
Main	=B3+0.4*E3+0.4*H3	=C3+0.4*F3+0.4*I3	=0.4*B3+E3+0.4*H3	=0.4*C3+F3+0.4*I3

	A	B	C	D	E	F
1		**SHINE RCA (in)**				
2	**X Dimension**	1960.00				
3	**Y Dimension**	2380.00				
4						
5						
6	**AE Moments**					
7		**Moment Arm X Force (ft)**	**Moment Arm Y Force (ft)**	**100 40 40 (kip-ft)**	**40 100 40 (kip-ft)**	**Max (kip-ft)**
8	**PF-4 Equipment Room**	9.92	8.17	136294.20	135385.16	136294.20

Main area AE
Moment

	A	B	C	D	E	F
1		SHINE RCA (in)				
2	X Dimension	1960				
3	Y Dimension	2380				
4						
5						
6	AE Moments					
7		Moment Arm X Force (ft)	Moment Arm Y Force (ft)	100 40 40 (kip-ft)	40 100 40 (kip-ft)	Max (kip-ft)
8	PF-4 Equipment Room	=0.05*$B$3/12	=0.05*$B$2/12	=$B8*'Force Summary'!B10+'Moment formulas'!$C8*'Force Summary'!C10	=$B8*'Force Summary'!D10+'Moment formulas'!$C8*'Force Summary'!E10	=MAX(D8,E8)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2							G_{int} =	248031									
3																	
4							E_{int} =	580393									
5		**Wall Center of Gravity Calculation**															
6		**Name**	**Min X**	**Max X**	**Min Y**	**Max Y**	**Length (ft)**	**Thickness (in)**	**Height (ft)**	**CG X (ft)**	**CG Y (ft)**	**k (kip/ft)**	**k x X**	**k*(X-CR)^2**	**V (kips)**	**# of Joints**	**Load per Joint (kips)**
7	**N-S Walls**	NS2	29	29	0	198.33	198.33	24.00	48.33	29.00	99.17	1.66E+06	4.82E+07	1.14E+10	-410.25	81	-5.0650
8		NS3	135.33	135.33	50.33	198.33	148.00	24.00	57.66	135.33	124.33	1.01E+06	1.36E+08	5.57E+08	70.58	61	1.1580
9		NS4	192.33	192.33	0.00	198.33	198.33	24.00	56.33	192.33	99.17	1.41E+06	2.72E+08	9.17E+09	339.67	81	4.1940
10																	
11																	
12																	
13																	

Main area AE
N-S Walls

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2							G_{int} =	='E-W Walls'!H2									
3																	
4							E_{int} =	='E-W Walls'!H4									
5		**Wall Cen**															
6		**Name**	**Min X**	**Max X**	**Min Y**	**Max Y**	**Length (ft)**	**Thickness (in)**	**Height (ft)**	**CG X (ft)**	**CG Y (ft)**	**k (kip/ft)**	**k x X**	**k*(X-CR)^2**	**V (kips)**	**# of Joints**	**Load per Joint (kips)**
7	**N-S Walls**	NS2	29	29	0	=198.33	=(F7-E7)	24	48.33	=(C7+D7)/2	=(F7+E7)/2	=1/(((1.2*I7)/($H$2*(H7/12)*G7))+((I7^3)/($H$4*(H7/12)*(G7^3))))	=J7*L7	=L7*(J7-CR!$B$4)^2	=L7*(J7-CR!$B$4)*Moment!$F$8/CR!$D$4	81	=ROUNDUP(O7/P7,3)
8		NS3	135.33	135.33	50.33	198.33	=(F8-E8)	24	57.66	=(C8+D8)/2	=(F8+E8)/2	=1/(((1.2*I8)/($H$2*(H8/12)*G8))+((I8^3)/($H$4*(H8/12)*(G8^3))))	=J8*L8	=L8*(J8-CR!$B$4)^2	=L8*(J8-CR!$B$4)*Moment!$F$8/CR!$D$4	61	=ROUNDUP(O8/P8,3)
9		NS4	192.33	192.33	0	198.33	=(F9-E9)	24	56.33	=(C9+D9)/2	=(F9+E9)/2	=1/(((1.2*I9)/($H$2*(H9/12)*G9))+((I9^3)/($H$4*(H9/12)*(G9^3))))	=J9*L9	=L9*(J9-CR!$B$4)^2	=L9*(J9-CR!$B$4)*Moment!$F$8/CR!$D$4	81	=ROUNDUP(O9/P9,3)
10																	
11																	
12																	
13																	

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
3	1000	0.241805	0.145752	0.001758		0.034627	0.40843	0.003527		0.005759	0.046462	0.229946
4	1002	0.254781	0.155763	0.001857		0.035168	0.435671	0.003928		0.005779	0.049756	0.242009
5	10032	0.621287	0.071568	0.023183		0.021408	0.594241	0.019195		0.026537	0.02045	0.530139
6	10033	0.629447	0.063868	0.021963		0.017128	0.598873	0.016966		0.02285	0.018142	0.539816
7	10034	0.61686	0.074082	0.018675		0.032794	0.595113	0.018677		0.029604	0.020802	0.530279
8	10035	0.626112	0.065309	0.017155		0.026806	0.599168	0.016863		0.025002	0.018267	0.539884
9	10036	0.610092	0.076197	0.017837		0.046639	0.59597	0.022917		0.030546	0.021067	0.53058
10	10037	0.620144	0.066252	0.016577		0.039179	0.599253	0.021378		0.026779	0.018294	0.540143
11	10038	0.60074	0.077934	0.02198		0.062505	0.596682	0.03372		0.028055	0.021295	0.531009
12	1004	0.267784	0.166115	0.001985		0.035405	0.463843	0.004349		0.005806	0.053175	0.254011
13	10040	0.611085	0.066979	0.020553		0.052915	0.599331	0.03175		0.025916	0.018306	0.540537
14	10042	0.588424	0.079372	0.03154		0.079197	0.597314	0.049535		0.020256	0.021484	0.531469
15	10044	0.598286	0.067752	0.029823		0.067074	0.599551	0.046972		0.019115	0.018368	0.540983
16	10046	0.579777	0.050177	0.017603		0.016753	0.553094	0.011883		0.040735	0.014089	0.504335
17	10048	0.577495	0.050038	0.01347		0.018934	0.552516	0.013004		0.039569	0.013862	0.504328
18	10050	0.572942	0.049451	0.013405		0.028749	0.551815	0.017523		0.032801	0.013581	0.50453
19	10051	0.565521	0.049139	0.016625		0.039012	0.551396	0.02596		0.023275	0.013414	0.504841
20	10052	0.554527	0.049257	0.024398		0.049387	0.551321	0.038607		0.01314	0.013675	0.505234
21	10053	0.600684	0.045488	0.015334		0.017291	0.56719	0.009141		0.052607	0.012563	0.521077
22	10054	0.597287	0.043581	0.012061		0.019194	0.565611	0.011795		0.051109	0.011946	0.521084
23	10055	0.591605	0.042098	0.012142		0.024267	0.564451	0.016148		0.04345	0.011614	0.521255
24	10056	0.582249	0.04122	0.014992		0.03294	0.563759	0.023582		0.032105	0.011616	0.521526
25	10057	0.567909	0.041023	0.022067		0.041733	0.563539	0.035062		0.019416	0.011814	0.521899
26	1006	0.303983	0.191154	0.002283		0.038409	0.532879	0.005026		0.006517	0.061309	0.287913
27	10068	0.606269	0.064248	0.042033		0.016668	0.577021	0.033642		0.01992	0.019032	0.516597
28	10069	0.60985	0.05812	0.04041		0.01516	0.581023	0.031066		0.014021	0.017058	0.525037
29	10070	0.560348	0.046713	0.035111		0.016658	0.537509	0.025273		0.022732	0.013536	0.490922
30	10071	0.573951	0.043489	0.034645		0.019199	0.552191	0.023188		0.030584	0.012496	0.5077
31	1008	0.340277	0.21735	0.002483		0.040387	0.604742	0.005346		0.007127	0.069869	0.321565
32	1010	0.301834	0.195452	0.002148		0.033385	0.543159	0.004155		0.006169	0.062953	0.284538
33	1012	0.263299	0.17199	0.001887		0.027445	0.478069	0.003125		0.005245	0.055476	0.247738
34	1014	0.281538	0.185077	0.002037		0.02756	0.515392	0.002777		0.005399	0.059797	0.264403
35	1016	0.330848	0.218342	0.002341		0.030585	0.610644	0.00251		0.006034	0.070726	0.310051
36	1018	0.362196	0.239329	0.002499		0.031212	0.674343	0.002702		0.006223	0.077859	0.338599
37	1020	0.352191	0.232565	0.00244		0.028116	0.660772	0.002774		0.005663	0.076085	0.328524
38	1022	0.342151	0.225556	0.002384		0.025318	0.645875	0.002875		0.005088	0.074269	0.318604
39	1024	0.337299	0.221648	0.002272		0.022973	0.6397	0.002877		0.004633	0.073526	0.313651
40	1026	0.264928	0.173307	0.001748		0.016511	0.504224	0.002567		0.003417	0.057938	0.246077
41	1028	0.270308	0.176205	0.001802		0.015948	0.515348	0.002978		0.003363	0.059184	0.250917
42	1030	0.343595	0.222009	0.002341		0.018376	0.656337	0.004598		0.004131	0.075205	0.318553
43	1032	0.344119	0.219823	0.002251		0.017751	0.657721	0.005316		0.004502	0.075044	0.31868
44	1034	0.344656	0.218673	0.002178		0.017402	0.658481	0.005865		0.005032	0.074709	0.318764
45	1036	0.345198	0.217186	0.002199		0.016986	0.658773	0.006232		0.005586	0.074293	0.318761
46	1038	0.306446	0.190889	0.001974		0.015783	0.583592	0.005648		0.005318	0.065434	0.282479
47	1040	0.267478	0.165115	0.001654		0.014465	0.508078	0.004847		0.004849	0.056724	0.246218
48	1042	0.307184	0.187759	0.001822		0.017351	0.581631	0.005402		0.005839	0.064659	0.282395
49	1044	0.347107	0.20928	0.002038		0.020602	0.654083	0.005892		0.006959	0.072284	0.318615
50	1046	0.347632	0.206438	0.002027		0.021985	0.651392	0.005731		0.007182	0.071478	0.318712
51	1048	0.348151	0.203118	0.001872		0.024271	0.647894	0.005524		0.007473	0.070471	0.31888
52	1050	0.34867	0.199426	0.002037		0.026501	0.643816	0.005373		0.007943	0.069431	0.319083
53	1052	0.343888	0.196028	0.00209		0.028189	0.629633	0.005173		0.008225	0.068356	0.314461
54	1054	0.270183	0.153379	0.001699		0.023595	0.490222	0.003834		0.006686	0.05354	0.246904
55	1056	0.275692	0.155985	0.001788		0.024911	0.497263	0.003629		0.006934	0.054521	0.251864
56	1058	0.350369	0.19681	0.002429		0.033451	0.624927	0.003797		0.009055	0.068956	0.319954
57	1060	0.350799	0.195349	0.002538		0.035186	0.618318	0.002993		0.009262	0.06852	0.320224
58	1062	0.351181	0.1944	0.002588		0.036767	0.611278	0.002431		0.009379	0.067943	0.320438
59	1064	0.35152	0.193914	0.002511		0.038199	0.603623	0.002418		0.009428	0.067335	0.320566
60	1066	0.311845	0.171189	0.002049		0.034993	0.527883	0.002223		0.008917	0.059084	0.284117
61	1068	0.272084	0.148635	0.001815		0.031539	0.455839	0.002102		0.008362	0.051062	0.247589
62	1070	0.312388	0.169586	0.002316		0.03742	0.5178	0.002655		0.010196	0.058044	0.283815
63	1072	0.352831	0.189519	0.002871		0.043917	0.576299	0.003275		0.012241	0.064707	0.319874
64	1074	0.272929	0.144676	0.002619		0.035194	0.438946	0.003023		0.00987	0.049302	0.246881
65	1076	0.17669	0.09313	0.001863		0.02318	0.281705	0.002217		0.006477	0.031616	0.159635
66	1078	0.24103	0.127693	0.00272		0.032035	0.381413	0.003304		0.008887	0.042766	0.217558
67	1080	0.321593	0.171677	0.004009		0.043787	0.500748	0.004969		0.011839	0.056015	0.289756
68	1082	0.321797	0.17257	0.004393		0.044796	0.495328	0.005429		0.011624	0.054896	0.289456
69	1083	0.442022	0.034306	0.034619		0.046141	0.456503	0.055517		0.009318	0.010154	0.42292
70	1084	0.404804	0.034391	0.035554		0.03756	0.406525	0.040376		0.005636	0.006414	0.379012
71	1091	0.429132	0.040986	0.037289		0.055888	0.446614	0.059487		0.008723	0.01162	0.409299
72	1092	0.395445	0.040984	0.038301		0.045349	0.397653	0.043472		0.005903	0.007052	0.367148

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
73	1093	0.461146	0.056208	0.04465		0.078075	0.485803	0.070733		0.011756	0.015097	0.438158
74	1094	0.428879	0.056063	0.045866		0.063098	0.432707	0.051963		0.008129	0.009296	0.393486
75	1095	0.417913	0.060616	0.043118		0.085337	0.445558	0.067949		0.013014	0.016242	0.396139
76	1096	0.3918	0.060392	0.044289		0.068748	0.397432	0.050079		0.008779	0.0099	0.356011
77	1097	0.226238	0.041043	0.024622		0.058691	0.246107	0.03858		0.009064	0.010936	0.214064
78	1098	0.214934	0.040912	0.025299		0.047104	0.220261	0.028538		0.00595	0.006773	0.192659
79	1099	0.373762	0.082317	0.030842		0.106333	0.419306	0.049174		0.016543	0.022917	0.353641
80	1100	0.432635	0.10676	0.026382		0.121115	0.496157	0.042956		0.018843	0.030552	0.409483
81	1101	0.491429	0.140451	0.01949		0.13345	0.586968	0.032979		0.020726	0.040944	0.465468
82	1102	0.456665	0.149802	0.01105		0.119417	0.57425	0.019853		0.018481	0.043895	0.432905
83	1103	0.30286	0.108186	0.005229		0.07686	0.39379	0.009668		0.011873	0.031747	0.287321
84	1104	0.237944	0.090171	0.003238		0.059031	0.316942	0.00643		0.009097	0.026487	0.225846
85	1105	0.315181	0.125101	0.00351		0.076708	0.428076	0.007852		0.011791	0.036776	0.299261
86	1106	0.467231	0.201149	0.003494		0.109461	0.657529	0.010739		0.016734	0.059258	0.443821
87	1107	0.398623	0.185152	0.00217		0.089522	0.580738	0.009529		0.013565	0.054725	0.378896
88	1108	0.352323	0.172795	0.001346		0.076633	0.526888	0.008875		0.011736	0.051216	0.335017
89	1109	0.352408	0.181621	0.001576		0.074235	0.541221	0.009157		0.011519	0.053976	0.335217
90	1110	0.391311	0.211006	0.002246		0.079703	0.61627	0.009966		0.012239	0.062861	0.372261
91	1111	0.312472	0.175239	0.001753		0.061403	0.503392	0.007201		0.00937	0.052375	0.297366
92	1112	0.244495	0.141011	0.001408		0.046746	0.400555	0.004963		0.007283	0.042234	0.232671
93	1113	0.272429	0.160429	0.001618		0.050919	0.4521	0.00487		0.008103	0.048116	0.259214
94	1114	0.322114	0.195282	0.002037		0.058068	0.544592	0.004838		0.009541	0.058669	0.30633
95	1115	0.355423	0.221051	0.002505		0.061659	0.611245	0.004903		0.010231	0.066509	0.337708
96	1116	0.303855	0.19312	0.001997		0.05069	0.530558	0.004174		0.008428	0.058265	0.288419
97	1117	0.291601	0.188757	0.001893		0.046992	0.51606	0.004248		0.007924	0.057095	0.276473
98	1118	0.307273	0.202244	0.00201		0.047792	0.5508	0.00488		0.008129	0.061327	0.290974
99	1119	0.322985	0.216162	0.002165		0.048234	0.586777	0.005578		0.008174	0.065718	0.305411
100	1120	0.405511	0.275533	0.002936		0.057881	0.746113	0.007354		0.010204	0.083985	0.382846
101	1121	0.410555	0.283103	0.0027		0.055045	0.765912	0.007083		0.010536	0.086676	0.386587
102	1122	0.364178	0.254373	0.002348		0.045735	0.688291	0.005469		0.00905	0.078221	0.34202
103	1123	0.317682	0.22379	0.002065		0.037697	0.606052	0.00406		0.007456	0.069043	0.297759
104	1124	0.379006	0.268938	0.002645		0.042104	0.729388	0.004149		0.008503	0.083265	0.354528
105	1125	0.399282	0.284656	0.002544		0.041361	0.774616	0.003198		0.00852	0.088575	0.372563
106	1126	0.437269	0.312794	0.002717		0.042346	0.855723	0.002686		0.008495	0.098003	0.406799
107	1127	0.425438	0.304587	0.002656		0.038316	0.838747	0.002433		0.007466	0.096148	0.394642
108	1128	0.452148	0.323391	0.003046		0.037586	0.896774	0.003164		0.007426	0.10285	0.418312
109	1129	0.407995	0.290393	0.002438		0.031086	0.812352	0.002866		0.006292	0.093123	0.376698
110	1130	0.32062	0.226846	0.001848		0.022556	0.640396	0.002856		0.004513	0.073338	0.295537
111	1131	0.327218	0.230539	0.001907		0.021875	0.654558	0.003406		0.004359	0.074884	0.301363
112	1132	0.45485	0.317705	0.002992		0.027392	0.911641	0.005989		0.006358	0.10405	0.418231
113	1133	0.416812	0.288563	0.002393		0.023956	0.835356	0.006457		0.006368	0.094999	0.38284
114	1134	0.417537	0.287313	0.002357		0.023682	0.836262	0.007186		0.006852	0.094672	0.38297
115	1135	0.41826	0.285663	0.002423		0.023315	0.836515	0.007677		0.007311	0.094172	0.382967
116	1136	0.411084	0.278337	0.002603		0.024095	0.820392	0.00788		0.007976	0.091781	0.375578
117	1137	0.32423	0.217541	0.001843		0.019957	0.645042	0.005958		0.006741	0.07176	0.295753
118	1138	0.372399	0.247482	0.002029		0.023949	0.738342	0.006587		0.00801	0.081664	0.339182
119	1139	0.420857	0.275984	0.002226		0.028443	0.830194	0.007141		0.009319	0.09109	0.382681
120	1140	0.460925	0.297917	0.002689		0.033	0.903971	0.0078		0.01073	0.098343	0.418479
121	1141	0.422371	0.268154	0.002428		0.033367	0.821996	0.006752		0.010295	0.088582	0.383053
122	1142	0.423082	0.263506	0.002581		0.03631	0.816582	0.006676		0.010816	0.087104	0.383318
123	1143	0.417357	0.258385	0.002573		0.038578	0.798286	0.006564		0.011091	0.084207	0.377774
124	1144	0.368823	0.226965	0.002269		0.0365	0.698876	0.005758		0.010232	0.072886	0.333506
125	1145	0.334737	0.204885	0.002156		0.034376	0.630127	0.004685		0.009508	0.065248	0.302564
126	1146	0.425486	0.257831	0.002969		0.046207	0.791595	0.004762		0.012404	0.080926	0.384383
127	1147	0.426073	0.256003	0.003171		0.048566	0.782903	0.003616		0.012643	0.079805	0.384759
128	1148	0.466446	0.279117	0.00344		0.055541	0.845974	0.003166		0.014095	0.086137	0.420904
129	1149	0.427196	0.253804	0.003046		0.052794	0.763499	0.002742		0.013033	0.077258	0.385253
130	1150	0.379029	0.223356	0.002407		0.048349	0.668355	0.002433		0.011502	0.066967	0.341451
131	1151	0.330651	0.193452	0.002043		0.043122	0.577275	0.002151		0.010862	0.057293	0.297546
132	1152	0.420054	0.243831	0.003128		0.056841	0.72579	0.003347		0.014986	0.071317	0.377455
133	1153	0.42837	0.245394	0.003213		0.060462	0.729092	0.003541		0.016408	0.070471	0.38437
134	1154	0.331064	0.189368	0.002896		0.048397	0.554726	0.00353		0.013199	0.052774	0.296639
135	1155	0.21428	0.123393	0.002094		0.031868	0.356328	0.002636		0.008646	0.033573	0.191805
136	11553	0.393786	0.046392	0.037665		0.038773	0.373812	0.039628		0.014016	0.01004	0.332605
137	11554	0.401613	0.050263	0.029219		0.03214	0.380393	0.030155		0.023191	0.010017	0.337708
138	11555	0.413616	0.058022	0.016997		0.038897	0.394172	0.016733		0.033114	0.010286	0.347645
139	11556	0.411942	0.061085	0.013799		0.041264	0.395665	0.0139		0.032562	0.010374	0.347946
140	11557	0.409244	0.063827	0.014317		0.046861	0.396958	0.014331		0.029704	0.010579	0.348535
141	11558	0.405562	0.066173	0.018714		0.053228	0.398055	0.019608		0.023417	0.010758	0.349403
142	11559	0.400867	0.068044	0.025738		0.06068	0.398944	0.028092		0.014401	0.010905	0.350436

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
143	1156	0.334084	0.193316	0.003677		0.050391	0.553057	0.00465		0.013557	0.051652	0.298693
144	11560	0.351475	0.061684	0.031731		0.061943	0.355212	0.035486		0.008805	0.010106	0.312476
145	11561	0.53401	0.080247	0.046387		0.07912	0.533527	0.05193		0.011816	0.013058	0.477143
146	11562	0.535807	0.068113	0.043909		0.065962	0.532043	0.049214		0.010052	0.011356	0.483196
147	11563	0.493616	0.049595	0.036281		0.04668	0.489001	0.040733		0.007273	0.008488	0.451037
148	11564	0.504425	0.041422	0.033184		0.038309	0.499902	0.037309		0.006517	0.007561	0.465702
149	1157	0.390096	0.226896	0.004465		0.060228	0.638603	0.005946		0.01578	0.059322	0.348137
150	11571	0.55874	0.045907	0.045183		0.027028	0.541733	0.045548		0.008918	0.012103	0.498349
151	11573	0.548746	0.048118	0.044621		0.029397	0.526963	0.044934		0.011353	0.012416	0.481758
152	11575	0.598233	0.059035	0.051218		0.042535	0.569227	0.052304		0.018846	0.014388	0.515135
153	11577	0.594089	0.064264	0.053733		0.050612	0.562907	0.055757		0.022438	0.01483	0.505071
154	1158	0.390322	0.227655	0.004924		0.061386	0.631551	0.006338		0.015452	0.058157	0.347753
155	11580	0.628802	0.077935	0.02424		0.053843	0.589281	0.024002		0.061216	0.013987	0.526264
156	11581	0.638657	0.06998	0.022599		0.045304	0.596585	0.022324		0.06082	0.012809	0.538428
157	11582	0.626895	0.081152	0.01953		0.057691	0.590653	0.019864		0.062146	0.014032	0.526745
158	11583	0.637207	0.071988	0.018119		0.049348	0.597065	0.0185		0.06169	0.012652	0.538904
159	11584	0.622581	0.08388	0.01994		0.064328	0.591923	0.020299		0.054168	0.014195	0.527574
160	11585	0.633063	0.073372	0.018362		0.055112	0.597317	0.019009		0.053162	0.012655	0.539685
161	11586	0.615828	0.086115	0.026579		0.070463	0.592965	0.028106		0.038376	0.014327	0.528753
162	11587	0.626	0.074438	0.02496		0.059707	0.597532	0.026661		0.03683	0.012654	0.540768
163	11588	0.606483	0.087942	0.037036		0.077903	0.593846	0.040519		0.022961	0.014442	0.530182
164	11589	0.615637	0.075491	0.035141		0.065366	0.597922	0.038555		0.018195	0.01269	0.542095
165	1159	0.431096	0.251485	0.006245		0.068999	0.68884	0.007831		0.016351	0.062667	0.38347
166	11590	0.585773	0.055205	0.017497		0.027296	0.551039	0.017001		0.040041	0.011116	0.503208
167	11591	0.584635	0.055374	0.014304		0.031067	0.550648	0.01465		0.040327	0.010289	0.50361
168	11592	0.581303	0.054938	0.014651		0.035942	0.550104	0.015633		0.033657	0.009767	0.504254
169	11593	0.575397	0.054752	0.020187		0.039998	0.549797	0.021857		0.021813	0.009532	0.505116
170	11594	0.56644	0.055009	0.028711		0.044794	0.549797	0.031635		0.009203	0.009491	0.506184
171	11595	0.600004	0.05035	0.014753		0.023716	0.565196	0.013938		0.024938	0.010917	0.520086
172	11596	0.597282	0.048435	0.012852		0.023297	0.563841	0.013336		0.025067	0.009871	0.520484
173	11597	0.592948	0.046918	0.013185		0.026021	0.562837	0.014446		0.019965	0.009156	0.521064
174	11598	0.586417	0.046043	0.018173		0.029777	0.562247	0.019886		0.01557	0.008765	0.521825
175	11599	0.577225	0.045915	0.025943		0.034861	0.56209	0.028692		0.010324	0.008558	0.522783
176	1162	0.390702	0.226602	0.005533		0.063456	0.614805	0.006468		0.013771	0.055466	0.347244
177	1164	0.403826	0.232093	0.005793		0.06643	0.62505	0.006276		0.012763	0.05568	0.358778
178	1166	0.390886	0.221608	0.005733		0.065622	0.595332	0.005766		0.010558	0.051801	0.347337
179	1168	0.328696	0.183543	0.005086		0.056391	0.493283	0.004949		0.008577	0.041785	0.292144
180	1170	0.319378	0.176203	0.004649		0.055446	0.47456	0.004467		0.00833	0.039633	0.284001
181	1172	0.430316	0.230843	0.005794		0.076407	0.627908	0.005568		0.011141	0.050502	0.383039
182	1174	0.43047	0.223364	0.005422		0.078096	0.616134	0.005283		0.011057	0.047534	0.383584
183	1176	0.470888	0.235191	0.00571		0.087422	0.660246	0.005651		0.012117	0.049379	0.419918
184	1178	0.431058	0.205516	0.004415		0.081866	0.590747	0.004367		0.011138	0.042676	0.385105
185	1180	0.431423	0.195208	0.003857		0.083833	0.57717	0.003965		0.011164	0.040112	0.386066
186	1182	0.431871	0.184305	0.003363		0.086369	0.563267	0.003952		0.011238	0.037477	0.386992
187	1184	0.472746	0.189143	0.004033		0.097652	0.600361	0.004904		0.012511	0.038031	0.423828
188	1186	0.433051	0.160958	0.004708		0.092132	0.534488	0.006234		0.011693	0.03197	0.388334
189	1188	0.473121	0.162133	0.008573		0.103376	0.56694	0.01021		0.012998	0.031743	0.423948
190	1190	0.53348	0.164626	0.015999		0.120198	0.616665	0.0184		0.015101	0.03151	0.477203
191	1192	0.474762	0.131622	0.021753		0.109672	0.530195	0.024708		0.013825	0.024454	0.424041
192	1194	0.475357	0.117654	0.031793		0.112086	0.514436	0.03594		0.014161	0.020896	0.423959
193	1196	0.396297	0.087644	0.037544		0.094709	0.416003	0.042388		0.012018	0.014502	0.353127
194	1197	0.299168	0.05087	0.0322		0.072458	0.323355	0.050526		0.011154	0.01358	0.283163
195	1198	0.282874	0.050666	0.033063		0.058173	0.288905	0.037319		0.007368	0.008424	0.254593
196	1201	0.436269	0.0449	0.049436		0.038691	0.413692	0.044189		0.010596	0.014173	0.369221
197	1202	0.400514	0.043347	0.04654		0.054216	0.3779	0.048169		0.00792	0.011354	0.33741
198	12722	0.573182	0.047336	0.03412		0.030371	0.549809	0.033715		0.013794	0.011831	0.505745
199	12723	0.563619	0.050691	0.03503		0.024967	0.535129	0.035273		0.022508	0.012001	0.489012
200	12724	0.614535	0.062838	0.040696		0.034248	0.578405	0.041715		0.035972	0.013622	0.522984
201	12725	0.608178	0.068988	0.042333		0.042551	0.571741	0.043731		0.037988	0.013753	0.512232
202	1308	0.466606	0.041436	0.03211		0.042439	0.471982	0.036518		0.005973	0.00755	0.437225
203	1309	0.455823	0.050133	0.035069		0.051562	0.463263	0.039836		0.006723	0.008898	0.42359
204	1310	0.494359	0.069494	0.042419		0.072128	0.506869	0.048074		0.009302	0.012233	0.454011
205	1311	0.451652	0.075349	0.041048		0.078787	0.466726	0.046417		0.010067	0.013026	0.410777
206	1312	0.326173	0.063215	0.030636		0.066735	0.3398	0.034584		0.008458	0.010674	0.29378
207	1313	0.245775	0.050447	0.023239		0.053604	0.256892	0.026226		0.006774	0.008437	0.220423
208	1314	0.294682	0.068906	0.019633		0.063571	0.317901	0.022179		0.008036	0.012269	0.264612
209	1315	0.294341	0.078092	0.013356		0.062414	0.32772	0.015154		0.007886	0.014509	0.264657
210	1316	0.306181	0.091133	0.00905		0.063535	0.351808	0.010401		0.008046	0.01773	0.275667
211	1317	0.293479	0.097565	0.005137		0.059281	0.349254	0.006151		0.007587	0.019619	0.264569
212	1318	0.26868	0.097073	0.002768		0.052876	0.329033	0.003693		0.006835	0.019941	0.242328

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
213	1319	0.268375	0.104365	0.002196		0.05138	0.337765	0.002656		0.006765	0.021978	0.241969
214	1320	0.268102	0.111149	0.002116		0.04982	0.346162	0.00238		0.006712	0.02418	0.241526
215	1321	0.267857	0.11755	0.002422		0.048573	0.354324	0.002388		0.006658	0.026331	0.240989
216	1322	0.267649	0.123571	0.002785		0.047458	0.362279	0.002627		0.006622	0.028475	0.240406
217	1323	0.267483	0.129087	0.003331		0.046395	0.369946	0.003202		0.006619	0.03067	0.239855
218	1324	0.267347	0.133914	0.003588		0.045371	0.377178	0.003466		0.006632	0.032923	0.239466
219	1325	0.267224	0.138203	0.003812		0.044338	0.384143	0.003666		0.006631	0.035078	0.239129
220	1326	0.198323	0.105349	0.003032		0.032166	0.290154	0.002936		0.004926	0.027475	0.177304
221	1327	0.178061	0.095582	0.002792		0.028569	0.262564	0.002741		0.004429	0.025237	0.159127
222	1328	0.242746	0.132208	0.003762		0.038192	0.362529	0.00382		0.0067	0.035683	0.216857
223	1329	0.250743	0.13822	0.003783		0.038594	0.379503	0.004091		0.007781	0.038188	0.224017
224	1330	0.242562	0.134742	0.003625		0.036797	0.371395	0.00419		0.008193	0.037971	0.216815
225	1331	0.24246	0.135191	0.003556		0.0362	0.375225	0.004345		0.008725	0.038885	0.216925
226	1332	0.242336	0.135007	0.003239		0.035541	0.379597	0.00406		0.009092	0.039778	0.217124
227	1333	0.242173	0.13441	0.002948		0.034747	0.384133	0.003703		0.009273	0.040581	0.217355
228	1334	0.181505	0.100051	0.002026		0.025436	0.292714	0.002486		0.006969	0.030962	0.163197
229	1335	0.133054	0.072983	0.001376		0.01841	0.216233	0.001645		0.005082	0.02289	0.11975
230	1336	0.205517	0.112287	0.001911		0.027947	0.337003	0.002188		0.007745	0.035699	0.185202
231	1337	0.265676	0.147221	0.00211		0.034867	0.442661	0.002325		0.009585	0.046848	0.239963
232	1338	0.235288	0.131892	0.001739		0.029692	0.397882	0.00193		0.007942	0.042009	0.212914
233	1339	0.20503	0.115688	0.001342		0.025014	0.350294	0.001491		0.006463	0.036962	0.185747
234	1340	0.235037	0.133363	0.001532		0.027852	0.40554	0.001557		0.006801	0.042767	0.213157
235	1341	0.264923	0.151267	0.001898		0.030399	0.463688	0.001735		0.007485	0.048698	0.240498
236	1342	0.264644	0.151842	0.00196		0.029249	0.469734	0.001776		0.00744	0.049073	0.240386
237	1343	0.264332	0.152291	0.001939		0.027987	0.475197	0.002259		0.007343	0.049465	0.240219
238	1344	0.263983	0.153565	0.001844		0.026603	0.480343	0.002906		0.007174	0.049749	0.240006
239	1345	0.207701	0.121847	0.001344		0.019794	0.382306	0.002815		0.005485	0.039955	0.188923
240	1346	0.20354	0.119887	0.001278		0.018739	0.376945	0.002996		0.005286	0.039667	0.185201
241	1347	0.259041	0.15333	0.001587		0.022369	0.484169	0.003987		0.006502	0.051523	0.235877
242	1348	0.262618	0.156113	0.001566		0.021025	0.495127	0.004093		0.006283	0.053271	0.239343
243	1349	0.262204	0.15896	0.001451		0.019262	0.498353	0.004193		0.005915	0.054169	0.239184
244	1350	0.261788	0.161554	0.00152		0.017447	0.501146	0.004364		0.005689	0.054971	0.239048
245	1351	0.261367	0.163737	0.001488		0.016385	0.503203	0.004458		0.005507	0.055625	0.238972
246	1352	0.231285	0.146877	0.001327		0.013797	0.447472	0.004088		0.004622	0.0498	0.211808
247	1353	0.201378	0.129155	0.001213		0.011501	0.390921	0.003688		0.003834	0.043719	0.184679
248	1354	0.230702	0.149297	0.00147		0.012544	0.449072	0.004323		0.004196	0.050461	0.211883
249	1355	0.259854	0.169757	0.001598		0.013461	0.506894	0.004746		0.004396	0.057293	0.23911
250	1356	0.259423	0.170823	0.001567		0.013762	0.506666	0.004451		0.003956	0.057597	0.239114
251	1357	0.258998	0.17167	0.001631		0.014016	0.50612	0.004023		0.003612	0.057836	0.239041
252	1358	0.25858	0.173182	0.001734		0.014522	0.505114	0.003453		0.003308	0.057954	0.238925
253	1359	0.203405	0.137448	0.001304		0.01263	0.396563	0.002205		0.002627	0.045606	0.188195
254	1360	0.199309	0.135208	0.001254		0.013072	0.387977	0.00188		0.002675	0.04465	0.184564
255	1361	0.253636	0.173001	0.001642		0.018146	0.492204	0.00196		0.003633	0.056679	0.235244
256	1362	0.257179	0.176096	0.001769		0.020004	0.496961	0.002014		0.003997	0.057253	0.238962
257	1363	0.264705	0.181451	0.001781		0.022222	0.508313	0.001894		0.004461	0.0586	0.246417
258	1364	0.272208	0.186535	0.00181		0.024655	0.518655	0.001836		0.004937	0.05987	0.25399
259	1365	0.248636	0.170021	0.001708		0.024156	0.469615	0.00194		0.004819	0.054285	0.232593
260	1366	0.211571	0.144062	0.001507		0.02184	0.396341	0.00217		0.004329	0.045835	0.198365
261	1367	0.197857	0.133842	0.001378		0.021753	0.367559	0.002433		0.004217	0.042477	0.185867
262	1368	0.226808	0.152106	0.00156		0.026456	0.417506	0.003241		0.004964	0.048166	0.213483
263	1369	0.255687	0.169211	0.001803		0.03198	0.464745	0.004188		0.005734	0.053428	0.241282
264	1370	0.228407	0.148841	0.001686		0.030397	0.409447	0.003929		0.005231	0.04686	0.216048
265	1371	0.201198	0.129263	0.001445		0.028004	0.356286	0.003366		0.004646	0.040612	0.190605
266	1372	0.191418	0.121086	0.001343		0.027815	0.334538	0.002999		0.00462	0.037962	0.181597
267	1373	0.181665	0.113187	0.001272		0.027368	0.313543	0.002662		0.004571	0.03541	0.172547
268	1374	0.189307	0.115997	0.001347		0.029542	0.322476	0.002629		0.004958	0.036207	0.179998
269	1375	0.196941	0.118194	0.00142		0.031832	0.330433	0.00275		0.005299	0.03681	0.187438
270	1376	0.200709	0.117533	0.001375		0.033606	0.331248	0.003008		0.005517	0.036541	0.191176
271	1377	0.169752	0.096524	0.001098		0.029492	0.275074	0.002965		0.004796	0.029953	0.161776
272	1378	0.152349	0.084805	0.00095		0.027082	0.243789	0.002985		0.004362	0.026275	0.145215
273	1379	0.194712	0.105312	0.001193		0.035606	0.306508	0.004282		0.005696	0.032544	0.185594
274	1380	0.219698	0.114096	0.001296		0.041585	0.338144	0.005297		0.006531	0.0351	0.209358
275	1381	0.219635	0.10906	0.001093		0.042979	0.329895	0.005439		0.006641	0.03337	0.209245
276	1382	0.219582	0.103859	0.000866		0.044387	0.321883	0.005337		0.006814	0.031574	0.209133
277	1383	0.248436	0.111483	0.001287		0.051828	0.355104	0.00579		0.007892	0.033651	0.236521
278	1384	0.267666	0.111462	0.00184		0.058016	0.369746	0.006056		0.008828	0.033359	0.254693
279	1385	0.196414	0.075396	0.002032		0.04408	0.262051	0.004748		0.00675	0.022432	0.186807
280	1386	0.148277	0.054284	0.001925		0.033879	0.194078	0.003892		0.0052	0.016116	0.140982
281	1387	0.188727	0.064967	0.003142		0.044025	0.241203	0.005796		0.006771	0.019247	0.179359
282	1388	0.260974	0.08208	0.00622		0.062479	0.322573	0.011085		0.009629	0.024244	0.24784

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
283	1389	0.306292	0.083227	0.011973		0.075784	0.35953	0.020151		0.011698	0.02439	0.290585
284	1390	0.26973	0.062736	0.0163		0.068509	0.306915	0.026463		0.010579	0.017928	0.25564
285	1391	0.233151	0.047714	0.019095		0.060011	0.259252	0.030408		0.009267	0.013265	0.22078
286	1392	0.433714	0.072824	0.033762		0.087713	0.471931	0.053846		0.013374	0.020237	0.411737
287	1393	0.478563	0.067996	0.034906		0.07996	0.512889	0.055832		0.012045	0.019689	0.45539
288	1394	0.445379	0.049439	0.028827		0.056824	0.468975	0.046298		0.008847	0.015412	0.425305
289	1395	0.45878	0.04086	0.026332		0.046485	0.477434	0.042408		0.008809	0.013434	0.439316
290	1400	0.530429	0.053875	0.021928		0.052485	0.557302	0.035544		0.009133	0.018911	0.508323
291	1401	0.5149	0.06637	0.024275		0.064482	0.549697	0.039326		0.010001	0.021667	0.492205
292	1402	0.553242	0.092104	0.029657		0.091179	0.604374	0.04801		0.01375	0.02744	0.52715
293	1403	0.501457	0.09808	0.028777		0.100158	0.55785	0.046586		0.015275	0.027985	0.476682
294	1406	0.601962	0.07148	0.0157		0.058451	0.641364	0.025995		0.009327	0.026011	0.577453
295	1407	0.58426	0.089495	0.017493		0.071797	0.635851	0.029014		0.011064	0.031157	0.559215
296	1408	0.627761	0.125121	0.02153		0.101492	0.703509	0.035816		0.015324	0.041687	0.599038
297	1409	0.569101	0.132426	0.020986		0.111356	0.651618	0.035032		0.016986	0.039704	0.541772
298	1412	0.51275	0.070827	0.008006		0.049374	0.554145	0.013879		0.007784	0.030343	0.492294
299	1413	0.497619	0.089104	0.008919		0.060269	0.551782	0.015522		0.009261	0.037424	0.476784
300	1414	0.53466	0.124959	0.011021		0.084705	0.613738	0.019292		0.012789	0.047942	0.510808
301	1415	0.484754	0.132213	0.010802		0.092512	0.570182	0.01902		0.014099	0.044047	0.462029
302	1418	0.370778	0.056586	0.003931		0.035579	0.404469	0.007045		0.005591	0.025997	0.356159
303	1419	0.359818	0.071518	0.004353		0.043178	0.403819	0.007879		0.006644	0.031639	0.344955
304	1420	0.386597	0.100364	0.005377		0.060313	0.450646	0.009834		0.009095	0.039868	0.369599
305	1421	0.350525	0.105658	0.005315		0.065586	0.42153	0.009768		0.009978	0.036158	0.334326
306	1424	0.291304	0.04768	0.002305		0.027868	0.319833	0.004701		0.004382	0.022882	0.279905
307	1425	0.282686	0.060234	0.00255		0.033673	0.31991	0.00529		0.005198	0.027304	0.27111
308	1426	0.303724	0.084399	0.00317		0.046805	0.357841	0.006641		0.007049	0.033826	0.290491
309	1427	0.275389	0.088663	0.003164		0.050715	0.338661	0.006602		0.0077	0.030517	0.262777
310	1430	0.385872	0.066321	0.002328		0.036794	0.425808	0.005774		0.005799	0.03279	0.370856
311	1431	0.374452	0.08382	0.002577		0.044301	0.426532	0.0065		0.006868	0.038743	0.359214
312	1432	0.402318	0.117456	0.003226		0.061329	0.478004	0.008158		0.009294	0.047146	0.384907
313	1433	0.364789	0.123331	0.003261		0.066257	0.45666	0.008099		0.010037	0.042428	0.348192
314	1436	0.525849	0.097116	0.00191		0.049675	0.58561	0.007476		0.007899	0.049516	0.505575
315	1437	0.510282	0.123132	0.002154		0.059447	0.588164	0.008434		0.009322	0.057613	0.489731
316	1438	0.548259	0.173139	0.002765		0.081698	0.663695	0.010585		0.012564	0.069452	0.524792
317	1439	0.497126	0.182131	0.002854		0.087823	0.64278	0.010472		0.013314	0.062349	0.474745
318	1442	0.488054	0.095201	0.001404		0.045407	0.548751	0.007147		0.007326	0.049699	0.469389
319	1443	0.473609	0.121336	0.001575		0.054034	0.552606	0.008094		0.008616	0.056918	0.454709
320	1444	0.508866	0.171696	0.002005		0.073761	0.634422	0.010178		0.011553	0.069289	0.487299
321	1445	0.461413	0.181381	0.002053		0.078909	0.616026	0.010052		0.012194	0.062008	0.440847
322	1448	0.431343	0.087381	0.001576		0.039482	0.488732	0.006459		0.00646	0.046435	0.414933
323	1449	0.418582	0.111752	0.001711		0.04681	0.49313	0.007316		0.007579	0.053138	0.401978
324	1450	0.449752	0.158825	0.001992		0.063604	0.5729	0.009232		0.010122	0.064786	0.43082
325	1451	0.40782	0.168314	0.001802		0.067822	0.557379	0.009179		0.010622	0.05769	0.389772
326	1454	0.431392	0.091062	0.001909		0.038705	0.492657	0.006394		0.006422	0.048871	0.415045
327	1455	0.418636	0.116619	0.002069		0.045743	0.498009	0.007237		0.007526	0.056807	0.402111
328	1456	0.449823	0.166069	0.002416		0.061913	0.584584	0.009151		0.010027	0.06846	0.430999
329	1457	0.407895	0.176288	0.002216		0.065842	0.569843	0.009143		0.010477	0.060517	0.389959
330	1460	0.431448	0.095498	0.002156		0.037809	0.496634	0.006135		0.006349	0.05219	0.415137
331	1461	0.4187	0.122158	0.00233		0.044568	0.502904	0.006924		0.00744	0.060377	0.402224
332	1462	0.449907	0.173776	0.002722		0.060129	0.595703	0.008729		0.009913	0.071864	0.43116
333	1463	0.407985	0.184405	0.00251		0.063815	0.581749	0.008715		0.010362	0.063005	0.390138
334	1466	0.382303	0.089095	0.002067		0.032616	0.44344	0.005063		0.005518	0.048876	0.367852
335	1467	0.371019	0.113615	0.002232		0.038366	0.449779	0.005679		0.00647	0.056053	0.356428
336	1468	0.39869	0.161083	0.002594		0.051625	0.53715	0.007087		0.008634	0.067193	0.382104
337	1469	0.361555	0.170599	0.002381		0.0547	0.525463	0.007009		0.009044	0.057841	0.345782
338	1472	0.299067	0.072461	0.001696		0.024941	0.348806	0.003682		0.004225	0.03928	0.28774
339	1473	0.290247	0.092138	0.001824		0.029299	0.354225	0.0041		0.004959	0.045104	0.278811
340	1474	0.311908	0.130222	0.002115		0.039357	0.425562	0.005048		0.006624	0.054417	0.298912
341	1475	0.282868	0.137657	0.001932		0.04165	0.416823	0.004955		0.006941	0.046634	0.270515
342	1478	0.333173	0.08305	0.001953		0.027253	0.390172	0.003836		0.004607	0.044932	0.320518
343	1479	0.323355	0.105374	0.002098		0.031987	0.396609	0.004242		0.005412	0.051498	0.310575
344	1480	0.347502	0.148584	0.002431		0.04292	0.478691	0.005152		0.007237	0.061829	0.332975
345	1481	0.315161	0.156867	0.002222		0.045379	0.469681	0.005055		0.007581	0.052833	0.301352
346	1484	0.393818	0.101823	0.002397		0.031242	0.463826	0.004123		0.005234	0.052916	0.378754
347	1485	0.382229	0.128857	0.002571		0.036616	0.472839	0.00461		0.006159	0.062261	0.367003
348	1486	0.4108	0.181224	0.002978		0.049054	0.573809	0.005671		0.008254	0.074309	0.393474
349	1487	0.372593	0.191104	0.002732		0.051812	0.564779	0.005473		0.008667	0.063291	0.356109
350	1490	0.386313	0.102505	0.002411		0.029731	0.457255	0.003933		0.004904	0.052487	0.371393
351	1491	0.374962	0.129548	0.002582		0.034825	0.468871	0.004386		0.005782	0.06149	0.359861
352	1492	0.403017	0.182017	0.002989		0.046603	0.570099	0.005358		0.007779	0.073068	0.385804

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
353	1493	0.365559	0.191952	0.002746		0.049173	0.562676	0.00512		0.008214	0.063152	0.34916
354	1496	0.371234	0.100223	0.002357		0.027648	0.441445	0.003698		0.004472	0.050461	0.356718
355	1497	0.360342	0.126635	0.002521		0.032373	0.455227	0.004132		0.005285	0.05888	0.345624
356	1498	0.387332	0.178012	0.002912		0.043302	0.554493	0.005067		0.00714	0.069688	0.370518
357	1499	0.351354	0.187942	0.002667		0.045678	0.548617	0.004864		0.007586	0.061913	0.335311
358	1502	0.356147	0.097157	0.002285		0.025671	0.425249	0.003492		0.00407	0.048233	0.342031
359	1503	0.345712	0.122817	0.002441		0.03005	0.440671	0.003924		0.00482	0.056049	0.331373
360	1504	0.371632	0.172873	0.002814		0.040182	0.537709	0.004872		0.006532	0.066052	0.355214
361	1505	0.337134	0.18283	0.002567		0.042374	0.532964	0.00475		0.006962	0.060349	0.321446
362	1508	0.375164	0.103177	0.002423		0.026102	0.449858	0.003622		0.004054	0.050653	0.360064
363	1509	0.364188	0.130501	0.002586		0.030548	0.468169	0.004104		0.004811	0.058564	0.348816
364	1510	0.391518	0.183965	0.002978		0.040837	0.572635	0.005181		0.006537	0.068623	0.373879
365	1511	0.355198	0.19493	0.002714		0.043049	0.568105	0.005154		0.00697	0.064502	0.338319
366	1514	0.394201	0.109479	0.002555		0.026285	0.475063	0.003716		0.003996	0.053237	0.378033
367	1515	0.382686	0.138488	0.002725		0.030758	0.496291	0.004251		0.004753	0.061131	0.366187
368	1516	0.411436	0.195425	0.003138		0.041111	0.608531	0.00547		0.006474	0.071043	0.392452
369	1517	0.373293	0.207419	0.002869		0.043333	0.604325	0.005556		0.00691	0.068828	0.355103
370	1520	0.447374	0.125905	0.002901		0.028482	0.541783	0.004055		0.004248	0.060621	0.428648
371	1521	0.434329	0.159124	0.003091		0.033326	0.567863	0.004679		0.005064	0.069079	0.415169
372	1522	0.466993	0.224476	0.003558		0.044545	0.697914	0.006109		0.007027	0.079513	0.444883
373	1523	0.423727	0.2384	0.00326		0.046974	0.693732	0.006299		0.007699	0.079292	0.40251
374	1526	0.500619	0.144088	0.003232		0.029884	0.609889	0.004176		0.004417	0.067969	0.47908
375	1527	0.486054	0.181612	0.003441		0.034968	0.641504	0.004853		0.005411	0.076702	0.463938
376	1528	0.522661	0.255563	0.003954		0.046747	0.790682	0.006403		0.007655	0.087702	0.497036
377	1529	0.474278	0.271167	0.003607		0.049325	0.786741	0.006656		0.0084	0.090345	0.449626
378	1532	0.443889	0.130903	0.002839		0.02468	0.543806	0.00348		0.003791	0.059441	0.424246
379	1533	0.431008	0.164418	0.00302		0.028883	0.573656	0.003787		0.00465	0.066563	0.410764
380	1534	0.46352	0.23052	0.003463		0.03862	0.709058	0.005009		0.006587	0.079063	0.439963
381	1535	0.420653	0.244135	0.003148		0.040754	0.706162	0.005202		0.007245	0.081361	0.397923
382	1538	0.387095	0.115933	0.00245		0.020311	0.476128	0.003021		0.003228	0.050366	0.369592
383	1539	0.375884	0.145281	0.002605		0.023729	0.503221	0.003141		0.003958	0.056192	0.357795
384	1540	0.404276	0.203195	0.002987		0.031741	0.623325	0.003795		0.005603	0.069573	0.383156
385	1541	0.366917	0.214941	0.002721		0.033499	0.621181	0.003928		0.006161	0.071607	0.346496
386	1544	0.413787	0.125146	0.002588		0.020781	0.510874	0.003226		0.003375	0.051392	0.394684
387	1545	0.40183	0.156604	0.002749		0.024197	0.540846	0.003339		0.004132	0.057238	0.382033
388	1546	0.43222	0.218734	0.003159		0.032125	0.671287	0.003676		0.00583	0.074757	0.409034
389	1547	0.392309	0.23127	0.002901		0.0337	0.66935	0.003496		0.006383	0.077029	0.369845
390	1550	0.486092	0.147435	0.002997		0.023154	0.602554	0.004003		0.003871	0.056226	0.463143
391	1551	0.472079	0.18445	0.003195		0.026959	0.638945	0.004107		0.004723	0.065247	0.44823
392	1552	0.507837	0.257668	0.003682		0.035794	0.794708	0.004433		0.006629	0.087969	0.479809
393	1553	0.460983	0.272598	0.003374		0.037562	0.792813	0.003795		0.007207	0.090843	0.433769
394	1556	0.531905	0.160282	0.003243		0.023652	0.662356	0.00463		0.004113	0.065774	0.506174
395	1557	0.516619	0.200803	0.003458		0.027537	0.703442	0.004761		0.004991	0.073891	0.489797
396	1558	0.555823	0.281175	0.003983		0.036556	0.876842	0.005145		0.006949	0.09709	0.524184
397	1559	0.504601	0.298126	0.003638		0.038351	0.875221	0.004374		0.007505	0.099606	0.473796
398	1562	0.516953	0.154036	0.003145		0.021328	0.646518	0.004712		0.003871	0.067193	0.491414
399	1563	0.502142	0.193397	0.003343		0.024831	0.687709	0.00485		0.004664	0.073886	0.475454
400	1564	0.540323	0.271697	0.003832		0.03296	0.858267	0.00524		0.00643	0.097062	0.508742
401	1565	0.490588	0.288895	0.003511		0.034562	0.857174	0.004459		0.00689	0.096993	0.459768
402	1568	0.501983	0.148356	0.003051		0.019176	0.630216	0.004757		0.003635	0.064902	0.476768
403	1569	0.487648	0.186524	0.003242		0.022327	0.671022	0.0049		0.004343	0.072867	0.461248
404	1570	0.524796	0.262593	0.003721		0.029641	0.838093	0.0053		0.005915	0.095898	0.493486
405	1571	0.476545	0.279714	0.003402		0.0311	0.837455	0.004523		0.006265	0.094503	0.445937
406	1574	0.494622	0.14579	0.002995		0.01737	0.623212	0.004863		0.003452	0.063223	0.469432
407	1575	0.480544	0.183294	0.003183		0.020226	0.663771	0.00502		0.004089	0.072138	0.454132
408	1576	0.517226	0.25807	0.003648		0.026857	0.829598	0.005443		0.005502	0.095323	0.485848
409	1577	0.469729	0.274917	0.003319		0.028195	0.82929	0.004636		0.005763	0.093555	0.439019
410	1580	0.388283	0.11454	0.002334		0.012466	0.490787	0.003946		0.002611	0.04843	0.368287
411	1581	0.377271	0.143848	0.002481		0.014517	0.522654	0.004088		0.003068	0.056595	0.356282
412	1582	0.406132	0.20224	0.002843		0.019276	0.653587	0.004462		0.004087	0.075131	0.381166
413	1583	0.368887	0.215201	0.002579		0.020222	0.65355	0.003823		0.004259	0.073771	0.34443
414	1586	0.39602	0.116816	0.002368		0.012004	0.501421	0.004103		0.002604	0.048671	0.375505
415	1587	0.384813	0.146597	0.002518		0.013978	0.533857	0.004263		0.003046	0.057732	0.363269
416	1588	0.414291	0.205898	0.002887		0.01856	0.667783	0.00468		0.004036	0.07681	0.388649
417	1589	0.376329	0.218928	0.002628		0.019512	0.667861	0.004173		0.004195	0.075379	0.3512
418	1592	0.502921	0.14759	0.002978		0.014164	0.638484	0.005435		0.00318	0.060664	0.476622
419	1593	0.488745	0.185099	0.003167		0.016431	0.679366	0.005781		0.003691	0.073703	0.461105
420	1594	0.52627	0.259729	0.003638		0.021702	0.850116	0.00661		0.00484	0.098229	0.493352
421	1595	0.478118	0.275963	0.003331		0.022677	0.850399	0.006273		0.00499	0.095785	0.445843
422	1598	0.503213	0.145398	0.002938		0.013491	0.64032	0.005916		0.003454	0.060374	0.476657

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
423	1599	0.489085	0.182546	0.003126		0.015687	0.680675	0.006362		0.004012	0.074774	0.461154
424	1600	0.526727	0.256466	0.003588		0.0208	0.851953	0.007429		0.005294	0.099492	0.493438
425	1601	0.478597	0.272701	0.003271		0.021812	0.852284	0.007142		0.005502	0.095895	0.445958
426	1604	0.503516	0.141645	0.002892		0.013124	0.641944	0.006273		0.003865	0.061356	0.476687
427	1605	0.48944	0.17851	0.003077		0.015284	0.68145	0.006798		0.004499	0.076343	0.461192
428	1606	0.527201	0.253228	0.003531		0.020311	0.853045	0.00805		0.00596	0.101124	0.493499
429	1607	0.479103	0.270697	0.003207		0.021338	0.853377	0.007818		0.006229	0.0973	0.446038
430	1610	0.503831	0.138928	0.002837		0.012704	0.643376	0.006475		0.004228	0.063015	0.476704
431	1611	0.489808	0.1763	0.003022		0.01482	0.681625	0.007044		0.004929	0.077979	0.461208
432	1612	0.527696	0.250693	0.003478		0.019741	0.853349	0.008407		0.006549	0.102717	0.493512
433	1613	0.479628	0.268445	0.003181		0.02078	0.853721	0.008249		0.006874	0.098575	0.446044
434	1616	0.446866	0.121219	0.002456		0.011425	0.571366	0.005773		0.004024	0.057005	0.422539
435	1617	0.434487	0.154116	0.00262		0.013413	0.603759	0.006286		0.004697	0.07021	0.408796
436	1618	0.468183	0.219655	0.003025		0.018036	0.755893	0.007576		0.006245	0.092058	0.437408
437	1619	0.425603	0.235592	0.002786		0.019142	0.756245	0.007445		0.006546	0.088184	0.395311
438	1622	0.389775	0.104483	0.002096		0.010433	0.498743	0.00498		0.003669	0.050127	0.368372
439	1623	0.379017	0.132974	0.002238		0.012257	0.525755	0.005416		0.004286	0.061588	0.356385
440	1624	0.408475	0.189753	0.002586		0.0165	0.658203	0.006576		0.005703	0.080588	0.381311
441	1625	0.371369	0.203674	0.002376		0.017526	0.658477	0.006439		0.005974	0.07719	0.344592
442	1628	0.447328	0.118619	0.002346		0.012476	0.572688	0.005597		0.004371	0.057653	0.422558
443	1629	0.43503	0.151055	0.002508		0.01467	0.60209	0.006076		0.00511	0.07073	0.408803
444	1630	0.468915	0.215684	0.0029		0.019768	0.753681	0.007425		0.006813	0.092483	0.43738
445	1631	0.426378	0.231574	0.002657		0.021014	0.753922	0.007238		0.007161	0.088666	0.395245
446	1634	0.505024	0.132133	0.00255		0.014761	0.646765	0.006086		0.005133	0.064908	0.476779
447	1635	0.49121	0.168323	0.002729		0.017374	0.677413	0.006615		0.00601	0.079541	0.461259
448	1636	0.529583	0.24039	0.003167		0.023443	0.847747	0.008126		0.008033	0.104018	0.493499
449	1637	0.481631	0.258096	0.00292		0.024942	0.8479	0.007905		0.008482	0.099926	0.44595
450	1640	0.505374	0.130229	0.002436		0.015957	0.64715	0.005817		0.005515	0.064713	0.476865
451	1641	0.491623	0.165974	0.00261		0.018746	0.675131	0.006372		0.00621	0.079211	0.461355
452	1642	0.530139	0.237099	0.003037		0.025208	0.844537	0.007836		0.00831	0.103601	0.493618
453	1643	0.482222	0.254559	0.002823		0.026727	0.844494	0.007637		0.00877	0.099718	0.44607
454	1646	0.505731	0.127753	0.002303		0.017611	0.647271	0.005527		0.006196	0.064765	0.476992
455	1647	0.492042	0.163018	0.002468		0.020699	0.674864	0.006095		0.006563	0.079115	0.461501
456	1648	0.530705	0.233145	0.002871		0.027849	0.840686	0.00753		0.008737	0.103369	0.493808
457	1649	0.482819	0.250427	0.002654		0.029525	0.840299	0.007364		0.009172	0.099606	0.44627
458	1652	0.506091	0.125431	0.002213		0.019177	0.647152	0.005202		0.006897	0.065134	0.477157
459	1653	0.492469	0.159941	0.002364		0.02255	0.674709	0.005777		0.007081	0.079326	0.461691
460	1654	0.531283	0.228673	0.002735		0.030362	0.836192	0.007197		0.009246	0.103382	0.494056
461	1655	0.48344	0.245693	0.00265		0.032215	0.835392	0.007101		0.00973	0.099594	0.446525
462	1658	0.498784	0.123916	0.002212		0.020337	0.637017	0.004744		0.007477	0.064637	0.470119
463	1659	0.485434	0.157897	0.002362		0.023923	0.664074	0.005308		0.007721	0.078457	0.454917
464	1660	0.523816	0.225459	0.002847		0.032231	0.818431	0.006683		0.009542	0.101914	0.486855
465	1661	0.476741	0.241924	0.002788		0.034228	0.81725	0.006687		0.010062	0.098055	0.440042
466	1664	0.39163	0.097528	0.00175		0.01699	0.499411	0.003374		0.006361	0.050951	0.369021
467	1665	0.381208	0.124149	0.001931		0.019992	0.52054	0.003804		0.006625	0.061683	0.357119
468	1666	0.411441	0.176977	0.002377		0.026948	0.63773	0.004821		0.00776	0.079921	0.382232
469	1667	0.374536	0.189605	0.002302		0.028626	0.636488	0.004868		0.008182	0.076818	0.3455
470	1670	0.399477	0.099601	0.001825		0.017916	0.508887	0.003239		0.006761	0.051941	0.376353
471	1671	0.388881	0.126699	0.002036		0.021087	0.530351	0.003626		0.007085	0.062825	0.364236
472	1672	0.419781	0.180407	0.002502		0.028431	0.647302	0.004592		0.008049	0.081343	0.389878
473	1673	0.382169	0.193071	0.002425		0.030208	0.645818	0.004632		0.008487	0.078182	0.352429
474	1676	0.507395	0.126637	0.002482		0.023979	0.644999	0.003847		0.009107	0.065523	0.477887
475	1677	0.494017	0.160885	0.002743		0.028235	0.672024	0.004001		0.009657	0.079213	0.462547
476	1678	0.533394	0.228613	0.003339		0.038095	0.814492	0.004999		0.01085	0.10258	0.49518
477	1679	0.485705	0.244175	0.003246		0.040515	0.812082	0.00497		0.011055	0.098698	0.447664
478	1682	0.507757	0.126532	0.002598		0.025129	0.643839	0.003586		0.009505	0.064736	0.478063
479	1683	0.494446	0.16057	0.002872		0.029605	0.670587	0.003702		0.010205	0.078301	0.462762
480	1684	0.533982	0.227748	0.003508		0.039986	0.806801	0.004142		0.011736	0.101545	0.495482
481	1685	0.486336	0.24283	0.003402		0.042567	0.803859	0.004032		0.011277	0.097879	0.447991
482	1688	0.508112	0.125961	0.002651		0.026182	0.642401	0.00363		0.00977	0.06384	0.478183
483	1689	0.494867	0.15972	0.002928		0.030866	0.668808	0.003758		0.01062	0.077258	0.462914
484	1690	0.534553	0.226238	0.003574		0.04173	0.798615	0.004126		0.012496	0.100331	0.495706
485	1691	0.486948	0.240902	0.003468		0.044461	0.795091	0.003614		0.011547	0.096875	0.448244
486	1694	0.50846	0.126043	0.002636		0.027149	0.640703	0.00374		0.009927	0.063126	0.478222
487	1695	0.495276	0.159533	0.0029		0.031996	0.666701	0.003878		0.010924	0.076363	0.462971
488	1696	0.53511	0.225834	0.003516		0.043298	0.79	0.004264		0.013145	0.099174	0.495806
489	1697	0.487541	0.240786	0.00339		0.046169	0.785769	0.003714		0.01248	0.095834	0.448372
490	1700	0.45098	0.112463	0.002449		0.025387	0.566193	0.003429		0.008882	0.057077	0.423829
491	1701	0.43935	0.142063	0.002598		0.029792	0.58891	0.003566		0.009895	0.067144	0.410311
492	1702	0.474781	0.200498	0.002974		0.040009	0.692239	0.003934		0.012173	0.087041	0.439413

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
493	1703	0.432654	0.213196	0.002822		0.042378	0.6878	0.003426		0.011859	0.084049	0.39738
494	1706	0.393358	0.098389	0.002315		0.022973	0.492703	0.003145		0.007788	0.051145	0.369406
495	1707	0.383254	0.124111	0.00246		0.026958	0.512475	0.003278		0.008758	0.058286	0.357611
496	1708	0.414226	0.174781	0.002826		0.036205	0.601281	0.003633		0.010948	0.075383	0.382956
497	1709	0.377519	0.185488	0.002586		0.038358	0.593581	0.003192		0.010857	0.07269	0.34631
498	1712	0.451423	0.112988	0.00287		0.027265	0.564111	0.003856		0.008992	0.059396	0.423584
499	1713	0.439872	0.142368	0.003058		0.03199	0.586464	0.004031		0.010199	0.066584	0.410033
500	1714	0.475486	0.200128	0.003524		0.042958	0.687699	0.00448		0.012934	0.085904	0.439055
501	1715	0.433401	0.212025	0.003241		0.04551	0.67369	0.003953		0.013014	0.082709	0.397012
502	1718	0.509602	0.127086	0.003637		0.032019	0.634317	0.004746		0.010255	0.06548	0.477609
503	1719	0.49662	0.159995	0.003886		0.037555	0.659012	0.004989		0.011737	0.074526	0.462278
504	1720	0.536918	0.224545	0.004496		0.050411	0.772208	0.005597		0.015105	0.095927	0.494925
505	1721	0.489462	0.237478	0.004131		0.053407	0.749843	0.004963		0.01541	0.092241	0.447484
506	1724	0.394002	0.097366	0.003216		0.025658	0.488051	0.003985		0.008029	0.051	0.368807
507	1725	0.384006	0.12256	0.003455		0.030079	0.506683	0.004223		0.009241	0.056801	0.35692
508	1726	0.415225	0.171885	0.004037		0.040359	0.593272	0.004805		0.012	0.073068	0.382062
509	1727	0.378567	0.181586	0.003744		0.042751	0.57179	0.004384		0.012342	0.070261	0.345399
510	1730	0.255016	0.062584	0.002227		0.016911	0.314974	0.002691		0.005235	0.033102	0.238544
511	1731	0.248558	0.078787	0.002403		0.019821	0.326858	0.002864		0.006033	0.036383	0.230838
512	1732	0.268784	0.110484	0.002821		0.026586	0.382548	0.003351		0.007851	0.046818	0.247074
513	1733	0.245065	0.116675	0.002626		0.028156	0.368453	0.003116		0.008089	0.045041	0.223351
514	1736	0.347828	0.084795	0.003205		0.023403	0.428537	0.003812		0.007185	0.045168	0.325179
515	1737	0.339034	0.106766	0.003465		0.027424	0.444538	0.004121		0.00828	0.049136	0.314654
516	1738	0.366639	0.149757	0.004079		0.036773	0.520072	0.004862		0.010777	0.06326	0.336757
517	1739	0.334298	0.158765	0.003811		0.038935	0.500799	0.004568		0.011104	0.060893	0.304405
518	1742	0.463972	0.113841	0.004691		0.032085	0.568695	0.005528		0.0097	0.060289	0.43329
519	1743	0.452273	0.143286	0.005089		0.037581	0.589454	0.006018		0.011148	0.06488	0.419213
520	1744	0.489141	0.201174	0.006024		0.050354	0.688998	0.007194		0.01445	0.082649	0.448589
521	1745	0.44602	0.213012	0.005651		0.053283	0.663095	0.006845		0.014839	0.079646	0.405449
522	1748	0.464158	0.114228	0.005056		0.032921	0.565995	0.00588		0.009813	0.060846	0.43304
523	1749	0.452484	0.143776	0.005498		0.038538	0.586138	0.006428		0.011207	0.066943	0.418924
524	1750	0.489405	0.201769	0.006536		0.051597	0.684403	0.007739		0.014391	0.080954	0.448212
525	1751	0.446279	0.213471	0.006158		0.054551	0.658191	0.007417		0.014662	0.078019	0.405064
526	1754	0.464332	0.114127	0.005357		0.033703	0.563261	0.006113		0.009918	0.062206	0.432843
527	1755	0.452679	0.143672	0.005836		0.039434	0.582742	0.006691		0.011223	0.070068	0.418695
528	1756	0.489645	0.201567	0.006953		0.052747	0.67961	0.008061		0.014211	0.079944	0.447912
529	1757	0.446513	0.213787	0.006572		0.055712	0.652991	0.007734		0.014299	0.076411	0.404755
530	1758	0.321965	0.172909	0.004752		0.045678	0.491053	0.005726		0.011202	0.053696	0.289206
531	1759	0.464494	0.113695	0.005584		0.034427	0.560354	0.00622		0.010011	0.064188	0.432717
532	1760	0.45286	0.143131	0.006089		0.040258	0.579116	0.006798		0.011202	0.072246	0.418549
533	1762	0.480129	0.116813	0.005921		0.036256	0.575666	0.006415		0.010421	0.068354	0.447099
534	1763	0.468127	0.147008	0.006459		0.042376	0.594234	0.006994		0.011516	0.076811	0.432452
535	1765	0.464783	0.112122	0.005789		0.035956	0.553095	0.006082		0.010125	0.067267	0.432734
536	1766	0.453185	0.140998	0.006317		0.042017	0.570118	0.006615		0.011029	0.077335	0.41857
537	17669	0.629624	0.104358	0.027695		0.058727	0.619623	0.026707		0.027593	0.018288	0.535914
538	17670	0.571458	0.101039	0.02066		0.05752	0.567475	0.020394		0.025093	0.016735	0.488987
539	17671	0.513626	0.095936	0.019785		0.063039	0.514521	0.019377		0.019999	0.015434	0.442505
540	17672	0.492162	0.096158	0.024221		0.073137	0.497195	0.025105		0.014454	0.015424	0.427507
541	17673	0.470705	0.095215	0.031381		0.083187	0.479393	0.034159		0.011108	0.015421	0.412584
542	17674	0.40062	0.082832	0.036838		0.083215	0.411033	0.041143		0.010352	0.013448	0.354423
543	17675	0.642986	0.098765	0.036912		0.054947	0.626094	0.036229		0.025151	0.018711	0.544264
544	17677	0.66354	0.093535	0.050082		0.056983	0.638312	0.050758		0.020729	0.01919	0.557999
545	17678	0.712736	0.091022	0.0723		0.082368	0.676673	0.076232		0.015239	0.020322	0.595007
546	17679	0.704342	0.108774	0.030135		0.034797	0.706413	0.026144		0.012357	0.031513	0.612396
547	1768	0.34092	0.081438	0.004219		0.02688	0.402734	0.00432		0.007413	0.049282	0.317438
548	17680	0.632651	0.104365	0.022702		0.051167	0.644513	0.022973		0.014361	0.029373	0.557018
549	17681	0.56237	0.098258	0.019249		0.065657	0.581876	0.024664		0.015257	0.027035	0.501785
550	17682	0.53699	0.098531	0.022649		0.083299	0.564328	0.034301		0.016539	0.026684	0.486037
551	17683	0.511737	0.097737	0.030326		0.100695	0.546375	0.047406		0.017296	0.026176	0.470275
552	17684	0.433608	0.085271	0.036493		0.105586	0.470505	0.057189		0.016509	0.022689	0.404881
553	17685	0.721278	0.103406	0.040073		0.022144	0.712073	0.03348		0.009716	0.030968	0.619641
554	17687	0.746173	0.09869	0.055146		0.028073	0.725291	0.04724		0.011133	0.030635	0.633856
555	17688	0.799864	0.096753	0.079623		0.055015	0.764701	0.073856		0.015182	0.031145	0.67191
556	1769	0.332427	0.102317	0.004603		0.03142	0.414537	0.004691		0.007972	0.05922	0.307068
557	1771	0.379706	0.090072	0.004653		0.030239	0.446579	0.004699		0.008225	0.056287	0.353602
558	1772	0.370255	0.1131	0.005077		0.035358	0.459257	0.005101		0.00878	0.067649	0.342069
559	1774	0.51155	0.119076	0.006052		0.041515	0.595967	0.005948		0.010905	0.078854	0.476619
560	1775	0.498845	0.149352	0.006598		0.048589	0.611634	0.006457		0.011471	0.095139	0.461135
561	1777	0.511636	0.116056	0.005702		0.042211	0.590733	0.005455		0.010595	0.078978	0.477053
562	1778	0.498959	0.145438	0.00621		0.049479	0.60461	0.005923		0.011	0.096318	0.461633

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
563	1780	0.5117	0.112232	0.005216		0.042806	0.585331	0.004839		0.010132	0.074853	0.477563
564	1781	0.499059	0.140571	0.005675		0.050289	0.597698	0.005251		0.010407	0.093158	0.462221
565	1783	0.511741	0.107668	0.004586		0.043288	0.580043	0.004085		0.009503	0.071543	0.478121
566	1784	0.499142	0.134835	0.004979		0.051001	0.5908	0.004418		0.009686	0.085812	0.462868
567	1786	0.511759	0.102972	0.003792		0.043636	0.57463	0.003294		0.008697	0.067328	0.478692
568	1787	0.499214	0.129404	0.004106		0.051602	0.583594	0.003583		0.008826	0.078873	0.463532
569	1789	0.511758	0.098387	0.00291		0.043839	0.568595	0.003024		0.00772	0.062308	0.479234
570	1790	0.499275	0.123334	0.003208		0.052077	0.57572	0.003315		0.00805	0.073737	0.464164
571	1792	0.511743	0.092886	0.002597		0.043891	0.56177	0.003381		0.006799	0.056937	0.479712
572	1793	0.499335	0.116235	0.002897		0.052424	0.56698	0.003694		0.007901	0.068045	0.464717
573	1795	0.51173	0.086175	0.003384		0.044205	0.555483	0.00455		0.006588	0.050826	0.480099
574	1796	0.499408	0.107819	0.003774		0.053154	0.557984	0.005016		0.007721	0.061361	0.465159
575	1798	0.558261	0.085379	0.006105		0.048477	0.598832	0.007795		0.006932	0.047042	0.524055
576	1799	0.544928	0.107012	0.00685		0.058624	0.599575	0.008627		0.008206	0.057555	0.507792
577	1801	0.581629	0.077198	0.0114		0.050707	0.614537	0.013432		0.006908	0.0355	0.546136
578	1802	0.567894	0.097079	0.012767		0.06173	0.612709	0.014939		0.008284	0.046037	0.529211
579	1804	0.55863	0.063981	0.017267		0.048984	0.581575	0.019883		0.006456	0.021028	0.524423
580	1805	0.545578	0.080413	0.019292		0.059886	0.577303	0.022121		0.007829	0.030641	0.508165
581	1807	0.559148	0.055493	0.026164		0.049679	0.573386	0.029853		0.006529	0.011841	0.524534
582	1808	0.546196	0.06891	0.029007		0.060726	0.566344	0.033015		0.007926	0.013911	0.50824
583	1827	0.489869	0.200716	0.007258		0.053802	0.674459	0.008154		0.013935	0.082336	0.447721
584	1828	0.506409	0.206691	0.0077		0.056585	0.691037	0.008332		0.014032	0.0876	0.462585
585	1829	0.490269	0.198731	0.007534		0.056076	0.661852	0.007837		0.013113	0.088359	0.447756
586	1830	0.359644	0.144172	0.00549		0.041946	0.480434	0.005544		0.009259	0.067854	0.328509
587	1831	0.400579	0.159209	0.00605		0.047217	0.531701	0.006024		0.010059	0.077705	0.365979
588	1832	0.539733	0.209606	0.007846		0.064962	0.706379	0.007629		0.012771	0.110218	0.493452
589	1833	0.539907	0.203595	0.00737		0.066288	0.696264	0.007015		0.011921	0.113231	0.494085
590	1834	0.540076	0.196727	0.006716		0.067557	0.686034	0.006218		0.011025	0.112037	0.494837
591	1835	0.540247	0.189206	0.005861		0.068765	0.675628	0.005193		0.010616	0.106508	0.495682
592	1836	0.540424	0.18104	0.00479		0.069898	0.664792	0.004249		0.010575	0.098109	0.49656
593	1837	0.540611	0.172019	0.003906		0.070946	0.653228	0.004066		0.010508	0.089072	0.497395
594	1838	0.540812	0.161809	0.00363		0.072045	0.640772	0.004507		0.010409	0.08109	0.498119
595	1839	0.541045	0.150161	0.004705		0.073506	0.627502	0.006189		0.010288	0.074232	0.498683
596	1840	0.590541	0.14956	0.008601		0.081588	0.671391	0.01063		0.011081	0.072915	0.54444
597	1841	0.615642	0.136668	0.015877		0.086495	0.68254	0.018418		0.011367	0.061727	0.567411
598	1842	0.591601	0.113836	0.023841		0.084239	0.639672	0.027193		0.010881	0.04115	0.544813
599	1843	0.592348	0.097234	0.035525		0.08539	0.62372	0.040295		0.011019	0.019612	0.544827
600	1844	0.446722	0.213849	0.006849		0.056763	0.647352	0.007758		0.013789	0.07485	0.404561
601	1845	0.461816	0.220202	0.007251		0.059649	0.662513	0.007843		0.013603	0.075667	0.417989
602	1846	0.447105	0.21129	0.00711		0.059083	0.633767	0.007338		0.012382	0.071191	0.404606
603	1847	0.327979	0.153077	0.005185		0.04419	0.459537	0.005182		0.008512	0.05059	0.296873
604	1848	0.365312	0.168941	0.005707		0.049749	0.508223	0.005628		0.009094	0.05763	0.330753
605	1849	0.492235	0.222202	0.007362		0.068511	0.674087	0.007122		0.011139	0.082895	0.446009
606	1850	0.492425	0.215677	0.006905		0.070006	0.66316	0.006585		0.010825	0.086474	0.44663
607	1851	0.492625	0.208207	0.006287		0.071479	0.651933	0.005861		0.010827	0.087091	0.447374
608	1852	0.492843	0.199908	0.005436		0.072932	0.640358	0.004843		0.010819	0.084543	0.448241
609	1853	0.493093	0.190838	0.004386		0.07438	0.62832	0.004032		0.010824	0.079577	0.449158
610	1854	0.49337	0.180944	0.003778		0.075802	0.615688	0.004014		0.010822	0.073533	0.450024
611	1855	0.493673	0.170032	0.003634		0.077514	0.602353	0.004437		0.010796	0.067596	0.450766
612	1856	0.494015	0.157935	0.004676		0.079404	0.588357	0.006139		0.010768	0.061899	0.451335
613	1857	0.539357	0.157881	0.008589		0.088525	0.626658	0.010461		0.01173	0.060317	0.492768
614	1858	0.56244	0.145458	0.015634		0.094295	0.635014	0.018033		0.012194	0.050239	0.513537
615	1859	0.540551	0.122347	0.023318		0.092106	0.593289	0.026507		0.011782	0.03291	0.493053
616	1860	0.541236	0.105377	0.03455		0.093451	0.576527	0.039093		0.011947	0.019874	0.493014
617	1861	0.322108	0.172537	0.004902		0.046461	0.486311	0.005626		0.010606	0.052466	0.289058
618	1862	0.332984	0.177201	0.005146		0.04877	0.497153	0.005564		0.010201	0.052836	0.298656
619	1863	0.322372	0.169659	0.005087		0.048279	0.475096	0.005195		0.008958	0.04948	0.289105
620	1864	0.236475	0.122735	0.003739		0.036113	0.344189	0.00369		0.005922	0.035056	0.212139
621	1865	0.263386	0.135341	0.004092		0.040655	0.380439	0.003987		0.006314	0.038182	0.236364
622	1866	0.354895	0.177724	0.005199		0.056018	0.503928	0.005007		0.008515	0.048747	0.318766
623	1867	0.355054	0.172319	0.004884		0.057311	0.495032	0.004694		0.008528	0.045748	0.319219
624	1868	0.355223	0.166183	0.004485		0.058586	0.485806	0.004256		0.008516	0.042632	0.319756
625	1869	0.355425	0.159249	0.003795		0.059884	0.476132	0.003497		0.008513	0.039613	0.320451
626	1870	0.355674	0.151655	0.003227		0.061242	0.466078	0.003103		0.008552	0.036723	0.321195
627	1871	0.355962	0.143515	0.002803		0.06263	0.455698	0.003087		0.008604	0.033852	0.321883
628	1872	0.356275	0.134775	0.00283		0.064492	0.444935	0.003425		0.008641	0.030856	0.322462
629	1873	0.35663	0.125314	0.003596		0.066289	0.433734	0.00476		0.008698	0.028066	0.322915
630	1874	0.389485	0.125755	0.006646		0.074197	0.460681	0.007995		0.009597	0.027589	0.352558
631	1875	0.406279	0.116967	0.011848		0.079382	0.464716	0.013622		0.010117	0.023833	0.367376
632	1876	0.390529	0.099649	0.01754		0.077828	0.433413	0.019903		0.009868	0.019078	0.352705

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
633	1877	0.390993	0.087206	0.025854		0.079146	0.420492	0.02921		0.010035	0.015587	0.352651
634	1935	0.480656	0.042224	0.035918		0.032064	0.472184	0.035331		0.005789	0.014495	0.432648
635	1936	0.471477	0.047001	0.039069		0.038365	0.460962	0.038742		0.006368	0.014386	0.41841
636	1937	0.513838	0.058505	0.047987		0.052419	0.499569	0.048568		0.007416	0.015132	0.447477
637	1938	0.472029	0.058291	0.047966		0.05585	0.456262	0.04961		0.007858	0.013397	0.404538
638	1939	0.342883	0.044896	0.0377		0.045945	0.329378	0.040061		0.006921	0.009724	0.289244
639	1940	0.312785	0.044533	0.037501		0.046416	0.300488	0.041011		0.006981	0.00937	0.26061
640	1964	0.31847	0.042604	0.03617		0.044684	0.3052	0.038945		0.00698	0.009204	0.266984
641	1966	0.739942	0.109357	0.094014		0.115358	0.711945	0.104771		0.017018	0.022688	0.613117
642	2038	0.315521	0.044623	0.036261		0.031788	0.307136	0.037443		0.008167	0.014311	0.263774
643	2039	0.26062	0.034933	0.028371		0.024458	0.254323	0.028447		0.006382	0.011056	0.219681
644	2040	0.476629	0.054777	0.045668		0.036857	0.467017	0.042896		0.010081	0.017152	0.409661
645	2041	0.519585	0.05298	0.045324		0.034059	0.510567	0.040954		0.010525	0.016489	0.453222
646	2042	0.476281	0.041519	0.036384		0.024445	0.470005	0.03187		0.008734	0.012776	0.423509
647	2043	0.485232	0.03681	0.033066		0.020136	0.480447	0.028656		0.007922	0.011295	0.437673
648	2048	0.560148	0.047061	0.032022		0.023877	0.560754	0.029754		0.008866	0.014763	0.506018
649	2049	0.549841	0.056342	0.036514		0.028711	0.551717	0.034311		0.009783	0.018678	0.489653
650	2050	0.599805	0.076345	0.04699		0.039644	0.603546	0.045176		0.011814	0.02721	0.524029
651	2051	0.550303	0.081035	0.048159		0.042682	0.554533	0.047414		0.01131	0.027048	0.47367
652	2054	0.634693	0.065496	0.029872		0.028047	0.643751	0.029145		0.009587	0.025824	0.574255
653	2055	0.622799	0.08055	0.034664		0.033222	0.637193	0.034092		0.010582	0.033986	0.555621
654	2056	0.679385	0.111626	0.045556		0.045188	0.702646	0.045298		0.012868	0.051115	0.59457
655	2057	0.623411	0.118936	0.047188		0.048143	0.648821	0.047374		0.012459	0.053083	0.537387
656	2060	0.539998	0.067071	0.021404		0.024326	0.553816	0.021069		0.007722	0.040264	0.489055
657	2061	0.529709	0.082876	0.024899		0.028544	0.550701	0.024576		0.008534	0.050824	0.473128
658	2062	0.577735	0.115396	0.032864		0.03829	0.611133	0.032492		0.010431	0.072361	0.506218
659	2063	0.530203	0.123167	0.034132		0.040403	0.56673	0.033748		0.010166	0.070932	0.457483
660	2064	0.747889	0.109223	0.090926		0.080382	0.725745	0.097127		0.020248	0.035966	0.620715
661	2067	0.390232	0.054499	0.013754		0.017807	0.402993	0.013371		0.005339	0.039445	0.353558
662	2068	0.38272	0.0674	0.015978		0.020628	0.401811	0.015528		0.005907	0.049978	0.342015
663	2069	0.417366	0.093546	0.02105		0.027421	0.447612	0.020389		0.007239	0.067694	0.365896
664	2070	0.383031	0.099181	0.021844		0.028774	0.416226	0.021068		0.007107	0.064282	0.330649
665	2073	0.306461	0.046054	0.00989		0.01404	0.318397	0.009417		0.004043	0.037393	0.277714
666	2074	0.300526	0.056918	0.011462		0.016189	0.318168	0.010885		0.004477	0.046655	0.268631
667	2075	0.3277	0.078803	0.01507		0.021323	0.355245	0.014218		0.005496	0.061419	0.287366
668	2076	0.30074	0.083311	0.015609		0.022299	0.330776	0.01462		0.005489	0.057295	0.259728
669	2079	0.405824	0.064143	0.012153		0.018574	0.423819	0.011282		0.005182	0.056173	0.367797
670	2080	0.397931	0.079301	0.014066		0.021348	0.424152	0.012998		0.005743	0.068941	0.355751
671	2081	0.433879	0.109734	0.018444		0.027958	0.474527	0.016883		0.007062	0.089075	0.380539
672	2082	0.398179	0.115893	0.019076		0.029169	0.442467	0.017294		0.007182	0.082174	0.344014
673	2085	0.552749	0.094351	0.01435		0.025028	0.582957	0.012363		0.006596	0.090071	0.501016
674	2086	0.541922	0.116964	0.016541		0.02862	0.585034	0.014127		0.007327	0.107834	0.48457
675	2087	0.590803	0.162188	0.021622		0.037228	0.656894	0.018141		0.009042	0.135562	0.518412
676	2088	0.542161	0.171382	0.022344		0.038706	0.616386	0.018392		0.009596	0.123325	0.46871
677	2091	0.512766	0.093386	0.011403		0.022697	0.546509	0.00863		0.005648	0.09126	0.464811
678	2092	0.502666	0.116303	0.013118		0.025856	0.550015	0.009755		0.006297	0.106968	0.449525
679	2093	0.54793	0.162032	0.017097		0.033552	0.619821	0.012311		0.008151	0.131591	0.48105
680	2094	0.502785	0.171617	0.017639		0.034803	0.589342	0.012281		0.008729	0.118865	0.434922
681	2097	0.453024	0.086396	0.008894		0.019567	0.486806	0.005775		0.004662	0.083548	0.41068
682	2098	0.444063	0.107978	0.010212		0.02224	0.490983	0.006446		0.005216	0.096388	0.397163
683	2099	0.484001	0.150982	0.013286		0.028892	0.554798	0.007976		0.007082	0.116726	0.425084
684	2100	0.444088	0.160184	0.013689		0.029935	0.532556	0.007803		0.007596	0.105102	0.384324
685	2103	0.452923	0.090368	0.007832		0.019	0.49058	0.004056		0.004366	0.086293	0.410623
686	2104	0.443931	0.11325	0.008982		0.02156	0.495814	0.004442		0.005096	0.097808	0.397141
687	2105	0.483805	0.15876	0.011665		0.028094	0.561712	0.005321		0.006955	0.120347	0.425066
688	2106	0.443871	0.168583	0.012009		0.02909	0.544007	0.005216		0.00747	0.109232	0.384313
689	2109	0.452833	0.094465	0.006884		0.018379	0.494219	0.003456		0.004254	0.090377	0.410592
690	2110	0.443812	0.118594	0.007884		0.020892	0.500484	0.004001		0.004995	0.101136	0.397127
691	2111	0.483624	0.166477	0.010228		0.027266	0.568419	0.005247		0.006814	0.126207	0.425055
692	2112	0.443664	0.176777	0.010521		0.028226	0.555152	0.005426		0.007323	0.113281	0.384308
693	2115	0.401121	0.087292	0.005349		0.015714	0.440944	0.003155		0.003668	0.08523	0.363762
694	2116	0.393103	0.109709	0.006122		0.017948	0.447385	0.003655		0.004327	0.095829	0.35183
695	2117	0.428322	0.154092	0.007933		0.023401	0.510503	0.004803		0.005896	0.117025	0.376575
696	2118	0.392896	0.163548	0.008158		0.024227	0.50143	0.00498		0.006337	0.103917	0.34048
697	2121	0.313706	0.070322	0.003777		0.011989	0.346692	0.002514		0.002807	0.070195	0.284531
698	2122	0.30742	0.088441	0.004319		0.013692	0.352254	0.002915		0.003319	0.07849	0.275187
699	2123	0.334935	0.124261	0.005596		0.017838	0.40451	0.003837		0.004517	0.094547	0.294542
700	2124	0.307212	0.131841	0.005753		0.01847	0.397822	0.003988		0.004854	0.083392	0.266311
701	2127	0.349407	0.08	0.003874		0.013083	0.387752	0.002835		0.003076	0.08119	0.316955
702	2128	0.342393	0.100673	0.004431		0.014942	0.394402	0.003289		0.003635	0.090214	0.30654

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
703	2129	0.373016	0.141501	0.005739		0.019453	0.455094	0.004335		0.004942	0.107745	0.328091
704	2130	0.342122	0.150116	0.005902		0.020144	0.447994	0.004513		0.005308	0.094657	0.296645
705	2133	0.412869	0.097197	0.004037		0.014968	0.461045	0.0034		0.003536	0.100213	0.374608
706	2134	0.404557	0.122456	0.004616		0.017101	0.469703	0.003946		0.004175	0.110575	0.362312
707	2135	0.440701	0.172285	0.005982		0.022234	0.545677	0.005209		0.005666	0.130887	0.387727
708	2136	0.404169	0.182813	0.006156		0.02303	0.538505	0.005433		0.006082	0.114591	0.350566
709	2139	0.404866	0.097467	0.003501		0.014211	0.454842	0.003367		0.003367	0.099989	0.367433
710	2140	0.396693	0.122964	0.004005		0.016243	0.464068	0.003909		0.003971	0.110659	0.355385
711	2141	0.432096	0.173231	0.005194		0.021088	0.542286	0.005163		0.005381	0.13051	0.380248
712	2142	0.396247	0.183922	0.005352		0.021851	0.536652	0.005389		0.00577	0.114261	0.343803
713	2145	0.388925	0.095448	0.002983		0.0132	0.439609	0.003314		0.003141	0.095046	0.353055
714	2146	0.381052	0.120594	0.003398		0.015097	0.449164	0.004027		0.003688	0.106914	0.341491
715	2147	0.415023	0.170145	0.004413		0.019565	0.52755	0.005681		0.00499	0.126209	0.365329
716	2148	0.380561	0.180776	0.004554		0.020283	0.523377	0.006236		0.005346	0.110831	0.330292
717	2151	0.372992	0.093041	0.002597		0.012259	0.423997	0.003745		0.002933	0.089178	0.338671
718	2152	0.365423	0.1177	0.002902		0.014029	0.433756	0.004525		0.003417	0.101969	0.327588
719	2153	0.397967	0.166264	0.003774		0.018178	0.511529	0.006308		0.00462	0.12089	0.350476
720	2154	0.364894	0.176749	0.003942		0.018822	0.508545	0.006868		0.004946	0.106686	0.316778
721	2157	0.392768	0.099554	0.002495		0.012487	0.449005	0.004497		0.003005	0.092357	0.356709
722	2158	0.384776	0.126063	0.002772		0.014299	0.459891	0.005399		0.003483	0.10607	0.345047
723	2159	0.419009	0.178226	0.003561		0.018547	0.544286	0.007463		0.004685	0.126612	0.369172
724	2160	0.384158	0.189509	0.003756		0.019197	0.542164	0.008075		0.005013	0.112435	0.333681
725	2163	0.412527	0.106459	0.002386		0.012623	0.474482	0.005303		0.00306	0.094843	0.374745
726	2164	0.404109	0.134905	0.002648		0.014467	0.486604	0.006333		0.003542	0.10965	0.362502
727	2165	0.44002	0.190797	0.003317		0.018788	0.578255	0.008694		0.004739	0.132117	0.387865
728	2166	0.403387	0.202828	0.003506		0.019443	0.57685	0.009354		0.005052	0.118207	0.350594
729	2169	0.467967	0.122957	0.002483		0.013762	0.541399	0.006649		0.003361	0.105472	0.425201
730	2170	0.45839	0.155885	0.002756		0.015786	0.555901	0.007889		0.003886	0.122848	0.411316
731	2171	0.499078	0.220456	0.003418		0.020526	0.663417	0.010736		0.005208	0.149493	0.440106
732	2172	0.457489	0.2342	0.003502		0.021236	0.662428	0.011491		0.005543	0.134714	0.397825
733	2175	0.523355	0.14041	0.00252		0.014602	0.609683	0.008233		0.003599	0.116277	0.475637
734	2176	0.512604	0.178148	0.0028		0.016768	0.626916	0.009731		0.004155	0.136678	0.460106
735	2177	0.558037	0.251936	0.003479		0.021919	0.752121	0.013181		0.005572	0.168253	0.49231
736	2178	0.51148	0.267375	0.003455		0.022822	0.751759	0.014044		0.00592	0.152775	0.445009
737	2181	0.463759	0.126342	0.00205		0.012244	0.543705	0.007898		0.003309	0.10298	0.421552
738	2182	0.454198	0.160564	0.002283		0.01416	0.559825	0.009307		0.003739	0.121913	0.407779
739	2183	0.494394	0.227294	0.002847		0.018636	0.675048	0.012556		0.00474	0.151384	0.436305
740	2184	0.453101	0.241128	0.002838		0.01942	0.675287	0.013338		0.004987	0.138181	0.394366
741	2187	0.404218	0.110813	0.001683		0.010304	0.476089	0.007233		0.002985	0.090207	0.36747
742	2188	0.39586	0.141132	0.001879		0.011926	0.490684	0.008505		0.003366	0.10718	0.355455
743	2189	0.430853	0.200169	0.002353		0.015708	0.593783	0.011439		0.004243	0.133686	0.380304
744	2190	0.394835	0.212459	0.002354		0.01638	0.594331	0.012119		0.004309	0.122353	0.343731
745	2193	0.431866	0.118502	0.001707		0.010616	0.510933	0.008051		0.0033	0.096844	0.392638
746	2194	0.42291	0.151381	0.001927		0.012295	0.527084	0.009449		0.003713	0.115318	0.379789
747	2195	0.460251	0.215348	0.002444		0.016209	0.639746	0.012675		0.004661	0.144258	0.406319
748	2196	0.421741	0.228861	0.002464		0.016924	0.640677	0.013394		0.00466	0.132298	0.367226
749	2199	0.507018	0.138511	0.002036		0.011938	0.602863	0.009824		0.004022	0.113851	0.461003
750	2200	0.496469	0.177684	0.002298		0.013835	0.622543	0.01151		0.004515	0.135691	0.445899
751	2201	0.540246	0.253865	0.002906		0.018291	0.757522	0.015399		0.00564	0.170031	0.47702
752	2202	0.494994	0.270367	0.002917		0.019169	0.759071	0.016238		0.005582	0.15623	0.431105
753	2205	0.55438	0.15248	0.002236		0.01238	0.663142	0.011157		0.004589	0.123948	0.504114
754	2206	0.542798	0.193473	0.002523		0.014406	0.685568	0.013048		0.005139	0.147487	0.487575
755	2207	0.59058	0.277915	0.003186		0.019101	0.835668	0.017416		0.006389	0.184681	0.521572
756	2208	0.541044	0.296791	0.003187		0.020008	0.837983	0.018334		0.006283	0.169931	0.471347
757	2211	0.538372	0.149304	0.002143		0.011455	0.647702	0.011169		0.004633	0.119982	0.489609
758	2212	0.527078	0.187788	0.002421		0.013325	0.670322	0.013047		0.005182	0.141997	0.473525
759	2213	0.573398	0.269801	0.003062		0.017657	0.817594	0.017387		0.006425	0.176922	0.506511
760	2214	0.525238	0.288655	0.003116		0.018487	0.820446	0.01828		0.006295	0.162678	0.457719
761	2217	0.522382	0.14588	0.002016		0.010585	0.631571	0.01109		0.004646	0.117393	0.475126
762	2218	0.511382	0.183283	0.002281		0.012309	0.654247	0.012946		0.005197	0.137692	0.4595
763	2219	0.556251	0.261792	0.002923		0.016304	0.798052	0.017241		0.006443	0.169938	0.491484
764	2220	0.509475	0.280177	0.003005		0.017067	0.801304	0.01812		0.006314	0.155695	0.444124
765	2223	0.514314	0.144487	0.001881		0.009891	0.624488	0.011118		0.005107	0.118485	0.467864
766	2224	0.503442	0.181357	0.00213		0.011499	0.647484	0.012972		0.005544	0.13734	0.452462
767	2225	0.547548	0.257828	0.00277		0.015227	0.789798	0.017272		0.006551	0.167231	0.483935
768	2226	0.501447	0.275704	0.002849		0.015938	0.793358	0.018165		0.006435	0.152217	0.437287
769	2229	0.403421	0.113833	0.001362		0.007347	0.491571	0.008834		0.004524	0.096332	0.367063
770	2230	0.394863	0.142736	0.001561		0.00854	0.51008	0.010301		0.004961	0.110337	0.354971
771	2231	0.429405	0.202606	0.002024		0.011308	0.622197	0.013711		0.005916	0.13243	0.379651
772	2232	0.393213	0.215774	0.002076		0.011837	0.625176	0.014422		0.005543	0.11958	0.343047

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
773	2235	0.411259	0.116249	0.001312		0.007266	0.502052	0.009055		0.004906	0.100397	0.374252
774	2236	0.402517	0.145642	0.001503		0.008431	0.521185	0.010555		0.005409	0.114304	0.361921
775	2237	0.437698	0.206649	0.001943		0.011137	0.635692	0.014041		0.006512	0.136147	0.387079
776	2238	0.400782	0.219362	0.001986		0.01166	0.638812	0.014761		0.006169	0.122375	0.349756
777	2241	0.521822	0.147693	0.001465		0.008712	0.638916	0.011557		0.006831	0.131691	0.475018
778	2242	0.510688	0.185017	0.001672		0.010106	0.663738	0.013459		0.007595	0.148711	0.459365
779	2243	0.555258	0.261856	0.002146		0.013348	0.809099	0.017878		0.009279	0.175272	0.491294
780	2244	0.508371	0.277861	0.002294		0.013943	0.813199	0.018765		0.008934	0.156494	0.44392
781	2247	0.521656	0.147499	0.001229		0.008178	0.640528	0.011578		0.007376	0.133857	0.475055
782	2248	0.510487	0.184768	0.001399		0.009484	0.665841	0.013469		0.00826	0.150612	0.459404
783	2249	0.55497	0.260697	0.002001		0.012523	0.810423	0.017863		0.010223	0.176653	0.491341
784	2250	0.508054	0.276701	0.002224		0.013083	0.814649	0.01872		0.009978	0.157221	0.443966
785	2253	0.521489	0.14699	0.001091		0.007619	0.642125	0.011562		0.007854	0.133294	0.47512
786	2254	0.510282	0.184122	0.001325		0.00883	0.667883	0.01344		0.008851	0.150185	0.459476
787	2255	0.554682	0.258992	0.0019		0.011652	0.81072	0.017798		0.011074	0.17643	0.491428
788	2256	0.507733	0.274946	0.002146		0.01217	0.815099	0.018629		0.010934	0.157144	0.444051
789	2259	0.52132	0.14621	0.001064		0.007035	0.643658	0.011517		0.008254	0.130549	0.47521
790	2260	0.510078	0.183125	0.001231		0.008147	0.669814	0.013379		0.00935	0.147974	0.459575
791	2261	0.554394	0.257036	0.001772		0.01074	0.810062	0.017701		0.011797	0.175112	0.491548
792	2262	0.507418	0.272828	0.002085		0.011212	0.814614	0.018509		0.011746	0.156595	0.444164
793	2265	0.46193	0.128679	0.000937		0.005698	0.571694	0.010144		0.007596	0.112552	0.421307
794	2266	0.451934	0.161135	0.00109		0.006592	0.595186	0.01178		0.008634	0.128787	0.407459
795	2267	0.491145	0.226088	0.001509		0.008682	0.716749	0.015581		0.01095	0.154115	0.43582
796	2268	0.449485	0.239818	0.001779		0.009133	0.720897	0.016291		0.010953	0.138592	0.393812
797	2271	0.402607	0.111416	0.000808		0.004595	0.499017	0.008782		0.006763	0.0963	0.367368
798	2272	0.393875	0.139492	0.000937		0.005312	0.519671	0.010198		0.007698	0.111105	0.355304
799	2273	0.428013	0.195958	0.00127		0.00705	0.62372	0.013491		0.009782	0.134206	0.380046
800	2274	0.391683	0.207689	0.001497		0.007458	0.627354	0.014114		0.009797	0.12118	0.343418
801	2277	0.4617	0.126735	0.000906		0.004833	0.572905	0.009983		0.007875	0.10901	0.421486
802	2278	0.451661	0.158854	0.001049		0.00561	0.596762	0.01159		0.008968	0.126823	0.407658
803	2279	0.490773	0.223419	0.001398		0.007511	0.713911	0.015334		0.011398	0.154568	0.436062
804	2280	0.449086	0.236578	0.001666		0.007952	0.71803	0.016052		0.01141	0.140008	0.394041
805	2283	0.520728	0.141423	0.001014		0.004838	0.646784	0.011088		0.008994	0.121826	0.475663
806	2284	0.509373	0.177952	0.001176		0.00566	0.673885	0.012868		0.010237	0.143183	0.46008
807	2285	0.55343	0.249768	0.001567		0.007588	0.802815	0.017018		0.012986	0.17629	0.492164
808	2286	0.506381	0.26421	0.001861		0.008045	0.80729	0.017808		0.012971	0.160097	0.444753
809	2289	0.520567	0.140108	0.001021		0.004226	0.646996	0.010868		0.009052	0.121108	0.475806
810	2290	0.509185	0.176069	0.001179		0.004948	0.674219	0.012602		0.010286	0.143533	0.460241
811	2291	0.553175	0.246823	0.001624		0.006645	0.799641	0.016646		0.013005	0.178122	0.492368
812	2292	0.506111	0.260959	0.001887		0.00706	0.803864	0.017393		0.012937	0.161959	0.444958
813	2295	0.520415	0.138103	0.001105		0.003571	0.647149	0.010605		0.009079	0.11985	0.475943
814	2296	0.509005	0.173716	0.001289		0.004188	0.675226	0.012285		0.010292	0.142949	0.460397
815	2297	0.552934	0.244373	0.001718		0.005641	0.795714	0.0162		0.012958	0.178433	0.492565
816	2298	0.505852	0.257993	0.00197		0.00601	0.799652	0.016902		0.012832	0.162359	0.445157
817	2301	0.520273	0.136706	0.001243		0.002968	0.647333	0.010313		0.009091	0.117475	0.47607
818	2302	0.508839	0.172771	0.001444		0.00343	0.675785	0.011933		0.010275	0.140699	0.46054
819	2303	0.552709	0.243142	0.001916		0.004619	0.794772	0.015707		0.012874	0.176272	0.492746
820	2304	0.505613	0.256827	0.002029		0.004929	0.794562	0.016364		0.012693	0.160446	0.445338
821	2307	0.512265	0.134424	0.0014		0.003302	0.637683	0.009853		0.00896	0.112455	0.468967
822	2308	0.500982	0.169296	0.001627		0.003714	0.66461	0.011388		0.010089	0.134847	0.453687
823	2309	0.544137	0.237762	0.002153		0.004669	0.781958	0.014966		0.012569	0.16904	0.485437
824	2310	0.497741	0.251296	0.002263		0.004758	0.778253	0.015568		0.012327	0.153743	0.438745
825	2313	0.401849	0.105569	0.00122		0.003201	0.50034	0.007494		0.007036	0.085705	0.368028
826	2314	0.392983	0.132975	0.001422		0.003616	0.521368	0.008654		0.007889	0.102482	0.356049
827	2315	0.426809	0.186172	0.00189		0.004614	0.612533	0.011363		0.00976	0.127986	0.380983
828	2316	0.390398	0.195763	0.001984		0.0048	0.609745	0.011813		0.00951	0.116065	0.344349
829	2319	0.409686	0.107537	0.00131		0.00364	0.510043	0.007497		0.00718	0.086105	0.375278
830	2320	0.400639	0.13548	0.001528		0.004122	0.53143	0.008654		0.008027	0.102581	0.363069
831	2321	0.43511	0.189728	0.002036		0.00535	0.624259	0.011359		0.009886	0.127511	0.388506
832	2322	0.39798	0.199548	0.002141		0.005548	0.620626	0.011813		0.009588	0.115276	0.351156
833	2325	0.519912	0.135912	0.001787		0.005571	0.646826	0.009197		0.009132	0.107392	0.476367
834	2326	0.508414	0.171311	0.002089		0.006405	0.673809	0.010609		0.010158	0.12661	0.460881
835	2327	0.552134	0.24007	0.002791		0.008329	0.791406	0.013922		0.012411	0.155364	0.493192
836	2328	0.504994	0.252644	0.002944		0.008574	0.7833	0.014487		0.011946	0.139275	0.445799
837	2331	0.519863	0.134979	0.001882		0.00663	0.645933	0.008873		0.009159	0.106407	0.476385
838	2332	0.508357	0.170236	0.002205		0.007621	0.673712	0.010226		0.01014	0.123791	0.460905
839	2333	0.552049	0.23876	0.002953		0.009912	0.79228	0.013405		0.012299	0.149377	0.493231
840	2334	0.504898	0.251447	0.003121		0.010207	0.776024	0.013941		0.011758	0.132406	0.445853
841	2337	0.519846	0.133837	0.001947		0.007724	0.647529	0.008543		0.009185	0.105809	0.476364
842	2338	0.508332	0.16888	0.002282		0.008877	0.675673	0.009829		0.010126	0.120993	0.460879

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
843	2339	0.552007	0.237033	0.003061		0.011543	0.793891	0.012858		0.01221	0.143537	0.493202
844	2340	0.504841	0.249799	0.00324		0.011884	0.766741	0.013346		0.011614	0.125743	0.445831
845	2343	0.519863	0.132615	0.001977		0.008857	0.649275	0.008205		0.00919	0.109428	0.476298
846	2344	0.508348	0.167382	0.002318		0.010176	0.677361	0.009421		0.010095	0.117119	0.460801
847	2345	0.552016	0.235029	0.003112		0.013228	0.795217	0.012281		0.012117	0.137076	0.493094
848	2346	0.504835	0.247807	0.003296		0.013611	0.764316	0.012716		0.011482	0.11896	0.445715
849	2349	0.460835	0.116451	0.001806		0.008892	0.576104	0.006973		0.008111	0.094565	0.422079
850	2350	0.450634	0.146971	0.002078		0.010215	0.600943	0.00798		0.008882	0.100201	0.408323
851	2351	0.489347	0.206371	0.002753		0.013272	0.70509	0.010356		0.010617	0.11468	0.436899
852	2352	0.447517	0.217629	0.002915		0.013649	0.677146	0.010677		0.01003	0.099005	0.394885
853	2355	0.401807	0.103309	0.001615		0.008477	0.502087	0.005879		0.007014	0.077076	0.367884
854	2356	0.392922	0.129293	0.001855		0.009738	0.523709	0.006711		0.007663	0.081681	0.355874
855	2357	0.426685	0.178786	0.002409		0.012649	0.614297	0.008665		0.009131	0.094746	0.380746
856	2358	0.390213	0.188236	0.002506		0.013002	0.589679	0.008894		0.008605	0.081723	0.344103
857	2361	0.46098	0.123584	0.001893		0.010579	0.575563	0.006525		0.007937	0.079438	0.421877
858	2362	0.450802	0.154172	0.002173		0.012157	0.600358	0.007421		0.008653	0.087966	0.408078
859	2363	0.489557	0.212061	0.002818		0.015788	0.704053	0.009532		0.010279	0.102252	0.436556
860	2364	0.447715	0.219114	0.00289		0.01622	0.675523	0.009804		0.009659	0.088326	0.394507
861	23658	0.540789	0.118042	0.033146		0.131439	0.599688	0.053967		0.020526	0.032928	0.504796
862	23659	0.625628	0.153098	0.027346		0.150413	0.709613	0.045539		0.023433	0.043889	0.583167
863	23660	0.710432	0.201565	0.020317		0.166728	0.840253	0.034816		0.025847	0.058763	0.660531
864	23661	0.705042	0.229467	0.014907		0.160276	0.877884	0.028225		0.024677	0.067188	0.654458
865	23662	0.437756	0.155147	0.008123		0.09705	0.563786	0.016235		0.014865	0.045495	0.406137
866	23663	0.343923	0.129287	0.007204		0.074699	0.453781	0.011936		0.011402	0.037944	0.319107
867	23664	0.455564	0.179314	0.010262		0.097198	0.61287	0.01498		0.014786	0.052664	0.422716
868	23665	0.720604	0.307572	0.017295		0.14841	1.004316	0.022766		0.022399	0.090464	0.668651
869	23666	0.576143	0.265493	0.015174		0.114134	0.831546	0.020692		0.017187	0.078305	0.535389
870	23667	0.509202	0.247802	0.014415		0.097649	0.754534	0.021244		0.014842	0.073255	0.479402
871	23668	0.509291	0.260489	0.015373		0.094452	0.775077	0.023953		0.014481	0.077177	0.486198
872	23669	0.608262	0.325407	0.0194		0.109012	0.949169	0.030371		0.01691	0.096613	0.588442
873	2367	0.520239	0.14851	0.002186		0.013227	0.6496	0.007052		0.008717	0.07983	0.475787
874	23670	0.451442	0.251275	0.015109		0.078154	0.720935	0.022817		0.012252	0.074839	0.440229
875	23671	0.353194	0.202166	0.0122		0.059426	0.573671	0.017821		0.009369	0.060339	0.346161
876	23672	0.393514	0.229955	0.01393		0.064679	0.647462	0.020101		0.010257	0.068728	0.387115
877	23673	0.465222	0.279901	0.017108		0.073679	0.779946	0.02401		0.011781	0.083798	0.460089
878	23674	0.554938	0.342467	0.021119		0.084685	0.946292	0.029733		0.013692	0.102671	0.55127
879	23675	0.438696	0.276845	0.017269		0.064423	0.759858	0.024787		0.010519	0.083237	0.435952
880	23676	0.420945	0.27065	0.016975		0.059489	0.739125	0.023882		0.00976	0.081588	0.418416
881	23677	0.443509	0.290032	0.018244		0.060366	0.78888	0.02609		0.009908	0.087651	0.441196
882	23678	0.466122	0.310028	0.019496		0.060703	0.840418	0.028425		0.010228	0.093946	0.464265
883	23679	0.628472	0.424319	0.026511		0.078153	1.147577	0.039228		0.013722	0.128912	0.626242
884	2368	0.508785	0.184418	0.002508		0.015206	0.677704	0.007992		0.009479	0.09049	0.460186
885	23680	0.592247	0.406022	0.025541		0.069185	1.097044	0.038641		0.012798	0.123937	0.586279
886	23681	0.525418	0.364771	0.023138		0.057195	0.985875	0.034945		0.010917	0.11185	0.516014
887	23682	0.458435	0.320885	0.020522		0.047003	0.868061	0.030594		0.009213	0.098729	0.447722
888	23683	0.589616	0.415524	0.026781		0.056689	1.125844	0.039223		0.011353	0.128295	0.572824
889	23684	0.57636	0.408215	0.026758		0.051907	1.109529	0.039512		0.010476	0.126713	0.554742
890	23685	0.631213	0.448666	0.029838		0.052992	1.225744	0.044648		0.010629	0.140259	0.601899
891	23686	0.614019	0.436939	0.029321		0.047755	1.201423	0.044453		0.009523	0.137644	0.582073
892	23687	0.6975	0.495788	0.033321		0.050237	1.373056	0.050978		0.009957	0.157358	0.659229
893	23688	0.588519	0.416524	0.028175		0.039018	1.163621	0.044356		0.007708	0.133325	0.553657
894	23689	0.462404	0.325341	0.022065		0.028125	0.917312	0.035272		0.005578	0.104989	0.434365
895	2369	0.552569	0.251609	0.003251		0.019763	0.794506	0.010203		0.011218	0.105824	0.492238
896	23690	0.471871	0.330618	0.022477		0.027195	0.93759	0.036002		0.005417	0.107198	0.443721
897	23691	0.701053	0.486954	0.033232		0.036582	1.395805	0.052833		0.008476	0.15917	0.661818
898	23692	0.600685	0.413876	0.028566		0.029791	1.196549	0.046484		0.007941	0.135999	0.567764
899	23693	0.601603	0.412106	0.02845		0.029366	1.197839	0.047403		0.008514	0.135541	0.56969
900	23694	0.602531	0.409754	0.028122		0.028856	1.198178	0.047733		0.009419	0.134827	0.571992
901	23695	0.636129	0.428852	0.029042		0.032348	1.262305	0.050029		0.010802	0.141108	0.605188
902	23696	0.466853	0.312046	0.021092		0.025041	0.923879	0.037229		0.008358	0.102712	0.44325
903	23697	0.536151	0.355009	0.02383		0.030166	1.057526	0.043045		0.010068	0.116875	0.50817
904	23698	0.605827	0.395908	0.026278		0.035989	1.189078	0.048714		0.01197	0.130343	0.573992
905	23699	0.709178	0.456795	0.02984		0.045713	1.383952	0.056641		0.014529	0.150372	0.672187
906	2370	0.50536	0.257903	0.003346		0.020294	0.761614	0.010607		0.010508	0.091783	0.444779
907	23700	0.607658	0.384696	0.025319		0.04325	1.177304	0.049475		0.012791	0.126738	0.57314
908	23701	0.60857	0.378043	0.025122		0.047302	1.169535	0.050014		0.013546	0.124621	0.571022
909	23702	0.60023	0.370675	0.024308		0.050422	1.1433	0.049267		0.014035	0.120472	0.560938
910	23703	0.573363	0.351877	0.022839		0.051422	1.081928	0.046441		0.01396	0.112681	0.534447
911	23704	0.481223	0.293846	0.019031		0.044727	0.902398	0.039237		0.011959	0.093331	0.447156
912	23705	0.611613	0.369744	0.024065		0.060184	1.133645	0.049918		0.015649	0.11617	0.566312

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
913	23706	0.612396	0.367249	0.023928		0.063354	1.121192	0.049692		0.015998	0.114871	0.566782
914	23707	0.716619	0.427892	0.029582		0.077386	1.294971	0.058008		0.018978	0.132543	0.663725
915	23708	0.613765	0.363989	0.026667		0.068837	1.093575	0.050266		0.016346	0.111253	0.56612
916	23709	0.544529	0.320261	0.024618		0.063107	0.957047	0.044357		0.014543	0.096439	0.500421
917	23710	0.475007	0.277346	0.022067		0.056255	0.826629	0.03869		0.013973	0.082502	0.436002
918	23711	0.648323	0.37546	0.031178		0.078514	1.116566	0.052503		0.020677	0.110298	0.595184
919	23712	0.615315	0.351732	0.031796		0.077527	1.044004	0.050435		0.021224	0.101471	0.564008
920	23713	0.4756	0.271942	0.026278		0.062087	0.794237	0.039029		0.01732	0.075983	0.436589
921	23714	0.307755	0.177196	0.017564		0.040873	0.510882	0.025188		0.011427	0.048334	0.283082
922	23715	0.521788	0.301962	0.030419		0.070199	0.862557	0.042924		0.019589	0.080787	0.480733
923	23716	0.559644	0.325888	0.033679		0.077136	0.915792	0.049946		0.021061	0.084005	0.514921
924	23717	0.560049	0.32699	0.034378		0.078826	0.905691	0.051992		0.020669	0.082252	0.514442
925	23718	0.663938	0.387534	0.042884		0.095103	1.059911	0.061239		0.023594	0.095099	0.609388
926	23719	0.560677	0.325457	0.037503		0.081655	0.88153	0.049553		0.018712	0.078478	0.512445
927	23720	0.579648	0.333328	0.039774		0.085725	0.896124	0.048014		0.017737	0.078775	0.528443
928	23721	0.561225	0.318213	0.039326		0.084281	0.853381	0.043731		0.015265	0.073259	0.511616
929	23722	0.514122	0.286894	0.03625		0.078692	0.769992	0.038529		0.012372	0.064297	0.468915
930	23723	0.458628	0.252991	0.032007		0.071031	0.680219	0.033979		0.010917	0.05602	0.417386
931	23724	0.618089	0.33136	0.041556		0.098066	0.899064	0.045398		0.014667	0.071375	0.559255
932	23725	0.618464	0.320627	0.039687		0.100472	0.882192	0.044487		0.014612	0.068069	0.556084
933	23726	0.723355	0.360699	0.044101		0.12023	1.010506	0.048978		0.017002	0.075584	0.64618
934	23727	0.619349	0.294907	0.034782		0.105456	0.8457	0.037651		0.014496	0.06113	0.547712
935	23728	0.619905	0.280066	0.0317		0.10819	0.826181	0.032411		0.01448	0.057482	0.546066
936	23729	0.620539	0.264378	0.028497		0.111048	0.806203	0.027267		0.014505	0.053739	0.545931
937	2373	0.402153	0.123371	0.001754		0.011245	0.503805	0.005222		0.006481	0.055905	0.367507
938	23730	0.726123	0.289871	0.029034		0.133192	0.918525	0.026405		0.017026	0.058316	0.639345
939	23731	0.622019	0.230824	0.020153		0.117028	0.764886	0.019765		0.014682	0.045884	0.548874
940	23732	0.67947	0.232556	0.016678		0.131036	0.811293	0.021258		0.016353	0.045564	0.599633
941	23733	0.814961	0.251085	0.019931		0.161396	0.938731	0.026205		0.020107	0.048087	0.718894
942	23734	0.681404	0.188817	0.022461		0.137936	0.758423	0.025139		0.017156	0.035083	0.601408
943	23735	0.682122	0.16882	0.034654		0.140417	0.73578	0.038042		0.017447	0.029983	0.603192
944	23736	0.568819	0.125718	0.04199		0.118175	0.594951	0.046657		0.014685	0.020806	0.503506
945	23737	0.643735	0.140237	0.035045		0.113877	0.668895	0.037597		0.015186	0.02332	0.563608
946	23738	0.647459	0.137521	0.027458		0.096289	0.667744	0.028013		0.018362	0.023079	0.559667
947	23739	0.650946	0.13364	0.023739		0.079873	0.666064	0.02403		0.024324	0.022741	0.556299
948	2374	0.393337	0.152589	0.002024		0.012949	0.525851	0.005891		0.007035	0.063595	0.355425
949	23740	0.745069	0.146788	0.026588		0.074704	0.756189	0.029325		0.031403	0.02545	0.63221
950	23741	0.839798	0.157721	0.035724		0.077936	0.845259	0.040733		0.03543	0.027987	0.709943
951	23742	0.832837	0.148055	0.046533		0.070698	0.829989	0.053937		0.031441	0.027393	0.702818
952	23743	0.844348	0.141359	0.063297		0.071765	0.832196	0.074316		0.025608	0.027347	0.710134
953	23744	0.855721	0.134249	0.087131		0.098364	0.833548	0.102485		0.017761	0.027067	0.714816
954	23745	1.027429	0.206479	0.102741		0.119386	1.040756	0.130268		0.020057	0.039063	0.857848
955	23746	1.027378	0.248726	0.097029		0.11951	1.079187	0.13122		0.018631	0.04706	0.857122
956	23747	1.224434	0.343709	0.107104		0.141232	1.334073	0.157958		0.02009	0.065525	1.02691
957	23748	1.026311	0.328483	0.083221		0.11658	1.161903	0.137059		0.016958	0.063362	0.866474
958	23749	0.940211	0.330796	0.070982		0.104906	1.097523	0.126478		0.015761	0.064364	0.794036
959	2375	0.427239	0.206524	0.002653		0.016857	0.61624	0.007565		0.008301	0.074766	0.380135
960	23750	1.089621	0.416461	0.084261		0.118974	1.309532	0.144		0.018524	0.08159	0.915791
961	23751	0.938764	0.385991	0.076608		0.100007	1.160082	0.121532		0.016173	0.07613	0.782501
962	23752	0.937955	0.411512	0.080302		0.097116	1.19031	0.120038		0.016271	0.081693	0.786739
963	23753	0.937105	0.435352	0.084929		0.093962	1.219738	0.121566		0.016222	0.08777	0.795368
964	23754	1.085674	0.530401	0.10659		0.104887	1.44756	0.146693		0.018591	0.109828	0.935764
965	23755	0.935041	0.477589	0.099902		0.086702	1.275666	0.135749		0.0157	0.100967	0.814343
966	23756	0.933916	0.495801	0.107212		0.082751	1.305536	0.14428		0.015193	0.107185	0.821753
967	23757	0.692468	0.379911	0.083767		0.058242	0.991876	0.111548		0.011185	0.08413	0.613344
968	23758	0.75986	0.422731	0.093442		0.062082	1.100336	0.123843		0.012319	0.094733	0.674482
969	23759	0.846269	0.481268	0.107259		0.065574	1.247974	0.142173		0.013774	0.109519	0.75179
970	2376	0.390767	0.209732	0.002761		0.017319	0.589828	0.00783		0.007759	0.065066	0.343453
971	23760	0.873374	0.50643	0.111834		0.063685	1.311703	0.148993		0.01423	0.117389	0.777506
972	23761	0.844467	0.494427	0.105454		0.058501	1.286477	0.142107		0.013684	0.116884	0.755559
973	23762	0.989341	0.579173	0.113941		0.065236	1.528642	0.15731		0.015806	0.140153	0.891943
974	23763	0.843096	0.489145	0.08597		0.05225	1.317809	0.124681		0.013128	0.121093	0.764949
975	23764	0.842048	0.481628	0.071881		0.048121	1.329231	0.111732		0.012668	0.123218	0.768587
976	23765	0.768568	0.432402	0.052822		0.03993	1.224009	0.09008		0.011138	0.115703	0.704445
977	23766	0.462191	0.257946	0.028293		0.022849	0.739235	0.051509		0.006558	0.070478	0.423682
978	23767	0.713804	0.39447	0.038921		0.033236	1.147285	0.075319		0.009851	0.110502	0.654023
979	23768	0.9228	0.506824	0.041394		0.038454	1.500881	0.090747		0.013056	0.147582	0.845263
980	23769	0.961107	0.534431	0.036428		0.035824	1.588747	0.088505		0.015009	0.158198	0.881819
981	23770	0.712197	0.399216	0.024145		0.0243	1.190875	0.063363		0.011797	0.119637	0.654623
982	23771	0.81663	0.460913	0.025326		0.025412	1.380319	0.069549		0.014296	0.13971	0.752286

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
983	23772	0.921019	0.523604	0.026582		0.025273	1.577405	0.072605		0.017241	0.160826	0.850177
984	23773	1.067943	0.610357	0.028571		0.025612	1.853722	0.07663		0.021306	0.189687	0.985034
985	23774	0.920756	0.528062	0.021782		0.019101	1.617595	0.062947		0.01947	0.165965	0.845031
986	23775	0.920761	0.53159	0.018827		0.016732	1.635568	0.061363		0.020654	0.168591	0.844162
987	23776	0.725526	0.422228	0.013565		0.011334	1.301826	0.047929		0.01721	0.135965	0.665728
988	23777	0.851747	0.497535	0.015593		0.01208	1.53643	0.05593		0.020827	0.161641	0.781635
989	23778	0.907156	0.532544	0.015631		0.01126	1.649409	0.0605		0.023118	0.175392	0.8325
990	23779	0.921341	0.54273	0.015272		0.010641	1.687361	0.059313		0.024323	0.181325	0.850691
991	23780	0.921627	0.551894	0.014813		0.011275	1.698464	0.053553		0.025001	0.184365	0.855677
992	23781	1.069232	0.65023	0.015945		0.014686	1.980846	0.055697		0.029559	0.217134	0.9957
993	23782	0.922308	0.56862	0.013302		0.014556	1.715418	0.047184		0.025536	0.189648	0.856877
994	23783	0.817845	0.510351	0.012457		0.0146	1.525694	0.041441		0.022336	0.170183	0.757181
995	23784	0.713245	0.448783	0.011191		0.013865	1.332788	0.035894		0.019073	0.149726	0.65866
996	23785	0.962416	0.610004	0.015567		0.020186	1.800365	0.049427		0.024937	0.203702	0.886473
997	23786	0.923789	0.590113	0.01784		0.021183	1.728575	0.052463		0.022553	0.197097	0.846117
998	23787	0.924243	0.593868	0.019766		0.02297	1.728232	0.053922		0.021004	0.19842	0.841209
999	23788	0.924722	0.59643	0.020145		0.024688	1.726272	0.050878		0.019333	0.199306	0.836456
1000	23789	1.073021	0.698116	0.022157		0.030527	1.997838	0.052641		0.020251	0.231629	0.971589
1001	2379	0.260277	0.083265	0.001216		0.007644	0.3272	0.003295		0.004085	0.03441	0.237746
1002	23790	0.72937	0.477965	0.015778		0.022058	1.352664	0.034366		0.012149	0.157108	0.660808
1003	23791	0.715581	0.470431	0.015884		0.022416	1.323483	0.033663		0.011031	0.153798	0.648635
1004	23792	0.912535	0.602263	0.019297		0.030232	1.678759	0.044334		0.012905	0.195095	0.82816
1005	23793	1.075227	0.711175	0.022081		0.037554	1.965281	0.055299		0.014797	0.228211	0.977428
1006	23794	0.955784	0.631938	0.019234		0.035077	1.733366	0.053776		0.012697	0.200751	0.869632
1007	23795	0.98451	0.648859	0.020124		0.037924	1.768622	0.056802		0.01256	0.204164	0.898358
1008	23796	0.900691	0.589936	0.020679		0.03626	1.600816	0.04905		0.011234	0.184163	0.825906
1009	23797	0.910418	0.59197	0.022962		0.037906	1.602335	0.045268		0.011118	0.18384	0.838469
1010	23798	0.71843	0.463287	0.019074		0.030798	1.252372	0.034246		0.008813	0.143189	0.662807
1011	23799	0.824447	0.526521	0.023056		0.036364	1.42242	0.037892		0.010218	0.162098	0.763608
1012	2380	0.254588	0.102844	0.001354		0.008812	0.341671	0.003721		0.004431	0.039146	0.229919
1013	23800	0.930677	0.585761	0.028224		0.042552	1.582696	0.041344		0.012257	0.179648	0.866405
1014	23801	0.977871	0.60514	0.031863		0.046229	1.637196	0.042888		0.013797	0.185089	0.913349
1015	23802	0.733974	0.447217	0.025145		0.035595	1.212476	0.033767		0.01087	0.136415	0.684515
1016	23803	0.698972	0.418481	0.025145		0.03473	1.138253	0.033633		0.010815	0.127365	0.650066
1017	23804	0.663912	0.390576	0.024933		0.033664	1.066521	0.032999		0.010652	0.118659	0.615654
1018	23805	0.692413	0.399534	0.027074		0.035769	1.096413	0.035266		0.011488	0.12117	0.640151
1019	23806	0.862886	0.48661	0.035051		0.04538	1.344092	0.044871		0.014816	0.147274	0.794854
1020	23807	0.735362	0.40427	0.03081		0.039343	1.125465	0.040142		0.013032	0.121904	0.672939
1021	23808	0.622472	0.332363	0.02723		0.033867	0.934341	0.035487		0.011363	0.099791	0.564939
1022	23809	0.558956	0.292339	0.025267		0.030736	0.827841	0.032693		0.010394	0.0875	0.504041
1023	2381	0.276557	0.138732	0.001779		0.01149	0.400342	0.004777		0.005224	0.046031	0.245887
1024	23810	0.714853	0.363531	0.033578		0.039819	1.04024	0.043084		0.013588	0.108371	0.638661
1025	23811	0.952247	0.465379	0.04687		0.053865	1.35283	0.06		0.018584	0.138041	0.838928
1026	23812	0.807567	0.377451	0.041912		0.046972	1.118143	0.055525		0.016153	0.111388	0.699307
1027	23813	0.807934	0.359167	0.044197		0.048256	1.088416	0.061409		0.016534	0.105655	0.688005
1028	23814	0.914686	0.384475	0.054263		0.056015	1.198997	0.077291		0.019117	0.113067	0.771062
1029	23815	1.137456	0.441197	0.073393		0.071585	1.438053	0.109102		0.024255	0.130221	0.957315
1030	23816	0.724169	0.25772	0.04964		0.046506	0.882313	0.077517		0.015522	0.076319	0.608308
1031	23817	0.546907	0.185169	0.039244		0.035429	0.652698	0.061034		0.011719	0.054877	0.458678
1032	23818	0.696395	0.220892	0.052707		0.045612	0.809622	0.080483		0.014963	0.065448	0.58246
1033	23819	1.114098	0.320381	0.090304		0.073933	1.24831	0.131891		0.024055	0.094969	0.930855
1034	2382	0.252964	0.1402	0.001848		0.011816	0.382786	0.004938		0.004879	0.04167	0.222222
1035	23820	1.131081	0.274133	0.10112		0.076099	1.196885	0.136746		0.024439	0.082042	0.945963
1036	23821	0.996125	0.192361	0.096202		0.067776	1.010168	0.119731		0.020961	0.059471	0.833828
1037	23822	0.860672	0.132912	0.085225		0.058593	0.847657	0.096928		0.01703	0.042407	0.720755
1038	23823	0.8452	0.13886	0.062857		0.031527	0.844476	0.067678		0.012978	0.042958	0.713947
1039	23824	0.829804	0.144025	0.047415		0.0255	0.840916	0.045801		0.010934	0.043444	0.707352
1040	23825	0.831615	0.152032	0.040976		0.041659	0.855251	0.037548		0.014147	0.044826	0.716215
1041	23826	0.732188	0.140346	0.032861		0.059705	0.764258	0.025967		0.016133	0.040597	0.637961
1042	23827	0.634767	0.126912	0.02654		0.074547	0.672522	0.022414		0.01674	0.036215	0.560524
1043	23828	0.626372	0.129879	0.02502		0.097461	0.673683	0.029662		0.018835	0.036677	0.562203
1044	23829	0.617596	0.131909	0.02702		0.121634	0.674445	0.043048		0.020481	0.03698	0.565367
1045	23830	0.977948	0.195791	0.076124		0.036973	1.00436	0.095487		0.015833	0.059427	0.825079
1046	23831	1.110703	0.274769	0.090069		0.043223	1.189727	0.129283		0.019188	0.081687	0.943617
1047	23832	1.063115	0.31021	0.084301		0.042223	1.204133	0.138055		0.018898	0.091688	0.92707
1048	23833	0.684207	0.219815	0.055051		0.027422	0.803529	0.092332		0.012265	0.064866	0.614557
1049	23834	0.53746	0.184102	0.043658		0.021667	0.647578	0.072436		0.00968	0.054279	0.494399
1050	23835	0.711801	0.256082	0.057836		0.028802	0.875317	0.093863		0.012846	0.075437	0.664953
1051	23836	1.086294	0.425288	0.086106		0.044113	1.385666	0.132084		0.019547	0.125028	1.036834
1052	23837	0.899399	0.381326	0.06663		0.036426	1.189499	0.099567		0.015955	0.111826	0.876325

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1053	23838	0.794519	0.356239	0.055282		0.032073	1.079828	0.082183		0.013829	0.104472	0.789549
1054	23839	0.794225	0.374388	0.053963		0.031911	1.109277	0.077937		0.013509	0.110048	0.807735
1055	23840	0.910463	0.448728	0.061066		0.036411	1.304579	0.08671		0.015093	0.132443	0.94786
1056	23841	0.703148	0.360626	0.047155		0.027916	1.031979	0.067315		0.011342	0.106872	0.746605
1057	23842	0.549836	0.29	0.036862		0.021693	0.821261	0.052839		0.008685	0.086231	0.589989
1058	23843	0.612344	0.329737	0.040955		0.024024	0.926953	0.058634		0.009509	0.098304	0.66051
1059	23844	0.723449	0.401067	0.047981		0.028112	1.116501	0.068124		0.010932	0.120019	0.783048
1060	23845	0.825675	0.469564	0.053952		0.031734	1.296736	0.076158		0.01218	0.14098	0.900526
1061	23846	0.681298	0.396538	0.043664		0.025811	1.087701	0.062817		0.009822	0.119285	0.747899
1062	23847	0.653305	0.387729	0.040882		0.024361	1.058063	0.060191		0.009192	0.116846	0.720666
1063	23848	0.687861	0.415506	0.041833		0.025165	1.129263	0.062815		0.009392	0.125478	0.761653
1064	23849	0.722378	0.444021	0.042423		0.025798	1.202863	0.064607		0.009452	0.134456	0.801782
1065	2385	0.354994	0.117701	0.001764		0.010842	0.447935	0.004402		0.005433	0.04512	0.324138
1066	23850	0.935543	0.583882	0.053002		0.032534	1.578619	0.081792		0.011581	0.177377	1.038107
1067	23851	0.916202	0.581378	0.05131		0.030708	1.570174	0.080911		0.010383	0.177198	1.012336
1068	23852	0.811753	0.522466	0.044429		0.026205	1.411164	0.073553		0.008457	0.159907	0.889236
1069	23853	0.70746	0.459681	0.037633		0.022189	1.242435	0.065966		0.007343	0.141258	0.76875
1070	23854	0.871789	0.571063	0.044608		0.026579	1.545461	0.084852		0.009332	0.176332	0.939871
1071	23855	0.887208	0.585422	0.042825		0.026166	1.58811	0.093559		0.010122	0.181729	0.949722
1072	23856	0.969977	0.643938	0.043456		0.027422	1.754605	0.108815		0.011925	0.201502	1.030817
1073	23857	0.941882	0.627069	0.039678		0.025429	1.7196	0.10426		0.012297	0.198116	0.993355
1074	23858	1.029674	0.685417	0.041489		0.026644	1.894079	0.106243		0.01401	0.218702	1.076797
1075	23859	0.899667	0.597352	0.034466		0.022227	1.665394	0.087512		0.014019	0.192353	0.933118
1076	2386	0.347258	0.145291	0.001902		0.012515	0.467972	0.004958		0.005891	0.051256	0.313454
1077	23860	0.705649	0.466572	0.026684		0.016612	1.312932	0.066282		0.012248	0.15157	0.727746
1078	23861	0.719347	0.474084	0.026351		0.016433	1.341865	0.067487		0.013138	0.154818	0.740996
1079	23862	1.028422	0.672914	0.034694		0.022248	1.925364	0.100712		0.020264	0.221769	1.062189
1080	23863	0.912465	0.592473	0.031601		0.018597	1.712453	0.098644		0.019106	0.196507	0.95052
1081	23864	0.912218	0.58999	0.030831		0.017391	1.71441	0.104644		0.020193	0.195724	0.960372
1082	23865	0.911996	0.586288	0.028071		0.016135	1.714706	0.102813		0.021241	0.194474	0.969536
1083	23866	0.923749	0.589102	0.029564		0.015049	1.73577	0.096295		0.022496	0.195342	0.99013
1084	23867	0.704448	0.445968	0.022864		0.010699	1.322034	0.07036		0.017596	0.147716	0.759736
1085	23868	0.807913	0.507257	0.02611		0.011365	1.513383	0.080872		0.020581	0.167881	0.876387
1086	23869	0.911322	0.565328	0.029999		0.011498	1.70152	0.091643		0.023545	0.187076	0.994679
1087	2387	0.377259	0.195695	0.002493		0.016348	0.548371	0.006388		0.006943	0.060106	0.335243
1088	23870	1.026675	0.628221	0.034985		0.012475	1.908754	0.105262		0.026505	0.208103	1.123388
1089	23871	0.911073	0.548979	0.031477		0.011988	1.684663	0.103469		0.023093	0.181955	0.99352
1090	23872	0.911002	0.539792	0.031443		0.013319	1.673664	0.112659		0.022431	0.178996	0.983676
1091	23873	0.89718	0.529544	0.030693		0.014524	1.63599	0.1137		0.021207	0.173125	0.955698
1092	23874	0.819433	0.481038	0.02955		0.014712	1.482014	0.102197		0.01839	0.155112	0.862899
1093	23875	0.717796	0.419705	0.0268		0.013766	1.291176	0.089372		0.015503	0.134135	0.753151
1094	23876	0.911165	0.528333	0.036695		0.019385	1.62223	0.114102		0.01826	0.166892	0.955794
1095	23877	0.911356	0.525069	0.040602		0.02131	1.604326	0.116852		0.016781	0.164821	0.960563
1096	23878	1.027182	0.589466	0.052093		0.026229	1.786059	0.138314		0.017221	0.183081	1.087992
1097	23879	0.912003	0.52039	0.050796		0.02529	1.564587	0.133426		0.013722	0.159849	0.96748
1098	2388	0.345098	0.19707	0.002598		0.016831	0.525214	0.006577		0.006485	0.056156	0.303022
1099	23880	0.808796	0.457989	0.048824		0.024289	1.369364	0.126946		0.010754	0.138867	0.85533
1100	23881	0.705462	0.396599	0.04566		0.02295	1.181381	0.115006		0.008404	0.118892	0.743323
1101	23882	0.925473	0.515946	0.065269		0.032572	1.531851	0.155778		0.009676	0.152762	0.972862
1102	23883	0.91433	0.503281	0.075572		0.035581	1.489776	0.163212		0.010309	0.146615	0.963291
1103	23884	0.707293	0.39275	0.07079		0.030354	1.140246	0.134512		0.008649	0.109822	0.749286
1104	23885	0.45796	0.256694	0.05126		0.020699	0.734618	0.091431		0.005819	0.069761	0.486484
1105	23886	0.740999	0.418433	0.090619		0.034906	1.18346	0.154293		0.009686	0.111208	0.788275
1106	23887	0.833975	0.477592	0.121894		0.042184	1.319861	0.190504		0.011468	0.121774	0.886822
1107	23888	0.834644	0.483234	0.139809		0.044551	1.307399	0.20527		0.011985	0.118296	0.882675
1108	23889	0.951526	0.554276	0.175904		0.052727	1.472869	0.246319		0.014096	0.131585	0.99851
1109	23890	0.835415	0.486186	0.166698		0.047592	1.275142	0.226477		0.012622	0.112804	0.877609
1110	23891	0.863622	0.498402	0.179757		0.05051	1.300228	0.239637		0.013218	0.113252	0.909
1111	23892	0.836326	0.47462	0.175568		0.050753	1.238135	0.231604		0.012874	0.105607	0.884111
1112	23893	0.730492	0.406308	0.150875		0.046081	1.063067	0.19863		0.011566	0.088836	0.775394
1113	23894	0.683884	0.375297	0.139434		0.04413	0.984776	0.18408		0.010983	0.080993	0.726812
1114	23895	0.922101	0.489994	0.179725		0.062288	1.29649	0.238558		0.015145	0.103078	0.977305
1115	23896	0.923032	0.472234	0.167505		0.06512	1.2669	0.221806		0.015327	0.097092	0.966103
1116	23897	1.041055	0.509861	0.173011		0.076448	1.396922	0.227208		0.017217	0.103537	1.066545
1117	23898	0.924803	0.430869	0.141437		0.070392	1.211667	0.18692		0.015039	0.086712	0.924354
1118	23899	0.925593	0.40745	0.129471		0.072663	1.182583	0.177941		0.014677	0.081451	0.905626
1119	23900	0.926335	0.382476	0.116312		0.074684	1.152718	0.173815		0.01417	0.076073	0.892134
1120	23901	1.044541	0.40136	0.117231		0.08618	1.264412	0.19301		0.015194	0.079403	0.990788
1121	23902	0.927674	0.328622	0.092911		0.077963	1.090924	0.166967		0.014002	0.064618	0.860137
1122	23903	1.012608	0.326955	0.08831		0.086201	1.155069	0.169616		0.018198	0.063698	0.90584

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1123	23904	1.173097	0.333526	0.093244		0.100627	1.288221	0.169227		0.025353	0.064024	1.019144
1124	23905	1.013445	0.250281	0.079253		0.086781	1.073363	0.126495		0.025245	0.047417	0.862919
1125	23906	1.013362	0.210651	0.078758		0.086004	1.036253	0.108765		0.028336	0.039521	0.850024
1126	23907	0.959864	0.199319	0.062548		0.029695	0.998634	0.067556		0.012385	0.059519	0.816533
1127	23908	1.089929	0.275991	0.082207		0.034422	1.182668	0.103146		0.014402	0.081484	0.95163
1128	23909	1.044195	0.309777	0.082152		0.033932	1.196513	0.120708		0.014542	0.091168	0.968797
1129	2391	0.473534	0.177121	0.002628		0.015589	0.602722	0.005575		0.006827	0.057412	0.43202
1130	23910	0.671673	0.218892	0.053876		0.022315	0.797584	0.083203		0.009567	0.064323	0.657926
1131	23911	0.527659	0.183116	0.043784		0.017837	0.642651	0.065976		0.007608	0.053768	0.533239
1132	23912	0.698873	0.254515	0.058975		0.023959	0.868527	0.085817		0.010147	0.074681	0.720496
1133	23913	1.067366	0.422481	0.089633		0.037466	1.375561	0.121094		0.015553	0.123788	1.1321
1134	23914	0.883277	0.378403	0.072593		0.031564	1.180144	0.091933		0.012753	0.110646	0.965052
1135	23915	0.78035	0.353469	0.064577		0.028131	1.071353	0.077527		0.011113	0.103353	0.875767
1136	23916	0.780135	0.371463	0.065087		0.028212	1.100553	0.076032		0.010898	0.108809	0.901533
1137	23917	0.895064	0.445523	0.074912		0.032313	1.295227	0.087677		0.012212	0.130942	1.064107
1138	23918	0.690798	0.357791	0.05824		0.024788	1.023869	0.069389		0.009188	0.105507	0.841586
1139	23919	0.540217	0.287729	0.046037		0.01926	0.814839	0.05484		0.007048	0.085084	0.666408
1140	2392	0.46327	0.216834	0.00283		0.018023	0.630475	0.00629		0.007403	0.065753	0.417746
1141	23920	0.601666	0.327146	0.051561		0.021311	0.919691	0.060933		0.007873	0.096953	0.746277
1142	23921	0.710897	0.397931	0.061046		0.024861	1.107723	0.070713		0.009468	0.118302	0.883547
1143	23922	0.812095	0.466317	0.069335		0.027929	1.287544	0.079202		0.010937	0.13903	1.007435
1144	23923	0.6696	0.393577	0.056582		0.022531	1.079163	0.065484		0.008975	0.117553	0.830751
1145	23924	0.642145	0.384926	0.053427		0.021102	1.049812	0.063337		0.008409	0.115187	0.801601
1146	23925	0.676175	0.412548	0.055113		0.021605	1.120457	0.066958		0.008455	0.123738	0.847954
1147	23926	0.710182	0.440867	0.057746		0.021878	1.193461	0.069846		0.008163	0.132642	0.892918
1148	23927	0.92053	0.580075	0.075012		0.027194	1.567342	0.089189		0.010031	0.17516	1.156958
1149	23928	0.900984	0.577088	0.073662		0.025067	1.557926	0.086857		0.008984	0.17494	1.128005
1150	23929	0.798405	0.518517	0.064725		0.02083	1.40017	0.077049		0.007135	0.157905	0.990142
1151	2393	0.503423	0.286753	0.00352		0.023683	0.745264	0.008126		0.008725	0.075815	0.446976
1152	23930	0.695923	0.45616	0.055367		0.017228	1.232704	0.068045		0.006022	0.139493	0.854567
1153	23931	0.858368	0.567108	0.066366		0.020092	1.53447	0.086974		0.00797	0.174265	1.043682
1154	23932	0.873014	0.580986	0.064869		0.019084	1.575679	0.095525		0.008872	0.179512	1.052812
1155	23933	0.954664	0.639099	0.067412		0.019077	1.740928	0.111993		0.010622	0.199092	1.141376
1156	23934	0.927221	0.622265	0.06383		0.016699	1.70614	0.108518		0.011068	0.195729	1.097347
1157	23935	1.014542	0.680423	0.067638		0.017271	1.880362	0.11145		0.013841	0.216121	1.187139
1158	23936	0.886059	0.592526	0.056627		0.014533	1.652339	0.09101		0.013939	0.189909	1.026732
1159	23937	0.695135	0.462789	0.043016		0.010958	1.302656	0.068969		0.012009	0.149602	0.800135
1160	23938	0.708726	0.470259	0.042862		0.010897	1.331327	0.070861		0.01277	0.152786	0.814472
1161	23939	1.014153	0.668046	0.059086		0.014902	1.911362	0.105434		0.019349	0.218982	1.168745
1162	2394	0.460608	0.281988	0.003663		0.024514	0.718416	0.008373		0.008145	0.072181	0.404015
1163	23940	0.899423	0.588436	0.050871		0.012578	1.698992	0.104331		0.017888	0.193995	1.047791
1164	23941	0.899397	0.586035	0.049409		0.011892	1.700975	0.112193		0.018566	0.193303	1.061921
1165	23942	0.899393	0.582385	0.049538		0.011173	1.701207	0.111772		0.01922	0.192112	1.073766
1166	23943	0.911877	0.585625	0.050831		0.010582	1.723229	0.106279		0.020103	0.193107	1.099349
1167	23944	0.695009	0.443072	0.038835		0.008512	1.311578	0.079418		0.015585	0.145943	0.844939
1168	23945	0.797236	0.504048	0.044131		0.011012	1.501446	0.091451		0.018103	0.165883	0.977001
1169	23946	0.899494	0.561877	0.04853		0.014255	1.688038	0.104238		0.020564	0.184865	1.111078
1170	23947	1.014261	0.624924	0.056161		0.018477	1.894721	0.120708		0.023054	0.205785	1.256488
1171	23948	0.899661	0.545862	0.050604		0.018544	1.671276	0.117482		0.019955	0.179884	1.110881
1172	23949	0.899792	0.53662	0.050701		0.020684	1.660401	0.127086		0.019177	0.176984	1.097565
1173	23950	0.88633	0.526335	0.04922		0.022528	1.622959	0.127685		0.017863	0.171139	1.061146
1174	23951	0.810364	0.478417	0.045256		0.022623	1.471302	0.114909		0.015224	0.153381	0.953623
1175	23952	0.709345	0.417039	0.040214		0.020871	1.280824	0.100389		0.012648	0.132548	0.829806
1176	23953	0.900617	0.524896	0.05455		0.028817	1.609266	0.129019		0.014425	0.165943	1.050236
1177	23954	0.900977	0.521859	0.05944		0.031118	1.591439	0.133913		0.012702	0.163886	1.053315
1178	23955	1.016336	0.586088	0.074479		0.037718	1.772695	0.160687		0.012292	0.182161	1.191881
1179	23956	0.901909	0.516966	0.072909		0.035763	1.552332	0.155041		0.009007	0.158961	1.058502
1180	23957	0.799947	0.454879	0.070166		0.033742	1.358641	0.147232		0.006263	0.138071	0.935295
1181	23958	0.697797	0.393827	0.065394		0.030843	1.172076	0.133316		0.005336	0.118171	0.812703
1182	23959	0.916145	0.512595	0.092879		0.042483	1.520861	0.181035		0.007521	0.151907	1.065469
1183	23960	0.904446	0.499523	0.103819		0.044573	1.47906	0.189872		0.008431	0.145709	1.058482
1184	23961	0.699578	0.390347	0.094754		0.036523	1.132152	0.157327		0.007299	0.109218	0.827481
1185	23962	0.452914	0.254923	0.067688		0.024366	0.729298	0.107273		0.004977	0.069417	0.538575
1186	23963	0.73342	0.415566	0.118278		0.040416	1.175772	0.181283		0.008365	0.110607	0.875161
1187	23964	0.824457	0.47271	0.1526		0.047343	1.309403	0.22175		0.010157	0.120416	0.987367
1188	23965	0.824908	0.476998	0.170826		0.048826	1.296264	0.23669		0.011119	0.117042	0.98529
1189	23966	0.940929	0.546306	0.212577		0.05695	1.460652	0.282271		0.013562	0.129438	1.131144
1190	23967	0.825373	0.478282	0.200141		0.050785	1.263392	0.257417		0.012529	0.10985	0.997435
1191	23968	0.85308	0.490346	0.21673		0.053267	1.287728	0.272783		0.013552	0.109659	1.035908
1192	23969	0.825865	0.467441	0.214154		0.052525	1.226863	0.266643		0.013593	0.102113	1.008466

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1193	2397	0.473744	0.196725	0.0029		0.01673	0.607758	0.005202		0.006345	0.057636	0.431859
1194	23970	0.721802	0.401002	0.186254		0.046878	1.054965	0.232042		0.012055	0.086109	0.88524
1195	23971	0.674993	0.370202	0.17261		0.044432	0.976551	0.216003		0.011305	0.078824	0.82941
1196	23972	0.909832	0.483682	0.223858		0.061575	1.286149	0.282602		0.015285	0.101393	1.114924
1197	23973	0.910543	0.466464	0.209664		0.063365	1.25728	0.263936		0.015178	0.096467	1.097305
1198	23974	1.027459	0.504277	0.217662		0.073566	1.387464	0.269567		0.016659	0.103088	1.20288
1199	23975	0.911985	0.426096	0.178129		0.067131	1.202844	0.217898		0.014158	0.086359	1.034401
1200	23976	0.912671	0.403184	0.163232		0.068917	1.174136	0.202898		0.013451	0.081226	1.005564
1201	23977	0.913333	0.378788	0.146417		0.070618	1.144649	0.193829		0.012573	0.075986	0.981651
1202	23978	1.030497	0.398192	0.142935		0.081464	1.256583	0.210937		0.013565	0.079516	1.07988
1203	23979	0.91455	0.326336	0.105985		0.073703	1.08364	0.177698		0.015499	0.064747	0.926876
1204	2398	0.463557	0.24151	0.003145		0.019415	0.639599	0.005866		0.006887	0.063118	0.417715
1205	23980	0.998252	0.325412	0.09624		0.081665	1.147578	0.174013		0.020934	0.063894	0.962475
1206	23981	1.157145	0.333593	0.09784		0.095902	1.281066	0.161541		0.030003	0.06435	1.031985
1207	23982	0.999111	0.252054	0.072591		0.083394	1.067246	0.108883		0.030403	0.047713	0.860309
1208	23983	0.999297	0.215149	0.059473		0.084006	1.031634	0.084057		0.034534	0.039957	0.841499
1209	23984	0.961876	0.206879	0.055954		0.048231	1.014607	0.054204		0.015635	0.060981	0.826608
1210	23985	1.092222	0.283322	0.075349		0.054204	1.20141	0.072933		0.016249	0.083038	0.971446
1211	23986	1.044331	0.315491	0.08379		0.050938	1.212114	0.088588		0.013656	0.092361	1.006556
1212	23987	0.673032	0.22278	0.056632		0.032367	0.80917	0.06135		0.007755	0.065166	0.688157
1213	23988	0.528749	0.186147	0.045157		0.025135	0.651844	0.048226		0.005627	0.054428	0.559698
1214	23989	0.700346	0.25853	0.060504		0.033385	0.880836	0.062		0.007559	0.075563	0.758453
1215	2399	0.503857	0.32218	0.00374		0.025601	0.770167	0.007648		0.008127	0.073949	0.446959
1216	23990	1.067765	0.427954	0.094444		0.051081	1.392248	0.085205		0.011703	0.124972	1.196625
1217	23991	0.885315	0.38382	0.080841		0.042332	1.196634	0.064948		0.009718	0.111912	1.029972
1218	23992	0.782221	0.358476	0.073132		0.03722	1.086306	0.056425		0.00853	0.104531	0.939877
1219	23993	0.782079	0.376708	0.074469		0.036894	1.115919	0.05787		0.008424	0.110015	0.971532
1220	23994	0.895433	0.450794	0.086318		0.041724	1.310394	0.069559		0.010013	0.132019	1.147034
1221	23995	0.692654	0.362823	0.067441		0.031768	1.038177	0.056451		0.008064	0.106564	0.910239
1222	23996	0.541712	0.291768	0.052942		0.02449	0.826223	0.044023		0.006499	0.085897	0.720719
1223	23997	0.603371	0.331742	0.059025		0.02693	0.932544	0.047733		0.007409	0.097846	0.806655
1224	23998	0.712986	0.403536	0.070078		0.031128	1.123197	0.053684		0.009048	0.119335	0.953864
1225	23999	0.812618	0.471771	0.079892		0.03462	1.302344	0.058802		0.010586	0.139849	1.084022
1226	2400	0.461176	0.319241	0.003877		0.026742	0.743996	0.007899		0.007592	0.068986	0.403999
1227	24000	0.671707	0.399217	0.066301		0.027809	1.094262	0.048921		0.00882	0.118562	0.896679
1228	24001	0.644233	0.390495	0.06402		0.025874	1.064515	0.048163		0.008354	0.116205	0.866058
1229	24002	0.678446	0.418561	0.067765		0.026334	1.13617	0.052274		0.008488	0.124871	0.916991
1230	24003	0.712657	0.447311	0.07157		0.026511	1.210199	0.056057		0.008285	0.133897	0.966476
1231	24004	0.921913	0.587275	0.093217		0.032707	1.585904	0.072261		0.009535	0.176473	1.250592
1232	24005	0.904397	0.585441	0.092475		0.03	1.579793	0.0692		0.008095	0.176726	1.22373
1233	24006	0.801579	0.525948	0.081978		0.024692	1.419814	0.05845		0.006694	0.159555	1.074951
1234	24007	0.698795	0.462655	0.070637		0.020235	1.249984	0.049562		0.005475	0.140953	0.927557
1235	24008	0.860097	0.573832	0.085199		0.023318	1.552382	0.061363		0.006414	0.175675	1.129471
1236	24009	0.876907	0.589225	0.084512		0.021902	1.597767	0.067475		0.007317	0.181421	1.141704
1237	24010	0.959138	0.648156	0.090815		0.021404	1.76535	0.080802		0.008914	0.201236	1.23697
1238	24011	0.931788	0.631034	0.08723		0.018221	1.730067	0.080431		0.009404	0.197821	1.187938
1239	24012	1.017827	0.688571	0.092803		0.01716	1.902984	0.086867		0.012209	0.217945	1.281452
1240	24013	0.890835	0.600737	0.07858		0.012528	1.675507	0.079761		0.01244	0.191862	1.111211
1241	24014	0.699046	0.469184	0.059681		0.008797	1.320919	0.065075		0.010767	0.151112	0.866817
1242	24015	0.712814	0.476766	0.059806		0.008489	1.349987	0.067619		0.011445	0.154312	0.882814
1243	24016	1.018303	0.676034	0.083322		0.011254	1.934337	0.099534		0.017285	0.220707	1.265605
1244	24017	0.905047	0.597103	0.072445		0.00937	1.722801	0.091992		0.015908	0.195956	1.138717
1245	24018	0.905241	0.594707	0.070575		0.008717	1.724821	0.094834		0.016342	0.195314	1.155029
1246	24019	0.905461	0.591048	0.07061		0.010269	1.725039	0.096445		0.016716	0.194157	1.168784
1247	24020	0.916304	0.59311	0.071988		0.013005	1.743545	0.098502		0.017246	0.194771	1.194138
1248	24021	0.699999	0.449744	0.055164		0.011723	1.329928	0.076378		0.013271	0.147559	0.920632
1249	24022	0.803112	0.511699	0.062941		0.015486	1.522457	0.088928		0.015263	0.167758	1.065431
1250	24023	0.906344	0.570509	0.069431		0.020409	1.711645	0.101976		0.017126	0.186982	1.212275
1251	24024	1.020275	0.633408	0.075943		0.026228	1.917422	0.116571		0.018937	0.207742	1.368106
1252	24025	0.906931	0.554417	0.068488		0.026152	1.694625	0.106285		0.016164	0.18198	1.212743
1253	24026	0.907262	0.544948	0.068689		0.028964	1.683589	0.112638		0.015208	0.17904	1.197555
1254	24027	0.89388	0.534415	0.06675		0.0313	1.645591	0.112316		0.013758	0.173369	1.155301
1255	24028	0.815473	0.484524	0.06006		0.031001	1.488129	0.10068		0.011256	0.155623	1.032465
1256	24029	0.715605	0.423351	0.05332		0.028472	1.29863	0.08889		0.009103	0.135261	0.899294
1257	2403	0.473971	0.212731	0.003159		0.01788	0.612867	0.004757		0.005805	0.057972	0.431784
1258	24030	0.908728	0.532765	0.070446		0.038914	1.631638	0.116791		0.009706	0.16867	1.135168
1259	24031	0.909241	0.529818	0.076706		0.041637	1.613528	0.124577		0.007723	0.166592	1.135332
1260	24032	1.023844	0.593773	0.093278		0.049855	1.793718	0.152046		0.008227	0.184797	1.279033
1261	24033	0.910407	0.524664	0.091486		0.046896	1.574102	0.147831		0.007712	0.161548	1.136786
1262	24034	0.807546	0.461564	0.087952		0.043826	1.37766	0.13986		0.007144	0.140259	1.004128

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1263	24035	0.704447	0.399552	0.081662		0.039729	1.188452	0.126278		0.006421	0.120008	0.872799
1264	24036	0.922905	0.518833	0.114916		0.054007	1.539989	0.171011		0.008649	0.153896	1.142986
1265	24037	0.912991	0.506569	0.126954		0.0559	1.500874	0.181485		0.00941	0.147937	1.141243
1266	24038	0.706083	0.395873	0.110707		0.045066	1.147756	0.153382		0.008378	0.110951	0.895128
1267	24039	0.457075	0.258327	0.078256		0.029784	0.739265	0.105624		0.005783	0.070561	0.583549
1268	2404	0.463843	0.261537	0.003445		0.020759	0.648147	0.005412		0.006311	0.062348	0.417697
1269	24040	0.738114	0.419678	0.135159		0.048869	1.188507	0.179192		0.009775	0.112203	0.946876
1270	24041	0.83177	0.477699	0.171995		0.056577	1.326651	0.221598		0.011928	0.122477	1.074619
1271	24042	0.83209	0.481062	0.189566		0.057765	1.31282	0.23677		0.012776	0.1183	1.075134
1272	24043	0.94703	0.548926	0.232658		0.066696	1.475684	0.28066		0.015269	0.130627	1.23636
1273	24044	0.83237	0.481104	0.217759		0.05924	1.278814	0.254748		0.013908	0.111147	1.096464
1274	24045	0.860209	0.493148	0.234653		0.061759	1.302569	0.269153		0.014822	0.111026	1.140893
1275	24046	0.832619	0.470353	0.233201		0.060404	1.241332	0.264385		0.01464	0.103461	1.110611
1276	24047	0.725574	0.402726	0.203481		0.053242	1.064937	0.23159		0.012779	0.087075	0.971096
1277	24048	0.68027	0.372943	0.189772		0.050301	0.988648	0.217665		0.011922	0.079947	0.912238
1278	24049	0.916705	0.487634	0.247583		0.068968	1.302626	0.288704		0.015851	0.102909	1.225002
1279	2405	0.504334	0.350957	0.004129		0.027532	0.787195	0.007018		0.007463	0.072572	0.446931
1280	24050	0.91721	0.470612	0.233139		0.070334	1.274389	0.272651		0.015467	0.097967	1.202575
1281	24051	1.032801	0.508156	0.24269		0.080841	1.403967	0.278934		0.016634	0.104556	1.310419
1282	24052	0.918331	0.430475	0.19968		0.073435	1.219688	0.224143		0.013861	0.087794	1.124706
1283	24053	0.918911	0.40763	0.183243		0.075045	1.190753	0.204846		0.012844	0.082625	1.08743
1284	24054	0.919494	0.383309	0.164267		0.076651	1.161013	0.191251		0.01165	0.077347	1.05377
1285	24055	1.035394	0.402649	0.159438		0.088018	1.272318	0.202902		0.013524	0.080874	1.146722
1286	24056	0.92061	0.331184	0.116714		0.079683	1.099517	0.16786		0.016263	0.066005	0.977137
1287	24057	1.004861	0.331047	0.099081		0.088372	1.164701	0.160334		0.022601	0.0652	1.004893
1288	24058	1.163148	0.340325	0.097622		0.103894	1.298591	0.141887		0.032981	0.065695	1.063581
1289	24059	1.006534	0.259542	0.070165		0.091076	1.084308	0.089038		0.033787	0.048932	0.865353
1290	2406	0.46175	0.35148	0.004143		0.02888	0.762464	0.007246		0.006977	0.066334	0.40397
1291	24060	1.007253	0.224388	0.053305		0.092332	1.049237	0.06661		0.038653	0.041183	0.847651
1292	24061	0.846843	0.187979	0.0461		0.068945	0.905958	0.03628		0.017868	0.054959	0.736711
1293	24062	0.961515	0.255098	0.063033		0.077315	1.072759	0.043726		0.018737	0.074377	0.865339
1294	24063	0.903962	0.277935	0.070864		0.071251	1.063541	0.047942		0.015809	0.081018	0.877774
1295	24064	0.592423	0.199143	0.049372		0.045921	0.721731	0.031793		0.009387	0.058056	0.608531
1296	24065	0.465426	0.166215	0.039733		0.035587	0.581286	0.024693		0.006755	0.048455	0.494746
1297	24066	0.616486	0.230708	0.053298		0.046569	0.785384	0.034294		0.008244	0.067249	0.671033
1298	24067	0.924665	0.37545	0.082286		0.06814	1.221025	0.059661		0.01149	0.109388	1.045851
1299	24068	0.779422	0.342141	0.07258		0.05576	1.066704	0.051996		0.009131	0.099619	0.919619
1300	24069	0.688713	0.319514	0.06627		0.048003	0.968344	0.040756		0.007694	0.093059	0.841922
1301	2407	0.335014	0.258607	0.003334		0.023775	0.563936	0.005766		0.005154	0.0496	0.288738
1302	24070	0.688648	0.335746	0.068022		0.046657	0.994706	0.037247		0.007328	0.097931	0.871783
1303	24071	0.77324	0.394051	0.077895		0.050814	1.145466	0.042275		0.00788	0.115208	1.009359
1304	24072	0.610026	0.323403	0.062555		0.038796	0.925397	0.033151		0.006553	0.094808	0.815567
1305	24073	0.47713	0.260085	0.049414		0.02954	0.736485	0.02538		0.005396	0.076404	0.644835
1306	24074	0.531475	0.295726	0.055354		0.032176	0.831254	0.027519		0.006236	0.087014	0.720976
1307	24075	0.628096	0.35973	0.065877		0.036692	1.001175	0.032127		0.007752	0.106088	0.851653
1308	24076	0.700652	0.411631	0.07427		0.039456	1.13615	0.041875		0.009015	0.121648	0.951633
1309	24077	0.591866	0.355922	0.063669		0.032033	0.975402	0.036197		0.007798	0.105399	0.811169
1310	24078	0.56772	0.348172	0.061734		0.029531	0.948924	0.033534		0.007486	0.103328	0.783917
1311	24079	0.59794	0.373218	0.06556		0.029797	1.012808	0.035246		0.007712	0.111057	0.83052
1312	2408	0.474195	0.22281	0.003501		0.01899	0.612917	0.004267		0.005219	0.055493	0.431767
1313	24080	0.628175	0.398865	0.069426		0.029736	1.078789	0.038303		0.007679	0.119105	0.875937
1314	24081	0.79744	0.51387	0.088935		0.035706	1.387189	0.051793		0.008909	0.154042	1.113015
1315	24082	0.797442	0.522062	0.090368		0.033048	1.408272	0.052343		0.007371	0.157282	1.111136
1316	24083	0.706921	0.46898	0.080583		0.026904	1.26568	0.049675		0.006057	0.142023	0.97682
1317	24084	0.61637	0.412496	0.069782		0.021836	1.114262	0.046261		0.004938	0.125459	0.842999
1318	24085	0.743464	0.50128	0.082968		0.024381	1.355996	0.05867		0.005512	0.153176	1.005654
1319	24086	0.773742	0.525253	0.084987		0.023029	1.424286	0.062533		0.005199	0.161453	1.036816
1320	24087	0.846498	0.577754	0.094093		0.022929	1.57372	0.068401		0.005889	0.17907	1.122437
1321	24088	0.822558	0.562472	0.090715		0.020348	1.542237	0.06743		0.006346	0.175997	1.077415
1322	24089	0.883401	0.603354	0.095245		0.01984	1.667559	0.073821		0.007791	0.190558	1.143032
1323	2409	0.464147	0.273593	0.003793		0.022106	0.650412	0.004875		0.005686	0.060887	0.417674
1324	24090	0.786778	0.535506	0.082804		0.015816	1.493614	0.06811		0.008412	0.170654	1.010034
1325	24091	0.617536	0.418236	0.063373		0.01096	1.177542	0.056417		0.007454	0.134397	0.789518
1326	24092	0.629787	0.424976	0.063682		0.010555	1.203433	0.058941		0.008003	0.13723	0.804901
1327	24093	0.884572	0.592338	0.087465		0.013475	1.69504	0.085131		0.011998	0.192899	1.135777
1328	24094	0.800017	0.532449	0.077957		0.010967	1.535775	0.078768		0.01129	0.174245	1.040539
1329	24095	0.800385	0.530339	0.076323		0.010924	1.537612	0.08039		0.011578	0.173703	1.055478
1330	24096	0.800774	0.52711	0.075106		0.012219	1.537767	0.082238		0.011758	0.172709	1.06718
1331	24097	0.795194	0.51902	0.074752		0.014901	1.52488	0.083909		0.01176	0.170016	1.068531
1332	24098	0.619336	0.401183	0.058471		0.013594	1.185551	0.066977		0.009134	0.131336	0.83908

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1333	24099	0.7107	0.456495	0.066932		0.017857	1.357207	0.078271		0.010377	0.149353	0.970399
1334	24100	0.802245	0.509009	0.074186		0.023404	1.525833	0.089061		0.011426	0.166491	1.103123
1335	24101	0.887904	0.555585	0.079634		0.029427	1.680219	0.098332		0.012139	0.181807	1.223102
1336	24102	0.803132	0.49473	0.07128		0.029727	1.510648	0.091188		0.010252	0.162011	1.103059
1337	24103	0.803599	0.48632	0.071544		0.032786	1.500836	0.093047		0.009251	0.15937	1.089895
1338	24104	0.791906	0.476778	0.06954		0.035247	1.466906	0.092944		0.007866	0.154733	1.051959
1339	24105	0.707144	0.423041	0.06028		0.033966	1.298271	0.084415		0.006363	0.136008	0.920118
1340	24106	0.634151	0.377658	0.054516		0.031758	1.157599	0.076769		0.005514	0.120765	0.818609
1341	24107	0.805423	0.475224	0.07088		0.043127	1.454462	0.100068		0.006644	0.150607	1.032017
1342	24108	0.805989	0.472605	0.076907		0.045851	1.438282	0.102644		0.006812	0.148774	1.030027
1343	24109	0.892207	0.52062	0.091385		0.053623	1.571702	0.116512		0.00809	0.162278	1.138277
1344	2411	0.490239	0.233458	0.00404		0.020762	0.627619	0.00387		0.004761	0.055262	0.446139
1345	24110	0.807176	0.467934	0.089361		0.050981	1.403234	0.112826		0.007773	0.144236	1.02811
1346	24111	0.716004	0.411618	0.085774		0.047306	1.22811	0.10576		0.007252	0.125187	0.907971
1347	24112	0.624589	0.356277	0.079335		0.042611	1.060007	0.095989		0.006543	0.107073	0.789387
1348	24113	0.802739	0.453839	0.108815		0.056427	1.347754	0.129259		0.008841	0.134703	1.014647
1349	24114	0.809387	0.451579	0.121156		0.058927	1.338761	0.141611		0.010123	0.131922	1.033339
1350	24115	0.625868	0.352542	0.102996		0.046992	1.022349	0.120802		0.008847	0.098958	0.811014
1351	24116	0.40511	0.229902	0.071123		0.030872	0.658435	0.082616		0.006186	0.062955	0.528927
1352	24117	0.638599	0.364403	0.11923		0.049215	1.033361	0.136193		0.010297	0.097785	0.838266
1353	24118	0.737037	0.424254	0.153672		0.057875	1.181229	0.174294		0.012919	0.109403	0.975575
1354	24119	0.737223	0.426627	0.167924		0.058697	1.168618	0.187633		0.013645	0.105763	0.97653
1355	2412	0.479927	0.285671	0.004402		0.024177	0.663492	0.004427		0.005202	0.06393	0.43157
1356	24120	0.823422	0.47721	0.201147		0.066196	1.28901	0.218143		0.01564	0.113917	1.097339
1357	24121	0.737342	0.425847	0.191011		0.059669	1.137867	0.199639		0.013959	0.098806	0.993506
1358	24122	0.761932	0.436398	0.205375		0.061968	1.158137	0.20902		0.014022	0.098737	1.034554
1359	24123	0.737391	0.416325	0.202617		0.060297	1.103774	0.205066		0.013642	0.092058	1.006477
1360	24124	0.62693	0.347989	0.173311		0.051628	0.924197	0.176554		0.011515	0.075633	0.857866
1361	24125	0.602315	0.330364	0.16596		0.049947	0.879399	0.170746		0.010958	0.071191	0.825185
1362	24126	0.811482	0.432244	0.2175		0.06831	1.159104	0.229418		0.014385	0.091691	1.106922
1363	24127	0.811761	0.417443	0.205898		0.069429	1.135156	0.220062		0.013849	0.087343	1.08648
1364	24128	0.898395	0.443366	0.211844		0.078122	1.229567	0.223995		0.014462	0.091675	1.164416
1365	24129	0.812913	0.38238	0.177782		0.071863	1.086885	0.182417		0.012103	0.078334	1.016688
1366	24130	0.813666	0.362362	0.163286		0.073104	1.061273	0.164099		0.011028	0.073725	0.981717
1367	24131	0.814427	0.341055	0.14622		0.074333	1.034918	0.149902		0.009813	0.06902	0.948239
1368	24132	0.901734	0.352583	0.139115		0.083553	1.114988	0.153222		0.011205	0.070932	1.009738
1369	24133	0.815949	0.295505	0.103069		0.076676	0.980468	0.126249		0.01357	0.058925	0.871254
1370	24134	0.890962	0.296063	0.086801		0.084803	1.038913	0.118981		0.019391	0.058268	0.893422
1371	24135	1.015913	0.301039	0.078548		0.098025	1.141372	0.102826		0.0283	0.057962	0.931081
1372	24136	0.892809	0.23469	0.056704		0.087165	0.968203	0.063991		0.029666	0.044013	0.776487
1373	24137	0.893564	0.205134	0.04289		0.088541	0.937696	0.047127		0.034099	0.037223	0.759763
1374	24138	0.734134	0.167946	0.036231		0.086013	0.796725	0.023181		0.018591	0.048744	0.648996
1375	24139	0.833318	0.225623	0.047251		0.096429	0.943558	0.027656		0.019636	0.065632	0.756276
1376	2414	0.474661	0.222091	0.004393		0.021216	0.597105	0.003108		0.004123	0.055083	0.431728
1377	24140	0.818403	0.255745	0.056439		0.092793	0.976582	0.029439		0.017572	0.074473	0.785859
1378	24141	0.513405	0.175116	0.038006		0.057188	0.634215	0.018549		0.010153	0.051007	0.517349
1379	24142	0.403348	0.14605	0.030801		0.044269	0.510712	0.017476		0.007423	0.042551	0.419102
1380	24143	0.534266	0.20263	0.041566		0.057867	0.689945	0.026506		0.009199	0.059044	0.567663
1381	24144	0.836366	0.343971	0.068231		0.088136	1.119201	0.048012		0.013336	0.10025	0.923584
1382	24145	0.67555	0.300297	0.058411		0.068899	0.936824	0.037003		0.010196	0.087521	0.779249
1383	24146	0.596973	0.280416	0.05378		0.059185	0.850404	0.028866		0.008614	0.081786	0.713702
1384	24147	0.596965	0.294679	0.055596		0.057414	0.873533	0.029311		0.008219	0.086075	0.738354
1385	24148	0.705339	0.363913	0.067425		0.065682	1.058303	0.039167		0.00924	0.106529	0.89736
1386	24149	0.528914	0.283927	0.051852		0.047591	0.812641	0.030948		0.006577	0.083325	0.68699
1387	2415	0.464758	0.270618	0.004827		0.024727	0.627108	0.003537		0.004798	0.063151	0.417624
1388	24150	0.413722	0.228355	0.041171		0.036204	0.646736	0.024788		0.005068	0.067147	0.541965
1389	24151	0.460878	0.259667	0.046295		0.039411	0.729956	0.02965		0.005672	0.076466	0.605164
1390	24152	0.544726	0.315885	0.055832		0.044913	0.879172	0.038896		0.006737	0.093212	0.722737
1391	24153	0.642715	0.382244	0.067033		0.051062	1.055053	0.052928		0.008378	0.11301	0.859817
1392	24154	0.513426	0.312549	0.054578		0.039198	0.856552	0.042235		0.00699	0.092609	0.693044
1393	24155	0.492537	0.305734	0.053093		0.036154	0.833303	0.039875		0.006822	0.090805	0.669727
1394	24156	0.518818	0.327733	0.056515		0.036507	0.889417	0.04194		0.007164	0.097604	0.709496
1395	24157	0.545129	0.350271	0.059934		0.036482	0.947369	0.043579		0.007313	0.104676	0.748247
1396	24158	0.727143	0.474115	0.08073		0.046109	1.279743	0.058896		0.009217	0.142222	0.998737
1397	24159	0.692255	0.458537	0.078425		0.040743	1.236736	0.058774		0.007719	0.138244	0.949238
1398	24160	0.613798	0.411905	0.070242		0.033285	1.111509	0.0563		0.006413	0.124833	0.834537
1399	24161	0.535262	0.362266	0.061057		0.027098	0.978533	0.051863		0.005304	0.110251	0.720103
1400	24162	0.680807	0.464068	0.076881		0.032	1.25538	0.068811		0.00634	0.141882	0.905186
1401	24163	0.672167	0.461186	0.077086		0.029242	1.250801	0.070923		0.005783	0.141809	0.88463
1402	24164	0.73555	0.507233	0.085682		0.029558	1.38204	0.079181		0.005718	0.157235	0.956783

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1403	24165	0.714927	0.493842	0.082881		0.026266	1.354407	0.076557		0.004973	0.154485	0.918293
1404	24166	0.803132	0.55401	0.091329		0.026823	1.531346	0.085644		0.005307	0.174878	1.019771
1405	24167	0.684161	0.470302	0.076631		0.020865	1.311728	0.075226		0.00469	0.14976	0.863603
1406	24168	0.537122	0.367313	0.059067		0.015044	1.034148	0.060972		0.00422	0.117937	0.676579
1407	24169	0.547855	0.373217	0.059506		0.014534	1.056891	0.063039		0.004663	0.120413	0.690499
1408	2417	0.34823	0.156925	0.003573		0.016251	0.431285	0.002054		0.002962	0.040581	0.31659
1409	24170	0.8049	0.543888	0.085695		0.019361	1.556603	0.09401		0.007569	0.176959	1.019849
1410	24171	0.696283	0.467593	0.0736		0.015074	1.348763	0.083391		0.006942	0.152855	0.89373
1411	24172	0.696775	0.465738	0.07253		0.015267	1.350374	0.08477		0.007176	0.152387	0.905746
1412	24173	0.697289	0.462943	0.07032		0.015724	1.350517	0.085277		0.007265	0.151538	0.914349
1413	24174	0.727918	0.479105	0.072373		0.018502	1.407361	0.089145		0.007554	0.15682	0.960123
1414	24175	0.539535	0.352424	0.053965		0.014881	1.041195	0.066962		0.005503	0.115301	0.716294
1415	24176	0.619244	0.40104	0.06193		0.019206	1.19196	0.07748		0.006154	0.131149	0.827011
1416	24177	0.699178	0.4472	0.068893		0.025084	1.340067	0.087263		0.007375	0.146209	0.93833
1417	24178	0.809425	0.510431	0.077656		0.032886	1.54303	0.10142		0.00891	0.166934	1.086696
1418	24179	0.70027	0.43467	0.06581		0.03168	1.326732	0.089776		0.007916	0.142226	0.937277
1419	2418	0.341013	0.190709	0.003947		0.018937	0.450687	0.002363		0.003458	0.046256	0.306244
1420	24180	0.700827	0.427288	0.066063		0.034837	1.318107	0.091535		0.008032	0.139884	0.92745
1421	24181	0.690769	0.418842	0.064207		0.037323	1.288306	0.091317		0.007899	0.13542	0.897408
1422	24182	0.652469	0.39301	0.058921		0.0379	1.205734	0.087186		0.007525	0.125915	0.83198
1423	24183	0.553316	0.331768	0.049336		0.033428	1.016641	0.074608		0.006473	0.105729	0.700688
1424	24184	0.702864	0.41747	0.063587		0.045197	1.277376	0.094894		0.008546	0.132297	0.883913
1425	24185	0.703448	0.415094	0.068635		0.04784	1.263169	0.095174		0.008827	0.130744	0.881682
1426	24186	0.814403	0.478172	0.084743		0.058256	1.443363	0.110386		0.01044	0.149108	1.017749
1427	24187	0.704594	0.411014	0.077886		0.052715	1.232402	0.09777		0.009151	0.126749	0.878618
1428	24188	0.625021	0.361541	0.074273		0.048655	1.07858	0.089059		0.008195	0.109969	0.775828
1429	24189	0.545213	0.312926	0.068422		0.043623	0.931289	0.080212		0.007483	0.094033	0.674401
1430	24190	0.736422	0.418908	0.097995		0.060418	1.24439	0.112577		0.01161	0.124255	0.910438
1431	24191	0.70643	0.3966	0.102974		0.059622	1.176198	0.115989		0.012875	0.115773	0.881236
1432	24192	0.546187	0.309056	0.086642		0.047193	0.896989	0.097409		0.011145	0.086814	0.690349
1433	24193	0.353507	0.201443	0.058257		0.030882	0.577655	0.065988		0.00758	0.055226	0.449813
1434	24194	0.593004	0.339652	0.102533		0.052232	0.964706	0.115175		0.013163	0.091277	0.758147
1435	24195	0.643027	0.371195	0.123222		0.057397	1.036121	0.135437		0.014989	0.096005	0.828596
1436	24196	0.643117	0.372896	0.133815		0.057931	1.024908	0.143713		0.015419	0.092881	0.829764
1437	24197	0.754047	0.437567	0.167524		0.068341	1.186575	0.174498		0.01817	0.105048	0.969001
1438	24198	0.643101	0.37171	0.150951		0.058497	0.99765	0.151218		0.015203	0.08655	0.834579
1439	24199	0.664483	0.380833	0.16204		0.060557	1.014635	0.156377		0.015119	0.086509	0.868711
1440	2420	0.38789	0.169818	0.004222		0.01852	0.476353	0.002182		0.003251	0.044575	0.35256
1441	24200	0.642998	0.363359	0.15978		0.058946	0.966992	0.1498		0.013696	0.080677	0.844303
1442	24201	0.582398	0.323735	0.145183		0.053944	0.862753	0.133746		0.011403	0.07065	0.765869
1443	24202	0.525198	0.288501	0.130694		0.049113	0.770552	0.119525		0.009779	0.062417	0.691122
1444	24203	0.708003	0.377662	0.171922		0.067528	1.015903	0.162528		0.012737	0.080427	0.927002
1445	24204	0.708619	0.364948	0.163516		0.068999	0.995995	0.158692		0.012176	0.076655	0.911853
1446	24205	0.82044	0.405628	0.176732		0.081658	1.128406	0.171646		0.013191	0.084182	1.026011
1447	24206	0.70988	0.334741	0.142238		0.072304	0.954019	0.133711		0.010477	0.068795	0.860339
1448	24207	0.710533	0.317457	0.130716		0.074115	0.931689	0.119725		0.009498	0.064741	0.833483
1449	24208	0.711206	0.299052	0.116959		0.076006	0.908689	0.107781		0.009728	0.060591	0.806681
1450	24209	0.823499	0.323644	0.116169		0.090179	1.023946	0.112983		0.011814	0.06513	0.899411
1451	2421	0.379878	0.206232	0.004689		0.021578	0.496216	0.002509		0.0038	0.050734	0.341038
1452	24210	0.712586	0.259787	0.082137		0.079916	0.86122	0.087218		0.01105	0.051739	0.743573
1453	24211	0.77814	0.260814	0.068922		0.089259	0.912851	0.082139		0.014646	0.051229	0.765924
1454	24212	0.923482	0.276984	0.061877		0.108565	1.044254	0.076177		0.022649	0.053199	0.838355
1455	24213	0.779886	0.208687	0.042624		0.093489	0.851486	0.047563		0.022943	0.038957	0.683018
1456	24214	0.780621	0.184073	0.033488		0.094993	0.825226	0.03522		0.026425	0.033095	0.668618
1457	24215	0.724397	0.170296	0.031275		0.11222	0.797697	0.028623		0.021003	0.049149	0.648167
1458	24216	0.822233	0.226635	0.036842		0.125532	0.944882	0.028998		0.022363	0.065946	0.750616
1459	24217	0.806175	0.25574	0.0431		0.120402	0.976092	0.025178		0.020243	0.074543	0.756563
1460	24218	0.5064	0.175138	0.029257		0.074208	0.634628	0.016909		0.011865	0.051099	0.493457
1461	24219	0.397838	0.145988	0.024198		0.057369	0.510957	0.015186		0.008771	0.042615	0.397379
1462	24220	0.526974	0.202497	0.033211		0.074906	0.690196	0.021743		0.010988	0.05913	0.536332
1463	24221	0.823828	0.343222	0.055235		0.113693	1.117891	0.037835		0.016441	0.100261	0.867633
1464	24222	0.666397	0.299981	0.047907		0.088825	0.936893	0.03379		0.012812	0.087727	0.730304
1465	24223	0.588924	0.280113	0.044474		0.076176	0.850424	0.032605		0.010992	0.082012	0.666742
1466	24224	0.588964	0.294387	0.046327		0.073798	0.873515	0.035987		0.010683	0.08633	0.687286
1467	24225	0.694793	0.363059	0.056515		0.084204	1.056554	0.047706		0.012317	0.106666	0.830681
1468	24226	0.521923	0.283754	0.043809		0.061081	0.812581	0.036371		0.009019	0.083599	0.633935
1469	24227	0.408289	0.228251	0.035156		0.046441	0.646688	0.029663		0.006866	0.067377	0.502847
1470	24228	0.454858	0.259571	0.04002		0.050541	0.729895	0.034407		0.007468	0.076729	0.565707
1471	24229	0.537674	0.315799	0.048573		0.057581	0.879096	0.043395		0.008506	0.093525	0.675867
1472	2423	0.522695	0.212637	0.006444		0.026062	0.631227	0.00262		0.004222	0.056678	0.474865

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1473	24230	0.633313	0.381479	0.05841		0.06536	1.053106	0.055707		0.009702	0.113156	0.801993
1474	24231	0.5069	0.312445	0.047783		0.050299	0.856481	0.046546		0.007527	0.092922	0.646719
1475	24232	0.486336	0.305614	0.046603		0.046404	0.833243	0.04457		0.007321	0.091117	0.624268
1476	24233	0.512352	0.327589	0.049704		0.046885	0.889354	0.047254		0.007874	0.097933	0.660757
1477	24234	0.538415	0.350131	0.052792		0.046895	0.947312	0.050458		0.008269	0.105008	0.696388
1478	24235	0.717138	0.473237	0.071145		0.059259	1.277685	0.068351		0.010729	0.142395	0.927648
1479	24236	0.683968	0.458437	0.069407		0.052565	1.236674	0.068182		0.009503	0.138652	0.882045
1480	24237	0.606579	0.411831	0.062402		0.043031	1.111459	0.063183		0.008003	0.125182	0.775061
1481	24238	0.529058	0.362189	0.054602		0.035091	0.978492	0.056573		0.00664	0.110526	0.66884
1482	24239	0.671871	0.463155	0.070194		0.04146	1.253234	0.073838		0.007941	0.141917	0.839481
1483	2424	0.511967	0.258258	0.007199		0.030368	0.654058	0.003013		0.004955	0.064674	0.459344
1484	24240	0.664622	0.460974	0.071002		0.038669	1.250746	0.076312		0.007268	0.14206	0.821183
1485	24241	0.727476	0.506943	0.079156		0.039102	1.381981	0.085645		0.007197	0.157441	0.887635
1486	24242	0.707266	0.493596	0.076862		0.034859	1.354361	0.084228		0.006295	0.15462	0.852538
1487	24243	0.79356	0.553069	0.085074		0.036273	1.529157	0.09496		0.00641	0.174715	0.947191
1488	24244	0.677169	0.470237	0.071974		0.028524	1.311713	0.083123		0.004926	0.149845	0.804523
1489	24245	0.531765	0.367281	0.055836		0.020518	1.034144	0.066786		0.003698	0.118002	0.631335
1490	24246	0.542473	0.373174	0.056416		0.019822	1.056889	0.068735		0.004039	0.120471	0.644888
1491	24247	0.796027	0.542996	0.081537		0.026415	1.55441	0.102274		0.006567	0.176746	0.951939
1492	24248	0.689793	0.467418	0.070479		0.021082	1.348763	0.091362		0.006191	0.152889	0.834101
1493	24249	0.690456	0.465553	0.069843		0.021094	1.350377	0.093514		0.006645	0.152419	0.84361
1494	24250	0.691144	0.462792	0.068079		0.021069	1.350531	0.094083		0.007245	0.151582	0.85006
1495	24251	0.720514	0.478266	0.068411		0.024128	1.405187	0.097932		0.008192	0.156634	0.889554
1496	24252	0.53502	0.352374	0.050507		0.019174	1.041233	0.073551		0.006404	0.115386	0.6631
1497	24253	0.614181	0.400994	0.058053		0.023407	1.192012	0.085329		0.007723	0.131273	0.763832
1498	24254	0.693634	0.447156	0.064794		0.029669	1.340134	0.096761		0.00921	0.146353	0.86476
1499	24255	0.802021	0.509672	0.073353		0.038727	1.540939	0.112059		0.011064	0.16682	0.99919
1500	24256	0.695039	0.434597	0.062663		0.037261	1.326808	0.099156		0.009875	0.142321	0.862947
1501	24257	0.695743	0.427209	0.06231		0.040896	1.318188	0.100923		0.010178	0.139964	0.855645
1502	24258	0.685902	0.418747	0.060594		0.04373	1.288391	0.099711		0.010352	0.135263	0.83128
1503	24259	0.646808	0.392274	0.055669		0.044191	1.203696	0.093641		0.0102	0.124909	0.772713
1504	2426	0.522905	0.194943	0.007293		0.027095	0.621822	0.002257		0.004044	0.054486	0.474857
1505	24260	0.549572	0.331737	0.046572		0.038973	1.016733	0.079963		0.008852	0.105153	0.652937
1506	24261	0.698215	0.417443	0.059031		0.052551	1.277501	0.102346		0.011631	0.132098	0.825034
1507	24262	0.69889	0.414925	0.062779		0.055478	1.263303	0.10213		0.011955	0.130599	0.823606
1508	24263	0.80802	0.477374	0.07702		0.06723	1.441485	0.117522		0.014045	0.148803	0.949805
1509	24264	0.700138	0.410936	0.070591		0.060709	1.232477	0.103486		0.012266	0.126603	0.82071
1510	24265	0.62108	0.361502	0.065699		0.055839	1.07865	0.093351		0.010925	0.109815	0.724603
1511	24266	0.541772	0.312912	0.060305		0.049921	0.931465	0.082048		0.010659	0.09389	0.629855
1512	24267	0.730555	0.41825	0.085864		0.068769	1.242723	0.111379		0.015875	0.123878	0.848485
1513	24268	0.701883	0.396619	0.089666		0.067629	1.176409	0.109179		0.01694	0.115517	0.820012
1514	24269	0.542613	0.308339	0.074843		0.053281	0.896141	0.085632		0.014226	0.086576	0.640053
1515	2427	0.512239	0.237216	0.0082		0.03177	0.641915	0.002721		0.004767	0.061733	0.459336
1516	24270	0.351171	0.200916	0.050114		0.034773	0.577081	0.057612		0.009533	0.055066	0.416333
1517	24271	0.587859	0.337993	0.085926		0.058552	0.961785	0.099721		0.01634	0.090838	0.69949
1518	24272	0.638659	0.369859	0.101232		0.064188	1.034931	0.11546		0.01827	0.095684	0.764246
1519	24273	0.638676	0.37131	0.10934		0.065385	1.023633	0.12139		0.018427	0.09259	0.76482
1520	24274	0.74756	0.434794	0.136057		0.07812	1.183179	0.145244		0.021355	0.104659	0.892414
1521	24275	0.638507	0.369799	0.122375		0.068026	0.996242	0.12552		0.017672	0.08644	0.760167
1522	24276	0.659671	0.378819	0.131103		0.071584	1.012788	0.129195		0.017369	0.086405	0.787244
1523	24277	0.638869	0.361474	0.129245		0.070583	0.964949	0.122774		0.015595	0.080581	0.764389
1524	24278	0.577858	0.321474	0.116715		0.064809	0.859205	0.108406		0.012932	0.070417	0.691836
1525	24279	0.522269	0.287125	0.105445		0.059082	0.768983	0.096602		0.010985	0.062349	0.625283
1526	24280	0.704015	0.37602	0.139171		0.081119	1.014405	0.1259		0.012672	0.080364	0.839269
1527	24281	0.704596	0.363544	0.132873		0.082765	0.995147	0.120095		0.012552	0.076626	0.828906
1528	24282	0.814546	0.403701	0.143967		0.097617	1.126017	0.129914		0.014087	0.084057	0.937838
1529	24283	0.705792	0.333841	0.116251		0.086454	0.953521	0.103152		0.011838	0.068807	0.792891
1530	24284	0.706436	0.316813	0.10689		0.088886	0.931343	0.092349		0.01158	0.064744	0.773444
1531	24285	0.707117	0.298682	0.095672		0.091397	0.908495	0.082453		0.011302	0.060577	0.753711
1532	24286	0.817589	0.32309	0.094988		0.108477	1.022418	0.085603		0.013151	0.064998	0.845184
1533	24287	0.708544	0.260047	0.067243		0.096415	0.861377	0.06653		0.012184	0.051741	0.705274
1534	24288	0.773769	0.261517	0.056392		0.107833	0.91328	0.063634		0.014115	0.051312	0.734283
1535	24289	0.917149	0.278185	0.050429		0.131061	1.043857	0.061322		0.017789	0.053337	0.818205
1536	2429	0.523102	0.176937	0.00825		0.028047	0.612696	0.003736		0.003972	0.052077	0.474854
1537	24290	0.775599	0.210775	0.034474		0.112987	0.852653	0.041102		0.017495	0.039239	0.679303
1538	24291	0.776374	0.187215	0.029935		0.11469	0.826689	0.034086		0.020107	0.033446	0.666898
1539	24292	0.714294	0.171807	0.026905		0.139689	0.798287	0.03672		0.02296	0.049396	0.651223
1540	24293	0.810868	0.22705	0.025798		0.155747	0.945614	0.039422		0.02467	0.066148	0.741946
1541	24294	0.794012	0.255295	0.028231		0.148675	0.975124	0.035814		0.022774	0.074591	0.735263
1542	24295	0.499509	0.17495	0.019625		0.091519	0.63474	0.020121		0.013883	0.051189	0.46667

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1543	24296	0.392424	0.145795	0.01634		0.070628	0.51097	0.013988		0.010628	0.042689	0.370929
1544	24297	0.519793	0.202211	0.023007		0.09209	0.690149	0.020207		0.013791	0.059236	0.49803
1545	24298	0.811451	0.342248	0.039385		0.139274	1.116138	0.03523		0.020641	0.100338	0.79771
1546	24299	0.65729	0.299462	0.034445		0.108716	0.936563	0.033636		0.016153	0.087972	0.665769
1547	2430	0.512489	0.215909	0.009321		0.03305	0.630344	0.004358		0.004693	0.05851	0.459332
1548	24300	0.580873	0.279602	0.031841		0.093111	0.850031	0.033825		0.013923	0.082276	0.603178
1549	24301	0.580912	0.293881	0.033523		0.090112	0.873107	0.038626		0.01359	0.086636	0.618357
1550	24302	0.684165	0.361931	0.041243		0.102616	1.054345	0.048965		0.015673	0.106895	0.744857
1551	24303	0.514786	0.283379	0.032468		0.074527	0.812158	0.037005		0.011506	0.083945	0.571165
1552	24304	0.402703	0.227975	0.026175		0.056662	0.646314	0.029645		0.008781	0.067668	0.451971
1553	24305	0.448629	0.259293	0.02978		0.061653	0.729479	0.033354		0.009561	0.07707	0.50723
1554	24306	0.530318	0.315514	0.036229		0.070246	0.878631	0.041027		0.010919	0.093944	0.604708
1555	24307	0.623593	0.380472	0.043741		0.07963	1.050697	0.052368		0.012439	0.11345	0.715177
1556	24308	0.500087	0.312126	0.03624		0.061408	0.856023	0.044138		0.009641	0.093332	0.576346
1557	24309	0.47986	0.305241	0.035632		0.056688	0.832753	0.042183		0.008922	0.09151	0.555053
1558	24310	0.505596	0.327163	0.038139		0.0573	0.888836	0.044976		0.009248	0.098338	0.586547
1559	24311	0.531397	0.349691	0.040361		0.057368	0.946803	0.048355		0.009695	0.105416	0.617655
1560	24312	0.70677	0.471951	0.054157		0.072494	1.275029	0.066333		0.012741	0.14268	0.821006
1561	24313	0.6753	0.457926	0.05329		0.064736	1.235987	0.066437		0.011815	0.13913	0.780698
1562	24314	0.599027	0.411397	0.048319		0.053377	1.110821	0.060182		0.010083	0.125589	0.685956
1563	24315	0.522563	0.361828	0.042655		0.043802	0.977972	0.053011		0.008465	0.110858	0.592812
1564	24316	0.662606	0.461906	0.054722		0.052045	1.250493	0.068439		0.010235	0.14205	0.744061
1565	24317	0.656716	0.4604	0.05559		0.048274	1.250058	0.070556		0.009527	0.142376	0.729462
1566	24318	0.719017	0.50621	0.062136		0.049133	1.381155	0.079868		0.009628	0.157704	0.789075
1567	24319	0.699233	0.49293	0.060575		0.044281	1.353618	0.078373		0.008575	0.154809	0.759676
1568	2432	0.523291	0.159323	0.009321		0.028977	0.602741	0.005673		0.004102	0.053636	0.474857
1569	24320	0.78361	0.551682	0.067238		0.046007	1.526231	0.088227		0.008748	0.174632	0.845137
1570	24321	0.669824	0.469767	0.057449		0.036207	1.311018	0.078028		0.006762	0.149984	0.719548
1571	24322	0.526139	0.366933	0.044851		0.026032	1.033579	0.062313		0.004819	0.118112	0.564935
1572	24323	0.536818	0.372829	0.045437		0.025191	1.05634	0.063615		0.004853	0.120581	0.577263
1573	24324	0.786799	0.54172	0.065761		0.033491	1.551478	0.09403		0.007917	0.176637	0.850549
1574	24325	0.682966	0.466835	0.05728		0.027265	1.348074	0.084378		0.007493	0.152997	0.743888
1575	24326	0.68381	0.464931	0.057044		0.027006	1.349645	0.086424		0.008033	0.152514	0.749884
1576	24327	0.684674	0.462216	0.055885		0.026683	1.349868	0.086781		0.008925	0.151687	0.754285
1577	24328	0.712805	0.476992	0.056342		0.029895	1.402366	0.089745		0.01008	0.15652	0.78699
1578	24329	0.530252	0.351977	0.041302		0.023588	1.040771	0.067653		0.007897	0.115512	0.586158
1579	2433	0.512727	0.195444	0.010686		0.03422	0.617037	0.006577		0.004844	0.055172	0.459335
1580	24330	0.608833	0.400519	0.046574		0.028572	1.191449	0.078508		0.009519	0.131436	0.673546
1581	24331	0.687773	0.446631	0.051978		0.03436	1.339546	0.088766		0.011341	0.146546	0.761268
1582	24332	0.794288	0.508375	0.058906		0.044659	1.538154	0.102056		0.013604	0.166787	0.878186
1583	24333	0.689497	0.434033	0.050795		0.042911	1.326248	0.090581		0.012147	0.142488	0.759447
1584	24334	0.690356	0.426612	0.050175		0.047024	1.317595	0.092077		0.012596	0.140121	0.754752
1585	24335	0.680737	0.418201	0.048857		0.050198	1.287879	0.090582		0.013106	0.135428	0.737089
1586	24336	0.640902	0.391156	0.044884		0.050543	1.201149	0.08433		0.012873	0.124824	0.687673
1587	24337	0.545595	0.331392	0.037805		0.044597	1.016395	0.07218		0.011186	0.104879	0.583166
1588	24338	0.693285	0.41702	0.046874		0.06003	1.27703	0.092271		0.014653	0.131579	0.738044
1589	24339	0.694058	0.41434	0.049216		0.063267	1.26288	0.091653		0.015008	0.130112	0.737768
1590	24340	0.801364	0.476148	0.059921		0.076401	1.43904	0.104592		0.017576	0.148086	0.85061
1591	24341	0.695428	0.4105	0.054908		0.068922	1.231956	0.092035		0.015337	0.126092	0.735857
1592	24342	0.616928	0.361158	0.050711		0.063252	1.07818	0.082606		0.01394	0.109341	0.649838
1593	24343	0.538149	0.312665	0.045564		0.056436	0.931104	0.072105		0.01339	0.093499	0.565227
1594	24344	0.72449	0.417327	0.06449		0.077463	1.240324	0.096847		0.019608	0.123202	0.76003
1595	24345	0.697129	0.396403	0.067128		0.076056	1.175954	0.094591		0.020585	0.114998	0.733096
1596	24346	0.538884	0.307344	0.055684		0.060488	0.894806	0.073534		0.016993	0.086142	0.569744
1597	24347	0.348735	0.200236	0.037151		0.039815	0.576201	0.047472		0.01129	0.054784	0.369887
1598	24348	0.582578	0.33614	0.063382		0.0674	0.958379	0.079864		0.019174	0.090189	0.619284
1599	24349	0.634105	0.368403	0.07172		0.075163	1.033178	0.095632		0.02116	0.095135	0.675925
1600	2435	0.523482	0.142728	0.010859		0.029875	0.591257	0.007859		0.004211	0.049068	0.47487
1601	24350	0.634031	0.36971	0.076535		0.076847	1.021837	0.100213		0.021025	0.092054	0.675725
1602	24351	0.740966	0.432126	0.094685		0.091635	1.179278	0.116291		0.023977	0.104251	0.787743
1603	24352	0.634388	0.368025	0.084943		0.079837	0.994456	0.09545		0.019592	0.086796	0.672066
1604	24353	0.655947	0.376966	0.090738		0.083947	1.010938	0.095286		0.01897	0.087086	0.692863
1605	24354	0.635203	0.359756	0.089426		0.082672	0.962769	0.090135		0.016785	0.080965	0.669395
1606	24355	0.573324	0.31938	0.080646		0.075676	0.855569	0.07918		0.013745	0.070246	0.602356
1607	24356	0.519206	0.285876	0.072585		0.069068	0.7673	0.070712		0.011646	0.062328	0.544003
1608	24357	0.699824	0.374491	0.095813		0.09505	1.013174	0.091946		0.014549	0.080346	0.728456
1609	24358	0.700347	0.362198	0.091743		0.097524	0.99404	0.088163		0.014467	0.07662	0.723162
1610	24359	0.808408	0.401838	0.099595		0.115395	1.123326	0.095532		0.016533	0.083944	0.82396
1611	2436	0.512967	0.175631	0.012486		0.035293	0.602701	0.009112		0.004973	0.051664	0.459348
1612	24360	0.701459	0.332926	0.080516		0.102657	0.952717	0.074589		0.014171	0.06882	0.703276

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1613	24361	0.702093	0.316104	0.073958		0.10543	0.930667	0.065803		0.014025	0.064744	0.691996
1614	24362	0.702785	0.298212	0.066307		0.108293	0.907984	0.05738		0.013887	0.060554	0.681059
1615	24363	0.811446	0.322387	0.065966		0.12825	1.02056	0.056421		0.01585	0.06486	0.771086
1616	24364	0.704295	0.260099	0.046833		0.114078	0.86121	0.044582		0.013773	0.05173	0.652034
1617	24365	0.769201	0.261881	0.039279		0.127549	0.913314	0.044298		0.015304	0.051512	0.689058
1618	24366	0.910636	0.278786	0.03435		0.154829	1.042925	0.046161		0.019383	0.053663	0.80254
1619	24367	0.771119	0.212117	0.027149		0.133624	0.853331	0.034558		0.017269	0.039439	0.670707
1620	24368	0.771909	0.189286	0.03002		0.135653	0.827599	0.033544		0.017904	0.033683	0.67223
1621	2438	0.523691	0.126709	0.012613		0.030697	0.578467	0.010311		0.004298	0.043703	0.475025
1622	2439	0.513219	0.156237	0.01452		0.03628	0.587312	0.011962		0.005103	0.047765	0.459376
1623	2441	0.523935	0.111182	0.01458		0.031446	0.565433	0.013007		0.004363	0.039846	0.475184
1624	2442	0.513511	0.137353	0.016818		0.037204	0.57172	0.015125		0.005204	0.043229	0.45949
1625	2444	0.524241	0.096277	0.016797		0.03213	0.553536	0.01594		0.004411	0.035192	0.475333
1626	2445	0.513871	0.119134	0.019402		0.038067	0.557249	0.018563		0.005248	0.037958	0.459673
1627	2447	0.572337	0.089727	0.021047		0.035724	0.595335	0.020819		0.004855	0.03259	0.518682
1628	2448	0.561099	0.111099	0.024356		0.042411	0.594554	0.024294		0.005754	0.035004	0.501627
1629	2450	0.596938	0.076557	0.025848		0.037958	0.610072	0.026276		0.005115	0.026294	0.540426
1630	2451	0.585352	0.094905	0.029909		0.045204	0.606266	0.03067		0.006076	0.028195	0.522681
1631	2453	0.574011	0.064127	0.029096		0.037059	0.577647	0.029773		0.005557	0.0248	0.518907
1632	2454	0.563013	0.078205	0.033528		0.044266	0.571216	0.034634		0.006064	0.025055	0.501879
1633	2456	0.575298	0.056993	0.034869		0.03768	0.570887	0.03528		0.006264	0.024102	0.519017
1634	2457	0.564386	0.067245	0.039511		0.045177	0.56142	0.040366		0.006882	0.024114	0.50198
1635	2476	0.504808	0.366345	0.0045		0.029378	0.789914	0.006323		0.006744	0.072682	0.446895
1636	2477	0.52213	0.379452	0.005272		0.032211	0.803989	0.005698		0.006608	0.076648	0.461751
1637	2478	0.505773	0.356254	0.005857		0.032952	0.754834	0.004529		0.006363	0.074172	0.446819
1638	2479	0.371184	0.249909	0.004861		0.025377	0.536264	0.003069		0.004604	0.053522	0.327649
1639	2480	0.413535	0.269993	0.005798		0.029039	0.586382	0.003252		0.005072	0.058714	0.364873
1640	2481	0.557451	0.338394	0.00901		0.041168	0.761984	0.003904		0.006645	0.075764	0.491446
1641	2482	0.557851	0.311982	0.010346		0.043056	0.743963	0.00381		0.006438	0.071689	0.491436
1642	2483	0.558219	0.286404	0.011847		0.044787	0.726551	0.005786		0.006358	0.067236	0.491432
1643	2484	0.558565	0.260895	0.013911		0.046365	0.707605	0.008661		0.006669	0.062641	0.491435
1644	2485	0.558897	0.235481	0.016274		0.047809	0.686684	0.011973		0.006996	0.057939	0.49145
1645	2486	0.559239	0.210328	0.01896		0.049164	0.666646	0.015759		0.00726	0.052974	0.491486
1646	2487	0.55961	0.185663	0.021996		0.050444	0.646467	0.019974		0.00743	0.047526	0.491548
1647	2488	0.560051	0.161684	0.025427		0.051677	0.627362	0.024581		0.007511	0.041479	0.491639
1648	2489	0.611571	0.151207	0.03196		0.057666	0.665546	0.032214		0.008238	0.038129	0.536511
1649	2490	0.638048	0.130308	0.03923		0.06159	0.672445	0.040677		0.008654	0.030758	0.559055
1650	2491	0.613694	0.105515	0.043687		0.060438	0.629113	0.045725		0.008413	0.026233	0.536809
1651	2492	0.615106	0.087644	0.050451		0.061701	0.613744	0.052417		0.008493	0.024821	0.536923
1652	2493	0.462358	0.365311	0.004478		0.030993	0.763847	0.006478		0.006588	0.064049	0.403926
1653	2494	0.478374	0.373823	0.005138		0.034027	0.774594	0.005791		0.006884	0.066801	0.417341
1654	2495	0.463493	0.347816	0.005697		0.035141	0.725749	0.004668		0.006668	0.064169	0.403837
1655	2496	0.340222	0.243354	0.00477		0.027123	0.515366	0.003142		0.004842	0.046062	0.296127
1656	2497	0.379077	0.26296	0.005732		0.031029	0.563375	0.003321		0.00534	0.050413	0.329769
1657	2498	0.511089	0.330905	0.008987		0.04396	0.730563	0.003984		0.007026	0.064755	0.444164
1658	2499	0.511547	0.307377	0.0104		0.045966	0.70462	0.004162		0.006843	0.060975	0.444158
1659	2500	0.512041	0.283823	0.01221		0.047793	0.686061	0.006074		0.00697	0.056831	0.444155
1660	2501	0.512492	0.260113	0.014354		0.049455	0.666485	0.008985		0.007348	0.052547	0.444155
1661	2502	0.512921	0.235986	0.016806		0.050982	0.64575	0.012408		0.00772	0.048214	0.444167
1662	2503	0.513337	0.211833	0.019592		0.052397	0.626102	0.016363		0.008033	0.04377	0.444203
1663	2504	0.513778	0.188045	0.022752		0.053769	0.606396	0.020806		0.008232	0.039079	0.444269
1664	2505	0.514278	0.164718	0.026321		0.055096	0.587362	0.025643		0.008335	0.034053	0.44437
1665	2506	0.561675	0.154853	0.0331		0.061496	0.621227	0.033628		0.009157	0.031356	0.484911
1666	2507	0.586077	0.135681	0.040593		0.065693	0.624497	0.042438		0.009653	0.025886	0.505321
1667	2508	0.563738	0.108981	0.045007		0.064449	0.580812	0.047602		0.009412	0.023967	0.485287
1668	2509	0.565042	0.088884	0.051422		0.065788	0.56373	0.054275		0.009508	0.020781	0.48542
1669	2510	0.335759	0.263679	0.003616		0.025713	0.560665	0.005147		0.005277	0.047822	0.288696
1670	2511	0.347516	0.265042	0.004135		0.028383	0.565546	0.004593		0.005566	0.047358	0.298276
1671	2512	0.336851	0.245734	0.004527		0.029236	0.530219	0.003723		0.005435	0.043695	0.288617
1672	2513	0.247348	0.17242	0.003675		0.022532	0.37736	0.002475		0.003954	0.03058	0.211636
1673	2514	0.275654	0.186898	0.004441		0.025771	0.413018	0.002607		0.004365	0.033042	0.235678
1674	2515	0.371804	0.236895	0.007027		0.03649	0.536362	0.00313		0.005761	0.041344	0.317434
1675	2516	0.372267	0.22173	0.008288		0.038124	0.517265	0.003529		0.005668	0.03784	0.317434
1676	2517	0.372702	0.206515	0.009771		0.03965	0.50302	0.005027		0.005973	0.034104	0.317434
1677	2518	0.373095	0.191159	0.011494		0.040993	0.48839	0.00719		0.006276	0.03062	0.31743
1678	2519	0.373437	0.174679	0.013449		0.042188	0.4742	0.009921		0.006594	0.02803	0.317436
1679	2520	0.373764	0.158128	0.015684		0.04335	0.460026	0.013142		0.006871	0.026042	0.317464
1680	2521	0.374101	0.141713	0.018228		0.04447	0.445816	0.016778		0.007048	0.023888	0.317517
1681	2522	0.374447	0.125607	0.021083		0.045552	0.431743	0.020734		0.007139	0.021363	0.317601
1682	2523	0.408902	0.121451	0.026511		0.050818	0.455971	0.027142		0.007876	0.020429	0.346598

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1683	2524	0.426518	0.107379	0.032476		0.054231	0.45681	0.034218		0.008343	0.019161	0.361222
1684	2525	0.410057	0.086307	0.035922		0.053125	0.423183	0.038364		0.00819	0.016405	0.346934
1685	2526	0.410729	0.069696	0.040815		0.05414	0.409049	0.043778		0.008352	0.01405	0.347057
1686	2555	0.864368	0.16189	0.095458		0.091507	0.865995	0.100979		0.022532	0.050942	0.717013
1687	2558	0.980237	0.233764	0.093474		0.100935	1.026813	0.096249		0.024993	0.070424	0.813271
1688	2561	0.86309	0.245422	0.069869		0.086154	0.958604	0.069188		0.021975	0.072991	0.716493
1689	2564	0.603158	0.18939	0.043099		0.058774	0.695514	0.040942		0.015313	0.056406	0.500905
1690	2567	0.473759	0.158817	0.030751		0.045303	0.560977	0.028145		0.01196	0.047475	0.393554
1691	2570	0.627329	0.221168	0.037688		0.058995	0.758629	0.032962		0.015671	0.066193	0.521303
1692	2573	0.881983	0.339379	0.045657		0.080347	1.106429	0.035311		0.021641	0.100761	0.733141
1693	2576	0.791956	0.330568	0.0348		0.069712	1.030377	0.021168		0.019189	0.097596	0.658825
1694	2579	0.69936	0.308847	0.026992		0.059929	0.935472	0.012466		0.01676	0.091262	0.582213
1695	2582	0.698848	0.324501	0.02366		0.058257	0.961017	0.010127		0.016525	0.096275	0.582254
1696	2585	0.732075	0.355435	0.021792		0.059315	1.033138	0.011151		0.017037	0.10611	0.610421
1697	2588	0.618511	0.312428	0.016065		0.048593	0.894115	0.009948		0.014084	0.093841	0.515923
1698	2591	0.483612	0.251213	0.011342		0.037084	0.711551	0.008056		0.010779	0.075817	0.403545
1699	2594	0.538552	0.285628	0.011692		0.040482	0.803145	0.00919		0.01177	0.086513	0.449517
1700	2597	0.63619	0.347359	0.012338		0.046348	0.967378	0.01117		0.013444	0.105708	0.531237
1701	25978	0.154367	0.047957	0.003484		0.024368	0.185631	0.006373		0.008561	0.015306	0.137824
1702	25979	0.1919	0.058231	0.005919		0.022932	0.225095	0.008128		0.005325	0.01858	0.166666
1703	2600	0.660101	0.369729	0.01187		0.04667	1.021657	0.013163		0.013466	0.112912	0.551519
1704	2603	0.598955	0.343224	0.009808		0.041078	0.942432	0.014524		0.011748	0.10506	0.50049
1705	2606	0.574264	0.335473	0.008614		0.038277	0.916722	0.015709		0.010823	0.102844	0.479988
1706	26086	0.197946	0.058874	0.009292		0.017899	0.226853	0.006763		0.010274	0.018743	0.172019
1707	26087	0.203425	0.059621	0.012526		0.014168	0.228612	0.007146		0.011881	0.018884	0.179572
1708	26088	0.236732	0.06885	0.016883		0.013041	0.262423	0.012277		0.010756	0.021655	0.212047
1709	26089	0.211434	0.061426	0.015286		0.010896	0.232991	0.018328		0.01396	0.019295	0.188678
1710	2609	0.604547	0.359427	0.008271		0.039119	0.978394	0.018212		0.010925	0.110337	0.505444
1711	26090	0.211099	0.061605	0.015314		0.010682	0.233029	0.023705		0.01181	0.019363	0.181861
1712	26091	0.20993	0.061705	0.015413		0.006483	0.233171	0.024611		0.005331	0.020291	0.174712
1713	26092	0.177719	0.052571	0.013601		0.009028	0.198642	0.017626		0.00874	0.017826	0.14608
1714	26093	0.152495	0.06174	0.002576		0.022347	0.199872	0.003467		0.013754	0.019003	0.132267
1715	26094	0.190074	0.075468	0.007356		0.020807	0.244168	0.0079		0.006261	0.023208	0.168143
1716	26095	0.196629	0.076167	0.011169		0.016047	0.246126	0.009772		0.009364	0.023338	0.18443
1717	26096	0.202854	0.076905	0.014274		0.013122	0.248051	0.009609		0.010882	0.023402	0.198412
1718	26097	0.238538	0.088831	0.018473		0.014801	0.285896	0.012936		0.016021	0.026787	0.238467
1719	26098	0.212117	0.078607	0.016099		0.014853	0.252725	0.01674		0.020095	0.023571	0.20981
1720	26099	0.210435	0.078585	0.015675		0.013039	0.252629	0.02196		0.017115	0.024278	0.197741
1721	26100	0.208454	0.078569	0.01413		0.007621	0.252689	0.021024		0.006853	0.026248	0.177962
1722	26101	0.175032	0.066501	0.009695		0.00914	0.213972	0.011992		0.009935	0.022988	0.140334
1723	26102	0.164806	0.080344	0.003349		0.021386	0.23386	0.007068		0.018663	0.025149	0.139261
1724	26103	0.202334	0.097489	0.009352		0.019483	0.283488	0.012076		0.009877	0.030454	0.19166
1725	26104	0.210406	0.098472	0.013833		0.0148	0.285783	0.013436		0.007771	0.030574	0.216823
1726	26105	0.219296	0.09951	0.01733		0.01234	0.288033	0.011638		0.008891	0.030575	0.237491
1727	26106	0.257664	0.114508	0.021563		0.017335	0.330477	0.012039		0.02197	0.034706	0.283506
1728	26107	0.229917	0.101806	0.018114		0.018325	0.293291	0.01582		0.027886	0.03048	0.246083
1729	26108	0.227382	0.101843	0.015416		0.01508	0.293122	0.018587		0.025193	0.03029	0.226594
1730	26109	0.223347	0.101879	0.011976		0.009824	0.293127	0.015724		0.00982	0.032349	0.197853
1731	26110	0.18721	0.086803	0.0069		0.0096	0.249744	0.006437		0.009221	0.028316	0.147732
1732	26111	0.170459	0.093802	0.003904		0.018846	0.257108	0.00481		0.018821	0.029554	0.143069
1733	26112	0.210265	0.113642	0.010784		0.01701	0.311332	0.011912		0.011694	0.035722	0.201686
1734	26113	0.217398	0.114661	0.015798		0.012677	0.313866	0.014946		0.007779	0.035794	0.229656
1735	26114	0.226978	0.115668	0.019091		0.010406	0.316354	0.015814		0.011113	0.035688	0.250428
1736	26115	0.266929	0.132721	0.02278		0.015678	0.362757	0.01263		0.023524	0.040329	0.296217
1737	26116	0.238404	0.117878	0.018499		0.017133	0.322154	0.014871		0.031495	0.0353	0.256539
1738	26117	0.235724	0.117807	0.015614		0.015737	0.321988	0.018093		0.028658	0.034874	0.237266
1739	26118	0.231444	0.1178	0.0114		0.010474	0.322005	0.014217		0.012266	0.037091	0.209624
1740	26119	0.193945	0.100453	0.005557		0.009236	0.274599	0.003544		0.005579	0.032522	0.152283
1741	2612	0.634763	0.384078	0.007783		0.039691	1.042149	0.020822		0.010961	0.118104	0.530953
1742	26120	0.173279	0.102214	0.004179		0.015286	0.273634	0.006546		0.014184	0.033167	0.142069
1743	26121	0.215412	0.124033	0.011728		0.013783	0.331749	0.015279		0.011212	0.04016	0.202492
1744	26122	0.22373	0.125283	0.016913		0.010002	0.334514	0.018296		0.009012	0.04031	0.232647
1745	26123	0.232833	0.126576	0.020231		0.007747	0.337243	0.016998		0.011272	0.040298	0.255242
1746	26124	0.273969	0.145597	0.023808		0.011828	0.387048	0.014368		0.020134	0.045718	0.302947
1747	26125	0.244556	0.129504	0.018708		0.012991	0.343562	0.015615		0.026414	0.040146	0.261483
1748	26126	0.241485	0.129637	0.014632		0.012869	0.343411	0.017516		0.02439	0.039777	0.241181
1749	26127	0.236319	0.129765	0.009793		0.009592	0.343445	0.012846		0.012828	0.039539	0.212317
1750	26128	0.19775	0.110607	0.004285		0.008879	0.292626	0.002361		0.004947	0.03398	0.153433
1751	26129	0.179103	0.109171	0.004526		0.011779	0.291672	0.006104		0.007049	0.03648	0.14143
1752	26130	0.22297	0.132081	0.012726		0.010669	0.352634	0.015667		0.008864	0.044045	0.198898

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1753	26131	0.232038	0.13334	0.018201		0.007714	0.355559	0.019619		0.008852	0.044214	0.227698
1754	26132	0.240989	0.134608	0.021021		0.006637	0.358441	0.019462		0.009634	0.044224	0.25007
1755	26133	0.282035	0.154428	0.024122		0.007602	0.410691	0.016926		0.013283	0.050138	0.296804
1756	26134	0.251747	0.13745	0.018401		0.008297	0.365088	0.01524		0.015228	0.044171	0.256242
1757	26135	0.249023	0.137517	0.013871		0.008273	0.364936	0.01924		0.014605	0.043825	0.236371
1758	26136	0.244576	0.13761	0.008821		0.007253	0.364976	0.01485		0.010231	0.043598	0.209481
1759	26137	0.20502	0.117544	0.003549		0.00851	0.311671	0.003113		0.005627	0.037121	0.156097
1760	26138	0.181599	0.110289	0.004711		0.007898	0.30224	0.00664		0.003916	0.037055	0.138822
1761	26139	0.226513	0.133472	0.013203		0.007256	0.365425	0.017282		0.004517	0.044771	0.192517
1762	26140	0.235339	0.134813	0.018711		0.007526	0.368477	0.021488		0.007124	0.045025	0.218574
1763	26141	0.242778	0.13617	0.021264		0.008067	0.371487	0.020584		0.007015	0.045173	0.239467
1764	26142	0.281996	0.156299	0.02332		0.011157	0.42566	0.017999		0.008479	0.051424	0.284349
1765	26143	0.251567	0.139135	0.016827		0.009209	0.378405	0.017835		0.007975	0.045445	0.245913
1766	26144	0.250225	0.139217	0.011863		0.008092	0.378252	0.021347		0.005875	0.045186	0.227717
1767	26145	0.247788	0.139323	0.00692		0.007863	0.378295	0.016253		0.005615	0.045007	0.203521
1768	26146	0.209325	0.119013	0.002581		0.007127	0.323045	0.003429		0.008322	0.038338	0.154027
1769	26147	0.183102	0.107839	0.004645		0.006998	0.307334	0.006916		0.012793	0.037335	0.139276
1770	26148	0.228322	0.130499	0.012876		0.007236	0.371581	0.018369		0.004288	0.045103	0.193701
1771	26149	0.236365	0.131791	0.017959		0.006694	0.374674	0.023177		0.004973	0.045348	0.219909
1772	2615	0.752362	0.462469	0.008234		0.045392	1.252063	0.025985		0.012479	0.142507	0.629861
1773	26150	0.241966	0.133095	0.020006		0.008533	0.377716	0.022737		0.006241	0.045482	0.239933
1774	26151	0.278948	0.152749	0.021419		0.013069	0.43277	0.020796		0.009813	0.051755	0.282421
1775	26152	0.248892	0.135975	0.015063		0.014202	0.384698	0.018956		0.015875	0.045698	0.242215
1776	26153	0.249106	0.136068	0.010346		0.011455	0.384518	0.020024		0.013508	0.045404	0.223865
1777	26154	0.248785	0.136187	0.005854		0.008092	0.384545	0.015254		0.005962	0.045788	0.200799
1778	26155	0.211824	0.116342	0.002607		0.005886	0.328374	0.003312		0.010409	0.039925	0.153186
1779	26156	0.184109	0.104384	0.004501		0.007144	0.308198	0.0073		0.019699	0.036976	0.14043
1780	26157	0.22919	0.126336	0.012268		0.005812	0.372616	0.019444		0.008546	0.044669	0.197682
1781	26158	0.236178	0.127638	0.016812		0.005033	0.375696	0.024595		0.004754	0.044914	0.226797
1782	26159	0.23988	0.128988	0.018743		0.006675	0.378718	0.023957		0.004617	0.045058	0.249537
1783	26160	0.274553	0.148173	0.020362		0.013428	0.433884	0.022905		0.015335	0.051294	0.295897
1784	26161	0.24514	0.132032	0.01435		0.015671	0.385657	0.020678		0.025783	0.045329	0.254484
1785	26162	0.246884	0.132236	0.00972		0.0131	0.385447	0.021826		0.023011	0.045065	0.23414
1786	26163	0.248548	0.132433	0.005689		0.007114	0.385451	0.015922		0.007192	0.044879	0.207811
1787	26164	0.213174	0.113174	0.002379		0.008049	0.329136	0.004376		0.010716	0.038228	0.153814
1788	26165	0.184083	0.09947	0.00417		0.007062	0.304093	0.007438		0.021247	0.035666	0.140212
1789	26166	0.22888	0.120465	0.011502		0.004389	0.367784	0.019893		0.009688	0.043089	0.198042
1790	26167	0.235237	0.121786	0.01612		0.007171	0.370813	0.025282		0.005069	0.043297	0.228547
1791	26168	0.23808	0.123195	0.018082		0.00727	0.373776	0.02458		0.004825	0.043402	0.253478
1792	26169	0.27178	0.141716	0.019421		0.01028	0.428282	0.024044		0.015624	0.049381	0.303334
1793	26170	0.242729	0.126396	0.013821		0.012964	0.380557	0.021858		0.026748	0.043594	0.261916
1794	26171	0.245063	0.12671	0.009919		0.011125	0.380308	0.021753		0.024521	0.043298	0.240072
1795	26172	0.247447	0.126981	0.005887		0.006268	0.380282	0.015599		0.008338	0.043083	0.211307
1796	26173	0.212739	0.108519	0.002569		0.009877	0.324614	0.006718		0.009153	0.036667	0.154567
1797	26174	0.18435	0.096007	0.004046		0.008336	0.296445	0.007691		0.017569	0.033207	0.139703
1798	26175	0.22884	0.116207	0.010919		0.006375	0.358381	0.020589		0.00774	0.040094	0.194575
1799	26176	0.235088	0.117431	0.015229		0.009552	0.361285	0.02638		0.005506	0.040264	0.221546
1800	26177	0.238189	0.11872	0.017059		0.010871	0.36411	0.026242		0.005663	0.040324	0.242818
1801	26178	0.272319	0.136446	0.018623		0.01044	0.41704	0.025959		0.010136	0.045827	0.28775
1802	26179	0.243291	0.121659	0.013688		0.008421	0.370593	0.024986		0.019515	0.040464	0.247871
1803	2618	0.804693	0.503209	0.007394		0.046855	1.360384	0.030611		0.012725	0.155426	0.673902
1804	26180	0.245219	0.121919	0.009966		0.009046	0.370321	0.026479		0.018569	0.040205	0.228841
1805	26181	0.246982	0.122161	0.006297		0.008354	0.37028	0.019576		0.007119	0.040022	0.204323
1806	26182	0.211948	0.104431	0.00258		0.01121	0.316165	0.004317		0.005787	0.034081	0.154324
1807	26183	0.178188	0.090936	0.004288		0.009661	0.276665	0.007556		0.009861	0.030239	0.136091
1808	26184	0.222208	0.110641	0.011688		0.008063	0.336239	0.020153		0.006637	0.036381	0.189771
1809	26185	0.228678	0.111792	0.016662		0.010651	0.338985	0.025894		0.005645	0.03575	0.214829
1810	26186	0.232894	0.112995	0.019309		0.012935	0.341644	0.025997		0.006772	0.03541	0.234162
1811	26187	0.268576	0.130237	0.021955		0.014489	0.392494	0.028128		0.007172	0.040354	0.277553
1812	26188	0.239239	0.115782	0.016677		0.010594	0.347773	0.029117		0.007839	0.035954	0.239673
1813	26189	0.239947	0.116017	0.012916		0.009198	0.347568	0.028962		0.008126	0.036116	0.223298
1814	26190	0.240036	0.116248	0.00851		0.009846	0.347604	0.021202		0.006277	0.036203	0.200509
1815	26191	0.203899	0.09896	0.003523		0.010986	0.295583	0.0055		0.004621	0.030796	0.149334
1816	26192	0.169588	0.085471	0.004878		0.01104	0.252673	0.007442		0.004414	0.028084	0.130169
1817	26193	0.21292	0.104751	0.01345		0.010048	0.309476	0.020007		0.004943	0.034023	0.181655
1818	26194	0.219691	0.105752	0.019668		0.010548	0.312104	0.026247		0.005539	0.033394	0.205349
1819	26195	0.225335	0.106747	0.023603		0.013323	0.314661	0.02731		0.00699	0.032317	0.223993
1820	26196	0.262954	0.123369	0.028127		0.016599	0.36321	0.033615		0.009894	0.035866	0.267061
1821	26197	0.233255	0.109072	0.022078		0.013256	0.320657	0.035441		0.0083	0.031824	0.229676
1822	26198	0.232445	0.109167	0.017257		0.011338	0.320491	0.035406		0.006363	0.031983	0.213998

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1823	26199	0.230435	0.10931	0.011326		0.010566	0.32064	0.026255		0.005243	0.032087	0.192352
1824	26200	0.19296	0.092461	0.004432		0.009578	0.271059	0.00794		0.005181	0.027146	0.143179
1825	26201	0.157672	0.079293	0.005597		0.011597	0.226165	0.00798		0.006532	0.025071	0.12155
1826	26202	0.200037	0.098456	0.015607		0.01139	0.280346	0.020406		0.005478	0.030782	0.173679
1827	26203	0.206753	0.09967	0.023158		0.009386	0.282835	0.027156		0.006113	0.030284	0.198633
1828	26204	0.213271	0.101014	0.02884		0.01204	0.285463	0.032697		0.005572	0.029338	0.219201
1829	26205	0.252103	0.118119	0.037179		0.016175	0.332568	0.042731		0.009822	0.0324	0.265633
1830	26206	0.222292	0.104386	0.031494		0.013667	0.292679	0.043232		0.011542	0.028354	0.227127
1831	26207	0.220422	0.105011	0.026539		0.012282	0.293381	0.041544		0.010361	0.02828	0.209489
1832	26208	0.216905	0.10556	0.018408		0.009829	0.294118	0.030677		0.005559	0.028231	0.185905
1833	26209	0.178616	0.088636	0.006823		0.007836	0.24656	0.009778		0.005878	0.023598	0.134648
1834	2621	0.712749	0.452401	0.005401		0.040077	1.222622	0.028833		0.010687	0.140231	0.597042
1835	26210	0.164137	0.084949	0.006703		0.013311	0.228249	0.00996		0.012665	0.023809	0.127187
1836	26211	0.205749	0.104467	0.018965		0.013652	0.280497	0.024872		0.007173	0.02894	0.180147
1837	26212	0.212568	0.105703	0.029513		0.011547	0.283374	0.033401		0.008667	0.028384	0.206643
1838	26213	0.219893	0.107084	0.038177		0.0109	0.286368	0.040319		0.008516	0.02732	0.229031
1839	26214	0.259512	0.124544	0.05034		0.015421	0.331936	0.055189		0.008665	0.030834	0.27877
1840	26215	0.230007	0.110751	0.044449		0.013853	0.293565	0.054384		0.01593	0.027138	0.238789
1841	26216	0.227342	0.11162	0.039255		0.012734	0.294326	0.052282		0.015158	0.027374	0.217142
1842	26217	0.222531	0.11242	0.029022		0.009335	0.295143	0.039683		0.005826	0.027505	0.19161
1843	26218	0.183539	0.09527	0.011208		0.0086	0.24937	0.013713		0.009205	0.023221	0.140263
1844	26219	0.170638	0.087117	0.007777		0.015698	0.227752	0.008555		0.018762	0.022365	0.134757
1845	26220	0.21068	0.105991	0.021938		0.016778	0.276739	0.021859		0.008391	0.026915	0.187621
1846	26221	0.217756	0.107111	0.034474		0.015381	0.279022	0.032466		0.01253	0.026429	0.217398
1847	26222	0.226156	0.10833	0.044977		0.012842	0.281403	0.041434		0.014194	0.025497	0.24486
1848	26223	0.265466	0.125033	0.059457		0.012953	0.323768	0.060716		0.0083	0.027587	0.297613
1849	26224	0.235917	0.111611	0.05326		0.012185	0.288136	0.061512		0.01659	0.024662	0.256253
1850	26225	0.232487	0.112344	0.046982		0.010813	0.289332	0.058709		0.017006	0.02495	0.231867
1851	26226	0.227142	0.113035	0.034165		0.010141	0.290484	0.044019		0.005594	0.025096	0.199815
1852	26227	0.188695	0.096505	0.013395		0.011278	0.247608	0.016196		0.013548	0.021371	0.146458
1853	26228	0.171313	0.081283	0.007134		0.018317	0.219774	0.007498		0.020112	0.019814	0.137781
1854	26229	0.210076	0.098405	0.019943		0.01942	0.265802	0.019416		0.007564	0.023701	0.187315
1855	26230	0.217801	0.099327	0.03107		0.0186	0.267921	0.028383		0.01558	0.02319	0.215309
1856	26231	0.225904	0.100274	0.040004		0.016527	0.27012	0.03847		0.019249	0.022271	0.239466
1857	26232	0.2641	0.115156	0.051639		0.015268	0.309853	0.054915		0.013995	0.023928	0.288197
1858	26233	0.234966	0.102727	0.045244		0.012447	0.275935	0.053144		0.012978	0.021057	0.24939
1859	26234	0.231222	0.103099	0.039202		0.011691	0.276475	0.049296		0.013136	0.021067	0.227769
1860	26235	0.225991	0.103476	0.028264		0.010958	0.277088	0.037185		0.006555	0.021059	0.19875
1861	26236	0.189535	0.088526	0.011518		0.013356	0.236813	0.015511		0.01586	0.018024	0.148296
1862	26237	0.162723	0.064088	0.004769		0.019783	0.196101	0.004059		0.015192	0.016241	0.137622
1863	26238	0.201329	0.077859	0.013322		0.021321	0.238007	0.011087		0.006068	0.019425	0.174618
1864	26239	0.207274	0.078529	0.020555		0.020695	0.239796	0.017835		0.016731	0.018891	0.193337
1865	2624	0.621021	0.398111	0.004354		0.033921	1.076463	0.02597		0.00921	0.123864	0.520261
1866	26240	0.213094	0.079168	0.026249		0.020458	0.241611	0.024536		0.022081	0.0181	0.208389
1867	26241	0.248504	0.090929	0.033587		0.019361	0.277547	0.037298		0.020649	0.0196	0.247574
1868	26242	0.220625	0.080659	0.029177		0.014181	0.246529	0.039731		0.010316	0.016523	0.216454
1869	26243	0.218773	0.080666	0.025307		0.012678	0.246891	0.040014		0.0082	0.016004	0.203479
1870	26244	0.215752	0.080734	0.019734		0.012743	0.247352	0.033544		0.009727	0.016134	0.183696
1871	26245	0.180773	0.068742	0.010676		0.014433	0.210714	0.018128		0.01496	0.013812	0.144287
1872	26246	0.1591	0.048647	0.004049		0.021034	0.178675	0.004823		0.008465	0.010817	0.13803
1873	26247	0.196643	0.059117	0.006528		0.022786	0.216822	0.008853		0.005191	0.01304	0.166777
1874	26248	0.201843	0.059657	0.009502		0.021785	0.218395	0.012147		0.015969	0.01294	0.169829
1875	26249	0.206638	0.060179	0.012317		0.021092	0.219977	0.015202		0.021836	0.012766	0.174896
1876	26250	0.239852	0.069159	0.016958		0.021903	0.252597	0.022741		0.023768	0.01428	0.204223
1877	26251	0.213353	0.061319	0.016306		0.016242	0.224269	0.025401		0.015787	0.012231	0.181195
1878	26252	0.212208	0.061275	0.016131		0.014332	0.224508	0.028425		0.012248	0.011785	0.176931
1879	26253	0.210053	0.061264	0.015415		0.013636	0.224859	0.027945		0.011911	0.011547	0.174269
1880	26254	0.176479	0.052118	0.014435		0.014861	0.191521	0.020145		0.01231	0.009849	0.144901
1881	2627	0.697827	0.451139	0.004856		0.036972	1.221439	0.029443		0.010406	0.141017	0.584679
1882	2630	0.778324	0.506962	0.005649		0.039729	1.375997	0.034296		0.011645	0.159282	0.652299
1883	2633	0.85057	0.557582	0.006379		0.041426	1.520238	0.038504		0.012697	0.17657	0.713168
1884	2636	0.825557	0.543071	0.00631		0.038282	1.489929	0.038342		0.01219	0.173639	0.692574
1885	2639	0.829638	0.54613	0.006284		0.036656	1.509418	0.0389		0.012316	0.176412	0.696353
1886	2642	0.78784	0.517684	0.006082		0.033052	1.443039	0.038398		0.011744	0.168913	0.661646
1887	2645	0.617662	0.404363	0.004758		0.024557	1.13766	0.030536		0.00924	0.133213	0.519022
1888	2648	0.629477	0.410822	0.004848		0.024273	1.162766	0.031224		0.009432	0.136091	0.529152
1889	2651	0.827229	0.536028	0.006246		0.030139	1.534511	0.040325		0.014134	0.179194	0.695967
1890	2654	0.797644	0.511887	0.006033		0.027286	1.483957	0.039074		0.016307	0.172539	0.671713
1891	2657	0.797006	0.509666	0.005891		0.025446	1.48567	0.038648		0.018637	0.17169	0.671856
1892	2660	0.796387	0.506399	0.005706		0.023755	1.485977	0.038354		0.020455	0.170488	0.671982

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1893	2663	0.737732	0.465549	0.00501		0.020521	1.376585	0.034854		0.020133	0.156698	0.62309
1894	2666	0.614589	0.384995	0.004071		0.016069	1.14578	0.029386		0.017233	0.129534	0.519454
1895	2669	0.704595	0.437716	0.004561		0.017184	1.311661	0.03353		0.020039	0.147268	0.596009
1896	2672	0.794407	0.487545	0.00509		0.017448	1.474804	0.037168		0.022632	0.164141	0.672738
1897	2675	0.822687	0.498074	0.005191		0.015954	1.521676	0.036849		0.023149	0.167898	0.697503
1898	2678	0.79345	0.472984	0.005176		0.013201	1.460257	0.034813		0.02176	0.159532	0.673512
1899	2681	0.793014	0.465092	0.005262		0.010898	1.450718	0.033511		0.020966	0.156876	0.673836
1900	2684	0.780607	0.456445	0.005291		0.010367	1.418076	0.031856		0.019792	0.151733	0.663876
1901	2687	0.647953	0.377203	0.004558		0.01055	1.168108	0.025125		0.015773	0.123661	0.551477
1902	2690	0.624071	0.361997	0.004508		0.011254	1.11921	0.024248		0.014839	0.117636	0.531404
1903	2693	0.791816	0.455844	0.006228		0.017143	1.406223	0.029983		0.018095	0.1459	0.674774
1904	2696	0.791607	0.452593	0.006652		0.0201	1.390783	0.028858		0.017447	0.142878	0.675014
1905	2699	0.82016	0.467553	0.007245		0.024259	1.424124	0.027882		0.017446	0.145779	0.699602
1906	2702	0.791435	0.448934	0.007069		0.026774	1.356299	0.025974		0.016261	0.138236	0.674816
1907	2705	0.701543	0.395261	0.006409		0.026767	1.186462	0.021855		0.013952	0.120053	0.597667
1908	2708	0.611691	0.3424	0.005688		0.025425	1.023616	0.018398		0.011863	0.102802	0.52064
1909	2711	0.73402	0.40777	0.006901		0.033076	1.214613	0.020871		0.013865	0.120916	0.624138
1910	2714	0.792165	0.43483	0.007378		0.039333	1.290096	0.022192		0.014445	0.12689	0.672981
1911	2717	0.612534	0.337289	0.005682		0.033296	0.983656	0.016324		0.01075	0.095516	0.519953
1912	2720	0.396526	0.220606	0.003766		0.022601	0.633824	0.010189		0.006789	0.06093	0.336426
1913	2723	0.579558	0.325203	0.005745		0.034337	0.922728	0.014141		0.009688	0.087906	0.491529
1914	2726	0.722089	0.412717	0.007463		0.046226	1.140214	0.017165		0.011573	0.106866	0.61158
1915	2729	0.723264	0.421326	0.007913		0.050219	1.13174	0.016037		0.011789	0.10589	0.611522
1916	2732	0.75652	0.445777	0.009007		0.057319	1.16973	0.014709		0.012593	0.109282	0.638279
1917	2735	0.726536	0.428282	0.009079		0.0598	1.105988	0.013217		0.012308	0.102457	0.611359
1918	2738	0.7524	0.437478	0.010357		0.067586	1.1265	0.011688		0.012826	0.102816	0.631615
1919	2741	0.72955	0.41496	0.011361		0.070756	1.070975	0.009095		0.012451	0.095908	0.611139
1920	2744	0.575364	0.319472	0.010074		0.058976	0.828771	0.006342		0.009854	0.072843	0.481285
1921	2747	0.597113	0.327055	0.011001		0.062944	0.850763	0.006225		0.010232	0.073692	0.499038
1922	2750	0.805485	0.426852	0.01742		0.089665	1.119846	0.007918		0.013577	0.093955	0.67215
1923	2753	0.806588	0.41104	0.020446		0.094228	1.094205	0.009527		0.013958	0.088475	0.672155
1924	2756	0.836828	0.407546	0.025107		0.101949	1.109293	0.01416		0.015168	0.085871	0.696597
1925	2759	0.808438	0.374524	0.028307		0.102128	1.046032	0.01819		0.015176	0.076722	0.672183
1926	2762	0.809252	0.353846	0.033188		0.105635	1.020676	0.024812		0.01545	0.070749	0.672215
1927	2765	0.80997	0.331699	0.038755		0.108809	0.994632	0.032832		0.015654	0.065246	0.672286
1928	2768	0.839975	0.319487	0.046831		0.115719	1.003136	0.04399		0.016541	0.062358	0.696841
1929	2771	0.811166	0.283693	0.052117		0.11425	0.940729	0.051706		0.016274	0.054929	0.67267
1930	2774	0.885483	0.281197	0.065478		0.127297	0.995768	0.067633		0.01801	0.053987	0.734167
1931	2777	0.948094	0.263385	0.082475		0.139465	1.026034	0.087968		0.019755	0.050381	0.786105
1932	2780	0.886526	0.211046	0.088678		0.133029	0.924605	0.096358		0.018994	0.040042	0.735093
1933	2783	0.887057	0.173149	0.101024		0.135825	0.890921	0.111466		0.019604	0.03303	0.735485
1934	305	0.345457	0.044381	0.03621		0.030738	0.337538	0.03558		0.008136	0.013979	0.292815
1935	3066	0.301026	0.052346	0.030094		0.028088	0.303254	0.030774		0.007149	0.015779	0.25398
1936	3067	0.364492	0.066684	0.038402		0.036464	0.366538	0.039985		0.009111	0.020478	0.30489
1937	3068	0.341188	0.076426	0.029611		0.031302	0.356213	0.030154		0.007835	0.026213	0.288059
1938	3069	0.413266	0.096789	0.037702		0.040397	0.430824	0.038617		0.01005	0.028274	0.345741
1939	307	0.398916	0.066416	0.038419		0.035394	0.402077	0.038835		0.009103	0.019832	0.338553
1940	3070	0.290303	0.078084	0.021437		0.025973	0.313919	0.021183		0.006497	0.032244	0.245282
1941	3071	0.351704	0.098231	0.027284		0.033417	0.386117	0.026964		0.008426	0.030503	0.2945
1942	3072	0.209765	0.062318	0.013704		0.01839	0.234693	0.013115		0.004635	0.028023	0.177358
1943	3073	0.25418	0.07827	0.01743		0.023615	0.289204	0.016622		0.006042	0.025923	0.21295
1944	3074	0.164716	0.052172	0.009774		0.014198	0.188767	0.009046		0.003605	0.024436	0.139333
1945	3075	0.199606	0.065523	0.012428		0.01821	0.232925	0.01143		0.004706	0.022344	0.1673
1946	3076	0.218092	0.072505	0.01192		0.018519	0.254754	0.010641		0.004729	0.034633	0.184548
1947	3077	0.264304	0.091108	0.015177		0.023731	0.314666	0.013427		0.006175	0.03149	0.221593
1948	3078	0.296957	0.107303	0.013998		0.024478	0.358995	0.011152		0.006327	0.051599	0.251428
1949	3079	0.359896	0.135023	0.017825		0.031319	0.444046	0.013982		0.00825	0.046998	0.30188
1950	3081	0.275372	0.107666	0.011032		0.021958	0.34447	0.007226		0.005768	0.050233	0.233293
1951	309	0.452085	0.097114	0.037801		0.039577	0.471929	0.03833		0.009967	0.037319	0.384027
1952	311	0.384584	0.099868	0.027371		0.032943	0.413471	0.027051		0.008225	0.047112	0.326915
1953	313	0.277869	0.079873	0.017502		0.023351	0.306739	0.01679		0.005835	0.04147	0.236384
1954	3144	0.33372	0.135606	0.014042		0.02808	0.426565	0.00889		0.007536	0.046474	0.280097
1955	3145	0.243199	0.100586	0.008552		0.018868	0.312068	0.004429		0.005035	0.045034	0.206154
1956	3146	0.294707	0.126699	0.010881		0.024128	0.386763	0.005337		0.006588	0.042275	0.247517
1957	3147	0.243047	0.10583	0.007498		0.018328	0.319514	0.003246		0.004962	0.045285	0.206159
1958	3148	0.294509	0.133236	0.009544		0.023441	0.396823	0.004112		0.006502	0.043099	0.247531
1959	3149	0.242902	0.110819	0.00657		0.017788	0.327129	0.003392		0.004868	0.046638	0.206167
1960	315	0.218182	0.066915	0.01249		0.018046	0.246491	0.011603		0.004534	0.036397	0.185702
1961	3150	0.294314	0.139382	0.008365		0.022757	0.406842	0.004308		0.006383	0.043952	0.247555
1962	3151	0.215079	0.102332	0.005093		0.015276	0.296572	0.003134		0.004213	0.042624	0.182657

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
1963	3152	0.260585	0.128561	0.006484		0.019549	0.368975	0.004		0.005522	0.039974	0.219322
1964	3153	0.168158	0.082388	0.003592		0.01165	0.235925	0.002523		0.003226	0.034149	0.142868
1965	3154	0.203726	0.103434	0.004576		0.01491	0.293592	0.003229		0.004229	0.031987	0.171546
1966	3155	0.187251	0.093746	0.003687		0.012708	0.266223	0.002864		0.003527	0.038754	0.159142
1967	3156	0.226849	0.117644	0.004691		0.01627	0.331353	0.003674		0.004621	0.036269	0.191086
1968	3157	0.221182	0.114118	0.003855		0.014535	0.32058	0.003462		0.004037	0.047029	0.188074
1969	3158	0.267939	0.143157	0.004921		0.018612	0.399107	0.004453		0.005286	0.043901	0.225831
1970	3159	0.216821	0.114825	0.003369		0.0138	0.319788	0.003696		0.003822	0.047186	0.184448
1971	3160	0.262644	0.144017	0.004396		0.017678	0.398205	0.004887		0.004998	0.044088	0.221484
1972	3161	0.208214	0.112897	0.002948		0.012831	0.312164	0.004247		0.003533	0.046236	0.177193
1973	3162	0.252202	0.141572	0.003853		0.016471	0.388769	0.005613		0.004615	0.043588	0.212762
1974	3163	0.19962	0.110402	0.002578		0.011945	0.303572	0.00464		0.003265	0.045027	0.169936
1975	3164	0.241779	0.138424	0.003374		0.015335	0.37813	0.00612		0.004262	0.042861	0.204044
1976	3165	0.210133	0.118353	0.002461		0.012193	0.323919	0.005413		0.003306	0.048037	0.178951
1977	3166	0.2545	0.148361	0.003228		0.015665	0.403547	0.007115		0.004312	0.046175	0.214866
1978	3167	0.220623	0.126571	0.002302		0.012358	0.344956	0.006213		0.003316	0.051149	0.18802
1979	3168	0.267198	0.158604	0.003035		0.015881	0.429844	0.008134		0.004321	0.049663	0.225735
1980	3169	0.25018	0.145934	0.002301		0.01351	0.396433	0.007579		0.003629	0.05894	0.213362
1981	317	0.288878	0.093002	0.015238		0.023559	0.332425	0.013669		0.005947	0.051755	0.245964
1982	3170	0.303027	0.182763	0.003043		0.01737	0.494066	0.009858		0.00472	0.057741	0.256174
1983	3171	0.27966	0.166216	0.002151		0.014528	0.450202	0.009221		0.003868	0.06759	0.238654
1984	3172	0.338769	0.207956	0.002856		0.01868	0.561102	0.012016		0.005025	0.066903	0.28652
1985	3173	0.247702	0.149629	0.001696		0.012374	0.404615	0.008732		0.003254	0.061563	0.211469
1986	3174	0.300083	0.187044	0.00212		0.015968	0.504298	0.011372		0.004228	0.06136	0.25386
1987	3175	0.215825	0.131776	0.001416		0.010479	0.356244	0.007888		0.002734	0.054695	0.184298
1988	3176	0.261478	0.164662	0.001773		0.013523	0.444037	0.010235		0.003599	0.054675	0.22123
1989	3177	0.230503	0.142002	0.001495		0.010863	0.384162	0.008669		0.002913	0.059324	0.196878
1990	3178	0.279276	0.177406	0.00188		0.014014	0.478863	0.011187		0.003848	0.059438	0.236318
1991	3179	0.270498	0.167953	0.001746		0.012296	0.455332	0.010494		0.003429	0.070386	0.23111
1992	3180	0.327751	0.209821	0.002192		0.015857	0.567593	0.01357		0.004511	0.070819	0.2774
1993	3181	0.295604	0.184698	0.00194		0.012825	0.502958	0.011836		0.003765	0.077049	0.252673
1994	3182	0.358197	0.230786	0.002442		0.016533	0.627033	0.015301		0.0049	0.077926	0.303282
1995	3183	0.286915	0.179839	0.001921		0.011844	0.492786	0.01177		0.003687	0.074114	0.245363
1996	3184	0.347687	0.224757	0.002421		0.015268	0.614484	0.015197		0.004811	0.075251	0.294512
1997	3185	0.278256	0.174524	0.001869		0.010934	0.481588	0.01165		0.003604	0.071041	0.238069
1998	3186	0.337212	0.218088	0.002375		0.014096	0.60065	0.015002		0.004699	0.072281	0.285758
1999	3187	0.273827	0.171533	0.001777		0.010214	0.477008	0.011726		0.003693	0.069333	0.234397
2000	3188	0.331854	0.214256	0.002264		0.013171	0.595	0.015177		0.004641	0.070641	0.281351
2001	3189	0.21469	0.134094	0.001292		0.007587	0.375989	0.009328		0.00301	0.054193	0.183875
2002	319	0.393348	0.13758	0.017875		0.031178	0.467942	0.014389		0.007953	0.077165	0.335108
2003	3190	0.260195	0.167419	0.001781		0.009787	0.469032	0.01209		0.003673	0.055159	0.220706
2004	3191	0.218803	0.136292	0.001314		0.007474	0.384246	0.009532		0.003287	0.055241	0.187469
2005	3192	0.265184	0.170144	0.001809		0.009643	0.479367	0.012338		0.00384	0.05613	0.225017
2006	3193	0.277492	0.171757	0.001654		0.008913	0.489246	0.012059		0.004937	0.070188	0.23794
2007	3194	0.336327	0.214313	0.002269		0.011545	0.61043	0.015538		0.005881	0.071091	0.285598
2008	3195	0.277275	0.171223	0.001639		0.008362	0.490209	0.012016		0.005667	0.07029	0.237969
2009	3196	0.336081	0.21316	0.002253		0.010832	0.611671	0.015501		0.006873	0.071109	0.285636
2010	3197	0.277091	0.170323	0.001607		0.007785	0.490622	0.01194		0.006347	0.07026	0.238017
2011	3198	0.335834	0.212152	0.002209		0.010094	0.612266	0.015393		0.007788	0.071051	0.285695
2012	3199	0.276913	0.169131	0.001556		0.007234	0.490543	0.011834		0.006916	0.070119	0.238075
2013	3200	0.335593	0.21075	0.002136		0.009405	0.612301	0.015238		0.008549	0.070832	0.285759
2014	3201	0.245297	0.148662	0.001323		0.005954	0.434286	0.010403		0.006488	0.062111	0.211081
2015	3202	0.297257	0.185258	0.001808		0.007747	0.542208	0.013359		0.008036	0.062577	0.253349
2016	3203	0.213753	0.128671	0.001114		0.004867	0.377994	0.009041		0.005806	0.054262	0.184066
2017	3204	0.259019	0.160302	0.001526		0.006337	0.471968	0.011656		0.007186	0.054534	0.220918
2018	3205	0.245077	0.146447	0.00125		0.005198	0.432644	0.01031		0.006754	0.062488	0.211199
2019	3206	0.296964	0.182367	0.001716		0.006775	0.540227	0.01332		0.00835	0.062528	0.25348
2020	3207	0.276342	0.163392	0.001392		0.005274	0.486398	0.011422		0.007649	0.070884	0.238387
2021	3208	0.334833	0.203345	0.001909		0.006885	0.607382	0.014739		0.00943	0.070279	0.286112
2022	3209	0.276197	0.161301	0.001385		0.00464	0.484254	0.011104		0.007568	0.071027	0.23851
2023	321	0.364756	0.137971	0.014094		0.027979	0.448592	0.009418		0.007248	0.07469	0.310943
2024	3210	0.334642	0.200652	0.001889		0.006065	0.604724	0.014257		0.009289	0.069717	0.286266
2025	3211	0.27606	0.158877	0.001435		0.003966	0.481592	0.010778		0.007438	0.070657	0.238633
2026	3212	0.334458	0.197583	0.001953		0.005192	0.601362	0.01386		0.009086	0.069503	0.286425
2027	3213	0.275931	0.15764	0.001468		0.003265	0.478431	0.01042		0.007301	0.069416	0.238741
2028	3214	0.334289	0.195171	0.001992		0.004282	0.597398	0.013394		0.008875	0.067998	0.28656
2029	3215	0.271636	0.154444	0.001486		0.003126	0.467629	0.009882		0.007026	0.066161	0.235212
2030	3216	0.32907	0.191365	0.002013		0.004078	0.583945	0.012685		0.008491	0.064217	0.282323
2031	3217	0.213057	0.120363	0.001278		0.003046	0.363867	0.007486		0.005355	0.049663	0.184611
2032	3218	0.258096	0.149261	0.001652		0.003943	0.454419	0.009574		0.006426	0.047787	0.221587

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2033	3219	0.217195	0.122136	0.001382		0.003514	0.36901	0.007503		0.005355	0.04913	0.188267
2034	3220	0.263101	0.151528	0.001784		0.004505	0.460832	0.00964		0.006404	0.0475	0.225981
2035	3221	0.275593	0.154267	0.001906		0.005373	0.465402	0.009245		0.006589	0.058799	0.239031
2036	3222	0.333831	0.190598	0.002469		0.006883	0.578937	0.011923		0.007835	0.059387	0.286931
2037	3223	0.275543	0.153743	0.00203		0.006378	0.461423	0.008882		0.006415	0.055153	0.239085
2038	3224	0.333759	0.190096	0.002632		0.008122	0.572555	0.011443		0.007575	0.058479	0.287015
2039	3225	0.275514	0.152946	0.002114		0.00742	0.456609	0.008457		0.006278	0.051598	0.239086
2040	3226	0.333714	0.189283	0.002751		0.00945	0.566049	0.010825		0.00738	0.057493	0.287033
2041	3227	0.275516	0.151896	0.002149		0.00849	0.451356	0.00805		0.006167	0.049038	0.239008
2042	3228	0.333703	0.188134	0.002792		0.010807	0.559809	0.010337		0.007222	0.056363	0.286926
2043	3229	0.244242	0.133504	0.0019		0.008506	0.395414	0.006729		0.005359	0.041246	0.211718
2044	323	0.322151	0.128878	0.010929		0.024046	0.406128	0.005844		0.006319	0.066528	0.27477
2045	3230	0.295815	0.165466	0.002466		0.010821	0.490423	0.008671		0.006255	0.048901	0.254142
2046	3231	0.212975	0.115516	0.001634		0.008095	0.341691	0.005645		0.004581	0.034237	0.184464
2047	3232	0.257937	0.14324	0.002142		0.010289	0.423617	0.00728		0.005335	0.041947	0.22141
2048	3233	0.244368	0.131388	0.001829		0.010078	0.388493	0.006245		0.00512	0.038287	0.211455
2049	3234	0.295952	0.162985	0.002476		0.012803	0.481295	0.008005		0.005954	0.047156	0.253789
2050	3235	0.275854	0.151055	0.002117		0.01258	0.435683	0.006749		0.005548	0.043625	0.238365
2051	3236	0.334067	0.183145	0.002774		0.015947	0.53697	0.008723		0.006441	0.051603	0.286147
2052	3237	0.213337	0.120757	0.001748		0.010712	0.335307	0.00496		0.004092	0.033658	0.184164
2053	3238	0.258342	0.145282	0.002232		0.01355	0.412519	0.006441		0.004756	0.038538	0.221081
2054	3239	0.138123	0.079824	0.001176		0.007302	0.217026	0.003114		0.002573	0.021621	0.11916
2055	3240	0.167251	0.095489	0.00151		0.009219	0.266232	0.004019		0.002999	0.024448	0.143048
2056	3241	0.188455	0.111075	0.001656		0.010396	0.297126	0.00414		0.003421	0.029216	0.162486
2057	3242	0.228193	0.132097	0.002136		0.013109	0.36241	0.005319		0.003987	0.032769	0.19506
2058	3243	0.251651	0.155795	0.002334		0.01516	0.401123	0.005245		0.004305	0.038067	0.216632
2059	3244	0.304669	0.182317	0.002992		0.019027	0.482247	0.006779		0.005024	0.042339	0.260052
2060	3245	0.252132	0.16663	0.002487		0.016662	0.408688	0.004922		0.004017	0.037222	0.216618
2061	3246	0.305299	0.191314	0.003188		0.020951	0.486051	0.006329		0.004889	0.04161	0.260028
2062	3247	0.305994	0.200608	0.003413		0.022977	0.490232	0.005744		0.004994	0.04111	0.260014
2063	3248	0.306695	0.200782	0.003645		0.024964	0.485584	0.005249		0.005096	0.039944	0.259974
2064	3249	0.31752	0.202881	0.004165		0.027845	0.492473	0.004676		0.005367	0.039859	0.268588
2065	325	0.321964	0.135627	0.009582		0.023359	0.415568	0.004157		0.006223	0.06773	0.27477
2066	3250	0.307838	0.190374	0.004573		0.028912	0.465884	0.00368		0.005255	0.036923	0.259887
2067	3251	0.22608	0.135367	0.003716		0.022391	0.334441	0.002398		0.003824	0.025939	0.190569
2068	3252	0.251968	0.147979	0.004474		0.025663	0.367803	0.002529		0.004219	0.028116	0.212216
2069	3253	0.339876	0.191099	0.007015		0.036416	0.482021	0.00305		0.005618	0.035635	0.285827
2070	3254	0.340334	0.182216	0.00827		0.038148	0.468056	0.003734		0.005724	0.03339	0.285832
2071	3255	0.34076	0.172836	0.009762		0.039745	0.455921	0.005278		0.005979	0.031154	0.285842
2072	3256	0.341133	0.16309	0.011446		0.041221	0.444606	0.007274		0.006209	0.029294	0.285835
2073	3257	0.341465	0.152596	0.013395		0.042544	0.433024	0.009934		0.006459	0.027521	0.285841
2074	3258	0.341765	0.141675	0.015648		0.043742	0.421232	0.013184		0.006654	0.025695	0.28587
2075	3259	0.342059	0.130469	0.018203		0.044899	0.40927	0.016953		0.006756	0.023774	0.28593
2076	3260	0.342333	0.11896	0.021027		0.045966	0.397141	0.020834		0.006852	0.021776	0.286016
2077	3261	0.373748	0.116892	0.02643		0.051229	0.41984	0.027236		0.007649	0.02147	0.31215
2078	3262	0.389683	0.105462	0.032369		0.054634	0.420597	0.034377		0.008142	0.019456	0.325356
2079	3263	0.374443	0.086212	0.035764		0.053551	0.389167	0.038616		0.00799	0.01602	0.312515
2080	3264	0.374796	0.070428	0.040658		0.054624	0.375321	0.044423		0.008199	0.0135	0.312663
2081	327	0.321785	0.142099	0.008395		0.022668	0.424717	0.004337		0.006105	0.069939	0.274776
2082	3273	0.296611	0.224766	0.003074		0.022436	0.497174	0.005308		0.00472	0.043304	0.253778
2083	3275	0.312023	0.234622	0.003501		0.025284	0.514201	0.005009		0.005082	0.043698	0.266423
2084	3277	0.322969	0.235572	0.003997		0.02782	0.518635	0.004457		0.005377	0.04326	0.275258
2085	3279	0.313073	0.218728	0.004377		0.028584	0.487082	0.003581		0.005263	0.039863	0.266341
2086	3281	0.229916	0.153913	0.003567		0.022035	0.347354	0.002363		0.003836	0.027879	0.195301
2087	3283	0.256239	0.167176	0.00428		0.025196	0.380578	0.002483		0.004234	0.030141	0.217486
2088	3285	0.345641	0.212933	0.006788		0.035655	0.496161	0.002988		0.005607	0.037913	0.292931
2089	3287	0.346106	0.200288	0.007989		0.037242	0.480373	0.003482		0.005627	0.035048	0.292935
2090	3289	0.346532	0.187392	0.009427		0.03871	0.466412	0.004932		0.005919	0.032137	0.292936
2091	329	0.284937	0.131305	0.006508		0.019461	0.384708	0.003997		0.005283	0.063894	0.243441
2092	3291	0.361448	0.181884	0.011546		0.041733	0.472475	0.007196		0.006488	0.030597	0.305165
2093	3293	0.347239	0.160152	0.012958		0.041174	0.440872	0.009547		0.006521	0.026804	0.292935
2094	3295	0.347583	0.145831	0.01512		0.042318	0.42806	0.012679		0.006787	0.024502	0.292961
2095	3297	0.347896	0.131689	0.017573		0.043399	0.415159	0.016251		0.006949	0.022177	0.293013
2096	3299	0.348218	0.118795	0.020318		0.044442	0.402252	0.020082		0.00706	0.020052	0.293093
2097	3301	0.380225	0.115413	0.025539		0.049544	0.424808	0.026268		0.007836	0.019896	0.319862
2098	3303	0.396552	0.102604	0.03128		0.052833	0.425278	0.03306		0.008342	0.018426	0.333374
2099	3305	0.381153	0.082778	0.034575		0.051726	0.393599	0.037075		0.008197	0.015578	0.320203
2100	3307	0.381667	0.066858	0.039255		0.052663	0.379957	0.042385		0.008375	0.013312	0.320333
2101	331	0.22278	0.105762	0.00459		0.014839	0.305967	0.003211		0.004045	0.051161	0.190412
2102	333	0.248082	0.120371	0.00471		0.016186	0.3452	0.003642		0.004423	0.058022	0.212101

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2103	335	0.29305	0.146557	0.00492		0.018512	0.415579	0.004396		0.005064	0.070293	0.250658
2104	337	0.287282	0.14747	0.004286		0.017572	0.414465	0.004588		0.004798	0.070333	0.245823
2105	339	0.275887	0.144992	0.003702		0.016319	0.404505	0.005291		0.004439	0.068641	0.236158
2106	341	0.264509	0.141791	0.003234		0.015184	0.393303	0.005791		0.004104	0.066555	0.22649
2107	343	0.278451	0.152016	0.003083		0.015498	0.419584	0.006771		0.004157	0.070691	0.238508
2108	345	0.292361	0.162614	0.002879		0.015704	0.446741	0.007796		0.004174	0.074938	0.250612
2109	347	0.331544	0.187575	0.002883		0.017164	0.513324	0.009532		0.004573	0.086021	0.284384
2110	349	0.370633	0.213802	0.002708		0.018453	0.582877	0.011605		0.004876	0.098252	0.318104
2111	351	0.328292	0.192584	0.002196		0.015713	0.523812	0.010996		0.004104	0.089264	0.281881
2112	353	0.286051	0.169645	0.001829		0.013277	0.461157	0.009955		0.003434	0.079211	0.245672
2113	355	0.305518	0.182814	0.001927		0.013766	0.497263	0.010964		0.003706	0.085821	0.262449
2114	357	0.358548	0.21619	0.002262		0.015586	0.589346	0.013273		0.004392	0.101638	0.308088
2115	359	0.391854	0.237668	0.002494		0.016261	0.650911	0.014971		0.004835	0.110975	0.336836
2116	361	0.380354	0.23137	0.002467		0.015018	0.63763	0.014901		0.004728	0.106526	0.32709
2117	363	0.368894	0.224555	0.002391		0.013863	0.623039	0.01476		0.004742	0.101995	0.317368
2118	365	0.363043	0.220783	0.002272		0.012948	0.617054	0.01483		0.004853	0.09951	0.312475
2119	367	0.284648	0.172647	0.001649		0.009617	0.486344	0.011787		0.003947	0.077846	0.245127
2120	369	0.290109	0.175484	0.001592		0.009474	0.497002	0.012053		0.004432	0.079426	0.249919
2121	371	0.367951	0.221488	0.002006		0.011306	0.63277	0.015278		0.006566	0.101088	0.317203
2122	373	0.367675	0.22072	0.001986		0.01061	0.633983	0.015224		0.007467	0.101315	0.31724
2123	375	0.3674	0.219478	0.001949		0.009872	0.634463	0.015134		0.008302	0.101285	0.317303
2124	377	0.367132	0.217883	0.001889		0.009125	0.63427	0.015013		0.009007	0.101096	0.317383
2125	379	0.325184	0.191505	0.001608		0.007507	0.561452	0.013207		0.008437	0.089613	0.281399
2126	381	0.283345	0.165777	0.001353		0.006134	0.48865	0.011462		0.00755	0.078372	0.245388
2127	383	0.324851	0.188723	0.001516		0.006548	0.559286	0.013056		0.008788	0.09043	0.281561
2128	385	0.366267	0.210622	0.001689		0.006638	0.628769	0.014473		0.009957	0.102994	0.317805
2129	387	0.366043	0.207963	0.001688		0.005836	0.626008	0.014097		0.009879	0.103674	0.317965
2130	389	0.36583	0.204847	0.001753		0.004982	0.622601	0.013684		0.009742	0.103509	0.318122
2131	391	0.36563	0.203792	0.001797		0.004097	0.618539	0.013233		0.009587	0.101982	0.318262
2132	393	0.359917	0.19957	0.00185		0.003932	0.604561	0.012564		0.009255	0.097445	0.313556
2133	395	0.28228	0.155462	0.001617		0.003874	0.471161	0.009525		0.007082	0.07331	0.246099
2134	397	0.287763	0.157711	0.001748		0.004471	0.479241	0.009536		0.007104	0.072615	0.25097
2135	399	0.365152	0.199733	0.002409		0.006842	0.60457	0.011726		0.00877	0.087137	0.318631
2136	401	0.365088	0.198962	0.002561		0.008148	0.599282	0.011274		0.008568	0.082054	0.318691
2137	403	0.36506	0.197835	0.002665		0.009484	0.592762	0.010758		0.008413	0.077116	0.318686
2138	405	0.365069	0.196396	0.00271		0.010854	0.585748	0.010237		0.008284	0.072336	0.318588
2139	407	0.323634	0.172559	0.002397		0.010878	0.513176	0.008566		0.007212	0.059873	0.282226
2140	409	0.282203	0.14928	0.002061		0.010353	0.443615	0.007157		0.00617	0.049326	0.245908
2141	411	0.323809	0.16977	0.002306		0.012903	0.505785	0.007934		0.006908	0.053249	0.281901
2142	413	0.36554	0.198075	0.002695		0.016119	0.567984	0.008568		0.00749	0.059592	0.31779
2143	415	0.282699	0.159201	0.002224		0.013741	0.439516	0.006297		0.005522	0.046162	0.245486
2144	417	0.18303	0.105637	0.001495		0.009372	0.285774	0.00395		0.003473	0.029672	0.158837
2145	419	0.249733	0.147529	0.0021		0.013357	0.391917	0.00525		0.004614	0.040075	0.21659
2146	421	0.333456	0.208627	0.002968		0.019459	0.531304	0.006646		0.00581	0.052062	0.288768
2147	423	0.334154	0.228515	0.003143		0.021546	0.546375	0.006266		0.005389	0.050648	0.288757
2148	48	0.253297	0.050384	0.027713		0.072361	0.278316	0.043378		0.011251	0.01339	0.239606
2149	49	0.229607	0.047647	0.026987		0.054979	0.236587	0.030436		0.007005	0.007733	0.204576
2150	679	0.612721	0.044664	0.051087		0.025174	0.601193	0.039086		0.010224	0.01338	0.552023
2151	680	0.561464	0.04376	0.04912		0.037809	0.548925	0.046663		0.007025	0.012688	0.504892
2152	687	0.601493	0.047277	0.053748		0.03065	0.584788	0.040999		0.011348	0.014356	0.53405
2153	688	0.550815	0.046203	0.05136		0.045278	0.533939	0.049279		0.007835	0.01318	0.488212
2154	689	0.656193	0.057556	0.064295		0.042733	0.631137	0.05068		0.013643	0.017757	0.571459
2155	690	0.600309	0.056105	0.061012		0.061802	0.576336	0.059798		0.009205	0.015498	0.522065
2156	691	0.602007	0.057556	0.063424		0.046292	0.574706	0.052816		0.01308	0.017944	0.516556
2157	692	0.551606	0.05592	0.059967		0.065926	0.524906	0.060237		0.009003	0.015001	0.471896
2158	699	0.355625	0.0376	0.041635		0.033346	0.336288	0.038526		0.009028	0.011954	0.299276
2159	700	0.352599	0.038972	0.042205		0.050013	0.331651	0.044327		0.007522	0.010078	0.295353
2160	701	0.500311	0.054716	0.064847		0.053179	0.468341	0.067154		0.014039	0.018096	0.414269
2161	702	0.421826	0.048081	0.056075		0.066185	0.394174	0.061412		0.009995	0.011666	0.349006
2162	775	0.395476	0.043171	0.048908		0.039801	0.372297	0.048114		0.010636	0.013889	0.330085
2163	776	0.362508	0.041514	0.045803		0.054384	0.339989	0.04927		0.008158	0.010062	0.301655
2164	8383	0.615184	0.067899	0.031797		0.015691	0.585634	0.024492		0.023937	0.019757	0.523347
2165	8384	0.6212	0.061079	0.03052		0.014617	0.590002	0.022224		0.018778	0.017632	0.532418
2166	8385	0.571482	0.048622	0.025508		0.013796	0.545452	0.016138		0.034175	0.013894	0.497616
2167	8386	0.591495	0.045406	0.023193		0.01635	0.560283	0.011693		0.045094	0.012776	0.514292
2168	8509	0.61992	0.073443	0.032097		0.047876	0.580515	0.032388		0.052143	0.01385	0.519242
2169	8510	0.62823	0.066483	0.030505		0.039381	0.587552	0.030722		0.050992	0.012918	0.530688
2170	8511	0.576192	0.053099	0.024757		0.023465	0.543237	0.024308		0.033028	0.011619	0.496072
2171	8512	0.588839	0.049864	0.021652		0.032163	0.55807	0.020268		0.02004	0.01163	0.512811
2172	8666	0.403554	0.049788	0.021618		0.012794	0.388565	0.017326		0.015925	0.014627	0.343775

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force	Joint	X Force	Y Force	Z Force
2173	8667	0.40834	0.054032	0.022189		0.035472	0.387036	0.022178		0.029158	0.010151	0.342682
2174	8712	0.412812	0.056817	0.016741		0.018513	0.404872	0.014438		0.015244	0.016359	0.355342
2175	8714	0.389801	0.056982	0.013179		0.027358	0.387631	0.013331		0.01515	0.016034	0.339226
2176	8716	0.366455	0.056651	0.011897		0.036995	0.370125	0.015243		0.013891	0.015637	0.323198
2177	8718	0.342879	0.055774	0.013834		0.046687	0.352381	0.021054		0.011161	0.015179	0.30724
2178	8720	0.319137	0.05433	0.018428		0.055818	0.334402	0.028856		0.008962	0.014623	0.291262
2179	8722	0.26376	0.046678	0.021885		0.057713	0.282277	0.034356		0.008967	0.012471	0.245662
2180	8723	0.420013	0.062091	0.01765		0.04006	0.40399	0.017285		0.029382	0.010949	0.354256
2181	8725	0.399031	0.062659	0.013714		0.04053	0.387178	0.013735		0.027861	0.010556	0.338349
2182	8727	0.377542	0.06261	0.013663		0.044496	0.370022	0.013576		0.024009	0.010278	0.322712
2183	8729	0.3557	0.061883	0.016817		0.048954	0.352547	0.017553		0.017891	0.009957	0.307288
2184	8731	0.333612	0.060452	0.02177		0.053685	0.334756	0.023739		0.010357	0.009725	0.291915
2185	8733	0.278149	0.052035	0.025363		0.05243	0.282688	0.028352		0.007049	0.008538	0.246831
2186	8735	0.426896	0.048897	0.040943		0.02469	0.407786	0.036581		0.010806	0.015081	0.361385
2187	8738	0.443445	0.053868	0.032307		0.015067	0.426108	0.027015		0.01187	0.016277	0.376455
2188	8739	0.429032	0.055422	0.023235		0.014132	0.415804	0.018857		0.014372	0.016358	0.36619
2189	8740	0.433913	0.060126	0.023972		0.038282	0.41443	0.023856		0.028082	0.011293	0.365036
2190	8742	0.445922	0.05795	0.032911		0.036679	0.424224	0.033837		0.023684	0.011607	0.375191
2191	8744	0.427549	0.052092	0.041708		0.044244	0.405864	0.044045		0.014128	0.01115	0.359843
2192	8927	0.393418	0.043536	0.036948		0.021328	0.375608	0.032428		0.010457	0.013347	0.334073
2193	8928	0.399018	0.046676	0.02875		0.013033	0.382091	0.023792		0.012662	0.013998	0.338904
2194	8929	0.406555	0.053087	0.016074		0.017083	0.395231	0.013793		0.017675	0.015254	0.348679
2195	8930	0.402705	0.055549	0.01322		0.026146	0.396348	0.013349		0.018625	0.015626	0.348798
2196	8931	0.397808	0.057753	0.012552		0.037059	0.397313	0.016098		0.018089	0.015957	0.34902
2197	8932	0.391813	0.059644	0.015398		0.049374	0.398137	0.023487		0.014988	0.016259	0.349336
2198	8933	0.384601	0.061158	0.021797		0.062392	0.398815	0.034158		0.011147	0.016496	0.349665
2199	8934	0.33447	0.055341	0.027377		0.068035	0.354972	0.04302		0.01054	0.014819	0.311021
2200	8935	0.514795	0.072333	0.040229		0.087425	0.536761	0.063374		0.013368	0.019443	0.47745
2201	8936	0.517566	0.061022	0.037894		0.073119	0.533334	0.059889		0.010905	0.016445	0.48123
2202	8937	0.480646	0.044328	0.031322		0.053357	0.49031	0.049745		0.008606	0.012485	0.449474
2203	8938	0.493819	0.036939	0.028657		0.044872	0.501153	0.04569		0.011084	0.010836	0.464334
2204	8945	0.557754	0.042355	0.043556		0.017236	0.544351	0.035167		0.014368	0.012231	0.500459
2205	8947	0.547351	0.044662	0.043384		0.016994	0.529551	0.034247		0.010979	0.013171	0.483871
2206	8949	0.596399	0.05501	0.050039		0.02322	0.572027	0.040355		0.013338	0.016466	0.517487
2207	8951	0.59535	0.060365	0.052851		0.027624	0.568335	0.04436		0.015764	0.018273	0.5098
2208	964	0.310585	0.060171	0.025177		0.074564	0.343167	0.040092		0.011476	0.016735	0.294307
2209	966	0.359231	0.079821	0.021484		0.085157	0.406241	0.034834		0.013106	0.022827	0.340766
2210	968	0.407837	0.106417	0.015739		0.09437	0.47526	0.026411		0.01452	0.031311	0.387337
2211	970	0.347463	0.105545	0.008154		0.078008	0.423167	0.01447		0.011985	0.031339	0.330354
2212	972	0.251266	0.0838	0.004079		0.055079	0.316333	0.007518		0.008445	0.024967	0.239063
2213	974	0.197411	0.070121	0.002472		0.042447	0.254452	0.005063		0.006495	0.020944	0.187908
2214	976	0.261501	0.097445	0.002592		0.055292	0.343463	0.006191		0.00844	0.029186	0.248988
2215	978	0.356365	0.144044	0.002319		0.072915	0.484334	0.00794		0.01106	0.043486	0.339479
2216	980	0.330765	0.143925	0.001643		0.065253	0.464949	0.007572		0.009984	0.043962	0.315252
2217	982	0.292351	0.133937	0.001201		0.055938	0.421263	0.006989		0.008631	0.041318	0.278741
2218	984	0.292415	0.140535	0.001518		0.05419	0.431321	0.007025		0.008445	0.043743	0.278887
2219	986	0.292491	0.147007	0.001759		0.052454	0.441348	0.006769		0.008337	0.046088	0.279034
2220	988	0.25922	0.135783	0.001644		0.044924	0.399928	0.005495		0.007284	0.042794	0.247343
2221	990	0.202816	0.109401	0.001319		0.034181	0.318004	0.003861		0.005589	0.034574	0.19352
2222	992	0.22598	0.124557	0.00152		0.037213	0.35873	0.003865		0.006108	0.039423	0.215588
2223	994	0.267181	0.151674	0.001892		0.042433	0.431823	0.004011		0.007011	0.048084	0.254765
2224	996	0.262155	0.152455	0.001924		0.040225	0.430609	0.003682		0.006705	0.048404	0.249787
2225	998	0.251987	0.149513	0.001849		0.037349	0.420157	0.003529		0.006249	0.047562	0.239873
2226	TOTAL	1143.481	518.119	66.33243		85.57135	1660.891	85.57436		23.89925	171.4296	1130.429

	B	C	D	E	F	G	H	I	J	K	L	M
1		X-Excitation				Y-Excitation				Z-Excitation		
2	Joint	X Force	Y Force	Z Force	oi	X Force	Y Force	Z Force	b	X Force	Y Force	Z Force
2226	TOTAL	=SUM(C3:C2225)	=SUM(D3:D2225)	=SUM(E3:E2225)		=SUM(G3:G2225)	=SUM(H3:H2225)	=SUM(I3:I2225)		=SUM(K3:K2225)	=SUM(L3:L2225)	=SUM(M3:M2225)

	A	B	C	D
1	**Summary Table: Center of Rigidity**			
2	**Level**	**Center of Rigidity**		**Rotational Stiffness (kip-ft)**
3		**CR X (ft)**	**CR Y (ft)**	
4	**Control Area**	**14.50**	**99.17**	**1.0454E+10**
5	**Total**	**14.50 ft**	**99.17 ft**	

Control area AE
CR

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2							G_{int} =	248031									
3																	
4							E_{int} =	580393									
5		**Wall Center of Gravity Calculation**															
6		**Name**	**Min X**	**Max X**	**Min Y**	**Max Y**	**Length (ft)**	**Thickness (in)**	**Height (ft)**	**CG X (ft)**	**CG Y (ft)**	**k (kip/ft)**	**k x Y**	**k*(Y-CR)^2**	**V (kips)**	**# of Joints**	**Load per Joint (kips)**
7	**E-W**	EW4	0	29	0	0	29.00	24.00	22.00	14.50	0.00	4.52E+05	0.00E+00	4.45E+09	58.29	9	6.4770
8	**Walls**	EW5	0	29	198.33	198.33	29.00	24.00	22.00	14.50	198.33	4.52E+05	8.97E+07	4.45E+09	-58.29	9	-6.4770
9																	
10																	
11																	
12																	
13																	

Control area AE
E-W Walls

	A	B	C	D	E	F	G	H	I	J	K
1	**Level**	**X Excitation**			**Y Excitation**			**Z Excitation**			
2		X (kips)	Y (kips)	Z (kips)	X (kips)	Y (kips)	Z (kips)	X (kips)	Y (kips)	Z (kips)	
3	Control Area	1143.48	518.12	66.33	85.57	1660.89	85.57	23.90	171.43	1130.43	
4											
5											
6											
7											
8	**Level**	**100 40 40**		**40 100 40**							
9		X (kips)	Y (kips)	X (kips)	Y (kips)						
10	Control Area	1187	1251	553	1937						

	A	B	C	D	E	F
1		**SHINE RCA (in)**				
2	**X Dimension**	348.00				
3	**Y Dimension**	2380.00				
4						
5						
6	**AE Moments**					
7		**Moment Arm X Force (ft)**	**Moment Arm Y Force (ft)**	**100 40 40 (kip-ft)**	**40 100 40 (kip-ft)**	**Max (kip-ft)**
8	**PF-4 Equipment Room**	9.92	1.45	13587.77	8287.42	13587.77

Control area AE
Moment

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2							G_{int} =	248031									
3																	
4							E_{int} =	580393									
5		**Wall Center of Gravity Calculation**															
6		**Name**	**Min X**	**Max X**	**Min Y**	**Max Y**	**Length (ft)**	**Thickness (in)**	**Height (ft)**	**CG X (ft)**	**CG Y (ft)**	**k (kip/ft)**	**k x X**	**k*(X-CR)^2**	**V (kips)**	**# of Joints**	**Load per Joint (kips)**
7	**N-S**	NS1	0	0	0	198.33	198.33	24.00	22.00	0.00	99.17	3.71E+06	0.00E+00	7.80E+08	-69.93	81	-0.8640
8	**Walls**	NS2	29	29	0	198.33	198.33	24.00	22.00	29.00	99.17	3.71E+06	1.08E+08	7.80E+08	69.93	81	0.8640
9																	
10																	
11																	
12																	
13																	

Control area AE
N-S Walls

I1.0 INTRODUCTION

I1.1 Purpose and Scope

The SHINE Medical Isotope Production Facility Building is evaluated for stability against sliding and overturning. The objective of this Attachment is to show that the structure meets the minimum factor of safety requirements of ASCE 43-05 (Ref. 3.1.5) and SRP 3.8.5 (Ref. 3.1.21) for sliding and overturning. Lateral loads and overturning moments are compared to the structure's computed resistance to sliding and overturning to ensure minimum factor of safety requirements are met.

In the event that the self weight of the structure is insufficient to resist sliding or overturning, it is required to determine the contribution of active and passive soil pressures to obtain the minimum factor of safety. In this case, building movement is computed to see if it is acceptable so as to ensure that the required passive pressure is attainable. However, if the evaluation with no building movement shows the structure to be stable, then active and passive pressures are not required.

The following sections of this attachment describe the stability evaluation methodology and acceptance criteria and, more specifically, Section 4.0 presents the detailed stability calculation of the structure.

I2.0 BASIS

I2.1 Analysis Inputs

I2.1.1 Building Loading and Geometry

Loading input used for the stability analysis includes vertical and lateral loads, and resulting moments due to those loads. These inputs are obtained from the SAP2000 model by taking the base reaction results for each respective applied load. For vertical loads, these reactions include total Dead load, Crane and vertical Seismic loads. For lateral loads, these reactions include earth pressure and loading associated with horizontal seismic. Information on the SAP2000 model and the applied loading methodology is found in Section 4.0 of the main body this calculation.

The Production Facility is predominantly an above-ground structure with wind load acting on a majority of its surfaces. However, because base reaction results for wind and tornado forces are not expected to control over seismic forces, a stability analysis for wind is not required. This is verified in the following sections by comparing the lateral base reactions due to wind and tornado with those due to seismic.

The SAP2000 model used for the stability evaluation is a fixed-base, time-history model using a single crane mass for each crane at their "parked" position.

There are two cases considered for overturning. The first evaluates overturning about the toe of the 19 ft. sub-grade wall (See Figure I1). The second evaluates overturning about the toe of the exterior wall at grade elevation. This difference is only critical for overturning about the North-South direction (X) because of the varying elevations of the sub-grade walls. The center of gravity of the structure is located closer to the north-east corner of the building and, therefore, it is expected that overturning about the toe of the 19 ft. sub-grade wall is most critical because of the shorter restoring moment arm. However, both cases are evaluated.

I2.1.2 Soil Parameters

Detailed information on the soil parameters that are used to find the static lateral earth pressure loads, static and dynamic surcharge loads, and elastic dynamic soil pressure loads is found in

Attachment E. Further, the attachment includes a detailed calculation of soil pressure load values.

I2.1.3 Seismic Input

Seismic base reactions are obtained from a fixed base analysis of the SAP2000 Production Facility seismic model. A summary of the resulting lateral forces and moments from the model are found in the tables presented in this attachment.

I2.2 Criteria

I2.2.1 The minimum factor of safety for foundation stability with respect to sliding is 1.1 for seismic combinations in accordance with ASCE 43-05, Section 7.2.1 (Ref. 3.1.5) and SRP 3.8.5 (Ref. 3.1.21).

I2.2.2 The minimum factor of safety for foundation stability with respect to overturning is 1.1 for seismic combinations in accordance with ASCE 43-05, Section 7.2.2 (Ref. 3.1.5) and SRP 3.8.5 (Ref. 3.1.21).

I2.2.3 The minimum factor of safety for foundation stability with respect to overturning and sliding is 1.1 for tornado combinations in accordance with SRP 3.8.5 (Ref. 3.1.21)

I2.2.4 The minimum factor of safety for foundation stability with respect to overturning and sliding is 1.5 for wind combinations in accordance with SRP 3.8.5 (Ref. 3.1.21)

I3.0 METHODS

The stability of the Production Facility is evaluated considering the following load combinations and factors of safety in accordance with Section 7.2 of ASCE 43-05 and SRP 3.8.5, as shown below:

Table I1. Factor of Safety Requirements

Load Combination	Minimum Factor of Safety	
	Sliding	Overturning
D + H + E’	1.1	1.1
D + H + W_t	1.1	1.1
D + H + W	1.5	1.5

Where,

D = Dead Load
H = Lateral Earth Pressures
E = Earthquake Load
W_t = Tornado Load
W = Wind Load

In addition to self-weight of the structure, floor loads and equipment loads are converted to mass and included in the model. Mass equivalent to 25 percent of the live load and 75 percent of the roof snow load are also included in the model for seismic.

The evaluation considers simultaneous seismic excitation in each direction (East/West, North/South, and Vertical) using the 100-40-40 percent combination rule as specified in the Section 3.2.7 of ASCE 4-98 (Ref. 3.1.4). Three seismic cases are evaluated as illustrated below

in Table I2. For the primary direction under consideration, 100% of the seismic acceleration is applied. For the non-primary directions, the acceleration is multiplied by 40%. For this evaluation, only positive accelerations are considered (i.e. acting towards the sub-grade wall and upwards) since this is the critical case for each direction under consideration. Acceleration acting towards the sub-grade wall produces the greatest driving force, and acceleration acting upwards provides the least amount of resistance since this reduces the effective weight of the building.

Table I2. Seismic Evaluation Cases

Case	Percent Acceleration Applied		
	East/West Direction	North/South Direction	Vertical Direction
A	100%	40%	40%
B	40%	100%	40%
C	40%	40%	100%

As mentioned in soil parameters section, according to Section 5.2.2 of the Golder Report, the ground water table at the Production Facility is approximately 50 to 65 feet below grade, and the hydrostatic pressure due to groundwater infiltration will be minimal. Consequently, hydrostatic pressure, hydrodynamic pressure, and buoyancy are not considered in the stability evaluation. The potential for soil liquefaction at the site was reviewed in Section 8.4 of the Golder Report, where it was determined that it is not a necessary design consideration.

As stated in Section 2.0, wind and tornado forces are not expected to control over seismic forces and, therefore, a stability analysis for wind and tornado is not required. However, because the acceptance criteria according to SRP 3.8.5 establish a safety of factor of 1.5 for stability evaluation for wind, a check is made to ensure that this is satisfied. Conservatively, tornado forces are used in the check as they are more critical than wind forces.

I3.1 Lateral Forces

The following sub-sections provide the background for the derivation of the lateral driving and resisting forces that are applicable to the stability evaluation. The loads used for the stability analysis are obtained from the SAP2000 analysis results and are shown in Table I3.

I3.1.1 Driving Forces

I3.1.1.1 Static “At-Rest” Lateral Soil Force

The static soil pressure is acting equally on all sides of the building and, therefore, its contribution to the total lateral force is negated and is not considered in the stability analysis.

I3.1.1.2 Static “At-Rest” Surcharge Lateral Soil Force

The at-rest static surcharge load is a uniform pressure distributed along the height of the sub-grade walls. The total static surcharge force may be calculated with the following equation:

$$F_{s\_sur} = K_o * q * w * H$$

where:

K_o = at-rest lateral earth pressure coefficient of backfill

q = uniform surcharge load

w = width of sub-grade wall

H = height of sub-grade wall

When evaluating for stability, only live load surcharge is applicable because dead load surcharge is always present and applied to all sub-grade walls similar to the static at-rest soil pressure and, therefore, the net driving force due to dead load surcharge is zero.

I3.1.1.3 Dynamic Surcharge Lateral Soil Force

The dynamic surcharge load is a uniform pressure distributed along the height of the sub-grade walls. The soil pressure due to dynamic surcharge load is derived by applying the peak ground acceleration of 0.20g (Ref. 3.3.2) to the soil pressure due to surcharge load. In this analysis, the vertical acceleration is considered acting upwards, which has the effect of reducing the total surcharge load. However, the dynamic surcharge load is conservatively considered in the stability analysis.

I3.1.1.4 Dynamic Lateral Soil Force (Elastic Solution)

As presented in Attachment E, the dynamic lateral soil force is to be computed using the elastic solution per Section 3.5.3.2 of ASCE 4-98 (Ref. 3.1.4). The elastic solution is a conservative approach used to determine dynamic seismic soil pressures on embedded walls considering at-rest conditions. The maximum dynamic pressure is conservatively applied along the entire depth of the embedded walls.

I3.1.1.5 Seismic Lateral Inertial Force

Seismic base reactions are obtained from the fixed base, time history analysis of the SAP2000 Production Facility seismic model. Co-directional responses are combined using the 100-40-40 percent combination rule to obtain the total lateral seismic inertial force for each direction.

I3.1.1.6 Summary of Resulting Lateral Driving Forces

The following table summarizes the lateral driving forces that are taken as base reactions from the SAP2000 model and used for the stability evaluation.

Table I3. Lateral Driving Forces

SAP2000 Output Case	GlobalFX	GlobalFY	GlobalFZ
	Kip	Kip	Kip
SELFWEIGHT	0	0	75160
DEAD	0	0	18000
DOORDEAD	0	0	620
H.sur.+X	-2956	0	0
H.sur.-X	2956	0	0
H.sur.+Y	0	-3891	0
H.sur.-Y	0	3891	0
H.dyn.sur.+X	-591	0	0
H.dyn.sur.-X	591	0	0
H.dyn.sur.+Y	0	-778	0
H.dyn.sur.-Y	0	778	0
H.dyn.+X_e	-1537	0	0
H.dyn.-X_e	1454	0	0

H.dyn.+Y_e	0	-1942	0
H.dyn.-Y_e	0	1904	0
SEISMICCRANE	0	0	370
H1 (Seismic)	26033	567	314
H1 (Seismic)	-24736	-573	-211
H2 (Seismic)	565	25309	1009
H2 (Seismic)	-611	-26290	-1079
V (Seismic)	190	1053	26118
V (Seismic)	-245	-1007	-28221

Table I3a. Lateral Driving Forces (Tornado)

SAP2000 Output Case	GlobalFX	GlobalFY	GlobalFZ
	Kip	Kip	Kip
Wt1	-1004	1000	-6020
Wt2	971	1000	-6015
Wt3	971	-1173	-6277
Wt4	-1004	-1173	-6281
Wt5	-968	996	-6020
Wt6	1008	996	-6015
Wt7	1008	-1177	-6277
Wt8	-968	-1177	-6281
Wt9	-1003	943	-7400
Wt10	972	943	-7395
Wt11	972	-1230	-7657
Wt12	-1003	-1230	-7662
Wt13	-967	939	-7400
Wt14	1009	939	-7395
Wt15	1009	-1234	-7657
Wt16	-967	-1234	-7662
Wt17	-7	-184	-2614
Wt18	-6	-242	-3994
Wt19	15	-216	-2614
Wt20	16	-273	-3994
Wt21	-1839	1779	-7400
Wt22	1390	1361	-7395
Wt23	1390	-1648	-7657
Wt24	-1421	-1648	-7662
Wt25	-1385	1357	-7400
Wt26	1427	1357	-7395
Wt27	1427	-1652	-7657
Wt28	-1385	-1652	-7662
Wt29	-3185	3125	-7400
Wt30	3154	2034	-7395
Wt31	3154	-3412	-7657
Wt32	-2094	-3412	-7662
Wt33	-3149	2030	-7400
Wt34	2100	2030	-7395
Wt35	2100	-3416	-7657
Wt36	-3149	-3416	-7662

Wt37	-1003	943	-3375
Wt38	972	943	-3370
Wt39	972	-1230	-3632
Wt40	-1003	-1230	-3637
Wt41	-967	939	-3375
Wt42	1009	939	-3370
Wt43	1009	-1234	-3632
Wt44	-967	-1234	-3637
Wt45	5	-274	-6608

I3.1.2 Resisting Forces

I3.1.2.1 Friction Resistance

In accordance with Section 7.2.1 of ASCE 43-05 (Ref. 3.1.5), the static friction resistance consists of the total vertical downward (normal) force of the building multiplied by the coefficient of sliding friction. To account for earthquake excitation in the vertical direction, the total weight is reduced by the uplift force on the building from the vertical seismic excitation. The total static friction resistance force is calculated as follows:

$$F_f = \mu * (W_{total} - F_{E.v})$$

where:

μ = coefficient of friction (static for at- rest condition)

W_{total} = total weight of building (including Dead, Equipment, and Crane)

$F_{E.v}$ = vertical seismic uplift force

Since the sliding evaluation considers simultaneous excitation in both horizontal directions, forces from the two horizontal directions are combined by the Square Root of the Sum of the Squares (SRSS) method. Any additional resistance from cohesion is conservatively ignored.

I3.2 Moments

The following sub-sections provide the moments used for the analysis, which are obtained from the SAP2000 analysis results and are shown in Table I4.

I3.2.1 Overturning Moments

I3.2.1.1 Overturning Moment due to Lateral Seismic Inertial Force

Seismic overturning moments are obtained from the SAP2000 fixed base seismic time history model. Co-directional responses are combined using the 100-40-40 percent combination rule to obtain the total lateral seismic inertial force for each direction.

I3.2.1.2 Summary of Resulting Moment Forces

The following tables summarize the moment forces that are taken as base reactions from the SAP2000 Seismic Time History model and used for the stability evaluation. Table I4a provides

forces about the toe of the 19 ft. sub-grade wall, while Table I4b provides forces about the toe of exterior wall at grade (See Figure I1).

Table I4a. Resulting Moment Forces about toe of 19 ft. sub-grade wall

SAP2000 Output Case	GlobalMX	GlobalMY	GlobalMZ
	Kip-ft	Kip-ft	Kip-ft
SELFWEIGHT	-3034400	-6285069	0
DEAD	-927429	-2029867	0
DOORDEAD	-3400	-45942	0
H.sur.+X	0	-25970	-177867
H.sur.-X	0	25970	177867
H.sur.+Y	34757	0	-274764
H.sur.-Y	-34757	0	274764
H.dyn.sur.+X	0	-5194	-35573
H.dyn.sur.-X	0	5194	35573
H.dyn.sur.+Y	6951	0	-54953
H.dyn.sur.-Y	-6951	0	54953
H.dyn.+X_e	0	-13080	-94793
H.dyn.-X_e	0	12291	88158
H.dyn.+Y_e	16859	0	-132608
H.dyn.-Y_e	-16501	0	132293
SEISMICCRANE	-5514	-15381	0
H1 (Seismic)	36279	811955	1078905
H1 (Seismic)	-44064	-680162	-1017653
H2 (Seismic)	783214	113924	2273702
H2 (Seismic)	-908125	-91346	-2363216
V (Seismic)	1141059	2465527	74491
V (Seismic)	-1072504	-2281258	-86804

Table I4b. Resulting Moment Forces about toe of exterior wall at grade (EL. 0 ft)

SAP2000 Output Case	GlobalMX	GlobalMY	GlobalMZ
	Kip-ft	Kip-ft	Kip-ft
SELFWEIGHT	-5965650	-6285069	0
DEAD	-1629439	-2029867	0
DOORDEAD	-27561	-45942	0
H.sur.+X	0	30199	-293161
H.sur.-X	0	-30199	293161
H.sur.+Y	-39167	0	-274764
H.sur.-Y	39167	0	274764
H.dyn.sur.+X	0	6040	-58632
H.dyn.sur.-X	0	-6040	58632
H.dyn.sur.+Y	-7833	0	-54953
H.dyn.sur.-Y	7833	0	54953
H.dyn.+X_e	0	16125	-154740
H.dyn.-X_e	0	-15336	144864
H.dyn.+Y_e	-20035	0	-132608
H.dyn.-Y_e	19676	0	132293
SEISMICCRANE	-19944	-15381	0
H1 (Seismic)	29245	333946	2094173

H1 (Seismic)	-39147	-237569	-1982344
H2 (Seismic)	362497	106168	2279854
H2 (Seismic)	-449958	-86858	-2360748
V (Seismic)	2239973	2467783	68981
V (Seismic)	-2090316	-2283353	-86949

I3.3 Stability Evaluation

Stability of the Production Facility is evaluated by considering all applicable loads and load combinations. If the structure is found to be unstable for at-rest conditions (i.e. no Building Movement), then an additional evaluation is required using active and passive soil pressure conditions. If the building is stable against sliding and overturning, then the criteria as outlined above is required.

I3.3.1 Sliding Evaluation: No Building Movement

The forces acting on the Production Facility (driving and resisting) considering no building movement are shown in Figure I1. The lateral forces considering at-rest conditions include the static surcharge load, dynamic surcharge load, lateral dynamic soil load, and lateral seismic inertial load.

[Security-Related Information]

Figure I1 – Driving and Resisting Forces for At-Rest Conditions

The sliding evaluation considers no displacement at the base. Therefore, all loads are determined based on at-rest conditions, and the resistance against sliding is solely based on the available friction at the base of the structure.

The factor of safety for at-rest conditions is determined by the following equation:

$$FS_S = \frac{F_f}{F_{s\_sur} + F_{d\_sur} + F_{s\_dyn} + F_E} \geq 1.1$$

where:

F_f = friction resistance

F_{s_sur} = static surcharge force (at-rest)

F_{d_sur} = dynamic surcharge force (at-rest)

F_{s_dyn} = dynamic lateral soil pressure (elastic solution)

F_E = lateral seismic inertial force

I3.3.2 Overturning Evaluation

The forces acting to overturn the Production Facility are the static surcharge soil force, dynamic surcharge force, dynamic lateral soil force, horizontal seismic inertial force, and vertical seismic inertial force. Moments are taken about the bottom of the 19 ft. sub-grade wall and about the bottom of the exterior wall at grade as shown in Figure I1.

Overturning is conservatively evaluated only relying on the self weight and dead load of the structure for the restoring moment. The factor of safety against overturning is determined by the following equation:

$$FS_{OT} = \frac{RM}{M_{s\_sur} + M_{d\_sur} + M_{s\_dyn} + M_E} \geq 1.1$$

where:

$RM = W_{building} * M_{arm}$ = restoring moment due to weight of building

M_{s_sur} = overturning due to static surcharge force (at-rest)

M_{d_sur} = overturning due to dynamic surcharge force (at-rest)

M_{s_dyn} = overturning due to dynamic lateral soil pressure (elastic solution)

M_E = overturning due to lateral seismic inertial force

I3.4 Computer Programs

The following computer programs are used as technical aides in the preparation:

- MathCad Version 14.35, S&L Program No. 03.7.548-1435
- SAP2000 v14.1, S&L Program No. 03.7.224-14.1

The computer software listed above has been validated per S&L Software Verification and Validation procedures for the program functions used in the calculation. Computer PC# ZD6194 was used in the preparation of this calculation.

I4.0 Calculation and Analysis

$\phi := 34 \cdot deg$ — Effective friction angle used per Golder Report (Ref. 3.3.3)

The static coefficient of sliding friction is per NAVFAC 7.02, page 7.2-63 Table 1, (Ref. 3.3.6) for a soil type that fits the description for a clean fine to medium sand. Further, because of the higher friction angle used in the Golder report, the coefficient of friction chosen is the upper bound value.

$\mu_s := 0.55$ — Static coefficient of sliding friction for soil layer per NAVFAC 7.02, page 7.2-63 Table 1 (Ref. 3.3.6)

Weights

The following loads are base reactions taken from the SAP2000 fixed-base, time-history model:

$Self_{wt} := 75160 \cdot kip$ $\quad Dead := 18000 \cdot kip$ $\quad Dead_{door} := 620 \cdot kip$

Dead Load including loads additional to building self-weight

$Dead_{Total} := Self_{wt} + Dead + Dead_{door}$

$Dead_{Total} = 93780 \cdot kip$

$Crane := 370.00 \cdot kip$ — Crane Load

Find resisting vertical load of building used for global stability evaluation:

$W_{building} := 1.0 \cdot Dead_{Total} + 1.0 \cdot Crane = 94150 \cdot kip$

$W_{Total} := W_{building}$ — Total resisting weight

$W_{Total} = 94150 \cdot kip$

Seismic Base Reactions

The seismic base reactions are taken from the SAP2000 SHINE Building fixed base, seismic time history model.

The following factors are applied to ensure that the results form the fixed base SAP2000 model bound the results from the SASSI2010 Soil Structure Interaction Model.

$F_H := 1.20$ — Factor applied to horizontal base reactions

$F_V := 1.40$ — Factor applied to vertical base reactions.

As stated in the Section 2.0 of this attachment, there are two main stability cases considered for overturning. For this first evaluation, the case considering overturning about the toe of the 19 ft. sub-grade wall is evaluated.

$F_{E.Xx} := 26033\text{kip} \cdot F_H = 31240 \cdot \text{kip}$	Seismic base reaction NS (X) direction to due NS (x) loading
$F_{E.Xy} := 611\text{kip} \cdot F_H = 733 \cdot \text{kip}$	Seismic base reaction NS (X) direction to due EW (y) loading
$F_{E.Xz} := 245\text{kip} \cdot F_H = 294 \cdot \text{kip}$	Seismic base reaction NS (X) direction to due vertical (z) loading
$F_{E.Yx} := 573\text{kip} \cdot F_H = 688 \cdot \text{kip}$	Seismic base reaction EW (Y) direction to due NS (x) loading
$F_{E.Yy} := 26290\text{kip} \cdot F_H = 31548 \cdot \text{kip}$	Seismic base reaction EW (Y) direction to due EW (y) loading
$F_{E.Yz} := 1053\text{kip} \cdot F_H = 1264 \cdot \text{kip}$	Seismic base reaction EW (Y) direction to due vertical (z) loading
$F_{E.Zx} := 314\text{kip} \cdot F_V = 440 \cdot \text{kip}$	Seismic base reaction vertical (Z) direction to due NS (x) loading
$F_{E.Zy} := 1079\text{kip} \cdot F_V = 1511 \cdot \text{kip}$	Seismic base reaction vertical (Z) direction to due EW (y) loading
$F_{E.Zz} := 28221\text{kip} \cdot F_V = 39509 \cdot \text{kip}$	Seismic base reaction vertical (Z) direction to due vertical (z) loading
$M_{E.Xx} := 44064\text{kip} \cdot \text{ft} \cdot F_H = 52877 \cdot \text{kip} \cdot \text{ft}$	Seismic overturning moment about NS (X) due to NS (x) loading
$M_{E.Xy} := 908125\text{kip} \cdot \text{ft} \cdot F_H = 1089750 \cdot \text{kip} \cdot \text{ft}$	Seismic overturning moment about NS (X) due to EW (y) loading
$M_{E.Xz} := 1141059\text{kip} \cdot \text{ft} \cdot F_V = 1597483 \cdot \text{kip} \cdot \text{ft}$	Seismic overturning moment about NS (X) due to vertical (z) loading
$M_{E.Yx} := 811955\text{kip} \cdot \text{ft} \cdot F_H = 974346 \cdot \text{kip} \cdot \text{ft}$	Seismic overturning moment about EW (Y) due to NS (x) loading
$M_{E.Yy} := 113924\text{kip} \cdot \text{ft} \cdot F_H = 136709 \cdot \text{kip} \cdot \text{ft}$	Seismic overturning moment about EW (Y) due to EW (y) loading
$M_{E.Yz} := 2465527\text{kip} \cdot \text{ft} \cdot F_V = 3451738 \cdot \text{kip} \cdot \text{ft}$	Seismic overturning moment about EW (Y) due to vertical (z) loading

I4.1 Lateral Forces

I4.1.1 Driving Forces

For the calculation of driving forces due to surcharge loading, live load surcharge is only applicable for stability because dead load surcharge is always present and applied to all subgrade walls similar to the static at-rest soil pressure and, therefore, the net driving force due to dead load surcharge is zero.

I4.1.1.1 Static Live Load Surcharge Soil Force (At-Rest Conditions)

The total forces due to surcharge loading under at-rest conditions for the East/West and North/South Directions are calculated below.

$$F_{s\_sur\_ew} := 3891 \cdot kip \cdot \frac{125}{1250} = 389 \cdot kip$$

Static surcharge soil force for EW direction

$$F_{s\_sur\_ns} := 2956 \cdot kip \cdot \frac{125}{1250} = 296 \cdot kip$$

Static surcharge soil force for NS direction

Note: To account for surcharge due to live load only, the static surcharge base reactions are factored by 125/1250 (Total surcharge load = 1250, Live load surcharge load = 125) (See Attachment E for soil pressure loading).

I4.1.1.2 Dynamic Live Load Surcharge Soil Force (At-Rest Conditions)

$$F_{d\_sur\_ew} := 778 \cdot kip \cdot \frac{25}{250} = 78 \cdot kip$$

Dynamic surcharge soil force for EW direction

$$F_{d\_sur\_ns} := 591 \cdot kip \cdot \frac{25}{250} = 59 \cdot kip$$

Dynamic surcharge soil force for NS direction

Note: To account for dynamic surcharge due to live load only, the dynamic surcharge base reactions are factored by 25/250 (Total dynamic surcharge load = 250, Live load dynamic surcharge load = 25) (See Attachment E for soil pressure loading).

I4.1.1.3 Dynamic Lateral Soil Force (Elastic Solution)

The seismic induced soil pressure under at-rest conditions is calculated using the elastic method per ASCE 4-98 [3.1.1] in accordance with Section 3.5.3.2.

$$F_{s\_dyn\_ew} := 1942 \cdot kip$$

Dynamic soil force for EW direction

$$F_{s\_dyn\_ns} := 1537 \cdot kip$$

Dynamic soil force for NS direction

I4.1.1.4 Seismic Inertial Forces

The seismic base reactions are taken from the SAP2000 fixed base seismic time history model. Co-directional responses are combined using the 100-40-40 percent combination rule to obtain the total lateral seismic force for each direction (Ref. 3.1.10).

<u>Case A: 100% EW, 40% NS, 40% Vertical</u>

$F_{E.ew100v40} := F_{E.Xy} + 0.4 \cdot F_{E.Xx} + 0.4 \cdot F_{E.Xz}$ Total seismic inertial force (North/ South Direction)

$F_{E.ew100v40} = 13347 \cdot kip$

$F_{E.ns40v40} := F_{E.Yy} + 0.4 \cdot F_{E.Yx} + 0.4 \cdot F_{E.Yz}$ Total seismic inertial force (East/ West direction)

$F_{E.ns40v40} = 32328 \cdot kip$

$F_{E.v40ew100} := F_{E.Zy} + 0.4 \cdot F_{E.Zx} + 0.4 \cdot F_{E.Zz}$ Total seismic inertial force (Vertical Direction)

$F_{E.v40ew100} = 17490 \cdot kip$

<u>Case B: 40% EW, 100% NS, 40% Vertical</u>

$F_{E.ew40v40} := 0.4 \cdot F_{E.Xy} + F_{E.Xx} + 0.4 \cdot F_{E.Xz}$ Total seismic inertial force (North/ South Direction)

$F_{E.ew40v40} = 31650 \cdot kip$

$F_{E.ns100v40} := 0.4 \cdot F_{E.Yy} + F_{E.Yx} + 0.4 \cdot F_{E.Yz}$ Total seismic inertial force (East/ West direction)

$F_{E.ns100v40} = 13812 \cdot kip$

$F_{E.v40ns100} := 0.4 \cdot F_{E.Zy} + F_{E.Zx} + 0.4 \cdot F_{E.Zz}$ Total seismic inertial force (Vertical Direction)

$F_{E.v40ns100} = 16848 \cdot kip$

Case C: 40% EW, 40% NS, 100% Vertical

$F_{E.ew40v100} := 0.4 \cdot F_{E.Xy} + 0.4 \cdot F_{E.Xx} + F_{E.Xz}$ Total seismic inertial force (North/South Direction)

$F_{E.ew40v100} = 13083 \cdot kip$

$F_{E.ns40v100} := 0.4 \cdot F_{E.Yy} + 0.4 \cdot F_{E.Yx} + F_{E.Yz}$ Total seismic inertial force (East/West direction)

$F_{E.ns40v100} = 14158 \cdot kip$

$F_{E.v100} := 0.4 \cdot F_{E.Zy} + 0.4 \cdot F_{E.Zx} + F_{E.Zz}$ Total seismic inertial force (Vertical Direction)

$F_{E.v100} = 40289 \cdot kip$

I4.1.1.5 Total Lateral Force

The total lateral force considering at-rest conditions includes the static surcharge load, dynamic surcharge load, lateral dynamic soil load, and seismic lateral load.

Case A: 100% EW, 40% NS, 40% Vertical

$F_{T.ew100v40} := F_{s\_sur\_ew} + F_{s\_dyn\_ew} + F_{E.ew100v40} + F_{d\_sur\_ew}$

$F_{T.ew100v40} = 15756 \cdot kip$ Total lateral sliding force EW direction (100%)

$F_{T.ns40v40} := F_{s\_sur\_ns} + 0.4 \cdot F_{s\_dyn\_ns} + F_{E.ns40v40} + F_{d\_sur\_ns}$

$F_{T.ns40v40} = 33298 \cdot kip$ Total lateral sliding force NS direction (40%)

Case B: 40% EW, 100% NS, 40% Vertical

$F_{T.ew40v40} := F_{s\_sur\_ew} + 0.4 \cdot F_{s\_dyn\_ew} + F_{E.ew40v40} + F_{d\_sur\_ew}$

$F_{T.ew40v40} = 32894 \cdot kip$ Total lateral sliding force EW direction (40%)

$F_{T.ns100v40} := F_{s\_sur\_ns} + F_{s\_dyn\_ns} + F_{E.ns100v40} + F_{d\_sur\_ns}$

$F_{T.ns100v40} = 15704 \cdot kip$ Total lateral sliding force NS direction (100%)

<u>Case C: 40% EW, 40% NS, 100% Vertical</u>

$F_{T.ew40v100} := F_{s\_sur\_ew} + 0.4 \cdot F_{s\_dyn\_ew} + F_{E.ew40v100} + F_{d\_sur\_ew}$

$F_{T.ew40v100} = 14327 \cdot kip$

Total lateral sliding force EW direction (40%)

$F_{T.ns40v100} := F_{s\_sur\_ns} + 0.4 \cdot F_{s\_dyn\_ns} + F_{E.ns40v100} + F_{d\_sur\_ns}$

$F_{T.ns40v100} = 15127 \cdot kip$

Total lateral sliding force NS direction (40%)

I4.1.2 Resisting Forces

I4.1.2.1 Resistance due to Sliding Friction

The total resistance forces from friction considering 40% of the vertical acceleration and 100% of the vertical acceleration for at-rest conditions are calculated below:

$F_{f\_v40ew100} := \mu_s \cdot \left(W_{Total} - F_{E.v40ew100}\right)$

Friction resistance under at-rest conditions (considering 40% vertical excitation)

$F_{f\_v40ew100} = 42163 \cdot kip$

$F_{f\_v40ns100} := \mu_s \cdot \left(W_{Total} - F_{E.v40ns100}\right)$

Friction resistance under at-rest conditions (considering 40% vertical excitation)

$F_{f\_v40ns100} = 42516 \cdot kip$

$F_{f\_v100} := \mu_s \cdot \left(W_{Total} - F_{E.v100}\right)$

Friction resistance under at-rest conditions (considering 100% vertical excitation)

$F_{f\_v100} = 29623 \cdot kip$

I4.2 Moments

I4.2.1 Overturning Moments

I4.2.1.1 Overturning Moment due to Lateral Seismic Inertial Force

The overturning moments due to seismic inertial force are calculated below:

Case A: 100% EW, 40% NS, 40% Vertical

$M_{E.X.ew100} := M_{E.Xy} + 0.4 \cdot M_{E.Xx} + 0.4 \cdot M_{E.Xz}$ Total seismic inertial force (East/West Direction)

$M_{E.X.ew100} = 1749894 \, ft \cdot kip$

$M_{E.Y.ew100} := M_{E.Yy} + 0.4 \cdot M_{E.Yx} + 0.4 \cdot M_{E.Yz}$ Total seismic inertial force (North/South direction)

$M_{E.Y.ew100} = 1907142 \, ft \cdot kip$

Case B: 40% EW, 100% NS, 40% Vertical

$M_{E.X.ns100} := 0.4 \cdot M_{E.Xy} + M_{E.Xx} + 0.4 \cdot M_{E.Xz}$ Total seismic inertial force (East/West Direction)

$M_{E.X.ns100} = 1127770 \, ft \cdot kip$

$M_{E.Y.ns100} := 0.4 \cdot M_{E.Yy} + M_{E.Yx} + 0.4 \cdot M_{E.Yz}$ Total seismic inertial force (North/South direction)

$M_{E.Y.ns100} = 2409725 \, ft \cdot kip$

Case C: 40% EW, 40% NS, 100% Vertical

$M_{E.X.v100} := 0.4 \cdot M_{E.Xy} + 0.4 \cdot M_{E.Xx} + M_{E.Xz}$ Total seismic inertial force (East/West Direction)

$M_{E.X.v100} = 2054533 \, ft \cdot kip$

$M_{E.Y.v100} := 0.4 \cdot M_{E.Yy} + 0.4 \cdot M_{E.Yx} + M_{E.Yz}$ Total seismic inertial force (North/South direction)

$M_{E.Y.v100} = 3896160 \, ft \cdot kip$

I4.2.1.2 Overturning moment due to static live load surcharge force (at-rest)

The overturning moment due to the static live load surcharge force is calculated below:

$F_{s\_sur\_ew} = 389 \cdot kip$

Static surcharge soil force EW direction

$M_{sur.X} := 34757 \cdot kip \cdot ft \cdot \frac{125}{1250} = 3476 \cdot kip \cdot ft$

Overturning moment due to static surcharge force (about North/South direction)

$F_{s\_sur\_ns} = 296 \cdot kip$

Static surcharge soil force NS direction

$M_{sur.Y} := 25970 \cdot kip \cdot ft \cdot \frac{125}{1250} = 2597 \cdot kip \cdot ft$

Overturning moment due to static surcharge force (about East/West direction)

Note: To account for surcharge due to live load only, the static surcharge base reactions are factored by 125/1250 (Total surcharge load = 1250, Live load surcharge load = 125) (See Attachment E for soil pressure loading).

I4.2.1.3 Overturning moment due to dynamic live load surcharge force (at-rest)

$F_{d\_sur\_ew} = 78 \cdot kip$

Dynamic surcharge soil force EW direction

$M_{d.sur.X} := 6951 \cdot kip \cdot ft \cdot \frac{25}{250} = 695 \cdot kip \cdot ft$

Overturning moment due to Dynamic surcharge force (about North/South direction)

$F_{d\_sur\_ns} = 59 \cdot kip$

Dynamic surcharge soil force NS direction

$M_{d.sur.Y} := 5194 \cdot kip \cdot ft \cdot \frac{25}{250} = 519 \cdot kip \cdot ft$

Overturning moment due to Dynamic surcharge force (about East/West direction)

Note: To account for dynamic surcharge due to live load only, the dynamic surcharge base reactions are factored by 25/250 (Total dynamic surcharge load = 250, Live load dynamic surcharge load = 25) (See Attachment E for soil pressure loading).

I4.2.1.3 Overturning Moment due to Dynamic Lateral Soil Force (Elastic Solution)

The seismic induced overturning moment under at-rest conditions is calculated using the elastic method per ASCE 4-98 in accordance with Section 3.5.3.2 (Ref. 3.1.4).

Case A: 100% EW, 40% NS, 40% Vertical

$M_{s.dyn.X.ew100} := 16859 \cdot kip \cdot ft$

Overturning moment due to dynamic lateral soil force in EW direction

Case B: 40% EW, 100% NS, 40% Vertical

$M_{s.dyn.Y.ns100} := 13080 \cdot kip \cdot ft$

Overturning moment due to dynamic lateral soil force in NS direction

Case C: 40% EW, 40% NS, 100% Vertical

$M_{s.dyn.X.v100} := 0.4 \cdot M_{s.dyn.X.ew100}$

Overturning moment due to dynamic lateral soil force (EW direction)

$M_{s.dyn.X.v100} = 6744\, ft \cdot kip$

$M_{s.dyn.Y.v100} := 0.4 \cdot M_{s.dyn.Y.ns100}$

Overturning moment due to dynamic lateral soil force (NS direction)

$M_{s.dyn.Y.v100} = 5232\, ft \cdot kip$

I4.2.2 Restoring Moments

Overturning is conservatively evaluated only relying on the effective self weight of the structure for the restoring moment.

$RM_{Self.Y} := 6285069 \cdot kip \cdot ft$

Restoring Moment about the EW direction due to Self Weight

$RM_{dead.Y} := 2029867 \cdot kip \cdot ft$

Restoring Moment about the EW direction due to Dead Weight

$RM_Y := RM_{Self.Y} + RM_{dead.Y} = 8314936 \cdot kip \cdot ft$

Total restoring Moment about the EW direction

$RM_{Self.X} := 3034400 \cdot kip \cdot ft$

Restoring Moment about the NS direction due to Self Weight

$RM_{dead.X} := 927429 \cdot kip \cdot ft$

Restoring Moment about the NS direction due to Dead Weight

$RM_X := RM_{Self.X} + RM_{dead.X} = 3961829 \cdot kip \cdot ft$

Total restoring Moment about the NS direction

I4.3 Stability Evaluation

I4.3.1 Sliding

The lateral forces, considering at-rest conditions, include the static surcharge load, dynamic surcharge load, lateral dynamic soil load, and lateral seismic inertial load. The resistance against sliding is based on the available friction at the base of the structure.

Case A: 100% EW, 40% NS, 40% Vertical

$F_{T.ew100v40} = 15756 \cdot kip$ — Total lateral sliding force EW direction (100%)

$F_{T.ns40v40} = 33298 \cdot kip$ — Total lateral sliding force NS direction (40%)

$F_{f\_v40ew100} = 42163 \cdot kip$ — Friction Resistance (considering 40% vertical excitation)

$$FS_{v40ew100} := \frac{F_{f\_v40ew100}}{\sqrt{F_{T.ew100v40}^2 + F_{T.ns40v40}^2}}$$

Factor of safety for 40% vertical load with 100% EW and 40% NS

$FS_{v40ew100} = 1.14$

$\text{if}\left(FS_{v40ew100} \geq 1.1, \text{"OK"}, \text{"FAIL"}\right) = \text{"OK"}$ — Therefore, the building is stable against sliding

Case B: 40% EW, 100% NS, 40% Vertical

$F_{T.ns100v40} = 15704 \cdot kip$ — Total lateral sliding force NS direction (100%)

$F_{T.ew40v40} = 32894 \cdot kip$ — Total lateral sliding force EW direction (40%)

$F_{f\_v40ns100} = 42516 \cdot kip$ — Friction Resistance (considering 40% vertical excitation)

$$FS_{v40ns100} := \frac{F_{f\_v40ns100}}{\sqrt{F_{T.ns100v40}^2 + F_{T.ew40v40}^2}}$$

Factor of safety for 40% vertical load with 100% NS and 40% EW

$FS_{v40ns100} = 1.17$

$\text{if}\left(FS_{v40ns100} \geq 1.1, \text{"OK"}, \text{"FAIL"}\right) = \text{"OK"}$ — Therefore, the building is stable against sliding

Case C: 40% EW, 40% NS, 100% Vertical

$F_{T.ew40v100} = 14327 \cdot kip$

Total lateral sliding force EW direction (40%)

$F_{T.ns40v100} = 15127 \cdot kip$

Total lateral sliding force NS direction (40%)

$F_{f\_v100} = 29623 \cdot kip$

Friction Resistance (considering 100% vertical excitation)

$$FS_{v100} := \frac{F_{f\_v100}}{\sqrt{F_{T.ew40v100}^{\,2} + F_{T.ns40v100}^{\,2}}}$$

Factor of safety for 100% vertical load with 400% NS and 40% EW

$FS_{v100} = 1.42$

$\text{if}\left(FS_{v100} \geq 1.1, \text{"OK"}, \text{"FAIL"}\right) = \text{"OK"}$

Therefore, the building is stable against sliding

The factors of safety are above the minimum required factor of safety of 1.1. Therefore, the resistance against sliding for the SHINE Building is adequate.

I4.3.2 Overturning

Case A: 100% EW, 40% NS, 40% Vertical

$RM_X = 3961829 \cdot kip \cdot ft$ — Restoring moment due to weight of building

$M_{E.X.ew100} = 1749894 \cdot kip \cdot ft$ — Overturning moment due to seismic inertial force

$M_{sur.X} = 3476 \cdot kip \cdot ft$ — Overturning moment due to static surcharge force

$M_{d.sur.X} = 695.1 \cdot kip \cdot ft$ — Overturning moment due to dynamic surcharge force

$M_{s.dyn.X.ew100} = 16859 \cdot kip \cdot ft$ — Overturning moment due to dynamic soil pressure

$$FS_{OT.A} := \frac{RM_X}{M_{E.X.ew100} + M_{sur.X} + M_{s.dyn.X.ew100} + M_{d.sur.X}}$$

$FS_{OT.A} = 2.24$ — Factor of Safety

$\text{if}\left(FS_{OT.A} \geq 1.1, \text{"OK"}, \text{"FAIL"}\right) = \text{"OK"}$

Case B: 40% EW, 100% NS, 40% Vertical

$RM_Y = 8314936 \cdot kip \cdot ft$ — Restoring moment due to weight of building

$M_{E.Y.ns100} = 2409725 \cdot kip \cdot ft$ — Overturning moment due to seismic inertial force

$M_{sur.Y} = 2597 \cdot kip \cdot ft$ — Overturning moment due to static surcharge force

$M_{d.sur.Y} = 519 \cdot kip \cdot ft$ — Overturning moment due to dynamic surcharge force

$M_{s.dyn.Y.ns100} = 13080 \cdot kip \cdot ft$ — Overturning moment due to dynamic soil pressure

$$FS_{OT.B} := \frac{RM_Y}{M_{E.Y.ns100} + M_{sur.Y} + M_{s.dyn.Y.ns100} + M_{d.sur.Y}}$$

$FS_{OT.B} = 3.43$ — Factor of Safety

$\text{if}\left(FS_{OT.B} \geq 1.1, \text{"OK"}, \text{"FAIL"}\right) = \text{"OK"}$

Case C: 40% EW, 40% NS, 100% Vertical

$RM_Y = 8314936 \cdot kip \cdot ft$ Restoring moment due to weight of building

$M_{E.Y.v100} = 3896160 \cdot kip \cdot ft$ Overturning moment due to seismic inertial force

$M_{sur.Y} = 2597 \cdot kip \cdot ft$ Overturning moment due to static surcharge force

$M_{d.sur.Y} = 519 \cdot kip \cdot ft$ Overturning moment due to dynamic surcharge force

$M_{s.dyn.Y.v100} = 5232 \cdot kip \cdot ft$ Overturning moment due to dynamic soil pressure

$$FS_{OT.C1} := \frac{RM_Y}{M_{E.Y.v100} + M_{sur.Y} + M_{s.dyn.Y.v100} + M_{d.sur.Y}}$$

$FS_{OT.C1} = 2.13$ Factor of Safety

$\text{if}\left(FS_{OT.C1} \geq 1.1, \text{"OK"}, \text{"FAIL"}\right) = \text{"OK"}$

$RM_X = 3961829 \cdot kip \cdot ft$ Restoring moment due to weight of building

$M_{E.X.v100} = 2054533 \cdot kip \cdot ft$ Overturning moment due to seismic inertial force

$M_{sur.X} = 3476 \cdot kip \cdot ft$ Overturning moment due to static surcharge force

$M_{d.sur.X} = 695 \cdot kip \cdot ft$ Overturning moment due to dynamic surcharge force

$M_{s.dyn.X.v100} = 6743.6 \cdot kip \cdot ft$ Overturning moment due to dynamic soil pressure

$$FS_{OT.C2} := \frac{RM_X}{M_{E.X.v100} + M_{sur.X} + M_{s.dyn.X.v100} + M_{d.sur.X}}$$

$FS_{OT.C2} = 1.92$ Factor of Safety

$\text{if}\left(FS_{OT.C2} \geq 1.1, \text{"OK"}, \text{"FAIL"}\right) = \text{"OK"}$

The factors of safety are above the minimum required factor of safety of 1.1. Therefore, the resistance against overturning for the SHINE Building is adequate.

I4.3.3 Additional Checks

Overturning check about the toe of the exterior wall at grade elevation

With an overturning factor of safety of 2.16, the results show that Case C overturning about North/South direction (X) with 40% EW, 40% NS, 100% Vertical excitation is controlling. This case is re-evaluated for overturning about the toe of the exterior wall at grade elevation. For this evaluation the driving and restoring moment forces need to be adjusted.

$RM_{Self.X.adj} := 5965650 \cdot kip \cdot ft$ — Restoring Moment about the NS direction due to Self Weight

$RM_{dead.X.adj} := 1629439 \cdot kip \cdot ft$ — Restoring Moment about the NS direction due to Dead Weight

$RM_{X.adj} := RM_{Self.X.adj} + RM_{dead.X.adj} = 7595089 \cdot kip \cdot ft$ — Total restoring Moment about the NS direction

$M_{E.Xx.adj} := 39147 kip \cdot ft \cdot F_H = 46976 \cdot kip \cdot ft$ — Seismic overturning moment about EW (X) due to EW (x) loading

$M_{E.Xy.adj} := 449958 kip \cdot ft \cdot F_H = 539950 \cdot kip \cdot ft$ — Seismic overturning moment about EW (X) due to NS (y) loading

$M_{E.Xz.adj} := 2239973 kip \cdot ft \cdot F_V = 3135962 \cdot kip \cdot ft$ — Seismic overturning moment about EW (X) due to vertical (z) loading

Overturning moment due to seismic inertial force:

$$M_{E.X.v100.adj} := 0.4 \cdot M_{E.Xy.adj} + 0.4 \cdot M_{E.Xx.adj} + M_{E.Xz.adj} = 3370732.6 \cdot kip \cdot ft$$

$M_{sur.X.adj} := 39167 \cdot kip \cdot ft \cdot \frac{125}{1250} = 3917 \cdot kip \cdot ft$ — Conservatively include overturning moment due to static surcharge force (about North/South direction)

$M_{d.sur.X.adj} := 7833 \cdot kip \cdot ft \cdot \frac{25}{250} = 783 \cdot kip \cdot ft$ — Conservatively include overturning moment due to Dynamic surcharge force (about North/South direction)

$M_{s.dyn.X.ew100.adj} := 20035 \cdot kip \cdot ft$ — Conservatively include overturning moment due to dynamic lateral soil force (EW direction)

$M_{s.dyn.X.v100.adj} := 0.4 \cdot M_{s.dyn.X.ew100.adj} = 8014 \cdot kip \cdot ft$ Conservatively include overturning moment due to dynamic lateral soil force (EW direction) 100% vertical

$$FS_{OT.C2.adj} := \frac{RM_{X.adj}}{M_{E.X.v100.adj} + M_{sur.X.adj} + M_{s.dyn.X.v100.adj} + M_{d.sur.X.adj}}$$

$FS_{OT.C2.adj} = 2.24$ Factor of Safety

$\text{if}\left(FS_{OT.C2} \geq 1.1, \text{"OK"}, \text{"FAIL"}\right) = \text{"OK"}$

The factors of safety are above the minimum required factor of safety of 1.1. Therefore, the resistance against overturning is adequate.

Check Stability for Wind and Tornado forces

Tornado and wind forces are not expected to control over seismic forces; however, because the acceptance criteria according to SRP 3.8.5 establish a safety of factor of 1.5 for stability evaluation for wind, a check is made to ensure that this is satisfied.

Conservatively, the ratio of maximum forces due to tornado and seismic load cases is compared to the ratio of safety factors, 1.5/1.1. Note that the factor of safety for tornado is 1.1; however, because tornado loads are greater than wind loads, a comparison of tornado and seismic envelopes the comparison for wind.

Maximum force due to seismic loading (X,Y,Z):

$$F_{seismic} := \max\left(F_{E.Xx}, F_{E.Xy}, F_{E.Xz}, F_{E.Yx}, F_{E.Yy}, F_{E.Yz}\right) = 31548 \cdot kip$$

$F_{seismic.z} := \max\left(F_{E.Zx}, F_{E.Zy}, F_{E.Zz}\right) = 39509 \cdot kip$ (Z - vertical)

Maximum force due to tornado loading, taken from Table I3a (X,Y,Z):

$F_{tor.x} := 3185 \cdot kip$ $F_{tor.y} := 3416 \cdot kip$ $F_{tor.z} := 7662 \cdot kip$ (Z - vertical due to uplift at the roof)

Compare ratio of seismic force to wind force with ratio of tornado stability acceptance criteria to seismic stability acceptance criteria:

$\frac{F_{seismic}}{\max\left(F_{tor.x}, F_{tor.y}\right)} = 9.2$ >> $\frac{1.5}{1.1} = 1.4$ Lateral (X,Y)

$\frac{F_{seismic.z}}{F_{tor.z}} = 5.2$ >> $\frac{1.5}{1.1} = 1.4$ Vertical (Z)

The ratio of seismic forces to tornado forces is larger than 1.5/1.1 for both the lateral and vertical directions and, therefore, wind and tornado do not control the sliding or overturning stability evaluation.

I5.0 RESULTS AND CONCLUSIONS

The following sub-sections summarize results obtained form the stability evaluation.

I5.1 Sliding

The available friction at the base of the Production Facility is sufficient enough to prevent the building from sliding for all cases and, therefore, the structure is stable against sliding. The results computed in this attachment are shown in Table I5.

Table I5. Sliding evaluation results

Case	Required Factor of Safety	Computed Factor of Safety
A	1.1	1.14
B	1.1	1.17
C	1.1	1.42

I5.2 Overturning

Stability against overturning was evaluated relying solely on the weight of the Production Facility for resistance. The weight of the Production Facility is sufficient enough to prevent the building from overturning for all cases and, therefore, the structure is stable. The results computed in this attachment are shown below in Table I6.

Table I6. Overturning evaluation results

<table>
<tr><th colspan="2">Case</th><th>Required Factor of Safety</th><th>Computed Factor of Safety</th></tr>
<tr><td colspan="2">A</td><td>1.1</td><td>2.24</td></tr>
<tr><td colspan="2">B</td><td>1.1</td><td>3.43</td></tr>
<tr><td rowspan="2">C</td><td>Overturning about Y-axis</td><td>1.1</td><td>2.13</td></tr>
<tr><td>Overturning about X-axis</td><td>1.1</td><td>1.92</td></tr>
<tr><td>C</td><td>Overturning about X-axis (about toe of exterior wall at grade)</td><td>1.1</td><td>2.24</td></tr>
</table>

Table of Contents

Load Combinations and Factors for non-seismic permutations.

Section 5: 1.4D + 1.4F (ACI 349-06 Combination 1)
Section 5: 1.2D + 1.2F + 1.6L + 1.6H + 1.4C_{cr} + 0.5S (ACI 349-06 Combination 2)
Section 5: 1.2D + 1.2F + 0.8L + 0.8H + 1.4C_{cr} + 1.6S (ACI 349-06 Combination 3)
Section 5: 1.2D + 1.2F + 1.6L + 1.6H + 1.6W (ACI 349-06 Combination 5)
Section 5: 1.0D + 1.0F + 0.8L + 1.0H + W_t (ACI 349-06 Combination 7)
Section 5: 0.9D + 1.4F (ACI 349-06 Combination 1 with 0.9 D)
Section 5: 0.9D + 0F + 0.0L + 1.6H + 1.6W (ACI 349-06 Combination 5 with 0.9D, 0F, 0L)
Section 5: 0.9D + 0F + 0.0L + 1.0H + W_t (ACI 349-06 Combination 7 with 0.9D, 0F, 0L)

Dead Load	Factor	Fluid Load	Factor	Live Load	Factor	At Rest Static Soil (H)	Factor	Static Soil Surcharge (H)	Factor	Crane Load (C_{cr})	Factor	Snow Load (S)	Factor	Wind Load (W)	Factor	Tornado Wind (Wt)	Factor	Number of Combinations	Number of Terms	Number of Lines
D	1.4	F.stat	1.4															1	2	2
D	1.2	F.stat	1.2	L	1.6	H.rest	1.6	H.sur.+X	1.6	Crane1	1.4	S1	0.5					48	7	336
								H.sur.-X	1.6	Crane2	1.4	S2	0.5							
								H.sur.+Y	1.6	Crane3	1.4	S3	0.5							
								H.sur.-Y	1.6	Crane4	1.4									
D	1.2	F.stat	1.2	L	0.8	H.rest	0.8	H.sur.+X	0.8	Crane1	1.4	S1	1.6					48	7	336
								H.sur.-X	0.8	Crane2	1.4	S2	1.6							
								H.sur.+Y	0.8	Crane3	1.4	S3	1.6							
								H.sur.-Y	0.8	Crane4	1.4									
D	1.2	F.stat	1.2	L	1.6	H.rest	1.6	H.sur.+X	1.6					W1	1.6			84	6	504
								H.sur.-X	1.6					W2	1.6					
								H.sur.+Y	1.6					W3	1.6					
								H.sur.-Y	1.6					W4	1.6					
														W5	1.6					
														W6	1.6					
														W7	1.6					
														W8	1.6					
														W9	1.6					
														W10	1.6					
														W11	1.6					
														W12	1.6					
														W13	1.6					
														W14	1.6					
														W15	1.6					
														W16	1.6					
														W17	1.6					
														W18	1.6					
														W19	1.6					
														W20	1.6					
														W21	0					
D	1	F.stat	1	L	0.8	H.rest	1	H.sur.+X	1							W_t1	1	180	6	1080
								H.sur.-X	1							W_t2	1			
								H.sur.+Y	1							W_t3	1			
								H.sur.-Y	1							W_t4	1			
																W_t5	1			
																W_t6	1			
																W_t7	1			
																W_t8	1			
																W_t9	1			
																W_t10	1			
																W_t11	1			
																W_t12	1			
																W_t13	1			
																W_t14	1			
																W_t15	1			
																W_t16	1			
																W_t17	1			
																W_t18	1			
																W_t19	1			
																W_t20	1			
																W_t21	1			
																W_t22	1			
																W_t23	1			
																W_t24	1			

Load Combinations and Factors for non-seismic permutations. (Continued)

Section 5: 1.4D + 1.4F (ACI 349-06 Combination 1)
Section 5: 1.2D + 1.2F + 1.6L + 1.6H + 1.4C_{cr} + 0.5S (ACI 349-06 Combination 2)
Section 5: 1.2D + 1.2F + 0.8L + 0.8H + 1.4C_{cr} + 1.6S (ACI 349-06 Combination 3)
Section 5: 1.2D + 1.2F + 1.6L + 1.6H + 1.6W (ACI 349-06 Combination 5)
Section 5: 1.0D + 1.0F + 0.8L + 1.0H + W_t (ACI 349-06 Combination 7)
Section 5: 0.9D + 1.4F (ACI 349-06 Combination 1 with 0.9 D)
Section 5: 0.9D + 0F + 0.0L + 1.6H + 1.6W (ACI 349-06 Combination 5 with 0.9D, 0F, 0L)
Section 5: 0.9D + 0F + 0.0L + 1.0H + W_t (ACI 349-06 Combination 7 with 0.9D, 0F, 0L)

Dead Load	Factor	Fluid Load	Factor	Live Load	Factor	At Rest Static Soil (H)	Factor	Static Soil Surcharge (H)	Factor	Crane Load (C_{cr})	Factor	Snow Load (S)	Factor	Wind Load (W)	Factor	Tornado Wind (Wt)	Factor	Number of Combinations	Number of Terms	Number of Lines
																W_t25	1			
																W_t26	1			
																W_t27	1			
																W_t28	1			
																W_t29	1			
																W_t30	1			
																W_t31	1			
																W_t32	1			
																W_t33	1			
																W_t34	1			
																W_t35	1			
																W_t36	1			
																W_t37	1			
																W_t38	1			
																W_t39	1			
																W_t40	1			
																W_t41	1			
																W_t42	1			
																W_t43	1			
																W_t44	1			
																W_t45	1			
D	0.9	F.stat	1.4															1	2	2
D	0.9	F.stat	0	L	0	H.rest	1.6	H.sur.+X	1.6					W1	1.6			84	6	504
								H.sur.-X	1.6					W2	1.6					
								H.sur.+Y	1.6					W3	1.6					
								H.sur.-Y	1.6					W4	1.6					
														W5	1.6					
														W6	1.6					
														W7	1.6					
														W8	1.6					
														W9	1.6					
														W10	1.6					
														W11	1.6					
														W12	1.6					
														W13	1.6					
														W14	1.6					
														W15	1.6					
														W16	1.6					
														W17	1.6					
														W18	1.6					
														W19	1.6					
														W20	1.6					
														W21	0					
D	0.9	F.stat	0	L	0	H.rest	1	H.sur.+X	1							W_t1	1	180	6	1080
								H.sur.-X	1							W_t2	1			
								H.sur.+Y	1							W_t3	1			
								H.sur.-Y	1							W_t4	1			
																W_t5	1			
																W_t6	1			
																W_t7	1			
																W_t8	1			
																W_t9	1			
																W_t10	1			

Load Combinations and Factors for non-seismic permutations. (Continued)

Section 5: 1.4D + 1.4F (ACI 349-06 Combination 1)
Section 5: 1.2D + 1.2F + 1.6L + 1.6H + 1.4C_{cr} + 0.5S (ACI 349-06 Combination 2)
Section 5: 1.2D + 1.2F + 0.8L + 0.8H + 1.4C_{cr} + 1.6S (ACI 349-06 Combination 3)
Section 5: 1.2D + 1.2F + 1.6L + 1.6H + 1.6W (ACI 349-06 Combination 5)
Section 5: 1.0D + 1.0F + 0.8L + 1.0H + W_t (ACI 349-06 Combination 7)
Section 5: 0.9D + 1.4F (ACI 349-06 Combination 1 with 0.9 D)
Section 5: 0.9D + 0F + 0.0L + 1.6H + 1.6W (ACI 349-06 Combination 5 with 0.9D, 0F, 0L)
Section 5: 0.9D + 0F + 0.0L + 1.0H + W_t (ACI 349-06 Combination 7 with 0.9D, 0F, 0L)

Dead Load	Factor	Fluid Load	Factor	Live Load	Factor	At Rest Static Soil (H)	Factor	Static Soil Surcharge (H)	Factor	Crane Load (C_{cr})	Factor	Snow Load (S)	Factor	Wind Load (W)	Factor	Tornado Wind (Wt)	Factor	Number of Combinations	Number of Terms	Number of Lines
																W_t11	1			
																W_t12	1			
																W_t13	1			
																W_t14	1			
																W_t15	1			
																W_t16	1			
																W_t17	1			
																W_t18	1			
																W_t19	1			
																W_t20	1			
																W_t21	1			
																W_t22	1			
																W_t23	1			
																W_t24	1			
																W_t25	1			
																W_t26	1			
																W_t27	1			
																W_t28	1			
																W_t29	1			
																W_t30	1			
																W_t31	1			
																W_t32	1			
																W_t33	1			
																W_t34	1			
																W_t35	1			
																W_t36	1			
																W_t37	1			
																W_t38	1			
																W_t39	1			
																W_t40	1			
																W_t41	1			
																W_t42	1			
																W_t43	1			
																W_t44	1			
																W_t45	1			
																		626		3847

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5101	Linear Add	No	D	1.4	No	No	No	No		
5101			F.stat	1.4						
5102	Linear Add	No	D	1.2	No	No	No	No		
5102			F.stat	1.2						
5102			L	1.6						
5102			H.rest	1.6						
5102			H.sur.+X	1.6						
5102			Crane1	1.4						
5102			S1	0.5						
5103	Linear Add	No	D	1.2	No	No	No	No		
5103			F.stat	1.2						
5103			L	1.6						
5103			H.rest	1.6						
5103			H.sur.+X	1.6						
5103			Crane2	1.4						
5103			S1	0.5						
5104	Linear Add	No	D	1.2	No	No	No	No		
5104			F.stat	1.2						
5104			L	1.6						
5104			H.rest	1.6						
5104			H.sur.+X	1.6						
5104			Crane3	1.4						
5104			S1	0.5						
5105	Linear Add	No	D	1.2	No	No	No	No		
5105			F.stat	1.2						
5105			L	1.6						
5105			H.rest	1.6						
5105			H.sur.+X	1.6						
5105			Crane4	1.4						
5105			S1	0.5						
5106	Linear Add	No	D	1.2	No	No	No	No		
5106			F.stat	1.2						
5106			L	1.6						
5106			H.rest	1.6						
5106			H.sur.+X	1.6						
5106			Crane1	1.4						
5106			S2	0.5						
5107	Linear Add	No	D	1.2	No	No	No	No		
5107			F.stat	1.2						
5107			L	1.6						
5107			H.rest	1.6						
5107			H.sur.+X	1.6						
5107			Crane2	1.4						
5107			S2	0.5						
5108	Linear Add	No	D	1.2	No	No	No	No		
5108			F.stat	1.2						
5108			L	1.6						
5108			H.rest	1.6						
5108			H.sur.+X	1.6						
5108			Crane3	1.4						
5108			S2	0.5						
5109	Linear Add	No	D	1.2	No	No	No	No		
5109			F.stat	1.2						
5109			L	1.6						
5109			H.rest	1.6						
5109			H.sur.+X	1.6						
5109			Crane4	1.4						
5109			S2	0.5						
5110	Linear Add	No	D	1.2	No	No	No	No		
5110			F.stat	1.2						
5110			L	1.6						
5110			H.rest	1.6						
5110			H.sur.+X	1.6						
5110			Crane1	1.4						
5110			S3	0.5						
5111	Linear Add	No	D	1.2	No	No	No	No		
5111			F.stat	1.2						
5111			L	1.6						
5111			H.rest	1.6						
5111			H.sur.+X	1.6						
5111			Crane2	1.4						
5111			S3	0.5						
5112	Linear Add	No	D	1.2	No	No	No	No		
5112			F.stat	1.2						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5112			L	1.6						
5112			H.rest	1.6						
5112			H.sur.+X	1.6						
5112			Crane3	1.4						
5112			S3	0.5						
5113	Linear Add	No	D	1.2	No	No	No	No		
5113			F.stat	1.2						
5113			L	1.6						
5113			H.rest	1.6						
5113			H.sur.+X	1.6						
5113			Crane4	1.4						
5113			S3	0.5						
5114	Linear Add	No	D	1.2	No	No	No	No		
5114			F.stat	1.2						
5114			L	1.6						
5114			H.rest	1.6						
5114			H.sur.-X	1.6						
5114			Crane1	1.4						
5114			S1	0.5						
5115	Linear Add	No	D	1.2	No	No	No	No		
5115			F.stat	1.2						
5115			L	1.6						
5115			H.rest	1.6						
5115			H.sur.-X	1.6						
5115			Crane2	1.4						
5115			S1	0.5						
5116	Linear Add	No	D	1.2	No	No	No	No		
5116			F.stat	1.2						
5116			L	1.6						
5116			H.rest	1.6						
5116			H.sur.-X	1.6						
5116			Crane3	1.4						
5116			S1	0.5						
5117	Linear Add	No	D	1.2	No	No	No	No		
5117			F.stat	1.2						
5117			L	1.6						
5117			H.rest	1.6						
5117			H.sur.-X	1.6						
5117			Crane4	1.4						
5117			S1	0.5						
5118	Linear Add	No	D	1.2	No	No	No	No		
5118			F.stat	1.2						
5118			L	1.6						
5118			H.rest	1.6						
5118			H.sur.-X	1.6						
5118			Crane1	1.4						
5118			S2	0.5						
5119	Linear Add	No	D	1.2	No	No	No	No		
5119			F.stat	1.2						
5119			L	1.6						
5119			H.rest	1.6						
5119			H.sur.-X	1.6						
5119			Crane2	1.4						
5119			S2	0.5						
5120	Linear Add	No	D	1.2	No	No	No	No		
5120			F.stat	1.2						
5120			L	1.6						
5120			H.rest	1.6						
5120			H.sur.-X	1.6						
5120			Crane3	1.4						
5120			S2	0.5						
5121	Linear Add	No	D	1.2	No	No	No	No		
5121			F.stat	1.2						
5121			L	1.6						
5121			H.rest	1.6						
5121			H.sur.-X	1.6						
5121			Crane4	1.4						
5121			S2	0.5						
5122	Linear Add	No	D	1.2	No	No	No	No		
5122			F.stat	1.2						
5122			L	1.6						
5122			H.rest	1.6						
5122			H.sur.-X	1.6						
5122			Crane1	1.4						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5122			S3	0.5						
5123	Linear Add	No	D	1.2	No	No	No	No		
5123			F.stat	1.2						
5123			L	1.6						
5123			H.rest	1.6						
5123			H.sur.-X	1.6						
5123			Crane2	1.4						
5123			S3	0.5						
5124	Linear Add	No	D	1.2	No	No	No	No		
5124			F.stat	1.2						
5124			L	1.6						
5124			H.rest	1.6						
5124			H.sur.-X	1.6						
5124			Crane3	1.4						
5124			S3	0.5						
5125	Linear Add	No	D	1.2	No	No	No	No		
5125			F.stat	1.2						
5125			L	1.6						
5125			H.rest	1.6						
5125			H.sur.-X	1.6						
5125			Crane4	1.4						
5125			S3	0.5						
5126	Linear Add	No	D	1.2	No	No	No	No		
5126			F.stat	1.2						
5126			L	1.6						
5126			H.rest	1.6						
5126			H.sur.+Y	1.6						
5126			Crane1	1.4						
5126			S1	0.5						
5127	Linear Add	No	D	1.2	No	No	No	No		
5127			F.stat	1.2						
5127			L	1.6						
5127			H.rest	1.6						
5127			H.sur.+Y	1.6						
5127			Crane2	1.4						
5127			S1	0.5						
5128	Linear Add	No	D	1.2	No	No	No	No		
5128			F.stat	1.2						
5128			L	1.6						
5128			H.rest	1.6						
5128			H.sur.+Y	1.6						
5128			Crane3	1.4						
5128			S1	0.5						
5129	Linear Add	No	D	1.2	No	No	No	No		
5129			F.stat	1.2						
5129			L	1.6						
5129			H.rest	1.6						
5129			H.sur.+Y	1.6						
5129			Crane4	1.4						
5129			S1	0.5						
5130	Linear Add	No	D	1.2	No	No	No	No		
5130			F.stat	1.2						
5130			L	1.6						
5130			H.rest	1.6						
5130			H.sur.+Y	1.6						
5130			Crane1	1.4						
5130			S2	0.5						
5131	Linear Add	No	D	1.2	No	No	No	No		
5131			F.stat	1.2						
5131			L	1.6						
5131			H.rest	1.6						
5131			H.sur.+Y	1.6						
5131			Crane2	1.4						
5131			S2	0.5						
5132	Linear Add	No	D	1.2	No	No	No	No		
5132			F.stat	1.2						
5132			L	1.6						
5132			H.rest	1.6						
5132			H.sur.+Y	1.6						
5132			Crane3	1.4						
5132			S2	0.5						
5133	Linear Add	No	D	1.2	No	No	No	No		
5133			F.stat	1.2						
5133			L	1.6						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5133			H.rest	1.6						
5133			H.sur.+Y	1.6						
5133			Crane4	1.4						
5133			S2	0.5						
5134	Linear Add	No	D	1.2	No	No	No	No		
5134			F.stat	1.2						
5134			L	1.6						
5134			H.rest	1.6						
5134			H.sur.+Y	1.6						
5134			Crane1	1.4						
5134			S3	0.5						
5135	Linear Add	No	D	1.2	No	No	No	No		
5135			F.stat	1.2						
5135			L	1.6						
5135			H.rest	1.6						
5135			H.sur.+Y	1.6						
5135			Crane2	1.4						
5135			S3	0.5						
5136	Linear Add	No	D	1.2	No	No	No	No		
5136			F.stat	1.2						
5136			L	1.6						
5136			H.rest	1.6						
5136			H.sur.+Y	1.6						
5136			Crane3	1.4						
5136			S3	0.5						
5137	Linear Add	No	D	1.2	No	No	No	No		
5137			F.stat	1.2						
5137			L	1.6						
5137			H.rest	1.6						
5137			H.sur.+Y	1.6						
5137			Crane4	1.4						
5137			S3	0.5						
5138	Linear Add	No	D	1.2	No	No	No	No		
5138			F.stat	1.2						
5138			L	1.6						
5138			H.rest	1.6						
5138			H.sur.-Y	1.6						
5138			Crane1	1.4						
5138			S1	0.5						
5139	Linear Add	No	D	1.2	No	No	No	No		
5139			F.stat	1.2						
5139			L	1.6						
5139			H.rest	1.6						
5139			H.sur.-Y	1.6						
5139			Crane2	1.4						
5139			S1	0.5						
5140	Linear Add	No	D	1.2	No	No	No	No		
5140			F.stat	1.2						
5140			L	1.6						
5140			H.rest	1.6						
5140			H.sur.-Y	1.6						
5140			Crane3	1.4						
5140			S1	0.5						
5141	Linear Add	No	D	1.2	No	No	No	No		
5141			F.stat	1.2						
5141			L	1.6						
5141			H.rest	1.6						
5141			H.sur.-Y	1.6						
5141			Crane4	1.4						
5141			S1	0.5						
5142	Linear Add	No	D	1.2	No	No	No	No		
5142			F.stat	1.2						
5142			L	1.6						
5142			H.rest	1.6						
5142			H.sur.-Y	1.6						
5142			Crane1	1.4						
5142			S2	0.5						
5143	Linear Add	No	D	1.2	No	No	No	No		
5143			F.stat	1.2						
5143			L	1.6						
5143			H.rest	1.6						
5143			H.sur.-Y	1.6						
5143			Crane2	1.4						
5143			S2	0.5						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5144	Linear Add	No	D	1.2	No	No	No	No		
5144			F.stat	1.2						
5144			L	1.6						
5144			H.rest	1.6						
5144			H.sur.-Y	1.6						
5144			Crane3	1.4						
5144			S2	0.5						
5145	Linear Add	No	D	1.2	No	No	No	No		
5145			F.stat	1.2						
5145			L	1.6						
5145			H.rest	1.6						
5145			H.sur.-Y	1.6						
5145			Crane4	1.4						
5145			S2	0.5						
5146	Linear Add	No	D	1.2	No	No	No	No		
5146			F.stat	1.2						
5146			L	1.6						
5146			H.rest	1.6						
5146			H.sur.-Y	1.6						
5146			Crane1	1.4						
5146			S3	0.5						
5147	Linear Add	No	D	1.2	No	No	No	No		
5147			F.stat	1.2						
5147			L	1.6						
5147			H.rest	1.6						
5147			H.sur.-Y	1.6						
5147			Crane2	1.4						
5147			S3	0.5						
5148	Linear Add	No	D	1.2	No	No	No	No		
5148			F.stat	1.2						
5148			L	1.6						
5148			H.rest	1.6						
5148			H.sur.-Y	1.6						
5148			Crane3	1.4						
5148			S3	0.5						
5149	Linear Add	No	D	1.2	No	No	No	No		
5149			F.stat	1.2						
5149			L	1.6						
5149			H.rest	1.6						
5149			H.sur.-Y	1.6						
5149			Crane4	1.4						
5149			S3	0.5						
5150	Linear Add	No	D	1.2	No	No	No	No		
5150			F.stat	1.2						
5150			L	0.8						
5150			H.rest	0.8						
5150			H.sur.+X	0.8						
5150			Crane1	1.4						
5150			S1	1.6						
5151	Linear Add	No	D	1.2	No	No	No	No		
5151			F.stat	1.2						
5151			L	0.8						
5151			H.rest	0.8						
5151			H.sur.+X	0.8						
5151			Crane2	1.4						
5151			S1	1.6						
5152	Linear Add	No	D	1.2	No	No	No	No		
5152			F.stat	1.2						
5152			L	0.8						
5152			H.rest	0.8						
5152			H.sur.+X	0.8						
5152			Crane3	1.4						
5152			S1	1.6						
5153	Linear Add	No	D	1.2	No	No	No	No		
5153			F.stat	1.2						
5153			L	0.8						
5153			H.rest	0.8						
5153			H.sur.+X	0.8						
5153			Crane4	1.4						
5153			S1	1.6						
5154	Linear Add	No	D	1.2	No	No	No	No		
5154			F.stat	1.2						
5154			L	0.8						
5154			H.rest	0.8						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5154			H.sur.+X	0.8						
5154			Crane1	1.4						
5154			S2	1.6						
5155	Linear Add	No	D	1.2	No	No	No	No		
5155			F.stat	1.2						
5155			L	0.8						
5155			H.rest	0.8						
5155			H.sur.+X	0.8						
5155			Crane2	1.4						
5155			S2	1.6						
5156	Linear Add	No	D	1.2	No	No	No	No		
5156			F.stat	1.2						
5156			L	0.8						
5156			H.rest	0.8						
5156			H.sur.+X	0.8						
5156			Crane3	1.4						
5156			S2	1.6						
5157	Linear Add	No	D	1.2	No	No	No	No		
5157			F.stat	1.2						
5157			L	0.8						
5157			H.rest	0.8						
5157			H.sur.+X	0.8						
5157			Crane4	1.4						
5157			S2	1.6						
5158	Linear Add	No	D	1.2	No	No	No	No		
5158			F.stat	1.2						
5158			L	0.8						
5158			H.rest	0.8						
5158			H.sur.+X	0.8						
5158			Crane1	1.4						
5158			S3	1.6						
5159	Linear Add	No	D	1.2	No	No	No	No		
5159			F.stat	1.2						
5159			L	0.8						
5159			H.rest	0.8						
5159			H.sur.+X	0.8						
5159			Crane2	1.4						
5159			S3	1.6						
5160	Linear Add	No	D	1.2	No	No	No	No		
5160			F.stat	1.2						
5160			L	0.8						
5160			H.rest	0.8						
5160			H.sur.+X	0.8						
5160			Crane3	1.4						
5160			S3	1.6						
5161	Linear Add	No	D	1.2	No	No	No	No		
5161			F.stat	1.2						
5161			L	0.8						
5161			H.rest	0.8						
5161			H.sur.+X	0.8						
5161			Crane4	1.4						
5161			S3	1.6						
5162	Linear Add	No	D	1.2	No	No	No	No		
5162			F.stat	1.2						
5162			L	0.8						
5162			H.rest	0.8						
5162			H.sur.-X	0.8						
5162			Crane1	1.4						
5162			S1	1.6						
5163	Linear Add	No	D	1.2	No	No	No	No		
5163			F.stat	1.2						
5163			L	0.8						
5163			H.rest	0.8						
5163			H.sur.-X	0.8						
5163			Crane2	1.4						
5163			S1	1.6						
5164	Linear Add	No	D	1.2	No	No	No	No		
5164			F.stat	1.2						
5164			L	0.8						
5164			H.rest	0.8						
5164			H.sur.-X	0.8						
5164			Crane3	1.4						
5164			S1	1.6						
5165	Linear Add	No	D	1.2	No	No	No	No		

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5165			F.stat	1.2						
5165			L	0.8						
5165			H.rest	0.8						
5165			H.sur.-X	0.8						
5165			Crane4	1.4						
5165			S1	1.6						
5166	Linear Add	No	D	1.2	No	No	No	No		
5166			F.stat	1.2						
5166			L	0.8						
5166			H.rest	0.8						
5166			H.sur.-X	0.8						
5166			Crane1	1.4						
5166			S2	1.6						
5167	Linear Add	No	D	1.2	No	No	No	No		
5167			F.stat	1.2						
5167			L	0.8						
5167			H.rest	0.8						
5167			H.sur.-X	0.8						
5167			Crane2	1.4						
5167			S2	1.6						
5168	Linear Add	No	D	1.2	No	No	No	No		
5168			F.stat	1.2						
5168			L	0.8						
5168			H.rest	0.8						
5168			H.sur.-X	0.8						
5168			Crane3	1.4						
5168			S2	1.6						
5169	Linear Add	No	D	1.2	No	No	No	No		
5169			F.stat	1.2						
5169			L	0.8						
5169			H.rest	0.8						
5169			H.sur.-X	0.8						
5169			Crane4	1.4						
5169			S2	1.6						
5170	Linear Add	No	D	1.2	No	No	No	No		
5170			F.stat	1.2						
5170			L	0.8						
5170			H.rest	0.8						
5170			H.sur.-X	0.8						
5170			Crane1	1.4						
5170			S3	1.6						
5171	Linear Add	No	D	1.2	No	No	No	No		
5171			F.stat	1.2						
5171			L	0.8						
5171			H.rest	0.8						
5171			H.sur.-X	0.8						
5171			Crane2	1.4						
5171			S3	1.6						
5172	Linear Add	No	D	1.2	No	No	No	No		
5172			F.stat	1.2						
5172			L	0.8						
5172			H.rest	0.8						
5172			H.sur.-X	0.8						
5172			Crane3	1.4						
5172			S3	1.6						
5173	Linear Add	No	D	1.2	No	No	No	No		
5173			F.stat	1.2						
5173			L	0.8						
5173			H.rest	0.8						
5173			H.sur.-X	0.8						
5173			Crane4	1.4						
5173			S3	1.6						
5174	Linear Add	No	D	1.2	No	No	No	No		
5174			F.stat	1.2						
5174			L	0.8						
5174			H.rest	0.8						
5174			H.sur.+Y	0.8						
5174			Crane1	1.4						
5174			S1	1.6						
5175	Linear Add	No	D	1.2	No	No	No	No		
5175			F.stat	1.2						
5175			L	0.8						
5175			H.rest	0.8						
5175			H.sur.+Y	0.8						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5175			Crane2	1.4						
5175			S1	1.6						
5176	Linear Add	No	D	1.2	No	No	No	No		
5176			F.stat	1.2						
5176			L	0.8						
5176			H.rest	0.8						
5176			H.sur.+Y	0.8						
5176			Crane3	1.4						
5176			S1	1.6						
5177	Linear Add	No	D	1.2	No	No	No	No		
5177			F.stat	1.2						
5177			L	0.8						
5177			H.rest	0.8						
5177			H.sur.+Y	0.8						
5177			Crane4	1.4						
5177			S1	1.6						
5178	Linear Add	No	D	1.2	No	No	No	No		
5178			F.stat	1.2						
5178			L	0.8						
5178			H.rest	0.8						
5178			H.sur.+Y	0.8						
5178			Crane1	1.4						
5178			S2	1.6						
5179	Linear Add	No	D	1.2	No	No	No	No		
5179			F.stat	1.2						
5179			L	0.8						
5179			H.rest	0.8						
5179			H.sur.+Y	0.8						
5179			Crane2	1.4						
5179			S2	1.6						
5180	Linear Add	No	D	1.2	No	No	No	No		
5180			F.stat	1.2						
5180			L	0.8						
5180			H.rest	0.8						
5180			H.sur.+Y	0.8						
5180			Crane3	1.4						
5180			S2	1.6						
5181	Linear Add	No	D	1.2	No	No	No	No		
5181			F.stat	1.2						
5181			L	0.8						
5181			H.rest	0.8						
5181			H.sur.+Y	0.8						
5181			Crane4	1.4						
5181			S2	1.6						
5182	Linear Add	No	D	1.2	No	No	No	No		
5182			F.stat	1.2						
5182			L	0.8						
5182			H.rest	0.8						
5182			H.sur.+Y	0.8						
5182			Crane1	1.4						
5182			S3	1.6						
5183	Linear Add	No	D	1.2	No	No	No	No		
5183			F.stat	1.2						
5183			L	0.8						
5183			H.rest	0.8						
5183			H.sur.+Y	0.8						
5183			Crane2	1.4						
5183			S3	1.6						
5184	Linear Add	No	D	1.2	No	No	No	No		
5184			F.stat	1.2						
5184			L	0.8						
5184			H.rest	0.8						
5184			H.sur.+Y	0.8						
5184			Crane3	1.4						
5184			S3	1.6						
5185	Linear Add	No	D	1.2	No	No	No	No		
5185			F.stat	1.2						
5185			L	0.8						
5185			H.rest	0.8						
5185			H.sur.+Y	0.8						
5185			Crane4	1.4						
5185			S3	1.6						
5186	Linear Add	No	D	1.2	No	No	No	No		
5186			F.stat	1.2						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5186			L	0.8						
5186			H.rest	0.8						
5186			H.sur.-Y	0.8						
5186			Crane1	1.4						
5186			S1	1.6						
5187	Linear Add	No	D	1.2	No	No	No	No		
5187			F.stat	1.2						
5187			L	0.8						
5187			H.rest	0.8						
5187			H.sur.-Y	0.8						
5187			Crane2	1.4						
5187			S1	1.6						
5188	Linear Add	No	D	1.2	No	No	No	No		
5188			F.stat	1.2						
5188			L	0.8						
5188			H.rest	0.8						
5188			H.sur.-Y	0.8						
5188			Crane3	1.4						
5188			S1	1.6						
5189	Linear Add	No	D	1.2	No	No	No	No		
5189			F.stat	1.2						
5189			L	0.8						
5189			H.rest	0.8						
5189			H.sur.-Y	0.8						
5189			Crane4	1.4						
5189			S1	1.6						
5190	Linear Add	No	D	1.2	No	No	No	No		
5190			F.stat	1.2						
5190			L	0.8						
5190			H.rest	0.8						
5190			H.sur.-Y	0.8						
5190			Crane1	1.4						
5190			S2	1.6						
5191	Linear Add	No	D	1.2	No	No	No	No		
5191			F.stat	1.2						
5191			L	0.8						
5191			H.rest	0.8						
5191			H.sur.-Y	0.8						
5191			Crane2	1.4						
5191			S2	1.6						
5192	Linear Add	No	D	1.2	No	No	No	No		
5192			F.stat	1.2						
5192			L	0.8						
5192			H.rest	0.8						
5192			H.sur.-Y	0.8						
5192			Crane3	1.4						
5192			S2	1.6						
5193	Linear Add	No	D	1.2	No	No	No	No		
5193			F.stat	1.2						
5193			L	0.8						
5193			H.rest	0.8						
5193			H.sur.-Y	0.8						
5193			Crane4	1.4						
5193			S2	1.6						
5194	Linear Add	No	D	1.2	No	No	No	No		
5194			F.stat	1.2						
5194			L	0.8						
5194			H.rest	0.8						
5194			H.sur.-Y	0.8						
5194			Crane1	1.4						
5194			S3	1.6						
5195	Linear Add	No	D	1.2	No	No	No	No		
5195			F.stat	1.2						
5195			L	0.8						
5195			H.rest	0.8						
5195			H.sur.-Y	0.8						
5195			Crane2	1.4						
5195			S3	1.6						
5196	Linear Add	No	D	1.2	No	No	No	No		
5196			F.stat	1.2						
5196			L	0.8						
5196			H.rest	0.8						
5196			H.sur.-Y	0.8						
5196			Crane3	1.4						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5196			S3	1.6						
5197	Linear Add	No	D	1.2	No	No	No	No		
5197			F.stat	1.2						
5197			L	0.8						
5197			H.rest	0.8						
5197			H.sur.-Y	0.8						
5197			Crane4	1.4						
5197			S3	1.6						
5198	Linear Add	No	D	1.2	No	No	No	No		
5198			F.stat	1.2						
5198			L	1.6						
5198			H.rest	1.6						
5198			H.sur.+X	1.6						
5198			W1	1.6						
5199	Linear Add	No	D	1.2	No	No	No	No		
5199			F.stat	1.2						
5199			L	1.6						
5199			H.rest	1.6						
5199			H.sur.+X	1.6						
5199			W2	1.6						
5200	Linear Add	No	D	1.2	No	No	No	No		
5200			F.stat	1.2						
5200			L	1.6						
5200			H.rest	1.6						
5200			H.sur.+X	1.6						
5200			W3	1.6						
5201	Linear Add	No	D	1.2	No	No	No	No		
5201			F.stat	1.2						
5201			L	1.6						
5201			H.rest	1.6						
5201			H.sur.+X	1.6						
5201			W4	1.6						
5202	Linear Add	No	D	1.2	No	No	No	No		
5202			F.stat	1.2						
5202			L	1.6						
5202			H.rest	1.6						
5202			H.sur.+X	1.6						
5202			W5	1.6						
5203	Linear Add	No	D	1.2	No	No	No	No		
5203			F.stat	1.2						
5203			L	1.6						
5203			H.rest	1.6						
5203			H.sur.+X	1.6						
5203			W6	1.6						
5204	Linear Add	No	D	1.2	No	No	No	No		
5204			F.stat	1.2						
5204			L	1.6						
5204			H.rest	1.6						
5204			H.sur.+X	1.6						
5204			W7	1.6						
5205	Linear Add	No	D	1.2	No	No	No	No		
5205			F.stat	1.2						
5205			L	1.6						
5205			H.rest	1.6						
5205			H.sur.+X	1.6						
5205			W8	1.6						
5206	Linear Add	No	D	1.2	No	No	No	No		
5206			F.stat	1.2						
5206			L	1.6						
5206			H.rest	1.6						
5206			H.sur.+X	1.6						
5206			W9	1.6						
5207	Linear Add	No	D	1.2	No	No	No	No		
5207			F.stat	1.2						
5207			L	1.6						
5207			H.rest	1.6						
5207			H.sur.+X	1.6						
5207			W10	1.6						
5208	Linear Add	No	D	1.2	No	No	No	No		
5208			F.stat	1.2						
5208			L	1.6						
5208			H.rest	1.6						
5208			H.sur.+X	1.6						
5208			W11	1.6						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5209	Linear Add	No	D	1.2	No	No	No	No		
5209			F.stat	1.2						
5209			L	1.6						
5209			H.rest	1.6						
5209			H.sur.+X	1.6						
5209			W12	1.6						
5210	Linear Add	No	D	1.2	No	No	No	No		
5210			F.stat	1.2						
5210			L	1.6						
5210			H.rest	1.6						
5210			H.sur.+X	1.6						
5210			W13	1.6						
5211	Linear Add	No	D	1.2	No	No	No	No		
5211			F.stat	1.2						
5211			L	1.6						
5211			H.rest	1.6						
5211			H.sur.+X	1.6						
5211			W14	1.6						
5212	Linear Add	No	D	1.2	No	No	No	No		
5212			F.stat	1.2						
5212			L	1.6						
5212			H.rest	1.6						
5212			H.sur.+X	1.6						
5212			W15	1.6						
5213	Linear Add	No	D	1.2	No	No	No	No		
5213			F.stat	1.2						
5213			L	1.6						
5213			H.rest	1.6						
5213			H.sur.+X	1.6						
5213			W16	1.6						
5214	Linear Add	No	D	1.2	No	No	No	No		
5214			F.stat	1.2						
5214			L	1.6						
5214			H.rest	1.6						
5214			H.sur.+X	1.6						
5214			W17	1.6						
5215	Linear Add	No	D	1.2	No	No	No	No		
5215			F.stat	1.2						
5215			L	1.6						
5215			H.rest	1.6						
5215			H.sur.+X	1.6						
5215			W18	1.6						
5216	Linear Add	No	D	1.2	No	No	No	No		
5216			F.stat	1.2						
5216			L	1.6						
5216			H.rest	1.6						
5216			H.sur.+X	1.6						
5216			W19	1.6						
5217	Linear Add	No	D	1.2	No	No	No	No		
5217			F.stat	1.2						
5217			L	1.6						
5217			H.rest	1.6						
5217			H.sur.+X	1.6						
5217			W20	1.6						
5218	Linear Add	No	D	1.2	No	No	No	No		
5218			F.stat	1.2						
5218			L	1.6						
5218			H.rest	1.6						
5218			H.sur.+X	1.6						
5218			W21	0						
5219	Linear Add	No	D	1.2	No	No	No	No		
5219			F.stat	1.2						
5219			L	1.6						
5219			H.rest	1.6						
5219			H.sur.-X	1.6						
5219			W1	1.6						
5220	Linear Add	No	D	1.2	No	No	No	No		
5220			F.stat	1.2						
5220			L	1.6						
5220			H.rest	1.6						
5220			H.sur.-X	1.6						
5220			W2	1.6						
5221	Linear Add	No	D	1.2	No	No	No	No		
5221			F.stat	1.2						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5221			L	1.6						
5221			H.rest	1.6						
5221			H.sur.-X	1.6						
5221			W3	1.6						
5222	Linear Add	No	D	1.2	No	No	No	No		
5222			F.stat	1.2						
5222			L	1.6						
5222			H.rest	1.6						
5222			H.sur.-X	1.6						
5222			W4	1.6						
5223	Linear Add	No	D	1.2	No	No	No	No		
5223			F.stat	1.2						
5223			L	1.6						
5223			H.rest	1.6						
5223			H.sur.-X	1.6						
5223			W5	1.6						
5224	Linear Add	No	D	1.2	No	No	No	No		
5224			F.stat	1.2						
5224			L	1.6						
5224			H.rest	1.6						
5224			H.sur.-X	1.6						
5224			W6	1.6						
5225	Linear Add	No	D	1.2	No	No	No	No		
5225			F.stat	1.2						
5225			L	1.6						
5225			H.rest	1.6						
5225			H.sur.-X	1.6						
5225			W7	1.6						
5226	Linear Add	No	D	1.2	No	No	No	No		
5226			F.stat	1.2						
5226			L	1.6						
5226			H.rest	1.6						
5226			H.sur.-X	1.6						
5226			W8	1.6						
5227	Linear Add	No	D	1.2	No	No	No	No		
5227			F.stat	1.2						
5227			L	1.6						
5227			H.rest	1.6						
5227			H.sur.-X	1.6						
5227			W9	1.6						
5228	Linear Add	No	D	1.2	No	No	No	No		
5228			F.stat	1.2						
5228			L	1.6						
5228			H.rest	1.6						
5228			H.sur.-X	1.6						
5228			W10	1.6						
5229	Linear Add	No	D	1.2	No	No	No	No		
5229			F.stat	1.2						
5229			L	1.6						
5229			H.rest	1.6						
5229			H.sur.-X	1.6						
5229			W11	1.6						
5230	Linear Add	No	D	1.2	No	No	No	No		
5230			F.stat	1.2						
5230			L	1.6						
5230			H.rest	1.6						
5230			H.sur.-X	1.6						
5230			W12	1.6						
5231	Linear Add	No	D	1.2	No	No	No	No		
5231			F.stat	1.2						
5231			L	1.6						
5231			H.rest	1.6						
5231			H.sur.-X	1.6						
5231			W13	1.6						
5232	Linear Add	No	D	1.2	No	No	No	No		
5232			F.stat	1.2						
5232			L	1.6						
5232			H.rest	1.6						
5232			H.sur.-X	1.6						
5232			W14	1.6						
5233	Linear Add	No	D	1.2	No	No	No	No		
5233			F.stat	1.2						
5233			L	1.6						
5233			H.rest	1.6						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5233			H.sur.-X	1.6						
5233			W15	1.6						
5234	Linear Add	No	D	1.2	No	No	No	No		
5234			F.stat	1.2						
5234			L	1.6						
5234			H.rest	1.6						
5234			H.sur.-X	1.6						
5234			W16	1.6						
5235	Linear Add	No	D	1.2	No	No	No	No		
5235			F.stat	1.2						
5235			L	1.6						
5235			H.rest	1.6						
5235			H.sur.-X	1.6						
5235			W17	1.6						
5236	Linear Add	No	D	1.2	No	No	No	No		
5236			F.stat	1.2						
5236			L	1.6						
5236			H.rest	1.6						
5236			H.sur.-X	1.6						
5236			W18	1.6						
5237	Linear Add	No	D	1.2	No	No	No	No		
5237			F.stat	1.2						
5237			L	1.6						
5237			H.rest	1.6						
5237			H.sur.-X	1.6						
5237			W19	1.6						
5238	Linear Add	No	D	1.2	No	No	No	No		
5238			F.stat	1.2						
5238			L	1.6						
5238			H.rest	1.6						
5238			H.sur.-X	1.6						
5238			W20	1.6						
5239	Linear Add	No	D	1.2	No	No	No	No		
5239			F.stat	1.2						
5239			L	1.6						
5239			H.rest	1.6						
5239			H.sur.-X	1.6						
5239			W21	0						
5240	Linear Add	No	D	1.2	No	No	No	No		
5240			F.stat	1.2						
5240			L	1.6						
5240			H.rest	1.6						
5240			H.sur.+Y	1.6						
5240			W1	1.6						
5241	Linear Add	No	D	1.2	No	No	No	No		
5241			F.stat	1.2						
5241			L	1.6						
5241			H.rest	1.6						
5241			H.sur.+Y	1.6						
5241			W2	1.6						
5242	Linear Add	No	D	1.2	No	No	No	No		
5242			F.stat	1.2						
5242			L	1.6						
5242			H.rest	1.6						
5242			H.sur.+Y	1.6						
5242			W3	1.6						
5243	Linear Add	No	D	1.2	No	No	No	No		
5243			F.stat	1.2						
5243			L	1.6						
5243			H.rest	1.6						
5243			H.sur.+Y	1.6						
5243			W4	1.6						
5244	Linear Add	No	D	1.2	No	No	No	No		
5244			F.stat	1.2						
5244			L	1.6						
5244			H.rest	1.6						
5244			H.sur.+Y	1.6						
5244			W5	1.6						
5245	Linear Add	No	D	1.2	No	No	No	No		
5245			F.stat	1.2						
5245			L	1.6						
5245			H.rest	1.6						
5245			H.sur.+Y	1.6						
5245			W6	1.6						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5246	Linear Add	No	D	1.2	No	No	No	No		
5246			F.stat	1.2						
5246			L	1.6						
5246			H.rest	1.6						
5246			H.sur.+Y	1.6						
5246			W7	1.6						
5247	Linear Add	No	D	1.2	No	No	No	No		
5247			F.stat	1.2						
5247			L	1.6						
5247			H.rest	1.6						
5247			H.sur.+Y	1.6						
5247			W8	1.6						
5248	Linear Add	No	D	1.2	No	No	No	No		
5248			F.stat	1.2						
5248			L	1.6						
5248			H.rest	1.6						
5248			H.sur.+Y	1.6						
5248			W9	1.6						
5249	Linear Add	No	D	1.2	No	No	No	No		
5249			F.stat	1.2						
5249			L	1.6						
5249			H.rest	1.6						
5249			H.sur.+Y	1.6						
5249			W10	1.6						
5250	Linear Add	No	D	1.2	No	No	No	No		
5250			F.stat	1.2						
5250			L	1.6						
5250			H.rest	1.6						
5250			H.sur.+Y	1.6						
5250			W11	1.6						
5251	Linear Add	No	D	1.2	No	No	No	No		
5251			F.stat	1.2						
5251			L	1.6						
5251			H.rest	1.6						
5251			H.sur.+Y	1.6						
5251			W12	1.6						
5252	Linear Add	No	D	1.2	No	No	No	No		
5252			F.stat	1.2						
5252			L	1.6						
5252			H.rest	1.6						
5252			H.sur.+Y	1.6						
5252			W13	1.6						
5253	Linear Add	No	D	1.2	No	No	No	No		
5253			F.stat	1.2						
5253			L	1.6						
5253			H.rest	1.6						
5253			H.sur.+Y	1.6						
5253			W14	1.6						
5254	Linear Add	No	D	1.2	No	No	No	No		
5254			F.stat	1.2						
5254			L	1.6						
5254			H.rest	1.6						
5254			H.sur.+Y	1.6						
5254			W15	1.6						
5255	Linear Add	No	D	1.2	No	No	No	No		
5255			F.stat	1.2						
5255			L	1.6						
5255			H.rest	1.6						
5255			H.sur.+Y	1.6						
5255			W16	1.6						
5256	Linear Add	No	D	1.2	No	No	No	No		
5256			F.stat	1.2						
5256			L	1.6						
5256			H.rest	1.6						
5256			H.sur.+Y	1.6						
5256			W17	1.6						
5257	Linear Add	No	D	1.2	No	No	No	No		
5257			F.stat	1.2						
5257			L	1.6						
5257			H.rest	1.6						
5257			H.sur.+Y	1.6						
5257			W18	1.6						
5258	Linear Add	No	D	1.2	No	No	No	No		
5258			F.stat	1.2						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5258			L	1.6						
5258			H.rest	1.6						
5258			H.sur.+Y	1.6						
5258			W19	1.6						
5259	Linear Add	No	D	1.2	No	No	No	No		
5259			F.stat	1.2						
5259			L	1.6						
5259			H.rest	1.6						
5259			H.sur.+Y	1.6						
5259			W20	1.6						
5260	Linear Add	No	D	1.2	No	No	No	No		
5260			F.stat	1.2						
5260			L	1.6						
5260			H.rest	1.6						
5260			H.sur.+Y	1.6						
5260			W21	0						
5261	Linear Add	No	D	1.2	No	No	No	No		
5261			F.stat	1.2						
5261			L	1.6						
5261			H.rest	1.6						
5261			H.sur.-Y	1.6						
5261			W1	1.6						
5262	Linear Add	No	D	1.2	No	No	No	No		
5262			F.stat	1.2						
5262			L	1.6						
5262			H.rest	1.6						
5262			H.sur.-Y	1.6						
5262			W2	1.6						
5263	Linear Add	No	D	1.2	No	No	No	No		
5263			F.stat	1.2						
5263			L	1.6						
5263			H.rest	1.6						
5263			H.sur.-Y	1.6						
5263			W3	1.6						
5264	Linear Add	No	D	1.2	No	No	No	No		
5264			F.stat	1.2						
5264			L	1.6						
5264			H.rest	1.6						
5264			H.sur.-Y	1.6						
5264			W4	1.6						
5265	Linear Add	No	D	1.2	No	No	No	No		
5265			F.stat	1.2						
5265			L	1.6						
5265			H.rest	1.6						
5265			H.sur.-Y	1.6						
5265			W5	1.6						
5266	Linear Add	No	D	1.2	No	No	No	No		
5266			F.stat	1.2						
5266			L	1.6						
5266			H.rest	1.6						
5266			H.sur.-Y	1.6						
5266			W6	1.6						
5267	Linear Add	No	D	1.2	No	No	No	No		
5267			F.stat	1.2						
5267			L	1.6						
5267			H.rest	1.6						
5267			H.sur.-Y	1.6						
5267			W7	1.6						
5268	Linear Add	No	D	1.2	No	No	No	No		
5268			F.stat	1.2						
5268			L	1.6						
5268			H.rest	1.6						
5268			H.sur.-Y	1.6						
5268			W8	1.6						
5269	Linear Add	No	D	1.2	No	No	No	No		
5269			F.stat	1.2						
5269			L	1.6						
5269			H.rest	1.6						
5269			H.sur.-Y	1.6						
5269			W9	1.6						
5270	Linear Add	No	D	1.2	No	No	No	No		
5270			F.stat	1.2						
5270			L	1.6						
5270			H.rest	1.6						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5270			H.sur.-Y	1.6						
5270			W10	1.6						
5271	Linear Add	No	D	1.2	No	No	No	No		
5271			F.stat	1.2						
5271			L	1.6						
5271			H.rest	1.6						
5271			H.sur.-Y	1.6						
5271			W11	1.6						
5272	Linear Add	No	D	1.2	No	No	No	No		
5272			F.stat	1.2						
5272			L	1.6						
5272			H.rest	1.6						
5272			H.sur.-Y	1.6						
5272			W12	1.6						
5273	Linear Add	No	D	1.2	No	No	No	No		
5273			F.stat	1.2						
5273			L	1.6						
5273			H.rest	1.6						
5273			H.sur.-Y	1.6						
5273			W13	1.6						
5274	Linear Add	No	D	1.2	No	No	No	No		
5274			F.stat	1.2						
5274			L	1.6						
5274			H.rest	1.6						
5274			H.sur.-Y	1.6						
5274			W14	1.6						
5275	Linear Add	No	D	1.2	No	No	No	No		
5275			F.stat	1.2						
5275			L	1.6						
5275			H.rest	1.6						
5275			H.sur.-Y	1.6						
5275			W15	1.6						
5276	Linear Add	No	D	1.2	No	No	No	No		
5276			F.stat	1.2						
5276			L	1.6						
5276			H.rest	1.6						
5276			H.sur.-Y	1.6						
5276			W16	1.6						
5277	Linear Add	No	D	1.2	No	No	No	No		
5277			F.stat	1.2						
5277			L	1.6						
5277			H.rest	1.6						
5277			H.sur.-Y	1.6						
5277			W17	1.6						
5278	Linear Add	No	D	1.2	No	No	No	No		
5278			F.stat	1.2						
5278			L	1.6						
5278			H.rest	1.6						
5278			H.sur.-Y	1.6						
5278			W18	1.6						
5279	Linear Add	No	D	1.2	No	No	No	No		
5279			F.stat	1.2						
5279			L	1.6						
5279			H.rest	1.6						
5279			H.sur.-Y	1.6						
5279			W19	1.6						
5280	Linear Add	No	D	1.2	No	No	No	No		
5280			F.stat	1.2						
5280			L	1.6						
5280			H.rest	1.6						
5280			H.sur.-Y	1.6						
5280			W20	1.6						
5281	Linear Add	No	D	1.2	No	No	No	No		
5281			F.stat	1.2						
5281			L	1.6						
5281			H.rest	1.6						
5281			H.sur.-Y	1.6						
5281			W21	0						
5282	Linear Add	No	D	1	No	No	No	No		
5282			F.stat	1						
5282			L	0.8						
5282			H.rest	1						
5282			H.sur.+X	1						
5282			Wt1	1						

TABLE: Combination Definitions										
ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5283	Linear Add	No	D	1	No	No	No	No		
5283			F.stat	1						
5283			L	0.8						
5283			H.rest	1						
5283			H.sur.+X	1						
5283			Wt2	1						
5284	Linear Add	No	D	1	No	No	No	No		
5284			F.stat	1						
5284			L	0.8						
5284			H.rest	1						
5284			H.sur.+X	1						
5284			Wt3	1						
5285	Linear Add	No	D	1	No	No	No	No		
5285			F.stat	1						
5285			L	0.8						
5285			H.rest	1						
5285			H.sur.+X	1						
5285			Wt4	1						
5286	Linear Add	No	D	1	No	No	No	No		
5286			F.stat	1						
5286			L	0.8						
5286			H.rest	1						
5286			H.sur.+X	1						
5286			Wt5	1						
5287	Linear Add	No	D	1	No	No	No	No		
5287			F.stat	1						
5287			L	0.8						
5287			H.rest	1						
5287			H.sur.+X	1						
5287			Wt6	1						
5288	Linear Add	No	D	1	No	No	No	No		
5288			F.stat	1						
5288			L	0.8						
5288			H.rest	1						
5288			H.sur.+X	1						
5288			Wt7	1						
5289	Linear Add	No	D	1	No	No	No	No		
5289			F.stat	1						
5289			L	0.8						
5289			H.rest	1						
5289			H.sur.+X	1						
5289			Wt8	1						
5290	Linear Add	No	D	1	No	No	No	No		
5290			F.stat	1						
5290			L	0.8						
5290			H.rest	1						
5290			H.sur.+X	1						
5290			Wt9	1						
5291	Linear Add	No	D	1	No	No	No	No		
5291			F.stat	1						
5291			L	0.8						
5291			H.rest	1						
5291			H.sur.+X	1						
5291			Wt10	1						
5292	Linear Add	No	D	1	No	No	No	No		
5292			F.stat	1						
5292			L	0.8						
5292			H.rest	1						
5292			H.sur.+X	1						
5292			Wt11	1						
5293	Linear Add	No	D	1	No	No	No	No		
5293			F.stat	1						
5293			L	0.8						
5293			H.rest	1						
5293			H.sur.+X	1						
5293			Wt12	1						
5294	Linear Add	No	D	1	No	No	No	No		
5294			F.stat	1						
5294			L	0.8						
5294			H.rest	1						
5294			H.sur.+X	1						
5294			Wt13	1						
5295	Linear Add	No	D	1	No	No	No	No		
5295			F.stat	1						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5295			L	0.8						
5295			H.rest	1						
5295			H.sur.+X	1						
5295			Wt14	1						
5296	Linear Add	No	D	1	No	No	No	No		
5296			F.stat	1						
5296			L	0.8						
5296			H.rest	1						
5296			H.sur.+X	1						
5296			Wt15	1						
5297	Linear Add	No	D	1	No	No	No	No		
5297			F.stat	1						
5297			L	0.8						
5297			H.rest	1						
5297			H.sur.+X	1						
5297			Wt16	1						
5298	Linear Add	No	D	1	No	No	No	No		
5298			F.stat	1						
5298			L	0.8						
5298			H.rest	1						
5298			H.sur.+X	1						
5298			Wt17	1						
5299	Linear Add	No	D	1	No	No	No	No		
5299			F.stat	1						
5299			L	0.8						
5299			H.rest	1						
5299			H.sur.+X	1						
5299			Wt18	1						
5300	Linear Add	No	D	1	No	No	No	No		
5300			F.stat	1						
5300			L	0.8						
5300			H.rest	1						
5300			H.sur.+X	1						
5300			Wt19	1						
5301	Linear Add	No	D	1	No	No	No	No		
5301			F.stat	1						
5301			L	0.8						
5301			H.rest	1						
5301			H.sur.+X	1						
5301			Wt20	1						
5302	Linear Add	No	D	1	No	No	No	No		
5302			F.stat	1						
5302			L	0.8						
5302			H.rest	1						
5302			H.sur.+X	1						
5302			Wt21	1						
5303	Linear Add	No	D	1	No	No	No	No		
5303			F.stat	1						
5303			L	0.8						
5303			H.rest	1						
5303			H.sur.+X	1						
5303			Wt22	1						
5304	Linear Add	No	D	1	No	No	No	No		
5304			F.stat	1						
5304			L	0.8						
5304			H.rest	1						
5304			H.sur.+X	1						
5304			Wt23	1						
5305	Linear Add	No	D	1	No	No	No	No		
5305			F.stat	1						
5305			L	0.8						
5305			H.rest	1						
5305			H.sur.+X	1						
5305			Wt24	1						
5306	Linear Add	No	D	1	No	No	No	No		
5306			F.stat	1						
5306			L	0.8						
5306			H.rest	1						
5306			H.sur.+X	1						
5306			Wt25	1						
5307	Linear Add	No	D	1	No	No	No	No		
5307			F.stat	1						
5307			L	0.8						
5307			H.rest	1						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5307			H.sur.+X	1						
5307			Wt26	1						
5308	Linear Add	No	D	1	No	No	No	No		
5308			F.stat	1						
5308			L	0.8						
5308			H.rest	1						
5308			H.sur.+X	1						
5308			Wt27	1						
5309	Linear Add	No	D	1	No	No	No	No		
5309			F.stat	1						
5309			L	0.8						
5309			H.rest	1						
5309			H.sur.+X	1						
5309			Wt28	1						
5310	Linear Add	No	D	1	No	No	No	No		
5310			F.stat	1						
5310			L	0.8						
5310			H.rest	1						
5310			H.sur.+X	1						
5310			Wt29	1						
5311	Linear Add	No	D	1	No	No	No	No		
5311			F.stat	1						
5311			L	0.8						
5311			H.rest	1						
5311			H.sur.+X	1						
5311			Wt30	1						
5312	Linear Add	No	D	1	No	No	No	No		
5312			F.stat	1						
5312			L	0.8						
5312			H.rest	1						
5312			H.sur.+X	1						
5312			Wt31	1						
5313	Linear Add	No	D	1	No	No	No	No		
5313			F.stat	1						
5313			L	0.8						
5313			H.rest	1						
5313			H.sur.+X	1						
5313			Wt32	1						
5314	Linear Add	No	D	1	No	No	No	No		
5314			F.stat	1						
5314			L	0.8						
5314			H.rest	1						
5314			H.sur.+X	1						
5314			Wt33	1						
5315	Linear Add	No	D	1	No	No	No	No		
5315			F.stat	1						
5315			L	0.8						
5315			H.rest	1						
5315			H.sur.+X	1						
5315			Wt34	1						
5316	Linear Add	No	D	1	No	No	No	No		
5316			F.stat	1						
5316			L	0.8						
5316			H.rest	1						
5316			H.sur.+X	1						
5316			Wt35	1						
5317	Linear Add	No	D	1	No	No	No	No		
5317			F.stat	1						
5317			L	0.8						
5317			H.rest	1						
5317			H.sur.+X	1						
5317			Wt36	1						
5318	Linear Add	No	D	1	No	No	No	No		
5318			F.stat	1						
5318			L	0.8						
5318			H.rest	1						
5318			H.sur.+X	1						
5318			Wt37	1						
5319	Linear Add	No	D	1	No	No	No	No		
5319			F.stat	1						
5319			L	0.8						
5319			H.rest	1						
5319			H.sur.+X	1						
5319			Wt38	1						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5320	Linear Add	No	D	1	No	No	No	No		
5320			F.stat	1						
5320			L	0.8						
5320			H.rest	1						
5320			H.sur.+X	1						
5320			Wt39	1						
5321	Linear Add	No	D	1	No	No	No	No		
5321			F.stat	1						
5321			L	0.8						
5321			H.rest	1						
5321			H.sur.+X	1						
5321			Wt40	1						
5322	Linear Add	No	D	1	No	No	No	No		
5322			F.stat	1						
5322			L	0.8						
5322			H.rest	1						
5322			H.sur.+X	1						
5322			Wt41	1						
5323	Linear Add	No	D	1	No	No	No	No		
5323			F.stat	1						
5323			L	0.8						
5323			H.rest	1						
5323			H.sur.+X	1						
5323			Wt42	1						
5324	Linear Add	No	D	1	No	No	No	No		
5324			F.stat	1						
5324			L	0.8						
5324			H.rest	1						
5324			H.sur.+X	1						
5324			Wt43	1						
5325	Linear Add	No	D	1	No	No	No	No		
5325			F.stat	1						
5325			L	0.8						
5325			H.rest	1						
5325			H.sur.+X	1						
5325			Wt44	1						
5326	Linear Add	No	D	1	No	No	No	No		
5326			F.stat	1						
5326			L	0.8						
5326			H.rest	1						
5326			H.sur.+X	1						
5326			Wt45	1						
5327	Linear Add	No	D	1	No	No	No	No		
5327			F.stat	1						
5327			L	0.8						
5327			H.rest	1						
5327			H.sur.-X	1						
5327			Wt1	1						
5328	Linear Add	No	D	1	No	No	No	No		
5328			F.stat	1						
5328			L	0.8						
5328			H.rest	1						
5328			H.sur.-X	1						
5328			Wt2	1						
5329	Linear Add	No	D	1	No	No	No	No		
5329			F.stat	1						
5329			L	0.8						
5329			H.rest	1						
5329			H.sur.-X	1						
5329			Wt3	1						
5330	Linear Add	No	D	1	No	No	No	No		
5330			F.stat	1						
5330			L	0.8						
5330			H.rest	1						
5330			H.sur.-X	1						
5330			Wt4	1						
5331	Linear Add	No	D	1	No	No	No	No		
5331			F.stat	1						
5331			L	0.8						
5331			H.rest	1						
5331			H.sur.-X	1						
5331			Wt5	1						
5332	Linear Add	No	D	1	No	No	No	No		
5332			F.stat	1						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5332			L	0.8						
5332			H.rest	1						
5332			H.sur.-X	1						
5332			Wt6	1						
5333	Linear Add	No	D	1	No	No	No	No		
5333			F.stat	1						
5333			L	0.8						
5333			H.rest	1						
5333			H.sur.-X	1						
5333			Wt7	1						
5334	Linear Add	No	D	1	No	No	No	No		
5334			F.stat	1						
5334			L	0.8						
5334			H.rest	1						
5334			H.sur.-X	1						
5334			Wt8	1						
5335	Linear Add	No	D	1	No	No	No	No		
5335			F.stat	1						
5335			L	0.8						
5335			H.rest	1						
5335			H.sur.-X	1						
5335			Wt9	1						
5336	Linear Add	No	D	1	No	No	No	No		
5336			F.stat	1						
5336			L	0.8						
5336			H.rest	1						
5336			H.sur.-X	1						
5336			Wt10	1						
5337	Linear Add	No	D	1	No	No	No	No		
5337			F.stat	1						
5337			L	0.8						
5337			H.rest	1						
5337			H.sur.-X	1						
5337			Wt11	1						
5338	Linear Add	No	D	1	No	No	No	No		
5338			F.stat	1						
5338			L	0.8						
5338			H.rest	1						
5338			H.sur.-X	1						
5338			Wt12	1						
5339	Linear Add	No	D	1	No	No	No	No		
5339			F.stat	1						
5339			L	0.8						
5339			H.rest	1						
5339			H.sur.-X	1						
5339			Wt13	1						
5340	Linear Add	No	D	1	No	No	No	No		
5340			F.stat	1						
5340			L	0.8						
5340			H.rest	1						
5340			H.sur.-X	1						
5340			Wt14	1						
5341	Linear Add	No	D	1	No	No	No	No		
5341			F.stat	1						
5341			L	0.8						
5341			H.rest	1						
5341			H.sur.-X	1						
5341			Wt15	1						
5342	Linear Add	No	D	1	No	No	No	No		
5342			F.stat	1						
5342			L	0.8						
5342			H.rest	1						
5342			H.sur.-X	1						
5342			Wt16	1						
5343	Linear Add	No	D	1	No	No	No	No		
5343			F.stat	1						
5343			L	0.8						
5343			H.rest	1						
5343			H.sur.-X	1						
5343			Wt17	1						
5344	Linear Add	No	D	1	No	No	No	No		
5344			F.stat	1						
5344			L	0.8						
5344			H.rest	1						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5344			H.sur.-X	1						
5344			Wt18	1						
5345	Linear Add	No	D	1	No	No	No	No		
5345			F.stat	1						
5345			L	0.8						
5345			H.rest	1						
5345			H.sur.-X	1						
5345			Wt19	1						
5346	Linear Add	No	D	1	No	No	No	No		
5346			F.stat	1						
5346			L	0.8						
5346			H.rest	1						
5346			H.sur.-X	1						
5346			Wt20	1						
5347	Linear Add	No	D	1	No	No	No	No		
5347			F.stat	1						
5347			L	0.8						
5347			H.rest	1						
5347			H.sur.-X	1						
5347			Wt21	1						
5348	Linear Add	No	D	1	No	No	No	No		
5348			F.stat	1						
5348			L	0.8						
5348			H.rest	1						
5348			H.sur.-X	1						
5348			Wt22	1						
5349	Linear Add	No	D	1	No	No	No	No		
5349			F.stat	1						
5349			L	0.8						
5349			H.rest	1						
5349			H.sur.-X	1						
5349			Wt23	1						
5350	Linear Add	No	D	1	No	No	No	No		
5350			F.stat	1						
5350			L	0.8						
5350			H.rest	1						
5350			H.sur.-X	1						
5350			Wt24	1						
5351	Linear Add	No	D	1	No	No	No	No		
5351			F.stat	1						
5351			L	0.8						
5351			H.rest	1						
5351			H.sur.-X	1						
5351			Wt25	1						
5352	Linear Add	No	D	1	No	No	No	No		
5352			F.stat	1						
5352			L	0.8						
5352			H.rest	1						
5352			H.sur.-X	1						
5352			Wt26	1						
5353	Linear Add	No	D	1	No	No	No	No		
5353			F.stat	1						
5353			L	0.8						
5353			H.rest	1						
5353			H.sur.-X	1						
5353			Wt27	1						
5354	Linear Add	No	D	1	No	No	No	No		
5354			F.stat	1						
5354			L	0.8						
5354			H.rest	1						
5354			H.sur.-X	1						
5354			Wt28	1						
5355	Linear Add	No	D	1	No	No	No	No		
5355			F.stat	1						
5355			L	0.8						
5355			H.rest	1						
5355			H.sur.-X	1						
5355			Wt29	1						
5356	Linear Add	No	D	1	No	No	No	No		
5356			F.stat	1						
5356			L	0.8						
5356			H.rest	1						
5356			H.sur.-X	1						
5356			Wt30	1						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5357	Linear Add	No	D	1	No	No	No	No		
5357			F.stat	1						
5357			L	0.8						
5357			H.rest	1						
5357			H.sur.-X	1						
5357			Wt31	1						
5358	Linear Add	No	D	1	No	No	No	No		
5358			F.stat	1						
5358			L	0.8						
5358			H.rest	1						
5358			H.sur.-X	1						
5358			Wt32	1						
5359	Linear Add	No	D	1	No	No	No	No		
5359			F.stat	1						
5359			L	0.8						
5359			H.rest	1						
5359			H.sur.-X	1						
5359			Wt33	1						
5360	Linear Add	No	D	1	No	No	No	No		
5360			F.stat	1						
5360			L	0.8						
5360			H.rest	1						
5360			H.sur.-X	1						
5360			Wt34	1						
5361	Linear Add	No	D	1	No	No	No	No		
5361			F.stat	1						
5361			L	0.8						
5361			H.rest	1						
5361			H.sur.-X	1						
5361			Wt35	1						
5362	Linear Add	No	D	1	No	No	No	No		
5362			F.stat	1						
5362			L	0.8						
5362			H.rest	1						
5362			H.sur.-X	1						
5362			Wt36	1						
5363	Linear Add	No	D	1	No	No	No	No		
5363			F.stat	1						
5363			L	0.8						
5363			H.rest	1						
5363			H.sur.-X	1						
5363			Wt37	1						
5364	Linear Add	No	D	1	No	No	No	No		
5364			F.stat	1						
5364			L	0.8						
5364			H.rest	1						
5364			H.sur.-X	1						
5364			Wt38	1						
5365	Linear Add	No	D	1	No	No	No	No		
5365			F.stat	1						
5365			L	0.8						
5365			H.rest	1						
5365			H.sur.-X	1						
5365			Wt39	1						
5366	Linear Add	No	D	1	No	No	No	No		
5366			F.stat	1						
5366			L	0.8						
5366			H.rest	1						
5366			H.sur.-X	1						
5366			Wt40	1						
5367	Linear Add	No	D	1	No	No	No	No		
5367			F.stat	1						
5367			L	0.8						
5367			H.rest	1						
5367			H.sur.-X	1						
5367			Wt41	1						
5368	Linear Add	No	D	1	No	No	No	No		
5368			F.stat	1						
5368			L	0.8						
5368			H.rest	1						
5368			H.sur.-X	1						
5368			Wt42	1						
5369	Linear Add	No	D	1	No	No	No	No		
5369			F.stat	1						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5369			L	0.8						
5369			H.rest	1						
5369			H.sur.-X	1						
5369			Wt43	1						
5370	Linear Add	No	D	1	No	No	No	No		
5370			F.stat	1						
5370			L	0.8						
5370			H.rest	1						
5370			H.sur.-X	1						
5370			Wt44	1						
5371	Linear Add	No	D	1	No	No	No	No		
5371			F.stat	1						
5371			L	0.8						
5371			H.rest	1						
5371			H.sur.-X	1						
5371			Wt45	1						
5372	Linear Add	No	D	1	No	No	No	No		
5372			F.stat	1						
5372			L	0.8						
5372			H.rest	1						
5372			H.sur.+Y	1						
5372			Wt1	1						
5373	Linear Add	No	D	1	No	No	No	No		
5373			F.stat	1						
5373			L	0.8						
5373			H.rest	1						
5373			H.sur.+Y	1						
5373			Wt2	1						
5374	Linear Add	No	D	1	No	No	No	No		
5374			F.stat	1						
5374			L	0.8						
5374			H.rest	1						
5374			H.sur.+Y	1						
5374			Wt3	1						
5375	Linear Add	No	D	1	No	No	No	No		
5375			F.stat	1						
5375			L	0.8						
5375			H.rest	1						
5375			H.sur.+Y	1						
5375			Wt4	1						
5376	Linear Add	No	D	1	No	No	No	No		
5376			F.stat	1						
5376			L	0.8						
5376			H.rest	1						
5376			H.sur.+Y	1						
5376			Wt5	1						
5377	Linear Add	No	D	1	No	No	No	No		
5377			F.stat	1						
5377			L	0.8						
5377			H.rest	1						
5377			H.sur.+Y	1						
5377			Wt6	1						
5378	Linear Add	No	D	1	No	No	No	No		
5378			F.stat	1						
5378			L	0.8						
5378			H.rest	1						
5378			H.sur.+Y	1						
5378			Wt7	1						
5379	Linear Add	No	D	1	No	No	No	No		
5379			F.stat	1						
5379			L	0.8						
5379			H.rest	1						
5379			H.sur.+Y	1						
5379			Wt8	1						
5380	Linear Add	No	D	1	No	No	No	No		
5380			F.stat	1						
5380			L	0.8						
5380			H.rest	1						
5380			H.sur.+Y	1						
5380			Wt9	1						
5381	Linear Add	No	D	1	No	No	No	No		
5381			F.stat	1						
5381			L	0.8						
5381			H.rest	1						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
5381			H.sur.+Y	1						
5381			Wt10	1						
5382	Linear Add	No	D	1	No	No	No	No		
5382			F.stat	1						
5382			L	0.8						
5382			H.rest	1						
5382			H.sur.+Y	1						
5382			Wt11	1						
5383	Linear Add	No	D	1	No	No	No	No		
5383			F.stat	1						
5383			L	0.8						
5383			H.rest	1						
5383			H.sur.+Y	1						
5383			Wt12	1						
5384	Linear Add	No	D	1	No	No	No	No		
5384			F.stat	1						
5384			L	0.8						
5384			H.rest	1						
5384			H.sur.+Y	1						
5384			Wt13	1						
5385	Linear Add	No	D	1	No	No	No	No		
5385			F.stat	1						
5385			L	0.8						
5385			H.rest	1						
5385			H.sur.+Y	1						
5385			Wt14	1						
5386	Linear Add	No	D	1	No	No	No	No		
5386			F.stat	1						
5386			L	0.8						
5386			H.rest	1						
5386			H.sur.+Y	1						
5386			Wt15	1						
5387	Linear Add	No	D	1	No	No	No	No		
5387			F.stat	1						
5387			L	0.8						
5387			H.rest	1						
5387			H.sur.+Y	1						
5387			Wt16	1						
5388	Linear Add	No	D	1	No	No	No	No		
5388			F.stat	1						
5388			L	0.8						
5388			H.rest	1						
5388			H.sur.+Y	1						
5388			Wt17	1						
5389	Linear Add	No	D	1	No	No	No	No		
5389			F.stat	1						
5389			L	0.8						
5389			H.rest	1						
5389			H.sur.+Y	1						
5389			Wt18	1						
5390	Linear Add	No	D	1	No	No	No	No		
5390			F.stat	1						
5390			L	0.8						
5390			H.rest	1						
5390			H.sur.+Y	1						
5390			Wt19	1						
5391	Linear Add	No	D	1	No	No	No	No		

Wind Loads (applied based on unit wind pressure)

Load Case Number in Model	Description	Scale Factor for Secondary Wind Combinations	Scale Factor for Secondary Tornado Combinations
W001	Unit wind pressure, north wall and roof due to north wind	0.95	3.61
W002	Unit wind pressure, north wall due to south wind	0.95	3.61
W003	Unit wind pressure, east wall and roof due to east wind	0.95	3.61
W004	Unit wind pressure, east wall due to west wind	0.95	3.61
W005	Unit wind pressure, south wall due to north wind	0.95	3.61
W006	Unit wind pressure, south wall and roof due to south wind	0.95	3.61
W007	Unit wind pressure, west wall due to east wind	0.95	3.61
W008	Unit wind pressure, west wall and roof due to west wind	0.95	3.61
W009	Unit wind pressure, suction	0.95	3.61
W010	Unit wind pressure, positive internal pressure	0.95	3.61
W011	Unit wind pressure, negative internal pressure	0.95	3.61
W012	Torsion due to wind (ASCE Case 2), clockwise	0.95	3.61
W013	Torsion due to wind (ASCE Case 2), counter-clockwise	0.95	3.61
W014	Torsion due to wind (ASCE Case 4), clockwise	0.95	3.61
W015	Torsion due to wind (ASCE Case 4), counter-clockwise	0.95	3.61
W016	Tornado pressure drop	---	0.5
W017	Tornado missile, pipe, horizontal, northeast, CW	---	1
W018	Tornado missile, pipe, horizontal, northeast, CCW	---	1
W019	Tornado missile, pipe, horizontal, southeast, CW	---	1
W020	Tornado missile, pipe, horizontal, southeast, CCW	---	1
W021	Tornado missile, pipe, horizontal, southwest, CW	---	1
W022	Tornado missile, pipe, horizontal, southwest, CCW	---	1
W023	Tornado missile, pipe, horizontal, northwest, CW	---	1
W024	Tornado missile, pipe, horizontal, northwest, CCW	---	1
W025	Tornado missile, auto, horizontal, northeast, CW	---	1
W026	Tornado missile, auto, horizontal, northeast, CCW	---	1
W027	Tornado missile, auto, horizontal, southeast, CW	---	1
W028	Tornado missile, auto, horizontal, southeast, CCW	---	1
W029	Tornado missile, auto, horizontal, southwest, CW	---	1
W030	Tornado missile, auto, horizontal, southwest, CCW	---	1
W031	Tornado missile, auto, horizontal, northwest, CW	---	1
W032	Tornado missile, auto, horizontal, northwest, CCW	---	1
W033	Tornado missile, pipe and auto, vertical	---	1

Secondary Wind Combinations (scale combinations by operating wind scale factor)

Combination	Load Cases	Wind Direction	Internal	Torsion
W1	W001 + W003 + W005 + W007 + W010 + W014	Northeast	+	CW
W2	W002 + W003 + W006 + W007 + W010 + W014	Southeast	+	CW
W3	W002 + W004 + W006 + W008 + W010 + W014	Southwest	+	CW
W4	W001 + W004 + W005 + W008 + W010 + W014	Northwest	+	CW
W5	W001 + W003 + W005 + W007 + W010 + W015	Northeast	+	CCW
W6	W002 + W003 + W006 + W007 + W010 + W015	Southeast	+	CCW
W7	W002 + W004 + W006 + W008 + W010 + W015	Southwest	+	CCW
W8	W001 + W004 + W005 + W008 + W010 + W015	Northwest	+	CCW
W9	W001 + W003 + W005 + W007 + W011 + W014	Northeast	-	CW
W10	W002 + W003 + W006 + W007 + W011 + W014	Southeast	-	CW
W11	W002 + W004 + W006 + W008 + W011 + W014	Southwest	-	CW
W12	W001 + W004 + W005 + W008 + W011 + W014	Northwest	-	CW
W13	W001 + W003 + W005 + W007 + W011 + W015	Northeast	-	CCW
W14	W002 + W003 + W006 + W007 + W011 + W015	Southeast	-	CCW
W15	W002 + W004 + W006 + W008 + W011 + W015	Southwest	-	CCW
W16	W001 + W004 + W005 + W008 + W011 + W015	Northwest	-	CCW
W17	W009 + W010 + W012	Suction	+	CW
W18	W009 + W011 + W012	Suction	-	CW
W19	W009 + W010 + W013	Suction	+	CCW
W20	W009 + W011 + W013	Suction	-	CCW
W21	---	No Wind	N/A	N/A

Secondary Tornado Combinations (scale wind terms by tornado wind scale factor)

Combination	Load Cases	Wind Direction	Internal	Torsion	Missiles?
W_t1	W001 + W003 + W005 + W007 + W010 + W014 + 0.5W016	Northeast	+	CW	No
W_t2	W002 + W003 + W006 + W007 + W010 + W014 + 0.5W016	Southeast	+	CW	No
W_t3	W002 + W004 + W006 + W008 + W010 + W014 + 0.5W016	Southwest	+	CW	No
W_t4	W001 + W004 + W005 + W008 + W010 + W014 + 0.5W016	Northwest	+	CW	No
W_t5	W001 + W003 + W005 + W007 + W010 + W015 + 0.5W016	Northeast	+	CCW	No
W_t6	W002 + W003 + W006 + W007 + W010 + W015 + 0.5W016	Southeast	+	CCW	No
W_t7	W002 + W004 + W006 + W008 + W010 + W015 + 0.5W016	Southwest	+	CCW	No
W_t8	W001 + W004 + W005 + W008 + W010 + W015 + 0.5W016	Northwest	+	CCW	No
W_t9	W001 + W003 + W005 + W007 + W011 + W014 + 0.5W016	Northeast	-	CW	No
W_t10	W002 + W003 + W006 + W007 + W011 + W014 + 0.5W016	Southeast	-	CW	No
W_t11	W002 + W004 + W006 + W008 + W011 + W014 + 0.5W016	Southwest	-	CW	No
W_t12	W001 + W004 + W005 + W008 + W011 + W014 + 0.5W016	Northwest	-	CW	No
W_t13	W001 + W003 + W005 + W007 + W011 + W015 + 0.5W016	Northeast	-	CCW	No
W_t14	W002 + W003 + W006 + W007 + W011 + W015 + 0.5W016	Southeast	-	CCW	No
W_t15	W002 + W004 + W006 + W008 + W011 + W015 + 0.5W016	Southwest	-	CCW	No
W_t16	W001 + W004 + W005 + W008 + W011 + W015 + 0.5W016	Northwest	-	CCW	No
W_t17	W009 + W010 + W012 + 0.5W016	Suction	+	CW	No
W_t18	W009 + W011 + W012 + 0.5W016	Suction	-	CW	No
W_t19	W009 + W010 + W013 + 0.5W016	Suction	+	CCW	No
W_t20	W009 + W011 + W013 + 0.5W016	Suction	-	CCW	No
W_t21	W001 + W003 + W005 + W007 + W011 + W014 + 0.5W016 + W017	Northeast	-	CW	Horizontal pipe
W_t22	W002 + W003 + W006 + W007 + W011 + W014 + 0.5W016 + W019	Southeast	-	CW	Horizontal pipe
W_t23	W002 + W004 + W006 + W008 + W011 + W014 + 0.5W016 + W021	Southwest	-	CW	Horizontal pipe
W_t24	W001 + W004 + W005 + W008 + W011 + W014 + 0.5W016 + W023	Northwest	-	CW	Horizontal pipe
W_t25	W001 + W003 + W005 + W007 + W011 + W015 + 0.5W016 + W018	Northeast	-	CCW	Horizontal pipe
W_t26	W002 + W003 + W006 + W007 + W011 + W015 + 0.5W016 + W020	Southeast	-	CCW	Horizontal pipe
W_t27	W002 + W004 + W006 + W008 + W011 + W015 + 0.5W016 + W022	Southwest	-	CCW	Horizontal pipe
W_t28	W001 + W004 + W005 + W008 + W011 + W015 + 0.5W016 + W024	Northwest	-	CCW	Horizontal pipe
W_t29	W001 + W003 + W005 + W007 + W011 + W014 + 0.5W016 + W025	Northeast	-	CW	Horizontal auto
W_t30	W002 + W003 + W006 + W007 + W011 + W014 + 0.5W016 + W027	Southeast	-	CW	Horizontal auto
W_t31	W002 + W004 + W006 + W008 + W011 + W014 + 0.5W016 + W029	Southwest	-	CW	Horizontal auto
W_t32	W001 + W004 + W005 + W008 + W011 + W014 + 0.5W016 + W031	Northwest	-	CW	Horizontal auto
W_t33	W001 + W003 + W005 + W007 + W011 + W015 + 0.5W016 + W026	Northeast	-	CCW	Horizontal auto
W_t34	W002 + W003 + W006 + W007 + W011 + W015 + 0.5W016 + W028	Southeast	-	CCW	Horizontal auto
W_t35	W002 + W004 + W006 + W008 + W011 + W015 + 0.5W016 + W030	Southwest	-	CCW	Horizontal auto
W_t36	W001 + W004 + W005 + W008 + W011 + W015 + 0.5W016 + W032	Northwest	-	CCW	Horizontal auto
W_t37	W001 + W003 + W005 + W007 + W011 + W014 + 0.5W016 + W033	Northeast	-	CW	Vertical
W_t38	W002 + W003 + W006 + W007 + W011 + W014 + 0.5W016 + W033	Southeast	-	CW	Vertical
W_t39	W002 + W004 + W006 + W008 + W011 + W014 + 0.5W016 + W033	Southwest	-	CW	Vertical
W_t40	W001 + W004 + W005 + W008 + W011 + W014 + 0.5W016 + W033	Northwest	-	CW	Vertical
W_t41	W001 + W003 + W005 + W007 + W011 + W015 + 0.5W016 + W033	Northeast	-	CCW	Vertical
W_t42	W002 + W003 + W006 + W007 + W011 + W015 + 0.5W016 + W033	Southeast	-	CCW	Vertical
W_t43	W002 + W004 + W006 + W008 + W011 + W015 + 0.5W016 + W033	Southwest	-	CCW	Vertical
W_t44	W001 + W004 + W005 + W008 + W011 + W015 + 0.5W016 + W033	Northwest	-	CCW	Vertical
W_t45	W016	Pressure Drop	N/A	N/A	N/A

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
W1	Linear Add	No	W001	0.9523	No	No	No	No		
W1			W003	0.9523						
W1			W005	0.9523						
W1			W007	0.9523						
W1			W010	0.9523						
W1			W014	0.9523						
W2	Linear Add	No	W002	0.9523	No	No	No	No		
W2			W003	0.9523						
W2			W006	0.9523						
W2			W007	0.9523						
W2			W010	0.9523						
W2			W014	0.9523						
W3	Linear Add	No	W002	0.9523	No	No	No	No		
W3			W004	0.9523						
W3			W006	0.9523						
W3			W008	0.9523						
W3			W010	0.9523						
W3			W014	0.9523						
W4	Linear Add	No	W001	0.9523	No	No	No	No		
W4			W004	0.9523						
W4			W005	0.9523						
W4			W008	0.9523						
W4			W010	0.9523						
W4			W014	0.9523						
W5	Linear Add	No	W001	0.9523	No	No	No	No		
W5			W003	0.9523						
W5			W005	0.9523						
W5			W007	0.9523						
W5			W010	0.9523						
W5			W015	0.9523						
W6	Linear Add	No	W002	0.9523	No	No	No	No		
W6			W003	0.9523						
W6			W006	0.9523						
W6			W007	0.9523						
W6			W010	0.9523						
W6			W015	0.9523						
W7	Linear Add	No	W002	0.9523	No	No	No	No		
W7			W004	0.9523						
W7			W006	0.9523						
W7			W008	0.9523						
W7			W010	0.9523						
W7			W015	0.9523						
W8	Linear Add	No	W001	0.9523	No	No	No	No		
W8			W004	0.9523						
W8			W005	0.9523						
W8			W008	0.9523						
W8			W010	0.9523						
W8			W015	0.9523						
W9	Linear Add	No	W001	0.9523	No	No	No	No		
W9			W003	0.9523						
W9			W005	0.9523						
W9			W007	0.9523						
W9			W011	0.9523						
W9			W014	0.9523						
W10	Linear Add	No	W002	0.9523	No	No	No	No		
W10			W003	0.9523						
W10			W006	0.9523						
W10			W007	0.9523						
W10			W011	0.9523						
W10			W014	0.9523						
W11	Linear Add	No	W002	0.9523	No	No	No	No		
W11			W004	0.9523						
W11			W006	0.9523						
W11			W008	0.9523						
W11			W011	0.9523						
W11			W014	0.9523						
W12	Linear Add	No	W001	0.9523	No	No	No	No		
W12			W004	0.9523						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
W12			W005	0.9523						
W12			W008	0.9523						
W12			W011	0.9523						
W12			W014	0.9523						
W13	Linear Add	No	W001	0.9523	No	No	No	No		
W13			W003	0.9523						
W13			W005	0.9523						
W13			W007	0.9523						
W13			W011	0.9523						
W13			W015	0.9523						
W14	Linear Add	No	W002	0.9523	No	No	No	No		
W14			W003	0.9523						
W14			W006	0.9523						
W14			W007	0.9523						
W14			W011	0.9523						
W14			W015	0.9523						
W15	Linear Add	No	W002	0.9523	No	No	No	No		
W15			W004	0.9523						
W15			W006	0.9523						
W15			W008	0.9523						
W15			W011	0.9523						
W15			W015	0.9523						
W16	Linear Add	No	W001	0.9523	No	No	No	No		
W16			W004	0.9523						
W16			W005	0.9523						
W16			W008	0.9523						
W16			W011	0.9523						
W16			W015	0.9523						
W17	Linear Add	No	W009	0.9523	No	No	No	No		
W17			W010	0.9523						
W17			W012	0.9523						
W18	Linear Add	No	W009	0.9523	No	No	No	No		
W18			W011	0.9523						
W18			W012	0.9523						
W19	Linear Add	No	W009	0.9523	No	No	No	No		
W19			W010	0.9523						
W19			W013	0.9523						
W20	Linear Add	No	W009	0.9523	No	No	No	No		
W20			W011	0.9523						
W20			W013	0.9523						
W21	Linear Add	No	W001	0	No	No	No	No		
Wt1	Linear Add	No	W001	3.61	No	No	No	No		
Wt1			W003	3.61						
Wt1			W005	3.61						
Wt1			W007	3.61						
Wt1			W010	3.61						
Wt1			W014	3.61						
Wt1			W016	0.5						
Wt2	Linear Add	No	W002	3.61	No	No	No	No		
Wt2			W003	3.61						
Wt2			W006	3.61						
Wt2			W007	3.61						
Wt2			W010	3.61						
Wt2			W014	3.61						
Wt2			W016	0.5						
Wt3	Linear Add	No	W002	3.61	No	No	No	No		
Wt3			W004	3.61						
Wt3			W006	3.61						
Wt3			W008	3.61						
Wt3			W010	3.61						
Wt3			W014	3.61						
Wt3			W016	0.5						
Wt4	Linear Add	No	W001	3.61	No	No	No	No		
Wt4			W004	3.61						
Wt4			W005	3.61						
Wt4			W008	3.61						
Wt4			W010	3.61						
Wt4			W014	3.61						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
Wt4			W016	0.5						
Wt5	Linear Add	No	W001	3.61	No	No	No	No		
Wt5			W003	3.61						
Wt5			W005	3.61						
Wt5			W007	3.61						
Wt5			W010	3.61						
Wt5			W015	3.61						
Wt5			W016	0.5						
Wt6	Linear Add	No	W002	3.61	No	No	No	No		
Wt6			W003	3.61						
Wt6			W006	3.61						
Wt6			W007	3.61						
Wt6			W010	3.61						
Wt6			W015	3.61						
Wt6			W016	0.5						
Wt7	Linear Add	No	W002	3.61	No	No	No	No		
Wt7			W004	3.61						
Wt7			W006	3.61						
Wt7			W008	3.61						
Wt7			W010	3.61						
Wt7			W015	3.61						
Wt7			W016	0.5						
Wt8	Linear Add	No	W001	3.61	No	No	No	No		
Wt8			W004	3.61						
Wt8			W005	3.61						
Wt8			W008	3.61						
Wt8			W010	3.61						
Wt8			W015	3.61						
Wt8			W016	0.5						
Wt9	Linear Add	No	W001	3.61	No	No	No	No		
Wt9			W003	3.61						
Wt9			W005	3.61						
Wt9			W007	3.61						
Wt9			W011	3.61						
Wt9			W014	3.61						
Wt9			W016	0.5						
Wt10	Linear Add	No	W002	3.61	No	No	No	No		
Wt10			W003	3.61						
Wt10			W006	3.61						
Wt10			W007	3.61						
Wt10			W011	3.61						
Wt10			W014	3.61						
Wt10			W016	0.5						
Wt11	Linear Add	No	W002	3.61	No	No	No	No		
Wt11			W004	3.61						
Wt11			W006	3.61						
Wt11			W008	3.61						
Wt11			W011	3.61						
Wt11			W014	3.61						
Wt11			W016	0.5						
Wt12	Linear Add	No	W001	3.61	No	No	No	No		
Wt12			W004	3.61						
Wt12			W005	3.61						
Wt12			W008	3.61						
Wt12			W011	3.61						
Wt12			W014	3.61						
Wt12			W016	0.5						
Wt13	Linear Add	No	W001	3.61	No	No	No	No		
Wt13			W003	3.61						
Wt13			W005	3.61						
Wt13			W007	3.61						
Wt13			W011	3.61						
Wt13			W015	3.61						
Wt13			W016	0.5						
Wt14	Linear Add	No	W002	3.61	No	No	No	No		
Wt14			W003	3.61						
Wt14			W006	3.61						
Wt14			W007	3.61						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
Wt14			W011	3.61						
Wt14			W015	3.61						
Wt14			W016	0.5						
Wt15	Linear Add	No	W002	3.61	No	No	No	No		
Wt15			W004	3.61						
Wt15			W006	3.61						
Wt15			W008	3.61						
Wt15			W011	3.61						
Wt15			W015	3.61						
Wt15			W016	0.5						
Wt16	Linear Add	No	W001	3.61	No	No	No	No		
Wt16			W004	3.61						
Wt16			W005	3.61						
Wt16			W008	3.61						
Wt16			W011	3.61						
Wt16			W015	3.61						
Wt16			W016	0.5						
Wt17	Linear Add	No	W009	3.61	No	No	No	No		
Wt17			W010	3.61						
Wt17			W012	3.61						
Wt17			W016	0.5						
Wt18	Linear Add	No	W009	3.61	No	No	No	No		
Wt18			W011	3.61						
Wt18			W012	3.61						
Wt18			W016	0.5						
Wt19	Linear Add	No	W009	3.61	No	No	No	No		
Wt19			W010	3.61						
Wt19			W013	3.61						
Wt19			W016	0.5						
Wt20	Linear Add	No	W009	3.61	No	No	No	No		
Wt20			W011	3.61						
Wt20			W013	3.61						
Wt20			W016	0.5						
Wt21	Linear Add	No	W001	3.61	No	No	No	No		
Wt21			W003	3.61						
Wt21			W005	3.61						
Wt21			W007	3.61						
Wt21			W011	3.61						
Wt21			W014	3.61						
Wt21			W016	0.5						
Wt21			W017	1						
Wt22	Linear Add	No	W002	3.61	No	No	No	No		
Wt22			W003	3.61						
Wt22			W006	3.61						
Wt22			W007	3.61						
Wt22			W011	3.61						
Wt22			W014	3.61						
Wt22			W016	0.5						
Wt22			W019	1						
Wt23	Linear Add	No	W002	3.61	No	No	No	No		
Wt23			W004	3.61						
Wt23			W006	3.61						
Wt23			W008	3.61						
Wt23			W011	3.61						
Wt23			W014	3.61						
Wt23			W016	0.5						
Wt23			W021	1						
Wt24	Linear Add	No	W001	3.61	No	No	No	No		
Wt24			W004	3.61						
Wt24			W005	3.61						
Wt24			W008	3.61						
Wt24			W011	3.61						
Wt24			W014	3.61						
Wt24			W016	0.5						
Wt24			W023	1						
Wt25	Linear Add	No	W001	3.61	No	No	No	No		
Wt25			W003	3.61						
Wt25			W005	3.61						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
Wt25			W007	3.61						
Wt25			W011	3.61						
Wt25			W015	3.61						
Wt25			W016	0.5						
Wt25			W018	1						
Wt26	Linear Add	No	W002	3.61	No	No	No	No		
Wt26			W003	3.61						
Wt26			W006	3.61						
Wt26			W007	3.61						
Wt26			W011	3.61						
Wt26			W015	3.61						
Wt26			W016	0.5						
Wt26			W020	1						
Wt27	Linear Add	No	W002	3.61	No	No	No	No		
Wt27			W004	3.61						
Wt27			W006	3.61						
Wt27			W008	3.61						
Wt27			W011	3.61						
Wt27			W015	3.61						
Wt27			W016	0.5						
Wt27			W022	1						
Wt28	Linear Add	No	W001	3.61	No	No	No	No		
Wt28			W004	3.61						
Wt28			W005	3.61						
Wt28			W008	3.61						
Wt28			W011	3.61						
Wt28			W015	3.61						
Wt28			W016	0.5						
Wt28			W024	1						
Wt29	Linear Add	No	W001	3.61	No	No	No	No		
Wt29			W003	3.61						
Wt29			W005	3.61						
Wt29			W007	3.61						
Wt29			W011	3.61						
Wt29			W014	3.61						
Wt29			W016	0.5						
Wt29			W025	1						
Wt30	Linear Add	No	W002	3.61	No	No	No	No		
Wt30			W003	3.61						
Wt30			W006	3.61						
Wt30			W007	3.61						
Wt30			W011	3.61						
Wt30			W014	3.61						
Wt30			W016	0.5						
Wt30			W027	1						
Wt31	Linear Add	No	W002	3.61	No	No	No	No		
Wt31			W004	3.61						
Wt31			W006	3.61						
Wt31			W008	3.61						
Wt31			W011	3.61						
Wt31			W014	3.61						
Wt31			W016	0.5						
Wt31			W029	1						
Wt32	Linear Add	No	W001	3.61	No	No	No	No		
Wt32			W004	3.61						
Wt32			W005	3.61						
Wt32			W008	3.61						
Wt32			W011	3.61						
Wt32			W014	3.61						
Wt32			W016	0.5						
Wt32			W031	1						
Wt33	Linear Add	No	W001	3.61	No	No	No	No		
Wt33			W003	3.61						
Wt33			W005	3.61						
Wt33			W007	3.61						
Wt33			W011	3.61						
Wt33			W015	3.61						
Wt33			W016	0.5						

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
Wt33			W026	1						
Wt34	Linear Add	No	W002	3.61	No	No	No	No		
Wt34			W003	3.61						
Wt34			W006	3.61						
Wt34			W007	3.61						
Wt34			W011	3.61						
Wt34			W015	3.61						
Wt34			W016	0.5						
Wt34			W028	1						
Wt35	Linear Add	No	W002	3.61	No	No	No	No		
Wt35			W004	3.61						
Wt35			W006	3.61						
Wt35			W008	3.61						
Wt35			W011	3.61						
Wt35			W015	3.61						
Wt35			W016	0.5						
Wt35			W030	1						
Wt36	Linear Add	No	W001	3.61	No	No	No	No		
Wt36			W004	3.61						
Wt36			W005	3.61						
Wt36			W008	3.61						
Wt36			W011	3.61						
Wt36			W015	3.61						
Wt36			W016	0.5						
Wt36			W032	1						
Wt37	Linear Add	No	W001	3.61	No	No	No	No		
Wt37			W003	3.61						
Wt37			W005	3.61						
Wt37			W007	3.61						
Wt37			W011	3.61						
Wt37			W014	3.61						
Wt37			W016	0.5						
Wt37			W033	1						
Wt38	Linear Add	No	W002	3.61	No	No	No	No		
Wt38			W003	3.61						
Wt38			W006	3.61						
Wt38			W007	3.61						
Wt38			W011	3.61						
Wt38			W014	3.61						
Wt38			W016	0.5						
Wt38			W033	1						
Wt39	Linear Add	No	W002	3.61	No	No	No	No		
Wt39			W004	3.61						
Wt39			W006	3.61						
Wt39			W008	3.61						
Wt39			W011	3.61						
Wt39			W014	3.61						
Wt39			W016	0.5						
Wt39			W033	1						
Wt40	Linear Add	No	W001	3.61	No	No	No	No		
Wt40			W004	3.61						
Wt40			W005	3.61						
Wt40			W008	3.61						
Wt40			W011	3.61						
Wt40			W014	3.61						
Wt40			W016	0.5						
Wt40			W033	1						
Wt41	Linear Add	No	W001	3.61	No	No	No	No		
Wt41			W003	3.61						
Wt41			W005	3.61						
Wt41			W007	3.61						
Wt41			W011	3.61						
Wt41			W015	3.61						
Wt41			W016	0.5						
Wt41			W033	1						
Wt42	Linear Add	No	W002	3.61	No	No	No	No		
Wt42			W003	3.61						
Wt42			W006	3.61						

TABLE: Combination Definitions										
ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
Wt42			W007	3.61						
Wt42			W011	3.61						
Wt42			W015	3.61						
Wt42			W016	0.5						
Wt42			W033	1						
Wt43	Linear Add	No	W002	3.61	No	No	No	No		
Wt43			W004	3.61						
Wt43			W006	3.61						
Wt43			W008	3.61						
Wt43			W011	3.61						
Wt43			W015	3.61						
Wt43			W016	0.5						
Wt43			W033	1						
Wt44	Linear Add	No	W001	3.61	No	No	No	No		
Wt44			W004	3.61						
Wt44			W005	3.61						
Wt44			W008	3.61						
Wt44			W011	3.61						
Wt44			W015	3.61						
Wt44			W016	0.5						
Wt44			W033	1						
Wt45	Linear Add	No	W016	1	No	No	No	No		

Crane Live Loads in Model	**Description**
Crane1Live_Vert	Vertical Live Load at Crane 1
Crane2Live_Vert	Vertical Live Load at Crane 2
Crane3Live_Vert	Vertical Live Load at Crane 3
Crane4Live_Vert	Vertical Live Load at Crane 4
Crane5Live_Vert	Vertical Live Load at Crane 5
Crane6Live_Vert	Vertical Live Load at Crane 6
Crane7Live_Vert	Vertical Live Load at Crane 7
Crane8Live_Vert	Vertical Live Load at Crane 8
Crane9Live_Vert	Vertical Live Load at Crane 9
Crane10Live_Vert	Vertical Live Load at Crane 10
Crane1Live_Lat	Lateral Live Load at Crane 1
Crane2Live_Lat	Lateral Live Load at Crane 2
Crane3Live_Lat	Lateral Live Load at Crane 3
Crane4Live_Lat	Lateral Live Load at Crane 4
Crane5Live_Lat	Lateral Live Load at Crane 5
Crane6Live_Lat	Lateral Live Load at Crane 6
Crane7Live_Lat	Lateral Live Load at Crane 7
Crane8Live_Lat	Lateral Live Load at Crane 8
Crane9Live_Lat	Lateral Live Load at Crane 9
Crane10Live_Lat	Lateral Live Load at Crane 10
Crane1Live_Long	Longitudinal Live Load at Crane 1
Crane2Live_Long	Longitudinal Live Load at Crane 2
Crane3Live_Long	Longitudinal Live Load at Crane 3
Crane4Live_Long	Longitudinal Live Load at Crane 4
Crane5Live_Long	Longitudinal Live Load at Crane 5
Crane6Live_Long	Longitudinal Live Load at Crane 6
Crane7Live_Long	Longitudinal Live Load at Crane 7
Crane8Live_Long	Longitudinal Live Load at Crane 8
Crane9Live_Long	Longitudinal Live Load at Crane 9
Crane10Live_Long	Longitudinal Live Load at Crane 10
Crane1Stop	Stopping Load for Crane 1
Crane3Stop	Stopping Load for Crane 3
Crane4Stop	Stopping Load for Crane 4
Crane6Stop	Stopping Load for Crane 6
Crane7Stop	Stopping Load for Crane 7
Crane10Stop	Stopping Load for Crane 10

Secondary Crane Combinations

CraneLive_Vert	Crane1Live_Vert + Crane2Live_Vert + Crane3Live_Vert + Crane4Live_Vert + Crane5Live_Vert + Crane6Live_Vert + Crane7Live_Vert + Crane8Live_Vert + Crane9Live_Vert + Crane10Live_Vert	Set of all vertical components
CraneLive_Lat	Crane1Live_Lat + Crane2Live_Lat + Crane3Live_Lat + Crane4Live_Lat + Crane5Live_Lat + Crane6Live_Lat + Crane7Live_Lat + Crane8Live_Lat + Crane9Live_Lat + Crane10Live_Lat	Set of all lateral components
CraneLive_Long	Crane1Live_Long + Crane2Live_Long + Crane3Live_Long + Crane4Live_Long + Crane5Live_Long + Crane6Live_Long + Crane7Live_Long + Crane8Live_Long + Crane9Live_Long + Crane10Live_Long	Set of all longitudinal components

Terms for main load combinations		Lateral	Longitudinal	Stop
Crane1	CraneLive_Vert + CraneLive_Lat + CraneLive_Long + Crane3Stop + Crane6Stop + Crane7Stop	+	+	3, 6, 7
Crane2	CraneLive_Vert + CraneLive_Lat + (-)CraneLive_Long + Crane1Stop + Crane4Stop + Crane10Stop	+	-	1, 4, 10
Crane3	CraneLive_Vert + (-)CraneLive_Lat + CraneLive_Long + Crane3Stop + Crane6Stop + Crane7Stop	-	+	3, 6, 7
Crane4	CraneLive_Vert + (-)CraneLive_Lat + (-)CraneLive_Long + Crane1Stop + Crane4Stop + Crane10Stop	-	-	1, 4, 10

TABLE: Combination Definitions

ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign	GUID	Notes
Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No	Text	Text
CraneLive_Vert	Linear Add	No	Crane1Live_Vert	1	No	No	No	No		
CraneLive_Vert			Crane2Live_Vert	1						
CraneLive_Vert			Crane3Live_Vert	1						
CraneLive_Vert			Crane4Live_Vert	1						
CraneLive_Vert			Crane5Live_Vert	1						
CraneLive_Vert			Crane6Live_Vert	1						
CraneLive_Vert			Crane7Live_Vert	1						
CraneLive_Vert			Crane8Live_Vert	1						
CraneLive_Vert			Crane9Live_Vert	1						
CraneLive_Vert			Crane10Live_Vert	1						
CraneLive_Lat	Linear Add	No	Crane1Live_Lat	1	No	No	No	No		
CraneLive_Lat			Crane2Live_Lat	1						
CraneLive_Lat			Crane3Live_Lat	1						
CraneLive_Lat			Crane4Live_Lat	1						
CraneLive_Lat			Crane5Live_Lat	1						
CraneLive_Lat			Crane6Live_Lat	1						
CraneLive_Lat			Crane7Live_Lat	1						
CraneLive_Lat			Crane8Live_Lat	1						
CraneLive_Lat			Crane9Live_Lat	1						
CraneLive_Lat			Crane10Live_Lat	1						
CraneLive_Long	Linear Add	No	Crane1Live_Long	1	No	No	No	No		
CraneLive_Long			Crane2Live_Long	1						
CraneLive_Long			Crane3Live_Long	1						
CraneLive_Long			Crane4Live_Long	1						
CraneLive_Long			Crane5Live_Long	1						
CraneLive_Long			Crane6Live_Long	1						
CraneLive_Long			Crane7Live_Long	1						
CraneLive_Long			Crane8Live_Long	1						
CraneLive_Long			Crane9Live_Long	1						
CraneLive_Long			Crane10Live_Long	1						
Crane1	Linear Add	No	CraneLive_Vert	1	No	No	No	No		
Crane1			CraneLive_Lat	1						
Crane1			CraneLive_Long	1						
Crane1			Crane3Stop	1						
Crane1			Crane6Stop	1						
Crane1			Crane7Stop	1						
Crane2	Linear Add	No	CraneLive_Vert	1	No	No	No	No		
Crane2			CraneLive_Lat	1						
Crane2			CraneLive_Long	-1						
Crane2			Crane1Stop	1						
Crane2			Crane7Stop	1						
Crane2			Crane10Stop	1						
Crane3	Linear Add	No	CraneLive_Vert	1	No	No	No	No		
Crane3			CraneLive_Lat	-1						
Crane3			CraneLive_Long	1						
Crane3			Crane3Stop	1						
Crane3			Crane6Stop	1						
Crane3			Crane7Stop	1						
Crane4	Linear Add	No	CraneLive_Vert	1	No	No	No	No		
Crane4			CraneLive_Lat	-1						
Crane4			CraneLive_Long	-1						
Crane4			Crane1Stop	1						
Crane4			Crane7Stop	1						
Crane4			Crane10Stop	1						

J. 7 Load Combinations and Factors for Seismic Permutations

Combination 1: 1.0D + 1.0F + 0.8L + 1.0Ccr + 1.0H + 1.0H' + 1.0E (Elastic Soil)

Dead Load (D)	Factor
D	1

Live Load (L)	Factor
L	0.8

Crane Live (Ccr)*	Factor
Crane1	1

At Rest Static Soil (H)	Factor
H.rest	1

Fluid Load (F)	Factor
F.stat	1

Static Surcharge			Dynamic Soil (H'_x)			Dynamic Soil (H'_y)		
(H_x)	(H_y)	Factor	Dynamic Soil	Dynamic Surcharge	Factor	Dynamic Soil	Dynamic Surcharge	Factor
H.sur.+X	H.sur.+Y	1	H.dyn.+X_e	H.dyn.sur.+X	1	H.dyn.+Y_e	H.dyn.sur.+Y	0.4
H.sur.+X	H.sur.+Y	1	H.dyn.+X_e	H.dyn.sur.+X	1	H.dyn.+Y_e	H.dyn.sur.+Y	0.4
H.sur.+X	H.sur.-Y	1	H.dyn.+X_e	H.dyn.sur.+X	1	H.dyn.-Y_e	H.dyn.sur.-Y	0.4
H.sur.+X	H.sur.-Y	1	H.dyn.+X_e	H.dyn.sur.+X	1	H.dyn.-Y_e	H.dyn.sur.-Y	0.4
H.sur.-X	H.sur.+Y	1	H.dyn.-X_e	H.dyn.sur.-X	1	H.dyn.+Y_e	H.dyn.sur.+Y	0.4
H.sur.-X	H.sur.+Y	1	H.dyn.-X_e	H.dyn.sur.-X	1	H.dyn.+Y_e	H.dyn.sur.+Y	0.4
H.sur.-X	H.sur.-Y	1	H.dyn.-X_e	H.dyn.sur.-X	1	H.dyn.-Y_e	H.dyn.sur.-Y	0.4
H.sur.-X	H.sur.-Y	1	H.dyn.-X_e	H.dyn.sur.-X	1	H.dyn.-Y_e	H.dyn.sur.-Y	0.4
H.sur.+X	H.sur.+Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	1
H.sur.+X	H.sur.+Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	1
H.sur.+X	H.sur.-Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	1
H.sur.+X	H.sur.-Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	1
H.sur.-X	H.sur.+Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	1
H.sur.-X	H.sur.+Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	1
H.sur.-X	H.sur.-Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	1
H.sur.-X	H.sur.-Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	1
H.sur.+X	H.sur.+Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	0.4
H.sur.+X	H.sur.+Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	0.4
H.sur.+X	H.sur.-Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	0.4
H.sur.+X	H.sur.-Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	0.4
H.sur.-X	H.sur.+Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	0.4
H.sur.-X	H.sur.+Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	0.4
H.sur.-X	H.sur.-Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	0.4
H.sur.-X	H.sur.-Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	0.4

Seismic (E) - Using the 100/40/40 Method								
Xx	Xy	Xz	Yx	Yy	Yz	Zx	Zy	Zz
1	0.4	0.4	1	0.4	0.4	1	0.4	0.4
1	0.4	0.4	1	0.4	0.4	-1	-0.4	-0.4
1	0.4	0.4	-1	-0.4	-0.4	1	0.4	0.4
1	0.4	0.4	-1	-0.4	-0.4	-1	-0.4	-0.4
-1	-0.4	-0.4	1	0.4	0.4	1	0.4	0.4
-1	-0.4	-0.4	1	0.4	0.4	-1	-0.4	-0.4
-1	-0.4	-0.4	-1	-0.4	-0.4	1	0.4	0.4
-1	-0.4	-0.4	-1	-0.4	-0.4	-1	-0.4	-0.4
0.4	1	0.4	0.4	1	0.4	0.4	1	0.4
0.4	1	0.4	0.4	1	0.4	-0.4	-1	-0.4
0.4	1	0.4	-0.4	-1	-0.4	0.4	1	0.4
0.4	1	0.4	-0.4	-1	-0.4	-0.4	-1	-0.4
-0.4	-1	-0.4	0.4	1	0.4	0.4	1	0.4
-0.4	-1	-0.4	0.4	1	0.4	-0.4	-1	-0.4
-0.4	-1	-0.4	-0.4	-1	-0.4	0.4	1	0.4
-0.4	-1	-0.4	-0.4	-1	-0.4	-0.4	-1	-0.4
0.4	0.4	1	0.4	0.4	1	0.4	0.4	1
0.4	0.4	1	0.4	0.4	1	-0.4	-0.4	-1
0.4	0.4	1	-0.4	-0.4	-1	0.4	0.4	1
0.4	0.4	1	-0.4	-0.4	-1	-0.4	-0.4	-1
-0.4	-0.4	-1	0.4	0.4	1	0.4	0.4	1
-0.4	-0.4	-1	0.4	0.4	1	-0.4	-0.4	-1
-0.4	-0.4	-1	-0.4	-0.4	-1	0.4	0.4	1
-0.4	-0.4	-1	-0.4	-0.4	-1	-0.4	-0.4	-1

Seismic Accidental Eccentricity	Factor
AE	1
AE	-1

*Note: Crane2, Crane3, and Crane4 are each substituted into this combination when generating the SAP2000 input to create a full set of permutations that covers all four crane secondary combinations.

Combination 3: 0.9D + 0.0F + 0.0L + 0.0Ccr + 1.0H + 1.0H' + 1.0E (Elastic Soil)

Dead Load (D)	Factor
D	0.9

Live Load (L)	Factor
L	0

Crane Live Load (Ccr)	Factor
Ccr	0

At Rest Static Soil (H)	Factor
H.rest	1

Fluid Load (F)	Factor
F.stat	0

Static Surcharge			Dynamic Soil (H'_x)			Dynamic Soil (H'_y)			Seismic (E) - Using the 100/40/40 Method								
(H_x)	(H_y)	Factor	Dynamic Soil	Dynamic Surcharge	Factor	Dynamic Soil	Dynamic Surcharge	Factor	Xx	Xy	Xz	Yx	Yy	Yz	Zx	Zy	Zz
H.sur.+X	H.sur.+Y	1	H.dyn.+X_e	H.dyn.sur.+X	1	H.dyn.+Y_e	H.dyn.sur.+Y	0.4	1	0.4	0.4	1	0.4	0.4	1	0.4	0.4
H.sur.+X	H.sur.+Y	1	H.dyn.+X_e	H.dyn.sur.+X	1	H.dyn.+Y_e	H.dyn.sur.+Y	0.4	1	0.4	0.4	1	0.4	0.4	-1	-0.4	-0.4
H.sur.+X	H.sur.-Y	1	H.dyn.+X_e	H.dyn.sur.+X	1	H.dyn.-Y_e	H.dyn.sur.-Y	0.4	1	0.4	0.4	-1	-0.4	-0.4	1	0.4	0.4
H.sur.+X	H.sur.-Y	1	H.dyn.+X_e	H.dyn.sur.+X	1	H.dyn.-Y_e	H.dyn.sur.-Y	0.4	1	0.4	0.4	-1	-0.4	-0.4	-1	-0.4	-0.4
H.sur.-X	H.sur.+Y	1	H.dyn.-X_e	H.dyn.sur.-X	1	H.dyn.+Y_e	H.dyn.sur.+Y	0.4	-1	-0.4	-0.4	1	0.4	0.4	1	0.4	0.4
H.sur.-X	H.sur.+Y	1	H.dyn.-X_e	H.dyn.sur.-X	1	H.dyn.+Y_e	H.dyn.sur.+Y	0.4	-1	-0.4	-0.4	1	0.4	0.4	-1	-0.4	-0.4
H.sur.-X	H.sur.-Y	1	H.dyn.-X_e	H.dyn.sur.-X	1	H.dyn.-Y_e	H.dyn.sur.-Y	0.4	-1	-0.4	-0.4	-1	-0.4	-0.4	1	0.4	0.4
H.sur.-X	H.sur.-Y	1	H.dyn.-X_e	H.dyn.sur.-X	1	H.dyn.-Y_e	H.dyn.sur.-Y	0.4	-1	-0.4	-0.4	-1	-0.4	-0.4	-1	-0.4	-0.4
H.sur.+X	H.sur.+Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	1	0.4	1	0.4	0.4	1	0.4	0.4	1	0.4
H.sur.+X	H.sur.+Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	1	0.4	1	0.4	0.4	1	0.4	-0.4	-1	-0.4
H.sur.+X	H.sur.-Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	1	0.4	1	0.4	-0.4	-1	-0.4	0.4	1	0.4
H.sur.+X	H.sur.-Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	1	0.4	1	0.4	-0.4	-1	-0.4	-0.4	-1	-0.4
H.sur.-X	H.sur.+Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	1	-0.4	-1	-0.4	0.4	1	0.4	0.4	1	0.4
H.sur.-X	H.sur.+Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	1	-0.4	-1	-0.4	0.4	1	0.4	-0.4	-1	-0.4
H.sur.-X	H.sur.-Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	1	-0.4	-1	-0.4	-0.4	-1	-0.4	0.4	1	0.4
H.sur.-X	H.sur.-Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	1	-0.4	-1	-0.4	-0.4	-1	-0.4	-0.4	-1	-0.4
H.sur.+X	H.sur.+Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	0.4	0.4	0.4	1	0.4	0.4	1	0.4	0.4	1
H.sur.+X	H.sur.+Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	0.4	0.4	0.4	1	0.4	0.4	1	-0.4	-0.4	-1
H.sur.+X	H.sur.-Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	0.4	0.4	0.4	1	-0.4	-0.4	-1	0.4	0.4	1
H.sur.+X	H.sur.-Y	1	H.dyn.+X_e	H.dyn.sur.+X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	0.4	0.4	0.4	1	-0.4	-0.4	-1	-0.4	-0.4	-1
H.sur.-X	H.sur.+Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	0.4	-0.4	-0.4	-1	0.4	0.4	1	0.4	0.4	1
H.sur.-X	H.sur.+Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.+Y_e	H.dyn.sur.+Y	0.4	-0.4	-0.4	-1	0.4	0.4	1	-0.4	-0.4	-1
H.sur.-X	H.sur.-Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	0.4	-0.4	-0.4	-1	-0.4	-0.4	-1	0.4	0.4	1
H.sur.-X	H.sur.-Y	1	H.dyn.-X_e	H.dyn.sur.-X	0.4	H.dyn.-Y_e	H.dyn.sur.-Y	0.4	-0.4	-0.4	-1	-0.4	-0.4	-1	-0.4	-0.4	-1

Seismic Accidental Eccentricity	Factor
AE	1
AE	-1

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4	1001	Linear Add	No	D	1	No	No	No	No
5	1001			L	0.8				
6	1001			Crane1	1				
7	1001			H.rest	1				
8	1001			F.stat	1				
9	1001			H.sur.+X	1				
10	1001			H.sur.+Y	1				
11	1001			H.dyn.+X_e	1				
12	1001			H.dyn.+Y_e	0.4				
13	1001			H.dyn.sur.+X	1				
14	1001			H.dyn.sur.+Y	0.4				
15	1001			Xx	1				
16	1001			Xy	0.4				
17	1001			Xz	0.4				
18	1001			Yx	1				
19	1001			Yy	0.4				
20	1001			Yz	0.4				
21	1001			Zx	1				
22	1001			Zy	0.4				
23	1001			Zz	0.4				
24	1001			AE	1				
25	1002	Linear Add	No	D	1	No	No	No	No
26	1002			L	0.8				
27	1002			Crane1	1				
28	1002			H.rest	1				
29	1002			F.stat	1				
30	1002			H.sur.+X	1				
31	1002			H.sur.+Y	1				
32	1002			H.dyn.+X_e	1				
33	1002			H.dyn.+Y_e	0.4				
34	1002			H.dyn.sur.+X	1				
35	1002			H.dyn.sur.+Y	0.4				
36	1002			Xx	1				
37	1002			Xy	0.4				
38	1002			Xz	0.4				
39	1002			Yx	1				
40	1002			Yy	0.4				
41	1002			Yz	0.4				
42	1002			Zx	-1				
43	1002			Zy	-0.4				
44	1002			Zz	-0.4				
45	1002			AE	1				
46	1003	Linear Add	No	D	1	No	No	No	No
47	1003			L	0.8				
48	1003			Crane1	1				
49	1003			H.rest	1				
50	1003			F.stat	1				
51	1003			H.sur.+X	1				
52	1003			H.sur.-Y	1				
53	1003			H.dyn.+X_e	1				
54	1003			H.dyn.-Y_e	0.4				
55	1003			H.dyn.sur.+X	1				
56	1003			H.dyn.sur.-Y	0.4				
57	1003			Xx	1				
58	1003			Xy	0.4				
59	1003			Xz	0.4				
60	1003			Yx	-1				
61	1003			Yy	-0.4				
62	1003			Yz	-0.4				
63	1003			Zx	1				
64	1003			Zy	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
65	1003			Zz	0.4				
66	1003			AE	1				
67	1004	Linear Add	No	D	1	No	No	No	No
68	1004			L	0.8				
69	1004			Crane1	1				
70	1004			H.rest	1				
71	1004			F.stat	1				
72	1004			H.sur.+X	1				
73	1004			H.sur.-Y	1				
74	1004			H.dyn.+X_e	1				
75	1004			H.dyn.-Y_e	0.4				
76	1004			H.dyn.sur.+X	1				
77	1004			H.dyn.sur.-Y	0.4				
78	1004			Xx	1				
79	1004			Xy	0.4				
80	1004			Xz	0.4				
81	1004			Yx	-1				
82	1004			Yy	-0.4				
83	1004			Yz	-0.4				
84	1004			Zx	-1				
85	1004			Zy	-0.4				
86	1004			Zz	-0.4				
87	1004			AE	1				
88	1005	Linear Add	No	D	1	No	No	No	No
89	1005			L	0.8				
90	1005			Crane1	1				
91	1005			H.rest	1				
92	1005			F.stat	1				
93	1005			H.sur.-X	1				
94	1005			H.sur.+Y	1				
95	1005			H.dyn.-X_e	1				
96	1005			H.dyn.+Y_e	0.4				
97	1005			H.dyn.sur.-X	1				
98	1005			H.dyn.sur.+Y	0.4				
99	1005			Xx	-1				
100	1005			Xy	-0.4				
101	1005			Xz	-0.4				
102	1005			Yx	1				
103	1005			Yy	0.4				
104	1005			Yz	0.4				
105	1005			Zx	1				
106	1005			Zy	0.4				
107	1005			Zz	0.4				
108	1005			AE	1				
109	1006	Linear Add	No	D	1	No	No	No	No
110	1006			L	0.8				
111	1006			Crane1	1				
112	1006			H.rest	1				
113	1006			F.stat	1				
114	1006			H.sur.-X	1				
115	1006			H.sur.+Y	1				
116	1006			H.dyn.-X_e	1				
117	1006			H.dyn.+Y_e	0.4				
118	1006			H.dyn.sur.-X	1				
119	1006			H.dyn.sur.+Y	0.4				
120	1006			Xx	-1				
121	1006			Xy	-0.4				
122	1006			Xz	-0.4				
123	1006			Yx	1				
124	1006			Yy	0.4				
125	1006			Yz	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
126	1006			Zx	-1				
127	1006			Zy	-0.4				
128	1006			Zz	-0.4				
129	1006			AE	1				
130	1007	Linear Add	No	D	1	No	No	No	No
131	1007			L	0.8				
132	1007			Crane1	1				
133	1007			H.rest	1				
134	1007			F.stat	1				
135	1007			H.sur.-X	1				
136	1007			H.sur.-Y	1				
137	1007			H.dyn.-X_e	1				
138	1007			H.dyn.-Y_e	0.4				
139	1007			H.dyn.sur.-X	1				
140	1007			H.dyn.sur.-Y	0.4				
141	1007			Xx	-1				
142	1007			Xy	-0.4				
143	1007			Xz	-0.4				
144	1007			Yx	-1				
145	1007			Yy	-0.4				
146	1007			Yz	-0.4				
147	1007			Zx	1				
148	1007			Zy	0.4				
149	1007			Zz	0.4				
150	1007			AE	1				
151	1008	Linear Add	No	D	1	No	No	No	No
152	1008			L	0.8				
153	1008			Crane1	1				
154	1008			H.rest	1				
155	1008			F.stat	1				
156	1008			H.sur.-X	1				
157	1008			H.sur.-Y	1				
158	1008			H.dyn.-X_e	1				
159	1008			H.dyn.-Y_e	0.4				
160	1008			H.dyn.sur.-X	1				
161	1008			H.dyn.sur.-Y	0.4				
162	1008			Xx	-1				
163	1008			Xy	-0.4				
164	1008			Xz	-0.4				
165	1008			Yx	-1				
166	1008			Yy	-0.4				
167	1008			Yz	-0.4				
168	1008			Zx	-1				
169	1008			Zy	-0.4				
170	1008			Zz	-0.4				
171	1008			AE	1				
172	1009	Linear Add	No	D	1	No	No	No	No
173	1009			L	0.8				
174	1009			Crane1	1				
175	1009			H.rest	1				
176	1009			F.stat	1				
177	1009			H.sur.+X	1				
178	1009			H.sur.+Y	1				
179	1009			H.dyn.+X_e	0.4				
180	1009			H.dyn.+Y_e	1				
181	1009			H.dyn.sur.+X	0.4				
182	1009			H.dyn.sur.+Y	1				
183	1009			Xx	0.4				
184	1009			Xy	1				
185	1009			Xz	0.4				
186	1009			Yx	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
187	1009			Yy	1				
188	1009			Yz	0.4				
189	1009			Zx	0.4				
190	1009			Zy	1				
191	1009			Zz	0.4				
192	1009			AE	1				
193	1010	Linear Add	No	D	1	No	No	No	No
194	1010			L	0.8				
195	1010			Crane1	1				
196	1010			H.rest	1				
197	1010			F.stat	1				
198	1010			H.sur.+X	1				
199	1010			H.sur.+Y	1				
200	1010			H.dyn.+X_e	0.4				
201	1010			H.dyn.+Y_e	1				
202	1010			H.dyn.sur.+X	0.4				
203	1010			H.dyn.sur.+Y	1				
204	1010			Xx	0.4				
205	1010			Xy	1				
206	1010			Xz	0.4				
207	1010			Yx	0.4				
208	1010			Yy	1				
209	1010			Yz	0.4				
210	1010			Zx	-0.4				
211	1010			Zy	-1				
212	1010			Zz	-0.4				
213	1010			AE	1				
214	1011	Linear Add	No	D	1	No	No	No	No
215	1011			L	0.8				
216	1011			Crane1	1				
217	1011			H.rest	1				
218	1011			F.stat	1				
219	1011			H.sur.+X	1				
220	1011			H.sur.-Y	1				
221	1011			H.dyn.+X_e	0.4				
222	1011			H.dyn.-Y_e	1				
223	1011			H.dyn.sur.+X	0.4				
224	1011			H.dyn.sur.-Y	1				
225	1011			Xx	0.4				
226	1011			Xy	1				
227	1011			Xz	0.4				
228	1011			Yx	-0.4				
229	1011			Yy	-1				
230	1011			Yz	-0.4				
231	1011			Zx	0.4				
232	1011			Zy	1				
233	1011			Zz	0.4				
234	1011			AE	1				
235	1012	Linear Add	No	D	1	No	No	No	No
236	1012			L	0.8				
237	1012			Crane1	1				
238	1012			H.rest	1				
239	1012			F.stat	1				
240	1012			H.sur.+X	1				
241	1012			H.sur.-Y	1				
242	1012			H.dyn.+X_e	0.4				
243	1012			H.dyn.-Y_e	1				
244	1012			H.dyn.sur.+X	0.4				
245	1012			H.dyn.sur.-Y	1				
246	1012			Xx	0.4				
247	1012			Xy	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
248	1012			Xz	0.4				
249	1012			Yx	-0.4				
250	1012			Yy	-1				
251	1012			Yz	-0.4				
252	1012			Zx	-0.4				
253	1012			Zy	-1				
254	1012			Zz	-0.4				
255	1012			AE	1				
256	1013	Linear Add	No	D	1	No	No	No	No
257	1013			L	0.8				
258	1013			Crane1	1				
259	1013			H.rest	1				
260	1013			F.stat	1				
261	1013			H.sur.-X	1				
262	1013			H.sur.+Y	1				
263	1013			H.dyn.-X_e	0.4				
264	1013			H.dyn.+Y_e	1				
265	1013			H.dyn.sur.-X	0.4				
266	1013			H.dyn.sur.+Y	1				
267	1013			Xx	-0.4				
268	1013			Xy	-1				
269	1013			Xz	-0.4				
270	1013			Yx	0.4				
271	1013			Yy	1				
272	1013			Yz	0.4				
273	1013			Zx	0.4				
274	1013			Zy	1				
275	1013			Zz	0.4				
276	1013			AE	1				
277	1014	Linear Add	No	D	1	No	No	No	No
278	1014			L	0.8				
279	1014			Crane1	1				
280	1014			H.rest	1				
281	1014			F.stat	1				
282	1014			H.sur.-X	1				
283	1014			H.sur.+Y	1				
284	1014			H.dyn.-X_e	0.4				
285	1014			H.dyn.+Y_e	1				
286	1014			H.dyn.sur.-X	0.4				
287	1014			H.dyn.sur.+Y	1				
288	1014			Xx	-0.4				
289	1014			Xy	-1				
290	1014			Xz	-0.4				
291	1014			Yx	0.4				
292	1014			Yy	1				
293	1014			Yz	0.4				
294	1014			Zx	-0.4				
295	1014			Zy	-1				
296	1014			Zz	-0.4				
297	1014			AE	1				
298	1015	Linear Add	No	D	1	No	No	No	No
299	1015			L	0.8				
300	1015			Crane1	1				
301	1015			H.rest	1				
302	1015			F.stat	1				
303	1015			H.sur.-X	1				
304	1015			H.sur.-Y	1				
305	1015			H.dyn.-X_e	0.4				
306	1015			H.dyn.-Y_e	1				
307	1015			H.dyn.sur.-X	0.4				
308	1015			H.dyn.sur.-Y	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
309	1015			Xx	-0.4				
310	1015			Xy	-1				
311	1015			Xz	-0.4				
312	1015			Yx	-0.4				
313	1015			Yy	-1				
314	1015			Yz	-0.4				
315	1015			Zx	0.4				
316	1015			Zy	1				
317	1015			Zz	0.4				
318	1015			AE	1				
319	1016	Linear Add	No	D	1	No	No	No	No
320	1016			L	0.8				
321	1016			Crane1	1				
322	1016			H.rest	1				
323	1016			F.stat	1				
324	1016			H.sur.-X	1				
325	1016			H.sur.-Y	1				
326	1016			H.dyn.-X_e	0.4				
327	1016			H.dyn.-Y_e	1				
328	1016			H.dyn.sur.-X	0.4				
329	1016			H.dyn.sur.-Y	1				
330	1016			Xx	-0.4				
331	1016			Xy	-1				
332	1016			Xz	-0.4				
333	1016			Yx	-0.4				
334	1016			Yy	-1				
335	1016			Yz	-0.4				
336	1016			Zx	-0.4				
337	1016			Zy	-1				
338	1016			Zz	-0.4				
339	1016			AE	1				
340	1017	Linear Add	No	D	1	No	No	No	No
341	1017			L	0.8				
342	1017			Crane1	1				
343	1017			H.rest	1				
344	1017			F.stat	1				
345	1017			H.sur.+X	1				
346	1017			H.sur.+Y	1				
347	1017			H.dyn.+X_e	0.4				
348	1017			H.dyn.+Y_e	0.4				
349	1017			H.dyn.sur.+X	0.4				
350	1017			H.dyn.sur.+Y	0.4				
351	1017			Xx	0.4				
352	1017			Xy	0.4				
353	1017			Xz	1				
354	1017			Yx	0.4				
355	1017			Yy	0.4				
356	1017			Yz	1				
357	1017			Zx	0.4				
358	1017			Zy	0.4				
359	1017			Zz	1				
360	1017			AE	1				
361	1018	Linear Add	No	D	1	No	No	No	No
362	1018			L	0.8				
363	1018			Crane1	1				
364	1018			H.rest	1				
365	1018			F.stat	1				
366	1018			H.sur.+X	1				
367	1018			H.sur.+Y	1				
368	1018			H.dyn.+X_e	0.4				
369	1018			H.dyn.+Y_e	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
370	1018			H.dyn.sur.+X	0.4				
371	1018			H.dyn.sur.+Y	0.4				
372	1018			Xx	0.4				
373	1018			Xy	0.4				
374	1018			Xz	1				
375	1018			Yx	0.4				
376	1018			Yy	0.4				
377	1018			Yz	1				
378	1018			Zx	-0.4				
379	1018			Zy	-0.4				
380	1018			Zz	-1				
381	1018			AE	1				
382	1019	Linear Add	No	D	1	No	No	No	No
383	1019			L	0.8				
384	1019			Crane1	1				
385	1019			H.rest	1				
386	1019			F.stat	1				
387	1019			H.sur.+X	1				
388	1019			H.sur.-Y	1				
389	1019			H.dyn.+X_e	0.4				
390	1019			H.dyn.-Y_e	0.4				
391	1019			H.dyn.sur.+X	0.4				
392	1019			H.dyn.sur.-Y	0.4				
393	1019			Xx	0.4				
394	1019			Xy	0.4				
395	1019			Xz	1				
396	1019			Yx	-0.4				
397	1019			Yy	-0.4				
398	1019			Yz	-1				
399	1019			Zx	0.4				
400	1019			Zy	0.4				
401	1019			Zz	1				
402	1019			AE	1				
403	1020	Linear Add	No	D	1	No	No	No	No
404	1020			L	0.8				
405	1020			Crane1	1				
406	1020			H.rest	1				
407	1020			F.stat	1				
408	1020			H.sur.+X	1				
409	1020			H.sur.-Y	1				
410	1020			H.dyn.+X_e	0.4				
411	1020			H.dyn.-Y_e	0.4				
412	1020			H.dyn.sur.+X	0.4				
413	1020			H.dyn.sur.-Y	0.4				
414	1020			Xx	0.4				
415	1020			Xy	0.4				
416	1020			Xz	1				
417	1020			Yx	-0.4				
418	1020			Yy	-0.4				
419	1020			Yz	-1				
420	1020			Zx	-0.4				
421	1020			Zy	-0.4				
422	1020			Zz	-1				
423	1020			AE	1				
424	1021	Linear Add	No	D	1	No	No	No	No
425	1021			L	0.8				
426	1021			Crane1	1				
427	1021			H.rest	1				
428	1021			F.stat	1				
429	1021			H.sur.-X	1				
430	1021			H.sur.+Y	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
431	1021			H.dyn.-X_e	0.4				
432	1021			H.dyn.+Y_e	0.4				
433	1021			H.dyn.sur.-X	0.4				
434	1021			H.dyn.sur.+Y	0.4				
435	1021			Xx	-0.4				
436	1021			Xy	-0.4				
437	1021			Xz	-1				
438	1021			Yx	0.4				
439	1021			Yy	0.4				
440	1021			Yz	1				
441	1021			Zx	0.4				
442	1021			Zy	0.4				
443	1021			Zz	1				
444	1021			AE	1				
445	1022	Linear Add	No	D	1	No	No	No	No
446	1022			L	0.8				
447	1022			Crane1	1				
448	1022			H.rest	1				
449	1022			F.stat	1				
450	1022			H.sur.-X	1				
451	1022			H.sur.+Y	1				
452	1022			H.dyn.-X_e	0.4				
453	1022			H.dyn.+Y_e	0.4				
454	1022			H.dyn.sur.-X	0.4				
455	1022			H.dyn.sur.+Y	0.4				
456	1022			Xx	-0.4				
457	1022			Xy	-0.4				
458	1022			Xz	-1				
459	1022			Yx	0.4				
460	1022			Yy	0.4				
461	1022			Yz	1				
462	1022			Zx	-0.4				
463	1022			Zy	-0.4				
464	1022			Zz	-1				
465	1022			AE	1				
466	1023	Linear Add	No	D	1	No	No	No	No
467	1023			L	0.8				
468	1023			Crane1	1				
469	1023			H.rest	1				
470	1023			F.stat	1				
471	1023			H.sur.-X	1				
472	1023			H.sur.-Y	1				
473	1023			H.dyn.-X_e	0.4				
474	1023			H.dyn.-Y_e	0.4				
475	1023			H.dyn.sur.-X	0.4				
476	1023			H.dyn.sur.-Y	0.4				
477	1023			Xx	-0.4				
478	1023			Xy	-0.4				
479	1023			Xz	-1				
480	1023			Yx	-0.4				
481	1023			Yy	-0.4				
482	1023			Yz	-1				
483	1023			Zx	0.4				
484	1023			Zy	0.4				
485	1023			Zz	1				
486	1023			AE	1				
487	1024	Linear Add	No	D	1	No	No	No	No
488	1024			L	0.8				
489	1024			Crane1	1				
490	1024			H.rest	1				
491	1024			F.stat	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
492	1024			H.sur.-X	1				
493	1024			H.sur.-Y	1				
494	1024			H.dyn.-X_e	0.4				
495	1024			H.dyn.-Y_e	0.4				
496	1024			H.dyn.sur.-X	0.4				
497	1024			H.dyn.sur.-Y	0.4				
498	1024			Xx	-0.4				
499	1024			Xy	-0.4				
500	1024			Xz	-1				
501	1024			Yx	-0.4				
502	1024			Yy	-0.4				
503	1024			Yz	-1				
504	1024			Zx	-0.4				
505	1024			Zy	-0.4				
506	1024			Zz	-1				
507	1024			AE	1				
508	1025	Linear Add	No	D	1	No	No	No	No
509	1025			L	0.8				
510	1025			Crane1	1				
511	1025			H.rest	1				
512	1025			F.stat	1				
513	1025			H.sur.+X	1				
514	1025			H.sur.+Y	1				
515	1025			H.dyn.+X_e	1				
516	1025			H.dyn.+Y_e	0.4				
517	1025			H.dyn.sur.+X	1				
518	1025			H.dyn.sur.+Y	0.4				
519	1025			Xx	1				
520	1025			Xy	0.4				
521	1025			Xz	0.4				
522	1025			Yx	1				
523	1025			Yy	0.4				
524	1025			Yz	0.4				
525	1025			Zx	1				
526	1025			Zy	0.4				
527	1025			Zz	0.4				
528	1025			AE	-1				
529	1026	Linear Add	No	D	1	No	No	No	No
530	1026			L	0.8				
531	1026			Crane1	1				
532	1026			H.rest	1				
533	1026			F.stat	1				
534	1026			H.sur.+X	1				
535	1026			H.sur.+Y	1				
536	1026			H.dyn.+X_e	1				
537	1026			H.dyn.+Y_e	0.4				
538	1026			H.dyn.sur.+X	1				
539	1026			H.dyn.sur.+Y	0.4				
540	1026			Xx	1				
541	1026			Xy	0.4				
542	1026			Xz	0.4				
543	1026			Yx	1				
544	1026			Yy	0.4				
545	1026			Yz	0.4				
546	1026			Zx	-1				
547	1026			Zy	-0.4				
548	1026			Zz	-0.4				
549	1026			AE	-1				
550	1027	Linear Add	No	D	1	No	No	No	No
551	1027			L	0.8				
552	1027			Crane1	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
553	1027			H.rest	1				
554	1027			F.stat	1				
555	1027			H.sur.+X	1				
556	1027			H.sur.-Y	1				
557	1027			H.dyn.+X_e	1				
558	1027			H.dyn.-Y_e	0.4				
559	1027			H.dyn.sur.+X	1				
560	1027			H.dyn.sur.-Y	0.4				
561	1027			Xx	1				
562	1027			Xy	0.4				
563	1027			Xz	0.4				
564	1027			Yx	-1				
565	1027			Yy	-0.4				
566	1027			Yz	-0.4				
567	1027			Zx	1				
568	1027			Zy	0.4				
569	1027			Zz	0.4				
570	1027			AE	-1				
571	1028	Linear Add	No	D	1	No	No	No	No
572	1028			L	0.8				
573	1028			Crane1	1				
574	1028			H.rest	1				
575	1028			F.stat	1				
576	1028			H.sur.+X	1				
577	1028			H.sur.-Y	1				
578	1028			H.dyn.+X_e	1				
579	1028			H.dyn.-Y_e	0.4				
580	1028			H.dyn.sur.+X	1				
581	1028			H.dyn.sur.-Y	0.4				
582	1028			Xx	1				
583	1028			Xy	0.4				
584	1028			Xz	0.4				
585	1028			Yx	-1				
586	1028			Yy	-0.4				
587	1028			Yz	-0.4				
588	1028			Zx	-1				
589	1028			Zy	-0.4				
590	1028			Zz	-0.4				
591	1028			AE	-1				
592	1029	Linear Add	No	D	1	No	No	No	No
593	1029			L	0.8				
594	1029			Crane1	1				
595	1029			H.rest	1				
596	1029			F.stat	1				
597	1029			H.sur.-X	1				
598	1029			H.sur.+Y	1				
599	1029			H.dyn.-X_e	1				
600	1029			H.dyn.+Y_e	0.4				
601	1029			H.dyn.sur.-X	1				
602	1029			H.dyn.sur.+Y	0.4				
603	1029			Xx	-1				
604	1029			Xy	-0.4				
605	1029			Xz	-0.4				
606	1029			Yx	1				
607	1029			Yy	0.4				
608	1029			Yz	0.4				
609	1029			Zx	1				
610	1029			Zy	0.4				
611	1029			Zz	0.4				
612	1029			AE	-1				
613	1030	Linear Add	No	D	1	No	No	No	No

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
614	1030			L	0.8				
615	1030			Crane1	1				
616	1030			H.rest	1				
617	1030			F.stat	1				
618	1030			H.sur.-X	1				
619	1030			H.sur.+Y	1				
620	1030			H.dyn.-X_e	1				
621	1030			H.dyn.+Y_e	0.4				
622	1030			H.dyn.sur.-X	1				
623	1030			H.dyn.sur.+Y	0.4				
624	1030			Xx	-1				
625	1030			Xy	-0.4				
626	1030			Xz	-0.4				
627	1030			Yx	1				
628	1030			Yy	0.4				
629	1030			Yz	0.4				
630	1030			Zx	-1				
631	1030			Zy	-0.4				
632	1030			Zz	-0.4				
633	1030			AE	-1				
634	1031	Linear Add	No	D	1	No	No	No	No
635	1031			L	0.8				
636	1031			Crane1	1				
637	1031			H.rest	1				
638	1031			F.stat	1				
639	1031			H.sur.-X	1				
640	1031			H.sur.-Y	1				
641	1031			H.dyn.-X_e	1				
642	1031			H.dyn.-Y_e	0.4				
643	1031			H.dyn.sur.-X	1				
644	1031			H.dyn.sur.-Y	0.4				
645	1031			Xx	-1				
646	1031			Xy	-0.4				
647	1031			Xz	-0.4				
648	1031			Yx	-1				
649	1031			Yy	-0.4				
650	1031			Yz	-0.4				
651	1031			Zx	1				
652	1031			Zy	0.4				
653	1031			Zz	0.4				
654	1031			AE	-1				
655	1032	Linear Add	No	D	1	No	No	No	No
656	1032			L	0.8				
657	1032			Crane1	1				
658	1032			H.rest	1				
659	1032			F.stat	1				
660	1032			H.sur.-X	1				
661	1032			H.sur.-Y	1				
662	1032			H.dyn.-X_e	1				
663	1032			H.dyn.-Y_e	0.4				
664	1032			H.dyn.sur.-X	1				
665	1032			H.dyn.sur.-Y	0.4				
666	1032			Xx	-1				
667	1032			Xy	-0.4				
668	1032			Xz	-0.4				
669	1032			Yx	-1				
670	1032			Yy	-0.4				
671	1032			Yz	-0.4				
672	1032			Zx	-1				
673	1032			Zy	-0.4				
674	1032			Zz	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
675	1032			AE	-1				
676	1033	Linear Add	No	D	1	No	No	No	No
677	1033			L	0.8				
678	1033			Crane1	1				
679	1033			H.rest	1				
680	1033			F.stat	1				
681	1033			H.sur.+X	1				
682	1033			H.sur.+Y	1				
683	1033			H.dyn.+X_e	0.4				
684	1033			H.dyn.+Y_e	1				
685	1033			H.dyn.sur.+X	0.4				
686	1033			H.dyn.sur.+Y	1				
687	1033			Xx	0.4				
688	1033			Xy	1				
689	1033			Xz	0.4				
690	1033			Yx	0.4				
691	1033			Yy	1				
692	1033			Yz	0.4				
693	1033			Zx	0.4				
694	1033			Zy	1				
695	1033			Zz	0.4				
696	1033			AE	-1				
697	1034	Linear Add	No	D	1	No	No	No	No
698	1034			L	0.8				
699	1034			Crane1	1				
700	1034			H.rest	1				
701	1034			F.stat	1				
702	1034			H.sur.+X	1				
703	1034			H.sur.+Y	1				
704	1034			H.dyn.+X_e	0.4				
705	1034			H.dyn.+Y_e	1				
706	1034			H.dyn.sur.+X	0.4				
707	1034			H.dyn.sur.+Y	1				
708	1034			Xx	0.4				
709	1034			Xy	1				
710	1034			Xz	0.4				
711	1034			Yx	0.4				
712	1034			Yy	1				
713	1034			Yz	0.4				
714	1034			Zx	-0.4				
715	1034			Zy	-1				
716	1034			Zz	-0.4				
717	1034			AE	-1				
718	1035	Linear Add	No	D	1	No	No	No	No
719	1035			L	0.8				
720	1035			Crane1	1				
721	1035			H.rest	1				
722	1035			F.stat	1				
723	1035			H.sur.+X	1				
724	1035			H.sur.-Y	1				
725	1035			H.dyn.+X_e	0.4				
726	1035			H.dyn.-Y_e	1				
727	1035			H.dyn.sur.+X	0.4				
728	1035			H.dyn.sur.-Y	1				
729	1035			Xx	0.4				
730	1035			Xy	1				
731	1035			Xz	0.4				
732	1035			Yx	-0.4				
733	1035			Yy	-1				
734	1035			Yz	-0.4				
735	1035			Zx	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
736	1035			Zy	1				
737	1035			Zz	0.4				
738	1035			AE	-1				
739	1036	Linear Add	No	D	1	No	No	No	No
740	1036			L	0.8				
741	1036			Crane1	1				
742	1036			H.rest	1				
743	1036			F.stat	1				
744	1036			H.sur.+X	1				
745	1036			H.sur.-Y	1				
746	1036			H.dyn.+X_e	0.4				
747	1036			H.dyn.-Y_e	1				
748	1036			H.dyn.sur.+X	0.4				
749	1036			H.dyn.sur.-Y	1				
750	1036			Xx	0.4				
751	1036			Xy	1				
752	1036			Xz	0.4				
753	1036			Yx	-0.4				
754	1036			Yy	-1				
755	1036			Yz	-0.4				
756	1036			Zx	-0.4				
757	1036			Zy	-1				
758	1036			Zz	-0.4				
759	1036			AE	-1				
760	1037	Linear Add	No	D	1	No	No	No	No
761	1037			L	0.8				
762	1037			Crane1	1				
763	1037			H.rest	1				
764	1037			F.stat	1				
765	1037			H.sur.-X	1				
766	1037			H.sur.+Y	1				
767	1037			H.dyn.-X_e	0.4				
768	1037			H.dyn.+Y_e	1				
769	1037			H.dyn.sur.-X	0.4				
770	1037			H.dyn.sur.+Y	1				
771	1037			Xx	-0.4				
772	1037			Xy	-1				
773	1037			Xz	-0.4				
774	1037			Yx	0.4				
775	1037			Yy	1				
776	1037			Yz	0.4				
777	1037			Zx	0.4				
778	1037			Zy	1				
779	1037			Zz	0.4				
780	1037			AE	-1				
781	1038	Linear Add	No	D	1	No	No	No	No
782	1038			L	0.8				
783	1038			Crane1	1				
784	1038			H.rest	1				
785	1038			F.stat	1				
786	1038			H.sur.-X	1				
787	1038			H.sur.+Y	1				
788	1038			H.dyn.-X_e	0.4				
789	1038			H.dyn.+Y_e	1				
790	1038			H.dyn.sur.-X	0.4				
791	1038			H.dyn.sur.+Y	1				
792	1038			Xx	-0.4				
793	1038			Xy	-1				
794	1038			Xz	-0.4				
795	1038			Yx	0.4				
796	1038			Yy	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
797	1038			Yz	0.4				
798	1038			Zx	-0.4				
799	1038			Zy	-1				
800	1038			Zz	-0.4				
801	1038			AE	-1				
802	1039	Linear Add	No	D	1	No	No	No	No
803	1039			L	0.8				
804	1039			Crane1	1				
805	1039			H.rest	1				
806	1039			F.stat	1				
807	1039			H.sur.-X	1				
808	1039			H.sur.-Y	1				
809	1039			H.dyn.-X_e	0.4				
810	1039			H.dyn.-Y_e	1				
811	1039			H.dyn.sur.-X	0.4				
812	1039			H.dyn.sur.-Y	1				
813	1039			Xx	-0.4				
814	1039			Xy	-1				
815	1039			Xz	-0.4				
816	1039			Yx	-0.4				
817	1039			Yy	-1				
818	1039			Yz	-0.4				
819	1039			Zx	0.4				
820	1039			Zy	1				
821	1039			Zz	0.4				
822	1039			AE	-1				
823	1040	Linear Add	No	D	1	No	No	No	No
824	1040			L	0.8				
825	1040			Crane1	1				
826	1040			H.rest	1				
827	1040			F.stat	1				
828	1040			H.sur.-X	1				
829	1040			H.sur.-Y	1				
830	1040			H.dyn.-X_e	0.4				
831	1040			H.dyn.-Y_e	1				
832	1040			H.dyn.sur.-X	0.4				
833	1040			H.dyn.sur.-Y	1				
834	1040			Xx	-0.4				
835	1040			Xy	-1				
836	1040			Xz	-0.4				
837	1040			Yx	-0.4				
838	1040			Yy	-1				
839	1040			Yz	-0.4				
840	1040			Zx	-0.4				
841	1040			Zy	-1				
842	1040			Zz	-0.4				
843	1040			AE	-1				
844	1041	Linear Add	No	D	1	No	No	No	No
845	1041			L	0.8				
846	1041			Crane1	1				
847	1041			H.rest	1				
848	1041			F.stat	1				
849	1041			H.sur.+X	1				
850	1041			H.sur.+Y	1				
851	1041			H.dyn.+X_e	0.4				
852	1041			H.dyn.+Y_e	0.4				
853	1041			H.dyn.sur.+X	0.4				
854	1041			H.dyn.sur.+Y	0.4				
855	1041			Xx	0.4				
856	1041			Xy	0.4				
857	1041			Xz	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
858	1041			Yx	0.4				
859	1041			Yy	0.4				
860	1041			Yz	1				
861	1041			Zx	0.4				
862	1041			Zy	0.4				
863	1041			Zz	1				
864	1041			AE	-1				
865	1042	Linear Add	No	D	1	No	No	No	No
866	1042			L	0.8				
867	1042			Crane1	1				
868	1042			H.rest	1				
869	1042			F.stat	1				
870	1042			H.sur.+X	1				
871	1042			H.sur.+Y	1				
872	1042			H.dyn.+X_e	0.4				
873	1042			H.dyn.+Y_e	0.4				
874	1042			H.dyn.sur.+X	0.4				
875	1042			H.dyn.sur.+Y	0.4				
876	1042			Xx	0.4				
877	1042			Xy	0.4				
878	1042			Xz	1				
879	1042			Yx	0.4				
880	1042			Yy	0.4				
881	1042			Yz	1				
882	1042			Zx	-0.4				
883	1042			Zy	-0.4				
884	1042			Zz	-1				
885	1042			AE	-1				
886	1043	Linear Add	No	D	1	No	No	No	No
887	1043			L	0.8				
888	1043			Crane1	1				
889	1043			H.rest	1				
890	1043			F.stat	1				
891	1043			H.sur.+X	1				
892	1043			H.sur.-Y	1				
893	1043			H.dyn.+X_e	0.4				
894	1043			H.dyn.-Y_e	0.4				
895	1043			H.dyn.sur.+X	0.4				
896	1043			H.dyn.sur.-Y	0.4				
897	1043			Xx	0.4				
898	1043			Xy	0.4				
899	1043			Xz	1				
900	1043			Yx	-0.4				
901	1043			Yy	-0.4				
902	1043			Yz	-1				
903	1043			Zx	0.4				
904	1043			Zy	0.4				
905	1043			Zz	1				
906	1043			AE	-1				
907	1044	Linear Add	No	D	1	No	No	No	No
908	1044			L	0.8				
909	1044			Crane1	1				
910	1044			H.rest	1				
911	1044			F.stat	1				
912	1044			H.sur.+X	1				
913	1044			H.sur.-Y	1				
914	1044			H.dyn.+X_e	0.4				
915	1044			H.dyn.-Y_e	0.4				
916	1044			H.dyn.sur.+X	0.4				
917	1044			H.dyn.sur.-Y	0.4				
918	1044			Xx	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
919	1044			Xy	0.4				
920	1044			Xz	1				
921	1044			Yx	-0.4				
922	1044			Yy	-0.4				
923	1044			Yz	-1				
924	1044			Zx	-0.4				
925	1044			Zy	-0.4				
926	1044			Zz	-1				
927	1044			AE	-1				
928	1045	Linear Add	No	D	1	No	No	No	No
929	1045			L	0.8				
930	1045			Crane1	1				
931	1045			H.rest	1				
932	1045			F.stat	1				
933	1045			H.sur.-X	1				
934	1045			H.sur.+Y	1				
935	1045			H.dyn.-X_e	0.4				
936	1045			H.dyn.+Y_e	0.4				
937	1045			H.dyn.sur.-X	0.4				
938	1045			H.dyn.sur.+Y	0.4				
939	1045			Xx	-0.4				
940	1045			Xy	-0.4				
941	1045			Xz	-1				
942	1045			Yx	0.4				
943	1045			Yy	0.4				
944	1045			Yz	1				
945	1045			Zx	0.4				
946	1045			Zy	0.4				
947	1045			Zz	1				
948	1045			AE	-1				
949	1046	Linear Add	No	D	1	No	No	No	No
950	1046			L	0.8				
951	1046			Crane1	1				
952	1046			H.rest	1				
953	1046			F.stat	1				
954	1046			H.sur.-X	1				
955	1046			H.sur.+Y	1				
956	1046			H.dyn.-X_e	0.4				
957	1046			H.dyn.+Y_e	0.4				
958	1046			H.dyn.sur.-X	0.4				
959	1046			H.dyn.sur.+Y	0.4				
960	1046			Xx	-0.4				
961	1046			Xy	-0.4				
962	1046			Xz	-1				
963	1046			Yx	0.4				
964	1046			Yy	0.4				
965	1046			Yz	1				
966	1046			Zx	-0.4				
967	1046			Zy	-0.4				
968	1046			Zz	-1				
969	1046			AE	-1				
970	1047	Linear Add	No	D	1	No	No	No	No
971	1047			L	0.8				
972	1047			Crane1	1				
973	1047			H.rest	1				
974	1047			F.stat	1				
975	1047			H.sur.-X	1				
976	1047			H.sur.-Y	1				
977	1047			H.dyn.-X_e	0.4				
978	1047			H.dyn.-Y_e	0.4				
979	1047			H.dyn.sur.-X	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
980	1047			H.dyn.sur.-Y	0.4				
981	1047			Xx	-0.4				
982	1047			Xy	-0.4				
983	1047			Xz	-1				
984	1047			Yx	-0.4				
985	1047			Yy	-0.4				
986	1047			Yz	-1				
987	1047			Zx	0.4				
988	1047			Zy	0.4				
989	1047			Zz	1				
990	1047			AE	-1				
991	1048	Linear Add	No	D	1	No	No	No	No
992	1048			L	0.8				
993	1048			Crane1	1				
994	1048			H.rest	1				
995	1048			F.stat	1				
996	1048			H.sur.-X	1				
997	1048			H.sur.-Y	1				
998	1048			H.dyn.-X_e	0.4				
999	1048			H.dyn.-Y_e	0.4				
1000	1048			H.dyn.sur.-X	0.4				
1001	1048			H.dyn.sur.-Y	0.4				
1002	1048			Xx	-0.4				
1003	1048			Xy	-0.4				
1004	1048			Xz	-1				
1005	1048			Yx	-0.4				
1006	1048			Yy	-0.4				
1007	1048			Yz	-1				
1008	1048			Zx	-0.4				
1009	1048			Zy	-0.4				
1010	1048			Zz	-1				
1011	1048			AE	-1				
1012	1049	Linear Add	No	D	1	No	No	No	No
1013	1049			L	0.8				
1014	1049			Crane2	1				
1015	1049			H.rest	1				
1016	1049			F.stat	1				
1017	1049			H.sur.+X	1				
1018	1049			H.sur.+Y	1				
1019	1049			H.dyn.+X_e	1				
1020	1049			H.dyn.+Y_e	0.4				
1021	1049			H.dyn.sur.+X	1				
1022	1049			H.dyn.sur.+Y	0.4				
1023	1049			Xx	1				
1024	1049			Xy	0.4				
1025	1049			Xz	0.4				
1026	1049			Yx	1				
1027	1049			Yy	0.4				
1028	1049			Yz	0.4				
1029	1049			Zx	1				
1030	1049			Zy	0.4				
1031	1049			Zz	0.4				
1032	1049			AE	1				
1033	1050	Linear Add	No	D	1	No	No	No	No
1034	1050			L	0.8				
1035	1050			Crane2	1				
1036	1050			H.rest	1				
1037	1050			F.stat	1				
1038	1050			H.sur.+X	1				
1039	1050			H.sur.+Y	1				
1040	1050			H.dyn.+X_e	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1041	1050			H.dyn.+Y_e	0.4				
1042	1050			H.dyn.sur.+X	1				
1043	1050			H.dyn.sur.+Y	0.4				
1044	1050			Xx	1				
1045	1050			Xy	0.4				
1046	1050			Xz	0.4				
1047	1050			Yx	1				
1048	1050			Yy	0.4				
1049	1050			Yz	0.4				
1050	1050			Zx	-1				
1051	1050			Zy	-0.4				
1052	1050			Zz	-0.4				
1053	1050			AE	1				
1054	1051	Linear Add	No	D	1	No	No	No	No
1055	1051			L	0.8				
1056	1051			Crane2	1				
1057	1051			H.rest	1				
1058	1051			F.stat	1				
1059	1051			H.sur.+X	1				
1060	1051			H.sur.-Y	1				
1061	1051			H.dyn.+X_e	1				
1062	1051			H.dyn.-Y_e	0.4				
1063	1051			H.dyn.sur.+X	1				
1064	1051			H.dyn.sur.-Y	0.4				
1065	1051			Xx	1				
1066	1051			Xy	0.4				
1067	1051			Xz	0.4				
1068	1051			Yx	-1				
1069	1051			Yy	-0.4				
1070	1051			Yz	-0.4				
1071	1051			Zx	1				
1072	1051			Zy	0.4				
1073	1051			Zz	0.4				
1074	1051			AE	1				
1075	1052	Linear Add	No	D	1	No	No	No	No
1076	1052			L	0.8				
1077	1052			Crane2	1				
1078	1052			H.rest	1				
1079	1052			F.stat	1				
1080	1052			H.sur.+X	1				
1081	1052			H.sur.-Y	1				
1082	1052			H.dyn.+X_e	1				
1083	1052			H.dyn.-Y_e	0.4				
1084	1052			H.dyn.sur.+X	1				
1085	1052			H.dyn.sur.-Y	0.4				
1086	1052			Xx	1				
1087	1052			Xy	0.4				
1088	1052			Xz	0.4				
1089	1052			Yx	-1				
1090	1052			Yy	-0.4				
1091	1052			Yz	-0.4				
1092	1052			Zx	-1				
1093	1052			Zy	-0.4				
1094	1052			Zz	-0.4				
1095	1052			AE	1				
1096	1053	Linear Add	No	D	1	No	No	No	No
1097	1053			L	0.8				
1098	1053			Crane2	1				
1099	1053			H.rest	1				
1100	1053			F.stat	1				
1101	1053			H.sur.-X	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1102	1053			H.sur.+Y	1				
1103	1053			H.dyn.-X_e	1				
1104	1053			H.dyn.+Y_e	0.4				
1105	1053			H.dyn.sur.-X	1				
1106	1053			H.dyn.sur.+Y	0.4				
1107	1053			Xx	-1				
1108	1053			Xy	-0.4				
1109	1053			Xz	-0.4				
1110	1053			Yx	1				
1111	1053			Yy	0.4				
1112	1053			Yz	0.4				
1113	1053			Zx	1				
1114	1053			Zy	0.4				
1115	1053			Zz	0.4				
1116	1053			AE	1				
1117	1054	Linear Add	No	D	1	No	No	No	No
1118	1054			L	0.8				
1119	1054			Crane2	1				
1120	1054			H.rest	1				
1121	1054			F.stat	1				
1122	1054			H.sur.-X	1				
1123	1054			H.sur.+Y	1				
1124	1054			H.dyn.-X_e	1				
1125	1054			H.dyn.+Y_e	0.4				
1126	1054			H.dyn.sur.-X	1				
1127	1054			H.dyn.sur.+Y	0.4				
1128	1054			Xx	-1				
1129	1054			Xy	-0.4				
1130	1054			Xz	-0.4				
1131	1054			Yx	1				
1132	1054			Yy	0.4				
1133	1054			Yz	0.4				
1134	1054			Zx	-1				
1135	1054			Zy	-0.4				
1136	1054			Zz	-0.4				
1137	1054			AE	1				
1138	1055	Linear Add	No	D	1	No	No	No	No
1139	1055			L	0.8				
1140	1055			Crane2	1				
1141	1055			H.rest	1				
1142	1055			F.stat	1				
1143	1055			H.sur.-X	1				
1144	1055			H.sur.-Y	1				
1145	1055			H.dyn.-X_e	1				
1146	1055			H.dyn.-Y_e	0.4				
1147	1055			H.dyn.sur.-X	1				
1148	1055			H.dyn.sur.-Y	0.4				
1149	1055			Xx	-1				
1150	1055			Xy	-0.4				
1151	1055			Xz	-0.4				
1152	1055			Yx	-1				
1153	1055			Yy	-0.4				
1154	1055			Yz	-0.4				
1155	1055			Zx	1				
1156	1055			Zy	0.4				
1157	1055			Zz	0.4				
1158	1055			AE	1				
1159	1056	Linear Add	No	D	1	No	No	No	No
1160	1056			L	0.8				
1161	1056			Crane2	1				
1162	1056			H.rest	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1163	1056			F.stat	1				
1164	1056			H.sur.-X	1				
1165	1056			H.sur.-Y	1				
1166	1056			H.dyn.-X_e	1				
1167	1056			H.dyn.-Y_e	0.4				
1168	1056			H.dyn.sur.-X	1				
1169	1056			H.dyn.sur.-Y	0.4				
1170	1056			Xx	-1				
1171	1056			Xy	-0.4				
1172	1056			Xz	-0.4				
1173	1056			Yx	-1				
1174	1056			Yy	-0.4				
1175	1056			Yz	-0.4				
1176	1056			Zx	-1				
1177	1056			Zy	-0.4				
1178	1056			Zz	-0.4				
1179	1056			AE	1				
1180	1057	Linear Add	No	D	1	No	No	No	No
1181	1057			L	0.8				
1182	1057			Crane2	1				
1183	1057			H.rest	1				
1184	1057			F.stat	1				
1185	1057			H.sur.+X	1				
1186	1057			H.sur.+Y	1				
1187	1057			H.dyn.+X_e	0.4				
1188	1057			H.dyn.+Y_e	1				
1189	1057			H.dyn.sur.+X	0.4				
1190	1057			H.dyn.sur.+Y	1				
1191	1057			Xx	0.4				
1192	1057			Xy	1				
1193	1057			Xz	0.4				
1194	1057			Yx	0.4				
1195	1057			Yy	1				
1196	1057			Yz	0.4				
1197	1057			Zx	0.4				
1198	1057			Zy	1				
1199	1057			Zz	0.4				
1200	1057			AE	1				
1201	1058	Linear Add	No	D	1	No	No	No	No
1202	1058			L	0.8				
1203	1058			Crane2	1				
1204	1058			H.rest	1				
1205	1058			F.stat	1				
1206	1058			H.sur.+X	1				
1207	1058			H.sur.+Y	1				
1208	1058			H.dyn.+X_e	0.4				
1209	1058			H.dyn.+Y_e	1				
1210	1058			H.dyn.sur.+X	0.4				
1211	1058			H.dyn.sur.+Y	1				
1212	1058			Xx	0.4				
1213	1058			Xy	1				
1214	1058			Xz	0.4				
1215	1058			Yx	0.4				
1216	1058			Yy	1				
1217	1058			Yz	0.4				
1218	1058			Zx	-0.4				
1219	1058			Zy	-1				
1220	1058			Zz	-0.4				
1221	1058			AE	1				
1222	1059	Linear Add	No	D	1	No	No	No	No
1223	1059			L	0.8				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1224	1059			Crane2	1				
1225	1059			H.rest	1				
1226	1059			F.stat	1				
1227	1059			H.sur.+X	1				
1228	1059			H.sur.-Y	1				
1229	1059			H.dyn.+X_e	0.4				
1230	1059			H.dyn.-Y_e	1				
1231	1059			H.dyn.sur.+X	0.4				
1232	1059			H.dyn.sur.-Y	1				
1233	1059			Xx	0.4				
1234	1059			Xy	1				
1235	1059			Xz	0.4				
1236	1059			Yx	-0.4				
1237	1059			Yy	-1				
1238	1059			Yz	-0.4				
1239	1059			Zx	0.4				
1240	1059			Zy	1				
1241	1059			Zz	0.4				
1242	1059			AE	1				
1243	1060	Linear Add	No	D	1	No	No	No	No
1244	1060			L	0.8				
1245	1060			Crane2	1				
1246	1060			H.rest	1				
1247	1060			F.stat	1				
1248	1060			H.sur.+X	1				
1249	1060			H.sur.-Y	1				
1250	1060			H.dyn.+X_e	0.4				
1251	1060			H.dyn.-Y_e	1				
1252	1060			H.dyn.sur.+X	0.4				
1253	1060			H.dyn.sur.-Y	1				
1254	1060			Xx	0.4				
1255	1060			Xy	1				
1256	1060			Xz	0.4				
1257	1060			Yx	-0.4				
1258	1060			Yy	-1				
1259	1060			Yz	-0.4				
1260	1060			Zx	-0.4				
1261	1060			Zy	-1				
1262	1060			Zz	-0.4				
1263	1060			AE	1				
1264	1061	Linear Add	No	D	1	No	No	No	No
1265	1061			L	0.8				
1266	1061			Crane2	1				
1267	1061			H.rest	1				
1268	1061			F.stat	1				
1269	1061			H.sur.-X	1				
1270	1061			H.sur.+Y	1				
1271	1061			H.dyn.-X_e	0.4				
1272	1061			H.dyn.+Y_e	1				
1273	1061			H.dyn.sur.-X	0.4				
1274	1061			H.dyn.sur.+Y	1				
1275	1061			Xx	-0.4				
1276	1061			Xy	-1				
1277	1061			Xz	-0.4				
1278	1061			Yx	0.4				
1279	1061			Yy	1				
1280	1061			Yz	0.4				
1281	1061			Zx	0.4				
1282	1061			Zy	1				
1283	1061			Zz	0.4				
1284	1061			AE	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1285	1062	Linear Add	No	D	1	No	No	No	No
1286	1062			L	0.8				
1287	1062			Crane2	1				
1288	1062			H.rest	1				
1289	1062			F.stat	1				
1290	1062			H.sur.-X	1				
1291	1062			H.sur.+Y	1				
1292	1062			H.dyn.-X_e	0.4				
1293	1062			H.dyn.+Y_e	1				
1294	1062			H.dyn.sur.-X	0.4				
1295	1062			H.dyn.sur.+Y	1				
1296	1062			Xx	-0.4				
1297	1062			Xy	-1				
1298	1062			Xz	-0.4				
1299	1062			Yx	0.4				
1300	1062			Yy	1				
1301	1062			Yz	0.4				
1302	1062			Zx	-0.4				
1303	1062			Zy	-1				
1304	1062			Zz	-0.4				
1305	1062			AE	1				
1306	1063	Linear Add	No	D	1	No	No	No	No
1307	1063			L	0.8				
1308	1063			Crane2	1				
1309	1063			H.rest	1				
1310	1063			F.stat	1				
1311	1063			H.sur.-X	1				
1312	1063			H.sur.-Y	1				
1313	1063			H.dyn.-X_e	0.4				
1314	1063			H.dyn.-Y_e	1				
1315	1063			H.dyn.sur.-X	0.4				
1316	1063			H.dyn.sur.-Y	1				
1317	1063			Xx	-0.4				
1318	1063			Xy	-1				
1319	1063			Xz	-0.4				
1320	1063			Yx	-0.4				
1321	1063			Yy	-1				
1322	1063			Yz	-0.4				
1323	1063			Zx	0.4				
1324	1063			Zy	1				
1325	1063			Zz	0.4				
1326	1063			AE	1				
1327	1064	Linear Add	No	D	1	No	No	No	No
1328	1064			L	0.8				
1329	1064			Crane2	1				
1330	1064			H.rest	1				
1331	1064			F.stat	1				
1332	1064			H.sur.-X	1				
1333	1064			H.sur.-Y	1				
1334	1064			H.dyn.-X_e	0.4				
1335	1064			H.dyn.-Y_e	1				
1336	1064			H.dyn.sur.-X	0.4				
1337	1064			H.dyn.sur.-Y	1				
1338	1064			Xx	-0.4				
1339	1064			Xy	-1				
1340	1064			Xz	-0.4				
1341	1064			Yx	-0.4				
1342	1064			Yy	-1				
1343	1064			Yz	-0.4				
1344	1064			Zx	-0.4				
1345	1064			Zy	-1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1346	1064			Zz	-0.4				
1347	1064			AE	1				
1348	1065	Linear Add	No	D	1	No	No	No	No
1349	1065			L	0.8				
1350	1065			Crane2	1				
1351	1065			H.rest	1				
1352	1065			F.stat	1				
1353	1065			H.sur.+X	1				
1354	1065			H.sur.+Y	1				
1355	1065			H.dyn.+X_e	0.4				
1356	1065			H.dyn.+Y_e	0.4				
1357	1065			H.dyn.sur.+X	0.4				
1358	1065			H.dyn.sur.+Y	0.4				
1359	1065			Xx	0.4				
1360	1065			Xy	0.4				
1361	1065			Xz	1				
1362	1065			Yx	0.4				
1363	1065			Yy	0.4				
1364	1065			Yz	1				
1365	1065			Zx	0.4				
1366	1065			Zy	0.4				
1367	1065			Zz	1				
1368	1065			AE	1				
1369	1066	Linear Add	No	D	1	No	No	No	No
1370	1066			L	0.8				
1371	1066			Crane2	1				
1372	1066			H.rest	1				
1373	1066			F.stat	1				
1374	1066			H.sur.+X	1				
1375	1066			H.sur.+Y	1				
1376	1066			H.dyn.+X_e	0.4				
1377	1066			H.dyn.+Y_e	0.4				
1378	1066			H.dyn.sur.+X	0.4				
1379	1066			H.dyn.sur.+Y	0.4				
1380	1066			Xx	0.4				
1381	1066			Xy	0.4				
1382	1066			Xz	1				
1383	1066			Yx	0.4				
1384	1066			Yy	0.4				
1385	1066			Yz	1				
1386	1066			Zx	-0.4				
1387	1066			Zy	-0.4				
1388	1066			Zz	-1				
1389	1066			AE	1				
1390	1067	Linear Add	No	D	1	No	No	No	No
1391	1067			L	0.8				
1392	1067			Crane2	1				
1393	1067			H.rest	1				
1394	1067			F.stat	1				
1395	1067			H.sur.+X	1				
1396	1067			H.sur.-Y	1				
1397	1067			H.dyn.+X_e	0.4				
1398	1067			H.dyn.-Y_e	0.4				
1399	1067			H.dyn.sur.+X	0.4				
1400	1067			H.dyn.sur.-Y	0.4				
1401	1067			Xx	0.4				
1402	1067			Xy	0.4				
1403	1067			Xz	1				
1404	1067			Yx	-0.4				
1405	1067			Yy	-0.4				
1406	1067			Yz	-1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1407	1067			Zx	0.4				
1408	1067			Zy	0.4				
1409	1067			Zz	1				
1410	1067			AE	1				
1411	1068	Linear Add	No	D	1	No	No	No	No
1412	1068			L	0.8				
1413	1068			Crane2	1				
1414	1068			H.rest	1				
1415	1068			F.stat	1				
1416	1068			H.sur.+X	1				
1417	1068			H.sur.-Y	1				
1418	1068			H.dyn.+X_e	0.4				
1419	1068			H.dyn.-Y_e	0.4				
1420	1068			H.dyn.sur.+X	0.4				
1421	1068			H.dyn.sur.-Y	0.4				
1422	1068			Xx	0.4				
1423	1068			Xy	0.4				
1424	1068			Xz	1				
1425	1068			Yx	-0.4				
1426	1068			Yy	-0.4				
1427	1068			Yz	-1				
1428	1068			Zx	-0.4				
1429	1068			Zy	-0.4				
1430	1068			Zz	-1				
1431	1068			AE	1				
1432	1069	Linear Add	No	D	1	No	No	No	No
1433	1069			L	0.8				
1434	1069			Crane2	1				
1435	1069			H.rest	1				
1436	1069			F.stat	1				
1437	1069			H.sur.-X	1				
1438	1069			H.sur.+Y	1				
1439	1069			H.dyn.-X_e	0.4				
1440	1069			H.dyn.+Y_e	0.4				
1441	1069			H.dyn.sur.-X	0.4				
1442	1069			H.dyn.sur.+Y	0.4				
1443	1069			Xx	-0.4				
1444	1069			Xy	-0.4				
1445	1069			Xz	-1				
1446	1069			Yx	0.4				
1447	1069			Yy	0.4				
1448	1069			Yz	1				
1449	1069			Zx	0.4				
1450	1069			Zy	0.4				
1451	1069			Zz	1				
1452	1069			AE	1				
1453	1070	Linear Add	No	D	1	No	No	No	No
1454	1070			L	0.8				
1455	1070			Crane2	1				
1456	1070			H.rest	1				
1457	1070			F.stat	1				
1458	1070			H.sur.-X	1				
1459	1070			H.sur.+Y	1				
1460	1070			H.dyn.-X_e	0.4				
1461	1070			H.dyn.+Y_e	0.4				
1462	1070			H.dyn.sur.-X	0.4				
1463	1070			H.dyn.sur.+Y	0.4				
1464	1070			Xx	-0.4				
1465	1070			Xy	-0.4				
1466	1070			Xz	-1				
1467	1070			Yx	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1468	1070			Yy	0.4				
1469	1070			Yz	1				
1470	1070			Zx	-0.4				
1471	1070			Zy	-0.4				
1472	1070			Zz	-1				
1473	1070			AE	1				
1474	1071	Linear Add	No	D	1	No	No	No	No
1475	1071			L	0.8				
1476	1071			Crane2	1				
1477	1071			H.rest	1				
1478	1071			F.stat	1				
1479	1071			H.sur.-X	1				
1480	1071			H.sur.-Y	1				
1481	1071			H.dyn.-X_e	0.4				
1482	1071			H.dyn.-Y_e	0.4				
1483	1071			H.dyn.sur.-X	0.4				
1484	1071			H.dyn.sur.-Y	0.4				
1485	1071			Xx	-0.4				
1486	1071			Xy	-0.4				
1487	1071			Xz	-1				
1488	1071			Yx	-0.4				
1489	1071			Yy	-0.4				
1490	1071			Yz	-1				
1491	1071			Zx	0.4				
1492	1071			Zy	0.4				
1493	1071			Zz	1				
1494	1071			AE	1				
1495	1072	Linear Add	No	D	1	No	No	No	No
1496	1072			L	0.8				
1497	1072			Crane2	1				
1498	1072			H.rest	1				
1499	1072			F.stat	1				
1500	1072			H.sur.-X	1				
1501	1072			H.sur.-Y	1				
1502	1072			H.dyn.-X_e	0.4				
1503	1072			H.dyn.-Y_e	0.4				
1504	1072			H.dyn.sur.-X	0.4				
1505	1072			H.dyn.sur.-Y	0.4				
1506	1072			Xx	-0.4				
1507	1072			Xy	-0.4				
1508	1072			Xz	-1				
1509	1072			Yx	-0.4				
1510	1072			Yy	-0.4				
1511	1072			Yz	-1				
1512	1072			Zx	-0.4				
1513	1072			Zy	-0.4				
1514	1072			Zz	-1				
1515	1072			AE	1				
1516	1073	Linear Add	No	D	1	No	No	No	No
1517	1073			L	0.8				
1518	1073			Crane2	1				
1519	1073			H.rest	1				
1520	1073			F.stat	1				
1521	1073			H.sur.+X	1				
1522	1073			H.sur.+Y	1				
1523	1073			H.dyn.+X_e	1				
1524	1073			H.dyn.+Y_e	0.4				
1525	1073			H.dyn.sur.+X	1				
1526	1073			H.dyn.sur.+Y	0.4				
1527	1073			Xx	1				
1528	1073			Xy	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1529	1073			Xz	0.4				
1530	1073			Yx	1				
1531	1073			Yy	0.4				
1532	1073			Yz	0.4				
1533	1073			Zx	1				
1534	1073			Zy	0.4				
1535	1073			Zz	0.4				
1536	1073			AE	-1				
1537	1074	Linear Add	No	D	1	No	No	No	No
1538	1074			L	0.8				
1539	1074			Crane2	1				
1540	1074			H.rest	1				
1541	1074			F.stat	1				
1542	1074			H.sur.+X	1				
1543	1074			H.sur.+Y	1				
1544	1074			H.dyn.+X_e	1				
1545	1074			H.dyn.+Y_e	0.4				
1546	1074			H.dyn.sur.+X	1				
1547	1074			H.dyn.sur.+Y	0.4				
1548	1074			Xx	1				
1549	1074			Xy	0.4				
1550	1074			Xz	0.4				
1551	1074			Yx	1				
1552	1074			Yy	0.4				
1553	1074			Yz	0.4				
1554	1074			Zx	-1				
1555	1074			Zy	-0.4				
1556	1074			Zz	-0.4				
1557	1074			AE	-1				
1558	1075	Linear Add	No	D	1	No	No	No	No
1559	1075			L	0.8				
1560	1075			Crane2	1				
1561	1075			H.rest	1				
1562	1075			F.stat	1				
1563	1075			H.sur.+X	1				
1564	1075			H.sur.-Y	1				
1565	1075			H.dyn.+X_e	1				
1566	1075			H.dyn.-Y_e	0.4				
1567	1075			H.dyn.sur.+X	1				
1568	1075			H.dyn.sur.-Y	0.4				
1569	1075			Xx	1				
1570	1075			Xy	0.4				
1571	1075			Xz	0.4				
1572	1075			Yx	-1				
1573	1075			Yy	-0.4				
1574	1075			Yz	-0.4				
1575	1075			Zx	1				
1576	1075			Zy	0.4				
1577	1075			Zz	0.4				
1578	1075			AE	-1				
1579	1076	Linear Add	No	D	1	No	No	No	No
1580	1076			L	0.8				
1581	1076			Crane2	1				
1582	1076			H.rest	1				
1583	1076			F.stat	1				
1584	1076			H.sur.+X	1				
1585	1076			H.sur.-Y	1				
1586	1076			H.dyn.+X_e	1				
1587	1076			H.dyn.-Y_e	0.4				
1588	1076			H.dyn.sur.+X	1				
1589	1076			H.dyn.sur.-Y	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1590	1076			Xx	1				
1591	1076			Xy	0.4				
1592	1076			Xz	0.4				
1593	1076			Yx	-1				
1594	1076			Yy	-0.4				
1595	1076			Yz	-0.4				
1596	1076			Zx	-1				
1597	1076			Zy	-0.4				
1598	1076			Zz	-0.4				
1599	1076			AE	-1				
1600	1077	Linear Add	No	D	1	No	No	No	No
1601	1077			L	0.8				
1602	1077			Crane2	1				
1603	1077			H.rest	1				
1604	1077			F.stat	1				
1605	1077			H.sur.-X	1				
1606	1077			H.sur.+Y	1				
1607	1077			H.dyn.-X_e	1				
1608	1077			H.dyn.+Y_e	0.4				
1609	1077			H.dyn.sur.-X	1				
1610	1077			H.dyn.sur.+Y	0.4				
1611	1077			Xx	-1				
1612	1077			Xy	-0.4				
1613	1077			Xz	-0.4				
1614	1077			Yx	1				
1615	1077			Yy	0.4				
1616	1077			Yz	0.4				
1617	1077			Zx	1				
1618	1077			Zy	0.4				
1619	1077			Zz	0.4				
1620	1077			AE	-1				
1621	1078	Linear Add	No	D	1	No	No	No	No
1622	1078			L	0.8				
1623	1078			Crane2	1				
1624	1078			H.rest	1				
1625	1078			F.stat	1				
1626	1078			H.sur.-X	1				
1627	1078			H.sur.+Y	1				
1628	1078			H.dyn.-X_e	1				
1629	1078			H.dyn.+Y_e	0.4				
1630	1078			H.dyn.sur.-X	1				
1631	1078			H.dyn.sur.+Y	0.4				
1632	1078			Xx	-1				
1633	1078			Xy	-0.4				
1634	1078			Xz	-0.4				
1635	1078			Yx	1				
1636	1078			Yy	0.4				
1637	1078			Yz	0.4				
1638	1078			Zx	-1				
1639	1078			Zy	-0.4				
1640	1078			Zz	-0.4				
1641	1078			AE	-1				
1642	1079	Linear Add	No	D	1	No	No	No	No
1643	1079			L	0.8				
1644	1079			Crane2	1				
1645	1079			H.rest	1				
1646	1079			F.stat	1				
1647	1079			H.sur.-X	1				
1648	1079			H.sur.-Y	1				
1649	1079			H.dyn.-X_e	1				
1650	1079			H.dyn.-Y_e	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1651	1079			H.dyn.sur.-X	1				
1652	1079			H.dyn.sur.-Y	0.4				
1653	1079			Xx	-1				
1654	1079			Xy	-0.4				
1655	1079			Xz	-0.4				
1656	1079			Yx	-1				
1657	1079			Yy	-0.4				
1658	1079			Yz	-0.4				
1659	1079			Zx	1				
1660	1079			Zy	0.4				
1661	1079			Zz	0.4				
1662	1079			AE	-1				
1663	1080	Linear Add	No	D	1	No	No	No	No
1664	1080			L	0.8				
1665	1080			Crane2	1				
1666	1080			H.rest	1				
1667	1080			F.stat	1				
1668	1080			H.sur.-X	1				
1669	1080			H.sur.-Y	1				
1670	1080			H.dyn.-X_e	1				
1671	1080			H.dyn.-Y_e	0.4				
1672	1080			H.dyn.sur.-X	1				
1673	1080			H.dyn.sur.-Y	0.4				
1674	1080			Xx	-1				
1675	1080			Xy	-0.4				
1676	1080			Xz	-0.4				
1677	1080			Yx	-1				
1678	1080			Yy	-0.4				
1679	1080			Yz	-0.4				
1680	1080			Zx	-1				
1681	1080			Zy	-0.4				
1682	1080			Zz	-0.4				
1683	1080			AE	-1				
1684	1081	Linear Add	No	D	1	No	No	No	No
1685	1081			L	0.8				
1686	1081			Crane2	1				
1687	1081			H.rest	1				
1688	1081			F.stat	1				
1689	1081			H.sur.+X	1				
1690	1081			H.sur.+Y	1				
1691	1081			H.dyn.+X_e	0.4				
1692	1081			H.dyn.+Y_e	1				
1693	1081			H.dyn.sur.+X	0.4				
1694	1081			H.dyn.sur.+Y	1				
1695	1081			Xx	0.4				
1696	1081			Xy	1				
1697	1081			Xz	0.4				
1698	1081			Yx	0.4				
1699	1081			Yy	1				
1700	1081			Yz	0.4				
1701	1081			Zx	0.4				
1702	1081			Zy	1				
1703	1081			Zz	0.4				
1704	1081			AE	-1				
1705	1082	Linear Add	No	D	1	No	No	No	No
1706	1082			L	0.8				
1707	1082			Crane2	1				
1708	1082			H.rest	1				
1709	1082			F.stat	1				
1710	1082			H.sur.+X	1				
1711	1082			H.sur.+Y	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1712	1082			H.dyn.+X_e	0.4				
1713	1082			H.dyn.+Y_e	1				
1714	1082			H.dyn.sur.+X	0.4				
1715	1082			H.dyn.sur.+Y	1				
1716	1082			Xx	0.4				
1717	1082			Xy	1				
1718	1082			Xz	0.4				
1719	1082			Yx	0.4				
1720	1082			Yy	1				
1721	1082			Yz	0.4				
1722	1082			Zx	-0.4				
1723	1082			Zy	-1				
1724	1082			Zz	-0.4				
1725	1082			AE	-1				
1726	1083	Linear Add	No	D	1	No	No	No	No
1727	1083			L	0.8				
1728	1083			Crane2	1				
1729	1083			H.rest	1				
1730	1083			F.stat	1				
1731	1083			H.sur.+X	1				
1732	1083			H.sur.-Y	1				
1733	1083			H.dyn.+X_e	0.4				
1734	1083			H.dyn.-Y_e	1				
1735	1083			H.dyn.sur.+X	0.4				
1736	1083			H.dyn.sur.-Y	1				
1737	1083			Xx	0.4				
1738	1083			Xy	1				
1739	1083			Xz	0.4				
1740	1083			Yx	-0.4				
1741	1083			Yy	-1				
1742	1083			Yz	-0.4				
1743	1083			Zx	0.4				
1744	1083			Zy	1				
1745	1083			Zz	0.4				
1746	1083			AE	-1				
1747	1084	Linear Add	No	D	1	No	No	No	No
1748	1084			L	0.8				
1749	1084			Crane2	1				
1750	1084			H.rest	1				
1751	1084			F.stat	1				
1752	1084			H.sur.+X	1				
1753	1084			H.sur.-Y	1				
1754	1084			H.dyn.+X_e	0.4				
1755	1084			H.dyn.-Y_e	1				
1756	1084			H.dyn.sur.+X	0.4				
1757	1084			H.dyn.sur.-Y	1				
1758	1084			Xx	0.4				
1759	1084			Xy	1				
1760	1084			Xz	0.4				
1761	1084			Yx	-0.4				
1762	1084			Yy	-1				
1763	1084			Yz	-0.4				
1764	1084			Zx	-0.4				
1765	1084			Zy	-1				
1766	1084			Zz	-0.4				
1767	1084			AE	-1				
1768	1085	Linear Add	No	D	1	No	No	No	No
1769	1085			L	0.8				
1770	1085			Crane2	1				
1771	1085			H.rest	1				
1772	1085			F.stat	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1773	1085			H.sur.-X	1				
1774	1085			H.sur.+Y	1				
1775	1085			H.dyn.-X_e	0.4				
1776	1085			H.dyn.+Y_e	1				
1777	1085			H.dyn.sur.-X	0.4				
1778	1085			H.dyn.sur.+Y	1				
1779	1085			Xx	-0.4				
1780	1085			Xy	-1				
1781	1085			Xz	-0.4				
1782	1085			Yx	0.4				
1783	1085			Yy	1				
1784	1085			Yz	0.4				
1785	1085			Zx	0.4				
1786	1085			Zy	1				
1787	1085			Zz	0.4				
1788	1085			AE	-1				
1789	1086	Linear Add	No	D	1	No	No	No	No
1790	1086			L	0.8				
1791	1086			Crane2	1				
1792	1086			H.rest	1				
1793	1086			F.stat	1				
1794	1086			H.sur.-X	1				
1795	1086			H.sur.+Y	1				
1796	1086			H.dyn.-X_e	0.4				
1797	1086			H.dyn.+Y_e	1				
1798	1086			H.dyn.sur.-X	0.4				
1799	1086			H.dyn.sur.+Y	1				
1800	1086			Xx	-0.4				
1801	1086			Xy	-1				
1802	1086			Xz	-0.4				
1803	1086			Yx	0.4				
1804	1086			Yy	1				
1805	1086			Yz	0.4				
1806	1086			Zx	-0.4				
1807	1086			Zy	-1				
1808	1086			Zz	-0.4				
1809	1086			AE	-1				
1810	1087	Linear Add	No	D	1	No	No	No	No
1811	1087			L	0.8				
1812	1087			Crane2	1				
1813	1087			H.rest	1				
1814	1087			F.stat	1				
1815	1087			H.sur.-X	1				
1816	1087			H.sur.-Y	1				
1817	1087			H.dyn.-X_e	0.4				
1818	1087			H.dyn.-Y_e	1				
1819	1087			H.dyn.sur.-X	0.4				
1820	1087			H.dyn.sur.-Y	1				
1821	1087			Xx	-0.4				
1822	1087			Xy	-1				
1823	1087			Xz	-0.4				
1824	1087			Yx	-0.4				
1825	1087			Yy	-1				
1826	1087			Yz	-0.4				
1827	1087			Zx	0.4				
1828	1087			Zy	1				
1829	1087			Zz	0.4				
1830	1087			AE	-1				
1831	1088	Linear Add	No	D	1	No	No	No	No
1832	1088			L	0.8				
1833	1088			Crane2	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1834	1088			H.rest	1				
1835	1088			F.stat	1				
1836	1088			H.sur.-X	1				
1837	1088			H.sur.-Y	1				
1838	1088			H.dyn.-X_e	0.4				
1839	1088			H.dyn.-Y_e	1				
1840	1088			H.dyn.sur.-X	0.4				
1841	1088			H.dyn.sur.-Y	1				
1842	1088			Xx	-0.4				
1843	1088			Xy	-1				
1844	1088			Xz	-0.4				
1845	1088			Yx	-0.4				
1846	1088			Yy	-1				
1847	1088			Yz	-0.4				
1848	1088			Zx	-0.4				
1849	1088			Zy	-1				
1850	1088			Zz	-0.4				
1851	1088			AE	-1				
1852	1089	Linear Add	No	D	1	No	No	No	No
1853	1089			L	0.8				
1854	1089			Crane2	1				
1855	1089			H.rest	1				
1856	1089			F.stat	1				
1857	1089			H.sur.+X	1				
1858	1089			H.sur.+Y	1				
1859	1089			H.dyn.+X_e	0.4				
1860	1089			H.dyn.+Y_e	0.4				
1861	1089			H.dyn.sur.+X	0.4				
1862	1089			H.dyn.sur.+Y	0.4				
1863	1089			Xx	0.4				
1864	1089			Xy	0.4				
1865	1089			Xz	1				
1866	1089			Yx	0.4				
1867	1089			Yy	0.4				
1868	1089			Yz	1				
1869	1089			Zx	0.4				
1870	1089			Zy	0.4				
1871	1089			Zz	1				
1872	1089			AE	-1				
1873	1090	Linear Add	No	D	1	No	No	No	No
1874	1090			L	0.8				
1875	1090			Crane2	1				
1876	1090			H.rest	1				
1877	1090			F.stat	1				
1878	1090			H.sur.+X	1				
1879	1090			H.sur.+Y	1				
1880	1090			H.dyn.+X_e	0.4				
1881	1090			H.dyn.+Y_e	0.4				
1882	1090			H.dyn.sur.+X	0.4				
1883	1090			H.dyn.sur.+Y	0.4				
1884	1090			Xx	0.4				
1885	1090			Xy	0.4				
1886	1090			Xz	1				
1887	1090			Yx	0.4				
1888	1090			Yy	0.4				
1889	1090			Yz	1				
1890	1090			Zx	-0.4				
1891	1090			Zy	-0.4				
1892	1090			Zz	-1				
1893	1090			AE	-1				
1894	1091	Linear Add	No	D	1	No	No	No	No

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1895	1091			L	0.8				
1896	1091			Crane2	1				
1897	1091			H.rest	1				
1898	1091			F.stat	1				
1899	1091			H.sur.+X	1				
1900	1091			H.sur.-Y	1				
1901	1091			H.dyn.+X_e	0.4				
1902	1091			H.dyn.-Y_e	0.4				
1903	1091			H.dyn.sur.+X	0.4				
1904	1091			H.dyn.sur.-Y	0.4				
1905	1091			Xx	0.4				
1906	1091			Xy	0.4				
1907	1091			Xz	1				
1908	1091			Yx	-0.4				
1909	1091			Yy	-0.4				
1910	1091			Yz	-1				
1911	1091			Zx	0.4				
1912	1091			Zy	0.4				
1913	1091			Zz	1				
1914	1091			AE	-1				
1915	1092	Linear Add	No	D	1	No	No	No	No
1916	1092			L	0.8				
1917	1092			Crane2	1				
1918	1092			H.rest	1				
1919	1092			F.stat	1				
1920	1092			H.sur.+X	1				
1921	1092			H.sur.-Y	1				
1922	1092			H.dyn.+X_e	0.4				
1923	1092			H.dyn.-Y_e	0.4				
1924	1092			H.dyn.sur.+X	0.4				
1925	1092			H.dyn.sur.-Y	0.4				
1926	1092			Xx	0.4				
1927	1092			Xy	0.4				
1928	1092			Xz	1				
1929	1092			Yx	-0.4				
1930	1092			Yy	-0.4				
1931	1092			Yz	-1				
1932	1092			Zx	-0.4				
1933	1092			Zy	-0.4				
1934	1092			Zz	-1				
1935	1092			AE	-1				
1936	1093	Linear Add	No	D	1	No	No	No	No
1937	1093			L	0.8				
1938	1093			Crane2	1				
1939	1093			H.rest	1				
1940	1093			F.stat	1				
1941	1093			H.sur.-X	1				
1942	1093			H.sur.+Y	1				
1943	1093			H.dyn.-X_e	0.4				
1944	1093			H.dyn.+Y_e	0.4				
1945	1093			H.dyn.sur.-X	0.4				
1946	1093			H.dyn.sur.+Y	0.4				
1947	1093			Xx	-0.4				
1948	1093			Xy	-0.4				
1949	1093			Xz	-1				
1950	1093			Yx	0.4				
1951	1093			Yy	0.4				
1952	1093			Yz	1				
1953	1093			Zx	0.4				
1954	1093			Zy	0.4				
1955	1093			Zz	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
1956	1093			AE	-1				
1957	1094	Linear Add	No	D	1	No	No	No	No
1958	1094			L	0.8				
1959	1094			Crane2	1				
1960	1094			H.rest	1				
1961	1094			F.stat	1				
1962	1094			H.sur.-X	1				
1963	1094			H.sur.+Y	1				
1964	1094			H.dyn.-X_e	0.4				
1965	1094			H.dyn.+Y_e	0.4				
1966	1094			H.dyn.sur.-X	0.4				
1967	1094			H.dyn.sur.+Y	0.4				
1968	1094			Xx	-0.4				
1969	1094			Xy	-0.4				
1970	1094			Xz	-1				
1971	1094			Yx	0.4				
1972	1094			Yy	0.4				
1973	1094			Yz	1				
1974	1094			Zx	-0.4				
1975	1094			Zy	-0.4				
1976	1094			Zz	-1				
1977	1094			AE	-1				
1978	1095	Linear Add	No	D	1	No	No	No	No
1979	1095			L	0.8				
1980	1095			Crane2	1				
1981	1095			H.rest	1				
1982	1095			F.stat	1				
1983	1095			H.sur.-X	1				
1984	1095			H.sur.-Y	1				
1985	1095			H.dyn.-X_e	0.4				
1986	1095			H.dyn.-Y_e	0.4				
1987	1095			H.dyn.sur.-X	0.4				
1988	1095			H.dyn.sur.-Y	0.4				
1989	1095			Xx	-0.4				
1990	1095			Xy	-0.4				
1991	1095			Xz	-1				
1992	1095			Yx	-0.4				
1993	1095			Yy	-0.4				
1994	1095			Yz	-1				
1995	1095			Zx	0.4				
1996	1095			Zy	0.4				
1997	1095			Zz	1				
1998	1095			AE	-1				
1999	1096	Linear Add	No	D	1	No	No	No	No
2000	1096			L	0.8				
2001	1096			Crane2	1				
2002	1096			H.rest	1				
2003	1096			F.stat	1				
2004	1096			H.sur.-X	1				
2005	1096			H.sur.-Y	1				
2006	1096			H.dyn.-X_e	0.4				
2007	1096			H.dyn.-Y_e	0.4				
2008	1096			H.dyn.sur.-X	0.4				
2009	1096			H.dyn.sur.-Y	0.4				
2010	1096			Xx	-0.4				
2011	1096			Xy	-0.4				
2012	1096			Xz	-1				
2013	1096			Yx	-0.4				
2014	1096			Yy	-0.4				
2015	1096			Yz	-1				
2016	1096			Zx	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2017	1096			Zy	-0.4				
2018	1096			Zz	-1				
2019	1096			AE	-1				
2020	1097	Linear Add	No	D	1	No	No	No	No
2021	1097			L	0.8				
2022	1097			Crane3	1				
2023	1097			H.rest	1				
2024	1097			F.stat	1				
2025	1097			H.sur.+X	1				
2026	1097			H.sur.+Y	1				
2027	1097			H.dyn.+X_e	1				
2028	1097			H.dyn.+Y_e	0.4				
2029	1097			H.dyn.sur.+X	1				
2030	1097			H.dyn.sur.+Y	0.4				
2031	1097			Xx	1				
2032	1097			Xy	0.4				
2033	1097			Xz	0.4				
2034	1097			Yx	1				
2035	1097			Yy	0.4				
2036	1097			Yz	0.4				
2037	1097			Zx	1				
2038	1097			Zy	0.4				
2039	1097			Zz	0.4				
2040	1097			AE	1				
2041	1098	Linear Add	No	D	1	No	No	No	No
2042	1098			L	0.8				
2043	1098			Crane3	1				
2044	1098			H.rest	1				
2045	1098			F.stat	1				
2046	1098			H.sur.+X	1				
2047	1098			H.sur.+Y	1				
2048	1098			H.dyn.+X_e	1				
2049	1098			H.dyn.+Y_e	0.4				
2050	1098			H.dyn.sur.+X	1				
2051	1098			H.dyn.sur.+Y	0.4				
2052	1098			Xx	1				
2053	1098			Xy	0.4				
2054	1098			Xz	0.4				
2055	1098			Yx	1				
2056	1098			Yy	0.4				
2057	1098			Yz	0.4				
2058	1098			Zx	-1				
2059	1098			Zy	-0.4				
2060	1098			Zz	-0.4				
2061	1098			AE	1				
2062	1099	Linear Add	No	D	1	No	No	No	No
2063	1099			L	0.8				
2064	1099			Crane3	1				
2065	1099			H.rest	1				
2066	1099			F.stat	1				
2067	1099			H.sur.+X	1				
2068	1099			H.sur.-Y	1				
2069	1099			H.dyn.+X_e	1				
2070	1099			H.dyn.-Y_e	0.4				
2071	1099			H.dyn.sur.+X	1				
2072	1099			H.dyn.sur.-Y	0.4				
2073	1099			Xx	1				
2074	1099			Xy	0.4				
2075	1099			Xz	0.4				
2076	1099			Yx	-1				
2077	1099			Yy	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2078	1099			Yz	-0.4				
2079	1099			Zx	1				
2080	1099			Zy	0.4				
2081	1099			Zz	0.4				
2082	1099			AE	1				
2083	1100	Linear Add	No	D	1	No	No	No	No
2084	1100			L	0.8				
2085	1100			Crane3	1				
2086	1100			H.rest	1				
2087	1100			F.stat	1				
2088	1100			H.sur.+X	1				
2089	1100			H.sur.-Y	1				
2090	1100			H.dyn.+X_e	1				
2091	1100			H.dyn.-Y_e	0.4				
2092	1100			H.dyn.sur.+X	1				
2093	1100			H.dyn.sur.-Y	0.4				
2094	1100			Xx	1				
2095	1100			Xy	0.4				
2096	1100			Xz	0.4				
2097	1100			Yx	-1				
2098	1100			Yy	-0.4				
2099	1100			Yz	-0.4				
2100	1100			Zx	-1				
2101	1100			Zy	-0.4				
2102	1100			Zz	-0.4				
2103	1100			AE	1				
2104	1101	Linear Add	No	D	1	No	No	No	No
2105	1101			L	0.8				
2106	1101			Crane3	1				
2107	1101			H.rest	1				
2108	1101			F.stat	1				
2109	1101			H.sur.-X	1				
2110	1101			H.sur.+Y	1				
2111	1101			H.dyn.-X_e	1				
2112	1101			H.dyn.+Y_e	0.4				
2113	1101			H.dyn.sur.-X	1				
2114	1101			H.dyn.sur.+Y	0.4				
2115	1101			Xx	-1				
2116	1101			Xy	-0.4				
2117	1101			Xz	-0.4				
2118	1101			Yx	1				
2119	1101			Yy	0.4				
2120	1101			Yz	0.4				
2121	1101			Zx	1				
2122	1101			Zy	0.4				
2123	1101			Zz	0.4				
2124	1101			AE	1				
2125	1102	Linear Add	No	D	1	No	No	No	No
2126	1102			L	0.8				
2127	1102			Crane3	1				
2128	1102			H.rest	1				
2129	1102			F.stat	1				
2130	1102			H.sur.-X	1				
2131	1102			H.sur.+Y	1				
2132	1102			H.dyn.-X_e	1				
2133	1102			H.dyn.+Y_e	0.4				
2134	1102			H.dyn.sur.-X	1				
2135	1102			H.dyn.sur.+Y	0.4				
2136	1102			Xx	-1				
2137	1102			Xy	-0.4				
2138	1102			Xz	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2139	1102			Yx	1				
2140	1102			Yy	0.4				
2141	1102			Yz	0.4				
2142	1102			Zx	-1				
2143	1102			Zy	-0.4				
2144	1102			Zz	-0.4				
2145	1102			AE	1				
2146	1103	Linear Add	No	D	1	No	No	No	No
2147	1103			L	0.8				
2148	1103			Crane3	1				
2149	1103			H.rest	1				
2150	1103			F.stat	1				
2151	1103			H.sur.-X	1				
2152	1103			H.sur.-Y	1				
2153	1103			H.dyn.-X_e	1				
2154	1103			H.dyn.-Y_e	0.4				
2155	1103			H.dyn.sur.-X	1				
2156	1103			H.dyn.sur.-Y	0.4				
2157	1103			Xx	-1				
2158	1103			Xy	-0.4				
2159	1103			Xz	-0.4				
2160	1103			Yx	-1				
2161	1103			Yy	-0.4				
2162	1103			Yz	-0.4				
2163	1103			Zx	1				
2164	1103			Zy	0.4				
2165	1103			Zz	0.4				
2166	1103			AE	1				
2167	1104	Linear Add	No	D	1	No	No	No	No
2168	1104			L	0.8				
2169	1104			Crane3	1				
2170	1104			H.rest	1				
2171	1104			F.stat	1				
2172	1104			H.sur.-X	1				
2173	1104			H.sur.-Y	1				
2174	1104			H.dyn.-X_e	1				
2175	1104			H.dyn.-Y_e	0.4				
2176	1104			H.dyn.sur.-X	1				
2177	1104			H.dyn.sur.-Y	0.4				
2178	1104			Xx	-1				
2179	1104			Xy	-0.4				
2180	1104			Xz	-0.4				
2181	1104			Yx	-1				
2182	1104			Yy	-0.4				
2183	1104			Yz	-0.4				
2184	1104			Zx	-1				
2185	1104			Zy	-0.4				
2186	1104			Zz	-0.4				
2187	1104			AE	1				
2188	1105	Linear Add	No	D	1	No	No	No	No
2189	1105			L	0.8				
2190	1105			Crane3	1				
2191	1105			H.rest	1				
2192	1105			F.stat	1				
2193	1105			H.sur.+X	1				
2194	1105			H.sur.+Y	1				
2195	1105			H.dyn.+X_e	0.4				
2196	1105			H.dyn.+Y_e	1				
2197	1105			H.dyn.sur.+X	0.4				
2198	1105			H.dyn.sur.+Y	1				
2199	1105			Xx	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2200	1105			Xy	1				
2201	1105			Xz	0.4				
2202	1105			Yx	0.4				
2203	1105			Yy	1				
2204	1105			Yz	0.4				
2205	1105			Zx	0.4				
2206	1105			Zy	1				
2207	1105			Zz	0.4				
2208	1105			AE	1				
2209	1106	Linear Add	No	D	1	No	No	No	No
2210	1106			L	0.8				
2211	1106			Crane3	1				
2212	1106			H.rest	1				
2213	1106			F.stat	1				
2214	1106			H.sur.+X	1				
2215	1106			H.sur.+Y	1				
2216	1106			H.dyn.+X_e	0.4				
2217	1106			H.dyn.+Y_e	1				
2218	1106			H.dyn.sur.+X	0.4				
2219	1106			H.dyn.sur.+Y	1				
2220	1106			Xx	0.4				
2221	1106			Xy	1				
2222	1106			Xz	0.4				
2223	1106			Yx	0.4				
2224	1106			Yy	1				
2225	1106			Yz	0.4				
2226	1106			Zx	-0.4				
2227	1106			Zy	-1				
2228	1106			Zz	-0.4				
2229	1106			AE	1				
2230	1107	Linear Add	No	D	1	No	No	No	No
2231	1107			L	0.8				
2232	1107			Crane3	1				
2233	1107			H.rest	1				
2234	1107			F.stat	1				
2235	1107			H.sur.+X	1				
2236	1107			H.sur.-Y	1				
2237	1107			H.dyn.+X_e	0.4				
2238	1107			H.dyn.-Y_e	1				
2239	1107			H.dyn.sur.+X	0.4				
2240	1107			H.dyn.sur.-Y	1				
2241	1107			Xx	0.4				
2242	1107			Xy	1				
2243	1107			Xz	0.4				
2244	1107			Yx	-0.4				
2245	1107			Yy	-1				
2246	1107			Yz	-0.4				
2247	1107			Zx	0.4				
2248	1107			Zy	1				
2249	1107			Zz	0.4				
2250	1107			AE	1				
2251	1108	Linear Add	No	D	1	No	No	No	No
2252	1108			L	0.8				
2253	1108			Crane3	1				
2254	1108			H.rest	1				
2255	1108			F.stat	1				
2256	1108			H.sur.+X	1				
2257	1108			H.sur.-Y	1				
2258	1108			H.dyn.+X_e	0.4				
2259	1108			H.dyn.-Y_e	1				
2260	1108			H.dyn.sur.+X	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2261	1108			H.dyn.sur.-Y	1				
2262	1108			Xx	0.4				
2263	1108			Xy	1				
2264	1108			Xz	0.4				
2265	1108			Yx	-0.4				
2266	1108			Yy	-1				
2267	1108			Yz	-0.4				
2268	1108			Zx	-0.4				
2269	1108			Zy	-1				
2270	1108			Zz	-0.4				
2271	1108			AE	1				
2272	1109	Linear Add	No	D	1	No	No	No	No
2273	1109			L	0.8				
2274	1109			Crane3	1				
2275	1109			H.rest	1				
2276	1109			F.stat	1				
2277	1109			H.sur.-X	1				
2278	1109			H.sur.+Y	1				
2279	1109			H.dyn.-X_e	0.4				
2280	1109			H.dyn.+Y_e	1				
2281	1109			H.dyn.sur.-X	0.4				
2282	1109			H.dyn.sur.+Y	1				
2283	1109			Xx	-0.4				
2284	1109			Xy	-1				
2285	1109			Xz	-0.4				
2286	1109			Yx	0.4				
2287	1109			Yy	1				
2288	1109			Yz	0.4				
2289	1109			Zx	0.4				
2290	1109			Zy	1				
2291	1109			Zz	0.4				
2292	1109			AE	1				
2293	1110	Linear Add	No	D	1	No	No	No	No
2294	1110			L	0.8				
2295	1110			Crane3	1				
2296	1110			H.rest	1				
2297	1110			F.stat	1				
2298	1110			H.sur.-X	1				
2299	1110			H.sur.+Y	1				
2300	1110			H.dyn.-X_e	0.4				
2301	1110			H.dyn.+Y_e	1				
2302	1110			H.dyn.sur.-X	0.4				
2303	1110			H.dyn.sur.+Y	1				
2304	1110			Xx	-0.4				
2305	1110			Xy	-1				
2306	1110			Xz	-0.4				
2307	1110			Yx	0.4				
2308	1110			Yy	1				
2309	1110			Yz	0.4				
2310	1110			Zx	-0.4				
2311	1110			Zy	-1				
2312	1110			Zz	-0.4				
2313	1110			AE	1				
2314	1111	Linear Add	No	D	1	No	No	No	No
2315	1111			L	0.8				
2316	1111			Crane3	1				
2317	1111			H.rest	1				
2318	1111			F.stat	1				
2319	1111			H.sur.-X	1				
2320	1111			H.sur.-Y	1				
2321	1111			H.dyn.-X_e	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2322	1111			H.dyn.-Y_e	1				
2323	1111			H.dyn.sur.-X	0.4				
2324	1111			H.dyn.sur.-Y	1				
2325	1111			Xx	-0.4				
2326	1111			Xy	-1				
2327	1111			Xz	-0.4				
2328	1111			Yx	-0.4				
2329	1111			Yy	-1				
2330	1111			Yz	-0.4				
2331	1111			Zx	0.4				
2332	1111			Zy	1				
2333	1111			Zz	0.4				
2334	1111			AE	1				
2335	1112	Linear Add	No	D	1	No	No	No	No
2336	1112			L	0.8				
2337	1112			Crane3	1				
2338	1112			H.rest	1				
2339	1112			F.stat	1				
2340	1112			H.sur.-X	1				
2341	1112			H.sur.-Y	1				
2342	1112			H.dyn.-X_e	0.4				
2343	1112			H.dyn.-Y_e	1				
2344	1112			H.dyn.sur.-X	0.4				
2345	1112			H.dyn.sur.-Y	1				
2346	1112			Xx	-0.4				
2347	1112			Xy	-1				
2348	1112			Xz	-0.4				
2349	1112			Yx	-0.4				
2350	1112			Yy	-1				
2351	1112			Yz	-0.4				
2352	1112			Zx	-0.4				
2353	1112			Zy	-1				
2354	1112			Zz	-0.4				
2355	1112			AE	1				
2356	1113	Linear Add	No	D	1	No	No	No	No
2357	1113			L	0.8				
2358	1113			Crane3	1				
2359	1113			H.rest	1				
2360	1113			F.stat	1				
2361	1113			H.sur.+X	1				
2362	1113			H.sur.+Y	1				
2363	1113			H.dyn.+X_e	0.4				
2364	1113			H.dyn.+Y_e	0.4				
2365	1113			H.dyn.sur.+X	0.4				
2366	1113			H.dyn.sur.+Y	0.4				
2367	1113			Xx	0.4				
2368	1113			Xy	0.4				
2369	1113			Xz	1				
2370	1113			Yx	0.4				
2371	1113			Yy	0.4				
2372	1113			Yz	1				
2373	1113			Zx	0.4				
2374	1113			Zy	0.4				
2375	1113			Zz	1				
2376	1113			AE	1				
2377	1114	Linear Add	No	D	1	No	No	No	No
2378	1114			L	0.8				
2379	1114			Crane3	1				
2380	1114			H.rest	1				
2381	1114			F.stat	1				
2382	1114			H.sur.+X	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2383	1114			H.sur.+Y	1				
2384	1114			H.dyn.+X_e	0.4				
2385	1114			H.dyn.+Y_e	0.4				
2386	1114			H.dyn.sur.+X	0.4				
2387	1114			H.dyn.sur.+Y	0.4				
2388	1114			Xx	0.4				
2389	1114			Xy	0.4				
2390	1114			Xz	1				
2391	1114			Yx	0.4				
2392	1114			Yy	0.4				
2393	1114			Yz	1				
2394	1114			Zx	-0.4				
2395	1114			Zy	-0.4				
2396	1114			Zz	-1				
2397	1114			AE	1				
2398	1115	Linear Add	No	D	1	No	No	No	No
2399	1115			L	0.8				
2400	1115			Crane3	1				
2401	1115			H.rest	1				
2402	1115			F.stat	1				
2403	1115			H.sur.+X	1				
2404	1115			H.sur.-Y	1				
2405	1115			H.dyn.+X_e	0.4				
2406	1115			H.dyn.-Y_e	0.4				
2407	1115			H.dyn.sur.+X	0.4				
2408	1115			H.dyn.sur.-Y	0.4				
2409	1115			Xx	0.4				
2410	1115			Xy	0.4				
2411	1115			Xz	1				
2412	1115			Yx	-0.4				
2413	1115			Yy	-0.4				
2414	1115			Yz	-1				
2415	1115			Zx	0.4				
2416	1115			Zy	0.4				
2417	1115			Zz	1				
2418	1115			AE	1				
2419	1116	Linear Add	No	D	1	No	No	No	No
2420	1116			L	0.8				
2421	1116			Crane3	1				
2422	1116			H.rest	1				
2423	1116			F.stat	1				
2424	1116			H.sur.+X	1				
2425	1116			H.sur.-Y	1				
2426	1116			H.dyn.+X_e	0.4				
2427	1116			H.dyn.-Y_e	0.4				
2428	1116			H.dyn.sur.+X	0.4				
2429	1116			H.dyn.sur.-Y	0.4				
2430	1116			Xx	0.4				
2431	1116			Xy	0.4				
2432	1116			Xz	1				
2433	1116			Yx	-0.4				
2434	1116			Yy	-0.4				
2435	1116			Yz	-1				
2436	1116			Zx	-0.4				
2437	1116			Zy	-0.4				
2438	1116			Zz	-1				
2439	1116			AE	1				
2440	1117	Linear Add	No	D	1	No	No	No	No
2441	1117			L	0.8				
2442	1117			Crane3	1				
2443	1117			H.rest	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2444	1117			F.stat	1				
2445	1117			H.sur.-X	1				
2446	1117			H.sur.+Y	1				
2447	1117			H.dyn.-X_e	0.4				
2448	1117			H.dyn.+Y_e	0.4				
2449	1117			H.dyn.sur.-X	0.4				
2450	1117			H.dyn.sur.+Y	0.4				
2451	1117			Xx	-0.4				
2452	1117			Xy	-0.4				
2453	1117			Xz	-1				
2454	1117			Yx	0.4				
2455	1117			Yy	0.4				
2456	1117			Yz	1				
2457	1117			Zx	0.4				
2458	1117			Zy	0.4				
2459	1117			Zz	1				
2460	1117			AE	1				
2461	1118	Linear Add	No	D	1	No	No	No	No
2462	1118			L	0.8				
2463	1118			Crane3	1				
2464	1118			H.rest	1				
2465	1118			F.stat	1				
2466	1118			H.sur.-X	1				
2467	1118			H.sur.+Y	1				
2468	1118			H.dyn.-X_e	0.4				
2469	1118			H.dyn.+Y_e	0.4				
2470	1118			H.dyn.sur.-X	0.4				
2471	1118			H.dyn.sur.+Y	0.4				
2472	1118			Xx	-0.4				
2473	1118			Xy	-0.4				
2474	1118			Xz	-1				
2475	1118			Yx	0.4				
2476	1118			Yy	0.4				
2477	1118			Yz	1				
2478	1118			Zx	-0.4				
2479	1118			Zy	-0.4				
2480	1118			Zz	-1				
2481	1118			AE	1				
2482	1119	Linear Add	No	D	1	No	No	No	No
2483	1119			L	0.8				
2484	1119			Crane3	1				
2485	1119			H.rest	1				
2486	1119			F.stat	1				
2487	1119			H.sur.-X	1				
2488	1119			H.sur.-Y	1				
2489	1119			H.dyn.-X_e	0.4				
2490	1119			H.dyn.-Y_e	0.4				
2491	1119			H.dyn.sur.-X	0.4				
2492	1119			H.dyn.sur.-Y	0.4				
2493	1119			Xx	-0.4				
2494	1119			Xy	-0.4				
2495	1119			Xz	-1				
2496	1119			Yx	-0.4				
2497	1119			Yy	-0.4				
2498	1119			Yz	-1				
2499	1119			Zx	0.4				
2500	1119			Zy	0.4				
2501	1119			Zz	1				
2502	1119			AE	1				
2503	1120	Linear Add	No	D	1	No	No	No	No
2504	1120			L	0.8				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2505	1120			Crane3	1				
2506	1120			H.rest	1				
2507	1120			F.stat	1				
2508	1120			H.sur.-X	1				
2509	1120			H.sur.-Y	1				
2510	1120			H.dyn.-X_e	0.4				
2511	1120			H.dyn.-Y_e	0.4				
2512	1120			H.dyn.sur.-X	0.4				
2513	1120			H.dyn.sur.-Y	0.4				
2514	1120			Xx	-0.4				
2515	1120			Xy	-0.4				
2516	1120			Xz	-1				
2517	1120			Yx	-0.4				
2518	1120			Yy	-0.4				
2519	1120			Yz	-1				
2520	1120			Zx	-0.4				
2521	1120			Zy	-0.4				
2522	1120			Zz	-1				
2523	1120			AE	1				
2524	1121	Linear Add	No	D	1	No	No	No	No
2525	1121			L	0.8				
2526	1121			Crane3	1				
2527	1121			H.rest	1				
2528	1121			F.stat	1				
2529	1121			H.sur.+X	1				
2530	1121			H.sur.+Y	1				
2531	1121			H.dyn.+X_e	1				
2532	1121			H.dyn.+Y_e	0.4				
2533	1121			H.dyn.sur.+X	1				
2534	1121			H.dyn.sur.+Y	0.4				
2535	1121			Xx	1				
2536	1121			Xy	0.4				
2537	1121			Xz	0.4				
2538	1121			Yx	1				
2539	1121			Yy	0.4				
2540	1121			Yz	0.4				
2541	1121			Zx	1				
2542	1121			Zy	0.4				
2543	1121			Zz	0.4				
2544	1121			AE	-1				
2545	1122	Linear Add	No	D	1	No	No	No	No
2546	1122			L	0.8				
2547	1122			Crane3	1				
2548	1122			H.rest	1				
2549	1122			F.stat	1				
2550	1122			H.sur.+X	1				
2551	1122			H.sur.+Y	1				
2552	1122			H.dyn.+X_e	1				
2553	1122			H.dyn.+Y_e	0.4				
2554	1122			H.dyn.sur.+X	1				
2555	1122			H.dyn.sur.+Y	0.4				
2556	1122			Xx	1				
2557	1122			Xy	0.4				
2558	1122			Xz	0.4				
2559	1122			Yx	1				
2560	1122			Yy	0.4				
2561	1122			Yz	0.4				
2562	1122			Zx	-1				
2563	1122			Zy	-0.4				
2564	1122			Zz	-0.4				
2565	1122			AE	-1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2566	1123	Linear Add	No	D	1	No	No	No	No
2567	1123			L	0.8				
2568	1123			Crane3	1				
2569	1123			H.rest	1				
2570	1123			F.stat	1				
2571	1123			H.sur.+X	1				
2572	1123			H.sur.-Y	1				
2573	1123			H.dyn.+X_e	1				
2574	1123			H.dyn.-Y_e	0.4				
2575	1123			H.dyn.sur.+X	1				
2576	1123			H.dyn.sur.-Y	0.4				
2577	1123			Xx	1				
2578	1123			Xy	0.4				
2579	1123			Xz	0.4				
2580	1123			Yx	-1				
2581	1123			Yy	-0.4				
2582	1123			Yz	-0.4				
2583	1123			Zx	1				
2584	1123			Zy	0.4				
2585	1123			Zz	0.4				
2586	1123			AE	-1				
2587	1124	Linear Add	No	D	1	No	No	No	No
2588	1124			L	0.8				
2589	1124			Crane3	1				
2590	1124			H.rest	1				
2591	1124			F.stat	1				
2592	1124			H.sur.+X	1				
2593	1124			H.sur.-Y	1				
2594	1124			H.dyn.+X_e	1				
2595	1124			H.dyn.-Y_e	0.4				
2596	1124			H.dyn.sur.+X	1				
2597	1124			H.dyn.sur.-Y	0.4				
2598	1124			Xx	1				
2599	1124			Xy	0.4				
2600	1124			Xz	0.4				
2601	1124			Yx	-1				
2602	1124			Yy	-0.4				
2603	1124			Yz	-0.4				
2604	1124			Zx	-1				
2605	1124			Zy	-0.4				
2606	1124			Zz	-0.4				
2607	1124			AE	-1				
2608	1125	Linear Add	No	D	1	No	No	No	No
2609	1125			L	0.8				
2610	1125			Crane3	1				
2611	1125			H.rest	1				
2612	1125			F.stat	1				
2613	1125			H.sur.-X	1				
2614	1125			H.sur.+Y	1				
2615	1125			H.dyn.-X_e	1				
2616	1125			H.dyn.+Y_e	0.4				
2617	1125			H.dyn.sur.-X	1				
2618	1125			H.dyn.sur.+Y	0.4				
2619	1125			Xx	-1				
2620	1125			Xy	-0.4				
2621	1125			Xz	-0.4				
2622	1125			Yx	1				
2623	1125			Yy	0.4				
2624	1125			Yz	0.4				
2625	1125			Zx	1				
2626	1125			Zy	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2627	1125			Zz	0.4				
2628	1125			AE	-1				
2629	1126	Linear Add	No	D	1	No	No	No	No
2630	1126			L	0.8				
2631	1126			Crane3	1				
2632	1126			H.rest	1				
2633	1126			F.stat	1				
2634	1126			H.sur.-X	1				
2635	1126			H.sur.+Y	1				
2636	1126			H.dyn.-X_e	1				
2637	1126			H.dyn.+Y_e	0.4				
2638	1126			H.dyn.sur.-X	1				
2639	1126			H.dyn.sur.+Y	0.4				
2640	1126			Xx	-1				
2641	1126			Xy	-0.4				
2642	1126			Xz	-0.4				
2643	1126			Yx	1				
2644	1126			Yy	0.4				
2645	1126			Yz	0.4				
2646	1126			Zx	-1				
2647	1126			Zy	-0.4				
2648	1126			Zz	-0.4				
2649	1126			AE	-1				
2650	1127	Linear Add	No	D	1	No	No	No	No
2651	1127			L	0.8				
2652	1127			Crane3	1				
2653	1127			H.rest	1				
2654	1127			F.stat	1				
2655	1127			H.sur.-X	1				
2656	1127			H.sur.-Y	1				
2657	1127			H.dyn.-X_e	1				
2658	1127			H.dyn.-Y_e	0.4				
2659	1127			H.dyn.sur.-X	1				
2660	1127			H.dyn.sur.-Y	0.4				
2661	1127			Xx	-1				
2662	1127			Xy	-0.4				
2663	1127			Xz	-0.4				
2664	1127			Yx	-1				
2665	1127			Yy	-0.4				
2666	1127			Yz	-0.4				
2667	1127			Zx	1				
2668	1127			Zy	0.4				
2669	1127			Zz	0.4				
2670	1127			AE	-1				
2671	1128	Linear Add	No	D	1	No	No	No	No
2672	1128			L	0.8				
2673	1128			Crane3	1				
2674	1128			H.rest	1				
2675	1128			F.stat	1				
2676	1128			H.sur.-X	1				
2677	1128			H.sur.-Y	1				
2678	1128			H.dyn.-X_e	1				
2679	1128			H.dyn.-Y_e	0.4				
2680	1128			H.dyn.sur.-X	1				
2681	1128			H.dyn.sur.-Y	0.4				
2682	1128			Xx	-1				
2683	1128			Xy	-0.4				
2684	1128			Xz	-0.4				
2685	1128			Yx	-1				
2686	1128			Yy	-0.4				
2687	1128			Yz	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2688	1128			Zx	-1				
2689	1128			Zy	-0.4				
2690	1128			Zz	-0.4				
2691	1128			AE	-1				
2692	1129	Linear Add	No	D	1	No	No	No	No
2693	1129			L	0.8				
2694	1129			Crane3	1				
2695	1129			H.rest	1				
2696	1129			F.stat	1				
2697	1129			H.sur.+X	1				
2698	1129			H.sur.+Y	1				
2699	1129			H.dyn.+X_e	0.4				
2700	1129			H.dyn.+Y_e	1				
2701	1129			H.dyn.sur.+X	0.4				
2702	1129			H.dyn.sur.+Y	1				
2703	1129			Xx	0.4				
2704	1129			Xy	1				
2705	1129			Xz	0.4				
2706	1129			Yx	0.4				
2707	1129			Yy	1				
2708	1129			Yz	0.4				
2709	1129			Zx	0.4				
2710	1129			Zy	1				
2711	1129			Zz	0.4				
2712	1129			AE	-1				
2713	1130	Linear Add	No	D	1	No	No	No	No
2714	1130			L	0.8				
2715	1130			Crane3	1				
2716	1130			H.rest	1				
2717	1130			F.stat	1				
2718	1130			H.sur.+X	1				
2719	1130			H.sur.+Y	1				
2720	1130			H.dyn.+X_e	0.4				
2721	1130			H.dyn.+Y_e	1				
2722	1130			H.dyn.sur.+X	0.4				
2723	1130			H.dyn.sur.+Y	1				
2724	1130			Xx	0.4				
2725	1130			Xy	1				
2726	1130			Xz	0.4				
2727	1130			Yx	0.4				
2728	1130			Yy	1				
2729	1130			Yz	0.4				
2730	1130			Zx	-0.4				
2731	1130			Zy	-1				
2732	1130			Zz	-0.4				
2733	1130			AE	-1				
2734	1131	Linear Add	No	D	1	No	No	No	No
2735	1131			L	0.8				
2736	1131			Crane3	1				
2737	1131			H.rest	1				
2738	1131			F.stat	1				
2739	1131			H.sur.+X	1				
2740	1131			H.sur.-Y	1				
2741	1131			H.dyn.+X_e	0.4				
2742	1131			H.dyn.-Y_e	1				
2743	1131			H.dyn.sur.+X	0.4				
2744	1131			H.dyn.sur.-Y	1				
2745	1131			Xx	0.4				
2746	1131			Xy	1				
2747	1131			Xz	0.4				
2748	1131			Yx	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2749	1131			Yy	-1				
2750	1131			Yz	-0.4				
2751	1131			Zx	0.4				
2752	1131			Zy	1				
2753	1131			Zz	0.4				
2754	1131			AE	-1				
2755	1132	Linear Add	No	D	1	No	No	No	No
2756	1132			L	0.8				
2757	1132			Crane3	1				
2758	1132			H.rest	1				
2759	1132			F.stat	1				
2760	1132			H.sur.+X	1				
2761	1132			H.sur.-Y	1				
2762	1132			H.dyn.+X_e	0.4				
2763	1132			H.dyn.-Y_e	1				
2764	1132			H.dyn.sur.+X	0.4				
2765	1132			H.dyn.sur.-Y	1				
2766	1132			Xx	0.4				
2767	1132			Xy	1				
2768	1132			Xz	0.4				
2769	1132			Yx	-0.4				
2770	1132			Yy	-1				
2771	1132			Yz	-0.4				
2772	1132			Zx	-0.4				
2773	1132			Zy	-1				
2774	1132			Zz	-0.4				
2775	1132			AE	-1				
2776	1133	Linear Add	No	D	1	No	No	No	No
2777	1133			L	0.8				
2778	1133			Crane3	1				
2779	1133			H.rest	1				
2780	1133			F.stat	1				
2781	1133			H.sur.-X	1				
2782	1133			H.sur.+Y	1				
2783	1133			H.dyn.-X_e	0.4				
2784	1133			H.dyn.+Y_e	1				
2785	1133			H.dyn.sur.-X	0.4				
2786	1133			H.dyn.sur.+Y	1				
2787	1133			Xx	-0.4				
2788	1133			Xy	-1				
2789	1133			Xz	-0.4				
2790	1133			Yx	0.4				
2791	1133			Yy	1				
2792	1133			Yz	0.4				
2793	1133			Zx	0.4				
2794	1133			Zy	1				
2795	1133			Zz	0.4				
2796	1133			AE	-1				
2797	1134	Linear Add	No	D	1	No	No	No	No
2798	1134			L	0.8				
2799	1134			Crane3	1				
2800	1134			H.rest	1				
2801	1134			F.stat	1				
2802	1134			H.sur.-X	1				
2803	1134			H.sur.+Y	1				
2804	1134			H.dyn.-X_e	0.4				
2805	1134			H.dyn.+Y_e	1				
2806	1134			H.dyn.sur.-X	0.4				
2807	1134			H.dyn.sur.+Y	1				
2808	1134			Xx	-0.4				
2809	1134			Xy	-1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2810	1134			Xz	-0.4				
2811	1134			Yx	0.4				
2812	1134			Yy	1				
2813	1134			Yz	0.4				
2814	1134			Zx	-0.4				
2815	1134			Zy	-1				
2816	1134			Zz	-0.4				
2817	1134			AE	-1				
2818	1135	Linear Add	No	D	1	No	No	No	No
2819	1135			L	0.8				
2820	1135			Crane3	1				
2821	1135			H.rest	1				
2822	1135			F.stat	1				
2823	1135			H.sur.-X	1				
2824	1135			H.sur.-Y	1				
2825	1135			H.dyn.-X_e	0.4				
2826	1135			H.dyn.-Y_e	1				
2827	1135			H.dyn.sur.-X	0.4				
2828	1135			H.dyn.sur.-Y	1				
2829	1135			Xx	-0.4				
2830	1135			Xy	-1				
2831	1135			Xz	-0.4				
2832	1135			Yx	-0.4				
2833	1135			Yy	-1				
2834	1135			Yz	-0.4				
2835	1135			Zx	0.4				
2836	1135			Zy	1				
2837	1135			Zz	0.4				
2838	1135			AE	-1				
2839	1136	Linear Add	No	D	1	No	No	No	No
2840	1136			L	0.8				
2841	1136			Crane3	1				
2842	1136			H.rest	1				
2843	1136			F.stat	1				
2844	1136			H.sur.-X	1				
2845	1136			H.sur.-Y	1				
2846	1136			H.dyn.-X_e	0.4				
2847	1136			H.dyn.-Y_e	1				
2848	1136			H.dyn.sur.-X	0.4				
2849	1136			H.dyn.sur.-Y	1				
2850	1136			Xx	-0.4				
2851	1136			Xy	-1				
2852	1136			Xz	-0.4				
2853	1136			Yx	-0.4				
2854	1136			Yy	-1				
2855	1136			Yz	-0.4				
2856	1136			Zx	-0.4				
2857	1136			Zy	-1				
2858	1136			Zz	-0.4				
2859	1136			AE	-1				
2860	1137	Linear Add	No	D	1	No	No	No	No
2861	1137			L	0.8				
2862	1137			Crane3	1				
2863	1137			H.rest	1				
2864	1137			F.stat	1				
2865	1137			H.sur.+X	1				
2866	1137			H.sur.+Y	1				
2867	1137			H.dyn.+X_e	0.4				
2868	1137			H.dyn.+Y_e	0.4				
2869	1137			H.dyn.sur.+X	0.4				
2870	1137			H.dyn.sur.+Y	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2871	1137			Xx	0.4				
2872	1137			Xy	0.4				
2873	1137			Xz	1				
2874	1137			Yx	0.4				
2875	1137			Yy	0.4				
2876	1137			Yz	1				
2877	1137			Zx	0.4				
2878	1137			Zy	0.4				
2879	1137			Zz	1				
2880	1137			AE	-1				
2881	1138	Linear Add	No	D	1	No	No	No	No
2882	1138			L	0.8				
2883	1138			Crane3	1				
2884	1138			H.rest	1				
2885	1138			F.stat	1				
2886	1138			H.sur.+X	1				
2887	1138			H.sur.+Y	1				
2888	1138			H.dyn.+X_e	0.4				
2889	1138			H.dyn.+Y_e	0.4				
2890	1138			H.dyn.sur.+X	0.4				
2891	1138			H.dyn.sur.+Y	0.4				
2892	1138			Xx	0.4				
2893	1138			Xy	0.4				
2894	1138			Xz	1				
2895	1138			Yx	0.4				
2896	1138			Yy	0.4				
2897	1138			Yz	1				
2898	1138			Zx	-0.4				
2899	1138			Zy	-0.4				
2900	1138			Zz	-1				
2901	1138			AE	-1				
2902	1139	Linear Add	No	D	1	No	No	No	No
2903	1139			L	0.8				
2904	1139			Crane3	1				
2905	1139			H.rest	1				
2906	1139			F.stat	1				
2907	1139			H.sur.+X	1				
2908	1139			H.sur.-Y	1				
2909	1139			H.dyn.+X_e	0.4				
2910	1139			H.dyn.-Y_e	0.4				
2911	1139			H.dyn.sur.+X	0.4				
2912	1139			H.dyn.sur.-Y	0.4				
2913	1139			Xx	0.4				
2914	1139			Xy	0.4				
2915	1139			Xz	1				
2916	1139			Yx	-0.4				
2917	1139			Yy	-0.4				
2918	1139			Yz	-1				
2919	1139			Zx	0.4				
2920	1139			Zy	0.4				
2921	1139			Zz	1				
2922	1139			AE	-1				
2923	1140	Linear Add	No	D	1	No	No	No	No
2924	1140			L	0.8				
2925	1140			Crane3	1				
2926	1140			H.rest	1				
2927	1140			F.stat	1				
2928	1140			H.sur.+X	1				
2929	1140			H.sur.-Y	1				
2930	1140			H.dyn.+X_e	0.4				
2931	1140			H.dyn.-Y_e	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2932	1140			H.dyn.sur.+X	0.4				
2933	1140			H.dyn.sur.-Y	0.4				
2934	1140			Xx	0.4				
2935	1140			Xy	0.4				
2936	1140			Xz	1				
2937	1140			Yx	-0.4				
2938	1140			Yy	-0.4				
2939	1140			Yz	-1				
2940	1140			Zx	-0.4				
2941	1140			Zy	-0.4				
2942	1140			Zz	-1				
2943	1140			AE	-1				
2944	1141	Linear Add	No	D	1	No	No	No	No
2945	1141			L	0.8				
2946	1141			Crane3	1				
2947	1141			H.rest	1				
2948	1141			F.stat	1				
2949	1141			H.sur.-X	1				
2950	1141			H.sur.+Y	1				
2951	1141			H.dyn.-X_e	0.4				
2952	1141			H.dyn.+Y_e	0.4				
2953	1141			H.dyn.sur.-X	0.4				
2954	1141			H.dyn.sur.+Y	0.4				
2955	1141			Xx	-0.4				
2956	1141			Xy	-0.4				
2957	1141			Xz	-1				
2958	1141			Yx	0.4				
2959	1141			Yy	0.4				
2960	1141			Yz	1				
2961	1141			Zx	0.4				
2962	1141			Zy	0.4				
2963	1141			Zz	1				
2964	1141			AE	-1				
2965	1142	Linear Add	No	D	1	No	No	No	No
2966	1142			L	0.8				
2967	1142			Crane3	1				
2968	1142			H.rest	1				
2969	1142			F.stat	1				
2970	1142			H.sur.-X	1				
2971	1142			H.sur.+Y	1				
2972	1142			H.dyn.-X_e	0.4				
2973	1142			H.dyn.+Y_e	0.4				
2974	1142			H.dyn.sur.-X	0.4				
2975	1142			H.dyn.sur.+Y	0.4				
2976	1142			Xx	-0.4				
2977	1142			Xy	-0.4				
2978	1142			Xz	-1				
2979	1142			Yx	0.4				
2980	1142			Yy	0.4				
2981	1142			Yz	1				
2982	1142			Zx	-0.4				
2983	1142			Zy	-0.4				
2984	1142			Zz	-1				
2985	1142			AE	-1				
2986	1143	Linear Add	No	D	1	No	No	No	No
2987	1143			L	0.8				
2988	1143			Crane3	1				
2989	1143			H.rest	1				
2990	1143			F.stat	1				
2991	1143			H.sur.-X	1				
2992	1143			H.sur.-Y	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
2993	1143			H.dyn.-X_e	0.4				
2994	1143			H.dyn.-Y_e	0.4				
2995	1143			H.dyn.sur.-X	0.4				
2996	1143			H.dyn.sur.-Y	0.4				
2997	1143			Xx	-0.4				
2998	1143			Xy	-0.4				
2999	1143			Xz	-1				
3000	1143			Yx	-0.4				
3001	1143			Yy	-0.4				
3002	1143			Yz	-1				
3003	1143			Zx	0.4				
3004	1143			Zy	0.4				
3005	1143			Zz	1				
3006	1143			AE	-1				
3007	1144	Linear Add	No	D	1	No	No	No	No
3008	1144			L	0.8				
3009	1144			Crane3	1				
3010	1144			H.rest	1				
3011	1144			F.stat	1				
3012	1144			H.sur.-X	1				
3013	1144			H.sur.-Y	1				
3014	1144			H.dyn.-X_e	0.4				
3015	1144			H.dyn.-Y_e	0.4				
3016	1144			H.dyn.sur.-X	0.4				
3017	1144			H.dyn.sur.-Y	0.4				
3018	1144			Xx	-0.4				
3019	1144			Xy	-0.4				
3020	1144			Xz	-1				
3021	1144			Yx	-0.4				
3022	1144			Yy	-0.4				
3023	1144			Yz	-1				
3024	1144			Zx	-0.4				
3025	1144			Zy	-0.4				
3026	1144			Zz	-1				
3027	1144			AE	-1				
3028	1145	Linear Add	No	D	1	No	No	No	No
3029	1145			L	0.8				
3030	1145			Crane4	1				
3031	1145			H.rest	1				
3032	1145			F.stat	1				
3033	1145			H.sur.+X	1				
3034	1145			H.sur.+Y	1				
3035	1145			H.dyn.+X_e	1				
3036	1145			H.dyn.+Y_e	0.4				
3037	1145			H.dyn.sur.+X	1				
3038	1145			H.dyn.sur.+Y	0.4				
3039	1145			Xx	1				
3040	1145			Xy	0.4				
3041	1145			Xz	0.4				
3042	1145			Yx	1				
3043	1145			Yy	0.4				
3044	1145			Yz	0.4				
3045	1145			Zx	1				
3046	1145			Zy	0.4				
3047	1145			Zz	0.4				
3048	1145			AE	1				
3049	1146	Linear Add	No	D	1	No	No	No	No
3050	1146			L	0.8				
3051	1146			Crane4	1				
3052	1146			H.rest	1				
3053	1146			F.stat	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3054	1146			H.sur.+X	1				
3055	1146			H.sur.+Y	1				
3056	1146			H.dyn.+X_e	1				
3057	1146			H.dyn.+Y_e	0.4				
3058	1146			H.dyn.sur.+X	1				
3059	1146			H.dyn.sur.+Y	0.4				
3060	1146			Xx	1				
3061	1146			Xy	0.4				
3062	1146			Xz	0.4				
3063	1146			Yx	1				
3064	1146			Yy	0.4				
3065	1146			Yz	0.4				
3066	1146			Zx	-1				
3067	1146			Zy	-0.4				
3068	1146			Zz	-0.4				
3069	1146			AE	1				
3070	1147	Linear Add	No	D	1	No	No	No	No
3071	1147			L	0.8				
3072	1147			Crane4	1				
3073	1147			H.rest	1				
3074	1147			F.stat	1				
3075	1147			H.sur.+X	1				
3076	1147			H.sur.-Y	1				
3077	1147			H.dyn.+X_e	1				
3078	1147			H.dyn.-Y_e	0.4				
3079	1147			H.dyn.sur.+X	1				
3080	1147			H.dyn.sur.-Y	0.4				
3081	1147			Xx	1				
3082	1147			Xy	0.4				
3083	1147			Xz	0.4				
3084	1147			Yx	-1				
3085	1147			Yy	-0.4				
3086	1147			Yz	-0.4				
3087	1147			Zx	1				
3088	1147			Zy	0.4				
3089	1147			Zz	0.4				
3090	1147			AE	1				
3091	1148	Linear Add	No	D	1	No	No	No	No
3092	1148			L	0.8				
3093	1148			Crane4	1				
3094	1148			H.rest	1				
3095	1148			F.stat	1				
3096	1148			H.sur.+X	1				
3097	1148			H.sur.-Y	1				
3098	1148			H.dyn.+X_e	1				
3099	1148			H.dyn.-Y_e	0.4				
3100	1148			H.dyn.sur.+X	1				
3101	1148			H.dyn.sur.-Y	0.4				
3102	1148			Xx	1				
3103	1148			Xy	0.4				
3104	1148			Xz	0.4				
3105	1148			Yx	-1				
3106	1148			Yy	-0.4				
3107	1148			Yz	-0.4				
3108	1148			Zx	-1				
3109	1148			Zy	-0.4				
3110	1148			Zz	-0.4				
3111	1148			AE	1				
3112	1149	Linear Add	No	D	1	No	No	No	No
3113	1149			L	0.8				
3114	1149			Crane4	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3115	1149			H.rest	1				
3116	1149			F.stat	1				
3117	1149			H.sur.-X	1				
3118	1149			H.sur.+Y	1				
3119	1149			H.dyn.-X_e	1				
3120	1149			H.dyn.+Y_e	0.4				
3121	1149			H.dyn.sur.-X	1				
3122	1149			H.dyn.sur.+Y	0.4				
3123	1149			Xx	-1				
3124	1149			Xy	-0.4				
3125	1149			Xz	-0.4				
3126	1149			Yx	1				
3127	1149			Yy	0.4				
3128	1149			Yz	0.4				
3129	1149			Zx	1				
3130	1149			Zy	0.4				
3131	1149			Zz	0.4				
3132	1149			AE	1				
3133	1150	Linear Add	No	D	1	No	No	No	No
3134	1150			L	0.8				
3135	1150			Crane4	1				
3136	1150			H.rest	1				
3137	1150			F.stat	1				
3138	1150			H.sur.-X	1				
3139	1150			H.sur.+Y	1				
3140	1150			H.dyn.-X_e	1				
3141	1150			H.dyn.+Y_e	0.4				
3142	1150			H.dyn.sur.-X	1				
3143	1150			H.dyn.sur.+Y	0.4				
3144	1150			Xx	-1				
3145	1150			Xy	-0.4				
3146	1150			Xz	-0.4				
3147	1150			Yx	1				
3148	1150			Yy	0.4				
3149	1150			Yz	0.4				
3150	1150			Zx	-1				
3151	1150			Zy	-0.4				
3152	1150			Zz	-0.4				
3153	1150			AE	1				
3154	1151	Linear Add	No	D	1	No	No	No	No
3155	1151			L	0.8				
3156	1151			Crane4	1				
3157	1151			H.rest	1				
3158	1151			F.stat	1				
3159	1151			H.sur.-X	1				
3160	1151			H.sur.-Y	1				
3161	1151			H.dyn.-X_e	1				
3162	1151			H.dyn.-Y_e	0.4				
3163	1151			H.dyn.sur.-X	1				
3164	1151			H.dyn.sur.-Y	0.4				
3165	1151			Xx	-1				
3166	1151			Xy	-0.4				
3167	1151			Xz	-0.4				
3168	1151			Yx	-1				
3169	1151			Yy	-0.4				
3170	1151			Yz	-0.4				
3171	1151			Zx	1				
3172	1151			Zy	0.4				
3173	1151			Zz	0.4				
3174	1151			AE	1				
3175	1152	Linear Add	No	D	1	No	No	No	No

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3176	1152			L	0.8				
3177	1152			Crane4	1				
3178	1152			H.rest	1				
3179	1152			F.stat	1				
3180	1152			H.sur.-X	1				
3181	1152			H.sur.-Y	1				
3182	1152			H.dyn.-X_e	1				
3183	1152			H.dyn.-Y_e	0.4				
3184	1152			H.dyn.sur.-X	1				
3185	1152			H.dyn.sur.-Y	0.4				
3186	1152			Xx	-1				
3187	1152			Xy	-0.4				
3188	1152			Xz	-0.4				
3189	1152			Yx	-1				
3190	1152			Yy	-0.4				
3191	1152			Yz	-0.4				
3192	1152			Zx	-1				
3193	1152			Zy	-0.4				
3194	1152			Zz	-0.4				
3195	1152			AE	1				
3196	1153	Linear Add	No	D	1	No	No	No	No
3197	1153			L	0.8				
3198	1153			Crane4	1				
3199	1153			H.rest	1				
3200	1153			F.stat	1				
3201	1153			H.sur.+X	1				
3202	1153			H.sur.+Y	1				
3203	1153			H.dyn.+X_e	0.4				
3204	1153			H.dyn.+Y_e	1				
3205	1153			H.dyn.sur.+X	0.4				
3206	1153			H.dyn.sur.+Y	1				
3207	1153			Xx	0.4				
3208	1153			Xy	1				
3209	1153			Xz	0.4				
3210	1153			Yx	0.4				
3211	1153			Yy	1				
3212	1153			Yz	0.4				
3213	1153			Zx	0.4				
3214	1153			Zy	1				
3215	1153			Zz	0.4				
3216	1153			AE	1				
3217	1154	Linear Add	No	D	1	No	No	No	No
3218	1154			L	0.8				
3219	1154			Crane4	1				
3220	1154			H.rest	1				
3221	1154			F.stat	1				
3222	1154			H.sur.+X	1				
3223	1154			H.sur.+Y	1				
3224	1154			H.dyn.+X_e	0.4				
3225	1154			H.dyn.+Y_e	1				
3226	1154			H.dyn.sur.+X	0.4				
3227	1154			H.dyn.sur.+Y	1				
3228	1154			Xx	0.4				
3229	1154			Xy	1				
3230	1154			Xz	0.4				
3231	1154			Yx	0.4				
3232	1154			Yy	1				
3233	1154			Yz	0.4				
3234	1154			Zx	-0.4				
3235	1154			Zy	-1				
3236	1154			Zz	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3237	1154			AE	1				
3238	1155	Linear Add	No	D	1	No	No	No	No
3239	1155			L	0.8				
3240	1155			Crane4	1				
3241	1155			H.rest	1				
3242	1155			F.stat	1				
3243	1155			H.sur.+X	1				
3244	1155			H.sur.-Y	1				
3245	1155			H.dyn.+X_e	0.4				
3246	1155			H.dyn.-Y_e	1				
3247	1155			H.dyn.sur.+X	0.4				
3248	1155			H.dyn.sur.-Y	1				
3249	1155			Xx	0.4				
3250	1155			Xy	1				
3251	1155			Xz	0.4				
3252	1155			Yx	-0.4				
3253	1155			Yy	-1				
3254	1155			Yz	-0.4				
3255	1155			Zx	0.4				
3256	1155			Zy	1				
3257	1155			Zz	0.4				
3258	1155			AE	1				
3259	1156	Linear Add	No	D	1	No	No	No	No
3260	1156			L	0.8				
3261	1156			Crane4	1				
3262	1156			H.rest	1				
3263	1156			F.stat	1				
3264	1156			H.sur.+X	1				
3265	1156			H.sur.-Y	1				
3266	1156			H.dyn.+X_e	0.4				
3267	1156			H.dyn.-Y_e	1				
3268	1156			H.dyn.sur.+X	0.4				
3269	1156			H.dyn.sur.-Y	1				
3270	1156			Xx	0.4				
3271	1156			Xy	1				
3272	1156			Xz	0.4				
3273	1156			Yx	-0.4				
3274	1156			Yy	-1				
3275	1156			Yz	-0.4				
3276	1156			Zx	-0.4				
3277	1156			Zy	-1				
3278	1156			Zz	-0.4				
3279	1156			AE	1				
3280	1157	Linear Add	No	D	1	No	No	No	No
3281	1157			L	0.8				
3282	1157			Crane4	1				
3283	1157			H.rest	1				
3284	1157			F.stat	1				
3285	1157			H.sur.-X	1				
3286	1157			H.sur.+Y	1				
3287	1157			H.dyn.-X_e	0.4				
3288	1157			H.dyn.+Y_e	1				
3289	1157			H.dyn.sur.-X	0.4				
3290	1157			H.dyn.sur.+Y	1				
3291	1157			Xx	-0.4				
3292	1157			Xy	-1				
3293	1157			Xz	-0.4				
3294	1157			Yx	0.4				
3295	1157			Yy	1				
3296	1157			Yz	0.4				
3297	1157			Zx	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3298	1157			Zy	1				
3299	1157			Zz	0.4				
3300	1157			AE	1				
3301	1158	Linear Add	No	D	1	No	No	No	No
3302	1158			L	0.8				
3303	1158			Crane4	1				
3304	1158			H.rest	1				
3305	1158			F.stat	1				
3306	1158			H.sur.-X	1				
3307	1158			H.sur.+Y	1				
3308	1158			H.dyn.-X_e	0.4				
3309	1158			H.dyn.+Y_e	1				
3310	1158			H.dyn.sur.-X	0.4				
3311	1158			H.dyn.sur.+Y	1				
3312	1158			Xx	-0.4				
3313	1158			Xy	-1				
3314	1158			Xz	-0.4				
3315	1158			Yx	0.4				
3316	1158			Yy	1				
3317	1158			Yz	0.4				
3318	1158			Zx	-0.4				
3319	1158			Zy	-1				
3320	1158			Zz	-0.4				
3321	1158			AE	1				
3322	1159	Linear Add	No	D	1	No	No	No	No
3323	1159			L	0.8				
3324	1159			Crane4	1				
3325	1159			H.rest	1				
3326	1159			F.stat	1				
3327	1159			H.sur.-X	1				
3328	1159			H.sur.-Y	1				
3329	1159			H.dyn.-X_e	0.4				
3330	1159			H.dyn.-Y_e	1				
3331	1159			H.dyn.sur.-X	0.4				
3332	1159			H.dyn.sur.-Y	1				
3333	1159			Xx	-0.4				
3334	1159			Xy	-1				
3335	1159			Xz	-0.4				
3336	1159			Yx	-0.4				
3337	1159			Yy	-1				
3338	1159			Yz	-0.4				
3339	1159			Zx	0.4				
3340	1159			Zy	1				
3341	1159			Zz	0.4				
3342	1159			AE	1				
3343	1160	Linear Add	No	D	1	No	No	No	No
3344	1160			L	0.8				
3345	1160			Crane4	1				
3346	1160			H.rest	1				
3347	1160			F.stat	1				
3348	1160			H.sur.-X	1				
3349	1160			H.sur.-Y	1				
3350	1160			H.dyn.-X_e	0.4				
3351	1160			H.dyn.-Y_e	1				
3352	1160			H.dyn.sur.-X	0.4				
3353	1160			H.dyn.sur.-Y	1				
3354	1160			Xx	-0.4				
3355	1160			Xy	-1				
3356	1160			Xz	-0.4				
3357	1160			Yx	-0.4				
3358	1160			Yy	-1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3359	1160			Yz	-0.4				
3360	1160			Zx	-0.4				
3361	1160			Zy	-1				
3362	1160			Zz	-0.4				
3363	1160			AE	1				
3364	1161	Linear Add	No	D	1	No	No	No	No
3365	1161			L	0.8				
3366	1161			Crane4	1				
3367	1161			H.rest	1				
3368	1161			F.stat	1				
3369	1161			H.sur.+X	1				
3370	1161			H.sur.+Y	1				
3371	1161			H.dyn.+X_e	0.4				
3372	1161			H.dyn.+Y_e	0.4				
3373	1161			H.dyn.sur.+X	0.4				
3374	1161			H.dyn.sur.+Y	0.4				
3375	1161			Xx	0.4				
3376	1161			Xy	0.4				
3377	1161			Xz	1				
3378	1161			Yx	0.4				
3379	1161			Yy	0.4				
3380	1161			Yz	1				
3381	1161			Zx	0.4				
3382	1161			Zy	0.4				
3383	1161			Zz	1				
3384	1161			AE	1				
3385	1162	Linear Add	No	D	1	No	No	No	No
3386	1162			L	0.8				
3387	1162			Crane4	1				
3388	1162			H.rest	1				
3389	1162			F.stat	1				
3390	1162			H.sur.+X	1				
3391	1162			H.sur.+Y	1				
3392	1162			H.dyn.+X_e	0.4				
3393	1162			H.dyn.+Y_e	0.4				
3394	1162			H.dyn.sur.+X	0.4				
3395	1162			H.dyn.sur.+Y	0.4				
3396	1162			Xx	0.4				
3397	1162			Xy	0.4				
3398	1162			Xz	1				
3399	1162			Yx	0.4				
3400	1162			Yy	0.4				
3401	1162			Yz	1				
3402	1162			Zx	-0.4				
3403	1162			Zy	-0.4				
3404	1162			Zz	-1				
3405	1162			AE	1				
3406	1163	Linear Add	No	D	1	No	No	No	No
3407	1163			L	0.8				
3408	1163			Crane4	1				
3409	1163			H.rest	1				
3410	1163			F.stat	1				
3411	1163			H.sur.+X	1				
3412	1163			H.sur.-Y	1				
3413	1163			H.dyn.+X_e	0.4				
3414	1163			H.dyn.-Y_e	0.4				
3415	1163			H.dyn.sur.+X	0.4				
3416	1163			H.dyn.sur.-Y	0.4				
3417	1163			Xx	0.4				
3418	1163			Xy	0.4				
3419	1163			Xz	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3420	1163			Yx	-0.4				
3421	1163			Yy	-0.4				
3422	1163			Yz	-1				
3423	1163			Zx	0.4				
3424	1163			Zy	0.4				
3425	1163			Zz	1				
3426	1163			AE	1				
3427	1164	Linear Add	No	D	1	No	No	No	No
3428	1164			L	0.8				
3429	1164			Crane4	1				
3430	1164			H.rest	1				
3431	1164			F.stat	1				
3432	1164			H.sur.+X	1				
3433	1164			H.sur.-Y	1				
3434	1164			H.dyn.+X_e	0.4				
3435	1164			H.dyn.-Y_e	0.4				
3436	1164			H.dyn.sur.+X	0.4				
3437	1164			H.dyn.sur.-Y	0.4				
3438	1164			Xx	0.4				
3439	1164			Xy	0.4				
3440	1164			Xz	1				
3441	1164			Yx	-0.4				
3442	1164			Yy	-0.4				
3443	1164			Yz	-1				
3444	1164			Zx	-0.4				
3445	1164			Zy	-0.4				
3446	1164			Zz	-1				
3447	1164			AE	1				
3448	1165	Linear Add	No	D	1	No	No	No	No
3449	1165			L	0.8				
3450	1165			Crane4	1				
3451	1165			H.rest	1				
3452	1165			F.stat	1				
3453	1165			H.sur.-X	1				
3454	1165			H.sur.+Y	1				
3455	1165			H.dyn.-X_e	0.4				
3456	1165			H.dyn.+Y_e	0.4				
3457	1165			H.dyn.sur.-X	0.4				
3458	1165			H.dyn.sur.+Y	0.4				
3459	1165			Xx	-0.4				
3460	1165			Xy	-0.4				
3461	1165			Xz	-1				
3462	1165			Yx	0.4				
3463	1165			Yy	0.4				
3464	1165			Yz	1				
3465	1165			Zx	0.4				
3466	1165			Zy	0.4				
3467	1165			Zz	1				
3468	1165			AE	1				
3469	1166	Linear Add	No	D	1	No	No	No	No
3470	1166			L	0.8				
3471	1166			Crane4	1				
3472	1166			H.rest	1				
3473	1166			F.stat	1				
3474	1166			H.sur.-X	1				
3475	1166			H.sur.+Y	1				
3476	1166			H.dyn.-X_e	0.4				
3477	1166			H.dyn.+Y_e	0.4				
3478	1166			H.dyn.sur.-X	0.4				
3479	1166			H.dyn.sur.+Y	0.4				
3480	1166			Xx	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3481	1166			Xy	-0.4				
3482	1166			Xz	-1				
3483	1166			Yx	0.4				
3484	1166			Yy	0.4				
3485	1166			Yz	1				
3486	1166			Zx	-0.4				
3487	1166			Zy	-0.4				
3488	1166			Zz	-1				
3489	1166			AE	1				
3490	1167	Linear Add	No	D	1	No	No	No	No
3491	1167			L	0.8				
3492	1167			Crane4	1				
3493	1167			H.rest	1				
3494	1167			F.stat	1				
3495	1167			H.sur.-X	1				
3496	1167			H.sur.-Y	1				
3497	1167			H.dyn.-X_e	0.4				
3498	1167			H.dyn.-Y_e	0.4				
3499	1167			H.dyn.sur.-X	0.4				
3500	1167			H.dyn.sur.-Y	0.4				
3501	1167			Xx	-0.4				
3502	1167			Xy	-0.4				
3503	1167			Xz	-1				
3504	1167			Yx	-0.4				
3505	1167			Yy	-0.4				
3506	1167			Yz	-1				
3507	1167			Zx	0.4				
3508	1167			Zy	0.4				
3509	1167			Zz	1				
3510	1167			AE	1				
3511	1168	Linear Add	No	D	1	No	No	No	No
3512	1168			L	0.8				
3513	1168			Crane4	1				
3514	1168			H.rest	1				
3515	1168			F.stat	1				
3516	1168			H.sur.-X	1				
3517	1168			H.sur.-Y	1				
3518	1168			H.dyn.-X_e	0.4				
3519	1168			H.dyn.-Y_e	0.4				
3520	1168			H.dyn.sur.-X	0.4				
3521	1168			H.dyn.sur.-Y	0.4				
3522	1168			Xx	-0.4				
3523	1168			Xy	-0.4				
3524	1168			Xz	-1				
3525	1168			Yx	-0.4				
3526	1168			Yy	-0.4				
3527	1168			Yz	-1				
3528	1168			Zx	-0.4				
3529	1168			Zy	-0.4				
3530	1168			Zz	-1				
3531	1168			AE	1				
3532	1169	Linear Add	No	D	1	No	No	No	No
3533	1169			L	0.8				
3534	1169			Crane4	1				
3535	1169			H.rest	1				
3536	1169			F.stat	1				
3537	1169			H.sur.+X	1				
3538	1169			H.sur.+Y	1				
3539	1169			H.dyn.+X_e	1				
3540	1169			H.dyn.+Y_e	0.4				
3541	1169			H.dyn.sur.+X	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3542	1169			H.dyn.sur.+Y	0.4				
3543	1169			Xx	1				
3544	1169			Xy	0.4				
3545	1169			Xz	0.4				
3546	1169			Yx	1				
3547	1169			Yy	0.4				
3548	1169			Yz	0.4				
3549	1169			Zx	1				
3550	1169			Zy	0.4				
3551	1169			Zz	0.4				
3552	1169			AE	-1				
3553	1170	Linear Add	No	D	1	No	No	No	No
3554	1170			L	0.8				
3555	1170			Crane4	1				
3556	1170			H.rest	1				
3557	1170			F.stat	1				
3558	1170			H.sur.+X	1				
3559	1170			H.sur.+Y	1				
3560	1170			H.dyn.+X_e	1				
3561	1170			H.dyn.+Y_e	0.4				
3562	1170			H.dyn.sur.+X	1				
3563	1170			H.dyn.sur.+Y	0.4				
3564	1170			Xx	1				
3565	1170			Xy	0.4				
3566	1170			Xz	0.4				
3567	1170			Yx	1				
3568	1170			Yy	0.4				
3569	1170			Yz	0.4				
3570	1170			Zx	-1				
3571	1170			Zy	-0.4				
3572	1170			Zz	-0.4				
3573	1170			AE	-1				
3574	1171	Linear Add	No	D	1	No	No	No	No
3575	1171			L	0.8				
3576	1171			Crane4	1				
3577	1171			H.rest	1				
3578	1171			F.stat	1				
3579	1171			H.sur.+X	1				
3580	1171			H.sur.-Y	1				
3581	1171			H.dyn.+X_e	1				
3582	1171			H.dyn.-Y_e	0.4				
3583	1171			H.dyn.sur.+X	1				
3584	1171			H.dyn.sur.-Y	0.4				
3585	1171			Xx	1				
3586	1171			Xy	0.4				
3587	1171			Xz	0.4				
3588	1171			Yx	-1				
3589	1171			Yy	-0.4				
3590	1171			Yz	-0.4				
3591	1171			Zx	1				
3592	1171			Zy	0.4				
3593	1171			Zz	0.4				
3594	1171			AE	-1				
3595	1172	Linear Add	No	D	1	No	No	No	No
3596	1172			L	0.8				
3597	1172			Crane4	1				
3598	1172			H.rest	1				
3599	1172			F.stat	1				
3600	1172			H.sur.+X	1				
3601	1172			H.sur.-Y	1				
3602	1172			H.dyn.+X_e	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3603	1172			H.dyn.-Y_e	0.4				
3604	1172			H.dyn.sur.+X	1				
3605	1172			H.dyn.sur.-Y	0.4				
3606	1172			Xx	1				
3607	1172			Xy	0.4				
3608	1172			Xz	0.4				
3609	1172			Yx	-1				
3610	1172			Yy	-0.4				
3611	1172			Yz	-0.4				
3612	1172			Zx	-1				
3613	1172			Zy	-0.4				
3614	1172			Zz	-0.4				
3615	1172			AE	-1				
3616	1173	Linear Add	No	D	1	No	No	No	No
3617	1173			L	0.8				
3618	1173			Crane4	1				
3619	1173			H.rest	1				
3620	1173			F.stat	1				
3621	1173			H.sur.-X	1				
3622	1173			H.sur.+Y	1				
3623	1173			H.dyn.-X_e	1				
3624	1173			H.dyn.+Y_e	0.4				
3625	1173			H.dyn.sur.-X	1				
3626	1173			H.dyn.sur.+Y	0.4				
3627	1173			Xx	-1				
3628	1173			Xy	-0.4				
3629	1173			Xz	-0.4				
3630	1173			Yx	1				
3631	1173			Yy	0.4				
3632	1173			Yz	0.4				
3633	1173			Zx	1				
3634	1173			Zy	0.4				
3635	1173			Zz	0.4				
3636	1173			AE	-1				
3637	1174	Linear Add	No	D	1	No	No	No	No
3638	1174			L	0.8				
3639	1174			Crane4	1				
3640	1174			H.rest	1				
3641	1174			F.stat	1				
3642	1174			H.sur.-X	1				
3643	1174			H.sur.+Y	1				
3644	1174			H.dyn.-X_e	1				
3645	1174			H.dyn.+Y_e	0.4				
3646	1174			H.dyn.sur.-X	1				
3647	1174			H.dyn.sur.+Y	0.4				
3648	1174			Xx	-1				
3649	1174			Xy	-0.4				
3650	1174			Xz	-0.4				
3651	1174			Yx	1				
3652	1174			Yy	0.4				
3653	1174			Yz	0.4				
3654	1174			Zx	-1				
3655	1174			Zy	-0.4				
3656	1174			Zz	-0.4				
3657	1174			AE	-1				
3658	1175	Linear Add	No	D	1	No	No	No	No
3659	1175			L	0.8				
3660	1175			Crane4	1				
3661	1175			H.rest	1				
3662	1175			F.stat	1				
3663	1175			H.sur.-X	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3664	1175			H.sur.-Y	1				
3665	1175			H.dyn.-X_e	1				
3666	1175			H.dyn.-Y_e	0.4				
3667	1175			H.dyn.sur.-X	1				
3668	1175			H.dyn.sur.-Y	0.4				
3669	1175			Xx	-1				
3670	1175			Xy	-0.4				
3671	1175			Xz	-0.4				
3672	1175			Yx	-1				
3673	1175			Yy	-0.4				
3674	1175			Yz	-0.4				
3675	1175			Zx	1				
3676	1175			Zy	0.4				
3677	1175			Zz	0.4				
3678	1175			AE	-1				
3679	1176	Linear Add	No	D	1	No	No	No	No
3680	1176			L	0.8				
3681	1176			Crane4	1				
3682	1176			H.rest	1				
3683	1176			F.stat	1				
3684	1176			H.sur.-X	1				
3685	1176			H.sur.-Y	1				
3686	1176			H.dyn.-X_e	1				
3687	1176			H.dyn.-Y_e	0.4				
3688	1176			H.dyn.sur.-X	1				
3689	1176			H.dyn.sur.-Y	0.4				
3690	1176			Xx	-1				
3691	1176			Xy	-0.4				
3692	1176			Xz	-0.4				
3693	1176			Yx	-1				
3694	1176			Yy	-0.4				
3695	1176			Yz	-0.4				
3696	1176			Zx	-1				
3697	1176			Zy	-0.4				
3698	1176			Zz	-0.4				
3699	1176			AE	-1				
3700	1177	Linear Add	No	D	1	No	No	No	No
3701	1177			L	0.8				
3702	1177			Crane4	1				
3703	1177			H.rest	1				
3704	1177			F.stat	1				
3705	1177			H.sur.+X	1				
3706	1177			H.sur.+Y	1				
3707	1177			H.dyn.+X_e	0.4				
3708	1177			H.dyn.+Y_e	1				
3709	1177			H.dyn.sur.+X	0.4				
3710	1177			H.dyn.sur.+Y	1				
3711	1177			Xx	0.4				
3712	1177			Xy	1				
3713	1177			Xz	0.4				
3714	1177			Yx	0.4				
3715	1177			Yy	1				
3716	1177			Yz	0.4				
3717	1177			Zx	0.4				
3718	1177			Zy	1				
3719	1177			Zz	0.4				
3720	1177			AE	-1				
3721	1178	Linear Add	No	D	1	No	No	No	No
3722	1178			L	0.8				
3723	1178			Crane4	1				
3724	1178			H.rest	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3725	1178			F.stat	1				
3726	1178			H.sur.+X	1				
3727	1178			H.sur.+Y	1				
3728	1178			H.dyn.+X_e	0.4				
3729	1178			H.dyn.+Y_e	1				
3730	1178			H.dyn.sur.+X	0.4				
3731	1178			H.dyn.sur.+Y	1				
3732	1178			Xx	0.4				
3733	1178			Xy	1				
3734	1178			Xz	0.4				
3735	1178			Yx	0.4				
3736	1178			Yy	1				
3737	1178			Yz	0.4				
3738	1178			Zx	-0.4				
3739	1178			Zy	-1				
3740	1178			Zz	-0.4				
3741	1178			AE	-1				
3742	1179	Linear Add	No	D	1	No	No	No	No
3743	1179			L	0.8				
3744	1179			Crane4	1				
3745	1179			H.rest	1				
3746	1179			F.stat	1				
3747	1179			H.sur.+X	1				
3748	1179			H.sur.-Y	1				
3749	1179			H.dyn.+X_e	0.4				
3750	1179			H.dyn.-Y_e	1				
3751	1179			H.dyn.sur.+X	0.4				
3752	1179			H.dyn.sur.-Y	1				
3753	1179			Xx	0.4				
3754	1179			Xy	1				
3755	1179			Xz	0.4				
3756	1179			Yx	-0.4				
3757	1179			Yy	-1				
3758	1179			Yz	-0.4				
3759	1179			Zx	0.4				
3760	1179			Zy	1				
3761	1179			Zz	0.4				
3762	1179			AE	-1				
3763	1180	Linear Add	No	D	1	No	No	No	No
3764	1180			L	0.8				
3765	1180			Crane4	1				
3766	1180			H.rest	1				
3767	1180			F.stat	1				
3768	1180			H.sur.+X	1				
3769	1180			H.sur.-Y	1				
3770	1180			H.dyn.+X_e	0.4				
3771	1180			H.dyn.-Y_e	1				
3772	1180			H.dyn.sur.+X	0.4				
3773	1180			H.dyn.sur.-Y	1				
3774	1180			Xx	0.4				
3775	1180			Xy	1				
3776	1180			Xz	0.4				
3777	1180			Yx	-0.4				
3778	1180			Yy	-1				
3779	1180			Yz	-0.4				
3780	1180			Zx	-0.4				
3781	1180			Zy	-1				
3782	1180			Zz	-0.4				
3783	1180			AE	-1				
3784	1181	Linear Add	No	D	1	No	No	No	No
3785	1181			L	0.8				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3786	1181			Crane4	1				
3787	1181			H.rest	1				
3788	1181			F.stat	1				
3789	1181			H.sur.-X	1				
3790	1181			H.sur.+Y	1				
3791	1181			H.dyn.-X_e	0.4				
3792	1181			H.dyn.+Y_e	1				
3793	1181			H.dyn.sur.-X	0.4				
3794	1181			H.dyn.sur.+Y	1				
3795	1181			Xx	-0.4				
3796	1181			Xy	-1				
3797	1181			Xz	-0.4				
3798	1181			Yx	0.4				
3799	1181			Yy	1				
3800	1181			Yz	0.4				
3801	1181			Zx	0.4				
3802	1181			Zy	1				
3803	1181			Zz	0.4				
3804	1181			AE	-1				
3805	1182	Linear Add	No	D	1	No	No	No	No
3806	1182			L	0.8				
3807	1182			Crane4	1				
3808	1182			H.rest	1				
3809	1182			F.stat	1				
3810	1182			H.sur.-X	1				
3811	1182			H.sur.+Y	1				
3812	1182			H.dyn.-X_e	0.4				
3813	1182			H.dyn.+Y_e	1				
3814	1182			H.dyn.sur.-X	0.4				
3815	1182			H.dyn.sur.+Y	1				
3816	1182			Xx	-0.4				
3817	1182			Xy	-1				
3818	1182			Xz	-0.4				
3819	1182			Yx	0.4				
3820	1182			Yy	1				
3821	1182			Yz	0.4				
3822	1182			Zx	-0.4				
3823	1182			Zy	-1				
3824	1182			Zz	-0.4				
3825	1182			AE	-1				
3826	1183	Linear Add	No	D	1	No	No	No	No
3827	1183			L	0.8				
3828	1183			Crane4	1				
3829	1183			H.rest	1				
3830	1183			F.stat	1				
3831	1183			H.sur.-X	1				
3832	1183			H.sur.-Y	1				
3833	1183			H.dyn.-X_e	0.4				
3834	1183			H.dyn.-Y_e	1				
3835	1183			H.dyn.sur.-X	0.4				
3836	1183			H.dyn.sur.-Y	1				
3837	1183			Xx	-0.4				
3838	1183			Xy	-1				
3839	1183			Xz	-0.4				
3840	1183			Yx	-0.4				
3841	1183			Yy	-1				
3842	1183			Yz	-0.4				
3843	1183			Zx	0.4				
3844	1183			Zy	1				
3845	1183			Zz	0.4				
3846	1183			AE	-1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3847	1184	Linear Add	No	D	1	No	No	No	No
3848	1184			L	0.8				
3849	1184			Crane4	1				
3850	1184			H.rest	1				
3851	1184			F.stat	1				
3852	1184			H.sur.-X	1				
3853	1184			H.sur.-Y	1				
3854	1184			H.dyn.-X_e	0.4				
3855	1184			H.dyn.-Y_e	1				
3856	1184			H.dyn.sur.-X	0.4				
3857	1184			H.dyn.sur.-Y	1				
3858	1184			Xx	-0.4				
3859	1184			Xy	-1				
3860	1184			Xz	-0.4				
3861	1184			Yx	-0.4				
3862	1184			Yy	-1				
3863	1184			Yz	-0.4				
3864	1184			Zx	-0.4				
3865	1184			Zy	-1				
3866	1184			Zz	-0.4				
3867	1184			AE	-1				
3868	1185	Linear Add	No	D	1	No	No	No	No
3869	1185			L	0.8				
3870	1185			Crane4	1				
3871	1185			H.rest	1				
3872	1185			F.stat	1				
3873	1185			H.sur.+X	1				
3874	1185			H.sur.+Y	1				
3875	1185			H.dyn.+X_e	0.4				
3876	1185			H.dyn.+Y_e	0.4				
3877	1185			H.dyn.sur.+X	0.4				
3878	1185			H.dyn.sur.+Y	0.4				
3879	1185			Xx	0.4				
3880	1185			Xy	0.4				
3881	1185			Xz	1				
3882	1185			Yx	0.4				
3883	1185			Yy	0.4				
3884	1185			Yz	1				
3885	1185			Zx	0.4				
3886	1185			Zy	0.4				
3887	1185			Zz	1				
3888	1185			AE	-1				
3889	1186	Linear Add	No	D	1	No	No	No	No
3890	1186			L	0.8				
3891	1186			Crane4	1				
3892	1186			H.rest	1				
3893	1186			F.stat	1				
3894	1186			H.sur.+X	1				
3895	1186			H.sur.+Y	1				
3896	1186			H.dyn.+X_e	0.4				
3897	1186			H.dyn.+Y_e	0.4				
3898	1186			H.dyn.sur.+X	0.4				
3899	1186			H.dyn.sur.+Y	0.4				
3900	1186			Xx	0.4				
3901	1186			Xy	0.4				
3902	1186			Xz	1				
3903	1186			Yx	0.4				
3904	1186			Yy	0.4				
3905	1186			Yz	1				
3906	1186			Zx	-0.4				
3907	1186			Zy	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3908	1186			Zz	-1				
3909	1186			AE	-1				
3910	1187	Linear Add	No	D	1	No	No	No	No
3911	1187			L	0.8				
3912	1187			Crane4	1				
3913	1187			H.rest	1				
3914	1187			F.stat	1				
3915	1187			H.sur.+X	1				
3916	1187			H.sur.-Y	1				
3917	1187			H.dyn.+X_e	0.4				
3918	1187			H.dyn.-Y_e	0.4				
3919	1187			H.dyn.sur.+X	0.4				
3920	1187			H.dyn.sur.-Y	0.4				
3921	1187			Xx	0.4				
3922	1187			Xy	0.4				
3923	1187			Xz	1				
3924	1187			Yx	-0.4				
3925	1187			Yy	-0.4				
3926	1187			Yz	-1				
3927	1187			Zx	0.4				
3928	1187			Zy	0.4				
3929	1187			Zz	1				
3930	1187			AE	-1				
3931	1188	Linear Add	No	D	1	No	No	No	No
3932	1188			L	0.8				
3933	1188			Crane4	1				
3934	1188			H.rest	1				
3935	1188			F.stat	1				
3936	1188			H.sur.+X	1				
3937	1188			H.sur.-Y	1				
3938	1188			H.dyn.+X_e	0.4				
3939	1188			H.dyn.-Y_e	0.4				
3940	1188			H.dyn.sur.+X	0.4				
3941	1188			H.dyn.sur.-Y	0.4				
3942	1188			Xx	0.4				
3943	1188			Xy	0.4				
3944	1188			Xz	1				
3945	1188			Yx	-0.4				
3946	1188			Yy	-0.4				
3947	1188			Yz	-1				
3948	1188			Zx	-0.4				
3949	1188			Zy	-0.4				
3950	1188			Zz	-1				
3951	1188			AE	-1				
3952	1189	Linear Add	No	D	1	No	No	No	No
3953	1189			L	0.8				
3954	1189			Crane4	1				
3955	1189			H.rest	1				
3956	1189			F.stat	1				
3957	1189			H.sur.-X	1				
3958	1189			H.sur.+Y	1				
3959	1189			H.dyn.-X_e	0.4				
3960	1189			H.dyn.+Y_e	0.4				
3961	1189			H.dyn.sur.-X	0.4				
3962	1189			H.dyn.sur.+Y	0.4				
3963	1189			Xx	-0.4				
3964	1189			Xy	-0.4				
3965	1189			Xz	-1				
3966	1189			Yx	0.4				
3967	1189			Yy	0.4				
3968	1189			Yz	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
3969	1189			Zx	0.4				
3970	1189			Zy	0.4				
3971	1189			Zz	1				
3972	1189			AE	-1				
3973	1190	Linear Add	No	D	1	No	No	No	No
3974	1190			L	0.8				
3975	1190			Crane4	1				
3976	1190			H.rest	1				
3977	1190			F.stat	1				
3978	1190			H.sur.-X	1				
3979	1190			H.sur.+Y	1				
3980	1190			H.dyn.-X_e	0.4				
3981	1190			H.dyn.+Y_e	0.4				
3982	1190			H.dyn.sur.-X	0.4				
3983	1190			H.dyn.sur.+Y	0.4				
3984	1190			Xx	-0.4				
3985	1190			Xy	-0.4				
3986	1190			Xz	-1				
3987	1190			Yx	0.4				
3988	1190			Yy	0.4				
3989	1190			Yz	1				
3990	1190			Zx	-0.4				
3991	1190			Zy	-0.4				
3992	1190			Zz	-1				
3993	1190			AE	-1				
3994	1191	Linear Add	No	D	1	No	No	No	No
3995	1191			L	0.8				
3996	1191			Crane4	1				
3997	1191			H.rest	1				
3998	1191			F.stat	1				
3999	1191			H.sur.-X	1				
4000	1191			H.sur.-Y	1				
4001	1191			H.dyn.-X_e	0.4				
4002	1191			H.dyn.-Y_e	0.4				
4003	1191			H.dyn.sur.-X	0.4				
4004	1191			H.dyn.sur.-Y	0.4				
4005	1191			Xx	-0.4				
4006	1191			Xy	-0.4				
4007	1191			Xz	-1				
4008	1191			Yx	-0.4				
4009	1191			Yy	-0.4				
4010	1191			Yz	-1				
4011	1191			Zx	0.4				
4012	1191			Zy	0.4				
4013	1191			Zz	1				
4014	1191			AE	-1				
4015	1192	Linear Add	No	D	1	No	No	No	No
4016	1192			L	0.8				
4017	1192			Crane4	1				
4018	1192			H.rest	1				
4019	1192			F.stat	1				
4020	1192			H.sur.-X	1				
4021	1192			H.sur.-Y	1				
4022	1192			H.dyn.-X_e	0.4				
4023	1192			H.dyn.-Y_e	0.4				
4024	1192			H.dyn.sur.-X	0.4				
4025	1192			H.dyn.sur.-Y	0.4				
4026	1192			Xx	-0.4				
4027	1192			Xy	-0.4				
4028	1192			Xz	-1				
4029	1192			Yx	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4030	1192			Yy	-0.4				
4031	1192			Yz	-1				
4032	1192			Zx	-0.4				
4033	1192			Zy	-0.4				
4034	1192			Zz	-1				
4035	1192			AE	-1				
4036	3001	Linear Add	No	D	0.9	No	No	No	No
4037	3001			H.rest	1				
4038	3001			H.sur.+X	1				
4039	3001			H.sur.+Y	1				
4040	3001			H.dyn.+X_e	1				
4041	3001			H.dyn.+Y_e	0.4				
4042	3001			H.dyn.sur.+X	1				
4043	3001			H.dyn.sur.+Y	0.4				
4044	3001			Xx	1				
4045	3001			Xy	0.4				
4046	3001			Xz	0.4				
4047	3001			Yx	1				
4048	3001			Yy	0.4				
4049	3001			Yz	0.4				
4050	3001			Zx	1				
4051	3001			Zy	0.4				
4052	3001			Zz	0.4				
4053	3001			AE	1				
4054	3002	Linear Add	No	D	0.9	No	No	No	No
4055	3002			H.rest	1				
4056	3002			H.sur.+X	1				
4057	3002			H.sur.+Y	1				
4058	3002			H.dyn.+X_e	1				
4059	3002			H.dyn.+Y_e	0.4				
4060	3002			H.dyn.sur.+X	1				
4061	3002			H.dyn.sur.+Y	0.4				
4062	3002			Xx	1				
4063	3002			Xy	0.4				
4064	3002			Xz	0.4				
4065	3002			Yx	1				
4066	3002			Yy	0.4				
4067	3002			Yz	0.4				
4068	3002			Zx	-1				
4069	3002			Zy	-0.4				
4070	3002			Zz	-0.4				
4071	3002			AE	1				
4072	3003	Linear Add	No	D	0.9	No	No	No	No
4073	3003			H.rest	1				
4074	3003			H.sur.+X	1				
4075	3003			H.sur.-Y	1				
4076	3003			H.dyn.+X_e	1				
4077	3003			H.dyn.-Y_e	0.4				
4078	3003			H.dyn.sur.+X	1				
4079	3003			H.dyn.sur.-Y	0.4				
4080	3003			Xx	1				
4081	3003			Xy	0.4				
4082	3003			Xz	0.4				
4083	3003			Yx	-1				
4084	3003			Yy	-0.4				
4085	3003			Yz	-0.4				
4086	3003			Zx	1				
4087	3003			Zy	0.4				
4088	3003			Zz	0.4				
4089	3003			AE	1				
4090	3004	Linear Add	No	D	0.9	No	No	No	No

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4091	3004			H.rest	1				
4092	3004			H.sur.+X	1				
4093	3004			H.sur.-Y	1				
4094	3004			H.dyn.+X_e	1				
4095	3004			H.dyn.-Y_e	0.4				
4096	3004			H.dyn.sur.+X	1				
4097	3004			H.dyn.sur.-Y	0.4				
4098	3004			Xx	1				
4099	3004			Xy	0.4				
4100	3004			Xz	0.4				
4101	3004			Yx	-1				
4102	3004			Yy	-0.4				
4103	3004			Yz	-0.4				
4104	3004			Zx	-1				
4105	3004			Zy	-0.4				
4106	3004			Zz	-0.4				
4107	3004			AE	1				
4108	3005	Linear Add	No	D	0.9	No	No	No	No
4109	3005			H.rest	1				
4110	3005			H.sur.-X	1				
4111	3005			H.sur.+Y	1				
4112	3005			H.dyn.-X_e	1				
4113	3005			H.dyn.+Y_e	0.4				
4114	3005			H.dyn.sur.-X	1				
4115	3005			H.dyn.sur.+Y	0.4				
4116	3005			Xx	-1				
4117	3005			Xy	-0.4				
4118	3005			Xz	-0.4				
4119	3005			Yx	1				
4120	3005			Yy	0.4				
4121	3005			Yz	0.4				
4122	3005			Zx	1				
4123	3005			Zy	0.4				
4124	3005			Zz	0.4				
4125	3005			AE	1				
4126	3006	Linear Add	No	D	0.9	No	No	No	No
4127	3006			H.rest	1				
4128	3006			H.sur.-X	1				
4129	3006			H.sur.+Y	1				
4130	3006			H.dyn.-X_e	1				
4131	3006			H.dyn.+Y_e	0.4				
4132	3006			H.dyn.sur.-X	1				
4133	3006			H.dyn.sur.+Y	0.4				
4134	3006			Xx	-1				
4135	3006			Xy	-0.4				
4136	3006			Xz	-0.4				
4137	3006			Yx	1				
4138	3006			Yy	0.4				
4139	3006			Yz	0.4				
4140	3006			Zx	-1				
4141	3006			Zy	-0.4				
4142	3006			Zz	-0.4				
4143	3006			AE	1				
4144	3007	Linear Add	No	D	0.9	No	No	No	No
4145	3007			H.rest	1				
4146	3007			H.sur.-X	1				
4147	3007			H.sur.-Y	1				
4148	3007			H.dyn.-X_e	1				
4149	3007			H.dyn.-Y_e	0.4				
4150	3007			H.dyn.sur.-X	1				
4151	3007			H.dyn.sur.-Y	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4152	3007			Xx	-1				
4153	3007			Xy	-0.4				
4154	3007			Xz	-0.4				
4155	3007			Yx	-1				
4156	3007			Yy	-0.4				
4157	3007			Yz	-0.4				
4158	3007			Zx	1				
4159	3007			Zy	0.4				
4160	3007			Zz	0.4				
4161	3007			AE	1				
4162	3008	Linear Add	No	D	0.9	No	No	No	No
4163	3008			H.rest	1				
4164	3008			H.sur.-X	1				
4165	3008			H.sur.-Y	1				
4166	3008			H.dyn.-X_e	1				
4167	3008			H.dyn.-Y_e	0.4				
4168	3008			H.dyn.sur.-X	1				
4169	3008			H.dyn.sur.-Y	0.4				
4170	3008			Xx	-1				
4171	3008			Xy	-0.4				
4172	3008			Xz	-0.4				
4173	3008			Yx	-1				
4174	3008			Yy	-0.4				
4175	3008			Yz	-0.4				
4176	3008			Zx	-1				
4177	3008			Zy	-0.4				
4178	3008			Zz	-0.4				
4179	3008			AE	1				
4180	3009	Linear Add	No	D	0.9	No	No	No	No
4181	3009			H.rest	1				
4182	3009			H.sur.+X	1				
4183	3009			H.sur.+Y	1				
4184	3009			H.dyn.+X_e	0.4				
4185	3009			H.dyn.+Y_e	1				
4186	3009			H.dyn.sur.+X	0.4				
4187	3009			H.dyn.sur.+Y	1				
4188	3009			Xx	0.4				
4189	3009			Xy	1				
4190	3009			Xz	0.4				
4191	3009			Yx	0.4				
4192	3009			Yy	1				
4193	3009			Yz	0.4				
4194	3009			Zx	0.4				
4195	3009			Zy	1				
4196	3009			Zz	0.4				
4197	3009			AE	1				
4198	3010	Linear Add	No	D	0.9	No	No	No	No
4199	3010			H.rest	1				
4200	3010			H.sur.+X	1				
4201	3010			H.sur.+Y	1				
4202	3010			H.dyn.+X_e	0.4				
4203	3010			H.dyn.+Y_e	1				
4204	3010			H.dyn.sur.+X	0.4				
4205	3010			H.dyn.sur.+Y	1				
4206	3010			Xx	0.4				
4207	3010			Xy	1				
4208	3010			Xz	0.4				
4209	3010			Yx	0.4				
4210	3010			Yy	1				
4211	3010			Yz	0.4				
4212	3010			Zx	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4213	3010			Zy	-1				
4214	3010			Zz	-0.4				
4215	3010			AE	1				
4216	3011	Linear Add	No	D	0.9	No	No	No	No
4217	3011			H.rest	1				
4218	3011			H.sur.+X	1				
4219	3011			H.sur.-Y	1				
4220	3011			H.dyn.+X_e	0.4				
4221	3011			H.dyn.-Y_e	1				
4222	3011			H.dyn.sur.+X	0.4				
4223	3011			H.dyn.sur.-Y	1				
4224	3011			Xx	0.4				
4225	3011			Xy	1				
4226	3011			Xz	0.4				
4227	3011			Yx	-0.4				
4228	3011			Yy	-1				
4229	3011			Yz	-0.4				
4230	3011			Zx	0.4				
4231	3011			Zy	1				
4232	3011			Zz	0.4				
4233	3011			AE	1				
4234	3012	Linear Add	No	D	0.9	No	No	No	No
4235	3012			H.rest	1				
4236	3012			H.sur.+X	1				
4237	3012			H.sur.-Y	1				
4238	3012			H.dyn.+X_e	0.4				
4239	3012			H.dyn.-Y_e	1				
4240	3012			H.dyn.sur.+X	0.4				
4241	3012			H.dyn.sur.-Y	1				
4242	3012			Xx	0.4				
4243	3012			Xy	1				
4244	3012			Xz	0.4				
4245	3012			Yx	-0.4				
4246	3012			Yy	-1				
4247	3012			Yz	-0.4				
4248	3012			Zx	-0.4				
4249	3012			Zy	-1				
4250	3012			Zz	-0.4				
4251	3012			AE	1				
4252	3013	Linear Add	No	D	0.9	No	No	No	No
4253	3013			H.rest	1				
4254	3013			H.sur.-X	1				
4255	3013			H.sur.+Y	1				
4256	3013			H.dyn.-X_e	0.4				
4257	3013			H.dyn.+Y_e	1				
4258	3013			H.dyn.sur.-X	0.4				
4259	3013			H.dyn.sur.+Y	1				
4260	3013			Xx	-0.4				
4261	3013			Xy	-1				
4262	3013			Xz	-0.4				
4263	3013			Yx	0.4				
4264	3013			Yy	1				
4265	3013			Yz	0.4				
4266	3013			Zx	0.4				
4267	3013			Zy	1				
4268	3013			Zz	0.4				
4269	3013			AE	1				
4270	3014	Linear Add	No	D	0.9	No	No	No	No
4271	3014			H.rest	1				
4272	3014			H.sur.-X	1				
4273	3014			H.sur.+Y	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4274	3014			H.dyn.-X_e	0.4				
4275	3014			H.dyn.+Y_e	1				
4276	3014			H.dyn.sur.-X	0.4				
4277	3014			H.dyn.sur.+Y	1				
4278	3014			Xx	-0.4				
4279	3014			Xy	-1				
4280	3014			Xz	-0.4				
4281	3014			Yx	0.4				
4282	3014			Yy	1				
4283	3014			Yz	0.4				
4284	3014			Zx	-0.4				
4285	3014			Zy	-1				
4286	3014			Zz	-0.4				
4287	3014			AE	1				
4288	3015	Linear Add	No	D	0.9	No	No	No	No
4289	3015			H.rest	1				
4290	3015			H.sur.-X	1				
4291	3015			H.sur.-Y	1				
4292	3015			H.dyn.-X_e	0.4				
4293	3015			H.dyn.-Y_e	1				
4294	3015			H.dyn.sur.-X	0.4				
4295	3015			H.dyn.sur.-Y	1				
4296	3015			Xx	-0.4				
4297	3015			Xy	-1				
4298	3015			Xz	-0.4				
4299	3015			Yx	-0.4				
4300	3015			Yy	-1				
4301	3015			Yz	-0.4				
4302	3015			Zx	0.4				
4303	3015			Zy	1				
4304	3015			Zz	0.4				
4305	3015			AE	1				
4306	3016	Linear Add	No	D	0.9	No	No	No	No
4307	3016			H.rest	1				
4308	3016			H.sur.-X	1				
4309	3016			H.sur.-Y	1				
4310	3016			H.dyn.-X_e	0.4				
4311	3016			H.dyn.-Y_e	1				
4312	3016			H.dyn.sur.-X	0.4				
4313	3016			H.dyn.sur.-Y	1				
4314	3016			Xx	-0.4				
4315	3016			Xy	-1				
4316	3016			Xz	-0.4				
4317	3016			Yx	-0.4				
4318	3016			Yy	-1				
4319	3016			Yz	-0.4				
4320	3016			Zx	-0.4				
4321	3016			Zy	-1				
4322	3016			Zz	-0.4				
4323	3016			AE	1				
4324	3017	Linear Add	No	D	0.9	No	No	No	No
4325	3017			H.rest	1				
4326	3017			H.sur.+X	1				
4327	3017			H.sur.+Y	1				
4328	3017			H.dyn.+X_e	0.4				
4329	3017			H.dyn.+Y_e	0.4				
4330	3017			H.dyn.sur.+X	0.4				
4331	3017			H.dyn.sur.+Y	0.4				
4332	3017			Xx	0.4				
4333	3017			Xy	0.4				
4334	3017			Xz	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4335	3017			Yx	0.4				
4336	3017			Yy	0.4				
4337	3017			Yz	1				
4338	3017			Zx	0.4				
4339	3017			Zy	0.4				
4340	3017			Zz	1				
4341	3017			AE	1				
4342	3018	Linear Add	No	D	0.9	No	No	No	No
4343	3018			H.rest	1				
4344	3018			H.sur.+X	1				
4345	3018			H.sur.+Y	1				
4346	3018			H.dyn.+X_e	0.4				
4347	3018			H.dyn.+Y_e	0.4				
4348	3018			H.dyn.sur.+X	0.4				
4349	3018			H.dyn.sur.+Y	0.4				
4350	3018			Xx	0.4				
4351	3018			Xy	0.4				
4352	3018			Xz	1				
4353	3018			Yx	0.4				
4354	3018			Yy	0.4				
4355	3018			Yz	1				
4356	3018			Zx	-0.4				
4357	3018			Zy	-0.4				
4358	3018			Zz	-1				
4359	3018			AE	1				
4360	3019	Linear Add	No	D	0.9	No	No	No	No
4361	3019			H.rest	1				
4362	3019			H.sur.+X	1				
4363	3019			H.sur.-Y	1				
4364	3019			H.dyn.+X_e	0.4				
4365	3019			H.dyn.-Y_e	0.4				
4366	3019			H.dyn.sur.+X	0.4				
4367	3019			H.dyn.sur.-Y	0.4				
4368	3019			Xx	0.4				
4369	3019			Xy	0.4				
4370	3019			Xz	1				
4371	3019			Yx	-0.4				
4372	3019			Yy	-0.4				
4373	3019			Yz	-1				
4374	3019			Zx	0.4				
4375	3019			Zy	0.4				
4376	3019			Zz	1				
4377	3019			AE	1				
4378	3020	Linear Add	No	D	0.9	No	No	No	No
4379	3020			H.rest	1				
4380	3020			H.sur.+X	1				
4381	3020			H.sur.-Y	1				
4382	3020			H.dyn.+X_e	0.4				
4383	3020			H.dyn.-Y_e	0.4				
4384	3020			H.dyn.sur.+X	0.4				
4385	3020			H.dyn.sur.-Y	0.4				
4386	3020			Xx	0.4				
4387	3020			Xy	0.4				
4388	3020			Xz	1				
4389	3020			Yx	-0.4				
4390	3020			Yy	-0.4				
4391	3020			Yz	-1				
4392	3020			Zx	-0.4				
4393	3020			Zy	-0.4				
4394	3020			Zz	-1				
4395	3020			AE	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4396	3021	Linear Add	No	D	0.9	No	No	No	No
4397	3021			H.rest	1				
4398	3021			H.sur.-X	1				
4399	3021			H.sur.+Y	1				
4400	3021			H.dyn.-X_e	0.4				
4401	3021			H.dyn.+Y_e	0.4				
4402	3021			H.dyn.sur.-X	0.4				
4403	3021			H.dyn.sur.+Y	0.4				
4404	3021			Xx	-0.4				
4405	3021			Xy	-0.4				
4406	3021			Xz	-1				
4407	3021			Yx	0.4				
4408	3021			Yy	0.4				
4409	3021			Yz	1				
4410	3021			Zx	0.4				
4411	3021			Zy	0.4				
4412	3021			Zz	1				
4413	3021			AE	1				
4414	3022	Linear Add	No	D	0.9	No	No	No	No
4415	3022			H.rest	1				
4416	3022			H.sur.-X	1				
4417	3022			H.sur.+Y	1				
4418	3022			H.dyn.-X_e	0.4				
4419	3022			H.dyn.+Y_e	0.4				
4420	3022			H.dyn.sur.-X	0.4				
4421	3022			H.dyn.sur.+Y	0.4				
4422	3022			Xx	-0.4				
4423	3022			Xy	-0.4				
4424	3022			Xz	-1				
4425	3022			Yx	0.4				
4426	3022			Yy	0.4				
4427	3022			Yz	1				
4428	3022			Zx	-0.4				
4429	3022			Zy	-0.4				
4430	3022			Zz	-1				
4431	3022			AE	1				
4432	3023	Linear Add	No	D	0.9	No	No	No	No
4433	3023			H.rest	1				
4434	3023			H.sur.-X	1				
4435	3023			H.sur.-Y	1				
4436	3023			H.dyn.-X_e	0.4				
4437	3023			H.dyn.-Y_e	0.4				
4438	3023			H.dyn.sur.-X	0.4				
4439	3023			H.dyn.sur.-Y	0.4				
4440	3023			Xx	-0.4				
4441	3023			Xy	-0.4				
4442	3023			Xz	-1				
4443	3023			Yx	-0.4				
4444	3023			Yy	-0.4				
4445	3023			Yz	-1				
4446	3023			Zx	0.4				
4447	3023			Zy	0.4				
4448	3023			Zz	1				
4449	3023			AE	1				
4450	3024	Linear Add	No	D	0.9	No	No	No	No
4451	3024			H.rest	1				
4452	3024			H.sur.-X	1				
4453	3024			H.sur.-Y	1				
4454	3024			H.dyn.-X_e	0.4				
4455	3024			H.dyn.-Y_e	0.4				
4456	3024			H.dyn.sur.-X	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4457	3024			H.dyn.sur.-Y	0.4				
4458	3024			Xx	-0.4				
4459	3024			Xy	-0.4				
4460	3024			Xz	-1				
4461	3024			Yx	-0.4				
4462	3024			Yy	-0.4				
4463	3024			Yz	-1				
4464	3024			Zx	-0.4				
4465	3024			Zy	-0.4				
4466	3024			Zz	-1				
4467	3024			AE	1				
4468	3025	Linear Add	No	D	0.9	No	No	No	No
4469	3025			H.rest	1				
4470	3025			H.sur.+X	1				
4471	3025			H.sur.+Y	1				
4472	3025			H.dyn.+X_e	1				
4473	3025			H.dyn.+Y_e	0.4				
4474	3025			H.dyn.sur.+X	1				
4475	3025			H.dyn.sur.+Y	0.4				
4476	3025			Xx	1				
4477	3025			Xy	0.4				
4478	3025			Xz	0.4				
4479	3025			Yx	1				
4480	3025			Yy	0.4				
4481	3025			Yz	0.4				
4482	3025			Zx	1				
4483	3025			Zy	0.4				
4484	3025			Zz	0.4				
4485	3025			AE	-1				
4486	3026	Linear Add	No	D	0.9	No	No	No	No
4487	3026			H.rest	1				
4488	3026			H.sur.+X	1				
4489	3026			H.sur.+Y	1				
4490	3026			H.dyn.+X_e	1				
4491	3026			H.dyn.+Y_e	0.4				
4492	3026			H.dyn.sur.+X	1				
4493	3026			H.dyn.sur.+Y	0.4				
4494	3026			Xx	1				
4495	3026			Xy	0.4				
4496	3026			Xz	0.4				
4497	3026			Yx	1				
4498	3026			Yy	0.4				
4499	3026			Yz	0.4				
4500	3026			Zx	-1				
4501	3026			Zy	-0.4				
4502	3026			Zz	-0.4				
4503	3026			AE	-1				
4504	3027	Linear Add	No	D	0.9	No	No	No	No
4505	3027			H.rest	1				
4506	3027			H.sur.+X	1				
4507	3027			H.sur.-Y	1				
4508	3027			H.dyn.+X_e	1				
4509	3027			H.dyn.-Y_e	0.4				
4510	3027			H.dyn.sur.+X	1				
4511	3027			H.dyn.sur.-Y	0.4				
4512	3027			Xx	1				
4513	3027			Xy	0.4				
4514	3027			Xz	0.4				
4515	3027			Yx	-1				
4516	3027			Yy	-0.4				
4517	3027			Yz	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4518	3027			Zx	1				
4519	3027			Zy	0.4				
4520	3027			Zz	0.4				
4521	3027			AE	-1				
4522	3028	Linear Add	No	D	0.9	No	No	No	No
4523	3028			H.rest	1				
4524	3028			H.sur.+X	1				
4525	3028			H.sur.-Y	1				
4526	3028			H.dyn.+X_e	1				
4527	3028			H.dyn.-Y_e	0.4				
4528	3028			H.dyn.sur.+X	1				
4529	3028			H.dyn.sur.-Y	0.4				
4530	3028			Xx	1				
4531	3028			Xy	0.4				
4532	3028			Xz	0.4				
4533	3028			Yx	-1				
4534	3028			Yy	-0.4				
4535	3028			Yz	-0.4				
4536	3028			Zx	-1				
4537	3028			Zy	-0.4				
4538	3028			Zz	-0.4				
4539	3028			AE	-1				
4540	3029	Linear Add	No	D	0.9	No	No	No	No
4541	3029			H.rest	1				
4542	3029			H.sur.-X	1				
4543	3029			H.sur.+Y	1				
4544	3029			H.dyn.-X_e	1				
4545	3029			H.dyn.+Y_e	0.4				
4546	3029			H.dyn.sur.-X	1				
4547	3029			H.dyn.sur.+Y	0.4				
4548	3029			Xx	-1				
4549	3029			Xy	-0.4				
4550	3029			Xz	-0.4				
4551	3029			Yx	1				
4552	3029			Yy	0.4				
4553	3029			Yz	0.4				
4554	3029			Zx	1				
4555	3029			Zy	0.4				
4556	3029			Zz	0.4				
4557	3029			AE	-1				
4558	3030	Linear Add	No	D	0.9	No	No	No	No
4559	3030			H.rest	1				
4560	3030			H.sur.-X	1				
4561	3030			H.sur.+Y	1				
4562	3030			H.dyn.-X_e	1				
4563	3030			H.dyn.+Y_e	0.4				
4564	3030			H.dyn.sur.-X	1				
4565	3030			H.dyn.sur.+Y	0.4				
4566	3030			Xx	-1				
4567	3030			Xy	-0.4				
4568	3030			Xz	-0.4				
4569	3030			Yx	1				
4570	3030			Yy	0.4				
4571	3030			Yz	0.4				
4572	3030			Zx	-1				
4573	3030			Zy	-0.4				
4574	3030			Zz	-0.4				
4575	3030			AE	-1				
4576	3031	Linear Add	No	D	0.9	No	No	No	No
4577	3031			H.rest	1				
4578	3031			H.sur.-X	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4579	3031			H.sur.-Y	1				
4580	3031			H.dyn.-X_e	1				
4581	3031			H.dyn.-Y_e	0.4				
4582	3031			H.dyn.sur.-X	1				
4583	3031			H.dyn.sur.-Y	0.4				
4584	3031			Xx	-1				
4585	3031			Xy	-0.4				
4586	3031			Xz	-0.4				
4587	3031			Yx	-1				
4588	3031			Yy	-0.4				
4589	3031			Yz	-0.4				
4590	3031			Zx	1				
4591	3031			Zy	0.4				
4592	3031			Zz	0.4				
4593	3031			AE	-1				
4594	3032	Linear Add	No	D	0.9	No	No	No	No
4595	3032			H.rest	1				
4596	3032			H.sur.-X	1				
4597	3032			H.sur.-Y	1				
4598	3032			H.dyn.-X_e	1				
4599	3032			H.dyn.-Y_e	0.4				
4600	3032			H.dyn.sur.-X	1				
4601	3032			H.dyn.sur.-Y	0.4				
4602	3032			Xx	-1				
4603	3032			Xy	-0.4				
4604	3032			Xz	-0.4				
4605	3032			Yx	-1				
4606	3032			Yy	-0.4				
4607	3032			Yz	-0.4				
4608	3032			Zx	-1				
4609	3032			Zy	-0.4				
4610	3032			Zz	-0.4				
4611	3032			AE	-1				
4612	3033	Linear Add	No	D	0.9	No	No	No	No
4613	3033			H.rest	1				
4614	3033			H.sur.+X	1				
4615	3033			H.sur.+Y	1				
4616	3033			H.dyn.+X_e	0.4				
4617	3033			H.dyn.+Y_e	1				
4618	3033			H.dyn.sur.+X	0.4				
4619	3033			H.dyn.sur.+Y	1				
4620	3033			Xx	0.4				
4621	3033			Xy	1				
4622	3033			Xz	0.4				
4623	3033			Yx	0.4				
4624	3033			Yy	1				
4625	3033			Yz	0.4				
4626	3033			Zx	0.4				
4627	3033			Zy	1				
4628	3033			Zz	0.4				
4629	3033			AE	-1				
4630	3034	Linear Add	No	D	0.9	No	No	No	No
4631	3034			H.rest	1				
4632	3034			H.sur.+X	1				
4633	3034			H.sur.+Y	1				
4634	3034			H.dyn.+X_e	0.4				
4635	3034			H.dyn.+Y_e	1				
4636	3034			H.dyn.sur.+X	0.4				
4637	3034			H.dyn.sur.+Y	1				
4638	3034			Xx	0.4				
4639	3034			Xy	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4640	3034			Xz	0.4				
4641	3034			Yx	0.4				
4642	3034			Yy	1				
4643	3034			Yz	0.4				
4644	3034			Zx	-0.4				
4645	3034			Zy	-1				
4646	3034			Zz	-0.4				
4647	3034			AE	-1				
4648	3035	Linear Add	No	D	0.9	No	No	No	No
4649	3035			H.rest	1				
4650	3035			H.sur.+X	1				
4651	3035			H.sur.-Y	1				
4652	3035			H.dyn.+X_e	0.4				
4653	3035			H.dyn.-Y_e	1				
4654	3035			H.dyn.sur.+X	0.4				
4655	3035			H.dyn.sur.-Y	1				
4656	3035			Xx	0.4				
4657	3035			Xy	1				
4658	3035			Xz	0.4				
4659	3035			Yx	-0.4				
4660	3035			Yy	-1				
4661	3035			Yz	-0.4				
4662	3035			Zx	0.4				
4663	3035			Zy	1				
4664	3035			Zz	0.4				
4665	3035			AE	-1				
4666	3036	Linear Add	No	D	0.9	No	No	No	No
4667	3036			H.rest	1				
4668	3036			H.sur.+X	1				
4669	3036			H.sur.-Y	1				
4670	3036			H.dyn.+X_e	0.4				
4671	3036			H.dyn.-Y_e	1				
4672	3036			H.dyn.sur.+X	0.4				
4673	3036			H.dyn.sur.-Y	1				
4674	3036			Xx	0.4				
4675	3036			Xy	1				
4676	3036			Xz	0.4				
4677	3036			Yx	-0.4				
4678	3036			Yy	-1				
4679	3036			Yz	-0.4				
4680	3036			Zx	-0.4				
4681	3036			Zy	-1				
4682	3036			Zz	-0.4				
4683	3036			AE	-1				
4684	3037	Linear Add	No	D	0.9	No	No	No	No
4685	3037			H.rest	1				
4686	3037			H.sur.-X	1				
4687	3037			H.sur.+Y	1				
4688	3037			H.dyn.-X_e	0.4				
4689	3037			H.dyn.+Y_e	1				
4690	3037			H.dyn.sur.-X	0.4				
4691	3037			H.dyn.sur.+Y	1				
4692	3037			Xx	-0.4				
4693	3037			Xy	-1				
4694	3037			Xz	-0.4				
4695	3037			Yx	0.4				
4696	3037			Yy	1				
4697	3037			Yz	0.4				
4698	3037			Zx	0.4				
4699	3037			Zy	1				
4700	3037			Zz	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4701	3037			AE	-1				
4702	3038	Linear Add	No	D	0.9	No	No	No	No
4703	3038			H.rest	1				
4704	3038			H.sur.-X	1				
4705	3038			H.sur.+Y	1				
4706	3038			H.dyn.-X_e	0.4				
4707	3038			H.dyn.+Y_e	1				
4708	3038			H.dyn.sur.-X	0.4				
4709	3038			H.dyn.sur.+Y	1				
4710	3038			Xx	-0.4				
4711	3038			Xy	-1				
4712	3038			Xz	-0.4				
4713	3038			Yx	0.4				
4714	3038			Yy	1				
4715	3038			Yz	0.4				
4716	3038			Zx	-0.4				
4717	3038			Zy	-1				
4718	3038			Zz	-0.4				
4719	3038			AE	-1				
4720	3039	Linear Add	No	D	0.9	No	No	No	No
4721	3039			H.rest	1				
4722	3039			H.sur.-X	1				
4723	3039			H.sur.-Y	1				
4724	3039			H.dyn.-X_e	0.4				
4725	3039			H.dyn.-Y_e	1				
4726	3039			H.dyn.sur.-X	0.4				
4727	3039			H.dyn.sur.-Y	1				
4728	3039			Xx	-0.4				
4729	3039			Xy	-1				
4730	3039			Xz	-0.4				
4731	3039			Yx	-0.4				
4732	3039			Yy	-1				
4733	3039			Yz	-0.4				
4734	3039			Zx	0.4				
4735	3039			Zy	1				
4736	3039			Zz	0.4				
4737	3039			AE	-1				
4738	3040	Linear Add	No	D	0.9	No	No	No	No
4739	3040			H.rest	1				
4740	3040			H.sur.-X	1				
4741	3040			H.sur.-Y	1				
4742	3040			H.dyn.-X_e	0.4				
4743	3040			H.dyn.-Y_e	1				
4744	3040			H.dyn.sur.-X	0.4				
4745	3040			H.dyn.sur.-Y	1				
4746	3040			Xx	-0.4				
4747	3040			Xy	-1				
4748	3040			Xz	-0.4				
4749	3040			Yx	-0.4				
4750	3040			Yy	-1				
4751	3040			Yz	-0.4				
4752	3040			Zx	-0.4				
4753	3040			Zy	-1				
4754	3040			Zz	-0.4				
4755	3040			AE	-1				
4756	3041	Linear Add	No	D	0.9	No	No	No	No
4757	3041			H.rest	1				
4758	3041			H.sur.+X	1				
4759	3041			H.sur.+Y	1				
4760	3041			H.dyn.+X_e	0.4				
4761	3041			H.dyn.+Y_e	0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4762	3041			H.dyn.sur.+X	0.4				
4763	3041			H.dyn.sur.+Y	0.4				
4764	3041			Xx	0.4				
4765	3041			Xy	0.4				
4766	3041			Xz	1				
4767	3041			Yx	0.4				
4768	3041			Yy	0.4				
4769	3041			Yz	1				
4770	3041			Zx	0.4				
4771	3041			Zy	0.4				
4772	3041			Zz	1				
4773	3041			AE	-1				
4774	3042	Linear Add	No	D	0.9	No	No	No	No
4775	3042			H.rest	1				
4776	3042			H.sur.+X	1				
4777	3042			H.sur.+Y	1				
4778	3042			H.dyn.+X_e	0.4				
4779	3042			H.dyn.+Y_e	0.4				
4780	3042			H.dyn.sur.+X	0.4				
4781	3042			H.dyn.sur.+Y	0.4				
4782	3042			Xx	0.4				
4783	3042			Xy	0.4				
4784	3042			Xz	1				
4785	3042			Yx	0.4				
4786	3042			Yy	0.4				
4787	3042			Yz	1				
4788	3042			Zx	-0.4				
4789	3042			Zy	-0.4				
4790	3042			Zz	-1				
4791	3042			AE	-1				
4792	3043	Linear Add	No	D	0.9	No	No	No	No
4793	3043			H.rest	1				
4794	3043			H.sur.+X	1				
4795	3043			H.sur.-Y	1				
4796	3043			H.dyn.+X_e	0.4				
4797	3043			H.dyn.-Y_e	0.4				
4798	3043			H.dyn.sur.+X	0.4				
4799	3043			H.dyn.sur.-Y	0.4				
4800	3043			Xx	0.4				
4801	3043			Xy	0.4				
4802	3043			Xz	1				
4803	3043			Yx	-0.4				
4804	3043			Yy	-0.4				
4805	3043			Yz	-1				
4806	3043			Zx	0.4				
4807	3043			Zy	0.4				
4808	3043			Zz	1				
4809	3043			AE	-1				
4810	3044	Linear Add	No	D	0.9	No	No	No	No
4811	3044			H.rest	1				
4812	3044			H.sur.+X	1				
4813	3044			H.sur.-Y	1				
4814	3044			H.dyn.+X_e	0.4				
4815	3044			H.dyn.-Y_e	0.4				
4816	3044			H.dyn.sur.+X	0.4				
4817	3044			H.dyn.sur.-Y	0.4				
4818	3044			Xx	0.4				
4819	3044			Xy	0.4				
4820	3044			Xz	1				
4821	3044			Yx	-0.4				
4822	3044			Yy	-0.4				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4823	3044			Yz	-1				
4824	3044			Zx	-0.4				
4825	3044			Zy	-0.4				
4826	3044			Zz	-1				
4827	3044			AE	-1				
4828	3045	Linear Add	No	D	0.9	No	No	No	No
4829	3045			H.rest	1				
4830	3045			H.sur.-X	1				
4831	3045			H.sur.+Y	1				
4832	3045			H.dyn.-X_e	0.4				
4833	3045			H.dyn.+Y_e	0.4				
4834	3045			H.dyn.sur.-X	0.4				
4835	3045			H.dyn.sur.+Y	0.4				
4836	3045			Xx	-0.4				
4837	3045			Xy	-0.4				
4838	3045			Xz	-1				
4839	3045			Yx	0.4				
4840	3045			Yy	0.4				
4841	3045			Yz	1				
4842	3045			Zx	0.4				
4843	3045			Zy	0.4				
4844	3045			Zz	1				
4845	3045			AE	-1				
4846	3046	Linear Add	No	D	0.9	No	No	No	No
4847	3046			H.rest	1				
4848	3046			H.sur.-X	1				
4849	3046			H.sur.+Y	1				
4850	3046			H.dyn.-X_e	0.4				
4851	3046			H.dyn.+Y_e	0.4				
4852	3046			H.dyn.sur.-X	0.4				
4853	3046			H.dyn.sur.+Y	0.4				
4854	3046			Xx	-0.4				
4855	3046			Xy	-0.4				
4856	3046			Xz	-1				
4857	3046			Yx	0.4				
4858	3046			Yy	0.4				
4859	3046			Yz	1				
4860	3046			Zx	-0.4				
4861	3046			Zy	-0.4				
4862	3046			Zz	-1				
4863	3046			AE	-1				
4864	3047	Linear Add	No	D	0.9	No	No	No	No
4865	3047			H.rest	1				
4866	3047			H.sur.-X	1				
4867	3047			H.sur.-Y	1				
4868	3047			H.dyn.-X_e	0.4				
4869	3047			H.dyn.-Y_e	0.4				
4870	3047			H.dyn.sur.-X	0.4				
4871	3047			H.dyn.sur.-Y	0.4				
4872	3047			Xx	-0.4				
4873	3047			Xy	-0.4				
4874	3047			Xz	-1				
4875	3047			Yx	-0.4				
4876	3047			Yy	-0.4				
4877	3047			Yz	-1				
4878	3047			Zx	0.4				
4879	3047			Zy	0.4				
4880	3047			Zz	1				
4881	3047			AE	-1				
4882	3048	Linear Add	No	D	0.9	No	No	No	No
4883	3048			H.rest	1				

	A	B	C	D	E	F	G	H	I
1	TABLE: Combination Definitions								
2	ComboName	ComboType	AutoDesign	CaseName	ScaleFactor	SteelDesign	ConcDesign	AlumDesign	ColdDesign
3	Text	Text	Yes/No	Text	Unitless	Yes/No	Yes/No	Yes/No	Yes/No
4884	3048			H.sur.-X	1				
4885	3048			H.sur.-Y	1				
4886	3048			H.dyn.-X_e	0.4				
4887	3048			H.dyn.-Y_e	0.4				
4888	3048			H.dyn.sur.-X	0.4				
4889	3048			H.dyn.sur.-Y	0.4				
4890	3048			Xx	-0.4				
4891	3048			Xy	-0.4				
4892	3048			Xz	-1				
4893	3048			Yx	-0.4				
4894	3048			Yy	-0.4				
4895	3048			Yz	-1				
4896	3048			Zx	-0.4				
4897	3048			Zy	-0.4				
4898	3048			Zz	-1				
4899	3048			AE	-1				

Table of Contents

K.1 Introduction

This attachment details the reinforced concrete section design for Group 1301, which represents the North Wall of the SHINE Facility. The group is located along the northern boundary of the main facility, extends both above and below grade, and contains elements of varying thickness; this attachment considers only the 2-ft. thick elements. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

K.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 1684 shell elements comprising the group, Element 20100 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 11, column 35.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Wall Height	57′-8″
Wall Height at Element 20100	53′-2″
Wall Length	192′-4″
Wall Length at Element 20100	163′-4″
Wall Thickness	2′-0″
Concrete Clear Cover	2″
Number of Shell Elements	1684

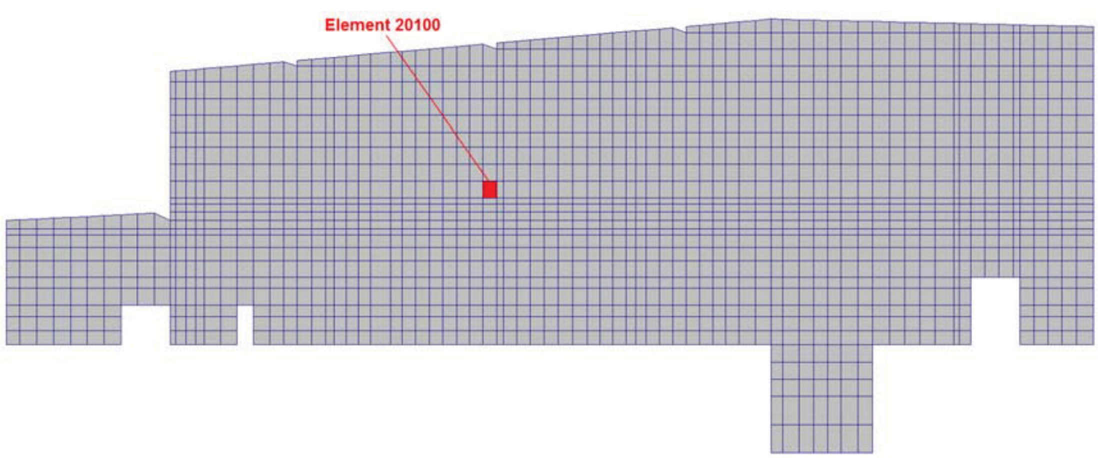


Figure 1 – Elevation view of Group 1301 indicating Element 20100, looking North.

K.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section K.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	1049 / 1092	-20.5	6.63
Horizontal	Bottom	1032 / 1032	30.2	16.1
Vertical	Top	3001 / 3009	-58.3	3.87
Vertical	Bottom	3006 / 3013	67.6	4.81

K.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section K.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	11	1183	Seismic	6653	-2117
Vertical	35	1183	Seismic	3115	187.6

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	3030	1.15	-17.8
Vertical	3044	0.46	5.92

K.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	0.53	0.89	#9 @ 12″ on center	1.00
	In-Plane Shear	0.36			
Vertical Longitudinal	Flexural	0.79	1.15	#10 @ 12″ on center	1.27
	In-Plane Shear	0.36			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

K.6 Flexural Reinforcement Design

Concrete walls in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given wall is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E_c := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000\text{psi}$ — Steel yield strength

$E_s := 29000000\text{psi}$ — Steel elastic modulus

$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \left| \begin{array}{l} 0.65 \ \text{ if } 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 \ \text{ if } 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} \ \text{ otherwise} \end{array} \right. = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0 \cdot \text{in}$ — Design strip width

$h_w = 57.7\ \text{ft}$ — Wall height

$l_w = 192.3\ \text{ft}$ — Wall length

$t_w = 24.0 \cdot \text{in}$ — Wall thickness

$c_c = 2.0 \cdot \text{in}$ — Concrete clear cover

$A_g := b_w \cdot t_w = 288.0 \cdot \text{in}^2$ — Gross concrete area

$D_{tie} = 0.50 \cdot \text{in}$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 0.790 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.000 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5 D_{b.hor} = 21.0 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 18.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 0.53 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 15.6 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ — Steel stress

$a := \beta_1 \cdot c = 12.5 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 403.8 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 206.3 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.53\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 83.8 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 12.6 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 10.1 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 314.3 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 208.7 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 7.9\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \beta_1\cdot c = 6.3\cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 260.7\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)(a\cdot b_w) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 234.6\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ — Steel stress

$$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 49.0\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.hor} \cdot f_y\right) = -56.9 \cdot kip$

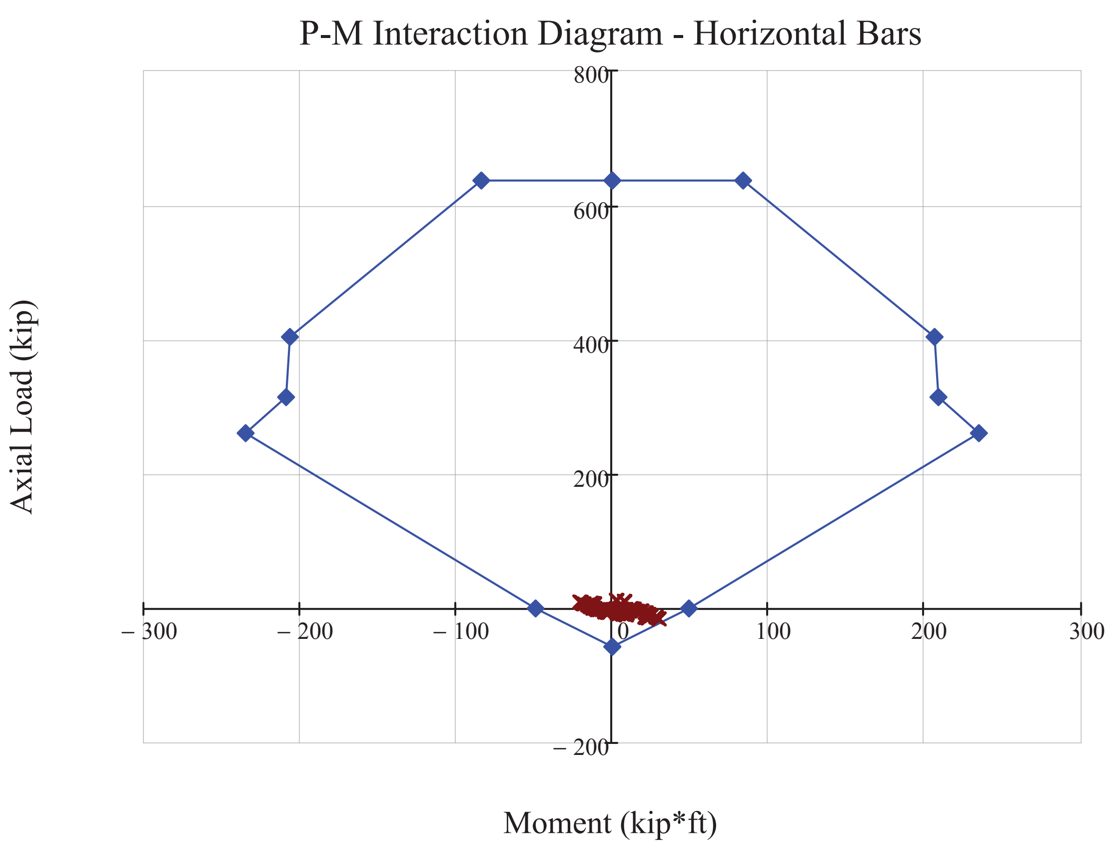
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 403.8 \\ 314.3 \\ 260.7 \\ 0.0 \\ -56.9 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 83.8 \\ 206.3 \\ 208.7 \\ 234.6 \\ 49.0 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 0.790 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.000 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.000 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 20.0 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 12.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \frac{b_w}{s_{vert}} = 0.79 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 14.9 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 11.9 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 379.0 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 209.2 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\dfrac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.50\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 79.9 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{vmatrix} 0.65 \ \text{ if } \varepsilon_s < 0.002 \\ 0.9 \ \text{ if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] \ \text{ otherwise} \end{vmatrix} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 12.0 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 9.6 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 288.5 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 210.8 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 7.5\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \beta_1\cdot c = 6.0\cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 232.7\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 235.0\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ — Steel stress

$$a := \frac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 69.4\cdot kip\cdot ft$$

<u>Point 7 - Axial Tension Only</u>

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.vert} \cdot f_y\right) = -85.3 \cdot kip$ — Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

<u>Check Slenderness Effects</u>

$k = 0.65$ — Effective length factor, assuming a fixed-fixed end condition

$l_u := h_w = 57.7\,ft$ — Unbraced height of wall

$I_g := \frac{1}{12} \cdot l_w \cdot t_w^{\ 3} = 128.2\,ft^{4.0}$ — Moment of inertia of wall

$r := \max\left(\sqrt{\frac{I_g}{l_w \cdot t_w}}, 0.3 \cdot t_w\right) = 7.2 \cdot in$ — Radius of gyration of wall per Section 10.11.2 of Ref. 3.1.9

$C_m := \begin{cases} 0 & \text{if } \frac{k \cdot l_u}{r} \le 22 \\ 1.0 & \text{otherwise} \end{cases} = 1.0$ — Slenderness check per Eq. 10-7 of Ref. 3.1.9, conservatively taking M1/M2 equal to 1.0
- if slender, Cm is conservatively taken as 1
- if non-slender, Cm is taken as 0

$\beta_d := 1$ — Ratio of maximum sustained axial load to maximum axial load per Ch. 10 of Ref. 3.1.9; conservatively taken as 1.0

$EI := \frac{0.4 \cdot E_c \cdot I_g}{1 + \beta_d} = 14883604 \cdot kip \cdot ft^2$ — Equation 10-12 of Ref. 3.1.9

$P_c := \frac{\pi^2 \cdot EI}{\left(k \cdot l_u\right)^2} = 104540 \cdot kip$ — Critical buckling load for wall; Equation 10-10 of Ref. 3.1.9

$P_u = 331.9 \cdot kip$ — Total factored axial load on wall

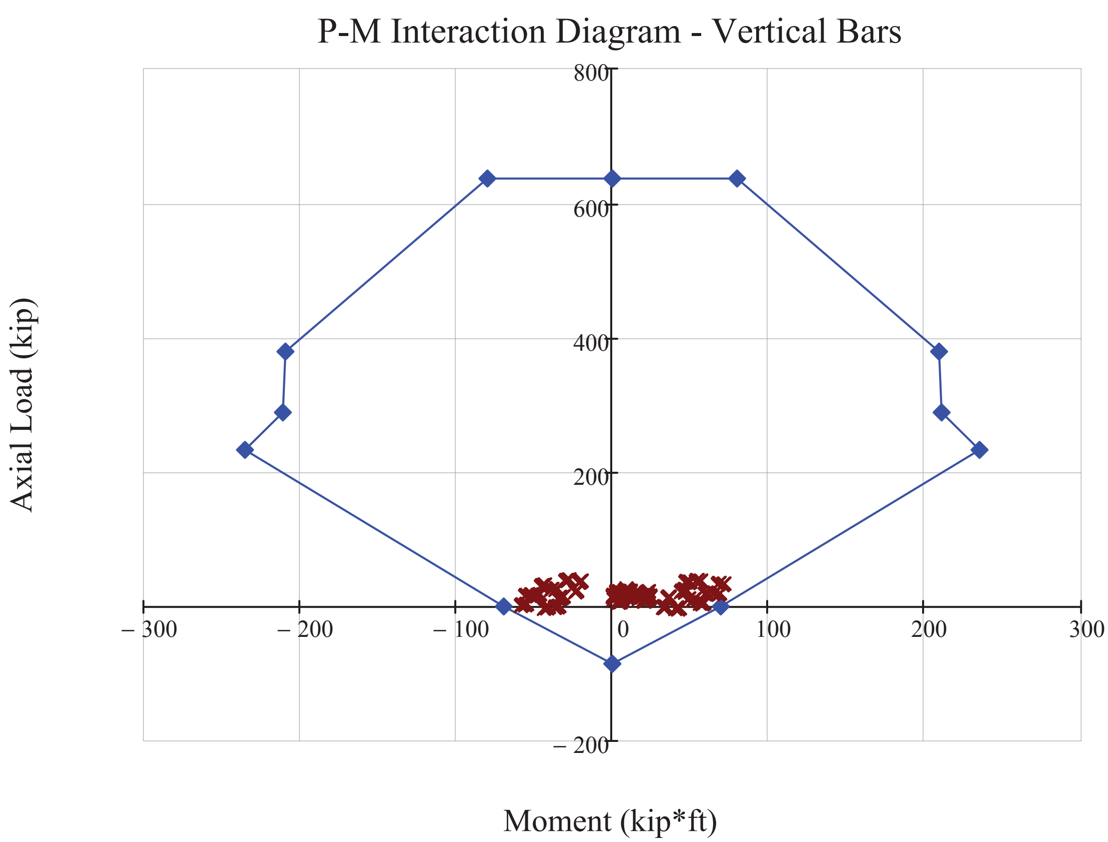
$\delta_{ns} := \max\left(1.0, \frac{C_m}{1 - \frac{P_u}{0.75P_c}}\right) = 1.00$ — Moment magnification factor per Eq. 10-9 of Ref. 3.1.9; *Note: if wall is non-slender as determined by the kl/r check above, this factor will automatically default to 1.0*

Note: when plotted on the P-M diagram below, the moments for all load points are magnified by the moment magnification factor determined above to account for slenderness effects, if any.

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 379.0 \\ 288.5 \\ 232.7 \\ 0.0 \\ -85.3 \end{pmatrix} \cdot \text{kip} \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 79.9 \\ 209.2 \\ 210.8 \\ 235.0 \\ 69.4 \\ 0.0 \end{pmatrix} \text{ft} \cdot \text{kip}$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 1.05 \cdot in^2$ — Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 1.58 \cdot in^2$ — Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 0.72 \cdot in^2$ — Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 0.72 \cdot in^2$ — Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 1.8 \cdot in^2$ — Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 2.3 \cdot in^2$ — Total area of vertical steel required

$A_{min1} := 2 \cdot 0.0018 A_g = 1.04 \cdot in^2$ — Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$A_{min2.h} := 0.0025 A_g = 0.72 \cdot in^2$ — Minimum horizontal reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.3 (b) of Ref. 3.1.9

$A_{min2.v} := 0.0015 A_g = 0.43 \cdot in^2$ — Minimum vertical reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.2 (b) of Ref. 3.1.9

$A_{min3} := 0.0025 A_g = 0.72 \cdot in^2$ — Minimum vertical and horizontal reinforcement for seismic cases if Vu > Acv/fc per Section 21.7.2.1 of Ref. 3.1.9

$$Check\_H := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.H} > \max(A_{min1}, A_{min2.h}, A_{min3}) \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

$$Check\_V := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.V} > \max(A_{min1}, A_{min2.v}, A_{min3}) \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

K.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for the given wall considers seismic effects; therefore, in-plane shear design follows the provisions of Chapter 21 of ACI 349-06 (Ref. 3.1.9). Out-of-plane shear design, which is unaffected by load case type, follows the provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000\text{psi}$ — Steel yield strength

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 530.3\ \text{psi}$ — Concrete modulus of rupture

$t_w = 24.0 \cdot \text{in}$ — Wall thickness

$l_w = 163.3\ \text{ft}$ — Wall length

$h_w = 53.2\ \text{ft}$ — Wall height

$\phi_v := 0.75$ — Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

$$\alpha_c := \begin{cases} 3.0 & \text{if } \frac{h_w}{l_w} < 1.5 \\ 2.0 & \text{if } \frac{h_w}{l_w} > 2.0 \\ 2.0 + \frac{(3.0 - 2.0)}{(1.5 - 2.0)} \cdot \left(\frac{h_w}{l_w} - 2.0\right) & \text{otherwise} \end{cases} = 3.0$$

Coefficient per Section 21.7.4.1 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$V_{u.hor} = 6653.0 \cdot kip$ — Factored shear force in wall

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.h} = 1.0\,ft$ — Spacing of horizontal shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Height of element above section cut; in this case, consider 12-in. design section

$A_{cv} := l_w \cdot t_w = 326.7 \cdot ft^2$ — Gross concrete area bounded by wall thickness and wall length

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.hor}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.11 \cdot in^2$$

Minimum area of reinforcement required for strength

$A_{v.min} := 0.0025 \cdot t_w \cdot s_{IP.h} = 0.72 \cdot in^2$ — Minimum area of reinforcement required per Section 21.7.2.1 of Ref. 3.1.9

$A_{v.req.iph} := \max\left(A_{v.min}, A_v\right) = 0.72 \cdot in^2$ — Required area of horizontal in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 26609 \cdot kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{cases} \text{"OK"} & \text{if } V_{u.hor} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

In-Plane Shear Design - Vertical

$V_{u.vert} = 3115.0 \cdot kip$ — Factored shear force in wall

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.v} = 12.0 \cdot in$ — Spacing of vertical shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Length of element aside section cut; in this case, consider 12-in. design section

$A_{cv} := h_w \cdot t_w = 106.4 \cdot ft^2$ — Gross concrete area bounded by wall thickness and wall height

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.vert}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = 0.28 \cdot in^2$$

Minimum area of reinforcement required for strength

$$A_{v.min} := \begin{cases} A_{v.req.iph} & \text{if } \dfrac{h_w}{l_w} < 2.0 \\ 0.0025 \cdot t_w \cdot s_{IP.v} & \text{otherwise} \end{cases} = 0.72 \cdot in^2$$

Minimum area of reinforcement required per Sections 21.7.2.1 and 21.7.4.3 of Ref. 3.1.9

$A_{v.req.ipv} := \max(A_{v.min}, A_v) = 0.72 \cdot in^2$ — Required area of vertical in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 8666 \cdot kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{cases} \text{"OK"} & \text{if } V_{u.vert} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = 17.8 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.hor} = 1.2 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 20.0 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 35.0 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.04$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -5.9 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.vert} = 0.5 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 21.0 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 34.2 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.02$$

Table of Contents

L.1 Introduction

This attachment details the reinforced concrete section design for Group 1213, which represents the East Wall of the SHINE Facility. The group is located along the eastern boundary of the main facility, extends only above grade, and contains elements of uniform thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

L.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 1920 shell elements comprising the group, Element 21840 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 7, column 37.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Wall Height	56′-4″
Wall Length	198′-4″
Wall Thickness	2′-0″
Concrete Clear Cover	2″
Number of Shell Elements	1920

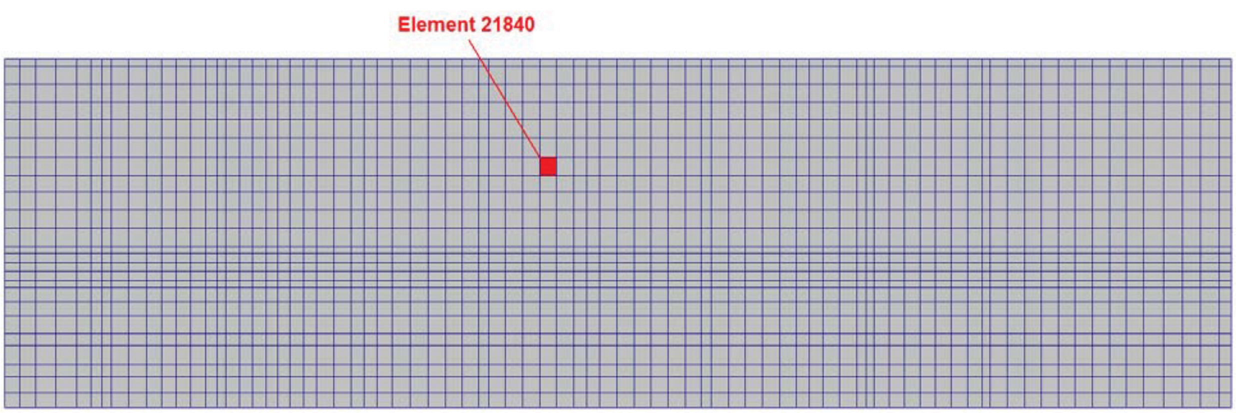


Figure 1 – Elevation view of Group 1213 indicating Element 21840, looking East.

L.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section L.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	1179 / 1112	-25.1	-28.0
Horizontal	Bottom	1058 / 1082	33.7	30.0
Vertical	Top	1131 / 1020	-88.5	-30.6
Vertical	Bottom	1010 / 1046	95.3	-27.5

L.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section L.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	7	1126	Seismic	3614	-2973
Vertical	37	1004	Seismic	1507	-452

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	1184	7.15	-29.5
Vertical	1082	3.65	29.9

L.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-prov}}$) exceeding those required ($A_{s\text{-total}}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-req}}$	$A_{s\text{-total}}$	Reinforcement	$A_{s\text{-prov}}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	0.79	1.15	#10 @ 12″ on center	1.27
	In-Plane Shear	0.36			
Vertical Longitudinal	Flexural	1.00	1.36	#10 @ 9″ on center	1.69
	In-Plane Shear	0.36			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

L.6 Flexural Reinforcement Design

Concrete walls in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given wall is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E_c := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000\text{psi}$ — Steel yield strength

$E_s := 29000000\text{psi}$ — Steel elastic modulus

$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \begin{cases} 0.65 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} & \text{otherwise} \end{cases} = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0 \cdot \text{in}$ — Design strip width

$h_w = 56.3\ \text{ft}$ — Wall height

$l_w = 198.3\ \text{ft}$ — Wall length

$t_w = 24.0 \cdot \text{in}$ — Wall thickness

$c_c = 2.0 \cdot \text{in}$ — Concrete clear cover

$A_g := b_w \cdot t_w = 288.0 \cdot \text{in}^2$ — Gross concrete area

$D_{tie} = 0.50 \cdot \text{in}$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 0.790 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.000 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5 D_{b.hor} = 21.0 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 12.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 0.79 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 15.6 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 12.5 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 398.7 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 210.1 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.53\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 84.2 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 12.6 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 10.1 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 304.4 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 216.1 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 7.9\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1\cdot c = 6.3\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 246.5\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 245.3\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 73.0\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.hor} \cdot f_y\right) = -85.3 \cdot \text{kip}$

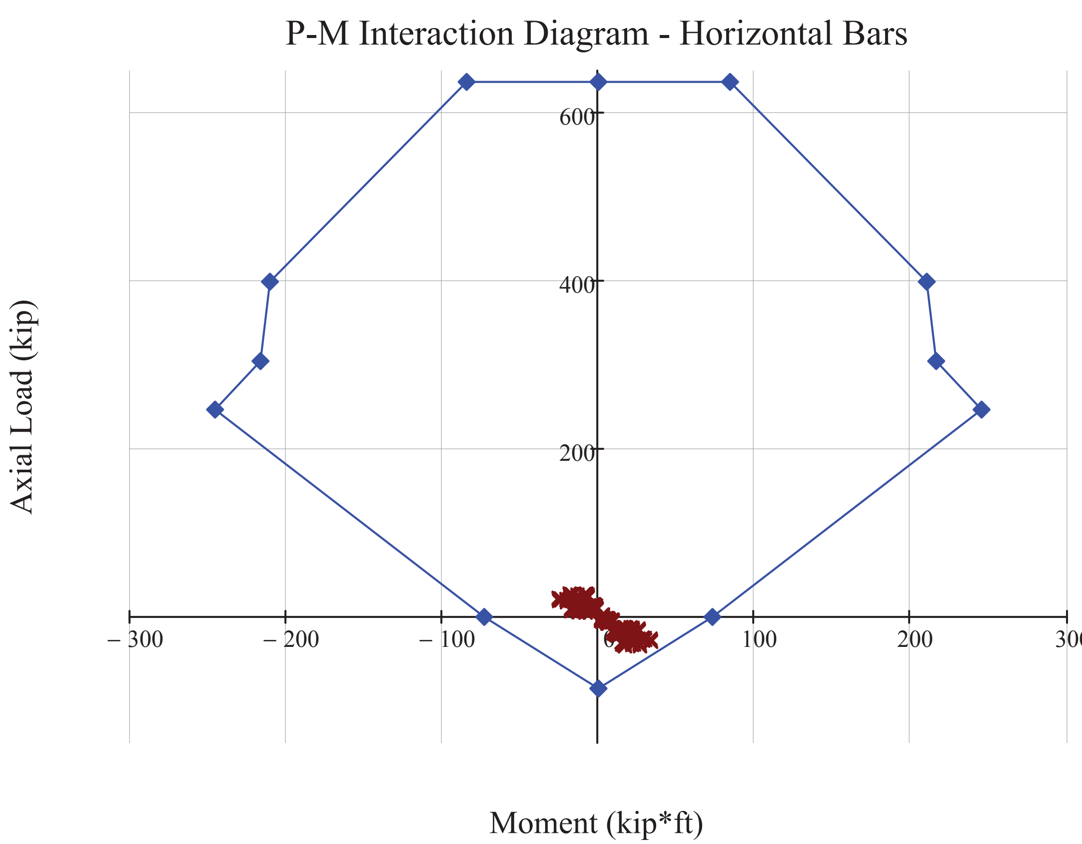
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 398.7 \\ 304.4 \\ 246.5 \\ 0.0 \\ -85.3 \end{pmatrix} \cdot \text{kip} \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 84.2 \\ 210.1 \\ 216.1 \\ 245.3 \\ 73.0 \\ 0.0 \end{pmatrix} \text{ft} \cdot \text{kip}$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 1.000 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.128 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.000 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 19.9 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 12.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \frac{b_w}{s_{vert}} = 1.00 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{vmatrix} 0.65 \ \text{ if } \ \varepsilon_s < 0.002 \\ 0.9 \ \text{ if } \ \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] \ \text{ otherwise} \end{vmatrix} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 14.8 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 11.9 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 373.6 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 211.8 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.50\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 79.9 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 12.0 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 9.6 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 279.5 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 215.7 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 7.5\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1\cdot c = 6.0\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 220.5\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 241.8\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$$a := \frac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 87.1\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$	Strength reduction factor per Section 9.3.2 of Ref. 3.1.9
$\phi P_{n_7} := -\phi \cdot \left(2A_{s.vert} \cdot f_y\right) = -108.0 \cdot \text{kip}$	Maximum tensile load; note that the tensile capacity of concrete is ignored
$\phi M_{n_7} := 0$	

Check Slenderness Effects

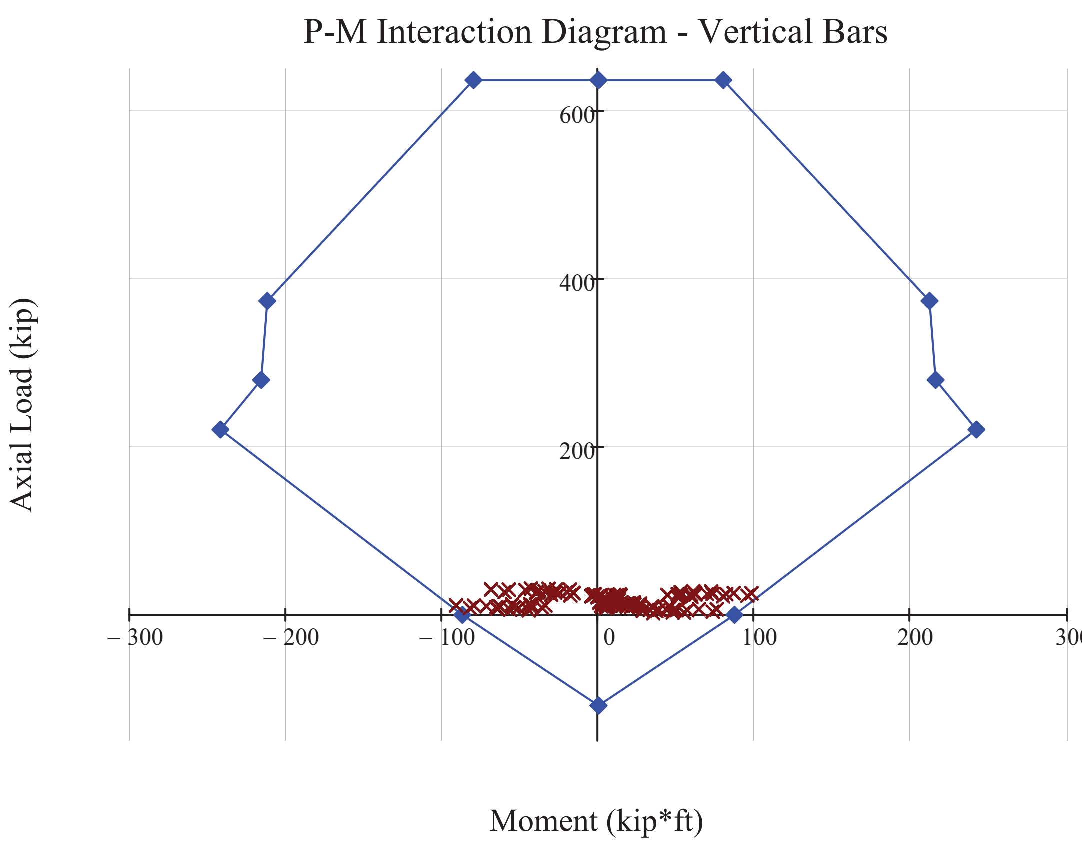
$k = 0.65$	Effective length factor, assuming a fixed-fixed end condition
$l_u := h_w - 2\text{ft} = 54.3\ \text{ft}$	Unbraced height of wall
$I_g := \frac{1}{12} \cdot l_w \cdot t_w^{\ 3} = 132.2\ \text{ft}^{4.0}$	Moment of inertia of wall
$r := \max\left(\sqrt{\frac{I_g}{l_w \cdot t_w}}, 0.3 \cdot t_w\right) = 7.2 \cdot \text{in}$	Radius of gyration of wall per Section 10.11.2 of Ref. 3.1.9
$C_m := \begin{cases} 0 & \text{if } \frac{k \cdot l_u}{r} \le 22 \\ 1.0 & \text{otherwise} \end{cases} = 1.0$	Slenderness check per Eq. 10-7 of Ref. 3.1.9, conservatively taking M1/M2 equal to 1.0 - if slender, Cm is conservatively taken as 1 - if non-slender, Cm is taken as 0
$\beta_d := 1$	Ratio of maximum sustained axial load to maximum axial load per Ch. 10 of Ref. 3.1.9; conservatively taken as 1.0
$EI := \frac{0.4 \cdot E_c \cdot I_g}{1 + \beta_d} = 15345597 \cdot \text{kip} \cdot \text{ft}^2$	Equation 10-12 of Ref. 3.1.9
$P_c := \frac{\pi^2 \cdot EI}{\left(k \cdot l_u\right)^2} = 121579 \cdot \text{kip}$	Critical buckling load for wall; Equation 10-10 of Ref. 3.1.9
$P_u = 2489.2 \cdot \text{kip}$	Total factored axial load on wall
$\delta_{ns} := \max\left(1.0, \frac{C_m}{1 - \frac{P_u}{0.75P_c}}\right) = 1.03$	Moment magnification factor per Eq. 10-9 of Ref. 3.1.9; *Note: if wall is non-slender as determined by the kl/r check above, this factor will automatically default to 1.0*

Note: when plotted on the P-M diagram below, the moments for all load points are magnified by the moment magnification factor determined above to account for slenderness effects, if any.

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 373.6 \\ 279.5 \\ 220.5 \\ 0.0 \\ -108.0 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 79.9 \\ 211.8 \\ 215.7 \\ 241.8 \\ 87.1 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 1.58 \cdot in^2$

Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 2.00 \cdot in^2$

Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 0.72 \cdot in^2$

Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 0.72 \cdot in^2$

Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 2.3 \cdot in^2$

Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 2.7 \cdot in^2$

Total area of vertical steel required

$A_{min1} := 2 \cdot 0.0018 A_g = 1.04 \cdot in^2$

Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$A_{min2.h} := 0.0025 A_g = 0.72 \cdot in^2$

Minimum horizontal reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.3 (b) of Ref. 3.1.9

$A_{min2.v} := 0.0015 A_g = 0.43 \cdot in^2$

Minimum vertical reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.2 (b) of Ref. 3.1.9

$A_{min3} := 0.0025 A_g = 0.72 \cdot in^2$

Minimum vertical and horizontal reinforcement for seismic cases if Vu > Acv/fc per Section 21.7.2.1 of Ref. 3.1.9

$$\text{Check\_H} := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.H} > \max(A_{min1}, A_{min2.h}, A_{min3}) \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

$$\text{Check\_V} := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.V} > \max(A_{min1}, A_{min2.v}, A_{min3}) \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

L.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for the given wall considers seismic effects; therefore, in-plane shear design follows the provisions of Chapter 21 of ACI 349-06 (Ref. 3.1.9). Out-of-plane shear design, which is unaffected by load case type, follows the provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000\text{psi}$ — Steel yield strength

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 530.3\ \text{psi}$ — Concrete modulus of rupture

$t_w = 24.0 \cdot \text{in}$ — Wall thickness

$l_w = 198.3\ \text{ft}$ — Wall length

$h_w = 56.3\ \text{ft}$ — Wall height

$\phi_v := 0.75$ — Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

$$\alpha_c := \begin{cases} 3.0 & \text{if } \frac{h_w}{l_w} < 1.5 \\ 2.0 & \text{if } \frac{h_w}{l_w} > 2.0 \\ 2.0 + \frac{(3.0 - 2.0)}{(1.5 - 2.0)} \cdot \left(\frac{h_w}{l_w} - 2.0\right) & \text{otherwise} \end{cases} = 3.0$$

Coefficient per Section 21.7.4.1 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$V_{u.hor} = 3614.0 \cdot kip$ — Factored shear force in wall

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.h} = 1.0\,ft$ — Spacing of horizontal shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Height of element above section cut; in this case, consider 12-in. design section

$A_{cv} := l_w \cdot t_w = 396.6 \cdot ft^2$ — Gross concrete area bounded by wall thickness and wall length

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.hor}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.61 \cdot in^2$$

Minimum area of reinforcement required for strength

$A_{v.min} := 0.0025 \cdot t_w \cdot s_{IP.h} = 0.72 \cdot in^2$ — Minimum area of reinforcement required per Section 21.7.2.1 of Ref. 3.1.9

$A_{v.req.iph} := \max(A_{v.min}, A_v) = 0.72 \cdot in^2$ — Required area of horizontal in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 32307\,kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \left| \begin{array}{ll} \text{"OK"} & \text{if } V_{u.hor} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{array} \right. = \text{"OK"}$$

In-Plane Shear Design - Vertical

$V_{u.vert} = 1507.0 \cdot kip$ — Factored shear force in wall

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.v} = 12.0 \cdot in$ — Spacing of vertical shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Length of element aside section cut; in this case, consider 12-in. design section

$A_{cv} := h_w \cdot t_w = 112.6 \cdot ft^2$ — Gross concrete area bounded by wall thickness and wall height

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.vert}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.42 \cdot in^2$$

Minimum area of reinforcement required for strength

$$A_{v.min} := \begin{cases} A_{v.req.iph} & \text{if } \frac{h_w}{l_w} < 2.0 \\ 0.0025 \cdot t_w \cdot s_{IP.v} & \text{otherwise} \end{cases} = 0.72 \cdot in^2$$

Minimum area of reinforcement required per Sections 21.7.2.1 and 21.7.4.3 of Ref. 3.1.9

$A_{v.req.ipv} := \max(A_{v.min}, A_v) = 0.72 \cdot in^2$ — Required area of vertical in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 9172\,kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{cases} \text{"OK"} & \text{if } V_{u.vert} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = 29.5 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.hor} = 7.2 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 19.9 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \frac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 35.6 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.27$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -29.9 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.vert} = 3.7 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 21.0 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 28.3 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.17$$

Table of Contents

M.1 Introduction

This attachment details the reinforced concrete section design for Group 1318, which represents the South Wall of the SHINE Facility. The group is located along the southern boundary of the main facility, extends only above grade, and contains elements of uniform thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

M.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 1643 shell elements comprising the group, Element 16350 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 17, column 65.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Wall Height	57′-8″
Wall Height at Element 16350	57′-1″
Wall Length	192′-4″
Wall Thickness	2′-0″
Concrete Clear Cover	2″
Number of Shell Elements	1643

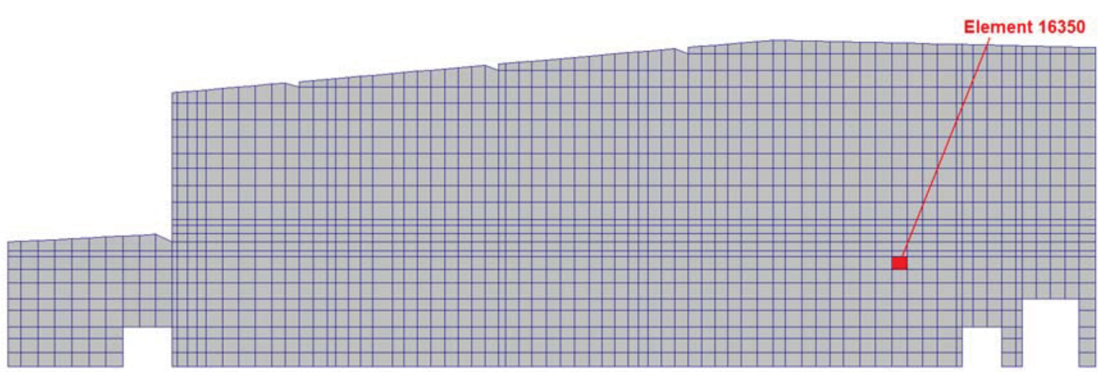


Figure 1 – Elevation view of Group 1318 indicating Element 16350, looking North.

M.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section M.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	1034 / 1034	-46.8	38.9
Horizontal	Bottom	3031 / 1174	14.7	33.0
Vertical	Top	1074 / 1018	-112	-37.5
Vertical	Bottom	3007 / 1006	38.5	-33.6

M.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section M.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	17	1155	Seismic	7045	-2170
Vertical	65	1086	Seismic	2316	628

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	1174	8.45	-32.3
Vertical	1170	1.47	26.7

M.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	1.00	1.36	#10 @ 9″ on center	1.69
	In-Plane Shear	0.36			
Vertical Longitudinal	Flexural	1.27	1.63	#10 @ 9″ on center	1.69
	In-Plane Shear	0.36			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

M.6 Flexural Reinforcement Design

Concrete walls in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given wall is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E_c := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000\text{psi}$ — Steel yield strength

$E_s := 29000000\text{psi}$ — Steel elastic modulus

$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \begin{cases} 0.65 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} & \text{otherwise} \end{cases} = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0 \cdot \text{in}$ — Design strip width

$t_w = 24.0 \cdot \text{in}$ — Wall thickness

$h_w = 57.7\ \text{ft}$ — Wall height

$l_w = 192.3\ \text{ft}$ — Wall length

$c_c = 2.0 \cdot \text{in}$ — Concrete clear cover

$A_g := b_w \cdot t_w = 288.0 \cdot \text{in}^2$ — Gross concrete area

$D_{tie} = 0.50 \cdot \text{in}$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 1.000 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.128 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 20.9 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 12.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 1.00 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 15.6 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 12.5 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 393.4 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 213.1 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\dfrac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.53\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 84.3 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 12.6 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 10.0 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 295.4 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 221.7 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 7.9\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \beta_1\cdot c = 6.3\cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 234.3\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 253.1\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ — Steel stress

$$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 91.6\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot (2A_{s.hor} \cdot f_y) = -108.0 \cdot kip$

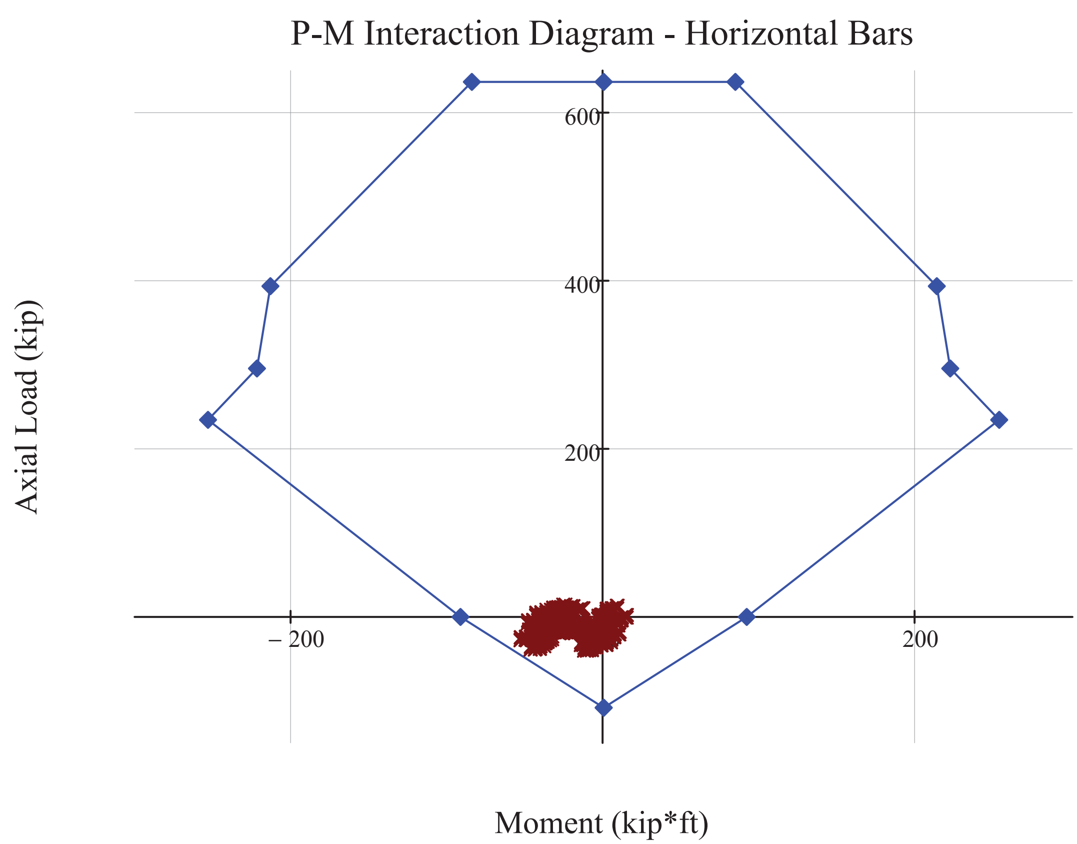
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 393.4 \\ 295.4 \\ 234.3 \\ 0.0 \\ -108.0 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 84.3 \\ 213.1 \\ 221.7 \\ 253.1 \\ 91.6 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 1.270 \cdot in^2$ Area of reinforcement per bar

$D_{b.vert} = 1.270 \cdot in$ Diameter of vertical bar

$D_{b.hor} = 1.128 \cdot in$ Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 19.7 \cdot in$ Depth to centroid of vertical reinforcing steel

$s_{vert} = 12.0 \cdot in$ Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \frac{b_w}{s_{vert}} = 1.27 \cdot in^2$ Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 14.7 \cdot in$ Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ Steel stress

$a := \beta_1 \cdot c = 11.7 \cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 364.4 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 214.8 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\dfrac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.50\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 79.3 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 11.8 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 9.5 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 266.2 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 221.0 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 7.4\cdot in$ Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1\cdot c = 5.9\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 203.2\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 248.9\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$a := \dfrac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$ Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 108.5\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot (2A_{s.vert} \cdot f_y) = -137.2 \cdot kip$ — Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Check Slenderness Effects

$k = 0.65$ — Effective length factor, assuming a fixed-fixed end condition

$l_u := h_w - 2ft = 55.7\,ft$ — Unbraced height of wall

$I_g := \frac{1}{12} \cdot l_w \cdot t_w^{\;3} = 128.2\,ft^{4.0}$ — Moment of inertia of wall

$r := \max\left(\sqrt{\frac{I_g}{l_w \cdot t_w}}, 0.3 \cdot t_w\right) = 7.2 \cdot in$ — Radius of gyration of wall per Section 10.11.2 of Ref. 3.1.9

$$C_m := \begin{cases} 0 & \text{if } \frac{k \cdot l_u}{r} \le 22 \\ 1.0 & \text{otherwise} \end{cases} = 1.0$$

Slenderness check per Eq. 10-7 of Ref. 3.1.9, conservatively taking M1/M2 equal to 1.0
- if slender, Cm is conservatively taken as 1
- if non-slender, Cm is taken as 0

$\beta_d := 1$ — Ratio of maximum sustained axial load to maximum axial load per Ch. 10 of Ref. 3.1.9; conservatively taken as 1.0

$EI := \frac{0.4 \cdot E_c \cdot I_g}{1 + \beta_d} = 14883604 \cdot kip \cdot ft^2$ — Equation 10-12 of Ref. 3.1.9

$P_c := \frac{\pi^2 \cdot EI}{(k \cdot l_u)^2} = 112186 \cdot kip$ — Critical buckling load for wall; Equation 10-10 of Ref. 3.1.9

$P_u = 918.1 \cdot kip$ — Total factored axial load on wall

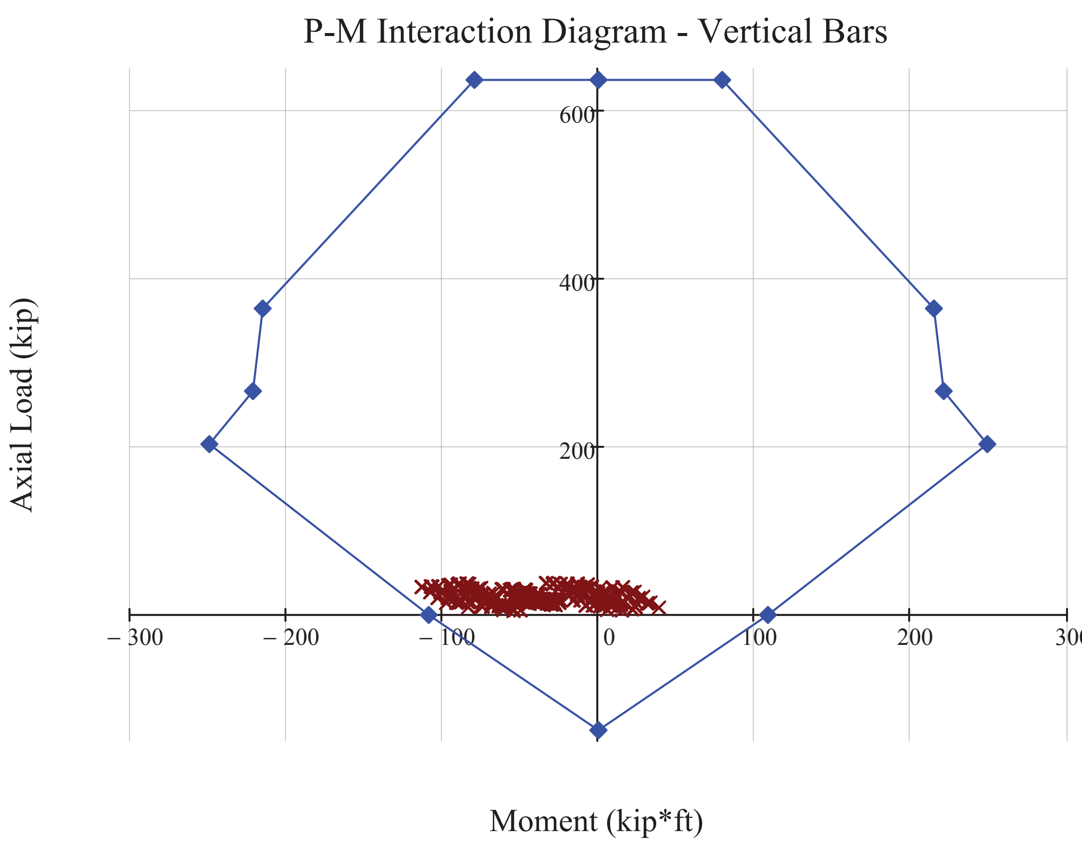
$\delta_{ns} := \max\left(1.0, \frac{C_m}{1 - \frac{P_u}{0.75P_c}}\right) = 1.01$ — Moment magnification factor per Eq. 10-9 of Ref. 3.1.9; *Note: if wall is non-slender as determined by the kl/r check above, this factor will automatically default to 1.0*

Note: when plotted on the P-M diagram below, the moments for all load points are magnified by the moment magnification factor determined above to account for slenderness effects, if any.

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 364.4 \\ 266.2 \\ 203.2 \\ 0.0 \\ -137.2 \end{pmatrix} \cdot \text{kip} \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 79.3 \\ 214.8 \\ 221.0 \\ 248.9 \\ 108.5 \\ 0.0 \end{pmatrix} \text{ft} \cdot \text{kip}$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 2.00 \cdot in^2$ — Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 2.54 \cdot in^2$ — Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 0.72 \cdot in^2$ — Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 0.72 \cdot in^2$ — Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 2.7 \cdot in^2$ — Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 3.3 \cdot in^2$ — Total area of vertical steel required

$A_{min1} := 2 \cdot 0.0018 A_g = 1.04 \cdot in^2$ — Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$A_{min2.h} := 0.0025 A_g = 0.72 \cdot in^2$ — Minimum horizontal reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.3 (b) of Ref. 3.1.9

$A_{min2.v} := 0.0015 A_g = 0.43 \cdot in^2$ — Minimum vertical reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.2 (b) of Ref. 3.1.9

$A_{min3} := 0.0025 A_g = 0.72 \cdot in^2$ — Minimum vertical and horizontal reinforcement for seismic cases if Vu > Acv/fc per Section 21.7.2.1 of Ref. 3.1.9

$$Check\_H := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.H} > \max(A_{min1}, A_{min2.h}, A_{min3}) \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

$$Check\_V := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.V} > \max(A_{min1}, A_{min2.v}, A_{min3}) \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

M.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for the given wall considers seismic effects; therefore, in-plane shear design follows the provisions of Chapter 21 of ACI 349-06 (Ref. 3.1.9). Out-of-plane shear design, which is unaffected by load case type, follows the provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000\text{psi}$ — Steel yield strength

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\,\text{psi}$ — Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 530.3\,\text{psi}$ — Concrete modulus of rupture

$t_w = 24.0 \cdot \text{in}$ — Wall thickness

$l_w = 192.3\,\text{ft}$ — Wall length

$h_w = 57.1\,\text{ft}$ — Wall height

$\phi_v := 0.75$ — Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

$$\alpha_c := \begin{cases} 3.0 & \text{if } \frac{h_w}{l_w} < 1.5 \\ 2.0 & \text{if } \frac{h_w}{l_w} > 2.0 \\ 2.0 + \frac{(3.0 - 2.0)}{(1.5 - 2.0)} \cdot \left(\frac{h_w}{l_w} - 2.0\right) & \text{otherwise} \end{cases} = 3.0$$

Coefficient per Section 21.7.4.1 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$V_{u.hor} = 7045.0 \cdot kip$ — Factored shear force in wall

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.h} = 1.0\,ft$ — Spacing of horizontal shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Height of element above section cut; in this case, consider 12-in. design section

$A_{cv} := l_w \cdot t_w = 384.7 \cdot ft^2$ — Gross concrete area bounded by wall thickness and wall length

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.hor}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.20 \cdot in^2$$

Minimum area of reinforcement required for strength

$A_{v.min} := 0.0025 \cdot t_w \cdot s_{IP.h} = 0.72 \cdot in^2$ — Minimum area of reinforcement required per Section 21.7.2.1 of Ref. 3.1.9

$A_{v.req.iph} := \max\left(A_{v.min}, A_v\right) = 0.72 \cdot in^2$ — Required area of horizontal in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 31334 \cdot kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{cases} \text{"OK"} & \text{if } V_{u.hor} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

In-Plane Shear Design - Vertical

$V_{u.vert} = 2316.0 \cdot kip$ — Factored shear force in wall

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.v} = 12.0 \cdot in$ — Spacing of vertical shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Length of element aside section cut; in this case, consider 12-in. design section

$A_{cv} := h_w \cdot t_w = 114.2 \cdot ft^2$ — Gross concrete area bounded by wall thickness and wall height

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.vert}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.12 \cdot in^2$$

Minimum area of reinforcement required for strength

$$A_{v.min} := \begin{vmatrix} A_{v.req.iph} & \text{if } \dfrac{h_w}{l_w} < 2.0 \\ 0.0025 \cdot t_w \cdot s_{IP.v} & \text{otherwise} \end{vmatrix} = 0.72 \cdot in^2$$

Minimum area of reinforcement required per Sections 21.7.2.1 and 21.7.4.3 of Ref. 3.1.9

$$A_{v.req.ipv} := \max\left(A_{v.min}, A_v\right) = 0.72 \cdot in^2$$

Required area of vertical in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 9304 \cdot kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{vmatrix} \text{"OK"} & \text{if } V_{u.vert} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{vmatrix} = \text{"OK"}$$

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = 32.3 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.hor} = 8.5 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5 D_{b.vert} = 19.7 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \left| \begin{array}{ll} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{500 A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{array} \right. = 35.4 \cdot kip$$

$$Check := \left| \begin{array}{ll} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{array} \right. = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.32$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -26.7 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.vert} = 1.5 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5 D_{b.hor} = 20.9 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \frac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.oop.vert}}{500 A_g}\right) \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 28.9 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.07$$

Table of Contents

N.1 Introduction

This attachment details the reinforced concrete section design for Group 1201, which represents the West Wall of the SHINE Facility. The group is located along the western boundary of the seismic radioactive containment area within the facility, extends only above grade, and contains elements of uniform 2-ft. thickness. A representative element within the group is selected and is designed for the effects of axial, flexural, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

N.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 1680 shell elements comprising the group, Element 21935 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 3, column 48.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Wall Height	48′-4″
Wall Length	198′-4″
Wall Thickness	2′-0″
Concrete Clear Cover	2″
Number of Shell Elements	1680

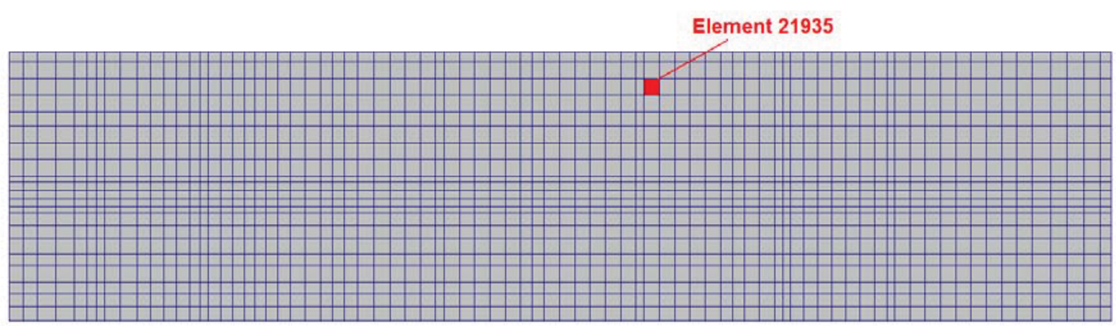


Figure 1 – Elevation view of Group 1201 indicating Element 21935, looking East.

N.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section N.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	1180 / 1179	-14.9	71.5
Horizontal	Bottom	3043 / 1115	1.6	54.6
Vertical	Top	1092 / 1018	-108	-43.3
Vertical	Bottom	3045 / 3047	19.5	3.5

N.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section N.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	3	1150	Seismic	4868	-5621
Vertical	48	1151	Seismic	1820	36.5

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	1090	8.38	-42.4
Vertical	5453	0.35	22.8

N.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	0.79	1.15	#10 @ 12″ on center	1.27
	In-Plane Shear	0.36			
Vertical Longitudinal	Flexural	1.00	1.36	#10 @ 9″ on center	1.69
	In-Plane Shear	0.36			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

N.6 Flexural Reinforcement Design

Concrete walls in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given wall is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E_c := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000\text{psi}$ — Steel yield strength

$E_s := 29000000\text{psi}$ — Steel elastic modulus

$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \begin{cases} 0.65 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} & \text{otherwise} \end{cases} = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0 \cdot \text{in}$ — Design strip width

$h_w = 48.3\ \text{ft}$ — Wall height

$l_w = 198.3\ \text{ft}$ — Wall length

$t_w = 24.0 \cdot \text{in}$ — Wall thickness

$c_c = 2.0 \cdot \text{in}$ — Concrete clear cover

$A_g := b_w \cdot t_w = 288.0 \cdot \text{in}^2$ — Gross concrete area

$D_{tie} = 0.50 \cdot \text{in}$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 0.790 \cdot in^2$ Area of reinforcement per bar

$D_{b.hor} = 1.000 \cdot in$ Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 21.0 \cdot in$ Depth to centroid of horizontal reinforcing steel

$s_{hor} = 12.0 \cdot in$ Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 0.79 \cdot in^2$ Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 15.6 \cdot in$ Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ Steel stress

$a := \beta_1 \cdot c = 12.5 \cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 398.7 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 210.1 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\dfrac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.53\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 84.2 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \left| \begin{array}{l} 0.65 \quad \text{if } \varepsilon_s < 0.002 \\ 0.9 \quad \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] \quad \text{otherwise} \end{array} \right. = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 12.6 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 10.1 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 304.4 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 216.1 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 7.9\cdot in$$ Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1\cdot c = 6.3\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 246.5\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 245.3\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$ Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 73.0\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.hor} \cdot f_y\right) = -85.3 \cdot kip$

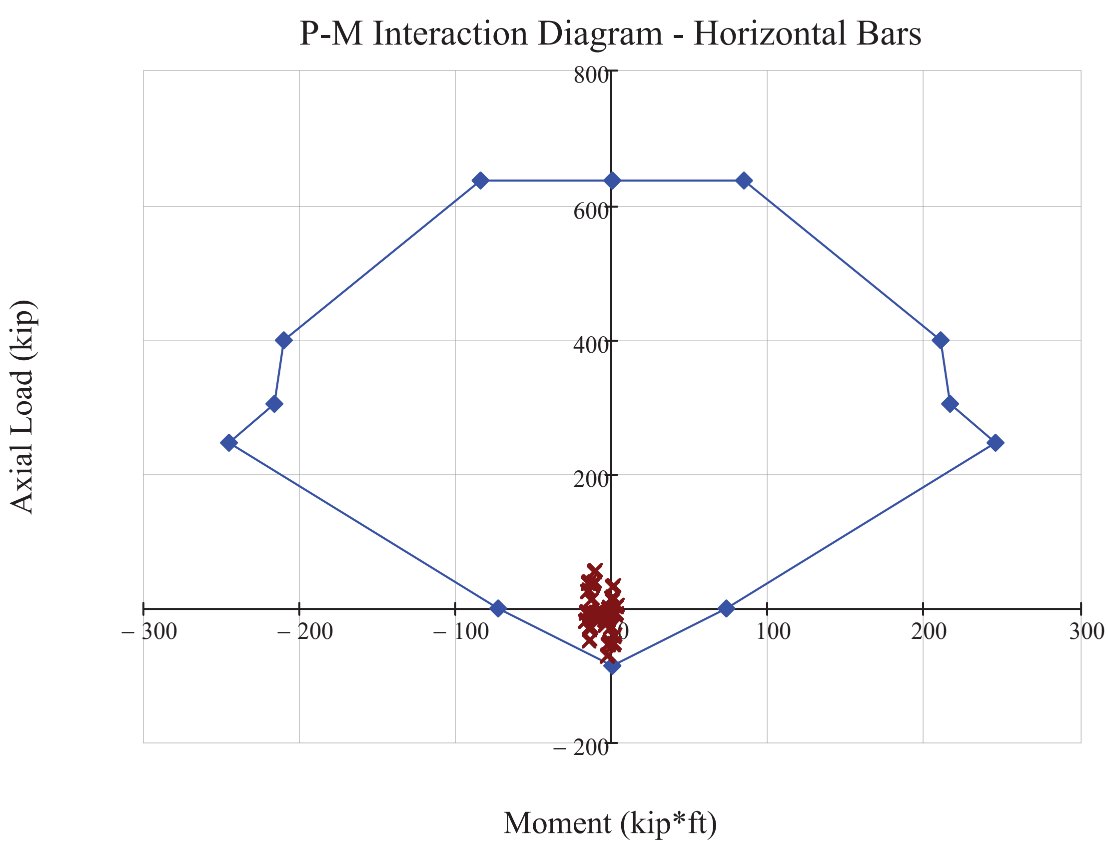
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 398.7 \\ 304.4 \\ 246.5 \\ 0.0 \\ -85.3 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 84.2 \\ 210.1 \\ 216.1 \\ 245.3 \\ 73.0 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 1.000 \cdot in^2$ Area of reinforcement per bar

$D_{b.vert} = 1.128 \cdot in$ Diameter of vertical bar

$D_{b.hor} = 1.000 \cdot in$ Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 19.9 \cdot in$ Depth to centroid of vertical reinforcing steel

$s_{vert} = 12.0 \cdot in$ Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \frac{b_w}{s_{vert}} = 1.00 \cdot in^2$ Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ Steel strain

$$\phi := \begin{vmatrix} 0.65 \text{ if } \varepsilon_s < 0.002 \\ 0.9 \text{ if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] \text{ otherwise} \end{vmatrix} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 14.8 \cdot in$ Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ Steel stress

$a := \beta_1 \cdot c = 11.9 \cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 373.6 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 211.8 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$Slope := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.50\,ft$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot kip$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - Slope \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 79.9 \cdot kip \cdot ft$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \left| \begin{array}{l} 0.65 \ \text{ if } \varepsilon_s < 0.002 \\ 0.9 \ \text{ if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right) \right] \right] \ \text{ otherwise} \end{array} \right. = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 12.0 \cdot in$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,psi$$

Steel stress

$$a := \beta_1 \cdot c = 9.6 \cdot in$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 279.5 \cdot kip$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 215.7 \cdot kip \cdot ft$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 7.5\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1 \cdot c = 6.0\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 220.5\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 241.8\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$$a := \frac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 87.1\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.vert} \cdot f_y\right) = -108.0 \cdot kip$ — Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Check Slenderness Effects

$k = 0.65$ — Effective length factor, assuming a fixed-fixed end condition

$l_u := 23ft$ — Approximate unbraced height of wall

$I_g := \frac{1}{12} \cdot l_w \cdot t_w^{\ 3} = 132.2\ ft^{4.0}$ — Moment of inertia of wall

$r := \max\left(\sqrt{\frac{I_g}{l_w \cdot t_w}}, 0.3 \cdot t_w\right) = 7.2 \cdot in$ — Radius of gyration of wall per Section 10.11.2 of Ref. 3.1.9

$C_m := \begin{cases} 0 & \text{if } \frac{k \cdot l_u}{r} \le 22 \\ 1.0 & \text{otherwise} \end{cases} = 1.0$ — Slenderness check per Eq. 10-7 of Ref. 3.1.9, conservatively taking M1/M2 equal to 1.0
- if slender, Cm is conservatively taken as 1
- if non-slender, Cm is taken as 0

$\beta_d := 1$ — Ratio of maximum sustained axial load to maximum axial load per Ch. 10 of Ref. 3.1.9; conservatively taken as 1.0

$EI := \frac{0.4 \cdot E_c \cdot I_g}{1 + \beta_d} = 15347919 \cdot kip \cdot ft^2$ — Equation 10-12 of Ref. 3.1.9

$P_c := \frac{\pi^2 \cdot EI}{\left(k \cdot l_u\right)^2} = 677746 \cdot kip$ — Critical buckling load for wall; Equation 10-10 of Ref. 3.1.9

$P_u = 6123.0 \cdot kip$ — Total factored axial load on wall

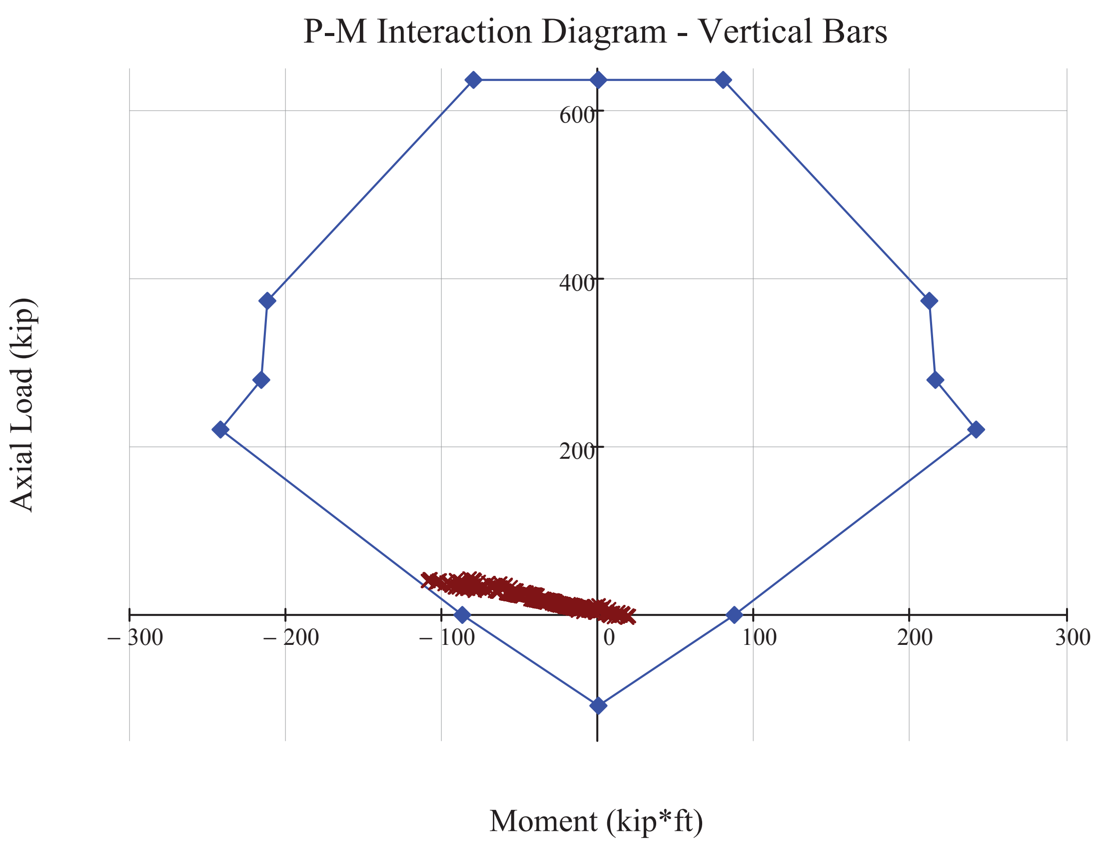
$\delta_{ns} := \max\left(1.0, \frac{C_m}{1 - \frac{P_u}{0.75P_c}}\right) = 1.01$ — Moment magnification factor per Eq. 10-9 of Ref. 3.1.9; *Note: if wall is non-slender as determined by the kl/r check above, this factor will automatically default to 1.0*

Note: when plotted on the P-M diagram below, the moments for all load points are magnified by the moment magnification factor determined above to account for slenderness effects, if any.

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 373.6 \\ 279.5 \\ 220.5 \\ 0.0 \\ -108.0 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 79.9 \\ 211.8 \\ 215.7 \\ 241.8 \\ 87.1 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 1.58 \cdot in^2$ — Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 2.00 \cdot in^2$ — Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 0.72 \cdot in^2$ — Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 0.72 \cdot in^2$ — Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 2.3 \cdot in^2$ — Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 2.7 \cdot in^2$ — Total area of vertical steel required

$A_{min1} := 2 \cdot 0.0018 A_g = 1.04 \cdot in^2$ — Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$A_{min2.h} := 0.0025 A_g = 0.72 \cdot in^2$ — Minimum horizontal reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.3 (b) of Ref. 3.1.9

$A_{min2.v} := 0.0015 A_g = 0.43 \cdot in^2$ — Minimum vertical reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.2 (b) of Ref. 3.1.9

$A_{min3} := 0.0025 A_g = 0.72 \cdot in^2$ — Minimum vertical and horizontal reinforcement for seismic cases if Vu > Acv/fc per Section 21.7.2.1 of Ref. 3.1.9

$$\text{Check\_H} := \begin{vmatrix} \text{"OK"} \quad \text{if } A_{s.H} > \max\left(A_{min1}, A_{min2.h}, A_{min3}\right) \\ \text{"No Good"} \quad \text{otherwise} \end{vmatrix} = \text{"OK"}$$

$$\text{Check\_V} := \begin{vmatrix} \text{"OK"} \quad \text{if } A_{s.V} > \max\left(A_{min1}, A_{min2.v}, A_{min3}\right) \\ \text{"No Good"} \quad \text{otherwise} \end{vmatrix} = \text{"OK"}$$

N.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for the given wall considers seismic effects; therefore, in-plane shear design follows the provisions of Chapter 21 of ACI 349-06 (Ref. 3.1.9). Out-of-plane shear design, which is unaffected by load case type, follows the provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000\text{psi}$ — Steel yield strength

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 530.3\ \text{psi}$ — Concrete modulus of rupture

$t_w = 24.0 \cdot \text{in}$ — Wall thickness

$l_w = 198.3\ \text{ft}$ — Wall length

$h_w = 48.3\ \text{ft}$ — Wall height

$\phi_v := 0.75$ — Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

$$\alpha_c := \left| \begin{array}{l} 3.0 \ \ \text{if} \ \ \frac{h_w}{l_w} < 1.5 \\ 2.0 \ \ \text{if} \ \ \frac{h_w}{l_w} > 2.0 \\ 2.0 + \frac{(3.0 - 2.0)}{(1.5 - 2.0)} \cdot \left(\frac{h_w}{l_w} - 2.0 \right) \ \ \text{otherwise} \end{array} \right. = 3.0$$

Coefficient per Section 21.7.4.1 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$V_{u.hor} = 4868.0 \cdot kip$

Factored shear force in wall

$s_{max} := 18in$

Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.h} = 1.0\,ft$

Spacing of horizontal shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$

Height of element above section cut; in this case, consider 12-in. design section

$A_{cv} := l_w \cdot t_w = 396.7 \cdot ft^2$

Gross concrete area bounded by wall thickness and wall length

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.hor}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.47 \cdot in^2$$

Minimum area of reinforcement required for strength

$A_{v.min} := 0.0025 \cdot t_w \cdot s_{IP.h} = 0.72 \cdot in^2$

Minimum area of reinforcement required per Section 21.7.2.1 of Ref. 3.1.9

$A_{v.req.iph} := \max\left(A_{v.min}, A_v\right) = 0.72 \cdot in^2$

Required area of horizontal in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 32311 \cdot kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{vmatrix} \text{"OK"} & \text{if } V_{u.hor} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{vmatrix} = \text{"OK"}$$

In-Plane Shear Design - Vertical

$V_{u.vert} = 1820.0 \cdot kip$ — Factored shear force in wall

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.v} = 12.0 \cdot in$ — Spacing of vertical shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Length of element aside section cut; in this case, consider 12-in. design section

$A_{cv} := h_w \cdot t_w = 96.7 \cdot ft^2$ — Gross concrete area bounded by wall thickness and wall height

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.vert}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.18 \cdot in^2$$

Minimum area of reinforcement required for strength

$$A_{v.min} := \begin{vmatrix} A_{v.req.iph} & \text{if } \dfrac{h_w}{l_w} < 2.0 \\ 0.0025 \cdot t_w \cdot s_{IP.v} & \text{otherwise} \end{vmatrix} = 0.72 \cdot in^2$$

Minimum area of reinforcement required per Sections 21.7.2.1 and 21.7.4.3 of Ref. 3.1.9

$A_{v.req.ipv} := \max(A_{v.min}, A_v) = 0.72 \cdot in^2$ — Required area of vertical in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 7874 \cdot kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{vmatrix} \text{"OK"} & \text{if } V_{u.vert} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{vmatrix} = \text{"OK"}$$

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = 42.4 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.hor} = 8.4 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 19.9 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 36.3 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.31$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -22.8 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.vert} = 0.4 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 21.0 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 30.0 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.02$$

Table of Contents

O.1 Introduction

This attachment details the reinforced concrete section design for Group 1200, which represents the Control Building West Wall of the SHINE Facility. The group is located along the western boundary of the main facility, extends above grade, and contains elements of uniform thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

O.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 800 shell elements comprising the group, Element 15923 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 3, column 43.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Wall Height	22′-0″
Wall Length	198′-4″
Wall Thickness	2′-0″
Concrete Clear Cover	2″
Number of Shell Elements	800

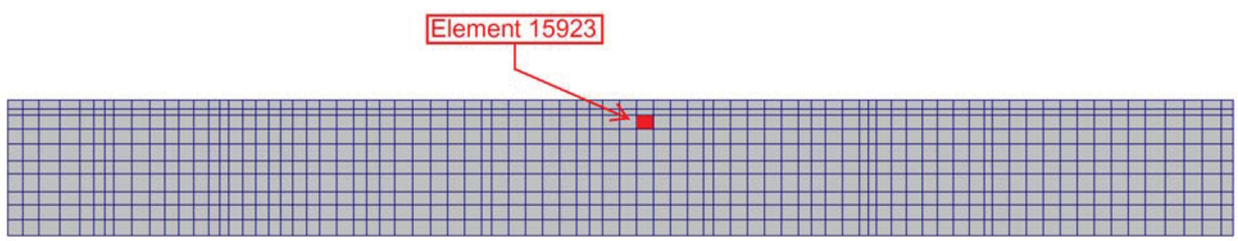


Figure 1 – Elevation view of Group 1200 indicating Element 15923, looking East.

O.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section O.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	1184 / 1136	-10.3	70.6
Horizontal	Bottom	3009 / 5316	6.6	15.0
Vertical	Top	1112 / 5458	-55.8	-34.0
Vertical	Bottom	1009 / 5457	38.6	-34.0

O.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section O.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	3	5622	Non-Seismic	1595	-243
Vertical	43	5412	Non-Seismic	397	120

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	5725	-2.81	31.84
Vertical	3033	0.05	-36.89

O.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	0.79	1.15	#10 @ 12″ on center	1.27
	In-Plane Shear	0.36			
Vertical Longitudinal	Flexural	0.79	1.15	#10 @ 12″ on center	1.27
	In-Plane Shear	0.36			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

O.6 Flexural Reinforcement Design

Concrete walls in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given wall is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$	Concrete compressive strength
$E_c := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$	Concrete elastic modulus
$\varepsilon_{cu} := 0.003$	Ultimate concrete strain
$f_y := 60000\text{psi}$	Steel yield strength
$E_s := 29000000\text{psi}$	Steel elastic modulus
$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$	Steel yield strain
$\beta_1 := \begin{cases} 0.65 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} & \text{otherwise} \end{cases} = 0.80$	Factor per Section 10.2.7.3 of Ref. 3.1.9
$b_w = 12.0 \cdot \text{in}$	Design strip width
$h_w = 22.0\ \text{ft}$	Wall height
$l_w = 198.3\ \text{ft}$	Wall length
$t_w = 24.0 \cdot \text{in}$	Wall thickness
$c_c = 2.0 \cdot \text{in}$	Concrete clear cover
$A_g := b_w \cdot t_w = 288.0 \cdot \text{in}^2$	Gross concrete area
$D_{tie} = 0.50 \cdot \text{in}$	Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 0.790 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.000 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 21.0 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 12.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 0.79 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 15.6 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 12.5 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 398.7 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 210.1 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.53\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 84.2 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 12.6 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 10.1 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 304.4 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 216.1 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 7.9\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \beta_1\cdot c = 6.3\cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 246.5\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 245.3\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ — Steel stress

$$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 73.0\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.hor} \cdot f_y\right) = -85.3 \cdot kip$

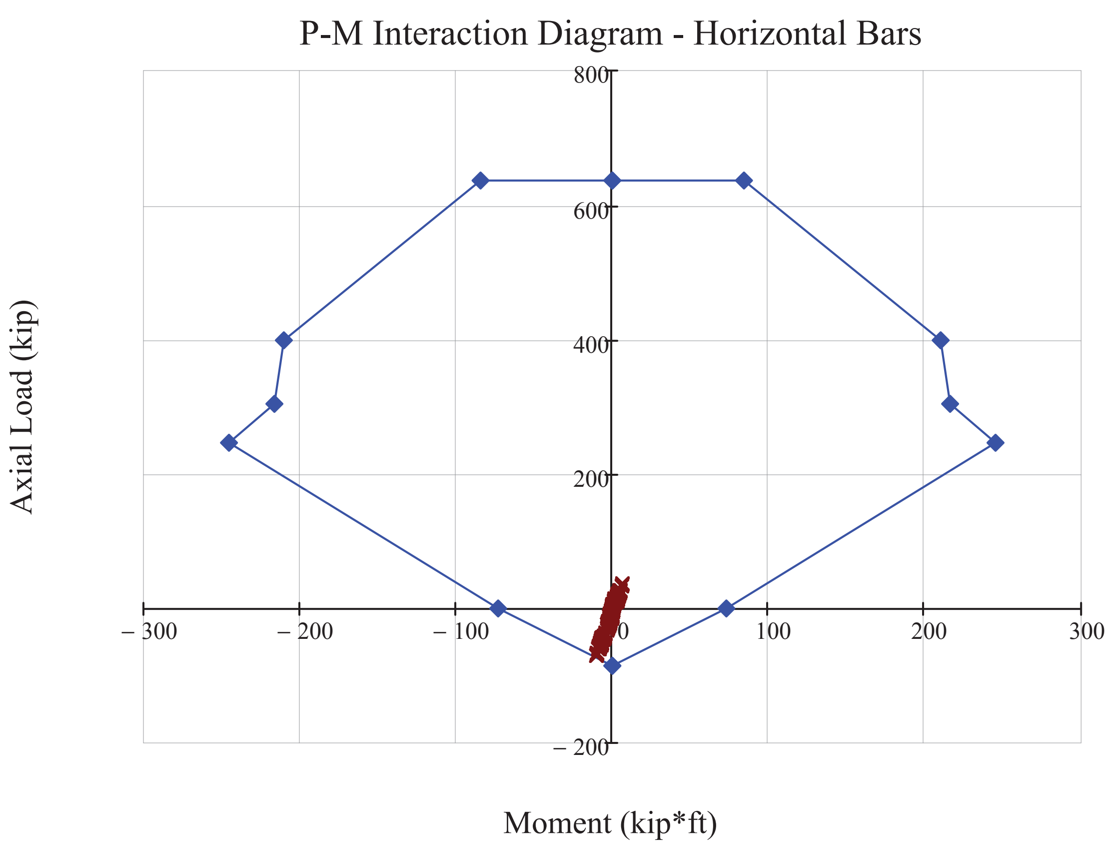
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 398.7 \\ 304.4 \\ 246.5 \\ 0.0 \\ -85.3 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 84.2 \\ 210.1 \\ 216.1 \\ 245.3 \\ 73.0 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 0.790 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.000 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.000 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 20.0 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 12.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \frac{b_w}{s_{vert}} = 0.79 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{array}{|l} 0.65 \ \text{ if } \ \varepsilon_s < 0.002 \\ 0.9 \ \text{ if } \ \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] \ \text{ otherwise} \end{array} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 14.9 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ — Steel stress

$a := \beta_1 \cdot c = 11.9 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 379.0 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 209.2 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$Slope := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.50\,ft$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot kip$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - Slope \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 79.9 \cdot kip \cdot ft$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \left| \begin{array}{l} 0.65 \ \ \text{if } \varepsilon_s < 0.002 \\ 0.9 \ \ \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] \ \ \text{otherwise} \end{array} \right. = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 12.0 \cdot in$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,psi$$

Steel stress

$$a := \beta_1 \cdot c = 9.6 \cdot in$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 288.5 \cdot kip$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 210.8 \cdot kip \cdot ft$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 7.5\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1\cdot c = 6.0\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 232.7\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 235.0\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$$a := \frac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 69.4\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.vert} \cdot f_y\right) = -85.3 \cdot kip$

Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Check Slenderness Effects

$k = 0.7$

Effective length factor, assuming a fixed-fixed end condition

$l_u := h_w = 22.0\,ft$

Unbraced height of wall

$I_g := \frac{1}{12} \cdot l_w \cdot t_w^{\ 3} = 132.2\,ft^{4.0}$

Moment of inertia of wall

$r := \max\left(\sqrt{\frac{I_g}{l_w \cdot t_w}}, 0.3 \cdot t_w\right) = 7.2 \cdot in$

Radius of gyration of wall per Section 10.11.2 of Ref. 3.1.9

$$C_m := \left| \begin{array}{l} 0 \ \text{ if } \ \frac{k \cdot l_u}{r} \le 22 \\ 1.0 \ \text{ otherwise} \end{array} \right. = 1.0$$

Slenderness check per Eq. 10-7 of Ref. 3.1.9, conservatively taking M1/M2 equal to 1.0
- if slender, Cm is conservatively taken as 1
- if non-slender, Cm is taken as 0

$\beta_d := 1$

Ratio of maximum sustained axial load to maximum axial load per Ch. 10 of Ref. 3.1.9; conservatively taken as 1.0

$$EI := \frac{0.4 \cdot E_c \cdot I_g}{1 + \beta_d} = 15347919 \cdot kip \cdot ft^2$$

Equation 10-12 of Ref. 3.1.9

$$P_c := \frac{\pi^2 \cdot EI}{\left(k \cdot l_u\right)^2} = 740759 \cdot kip$$

Critical buckling load for wall; Equation 10-10 of Ref. 3.1.9

$P_u = 1607.6 \cdot kip$

Total factored axial load on wall

$$\delta_{ns} := \max\left(1.0, \frac{C_m}{1 - \frac{P_u}{0.75P_c}}\right) = 1.00$$

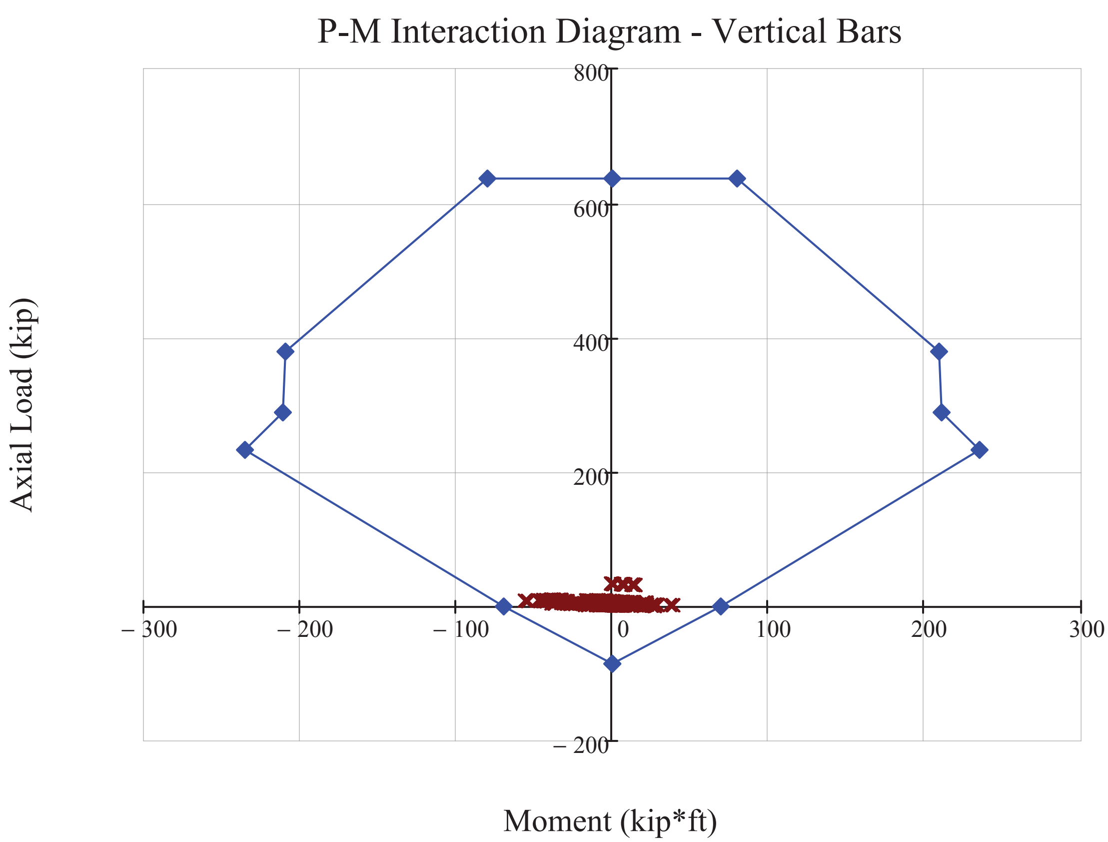
Moment magnification factor per Eq. 10-9 of Ref. 3.1.9; *Note: if wall is non-slender as determined by the kl/r check above, this factor will automatically default to 1.0*

Note: when plotted on the P-M diagram below, the moments for all load points are magnified by the moment magnification factor determined above to account for slenderness effects, if any.

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 379.0 \\ 288.5 \\ 232.7 \\ 0.0 \\ -85.3 \end{pmatrix} \cdot \text{kip} \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 79.9 \\ 209.2 \\ 210.8 \\ 235.0 \\ 69.4 \\ 0.0 \end{pmatrix} \text{ft} \cdot \text{kip}$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 1.58 \cdot in^2$ — Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 1.58 \cdot in^2$ — Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 0.72 \cdot in^2$ — Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 0.72 \cdot in^2$ — Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 2.3 \cdot in^2$ — Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 2.3 \cdot in^2$ — Total area of vertical steel required

$A_{min1} := 2 \cdot 0.0018 A_g = 1.04 \cdot in^2$ — Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$A_{min2.h} := 0.0025 A_g = 0.72 \cdot in^2$ — Minimum horizontal reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.3 (b) of Ref. 3.1.9

$A_{min2.v} := 0.0015 A_g = 0.43 \cdot in^2$ — Minimum vertical reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.2 (b) of Ref. 3.1.9

$A_{min3} := 0.0025 A_g = 0.72 \cdot in^2$ — Minimum vertical and horizontal reinforcement for seismic cases if Vu > Acv/fc per Section 21.7.2.1 of Ref. 3.1.9

$$Check\_H := \begin{cases} \text{"OK"} & \text{if } A_{s.H} > \max(A_{min1}, A_{min2.h}, A_{min3}) \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

$$Check\_V := \begin{cases} \text{"OK"} & \text{if } A_{s.V} > \max(A_{min1}, A_{min2.v}, A_{min3}) \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

O.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for the given wall does not consider seismic effects; therefore, in-plane shear design follows provisions of ACI 349-06 (Ref. 3.1.9) Sections 11.10.2 through 11.10.9. Out-of-plane shear design, which is unaffected by load case type, follows provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000psi$ — Steel yield strength

$f'_c := 5000psi$ — Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi = 4030509\,psi$ — Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi = 530.3\,psi$ — Concrete modulus of rupture

$t_w = 24.0 \cdot in$ — Wall thickness

$l_w = 198.3\,ft$ — Wall length

$h_w = 22.0\,ft$ — Wall height

$\phi_v := 0.75$ — Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$N_{u.hor} = 242.5 \cdot kip$

Factored axial force on wall (vertical); positive = compression, negative = tension

$V_{u.hor} = 1595.0 \cdot kip$

Factored shear force in wall

$d := 0.8 \cdot l_w = 158.7\ ft$

Depth per Section 11.10.4 of Ref. 3.1.9

Check shear strength limit for existing wall geometry:

$$\phi V_{n.max} := \phi_v \cdot 10 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 24233.6 \cdot kip$$

Nominal shear strength limit per Ref. 3.1.9, Section 11.10.3

$$Check\_Limit := \begin{cases} \text{"OK"} & \text{if } V_{u.hor} < \phi V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

Calculation of concrete shear strength per Section 11.10.5 of Ref. 3.1.9:

$$V_c := \begin{cases} \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.hor}}{500 t_w \cdot l_w}\right) \cdot \sqrt{\frac{f'_c}{psi}} t_w \cdot d\right] & \text{if } N_{u.hor} < 0 \\ 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi & \text{otherwise} \end{cases} = 6462.3 \cdot kip$$

$$Check := \begin{cases} \text{"Only Minimum Rebar Required"} & \text{if } \phi_v \cdot V_c > V_{u.hor} \\ \text{"Rebar Required for Strength"} & \text{otherwise} \end{cases} = \text{"Only Minimum Rebar Required"}$$

Design of shear reinforcement per Section 11.10.9 of Ref. 3.1.9:

$$s_{max} := \min\left(\frac{l_w}{5}, 3 \cdot t_w, 18in\right) = 18.0 \cdot in$$

Maximum spacing of horizontal shear reinforcement per Section 11.10.9.3 of Ref. 3.1.9

$$s := s_{IP.h} = 12.0 \cdot in$$

Spacing of horizontal shear reinforcement

$$V_{s.req} := \frac{V_{u.hor}}{\phi_v} - V_c = -4335.6 \cdot kip$$

Minimum steel shear strength

$$A_{v.min} := 0.0025 t_w \cdot s_{IP.h} = 0.72 \cdot in^2$$

Minimum area of in-plane shear steel required per Sections 11.10.9.1 and 11.10.9.2 of Ref. 3.1.9; note that the minimum shear reinforcement per Section 11.10.9.2 governs over those in Sections 7.12.2.1 and 14.3.3.

$$A_v := \frac{V_{s.req} \cdot s_{IP.h}}{d \cdot f_y} = -0.46 \cdot in^2$$

Minimum area of steel required for strength

$$A_{v.req.iph} := \max\left(A_{v.min}, A_v\right) = 0.72 \cdot in^2$$

Required area of horizontal in-plane shear reinforcement

In-Plane Shear Design - Vertical

$N_{u.vert} = -119.7 \cdot kip$

Factored axial force on wall (horizontal); positive = compression, negative = tension

$V_{u.vert} = 396.7 \cdot kip$

Factored shear force in wall

$d := 0.8 \cdot h_w = 17.6\,ft$

Depth per Section 11.10.4 of Ref. 3.1.9

Check shear strength limit for existing wall geometry:

$\phi V_{n.max} := \phi_v \cdot 10 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 2688.1 \cdot kip$

Nominal shear strength limit per Ref. 3.1.9, Section 11.10.3

$$Check\_Limit := \begin{vmatrix} \text{"OK"} \quad \text{if } V_{u.vert} < \phi V_{n.max} \\ \text{"No Good"} \quad \text{otherwise} \end{vmatrix} = \text{"OK"}$$

Calculation of concrete shear strength per Section 11.10.5 of Ref. 3.1.9:

$$V_c := \begin{vmatrix} \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.vert}}{500 t_w \cdot l_w}\right) \cdot \sqrt{\frac{f'_c}{psi}} t_w \cdot d\right] \quad \text{if } N_{u.vert} < 0 \\ 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi \quad \text{otherwise} \end{vmatrix} = 713.8 \cdot kip$$

$$Check := \begin{vmatrix} \text{"Only Minimum Rebar Required"} \quad \text{if } \phi_v \cdot V_c > V_{u.vert} \\ \text{"Rebar Required for Strength"} \quad \text{otherwise} \end{vmatrix} = \text{"Only Minimum Rebar Required"}$$

Design of shear reinforcement per Section 11.10.9 of Ref. 3.1.9:

$$s_{max} := \min\left(\frac{l_w}{5}, 3\cdot t_w, 18in\right) = 18.0\cdot in$$

Maximum spacing of vertical shear reinforcement per Section 11.10.9.3 of Ref. 3.1.9

$$s_{IP.v} = 12.0\cdot in$$

Spacing of vertical shear reinforcement

$$V_{s.req} := \frac{V_{u.vert}}{\phi_v} - V_c = -184.9\cdot kip$$

Minimum steel shear strength

$$A_{v.min1} := 0.0025t_w\cdot s_{IP.v} = 0.72\cdot in^2$$

Minimum area of in-plane shear steel required per Sections 11.10.9.1 and 11.10.9.2 of Ref. 3.1.9; note that the minimum shear reinforcement per Section 11.10.9.2 governs over those in Sections 7.12.2.1 and 14.3.3.

$$\rho_t := \frac{A_{v.req.iph}}{b_w\cdot t_w} = 0.00250$$

Minimum ratio of horizontal shear reinforcement to gross concrete area of vertical section

$$\rho_l := 0.0025 + 0.5\cdot\left(2.5 - \frac{h_w}{l_w}\right)\cdot\left(\rho_t - 0.0025\right) = 0.00250$$

Minimum ratio of vertical shear reinforcement area to gross concrete area of horizontal section per Section 11.10.9.4 of Ref. 3.1.9

$$A_{v.min2} := \rho_l\cdot b_w\cdot t_w = 0.72\cdot in^2$$

Minimum area of steel per Section 11.10.9.4 of Ref. 3.1.9

$$A_v := \frac{V_{s.req}\cdot s_{IP.v}}{d\cdot f_y} = -0.18\cdot in^2$$

Minimum area of steel required for strength

$$A_{v.req.ipv} := \max\left(A_{v.min1}, A_{v.min2}, A_v\right) = 0.72\cdot in^2$$

Required area of vertical in-plane shear reinforcement

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = -31.8 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.hor} = 2.8 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 20.0 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 26.4 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.14$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = 36.9 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.vert} = 0.1 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 21.0 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 37.9 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.00$$

Table of Contents

P.1 Introduction

This attachment details the reinforced concrete section design for Group 1202, which represents the Interior North-South Wall of the SHINE Facility. The group is located within the seismic radioactive containment area of the main facility, extends only above grade, and contains elements of uniform 2-ft. thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per applicable provisions of ACI 349-06 (Reference 3.1.9).

P.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 976 shell elements comprising the group, Element 27117 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 1, column 55.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Wall Height	38′-2″
Wall Length	148′-0″
Wall Thickness	2′-0″
Concrete Clear Cover	2″
Number of Shell Elements	976

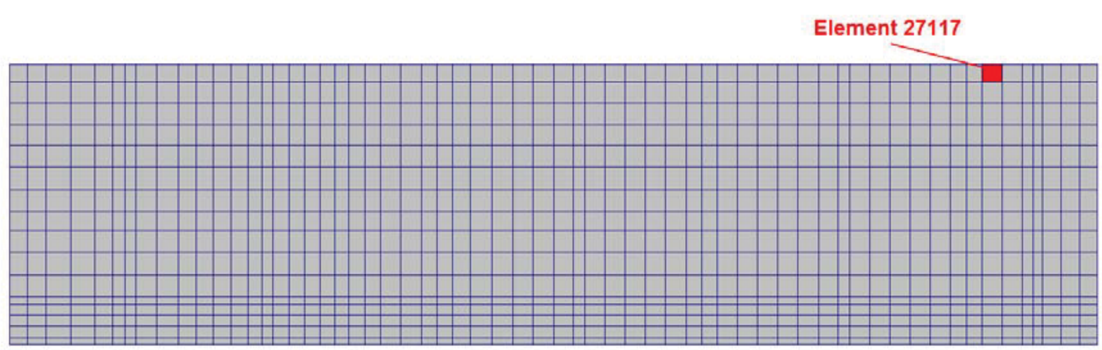


Figure 1 – Elevation view of Group 1202 indicating Element 27117, looking East.

P.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section P.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	3043 / 1001	-4.86	28.6
Horizontal	Bottom	1178 / 1082	16.5	33.7
Vertical	Top	3017 / 3045	-24.2	3.54
Vertical	Bottom	1192 / 1188	85.5	-57.8

P.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section P.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	1	1050	Seismic	5441	-7307
Vertical	55	1025	Seismic	1498	248

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	3040	6.24	-43.8
Vertical	1090	4.82	26.7

P.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	0.53	0.89	#9 @ 12″ on center	1.00
	In-Plane Shear	0.36			
Vertical Longitudinal	Flexural	0.67	1.03	#10 @ 12″ on center	1.27
	In-Plane Shear	0.36			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

P.6 Flexural Reinforcement Design

Concrete walls in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given wall is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E_c := 57000\cdot\sqrt{\frac{f'_c}{\text{psi}}}\cdot\text{psi} = 4030509\ \text{psi}$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000\text{psi}$ — Steel yield strength

$E_s := 29000000\text{psi}$ — Steel elastic modulus

$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \begin{cases} 0.65 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} & \text{otherwise} \end{cases} = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0\cdot\text{in}$ — Design strip width

$h_w = 38.2\ \text{ft}$ — Wall height

$l_w = 148.0\ \text{ft}$ — Wall length

$t_w = 24.0\cdot\text{in}$ — Wall thickness

$c_c = 2.0\cdot\text{in}$ — Concrete clear cover

$A_g := b_w\cdot t_w = 288.0\cdot\text{in}^2$ — Gross concrete area

$D_{tie} = 0.50\cdot\text{in}$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 0.790 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.000 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5 D_{b.hor} = 21.0 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 18.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 0.53 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 15.6 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ — Steel stress

$a := \beta_1 \cdot c = 12.5 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 403.8 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 206.3 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.53\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 83.8 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 12.6 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 10.1 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 314.3 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 208.7 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 7.9\cdot in$ — Neutral axis depth

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \beta_1\cdot c = 6.3\cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 260.7\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)(a\cdot b_w) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 234.6\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$ — Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 49.0\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.hor} \cdot f_y\right) = -56.9 \cdot kip$

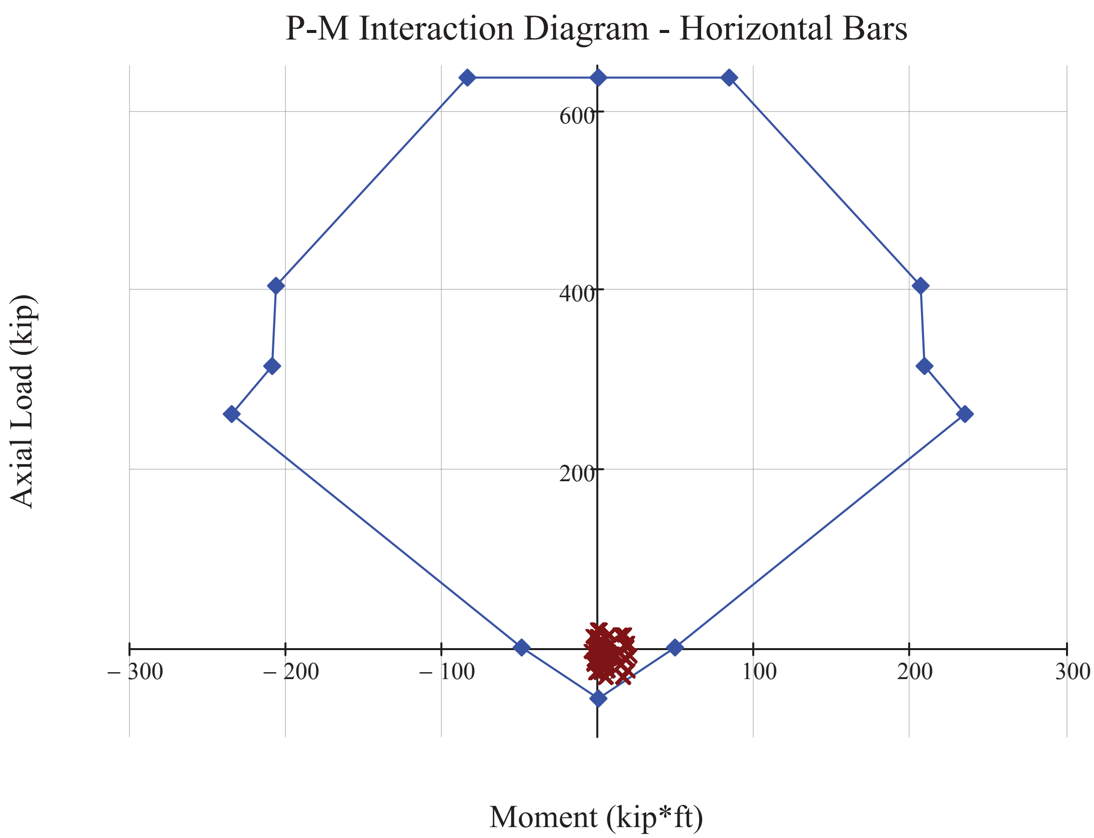
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 403.8 \\ 314.3 \\ 260.7 \\ 0.0 \\ -56.9 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 83.8 \\ 206.3 \\ 208.7 \\ 234.6 \\ 49.0 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 1.000 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.128 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.000 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5 D_{b.vert} = 19.9 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 18.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \dfrac{b_w}{s_{vert}} = 0.67 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 14.8 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ — Steel stress

$a := \beta_1 \cdot c = 11.9 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 380.1 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 207.5 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\mathrm{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.50\,\mathrm{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \mathrm{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \mathrm{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 79.5 \cdot \mathrm{kip} \cdot \mathrm{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 12.0 \cdot \mathrm{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\mathrm{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 9.6 \cdot \mathrm{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 292.1 \cdot \mathrm{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 207.4 \cdot \mathrm{kip} \cdot \mathrm{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 7.5\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$

Steel stress

$a := \beta_1\cdot c = 6.0\cdot in$

Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 238.5\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)(a\cdot b_w) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 229.9\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$

Steel stress

$$a := \frac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 58.6\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi\cdot\left(2A_{s.vert}\cdot f_y\right) = -72.0\cdot kip$

Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Check Slenderness Effects

$k = 0.65$

Effective length factor, assuming a fixed-fixed end condition

$l_u := h_w - 1ft = 37.2\,ft$

Unbraced height of wall

$I_g := \frac{1}{12}\cdot l_w\cdot t_w^{\ 3} = 98.7\,ft^{4.0}$

Moment of inertia of wall

$r := \max\left(\sqrt{\frac{I_g}{l_w\cdot t_w}}, 0.3\cdot t_w\right) = 7.2\cdot in$

Radius of gyration of wall per Section 10.11.2 of Ref. 3.1.9

$$C_m := \begin{vmatrix} 0 \ \text{ if } \ \frac{k\cdot l_u}{r} \le 22 \\ 1.0 \ \text{ otherwise} \end{vmatrix} = 1.0$$

Slenderness check per Eq. 10-7 of Ref. 3.1.9, conservatively taking M1/M2 equal to 1.0
- if slender, Cm is conservatively taken as 1
- if non-slender, Cm is taken as 0

$\beta_d := 1$

Ratio of maximum sustained axial load to maximum axial load per Ch. 10 of Ref. 3.1.9; conservatively taken as 1.0

$EI := \frac{0.4\cdot E_c\cdot I_g}{1+\beta_d} = 11453093\cdot kip\cdot ft^2$

Equation 10-12 of Ref. 3.1.9

$P_c := \frac{\pi^2\cdot EI}{\left(k\cdot l_u\right)^2} = 193647\cdot kip$

Critical buckling load for wall; Equation 10-10 of Ref. 3.1.9

$P_u = 8725.0\cdot kip$

Total factored axial load on wall

$$\delta_{ns} := \max\left(1.0, \frac{C_m}{1-\frac{P_u}{0.75P_c}}\right) = 1.06$$

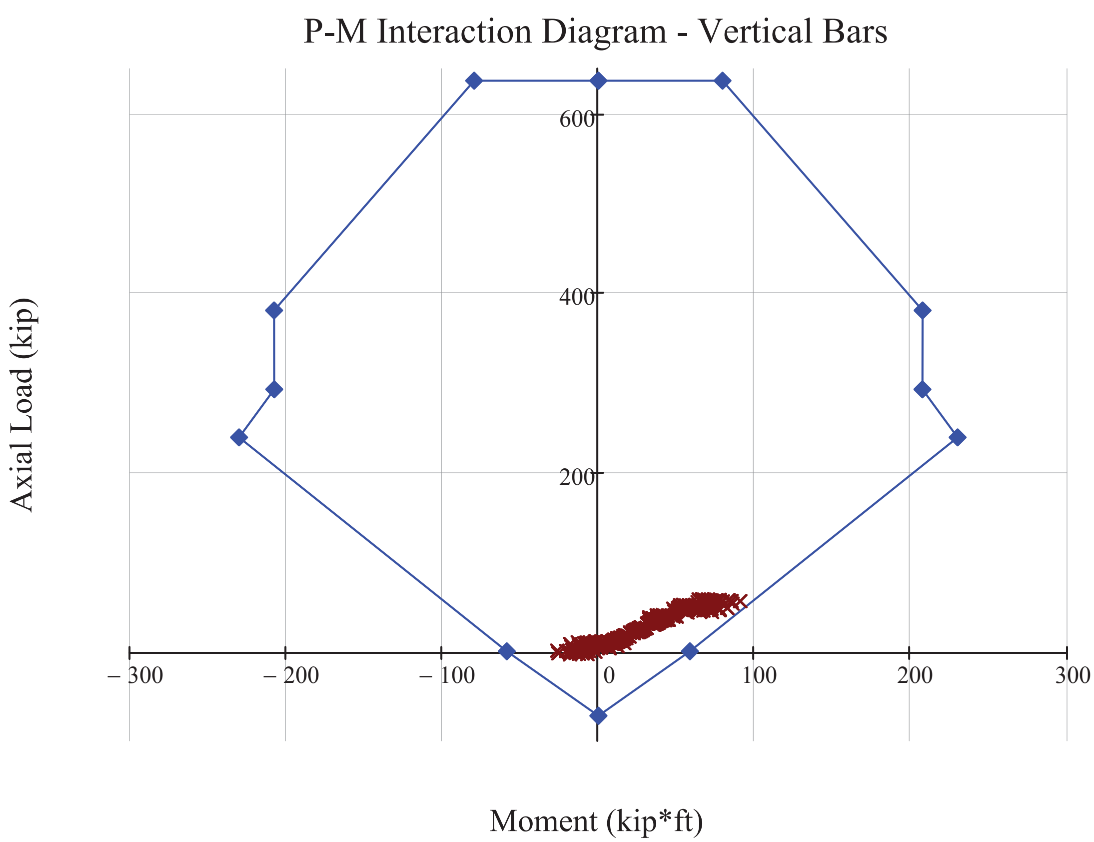
Moment magnification factor per Eq. 10-9 of Ref. 3.1.9; *Note: if wall is non-slender as determined by the kl/r check above, this factor will automatically default to 1.0*

Note: when plotted on the P-M diagram below, the moments for all load points are magnified by the moment magnification factor determined above to account for slenderness effects, if any.

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 380.1 \\ 292.1 \\ 238.5 \\ 0.0 \\ -72.0 \end{pmatrix} \cdot \text{kip} \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 79.5 \\ 207.5 \\ 207.4 \\ 229.9 \\ 58.6 \\ 0.0 \end{pmatrix} \text{ft} \cdot \text{kip}$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 1.05 \cdot in^2$

Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 1.33 \cdot in^2$

Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 0.72 \cdot in^2$

Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 0.72 \cdot in^2$

Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 1.8 \cdot in^2$

Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 2.1 \cdot in^2$

Total area of vertical steel required

$A_{min1} := 2 \cdot 0.0018 A_g = 1.04 \cdot in^2$

Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$A_{min2.h} := 0.0025 A_g = 0.72 \cdot in^2$

Minimum horizontal reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.3 (b) of Ref. 3.1.9

$A_{min2.v} := 0.0015 A_g = 0.43 \cdot in^2$

Minimum vertical reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.2 (b) of Ref. 3.1.9

$A_{min3} := 0.0025 A_g = 0.72 \cdot in^2$

Minimum vertical and horizontal reinforcement for seismic cases if Vu > Acv/fc per Section 21.7.2.1 of Ref. 3.1.9

$$\text{Check\_H} := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.H} > \max(A_{min1}, A_{min2.h}, A_{min3}) \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

$$\text{Check\_V} := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.V} > \max(A_{min1}, A_{min2.v}, A_{min3}) \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

P.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for the given wall considers seismic effects; therefore, in-plane shear design follows the provisions of Chapter 21 of ACI 349-06 (Ref. 3.1.9). Out-of-plane shear design, which is unaffected by load case type, follows the provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000\text{psi}$ — Steel yield strength

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 530.3\ \text{psi}$ — Concrete modulus of rupture

$t_w = 24.0 \cdot \text{in}$ — Wall thickness

$l_w = 148.0\ \text{ft}$ — Wall length

$h_w = 38.2\ \text{ft}$ — Wall height

$\phi_v := 0.75$ — Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

$$\alpha_c := \begin{cases} 3.0 & \text{if } \frac{h_w}{l_w} < 1.5 \\ 2.0 & \text{if } \frac{h_w}{l_w} > 2.0 \\ 2.0 + \frac{(3.0 - 2.0)}{(1.5 - 2.0)} \cdot \left(\frac{h_w}{l_w} - 2.0 \right) & \text{otherwise} \end{cases} = 3.0$$

Coefficient per Section 21.7.4.1 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$V_{u.hor} = 5441.0 \cdot kip$ — Factored shear force in wall

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.h} = 1.0\,ft$ — Spacing of horizontal shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Height of element above section cut; in this case, consider 12-in. design section

$A_{cv} := l_w \cdot t_w = 296.0 \cdot ft^2$ — Gross concrete area bounded by wall thickness and wall length

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.hor}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.20 \cdot in^2$$

Minimum area of reinforcement required for strength

$A_{v.min} := 0.0025 \cdot t_w \cdot s_{IP.h} = 0.72 \cdot in^2$ — Minimum area of reinforcement required per Section 21.7.2.1 of Ref. 3.1.9

$A_{v.req.iph} := \max\left(A_{v.min}, A_v\right) = 0.72 \cdot in^2$ — Required area of horizontal in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 24112 \cdot kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{cases} \text{"OK"} & \text{if } V_{u.hor} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

In-Plane Shear Design - Vertical

$V_{u.vert} = 1498.0 \cdot kip$ Factored shear force in wall

$s_{max} := 18in$ Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.v} = 12.0 \cdot in$ Spacing of vertical shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ Length of element aside section cut; in this case, consider 12-in. design section

$A_{cv} := h_w \cdot t_w = 76.3 \cdot ft^2$ Gross concrete area bounded by wall thickness and wall height

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.vert}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.15 \cdot in^2$$

Minimum area of reinforcement required for strength

$$A_{v.min} := \begin{cases} A_{v.req.iph} & \text{if } \frac{h_w}{l_w} < 2.0 \\ 0.0025 \cdot t_w \cdot s_{IP.v} & \text{otherwise} \end{cases} = 0.72 \cdot in^2$$

Minimum area of reinforcement required per Sections 21.7.2.1 and 21.7.4.3 of Ref. 3.1.9

$A_{v.req.ipv} := \max\left(A_{v.min}, A_v\right) = 0.72 \cdot in^2$ Required area of vertical in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 6219 \cdot kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{cases} \text{"OK"} & \text{if } V_{u.vert} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = 43.8 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.hor} = 6.2 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 19.9 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \frac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 36.4 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.23$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -26.7 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.vert} = 4.8 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5 D_{b.hor} = 21.0 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1 psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1 psi + \dfrac{N_{u.oop.vert}}{500 A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 29.0 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.22$$

Table of Contents

Q.1 Introduction

This attachment details the reinforced concrete section design for Group 1317, which represents the Interior East-West Wall of the SHINE Facility. The group extends both above and below grade and contains elements of different thicknesses; only the 2-ft. thick elements are considered in this attachment. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per applicable provisions of ACI 349-06 (Reference 3.1.9).

Q.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 567 shell elements comprising the group, Element 20627 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 10, column 14.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Wall Height	57′-8″
Wall Height at Element 20627	56′-10″
Wall Length	57′-0″
Wall Thickness	2′-0″
Concrete Clear Cover	2″
Number of Shell Elements	567

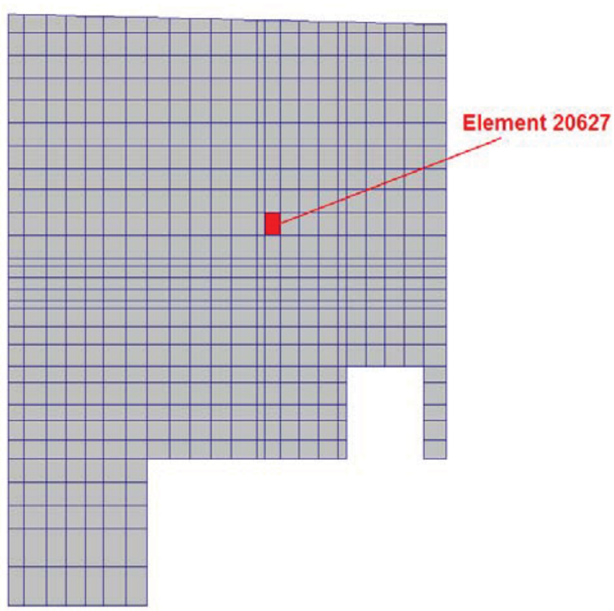


Figure 1 – Elevation view of Group 1317 indicating Element 20627, looking North.

Q.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section Q.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	1025 / 1033	-42.1	25.7
Horizontal	Bottom	1125 / 1133	32.0	25.8
Vertical	Top	1003 / 1186	-49.3	-61.5
Vertical	Bottom	3031 / 1118	21.1	-57.0

Q.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section Q.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	10	1112	Seismic	1918	-2479
Vertical	14	5133	Non-Seismic	1181	-147

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	1074	2.39	-57.4
Vertical	1174	3.77	15.6

Q.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	0.79	1.15	#10 @ 12″ on center	1.27
	In-Plane Shear	0.36			
Vertical Longitudinal	Flexural	0.53	0.89	#9 @ 12″ on center	1.00
	In-Plane Shear	0.36			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

Q.6 Flexural Reinforcement Design

Concrete walls in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given wall is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E_c := 57000 \cdot \sqrt{\dfrac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\,\text{psi}$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000\text{psi}$ — Steel yield strength

$E_s := 29000000\text{psi}$ — Steel elastic modulus

$\varepsilon_y := \dfrac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \left| \begin{array}{l} 0.65 \ \text{ if } \ 1.05 - \dfrac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 \ \text{ if } \ 1.05 - \dfrac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \dfrac{f'_c}{20\text{ksi}} \ \text{ otherwise} \end{array} \right. = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0 \cdot \text{in}$ — Design strip width

$h_w = 57.7\,\text{ft}$ — Wall height

$l_w = 57.0\,\text{ft}$ — Wall length

$t_w = 24.0 \cdot \text{in}$ — Wall thickness

$c_c = 2.0 \cdot \text{in}$ — Concrete clear cover

$A_g := b_w \cdot t_w = 288.0 \cdot \text{in}^2$ — Gross concrete area

$D_{tie} = 0.50 \cdot \text{in}$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 0.790 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.000 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5 D_{b.hor} = 21.0 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 12.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 0.79 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 15.6 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ — Steel stress

$a := \beta_1 \cdot c = 12.5 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 398.7 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 210.1 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\dfrac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.53\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 84.2 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{vmatrix} 0.65 \text{ if } \varepsilon_s < 0.002 \\ 0.9 \text{ if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] \text{ otherwise} \end{vmatrix} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 12.6 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 10.1 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 304.4 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 216.1 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 7.9\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \beta_1\cdot c = 6.3\cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 246.5\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 245.3\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ — Steel stress

$$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 73.0\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot (2A_{s.hor} \cdot f_y) = -85.3 \cdot kip$

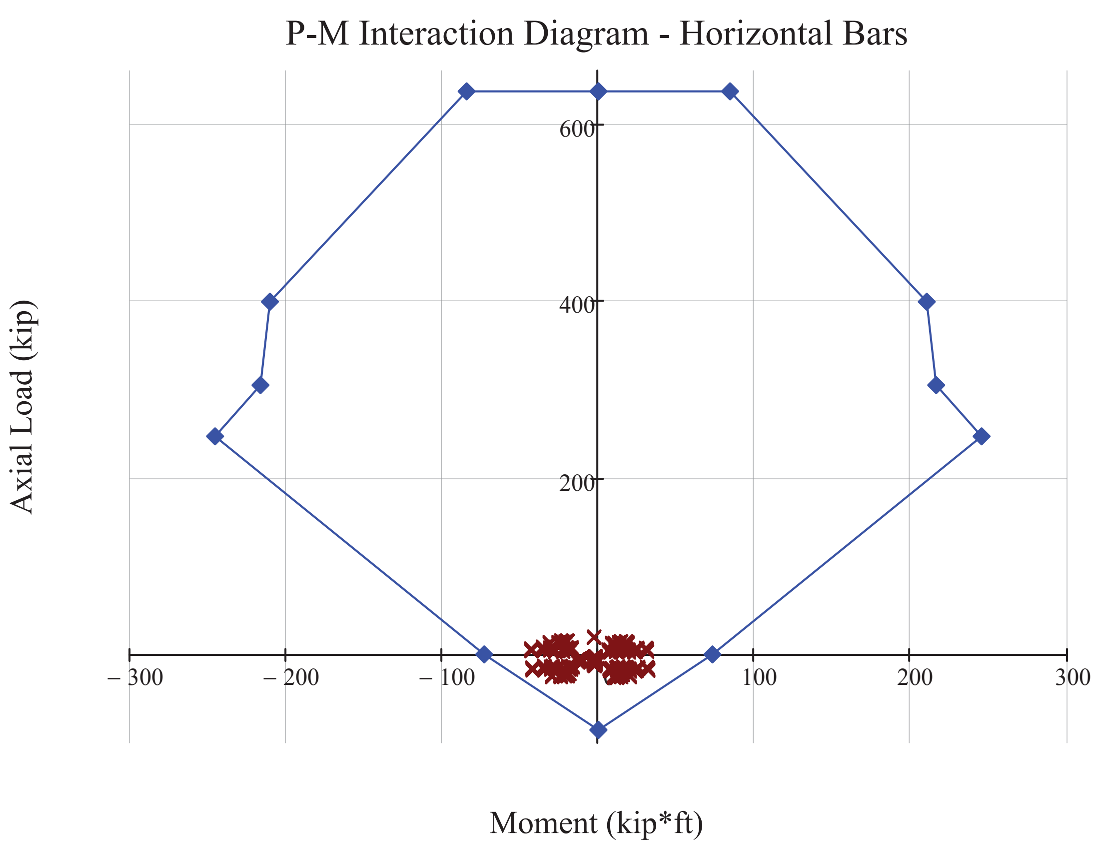
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 398.7 \\ 304.4 \\ 246.5 \\ 0.0 \\ -85.3 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 84.2 \\ 210.1 \\ 216.1 \\ 245.3 \\ 73.0 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 0.790 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.000 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.000 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5 D_{b.vert} = 20.0 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 18.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \dfrac{b_w}{s_{vert}} = 0.53 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 14.9 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 11.9 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 384.1 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 205.7 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\dfrac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.50\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 79.6 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 12.0 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 9.6 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 298.4 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 204.2 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 7.5\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \beta_1\cdot c = 6.0\cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 247.0\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 225.5\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ — Steel stress

$$a := \frac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 46.7\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.vert} \cdot f_y\right) = -56.9 \cdot kip$ — Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Check Slenderness Effects

$k = 0.65$ — Effective length factor, assuming a fixed-fixed end condition

$l_u := h_w - 2ft = 55.7\,ft$ — Unbraced height of wall

$I_g := \frac{1}{12} \cdot l_w \cdot t_w^{\,3} = 38.0\,ft^{4.0}$ — Moment of inertia of wall

$r := \max\left(\sqrt{\frac{I_g}{l_w \cdot t_w}}, 0.3 \cdot t_w\right) = 7.2 \cdot in$ — Radius of gyration of wall per Section 10.11.2 of Ref. 3.1.9

$C_m := \begin{cases} 0 & \text{if } \frac{k \cdot l_u}{r} \le 22 \\ 1.0 & \text{otherwise} \end{cases} = 1.0$ — Slenderness check per Eq. 10-7 of Ref. 3.1.9, conservatively taking M1/M2 equal to 1.0
- if slender, Cm is conservatively taken as 1
- if non-slender, Cm is taken as 0

$\beta_d := 1$ — Ratio of maximum sustained axial load to maximum axial load per Ch. 10 of Ref. 3.1.9; conservatively taken as 1.0

$EI := \frac{0.4 \cdot E_c \cdot I_g}{1 + \beta_d} = 4410989 \cdot kip \cdot ft^2$ — Equation 10-12 of Ref. 3.1.9

$P_c := \frac{\pi^2 \cdot EI}{\left(k \cdot l_u\right)^2} = 33248 \cdot kip$ — Critical buckling load for wall; Equation 10-10 of Ref. 3.1.9

$P_u = 1582.5 \cdot kip$ — Total factored axial load on wall

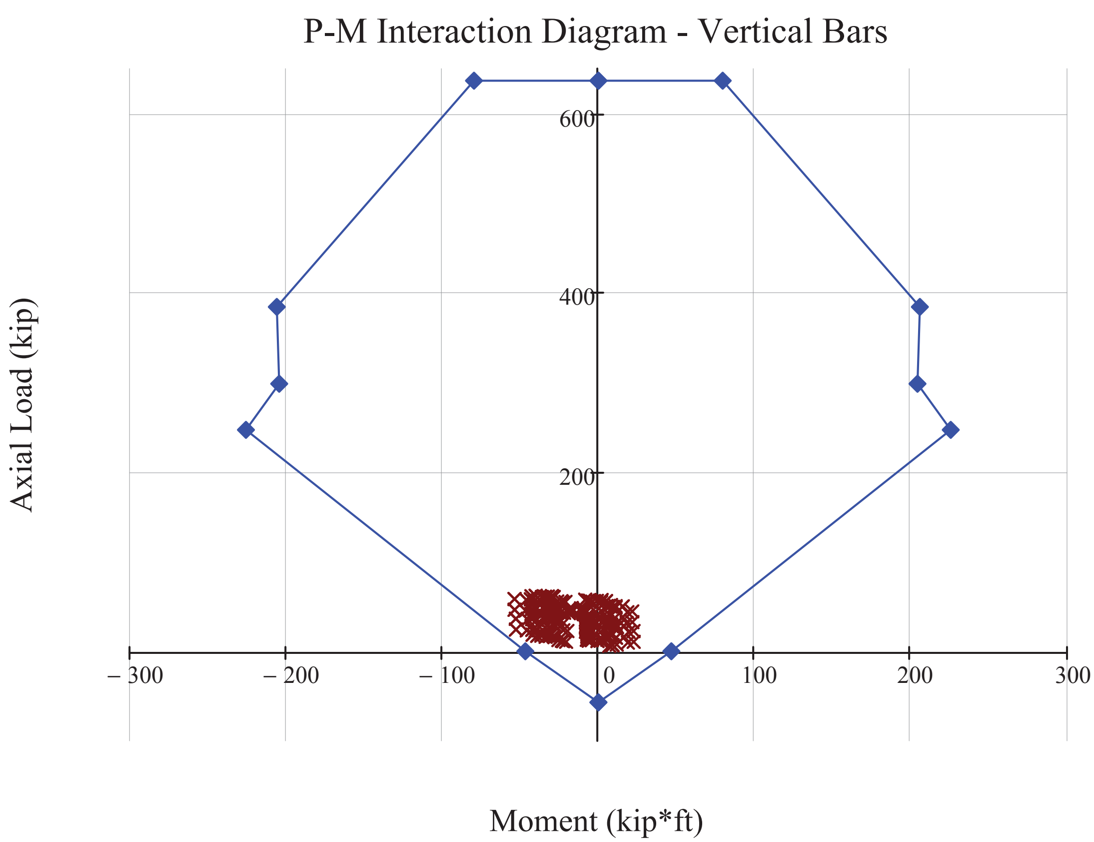
$\delta_{ns} := \max\left(1.0, \frac{C_m}{1 - \frac{P_u}{0.75P_c}}\right) = 1.07$ — Moment magnification factor per Eq. 10-9 of Ref. 3.1.9; *Note: if wall is non-slender as determined by the kl/r check above, this factor will automatically default to 1.0*

Note: when plotted on the P-M diagram below, the moments for all load points are magnified by the moment magnification factor determined above to account for slenderness effects, if any.

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 384.1 \\ 298.4 \\ 247.0 \\ 0.0 \\ -56.9 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 79.6 \\ 205.7 \\ 204.2 \\ 225.5 \\ 46.7 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 1.58 \cdot in^2$ — Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 1.05 \cdot in^2$ — Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 0.72 \cdot in^2$ — Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 0.72 \cdot in^2$ — Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 2.3 \cdot in^2$ — Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 1.8 \cdot in^2$ — Total area of vertical steel required

$A_{min1} := 2 \cdot 0.0018 A_g = 1.04 \cdot in^2$ — Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$A_{min2.h} := 0.0025 A_g = 0.72 \cdot in^2$ — Minimum horizontal reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.3 (b) of Ref. 3.1.9

$A_{min2.v} := 0.0015 A_g = 0.43 \cdot in^2$ — Minimum vertical reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.2 (b) of Ref. 3.1.9

$A_{min3} := 0.0025 A_g = 0.72 \cdot in^2$ — Minimum vertical and horizontal reinforcement for seismic cases if Vu > Acv/fc per Section 21.7.2.1 of Ref. 3.1.9

$$\text{Check\_H} := \begin{vmatrix} \text{"OK"} & \text{if } A_{s.H} > \max(A_{min1}, A_{min2.h}, A_{min3}) \\ \text{"No Good"} & \text{otherwise} \end{vmatrix} = \text{"OK"}$$

$$\text{Check\_V} := \begin{vmatrix} \text{"OK"} & \text{if } A_{s.V} > \max(A_{min1}, A_{min2.v}, A_{min3}) \\ \text{"No Good"} & \text{otherwise} \end{vmatrix} = \text{"OK"}$$

Q.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for in-plane horizontal shear in the given wall considers seismic effects, dictating that in-plane vertical shear design follow the provisions of Chapter 21 of ACI 349-06 (Ref. 3.1.9). The governing load case for the in-plane vertical shear, however, does not consider seismic effects; therefore, in-plane vertical shear design follows provisions of ACI 349-06 (Ref. 3.1.9) Sections 11.10.2 through 11.10.9. Out-of-plane shear design, unaffected by the load case type, follows provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000\text{psi}$ Steel yield strength

$f'_c := 5000\text{psi}$ Concrete compressive strength

$E := 57000\cdot\sqrt{\frac{f'_c}{\text{psi}}}\cdot\text{psi} = 4030509\ \text{psi}$ Elastic modulus of concrete

$f_r := 7.5\cdot\sqrt{\frac{f'_c}{\text{psi}}}\cdot\text{psi} = 530.3\ \text{psi}$ Concrete modulus of rupture

$t_w = 24.0\cdot\text{in}$ Wall thickness

$l_w = 57.0\ \text{ft}$ Wall length

$h_w = 56.8\ \text{ft}$ Wall height

$\phi_v := 0.75$ Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

$$\alpha_c := \begin{cases} 3.0 & \text{if } \frac{h_w}{l_w} < 1.5 \\ 2.0 & \text{if } \frac{h_w}{l_w} > 2.0 \\ 2.0 + \frac{(3.0-2.0)}{(1.5-2.0)}\cdot\left(\frac{h_w}{l_w} - 2.0\right) & \text{otherwise} \end{cases} = 3.0$$

Coefficient per Section 21.7.4.1 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$V_{u.hor} = 1918.0 \cdot kip$ — Factored shear force in wall

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.h} = 1.0\,ft$ — Spacing of horizontal shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Height of element above section cut; in this case, consider 12-in. design section

$A_{cv} := l_w \cdot t_w = 114.0 \cdot ft^2$ — Gross concrete area bounded by wall thickness and wall length

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.hor}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.27 \cdot in^2$$

Minimum area of reinforcement required for strength

$A_{v.min} := 0.0025 \cdot t_w \cdot s_{IP.h} = 0.72 \cdot in^2$ — Minimum area of reinforcement required per Section 21.7.2.1 of Ref. 3.1.9

$A_{v.req.iph} := \max\left(A_{v.min}, A_v\right) = 0.72 \cdot in^2$ — Required area of horizontal in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 9286 \cdot kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{vmatrix} \text{"OK"} & \text{if } V_{u.hor} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{vmatrix} = \text{"OK"}$$

In-Plane Shear Design - Vertical

$N_{u.vert} = 147.0 \cdot kip$

Factored axial force on wall (horizontal); positive = compression, negative = tension

$V_{u.vert} = 1181.0 \cdot kip$

Factored shear force in wall

$d := 0.8 \cdot h_w = 45.5\ ft$

Depth per Section 11.10.4 of Ref. 3.1.9

Check shear strength limit for existing wall geometry:

$$\phi V_{n.max} := \phi_v \cdot 10 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 6945.2 \cdot kip$$

Nominal shear strength limit per Ref. 3.1.9, Section 11.10.3

$$Check\_Limit := \begin{cases} \text{"OK"} & \text{if } V_{u.vert} < \phi V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

Calculation of concrete shear strength per Section 11.10.5 of Ref. 3.1.9:

$$V_c := \begin{cases} \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.vert}}{500 t_w \cdot l_w}\right) \cdot \sqrt{\frac{f'_c}{psi}} t_w \cdot d\right] & \text{if } N_{u.vert} < 0 \\ 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi & \text{otherwise} \end{cases} = 1852.0 \cdot kip$$

$$Check := \begin{cases} \text{"Only Minimum Rebar Required"} & \text{if } \phi_v \cdot V_c > V_{u.vert} \\ \text{"Rebar Required for Strength"} & \text{otherwise} \end{cases} = \text{"Only Minimum Rebar Required"}$$

Design of shear reinforcement per Section 11.10.9 of Ref. 3.1.9:

$s_{max} := \min\left(\frac{l_w}{5}, 3 \cdot t_w, 18in\right) = 18.0 \cdot in$

Maximum spacing of vertical shear reinforcement per Section 11.10.9.3 of Ref. 3.1.9

$s_{IP.v} = 12.0 \cdot in$

Spacing of vertical shear reinforcement

$A_{v.min1} := 0.0025 t_w \cdot s_{IP.v} = 0.72 \cdot in^2$

Minimum area of in-plane shear steel required per Sections 11.10.9.1 and 11.10.9.2 of Ref. 3.1.9; note that the minimum shear reinforcement per Section 11.10.9.2 governs over those in Sections 7.12.2.1 and 14.3.3.

$\rho_t := \frac{A_{v.req.iph}}{b_w \cdot t_w} = 0.00250$

Minimum ratio of horizontal shear reinforcement to gross concrete area of vertical section

$\rho_l := 0.0025 + 0.5 \cdot \left(2.5 - \frac{h_w}{l_w}\right) \cdot \left(\rho_t - 0.0025\right) = 0.00250$

Minimum ratio of vertical shear reinforcement area to gross concrete area of horizontal section per Section 11.10.9.4 of Ref. 3.1.9

$A_{v.min2} := \rho_l \cdot b_w \cdot t_w = 0.72 \cdot in^2$

Minimum area of steel per Section 11.10.9.4 of Ref. 3.1.9

$A_{v.req.ipv} := \max\left(A_{v.min1}, A_{v.min2}\right) = 0.72 \cdot in^2$

Required area of vertical in-plane shear reinforcement

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = 57.4 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.hor} = 2.4 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 20.0 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 37.3 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.09$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -15.6 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.vert} = 3.8 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 21.0 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 31.8 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.16$$

Table of Contents

R.1 Introduction

This attachment details the reinforced concrete section design for Group 1104, which, along with Groups 1103 and 1105, represents the Roof of the SHINE Facility. The group is located above the central portion of the main facility and contains elements of uniform 2-ft. thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

R.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 3680 shell elements comprising the group, Element 26438 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 11, column 71.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Slab Length (X)	198′-4″
Slab Length (Y)	106′-4″
Slab Thickness	2′-0″
Concrete Clear Cover	2″
Number of Shell Elements	3680

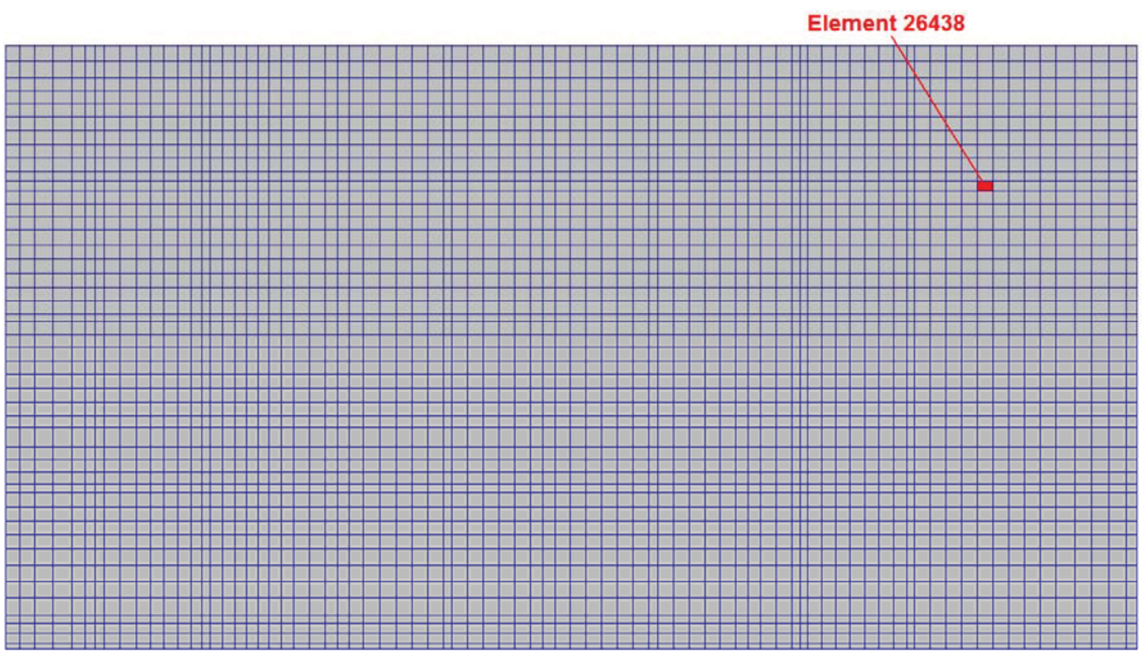


Figure 1 – Plan view of Group 1104 indicating Element 26438 (North points toward left of page).

R.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section R.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	3047 / 1041	-11.4	10.6
Horizontal	Bottom	1170 / 1170	66.6	19.6
Vertical	Top	3047 / 3047	-7.57	4.07
Vertical	Bottom	1140 / 1066	37.6	-53.8

R.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section R.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	11	1050	Seismic	1674	-4841
Vertical	71	1086	Seismic	3902	-1454

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	1162	5.18	-53.7
Vertical	3033	4.31	14.5

R.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	1.00	1.00	#9 @ 12″ on center	1.00
	In-Plane Shear	0			
Vertical Longitudinal	Flexural	0.53	0.67	#8 @ 12″ on center	0.79
	In-Plane Shear	0.14			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

R.6 Flexural Reinforcement Design

Concrete slabs in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given slab is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$	Concrete compressive strength
$E_c := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$	Concrete elastic modulus
$\varepsilon_{cu} := 0.003$	Ultimate concrete strain
$f_y := 60000\text{psi}$	Steel yield strength
$E_s := 29000000\text{psi}$	Steel elastic modulus
$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$	Steel yield strain
$\beta_1 := \begin{cases} 0.65 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} & \text{otherwise} \end{cases} = 0.80$	Factor per Section 10.2.7.3 of Ref. 3.1.9
$b_w = 12.0 \cdot \text{in}$	Design strip width
$t_w = 24.0 \cdot \text{in}$	Slab thickness
$c_c = 2.0 \cdot \text{in}$	Concrete clear cover
$A_g := b_w \cdot t_w = 288.0 \cdot \text{in}^2$	Gross concrete area
$D_{tie} = 0.50 \cdot \text{in}$	Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 1.000 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.128 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 20.9 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 12.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 1.00 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 15.6 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 12.5 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 393.4 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 213.1 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$Slope := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.53\,ft$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot kip$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - Slope \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 84.3 \cdot kip \cdot ft$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 12.6 \cdot in$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,psi$$

Steel stress

$$a := \beta_1 \cdot c = 10.0 \cdot in$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 295.4 \cdot kip$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 221.7 \cdot kip \cdot ft$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 7.9\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \beta_1\cdot c = 6.3\cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 234.3\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 253.1\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ — Steel stress

$$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 91.6\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2 A_{s.hor} \cdot f_y\right) = -108.0 \cdot kip$

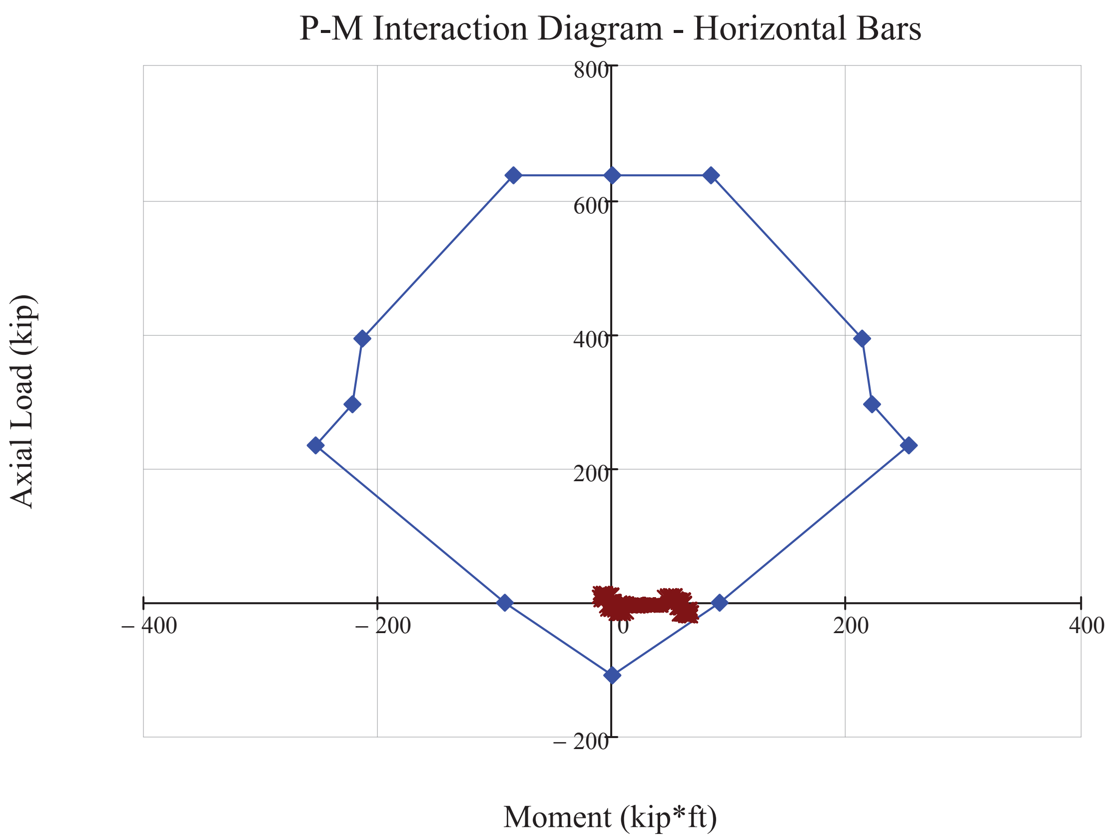
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 393.4 \\ 295.4 \\ 234.3 \\ 0.0 \\ -108.0 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 84.3 \\ 213.1 \\ 221.7 \\ 253.1 \\ 91.6 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 0.790 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.000 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.128 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 19.9 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 18.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \dfrac{b_w}{s_{vert}} = 0.53 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 14.8 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 11.8 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 381.6 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 205.6 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.50\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 79.0 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 11.9 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 9.5 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 296.3 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 203.6 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 7.5\cdot in$ Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1\cdot c = 6.0\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 245.2\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)(a\cdot b_w) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 224.3\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$a := \dfrac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$ Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 46.4\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot (2 A_{s.vert} \cdot f_y) = -56.9 \cdot kip$

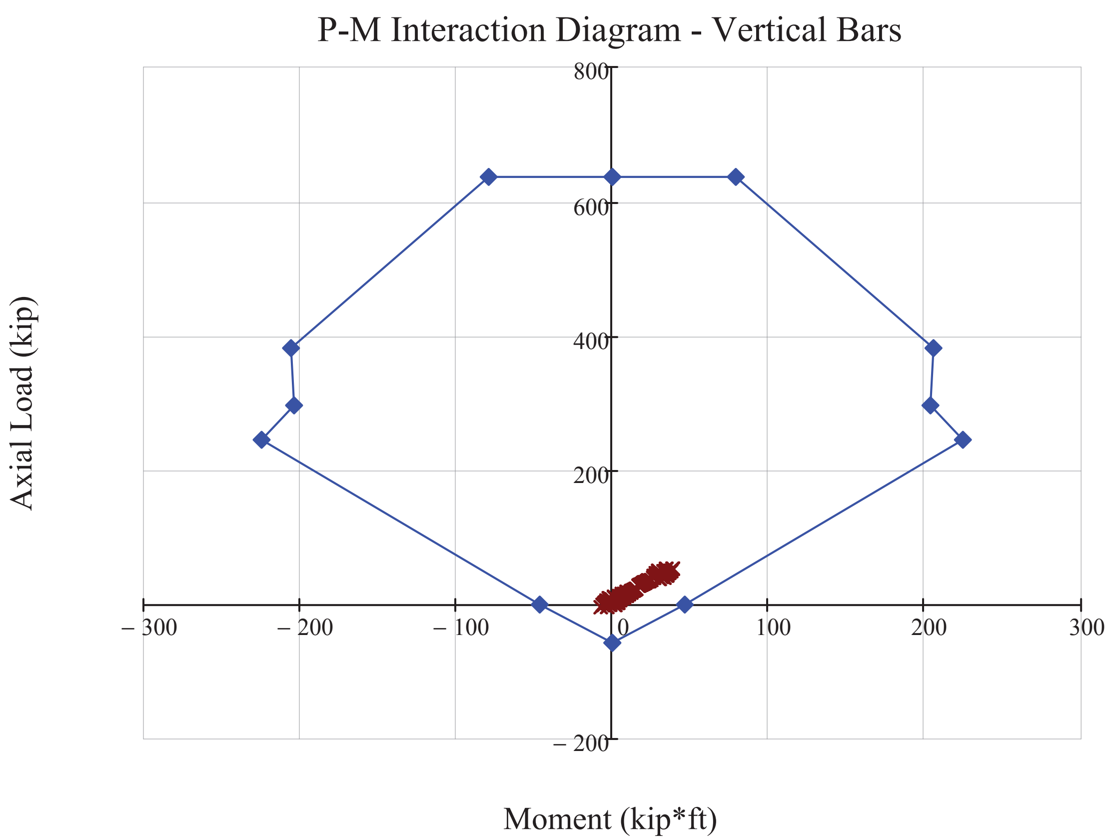
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 381.6 \\ 296.3 \\ 245.2 \\ 0.0 \\ -56.9 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 79.0 \\ 205.6 \\ 203.6 \\ 224.3 \\ 46.4 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 2.00 \cdot in^2$ — Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 1.05 \cdot in^2$ — Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 0.00 \cdot in^2$ — Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 0.14 \cdot in^2$ — Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 2.0 \cdot in^2$ — Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 1.2 \cdot in^2$ — Total area of vertical steel required

$A_{min} := 2 \cdot 0.0018 A_g = 1.04 \cdot in^2$ — Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$$\text{Check\_H} := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.H} > A_{min} \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

$$\text{Check\_V} := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.V} > A_{min} \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

R.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for the given slab considers seismic effects; therefore, in-plane shear design follows the provisions of Chapter 21 of ACI 349-06 (Ref. 3.1.9). Out-of-plane shear design, which is unaffected by load case type, follows the provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000psi$ Steel yield strength

$f'_c := 5000psi$ Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi = 4030509\ psi$ Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi = 530.3\ psi$ Concrete modulus of rupture

$t_w = 24.0 \cdot in$ Slab thickness

$l_w = 198.3\ ft$ Slab length (X, local 1 direction)

$h_w = 106.3\ ft$ Slab length (Y, local 2 direction)

$\phi_v := 0.75$ Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$V_{u.hor} = 1674.0 \cdot kip$

Factored shear force in slab

$s_{max} := 18in$

Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.h} = 1.0\,ft$

Spacing of horizontal shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$

Height of element above section cut; in this case, consider 12-in. design section

$A_{cv} := l_w \cdot t_w = 396.7 \cdot ft^2$

Gross concrete area bounded by slab thickness and slab length

$$A_{v.req} := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.hor}}{\phi_v \cdot A_{cv}} - 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.49 \cdot in^2$$

Area of reinforcement required for strength

$A_{v.req.iph} := \max\left(A_{v.req}, 0\right) = 0.00 \cdot in^2$

Required area of in-plane horizontal shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 32311 \cdot kip$$

Maximum nominal shear strength per Section 21.9.7.3 of Ref. 3.1.9

$$Check\_Vn := \begin{vmatrix} "OK" & \text{if } V_{u.hor} < \phi_v \cdot V_{n.max} \\ "No Good" & \text{otherwise} \end{vmatrix} = "OK"$$

In-Plane Shear Design - Vertical

$V_{u.vert} = 3902.0 \cdot kip$	Factored shear force in slab
$s_{max} := 18in$	Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9
$s_{IP.v} = 12.0 \cdot in$	Spacing of vertical shear reinforcement; in this case, consider 12-in. design section
$h_e := 12in$	Length of element aside section cut; in this case, consider 12-in. design section
$A_{cv} := h_w \cdot t_w = 212.7 \cdot ft^2$	Gross concrete area bounded by slab thickness and slab height
$A_{v.req} := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.vert}}{\phi_v \cdot A_{cv}} - 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = 0.14 \cdot in^2$	Area of reinforcement required for strength
$A_{v.req.ipv} := \max\left(A_{v.req}, 0\right) = 0.14 \cdot in^2$	Required area of in-plane vertical shear reinforcement
$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 17323 \cdot kip$	Maximum nominal shear strength per Section 21.9.7.3 of Ref. 3.1.9

$$Check\_Vn := \begin{cases} \text{"OK"} & \text{if } V_{u.vert} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = 53.7 \cdot kip$ — Factored axial force per 12-in. strip of slab; positive = compression, negative = tension

$V_{u.oop.hor} = 5.2 \cdot kip$ — Factored shear per 12-in. strip of slab

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 19.9 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \frac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 36.9 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.19$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -14.5 \cdot kip$ — Factored axial force per 12-in. strip of slab; positive = compression, negative = tension

$V_{u.oop.vert} = 4.3 \cdot kip$ — Factored shear per 12-in. strip of slab

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 20.9 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \frac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.oop.vert}}{500A_g}\right) \cdot \sqrt{\frac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 32.0 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.18$$

Table of Contents

S.1 Introduction

This attachment details the first of two reinforced concrete section designs for Group 1101, which represents the Basemat of the SHINE Facility. The group is located entirely at grade and contains elements of uniform 2-ft. thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

S.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 5345 shell elements comprising the group, Element 10305 is selected as representative of a typical element based on its location (beneath the super cells) and loading. The element is shown in Figure 1 and is located in row 10, column 73.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Slab Length (X)	198′-4″
Slab Length (Y)	192′-4″
Slab Thickness	2′-0″
Concrete Clear Cover	2″
Number of Shell Elements	5345

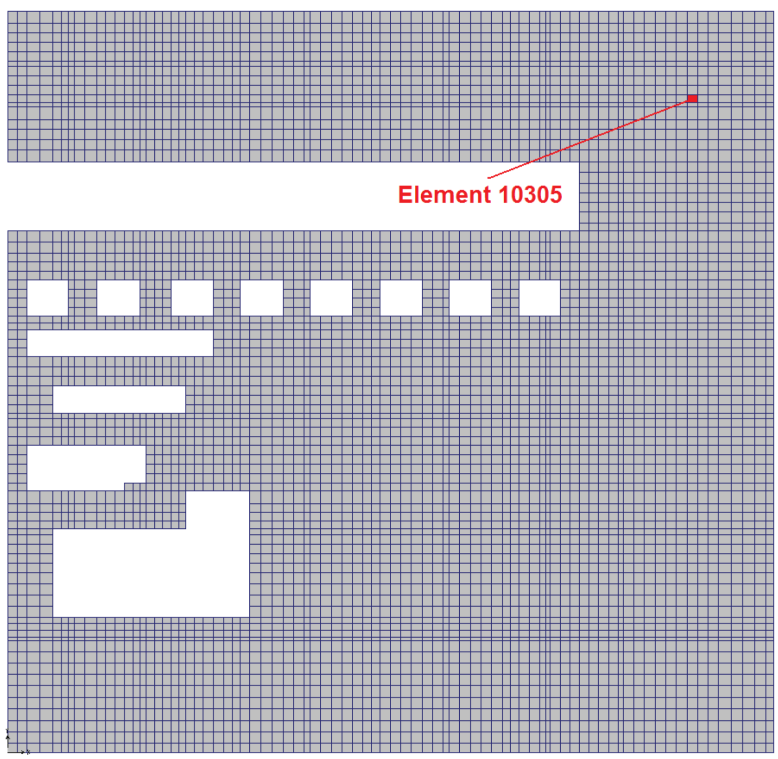


Figure 1 – Plan view of Group 1101 indicating Element 10305 (North points to left of page).

S.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section S.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	5101 / 1059	-128.2	7.7
Horizontal	Bottom	Not Applicable	0	0
Vertical	Top	1018 / 1063	-81.6	5.5
Vertical	Bottom	Not Applicable	0	0

S.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section S.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	10	1182	Seismic	2278	-3606
Vertical	73	1156	Seismic	3783	-1490

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	1167	6.99	2.09
Vertical	1183	2.88	6.97

S.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	1.69	1.69	#10 @ 9″ on center	1.69
	In-Plane Shear	0			
Vertical Longitudinal	Flexural	1.00	1.00	#9 @ 12″ on center	1.00
	In-Plane Shear	0			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

S.6 Flexural Reinforcement Design

Concrete slabs in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given slab is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E_c := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000\text{psi}$ — Steel yield strength

$E_s := 29000000\text{psi}$ — Steel elastic modulus

$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \left| \begin{array}{l} 0.65 \ \text{ if } \ 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 \ \text{ if } \ 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} \ \text{ otherwise} \end{array} \right. = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0 \cdot \text{in}$ — Design strip width

$t_w = 24.0 \cdot \text{in}$ — Slab thickness

$c_c = 2.0 \cdot \text{in}$ — Concrete clear cover

$A_g := b_w \cdot t_w = 288.0 \cdot \text{in}^2$ — Gross concrete area

$D_{tie} = 0.50 \cdot \text{in}$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 1.270 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.270 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 20.9 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 9.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 1.69 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \left| \begin{array}{l} 0.65 \ \text{ if } \ \varepsilon_s < 0.002 \\ 0.9 \ \text{ if } \ \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] \ \text{ otherwise} \end{array} \right. = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 15.5 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 12.4 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 378.4 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 223.1 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$Slope := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.53\,ft$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot kip$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - Slope \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 85.1 \cdot kip \cdot ft$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{array}{|l} 0.65 \ \text{ if } \varepsilon_s < 0.002 \\ 0.9 \ \text{ if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] \ \text{ otherwise} \end{array} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 12.5 \cdot in$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,psi$$

Steel stress

$$a := \beta_1 \cdot c = 10.0 \cdot in$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 268.2 \cdot kip$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 240.6 \cdot kip \cdot ft$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 7.8\cdot\text{in}$$

Neutral axis depth

$f_s := f_y = 60000\,\text{psi}$

Steel stress

$a := \beta_1\cdot c = 6.3\cdot\text{in}$

Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 195.9\cdot\text{kip}$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 279.9\cdot\text{kip}\cdot\text{ft}$$

Point 6 - Pure Bending

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,\text{psi}$

Steel stress

$$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.2\,\text{ft}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot\text{kip}$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 151.4\cdot\text{kip}\cdot\text{ft}$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.hor} \cdot f_y\right) = -182.9 \cdot kip$

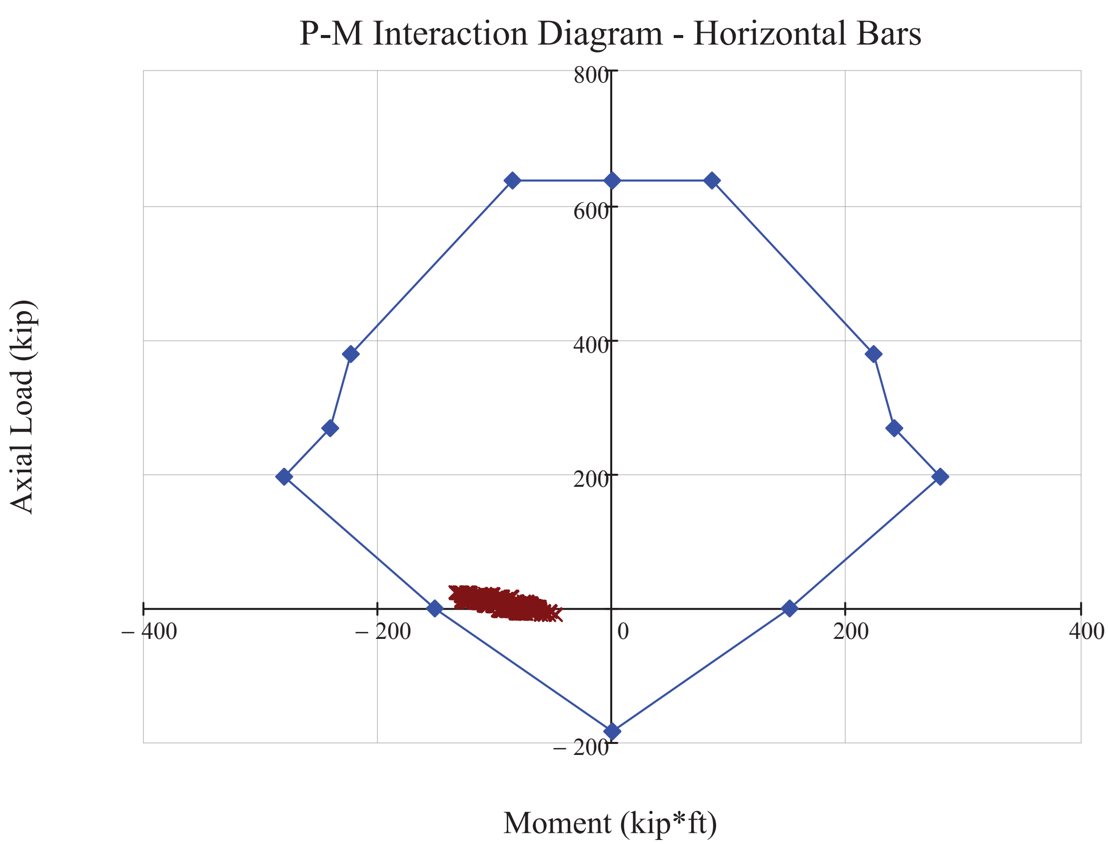
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 378.4 \\ 268.2 \\ 195.9 \\ 0.0 \\ -182.9 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 85.1 \\ 223.1 \\ 240.6 \\ 279.9 \\ 151.4 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 1.000 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.128 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.270 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5 D_{b.vert} = 19.7 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 12.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \frac{b_w}{s_{vert}} = 1.00 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 14.6 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ — Steel stress

$a := \beta_1 \cdot c = 11.7 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 368.3 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 211.2 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.49\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 78.7 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{array}{|l} 0.65 \quad \text{if } \varepsilon_s < 0.002 \\ 0.9 \quad \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] \quad \text{otherwise} \end{array} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 11.8 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 9.4 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 275.2 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 213.9 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 7.4\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1\cdot c = 5.9\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 216.8\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 238.7\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$$a := \frac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 85.8\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.vert} \cdot f_y\right) = -108.0 \cdot kip$

Maximum tensile load; note that the tensile capacity of concrete is ignored

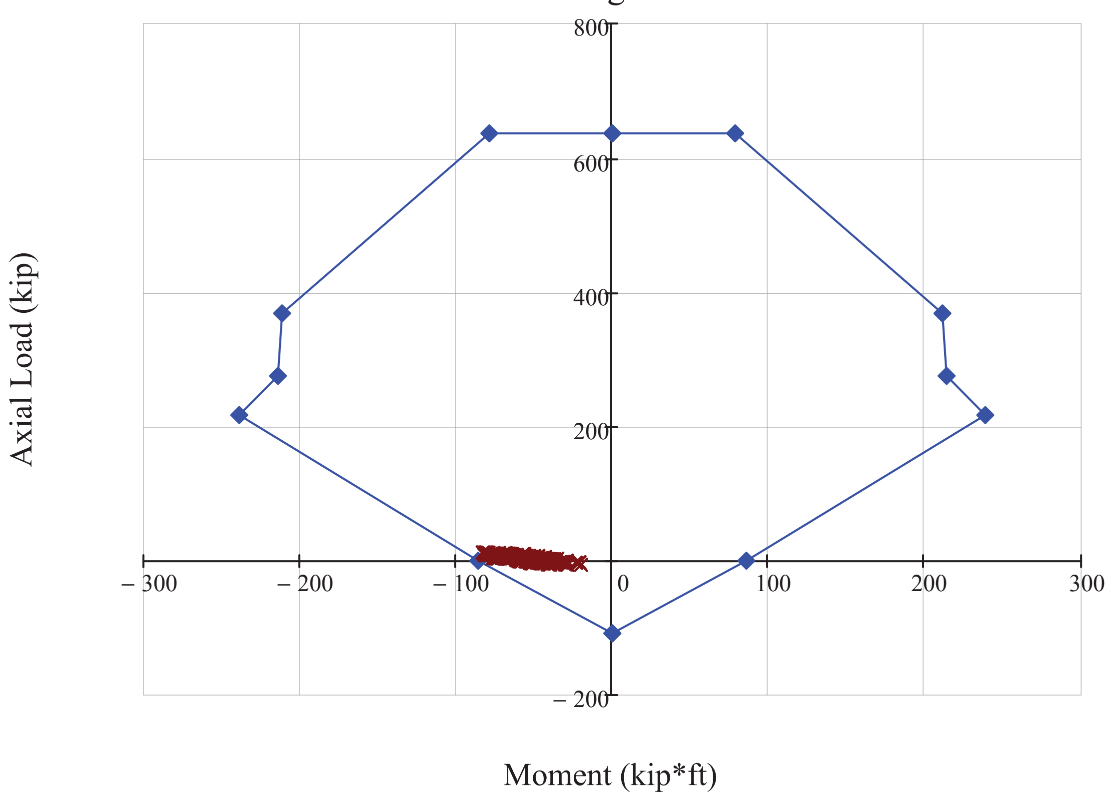
$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 368.3 \\ 275.2 \\ 216.8 \\ 0.0 \\ -108.0 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 78.7 \\ 211.2 \\ 213.9 \\ 238.7 \\ 85.8 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.

P-M Interaction Diagram - Vertical Bars



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 3.39 \cdot in^2$

Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 2.00 \cdot in^2$

Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 0.00 \cdot in^2$

Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 0.00 \cdot in^2$

Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 3.4 \cdot in^2$

Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 2.0 \cdot in^2$

Total area of vertical steel required

$A_{min} := 2 \cdot 0.0018 A_g = 1.04 \cdot in^2$

Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$$\text{Check\_H} := \left| \begin{array}{ll} \text{"OK"} & \text{if } A_{s.H} > A_{min} \\ \text{"No Good"} & \text{otherwise} \end{array} \right. = \text{"OK"}$$

$$\text{Check\_V} := \left| \begin{array}{ll} \text{"OK"} & \text{if } A_{s.V} > A_{min} \\ \text{"No Good"} & \text{otherwise} \end{array} \right. = \text{"OK"}$$

S.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for the given slab considers seismic effects; therefore, in-plane shear design follows the provisions of Chapter 21 of ACI 349-06 (Ref. 3.1.9). Out-of-plane shear design, which is unaffected by load case type, follows the provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000psi$ — Steel yield strength

$f'_c := 5000psi$ — Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi = 4030509\ psi$ — Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi = 530.3\ psi$ — Concrete modulus of rupture

$t_w = 24.0 \cdot in$ — Slab thickness

$l_w = 198.3\ ft$ — Slab length (X, local 1 direction)

$h_w = 192.3\ ft$ — Slab length (Y, local 2 direction)

$\phi_v := 0.75$ — Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$V_{u.hor} = 2278.0 \cdot kip$ — Factored shear force in slab

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.h} = 1.0\,ft$ — Spacing of horizontal shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Height of element above section cut; in this case, consider 12-in. design section

$A_{cv} := l_w \cdot t_w = 396.7 \cdot ft^2$ — Gross concrete area bounded by slab thickness and slab length

$$A_{v.req} := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.hor}}{\phi_v \cdot A_{cv}} - 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.42 \cdot in^2$$

Area of reinforcement required for strength

$A_{v.req.iph} := \max\left(A_{v.req}, 0\right) = 0.00 \cdot in^2$ — Required area of in-plane horizontal shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 32311 \cdot kip$$

Maximum nominal shear strength per Section 21.9.7.3 of Ref. 3.1.9

$$Check\_Vn := \begin{array}{|l} \text{"OK"} \quad \text{if } V_{u.hor} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} \quad \text{otherwise} \end{array} = \text{"OK"}$$

In-Plane Shear Design - Vertical

$V_{u.vert} = 3783.0 \cdot kip$ — Factored shear force in slab

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.v} = 12.0 \cdot in$ — Spacing of vertical shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Length of element aside section cut; in this case, consider 12-in. design section

$A_{cv} := h_w \cdot t_w = 384.7 \cdot ft^2$ — Gross concrete area bounded by slab thickness and slab height

$$A_{v.req} := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.vert}}{\phi_v \cdot A_{cv}} - 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.24 \cdot in^2$$

Area of reinforcement required for strength

$A_{v.req.ipv} := \max\left(A_{v.req}, 0\right) = 0.00 \cdot in^2$ — Required area of in-plane vertical shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 31334 \cdot kip$$

Maximum nominal shear strength per Section 21.9.7.3 of Ref. 3.1.9

$$Check\_Vn := \begin{vmatrix} \text{"OK"} & \text{if } V_{u.vert} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{vmatrix} = \text{"OK"}$$

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = -2.1 \cdot kip$ — Factored axial force per 12-in. strip of slab; positive = compression, negative = tension

$V_{u.oop.hor} = 6.7 \cdot kip$ — Factored shear per 12-in. strip of slab

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 19.7 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 32.9 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.27$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -7.0 \cdot kip$ — Factored axial force per 12-in. strip of slab; positive = compression, negative = tension

$V_{u.oop.vert} = 2.9 \cdot kip$ — Factored shear per 12-in. strip of slab

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 20.9 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 33.7 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.11$$

Table of Contents

T.1 Introduction

This attachment details the second of two reinforced concrete section designs for Group 1101, which represents the Basemat of the SHINE Facility. The group is located entirely at grade and contains elements of uniform 2-ft. thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

T.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 5345 shell elements comprising the group, Element 7891 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 45, column 32.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Slab Length (X)	198′-4″
Slab Length (Y)	192′-4″
Slab Length (Y) at Element 7891	174′-4″
Slab Thickness	2′-0″
Concrete Clear Cover	2″
Number of Shell Elements	5345

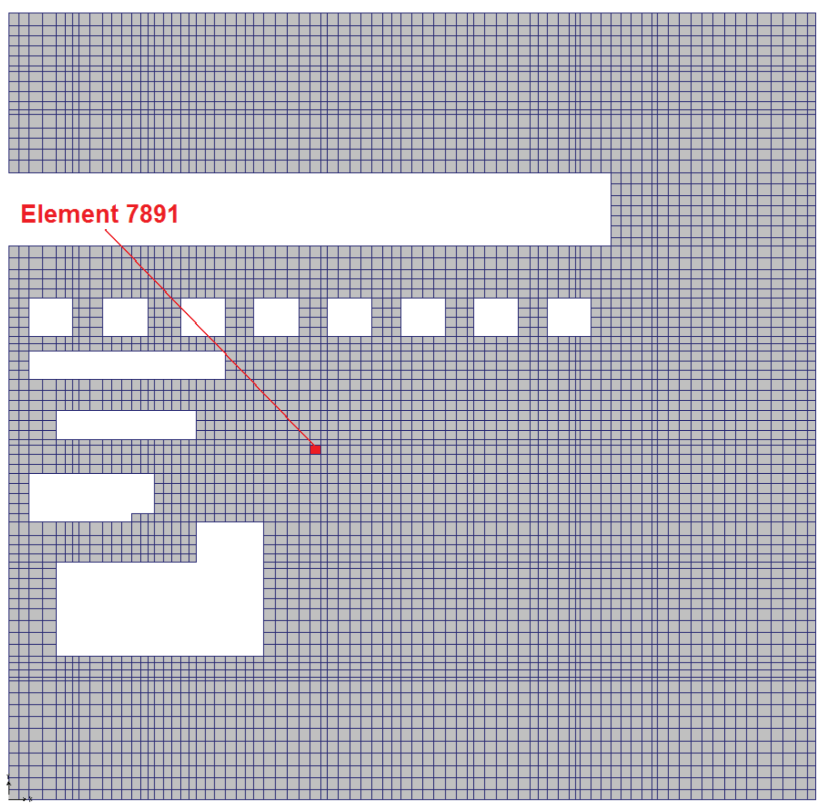


Figure 1 – Plan view of Group 1101 indicating Element 7891 (North points to left of page).

T.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section T.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	5101 / 5101	-63.8	26.0
Horizontal	Bottom	Not Applicable	0	0
Vertical	Top	5101 / 5101	-82.9	30.3
Vertical	Bottom	Not Applicable	0	0

T.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section T.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	45	5196	Non-Seismic	759	3356
Vertical	32	5407	Non-Seismic	1342	465

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	5137	3.96	30.9
Vertical	5125	5.41	27.6

T.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	1.00	1.00	#9 @ 12″ on center	1.00
	In-Plane Shear	0			
Vertical Longitudinal	Flexural	1.27	1.27	#10 @ 12″ on center	1.27
	In-Plane Shear	0			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

T.6 Flexural Reinforcement Design

Concrete slabs in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given slab is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000psi$ — Concrete compressive strength

$E_c := 57000 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi = 4030509\ psi$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000psi$ — Steel yield strength

$E_s := 29000000psi$ — Steel elastic modulus

$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \begin{vmatrix} 0.65 \ \text{ if } \ 1.05 - \frac{f'_c}{20ksi} < 0.65 \\ 0.85 \ \text{ if } \ 1.05 - \frac{f'_c}{20ksi} > 0.85 \\ 1.05 - \frac{f'_c}{20ksi} \ \text{ otherwise} \end{vmatrix} = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0 \cdot in$ — Design strip width

$t_w = 24.0 \cdot in$ — Slab thickness

$c_c = 2.0 \cdot in$ — Concrete clear cover

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area

$D_{tie} = 0.50 \cdot in$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 1.000 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.128 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 20.9 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 12.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 1.00 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 15.6 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 12.5 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 393.4 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 213.1 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\dfrac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.53\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 84.3 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 12.6 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 10.0 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 295.4 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 221.7 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 7.9 \cdot in$ Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1 \cdot c = 6.3 \cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 234.3 \cdot kip$$

$$\phi M_{n_5} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)(a \cdot b_w) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 253.1 \cdot kip \cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$a := \frac{A_{s.hor} \cdot f_y}{0.85 \cdot f'_c \cdot b_w} = 0.1\,ft$ Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 0.0 \cdot kip$$

$$\phi M_{n_6} := \phi \cdot A_{s.hor} \cdot f_y \cdot \left(d_h - \frac{a}{2}\right) = 91.6 \cdot kip \cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.hor} \cdot f_y\right) = -108.0 \cdot kip$

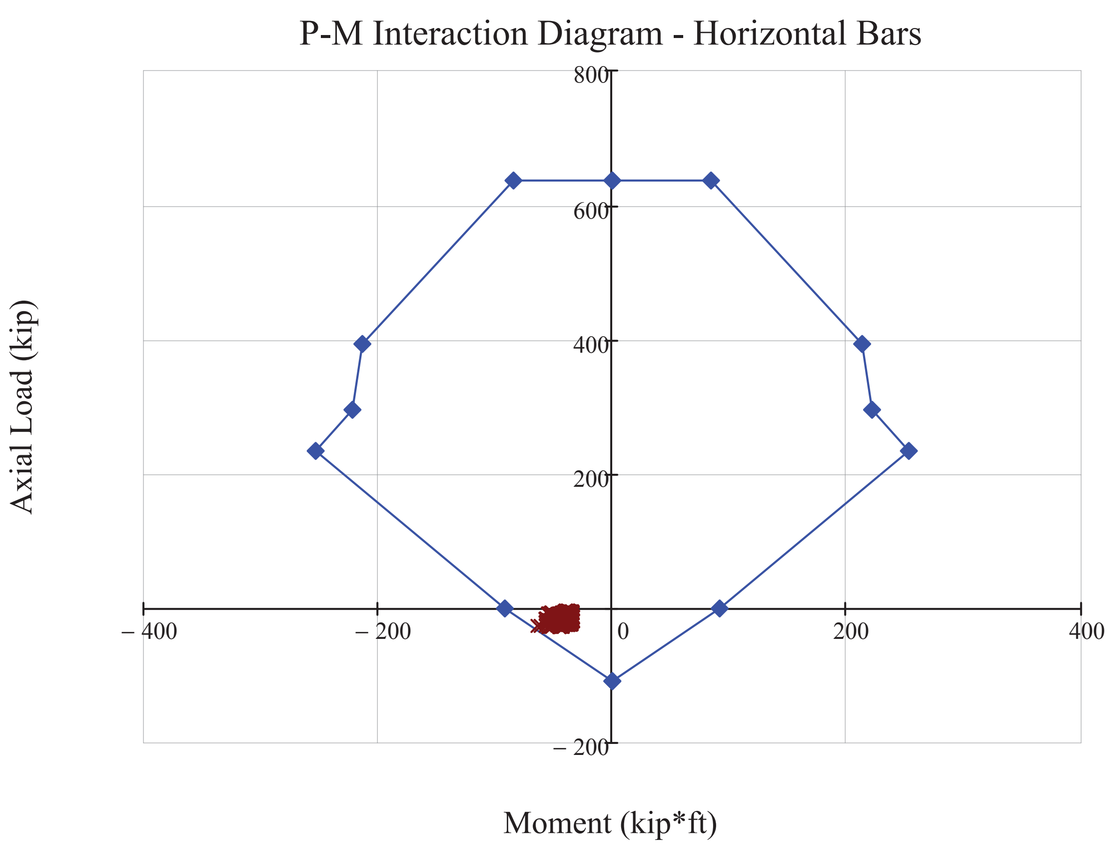
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 393.4 \\ 295.4 \\ 234.3 \\ 0.0 \\ -108.0 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 84.3 \\ 213.1 \\ 221.7 \\ 253.1 \\ 91.6 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 1.270 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.270 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.128 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 19.7 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 12.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \frac{b_w}{s_{vert}} = 1.27 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 636.5 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 14.7 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 11.7 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 364.4 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 214.8 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\dfrac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.50\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 636.5\cdot\text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope}\cdot\left(\phi P_{n_1} - \phi P_{n_3}\right) = 79.3\cdot\text{kip}\cdot\text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\dfrac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 11.8\cdot\text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s\cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1\cdot c = 9.5\cdot\text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 266.2\cdot\text{kip}$$

$$\phi M_{n_4} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 221.0\cdot\text{kip}\cdot\text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 7.4\cdot in$ Neutral axis depth

$f_s := f_y = 60000\ psi$ Steel stress

$a := \beta_1\cdot c = 5.9\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 203.2\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)(a\cdot b_w) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 248.9\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\ psi$ Steel stress

$a := \dfrac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\ ft$ Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 108.5\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.vert} \cdot f_y\right) = -137.2 \cdot kip$

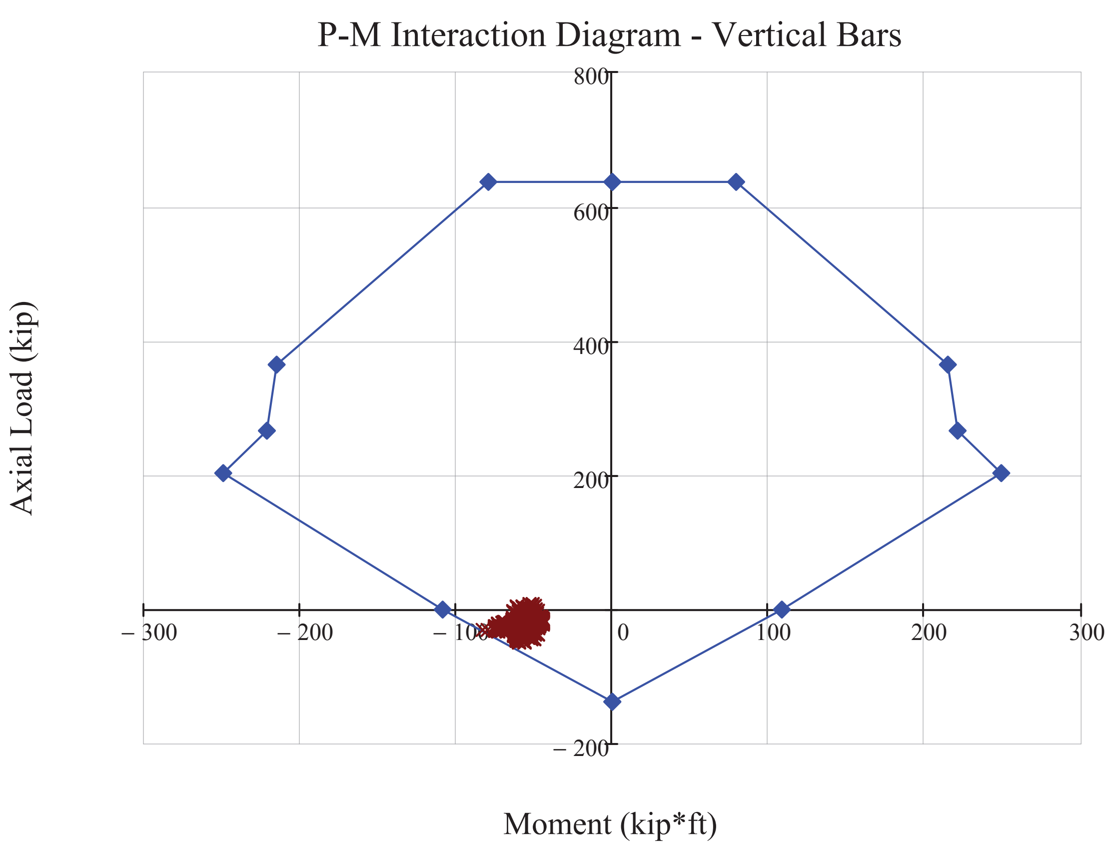
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 636.5 \\ 636.5 \\ 364.4 \\ 266.2 \\ 203.2 \\ 0.0 \\ -137.2 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 79.3 \\ 214.8 \\ 221.0 \\ 248.9 \\ 108.5 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 2.00 \cdot in^2$ — Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 2.54 \cdot in^2$ — Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 0.00 \cdot in^2$ — Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 0.00 \cdot in^2$ — Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 2.0 \cdot in^2$ — Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 2.5 \cdot in^2$ — Total area of vertical steel required

$A_{min} := 2 \cdot 0.0018 A_g = 1.04 \cdot in^2$ — Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$$Check\_H := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.H} > A_{min} \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

$$Check\_V := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.V} > A_{min} \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

T.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for the given slab does not consider seismic effects; therefore, in-plane shear design follows the design procedure in ACI 349-06 (Ref. 3.1.9) Sections 11.10.2 through 11.10.9, modified for slab applications. Out-of-plane shear design, which is unaffected by load case type, follows provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000\text{psi}$	Steel yield strength
$f'_c := 5000\text{psi}$	Concrete compressive strength
$E := 57000 \cdot \sqrt{\dfrac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$	Elastic modulus of concrete
$f_r := 7.5 \cdot \sqrt{\dfrac{f'_c}{\text{psi}}} \cdot \text{psi} = 530.3\ \text{psi}$	Concrete modulus of rupture
$t_w = 24.0 \cdot \text{in}$	Slab thickness
$l_w = 198.3\ \text{ft}$	Slab length (X, local 1 axis)
$h_w = 174.3\ \text{ft}$	Slab length (Y, local 2 axis)
$\phi_v := 0.75$	Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$V_{u.hor} = 759.0 \cdot kip$ — Factored shear force in slab

$d := 0.8 \cdot l_w = 158.7\ ft$ — Depth per Section 11.10.4 of Ref. 3.1.9

Check shear strength limit for existing slab geometry:

$$\phi V_{n.max} := \phi_v \cdot 10 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 24233.6 \cdot kip$$

Nominal shear strength limit per Ref. 3.1.9, Sections 11.5.7.9 and 11.3.1.1

$$Check\_Limit := \begin{array}{|l} \text{"OK"} \quad \text{if } V_{u.hor} < \phi V_{n.max} \\ \text{"No Good"} \quad \text{otherwise} \end{array} = \text{"OK"}$$

Calculation of concrete shear strength per Section 11.3.1.1 of Ref. 3.1.9:

$$V_c := 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 6462.3 \cdot kip$$

$$Check := \begin{array}{|l} \text{"OK - No Rebar Required"} \quad \text{if } \phi_v \cdot V_c > V_{u.hor} \\ \text{"Rebar Required for Strength"} \quad \text{otherwise} \end{array} = \text{"OK - No Rebar Required"}$$

In-Plane Shear Design - Vertical

$V_{u.vert} = 1342.0 \cdot kip$ — Factored shear force in slab

$d := 0.8 \cdot h_w = 139.5\ ft$ — Depth per Section 11.10.4 of Ref. 3.1.9

Check shear strength limit for existing slab geometry:

$$\phi V_{n.max} := \phi_v \cdot 10 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 21301.0 \cdot kip$$

Nominal shear strength limit per Ref. 3.1.9, Sections 11.5.7.9 and 11.3.1.1

$$Check\_Limit := \begin{array}{|l} \text{"OK"} \quad \text{if } V_{u.hor} < \phi V_{n.max} \\ \text{"No Good"} \quad \text{otherwise} \end{array} = \text{"OK"}$$

Calculation of concrete shear strength per Section 11.3.1.1 of Ref. 3.1.9:

$$V_c := 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 5680.3 \cdot kip$$

$$Check := \begin{array}{|l} \text{"OK - No Rebar Required"} \quad \text{if } \phi_v \cdot V_c > V_{u.vert} \\ \text{"Rebar Required for Strength"} \quad \text{otherwise} \end{array} = \text{"OK - No Rebar Required"}$$

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = -30.9 \cdot kip$ — Factored axial force per 12-in. strip of slab; positive = compression, negative = tension

$V_{u.oop.hor} = 4.0 \cdot kip$ — Factored shear per 12-in. strip of slab

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 19.7 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 26.3 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.20$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -27.6 \cdot kip$ — Factored axial force per 12-in. strip of slab; positive = compression, negative = tension

$V_{u.oop.vert} = 5.4 \cdot kip$ — Factored shear per 12-in. strip of slab

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 20.9 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 288.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 28.7 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.25$$

Table of Contents

U.1 Introduction

This attachment details the reinforced concrete section design for Group 1204, which, along with ten other finite element groups, comprise the Irradiation Cell Walls of the SHINE Facility. The group extends both above and below grade and contains elements of uniform 6-ft. thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per applicable provisions of ACI 349-06 (Reference 3.1.9).

U.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 793 shell elements comprising the group, Element 16343 is selected as representative of a typical element based on its loading. The element is shown in Figure 1 and is located in row 1, column 60.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Wall Height	38′-6″
Wall Length	148′-0″
Wall Thickness	6′-0″
Concrete Clear Cover	2″
Number of Shell Elements	793

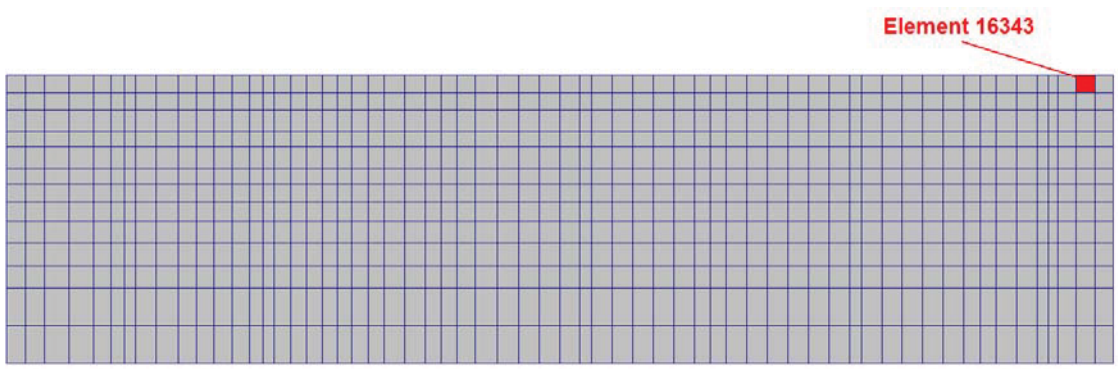


Figure 1 – Elevation view of Group 1204 indicating Element 16343, looking East.

U.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section U.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	3011 / 3003	-61.2	68.9
Horizontal	Bottom	1026 / 1026	160	109
Vertical	Top	1002 / 3027	-14.7	6.9
Vertical	Bottom	1134 / 1002	13.6	4.0

U.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section U.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	1	3032	Seismic	594	-67.8
Vertical	60	1130	Seismic	1715	-726

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	1082	8.14	1.0
Vertical	1034	56.3	82.0

U.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	1.56	2.64	#11 @ 6″ on center	3.12
	In-Plane Shear	1.08			
Vertical Longitudinal	Flexural	1.56	2.64	#11 @ 6″ on center	3.12
	In-Plane Shear	1.08			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

U.6 Flexural Reinforcement Design

Concrete walls in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given wall is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E_c := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000\text{psi}$ — Steel yield strength

$E_s := 29000000\text{psi}$ — Steel elastic modulus

$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \begin{cases} 0.65 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 & \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} & \text{otherwise} \end{cases} = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0 \cdot \text{in}$ — Design strip width

$h_w = 38.5\ \text{ft}$ — Wall height

$l_w = 148.0\ \text{ft}$ — Wall length

$t_w = 72.0 \cdot \text{in}$ — Wall thickness

$c_c = 2.0 \cdot \text{in}$ — Concrete clear cover

$A_g := b_w \cdot t_w = 864.0 \cdot \text{in}^2$ — Gross concrete area

$D_{tie} = 0.50 \cdot \text{in}$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 1.560 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.410 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 68.8 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 12.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 1.56 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 1909.4 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 51.2 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 40.9 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 1326.2 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 1839.7 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 1.73\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 1909.4\cdot\text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope}\cdot\left(\phi P_{n_1} - \phi P_{n_3}\right) = 828.1\cdot\text{kip}\cdot\text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 41.3\cdot\text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s\cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1\cdot c = 33.0\cdot\text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 1035.9\cdot\text{kip}$$

$$\phi M_{n_4} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 1938.6\cdot\text{kip}\cdot\text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 25.8\cdot in$ Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1\cdot c = 20.6\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 863.1\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 2257.5\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.2\,ft$ Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 476.5\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.hor} \cdot f_y\right) = -168.5 \cdot kip$

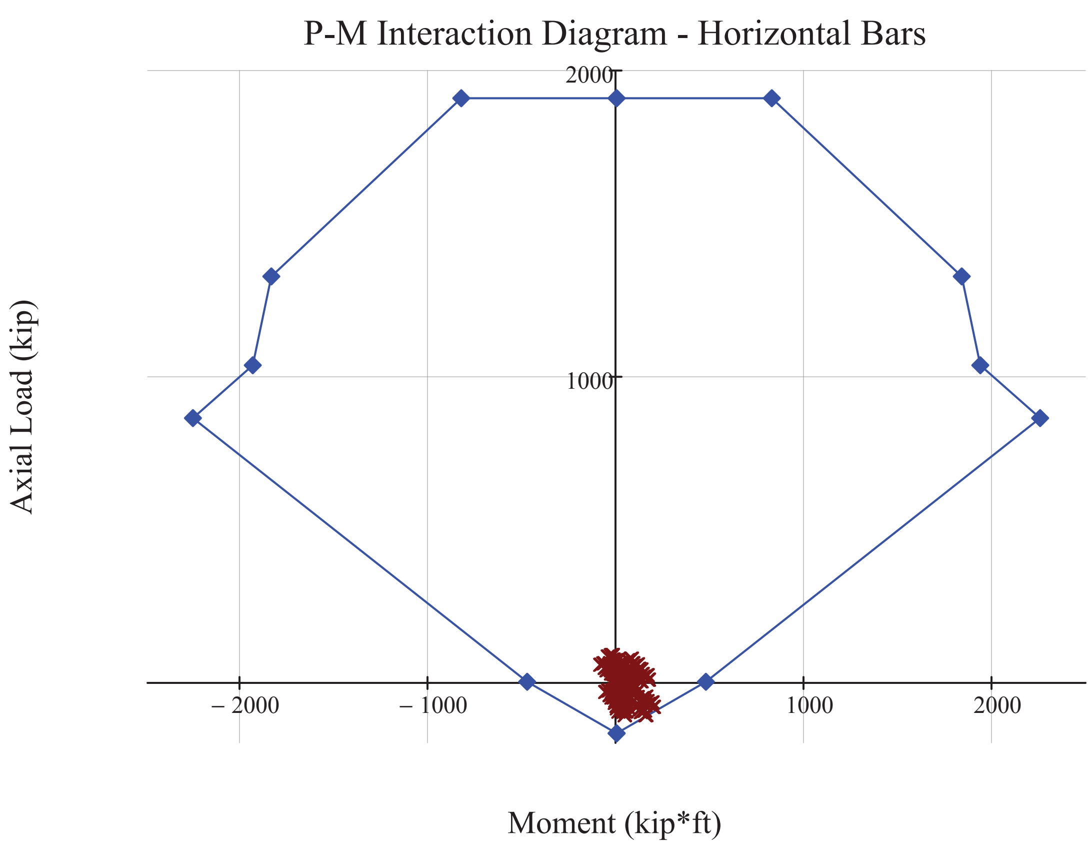
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

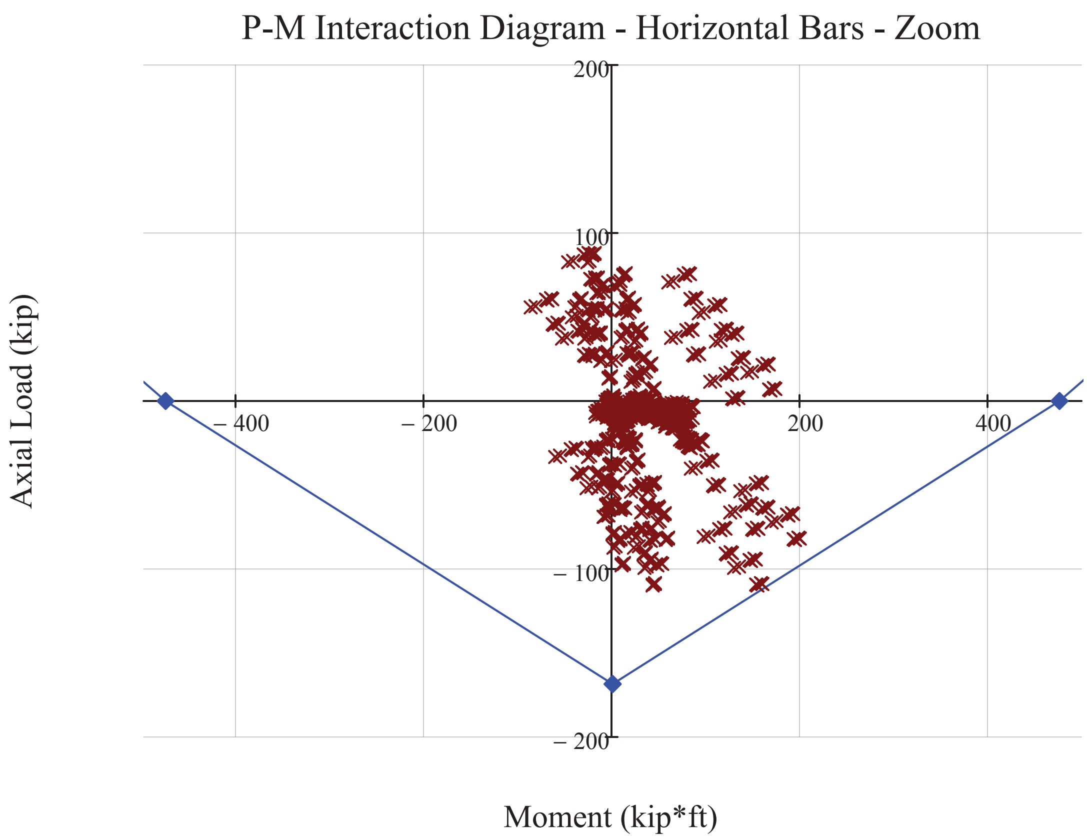
Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 1909.4 \\ 1909.4 \\ 1326.2 \\ 1035.9 \\ 863.1 \\ 0.0 \\ -168.5 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 828.1 \\ 1839.7 \\ 1938.6 \\ 2257.5 \\ 476.5 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



To ensure points are within P-M curve, zoom into region of load points on preceding P-M diagram:



Case 2) Vertical Reinforcement

$A_{b.vert} = 1.560 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.410 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.410 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5 D_{b.vert} = 67.4 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 12.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \dfrac{b_w}{s_{vert}} = 1.56 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 1909.4 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \left| \begin{array}{l} 0.65 \quad \text{if } \varepsilon_s < 0.002 \\ 0.9 \quad \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] \quad \text{otherwise} \end{array} \right. = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 50.1 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ — Steel stress

$a := \beta_1 \cdot c = 40.1 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 1298.4 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 1846.6 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\dfrac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 1.70\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 1909.4 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 809.9 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 40.4 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 32.3 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 1013.4 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 1925.5 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 25.3 \cdot in$ Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1 \cdot c = 20.2 \cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi \cdot (0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s) = 843.7 \cdot kip$$

$$\phi M_{n_5} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)(a \cdot b_w) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 2222.4 \cdot kip \cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$a := \frac{A_{s.vert} \cdot f_y}{0.85 \cdot f'_c \cdot b_w} = 0.2\,ft$ Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi \cdot (0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s) = 0.0 \cdot kip$$

$$\phi M_{n_6} := \phi \cdot A_{s.vert} \cdot f_y \cdot \left(d_v - \frac{a}{2}\right) = 466.6 \cdot kip \cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi\cdot\left(2A_{s.vert}\cdot f_y\right) = -168.5\cdot kip$ — Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Check Slenderness Effects

$k = 0.65$ — Effective length factor, assuming a fixed-fixed end condition

$l_u := 19.5ft$ — Unbraced height of wall

$I_g := \frac{1}{12}\cdot l_w\cdot t_w^{\,3} = 2664.0\,ft^{4.0}$ — Moment of inertia of wall

$r := \max\left(\sqrt{\frac{I_g}{l_w\cdot t_w}}, 0.3\cdot t_w\right) = 21.6\cdot in$ — Radius of gyration of wall per Section 10.11.2 of Ref. 3.1.9

$C_m := \begin{cases} 0 & \text{if } \frac{k\cdot l_u}{r} \le 22 \\ 1.0 & \text{otherwise} \end{cases} = 0.0$ — Slenderness check per Eq. 10-7 of Ref. 3.1.9, conservatively taking M1/M2 equal to 1.0
- if slender, Cm is conservatively taken as 1
- if non-slender, Cm is taken as 0

$\beta_d := 1$ — Ratio of maximum sustained axial load to maximum axial load per Ch. 10 of Ref. 3.1.9; conservatively taken as 1.0

$EI := \frac{0.4\cdot E_c\cdot I_g}{1+\beta_d} = 309233521\cdot kip\cdot ft^2$ — Equation 10-12 of Ref. 3.1.9

$P_c := \frac{\pi^2\cdot EI}{\left(k\cdot l_u\right)^2} = 18997234\cdot kip$ — Critical buckling load for wall; Equation 10-10 of Ref. 3.1.9

$P_u = 340.3\cdot kip$ — Total factored axial load on wall

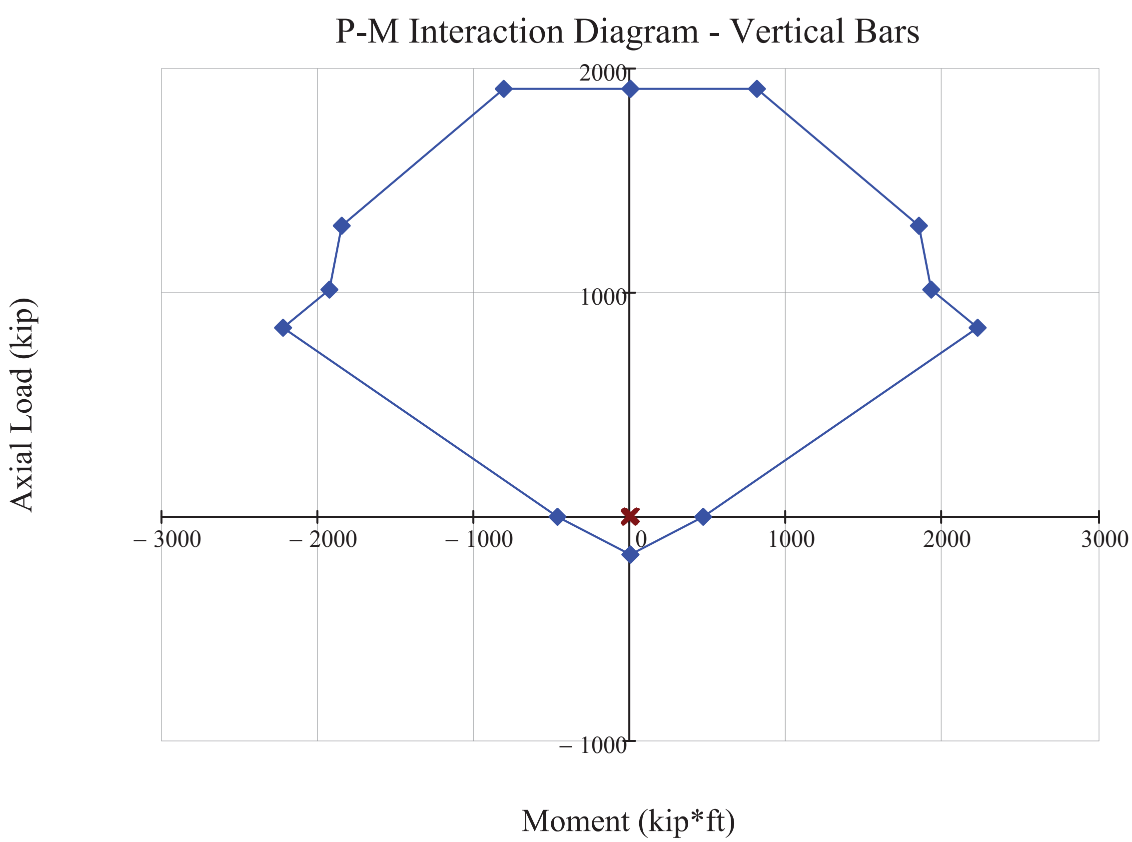
$\delta_{ns} := \max\left(1.0, \frac{C_m}{1-\frac{P_u}{0.75P_c}}\right) = 1.00$ — Moment magnification factor per Eq. 10-9 of Ref. 3.1.9; *Note: if wall is non-slender as determined by the kl/r check above, this factor will automatically default to 1.0*

Note: when plotted on the P-M diagram below, the moments for all load points are magnified by the moment magnification factor determined above to account for slenderness effects, if any.

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 1909.4 \\ 1909.4 \\ 1298.4 \\ 1013.4 \\ 843.7 \\ 0.0 \\ -168.5 \end{pmatrix} \cdot \text{kip} \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 809.9 \\ 1846.6 \\ 1925.5 \\ 2222.4 \\ 466.6 \\ 0.0 \end{pmatrix} \text{ft} \cdot \text{kip}$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 3.12 \cdot in^2$

Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 3.12 \cdot in^2$

Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 2.16 \cdot in^2$

Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 2.16 \cdot in^2$

Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 5.3 \cdot in^2$

Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 5.3 \cdot in^2$

Total area of vertical steel required

$A_{min1} := 2 \cdot 0.0018A_g = 3.11 \cdot in^2$

Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$A_{min2.h} := 0.0025A_g = 2.16 \cdot in^2$

Minimum horizontal reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.3 (b) of Ref. 3.1.9

$A_{min2.v} := 0.0015A_g = 1.30 \cdot in^2$

Minimum vertical reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.2 (b) of Ref. 3.1.9

$A_{min3} := 0.0025A_g = 2.16 \cdot in^2$

Minimum vertical and horizontal reinforcement for seismic cases if Vu > Acv/fc per Section 21.7.2.1 of Ref. 3.1.9

$$Check\_H := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.H} > \max\left(A_{min1}, A_{min2.h}, A_{min3}\right) \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

$$Check\_V := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.V} > \max\left(A_{min1}, A_{min2.v}, A_{min3}\right) \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

U.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for the given wall considers seismic effects; therefore, in-plane shear design follows the provisions of Chapter 21 of ACI 349-06 (Ref. 3.1.9). Out-of-plane shear design, which is unaffected by load case type, follows the provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000\text{psi}$ Steel yield strength

$f'_c := 5000\text{psi}$ Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 530.3\ \text{psi}$ Concrete modulus of rupture

$t_w = 72.0 \cdot \text{in}$ Wall thickness

$l_w = 148.0\ \text{ft}$ Wall length

$h_w = 38.5\ \text{ft}$ Wall height

$\phi_v := 0.75$ Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

$$\alpha_c := \begin{array}{|l} 3.0 \ \text{ if } \ \frac{h_w}{l_w} < 1.5 \\ 2.0 \ \text{ if } \ \frac{h_w}{l_w} > 2.0 \\ 2.0 + \frac{(3.0 - 2.0)}{(1.5 - 2.0)} \cdot \left(\frac{h_w}{l_w} - 2.0\right) \ \text{ otherwise} \end{array} = 3.0$$

Coefficient per Section 21.7.4.1 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$V_{u.hor} = 549.4 \cdot kip$ — Factored shear force in wall

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.h} = 1.0\,ft$ — Spacing of horizontal shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Height of element above section cut; in this case, consider 12-in. design section

$A_{cv} := l_w \cdot t_w = 888.0 \cdot ft^2$ — Gross concrete area bounded by wall thickness and wall length

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.hor}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -2.97 \cdot in^2$$

Minimum area of reinforcement required for strength

$A_{v.min} := 0.0025 \cdot t_w \cdot s_{IP.h} = 2.16 \cdot in^2$ — Minimum area of reinforcement required per Section 21.7.2.1 of Ref. 3.1.9

$A_{v.req.iph} := \max\left(A_{v.min}, A_v\right) = 2.16 \cdot in^2$ — Required area of horizontal in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 72335 \cdot kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{cases} \text{"OK"} & \text{if } V_{u.hor} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

In-Plane Shear Design - Vertical

$V_{u.vert} = 1715.0 \cdot kip$ — Factored shear force in wall

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.v} = 12.0 \cdot in$ — Spacing of vertical shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Length of element aside section cut; in this case, consider 12-in. design section

$A_{cv} := h_w \cdot t_w = 231.0 \cdot ft^2$ — Gross concrete area bounded by wall thickness and wall height

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.vert}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -2.06 \cdot in^2$$

Minimum area of reinforcement required for strength

$$A_{v.min} := \begin{cases} A_{v.req.iph} & \text{if } \dfrac{h_w}{l_w} < 2.0 \\ 0.0025 \cdot t_w \cdot s_{IP.v} & \text{otherwise} \end{cases} = 2.16 \cdot in^2$$

Minimum area of reinforcement required per Sections 21.7.2.1 and 21.7.4.3 of Ref. 3.1.9

$$A_{v.req.ipv} := \max\left(A_{v.min}, A_v\right) = 2.16 \cdot in^2$$

Required area of vertical in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 18817 \cdot kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{cases} \text{"OK"} & \text{if } V_{u.vert} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = -1.0 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.hor} = 8.1 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5 D_{b.vert} = 67.4 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 864.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{500 A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 114.1 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.10$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -81.9 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.vert} = 56.3 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5 D_{b.hor} = 68.8 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 864.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500 A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 94.6 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.79$$

Table of Contents

V.1 Introduction

This attachment details the reinforced concrete section design for Group 1205, which, along with twenty-one other finite element groups, comprise the Off-Gas Cell Walls of the SHINE Facility. The group is entirely above grade and contains elements of uniform 4-ft. thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

V.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 30 shell elements comprising the group, Element 15135 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 1, column 4.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Wall Height	14′-10″
Wall Length	14′-0″
Wall Thickness	4′-0″
Concrete Clear Cover	2″
Number of Shell Elements	30

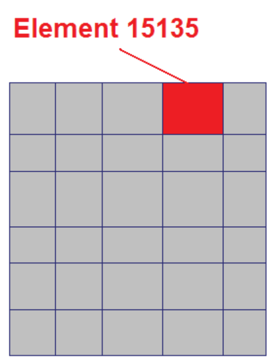


Figure 1 – Elevation view of Group 1205 indicating Element 15135, looking East.

V.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section V.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	1062 / 1014	-101	43.9
Horizontal	Bottom	3035 / 3039	17.8	6.75
Vertical	Top	1014 / 1002	-6.59	-4.78
Vertical	Bottom	1035 / 1188	0.52	-3.75

V.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section V.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	1	5147	Non-Seismic	141	-99.1
Vertical	4	5143	Non-Seismic	163	47.9

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	3038	1.44	-2.77
Vertical	1158	20.9	44.0

V.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	**Analysis Case**	$A_{s\text{-}req}$	$A_{s\text{-}total}$	**Reinforcement**	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	1.04	1.76	#9 @ 6″ on center	2.00
	In-Plane Shear	0.72			
Vertical Longitudinal	Flexural	1.04	1.76	#9 @ 6″ on center	2.00
	In-Plane Shear	0.72			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

V.6 Flexural Reinforcement Design

Concrete walls in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given wall is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E_c := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\,\text{psi}$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000\text{psi}$ — Steel yield strength

$E_s := 29000000\text{psi}$ — Steel elastic modulus

$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \begin{vmatrix} 0.65 \ \text{ if } \ 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 \ \text{ if } \ 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} \ \text{ otherwise} \end{vmatrix} = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0 \cdot \text{in}$ — Design strip width

$h_w = 14.8\,\text{ft}$ — Wall height

$l_w = 14.0\,\text{ft}$ — Wall length

$t_w = 48.0 \cdot \text{in}$ — Wall thickness

$c_c = 2.0 \cdot \text{in}$ — Concrete clear cover

$A_g := b_w \cdot t_w = 576.0 \cdot \text{in}^2$ — Gross concrete area

$D_{tie} = 0.50 \cdot \text{in}$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 1.560 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.410 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5 D_{b.hor} = 44.8 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 18.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 1.04 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 1273.0 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 33.3 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ — Steel stress

$a := \beta_1 \cdot c = 26.6 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 863.1 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 821.1 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 1.13\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 1273.0\cdot\text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope}\cdot\left(\phi P_{n_1} - \phi P_{n_3}\right) = 358.9\cdot\text{kip}\cdot\text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 26.9\cdot\text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s\cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1\cdot c = 21.5\cdot\text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 673.6\cdot\text{kip}$$

$$\phi M_{n_4} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 854.9\cdot\text{kip}\cdot\text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 16.8 \cdot in$ Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1 \cdot c = 13.4 \cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 560.7 \cdot kip$$

$$\phi M_{n_5} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 985.6 \cdot kip \cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$a := \frac{A_{s.hor} \cdot f_y}{0.85 \cdot f'_c \cdot b_w} = 0.1\,ft$ Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 0.0 \cdot kip$$

$$\phi M_{n_6} := \phi \cdot A_{s.hor} \cdot f_y \cdot \left(d_h - \frac{a}{2}\right) = 206.8 \cdot kip \cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot (2A_{s.hor} \cdot f_y) = -112.3 \cdot kip$

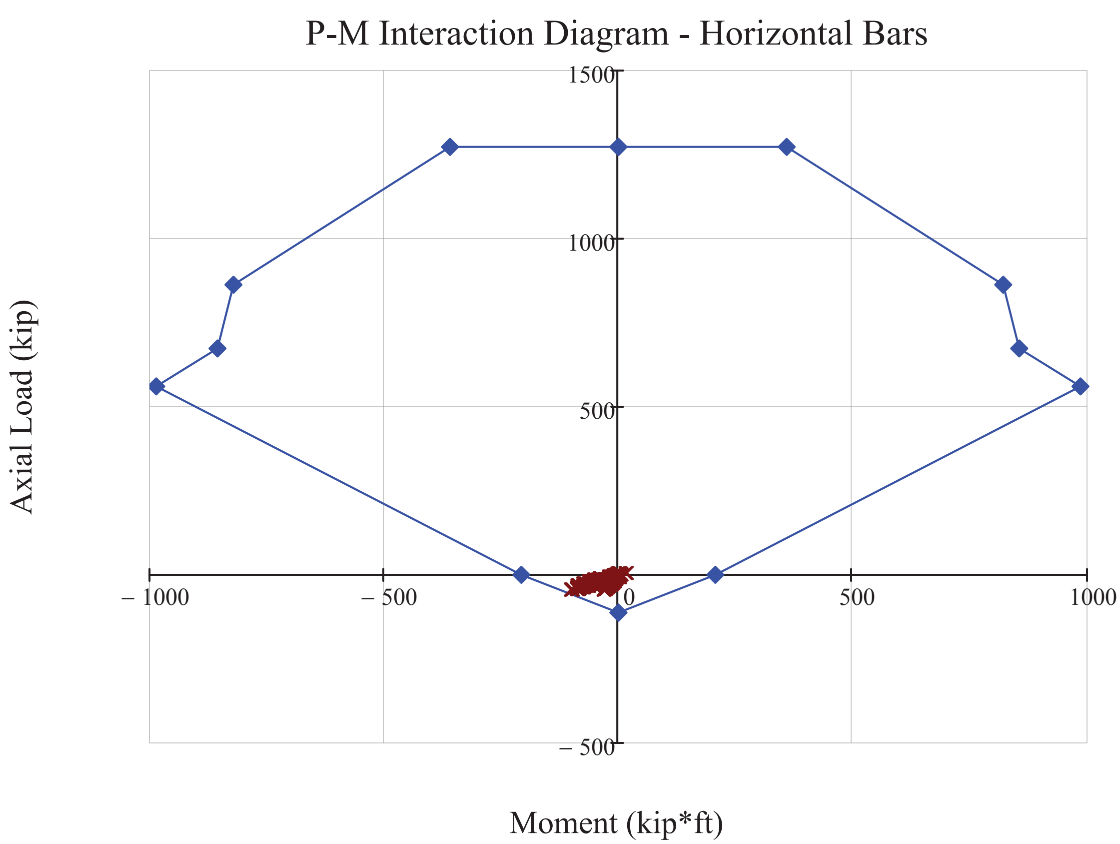
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 1273.0 \\ 1273.0 \\ 863.1 \\ 673.6 \\ 560.7 \\ 0.0 \\ -112.3 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 358.9 \\ 821.1 \\ 854.9 \\ 985.6 \\ 206.8 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 1.560 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.410 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.410 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5 D_{b.vert} = 43.4 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 18.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \frac{b_w}{s_{vert}} = 1.04 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 1273.0 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{vmatrix} 0.65 \ \text{ if } \ \varepsilon_s < 0.002 \\ 0.9 \ \text{ if } \ \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] \ \text{ otherwise} \end{vmatrix} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 32.3 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 25.8 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 835.3 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 823.8 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 1.09\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 1273.0 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 346.8 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 26.0 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 20.8 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 651.1 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 845.0 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 16.3\cdot in$ — Neutral axis depth

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \beta_1\cdot c = 13.0\cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 541.3\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)(a\cdot b_w) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 961.6\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \frac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$ — Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 200.2\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.vert} \cdot f_y\right) = -112.3 \cdot kip$

Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Check Slenderness Effects

$k = 0.65$

Effective length factor, assuming a fixed-fixed end condition

$l_u := h_w = 14.8\,ft$

Unbraced height of wall

$I_g := \frac{1}{12} \cdot l_w \cdot t_w^{\ 3} = 74.7\,ft^{4.0}$

Moment of inertia of wall

$r := \max\left(\sqrt{\frac{I_g}{l_w \cdot t_w}}, 0.3 \cdot t_w\right) = 14.4 \cdot in$

Radius of gyration of wall per Section 10.11.2 of Ref. 3.1.9

$$C_m := \begin{cases} 0 & \text{if } \frac{k \cdot l_u}{r} \le 22 \\ 1.0 & \text{otherwise} \end{cases} = 0.0$$

Slenderness check per Eq. 10-7 of Ref. 3.1.9, conservatively taking M1/M2 equal to 1.0
- if slender, Cm is conservatively taken as 1
- if non-slender, Cm is taken as 0

$\beta_d := 1$

Ratio of maximum sustained axial load to maximum axial load per Ch. 10 of Ref. 3.1.9; conservatively taken as 1.0

$$EI := \frac{0.4 \cdot E_c \cdot I_g}{1 + \beta_d} = 8667206 \cdot kip \cdot ft^2$$

Equation 10-12 of Ref. 3.1.9

$$P_c := \frac{\pi^2 \cdot EI}{\left(k \cdot l_u\right)^2} = 920598 \cdot kip$$

Critical buckling load for wall; Equation 10-10 of Ref. 3.1.9

$P_u = 164.5 \cdot kip$

Total factored axial load on wall

$$\delta_{ns} := \max\left(1.0, \frac{C_m}{1 - \frac{P_u}{0.75P_c}}\right) = 1.00$$

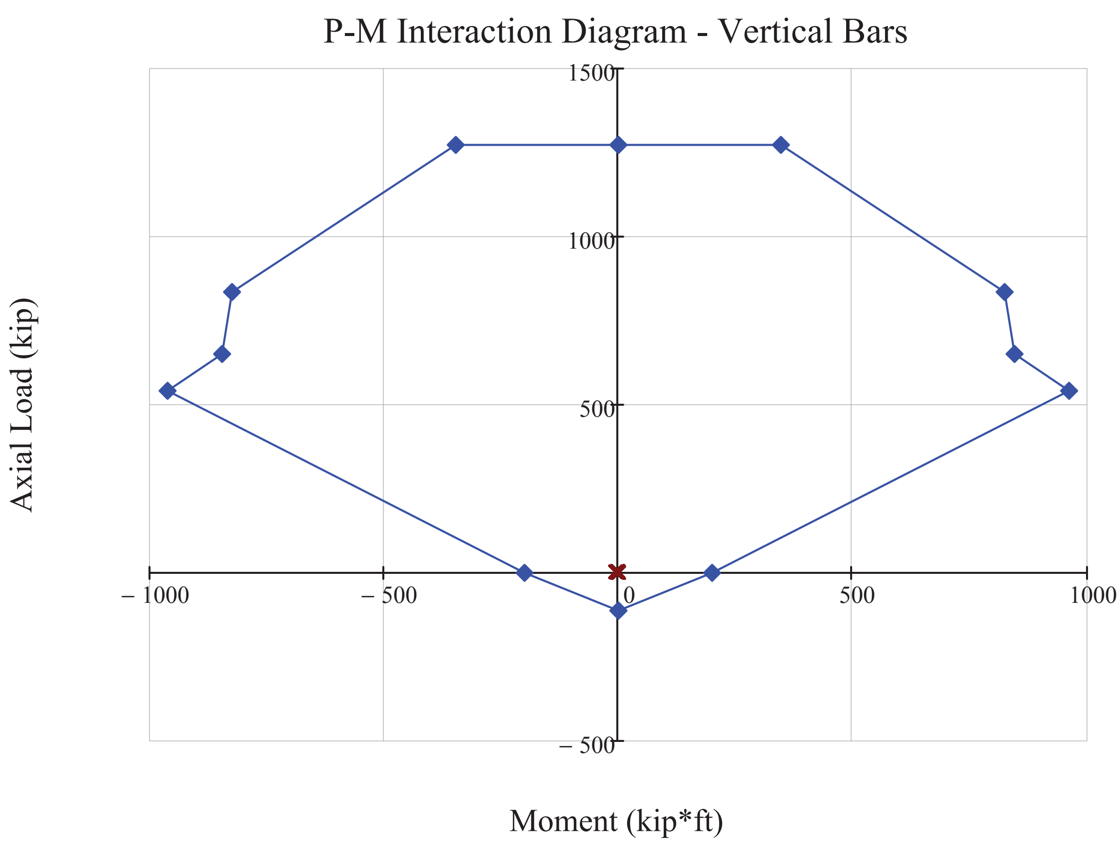
Moment magnification factor per Eq. 10-9 of Ref. 3.1.9; *Note: if wall is non-slender as determined by the kl/r check above, this factor will automatically default to 1.0*

Note: when plotted on the P-M diagram below, the moments for all load points are magnified by the moment magnification factor determined above to account for slenderness effects, if any.

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 1273.0 \\ 1273.0 \\ 835.3 \\ 651.1 \\ 541.3 \\ 0.0 \\ -112.3 \end{pmatrix} \cdot \text{kip} \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 346.8 \\ 823.8 \\ 845.0 \\ 961.6 \\ 200.2 \\ 0.0 \end{pmatrix} \text{ft} \cdot \text{kip}$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 2.08 \cdot in^2$ — Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 2.08 \cdot in^2$ — Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 1.44 \cdot in^2$ — Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 1.44 \cdot in^2$ — Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 3.5 \cdot in^2$ — Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 3.5 \cdot in^2$ — Total area of vertical steel required

$A_{min1} := 2 \cdot 0.0018 A_g = 2.07 \cdot in^2$ — Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$A_{min2.h} := 0.0025 A_g = 1.44 \cdot in^2$ — Minimum horizontal reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.3 (b) of Ref. 3.1.9

$A_{min2.v} := 0.0015 A_g = 0.86 \cdot in^2$ — Minimum vertical reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.2 (b) of Ref. 3.1.9

$A_{min3} := 0.0025 A_g = 1.44 \cdot in^2$ — Minimum vertical and horizontal reinforcement for seismic cases if Vu > Acv/fc per Section 21.7.2.1 of Ref. 3.1.9

$$\text{Check\_H} := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.H} > \max(A_{min1}, A_{min2.h}, A_{min3}) \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

$$\text{Check\_V} := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.V} > \max(A_{min1}, A_{min2.v}, A_{min3}) \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

V.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for the given wall does not consider seismic effects; therefore, in-plane shear design follows provisions of ACI 349-06 (Ref. 3.1.9) Sections 11.10.2 through 11.10.9. Out-of-plane shear design, which is unaffected by load case type, follows provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000\text{psi}$ — Steel yield strength

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 530.3\ \text{psi}$ — Concrete modulus of rupture

$t_w = 48.0 \cdot \text{in}$ — Wall thickness

$l_w = 14.0\ \text{ft}$ — Wall length

$h_w = 14.8\ \text{ft}$ — Wall height

$\phi_v := 0.75$ — Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$N_{u.hor} = 99.1 \cdot kip$

Factored axial force on wall (vertical); positive = compression, negative = tension

$V_{u.hor} = 140.6 \cdot kip$

Factored shear force in wall

$d := 0.8 \cdot l_w = 11.2\,ft$

Depth per Section 11.10.4 of Ref. 3.1.9

Check shear strength limit for existing wall geometry:

$$\phi V_{n.max} := \phi_v \cdot 10 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 3421.3 \cdot kip$$

Nominal shear strength limit per Ref. 3.1.9, Section 11.10.3

$$Check\_Limit := \begin{vmatrix} \text{"OK"} \quad \text{if } V_{u.hor} < \phi V_{n.max} \\ \text{"No Good"} \quad \text{otherwise} \end{vmatrix} = \text{"OK"}$$

Calculation of concrete shear strength per Section 11.10.5 of Ref. 3.1.9:

$$V_c := \begin{vmatrix} \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.hor}}{500 t_w \cdot l_w}\right) \cdot \sqrt{\frac{f'_c}{psi}} t_w \cdot d\right] \quad \text{if } N_{u.hor} < 0 \\ 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi \quad \text{otherwise} \end{vmatrix} = 912.3 \cdot kip$$

$$Check := \begin{vmatrix} \text{"Only Minimum Rebar Required"} \quad \text{if } \phi_v \cdot V_c > V_{u.hor} \\ \text{"Rebar Required for Strength"} \quad \text{otherwise} \end{vmatrix} = \text{"Only Minimum Rebar Required"}$$

Design of shear reinforcement per Section 11.10.9 of Ref. 3.1.9:

$s_{max} := \min\left(\frac{l_w}{5}, 3 \cdot t_w, 18in\right) = 18.0 \cdot in$

Maximum spacing of horizontal shear reinforcement per Section 11.10.9.3 of Ref. 3.1.9

$s := s_{IP.h} = 12.0 \cdot in$

Spacing of horizontal shear reinforcement

$A_{v.min} := 0.0025 t_w \cdot s_{IP.h} = 1.44 \cdot in^2$

Minimum area of in-plane shear steel required per Sections 11.10.9.1 and 11.10.9.2 of Ref. 3.1.9; note that the minimum shear reinforcement per Section 11.10.9.2 governs over those in Sections 7.12.2.1 and 14.3.3.

$A_{v.req.iph} := A_{v.min} = 1.44 \cdot in^2$

Required area of horizontal in-plane shear reinforcement

In-Plane Shear Design - Vertical

$N_{u.vert} = -47.9 \cdot kip$

Factored axial force on wall (horizontal); positive = compression, negative = tension

$V_{u.vert} = 162.5 \cdot kip$

Factored shear force in wall

$d := 0.8 \cdot h_w = 11.9\,ft$

Depth per Section 11.10.4 of Ref. 3.1.9

Check shear strength limit for existing wall geometry:

$$\phi V_{n.max} := \phi_v \cdot 10 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 3624.1 \cdot kip$$

Nominal shear strength limit per Ref. 3.1.9, Section 11.10.3

$$Check\_Limit := \left| \begin{array}{ll} \text{"OK"} & \text{if } V_{u.vert} < \phi V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{array} \right. = \text{"OK"}$$

Calculation of concrete shear strength per Section 11.10.5 of Ref. 3.1.9:

$$V_c := \left| \begin{array}{ll} \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.vert}}{500 t_w \cdot l_w}\right) \cdot \sqrt{\frac{f'_c}{psi}} t_w \cdot d\right] & \text{if } N_{u.vert} < 0 \\ 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi & \text{otherwise} \end{array} \right. = 954.9 \cdot kip$$

$$Check := \left| \begin{array}{ll} \text{"Only Minimum Rebar Required"} & \text{if } \phi_v \cdot V_c > V_{u.vert} \\ \text{"Rebar Required for Strength"} & \text{otherwise} \end{array} \right. = \text{"Only Minimum Rebar Required"}$$

Design of shear reinforcement per Section 11.10.9 of Ref. 3.1.9:

$$s_{max} := \min\left(\frac{l_w}{5}, 3 \cdot t_w, 18in\right) = 18.0 \cdot in$$

Maximum spacing of vertical shear reinforcement per Section 11.10.9.3 of Ref. 3.1.9

$$s_{IP.v} = 12.0 \cdot in$$

Spacing of vertical shear reinforcement

$$A_{v.min1} := 0.0025t_w \cdot s_{IP.v} = 1.44 \cdot in^2$$

Minimum area of in-plane shear steel required per Sections 11.10.9.1 and 11.10.9.2 of Ref. 3.1.9; note that the minimum shear reinforcement per Section 11.10.9.2 governs over those in Sections 7.12.2.1 and 14.3.3.

$$\rho_t := \frac{A_{v.req.iph}}{b_w \cdot t_w} = 0.00250$$

Minimum ratio of horizontal shear reinforcement to gross concrete area of vertical section

$$\rho_l := 0.0025 + 0.5 \cdot \left(2.5 - \frac{h_w}{l_w}\right) \cdot \left(\rho_t - 0.0025\right) = 0.00250$$

Minimum ratio of vertical shear reinforcement area to gross concrete area of horizontal section per Section 11.10.9.4 of Ref. 3.1.9

$$A_{v.min2} := \rho_l \cdot b_w \cdot t_w = 1.44 \cdot in^2$$

Minimum area of steel per Section 11.10.9.4 of Ref. 3.1.9

$$A_{v.req.ipv} := \max\left(A_{v.min1}, A_{v.min2}\right) = 1.44 \cdot in^2$$

Required area of vertical in-plane shear reinforcement

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = 2.8 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.hor} = 1.4 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 43.4 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 576.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 73.8 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.03$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -44.0 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.vert} = 20.9 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 44.8 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 576.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 64.4 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.43$$

Table of Contents

W.1 Introduction

This attachment details the reinforced concrete section design for Group 2103, which represents the Irradiation Cell Slab of the SHINE Facility. The group is located entirely below grade and contains elements of uniform 6-ft. thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

W.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 427 shell elements comprising the group, Element 1328 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 7, column 56.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Slab Length (X)	148′-0″
Slab Length (Y)	18′-0″
Slab Thickness	6′-0″
Concrete Clear Cover	2½″
Number of Shell Elements	427

Figure 1 – Plan view of Group 2103 indicating Element 1328 (North points to left of page).

W.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section W.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	1068 / 5101	-32.0	34.6
Horizontal	Bottom	1047 / 5101	24.5	34.6
Vertical	Top	3029 / 3021	-12.2	6.6
Vertical	Bottom	1100 / 1100	194	73.5

W.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section W.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	7	1130	Seismic	2806	3374
Vertical	56	5178	Non-Seismic	800	9.72

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	1164	43.3	72.3
Vertical	1164	14.0	16.5

W.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	1.56	1.56	#11 @ 12″ on center	1.56
	In-Plane Shear	0			
Vertical Longitudinal	Flexural	1.56	1.56	#11 @ 12″ on center	1.56
	In-Plane Shear	0			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

W.6 Flexural Reinforcement Design

Concrete slabs in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given slab is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E_c := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000\text{psi}$ — Steel yield strength

$E_s := 29000000\text{psi}$ — Steel elastic modulus

$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \left| \begin{array}{l} 0.65 \quad \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 \quad \text{if } 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} \quad \text{otherwise} \end{array} \right. = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0 \cdot \text{in}$ — Design strip width

$t_w = 72.0 \cdot \text{in}$ — Slab thickness

$c_c = 2.5 \cdot \text{in}$ — Concrete clear cover

$A_g := b_w \cdot t_w = 864.0 \cdot \text{in}^2$ — Gross concrete area

$D_{tie} = 0.50 \cdot \text{in}$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 1.560 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.410 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 68.3 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 12.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 1.56 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 1909.4 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 50.8 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ — Steel stress

$a := \beta_1 \cdot c = 40.6 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 1316.4 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 1842.4 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 1.72\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 1909.4\cdot\text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope}\cdot\left(\phi P_{n_1} - \phi P_{n_3}\right) = 821.6\cdot\text{kip}\cdot\text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 41.0\cdot\text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s\cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1\cdot c = 32.8\cdot\text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 1027.9\cdot\text{kip}$$

$$\phi M_{n_4} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 1934.1\cdot\text{kip}\cdot\text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 25.6\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\ psi$ Steel stress

$a := \beta_1\cdot c = 20.5\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 856.2\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)(a\cdot b_w) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 2245.2\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\ psi$ Steel stress

$$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.2\ ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 473.0\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.hor} \cdot f_y\right) = -168.5 \cdot kip$

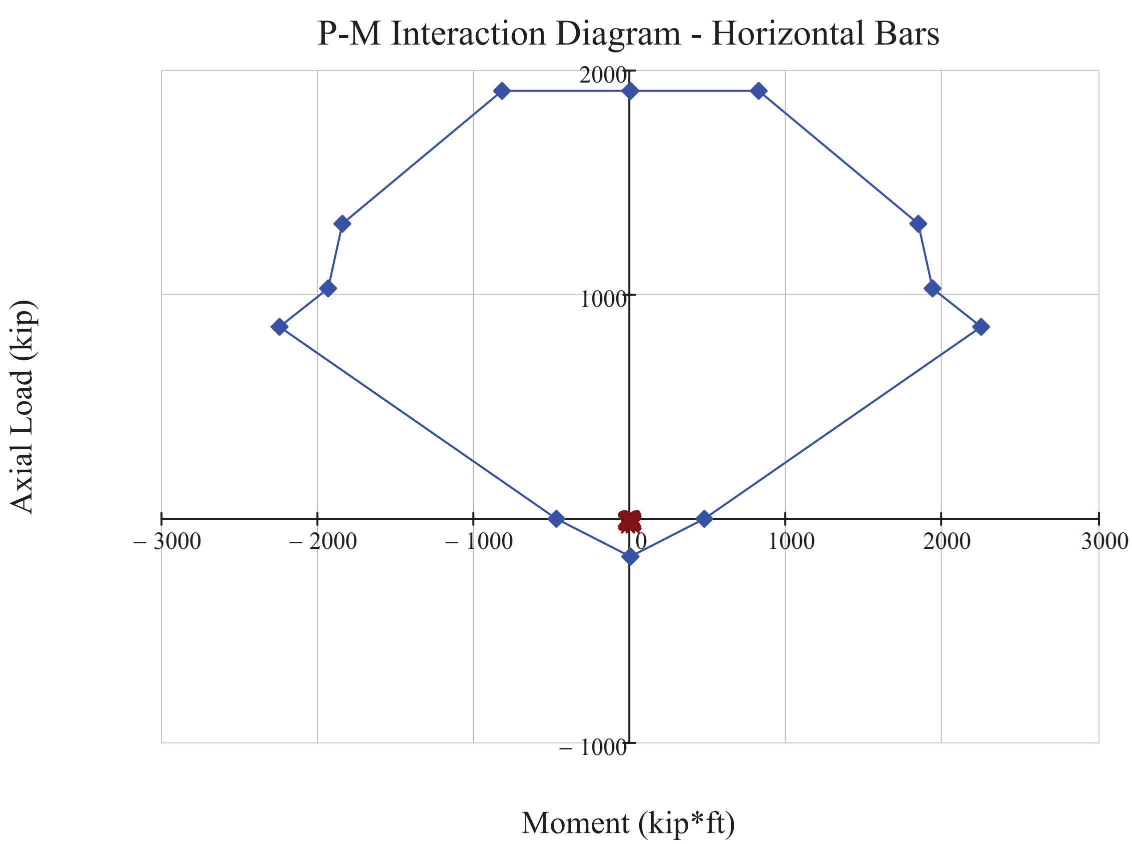
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 1909.4 \\ 1909.4 \\ 1316.4 \\ 1027.9 \\ 856.2 \\ 0.0 \\ -168.5 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 821.6 \\ 1842.4 \\ 1934.1 \\ 2245.2 \\ 473.0 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 1.560 \cdot in^2$	Area of reinforcement per bar
$D_{b.vert} = 1.410 \cdot in$	Diameter of vertical bar
$D_{b.hor} = 1.410 \cdot in$	Diameter of horizontal bar
$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 66.9 \cdot in$	Depth to centroid of vertical reinforcing steel
$s_{vert} = 12.0 \cdot in$	Spacing of vertical bars
$A_{s.vert} := A_{b.vert} \cdot \dfrac{b_w}{s_{vert}} = 1.56 \cdot in^2$	Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$	Strength reduction factor for axial compression
$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 1909.4 \cdot kip$	Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9
$\phi M_{n_1} := 0$	

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$	Steel strain
$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$	Strength reduction factor per Section 9.3.2 of Ref. 3.1.9
$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 49.7 \cdot in$	Neutral axis depth
$f_s := \varepsilon_s \cdot E_s = 30000\,psi$	Steel stress
$a := \beta_1 \cdot c = 39.8 \cdot in$	Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 1288.6 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 1848.6 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\dfrac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 1.68\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 1909.4\cdot\text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope}\cdot\left(\phi P_{n_1} - \phi P_{n_3}\right) = 803.5\cdot\text{kip}\cdot\text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\dfrac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 40.1\cdot\text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s\cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1\cdot c = 32.1\cdot\text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 1005.5\cdot\text{kip}$$

$$\phi M_{n_4} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 1920.5\cdot\text{kip}\cdot\text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 25.1\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \beta_1\cdot c = 20.1\cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 836.8\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 2209.8\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ — Steel stress

$$a := \frac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.2\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 463.1\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2 A_{s.vert} \cdot f_y\right) = -168.5 \cdot kip$

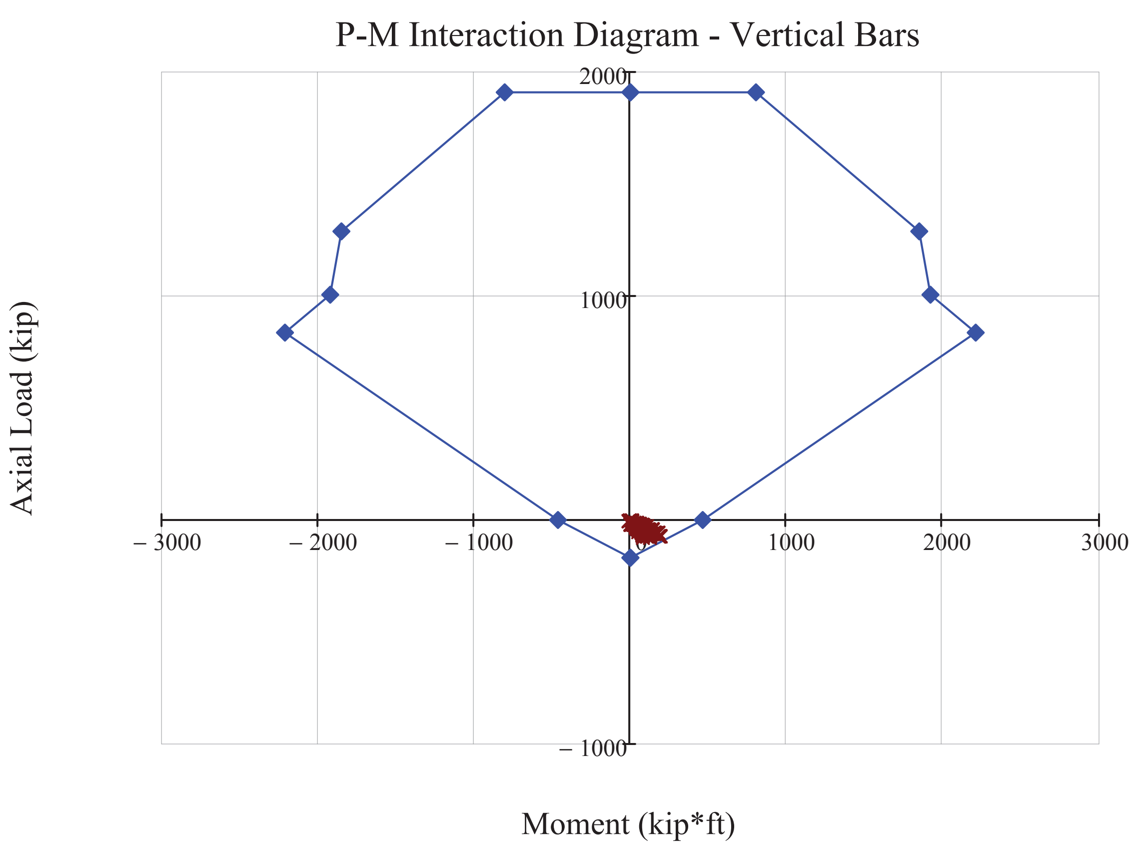
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 1909.4 \\ 1909.4 \\ 1288.6 \\ 1005.5 \\ 836.8 \\ 0.0 \\ -168.5 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 803.5 \\ 1848.6 \\ 1920.5 \\ 2209.8 \\ 463.1 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 3.12 \cdot in^2$

Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 3.12 \cdot in^2$

Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 0.00 \cdot in^2$

Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 0.00 \cdot in^2$

Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 3.1 \cdot in^2$

Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 3.1 \cdot in^2$

Total area of vertical steel required

$A_{min} := 2 \cdot 0.0018 A_g = 3.11 \cdot in^2$

Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$$Check\_H := \left| \begin{array}{ll} \text{"OK"} & \text{if } A_{s.H} > A_{min} \\ \text{"No Good"} & \text{otherwise} \end{array} \right. = \text{"OK"}$$

$$Check\_V := \left| \begin{array}{ll} \text{"OK"} & \text{if } A_{s.V} > A_{min} \\ \text{"No Good"} & \text{otherwise} \end{array} \right. = \text{"OK"}$$

W.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for horizontal in-plane shear considers seismic effects; therefore, horizontal in-plane shear design follows the provisions of Chapter 21 of ACI 349-06 (Ref. 3.1.9). The governing load case for vertical in-plane shear, however, does not consider seismic effects; therefore, vertical in-plane shear design follows the design procedure in ACI 349-06 (Ref. 3.1.9) Sections 11.10.2 through 11.10.9, modified for slab applications. Out-of-plane shear design, which is unaffected by load case type, follows the provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000psi$ Steel yield strength

$f'_c := 5000psi$ Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi = 4030509\ psi$ Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi = 530.3\ psi$ Concrete modulus of rupture

$t_w = 72.0 \cdot in$ Slab thickness

$l_w = 148.0\ ft$ Slab length (X, local 1 direction)

$h_w = 18.0\ ft$ Slab length (Y, local 2 direction)

$\phi_v := 0.75$ Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$V_{u.hor} = 2806.0\cdot kip$ — Factored shear force in slab

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.h} = 1.0\,ft$ — Spacing of horizontal shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Height of element above section cut; in this case, consider 12-in. design section

$A_{cv} := l_w \cdot t_w = 888.0\cdot ft^2$ — Gross concrete area bounded by slab thickness and slab length

$$A_{v.req} := \frac{t_w \cdot h_e}{f_y}\cdot\left(\frac{V_{u.hor}}{\phi_v \cdot A_{cv}} - 2\cdot\sqrt{\frac{f'_c}{psi}}\cdot psi\right) = -1.62\cdot in^2$$

Area of reinforcement required for strength

$A_{v.req.iph} := \max\left(A_{v.req}, 0\right) = 0.00\cdot in^2$ — Required area of in-plane horizontal shear reinforcement

$$V_{n.max} := 8\cdot A_{cv}\cdot\sqrt{\frac{f'_c}{psi}}psi = 72335\cdot kip$$

Maximum nominal shear strength per Section 21.9.7.3 of Ref. 3.1.9

$$Check\_Vn := \begin{cases} \text{"OK"} & \text{if } V_{u.hor} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

In-Plane Shear Design - Vertical

$V_{u.vert} = 800.0 \cdot kip$

Factored shear force in slab

$d := 0.8 \cdot h_w = 14.4\,ft$

Depth per Section 11.10.4 of Ref. 3.1.9

Check shear strength limit for existing slab geometry:

$\phi V_{n.max} := \phi_v \cdot 10 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 6598.2 \cdot kip$

Nominal shear strength limit per Ref. 3.1.9, Sections 11.5.7.9 and 11.3.1.1

$$\text{Check\_Limit} := \left| \begin{array}{l} \text{"OK"} \quad \text{if } V_{u.hor} < \phi V_{n.max} \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

Calculation of concrete shear strength per Section 11.3.1.1 of Ref. 3.1.9:

$V_c := 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 1759.5 \cdot kip$

$$\text{Check} := \left| \begin{array}{l} \text{"OK - No Rebar Required"} \quad \text{if } \phi_v \cdot V_c > V_{u.vert} \\ \text{"Rebar Required for Strength"} \quad \text{otherwise} \end{array} \right. = \text{"OK - No Rebar Required"}$$

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = -72.3 \cdot kip$ — Factored axial force per 12-in. strip of slab; positive = compression, negative = tension

$V_{u.oop.hor} = 43.3 \cdot kip$ — Factored shear per 12-in. strip of slab

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 66.9 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 864.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 94.5 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.61$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -16.5 \cdot kip$ — Factored axial force per 12-in. strip of slab; positive = compression, negative = tension

$V_{u.oop.vert} = 14.0 \cdot kip$ — Factored shear per 12-in. strip of slab

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5 D_{b.hor} = 68.3 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 864.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500 A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 111.5 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.17$$

Table of Contents

X.1 Introduction

This attachment details the reinforced concrete section design for Group 2201, which represents one of the Below Grade Tank Room Walls of the SHINE Facility. The group is entirely below grade and contains elements of uniform 3-ft. thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

X.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 115 shell elements comprising the group, Element 4452 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 1, column 1.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Wall Height	19′-0″
Wall Length	51′-0″
Wall Thickness	3′-0″
Concrete Clear Cover	2½″
Number of Shell Elements	115

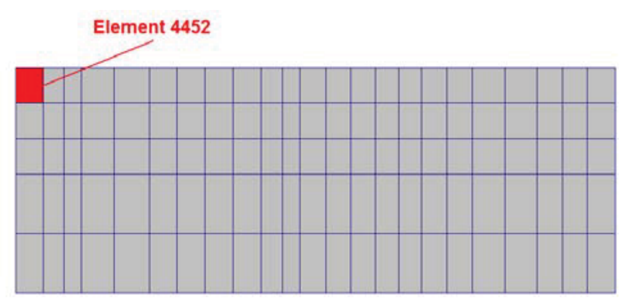


Figure 1 – Elevation view of Group 2201 indicating Element 4452, looking East.

X.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section X.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	3015 / 1009	-11.6	31.7
Horizontal	Bottom	1034 / 1034	44.7	38.6
Vertical	Top	1033 / 1033	-66.1	36.7
Vertical	Bottom	3016 / 1034	126	14.6

X.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section X.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	1	5359	Non-Seismic	672	-635
Vertical	1	1062	Seismic	408	33.9

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	1033	24.1	36.7
Vertical	1034	21.0	38.6

X.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	1.00	1.54	#11 @ 12″ on center	1.56
	In-Plane Shear	0.54			
Vertical Longitudinal	Flexural	1.00	1.54	#11 @ 12″ on center	1.56
	In-Plane Shear	0.54			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

X.6 Flexural Reinforcement Design

Concrete walls in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given wall is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E_c := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000\text{psi}$ — Steel yield strength

$E_s := 29000000\text{psi}$ — Steel elastic modulus

$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \left| \begin{array}{l} 0.65 \ \text{ if } \ 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 \ \text{ if } \ 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} \ \text{ otherwise} \end{array} \right. = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0 \cdot \text{in}$ — Design strip width

$h_w = 19.0\ \text{ft}$ — Wall height

$l_w = 51.0\ \text{ft}$ — Wall length

$t_w = 36.0 \cdot \text{in}$ — Wall thickness

$c_c = 2.5 \cdot \text{in}$ — Concrete clear cover

$A_g := b_w \cdot t_w = 432.0 \cdot \text{in}^2$ — Gross concrete area

$D_{tie} = 0.50 \cdot \text{in}$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 1.000 \cdot in^2$	Area of reinforcement per bar
$D_{b.hor} = 1.128 \cdot in$	Diameter of horizontal bar
$d_h := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 32.4 \cdot in$	Depth to centroid of horizontal reinforcing steel
$s_{hor} = 12.0 \cdot in$	Spacing of horizontal bars
$A_{s.hor} := A_{b.hor} \cdot \frac{b_w}{s_{hor}} = 1.00 \cdot in^2$	Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$	Strength reduction factor for axial compression
$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 954.7 \cdot kip$	Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9
$\phi M_{n_1} := 0$	

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$	Steel strain
$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$	Strength reduction factor per Section 9.3.2 of Ref. 3.1.9
$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 24.1 \cdot in$	Neutral axis depth
$f_s := \varepsilon_s \cdot E_s = 30000\,psi$	Steel stress
$a := \beta_1 \cdot c = 19.3 \cdot in$	Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 620.1 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 468.7 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\mathrm{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.82\,\mathrm{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 954.7 \cdot \mathrm{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \mathrm{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 195.1 \cdot \mathrm{kip} \cdot \mathrm{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 19.5 \cdot \mathrm{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\mathrm{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 15.6 \cdot \mathrm{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 478.4 \cdot \mathrm{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 484.7 \cdot \mathrm{kip} \cdot \mathrm{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 12.2 \cdot in$ Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1 \cdot c = 9.7 \cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 392.6 \cdot kip$$

$$\phi M_{n_5} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 553.8 \cdot kip \cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$a := \frac{A_{s.hor} \cdot f_y}{0.85 \cdot f'_c \cdot b_w} = 0.1\,ft$ Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 0.0 \cdot kip$$

$$\phi M_{n_6} := \phi \cdot A_{s.hor} \cdot f_y \cdot \left(d_h - \frac{a}{2}\right) = 143.3 \cdot kip \cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.hor} \cdot f_y\right) = -108.0 \cdot kip$

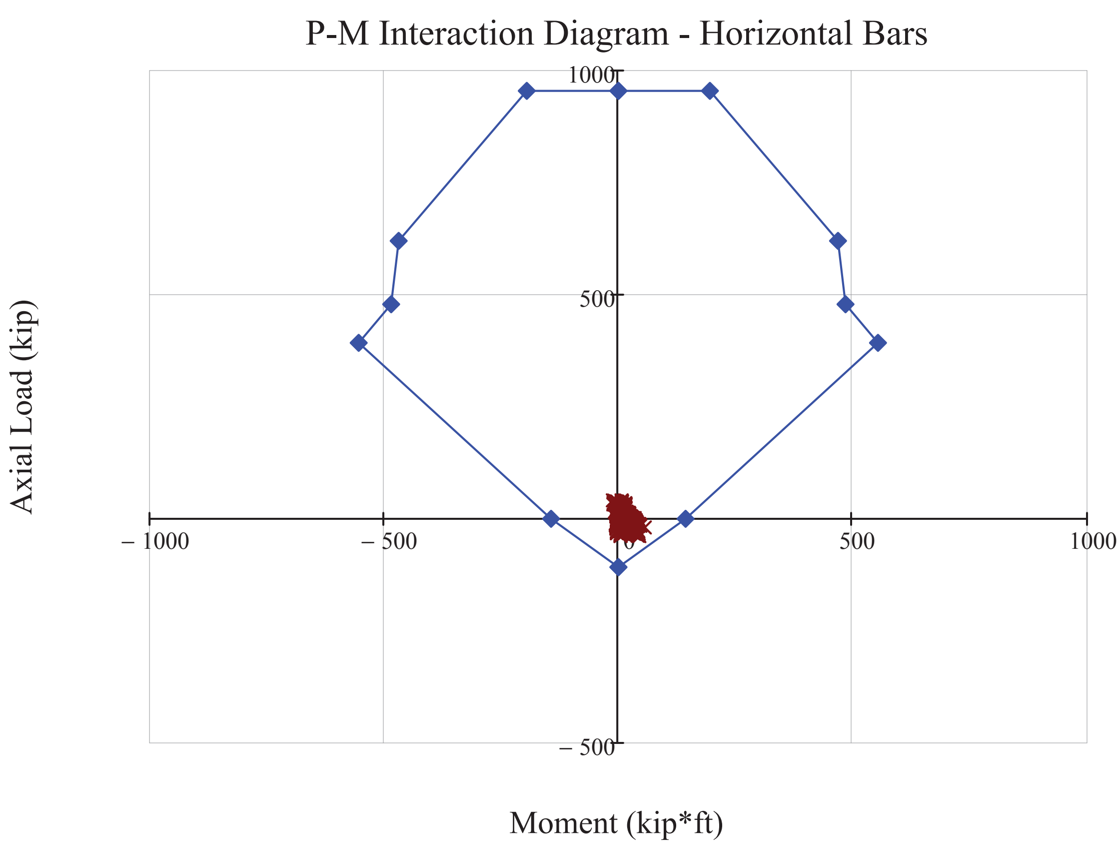
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 954.7 \\ 954.7 \\ 620.1 \\ 478.4 \\ 392.6 \\ 0.0 \\ -108.0 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 195.1 \\ 468.7 \\ 484.7 \\ 553.8 \\ 143.3 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 1.000 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.128 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.128 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5 D_{b.vert} = 31.3 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 12.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \dfrac{b_w}{s_{vert}} = 1.00 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 954.7 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 23.3 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 18.6 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 597.9 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 468.6 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$Slope := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.79\,ft$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 954.7 \cdot kip$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - Slope \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 187.8 \cdot kip \cdot ft$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 18.8 \cdot in$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,psi$$

Steel stress

$$a := \beta_1 \cdot c = 15.0 \cdot in$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 460.5 \cdot kip$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 477.1 \cdot kip \cdot ft$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 11.7 \cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 9.4 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 377.1 \cdot kip$$

$$\phi M_{n_5} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 537.8 \cdot kip \cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ — Steel stress

$$a := \frac{A_{s.vert} \cdot f_y}{0.85 \cdot f'_c \cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 0.0 \cdot kip$$

$$\phi M_{n_6} := \phi \cdot A_{s.vert} \cdot f_y \cdot \left(d_v - \frac{a}{2}\right) = 138.2 \cdot kip \cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.vert} \cdot f_y\right) = -108.0 \cdot kip$

Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Check Slenderness Effects

$k = 0.65$

Effective length factor, assuming a fixed-fixed end condition

$l_u := h_w = 19.0\,ft$

Unbraced height of wall

$I_g := \frac{1}{12} \cdot l_w \cdot t_w^{\,3} = 114.7\,ft^{4.0}$

Moment of inertia of wall

$r := \max\left(\sqrt{\frac{I_g}{l_w \cdot t_w}}, 0.3 \cdot t_w\right) = 10.8 \cdot in$

Radius of gyration of wall per Section 10.11.2 of Ref. 3.1.9

$C_m := \begin{cases} 0 & \text{if } \frac{k \cdot l_u}{r} \le 22 \\ 1.0 & \text{otherwise} \end{cases} = 0.0$

Slenderness check per Eq. 10-7 of Ref. 3.1.9, conservatively taking M1/M2 equal to 1.0
- if slender, Cm is conservatively taken as 1
- if non-slender, Cm is taken as 0

$\beta_d := 1$

Ratio of maximum sustained axial load to maximum axial load per Ch. 10 of Ref. 3.1.9; conservatively taken as 1.0

$EI := \frac{0.4 \cdot E_c \cdot I_g}{1 + \beta_d} = 13320025 \cdot kip \cdot ft^2$

Equation 10-12 of Ref. 3.1.9

$P_c := \frac{\pi^2 \cdot EI}{\left(k \cdot l_u\right)^2} = 861928 \cdot kip$

Critical buckling load for wall; Equation 10-10 of Ref. 3.1.9

$P_u = 2643.7 \cdot kip$

Total factored axial load on wall

$\delta_{ns} := \max\left(1.0, \frac{C_m}{1 - \frac{P_u}{0.75 P_c}}\right) = 1.00$

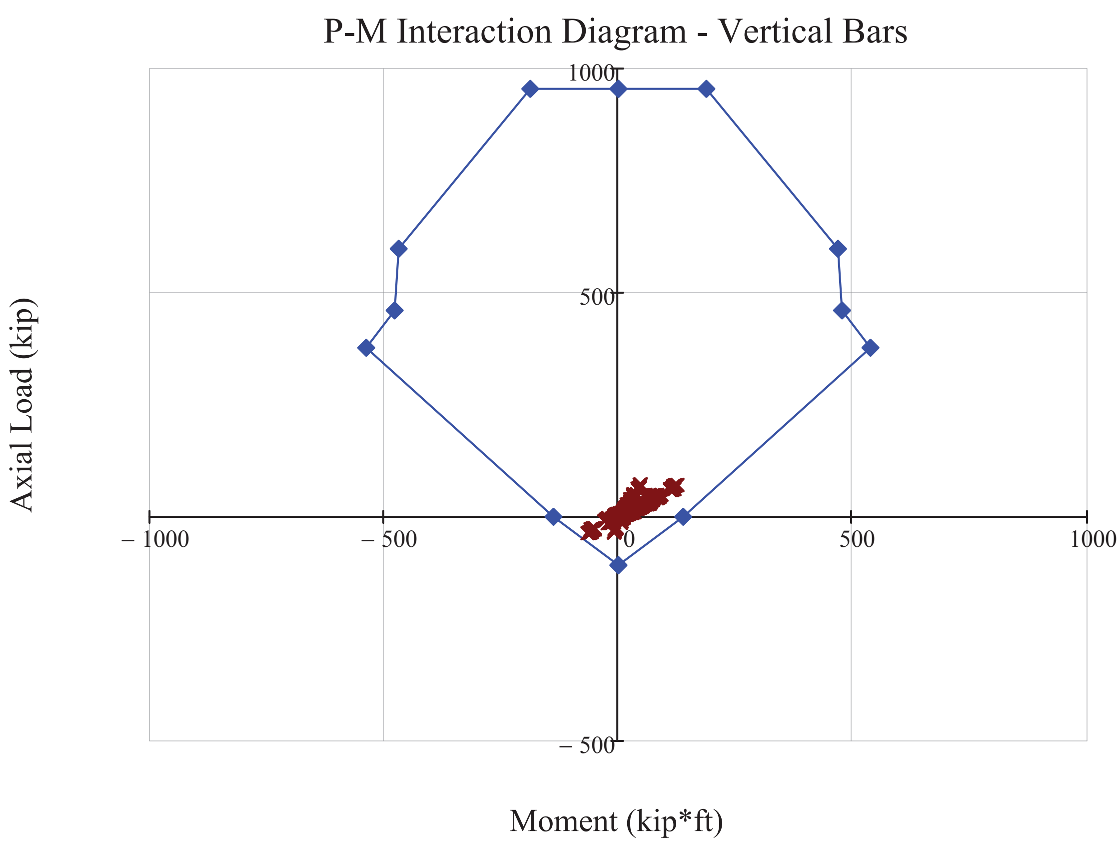
Moment magnification factor per Eq. 10-9 of Ref. 3.1.9; *Note: if wall is non-slender as determined by the kl/r check above, this factor will automatically default to 1.0*

Note: when plotted on the P-M diagram below, the moments for all load points are magnified by the moment magnification factor determined above to account for slenderness effects, if any.

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 954.7 \\ 954.7 \\ 597.9 \\ 460.5 \\ 377.1 \\ 0.0 \\ -108.0 \end{pmatrix} \cdot \text{kip} \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 187.8 \\ 468.6 \\ 477.1 \\ 537.8 \\ 138.2 \\ 0.0 \end{pmatrix} \text{ft} \cdot \text{kip}$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 2.00 \cdot in^2$ — Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 2.00 \cdot in^2$ — Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 1.08 \cdot in^2$ — Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 1.08 \cdot in^2$ — Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 3.1 \cdot in^2$ — Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 3.1 \cdot in^2$ — Total area of vertical steel required

$A_{min1} := 2 \cdot 0.0018 A_g = 1.56 \cdot in^2$ — Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$A_{min2.h} := 0.0025 A_g = 1.08 \cdot in^2$ — Minimum horizontal reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.3 (b) of Ref. 3.1.9

$A_{min2.v} := 0.0015 A_g = 0.65 \cdot in^2$ — Minimum vertical reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.2 (b) of Ref. 3.1.9

$A_{min3} := 0.0025 A_g = 1.08 \cdot in^2$ — Minimum vertical and horizontal reinforcement for seismic cases if Vu > Acv/fc per Section 21.7.2.1 of Ref. 3.1.9

$$\text{Check\_H} := \begin{cases} \text{"OK"} & \text{if } A_{s.H} > \max(A_{min1}, A_{min2.h}, A_{min3}) \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

$$\text{Check\_V} := \begin{cases} \text{"OK"} & \text{if } A_{s.V} > \max(A_{min1}, A_{min2.v}, A_{min3}) \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

X.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for in-plane horizontal shear does not consider seismic effects; therefore, in-plane horizontal shear design follows provisions of ACI 349-06 (Ref. 3.1.9) Sections 11.10.2 through 11.10.9. The governing load case for in-plane vertical shear, however, does consider seismic effects; therefore, in-plane vertical shear design follows the provisions of Chapter 21 of ACI 349-06 (Ref. 3.1.9). Out-of-plane shear design, which is unaffected by load case type, follows provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000\text{psi}$ — Steel yield strength

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 530.3\ \text{psi}$ — Concrete modulus of rupture

$t_w = 36.0 \cdot \text{in}$ — Wall thickness

$l_w = 51.0\ \text{ft}$ — Wall length

$h_w = 19.0\ \text{ft}$ — Wall height

$\phi_v := 0.75$ — Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

$$\alpha_c := \begin{cases} 3.0 & \text{if } \frac{h_w}{l_w} < 1.5 \\ 2.0 & \text{if } \frac{h_w}{l_w} > 2.0 \\ 2.0 + \frac{(3.0 - 2.0)}{(1.5 - 2.0)} \cdot \left(\frac{h_w}{l_w} - 2.0\right) & \text{otherwise} \end{cases} = 3.0$$

Coefficient per Section 21.7.4.1 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$N_{u.hor} = 635.0 \cdot kip$

Factored axial force on wall (vertical); positive = compression, negative = tension

$V_{u.hor} = 672.0 \cdot kip$

Factored shear force in wall

$d := 0.8 \cdot l_w = 40.8\,ft$

Depth per Section 11.10.4 of Ref. 3.1.9

Check shear strength limit for existing wall geometry:

$$\phi V_{n.max} := \phi_v \cdot 10 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 9347.4 \cdot kip$$

Nominal shear strength limit per Ref. 3.1.9, Section 11.10.3

$$Check\_Limit := \begin{vmatrix} \text{"OK"} & \text{if } V_{u.hor} < \phi V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{vmatrix} = \text{"OK"}$$

Calculation of concrete shear strength per Section 11.10.5 of Ref. 3.1.9:

$$V_c := \begin{vmatrix} \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.hor}}{500 t_w \cdot l_w}\right) \cdot \sqrt{\frac{f'_c}{psi}} t_w \cdot d\right] & \text{if } N_{u.hor} < 0 \\ 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi & \text{otherwise} \end{vmatrix} = 2492.6 \cdot kip$$

$$Check := \begin{vmatrix} \text{"Only Minimum Rebar Required"} & \text{if } \phi_v \cdot V_c > V_{u.hor} \\ \text{"Rebar Required for Strength"} & \text{otherwise} \end{vmatrix} = \text{"Only Minimum Rebar Required"}$$

Design of shear reinforcement per Section 11.10.9 of Ref. 3.1.9:

$s_{max} := \min\left(\frac{l_w}{5}, 3 \cdot t_w, 18in\right) = 18.0 \cdot in$

Maximum spacing of horizontal shear reinforcement per Section 11.10.9.3 of Ref. 3.1.9

$s := s_{IP.h} = 12.0 \cdot in$

Spacing of horizontal shear reinforcement

$A_{v.min} := 0.0025 t_w \cdot s_{IP.h} = 1.08 \cdot in^2$

Minimum area of in-plane shear steel required per Sections 11.10.9.1 and 11.10.9.2 of Ref. 3.1.9; note that the minimum shear reinforcement per Section 11.10.9.2 governs over those in Sections 7.12.2.1 and 14.3.3.

$A_{v.req.iph} := A_{v.min} = 1.08 \cdot in^2$

Required area of horizontal in-plane shear reinforcement

In-Plane Shear Design - Vertical

$V_{u.vert} = 408.0 \cdot kip$ — Factored shear force in wall

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.v} = 12.0 \cdot in$ — Spacing of vertical shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Length of element aside section cut; in this case, consider 12-in. design section

$A_{cv} := h_w \cdot t_w = 57.0 \cdot ft^2$ — Gross concrete area bounded by wall thickness and wall height

$$A_v := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.vert}}{\phi_v \cdot A_{cv}} - \alpha_c \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -1.05 \cdot in^2$$

Minimum area of reinforcement required for strength

$$A_{v.min} := \begin{cases} A_{v.req.iph} & \text{if } \frac{h_w}{l_w} < 2.0 \\ 0.0025 \cdot t_w \cdot s_{IP.v} & \text{otherwise} \end{cases} = 1.08 \cdot in^2$$

Minimum area of reinforcement required per Sections 21.7.2.1 and 21.7.4.3 of Ref. 3.1.9

$$A_{v.req.ipv} := \max\left(A_{v.min}, A_v\right) = 1.08 \cdot in^2$$

Required area of vertical in-plane shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 4643 \cdot kip$$

Maximum nominal shear strength per Section 21.7.4.4 of Ref. 3.1.9

$$Check\_Vn := \begin{cases} \text{"OK"} & \text{if } V_{u.vert} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = -36.7 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.hor} = 24.1 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 31.3 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 432.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 44.1 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.73$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -38.6 \cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.vert} = 21.0 \cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 32.4 \cdot in$ — Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 432.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 45.2 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.62$$

Table of Contents

Y.1 Introduction

This attachment details the reinforced concrete section design for Group 2205, which represents on of the Below Grade Tank Room Walls of the SHINE Facility. The group is entirely below grade and contains elements of uniform 3-ft. thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

Y.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 35 shell elements comprising the group, Element 3898 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 2, column 6.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Wall Height	19′-0″
Wall Length	16′-6″
Wall Thickness	3′-0″
Concrete Clear Cover	2½″
Number of Shell Elements	35

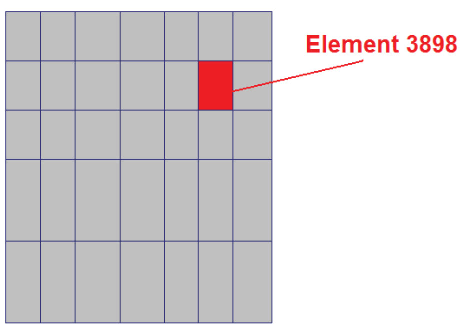


Figure 1 – Elevation view of Group 2205 indicating Element 3898, looking East.

Y.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section Y.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	5101 / 5101	-24.7	76.8
Horizontal	Bottom	5101 / 5101	14.0	76.8
Vertical	Top	5267 / 5186	-6.62	23.5
Vertical	Bottom	5101 / 5101	35.2	31.4

Y.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section Y.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	2	5125	Non-Seismic	655	-29.3
Vertical	6	5101	Non-Seismic	984	584

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	5149	15.9	19.6
Vertical	5101	18.2	76.8

Y.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	1.00	1.54	#11 @ 12″ on center	1.56
	In-Plane Shear	0.54			
Vertical Longitudinal	Flexural	1.00	1.54	#11 @ 12″ on center	1.56
	In-Plane Shear	0.54			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

Y.6 Flexural Reinforcement Design

Concrete walls in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given wall is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000psi$	Concrete compressive strength
$E_c := 57000\cdot\sqrt{\frac{f'_c}{psi}}\cdot psi = 4030509\ psi$	Concrete elastic modulus
$\varepsilon_{cu} := 0.003$	Ultimate concrete strain
$f_y := 60000psi$	Steel yield strength
$E_s := 29000000psi$	Steel elastic modulus
$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$	Steel yield strain
$\beta_1 := \begin{cases} 0.65 & \text{if } 1.05 - \frac{f'_c}{20ksi} < 0.65 \\ 0.85 & \text{if } 1.05 - \frac{f'_c}{20ksi} > 0.85 \\ 1.05 - \frac{f'_c}{20ksi} & \text{otherwise} \end{cases} = 0.80$	Factor per Section 10.2.7.3 of Ref. 3.1.9
$b_w = 12.0\cdot in$	Design strip width
$h_w = 19.0\ ft$	Wall height
$l_w = 16.5\ ft$	Wall length
$t_w = 36.0\cdot in$	Wall thickness
$c_c = 2.5\cdot in$	Concrete clear cover
$A_g := b_w\cdot t_w = 432.0\cdot in^2$	Gross concrete area
$D_{tie} = 0.50\cdot in$	Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 1.000 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.128 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 32.4 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 12.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \dfrac{b_w}{s_{hor}} = 1.00 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 954.7 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \left| \begin{array}{l} 0.65 \ \text{ if } \ \varepsilon_s < 0.002 \\ 0.9 \ \text{ if } \ \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] \ \text{ otherwise} \end{array} \right. = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 24.1 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 19.3 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 620.1 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 468.7 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.82\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 954.7 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 195.1 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{array}{|l} 0.65 \text{ if } \varepsilon_s < 0.002 \\ 0.9 \text{ if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] \text{ otherwise} \end{array} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 19.5 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 15.6 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 478.4 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 484.7 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 12.2\cdot in$ Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1\cdot c = 9.7\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 392.6\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 553.8\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$ Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 143.3\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.hor} \cdot f_y\right) = -108.0 \cdot kip$

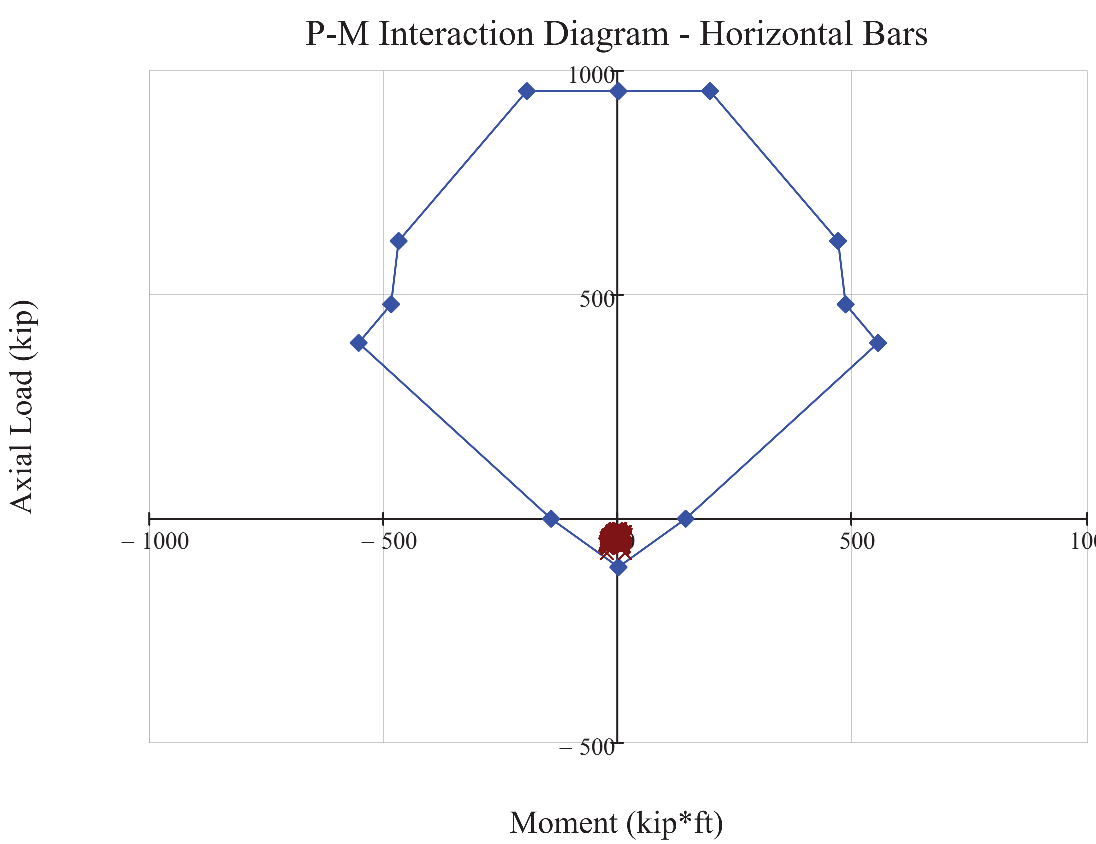
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 954.7 \\ 954.7 \\ 620.1 \\ 478.4 \\ 392.6 \\ 0.0 \\ -108.0 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 195.1 \\ 468.7 \\ 484.7 \\ 553.8 \\ 143.3 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 1.000 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.128 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.128 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 31.3 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 12.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \dfrac{b_w}{s_{vert}} = 1.00 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot (0.85 \cdot f'_c \cdot A_g) = 954.7 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 23.3 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 18.6 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot (0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s) = 597.9 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)(a \cdot b_w) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 468.6 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.79\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 954.7\cdot\text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope}\cdot\left(\phi P_{n_1} - \phi P_{n_3}\right) = 187.8\cdot\text{kip}\cdot\text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 18.8\cdot\text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s\cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1\cdot c = 15.0\cdot\text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 460.5\cdot\text{kip}$$

$$\phi M_{n_4} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 477.1\cdot\text{kip}\cdot\text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_v = 11.7\cdot in$ Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1\cdot c = 9.4\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 377.1\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)(a\cdot b_w) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 537.8\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$a := \dfrac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$ Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 138.2\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.vert} \cdot f_y\right) = -108.0 \cdot kip$ — Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Check Slenderness Effects

$k = 0.65$ — Effective length factor, assuming a fixed-fixed end condition

$l_u := h_w = 19.0\,ft$ — Unbraced height of wall

$I_g := \frac{1}{12} \cdot l_w \cdot t_w^{\ 3} = 37.1\,ft^{4.0}$ — Moment of inertia of wall

$r := \max\left(\sqrt{\frac{I_g}{l_w \cdot t_w}}, 0.3 \cdot t_w\right) = 10.8 \cdot in$ — Radius of gyration of wall per Section 10.11.2 of Ref. 3.1.9

$$C_m := \begin{cases} 0 & \text{if } \frac{k \cdot l_u}{r} \le 22 \\ 1.0 & \text{otherwise} \end{cases} = 0.0$$

Slenderness check per Eq. 10-7 of Ref. 3.1.9, conservatively taking M1/M2 equal to 1.0
- if slender, Cm is conservatively taken as 1
- if non-slender, Cm is taken as 0

$\beta_d := 1$ — Ratio of maximum sustained axial load to maximum axial load per Ch. 10 of Ref. 3.1.9; conservatively taken as 1.0

$EI := \frac{0.4 \cdot E_c \cdot I_g}{1 + \beta_d} = 4309420 \cdot kip \cdot ft^2$ — Equation 10-12 of Ref. 3.1.9

$P_c := \frac{\pi^2 \cdot EI}{\left(k \cdot l_u\right)^2} = 278859 \cdot kip$ — Critical buckling load for wall; Equation 10-10 of Ref. 3.1.9

$P_u = 12.3 \cdot kip$ — Total factored axial load on wall

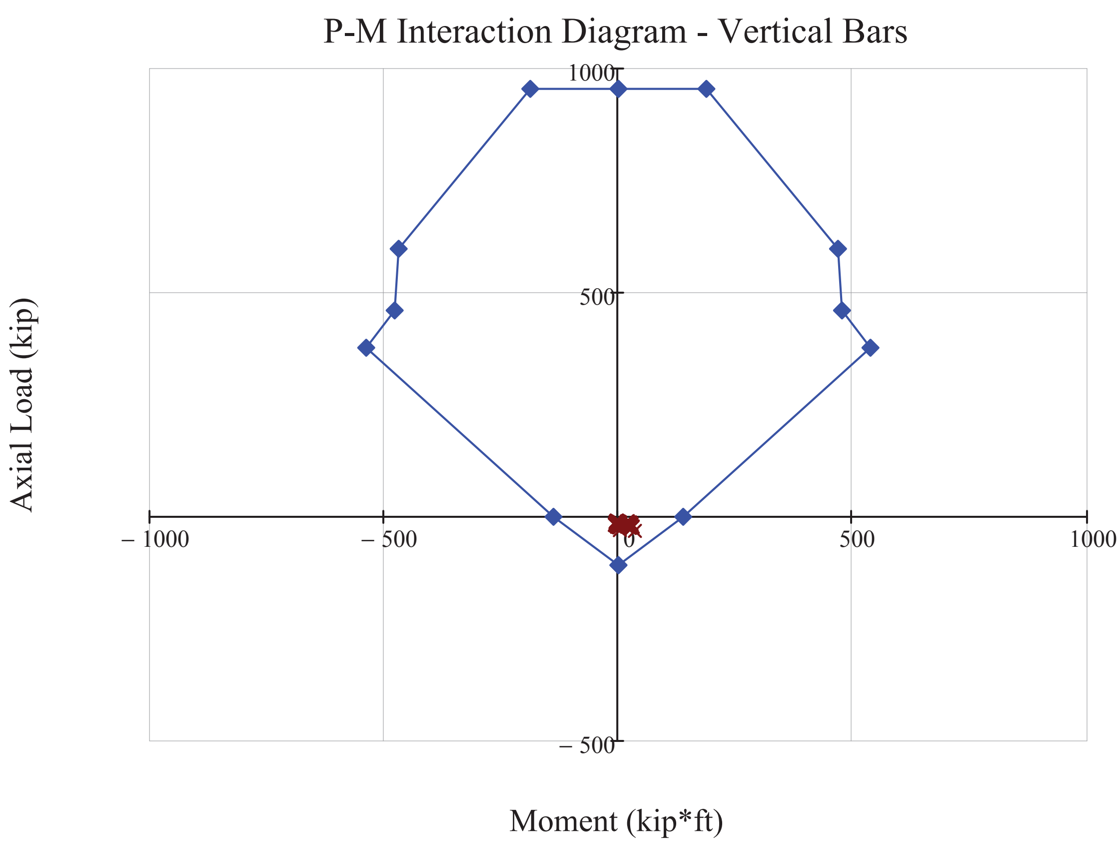
$\delta_{ns} := \max\left(1.0, \frac{C_m}{1 - \frac{P_u}{0.75P_c}}\right) = 1.00$ — Moment magnification factor per Eq. 10-9 of Ref. 3.1.9; *Note: if wall is non-slender as determined by the kl/r check above, this factor will automatically default to 1.0*

Note: when plotted on the P-M diagram below, the moments for all load points are magnified by the moment magnification factor determined above to account for slenderness effects, if any.

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 954.7 \\ 954.7 \\ 597.9 \\ 460.5 \\ 377.1 \\ 0.0 \\ -108.0 \end{pmatrix} \cdot \text{kip} \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 187.8 \\ 468.6 \\ 477.1 \\ 537.8 \\ 138.2 \\ 0.0 \end{pmatrix} \text{ft} \cdot \text{kip}$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 2.00 \cdot in^2$ — Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 2.00 \cdot in^2$ — Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 1.08 \cdot in^2$ — Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 1.08 \cdot in^2$ — Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 3.1 \cdot in^2$ — Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 3.1 \cdot in^2$ — Total area of vertical steel required

$A_{min1} := 2 \cdot 0.0018 A_g = 1.56 \cdot in^2$ — Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$A_{min2.h} := 0.0025 A_g = 1.08 \cdot in^2$ — Minimum horizontal reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.3 (b) of Ref. 3.1.9

$A_{min2.v} := 0.0015 A_g = 0.65 \cdot in^2$ — Minimum vertical reinforcement for bars larger than #5 for non-seismic cases per Section 14.3.2 (b) of Ref. 3.1.9

$A_{min3} := 0.0025 A_g = 1.08 \cdot in^2$ — Minimum vertical and horizontal reinforcement for seismic cases if Vu > Acv/fc per Section 21.7.2.1 of Ref. 3.1.9

$$\text{Check\_H} := \left| \begin{array}{ll} \text{"OK"} & \text{if } A_{s.H} > \max(A_{min1}, A_{min2.h}, A_{min3}) \\ \text{"No Good"} & \text{otherwise} \end{array} \right. = \text{"OK"}$$

$$\text{Check\_V} := \left| \begin{array}{ll} \text{"OK"} & \text{if } A_{s.V} > \max(A_{min1}, A_{min2.v}, A_{min3}) \\ \text{"No Good"} & \text{otherwise} \end{array} \right. = \text{"OK"}$$

Y.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for the given wall does not consider seismic effects; therefore, in-plane shear design follows provisions of ACI 349-06 (Ref. 3.1.9) Sections 11.10.2 through 11.10.9. Out-of-plane shear design, which is unaffected by load case type, follows provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000\text{psi}$ — Steel yield strength

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 530.3\ \text{psi}$ — Concrete modulus of rupture

$t_w = 36.0 \cdot \text{in}$ — Wall thickness

$l_w = 16.5\ \text{ft}$ — Wall length

$h_w = 19.0\ \text{ft}$ — Wall height

$\phi_v := 0.75$ — Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$N_{u.hor} = 29.3 \cdot kip$

Factored axial force on wall (vertical); positive = compression, negative = tension

$V_{u.hor} = 655.0 \cdot kip$

Factored shear force in wall

$d := 0.8 \cdot l_w = 13.2\,ft$

Depth per Section 11.10.4 of Ref. 3.1.9

Check shear strength limit for existing wall geometry:

$$\phi V_{n.max} := \phi_v \cdot 10 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 3024.2 \cdot kip$$

Nominal shear strength limit per Ref. 3.1.9, Section 11.10.3

$$Check\_Limit := \begin{cases} \text{"OK"} & \text{if } V_{u.hor} < \phi V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

Calculation of concrete shear strength per Section 11.10.5 of Ref. 3.1.9:

$$V_c := \begin{cases} \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.hor}}{500 t_w \cdot l_w}\right) \cdot \sqrt{\frac{f'_c}{psi}} t_w \cdot d\right] & \text{if } N_{u.hor} < 0 \\ 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi & \text{otherwise} \end{cases} = 806.4 \cdot kip$$

$$Check := \begin{cases} \text{"Only Minimum Rebar Required"} & \text{if } \phi_v \cdot V_c > V_{u.hor} \\ \text{"Rebar Required for Strength"} & \text{otherwise} \end{cases} = \text{"Rebar Required for Strength"}$$

Design of shear reinforcement per Section 11.10.9 of Ref. 3.1.9:

$$s_{max} := \min\left(\frac{l_w}{5}, 3 \cdot t_w, 18in\right) = 18.0 \cdot in$$

Maximum spacing of horizontal shear reinforcement per Section 11.10.9.3 of Ref. 3.1.9

$$s := s_{IP.h} = 12.0 \cdot in$$

Spacing of horizontal shear reinforcement

$$V_{s.req} := \frac{V_{u.hor}}{\phi_v} - V_c = 66.9 \cdot kip$$

Minimum steel shear strength

$$A_{v.min} := 0.0025 t_w \cdot s_{IP.h} = 1.08 \cdot in^2$$

Minimum area of in-plane shear steel required per Sections 11.10.9.1 and 11.10.9.2 of Ref. 3.1.9; note that the minimum shear reinforcement per Section 11.10.9.2 governs over those in Sections 7.12.2.1 and 14.3.3.

$$A_v := \frac{V_{s.req} \cdot s_{IP.h}}{d \cdot f_y} = 0.08 \cdot in^2$$

Minimum area of steel required for strength

$$A_{v.req.iph} := \max\left(A_{v.min}, A_v\right) = 1.08 \cdot in^2$$

Required area of horizontal in-plane shear reinforcement

In-Plane Shear Design - Vertical

$N_{u.vert} = -584.0 \cdot kip$ — Factored axial force on wall (horizontal); positive = compression, negative = tension

$V_{u.vert} = 984.0 \cdot kip$ — Factored shear force in wall

$d := 0.8 \cdot h_w = 15.2\,ft$ — Depth per Section 11.10.4 of Ref. 3.1.9

Check shear strength limit for existing wall geometry:

$$\phi V_{n.max} := \phi_v \cdot 10 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 3482.4 \cdot kip$$

Nominal shear strength limit per Ref. 3.1.9, Section 11.10.3

$$Check\_Limit := \begin{cases} \text{"OK"} & \text{if } V_{u.vert} < \phi V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

Calculation of concrete shear strength per Section 11.10.5 of Ref. 3.1.9:

$$V_c := \begin{cases} \max\left[0, 2 \cdot \left(1psi + \frac{N_{u.vert}}{500 t_w \cdot l_w}\right) \cdot \sqrt{\frac{f'_c}{psi}} t_w \cdot d\right] & \text{if } N_{u.vert} < 0 \\ 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi & \text{otherwise} \end{cases} = 776.5 \cdot kip$$

$$Check := \begin{cases} \text{"Only Minimum Rebar Required"} & \text{if } \phi_v \cdot V_c > V_{u.vert} \\ \text{"Rebar Required for Strength"} & \text{otherwise} \end{cases} = \text{"Rebar Required for Strength"}$$

Design of shear reinforcement per Section 11.10.9 of Ref. 3.1.9:

$s_{max} := \min\left(\frac{l_w}{5}, 3 \cdot t_w, 18in\right) = 18.0 \cdot in$

Maximum spacing of vertical shear reinforcement per Section 11.10.9.3 of Ref. 3.1.9

$s_{IP.v} = 12.0 \cdot in$

Spacing of vertical shear reinforcement

$V_{s.req} := \frac{V_{u.vert}}{\phi_v} - V_c = 535.5 \cdot kip$

Minimum steel shear strength

$A_{v.min1} := 0.0025 t_w \cdot s_{IP.v} = 1.08 \cdot in^2$

Minimum area of in-plane shear steel required per Sections 11.10.9.1 and 11.10.9.2 of Ref. 3.1.9; note that the minimum shear reinforcement per Section 11.10.9.2 governs over those in Sections 7.12.2.1 and 14.3.3.

$\rho_t := \frac{A_{v.req.iph}}{b_w \cdot t_w} = 0.00250$

Minimum ratio of horizontal shear reinforcement to gross concrete area of vertical section

$\rho_l := 0.0025 + 0.5 \cdot \left(2.5 - \frac{h_w}{l_w}\right) \cdot \left(\rho_t - 0.0025\right) = 0.00250$

Minimum ratio of vertical shear reinforcement area to gross concrete area of horizontal section per Section 11.10.9.4 of Ref. 3.1.9

$A_{v.min2} := \rho_l \cdot b_w \cdot t_w = 1.08 \cdot in^2$

Minimum area of steel per Section 11.10.9.4 of Ref. 3.1.9

$A_v := \frac{V_{s.req} \cdot s_{IP.v}}{d \cdot f_y} = 0.59 \cdot in^2$

Minimum area of steel required for strength

$A_{v.req.ipv} := \max\left(A_{v.min1}, A_{v.min2}, A_v\right) = 1.08 \cdot in^2$

Required area of vertical in-plane shear reinforcement

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = -19.6\cdot kip$ — Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.hor} = 15.9\cdot kip$ — Factored shear per 12-in. strip of wall

$b_w = 12.0\cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 31.3\cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w\cdot t_w = 432.0\cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2\cdot\sqrt{\dfrac{f'_c}{psi}}\cdot b_w\cdot d\cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2\cdot\left(1psi + \dfrac{N_{u.oop.hor}}{2000\cdot A_g}\right)\cdot\sqrt{\dfrac{f'_c}{psi}}\cdot b_w\cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2\cdot\left(1psi + \dfrac{N_{u.oop.hor}}{500A_g}\right)\cdot\sqrt{\dfrac{f'_c}{psi}}\cdot b_w\cdot d\right] & \text{otherwise} \end{cases} = 48.3\cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v\cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v\cdot V_c} = 0.44$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -76.8 \cdot kip$

Factored axial force per 12-in. strip of wall; positive = compression, negative = tension

$V_{u.oop.vert} = 18.2 \cdot kip$

Factored shear per 12-in. strip of wall

$b_w = 12.0 \cdot in$

Design strip width

$d := t_w - c_c - D_{tie} - 0.5 D_{b.hor} = 32.4 \cdot in$

Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 432.0 \cdot in^2$

Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500 A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 35.5 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.68$$

Table of Contents

Z.1 Introduction

This attachment details the reinforced concrete section design for Group 2102, which represents the Below Grade Tank Room Slab of the SHINE Facility. The group is entirely below grade and contains elements of uniform 3-ft. thickness. A representative element within the group is selected and is designed for the effects of axial loads, flexural loads, and shear loads per provisions of ACI 349-06 (Reference 3.1.9).

Z.2 Element Selection

Group geometry and model information are provided in Table 1. Of the 1207 shell elements comprising the group, Element 346 is selected as representative of a typical element based on its location and loading. The element is shown in Figure 1 and is located in row 30, column 7.

Table 1 – Group Geometry and SAP2000 Model Information

Property	Value
Slab Length (X)	138′-0″
Slab Length (X) at Element 346	51′-0″
Slab Length (Y)	100′-4″
Slab Thickness	3′-0″
Concrete Clear Cover	2½″
Number of Shell Elements	1207

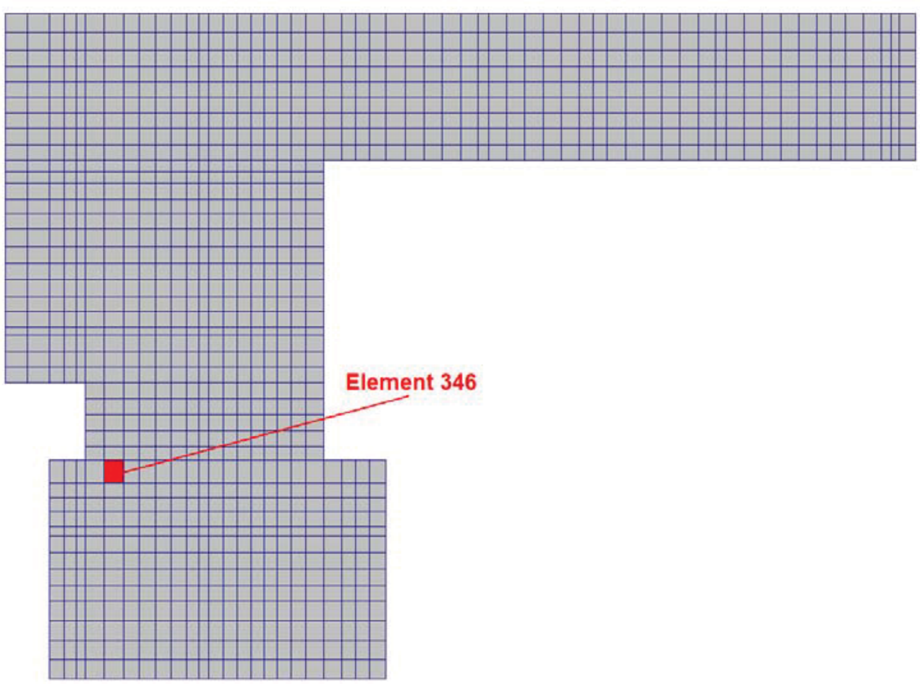


Figure 1 – Plan view of Group 2102 indicating Element 346 (North points to left of page).

Z.3 Axial and Flexural Design Methodology

This attachment first analyzes the selected element for combined axial and flexural effects. Two cases are considered: (1) design of a 12-in. wide concrete section with horizontal reinforcement and (2) design of a 12-in. wide concrete section with vertical reinforcement. The concrete sections for both cases extend through the wall or slab thickness. P-M diagrams for both cases are generated in Mathcad using user-specified reinforcement, and load points obtained from SAP2000 model data are superimposed on the diagrams (see subsequent pages for corresponding detailed design). The load points consider every load combination used in the SAP2000 analysis and are magnified to account for slenderness effects, where required. Reinforcement is increased until all load points fall within the P-M curve limits; this reinforcement is taken as the required area of steel for flexural loading. Results from the combined axial and flexural analyses are summarized in Section Z.5 of this attachment. For the selected element, governing load cases and corresponding axial and flexural forces are shown in Table 2.

Table 2 – Axial and Flexural Loading

Direction	Face	Governing Load Comb. (Flexural / Axial)	M_u	P_u (positive = tension)
(-)	(-)	(-)	(kip-ft/ft)	(kip/ft)
Horizontal	Top	1179 / 1123	-5.24	65.6
Horizontal	Bottom	3027 / 3027	15.9	65.8
Vertical	Top	3014 / 3006	-32.1	-80.1
Vertical	Bottom	1123 / 1171	78.7	34.9

Z.4 Shear Design Methodology

Following flexural design, this attachment analyzes the selected element for shear loading. Four scenarios are considered: (1) in-plane horizontal shear, (2) in-plane vertical shear, (3) out-of-plane (OOP) horizontal shear, and (4) OOP vertical shear. For each scenario, only the governing load combination is considered. Applicable loads are obtained from SAP2000 model data and are shown in Tables 3 and 4; note that a positive N_u value in the tables below indicates tension. A Mathcad module is used to determine the required areas of steel reinforcement for the four types of shear loading (see subsequent pages for corresponding detailed design). The results from the shear analyses are summarized in Section Z.5 of this attachment.

Table 3 – In-Plane Shear Loading

Direction	Row/Column	Governing Load Comb.	Load Comb. Type	V_u	N_u
(-)	(-)	(-)	(-)	(kip)	(kip)
Horizontal	30	1179	Seismic	787	-1142
Vertical	7	5448	Non-Seismic	1358	-222

Table 4 –Out-of-Plane Shear Loading

Direction	Governing Load Comb.	V_u (F3)	N_u (F1 or F2)
(-)	(-)	(kip/ft)	(kip/ft)
Horizontal	1179	17.4	24.2
Vertical	1171	6.65	66.2

Z.5 Results Summary

Results from the Mathcad analyses are summarized in Table 5. For the six types of steel considered in this evaluation (two flexural, four shear), the table lists the required areas of steel (per face) determined in accordance with ACI 349-06 (Ref. 3.1.9). For longitudinal reinforcement in either direction, the required flexural steel is added to the required in-plane shear steel to calculate a total area of required in-plane reinforcement. Then, the required areas of steel for horizontal and vertical OOP shear are combined to calculate a total area of required OOP reinforcement. Finally, reinforcement is specified to provide areas of steel ($A_{s\text{-}prov}$) exceeding those required ($A_{s\text{-}total}$). As shown, all provided reinforcement is sufficient for the concrete section and loading considered in this attachment.

Table 5 – Analysis Results Summary and Provided Steel Reinforcement (Per Face)

Steel Type	Analysis Case	$A_{s\text{-}req}$	$A_{s\text{-}total}$	Reinforcement	$A_{s\text{-}prov}$
(-)	(-)	(in^2/ft)	(in^2/ft)	(-)	(in^2/ft)
Horizontal Longitudinal	Flexural	1.00	1.00	#9 @ 12″ on center	1.00
	In-Plane Shear	0			
Vertical Longitudinal	Flexural	1.00	1.00	#9 @ 12″ on center	1.00
	In-Plane Shear	0			
Transverse	OOP Horizontal Shear	0	0	N/A	0
	OOP Vertical Shear	0			

Z.6 Flexural Reinforcement Design

Concrete slabs in the SHINE Facility are designed per ACI 349-06 (Ref. 3.1.9). In this section, reinforcement is selected to ensure the given slab is adequate under combined axial and flexural loads; two cases are considered:

Case 1) Horizontal reinforcement (local 1 axis)
Case 2) Vertical reinforcement (local 2 axis)

P-M interaction diagrams are generated for the two cases using user-specified reinforcement. Load points obtained from SAP2000 model data are superimposed on the diagrams to ensure the selected reinforcement is sufficient. Note that the compressive strength of steel is conservatively neglected in this design. The following dimensions and material properties are utilized throughout this evaluation:

$f'_c := 5000\text{psi}$ — Concrete compressive strength

$E_c := 57000 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} = 4030509\ \text{psi}$ — Concrete elastic modulus

$\varepsilon_{cu} := 0.003$ — Ultimate concrete strain

$f_y := 60000\text{psi}$ — Steel yield strength

$E_s := 29000000\text{psi}$ — Steel elastic modulus

$\varepsilon_y := \frac{f_y}{E_s} = 0.00207$ — Steel yield strain

$$\beta_1 := \left| \begin{array}{l} 0.65 \ \ \text{if}\ \ 1.05 - \frac{f'_c}{20\text{ksi}} < 0.65 \\ 0.85 \ \ \text{if}\ \ 1.05 - \frac{f'_c}{20\text{ksi}} > 0.85 \\ 1.05 - \frac{f'_c}{20\text{ksi}} \ \ \text{otherwise} \end{array} \right. = 0.80$$

Factor per Section 10.2.7.3 of Ref. 3.1.9

$b_w = 12.0 \cdot \text{in}$ — Design strip width

$t_w = 36.0 \cdot \text{in}$ — Slab thickness

$c_c = 2.5 \cdot \text{in}$ — Concrete clear cover

$A_g := b_w \cdot t_w = 432.0 \cdot \text{in}^2$ — Gross concrete area

$D_{tie} = 0.50 \cdot \text{in}$ — Diameter of shear tie; conservative

Case 1) Horizontal Reinforcement

$A_{b.hor} = 1.000 \cdot in^2$ — Area of reinforcement per bar

$D_{b.hor} = 1.128 \cdot in$ — Diameter of horizontal bar

$d_h := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 32.4 \cdot in$ — Depth to centroid of horizontal reinforcing steel

$s_{hor} = 12.0 \cdot in$ — Spacing of horizontal bars

$A_{s.hor} := A_{b.hor} \cdot \dfrac{b_w}{s_{hor}} = 1.00 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 954.7 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \left| \begin{array}{l} 0.65 \ \text{ if } \ \varepsilon_s < 0.002 \\ 0.9 \ \text{ if } \ \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] \ \text{ otherwise} \end{array} \right. = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 24.1 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\, psi$ — Steel stress

$a := \beta_1 \cdot c = 19.3 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 620.1 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 468.7 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.82\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 954.7 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 195.1 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_h = 19.5 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 15.6 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.hor} \cdot f_s\right) = 478.4 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.hor} \cdot f_s \cdot \left(d_h - \frac{t_w}{2}\right)\right] = 484.7 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}}\cdot d_h = 12.2\cdot in$$

Neutral axis depth

$f_s := f_y = 60000\,psi$ Steel stress

$a := \beta_1\cdot c = 9.7\cdot in$ Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 392.6\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)(a\cdot b_w) + A_{s.hor}\cdot f_s\cdot\left(d_h - \frac{t_w}{2}\right)\right] = 553.8\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ Steel stress

$$a := \frac{A_{s.hor}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$$

Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.hor}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.hor}\cdot f_y\cdot\left(d_h - \frac{a}{2}\right) = 143.3\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.hor} \cdot f_y\right) = -108.0 \cdot kip$

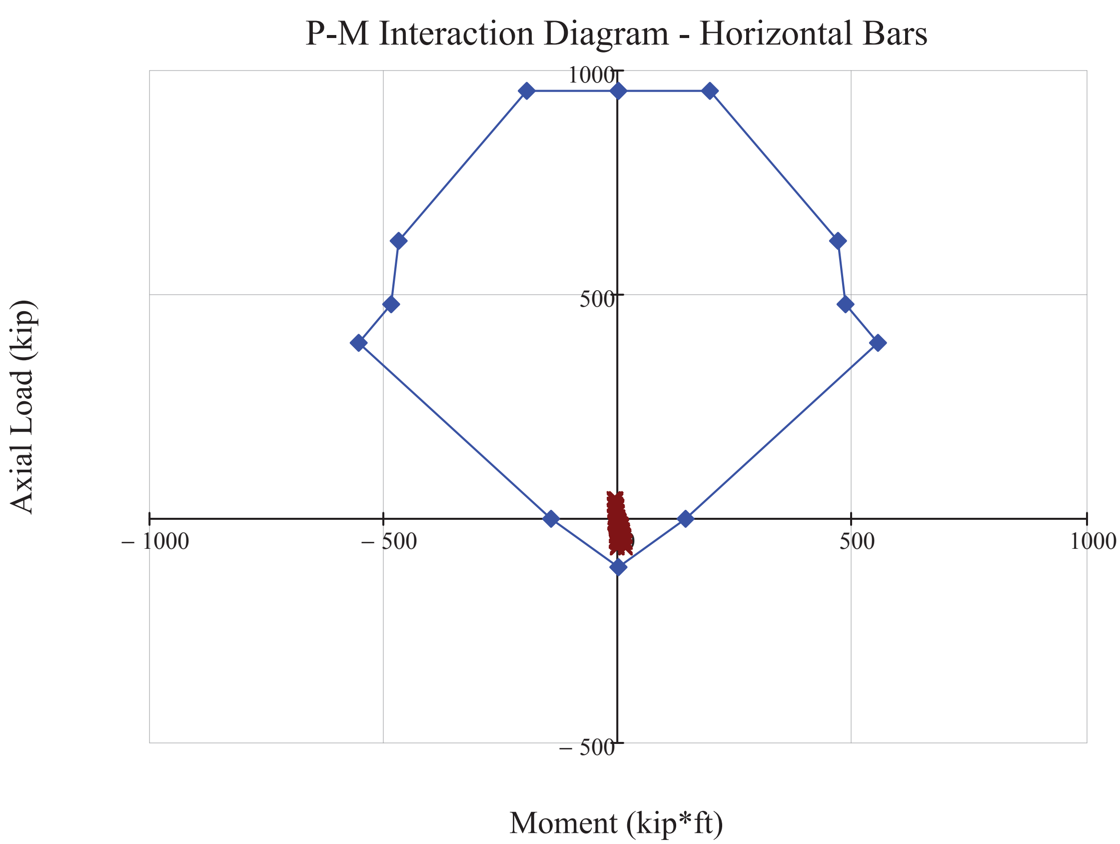
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Horizontal Bars

$$\phi P_n = \begin{pmatrix} 954.7 \\ 954.7 \\ 620.1 \\ 478.4 \\ 392.6 \\ 0.0 \\ -108.0 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 195.1 \\ 468.7 \\ 484.7 \\ 553.8 \\ 143.3 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified horizontal reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Case 2) Vertical Reinforcement

$A_{b.vert} = 1.000 \cdot in^2$ — Area of reinforcement per bar

$D_{b.vert} = 1.128 \cdot in$ — Diameter of vertical bar

$D_{b.hor} = 1.128 \cdot in$ — Diameter of horizontal bar

$d_v := t_w - c_c - D_{tie} - D_{b.hor} - 0.5 D_{b.vert} = 31.3 \cdot in$ — Depth to centroid of vertical reinforcing steel

$s_{vert} = 12.0 \cdot in$ — Spacing of vertical bars

$A_{s.vert} := A_{b.vert} \cdot \dfrac{b_w}{s_{vert}} = 1.00 \cdot in^2$ — Area of steel per row of reinforcement

Point 1 - Maximum Compression with No Moment

$\phi_c := 0.65$ — Strength reduction factor for axial compression

$\phi P_{n_1} := 0.80 \cdot \phi_c \cdot \left(0.85 \cdot f'_c \cdot A_g\right) = 954.7 \cdot kip$ — Design axial strength reduced by 20% to account for accidental eccentricity per Section 10.3.6.2 of Ref. 3.1.9

$\phi M_{n_1} := 0$

Point 3 - Tension Steel Strain at 50% of Yield Strain

$\varepsilon_s := 0.5 \cdot \varepsilon_y = 0.00103$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\dfrac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 23.3 \cdot in$ — Neutral axis depth

$f_s := \varepsilon_s \cdot E_s = 30000\ psi$ — Steel stress

$a := \beta_1 \cdot c = 18.6 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_3} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 597.9 \cdot kip$$

$$\phi M_{n_3} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 468.6 \cdot kip \cdot ft$$

Point 2 - Point on Compression Controlled Failure Curve Corresponding to Point 1 Axial Load

$$\text{Slope} := \frac{\phi M_{n_3}}{\frac{\phi P_{n_1}}{0.80} - \phi P_{n_3}} = 0.79\,\text{ft}$$

Linear change in moment per change in axial load between Point 3 and the design axial strength at zero eccentricity (i.e. not reduced by 20% per Section 10.3.6.2 of Ref. 3.1.9)

$$\phi P_{n_2} := \phi P_{n_1} = 954.7 \cdot \text{kip}$$

The axial load of Point 1

$$\phi M_{n_2} := \phi M_{n_3} - \text{Slope} \cdot \left(\phi P_{n_1} - \phi P_{n_3}\right) = 187.8 \cdot \text{kip} \cdot \text{ft}$$

Moment on compression controlled curve corresponding to the axial load of Point 1; note that the slope used in this calculation is conservative when compared to the actual compression controlled curve

Point 4 - Lower Bound of Compression Controlled Section

$$\varepsilon_s := 0.002$$

Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[\left(\varepsilon_s - 0.002\right) \cdot \left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.65$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$$c := \frac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 18.8 \cdot \text{in}$$

Neutral axis depth

$$f_s := \varepsilon_s \cdot E_s = 58000\,\text{psi}$$

Steel stress

$$a := \beta_1 \cdot c = 15.0 \cdot \text{in}$$

Depth of equivalent rectangular stress block

$$\phi P_{n_4} := \phi \cdot \left(0.85 \cdot f'_c \cdot a \cdot b_w - A_{s.vert} \cdot f_s\right) = 460.5 \cdot \text{kip}$$

$$\phi M_{n_4} := \phi \cdot \left[0.85 \cdot f'_c \cdot \left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a \cdot b_w\right) + A_{s.vert} \cdot f_s \cdot \left(d_v - \frac{t_w}{2}\right)\right] = 477.1 \cdot \text{kip} \cdot \text{ft}$$

Point 5 - Upper Bound of Tension Controlled Section

$\varepsilon_s := 0.005$ — Steel strain

$$\phi := \begin{cases} 0.65 & \text{if } \varepsilon_s < 0.002 \\ 0.9 & \text{if } \varepsilon_s > 0.005 \\ \left[0.65 + \left[(\varepsilon_s - 0.002)\cdot\left(\frac{250}{3}\right)\right]\right] & \text{otherwise} \end{cases} = 0.90$$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$c := \dfrac{\varepsilon_{cu}}{\varepsilon_s + \varepsilon_{cu}} \cdot d_v = 11.7 \cdot in$ — Neutral axis depth

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \beta_1 \cdot c = 9.4 \cdot in$ — Depth of equivalent rectangular stress block

$$\phi P_{n_5} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 377.1\cdot kip$$

$$\phi M_{n_5} := \phi\cdot\left[0.85\cdot f'_c\cdot\left(\frac{t_w}{2} - \frac{a}{2}\right)\left(a\cdot b_w\right) + A_{s.vert}\cdot f_s\cdot\left(d_v - \frac{t_w}{2}\right)\right] = 537.8\cdot kip\cdot ft$$

Point 6 - Pure Bending

$\phi := 0.90$ — Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$f_s := f_y = 60000\,psi$ — Steel stress

$a := \dfrac{A_{s.vert}\cdot f_y}{0.85\cdot f'_c\cdot b_w} = 0.1\,ft$ — Depth of equivalent rectangular stress block

$$\phi P_{n_6} := \phi\cdot\left(0.85\cdot f'_c\cdot a\cdot b_w - A_{s.vert}\cdot f_s\right) = 0.0\cdot kip$$

$$\phi M_{n_6} := \phi\cdot A_{s.vert}\cdot f_y\cdot\left(d_v - \frac{a}{2}\right) = 138.2\cdot kip\cdot ft$$

Point 7 - Axial Tension Only

$\phi := 0.90$

Strength reduction factor per Section 9.3.2 of Ref. 3.1.9

$\phi P_{n_7} := -\phi \cdot \left(2A_{s.vert} \cdot f_y\right) = -108.0 \cdot kip$

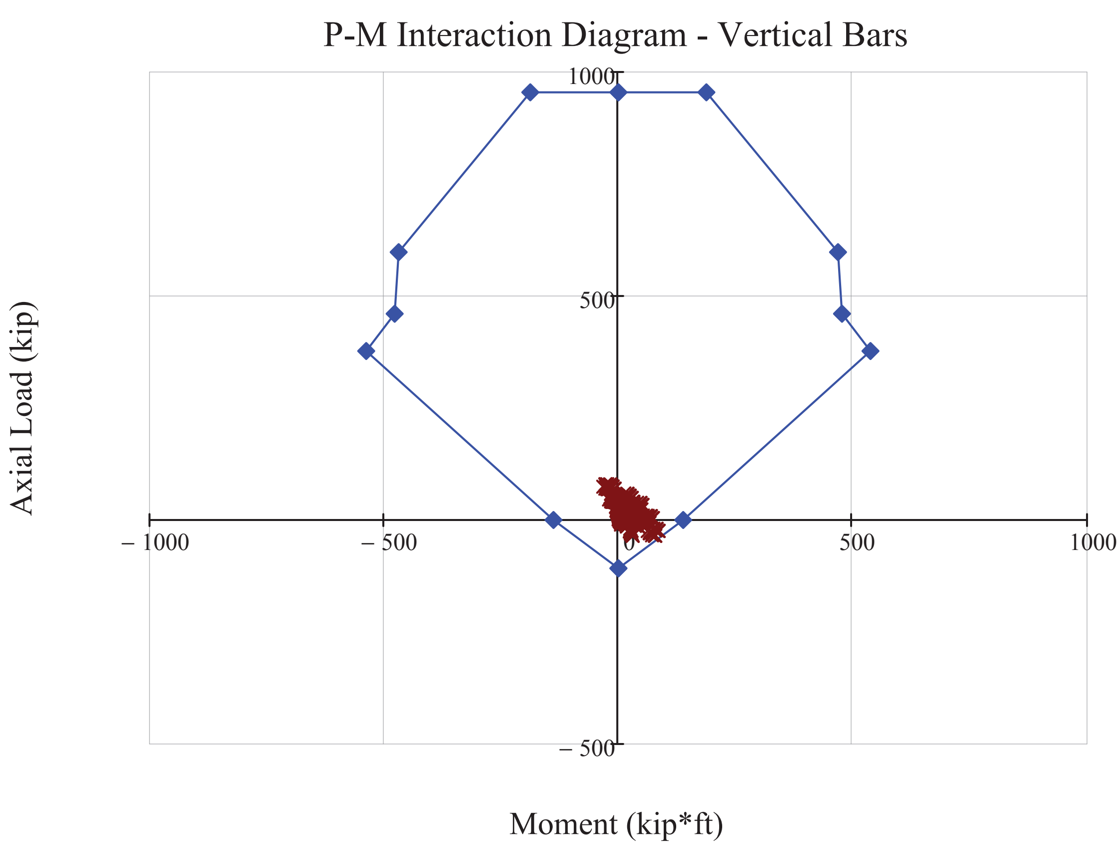
Maximum tensile load; note that the tensile capacity of concrete is ignored

$\phi M_{n_7} := 0$

Plot P-M Interaction Curve and Load Points for Section with Vertical Bars

$$\phi P_n = \begin{pmatrix} 954.7 \\ 954.7 \\ 597.9 \\ 460.5 \\ 377.1 \\ 0.0 \\ -108.0 \end{pmatrix} \cdot kip \qquad \phi M_n = \begin{pmatrix} 0.0 \\ 187.8 \\ 468.6 \\ 477.1 \\ 537.8 \\ 138.2 \\ 0.0 \end{pmatrix} ft \cdot kip$$

In the diagram below, P-M curve points are connected in blue, while actual load points are denoted by red X marks. As illustrated, the concrete section's capacity using the specified vertical reinforcement is adequate for the combined effects of axial loads and flexural bending moments.



Minimum Reinforcement Checks

$A_{s.FH} := 2A_{s.hor} = 2.00 \cdot in^2$

Total area of flexural horizontal steel required per 12-in. wide design section

$A_{s.FV} := 2A_{s.vert} = 2.00 \cdot in^2$

Total area of flexural vertical steel required per 12-in. wide design section

$A_{v.IPH} = 0.00 \cdot in^2$

Total area of horizontal in-plane shear reinforcement required

$A_{v.IPV} = 0.00 \cdot in^2$

Total area of vertical in-plane shear reinforcement required

$A_{s.H} := A_{s.FH} + A_{v.IPH} = 2.0 \cdot in^2$

Total area of horizontal steel required

$A_{s.V} := A_{s.FV} + A_{v.IPV} = 2.0 \cdot in^2$

Total area of vertical steel required

$A_{min} := 2 \cdot 0.0018 A_g = 1.56 \cdot in^2$

Minimum reinforcement per Section 7.12.5 of Ref. 3.1.9 for all load cases; can be waived if IC < 0.67

$$\text{Check\_H} := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.H} > A_{min} \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

$$\text{Check\_V} := \left| \begin{array}{l} \text{"OK"} \quad \text{if } A_{s.V} > A_{min} \\ \text{"No Good"} \quad \text{otherwise} \end{array} \right. = \text{"OK"}$$

Z.7 Shear Reinforcement Design

In this section, the area of steel reinforcement required to meet in-plane and out-of-plane shear demands, as well as minimum Code requirements, is determined. The governing load case for horizontal in-plane shear considers seismic effects; therefore, horizontal in-plane shear design follows the provisions of Chapter 21 of ACI 349-06 (Ref. 3.1.9). The governing load case for vertical in-plane shear, however, does not consider seismic effects; therefore, vertical in-plane shear design follows the design procedure in ACI 349-06 (Ref. 3.1.9) Sections 11.10.2 through 11.10.9, modified for slab applications. Out-of-plane shear design, which is unaffected by load case type, follows the provisions for slabs in ACI 349-06 Section 11.1 through 11.5, as dictated by Section 11.12.1.1.

The following dimensions, material properties, and coefficients are utilized throughout this section:

$f_y := 60000psi$ — Steel yield strength

$f'_c := 5000psi$ — Concrete compressive strength

$E := 57000 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi = 4030509\ psi$ — Elastic modulus of concrete

$f_r := 7.5 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi = 530.3\ psi$ — Concrete modulus of rupture

$t_w = 36.0 \cdot in$ — Slab thickness

$l_w = 51.0\ ft$ — Slab length (X, local 1 direction)

$h_w = 100.3\ ft$ — Slab length (Y, local 2 direction)

$\phi_v := 0.75$ — Strength reduction factor for shear per Section 9.3.2.3 of Ref. 3.1.9

In-Plane Shear Design - Horizontal

$V_{u.hor} = 787.0 \cdot kip$ — Factored shear force in slab

$s_{max} := 18in$ — Maximum spacing of reinforcement per Section 21.7.2.1 of Ref. 3.1.9

$s_{IP.h} = 1.0\,ft$ — Spacing of horizontal shear reinforcement; in this case, consider 12-in. design section

$h_e := 12in$ — Height of element above section cut; in this case, consider 12-in. design section

$A_{cv} := l_w \cdot t_w = 153.0 \cdot ft^2$ — Gross concrete area bounded by slab thickness and slab length

$$A_{v.req} := \frac{t_w \cdot h_e}{f_y} \cdot \left(\frac{V_{u.hor}}{\phi_v \cdot A_{cv}} - 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot psi \right) = -0.68 \cdot in^2$$

Area of reinforcement required for strength

$A_{v.req.iph} := \max\left(A_{v.req}, 0\right) = 0.00 \cdot in^2$ — Required area of in-plane horizontal shear reinforcement

$$V_{n.max} := 8 \cdot A_{cv} \cdot \sqrt{\frac{f'_c}{psi}} psi = 12463 \cdot kip$$

Maximum nominal shear strength per Section 21.9.7.3 of Ref. 3.1.9

$$Check\_Vn := \left| \begin{array}{ll} \text{"OK"} & \text{if } V_{u.hor} < \phi_v \cdot V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{array} \right. = \text{"OK"}$$

In-Plane Shear Design - Vertical

$V_{u.vert} = 1358.0 \cdot kip$

Factored shear force in slab

$d := 0.8 \cdot h_w = 80.3\,ft$

Depth per Section 11.10.4 of Ref. 3.1.9

Check shear strength limit for existing slab geometry:

$\phi V_{n.max} := \phi_v \cdot 10 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 18388.7 \cdot kip$

Nominal shear strength limit per Ref. 3.1.9, Sections 11.5.7.9 and 11.3.1.1

$$Check\_Limit := \begin{cases} \text{"OK"} & \text{if } V_{u.hor} < \phi V_{n.max} \\ \text{"No Good"} & \text{otherwise} \end{cases} = \text{"OK"}$$

Calculation of concrete shear strength per Section 11.3.1.1 of Ref. 3.1.9:

$V_c := 2 \cdot \sqrt{\frac{f'_c}{psi}} \cdot t_w \cdot d \cdot psi = 4903.7 \cdot kip$

$$Check := \begin{cases} \text{"OK - No Rebar Required"} & \text{if } \phi_v \cdot V_c > V_{u.vert} \\ \text{"Rebar Required for Strength"} & \text{otherwise} \end{cases} = \text{"OK - No Rebar Required"}$$

Out-of-Plane Shear - Horizontal

$N_{u.oop.hor} = -24.2 \cdot kip$ — Factored axial force per 12-in. strip of slab; positive = compression, negative = tension

$V_{u.oop.hor} = 17.4 \cdot kip$ — Factored shear per 12-in. strip of slab

$b_w = 12.0 \cdot in$ — Design strip width

$d := t_w - c_c - D_{tie} - D_{b.hor} - 0.5D_{b.vert} = 31.3 \cdot in$ — Depth to centroid of vertical longitudinal rebar

$A_g := b_w \cdot t_w = 432.0 \cdot in^2$ — Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.hor} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.hor} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.hor}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 47.2 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.hor} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.hor}}{\phi_v \cdot V_c} = 0.49$$

Out-of-Plane Shear - Vertical

$N_{u.oop.vert} = -66.2 \cdot kip$

Factored axial force per 12-in. strip of slab; positive = compression, negative = tension

$V_{u.oop.vert} = 6.7 \cdot kip$

Factored shear per 12-in. strip of slab

$b_w = 12.0 \cdot in$

Design strip width

$d := t_w - c_c - D_{tie} - 0.5D_{b.hor} = 32.4 \cdot in$

Depth to centroid of horizontal longitudinal rebar

$A_g := b_w \cdot t_w = 432.0 \cdot in^2$

Gross concrete area of design strip

Calculation of concrete shear strength per Sections 11.3.1.1 (where only shear and flexure exist), 11.3.1.3 (where axial compression exists), and 11.3.2.3 (where axial tension exists) of Ref. 3.1.9:

$$V_c := \begin{cases} 2 \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d \cdot psi & \text{if } N_{u.oop.vert} = 0 \\ 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{2000 \cdot A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d & \text{if } N_{u.oop.vert} > 0 \\ \max\left[0, 2 \cdot \left(1psi + \dfrac{N_{u.oop.vert}}{500A_g}\right) \cdot \sqrt{\dfrac{f'_c}{psi}} \cdot b_w \cdot d\right] & \text{otherwise} \end{cases} = 38.2 \cdot kip$$

$$Check := \begin{cases} \text{"OK - None Required"} & \text{if } \phi_v \cdot V_c > V_{u.oop.vert} \\ \text{"Reinforcement Required"} & \text{otherwise} \end{cases} = \text{"OK - None Required"}$$

$$IC := \frac{V_{u.oop.vert}}{\phi_v \cdot V_c} = 0.23$$