3H Design Details and Evaluation Results of Seismic Category I Structures

3H.1 Reactor Building

3H.1.1 Objective And Scope

The objective of this subsection is to document the structural design and analysis of the ABWR Reactor Building. The scope includes the design and analysis of the structure for normal, severe environmental, extreme environmental, abnormal, and construction loads.

This subsection addresses all applicable items included in Appendix C to USNRC Standard Review Plan, NUREG-0800, Section 3.8.4.

3H.1.2 Conclusions

The following are the major summary conclusions on the design and analysis of the Reactor Building:

- Based on the design drawings identified in Subsection 3H.1.5, stresses and strains in concrete, reinforcement, and the liner are less than the allowable stresses and strains per the applicable codes listed in Subsection 3H.1.4.1.
- The factors of safety against flotation, sliding, and overturning of the structure under various loading combinations are higher than the required minimum.
- The thickness of the roof slabs and exterior walls are more than the minimum required to preclude penetration, perforation or spalling resulting from impact of design basis tornado missiles.

3H.1.3 Structural Description

3H.1.3.1 Description of the Containment and the Reactor Building

The ABWR containment is integrated with, and fully contained within, the Reactor Building. The containment and the Reactor Building are supported by a 5.5m thick common foundation mat. The bottom of the foundation mat is embedded in the ground approximately 26m below grade. Figure 1.2-1 shows the location of the Reactor Building in relation to other plant structures. Figures 1.2-2 through 1.2-13k show the arrangement of the Reactor Building.

The containment structure is a right circular cylinder, 2m thick, with an inside radius of 14.5m and has a height of 29.5m measured from the top of the foundation mat to the bottom of the containment top slab.

The containment top slab is integral with the fuel pool girders and the containment wall. The top slab is nominally 2.2m thick. The slab thickness is increased to 2.4m beneath the fuel pool,

steam dryer and steam separator pool. The top slab has an opening of 5.15m radius at center for the refueling head.

Major containment internal structures consist of the reactor pedestal, the reactor shield wall and the diaphragm floor.

The reactor pedestal is a composite steel and concrete structure which provides support for the reactor pressure vessel, the reactor shield wall, the diaphragm floor (D/F), access tunnels, horizontal vents, and the lower drywell access platforms. The pedestal consists of two concentric steel shells tied together by vertical steel stiffener plates and filled with concrete.

The diaphragm floor serves as a barrier between the drywell and the wetwell. It is a reinforced concrete circular slab, with an outside radius of 14.5m, and a thickness of 1.2m. The diaphragm floor is supported by the containment wall with a fixed-end connection and by the reactor pedestal with a hinged connection.

The internal surface of the containment is lined with a steel liner plate. The liner plate is fabricated from carbon steel except that stainless steel is used for the wetted portion of the suppression pool.

There are two 4.3m diameter access tunnels that penetrate the containment suppression pool wall and the reactor pedestal at azimuths 0° and 180°. The center lines of these tunnels are located about 8.02m above the top of the base slab.

The RPV is laterally restrained near the top of the reactor shield wall by RPV stabilizers.

The Reactor Building is a 59.6m x 56.6m reinforced concrete structure. On the periphery, there are 24 reinforced concrete columns which are connected by reinforced concrete walls. Inside the Reactor Building, there are 18 columns supporting the floors and the fuel pool girders.

The Reactor Building has six reinforced concrete floors which are monolithically connected to the containment.

The operating floor at elevation TMSL 31700 mm is connected to the fuel pool girders which are supported by the containment and the Reactor Building.

The Reactor Building interior walls and the floor beams are not connected to the containment structure.

3H.1.4 Structural Design Criteria

3H.1.4.1 Codes

3H.1.4.1.1 Applicable Codes

(1) [*ASME/ACI 359: Boiler and Pressure Vessel Code Section III, Rules for Construction of Nuclear Power Plant Components, Division 2 Code for Concrete Reactor Vessels and Containments.*]*

(2) ACI 318: Building Code Requirements for Reinforced Concrete.

(3) [*ACI 349: Code Requirements for Nuclear Safety Related Concrete Structures.*]†

(4) AISC: Specification for Structural Steel Buildings - Allowable Stress Design (ASD) and Plastic Design.

(5) [*ANSI/AISC–N690: Specifications for the Design, Fabrication and Erection of Steel Structures for Nuclear Facilities, American Institute of Steel Construction.*]†

3H.1.4.1.2 ASME Code Jurisdictional Boundaries for the RCCV

Figure 3H.1-2 shows the ASME Section III, Division 2, Subsection CC Code jurisdictional boundaries for the concrete containment design.

3H.1.4.2 Site Design Parameters

The site design parameters are based on EPRI-ALWR requirements document for the standardized nuclear power plant (advanced). The following are some of the key design parameters:

(1) Soil Parameters:

- Minimum static bearing capacity demand: ≥718.20 kPa
- In addition for the load combinations involving seismic/dynamic loads, the dynamic bearing capacity demand shall also be met.
- Minimum shear wave velocity: 305 m/s
- Poisson's Ratio: 0.30 to 0.38
- Unit Weight: 1.9 to 2.2 t/m^3

* See Subsection 3.8.1.1.1.

† See Subsection 3.8.3.2.

(2) Maximum Ground Water Level:

- 0.61m below grade level

(3) Maximum Flood Level:

- 0.305m below grade level

(4) Maximum Snow Load:

- 2.39 kPa

(5) Design Temperatures:

- 0% exceedence values
  Maximum: 46.1°C dry bulb/26.7°C coincident wet bulb.
  Minimum: –40°C

- 1% exceedence values
  Maximum: 37.8°C dry bulb/25°C coincident wet bulb.
  Minimum: –23.3°C

(6) Seismology:

- SSE Peak Ground Acceleration (PGA): 0.30g (for both horizontal and vertical directions). SSE PGA is free field at plant grade elevation.

- SSE Response Spectra: Per Regulatory Guide 1.60

- SSE Time History: Envelope SSE response Spectra in accordance with SRP Section 3.7.1.

(7) Extreme Wind:

- Basic wind speed 177 km/h (50 year recurrence interval).

- Importance Factors:
  Safety related structures: 1.11
  Non-safety related structures: 1.00

- Exposure Category: Exposure D

(8) Tornado:

- Maximum tornado wind speed: 483 km/h

- Maximum Rotational Speed: 386 km/h

- Maximum Translational Speed: 97 km/h
- Radius: 45.7m
- Maximum Pressure Drop: 13.83 kPa
- Maximum Rate of Pressure Drop: 8.28 kPa/s
- Missile Spectrum: See Table 2.0-1.

(9) Maximum Rainfall:

- Design rainfall is 503 mm/h. Roof parapets are furnished with scuppers to supplement roof drains, or are designed without parapets so that excessive ponding of water cannot occur. Such roof design meets the provisions of ASCE 7, Section 8.0.

3H.1.4.3 Design Loads and Loading Combinations

3H.1.4.3.1 Design Loads

3H.1.4.3.1.1 Dead Load (D) and Live Load (L) and (L_O)

Top Head wt.	60t
Normal Operating RPV wt.	1900t
Reactor shield wall	1000t
Suppression pool water depth	7.1m HWL
Tunnel (2 pieces)	135t
Equipment load on D/F slab	9.8 kPa
Fuel Pool Water depth	11.82m
Fuel elements in the fuel pool	1000t
RCCV top slab	14.32 kPa
Service floor	23.93 kPa
Other concrete floors	14.32 kPa
Stairs & platforms	4.81 kPa
Floors adjacent to equipment hatches	47.86 kPa
Fuel storage pool floor	71.79 kPa
Floor at RPV laydown	47.86 kPa
Wt. of crane	310t
Fuel Cask Load	150t

For the computation of global seismic loads, the value of floor live load is limited to the expected live load, L_o, during normal plant operation. The values of L_o are 25% of the above full floor live loads L.

Fuel pool floor shall also be designed for the following high-density storage racks loads.

Liner and Racks	= 53.0 kPa
Water	= 115.7 kPa
Consolidated Fuel	= 139.3 kPa
Total:	308.0 kPa

3H.1.4.3.1.2 Snow Load

Snow load shall be taken as 2.39 kPa. Snow load shall be reduced to 75% when snow load is combined with seismic loads.

3H.1.4.3.1.3 Wind Load (W)

Wind load based on basic wind speed of 177 km/h (Subsection 3H.1.4.2).

3H.1.4.3.1.4 Tornado Load (W_t)

The tornado characteristics are defined in Subsection 3H.1.4.2. The tornado load, W_t is further defined by the following combinations:

$W_t = W_w$

$W_t = W_p$

$W_t = W_m$

$W_t = W_w + 0.5W_p$

$W_t = W_w + W_m$

$W_t = W_w + 0.5W_p + W_m$

where

$W_t =$ Total Tornado Load

$W_w =$ Tornado Wind Load

$W_p =$ Tornado Differential Pressure Load

$W_m =$ Tornado Missile Load

3H.1.4.3.1.5 Thermal Loads for the RCCV

- Design basis temperature: 15.5°C
- Normal Conditions:

Drywell	57°C
Suppression Pool	35°C
R/B Summer	40°C
R/B Winter	10°C

- Design Accident Conditions:

  Figure 3H.1-3 shows the section location for temperature distributions for various structural elements, and Table 3H.1-1 shows the magnitude of equivalent linear temperature distribution.

3H.1.4.3.1.6 Pressure Loads for the RCCV

3H.1.4.3.1.6.1 SIT and LOCA Loads

Table 3H.1-2 shows the structural integrity test and the LOCA (LBL and SBL/IBL) pressure loads.

3H.1.4.3.1.6.2 Condensation Oscillation (CO) and Chugging (CHUG) Loads

The condensation oscillation (CO) and chugging (CHUG) pressure loads along with Dynamic Load Factors (DLF) are provided in Table 3H.1-3. The pressure distribution for the CO loads is shown in Figure 3H.1-4, and for the chugging loads shown in Figure 3H.1-5.

3H.1.4.3.1.6.3 SRV Loads

The SRV loads along with Dynamic Load Factors (DLF) are provided in Table 3H.1-3. The pressure distributions for the SRV loads are provided in Figure 3H.1-6. The maximum SRV pressure which include a DLF of 1.8 are 171.6 kPa or –79.4 kPa.

3H.1.4.3.1.6.4 Steam Tunnel Subcompartment Pressure

The peak pressure in the R/B steam tunnel due to main steam line break is 150.0 kPa. This pressure includes a dynamic load factor of 2.0. Thermal loads need not be included due to short duration of the tunnel pressurization.

3H.1.4.3.1.6.5 Subcompartment Pressure in Other Compartments

For ABWR, the two systems, namely the Reactor Water Cleanup (CUW) system and the Reactor Core Isolation Cooling (RCIC) system are considered high energy during normal operation. The maximum pressure inside the affected subcompartments from the high energy

line breaks (HELB) of these systems are determined to be 103.9 kPa. Hence, the affected subcompartments shall be evaluated for pressure of 103.9 kPa laterally applied together with other applicable loads. Since this pressure occurs gradually over many seconds, dynamic load factor need not be included. Thermal loads need not be included due to short duration of subcompartment pressurization.

3H.1.4.3.1.7 Seismic Loads

The design seismic loads are as follows:

- Figure 3H.1-8: Design Seismic Shears and Moments for Reactor Building Outer Walls
- Figure 3H.1-9: Design Seismic Shears and Moments for RCCV
- Figure 3H.1-10: Design Seismic Shears and Moments for RPV Pedestal and Reactor Shield Wall
- Table 3H.1-4: Maximum Vertical Acceleration

The seismic loads shall be composed of two perpendicular horizontal and one vertical component. The effects of the three components shall be combined based on the square root of sum of the squares (SRSS) method.

3H.1.4.3.1.8 Lateral Soil Pressure

Lateral Soil Pressure for wall design is provided in Figure 3H.1-11.

3H.1.4.3.2 Load Combinations and Acceptance Criteria

Load combinations and acceptance criteria for the various elements of the Reactor Building complex are discussed on the following subsections.

3H.1.4.3.2.1 Reinforced Concrete Containment Vessel (RCCV)

Table 3.8-1 gives detailed list of the load combinations and load factors per ASME Section III Division 2. Table 3H.1-5a loading combinations have been selected from Table 3.8-1 for the RCCV design evaluation.

3H.1.4.3.2.2 Diaphragm Floor (D/F) Slab

The diaphragm floor slab is a part of containment internal structures. The same loading combinations and acceptance criteria as shown in Subsection 3H.1.4.3.2.1 for the RCCV shall be used.

3H.1.4.3.2.3 RPV Pedestal

The RPV pedestal experiences the same loads and loading combinations as the RCCV. The loading combinations shown in Subsection 3H.1.4.3.2.1 for RCCV will also be used for the

pedestal evaluation. The acceptance criteria are as per AISC for the steel components with allowable stresses limited to 0.9 Fy for factored loads. For the concrete portion of the pedestal, which is considered only to resist compressive loads, ACI 349 Code shall be used for acceptance criteria.

3H.1.4.3.2.4 Reactor Building (R/B) Concrete Structures Including Fuel Pool Girders

The loading combinations, as selected from Table 3.8-1, for the Reactor Building concrete structures including fuel pool girders are given in Table 3H.1-5b.

3H.1.4.4 Materials

3H.1.4.4.1 Concrete

- Concrete for the RCCV and the R/B including basemat and reactor well shield plugs shall have compressive strength, f'c = 2.76E+04 kPa, modulus of elasticity, E = 2.49E+07 kPa, Poisson’s ratio, μ = 0.2, and shear modulus, G = 1.04E+07 kPa.

- Concrete fill in the pedestal; f'c = 2.76E+04 kPa, E= 2.49E+07 kPa, μ = 0.2, and G = 1.04E+07 kPa.

- Concrete fill in the shield wall; f'c = 2.76E+04 kPa, E= 2.49E+07 kPa, μ = 0.2, and G = 1.04E+07 kPa.

3H.1.4.4.2 Reinforcing Steel

Reinforcing steel shall be deformed billet steel conforming to ASTM A-615 grade 60. Minimum yield strength, Fy = 4.14E+05 kPa.

3H.1.4.4.3 Liner Plate

- Liner plate for RCCV in the wetted area shall be stainless steel conforming to ASME SA-240, Type 304L, or carbon steel with a stainless clad conforming to ASME SA-516 Gr.70 or SA-537 Cl.2 or SA-738 Cl. B, with SA-264 Type 304L clad.

- Liner plate for the RCCV in the non-wetted area shall be 6.35 mm thick and conform to ASME SA-516 GR. 70 or SA-537 Cl.2 or SA-738 Cl.B.

- Liner Anchors: ASME SA-36.

- Stainless steel cladding to conform to ASME SA-264.

3H.1.4.4.4 Other Materials

Other materials shall conform:

- Structural steel and connections - ASTM A-36

- High strength structural steel plates - ASTM A-572 or A441
- Bolts studs & nuts (dia, >19 mm) -ASTM A-325 or A490
- Bolts studs & nuts (dia. ≤19 mm) -ASTM A-307

3H.1.4.5 Stability Requirements

The R/B foundations shall have the following safety factors against overturning and sliding.

Load Combination	Overturning	Sliding	Floatation
D + H' + F + L_o + SSE	1.1	1.1	
D + F'			1.1

Where

D = Dead Load

F = Buoyant forces of design ground water

F' = Buoyant forces of design basis flood

H' = Lateral earth pressure

L_o = Live Load (both cases of live load having its full value and being completely absent shall be considered)

SSE = Safe Shutdown Earthquake

3H.1.5 Structural Design and Analysis Summary

3H.1.5.1 Analytical Model

The containment and the Reactor Building are analyzed as one integrated structure utilizing the finite element computer program STARDYNE. The finite element model consists of quadrilateral, triangular, beam and wedge elements. The quadrilateral and triangular elements are used to represent the slabs and walls. Beam elements are used to represent columns and beams. The model is shown in Figures 3H.1-12 to 3H.1-15.

Because the Containment and the Reactor Building are symmetrical with respect to the plane that goes through the containment vertical center line and runs parallel with the pool girders (plane of symmetry) it is considered adequate to model the 180° portion of the structure, which includes the 0°, 270° and 180° portions of the structure.

Two models are prepared. Both of them have exactly the same nodalization and element numbers but have different boundary conditions at the plane of symmetry. One model is for the application of symmetrical loads (symmetrical w.r.t. the plane of symmetry). The nodal points at the plane of symmetry are restrained for the following movements:

Displacement in the global Y direction
Rotation about X-axis
Rotation about Z-axis

The other model applies the boundary condition for the anti-symmetric loads. This model is applicable for load applied perpendicular to the plane of symmetry, and it is prepared specifically for the seismic loads. The nodal points in the plane of symmetry are restrained for the following movements:

Displacement in the global X direction
Displacement in the global Z direction
Rotation about Z-axis

The 6.35 mm thick liner plate is included, and is located at the pressure boundary of the containment and on top of diaphragm slab. The liner plate nodal points are connected to the containment nodal points by rigid beams. The liner plate quad elements described above are shown in Figure 3H.1-14. Pressure loads in the containment are applied on the liner plate.

The interior walls consist of load bearing and the non-load bearing walls.

The load bearing walls are between elevations TMSL –8200 and TMSL 4800. Non-load bearing walls are included only for the application and distribution of weight. These walls are represented by elements with very small modulus of elasticity and unit weight of 2.4 t/m^3.

The reactor pedestal is a composite structure consisting of steel plates and concrete. The thickness of the finite elements representing the reactor pedestal is calculated so as to account for the steel plates and concrete acting as a composite section. The effective plate element thickness and the adjusted concrete modulus of elasticity are calculated from the bending and tension stiffnesses of the reactor pedestal.

The nodal points are defined by a right hand cartesian coordinate system X1, X2, X3. This system, called the global coordinate system, has its origin located at the center of the containment at the bottom of RPV. The positive X1 axis is parallel with the fuel pool girder in the 0° direction of the containment; the X2 axis is perpendicular to the fuel pool girder in the 270° direction of the containment; the X3 axis is vertical upward. This coordinate system is shown in Figure 3H.1-12.

The forces and moments tabulated in Table 3H.1-6 through Table 3H.1-13 are based on the local coordinate system of the quadrilateral elements described above, which is based on right hand rule for numbering a quadrilateral element.

3H.1.5.2 Foundation Soil Springs

The foundation soil is represented by soil springs. The spring constants for rocking and translations are determined based on the following soil parameters:

- Shear wave velocity 305 m/s
- Unit weight 1.92 t/m^3
- Shear modulus 1.8 x 10^4 t/m^3
- Poisson's Ratio 0.38

Embedment effect was taken into consideration in the determination of the soil spring values.

The following are the values of the soil springs used in the analysis:

Vertical springs	1,398 t/m/m^2
Horizontal springs in two perpendicular directions	1,250 t/m/m^2

These spring values are multiplied by the foundation mat nodal point tributary areas to compute the spring constants assigned to the base slab nodal points. The soil springs are shown in Figure 3H.1-16.

3H.1.5.3 Loads

The following twelve basic loads are separately applied to the finite element model for static analysis:

(1) Dead Load

(2) Live Load

(3) Unit Pressure in Drywell

(4) Unit Pressure in Wetwell

(5) Condensation Oscillation (CO)

(6) Chugging Pressure

(7) Safety Relief Valve Load (SRV)

(8) Unit Pressure in Steam Tunnel

(9) Horizontal Seismic due to SSE

(10) Vertical Seismic due to SSE

(11) Thermal Load (30 Minutes)

(12) Thermal Load (6 hours)

The forces and moments obtained from STARDYNE analysis for some of the significant loads are given in Tables 3H.1-6 to 3H.1-9. Table 3H.1-6 gives the results for applied drywell pressure of 6.9 kPa. Table 3H.1-7 shows the forces and moments for 6.9 kPa applied wetwell pressure. Table 3H.1-8 lists the results for the SRSS of the three components of SSE. No signs are shown in Table 3H.1-8 since the seismic loads can change direction. Table 3H.1-9 shows the forces and moments for 6 hour thermal load case. Positive axial forces are tensile while negative forces are compressive.

The structural deformations for unit pressure in drywell, unit wetwell pressure, 6 hour thermal load and east-west direction safe shutdown earthquake are shown in Figures 3H.1-17 to 3H.1-20.

Figure 3H.1-17 shows deformations corresponding to 6.9 kPa drywell pressure.

Figure 3H.1-18 shows deformations due to 6.9 kPa pressure in wetwell.

Figure 3H.1-19 shows deformations due to 6.0 hours of thermal load application.

Figure 3H.1-20 gives deformation for 0°-180° seismic load due to SSE.

3H.1.5.4 Load Combinations

The load combinations used for design are shown in Subsection 3H.1.4.3.2.1 for the RCCV and in Subsection 3H.1.4.3.2.4 for the Reactor Building. Tables 3H.1-10 to Table 3H.1-13 show results of the critical load combinations.

Table 3H.1-10 shows the load combination results corresponding to Load Combination 1, SIT (1), which consists of $D + L + P_t$ (1).

Table 3H.1-11 shows the results for Load Combination 8, LBL (30 min) which consists of $D + L + 1.5(P_a + CO) + T_a$.

Table 3H.1-12 shows the results for Load Combination 15, LBL (30 min) + SSE, which consists of $D + L + P_a + CO + T_a + SSE + R_a + Y$.

Table 3H.1-13 shows the load combination results corresponding to Load Combination 15a, 15b, IBL/SBL (6 hrs) + SSE, and consists of $D + L + P_a + CO + SRV + T_a + SSE$.

In these tables, the forces and moments are divided into three groups, for the convenience of input into the CECAP program for the rebar stress evaluation. The first row represents the

forces and moments caused by Thermal Load (T_A). The second row lists the forces and moments due to loads 1 through 8 listed in Subsection 3H.1.5.3. The last row lists the resulting forces and moments due to seismic loads (SRSS).

3H.1.5.5 Structural Design

The evaluation is based on the loads, load factors and load combinations indicated in Subsection 3H.1.4.

Figure 3H.1-21 shows the location of the sections which were selected for evaluation. Bechtel computer program 'CECAP' was used for the evaluation of stresses in rebar and concrete and strains in the liner plate. The input to CECAP consists of rebar ratios, material properties, and element geometry at the section under consideration together with the forces and moments from the STARDYNE analysis, which are shown in Tables 3H.1-10 through 3H.1-13. Table 3H.1-14 lists the rebar ratios used in the evaluation. At each section, in general, three elements were analyzed at azimuth 180°, 225° and 270°. Table 3H.1-15 through 3H.1-18 show the rebar and concrete stresses at these sections for the representative elements.

Figure 3H.1-22 shows flow chart for the structural analysis and design.

Figures 3H.1-28 through 3H.1-37 present the design drawings used for the evaluation of the containment and the Reactor Building Structural design.

3H.1.5.5.1 Containment Structure

3H.1.5.5.1.1 Containment Wall

Sections 1 through 6 shown in Figure 3H.1-21 are considered critical sections for the containment wall. Maximum stress was found to be 3.72×10^5 kPa in the meridional rebar at Section 1 near the bottom of the RCCV wall due to load combinations 15a and 15b, as shown in Table 3H.1-18. The maximum stress in the circumferential rebar was found to be 3.53×10^5 kPa which also occurs at Section 1. Table 3H.1-19 shows liner plate strains. The liner maximum strain was found to be 0.00197 at Section 1, which is within allowable limits given in Table CC-3720-1, ASME Code Section III, Division 2.

3H.1.5.5.1.2 Containment Top Slab

Sections 7, 8 and 9 were examined for the Containment Top Slab. The location of these sections are shown in Figure 3H.1-21. The maximum stress of 2.53×10^5kPa was found in the horizontal rebar in the top layer at Section 8 as shown in Table 3H.1-18. Maximum Liner strain was found to be 0.000499 at Section 8 as shown in Table 3H.1-19.

3H.1.5.5.1.3 Containment Foundation Mat

Sections 10 to 14 were evaluated for the basemat within the Containment Walls and Section 18, for outside the Containment. The sections are shown in Figure 3H.1-21. The maximum rebar

stress was calculated as $3.18x10^5$ kPa at Section 12 just outside the RPV Pedestal and is shown in Table 3H.1-18. The liner plate maximum strain was found to be 0.000439 at Section 14 as shown in Table 3H.1-19.

3H.1.5.5.2 Containment Internal Structures

3H.1.5.5.2.1 Diaphragm Floor

Sections 15, 16, and 17, were selected for evaluation of the diaphragm floor. The sections are shown in Figure 3H.1-21. The results of the analysis are shown in Tables 3H.1-15 to 3H.1-19. The maximum stress in the radial rebar was found to be $2.45x10^5$ kPa at Section 15 shown in Table 3H.1-18, whereas the maximum stress in the circumferential rebar was found to be $9.9x10^4$ kPa at Section 17, as shown in Table 3H.1-17. The maximum strain in the liner plate was found to be 0.000848 cm/cm (compressive) as shown in Table 3H.1-19.

3H.1.5.5.2.2 Reactor Pedestal

Sections 19, 20 and 21 were selected for evaluation of the pedestal. These are shown in Figure 3H.1-21. The forces and moments for the load combinations are shown in Tables 3H.1-10 to 3H.1-13. The results of the analysis are shown in Table 3H.1-20. The maximum membrane stress in cylindrical steel plate was found to be $2.07x10^5$ kPa and the maximum shear stress in the stiffener plates was found to be $1.84x10^5$kPa, which are within the allowable stress limits.

3H.1.5.5.3 Reactor Building

Sections 22 through 34 were analyzed for the Reactor Building outside the containment. The sections are shown in Figure 3H.1-21. Sections 22 to 24 were selected for the R/B Outside Wall, Sections 25 to 29 for the spent fuel pool walls and floor and Sections 30 to 34 for the R/B Slabs.

3H.1.5.5.3.1 R/B Outside Walls

These walls resist the lateral soil pressure besides the forces and moments from the other loads. The design lateral soil pressures are shown in Figure 3H.1-11. Out-of-plane moments and shears due to these were calculated at various wall sections and added to forces and moments from other loads before the wall sections were analyzed. The moments and shears due to lateral soil pressure at rest are given in Table 3H.1-21 whereas Table 3H.1-22 gives the resulting moments and shears due to lateral soil pressure during SSE condition.

The maximum rebar stress of $3.75x10^5$ kPa was found in the horizontal rebar at Section 24 as shown in Table 3H.1-18. The maximum vertical rebar stress was found to be $3.61x10^5$kPa, also as shown in Table 3H.1-18.

3H.1.5.5.3.2 Fuel Pool Girders

The maximum stress of $3.39x10^5$ kPa was found in the vertical rebar at Section 29 shown in Table 3H.1-17, whereas the maximum stress of $2.98x10^5$ kPa was found in the horizontal rebar at Section 28 as shown in Table 3H.1-18.

3H.1.5.5.3.3 R/B Floor Slabs

Sections 30 to 32 were selected for the floor slabs at elevations TMSL –1,700, TMSL 4,800 and TMSL 12,300 (see Figure 3H.1-21) at their junction with the Containment Wall. The forces and moments at these sections are shown in Tables 3H.1-10 to 3H.1-13. The resulting rebar and concrete stresses are shown in Tables 3H.1-15 to 3H.1-18. The rebar stresses are within the allowable stress limits. The slabs at elevation TMSL – 1,700 and TMSL 4,800 were also evaluated for buckling under the lateral soil pressure loads and were found to be adequate.

3H.1.5.5.3.4 Steam Tunnel Floors

Sections 33 and 34 were analyzed for the steam tunnel. The pipe break accident pressure load was applied to the steam tunnel wall and floor elements. No thermal gradient was applied across the wall thickness.

The sections are shown in Figure 3H.1-21 The forces and moments are given in Tables 3H.1-10 to 3H.1-13. The rebar and concrete stresses are shown in Tables 3H.1-15 to 3H.1-18. The stresses are all within the allowable limits.

3H.1.5.6 Foundation Stability

The Reactor Building was evaluated for stability against overturning, sliding and floatation. The energy approach was used in calculating the factor of safety against overturning.

The factors of safety against overturning, sliding and floatation are given in Table 3H.1-23. All of these meet the acceptance criteria.

Maximum soil bearing stress was found to be 700.2 kPa due to dead plus live loads which was found to increase to 2336.0 kPa when seismic and other loads are included.

3H.1.5.7 Tornado Missile Evaluation

The minimum thickness required to prevent penetration and concrete spalling was evaluated. The US Army Technical Manual TM-5-855-1 was used to calculate penetration by a tornado missile. This result was doubled to arrive at the minimum spalling thickness. The minimum thickness required is 384 mm and 335 mm for wall and slab respectively, which are less than that provided.

Table 3H.1-1 Equivalent Linear Temperature Distributions at Various Sections*

Section	Side		LOCA (30 min)		IBA/SBA (6 h)	
	T_1	T_2	T_2	T_1	T_2	T_1
			°C	°C	°C	°C
A	Soil	D/W	54.8	13.8	60.2	11.2
B	Soil	S/C Pool	37.1	14.6	41.9	12.4
C	SFP	D/W	60.5	49.3	84.2	37.6
D	Indoor	D/W	47.9	13.1	75.6	1.0
E	Indoor	S/C	38.4	13.0	53.5	6.5
F	Indoor	S/C Pool	37.4	13.6	53.5	6.5
I	S/C	D/W	52.9	36.1	84.8	43.1
M,K	D/S	D/W	49.4	12.6	71.8	2.6
J,L	SFP	D/W	60.8	49.4	81.0	40.4
X	S/C	D/W	52.9	36.1	84.8	43.1

* Note: See Figure 3H.1-3 for the Location of Sections

D/W = Drywell
S/C = Suppression Chamber
D/S = Dryer Separator
SFP = Spent Fuel Pool

Table 3H.1-2 SIT and LOCA Pressure Loads

Event	Pressure, P_a	
	Drywell Pressure, P_D (kPaG)	Supp. Pool Pressure, P_S (kPaG)
SIT (1)	358.90	358.90
SIT (2)	309.90	137.30
LBL (30 min)	309.90	241.25
SBL/IBL (6 hrs)	241.25	206.93

SIT = Structural Integrity Test

LBL = Large Break LOCA

IBL = Intermediate Break LOCA

SBL = Small Break LOCA

Table 3H.1-3 Hydrodynamic Loads

Hydrodynamic Loading	Pressure (kPaD)	Dynamic Load Factor (DLF)
CO	+154.95 to –154.95	1.8
Chugging (CHUG)	+35.99 to –21.18	1.5
SRV	+95.12 to –44.13	1.8

Notes: Load Distribution for Wetwell wetted surfaces are as follows:

Figure 3H.1-4: Condensation Oscillation Loads

Figure 3H.1-5: Chugging Pool Boundary Loads

Figure 3H.1-6: SRV Pool Boundary Loads

Table 3H.1-4 Maximum Vertical Acceleration

Reactor Building Outside RCCV		RCCV		Reactor Shield Wall & RPV Pedestal	
Node No.	**Max. Vert. Accln. (g)**	**Node No.**	**Max. Vert. Accln. (g)**	**Node No.**	**Max. Vert. Accln. (g)**
95	0.63	89	0.72	70	0.43
96	0.52	90	0.67	78	0.43
98	0.47	91	0.64	79	0.42
100	0.43	92	0.58	80	0.41
102	0.39	93	0.43	81	0.40
103	0.34	94	0.34	82	0.39
104	0.32	88	0.31	71	0.38
105	0.31	106	0.31	83	0.37
88	0.31			84	0.34
106	0.31			73	0.34
107	1.22			85	0.33
108	1.56			86	0.32
109	1.88			87	0.31
110	1.04				
111	0.54				
112	0.47				

Note: See Figure 3A-8 for Locations and Node Numbers.

Table 3H.1-5 Load Combinations, Load Factors and Acceptance Criteria for the Reinforced Concrete Containment

Notes:

1. For any load combination, if the effect of any load component, other than D, reduces the combined load, then the load component is deleted from the load combination.
2. Since P_a, P_i, P_s, T_a, SRV and LOCA are time dependent loads, their effects will be superimposed accordingly.
3. S = Allowable stress as in ASME Section III, Division 2, Subarticle CC-3430 for Service Load Combinations.

   U = Allowable stress as in ASME Sections III, Division 2, Subarticle CC-3420 for Factored Load Combinations.

Table 3H.1-5a Selected Load Combinations for the RCCV

No.	Event	Load Combination	Acceptance Criteria
1	SIT (1)	D + L + P_t (1)	S
1*	SIT(2)	D + L + P_t (2)	S
8	LBL (30 min)	D + L + 1.5 (P_a + CO) + T_a	U
8a,8b	IBL/SBL (6 h)	D + L + 1.5 (P_a + CO) + 1.25 SRV + T_a	U
15	LBL (30 min) + SSE	D + L + P_a + CO + T_a + SSE + R_a + Y	U
15a, 15b	IBL/SBL (6 h) + SSE	D + L + P_a + CO + SRV + T_a + SSE	U

P_t = Test Pressure During SIT; P_t (1) indicates test pressures of 358 kPaG in the drywell and wetwell; and P_t (2) indicates test pressures of 310 kPaG and 138 kPaG in the drywell and wetwell, respectively.

P_a, T_a, R_a = Containment Pressure, Temperature and Pipe Support reaction loads associated with the LOCA.

Y = Local effects on the containment due to DBA. These include Y_r (restraint reaction), Y_J (jet impingement) and Y_m (missile impact). These are to be considered only for those events which are not eliminated through application of Leak-Before-Break (LBB).

S = Allowable stress as in ASME Section III, Division 2, Subarticle CC-3430 for Service Load Combinations.

U = Allowable stress as in ASME Section III, Division 2, Subarticle CC-3420 for Factored Load Combinations.

Table 3H.1-5b Selected Load Combinations for the Reactor Building

	Concrete Structures Including Fuel Pool Girders	
Event	**Load Combination**	**Acceptance Criteria**
	1.4D + 1.7L	U
	$D + L + T_o + R_o + SRV + W_t$	U
	$D + L + P_t$ (1)	
LBL (30 min)	$D + L + 1.5 (P_a + CO) + T_a$	U
LBL/SBL (6 h)	$D + L + 1.5 (P_a + CO) + \ + 1.25 SRV + T_a$	U
LBL (30min) + SSE	$D + L + P_a + CO + T_a + SSE + R_a + Y$	U
IBL/SBL (6 h) + SSE	$D + L + P_a + CO + SRV + T_a + SSE$	U
W_t =	Tornado loading including effect of missile impact.	
R_o =	Pipe reaction during normal operating condition.	
T_o =	Normal operating thermal load.	
U =	Section strength required to resist design loads based on strength design methods described in ACI-349 Code.	
Note:	L includes lateral earth pressure on the external walls.	

Table 3H.1-6 Results of "Stardyne" Analysis for Unit Drywell Pressure: 6.9 kPa [Pd]

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
1	RCCV Wetwell Bottom	1	185.18	-7.18E+02	2.06E+04	-4.06E+02	-1.49E+03	-7.79E+03	6.32E+00	1.05E+01	1.94E+03
		5	225.80	-3.43E+02	2.13E+04	-1.45E+03	-1.45E+03	-7.78E+03	5.09E+01	1.75E+00	1.87E+03
		9	265.09	2.06E+02	1.98E+04	-1.82E+02	-1.82E+02	-7.83E+03	1.64E+01	-3.5E+00	1.82E+03
2	RCCV Wetwell Mid-Height	37	185.18	-8.73E+02	2.23E+04	-3.62E+02	-2.12E+02	-1.11E+03	8.63E+00	-3.5E+00	-5.88E+02
		41	225.80	-10.52E+02	2.08E+04	-2.54E+03	5.31E+01	-7.80E+02	7.98E+01	1.40E+01	-7.37E+02
		45	265.09	.21E-02	1.76E+04	-4.11E+02	-2.63E+02	-9.77E+02	8.72E+00	-1.92E+01	-7.58E+02
3	RCCV Wetwell Top	91	185.18	1.95E+04	2.12E+04	7.19E+02	1.83E+03	1.21E+04	-7.21E+01	-3.85E+01	5.53E+03
		95	225.80	1.68E+04	2.24E+04	-3.28E+03	1.83E+03	1.06E+04	-6.06 E+01	-1.15E+02	4.93E+03
		99	265.09	1.72E+04	1.32E+04	-7.23E+02	1.88E+03	1.03E+04	-1.70E+01	-1.40E+01	4.99E+03
4	RCCV Drywell Bottom	109	185.18	2.71E+04	4.25E+04	2.28E+03	-3.14E+03	-9.96E+03	-1.37E+02	-8.75E+00	9.70E+03
		113	225.80	2.49E+04	4.75E+04	-5.96E+03	-2.50E+03	-1.02E+04	-1.10E+02	-8.22E+01	1.20E+04
		117	265.09	2.48E+04	3.50E+04	-9.54E+02	-2.29E+03	1.03E+04	-4.07E+01	7.00E+00	1.21E+04
5	RCCV Drywell Mid-Height	127	185.18	2.64E+04	3.08E+04	2.75E+03	-4.97E+02	2.99E+03	4.45E+01	5.25E+01	-2.66E+03
		131	225.80	2.48E+04	4.72E+04	-7.30E+03	1.35E+03	8.62E+03	2.58E+02	9.80E+01	-5.95E+02
		135	265.09	2.46E+04	3.34E+04	-7.03E+02	1.89E+03	9.10E+03	-4.83E+01	-7.00E+01	-4.04E+02

Table 3H.1-6 Results of "Stardyne" Analysis for Unit Drywell Pressure: 6.9 kPa [Pd] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
6	RCCV Drywell Top	163	185.18	1.78E+04	2.74E+04	2.30E+03	-6.69E+03	-3.35E+04	5.06E+01	-2.03E+02	-1.55E+04
		167	225.80	1.09E+04	3.99E+04	-9.49E+03	-8.97E+03	-4.0E+04	6.65E+02	-3.06E+02	-2.01E+04
		171	265.09	8.55E+03	3.04E+04	-1.07E+03	-6.79E+03	-3.60E+04	1.47E+02	5.07E+01	-1.91E+04
7	RCCV Top Slab @ RCCV Wall	1616	185.18	1.81E+04	1.58E+04	2.13E+04	1.94E+03	-2.57E+04	1.11E+02	7.35E+01	1.86E+04
		1620	225.81	1.92E+03	3.25E+04	3.25E+04	9.55E+03	-1.70E+04	-4.88E+03	-7.02E+03	3.36E+04
		1624	265.09	3.92E+03	2.00E+04	2.00E+04	1.09E+03	-2.95E+04	6.24E+02	2.45E+02	2.24E+04
8	RCCV Top Slab @ Center	1634	185.18	7.35E+03	9.01E+03	9.01E+03	1.79E+04	1.89E+04	1.01E+03	-2.66E+02	4.80E+03
		1638	225.36	3.29E+03	1.07E+04	1.07E+04	3.05E+04	3.77E+04	2.94E+02	2.88E+02	4.64E+03
		1642	265.00	-7.41E+03	1.86E+04	1.86E+04	1.61E+04	1.90E+04	-6.42E+02	-1.44E+01	2.66E+03
9	RCCV Top Slab @ Drywell Head Opening	1652	185.00	-9.02E+03	-4.04E+03	3.60E+03	2.21E+04	-2.28E+04	1.82E+03	-2.39E+03	2.83E+04
		1656	225.00	3.98E+03	-1.83E+03	2.10E+04	1.43E+03	1.39E+04	1.30E+04	-2.49E+03	1.72E+04
		1660	265.00	-2.33E+04	-2.99E+02	-4.04E+04	2.24E+04	-1.74E+04	-3.95E+03	1.24E+03	2.24E+04
10	Basemat Cavity @ Center	929	270.00	1.92E+04	1.75E+04	1.75E+00	-2.24E+05	-2.17E+05	-5.43E+00	1.40E+01	-3.85E+04
11	Basemat Inside RPV Pedestal	926	192.04	1.83E+04	1.86E+04	8.60E+02	-1.95E+05	-1.9E+05	4.41E+03	-2.57E+03	-1.36E+04
		939	270.00	1.91E+04	1.75E+04	-1.05E+01	-2.09E+05	-1.89E+05	-1.33E+01	5.25E+00	-1.74E+04

Table 3H.1-6 Results of "Stardyne" Analysis for Unit Drywell Pressure: 6.9 kPa [Pd] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
12	Basemat Outside RPV Pedestal	908	185.01	6.55E+03	-2.70E+03	1.33E+02	-1.04E+05	-1.27E+05	9.68E+01	-1.30E+03	-4.40E+04
		912	225.00	7.37E+03	-3.42E+03	7.97E+02	-1.08E+05	-1.24E+05	-1.50E+03	-1.94E+02	-4.38E+04
		916	264.99	8.04E+03	-4.10E+03	1.30E+02	-1.07E+05	-1.24E+05	-2.50E+02	-1.75E+01	-4.27E+04
13	Basemat Between RCCV & RPV Pedestal	890	185.18	3.80E+03	2.10E+01	1.19E+02	-7.45E+04	-1.74E+04	-4.09E+02	9.81E+01	3.10E+04
		894	225.36	4.76E+03	-7.70E+02	8.21E+02	-7.85E+04	-1.65E+04	-5.13E+02	-7.32E+02	-3.03E+04
		898	265.00	5.57E+03	-1.37E+03	9.98E+01	-7.85E+04	-1.85E+04	1.93E+02	-4.55E+01	-2.96E+04
14	Basemat Inside RCCV	872	185.18	2.81E+03	1.01E+03	5.25E+01	-3.97E+04	4.53E+04	-5.50E+02	-1.77E+02	-2.41E+04
		876	225.81	3.86E+03	2.61E+02	9.74E+02	-4.55E+04	4.59E+04	8.62E+01	2.91E+02	-2.36E+04
		880	265.09	4.76E+03	-2.10E+02	8.76E+01	-4.45E+04	3.99E+04	5.41E+02	-1.51E+02	2.25E+04
15	S/P Slab @ RPV	1376	185.01	1.67E+04	1.11E+03	-1.51E+02	5.08E+01	-2.54E+03	-1.01E+02	-1.03E+02	1.84E+04
		1380	225.00	1.59E+04	1.87E+03	-1.36E+03	1.00E+01	-2.73E+03	-1.05E+02	1.49E+02	1.82E+04
		1384	264.99	1.52E+04	2.11E+03	-3.36E+02	8.30E+01	-2.61E+03	-1.72E+01	-5.43E+01	1.82E+04
16	S/P Slab @ Center	1358	185.18	1.27E+04	4.22E+03	-3.03E+02	-6.49E+03	-1.92E+04	2.13E+01	8.76E+00	-5.45E+03
		1362	225.36	1.18E+04	5.17E+03	-9.18E+02	-6.35E+03	-1.90E+04	-2.03E+02	-2.52E+02	-5.64E+03
		1366	265.00	1.18E+04	6.08E+03	-1.52E+02	-6.50E+03	-1.90E+04	-3.40E+01	-1.93E+01	-5.59E+03
17	S/P Slab @ RCCV	1340	185.18	1.22E+04	5.29E+03	-4.01E+02	1.65E+03	1.75E+04	-1.47E+01	5.43E+01	-1.91E+04
		1344	225.81	1.08E+04	6.80E+03	-2.61E+02	1.94E+03	1.82E+04	-8.68E+01	1.02E+02	-1.93E+04
		1348	265.09	1.18E+04	7.72E+03	-1.21E+02	1.78E+03	1.81E+04	-1.21E+01	-1.23E+01	-1.93E+04

Table 3H.1-6 Results of "Stardyne" Analysis for Unit Drywell Pressure: 6.9 kPa [Pd] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
18	Basemat Outside RCCV	946	185.18	6.50E+02	2.66E+03	8.06E+01	5.52E+04	-2.14E+04	6.09E+03	-2.64E+03	2.36E+02
		982	227.93	3.03E+03	-6.55E+02	6.29E+02	-2.24E+04	4.85E+04	-1.49E+04	-9.37E+02	-9.81E+02
		986	265.09	4.13E+03	-9.18E+02	-5.60E+02	-2.57E+04	4.58E+04	6.49E+03	6.51E+02	-7.36E+01
19	RPV Pedestal Bottom	199	185.01	1.44E+04	-3.75E+04	-3.87E+02	-2.15E+03	-1.08E+04	1.41E+01	1.58E+01	8.81E+03
		204	235.01	1.46E+04	-3.63E+04	-1.44E+02	-2.15E+03	-1.07E+04	-1.83E+01	-1.40E+01	8.79E+03
		208	275.01	1.47E+04	3.61E+04	7.01E+00	-2.14E+03	-1.06E+04	3.69E+00	1.05E+01	8.74E+03
20	RPV Pedestal Center	235	185.01	4.69E+04	-3.63E+04	3.55E+02	8.41E+02	4.22E+03	8.90E+02	-1.58E+01	-8.51E+02
		240	235.01	4.69E+04	-3.64E+04	-6.48E+01	8.05E+02	4.12E+03	-3.11E+00	8.76E+00	-8.83E+02
		244	275.01	4.69E+04	-3.66E+04	-1.33E+02	8.41E+02	4.11E+03	5.34E+01	-7.01E+00	8.98E+02
21	RPV Pedestal Top	289	185.01	3.56E+04	-3.68E+04	-1.63E+02	-6.63E+03	-2.50E+04	2.04E+02	1.21E+03	-3.87E+03
		294	235.01	3.38E+04	-3.71E+04	1.24E+03	-4.67E+03	-2.48E+04	-3.59E+02	-6.36E+02	-3.54E+03
		298	275.01	3.29E+04	-3.73E+04	-7.02E+02	-3.67E+03	-2.50E+04	1.39E+02	1.06E+03	-3.45E+03
22	R/B Outside Wall @ Base	397	183.86	1.23E+05	-5.94E+02	-2.08E+02	-2.53E+02	-1.07E+03	-1.64E+01	1.75E+01	1.45E+02
		404	221.17	-1.91E+02	-1.30E+03	-2.82E+02	9.30E+01	-1.30E+02	-6.98E+01	6.48E+01	8.06E+01
		405	224.57	-1.58E+02	-1.36E+03	7.36E+01	1.05E+02	-1.25E+02	3.37E+01	-7.18E+01	8.05E+01
		410	242.10	1.77E+02	-3.06E+02	3.91E+02	-2.17E+02	-1.01E+03	1.53E+02	-3.50E+01	2.10E+02
		415	267.23	4.03E+02	9.11E+01	-1.40E+01	-3.99E+02	-1.80E+03	2.11E+01	4.77E+01	3.92E+02

Table 3H.1-6 Results of "Stardyne" Analysis for Unit Drywell Pressure: 6.9 kPa [Pd] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
23	R/B Outside Wall @ Center	508	183.86	3.40E+02	7.71E+01	-3.85E+01	3.99E+01	3.51E+01	1.22E+01	2.63E+01	2.57E+02
		511	204.28	1.14E+02	3.33E+01	2.19E+02	-1.42E+01	-1.48E+02	1.15E+02	1.05E+01	1.51E+02
		516	224.57	-1.24E+02	-1.17E+03	-5.04E+02	7.38E+01	-5.96E+01	-2.20E+01	-6.3E+01	-4.2E+01
		521	242.10	2.71E+02	5.08E+01	-6.74E+02	5.78E+01	-2.75E+02	-1.51E+02	8.76E+00	-2.8E+01
24	R/B Outside Wall @ Grade	689	183.86	9.98E+02	-4.73E+02	-9.1E+01	3.52E+01	-3.19E+02	-2.17E+01	-2.1E+01	3.85E+01
		693	209.68	8.35E+02	-3.01E+02	-3.51E+02	-5.07E+01	-8.76E+01	-4.23E+00	7.88E+01	1.93E+01
		696	221.17	1.75E+02	-7.00E+00	-3.08E+02	-4.80E+01	1.07E+01	-2.13E+01	-3.15E+01	-2.45E+01
		701	237.99	7.62E+02	1.23E+02	3.47E+02	1.01E+01	1.10E+02	1.95E+01	-5.25E+00	-8.23E+01
		707	267.23	1.96E+03	6.13E+01	2.66E+02	1.17E+02	1.94E+02	2.53E+01	1.23E+01	-1.02E+02
25	Fuel Pool Wall @ Base	2561	184.31	1.42E+03	7.22E+02	-1.31E+02	2.61E+02	-3.50E+02	-1.18E+02	9.11E+01	-6.83E+01
		2562	192.75	5.36E+02	-6.62E+02	-2.28E+02	-2.63E+01	2.03E+02	-1.87E+02	3.54E+02	-4.31E+02
26	Fuel Pool Slab @ Center	3153	186.10	-3.50E+03	4.94E+03	-1.35E+03	2.05E+03	-3.02E+03	6.23E+02	-7.22E+02	-2.38E+02
		3158	197.05	-7.19E+03	4.27E+03	-5.62E+03	2.99E+03	9.30E+02	1.16E+03	-2.15E+02	-2.52E+03
27	Fuel Pool Girder @ Drywell Head Opening	2742	295.00	6.58E+03	-2.45E+04	-2.24E+04	6.76E+03	4.72E+04	3.76E+03	-4.96E+03	-1.32E+04
		2826	295.00	7.43E+04	3.71E+03	-1.35E+02	1.20E+03	4.94E+03	-7.96E+-3	-1.40E+03	-5.31E+03

Table 3H.1-6 Results of "Stardyne" Analysis for Unit Drywell Pressure: 6.9 kPa [Pd] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
28	Fuel Pool Girder @ RCCV Wall	2733	208.92	1.26E+04	4.98E+04	6.89E+03	1.28E+-3	3.25E+02	-4.94E+02	4.8E+02	6.73E+02
		2856	208.92	-1.40E+04	9.57E+03	1.41E+04	1.35E+03	9.23E+02	1.43E+03	-6.52E+02	-5.75E+02
29	Fuel Pool Girder @ Deep End	2567	199.68	8.10E+02	-4.23E+02	7.14E+03	-1.18E+03	-2.38E+03	8.81E+01	-2.43E+02	5.32E+02
		2655	199.68	9.01E+04	-1.35E+03	4.16E+03	-9.12E+02	-1.36E+03	-5.96E+02	7.0E+00	2.22E+02
		2730	199.68	6.05E+04	-2.03E+03	-2.65E+03	-6.76E+02	-1.01E+03	-1.22E+03	3.18E+02	1.06E+02
		2815	199.68	7.21E+03	-7.12E+02	-4.27E+03	6.23E+02	-4.34E+02	-1.76E+03	1.59E+03	1.06E+02
30	R/B Floor @ El-21.98 ft. @ RCCV	1086	185.18	7.91E+02	-1.73E+03	2.27E+02	-4.49E+02	-1.20E+02	-3.87E+01	-4.51E+02	-1.75E+00
		1109	213.85	9.01E+02	-1.67E+03	1.69E+02	-3.23E+02	-8.41E+01	5.78E+01	-1.19E+02	6.47E+01
		1125	265.09	-1.04E+03	1.23E+03	2.38E+02	-1.14E+02	-4.80E+02	-1.60E+01	-5.25E+01	-4.97E+02
31	R/B Floor @ El-0.67 ft. @ RCCV	1215	185.18	-2.97E+02	3.62E+02	-1.1E+02	-3.60E+02	-8.76E+01	-2.87E+01	-2.99E+02	-1.22E+01
		1239	213.85	-7.7E+02	2.38E+02	7.35E+01	-2.32E+02	5.25E+01	4.71E+01	-8.05E+01	5.25E+01
		1251	265.09	6.47E+02	-2.8E+02	-1.87E+02	-7.47E+01	-3.29E+02	-1.30E+01	-4.02E+01	-3.29E+02
32	R/B Floor @ El-23.95 ft. @ RCCV	1400	354.82	-7.22E+03	7.80E+03	1.45E+03	1.47E+03	-1.56E+02	-1.15E+02	-7.78E+02	2.43E+02
		1426	326.15	-4.58E+03	6.28E+03	-1.43E+03	1.15E+03	2.25E+02	3.53E+01	3.64E+02	4.11E+02
		1442	274.91	7.36E+03	-3.93E+03	9.97E+02	-1.20E+02	1.01E+03	-7.5E+01	-1.03E+02	8.05E+01
		2484	331.09	-4.83E+03	1.75E+04	1.05E+04	2.30E+02	-1.17E+03	-2.08E+02	-4.21E+02	1.27E+03
		2544	331.09	-9.53E+03	2.38E+04	4.67E+03	8.18E+02	1.29E+03	-2.56E+02	-3.85E+02	4.53E+02

Table 3H.1-6 Results of "Stardyne" Analysis for Unit Drywell Pressure: 6.9 kPa [Pd] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
33	Steam Tunnel Floor	1403	354.77	-2.77E+03	2.36E+03	7.73E+02	4.39E+02	-4.01E+02	-1.40E+02	1.13E+02	-9.45E+01
		1417	345.29	-3.51E+03	1.80E+03	2.53E+03	7.61E+02	4.80E+02	-2.73E+02	-2.46E+02	-3.32E+02
		2487	340.93	-2.24E+03	6.26E+02	-4.98E+03	-2.77E+02	-6.14E+02	-1.42E+01	1.20E+02	4.21E+02
		2547	340.93	1.03E+03	1.92E+03	-6.03E+03	-3.89E+01	4.49E+02	6.27E+01	3.85E+01	3.62E+02
34	Steam Tunnel Roof	1673	356.34	3.95E+02	3.27E+03	3.88E+02	1.43E+03	-3.72E+02	-3.88E+02	1.22E+03	-5.25E+00
		1695	337.09	1.23E+03	4.84E+02	6.44E+02	1.19E+01	4.94E+01	3.47E+00	-1.22E+01	1.05E+01
		1745	265.90	7.17E+02	-5.67E+02	-2.45E+02	-5.74E+00	6.81E+00	-8.9E+01	1.4E+01	1.75E+00
		1750	301.04	4.28E+02	5.28E+02	9.13E+02	7.65E+00	1.68E+01	-1.08E+01	8.75E+01	1.23E+01
		1754	319.38	1.17E+02	4.84E+02	2.8E+01	2.4E+01	-3.29E+01	2.09E+00	1.75E+01	1.75E+00

Table 3H.1-7 Results of "Stardyne" Analysis for Unit Wetwall Pressure: 6.9 kPa [Pw]

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
1	RCCV Wetwell Bottom	1	185.18	2.60E+04	2.22E+04	5.25E+01	-2.02E+03	-7.30E+03	3.93E+01	-1.93E+01	5.97E+03
		5	225.80	2.64E+04	2.41E+04	5.18E+02	-2.45E+03	-7.36E+03	-1.04E+02	-1.93E+01	5.92E+03
		9	265.09	2.58E+04	2.34E+04	-4.03E+01	-2.13E+03	-8.19E+03	-3.13E+01	-3.5E+00	6.43E+03
2	RCCV Wetwell Mid–Height	37	185.18	6.41E+04	2.24E+04	3.20E+02	1.52E+02	5.48E+03	-5.18E+00	-2.70E+02	3.87E+03
		41	225.80	6.65E+04	2.31E+04	-1.19E+02	-1.15E+03	5.20E+03	-7.49E+01	1.10E+02	3.91E+03
		45	265.09	6.42E+04	2.46E+04	-4.40E+02	4.71E+02	6.43E+03	-2.38E+03	-2.38E+01	3.89E+03
3	RCCV Wetwell Top	91	185.18	3.12E+04	2.23E+04	-3.68E+01	3.22E+03	-1.25E+04	-5.57E+01	-3.85E+01	-1.12E+04
		95	225.80	3.07E+04	2.41E+04	4.9E+02	-3.65E+03	-1.31E+04	-9.76E+01	-5.6E+01`	-1.13E+04
		99	265.09	2.87E+04	2.48E+04	-1.62E+02	-3.20E+03	-1.42E+04	2.77E+01	3.5E+00	-1.20E+04
4	RCCV Drywell Bottom	109	185.18	8.34E+03	-4.97E+03	-1.57E+02	6.41E+02	4.22E+03	-5.55E+00	-4.03E+01	-4.52E+03
		113	225.80	8.60E+03	-3.23E+03	2.01E+03	8.83E+-2	4.57E+03	-2.95E+02	1.14E+02	-2.98E+03
		117	265.09	8.45E+03	-1.25E+03	4.26E+02	1.08E+03	4.93E+03	-7.01E-01	1.4E+01	-2.84E+03
5	RCCV Drywell Mid–Height	127	185.18	2.33E+03	-4.55E+03	-3.41E+02	-1.41E+03	-6.60E+01	1.54E+01	-8.93E+01	-3.47E+03
		131	225.80	3.09E+03	-2.39E+03	1.80E+03	6.88E+01	-1.71E+03	-3.72E+01	1.80E+-2	-1.45E+03
		135	265.09	4.54E+03	-1.46E+03	3.87E+02	-1.89E+02	-1.32E+02	-6.2E-01	-1.58E+01	-1.65E+03
6	RCCV Drywell Top	163	185.18	9.12E+02	-8.18E+02	-5.13E+01	5.64E+02	4.21E+02	4.21E+00	-1.58E+01	6.53E+02
		167	225.80	4.9E+01	-1.13E+03	-1.19E+02	-1,20E+02	-6.54E+02	2.77E+02	-2.8E+01	5.44E+02
		171	265.09	-2.73E+02	-9.75E+02	2.45E+01	3.51E+02	-1.96E+03	-1.75E+01	7.0E+00	-2.99E+02

Table 3H.1-7 Results of "Stardyne" Analysis for Unit Wetwall Pressure: 6.9 kPa [Pw] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
7	RCCV Top Slab @ RCCV Wall	1616	185.18	1.14E+03	-6.48E+02	-2.87E+02	4.79E+02	8.94E+02	-1.31E+01	-4.9E+01	-3.60E+02
		1620	225.81	6.53E+02	-2.38E+02	-7.18E+01	1.48E+01	-5.07E+01	3.31E+02	2.8E+02	-6.51E+02
		1624	265.09	1.47E+02	6.43E+02	8.06E+01	1.03E+01	-8.22E+01	-4.79E+01	-3.33E+01	2.45E+01
8	RCCV Top Slab @ Center	1634	185.18	8.09E+02	-3.16E+02	-1.73E+02	6.25E+01	-1.56E+02	-6.14E+01	-5.43E+01	-2.77E+02
		1638	225.36	2.17E+02	4.08E+02	-1.19E+02	-5.02E+02	-5.90E+02	2.20E+02	2.29E+02	9.1E+01
		1642	265.00	2.50E+02	4.19E+02	4.72E+01	1.40E+02	-8.50E+01	2.67E+00	1.05E+01	4.2E+01
9	RCCV Top Slab @ Drywell Head Opening	1652	185.00	1.10E+03	6.48E+01	-4.38E+01	-2.16E_02	-2.23E+02	-2.91E+01	2.63E+01	1.49E+02
		1656	225.00	4.39E+02	9.98E+01	-5.78E+01	-1.87E+02	1.51E+02	-7.90E+01	-1.75E+01	-8.93E+01
		1660	265.00	6.88E+02	1.17E+02	3.40E+02	3.21E+02	1.46E+01	1.69E+01	-4.2E+01	-4.73E+01
10	Basemat Cavity @ Center	929	270.00	-3.08E+03	-2.99E+03	-5.25E+00	2.27E+04	2.57E+04	-1.02E+01	3.33E+01	-1.65E+02
11	Basemat Inside RPV Pedestal	926	192.04	-3.08E+03	-3.08E+03	7.88E+01	2.47E+04	2.49E+04	-9.46E+02	-4.92E+02	-4.87E+02
		939	270.00	-3.06E+03	-2.96E+03	02.1E+01	2.37E+04	2.69E+04	-1.83E+01	1.23E+01	-6.97E+02
12	Basemat Outside RPV Pedestal	908	185.01	4.97E+03	1.65E+04	4.03E+01	1.06E+04	6.32E+03	-2.41E+02	3.85E+01	2.15E+04
		912	225.00	5.30E+03	1.63E+04	-7.88E+01	9.94E+03	8.00E+03	01.21E+03	02.97E+01	2.19E+04
		916	264.99	5.10E+03	1.68E+04	-1.51E+02	9.57E+03	9.39E+03	-2.22E+02	-4.55E+01	2.22E+04

Table 3H.1-7 Results of "Stardyne" Analysis for Unit Wetwall Pressure: 6.9 kPa [Pw] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
13	Basemat Between RCCV & RPV Pedestal	890	185.18	7.81E+03	1.37E+04	5.95E+01	2.58E+03	-1.60E+04	-1.60E+02	-2.45E+01	-2.05E+03
		894	225.36	8.30E+03	1.34E+04	7.36E+01	1.41E+03	-1.53E+04	-1.09E+03	-7.88E+01	-1.70E+03
		898	265.00	7.93E+03	1.41E+04	-1.58E+02	7.67E+02	-1.49E+04	-5.27E+01	-8.05E+01	-1.48E+03
14	Basemat Inside RCCV	872	185.18	8.91E+03	1.27E+04	1.40E+01	9.87E+03	2.31E+04	1.29E+02	5.25E+01	-1.73E+04
		876	225.81	9.52E+03	1.21E+04	1.40E+02	8.53E+03	2.31E+04	-8.27E+02	-1.98E+02	-1.71E+04
		880	265.09	9.19E+03	1.32E+04	-2.07E+02	7.90E+04	2.30E+04	8.38E+01	-3.32E+01	-1.70E+04
15	S/P Slab @ RPV	1376	185.01	6.01E+03	1.77E+04	-4.61E+02	-2.62E+03	-5.12E+03	1.57E+02	1.35E+02	-2.24E+04
		1380	225.00	4.90E+03	1.77E+04	-2.46E+03	-2.71E+03	-5.12E+03	7.03E+00	-4.03E+01	-2.22E+04
		1384	264.99	2.86E+03	1.89E+04	-6.29E+02	-2.75E+03	-5.30E+03	2.65E+01	9.46E+01	-2.22E+04
16	S/P Slab @ Center	1358	185.18	9.60E+03	1.39E+04	-1.58E+02	5.66E+03	2.21E+04	-1.97E+01	8.75E-00	2.68E+03
		1362	225.36	8.83E+03	1.45E+04	-1.94E+03	5.64E+03	2.20E+04	1.18E+02	2.05E+02	2.73E+03
		1366	265.00	7.14E+03	1.63E+04	-6.70E+02	5.60E+03	2.22E+04	1.20E+01	1.58E+01	2.66E+03
17	S/P Slab @ RCCV	1340	185.18	9.93E+03	1.26E+04	-8.05E+01	-1.21E+03	-1.37E+04	-1.83E+01	5.25E+00	2.05E+04
		1344	225.81	9.46E+03	1.30E+04	-1.66E+03	-1.17E+03	-1.34E+04	-9.97E+01	1.58E+01	2.03E+04
		1348	265.09	8.42E+03	1.53E+04	-6.03E+02	-1.14E+03	-1.32E+04	-2.64E+01	1.05E+01	2.03E-04

Table 3H.1-7 Results of "Stardyne" Analysis for Unit Wetwall Pressure: 6.9 kPa [Pw] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
18	Basemat Outside RCCV	946	185.18	4.9E+01	6.15E+03	-5.44E+92	2.51E+03	6.13E+03	-8.85E+02	-1.41E+03	-5.29E+02
		982	227.93	5.99E+03	1.12E+02	1.92E+03	4.12E+93	4.07E+02	2.29E+02	-2.35E+02	3.87E+02
		986	265.09	6.58E+03	2.31E+02	-9.81E+02	4.05E+03	-9.03E+02	-4.21E+02	1.52E+02	-9.53E+02
19	RPV Pedestal Bottom	199	185.01	-1.55E+04	4.12E+04	.00	9.79E+01	4.89E+03	-1.90E+00	-1.41E+01	-6.08E+03
		204	235.01	-1.54E+04	4.12E+04	-3.60E+02	1.01E+03	5.03E+03	-5.46E+00	2.1E+01	-6.15E+03
		208	275.01	1.54E+04	4.19E+04	-1.57E+01	1.02E+03	5.16E+03	9.7E-01	-1.05E+01	-6.20E+03
20	RPV Pedestal Center	235	185.01	-4.76E+04	4.19E+04	1.90E+02	-5.20E+02	-2.74E+03	-2.66E-01	1.58E+01	2.29E+02
		240	235.01	-4.76E+04	4.12E+04	-6.79E+02	-5.65E+02	-2.92E+03	-5.06E+00	-5.08E+01	1.87E+02
		244	275.01	-4.76E+04	4.10E+04	1.71E+02	-6.58E+02	-3.03E+03	-4.88E-01	3.15E+01	1.70E+02
21	RPV Pedestal Top	289	185.01	-4.31E+03	4.29E+04	5.81E+02	3.60E+03	2.90E+04	-3.48E+02	-7.40E+02	1.16E+04
		294	235.01	-7.34E+03	4.20E+04	6.31E+02	6.67E+03	2.89E+04	-2.90E+02	1.71E+03	1.18E+04
		298	275.01	-5.14E+03	4.17E+04	2.8E+02	8.50E+03	2.90E+04	4.16E+00	-9.02E+02	1.21E+04
22	R/B Outside Wall @ Base	397	183.86	2.56E+03	1.02E+03	7.7E+01	-2.39E+02	-1.86E+01	3.81E+01	1.92E+01	9.05E+02
		404	221.17	1.21E+02	1.46E+03	6.54E+02	-3.23E+02	-3.91E+02	1.09E+02	1.57E+01	5.77E+01
		405	224.57	1.96E+02	1.37E+03	-1.31E+03	-2.94E+02	-3.49E+02	-1.10E+02	5.25E+00	5.25E+00
		410	242.10	2.22E+03	7.89E+02	-1.73E+03	-3.95E+02	-1.42E+03	-4.19E+02	-1.05E+02	5.28E+02
		415	267.23	4.16E+03	8.38E+02	-1.45E+02	-1.99E+02	-2.52E+03	-5.96E+01	7.88E+01	1.26E+03

Table 3H.1-7 Results of "Stardyne" Analysis for Unit Wetwall Pressure: 6.9 kPa [Pw] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
23	R/B Outside Wall @ Center	508	183.86	5.67E+03	1.12E+03	04.7E+03	8.01E+02	1.99E+03	-1.59E+02	2.1E+02	5.25E+00
		511	204.28	3.34E+03	1.28E+03	-4.02E+01	2.59E+02	1.39E+03	-1.08E+02	-6.1E+01	9.4E+-1
		516	242.57	1.00E+03	3.85E+03	06.05E+02	-9.17E+02	1.20E+02	2.57E+01	4.86E+02	1.75E+02
		521	242.10	3.65E+03	2.01E+02	-5.72E+02	1.45E+02	1.43E+03	1.42E+03	2.13E+02	8.75E+00
24	R/B Outside Wall @ Grade	689	183.86	1.29E+03	1.11E+03	7.7E+01	-6.63E+01	-4.54E+02	-1.94E+01	-1.75E+01	1.06E+02
		693	209.68	4.15E+02	1.27E+03	-8.62E+02	4.21E+01	-8.01E+01	6.27E+00	8.75E+00	-6.3E+01
		696	221.17	-1.4E+02	2.74E+02	-3.85E+02	1.98E+01	-2.96E+01	6.27E+00	3.15E+01	1.22E+01
		701	237.99	4.32E+02	3.60E+02	5.89E+02	2.98E+01	-6.81E+01	6.68E+00	1.22E+01	-1.75E+02
		707	267.23	1.18E+03	1.4E+02	3.69E+02	4.25E+01	1.06E+02	-1.65E+01	5.42E+01	-1.12E+02
25	Fuel Pool Wall @ Base	2561	184.31	1.05E+03	1.83E+02	-1.19E+02	6.99E+02	1.55E+03	1.89E+01	2.62E+01	-5.40E+02
		2562	192.75	6.09E+02	2.59E+02	-2.06E+02	9.48E+01	1.15E+03	-2.87E+01	-3.60E+02	-4.86E+02
26	Fuel Pool Slab @ Center	3153	186.10	-2.20E+03	-6.12E+01	-7.33E+02	1.38E+03	1.3E+03	-1.02E+02	7.68E+02	3.74E+02
		3158	197.05	-3.76E+03	-1.96E+02	1.94E+03	1.25E+03	9.08E+01	-6.90E+02	3.65E+02	7.14E+02
27	Fuel Pool Girder @ Drywell Head Opening	2742	295.00	2.59E+03	1.05E+02	–5.80E+02	–2.27E+02	–1.50E+02	–1.75E+02	–3.85E–01	2.28E+03
		2826	295.00	5.66E+03	0.89E+02	–3.31E+02	–2.56E+02	–7.48E+01	–1.85E+02	9.81E+01	–1.33E+02

Table 3H.1-7 Results of "Stardyne" Analysis for Unit Wetwall Pressure: 6.9 kPa [Pw] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
28	Fuel Pool Girder @ RCCV Wall	2733	208.92	3.29E+03	–2.63E+03	1.96E+02	–4.23E+01	1.09E+01	5.03E+01	–2.10E+01	7.00E+00
		2856	208.92	7.39E+03	–4.75E+02	1.05E+03	–1.30E+02	–2.18E+01	1.81E+02	–1.28E+02	–8.40E+01
29	Fuel Pool Girder @ Deep End	2567	199.68	–2.05E+03	–4.33E+02	3.45E+03	–5.12E+01	3.87E+02	–1.58E+02	4.55E+01	–1.14E+02
		2655	199.68	–2.73E+02	–4.15E+02	3.90E+03	–8.01E+01	9.75E+01	–3.56E+01	1.80E+02	–5.95E+01
		2730	199.68	1.72E+03	–9.46E+01	3.64E+03	–4.76E+01	–1.14E+02	–1.68E+01	1.10E+02	–1.23E+01
		2815	199.68	4.50E+03	2.63E+01	1.75E+03	–3.73E+01	–8.59E+01	–1.19E+02	1.91E+02	3.68E+01
30	R/B Floor @ El–21.98 ft. @ RCCV	1086	185.18	–1.30E+04	1.01E+04	–3.55E+03	–1.05E+02	–6.72E+00	–1.51E+01	–6.65E+01	2.63E+01
		1109	213.85	–1.45E+04	1.16E+04	2.71E+03	–1.27E+02	4.45E–01	2.08E+01	–2.45E+01	2.10E+01
		1125	265.09	1.05E+04	–1.36E+04	–2.59E+03	–1.35E+01	–1.88E+02	–7.5E+00	–1.58E+01	–1.45E+02
31	R/B Floor @ El–0.67 ft. @ RCCV	1215	185.18	–1.01E+04	9.81E+03	–2.68E+03	4.05E+02	9.52E+01	3.06E+01	2.99E+02	1.23E+01
		1239	213.85	–1.10E+04	1.00E+04	2.36E+03	2.72E+02	5.61E+01	–4.04E+01	6.83E+01	–5.43E+01
		1251	265.09	8.97E+03	–1.10E+04	–2.17E+03	1.05E+02	5.21E+02	1.73E+01	6.48E+01	5.45E+02
32	R/B Floor @ El–23.95 ft. @ RCCV	1400	354.82	–4.80E+03	6.09E+03	1.03E+03	1.94E+03	7.38E+02	–1.91E+02	–1.05E+03	6.12E+01
		1426	326.15	–2.40E+03	3.79E+03	–3.43E+03	7.65E+02	3.07E+02	7.92E+01	–2.28E+02	–2.18E+02
		1442	274.91	5.34E+03	–1.40E+03	1.08E+03	5.87E+02	2.64E+03	2.71E+00	–5.95E+01	2.45E+02
		2484	331.09	–3.73E+03	–3.39E+03	–7.17E+03	1.37E+02	5.38E+02	–1.02E+02	–1.57E+01	–4.09E+02
		2544	331.09	–5.88E+03	–2.34E+03	–6.75E+03	–4.00E+01	–1.26E+01	–9.35E+01	2.46E+02	1.92E+01

Table 3H.1-7 Results of "Stardyne" Analysis for Unit Wetwall Pressure: 6.9 kPa [Pw] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
33	Steam Tunnel Floor	1403	354.77	–8.74E+02	3.13E+03	6.46E+02	–6.72E+02	–5.70E+02	8.94E+01	–3.53E+02	–1.38E+02
		1417	345.29	–4.92E+02	2.15E+03	2.29E+03	2.57E+01	2.10E+02	1.14E+02	7.0E+01	–5.54E+02
		2487	340.93	–3.83E+02	7.22E+02	–5.04E+03	–2.69E+02	–4.54E+02	1.23E+01	–3.5E+01	3.16E+02
		2547	340.93	–2.81E+02	1.15E+03	–5.53E+03	–7.43E+01	2.61E+02	–5.70E+01	–4.55E+01	2.24E+02
34	Steam Tunnel Roof	1673	356.34	8.03E+02	7.68E+02	–1.47E+02	–2.56E+02	8.10E+01	6.94E+01	–1.56E+02	1.05E+01
		1695	337.09	1.59E+02	3.60E+02	2.53E+02	9.35E–01	1.99E+01	1.42E+00	–3.5E+00	2.1E+01
		1745	265.90	–6.12E+01	1.45E+02	1.22E+02	1.38E+01	–1.76E+01	1.46E+01	4.9E+01	–7.0E+00
		1750	301.04	4.72E+01	1.97E+02	2.27E+01	–5.83E+00	–5.47E+00	5.07E+00	1.75E+00	–7.0E+00
		1754	319.38	5.95E+01	1.26E+02	9.8E+01	1.60E+01	2.42E+01	3.87E+00	1.05E+01	1.75E+00

Table 3H.1-8 Results of "Stardyne" Analysis for Safe Shutdown Earthquake (SSE) SRSS of Three Components [Ess]

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
1	RCCV Wetwell Bottom	1	185.18	3.08E+06	1.00E+07	5.28E+06	4.05E+05	2.15E+06	1.83E+05	5.22E+04	9.50E+05
		5	225.80	3.50E+06	1.14E+07	6.44E+06	4.22E+05	2.28E+08	2.37E+05	9.16E+04	1.02E+06
		9	265.09	3.36E+06	1.04E+07	7.18E+06	–3.56E+05	2.25E+08	2.85E+05	5.90E+04	1.03E+06
2	RCCV Wetwell Mid–Height	37	185.18	4.88E+05	8.04E+06	6.27E+06	8.60E+04	3.63E+05	1.97E+05	3.26E+04	5.56E+04
		41	225.80	3.00E+05	8.33E+06	6.62E+06	1.49E+05	6.47E+05	2.47E+05	7.35E+04	1.85E+05
		45	265.09	4.92E+05	7.94E+06	6.89E+06	3.49E+05	7.28E+05	2.18E+05	1.78E+05	2.02E+05
3	RCCV Wetwell Top	91	185.18	8.50E+05	6.53E+06	5.90E+06	1.39E+05	4.36E+05	1.89E+05	3.69E+04	2.61E+05
		95	225.80	1.07E+06	5.97E+06	6.66E+06	3.19E+04	5.94E+05	2.31E+05	5.72E+04	3.15E+05
		99	265.09	7.73E+05	5.23E+06	6.43E+06	2.26E+05	9.00E+05	1.43E+05	2.45E+04	3.81E+05
4	RCCV Drywell Bottom	109	185.18	1.83E+06	5.88E+06	5.37E+06	1.25E+05	5.11E+05	2.28E+05	6.11E+04	1.31E+06
		113	225.80	1.70E+06	4.91E+06	6.21E+06	3.94E+05	7.93E+05	3.20E+05	8.88E+04	3.29E+05
		117	265.09	4.53E+05	4.08E+06	5.26E+06	2.19E+05	1.12E+06	1.18E+05	2.41E+04	4.17E+05
5	RCCV Drywell Mid–Height	127	185.18	2.80E+06	5.83E+06	5.36E+06	5.77E+05	3.63E+06	2.13E+05	9.45E+04	1.73E+06
		131	225.80	2.69E+06	4.27E+06	5.97E+06	4.30E+05	2.27E+05	2.84E+05	9.21E+04	3.61E+05
		135	265.09	7.82E+05	3.10E+06	4.85E+06	5.74E+04	1.25E+05	1.76E+05	9.01E+04	4.88E+05

Table 3H.1-8 Results of "Stardyne" Analysis for Safe Shutdown Earthquake (SSE) SRSS of Three Components [Ess] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
6	RCCV Drywell Top	163	185.18	2.19E+06	2.21E+05	3.47E+06	3.45E+05	8.37E+05	1.14E+05	7.86E+04	7.70E+05
		167	225.80	2.65E+06	2.46E+06	4.04E+06	4.71E+05	2.21E+06	1.19E+05	7.47E+04	8.47E+05
		171	265.09	2.56E+06	1.48E+06	3.87E+06	4.48E+05	2.33E+06	1.90E+05	8.18E+04	9.77E+05
7	RCCV Top Slab @ RCCV Wall	1616	185.18	2.53E+06	1.05E+06	1.32E+06	2.57E+05	8.01E+05	7.49E+04	2.03E+05	2.10E+05
		1620	225.81	2.71E+06	8.96E+05	1.44E+06	8.22E+05	7.06E+05	5.58E+05	7.31E+05	2.09E+06
		1624	265.09	2.71E+06	3.22E+05	1.36E+06	2.67E+05	1.87E+06	1.97E+05	7.67E+04	1.03E+06
8	RCCV Top Slab @ Center	1634	185.18	1.66E+06	6.86E+05	1.33E+06	2.80E+05	3.49E+05	2.99E+05	2.17E+05	1.88E+05
		1638	225.36	2.15E+06	6.21E+05	1.76E+06	1.88E+06	2.56E+06	5.70E+06	3.69E+05	7.13E+05
		1642	265.00	2.02E+06	4.02E+05	1.24E+06	5.58E+05	1.86E+06	1.01E+05	1.76E+05	1.06E+06
9	RCCV Top Slab @ Drywell Head Opening	1652	185.00	5.76E+05	1.82E+05	6.09E+05	3.28E+05	1.74E+05	4.04E+05	5.21E+04	1.36E+05
		1656	225.00	9.00E+05	1.07E+06	6.48E+05	2.67E+05	3.00E+05	2.20E+05	2.61E+05	2.22E+05
		1660	265.00	1.97E+06	1.83E+05	2.93E+05	5.22E+05	6.01E+05	1.61E+05	1.03E+05	2.44E+05
10	Basemat Cavity @ Center	929	270.00	3.55E+05	2.00E+05	3.48E+05	8.24E+06	8.25E+06	4.38E+05	2.63E+06	2.66E+06

Table 3H.1-8 Results of "Stardyne" Analysis for Safe Shutdown Earthquake (SSE) SRSS of Three Components [Ess] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
11	Basemat Inside RPV Pedestal	926	192.04	1.84E+06	1.39E+06	7.83E+05	1.48E+07	1.50E+07	1.24E+06	1.68E+06	3.62E+06
		939	270.00	1.45E+06	2.04E+05	1.38E+06	1.13E+07	1.23E+07	8.28E+04	9.95E+05	2.82E+06
12	Basemat Outside RPV Pedestal	908	185.01	1.83E+06	1.27E+06	1.50E+06	7.82E+06	1.37E+07	4.53E+06	1.60E+06	3.66E+06
		912	225.00	2.76E+06	3.16E+05	2.82E+05	7.26E+06	1.42E+07	4.50E+06	3.29E+05	3.13E+06
		916	264.99	2.20E+06	1.40E+06	1.11E+04	7.53E+06	1.31E+07	5.03E+06	2.02E+05	2.61E+06
13	Basemat Between RCCV & RPV Pedestal	890	185.18	2.48E+06	8.54E+05	2.69E+06	5.94E+06	5.55E+06	3.09E+06	7.54E+05	1.87E+06
		894	225.36	3.77E+06	4.99E+05	1.06E+06	5.73E+06	7.52E+06	2.52E+06	7.33E+05	1.65E+06
		898	265.00	3.08E+06	9.73E+05	2.40E+06	6.35E+06	7.46E+06	2.45E+06	5.88E+05	1.33E+06
14	Basemat Inside RCCV	872	185.18	3.30E+06	6.13E+05	3.72E+06	5.06E+06	4.06E+06	2.59E+06	6.80E+05	2.08E+06
		876	225.81	4.80E+06	1.05E+06	1.58E+06	4.37E+06	8.54E+06	2.42E+06	6.50E+05	2.19E+06
		880	265.09	4.21E+06	6.36E+05	3.35E+06	6.26E+06	7.92E+06	1.69E+06	3.80E+05	2.25E+06
15	S/P Slab @ RPV	1376	185.01	5.61E+05	8.14E+05	1.40E+05	4.10E+05	1.11E+06	8.70E+04	7.92E+04	5.45E+05
		1380	225.00	7.10E+05	2.96E+05	5.09E+05	3.39E+04	9.22E+05	1.06E+05	8.74E+04	4.3E+05
		1384	264.99	4.97E+05	4.08E+05	2.17E+05	2.81E+05	7.60E+05	1.19E+05	1.08E+05	3.44E+05

Table 3H.1-8 Results of "Stardyne" Analysis for Safe Shutdown Earthquake (SSE) SRSS of Three Components [Ess] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
16	S/P Slab @ Center	1358	185.18	6.08E+05	9.73E+05	1.7E+05	1.43E+05	2.57E+05	8.71E+04	6.60E+03	3.47E+05
		1362	225.36	8.60E+05	2.33E+05	3.60E+05	1.44E+05	1.76E+05	1.07E+05	8.50E+03	2.76E+05
		1366	265.00	5.38E+05	5.22E+05	5.03E+05	1.31E+05	1.14E+05	1.29E+05	1.04E+04	2.16E+05
17	S/P Slab @ RCCV	1340	185.18	8.32E+05	1.02E+06	2.15E+05	2.03E+05	1.00E+06	1.14E+04	3.10E+04	2.68E+05
		1344	225.81	9.84E+05	2.17E+05	3.20E+05	1.46E+05	7.46E+05	4.08E+04	6.26E+04	1.99E+05
		1348	265.09	6.54E+05	5.91E+05	6.32E+05	1.16E+05	5.65E+05	4.01E+04	2.97E+04	1.62E+05
18	Basemat Outside RCCV	946	185.18	2.19E+06	3.55E+06	8.79E+05	3.89E+06	5.48E+06	3.02E+06	7.00E+06	1.19E+06
		982	227.93	4.95E+06	1.29E+06	3.15E+06	3.54E+06	6.53E+06	2.98E+06	1.00E+06	7.57E+06
		986	265.09	4.95E+06	2.08E+06	1.65E+06	6.72E+06	9.36E+06	1.88E+06	7.71E+05	6.41E+06
19	RPV Pedestal Bottom	199	185.01	1.73E+06	8.90E+06	1.95E+06	3.58E+05	1.77E+06	2.56E+04	3.77E+04	7.82E+05
		204	235.01	1.72E+06	8.34E+06	2.45E+06	3.16E+05	1.64E+06	1.61E+04	5.86E+04	7.27E+05
		208	275.01	1.58E+06	7.95E+06	2.53E+06	3.20E+05	1.55E+06	2.50E+04	4.39E+04	6.87E+05
20	RPV Pedestal Center	235	185.01	5.04E+05	5.25E+06	2.83E+06	5.88E+04	1.14E+05	1.01E+04	2.49E+04	6.38E+04
		240	235.01	4.57E+05	4.90E+06	3.09E+06	7.12E+04	1.08E+05	8.52E+03	2.61E+04	5.51E+04
		244	275.01	4.48E+05	4.75E+06	3.23E+06	7.00E+04	1.08E+05	8.84E+03	3.13E+04	6.01E+04

Table 3H.1-8 Results of "Stardyne" Analysis for Safe Shutdown Earthquake (SSE) SRSS of Three Components [Ess] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
21	RPV Pedestal Top	289	185.01	9.64E+05	7.01E+05	1.58E+06	7.06 E+05	1.35E+06	4.54E+04	4.63E+04	6.16E+05
		294	235.01	1.12E+06	7.42E+05	1.83E+06	8.16E+05	1.06E+06	8.56E+04	1.44E+05	3.95E+05
		298	275.01	1.03E+06	7.80E+05	1.84E+06	3.57E+05	8.94E+05	4.29E+04	9.83E+04	3.82E+05
22	R/B Outside Wall @ Base	397	183.86	2.07E+06	5.05E+06	4.36E+06	1.27E+05	5.22E+05	4.37E+04	6.53E+03	1.22E+05
		404	221.17	4.36E+05	3.47E+06	2.52E+06	2.00E+05	5.18E+05	4.63E+04	1.00E+05	1.46E+05
		405	224.57	5.27E+05	3.43E+06	2.68E+06	1.66E+05	5.02E+05	3.92E+04	1.30E+05	1.70E+05
		410	242.10	2.47E+06	5.77E+06	4.18E+06	2.17E+05	7.38E+05	3.87E+04	3.33E+04	1.99E+05
		415	267.23	2.52E+06	3.36E+06	4.77E+06	1.99E+05	9.78E+05	5.71E+04	3.51E+04	3.11E+05
23	R/B Outside Wall @ Center	508	183.86	2.02E+05	4.81E+06	4.71E+06	2.56E+04	1.71E+04	1.85E+04	2.13E+04	3.84E+04
		511	204.28	1.86E+05	4.88E+06	4.50E+06	3.10E+04	8.87E+04	3.95E+04	5.18E+03	2.72E+04
		516	224.57	2.79E+05	3.68E+06	3.82E+06	1.00E+04	4.95E+04	9.65E+04	9.93E+04	6.52E+04
		521	242.10	5.00E+05	3.49E+06	4.45E+06	6.10E+04	1.19E+05	5.35E+04	3.09E+04	4.25E+04
		526	267.23	1.15E+06	6.22E+05	–1.01E+05	-2.98E+05	-6.45E+05	1.68E+04	4.62E+04	–8.95E+03
24	R/B Outside Wall @ Grade	689	183.86	3.90E+05	2.99E+06	2.34E+06	3.56E+04	1.00E+05	2.24E+04	1.22E+04	8.52E+04
		693	209.68	4.44E+05	3.50E+06	2.84E+06	8.70E+04	1.09E+05	1.83E+04	5.18E+04	1.75E+05
		696	221.17	1.11E+05	2.90E+06	2.64E+06	2.47E+04	4.05E+04	2.93E+04	2.14E+04	4.29E+04
		701	237.99	6.77E+05	1.70E+06	2.46E+06	2.14E+04	4.05E+04	1.18E+04	2.36E+04	7.02E+04
		707	267.23	8.60E+05	1.25E+06	2.60E+06	3.00E+04	1.57E+05	2.00E+04	3.38E+04	1.40E+05

Table 3H.1-8 Results of "Stardyne" Analysis for Safe Shutdown Earthquake (SSE) SRSS of Three Components [Ess] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
25	Fuel Pool Wall @ Base	2561	184.31	1.52E+06	3.68E+06	1.75E+06	6.50E+05	2.08E+06	1.58E+05	3.74E+04	6.00E+05
		2562	192.75	6.79E+05	1.85E+06	2.22E+06	2.99E+05	1.20E+06	2.02E+05	3.58E+05	3.92E+05
26	Fuel Pool Slab @ Center	3153	186.10	1.32E+06	1.77E+06	5.03E+05	4.31E+06	2.69E+06	4.58E+05	1.59E+06	7.35E+05
		3158	197.05	2.40E+06	1.64E+06	5.47E+05	1.86E+06	5.34E+05	1.21E+06	1.06E+06	1.56E+06
27	Fuel Pool Girder @ Drywell Head Opening	2742	295.00	6.71E+05	1.09E+06	1.26E+06	7.86E+05	3.79E+06	3.16E+05	1.20E+05	3.88E+05
		2826	295.00	2.32E+06	5.27E+05	1.18E+06	6.68E+05	2.29E+06	1.17E+06	8.12E+05	9.53E+05
28	Fuel Pool Girder @ RCCV Wall	2733	208.92	9.89E+05	2.87E+06	2.50E+06	3.20E+05	8.84E+05	9.58E+04	3.74E+05	2.81E+05
		2856	208.92	2.00E+06	1.96E+06	2.55E+06	9.10E+05	9.08E+05	5.16E+05	4.44E+05	2.45E+05
29	Fuel Pool Girder @ Deep End	2567	199.68	1.53E+06	3.14E+06	1.46E+06	4.51E+05	1.53E+06	2.15E+05	1.06E+05	5.30E+05
		2655	199.68	8.05E+05	2.09E+06	1.80E+06	3.10E+05	3.86E+05	3.30E+05	1.63E+05	2.42E+05
		2730	199.68	1.15E+06	9.24E+05	2.26E+06	4.07E+05	2.49E+05	4.91E+05	2.02E+05	9.06E+04
		2815	199.68	1.95E+06	2.41E+05	1.58E+06	6.31E+05	1.94E+05	7.60E+05	6.92E+05	2.08E+04
30	R/B Floor @ El– 21.98 ft. @ RCCV	1086	185.18	7.13E+05	3.70E+05	1.28E+06	4.32E+05	9.67E+04	2.95E+04	5.30E+05	5.85E+04
		1109	213.85	7.48E+05	6.18E+05	4.84E+05	2.47E+05	5.44E+04	4.39E+04	1.13E+05	4.76E+04
		1125	265.09	2.32E+05	1.14E+06	2.25E+05	7.58E+04	3.50E+05	1.52E+04	4.24E+04	3.87E+05

Table 3H.1-8 Results of "Stardyne" Analysis for Safe Shutdown Earthquake (SSE) SRSS of Three Components [Ess] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
31	R/B Floor @ El–0.67 ft. @ RCCV	1215	185.18	1.22E+05	3.66E+05	5.19E+04	1.77E+05	2.11E+05	1.92E+04	1.70E+05	1.35E+04
		1239	213.85	8.67E+04	3.19E+05	1.19E+05	1.35E+05	2.95E+04	2.22E+04	5.92E+04	3.10E+04
		1251	265.09	1.91E+05	2.87E+05	1.13E+05	4.53E+04	2.00E+04	9.03E+03	2.82E+04	2.33E+05
32	R/B Floor @ El–23.95 ft. @ RCCV	1400	354.82	1.65E+06	1.26E+06	3.83E+05	1.22E+06	3.51E+05	1.88E+05	7.35E+05	1.20E+05
		1426	326.15	3.28E+05	1.93E+06	1.41E+06	7.39E+05	2.48E+05	4.83E+04	2.79E+05	1.30E+05
		1442	274.91	6.82E+05	6.04E+05	8.92E+04	3.39E+05	1.60E+06	3.91E+04	6.46E+04	1.20E+06
		2484	331.09	1.86E+06	1.53E+06	2.96E+06	1.00E+05	4.40E+05	3.60E+04	1.60E+05	3.26E+05
		2544	331.09	4.84E+05	1.97E+06	3.02E+06	5.24E+04	1.71E+05	3.31E+04	8.58E+04	7.69E+04
33	Steam Tunnel Floor	1403	354.77	1.33E+06	1.01E+06	4.85E+05	2.90E+05	3.94E+05	7.44E+04	7.02E+04	9.22E+04
		1417	345.29	1.66E+06	8.05E+05	7.01E+05	3.66E+05	4.25E+05	1.01E+05	8.96E+04	2.92E+05
		2487	340.93	1.00E+06	5.48E+05	1.72E+06	1.52E+05	5.79E+05	2.99E+04	6.68E+04	1.52E+05
		2547	340.93	2.92E+05	1.71E+06	1.87E+06	9.90E+04	2.33E+05	7.00E+04	4.41E+04	1.20E+05
34	Steam Tunnel Roof	1673	356.34	2.17E+05	6.56E+05	6.71E+05	3.81E+05	1.11E+05	7.99E+04	1.22E+05	5.02E+04
		1695	337.09	1.68E+05	5.30E+05	2.05E+05	7.97E+03	3.97E+04	1.00E+04	3.72E+03	7.18E+04
		1745	265.90	4.60E+05	3.01E+05	3.45E+05	1.82E+04	7.93E+04	1.60E+04	5.90E+04	2.90E+04
		1750	301.04	3.44E+05	3.60E+05	5.61E+05	3.37E+04	5.76E+04	3.70E+03	1.44E+04	6.61E+04
		1754	319.38	2.09E+05	2.52E+05	3.12E+05	3.93E+04	3.74E+04	6.00E+03	1.80E+04	5.51E+04

Table 3H.1-9 Results of "Stardyne" Analysis for Thermal Loads (6 Hours) [T_{A-II}]

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
1	RCCV Wetwell Bottom	1	185.18	–3.33E+06	–3.06E+06	–7.87E+03	5.46E+06	5.53E+06	3.44E+03	–9.53E+03	2.68E+05
		5	225.80	–3.06E+06	–2.37E+06	–1.63E+05	5.45E+06	5.55E+06	–1.31E+04	–1.24E+04	2.77E+05
		9	265.09	–3.15E+06	–2.93E+06	–7.31E+04	5.50E+06	5.42E+06	1.70E+02	3.19E+03	3.29E+05
2	RCCV Wetwell Mid-Height	37	185.18	–3.77E+06	–2.61E+06	–3.23E+04	5.40E+06	4.80E+06	9.11E+03	–3.42E+04	2.38E+05
		41	225.80	–3.52E+06	–2.55E+06	–3.14E+05	5.25E+06	4.83E+06	–1.26E+04	1.82E+04	2.29E+05
		45	265.09	–3.87E+06	–2.73E+06	–1.14E+05	5.55E+06	4.97E+06	–2.13E+04	1.71E+04	2.73E+05
3	RCCV Wetwell Top	91	185.18	4.00E+06	–2.19E+06	–6.95E+04	5.79E+06	7.41E+06	–3.50E+03	–5.50E+04	1.06E+06
		95	225.80	3.87E+06	–2.68E+06	9.60E+03	5.41E+06	6.95E+06	–4.40E+04	–4.85E+04	8.90E+05
		99	265.09	2.40E+06	–2.77E+06	3.03E+04	5.78E+06	6.62E+06	–3.40E+01	–8.58E+02	6.37E+05
4	RCCV Drywell Bottom	109	185.18	1.07E+05	–2.46E+06	–3.33E+04	9.03E+06	1.03E+07	–1.26E+04	–3.75E+04	–2.17E+06
		113	225.80	1.91E+05	3.21E+06	8.47E+05	8.75E+06	1.04E+07	–1.19E+05	1.62E+04	–1.72E+06
		117	265.09	–1.53E+05	–2.39E+06	2.62E+05	9.32E+06	1.06E+07	–1.15E+04	1.74E+04	–1.32E+06
5	RCCV Drywell Mid-Height	127	185.18	–1.50E+06	–2.26E+06	–2.57E+05	7.89E+06	4.44E+06	4.46E+04	7.37E+04	–2.33E+06
		131	225.80	–1.44E+06	–3.53E+06	1.43E+06	7.90E+06	5.68E+06	–7.43E+04	–2.26E+03	–1.84E+06
		135	265.09	–3.54E+06	–2.14E+06	3.64E+05	8.63E+06	6.75E+06	4.75E+04	5.74E+04	–1.68E+06

Table 3H.1-9 Results of "Stardyne" Analysis for Thermal Loads (6 Hours) [T_{A-II}] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
6	RCCV Wetwell Top	163	185.18	–2.04E+06	–1.27E+06	1.15E+05	7.05E+06	10.50E+06	2.63E+04	6.62E+04	2.22E+06
		167	225.80	–1.34E+07	–1.36E+06	2.09E+06	6.54E+06	9.57E+06	3.43E+05	–4.43E+05	4.47E+05
		171	265.09	–1.46E+07	–1.54E+06	1.43E+05	6.31E+06	7.81E+06	5.23E+04	–3.70E+04	–9.60E+05
7	RCCV Top Slab @ RCCV Wall	1616	185.18	–7.55E+05	–2.49E+06	–1.41E+04	8.19E+06	11.33E+06	6.56E+04	5.60E+04	–1.51E+06
		1620	225.81	–7.70E+05	–2.64E+06	–5.97E+04	8.83E+06	1022E+06	1.66E+05	3.10E+05	–1.16E+06
		1624	265.09	–3.82E+06	–1.59E+06	–1.48E+05	9.30E+06	9.65E+06	–1.63E+04	–6.25E+04	1.02E+05
8	RCCV Top Slab @ Center	1634	185.18	–6.01E+06	–3.38E+06	5.63E+05	6.41E+06	5.29E+06	–1.31E+05	–1.73E+05	–1.75E+06
		1638	225.36	–8.09E+06	–1.32E+07	–3.19E+06	5.39E+06	6.58E+06	–2.51E+05	7.79E+05	–9.58E+05
		1642	265.00	–4.06E+06	–2.50E+06	7.07E+05	9.89E+06	9.80E+06	1.27E+05	–4.59E+04	1.40E+05
9	RCCV Top Slab @ Drywell Head Opening	1652	185.18	–1.01E+07	–1.47E+06	1.06E+05	5.52E+06	4.46E+05	–3.11E+04	4.71E+04	2.80E+05
		1656	225.00	–3.66E+06	–11.81E+06	–3.00E+05	4.54E+06	5.00E+06	4.78E+05	1.50E+06	2.03E+06
		1660	265.00	–1.83E+07	–5.53E+06	1.48E+06	9.36E+06	2.78E+06	–7.84E+05	7.55E+06	–4.38E+05
10	Basemat Cavity @ Center	929	270.00	–8.30E+06	–7.89E+06	3.68E+03	–4.03E+07	–3.87E+07	–8.25E+03	1.21E+04	7.55E+02
11	Basemat Inside RPV Pedestal	926	192.04	–8.12E+06	–8.19E+06	–6.65E+04	–3.98E+07	–3.98E+07	–7.20E+05	–2.80E+05	2.26E+04
		939	270.00	–8.23E+06	–7.83E+06	1.51E+04	–4.01E+07	–3.87E+07	–2.61E+04	3.71E+03	3.15E+04

Table 3H.1-9 Results of "Stardyne" Analysis for Thermal Loads (6 Hours) [T_{A-II}] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
12	Basemat Outside RPV Pedestal	908	185.01	9.63E+04	–1.19E+07	2.18E+04	–2.00E+07	–3.52E+07	–1.80E+05	9.44E+04	–1.04E+06
		912	225.00	3.85E+05	–1.19E+07	–1.54E+05	–2.04E+07	–3.41E+07	–6.28E+05	–2.61E+04	–8.39E+05
		916	264.99	1.84E+05	–1.13E+07	–6.19E+04	2.05E+07	–3.36E+07	–8.49E+04	–1.67E+04	–6.32E+05
13	Basemat Between RCCV & RPV Pedestal	890	185.18	–3.16E+06	–8.75E+06	4.63E+04	–2.27E+07	–2.94E+07	–1.62E+05	–3.12E+04	–6.85E+05
		894	225.36	–2.64E+06	–9.00E+06	–7.11E+04	–2.37E+07	–2.86E+07	–5.31E+05	–3.31E+04	–5.52E+05
		898	265.00	–2.80E+06	–8.19E+06	–7.53E+04	–2.36E+07	–2.90E+07	2.46E+04	–3.82E+04	–4.12E+05
14	Basemat Inside RCCV	872	185.18	–4.52E+06	–7.49E+06	1.51E+05	–2.33E+07	–2.68E+07	9.12E+03	2.56E+04	–5.18E+05
		876	225.81	–3.68E+06	–7.95E+06	1.91E+05	–2.44E+07	–2.62E+07	–3.82E+05	–2.19E+05	–3.68E+05
		880	265.09	–3.70E+06	–6.90E+06	–8.58E+04	–2.42E+07	–2.71E+07	1.62E+05	–9.16E+03	–2.84E+05
15	S/P Slab @ RPV	1376	185.01	–8.58E+06	–9.60E+06	–1.53E+05	–1.38E+06	–1.56E+05	–1.56E+04	8.79E+04	8.20E+05
		1380	225.00	–8.81E+06	–10.18E+06	–1.11E+06	–1.39E+06	–2.40E+05	–1.90E+04	2.33E+04	8.20E+05
		1384	264.99	–1.00E+06	–9.02E+06	–3.37E+04	–1.48E+07	–3.15E+05	–1.26E+03	–8.30E+04	7.16E+05
16	S/P Slab @ Center	1358	185.18	–8.98E+06	–9.52E+06	5.69E+04	–1.72E+06	–2.42E+06	2.50E+03	–1.69E+03	5.94E+05
		1362	225.36	–8.82E+06	–10.09E+06	–9.20E+05	–1.73E+06	–2.40E+06	–2.11E+04	–1.93E+03	5.56E+05
		1366	265.00	–1.02E+06	–8.49E+06	–4.75E+05	–1.75E+06	–2.33E+06	–1.17E+04	–1.68E+04	5.29E+05
17	S/P Slab @ RCCV	1340	185.18	–8.98E+06	–9.26E+06	1.26E+05	–2.28E+06	–3.71E+06	–3.34E+02	6.44E+03	4.62E+05
		1344	225.81	–9.01E+06	–10.34E+06	–7.71E+05	–2.27E+06	–3.66E+06	–4.71E+04	2.77E+04	4.48E+05
		1348	265.09	–9.95E+06	–8.17E+06	–4.21E+05	–2.26E+06	–3.47E+06	–1.73E+04	1.82E+02	4.06E+05

Table 3H.1-9 Results of "Stardyne" Analysis for Thermal Loads (6 Hours) [T_{A-II}] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
18	Basemat Outside RCCV	946	185.18	–6.74E+06	1.20E+07	–1.30E+06	–1.76E+07	–1.97E+06	–1.38E+06	–3.15E+06	–7.58E+05
		982	227.93	1.05E+07	–5.95E+06	4.10E+06	–4.50E+06	–1.59E+07	2.25E+06	4.45E+05	–2.31E+06
		986	265.09	1.26E+07	–6.04E+06	–1.77E+06	–3.07E+06	–1.90E+07	–9.83E+05	–2.12E+05	–3.05E+06
19	RPV Pedestal Bottom	199	185.11	–9.00E+06	–1.23E+06	–3.59E+04	4.94E+06	4.49E+06	–1.91E+03	1.52E+02	1.57E+06
		204	235.01	–8.98E+06	–1.06E+06	–1.30E+05	4.98E+06	4.58E+06	–3.41E+03	8.48E+03	1.531E+06
		208	275.01	–8.93E+06	–8.88E+05	–5.24E+04	4.98E+06	4.63E+06	4.97E+02	3.57E+02	1.51E+06
20	RPV Pedestal Center	235	185.01	2.98E+06	–6.76E+05	–2.38E+05	4.94E+06	4.54E+06	0.153E+02	1.91E+04	–2.36E+05
		240	235.01	2.96E+06	–1.01E+06	1.70E+04	4.94E+06	4.45E+06	–3.09E+03	–3.57E+04	–2.54E+05
		244	275.01	2.96E+06	–1.14E+06	–2.45E+05	4.94E+06	4.41E+06	1.08E+03	2.40E+04	–2.63E+05
21	RPV Pedestal Top	289	185.01	–7.79E+06	–1.28E+06	–4.10E+05	9.79E+06	7.03E+06	–1.11E+05	–9.61E+05	–5.60E+06
		294	235.01	–8.91E+06	–1.56E+06	1.09E+06	11.04E+06	7.16E+06	–8.68E+04	1.44E+06	–5.50E+06
		298	275.01	–9.95E+06	–1.77E+06	–6.43E+05	12.02E+06	7.16E+06	–6.00E+04	–1.04E+06	–5.32E+06
22	R/B Outside Wall @ Base	397	183.86	2.01E+06	8.60E+05	–1.48E+05	–4.76E+05	–8.41E+05	–3.10E+03	6.41E+03	8.61E+04
		404	221.17	1.98E+05	–1.93E+05	–2.45E+05	–4.43E+05	–5.56E+05	–2.62E+04	1.63E+04	2.82E+04
		405	224.57	2.84E+05	–2.28E+05	–2.87E+05	–4.18E+05	–5.00E+05	5.70E+03	–6.25E+03	5.43E+03
		410	242.10	1.84E+06	6.51E+05	–1.43E+05	–5.21E+05	–7.79E+05	–1.81E+03	–8.84E+03	8.42E+04
		415	267.23	3.29E+06	1.09E+06	9.79E+04	–4.49E+05	–9.34E+05	–6.68E+03	1.48E+04	1.30E+05

Table 3H.1-9 Results of "Stardyne" Analysis for Thermal Loads (6 Hours) [T_{A-II}] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
23	R/B Outside Wall @ Center	508	183.86	2.56E+05	9.60E+05	–7.14E+03	–3.63E+05	–6.90E+05	1.91E+04	–1.31E+04	6.29E+03
		511	204.28	–1.10E+05	6.69E+05	1.91E+05	–4.36E+05	–7.61E+05	3.72E+04	7.79E+03	–1.33E+04
		516	224.57	–6.36E+04	1.05E+06	–1.15E+06	–4.49E+05	–4.33E+05	–5.61E+04	–3.82E+04	–5.02E+04
		521	242.10	4.15E+05	3.43E+05	–9.35E+05	–4.72E+05	–7.65E+05	–8.28E+04	1.98E+04	–7.78E+04
24	R/B Outside Wall @ Grade	689	183.86	6.30E+06	2.82	–2.82	1.31	1.46	4.72	2.75	–6.25
		693	209.68	4.62E+06	2.14	–6.00	1.05E+06	1.36E+06	1.42E+04	9.75E+04	1.45E+04
		696	221.17	1.84E+06	3.15E+06	–7.99E+05	1.02E+06	1.35E+06	4.23E+04	–3.64E+05	–2.52E+05
		701	237.99	5.41E+06	1.09E+05	–7.27E+04	1.36E+05	1.32E+05	2.81E+03	–2.85E+04	–1.26E+04
		707	267.23	6.80E+06	1.12E+06	3.42E+05	1.38E+06	1.36E+06	1.76E+04	3.43E+04	–4.19E+04
25	Fuel Pool Wall @ Base	2561	184.31	–2.59E+06	–1.30E+06	1.37E+05	3.03E+06	4.41E+06	–6.10E+04	–6.02E+04	–7.44E+05
		2562	192.75	–2.42E+06	–1.86E+06	1.00E+06	2.23E+06	3.77E+06	–6.14E+04	–4.64E+05	–6.74E+05
26	Fuel Pool Slab @ Center	3153	186.10	–3.56E+06	5.29E+06	–1.15E+06	–5.07E+06	–5.12E+06	–2.14E+05	8.13E+02	1.28E+05
		3158	197.05	–5.88E+05	4.45E+06	–3.05E+06	–4.81E+06	–3.60E+06	3.62E+04	–2.28E+05	–6.69E+05
27	Fuel Pool Girder @ Drywell Head Opening	2742	295.00	2.68E+06	1.93E+06	–1.15	7.03E+06	3.75E+06	–4.49E+05	1.30E+06	–7.00E+04
		2826	295.00	3.34E+06	9.53E+05	9.25E+05	3.95E+06	2.24E+06	–7.21E+04	–5.27E+04	–1.82E+06

Table 3H.1-9 Results of "Stardyne" Analysis for Thermal Loads (6 Hours) [T_{A-II}] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
28	Fuel Pool Girder @ RCCV Wall	2733	208.92	–3.94E+06	–2.59E+06	5.59E+06	3.72E+06	3.24E+06	1.40E+05	–2.22E+05	–5.25E+05
		2856	208.92	9.60E+06	2.50E+06	1.09E+06	9.75E+06	–2.60E+05	2.60E+05	–3.73E+05	–5.92E+05
29	Fuel Pool Girder @ Deep End	2567	199.68	–2.08E+06	5.99E+05	2.49E+06	2.84E+06	3.02E+06	–4.98E+05	–3.29E+05	5.17E+05
		2655	199.68	–3.06E+06	6.41E+05	2.77E+06	3.07E+06	3.90E+06	–5.12E+05	3.36E+05	1.22E+05
		2730	199.68	–1.43E+06	1.20E+06	2.35E+06	3.23E+06	3.11E+06	3.67	2.22E+05	–2.61E+05
		2815	199.68	5.71E+06	6.13E+05	4.99E+05	3.55E+06	9.61E+05	–8.14E+04	2.59E+05	–3.66E+05
30	R/B Floor @ El– 21.98 ft. @ RCCV	1086	185.18	–1.38E+06	1.27E+06	–3.26E+05	8.41E+04	–1.11E+04	1.54E+03	1.77E+05	3.40E+04
		1109	213.85	–1.43E+06	1.32E+06	3.73E+05	–7.21E+03	–2.60E+04	–6.59E+03	1.64E+04	–5.53E+03
		1125	265.09	1.26E+06	–1.39E+06	–3.49E+05	–2.51E+04	1.23E+04	1.27E+03	1.00E+04	6.58E+04
31	R/B Floor @ El–0.67 ft. @ RCCV	1215	185.18	–9.68E+05	1.74E+05	–3.57E+05	–1.33E+04	2.57E+03	1.20E+03	3.17E+04	1.65E+03
		1239	213.85	–1.14E+06	1.84E+06	2.38E+05	–8.10E+03	2.46E+03	2.13E+03	4.75E+03	3.40E+03
		1251	265.09	1.55E+06	–9.95E+05	–4.40E+05	6.90E+03	2.06E+04	–4.42E+02	5.18E+03	4.94E+04
32	R/B Floor @ El– 23.95 ft. @ RCCV	1400	354.82	–6.95E+06	7.99E+06	1.60E+06	–4.81E+05	–1.85E+05	2.66E+04	–2.61E+05	5.27E+04
		1426	326.15	–5.62E+06	6.65E+06	–1.71E+06	–1.35E+05	–1.72E+04	–1.09E+05	3.27E+05	2.14E+05
		1442	274.91	6.70E+06	–4.85E+06	9.70E+05	5.61E+04	5.79E+05	8.01E+03	–1.56E+04	6.11E+05
		2484	331.09	–2.64E+06	3.71E+06	–1.59E+06	5.56E+05	1.96E+05	–8.37E+04	–4.27E+05	–1.26E+04
		2544	331.09	–2.17E+06	5.06E+06	–2.33E+06	5.34E+05	2.85E+05	–8.46E+04	1.66E+04	3.68E+04

Table 3H.1-9 Results of "Stardyne" Analysis for Thermal Loads (6 Hours) [T_{A-II}] (Continued)

Section	Location	Element #	Azimuth	F_x (N_{hh}) N/m	F_y(N_{mm}) N/m	F_{xy}(N_{hm}) N/m	M_x(M_{hh}) N·m/m	M_y(M_{mm}) N·m/m	M_{xy}(M_{mh}) N·m/m	Q_x(N_{rh}) N/m	Q_y(N_{rm}) N/m
33	Steam Tunnel Floor	1403	354.77	–1.84E+06	2.82E+06	7.78E+05	–1.19E+05	–2.58E+05	–4.90E+04	1.56E+05	–5.17E+04
		1417	345.29	–1.37E+06	1.45E+06	2.07E+06	–8.90E+04	–1.45E+04	–1.18E+05	–9.75E+04	–3.15E+04
		2487	340.93	–9.35E+05	–1.34E+05	–1.96E+06	–1.86E+05	–4.39E+03	–3.06E+04	–1.86E+04	1.11E+05
		2547	340.93	–2.35E+05	–7.27E+05	–2.29E+06	–1.10E+05	3.55E+05	2.68E+04	–1.27E+05	1.03E+05
34	Steam Tunnel Roof	1673	356.34	–1.39E+06	5.48E+05	4.75E+05	–8.94E+05	4.90E+04	1.66E+05	–4.75E+05	3.75E+04
		1695	337.09	–5.22E+05	–3.42E+05	1.03E+06	–4.67E+02	2.53E+04	4.85E+03	3.06E+03	2.61E+04
		1745	265.90	1.29E+05	–8.32E+05	2.47E+04	–8.05E+03	–1.01E+05	1.46E+04	5.22E+04	–4.78E+04
		1750	301.04	–5.17E+05	–3.68E+05	1.77E+06	–2.52E+04	–7.83E+04	6.10E+03	4.24E+03	–3.36E+04
		1754	319.38	–8.14E+05	–9.51E+05	2.29E+06	–1.26E+04	–1.61E+04	3.38E+03	–2.19E+03	–5.83E+03

Table 3H.1-10 Load Combination 1

	F_x (N_{hh}) N/m	F_y (N_{mm}) N/m	F_{xy} (N_{hm}) N/m	M_x (M_{hh}) N•m/m	M_y (M_{mm}) N•m/m	M_{xy} (N_{hm}) N•m/m	Q_{xz} (N_{hr}) N/m	Q_{yz} (N_{mr}) N/m
Section 1								
EL # 5 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 5 1-8	8.35E+05	–4.16E+06	–5.91E+04	–1.47E+05	–3.27E+05	–1.76E+03	2.39E+03	4.31E+05
EL # 5 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 2								
EL # 41 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 41 1-8	3.78E+06	–3.31E+06	1.24E+05	–4.73E+04	5.28E+05	–1.08E+04	–2.27E+03	1.03E+05
EL # 41 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 3								
EL # 95 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 95 1-8	1.80E+06	–2.45E+06	4.93E+05	–1.28E+05	–4.30E+05	–7.64E+04	–3.73E+04	–5.32E+05
EL # 95 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 4								
EL # 113 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 113 1-8	1.07E+06	–1.89E+06	9.18E+05	6.73E+04	4.92E+04	–1.33E+05	5.15E+04	2.60E+05
EL # 113 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 5								
EL # 131 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 131 1-8	8.74E+05	–1.41E+06	8.15E+05	1.97E+05	1.65E+05	–3.53E+04	5.19E+04	–2.9E+05
EL # 131 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 6								
EL # 167 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 167 1-8	7.16E+05	–1.83E+05	2.5E+05	–2.02E+05	–9.51E+05	8.25E+04	8.21E+02	–6.94E+05
EL # 167 SE	.00	.00	.00	.00	.00	.00	.00	.00

Table 3H.1-10 Load Combination 1 (Continued)

	F_x (N_{hh}) N/m	F_y (N_{mm}) N/m	F_{xy} (N_{hm}) N/m	M_x (M_{hh}) N•m/m	M_y (M_{mm}) N•m/m	M_{xy} (N_{hm}) N•m/m	Q_{xz} (N_{hr}) N/m	Q_{yz} (N_{mr}) N/m
Section 7								
EL # 1620 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 1620 1-8	7.58E05	1.37E+06	4.9E+03	7.76E+04	–5.8E+05	4.74E+04	1.43E+05	2.0E+05
EL # 1620 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 8								
EL # 1638 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 1638 1-8	7.04E+05	1.14E+06	–2.68E+05	2.22E+05	2.38E+05	2.13E+05	1.75E+05	7.0E+04
EL # 1638 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 9								
EL # 1656 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 1656 1-8	6.11E+05	5.17E+05	9.73E05	–2.21E+05	3.48E+05	4.67E+05	–1.6E+05	7.47E+05
EL # 1656 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 10								
EL # 922 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 929 1-8	5.44E+05	5.85E+05	–3.25E+03	–1.01E+06	–3.6E+05	–8.94E+03	4.67E+04	9.69E+04
EL # 929 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 11								
EL # 926 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 926 1-8	5.75E+05	5.66E+05	2.33E+03	–1.53E+06	–1.81E+06	–3.97E+05	1.59E+05	4.0E+05
EL # 926 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 12								
EL # 912 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 912 1-8	5.18E+05	5.07E+05	–3.96E+04	1.12E+04	–2.37E+05	–3.1E+05	1.6E+04	–1.22E+06
EL # 912 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 13								
EL # 894 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 894 1-8	5.36E+05	4.83E+05	–2.36E+04	1.2E+06	1.79E+06	–2.78E+05	4.43E+04	–3.19E+05
EL # 894 SE	.00	.00	.00	.00	.00	.00	.00	.00

Table 3H.1-10 Load Combination 1 (Continued)

	F_x (N_{hh}) N/m	F_y (N_{mm}) N/m	F_{xy} (N_{hm}) N/m	M_x (M_{hh}) N•m/m	M_y (M_{mm}) N•m/m	M_{xy} (N_{hm}) N•m/m	Q_{xz} (N_{hr}) N/m	Q_{yz} (N_{mr}) N/m
Section 14								
EL # 876 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 876 1-8	5.03E+05	4.79E+05	–1.66E+04	2.19E+06	1.48E+06	–2.96E+05	6.25E+04	3.58E+05
EL # 876 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 15								
EL # 1380 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 1380 1-8	1.27E+06	1.02E+06	–6.14E+05	1.15E+05	1.36E+05	6.22E+03	7.93E+02	1.41E+05
EL # 1380 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 16								
EL # 1362 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 1362 1-8	1.2E+06	1.1E+06	–4.99E+05	6.4E+04	–4.8E+04	5.97E+03	–2.56E+03	–8.27E+03
EL # 1362 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 17								
EL # 1344 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 1344 1-8	1.19E+06	1.15E+06	–4.28E+05	6.86E+03	–1.06E+5	–3.99E+04	5.52E+04	6.78E+04
EL # 1344 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 18								
EL # 982 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 982 1-8	2.29E+05	–4.96E+05	8.02E+04	3.26E+06	7.07E+05	–7.71E+04	3.46E+05	–2.69E+06
EL # 982 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 22								
EL # 415 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 415 1-8	–1.96E+05	–2.34E+06	–2.07E+05	8.82E+04	3.36E05	–9.5E+03	3.44E+03	–7.03E+03
EL # 415 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 23								
EL # 516 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 516 1-8	–2.82E+04	–1.05E+06	2.99E+05	–2.76E+04	3.74E+04	–1.49E+04	–6.76E+02	1.34E+04
EL # 516 SE	.00	.00	.00	.00	.00	.00	.00	.00

Table 3H.1-10 Load Combination 1 (Continued)

	F_x (N_{hh}) N/m	F_y (N_{mm}) N/m	F_{xy} (N_{hm}) N/m	M_x (M_{hh}) N•m/m	M_y (M_{mm}) N•m/m	M_{xy} (N_{hm}) N•m/m	Q_{xz} (N_{hr}) N/m	Q_{yz} (N_{mr}) N/m
Section 24								
EL # 707 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 707 1-8	2.64E+05	–7.48E+05	–6.24E+03	1.03E+04	–1.93E+03	5.26E+03	–3.96E+02	5.18E+04
EL # 707 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 25								
EL # 2561 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 2561	1.27E+06	2.03E+06	3.81E+05	–1.23E+05	–8.57E+05	–2.68E+04	1.54E+04	4.15E+05
EL # 2561	.00	.00	.00	.00	.00	.00	.00	.00
Section 26								
EL # 3158 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 3158 1-8	–4.91E+04	7.26E+05	–9.12E+05	–5.92E+05	3.11E+05	–7.45E+05	7.66E+05	–8.81E+05
EL # 3158 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 27								
EL # 2826 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 2826 1-8	4.21E+06	–4.93E+05	–3.16E+05	5.19E+04	–5.04E+05	–2.07E+05	–3.29E+04	–1.68E+05
EL # 2826 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 28								
EL # 2733 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 2733 1-8	1.47E+06	–4.96E+05	1.66E+06	5.49E+04	–6.22E+04	3.94E+04	–8.97E+04	8.76E+04
EL # 2733 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 29								
EL # 2567 TA	.00	.00	.00	.00	.00	.00	.00	.00
El # 2567 1-8	5.58E+05	1.66E+06	1.38E+06	–2.13E+05	–8.58E+05	–8.46E+04	–3.8E+04	4.48E+05
EL # 2567 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 30								
EL # 1109 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 1109 1-8	–6.85E+05	1.02E+06	3.78E+04	4.64E+04	1.59E+04	1.45E+04	8.27E+04	–1.18E+04
EL # 1109 SE	.00	.00	.00	.00	.00	.00	.00	.00

Table 3H.1-10 Load Combination 1 (Continued)

	F_x (N_{hh}) N/m	F_y (N_{mm}) N/m	F_{xy} (N_{hm}) N/m	M_x (M_{hh}) N•m/m	M_y (M_{mm}) N•m/m	M_{xy} (N_{hm}) N•m/m	Q_{xz} (N_{hr}) N/m	Q_{yz} (N_{mr}) N/m
Section 31								
EL # 1239 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 1239 1-8	–5.55E+05	7.45E+05	1.8E+05	6.20E+04	1.48E+04	3.21E+03	6.31E+04	–1.67E+04
EL # 1239 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 32								
EL # 1442 TA	.00	.00	.00	.00	.00	.00	.00	.00
El # 1442 1-8	6.22E+05	–2.70E+05	1.44E+05	2.86E+05	1.24E+06	–3.1E+04	–4.43E+04	9.93E+05
EL # 1442 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 33								
EL # 2487 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 2487 1-8	–1.09E+05	9.91E+04	–1.03E+06	1.37E+04	8.51E+04	1.77E+04	4.15E+03	–1.59E+04
EL # 2487 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 34								
EL # 1750 TA	.00	.00	.00	.00	.00	.00	.00	.00
EL # 1750 1-8	2.07E+05	9.30E+03	4.96E+04	–3.55E+04	–4.14E+04	1.07E+03	9.84E+03	5.11E+04
EL # 1750 SE	.00	.00	.00	.00	.00	.00	.00	.00

Table 3H.1-11 Load Combination 8

	F_x (N_{hh}) N/m	F_y (N_{mm}) N/m	F_{xy} (N_{hm}) N/m	M_x (M_{hh}) N•m/m	M_y (M_{mm}) N•m/m	M_{xy} (N_{hm}) N•m/m	Q_{xz} (N_{hr}) N/m	Q_{yz} (N_{mr}) N/m
Section 1								
EL # 5 TA	–1.41E+06	–1.83E+06	–1.34E+05	2.79E+06	3.09E+06	–1.06E+04	–7.43E+03	6.22E+04
EL # 5 1-8	1.50E+06	–3.39E+06	–5.36E+04	–2.99E+05	–1.05E+06	–3.2E+03	2.25E+03	9.93E+05
EL # 5 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 2								
EL # 41 TA	–2.52E+06	–1.94E+06	–2.48E+05	2.63E+06	2.4E+06	–4.92E03	1.04E+04	2.7E+05
EL # 41 1-8	4.46E+06	–2.58E+06	3.74E+04	–6.37E+04	5.07E+05	–5.63E+03	2.96E+03	5.62E+03
EL # 41 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 3								
EL # 95 TA	1.57E+06	–1.96E+06	–6.03E+04	2.97E+05	3.56E+06	–1.48E+04	–2.36E+04	3.34E+05
EL # 95 1-8	2.17E+06	–1.73E+06	2.89E+05	–1.01E+05	–2.16E+5	–5.63E+04	–3.08E+04	–4.03E+05
EL # 95 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 4								
EL # 113 TA	–6.48E+05	–2.11E+06	7.92E+05	4.09E+06	5.05E+06	–3.11E+04	7.02E+03	–9.28E+05
EL # 113 1-8	1.62E+06	–8.16E+05	5.62E+05	–3.03E+04	–5.35E04	–9.81E+04	3.51E+04	5.15E+05
EL # 113 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 5								
EL # 131 TA	–1.42E+06	–1.8E+06	9.61E+05	3.58E+06	2.44E06	6.67E+04	–6.02E+04	–1.08E+06
EL # 131 1-8	1.53E+06	–4.2E+05	4.63E+05	1.62E+05	3.38E+05	–1.83E+04	3.12E+04	–2.43E+05
EL # 131 SE	00	.00	.00	.00	.00	.00	.00	.00
Section 6								
EL # 167 TA	–3.33E+4	–8.23E+05	9.81E+05	5.64E+06	7.01E+06	3.17E+05	–2.92E+05	9.89E+05
EL # 167 1-8	9.52E+05	5.56E+05	1.09E+05	–3.6E+05	–1.58E+06	6.4E+04	1.56E+02	–1.02E+06
EL # 167 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 7								
EL # 1620 TA	–2.24E+06	–4.11E+06	–4.83E+05	6.08E+06	8.50E+06	–1.06E+05	5.88E+05	–9.39E+05
EL # 1620 1-8	7.28E+05	1.9E+06	–8.76E+04	2.00E+05	–8.71E+05	–5.77E+04	6.17E+03	7.93E+05
EL # 1620 SE	.00	.00	.00	.00	.00	.00	.00	.00

Table 3H.1-11 Load Combination 8 (Continued)

	F_x (N_{hh}) N/m	F_y (N_{mm}) N/m	F_{xy} (N_{hm}) N/m	M_x (M_{hh}) N•m/m	M_y (M_{mm}) N•m/m	M_{xy} (N_{hm}) N•m/m	Q_{xz} (N_{hr}) N/m	Q_{yz} (N_{mr}) N/m
Section 8								
EL # 1638 TA	–7.08E+06	–1.29E+07	–2.75E+06	9.74E+05	2.79E+06	–5.93E+05	4.40E+05	–1.04E+06
EL # 1638 1-8	7.38E+05	1.31E+06	–4.42E+05	7.33E+05	8.55E+05	1.91E+05	1.40E+05	1.28E+05
EL # 1638 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 9								
EL # 1656 TA	–3.88E+06	–1.06E+07	–4.16E+05	2.57E+05	1.18E+06	–3.28E+05	3.15E+05	7.50E+05
EL # 1656 1-8	6.07E+05	5.16E+05	1.29E+06	–1.84E+05	5.48E+05	6.92E+05	–2.03E+05	1.02E+06
EL # 1656 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 10								
EL # 929 TA	–1.09E+07	–1.06E+07	3.78E+03	–3.21E+07	–3.08E+07	–6.79E+03	1.48E+04	–9.32E+02
EL # 929 1-8	1.13E+06	9.99E+05	–2.73E+03	–1.10E+07	–1.01E+07	–7.71E+03	4.35E+04	9.38E+04
EL # 929 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 11								
EL # 926 TA	–1.08E+07	–1.08E+07	–6.03E+04	–3.17E+07	–3.17E+07	–5.01E+05	–2.64E+05	1.47E+04
EL # 926 1-8	1.08E+06	1.09E+06	7.63E+04	–1.13E+07	–1.17E+07	–5.40E+05	2.54E+05	3.85E+05
EL # 926 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 12								
EL # 912 TA	–1.17E+05	–1.08E+07	–1.31E+05	–1.47E+07	–2.64E+07	–4.82E+03	–1.27E+04	–5.46E+05
EL # 912 1-8	1.23E+06	1.68E+06	3.47E+04	–5.81E+06	–7.94E+06	–3.45E+05	2.15E+03	–2.00E+06
EL # 912 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 13								
EL # 894 TA	–2.70E+06	–8.30E+06	–7.71E+04	–1.76E+07	–2.22E+07	4.40E+05	–6.44E+03	–3.54E+05
EL # 894 1-8	1.37E+06	1.53E+06	3.88E+04	–4.09E+06	–2.25E+06	–2.78E+05	–5.91E+03	–1.64E+06
EL # 894 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 14								
EL # 876 TA	–3.72E+06	–7.45E+06	1.05E+05	–1.83E+07	–2.05E+07	–3.63E+05	–1.69E+05	–2.22E+05
EL # 876 1-8	1.39E+06	1.48E+06	4.03E+04	–1.48E+06	1.94E+06	–2.38E+05	5.71E+04	–1.38E+06
EL # 876 SE	.00	.00	.00	.00	.00	.00	.00	.00

Table 3H.1-11 Load Combination 8 (Continued)

	F_x (N_{hh}) N/m	F_y (N_{mm}) N/m	F_{xy} (N_{hm}) N/m	M_x (M_{hh}) N•m/m	M_y (M_{mm}) N•m/m	M_{xy} (N_{hm}) N•m/m	Q_{xz} (N_{hr}) N/m	Q_{yz} (N_{mr}) N/m
Section 15								
EL # 1380 TA	–5.03E+06	–6.30E+06	–7.29E+05	–4.46E+05	4.25E+05	–1.58E+04	1.70E+04	5.29E+05
EL # 1380 1-8	1.53E+06	1.14E+06	–4.63E+05	3.16E+04	–9.79E+04	4.55E+03	1.42E+03	3.27E+05
EL # 1380 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 16								
EL # 1362 TA	–5.15E+06	–6.21E+06	–6.26E+05	–6.31E+05	–1.02E+06	–1.67E+04	–1.48E+03	3.63E+05
EL # 1362 1-8	1.42E+06	1.24E+06	–3.75E+05	–7.58E+04	–2.95E+05	3.17E+03	–7.21E+03	–1.54E+05
EL # 1362 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 17								
EL # 1344 TA	–5.32E+06	–6.31E+06	–5.50E+05	–9.77E+05	–1.84E+06	–2.94E+04	1.29E+04	2.91E+05
EL # 1344 1-8	1.40E+06	1.30E+06	–3.16E+05	5.26E+04	3.36E+05	–3.26E+04	4.82E+04	–2.67E+05
EL # 1344 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 18								
EL # 982 TA	9.54E+06	–5.48E+06	3.40E+06	–2.66E+06	–1.33E+07	1.86E+06	3.89E+05	–1.73E+06
EL # 982 1-8	7.96E+05	–5.13E+05	2.71E+05	2.60E+05	4.25E+05	–6.12E+05	4.70E+05	–3.72E+06
EL # 982 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 22								
EL # 415 TA	2.82E+06	8.14E+05	7.29E+04	–4.25E+05	–7.34E+05	–3.64E+03	1.02E+04	7.78E+04
EL # 415 1-8	–1.13E+05	–2.34E+06	–2.25E+05	3.45E+04	4.63E+04	–7.67E+03	1.27E+04	9.58E+04
EL # 415 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 23								
EL # 516 TA	–9.23E+04	9.95E+05	–9.33E+05	–4.22E+05	–4.13E+05	–4.81E+04	–4.29E+04	–4.55E+04
EL # 516 1-8	–4.22E+04	–1.26E+06	3.57E+05	–2.14E+04	3.85E+04	–1.20E+04	–5.14E+03	1.19E+04
EL # 516 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 24								
EL # 707 TA	6.34E+06	1.11E+06	2.66E+05	1.35E+06	1.34E+06	1.80E+04	1.77E+04	–2.26E+04
EL # 707 1-8	2.93E+05	–7.56E+05	–2.92E+04	6.90E+03	–1.93E+04	7.79E+03	–4.72E+03	6.36E+04
EL # 707 SE	.00	.00	.00	.00	.00	.00	.00	.00

Table 3H.1-11 Load Combination 8 (Continued)

	F_x (N_{hh}) N/m	F_y (N_{mm}) N/m	F_{xy} (N_{hm}) N/m	M_x (M_{hh}) N•m/m	M_y (M_{mm}) N•m/m	M_{xy} (N_{hm}) N•m/m	Q_{xz} (N_{hr}) N/m	Q_{yz} (N_{mr}) N/m
Section 25								
EL # 2561 TA	–2.45E+06	–1.45E+06	–2.78E+04	4.11E+06	5.21E+06	–1.04E+05	–8.46E+04	–7.22E+05
EL # 2561 1-8	1.21E+06	2.03E+06	3.91E+05	–1.95E+05	–1.03E+06	–2.99E+04	1.55E+04	4.73E+05
EL # 2561 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 26								
EL # 3158 TA	–9.02E+05	2.05E+06	–1.15E+06	–5.21E+06	–4.13E+06	–1.49E+05	–4.29E+04	–4.50E+05
EL # 3158 1-8	2.42E+05	9.40E+05	–8.74E+05	–6.76E+05	2.92E+05	–6.49E+05	7.15E+05	–9.86E+05
EL # 3158 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 27								
EL # 2826 TA	1.67E+06	–5.24E+04	3.75E+04	5.07E+06	3.00E+06	–5.16E+03	–4.41E+05	–1.68E+06
EL # 2826 1-8	4.61E+06	–5.63E+05	–5.06E+05	8.91E+04	–4.22E+05	–3.03E+05	–6.78E+04	–2.30E+05
EL # 2826 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 28								
EL # 2733 TA	–6.06E+06	–1.34E+06	3.77E+06	5.21E+06	4.29E+06	1.68E+04	3.73E+04	–6.95E+05
EL # 2733 1-8	1.34E+06	5.95E+05	1.50E+06	7.42E+06	–7.08E+04	2.28E+04	–7.93E+04	1.00E+05
EL # 2733 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 29								
EL # 2567 TA	1.28E+05	6.58E+05	2.05E+06	4.54E+06	4.16E+06	–4.49E+05	–3.47E+05	3.84E+05
EL # 2567 1-8	7.74E+05	1.69E+06	1.12E+06	–2.39E+05	–9.33E+05	–6.06E+04	–4.54E+04	4.71E+05
EL # 2567 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 30								
EL # 1109 TA	–1.10E+06	1.08E+06	2.63E+05	8.90E+03	–2.58E+04	–6.85E+03	1.43E+04	–1.11E+04
EL # 1109 1-8	–1.06E+06	1.11E+06	1.40E+05	1.61E+04	6.78E+03	1.93E+04	6.78E+04	–6.15E+03
EL # 1109 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 31								
EL # 1239 TA	–7.62E+05	1.32E+06	1.87E+05	7.21E+03	5.20E+03	–1.13E+03	8.67E+03	–4.38E+02
EL # 1239 1-8	–5.82E+05	7.68E+05	1.70E+05	4.25E+04	9.57E+03	6.26E+03	5.58E+04	–1.23E+04
EL # 1239 SE	.00	.00	.00	.00	.00	.00	.00	.00

Table 3H.1-11 Load Combination 8 (Continued)

	F_x (N_{hh}) N/m	F_y (N_{mm}) N/m	F_{xy} (N_{hm}) N/m	M_x (M_{hh}) N•m/m	M_y (M_{mm}) N•m/m	M_{xy} (N_{hm}) N•m/m	Q_{xz} (N_{hr}) N/m	Q_{yz} (N_{mr}) N/m
Section 32								
EL # 1442 TA	4.20E+06	–3.27E+06	6.37E+05	4.23E+04	5.16E+05	8.27E+03	–1.03E+04	5.67E+05
EL # 1442 1-8	8.09E+05	–2.99E+05	1.47E+05	2.35E+05	1.07E+06	–2.95E+04	–3.91E+04	8.57E+05
EL # 1442 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 33								
EL # 2487 TA	–4.15E+05	–2.03E+05	–1.14E+06	–1.21E+05	7.43E+04	2.62E+04	–3.75E+04	1.37E+04
EL # 2487 1-8	–6.06E+04	7.66E+04	–6.99E+05	1.30E+04	9.09E+04	1.24E+04	1.01E+04	–1.76E+04
EL # 2487 SE	.00	.00	.00	.00	.00	.00	.00	.00
Section 34								
EL # 1750 TA	–5.55E+05	–4.59E+05	1.57E+06	–2.15E+04	–6.36E+04	4.85E+03	2.85E+03	–2.85E+04
EL # 1750 1-8	2.28E+05	2.02E+03	6.00E+04	–3.46E+04	–4.13E+04	2.87E+02	9.55E+03	5.21E+04
EL # 1750 SE	.00	.00	.00	.00	.00	.00	.00	.00

Table 3H.1-12 Load Combination 15

	F_x (Nhh) N/m	F_y (Nmm) N/m	F_{xy} (Nhm) N/m	M_x (Mhh) N-m/m	M_y (Mmm) N-m/m	M_{xy} (Mhm) N-m/m	Q_{xz} (Nhr) N/m	Q_{yz} (Nmr) N/m
SECTION 1								
EL # 5 TA	–1.41E+06	–1.83E+06	–1.34E+05	2.78E+06	3.09E+06	–1.06E+04	–7.43E+03	6.22E+04
EL # 5 1-8	8.30E+05	–4.43E+06	–3.92E+04	–1.82E+05	–5.43E+05	–1.78E+03	1.93E+03	6.71E+05
EL # 5 SE	3.50E+06	1.14E+07	6.44E+06	4.21E+05	2.28E+06	2.37E+05	9.16E+04	1.02E+06
SECTION 2								
EL # 41 TA	–2.52E+06	–1.94E+06	–2.48E+05	2.63E+06	2.40E+06	–4.92E+03	1.04E+04	2.70E+05
EL # 41 1-8	3.10E+06	–3.59E+06	1.12E+05	–3.90E+04	4.37E+05	–7.45E+03	–9.37E+02	–1.70E+04
EL # 41 SE	2.99E+05	8.33E+06	6.62E+06	1.49E+05	6.47E+05	2.47E+05	7.35E+04	1.85E+05
SECTION 3								
EL # 95 TA	1.57E+06	–1.96E+06	–6.03E+04	2.97E+06	3.56E+06	–1.48E+04	–2.36E+04	3.34E+05
EL # 95 1-8	1.22E+06	–2.77E+06	4.06E+05	–7.81E+04	–2.46E+05	–6.02E+04	–2.99E+04	–3.35E+05
EL # 95 SE	1.07E+06	5.98E+06	6.66E+06	3.19E+04	5.94E+05	2.31E+05	5.72E+04	3.15E+05
SECTION 4								
EL # 113 TA	–6.48E+05	–2.11E+06	7.92E+05	4.09E+06	5.05E+06	–3.11E+04	7.02E+03	–9.28E+05
EL # 113 1-8	8.59E+05	–1.94E+06	7.50E+05	3.02E+04	–4.48E+04	–1.03E+05	4.00E+04	2.73E+05
EL # 113 SE	1.70E+06	4.91E+06	6.22E+06	3.94E+05	7.92E+05	3.19E+05	8.89E+04	3.29E+05
SECTION 5								
EL # 131 TA	–1.42E+06	–1.80E+06	9.61E+05	3.58E+06	2.44E+06	6.67E+04	–6.02E+04	–1.08E+06
EL # 131 1-8	8.29E+05	–1.53E+06	6.76E+05	1.49E+05	1.60E+05	–2.78E+04	3.67E+04	–2.23E+05
EL # 131 SE	2.69E+06	4.27E+06	5.97E+06	4.30E+05	2.27E+05	2.81E+05	9.21E+04	3.61E+05
SECTION 6								
EL # 167 TA	–3.37E+06	–8.23E+05	9.81E+05	5.64E+06	7.00E+06	3.17E+05	–2.92E+05	9.89E+05
EL # 167 1-8	6.83E+05	–3.63E+05	3.23E+05	–1.50E+05	–6.67E+05	5.38E+04	6.17E+03	–5.74E+05
EL # 167 SE	2.65E+06	2.46E+06	4.04E+06	4.71E+05	2.21E+06	1.19E+05	7.47E+04	8.48E+05
SECTION 7								
EL # 1620 TA	–2.24E+06	–4.11E+06	–4.83E+05	6.08E+06	8.49E+06	–1.06E+05	5.88E+05	–9.39E+05
EL # 1620 1-8	6.94E+05	1.16E+06	1.06E+05	–6.49E+03	–4.78E+05	5.61E+04	1.69E+05	2.40E+04
EL # 1620 SE	2.71E+06	8.96E+05	1.44E+06	8.22E+05	7.06E+05	5.58E+05	7.31E+05	2.09E+06
SECTION 8								
EL # 1638 TA	–7.08E+06	–1.29E+07	–2.75E+06	9.74E+05	2.79E+06	–5.93E+05	4.40E+05	–1.04E+06
EL # 1638 1-8	6.66E+05	1.06E+06	–1.18E+05	4.28E+04	5.59E+03	1.99E+05	1.43E+05	2.67E+04
EL # 1638 SE	2.15E+05	6.21E+05	1.76E+06	1.88E+06	2.56E+06	5.70E+05	3.69E+05	7.13E+05
SECTION 9								
EL # 1656 TA	–3.88E+06	–1.06E+07	–4.16E+05	2.57E+05	1.18E+06	–3.28E+05	3.15E+05	7.50E+05
EL # 1656 1-8	5.31E+05	5.47E+05	8.19E+05	–2.17E+05	2.37E+05	3.77E+05	–1.47E+05	6.33E+05
EL # 1656 SE	8.90E+05	1.07E+06	6.48E+05	2.67E+05	3.00E+05	2.20E+05	2.61E+05	2.22E+05
SECTION 10								
EL # 929 TA	–1.09E+07	–1.06E+07	3.78E+03	–3.21E+07	–3.08E+07	–6.79E+03	1.48E+04	–9.32E+02
EL # 929 1-8	6.55E+05	6.09E+05	–2.78E+03	–4.17E+06	–3.54E+06	–7.85E+03	4.38E+04	1.64E+05
EL # 929 SE	3.55E+05	2.00E+05	3.48E+05	8.23E+06	8.24E+06	4.38E+05	2.63E+06	2.66E+06

Table 3H.1-12 Load Combination 15 (Continued)

	F_x (Nhh) N/m	F_y (Nmm) N/m	F_{xy} (Nhm) N/m	M_x (Mhh) N-m/m	M_y (Mmm) N-m/m	M_{xy} (Mhm) N-m/m	Q_{xz} (Nhr) N/m	Q_{yz} (Nmr) N/m
SECTION 11								
EL # 926 TA	–1.08E+07	–1.08E+07	–6.03E+04	–3.17E+07	–3.17E+07	–5.01E+05	–2.64E+05	1.47E+04
EL # 926 1-8	6.46E+05	6.46E+05	3.54E+04	–5.09E+06	–5.52E+06	–5.52E+05	2.75E+05	6.34E+05
EL # 926 SE	1.84E+06	1.39E+06	7.83E+05	1.47E+07	1.50E+07	1.24E+06	1.68E+06	3.62E+06
SECTION 12								
EL # 912 TA	–1.17E+05	–1.08E+07	–1.31E+05	–1.47E+07	–2.64E+07	–4.82E+05	–1.27E+04	–5.46E+05
EL # 912 1-8	7.73E+05	1.06E+06	–2.53E+03	–2.17E+06	–3.36E+06	–2.86E+05	1.06E+04	–1.36E+06
EL # 912 SE	2.77E+06	3.16E+05	2.82E+05	7.26E+06	1.42E+07	4.50E+06	3.29E+05	3.13E+06
SECTION 13								
EL # 894 TA	–2.70E+06	–8.30E+06	–7.71E+04	–1.76E+07	–2.22E+07	–4.40E+05	–6.44E+03	–3.54E+05
EL # 894 1-8	8.67E+05	9.64E+05	2.52E+03	–9.81E+05	–3.54E+05	–2.50E+05	2.49E+04	–6.42E+05
EL # 894 SE	3.77E+06	4.99E+05	1.07E+06	5.73E+06	7.52E+06	2.52E+06	7.33E+05	1.65E+06
SECTION 14								
EL # 876 TA	–3.55E+06	–7.45E+06	1.05E+05	–1.83E+07	–2.05E+07	–3.63E+05	–1.69E+05	–2.22E+05
EL # 876 1-8	8.62E+05	9.31E+05	2.08E+03	3.81E+05	5.92E+05	–2.44E+05	5.73E+04	9.70E+04
EL # 876 SE	4.80E+06	1.05E+06	1.58E+06	4.37E+06	8.54E+06	2.42E+06	6.50E+05	2.19E+06
SECTION 15								
EL # 1380 TA	–5.03E+06	–6.30E+06	–7.29E+05	–4.46E+05	4.25E+05	–1.58E+04	1.70E+04	5.29E+05
EL # 1380 1-8	1.08E+06	7.59E+05	–4.47E+05	1.04E+05	1.16E+05	6.80E+03	–6.74E+02	3.35E+05
EL # 1380 SE	7.10E+05	2.96E+05	5.09E+05	3.36E+05	9.22E+05	1.06E+05	8.75E+04	4.30E+05
SECTION 16								
EL # 1362 TA	–5.15E+06	–6.21E+06	–6.25E+05	–6.31E+05	–1.02E+06	–1.67E+04	–1.48E+03	3.63E+05
EL # 1362 1-8	9.87E+05	8.53E+05	–3.67E+05	–1.68E+04	–2.65E+05	5.56E+03	–4.84E+03	–5.52E+04
EL # 1362 SE	8.60E+05	2.33E+05	3.60E+05	1.44E+05	1.76E+05	1.07E+05	8.51E+03	2.76E+05
SECTION 17								
EL # 1344 TA	–5.32E+06	–6.31E+06	–5.50E+05	–9.76E+05	–1.84E+06	–2.94E+04	1.29E+04	2.91E+05
EL # 1344 1-8	9.74E+05	9.07E+05	–3.20E+05	2.39E+04	1.06E+05	–3.18E+04	4.85E+04	–1.74E+05
EL # 1344 SE	9.84E+05	2.17E+05	3.20E+05	1.46E+05	7.45E+05	4.08E+04	6.26E+04	1.99E+05
SECTION 18								
EL # 982 TA	9.54E+06	–5.48E+06	3.40E+06	–2.66E+06	–1.33E+07	1.85E+06	3.89E+05	–1.73E+06
EL # 982 1-8	4.51E+05	–4.98E+05	1.63E+05	1.63E+06	–3.29E+05	–1.78E+05	4.49E+05	–3.37E+06
EL # 982 SE	4.95E+06	1.29E+06	3.15E+06	3.54E+06	6.53E+06	2.97E+06	1.00E+06	7.57E+06
SECTION 22								
EL # 415 TA	2.82E+06	8.14E+05	7.29E+04	–4.25E+05	–7.34E+05	–3.64E+03	1.02E+04	7.78E+04
EL # 415 1-8	–2.20E+05	–2.35E+06	–2.16E+05	6.27E+04	2.18E+05	–7.61E+03	7.44E+03	3.29E+04
EL # 415 SE	2.52E+06	3.37E+06	4.77E+06	1.99E+05	9.78E+05	5.71E+04	3.51E+04	3.11E+05
SECTION 23								
EL # 516 TA	–9.23E+04	9.95E+05	–9.33E+05	–4.22E+05	–4.13E+05	–4.80E+04	–4.29E+04	–4.55E+04
EL # 516 1-8	–5.29E+04	–1.24E+06	3.57E+05	–8.82E+03	3.71E+04	–1.30E+04	–1.10E+04	1.01E+04
EL # 516 SE	2.78E+05	3.68E+06	3.82E+06	1.00E+05	4.95E+04	9.65E+04	9.93E+04	6.52E+04

Table 3H.1-12 Load Combination 15 (Continued)

	F_x (Nhh) N/m	F_y (Nmm) N/m	F_{xy} (Nhm) N/m	M_x (Mhh) N-m/m	M_y (Mmm) N-m/m	M_{xy} (Mhm) N-m/m	Q_{xz} (Nhr) N/m	Q_{yz} (Nmr) N/m
SECTION 24								
EL # 707 TA	6.34E+06	1.11E+06	2.66E+05	1.35E+06	1.33E+06	1.80E+04	1.77E+04	–2.26E+04
EL # 707 1-8	2.29E+05	–7.57E+05	–3.26E+04	5.26E+03	–1.87E+04	6.79E+03	–4.43E+03	6.34E+04
EL # 707 SE	8.60E+05	1.35E+06	2.61E+06	3.00E+04	1.57E+05	1.99E+04	3.39E+04	1.40E+05
SECTION 25								
EL # 2561 TA	–2.45E+06	–1.45E+06	–2.78E+04	4.11E+06	5.20E+06	–1.04E+05	–8.46E+04	–7.22E+05
EL # 2561 1-8	1.19E+06	2.01E+06	3.92E+05	–1.87E+05	–9.91E+05	–2.71E+05	1.34E+04	4.64E+05
EL # 2561 SE	1.52E+06	3.68E+05	1.75E+06	6.49E+05	2.08E+06	1.58E+95	3.74E+04	6.01E+05
SECTION 26								
EL # 3158 TA	–9.02E+05	2.04E+06	–1.15E+06	–5.20E+06	–4.13E+06	–1.49E+05	–4.29E+04	–4.50E+05
EL # 3158 1-8	3.35E+05	7.98E+05	–7.56E+05	–7.21E+05	2.81E+05	–6.89E+05	7.30E+05	–9.20E+05
EL # 3158 SE	2.40E+06	1.64E+06	5.47E+05	1.86E+06	5.34E+05	1.21E+06	1.06E+06	1.56E+06
SECTION 27								
EL # 2826 TA	1.67E+06	–5.24E+04	3.75E+04	5.07E+06	3.00E+06	–5.16E+03	–4.41E+05	–1.68E+06
EL # 2826 1-8	3.09E+06	–4.77E+05	–2.03E+05	6.04E+04	–5.34E+05	–1.29E+05	–3.37E+04	–1.15E+05
EL # 2826 SE	2.32E+06	5.27E+05	1.18E+06	6.87E+05	2.29E+06	1.17E+06	8.12E+05	9.53E+05
SECTION 28								
EL # 2733 TA	–6.06E+06	–1.34E+06	3.77E+06	5.20E+06	4.29E+06	1.68E+04	3.73E+04	–6.95E+05
EL # 2733 1-8	1.11E+06	–5.88E+05	1.39E+06	4.62E+04	–7.38E+04	3.60E+04	–9.08E+04	8.43E+04
EL # 2733 SE	9.89E+05	2.87E+06	2.50E+06	3.20E+05	8.84E+05	9.58E+04	3.74E+05	2.81E+05
SECTION 29								
EL # 2567 TA	1.28E+05	6.58E+05	2.05E+06	4.54E+06	4.16E+06	–4.49E+05	–3.47E+05	3.84E+05
EL # 2567 1-8	7.23E+05	1.70E+06	1.02E+06	–2.09E+05	–8.73E+05	–6.73E+04	–3.95E+04	4.56E+05
EL # 2567 SE	1.53E+06	3.14E+06	1.46E+06	4.51E+05	1.53E+06	2.15E+05	1.06E+05	5.29E+05
SECTION 30								
EL # 1109 TA	–1.10E+06	1.08E+06	2.63E+05	8.90E+03	–2.58E+04	–6.85E+03	1.43E+04	–1.11E+04
EL # 1109 1-8	–7.03E+05	9.10E+05	1.02E+06	3.40E+04	1.13E+04	1.64E+04	7.53E+04	–9.54E+03
EL # 1109 SE	7.48E+05	6.18E+05	4.85E+05	2.48E+05	5.43E+04	4.38E+04	1.13E+05	4.76E+04
SECTION 31								
EL # 1239 TA	–7.62E+05	1.32E+06	1.87E+05	7.21E+03	5.20E+03	–1.13E+03	8.67E+03	–4.38E+02
EL # 1239 1-8	–3.68E+05	5.82E+05	1.31E+05	4.83E+04	1.12E+04	5.13E+03	5.84E+04	–1.37E+04
EL # 1239 SE	8.67E+04	3.19E+05	1.19E+05	1.35E+05	2.95E+04	2.22E+04	5.92E+04	3.10E+04
SECTION 32								
EL # 1442 TA	4.20E+06	–3.27E+06	6.37E+05	4.23E+04	5.16E+05	8.27E+03	–1.03E+04	5.67E+05
EL # 1442 1-8	5.26E+05	–1.97E+05	1.09E+05	2.44E+05	1.06E+06	–2.88E+04	–3.80E+04	8.59E+05
EL # 1442 SE	6.82E+05	6.04E+05	8.92E+04	3.39E+05	1.60E+06	3.91E+04	6.46E+04	1.20E+06
SECTION 33								
EL # 2487 TA	–4.15E+05	–2.03E+05	–1.14E+06	–1.21E+05	7.43E+04	–2.62E+04	–3.75E+04	1.37E+04
EL # 2487 1-8	–3.13E+04	6.07E+04	–6.35E+05	2.27E+04	1.07E+05	1.42E+04	6.64E+03	–2.98E+04
EL # 2487 SE	1.00E+06	5.48E+05	1.72E+06	1.52E+05	5.79E+05	2.99E+04	6.69E+04	1.52E+05
SECTION 34								
EL # 1750 TA	–5.17E+05	–3.68E+05	1.77E+06	–2.52E+04	–7.83E+04	6.09E+03	4.24E+03	–3.36E+04
EL # 1750 1-8	2.13E+05	–2.07E+04	2.94E+04	–3.47E+04	–4.17E+04	4.81E+02	9.78E+03	5.19E+04
EL # 1750 SE	3.44E+05	3.60E+05	5.61E+05	3.37E+04	5.76E+04	3.69E+03	1.45E+04	6.61E+04

Table 3H.1-13 Load Combination 15a and 15b

	F_x (Nhh) N/m	F_y (Nmm) N/m	F_{xy} (Nhm) N/m	M_x (Mhh) N-m/m	M_y (Mmm) N-m/m	M_{xy} (Mhm) N-m/m	Q_{xz} (Nhr) N/m	Q_{yz} (Nmr) N/m
SECTION 1								
EL # 5 TA	–3.06E+06	–2.37E+06	–1.63E+05	5.45E+06	5.55E+06	–1.31E+04	–1.24E+04	2.77E+05
EL # 5 2-10	1.04E+06	–4.59E+06	–1.52E+04	–2.15E+05	–6.84E+05	–2.81E+03	1.82E+03	8.64E+05
EL # 5 SE	3.50E+06	1.14E+07	6.44E+06	4.21E+05	2.28E+06	2.37E+05	9.16E+04	1.02E+06
SECTION 2								
EL # 41 TA	–3.52E+06	–2.55E+06	–3.14E+05	5.25E+06	4.83E+06	–1.26E+04	1.82E+04	2.94E+05
EL # 41 2-10	3.15E+06	–3.75E+06	1.19E+05	–4.15E+04	4.26E+05	–6.27E+03	4.38E+02	–7.83E+04
EL # 41 SE	2.99E+05	8.33E+06	6.62E+06	1.49E+05	6.47E+05	2.47E+05	7.35E+04	1.85E+05
SECTION 3								
EL # 95 TA	3.87E+06	–2.68E+06	9.61E+03	5.40E+06	6.94E+06	–4.40E+04	–4.85E+04	8.90E+05
EL # 95 2-10	9.39E+05	–2.97E+06	3.73E+05	–7.95E+04	–2.70E+05	–5.05E+04	–2.51E+04	–3.01E+05
EL # 95 SE	1.07E+06	5.98E+06	6.66E+06	3.19E+04	5.94E+05	2.31E+05	5.72E+04	3.15E+05
SECTION 4								
EL # 113 TA	1.91E+05	–3.21E+06	8.48E+05	8.74E+06	1.07E+07	–1.19E+05	1.62E+04	–1.72E+06
EL # 113 2-10	6.31E+05	–2.27E+06	6.92E+05	2.71E+04	–1.78E+04	–8.52E+04	3.42E+04	1.94E+05
EL # 113 SE	1.70E+06	4.91E+06	6.22E+06	3.94E+05	7.92E+05	3.19E+05	8.89E+04	3.29E+05
SECTION 5								
EL # 131 TA	–1.44E+06	–3.53E+06	1.43E+06	7.89E+06	5.68E+06	–7.43E+04	–2.26E+03	–1.84E+06
EL # 131 2-10	6.74E+05	–1.88E+06	6.43E+05	1.13E+05	9.90E+04	–2.50E+04	2.90E+04	–1.87E+05
EL # 131 SE	2.69E+06	4.27E+06	5.97E+06	4.30E+05	2.27E+05	2.81E+05	9.21E+04	3.61E+05
SECTION 6								
EL # 167 TA	–1.34E+07	–1.36E+06	2.09E+06	6.54E+06	9.57E+06	3.43E+05	–4.43E+05	4.47E+05
EL # 167 2-10	5.99E+05	–7.07E+05	4.21E+05	–6.68E+04	–2.69E+05	3.42E+04	1.10E+04	–3.82E+05
EL # 167 SE	2.65E+06	2.46E+06	4.04E+06	4.71E+05	2.21E+05	1.19E+05	7.47E+04	8.48E+05
SECTION 7								
EL # 1620 TA	–7.70E+05	–2.64E+06	–5.97E+04	8.83E+06	1.02E+07	1.66E+05	3.10E+05	–1.16E+06
EL # 1620 2-10	6.47E+05	8.48E+05	2.20E+05	–1.12E+05	–3.19E+05	9.14E+04	2.26E+05	–2.80E+05
EL # 1620 SE	2.71E+06	8.96E+05	1.44E+06	8.22E+05	7.06E+05	5.58E+05	7.31E+05	2.09E+06
SECTION 8								
EL # 1638 TA	–8.09E+06	–1.32E+07	–3.19E+06	5.39E+06	6.58E+06	–2.51E+05	7.79E+05	–9.58E+05
EL # 1638 2-10	6.25E+05	9.47E+05	6.06E+04	–2.44E+05	–3.56E+05	1.94E+05	1.23E+05	–2.57E+04
EL # 1638 SE	2.15E+06	6.21E+05	1.76E+06	1.88E+06	2.56E+06	5.70E+05	3.69E+05	7.13E+05
SECTION 9								
EL # 1656 TA	–3.66E+06	–1.18E+07	–3.00E+05	4.54E+06	4.95E+06	4.77E+05	1.50E+06	2.03E+06
EL # 1656 2-10	4.63E+05	5.75E+05	6.04E+05	–2.25E+05	9.11E+04	2.41E+05	–1.22E+05	4.64E+05
EL # 1656 SE	9.00E+05	1.07E+06	6.48E+05	6.00E+04	3.00E+05	2.20E+05	2.61E+05	2.22E+05
SECTION 10								
EL # 929 TA	–8.30E+06	–7.89E+06	3.68E+03	–4.03E+07	–3.86E+07	–8.25E+03	1.21E+04	7.55E+02
EL # 929 2-10	6.18E+05	5.29E+05	–2.52E+03	–4.70E+06	–4.09E+06	–7.20E+03	4.20E+04	2.27E+05
EL # 929 SE	3.55E+05	2.00E+05	3.48E+05	8.23E+06	8.24E+06	4.38E+05	2.63E+06	2.66E+06

Table 3H.1-13 Load Combination 15a and 15b (Continued)

	F_x (Nhh) N/m	F_y (Nmm) N/m	F_{xy} (Nhm) N/m	M_x (Mhh) N-m/m	M_y (Mmm) N-m/m	M_{xy} (Mhm) N-m/m	Q_{xz} (Nhr) N/m	Q_{yz} (Nmr) N/m
SECTION 11								
EL # 926 TA	–8.12E+06	–8.19E+06	–6.66E+04	–3.97E+07	–3.98E+07	–7.19E+05	–2.80E+05	2.26E+04
EL # 926 2-10	5.90E+05	5.94E+05	5.17E+04	–6.00E+06	–6.54E+06	–6.79E+05	3.58E+05	8.53E+05
EL # 926 SE	1.84E+06	1.39E+06	7.83E+05	1.47E+07	1.50E+07	1.24E+06	1.68E+06	3.62E+06
SECTION 12								
EL # 912 TA	3.85E+05	–1.19E+07	–1.54E+05	–2.04E+07	–3.40E+07	–6.28E+05	–2.61E+04	–8.39E+05
EL # 912 2-10	9.33E+05	1.53E+06	1.55E+04	–2.82E+06	–4.45E+06	–2.71E+05	8.27E+03	–1.08E+06
EL # 912 SE	2.77E+06	3.16E+05	2.82E+05	7.26E+06	1.42E+07	4.50E+06	3.29E+05	3.13E+06
SECTION 13								
EL # 894 TA	–2.64E+06	–9.00E+06	–7.11E+04	–2.37E+07	–2.86E+07	–5.31E+05	–3.31E+04	–5.52E+05
EL # 894 2-10	1.13E+06	1.35E+06	1.48E+04	–1.84E+06	–1.60E+06	–2.37E+05	1.68E+04	–6.77E+05
EL # 894 SE	3.77E+06	4.99E+05	1.06E+06	5.73E+06	7.52E+06	2.52E+06	7.33E+05	1.65E+06
SECTION 14								
EL # 876 TA	–3.68E+06	–7.95E+06	1.91E+05	–2.44E+07	–2.62E+07	–3.82E+05	–2.19E+05	–3.68E+05
EL # 876 2-10	1.13E+06	1.29E+06	9.46E+03	–3.76E+05	–3.77E+04	–2.19E+05	5.08E+04	–3.34E+05
EL # 876 SE	4.80E+06	1.05E+06	1.58E+06	4.37E+06	8.54E+06	2.42E+06	6.50E+05	2.19E+06
SECTION 15								
EL # 1380 TA	–8.81E+06	–1.02E+07	–1.11E+05	–1.39E+06	–2.40E+05	–1.90E+04	2.33E+04	8.20E+05
EL # 1380 2-10	9.03E+05	6.82E+05	–3.52E+05	8.44E+04	9.47E+04	7.77E+03	–2.61E+03	2.31E+05
EL # 1380 SE	7.10E+05	2.96E+05	5.09E+05	7.56E+04	9.22E+05	1.06E+05	8.75E+04	4.30E+05
SECTION 16								
EL # 1362 TA	–8.82E+06	–1.01E+07	–9.20E+05	–1.73E+06	–2.40E+06	–2.11E+04	–1.93E+03	5.55E+05
EL # 1362 2-10	8.38E+05	7.49E+05	–2.93E+05	1.18E+03	–1.71E+05	7.10E+03	–3.69E+03	–3.59E+04
EL # 1362 SE	8.60E+05	2.33E+05	3.60E+05	1.44E+05	1.76E+05	1.07E+05	8.51E+03	2.76E+05
SECTION 17								
EL # 1344 TA	–9.01E+06	–1.03E+07	–7.71E+05	–2.27E+06	–3.66E+06	–4.71E+04	2.77E+04	4.48E+05
EL # 1344 2-10	8.31E+05	7.88E+05	–2.62E+05	1.67E+04	5.61E+04	–2.70E+04	4.40E+04	–1.01E+05
EL # 1344 SE	9.84E+05	2.17E+05	3.20E+05	1.46E+05	7.45E+05	4.08E+04	6.26E+04	1.99E+05
SECTION 18								
EL # 982 TA	1.05E+07	–5.95E+06	4.10E+06	–4.49E+06	–1.59E+07	2.25E+06	4.45E+05	–2.31E+06
EL # 982 2-10	6.13E+05	–4.94E+05	2.24E+05	8.15E+05	–1.27E+06	–1.44E+05	5.16E+05	–3.77E+06
EL # 982 SE	4.94E+06	1.29E+06	3.15E+06	3.54E+06	6.53E+06	2.97E+06	1.00E+06	7.57E+06
SECTION 22								
EL # 415 TA	3.29E+06	1.09E+06	9.79E+04	–4.49E+05	–9.34E+05	–6.67E+03	1.48E+04	1.30E+05
EL # 415 2-10	–2.07E+05	–2.35E+06	–2.23E+05	4.82E+04	1.38E+05	–6.98E+03	1.02E+04	6.56E+04
EL # 415 SE	2.52E+06	3.37E+06	4.77E+06	1.99E+05	9.78E+05	5.71E+04	3.51E+04	3.11E+05
SECTION 23								
EL # 516 TA	–6.36E+04	1.05E+06	–1.15E+06	–4.49E+05	–4.33E+0-5	–5.60E+04	–3.82E+04	–5.03E+04
EL # 516 2-10	–6.07E+04	–1.32E+06	3.94E+05	–3.70E+03	3.77E+04	–1.14E+04	–1.39E+04	9.38E+03
EL # 516 SE	2.78E+05	3.68E+06	3.82E+06	1.00E+05	4.95E+04	9.65E+04	9.93E+04	6.52E+04

Table 3H.1-13 Load Combination 15a and 15b (Continued)

	F_x (Nhh) N/m	F_y (Nmm) N/m	F_{xy} (Nhm) N/m	M_x (Mhh) N-m/m	M_y (Mmm) N-m/m	M_{xy} (Mhm) N-m/m	Q_{xz} (Nhr) N/m	Q_{yz} (Nmr) N/m
SECTION 24								
EL # 707 TA	6.80E+06	1.12E+06	3.42E+05	1.37E+06	1.36E+06	1.76E+04	3.43E+04	–4.19E+04
EL # 707 2-10	2.03E+05	–7.61E+05	–4.81E+04	1.81E+03	–2.93E+04	7.49E+03	–6.65E+03	7.03E+04
EL # 707 SE	8.60E+05	1.25E+06	2.61E+06	3.00E+04	1.57E+05	1.99E+04	3.39E+04	1.40E+05
SECTION 25								
EL # 2561 TA	–2.59E+06	–1.30E+06	1.37E+05	3.02E+06	4.40E+06	–6.09E+04	–6.02E+04	–7.44E+05
EL # 2561 2-10	1.13E+06	2.00E+06	3.99E+05	–2.24E+05	–1.06E+06	–2.65E+04	1.18E+04	4.91E+05
EL # 2561 SE	1.52E+06	3.68E+06	1.75E+06	6.49E+05	2.08E+06	1.58E+05	3.74E+04	6.01E+05
SECTION 26								
EL # 3158 TA	–5.88E+05	4.45E+06	–3.05E+06	–4.80E+06	–3.60E+06	3.62E+04	–2.28E+05	–6.69E+05
EL # 3158 2-10	5.88E+05	8.15E+05	–6.39E+05	–8.10E+05	2.58E+05	–6.65E+05	7.11E+05	–9.25E+05
EL # 3158 SE	2.40E+06	1.64E+06	5.47E+05	1.86E+06	5.34E+05	1.21E+06	1.06E+06	1.56E+06
SECTION 27								
EL # 2826 TA	3.34E+06	9.53E+05	9.25E+05	3.95E+06	2.24E+06	–7.21E+05	–5.27E+04	–1.82E+06
EL # 2826 2-10	2.02E+06	–4.45E+05	–5.95E+04	5.72E+04	–5.80E+05	–3.77E+04	–2.56E+04	–5.32E+04
EL # 2826 SE	2.32E+06	5.27E+05	1.18E+06	6.68E+05	2.29E+06	1.17E+06	8.12E+05	9.53E+05
SECTION 28								
EL # 2733 TA	–3.94E+06	–2.59E+06	5.59E+06	3.71E+06	3.23E+06	1.40E+05	–2.22E+05	–5.25E+05
EL # 2733 2-10	8.35E+05	–9.46E+05	1.21E+06	3.34E+04	–8.25E+04	3.71E+04	–9.43E+04	7.84E+04
EL # 2733 SE	9.89E+05	2.87E+06	2.50E+06	3.20E+05	8.84E+05	9.58E+04	3.74E+05	2.81E+05
SECTION 29								
EL # 2567 TA	–2.08E+06	5.99E+05	2.49E+06	2.84E+06	3.02E+06	–4.98E+05	–3.29E+05	5.17E+05
EL # 2567 2-10	8.07E+05	1.72E+06	7.88E+05	–2.00E+05	–8.67E+05	–5.83E+04	–3.88E+04	4.58E+05
EL # 2567 SE	1.53E+06	3.14E+06	1.46E+06	4.51E+05	1.53E+06	2.15E+05	1.06E+05	5.29E+05
SECTION 30								
EL # 1109 TA	–1.43E+06	1.32E+06	3.73E+05	–7.21E+03	–2.60E+04	–6.58E+03	1.64E+04	–5.53E+03
EL # 1109 2-10	–8.36E+05	9.40E+05	8.71E+04	2.84E+04	9.07E+03	1.72E+04	7.14E+04	–8.54E+03
EL # 1109 SE	7.48E+05	6.18E+05	4.85E+05	2.48E+05	5.43E+04	4.38E+04	1.13E+05	4.76E+04
SECTION 31								
EL # 1239 TA	–1.14E+06	1.84E+06	2.38E+05	–8.10E+03	2.46E+03	2.13E+03	4.75E+03	3.40E+03
EL # 1239 2-10	–3.07E+05	5.41E+05	1.14E+05	4.33E+04	9.75E+03	5.75E+03	5.65E+04	–1.26E+04
EL # 1239 SE	8.67E+04	3.19E+05	1.19E+05	1.35E+05	2.95E+04	2.22E+04	5.92E+04	3.10E+04
SECTION 32								
EL # 1442 TA	6.71E+06	–4.85E+06	9.70E+05	5.60E+04	5.78E+05	8.01E+03	–1.56E+04	6.11E+05
EL # 1442 2-10	4.53E+05	–1.37E+05	8.87E+04	2.22E+05	9.60E+05	–2.70E+04	–3.84E+04	7.89E+05
EL # 1442 SE	6.82E+05	6.04E+05	8.92E+04	3.39E+05	1.60E+06	3.91E+04	6.46E+04	1.20E+06
SECTION 33								
EL # 2487 TA	–9.35E+05	–1.34E+05	–1.96E+06	–1.86E+05	–4.39E+03	–3.06E+04	–1.86E+04	1.11E+05
EL # 2487 2-10	2.66E+04	3.77E+04	–3.96E+05	2.83E+04	1.22E+05	1.22E+04	7.21E+03	–3.90E+04
EL # 2487 SE	1.00E+06	5.48E+05	1.72E+06	1.52E+05	5.79E+05	2.99E+04	6.69E+04	1.52E+05

Table 3H.1-14 Rebar Ratios Used in the Analysis

Section #	Location	Reinforcing Steel %				
		Meridional		Hoop		
		Inside Face/Top	Outside Face/ Bottom	Inside Face/Top	Outside Face/ Bottom	Shear Ties
1	RCCV Wetwell Bottom	1.333	1.205	0.859	0.859	0.50
2	RCCV Wetwell Mid-Height	1.333	1.205	0.938	0.938	0.50
3	RCCV Wetwell Top	1.333	1.205	1.290	1.290	0.50
4	RCCV Drywell Bottom	1.333	1.205	1.721	1.721	0.50
5	RCCV Drywell Mid-Height	1.111	1.005	1.143	1.143	0.50
6	RCCV Drywell Top	1.111	1.005	1.143	1.143	0.50
7	RCCV Top Slab @ RCCV Wall	0.841	0.630	0.630	0.630	0.46
8	RCCV Top Slab @ Center	0.841	0.841	0.630	0.630	0.46
9	RCCV Top Slab @ Drywell Head Opening	1.262	1.262	0.630	0.630	0.91
10	Basemat Cavity @ Center	0.329	0.329	0.329	0.329	0.55
11	Basemat Inside RPV Pedestal	0.276	0.276	0.288	0.288	0.55
12	Basemat Outside RPV Pedestal	0.631	0.631	0.309	0.309	0.55
13	Basemat Between RCCV & RPV Pedestal	0.439	0.439	0.495	0.495	0.55
14	Basemat Inside RCCV	0.483	0.483	0.495	0.495	0.55
15	D/F Slab @ RPV	1.563	1.563	1.612	1.612	0.52
16	D/F Slab @ Center	0.943	0.943	1.074	1.074	0.31
17	D/F Slab @ RCCV	1.131	1.131	1.074	1.074	0.25
18	Basemat Outside RCCV	0.308	0.614	0.308	0.614	0.83
22	R/B Outside Wall @ Base	0.996	0.996	0.996	0.996	0.30

Table 3H.1-14 Rebar Ratios Used in the Analysis (Continued)

Section #	Location	Reinforcing Steel %				
		Meridional		Hoop		
		Inside Face/Top	Outside Face/ Bottom	Inside Face/Top	Outside Face/ Bottom	Shear Ties
23	R/B Outside Wall @ Center	1.059	1.059	1.059	1.059	0.30
24	R/B Outside Wall @ Grade	1.270	1.270	1.270	1.270	0.10
25	Fuel Pool Wall @ Base	0.851	0.851	0.851	0.851	0.20
26	Fuel Pool Slab @ Center	0.784	0.784	0.946	0.946	0.38
27	Fuel Pool Girder @ Drywell Head Opening	0.591	0.591	0.591	0.591	0.20
28	Fuel Pool Girder @ RCCV Wall	0.968	0.968	0.968	0.968	0.20
29	Fuel Pool Girder @ Deep End	0.968	0.968	0.968	0.968	0.20
30	R/B Floor @ El. –6.70m@ RCCV	1.409	1.409	1.409	1.409	0.20
31	R/B Floor @ El. –0.20m @ RCCV	1.692	1.692	1.692	1.692	0.20
32	R/B Floor @ El. 7.30m @ RCCV	0.908	0.908	0.605	0.605	0.30
33	Steam Tunnel Floor	1.211	1.211	1.211	1.211	0.50
34	Steam Tunnel Roof	1.129	1.129	1.129	1.129	0.50

Table 3H.1-15 Rebar and Concrete Stresses Due to Load Combination 1

Section #	Location	Element #	Azimuth (Deg.)	Calculated Reinforcing Steel Stresses (MPa)					Reinforcing Steel Allowable Stress (MPa)	Concrete Stress (MPa)	
				Inside Face/Top		Outside Face/ Bottom		Shear Ties			
				Merid.	Circum.	Merid.	Circum.			Calculated	Allowable
1	RCCV Wetwell Bottom	5	225.80	–10.69	30.27	–14.82	15.65	2.00	310.26	–1.896	–16.55
2	RCCV Wetwell Mid-Height	41	225.80	–14.48	107.91	–6.55	87.91	0.00	310.26	–2.020	–16.55
3	RCCV Wetwell Top	95	225.80	0.34	43.30	–7.65	31.23	22.06	310.26	–1.613	–16.55
4	RCCV Drywell Bottom	113	225.80	0.14	23.65	–0.69	20.48	15.44	310.26	–1.476	–16.55
5	RCCV Drywell Mid-Height	131	225.80	2.62	26.06	6.41	30.61	9.17	310.26	–1.158	–16.55
6	RCCV Drywell Top	167	225.80	34.00	22.48	9.17	15.38	45.51	310.26	–1.682	–16.55
7	RCCV Top Slab @ RCCV Wall	1620	225.81	23.17	30.06	68.19	29.44	25.03	310.26	–1.027	–16.55
8	RCCV Top Slab @ Center	1638	225.36	33.79	33.51	33.92	35.16	12.89	310.26	–0.903	–16.55
9	RCCV Top Slab @ Drywell Head Opening	1656	225.00	45.23	51.78	29.65	44.75	25.79	310.26	–1.855	–16.55
10	Basemat Cavity @ Center	929	270.00	11.10	6.14	14.76	19.03	4.07	310.26	–0.690	–16.55
11	Basemat Inside RPV Pedestal	926	192.04	12.76	8.76	32.20	26.82	9.93	310.26	–0.552	–16.55
12	Basemat Outside RPV Pedestal	912	225.00	24.68	17.24	24.62	15.93	28.61	310.26	–0.552	–16.55
13	Basemat Between RCCV & RPV Pedestal	894	225.36	28.20	20.48	6.62	3.86	8.83	310.26	–0.648	–16.55
14	Basemat Inside RCCV	876	225.81	24.41	27.10	7.58	–1.03	11.10	310.26	–0.696	–16.55
15	D/F Slab @ RPV	1380	225.00	44.33	45.37	42.40	45.92	21.17	310.26	–1.007	–16.55
16	D/F Slab @ Center	1362	225.36	49.99	56.95	79.57	66.60	–0.28	310.26	–0.848	–16.55
17	D/F Slab @ RCCV	1344	225.81	41.58	52.40	68.88	63.30	8.41	310.26	–1.090	–16.55
18	Basemat Outside RCCV	982	227.93	51.30	46.20	36.13	2.69	50.33	310.26	–1.331	–16.55

Table 3H.1-16 Rebar and Concrete Stresses Due to Load Combination 8

Section #	Location	Element #	Azimuth (Deg.)	Calculated Reinforcing Steel Stresses (MPa)					Reinforcing Steel Allowable Stress (MPa)	Concrete Stress (MPa)	
				Inside Face/Top		Outside Face/Bottom		Shear Ties		Calculated	Allowable
				Merid.	Circum.	Merid.	Circum.				
1	RCCV Wetwell Bottom	5	225.80	–28.75	25.23	1.79	45.30	27.86	372.32	–4.59	–23.44
2	RCCV Wetwell Mid-Height	41	225.80	–33.10	93.29	13.72	119.14	7.65	372.32	–5.27	–23.44
3	RCCV Wetwell Top	95	225.80	–31.30	38.75	25.03	73.57	11.58	372.32	–5.32	–23.44
4	RCCV Drywell Bottom	113	225.80	–34.27	–3.10	86.05	81.64	15.17	372.32	–8.09	–23.44
5	RCCV Drywell Mid-Height	131	225.80	2.07	–1.86	63.30	105.98	38.68	372.32	–4.77	–23.44
6	RCCV Drywell Top	167	225.80	19.03	–18.20	37.58	52.68	53.37	372.32	–4.35	–23.44
7	RCCV Top Slab @ RCCV Wall	1620	225.81	–39.16	–2.69	142.17	88.74	17.24	372.32	–9.89	–23.44
8	RCCV Top Slab @ Center	1638	225.36	–53.99	64.68	–9.03	95.91	18.00	372.32	–7.72	–23.44
9	RCCV Top Slab @ Drywell Head Opening	1656	225.00	–34.82	–8.83	–16.13	–8.14	17.79	372.32	–5.14	–23.44
10	Basemat Cavity @ Center	929	270.00	–22.96	–25.93	86.53	95.84	5.86	372.32	–4.68	–23.44
11	Basemat Inside RPV Pedestal	926	192.04	–25.79	–26.06	116.32	109.77	6.27	372.32	–5.84	–23.44
12	Basemat Outside RPV Pedestal	912	225.00	–38.20	–4.34	92.12	123.01	24.55	372.32	–7.12	–23.44
13	Basemat Between RCCV and RPV Pedestal	894	225.36	19.93	–8.89	67.98	70.47	41.65	372.32	–2.46	–23.44
14	Basemat Inside RCCV	876	225.81	22.41	–6.21	38.89	51.23	36.34	372.32	–1.35	–23.44
15	D/F Slab @ RPV	1380	225.00	–16.62	22.62	–29.86	–11.65	22.00	372.32	–4.92	–23.44
16	D/F Slab @ Center	1362	225.36	–42.40	–23.10	–4.69	–6.00	10.41	372.32	–8.80	–23.44
17	D/F Slab @ RCCV	1344	225.81	–45.37	–26.61	1.03	–5.45	13.31	372.32	–9.86	–23.44
18	Basemat Outside RCCV	982	227.93	52.26	271.04	98.05	166.24	82.88	372.32	–4.32	–23.44
22	R/B Outside Wall @ Base	415	267.23	51.64	59.64	–10.20	6.62	80.46	372.32	–4.77	–23.44
23	R/B Outside Wall @ Center	516	224.57	74.19	66.54	23.44	15.38	90.39	372.32	–3.59	–23.44
24	R/B Outside Wall @ Grade	707	267.23	–21.37	67.02	68.60	229.47	16.48	372.32	–4.01	–23.44
25	Fuel Pool Wall @ Base	2561	184.31	48.75	–5.58	74.95	74.88	45.85	372.32	–3.31	–23.44

Table 3H.1-16 Rebar and Concrete Stresses Due to Load Combination 8 (Continued)

Section #	Location	Element #	Azimuth (Deg.)	Calculated Reinforcing Steel Stresses (MPa)					Reinforcing Steel Allowable Stress (MPa)	Concrete Stress (MPa)	
				Inside Face/Top		Outside Face/Bottom		Shear Ties			
				Merid.	Circum.	Merid.	Circum.			Calculated	Allowable
26	Fuel Pool Slab @ Center	3158	197.05	107.70	26.82	132.45	126.04	149.83	372.32	–6.70	–23.44
27	Fuel Pool Girder @ Drywell Head Opening	2826	295.00	46.06	123.00	61.16	161.55	140.04	372.32	–1.50	–23.44
28	Fuel Pool Girder @ RCCV Wall	2733	208.92	57.99	–5.58	180.10	183.20	38.34	372.32	–8.43	–23.44
29	Fuel Pool Girder @ Deep End	2567	199.68	109.98	57.30	180.72	180.79	103.01	372.32	–6.27	–23.44
30	R/B Floor @ El. –6.70 m @ RCCV	1109	213.85	99.29	–8.89	99.22	–17.31	–0.28	372.32	–2.53	–23.44
31	R/B Floor @ El. –0.20 m @ RCCV	1239	213.85	97.56	5.10	86.19	–12.89	0.83	372.32	–2.45	–23.44
32	R/B Floor @ El. 7.30 m @ RCCV	1442	274.91	82.74	213.4	–7.86	160.38	135.35	372.32	–6.45	–23.44
33	Steam Tunnel Floor	2487	340.93	45.09	48.61	41.78	26.61	–0.28	372.32	–2.51	–23.44
34	Steam Tunnel Roof	1750	301.04	74.47	118.59	8.89	–1.52	14.62	372.32	–11.33	–23.44

Table 3H.1-17 Rebar and Concrete Stresses Due to Load Combination 15

Section #	Location	Element #	Azimuth (Deg.)	Calculated Reinforcing Steel Stresses (MPa)					Reinforcing Steel Allowable Stress (MPa)	Concrete Stress (MPa)	
				Inside Face/Top		Outside Face/Bottom		Shear Ties			
				Merid.	Circum.	Merid.	Circum.			Calculated	Allowable
1	RCCV Wetwell Bottom	5	225.80	218.15	260.29	334.27	324.07	193.82	372.32	–9.267	–23.44
2	RCCV Wetwell Mid-Height	41	225.80	164.10	188.79	277.32	282.28	67.16	372.32	–8.226	–23.44
3	RCCV Wetwell Top	95	225.80	120.25	164.65	253.87	232.29	63.99	372.32	–7.812	–23.44
4	RCCV Drywell Bottom	113	225.80	97.84	97.29	283.80	208.42	78.81	372.32	–8.680	–23.44
5	RCCV Drywell Mid-Height	131	225.80	199.13	176.37	291.04	289.80	147.07	372.32	–8.970	–23.44
6	RCCV Drywell Top	167	225.80	38.47	59.43	353.16	258.98	55.16	372.32	–8.708	–23.44
7	RCCV Top Slab @ RCCV Wall	1620	225.81	201.68	236.22	43.58	37.78	127.21	372.32	–5.868	–23.44
8	RCCV Top Slab @ Center	1638	225.36	15.79	193.96	–47.71	124.39	88.67	372.32	–9.377	–23.44
9	RCCV Top Slab @ Drywell Head Opening	1656	225.00	1.17	122.32	–26.89	123.70	34.68	372.32	–5.109	–23.44
10	Basemat Cavity @ Center	929	270.00	9.31	–7.86	107.29	117.35	70.88	372.32	–6.171	–23.44
11	Basemat Inside RPV Pedestal	926	192.04	43.04	–19.51	255.60	223.47	99.22	372.32	–8.991	–23.44
12	Basemat Outside RPV Pedestal	912	225.00	–59.78	41.44	174.79	257.46	62.54	372.32	–12.990	–23.44
13	Basemat Between RCCV and RPV Pedestal	894	225.36	–53.09	31.85	166.58	170.86	28.82	372.32	–9.619	–23.44
14	Basemat Inside RCCV	876	225.81	–34.54	68.88	177.68	191.82	45.92	372.32	–8.453	–23.44
15	D/F Slab @ RPV	1380	225.00	17.58	–25.93	–38.89	–4.96	58.75	372.32	–8.805	–23.44
16	D/F Slab @ Center	1362	225.36	–38.68	44.96	25.10	92.74	42.33	372.32	–10.143	–23.44
17	D/F Slab @ RCCV	1344	225.81	–60.06	46.75	78.53	98.53	24.48	372.32	–16.410	–23.44
18	Basemat Outside RCCV	982	227.93	216.43	317.86	276.63	253.12	224.16	372.32	–6.440	–23.44
22	R/B Outside Wall @ Base	415	267.23	342.68	306.83	190.78	220.30	321.10	372.32	–9.839	–23.44
23	R/B Outside Wall @ Center	516	224.57	316.62	238.43	216.37	152.17	293.38	372.32	–8.226	–23.44
24	R/B Outside Wall @ Grade	707	267.23	96.60	174.17	272.42	371.16	183.00	372.32	–7.005	–23.44
25	Fuel Pool Wall @ Base	2561	184.31	116.32	44.89	320.07	211.40	116.53	372.32	–5.454	–23.44

Table 3H.1-17 Rebar and Concrete Stresses Due to Load Combination 15 (Continued)

Section #	Location	Element #	Azimuth (Deg.)	Calculated Reinforcing Steel Stresses (MPa)					Reinforcing Steel Allowable Stress (MPa)	Concrete Stress (MPa)	
				Inside Face/Top		Outside Face/Bottom		Shear Ties		Calculated	Allowable
				Merid.	Circum.	Merid.	Circum.				
26	Fuel Pool Slab @ Center	3158	197.05	220.09	118.04	231.81	226.43	353.23	372.32	–10.053	–23.44
27	Fuel Pool Girder @ Drywell Head Opening	2826	295.00	98.94	196.65	155.83	257.18	300.21	372.32	–4.192	–23.44
28	Fuel Pool Girder @ RCCV Wall	2733	208.92	167.69	92.74	312.76	274.42	198.64	372.32	–10.446	–23.44
29	Fuel Pool Girder @ Deep End	2567	199.68	202.92	122.46	339.30	269.59	210.92	372.32	–7.219	–23.44
30	R/B Floor @ El. –6.70 m @ RCCV	1109	213.85	152.45	109.35	149.62	–13.24	40.61	372.32	–5.302	–23.44
31	R/B Floor @ El. –0.20 m @ RCCV	1239	213.85	127.63	60.61	83.36	–24.48	6.27	372.32	–5.419	–23.44
32	R/B Floor @ El. 7.30 m @ RCCV	1442	274.91	229.40	278.49	10.07	158.03	300.62	372.32	–12.521	–23.44
33	Steam Tunnel Floor	2487	340.93	97.08	134.59	118.04	76.81	10.41	372.32	–4.951	–23.44
34	Steam Tunnel Roof	1750	301.04	41.71	55.37	86.81	86.81	46.33	372.32	–9.239	–23.44

Table 3H.1-18 Rebar and Concrete Stresses Due to Load Combinations 15a and 15b

Section #	Location	Element #	Azimuth (Deg.)	Calculated Reinforcing Steel Stresses (MPa)					Reinforcing Steel Allowable Stress (MPa)	Concrete Stress (MPa)	
				Inside Face/Top		Outside Face/Bottom		Shear Ties			
				Merid.	Circum.	Merid.	Circum.			Calculated	Allowable
1	RCCV Wetwell Bottom	5	225.80	187.82	201.75	371.09	352.20	219.67	372.32	–10.515	–23.44
2	RCCV Wetwell Mid-Height	41	225.80	112.46	121.77	304.62	315.31	51.23	372.32	–8.019	–23.44
3	RCCV Wetwell Top	95	225.80	59.64	137.35	315.86	276.21	75.43	372.32	–10.308	–23.44
4	RCCV Drywell Bottom	113	225.80	23.65	53.16	367.02	258.77	100.11	372.32	–13.645	–23.44
5	RCCV Drywell Mid-Height	131	225.80	130.52	110.25	318.07	349.23	151.97	372.32	–9.784	–23.44
6	RCCV Drywell Top	167	225.80	15.17	–47.02	319.17	183.48	27.37	372.32	–13.362	–23.44
7	RCCV Top Slab @ RCCV Wall	1620	225.81	195.27	226.29	77.50	60.06	161.14	372.32	–3.854	–23.44
8	RCCV Top Slab @ Center	1638	225.36	146.66	252.29	–73.50	31.23	20.62	372.32	–14.831	–23.44
9	RCCV Top Slab @ Drywell Head Opening	1656	225.00	22.96	85.29	–45.78	40.34	59.78	372.32	–8.322	–23.44
10	Basemat Cavity @ Center	929	270.00	14.55	–3.31	138.10	155.07	76.26	372.32	–6.770	–23.44
11	Basemat Inside RPV Pedestal	926	192.04	52.54	–19.65	282.07	283.80	109.00	372.32	–10.452	–23.44
12	Basemat Outside RPV Pedestal	912	225.00	–75.29	19.38	206.37	316.90	52.68	372.32	–15.534	–23.44
13	Basemat Between RCCV and RPV Pedestal	894	225.36	–59.09	33.85	216.99	197.75	43.58	372.32	–12.004	–23.44
14	Basemat Inside RCCV	876	225.81	–39.78	61.57	211.33	213.75	55.50	372.32	–9.784	–23.44
15	D/F Slab @ RPV	1380	225.00	129.00	–49.09	245.19	20.62	42.06	372.32	–12.011	–23.44
16	D/F Slab @ Center	1362	225.36	–81.02	–54.95	5.65	–5.03	26.89	372.32	–18.244	–23.44
17	D/F Slab @ RCCV	1344	225.81	–73.50	–42.33	96.67	32.68	27.72	372.32	–22.650	–23.44
18	Basemat Outside RCCV	982	227.93	228.09	328.06	299.66	271.73	242.84	372.32	–7.089	–23.44
22	R/B Outside Wall @ Base	415	267.23	360.33	316.41	193.68	222.85	327.86	372.32	–10.170	–23.44
23	R/B Outside Wall @ Center	516	224.57	327.72	246.29	221.88	158.03	295.45	372.32	–8.460	–23.44
24	R/B Outside Wall @ Grade	707	267.23	96.87	177.62	273.25	373.92	194.44	372.32	–7.102	–23.44
25	Fuel Pool Wall @ Base	2561	184.31	128.59	60.26	309.24	183.61	120.52	372.32	–4.268	–23.44

Table 3H.1-18 Rebar and Concrete Stresses Due to Load Combinations 15a and 15b (Continued)

Section #	Location	Element #	Azimuth (Deg.)	Calculated Reinforcing Steel Stresses (MPa)					Reinforcing Steel Allowable Stress (MPa)	Concrete Stress (MPa)	
				Inside Face/Top		Outside Face/Bottom		Shear Ties			
				Merid.	Circum.	Merid.	Circum.			Calculated	Allowable
26	Fuel Pool Slab @ Center	3158	197.05	277.25	156.72	288.56	262.01	374.81	372.32	–10.287	–23.44
27	Fuel Pool Girder @ Drywell Head Opening	2826	295.00	149.21	220.22	194.23	271.94	343.65	372.32	–3.689	–23.44
28	Fuel Pool Girder @ RCCV Wall	2733	208.92	139.21	123.21	322.07	297.52	260.70	372.32	–10.646	–23.44
29	Fuel Pool Girder @ Deep End	2567	199.68	228.98	120.94	311.17	203.54	223.05	372.32	–7.122	–23.44
30	R/B Floor @ El. –6.70 m @ RCCV	1109	213.85	139.69	1.03	189.96	86.19	38.82	372.32	–4.640	–23.44
31	R/B Floor @ El. –0.20 m @ RCCV	1239	213.85	143.62	53.92	103.01	–24.89	8.00	372.32	–5.274	–23.44
32	R/B Floor @ El. 7.30 m @ RCCV	1442	274.91	218.02	355.44	0.97	232.71	288.56	372.32	–12.776	–23.44
33	Steam Tunnel Floor	2487	340.93	73.02	99.01	180.92	138.66	53.71	372.32	–5.964	–23.44
34	Steam Tunnel Roof	1750	301.04	49.58	64.19	98.53	92.67	46.40	372.32	–10.294	–23.44

Table 3H.1-19 Containment Liner Plate Strains (Max)

Load Comb. #	Struct. Comp.	Calculated Strain						Allowable Strain	
								Compress.	Tension
		Containment Wall							
	Section #	1	2	3	4	5	6		
	Element #	5	41	95	113	131	167		
1		0.000237	0.000771	0.000337	0.000210	0.000208	0.000301	–0.00400	0.00400
8		0.000200	0.000656	0.000282	–0.000313	–0.000142	0.000101	–0.00400	0.01000
15a,15b		0.001970	0.001060	0.001040	0.000309	0.001090	–0.000547	–0.01400	0.01000

Table 3H.1-19 Containment Liner Plate Strains (Max) (Continued)

Load Comb. #	Struct. Comp.	Calculated Strain								Allowable Strain	
										Compress.	Tension
		Containment Top Slab			Basemat Slab						
	Section #	7	8	9	10	11	12	13	14		
	Element #	1620	1638	1656	929	926	912	894	876		
1		0.000441	0.000384	0.000372	0.000134	0.000302	0.000200	0.000041	0.000043	–0.00400	0.00400
8		0.000017	0.000499	0.000004	–0.000163	–0.000206	–0.000252	0.000103	0.000123	–0.01400	0.01000
15a,15b		0.000341	0.000149	0.000318	0.000099	0.000259	0.000196	0.000291	0.000439	–0.01400	0.01000

Table 3H.1-19 Containment Liner Plate Strains (Max) (Continued)

Load Comb. #	Struct. Comp.	Calculated Strain						Allowable Strain	
								Compress.	Tension
		Diaphragm Floor Slab							
	Section #	**15**	**16**	**17**					
	Element #	**1380**	**1362**	**1344**					
1		0.000481	0.000833	0.000744				–0.00400	0.00400
1*		0.000408	0.001150	0.000512				–0.00400	0.00400
8		0.000017	–0.000328	–0.000365				–0.01400	0.01000
15a,15b		0.000044	–0.000658	–0.000848				–0.01400	0.01000

Table 3H.1-20 Stresses in Pedestal

Section	Critical Load Case	Resultant Membrane Stress in Steel Jacket (MPa)		Resultant Shear Stress in Stiffener Plate (MPa)	
		Calculated	Allowable	Calculated	Allowable
19	15a,15b	167.00	310.26	62.06	189.61
20	15a,15b	146.86	310.26	6.83	189.61
21	15a,15b	206.50	310.26	184.10	189.61

Table 3H.1-21 Maximum Moments and Shears in Walls Due to Lateral Soil Pressure (At-Rest Condition)

Section	M_x (N•m/m)	M_y (N•m/m)	V (N/m)
22	1.21E+06	7.95E+05	1.15E+06
23	8.19E+05	5.40E+05	7.81E+05
At El. 12.0m	5.31E+05	3.47E+05	4.57E+05

Table 3H.1-22 Maximum Moments and Shears in Walls Due to SSE Soil Pressure (SSE Condition)

Section	M_x (N•m/m)	M_y (N•m/m)	V (N/m)
22	1.62E+06	1.06E+06	1.54E+06
23	1.49E+06	9.85E+05	1.43E+06
At El. 12.0m	1.69E+06	1.11E+06	1.45E+06

Table 3H.1-23 Factors of Safety for Foundation Stability*

Load Combination	Overturning		Sliding		Floatation	
	Req'd.	Actual	Req'd.	Actual	Req'd.	Actual
D + F’					1.1	2.43
$D + L_o + F + H + E_{ss}$	1.1	490	1.1	1.11		

Here:

F = Buoyant Forces from Design Ground Water (0.61m Below Grade)

F’ = Buoyant Forces from Design Basis Flood (0.3m Below Grade)

H = Lateral Soil Pressure

L_o = Live Load Acting During an Earthquake (Zero Live Load is Considered).

E_{ss} = SSE Load

D = Dead Load

* Based on the calculation for shear forces due to tornado loads, it was found that it is less than 10% of the shear forces due to the seismic effects. Hence it was concluded that the load combinations comprising of wind and tornado loadings will not be the governing load combinations for the evaluation of overturning and sliding effects of the R/B stability and therefore, were not evaluated.

Figure 3H.1-1 (Refer to Figure 1.2-1)

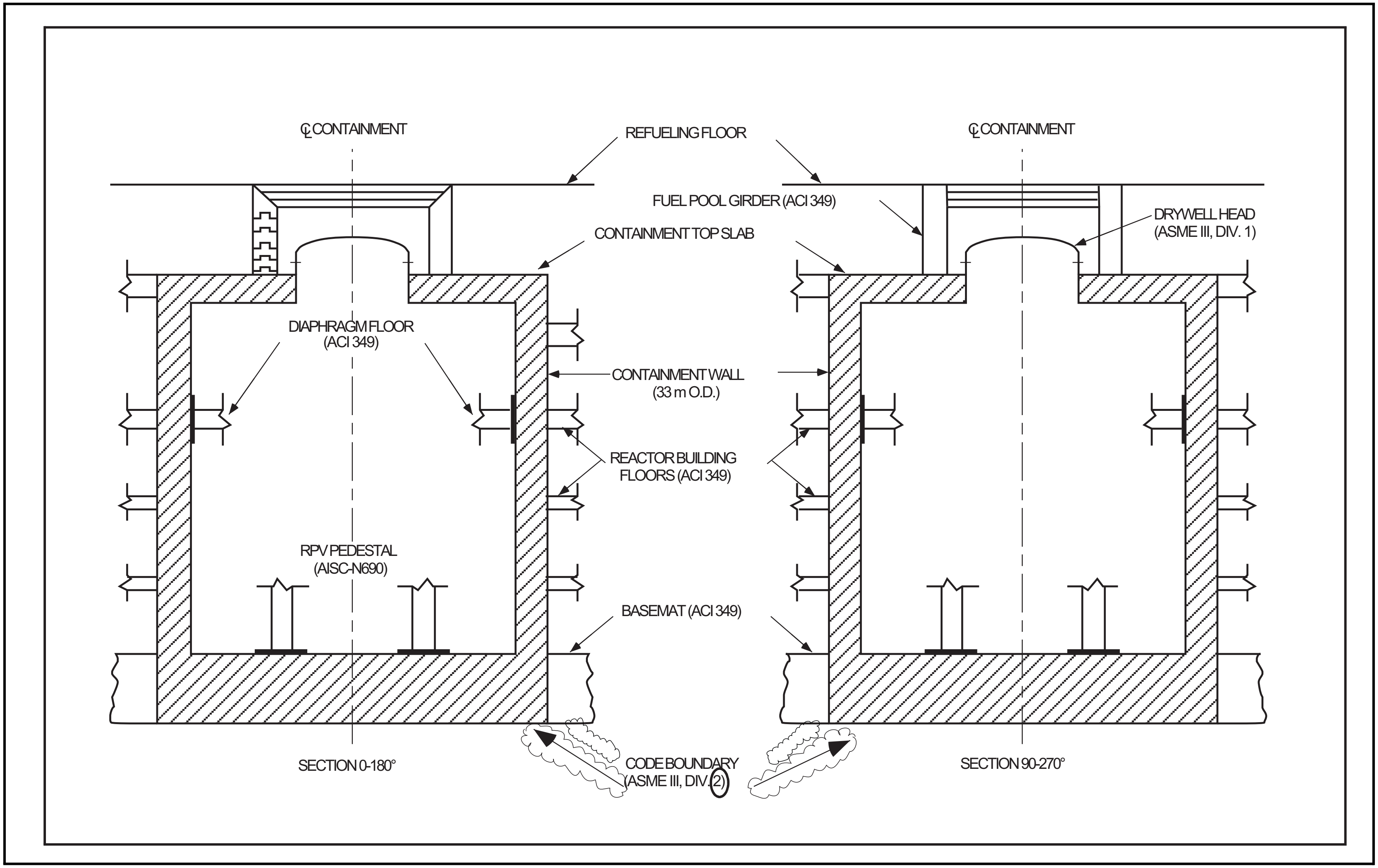


Figure 3H.1-2 Containment Structure ASME Code Jurisdictional Boundary

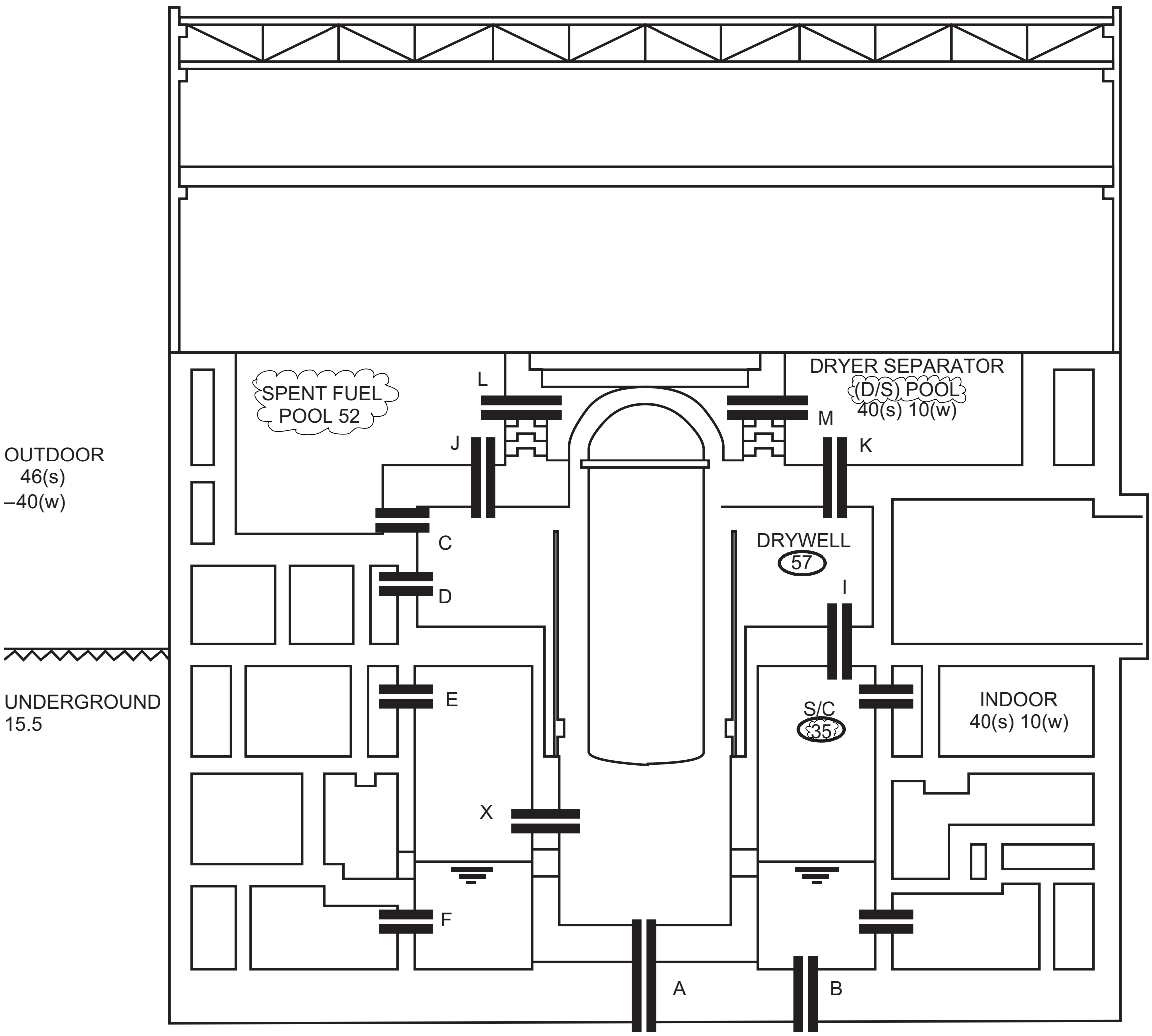


Figure 3H.1-3 Normal Operating Temperature (°C) and Sections Location for Thermal Distribution Analysis

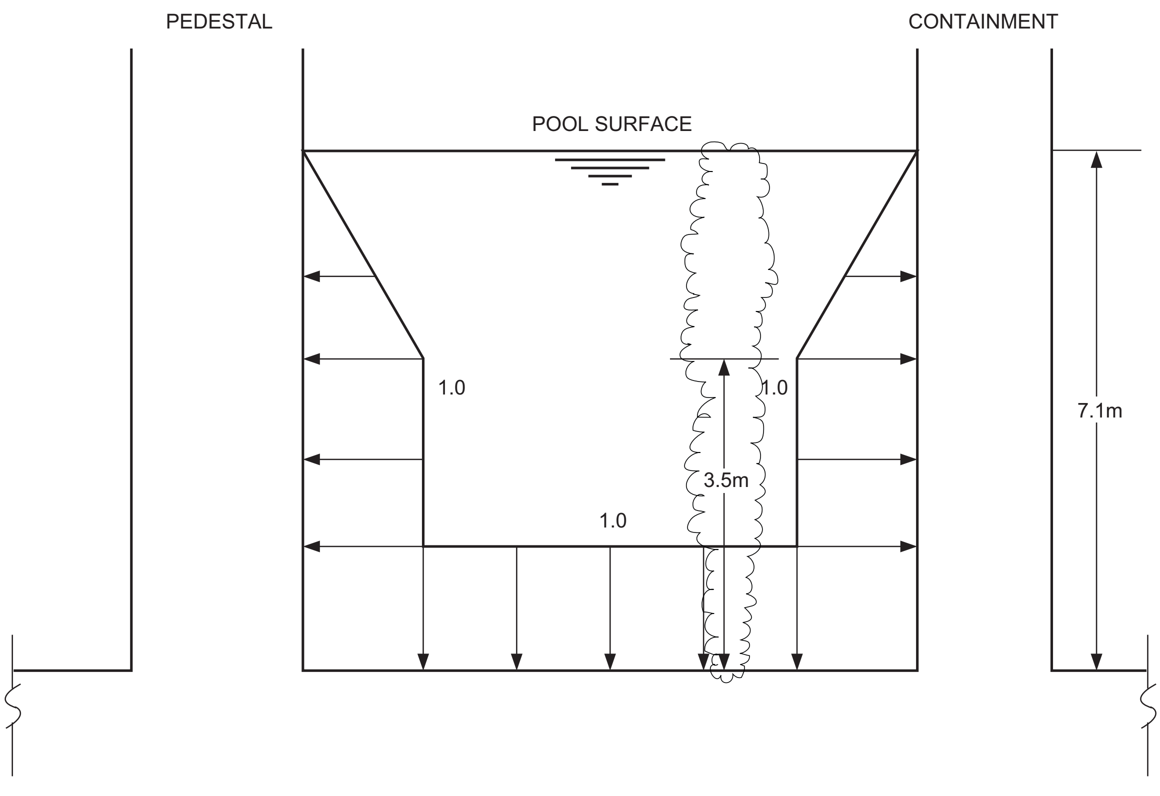


Figure 3H.1-4 Distribution of Condensation-Oscillation (CO) Pressure

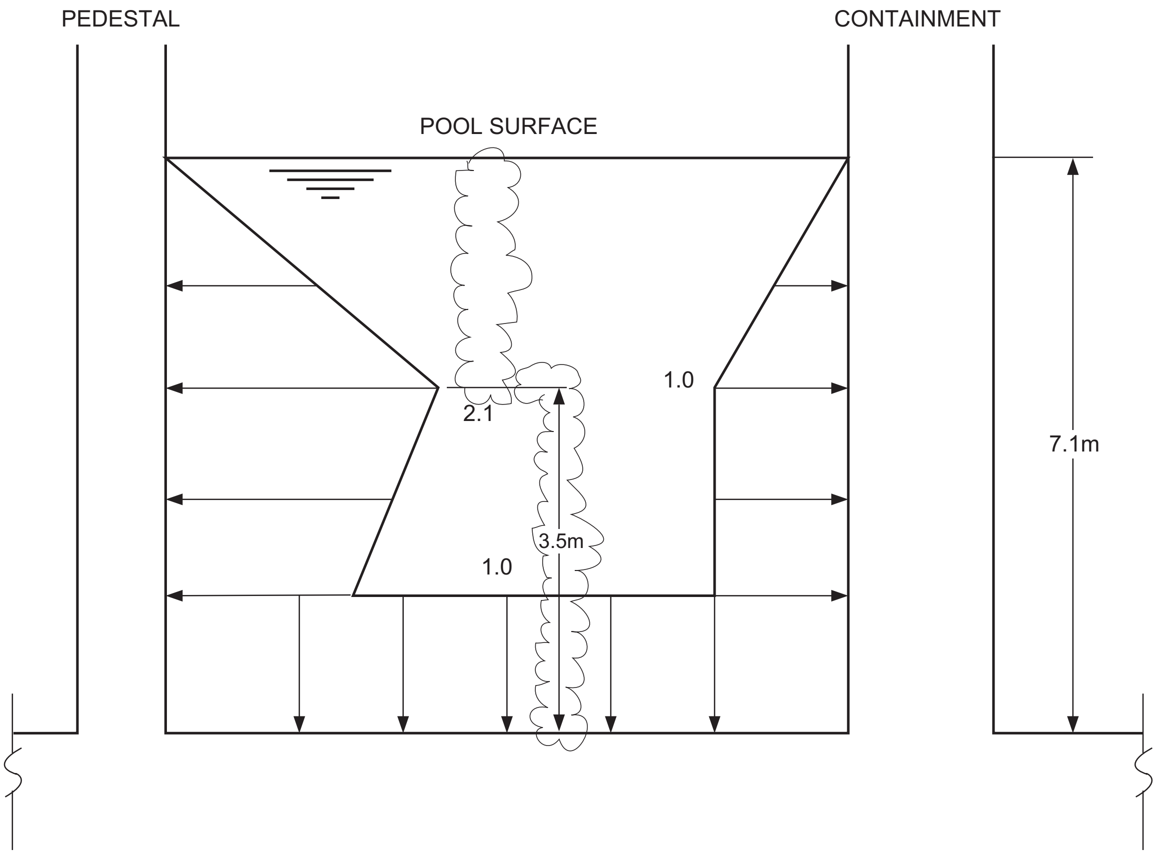


Figure 3H.1-5 Distribution of Chugging Pressure

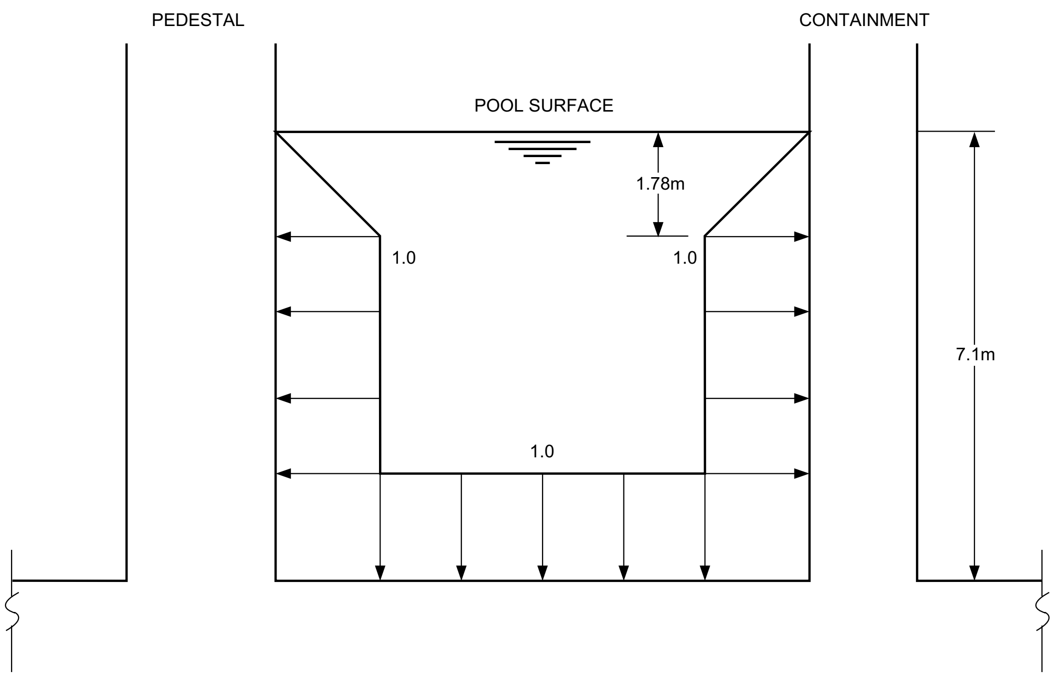


Figure 3H.1-6 Distribution of Safety-Relief Valve (SRV) Actuation Pressure

Figure 3H.1-7 Not Used

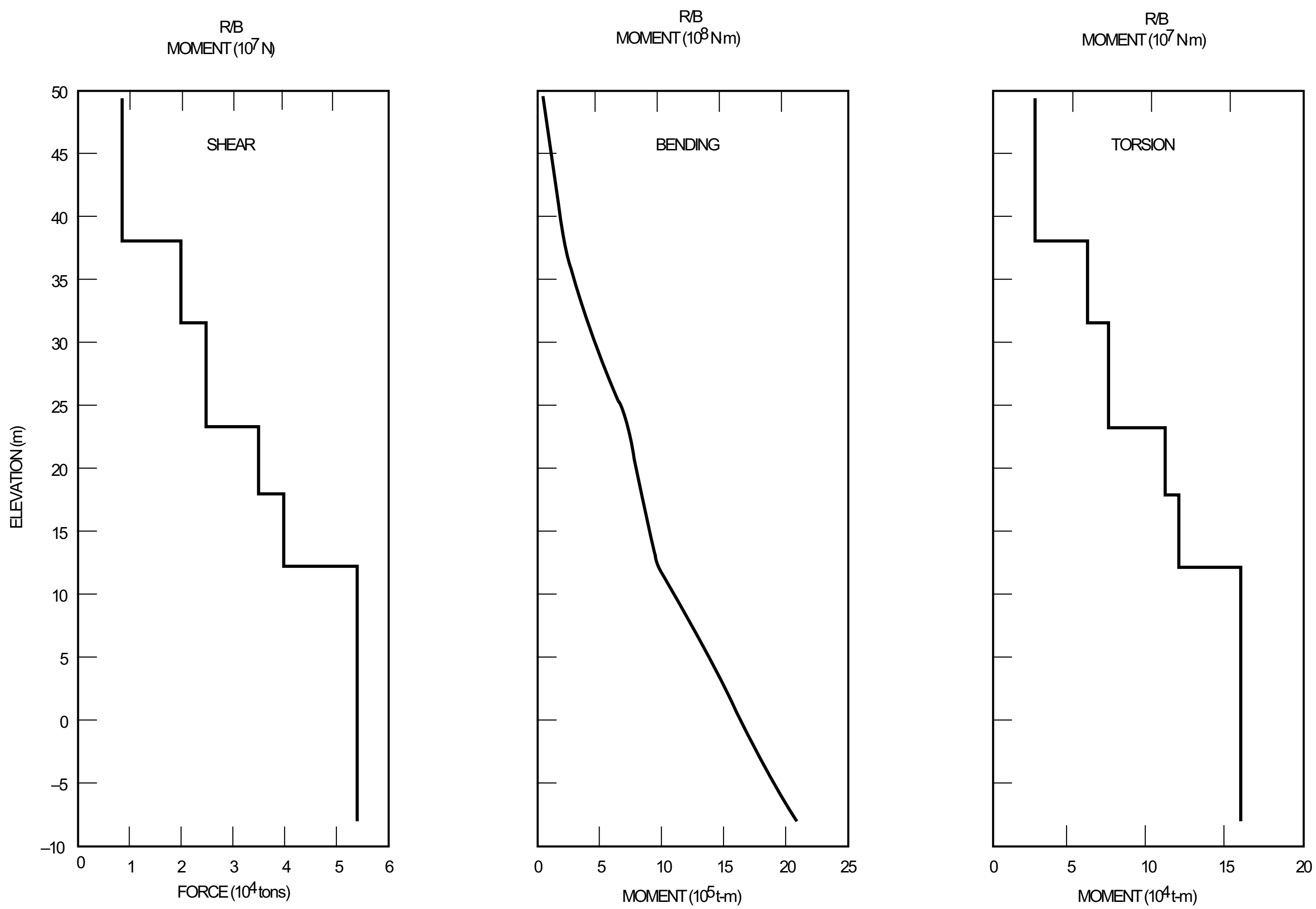


Figure 3H.1-8 Design Seismic Shears and Moments for Reactor Building Outer Walls

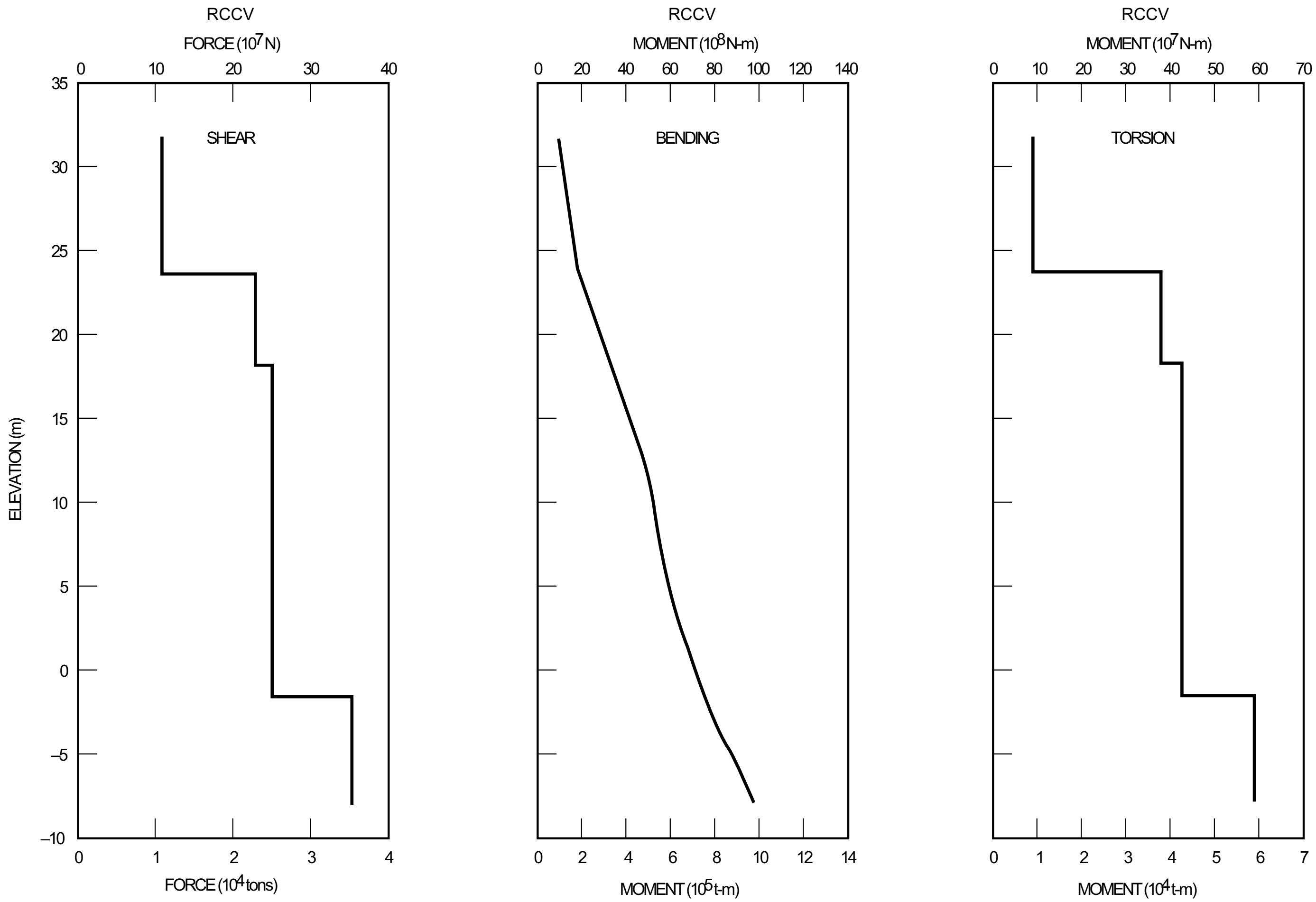


Figure 3H.1-9 Design Seismic Shears and Moments for RCCV

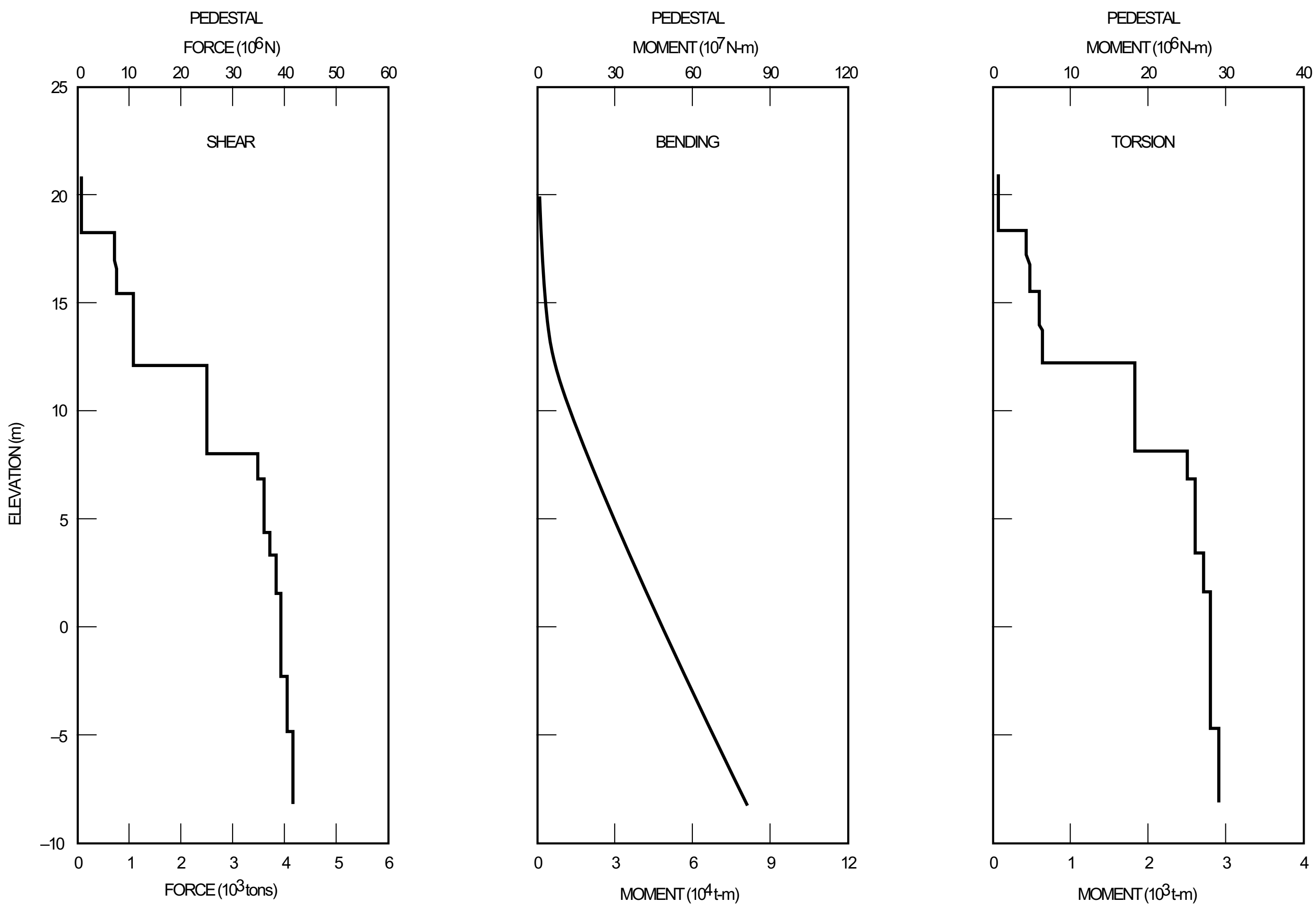


Figure 3H.1-10 Design Seismic Shears and Moments for RPV Pedestal Reactor Shield Wall

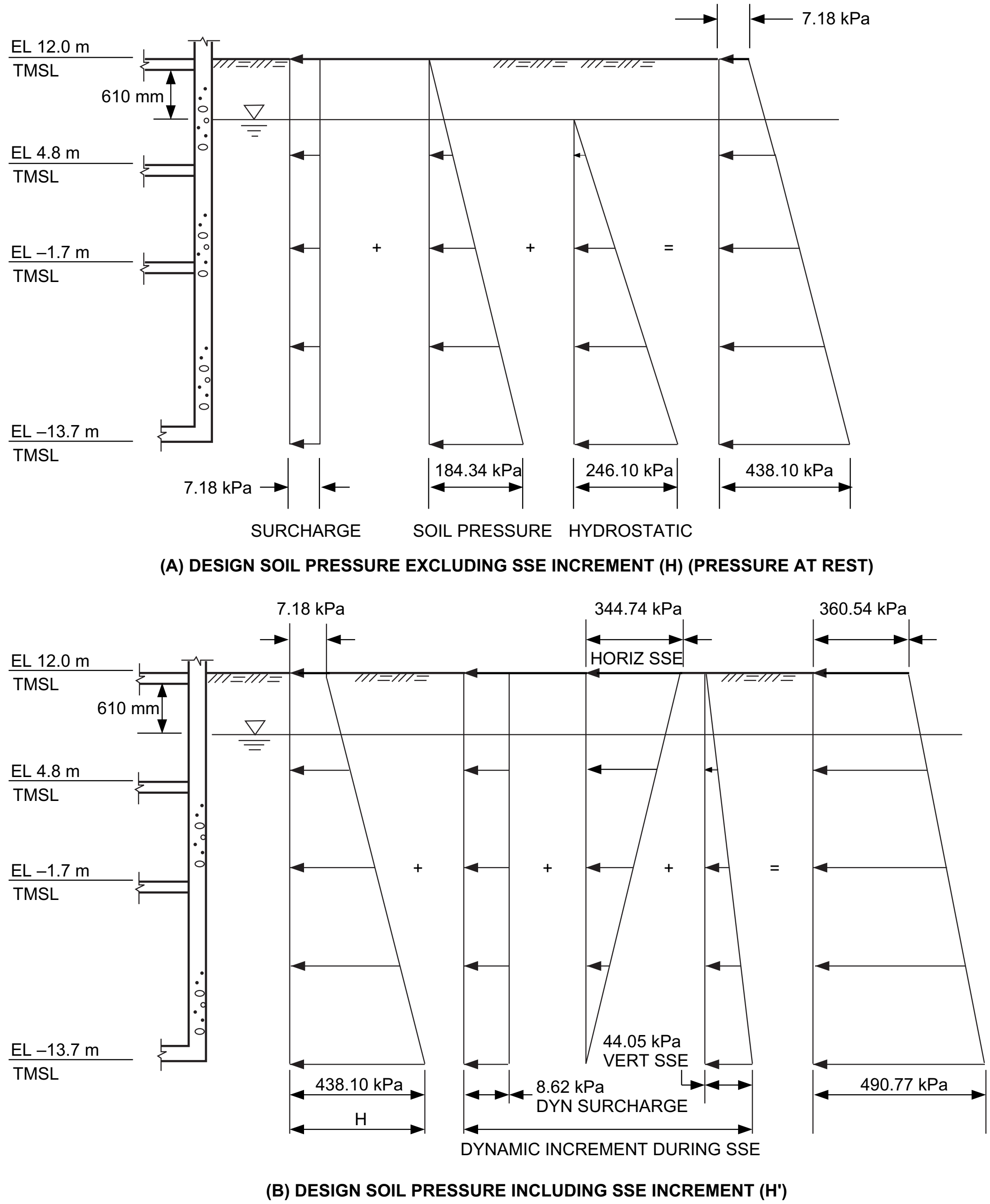


Figure 3H.1-11 Design Lateral Soil Pressures for RB Outerwalls

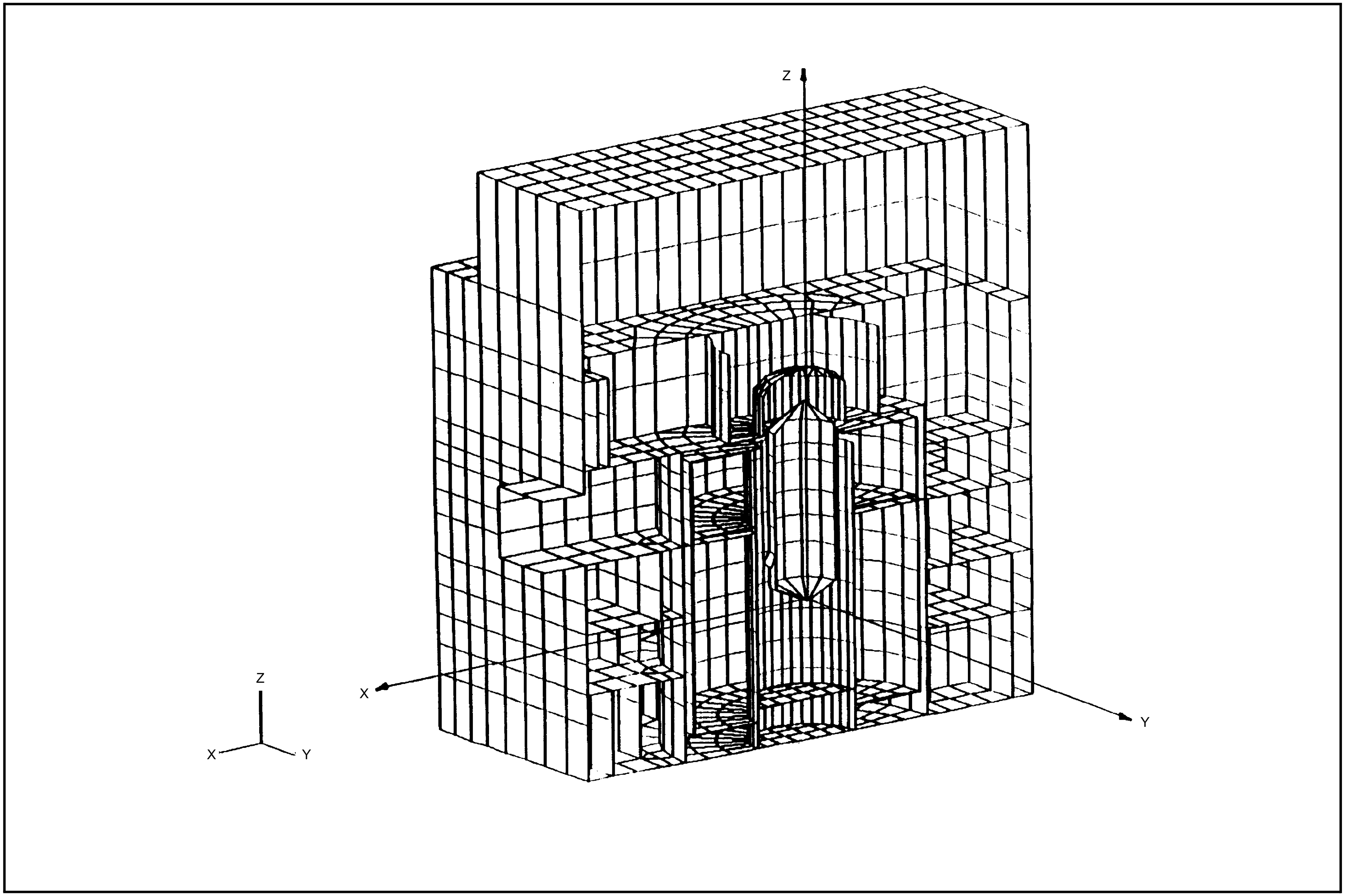


Figure 3H.1-12 F.E.M. Isometric View of Model Representing Half of Structure

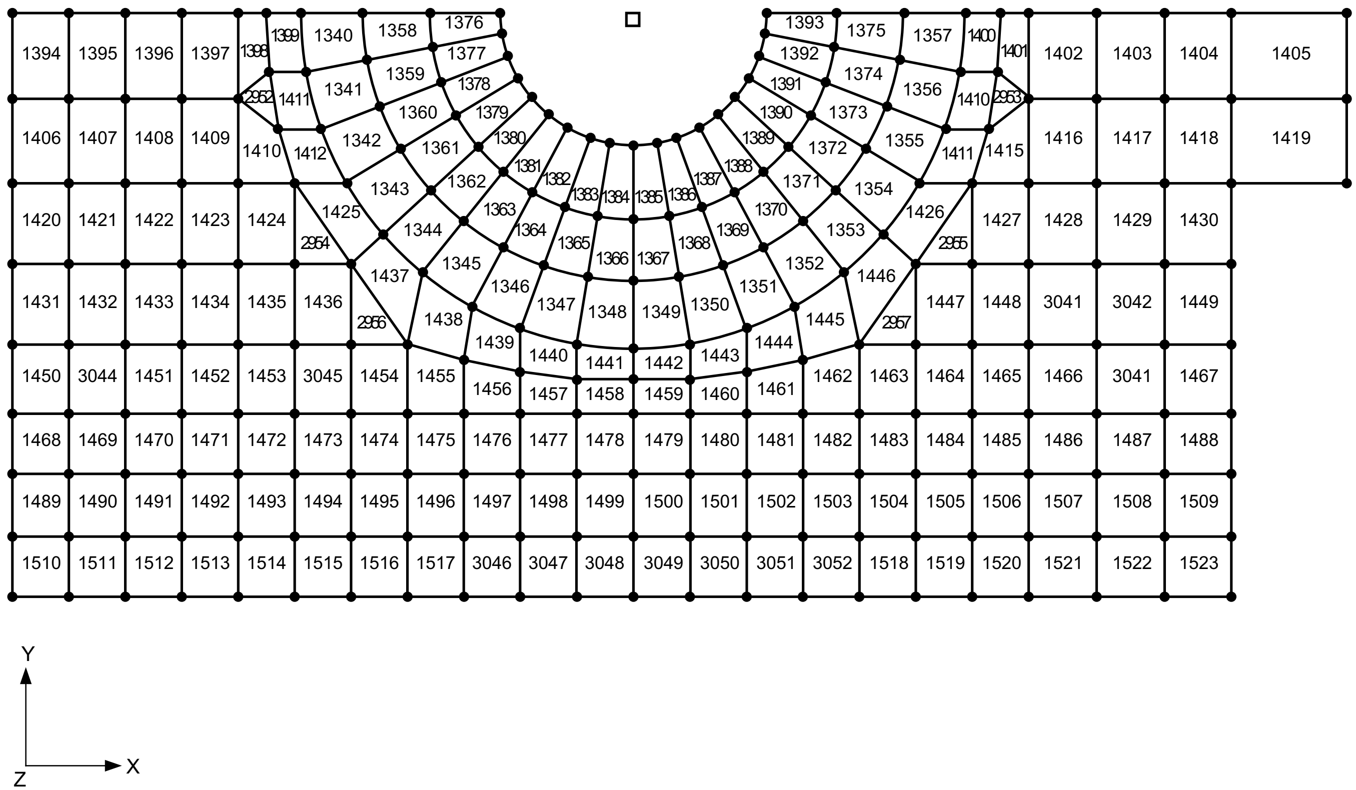


Figure 3H.1-13 F.E.M. Location of Elements at Diaphragm Floor Elevation

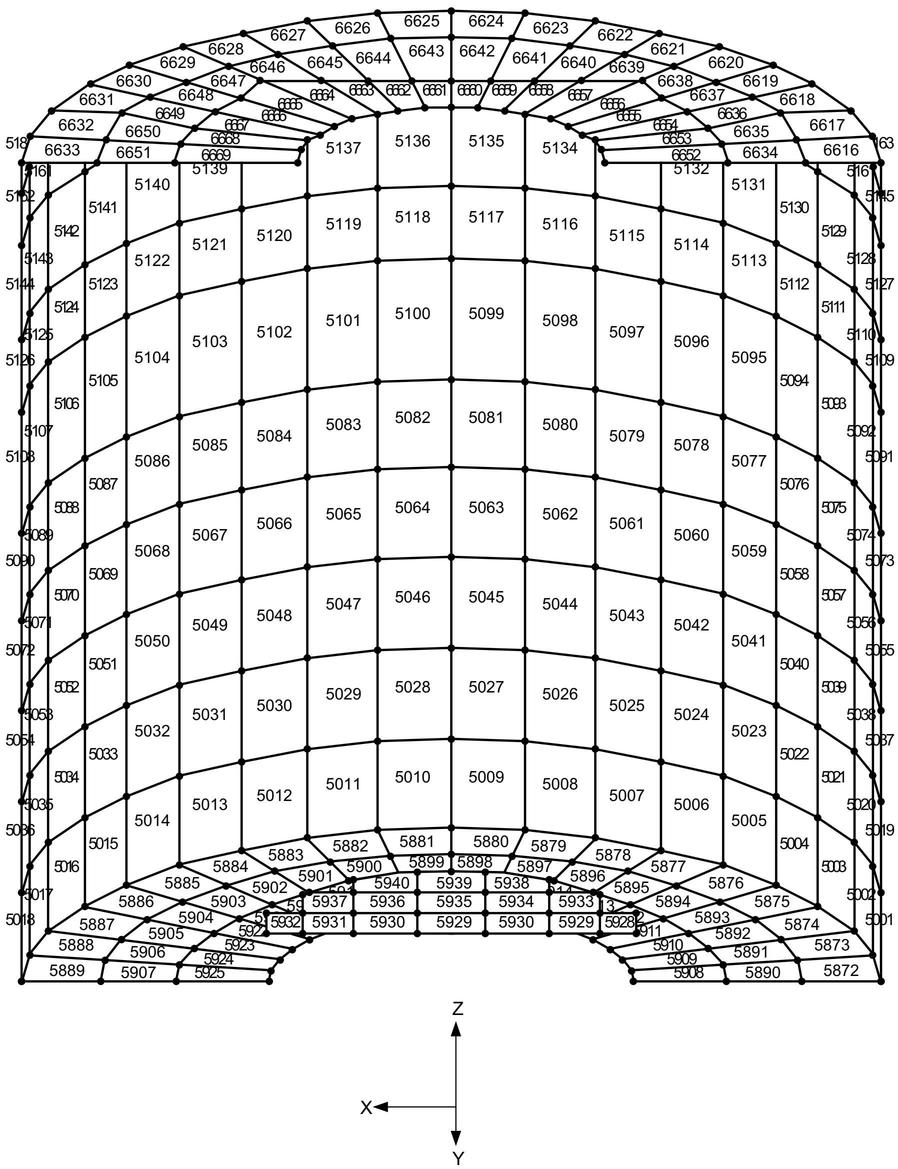


Figure 3H.1-14 F.E.M. Isometric View of Liner Plate

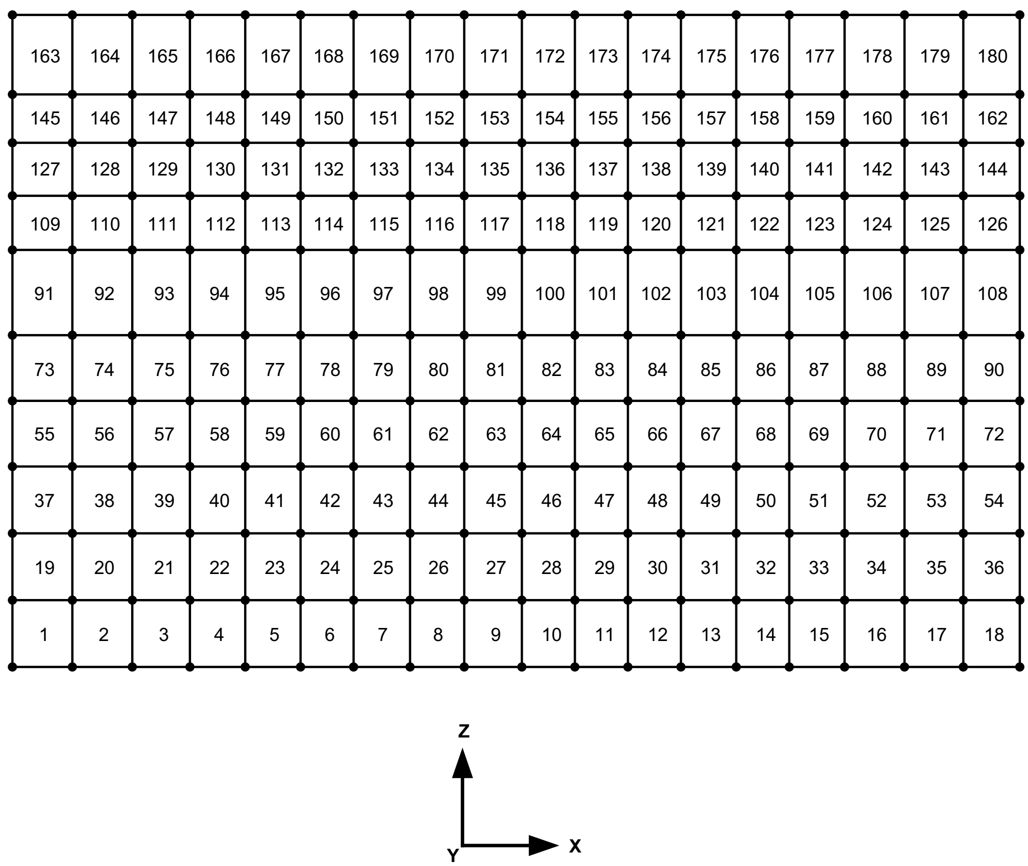


Figure 3H.1-15 F.E.M. Developed Elevation of RCCV Wall

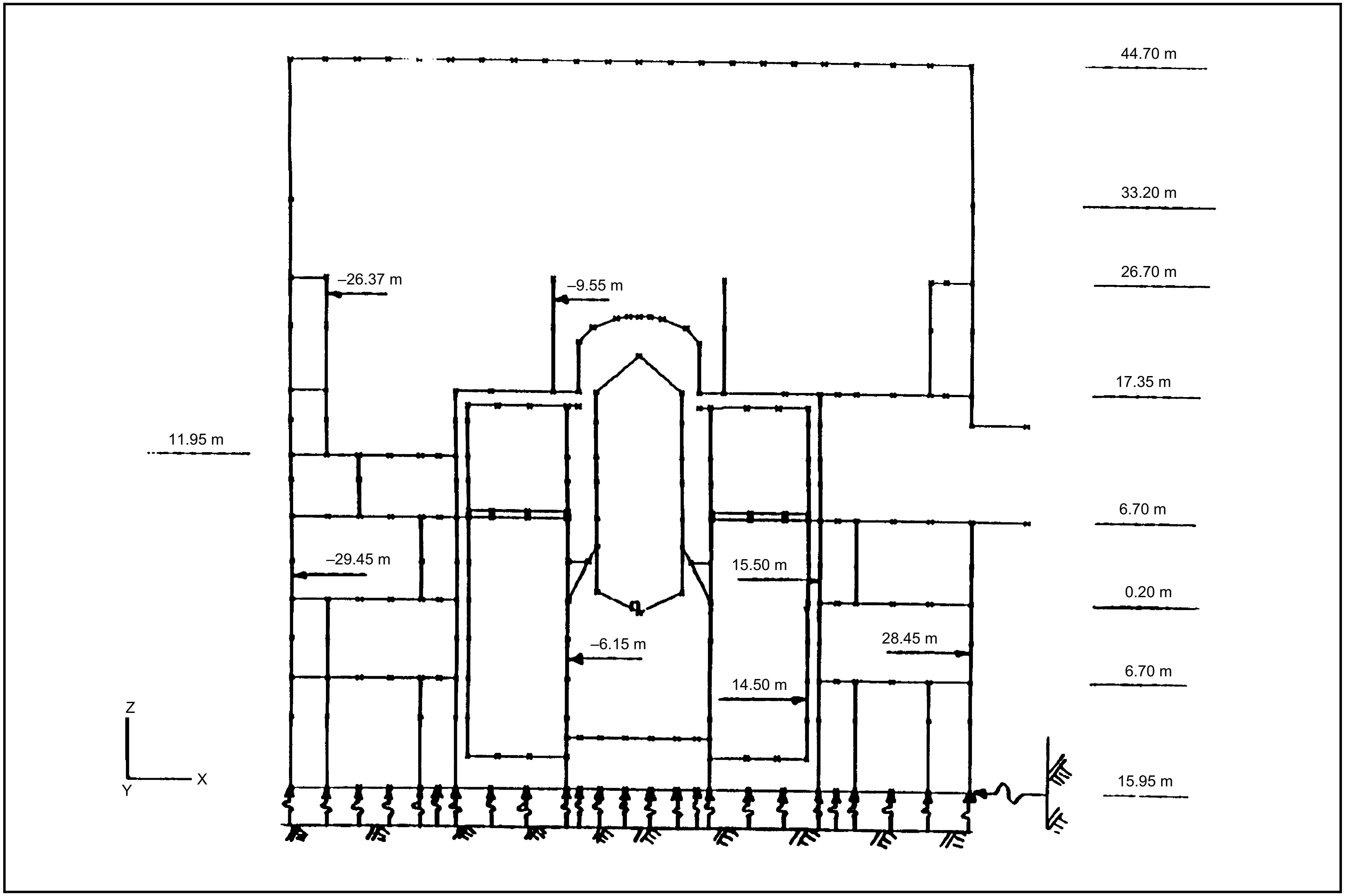


Figure 3H.1-16 Section 0°–180° Soil Springs

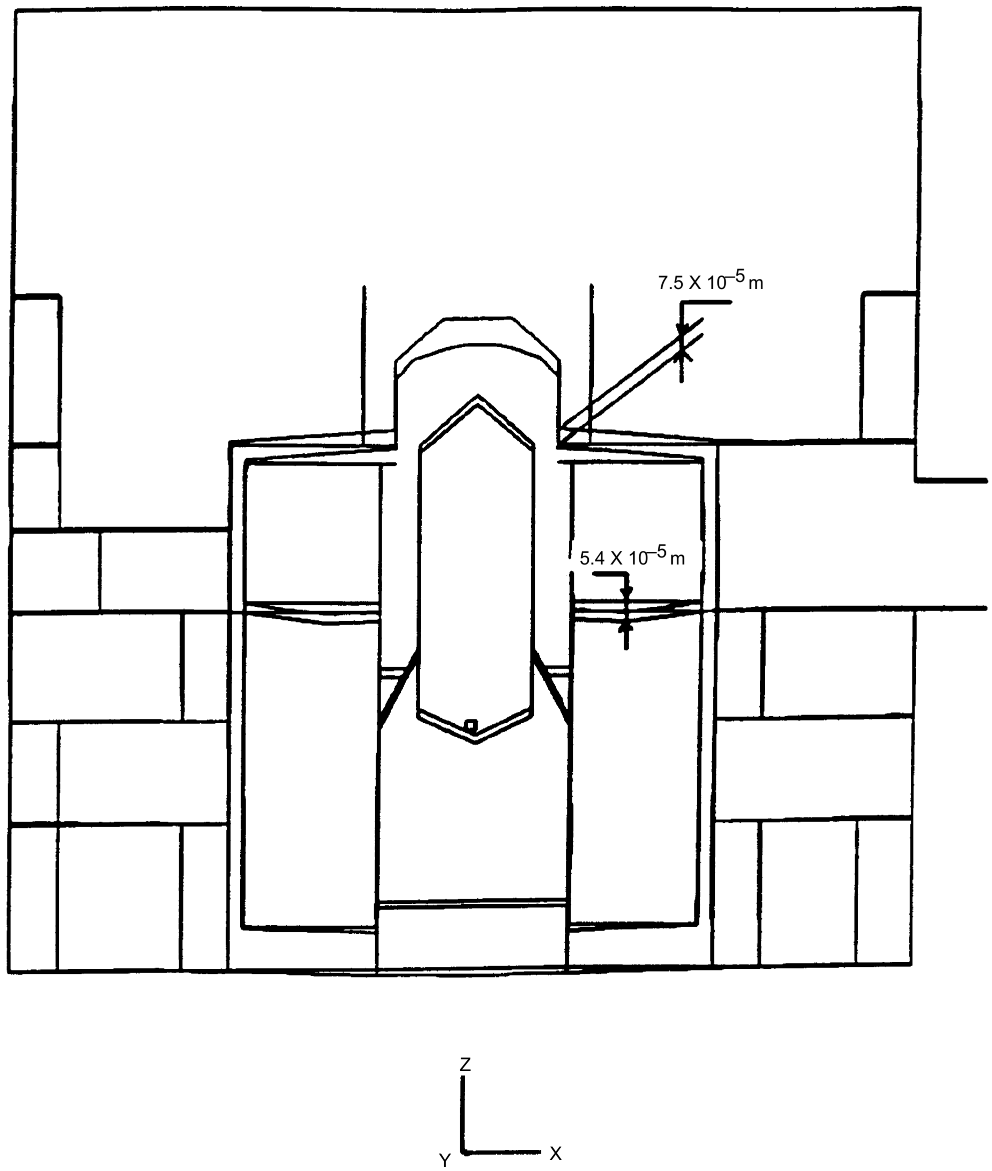


Figure 3H.1-17 Deformed Shape—Drywell Pressure (6.9 kPa)

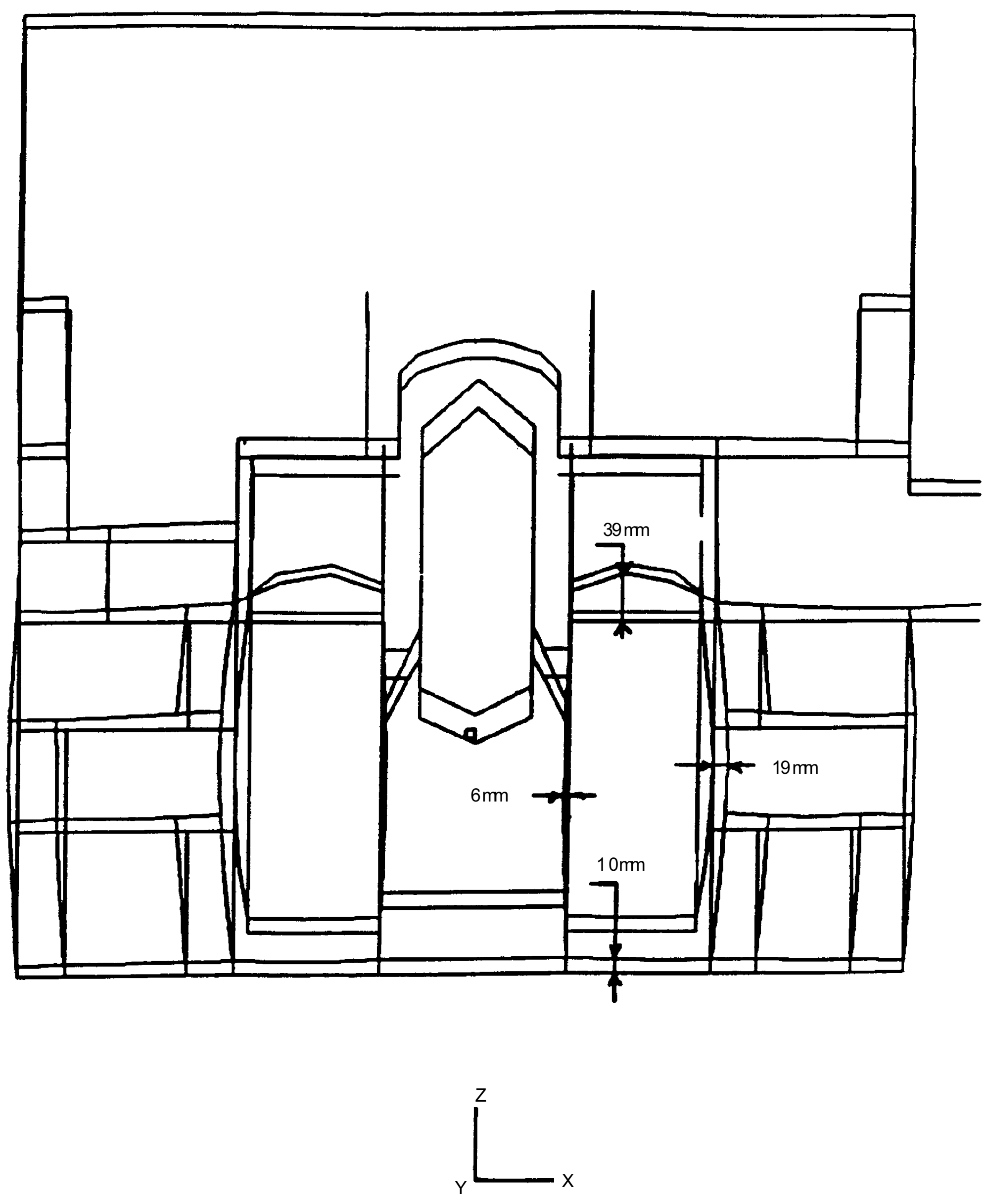


Figure 3H.1-18 Deformed Shape—Wetwell Pressure (6.9 kPa)

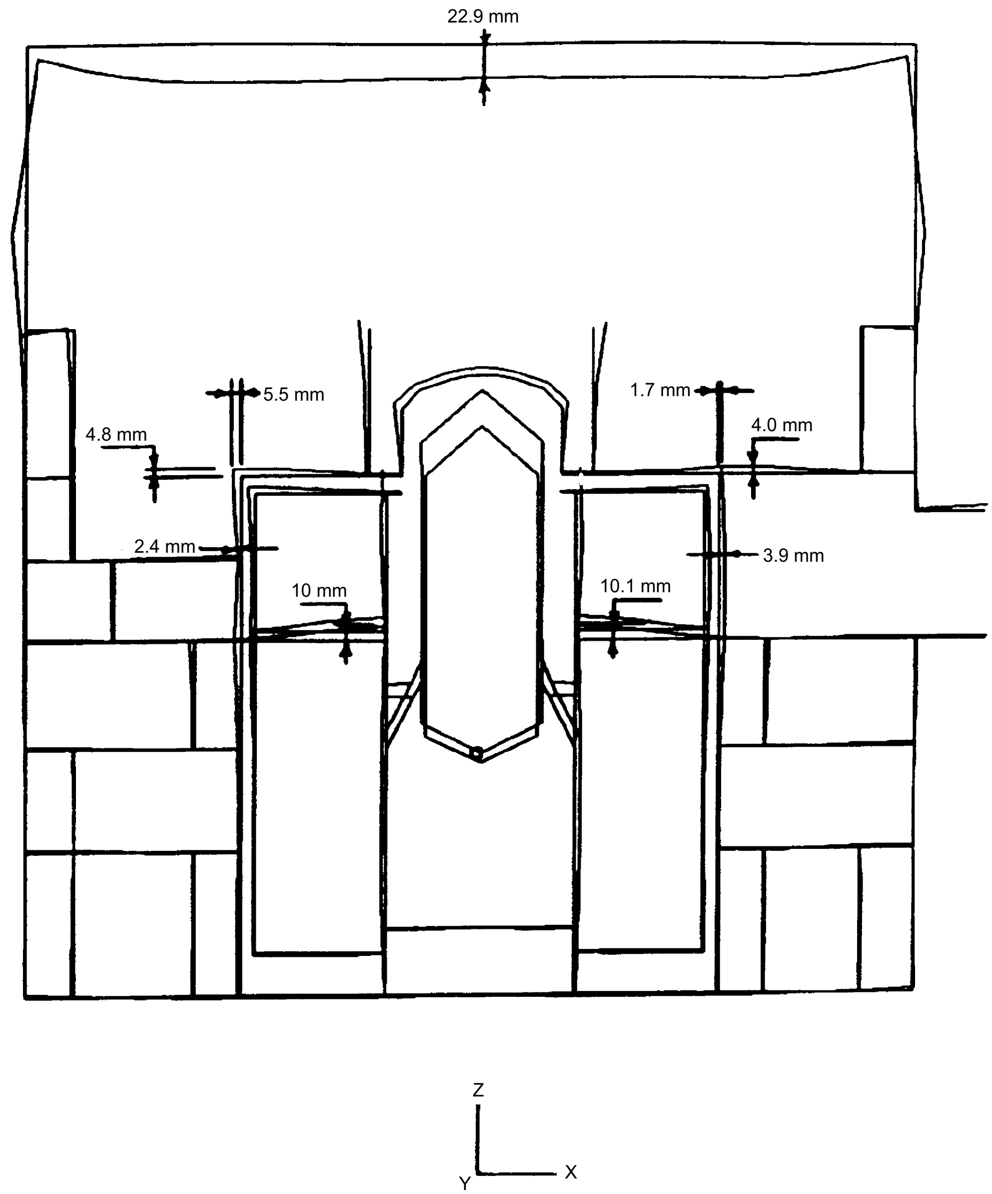


Figure 3H.1-19 Deformed Shape—Thermal Load (6 Hours)

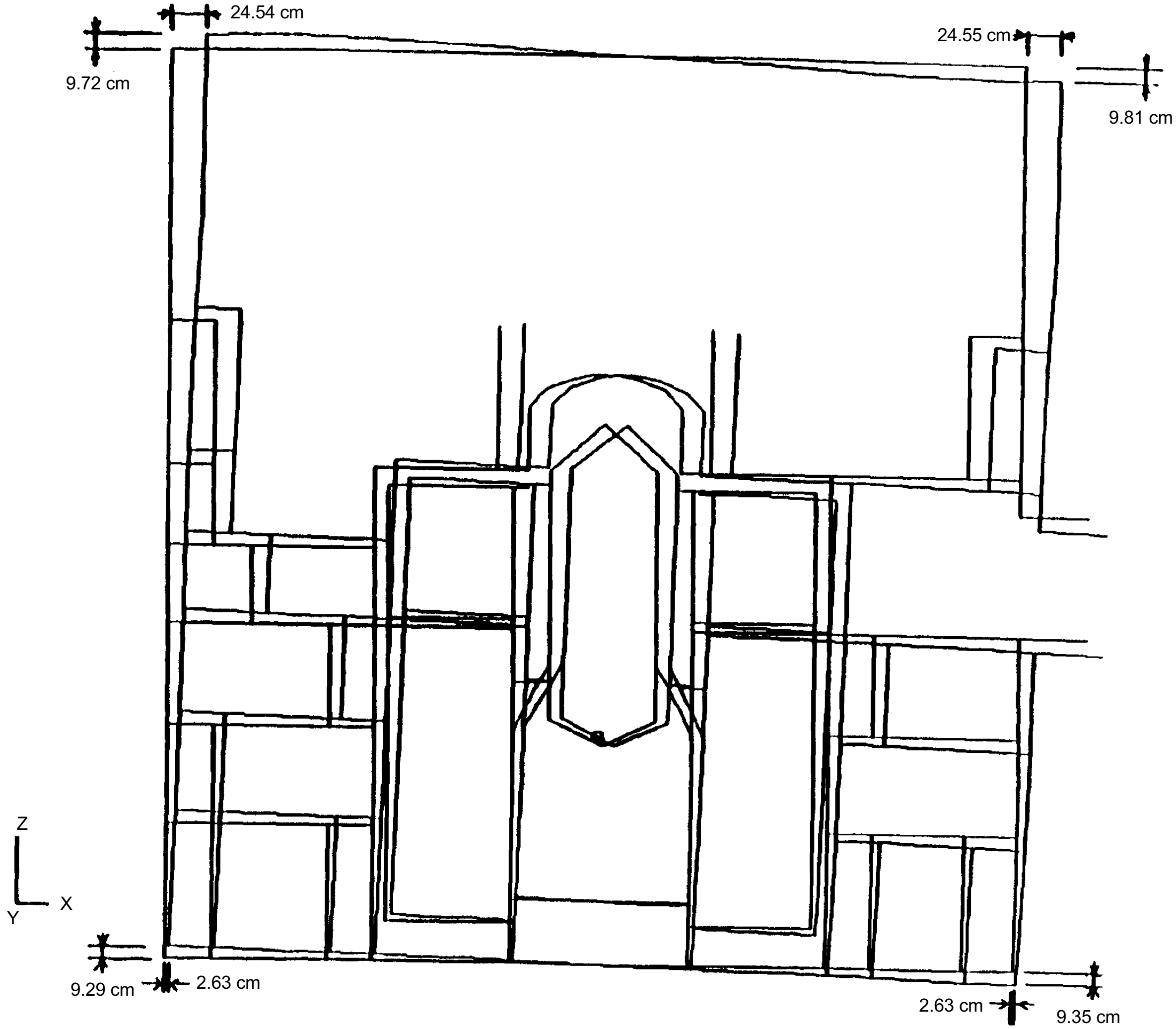


Figure 3H.1-20 Deformed Shape—SSE 0°-180°

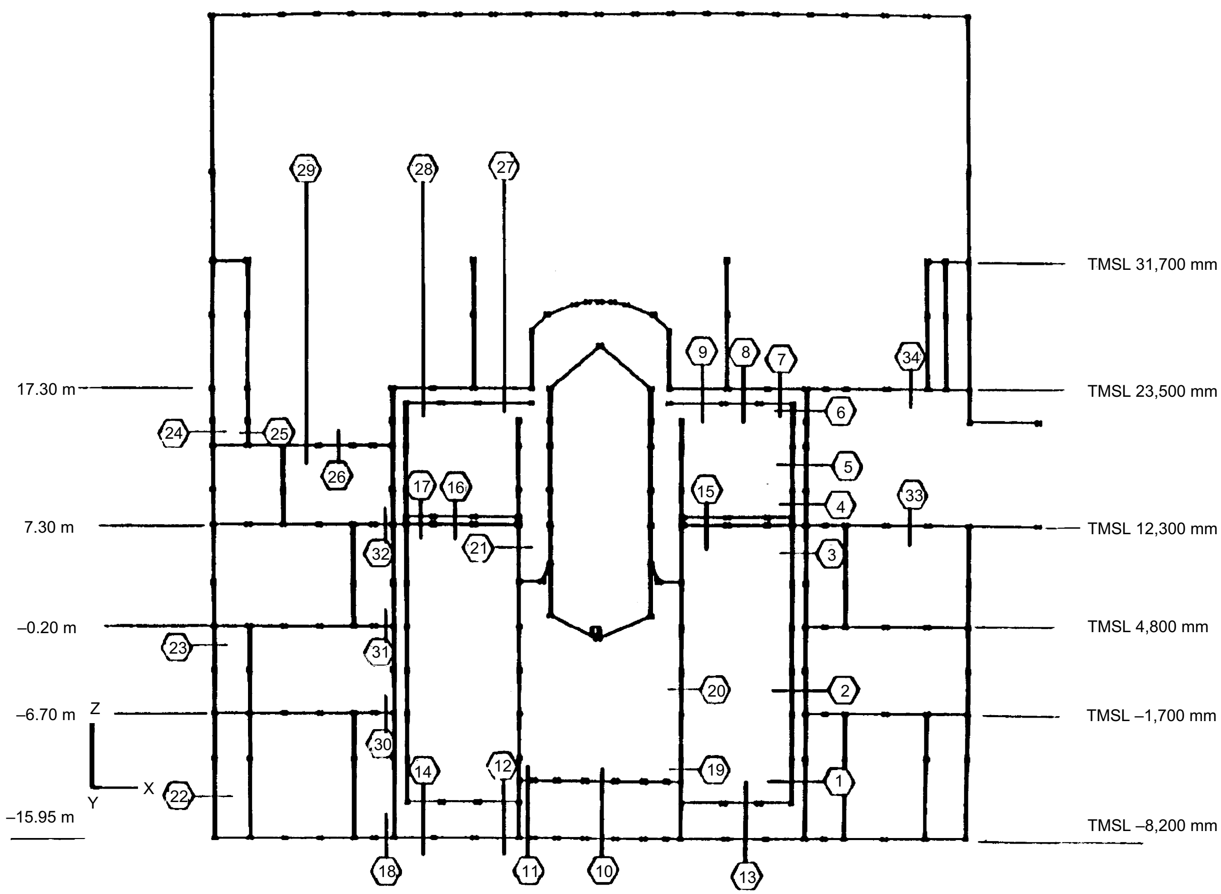


Figure 3H.1-21 Section Considered for Analysis

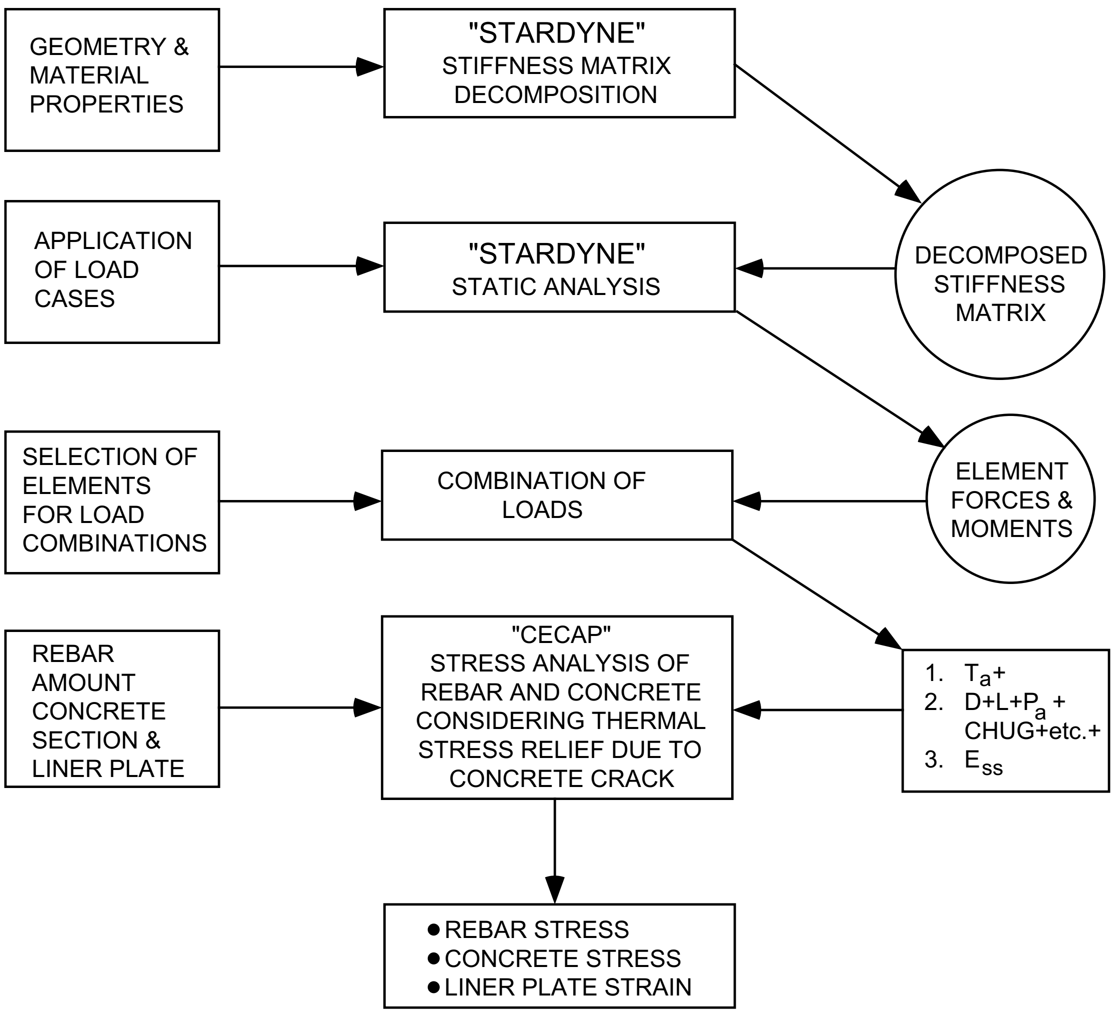


Figure 3H.1-22
FLOW CHART FOR STRUCTURAL ANALSIS AND DESIGN

Figure 3H.1-22 Flow Chart for Structural Analysis and Design

The following figures are not used in the DCD:

Figure 3H.1-23

Figure 3H.1-24

Figure 3H.1-25

Figure 3H.1-26

Figure 3H.1-27

The following figures are located in Chapter 21:

Figure 3H.1-28 Configuration of RPV Pedestal

Figure 3H.1-29 Rebar Arrangement of F/P Girder & Slab (1/2)

Figure 3H.1-30 Containment Structure Wall Reinforcement

Figure 3H.1-31 Containment Structure Opening Reinforcement

Figure 3H.1-32 Containment Structure Opening Reinforcement

Figure 3H.1-33 Containment Structure Top Slab Reinforcement

Figure 3H.1-34 Reactor Building Foundation Reinforcement, Sheet 1

Figure 3H.1-35 Reactor Building Foundation Reinforcement, Sheet 2

Figure 3H.1-36 Diaphragm Floor Reinforcement

Figure 3H.1-37 List of Seismic Wall Sections

3H.2 Control Building

3H.2.1 Objective and Scope

The objective of this subsection is to document the structural design and analysis of the ABWR Control Building. The scope includes the design and analysis of the structure for the normal, severe environmental, extreme environmental, abnormal, and construction loads.

This subsection addresses all applicable items included in Appendix C to USNRC Standard Review Plan, NUREG-0800, Section 3.8.4.

3H.2.2 Conclusions

The following are the major summary conclusions on the design and analysis of the Control Building:

- Based on the design drawings identified in Subsection 3H.2.5, stresses in concrete, reinforcement, structural steel, and steel deck are less than the allowable stresses per the applicable codes listed in Subsection 3H.2.4.1.
- The factors of safety against flotation, sliding, and overturning of the structure under various loading combinations are higher than the required minimum.
- The thickness of the roof slabs and exterior walls are more than the minimum required to preclude penetration, perforation, or spalling resulting from impact of design basis tornado missiles.
- The building has been evaluated for the design basis tornado. Welded studs are provided for the roof structural steel to provide required resistance for negative pressure.

3H.2.3 Structural Description

The Control Building is a Seismic Category I structure which houses the control room, computer facility, electrical panels, electrical switchgear, Reactor Building cooling water facilities, electrical battery and motor control center (MCC) rooms, and HVAC facilities. The main steam tunnel from the Reactor Building to the Turbine Building is located in the top portion of the Control Building.

The Control Building is a 56m long x 24m wide structure that is 30.4m high above the top of the 3m thick base mat. It consists of six floors, four of which are below grade. The total building embedment is 23.2m. It is a reinforced concrete structure consisting of walls and slabs and is supported by a mat foundation. Steel framing is used to support the slabs for construction loads. Steel deck is used as formwork to support the slabs during construction.

Figure 1.2-1 shows the location of the Control Building in relation to other plant structures. Figures 1.2-14 through 1.2-22 show the arrangement of the building.

3H.2.4 Structural Design Criteria

3H.2.4.1 Design Codes

Reinforced concrete is designed by the strength design method [*in accordance with ACI 349*]* as augmented by USNRC Regulatory Guide 1.142.

Structural steel is designed by the allowable stress design method [*in accordance with the ANSI/AISC-N690.*]*

3H.2.4.2 Site Design Parameters

The following are some of the key design parameters.

3H.2.4.2.1 Soil Parameters

- Minimum shear wave velocity: 305 m/s
- Poisson ratio: 0.3 to 0.38
- Unit weight: 1.9 to 2.2 t/m^3
- Liquefaction potential: None
- Minimum Static Soil Bearing Capacity Demand: ≥ 718.20 kPa

3H.2.4.2.2 Design Ground Water Level

Design ground water level is at 0.61m below grade level.

3H.2.4.2.3 Design Flood Level

Design flood level is at 0.305m below grade level.

3H.2.4.2.4 Maximum Snow Load

Design snow load is 2.39 kPa.

3H.2.4.2.5 Maximum Rainfall

Design rainfall is 503 mm/h. Roof parapets are furnished with scuppers to supplement roof drains, or, are designed without parapets so that excessive ponding of water cannot occur. Such roof design meets the provisions of ASCE 7, Section 8.0.

* See Subsection 3.8.3.2.

3H.2.4.2.6 Design Temperatures

- Maximum: 38°C
- Minimum: –23°C
- Stress Free Temperature: 15.1°C

3H.2.4.3 Design Loads and Load Combinations

3H.2.4.3.1 Normal Loads

Normal loads are those which are encountered during normal plant startup, operation, and shutdown.

3H.2.4.3.1.1 Dead Loads (D)

Dead loads include weight of the structure, permanent equipment, and other permanent static loads. An additional minimum allowance of 2.39 kPa uniform load is made for dead loads due to piping, raceways and HVAC duct work.

Figure 3H.2-11 shows the dead loads used in the design exclusive of concrete weight.

3H.2.4.3.1.2 Live Loads (L and Lo)

Live loads include floor and roof area loads, movable loads and laydown loads. The live loads, L, used in the design are as follows

- Roof 1.42 kPa*
- Floor at elevation 18250 mm TMSL 4.79 kPa
- Floor at elevation 3500 mm TMSL 19.15 kPa
- All other floors 11.97 kPa

* Snow load controls design of the roof.

Figure 3H.2-12 shows the live loads, L, used in the design.

For computation of global seismic loads, the value of live load is limited to the expected live load, L_o, during normal plant operation, which was taken as 25% of the above live loads L_o.

However, in the load combinations involving seismic loads, the valves of L_o used for the design are as follows:

- Roof 0.36 kPa*
- Floor at elevation 18250 mm TMSL 0
- Floor at elevation 3500 mm TMSL 14.37 kPa
- All other floors 7.18 kPa

* Snow load controls design of the roof.

Figure 3H.2-13 shows the live loads L_o used in the design.

3H.2.4.3.1.3 Snow Load

A value of 2.39 kPa is used for snow live load (L). The snow load (L_o) is reduced to 75%, when it is combined with seismic loads. Figures 3H.2-12 and 3H.2-13 show the snow loads used in the design.

3H.2.4.3.1.4 Lateral Soil Pressures (H and H')

The following soil parameters are used in the computation of lateral soil pressures:

- Dry unit weight: 1.9 to 2.2 t/m^3
- Shear wave velocity: 305 m/s
- Internal friction angle: 30° to 40°

A uniform surcharge load of 0.215 MPa is estimated from the Turbine Building. Conservatively, the same surcharge load is used in the computation of lateral soil pressures on each exterior wall. This adequately compensates for surcharge from the more lightly loaded Service Building.

The dynamic lateral soil pressure increment due to SSE is calculated per the Mononobe-Okabe method.

The design of the structure is based on the at rest soil pressure. Figure 3H.2-14 shows the at rest lateral soil pressure H (excluding the dynamic soil pressure increment) and H' (including the dynamic soil pressure increment). Active and passive soil pressures are used in the evaluation of the structure. Figure 3H.2-15 shows these pressures.

3H.2.4.3.1.5 Normal Thermal Load (T_o)

The normal operating temperatures used in the design are as follows:

- Inside steam tunnel: 57°C
- Below steam tunnel: 18°C
- On either side of steam tunnel: 10°C
- Outside Control Building: 38°C Max.
  –23°C Min.

3H.2.4.3.2 Severe Environmental Loads

The severe environmental load considered in the design is that generated by wind. The following parameters are used in the computation of wind loads:

- Basic wind speed: 177 km/h
- Exposure: D
- Importance factor: 1.11

Wind loads are calculated per the provisions of ASCE 7. Figure 3H.2-16 shows wind loads used in the design.

3H.2.4.3.3 Extreme Environmental Loads

Extreme environmental loads consist of loads generated by the tornado and safe shutdown earthquake.

3H.2.4.3.3.1 Tornado Loads (W_t)

The following tornado load effects are considered in the design:

- Wind pressure (W_w)
- Differential pressure (W_p)
- Missile impact (W_m)

Parameters used in computation of tornado loads are as follows:

- Maximum wind speed: 483 km/h
- Maximum rotational speed: 386 km/h
- Maximum translational speed: 97 km/h
- Radius of maximum rotational speed: 45.7m
- Differential pressure: 13.83 kPa
- Pressure differential rate: 8.28 kPa/s
- Missile spectrum: See Table 2.0-1

(1) Tornado Wind Pressure (W_w)

Tornado wind pressures are computed using the procedure described in Bechtel Topical Report BC-TOP-3-A. The topical report uses the methods and procedures contained in ASCE 7 with the following exceptions:

(a) Wind velocity and wind pressures are constant with height.

(b) Wind velocity and wind pressures vary with horizontal distance from the center of the tornado.

(c) Wind pressures are determined by multiplying the wind pressure at the radius of maximum wind by the size coefficient.

(d) The gust factor is unity.

(e) ASCE criteria for determining wind pressures on building components and cladding are not applicable.

(2) Tornado Differential Pressure (W_p)

The Control Building is designed as not vented, i.e. without major openings. The differential pressure causes suction on exterior walls and roof of the structure.

(3) Tornado Missile Impact (W_m)

Tornado missile impact effects on the structure can be assessed in the following two ways:

(a) Local damage in terms of penetration, perforation, and spalling.

(b) Structural response in terms of deformation limits, strain energy capacity, structural integrity and structural stability.

For the Control Building, the tornado missile effect has been assessed in terms of the local damage.

(4) Tornado Load Combinations

Tornado load effects are combined per USNRC Standard Review Plan, NUREG-0800 Section 3.3.2 as follows:

$$W_t = W_w$$

$$W_t = W_p$$

$$W_t = W_m$$

$$W_t = W_w + 0.5\ W_p$$

$$W_t = W_w + 1.0\ W_m$$

$$W_t = W_w + 0.5\ W_p + 1.0\ W_m$$

Figure 3H.2-17 shows distribution of tornado loads due to combined W_w and W_p.

3H.2.4.3.3.2 Safe Shutdown Earthquake Loads (E')

The SSE loads are applied in three directions, viz. the two horizontal directions and the vertical direction. The total structural response is predicted by combining the applicable maximum co-directional responses by "the square root of the sum of the squares (SRSS)" method.

The SSE loads are based on a free-field peak ground acceleration value of 0.3g at plant grade elevation. The loads consist of story shears, torsional moments, and overturning moments. The loads are distributed to the resisting walls in proportion to their rigidities. The SSE loads for the Control Building are provided in Table 3H.2-1.

3H.2.4.3.4 Abnormal Loads

Abnormal loads are loads generated by postulated accidents.

3H.2.4.3.4.1 Accident Pressure Load (P_a)

This load is caused by a break in the main steam line. The pressure is equal to 150.31 kPa including a dynamic load factor of 2 and is applied to the walls, floor and ceiling (i.e. underside of roof) of the steam tunnel as a static load.

Figure 3H.2-18 shows accident pressure load used in the design.

3H.2.4.3.4.2 Accident Thermal Load (T_a)

Due to the events short duration, T_o values discussed in Subsection 3H.2.4.3.1.5 are used for T_a.

3H.2.4.3.4.3 Accident Hydrostatic Load (F_a)

This load is caused by accidental flooding of any one of the three compartments of basement (EL –8200 mm TMSL). The design flood water level reaches the ceiling. For the purpose of design, the central compartment is flooded. The flood causes hydrostatic pressure on walls on grid lines A, D, 3, and 5, and vertical pressure on the base mat.

Figure 3H.2-19 shows accident hydrostatic load used in the design.

3H.2.4.3.5 Construction Loads

3H.2.4.3.5.1 Steel Deck

The steel deck supporting wet concrete is designed for the weight of concrete plus 2.39 kPa uniformly distributed load.

3H.2.4.3.5.2 Structural Steel Framing

The steel beams supporting the deck are designed for the weight of concrete plus 4.81 kPa uniformly distributed and a 22.26 kN concentrated load placed anywhere on the span of major beams to maximize moment and shear.

3H.2.4.3.6 Load Combinations

The load combinations and structural acceptance criteria are consistent with the provisions of Section 3.8.4 of USNRC Standard Review Plan NUREG-0800.

3H.2.4.3.6.1 Notations

S = Allowable stress for allowable stress design method

U = Required strength for strength design method

D = Dead load

L = Live load or snow load

L_o = Live load or snow load concurrent with earthquake

H = Lateral soil pressure

H' = Lateral soil pressure including dynamic increment

W = Wind load

W_t = Tornado load

E’ = Safe shutdown earthquake load

P_a = Accident pressure load

F_a = Accident hydrostatic load

T_o = Normal thermal load

T_a = Accident thermal load

3H.2.4.3.6.2 Structural Steel

$S = D + L$

$S = D + L + W$

$1.6S = D + L + W_t$

$1.6S = D + L_o + E'$

3H.2.4.3.6.3 Reinforced Concrete

$U = 1.4D + 1.7L + 1.7H$

$U = 1.4D + 1.7L + 1.7H + 1.7W$

$U = 1.2D + 1.7W$

$U = 0.75\ (1.4D + 1.7L + 1.7H + 1.7T_o)$

$U = 0.75\ (1.4D + 1.7L + 1.7H + 1.7W + 1.7T_o)$

$U = 1.0D + 1.0L + 1.0H + 1.0W_t + 1.0T_o$

$U = 1.0D + 1.0L + 1.0H + 1.5P_a + 1.0T_a$

$U = 1.0D + 1.0L_o + 1.0H' + 1.0P_a + 1.0E' + 1.0T_a$

$U = 1.0D + 1.0L_o + 1.0H' + 1.0F_a + 1.0E' + 1.0T_a$

3H.2.4.4 Materials

Structural materials used in the design and their properties are as follows:

3H.2.4.4.1 Concrete

Concrete conforms to the requirements of ACI 349. Its design properties are:

- Compressive strength (f'c) =27.58 MPa
- Modulus of elasticity = 24.81 GPa
- Shear modulus = 10.59 GPa
- Poisson's ratio = 0.18

3H.2.4.4.2 Reinforcement

Deformed billet-steel reinforcing bars are considered in the design. Reinforcement conforms to the requirement of ASTM A615. Its design properties are:

- Yield strength = 414 MPa
- Tensile strength = 621 MPa

3H.2.4.4.3 Structural Steel

High strength, low-alloy structural steel conforms to ASTM A572, Grade 50. The steel design properties are:

- Yield strength = 345 MPa
- Tensile strength = 448 MPa

3H.2.4.4.4 Anchor Bolts

Material for anchor bolts conforms to the requirements of ASTM A36. Its design properties are:

- Yield strength = 248 MPa
- Tensile strength = 400 MPa

3H.2.4.5 Stability Requirements

The stability requirements are based on the provisions of Section 3.8.5 of the USNRC Standard Review Plan, NUREG-0800.

The following minimum factors of safety are provided against overturning, sliding and flotation:

L_o = Live load concurrent with earthquake (both cases of live load having its full value and being completed absent shall be considered)

F = Buoyant Force of Design Ground Water

F′ = Buoyant Force of Design Basis Flood

Load Combination	Overturning	Sliding	Flotation
D = F'	-	-	1.1
D + F + W + H	1.5	1.5	-
D + F + W_t + H	1.1	1.1	-
D + L_o + F + H' + E'	1.1	1.1	-

The Control Building base shear and overturning moments for purpose of stability evaluation are given in Table 3H.2-2.

3H.2.5 Structural Design and Analysis Summary

3H.2.5.1 Analytical Model

A three dimensional finite element model representing half of the structure, i.e., between grid lines A & D and 1 & 4, was developed to perform the static analysis.

Figure 3H.2-20 shows the analytical model. Walls, floor slabs and roof slabs are represented by quadrilateral plate elements. The size of the plate elements vary from a minimum of 1.47m x 1.85m to a maximum of 2.0m x 2.2m. Linear elastic beam elements are used to represent the columns.

The 0° – 180° axis represents the plane of symmetry for the model. Nodal restraints are used to define the boundary conditions along this plane.

The foundation soil is represented by vertical and horizontal springs. The embedment effect is considered in the computation of the spring constants.

The model consists of a total of 1953 nodes, 2028 plate elements, 22 beam elements, and 240 soil springs.

3H.2.5.2 Analysis

A three dimensional finite element model was developed as described above for the structural evaluation of the Control Building. The STARDYNE computer program was used for the analysis.

The foundation soil is represented by vertical and horizontal springs.

Reinforced concrete floor slab and its supporting structural steel framing beam and columns are used to resist vertical loads such as dead load, live load, and equipment loads. Floor slabs act as diaphragms to transmit lateral loads to the exterior walls. Exterior walls act as shear walls

and are used to resist lateral loads, like soil earth pressure, seismic loads, wind loads and tornado loads. Minimum thicknesses for the exterior walls and roof are provided to preclude concrete penetration, perforation, and spalling and to prevent local damage due to the tornado generated missiles.

All loads as described in Subsection 3H.2.4 are considered. The horizontal SSE seismic loads, as described in Subsection 3H.2.4.3.3.2, are the equivalent static loads as provided in Table 3H.2-1. The horizontal seismic loads applied at different elevations of the structural model are given as shear forces and moments. These forces are distributed to the nodal points at the appropriate elevations in proportion to the nodal point masses. The vertical SSE seismic loads are applied as pressure loads which are computed by multiplying the acceleration 'g' values by the total floor masses. The horizontal torsional moment has been considered by calculating the center of mass in each direction. A distance equal to 5% of the building dimension perpendicular to the direction of the force for each level multiplied by the mass generated the torsional moment.

Velocity pressure loading due to wind and tornado is determined by using the method and procedures contained in ASCE 7. Velocity pressure is assumed not to vary with height. All significant openings are considered sealed, i.e. the structure is non-vented.

Loads from Subsection 3H.2.4 are applied to the model as plate pressure and nodal loads and these loads are combined in accordance with the load combinations described in Subsection 3H.2.4.3.6.

3H.2.5.3 Structural Design

The Control Building is essentially a reinforced concrete structure consisting of walls and slabs and is supported by a mat foundation. Steel framing is used to support the slabs. Steel deck is used as form work to support the slabs during construction.

The reinforced concrete elements of the structure along with the steel framing form the vertical load resisting system. The vertical loads are carried by the slabs and steel framing to the walls and columns. The walls and columns transmit the loads to the base mat which then transfers them to the foundation soil.

The lateral load resisting system is composed of only the reinforced concrete elements. The roof and floor slabs act as diaphragms to transfer the lateral loads to the walls. The loads are transmitted to the base mat from the walls and then to the foundation soil. The design evaluation of the Control Building structure is divided into the following parts:

- Reinforced concrete elements
- Structural steel framing

- Steel deck
- Stability evaluation

Criteria described in Subsection 3H.2.4 are used in the structural design.

Figures 3H.2-21 through 3H.2-30 present the design drawings used for the evaluation of the Control Building.

3H.2.5.3.1 Reinforced Concrete Elements

The reinforced concrete portion of the structure is comprised of the following elements:

- Base mat
- Floor and roof slabs
- Walls

The strength design method is used for design of the elements. The ACI 349 and the NRC Regulatory Guide 1.142 govern the design. All the loads and load combinations listed in Subsection 3H.2.4 are considered in the design. Concrete of 27.58 MPa compressive strength (f'c) and deformed billet steel reinforcement of 414 MPa yield strength (f_y) are considered in the design. The structural design of these elements are discussed in detail in the following subsections:

3H.2.5.3.1.1 Base Mat

The design forces, concrete thickness, required reinforcing, and provided reinforcement are shown in Table 3H.2-3. The design of the base mat is checked for the following:

- Transfer of lateral forces from the wall bases to the mat
- Punching shear under columns and walls.

3H.2.5.3.1.2 Floor and Roof Slabs

The design forces, concrete thickness, required reinforcement, and provided reinforcement are shown in Table 3H.2-3.

Tornado missile effect has been assessed in terms of local damage. Minimum thickness of slab precludes penetration, perforation, or spalling. The actual thickness of the structural slab, i.e. the total slab thickness, less the 76 mm steel deck, is 400 mm, which is greater than the minimum 335 mm thickness of the roof required to preclude spalling due to Spectrum I missiles. To resist pullout due to tornado suction, welded studs are used to anchor the roof slab at elevation 22,000 mm TMSL to the steel framing.

3H.2.5.3.1.3 Walls

The exterior walls, i.e., walls on column lines A, D, 1, and 7 are divided into two segments for design purposes:

- Top segment between roof and elevation 17,150 mm TMSL
- Bottom segment between elevation 17,150 mm TMSL and the basemat.

The two segments differ in thickness. The design forces, and concrete thickness, required reinforcement, and provided reinforcement are shown in Table 3H.2-4.

Tornado missile effect on exterior walls above grade has been assessed for local damage. The minimum design wall thickness is 600 mm, which is greater than the 384 mm minimum wall thickness required to preclude penetration, perforation, and spalling.

The interior walls are located on column lines 3 and 5. Table 3H.2-4 shows the design forces, concrete thickness, required reinforcement, and provided reinforcement.

3H.2.5.3.2 Structural Steel Framing

Structural steel framing consists of beams and columns. The steel framing with deck is required to support the steam tunnel floor and roof slabs when the concrete is wet. Once the concrete has attained its design strength, the slab will resist the load, and the steel framing is then redundant.

High-strength, low-alloy ASTM A572 steel with a yield strength (f_y) of 345 MPa is considered in the design. The choice of this high-strength steel over ASTM A36 steel is that it enables the use of less shallow beam sections, thereby increasing head room. Steel framing supporting floors at elevations 13,100 mm TMSL and 18,250 mm TMSL and roof at elevation 22,750 mm TMSL are encased in concrete to increase headroom. Columns are also of ASTM A572 steel so that smaller sections can be used.

Connections of steel framing supporting roof slabs at elevation 22,000 mm TMSL are designed to resist pullout due to tornado suction.

Steel beams are supported by the concrete walls and steel columns. The columns are supported by base plates attached to the base mat by ASTM A36 anchor bolts. The columns are designed as concentrically loaded compression members. The anchor bolts provided are nominal since they are not subjected to shear or tension.

The allowable stress design method is used for design of structural steel. AISC S-335 and ANSI/AISC-N690 govern the design. The number of different steel section sizes is kept to a minimum to optimize fabrication cost.

3H.2.5.3.3 Steel Deck

The steel deck is used as form work to support the wet concrete of the roof and floor slabs. The deck is designed for construction loads discussed in Subsection 3H.2.4.3.5. The depth of the deck is kept to a minimum to maximize floor to ceiling height. A 76 mm deck is used to support all slabs except those at elevations 18,250 mm TMSL and 22,750 mm TMSL, where a 114 mm deck is utilized. The steel deck conforms to ASTM A 446, grade A, and is galvanized.

3H.2.5.3.4 Stability Evaluation

The stability of the Control Building is evaluated for the various load combinations listed in Subsection 3H.2.4.5. The factors of safety are shown in Table 3H.2-5.

Table 3H.2-1 Control Building SSE Loads

TMSL Elev. (m)	Node	0°–180° Shear (t)	0°–180° Moment (MN·m)	Torsion (MN·m)	Vertical Accel. (g)
–8.2	102	18,100	4550	497	0.31
–2.15	103	18,100	3472	497	0.34
3.5	104	18,100	2471	497	0.39
7.9	105	14,600	1648	401	0.44
12.3	106	10,600	959	291	0.48
17.2	107	4,900	405	134	0.50

TMSL Elev. (m)	Node	90°–270° Shear (t)	90°–270° Moment (MN·m)	Torsion (MN·m)
–8.2	102	18,400	4835	506
–2.15	103	18,400	3736	506
3.5	104	18,400	2913	506
7.9	105	14,000	1961	385
12.3	106	9,600	1216	264
17.2	107	4,300	586	117

Table 3H.2-2 Control Building Base Shear and Overturning Moments for Stability Evaluation

Axis	Shear (t)	Moment (MN·m)
0°–180°	18,100	4550
90°–270°	18,400	4835

Table 3H.2-3 Base Mat, Floor and Roof Slabs–Design Forces and Reinforcement

Element No.	Load Combination	Design Loads (See Notes 1 and 2)							Reinforcement				Remarks
		Thick-ness mm (in.)	Axial		Shear		Flexure		Top & Bottom Each Way (cm^2/m)		Shear Ties (cm^2/m)		
			About 90°–270° Axis	About 0°–180° Axis	In-Plane	Out-of-Plane	About 90°–270° Axis	About 0°–180° Axis	Requ-ired	Actual	Requ-ired	Actual	
200	$D+L_o+H'+F_a+E'+T_a$	3000 (118)	9.93E+05 (68,074)	–1.38E+06 (–94,349)	1.37E+06 (93,946)	1.14E+06 (78,019)	5.77E+06 (1,296,979)	7.15E+06 (1,607,610)	89.3	101.6	<17.6	21.2	Basemat (El. –8200 mm TMSL)
66	$D+L_o+H'+F_a+E'+T_a$	3000 (118)	–5.63E+06 (–388,064)	–4.11E+06 (–281,586)	2.14E+06 (146,698)	5.80E+06 (397,354)	4.27E+06 (960,113)	7.10E+06 (1,595,485)	<89.3	101.6	17.6	21.2	
Slab at El. –2150 mm: Envelope Values	$D+L_o+H'+F_a+E'+T_a$ $D+L_o+H'+F_a+E'+T_a$	400 (16)	–4.09E+06 (–280,560)	–5.63E+06 (–385,459)	2.59E+06 (177,475)	Nominal	Nominal	Nominal	32.4	33.0	None	None	Slabs at El 2150, 3500, 7900, 12300 and 17150 mm TMSL
1691	$D+L_0+H'+F_a+E'+T_a$	1600 (63)	–6.72E+06 (–460,253)	–1.61E+06 (–110,141)	4.52E+06 (309,792)	3.40E+06 (233,050)	4.69E+05 (105,337)	3.28E+06 (738,328)	110.2	112.8	<20.1	21.2	Steam Tunnel Floor (El. 18250 mm TMSL)
1999	$D+L_0+H'+F_a+E'+T_a$	1600 (63)	–3.54E+06 (–242,458)	–7.55E+05 (–51,744)	4.55E+06 (311,875)	3.40E+06 (233,318)	4.78E+05 (107,564)	1.88E+06 (423,067)	<110.2	112.8	20.1	21.2	
2030	$D+L+H+1.5P_a+T_a$	1600 (63)	3.24E+06 (221,693)	1.24E+05 (8,521)	1.41E+05 (9,657)	5.58E+05 (38,257)	7.86E+05 (176,656)	1.01E+07 (2,268,556)	294.9 <183.3	338.7 203.2	<24.8	33.0	Steam Tunnel Roof (El. 22750 mm TMSL)
2168	$D+L+H+1.5P_a+T_a$	1600 (63)	9.33E+05 (63,921)	2.12E+06 (145,555)	1.07E+05 (7,338)	4.99E+05 (34,191)	7.41E+06 (1,666,253)	6.97E+06 (1,567,707)	<294.9 183.3	338.7 203.2	<24.8	33.0	* in X1 Direction ** in X2 Direction
2335	$D+L+H+1.5P_a+T_a$	1600 (63)	6.10E+06 (417,934)	1.02E+06 (69,821)	2.33E+06 (159,533)	4.06E+06 (278,208)	1.45E+06 (326,505)	9.66E+05 (217,243)	<294.9 <183.3	338.7 203.2	24.8	33.0	

Notes: 1. The values of axial forces and shears are shown in N/m and those for flexure are shown in N•m/m. The corresponding values in lb/ft and lb-ft/ft are shown in parenthesis.
2. Positive axial forces are tensile; negative axial forces are compressive.

Table 3H.2-4 Walls–Design Forces and Reinforcement

Element No.	Load Combination	Thickness mm (in)	Design Loads (See Notes 1 and 2)						Reinforcement						Remarks
			Axial		Shear		Flexure		Vertical ea face, (cm²/m)		Horizontal ea face, (cm²/m)		Shear Ties (cm²/m)		
			Horizontal	Vertical	In-Plane	Out-of-Plane	About Horizontal Axis	About Vertical Axis	Required	Actual	Required	Actual	Required	Actual	
2809	$D+L_0+H'+P_a+E'+T_a$	600 (24)	1.39E+06 (95,021)	1.70E+06 (116,256)	1.28E+06 (87,830)	9.20E+04 (6,302)	4.39E+05 (98,657)	3.49E+05 (78,551)	<83.7	84.8	55.0	56.8	None	None	Walls on grid lines A and D — portion between El. 17150 and roof
2781	$D+L_0+H'+P_a+E'+T_a$	600 (24)	1.17E+06 (80,438)	2.38E+06 (163,363)	1.09E+06 (74,995)	6.25E+04 (4,280)	6.25E+05 (140,611)	3.78E+05 (84,878)	83.7	84.8	<55.0	56.8	None	None	
2730	$D+L_0+H'+P_a+E'+T_a$	1000 (39)	5.71E+06 (391,238)	–3.29E+05 (–22,559)	1.04E+06 (71,232)	3.87E+05 (26,510)	1.29E+06 (289,467)	1.02E+06 (229,060)	<119.1	127.2	122.7	127.2	<19.9	21.2	Walls on grid lines A and D — portion between basemat (El. –8200) and El. 17150 *Between finished grade and El. 17150 only.
3448	$D+L_0+H'+P_a+E'+T_a$	1000 (39)	3.85E+06 (263,693)	–1.82E+06 (–124,454)	3.45E+06 (236,275)	4.39E+05 (30,092)	1.31E+06 (295,419)	1.10E+06 (248,020)	119.1	127.2	<122.7	127.2	<19.9	21.2	
2474	$D+L_0+H'+P_a+E'+T_a$	1000 (39)	–8.49E+05 (–58,188)	1.17E+06 (80,237)	2.32E+06 (158,928)	1.97E+06 (134,669)	8.31E+05 (186,864)	2.33E+05 (52,426)	<119.1	127.2	<43.0	56.8	19.9	21.2	
2437	$D+L_0+H'+P_a+E'+T_a$	1000 (39)	–1.95E+06 (–133,728)	–1.66E+05 (–11,370)	2.38E+06 (163,094)	1.27E+06 (86,688)	6.90E+04 (15,505)	9.27E+05 (208,403)	<123.4	127.2	43.0	56.8	<19.9	21.2	
3133	$D+L_0+H'+P_a+E'+T_a$	1000 (39)	–9.25E+05 (–63,356)	2.24E+06 (153,821)	2.65E+06 (181,507)	3.41E+05 (23,392)	1.83E+06 (410,942)	4.26E+05 (95,659)	123.4	127.2	<43.0	56.8	<19.9	21.2	
3757	$D+L_0+H'+F_a+E'+T_a$	600 (24)	8.12E+05 (55,608)	1.05E+06 (71,702)	1.11E+06 (76,070)	2.25E+05 (15,429)	5.09E+05 (114,398)	3.07E+05 (68,961)	58.7	66.1	49.2	49.6	None	None	Walls on grid lines 1 and 7 — portion between El. 17150 and roof
3751	$D+L_0+H'+F_a+E'+T_a$	1000 (39)	2.24E+06 (153,283)	3.52E+05 (24,098)	1.44E+06 (98,582)	1.04E+05 (7,116)	9.97E+05 (224,210)	9.97E+05 (223,990)	95.4	101.8	71.2	84.7	<18.0	21.2	Walls on grid lines 1 and 7 — portion between basemat (El. -8200) and El. 17150
3605	$D+L_0+H'+F_a+E'+T_a$	1000 (39)	–1.49E+06 (–102,211)	1.28E+06 (87,965)	2.69E+06 (184,195)	2.22E+05 (15,221)	1.44E+06 (323,639)	3.25E+05 (73,149)	95.4	101.8	<71.2	84.7	<18.0	21.2	
3632	$D+L_0+H'+F_a+E'+T_a$	1000 (39)	–2.80E+06 (–191,587)	1.17E+06 (80,237)	1.96E+06 (134,198)	1.82E+06 (124,723)	6.66E+05 (149,606)	2.40E+04 (5,401)	<95.4	101.8	<71.2	84.7	18.0	21.2	

Notes: 1. The values of axial forces and shears are shown in N/m and those for flexure are shown in N•m/m. The corresponding values in lb/ft and lb-ft/ft are shown in parenthesis.
2. Positive axial forces are tensile; negative axial forces are compressive.

Table 3H.2-4 Walls–Design Forces and Reinforcement (Continued)

Element No.	Load Combination	Thickness mm (in)	Design Loads (See Notes 1 and 2): Axial		Shear		Flexure		Reinforcement: Vertical ea face, (cm²/m)		Horizontal ea face, (cm²/m)		Shear Ties (cm²/m)		Remarks
			Horizontal	Vertical	In-Plane	Out-of-Plane	About Horizontal Axis	About Vertical Axis	Required	Actual	Required	Actual	Required	Actual	
3912	$D+L_0+H'+P_a+E'+T_a$	1600 (63)	5.98E+06 (409,450)	1.05E+07 (721,728)	6.08E+06 (416,774)	7.36E+05 (50,427)	2.18E+06 (490,749)	3.25E+05 (73,149)	249.7	254.4	<189.7	203.5	<10.6	12.7	Walls on grid lines 3 and 5
3912	$D+L_0+H'+P_a+E'+T_a$	1600 (63)	5.98E+06 (409,450)	1.05E+07 (721,728)	6.08E+06 (416,774)	7.36E+05 (50,427)	2.18E+06 (490,749)	3.25E+05 (73,149)	249.7	254.4	189.7	203.5	<10.6	12.7	
3948	$D+L+H+1.5P_a+E'+T_a$	1600 (63)	–3.06E+06 (–209,462)	–2.29E+06 (–157,114)	2.42E+06 (165,715)	1.99E+06 (136,349)	204,262 (101,236)	3.81E+05 (85,738)	<249.7	254.4	<189.7	203.5	10.6	12.7	

Notes:
1. The values of axial forces and shears are shown in N/m and those for flexure are shown in N•m/m. The corresponding values in lb/ft and lb-ft/ft are shown in parenthesis.
2. Positive axial forces are tensile; negative axial forces are compressive.

Table 3H.2-5 Stability Evaluation–Factors of Safety

Load Combination	Overturning		Sliding		Flotation	
	Required	Actual	Required	Actual	Required	Actual
D+F’	–	–	–	–	1.1	1.42
D+F+H+W	1.5	2.79	1.5	2.74	–	–
$D+F+H+W_t$	1.1	2.66	1.1	2.69	–	–
$D+L_o$+F+H’+E’**	1.1	123*	1.1	1.14	–	–

* Based on the energy technique

** Zero live load is considered.

Figure 3H.2-1 Not Used

Figure 3H.2-2 Not Used

Figure 3H.2-3 Not Used

Figure 3H.2-4 Not Used

Figure 3H.2-5 Not Used

Figure 3H.2-6 Not Used

Figure 3H.2-7 Not Used

Figure 3H.2-8 Not Used

Figure 3H.2-9 Not Used

Figure 3H.2-10 Not Used

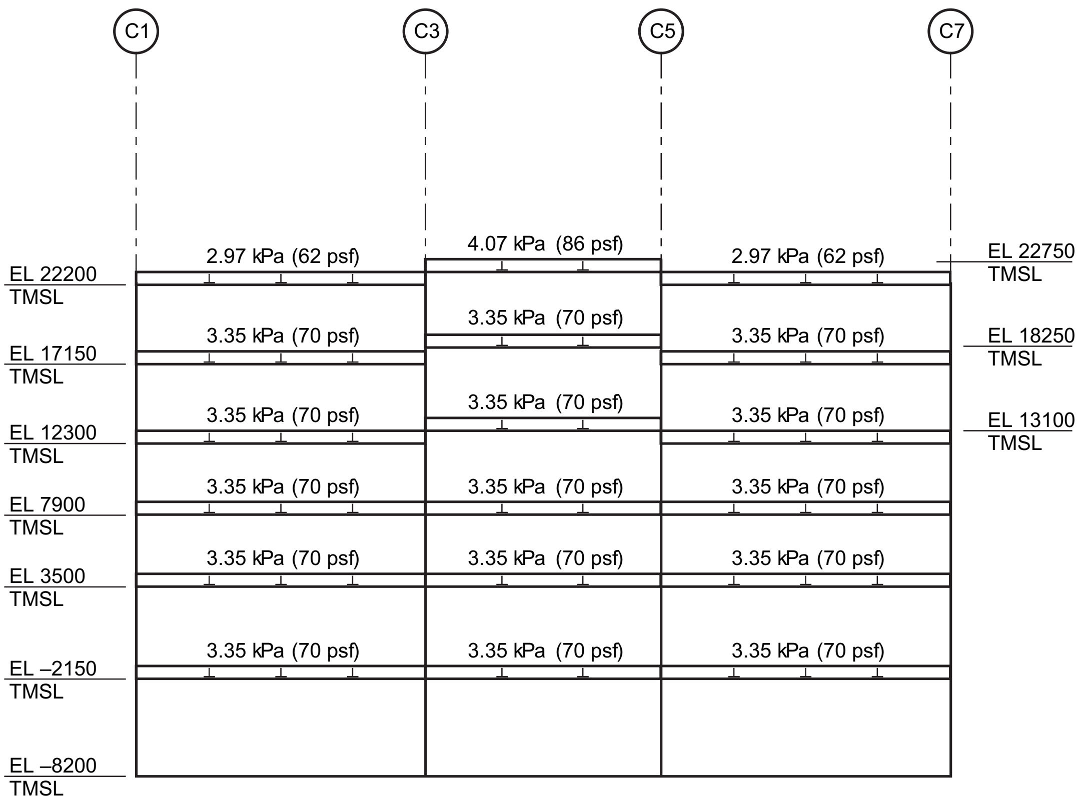


Figure 3H.2-11 Dead Load (D)

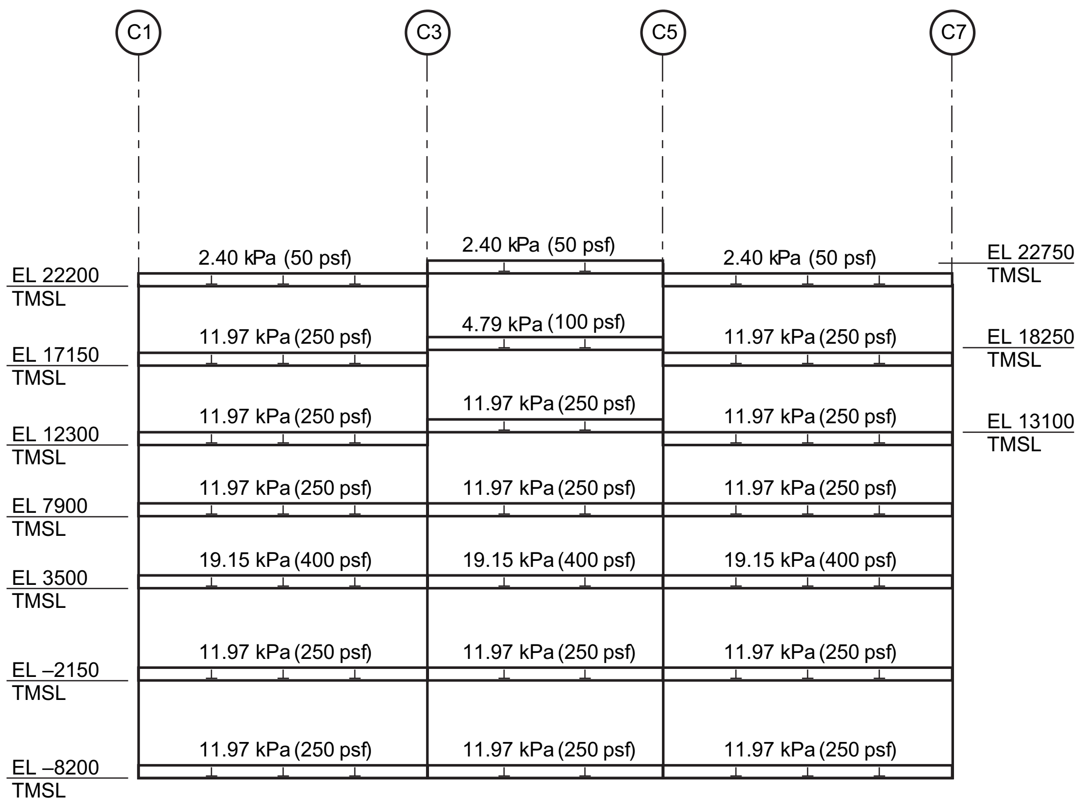


Figure 3H.2-12 Live and Snow Loads (L)

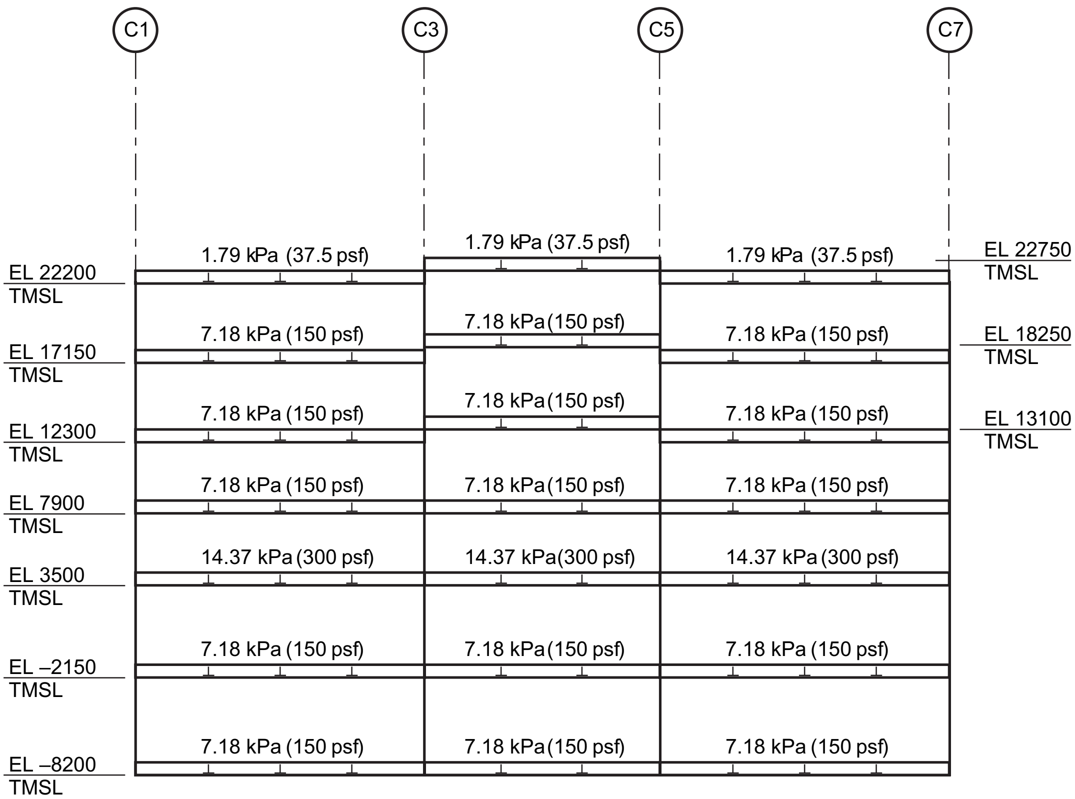


Figure 3H.2-13 Live and Snow Loads During SSE (L_o)

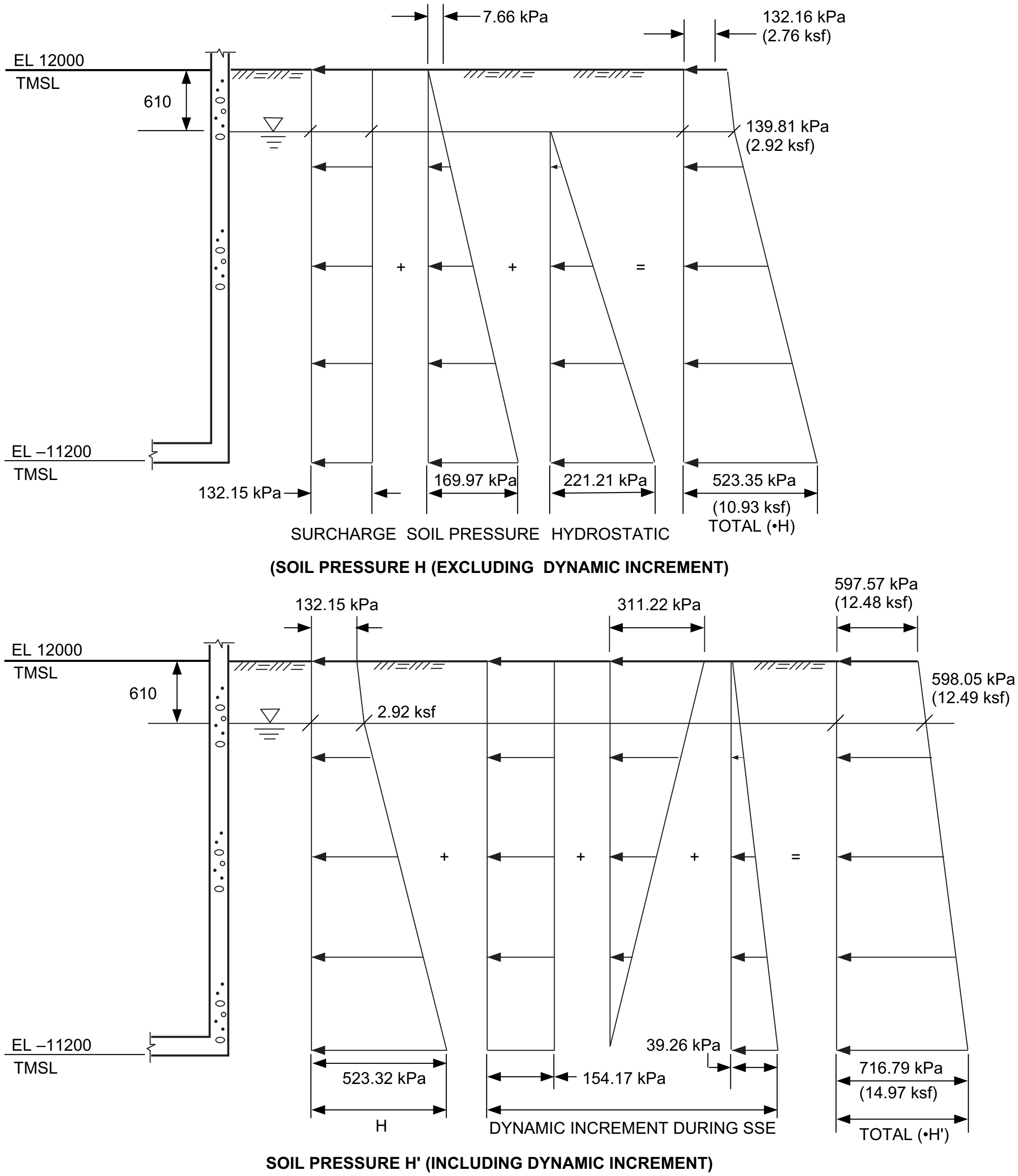


Figure 3H.2-14 At Rest Lateral Soil Pressures on Walls (H and H')

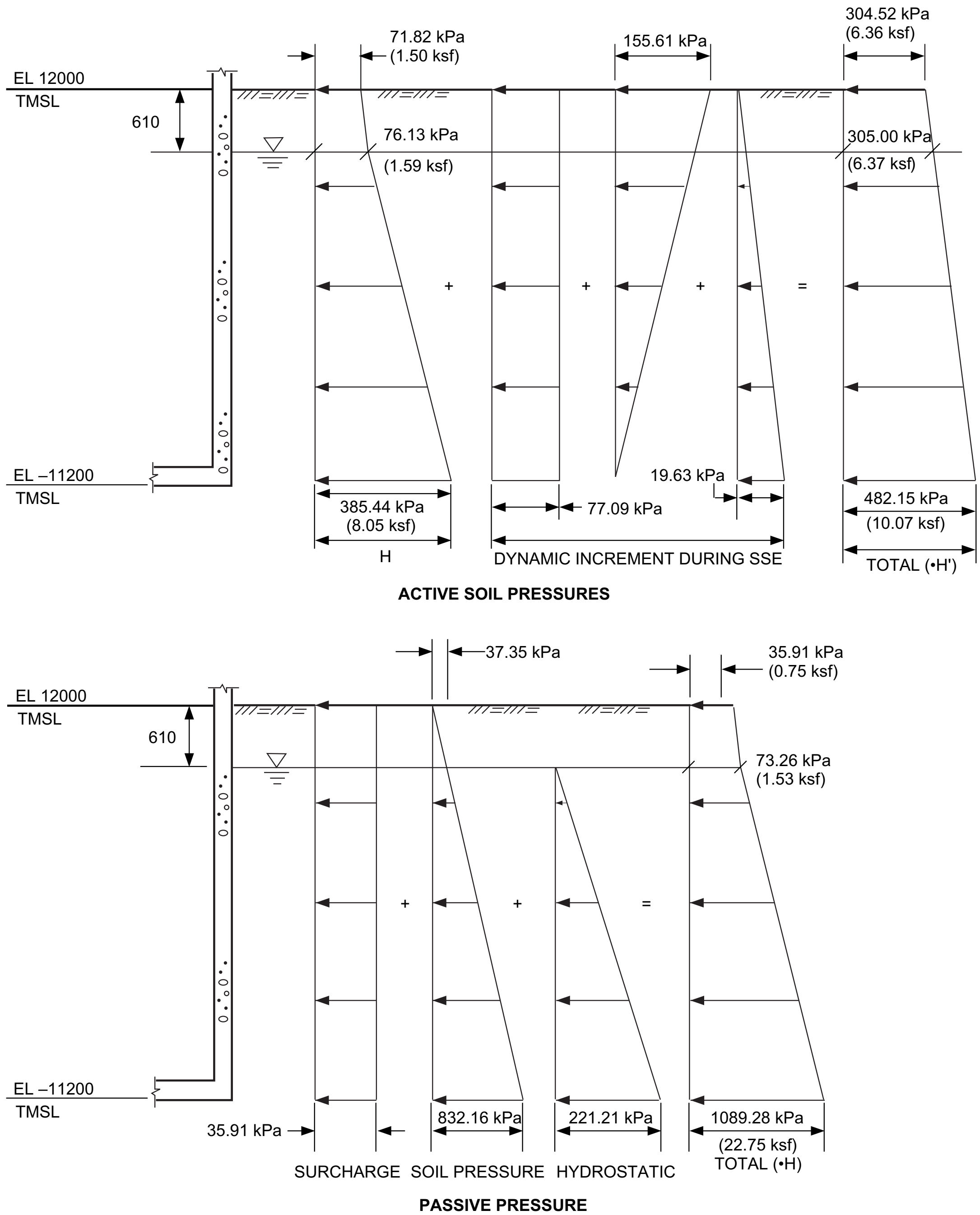


Figure 3H.2-15 Active and Passive Lateral Soil Pressures on Walls

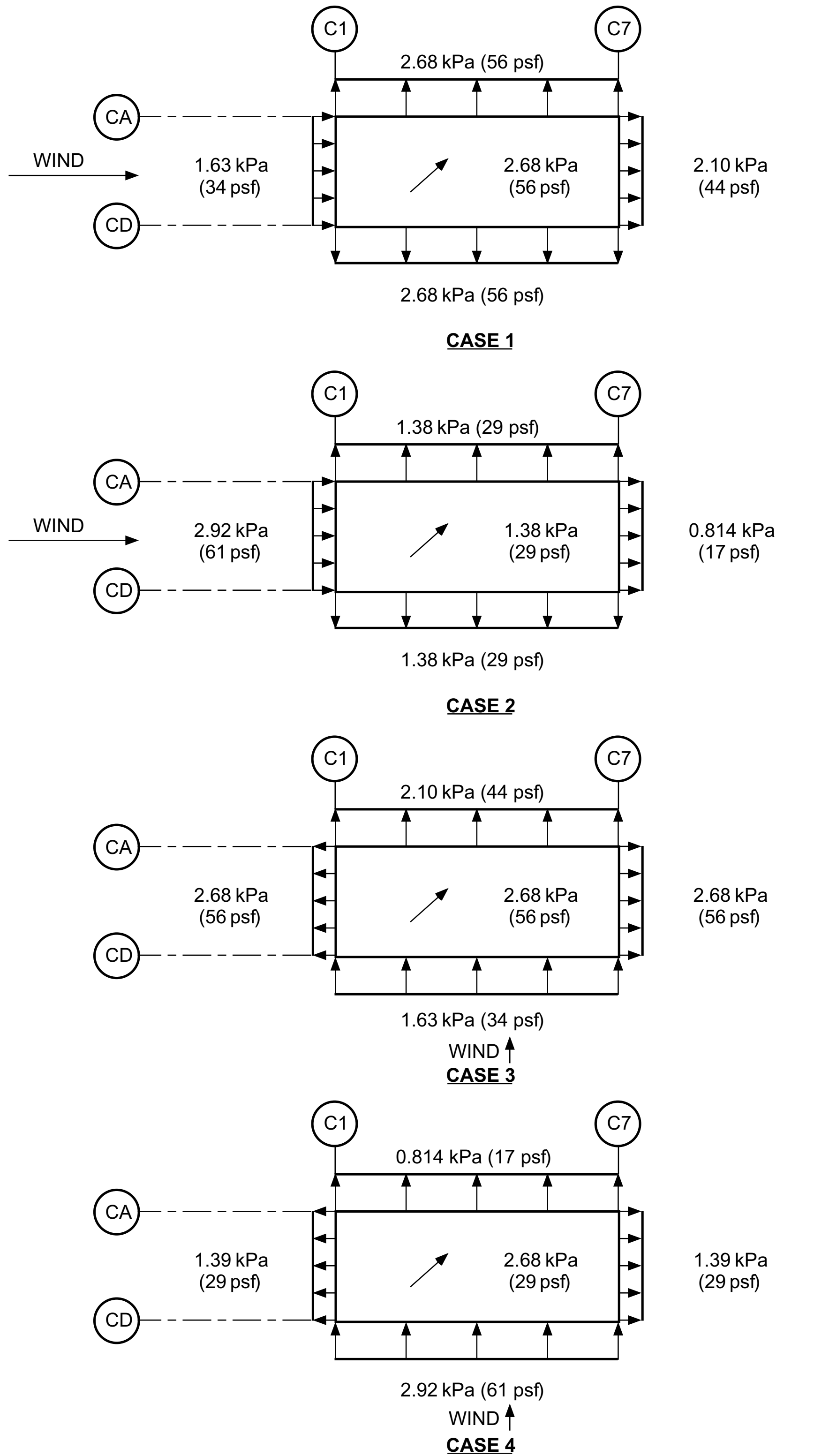


Figure 3H.2-16 Wind Loads (W)

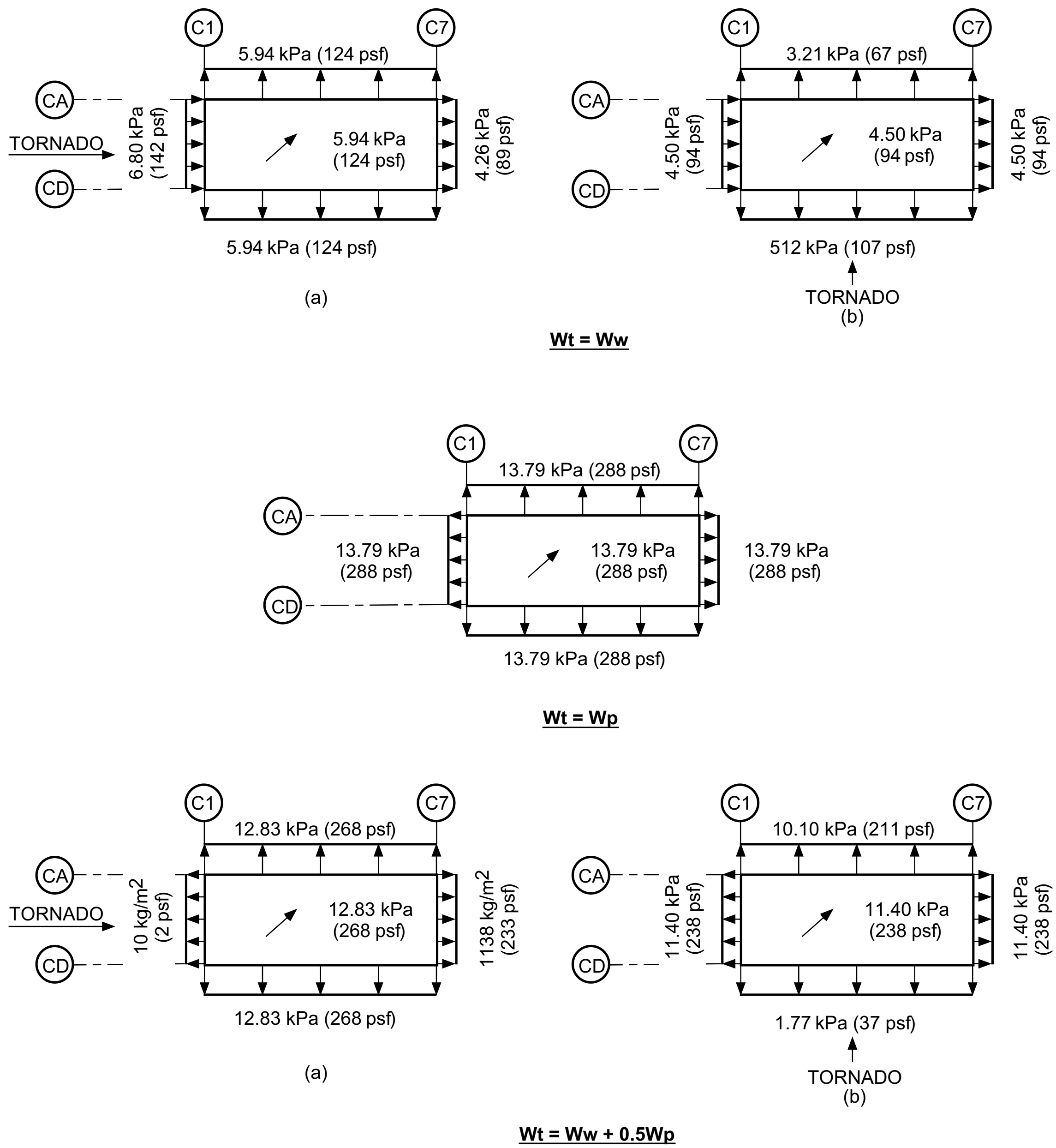


Figure 3H.2-17 Tornado Loads (W_t)

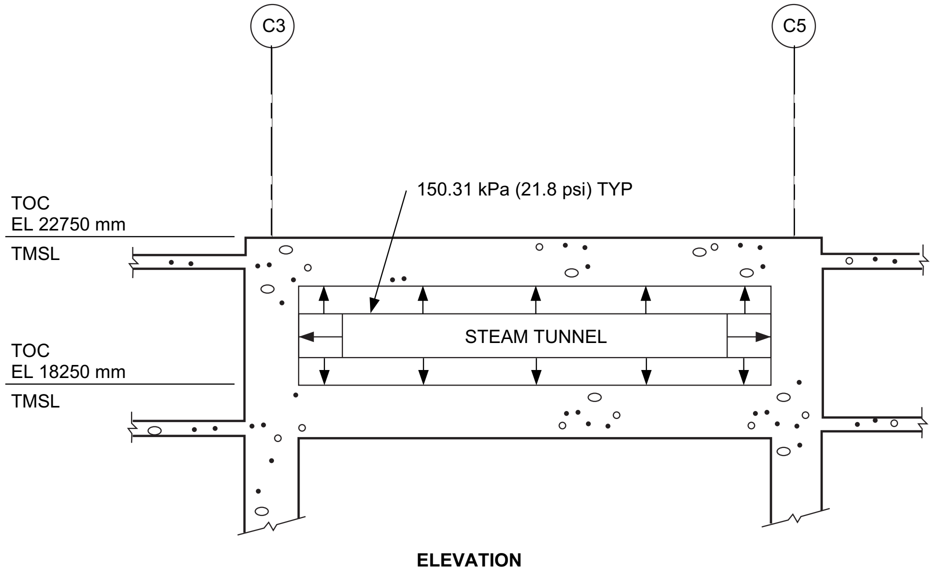


Figure 3H.2-18 Accident Pressure Load (P_a)

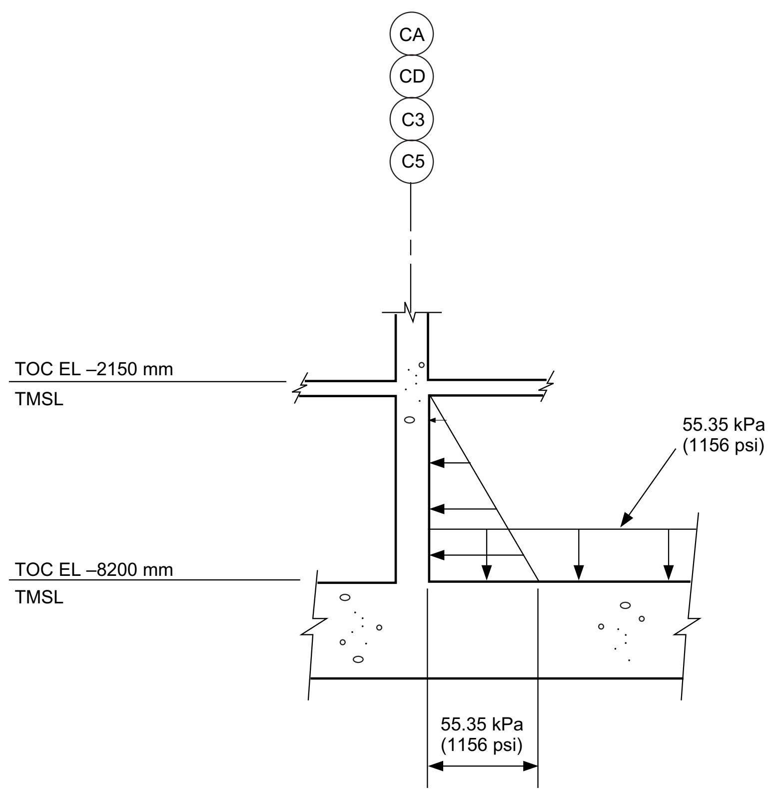


Figure 3H.2-19 Accident Hydrostatic Load (F_a)

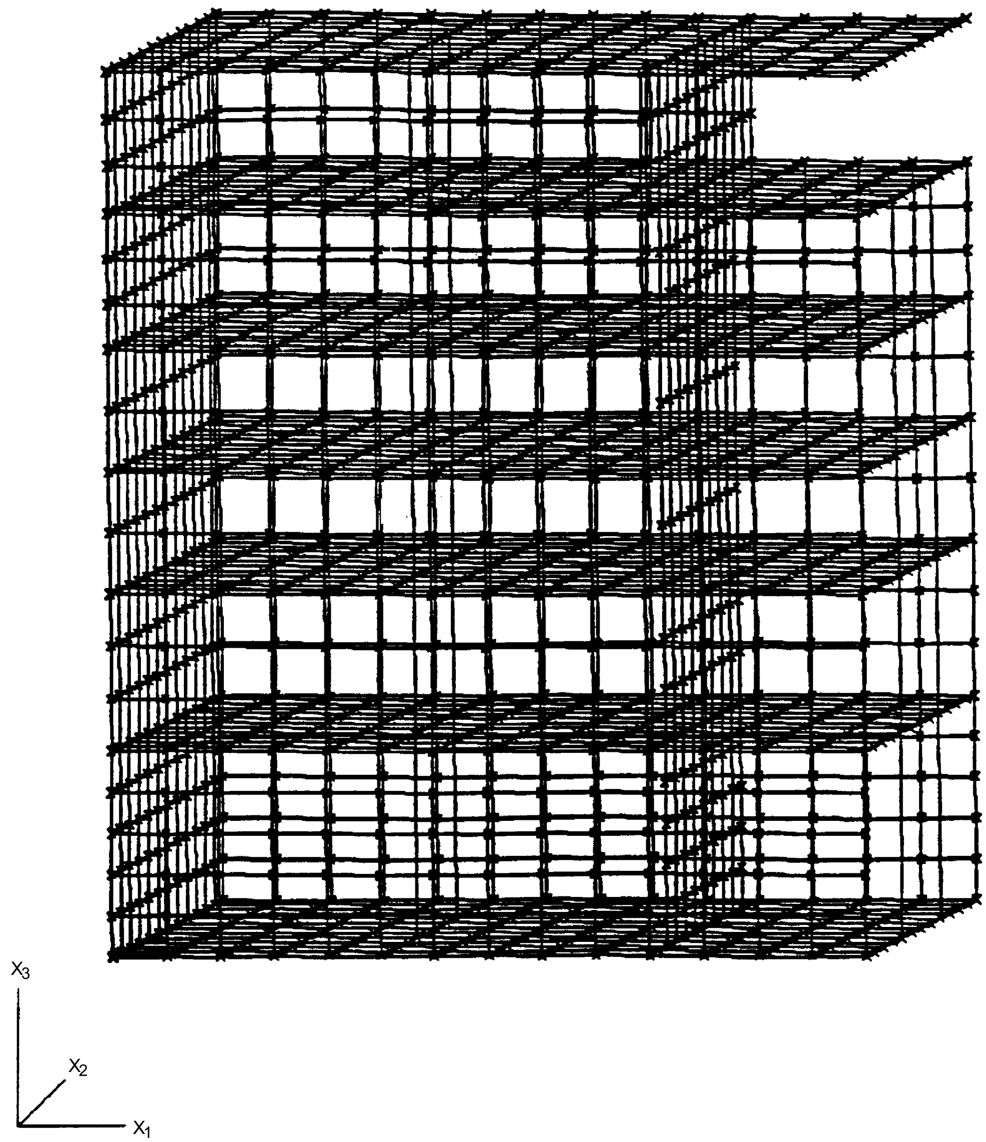


Figure 3H.2-20 Control Building Static Analysis Model

The following figures are located in Chapter 21 (C size, 17" x 22"):

3H.3 Not Used

3H.4 Structural Evaluation of R/B Compartment Walls Due to HELB

3H.4.1 Objective

The objective of this evaluation is to assess the structural adequacy of the Reactor Building compartment walls which may be subjected to pressure loads due to a high energy line break (HELB) of the reactor water cleanup lines (CUW) or the reactor core isolation lines (RCIC).

3H.4.2 Evaluation Approach

The Reactor Building subcompartment walls (shown in Figures 3H.4-1 through 3H.4-7), which may be subjected to HELB pressurization loads, were divided into two types.

Type 1 Walls

These are the walls which also act as shear walls in resisting seismic loads. These walls (S1 through S5) were modeled in the STARDYNE finite element analysis model and their stiffness were taken into consideration in the SASSI soil structure interaction analysis. These walls are rigidly connected with the floor slabs and are continuous in a vertical plane from the basemat upwards.

Type 2 Walls

These are the walls which are not shear walls. They are connected to the floor slabs with hinged connections.

For structural evaluation, the critical combination considered was:

$U = D + L + P_a + SSE.$

P_a, the compartment pressure load due to high energy line break (HELB) was defined to be 0.104 MPaD.

SSE loads, for Type 1 walls were obtained from the STARDYNE analysis of the Reactor Building. For the Type 2 walls, SSE loads were determined based on floor accelerations from the SASSI analysis.

3H.4.3 Analytical Results

The results are presented in Tables 3H.4-1 and 3H.4-2. Table 3H.4-1 shows reinforcing steel requirements for the Type 1 (shear) walls. Table 3H.4-2 shows reinforcing steel requirements for the Type 2 (non-shear) walls.

3H.4.4 Removable Walls

For areas where removal of a portion of the wall becomes necessary to provide access for equipment servicing/replacement such as for the CUW compartment at El. –1700, conceptual design has been developed using removable precast concrete blocks which are held together

and anchored to the non-removable portion of the wall by bolts. This is shown in Figure 3H.4-8. Heaviest block weighs approximately 2.5 metric tons. The bolts are sized and precast blocks are reinforced to 0.104 MPaD subcompartment pressure. Twenty five-millimeter diameter A-36 bolts are found to be adequate. The required reinforcing in the concrete blocks is shown in Table 3H.4-3.

3H.4.5 Conclusions

Based on the results of this evaluation, it can be concluded that the wall thickness, as provided, are adequate to resist the compartment pressure loads due to a high energy line break. The associated rebar requirements are summarized in Table 3H.4-1 and 3H.4-2.

It is also concluded that, to provide access for equipment removal such as for the CUW compartment at El. –1700 (see Figure 3H.4-3), a removable concrete block concept as shown in Figure 3H.4-8 is feasible.

Table 3H.4-1 Design of Type 1 (Shear) Walls Exposed to HELB Loadings

Wall #	Thickness (m)	Height (m)	Length (m)	Main Reinforcing (E.W. & E.F.)			Shear Reinforcing		
				As_{REQ} (cm^2/m)	As_{PROV} (cm^2/m)		Av_{REQ} (cm^2/cm^2)	As_{PROV} (cm^2/cm^2)	
S1a	0.90	3.00	5.60	83.6	84.7	#18 @ 0.305 m	0.0008	0.0031	#6 @0.305 m x 0.305 m
S1b	0.90	1.90	5.60	81.9	84.7	#18 @ 0.305 m	0.0008	0.0031	#6 @ 0.305 m x 0.305 m
S2	0.60	5.70	8.50	70.1	72.6	#18 @ 0.356 m	None	None	None
S3	0.80	5.70	5.90	55.0	56.5	#18 @ 0.457 m	None	None	None
S4	0.60	5.70	8.50	76.2	84.7	#18 @ 0.305 m	None	None	None
S5	0.80	5.70	6.70	72.4	72.6	#18 @ 0.357 m	0.0008	0.0022	#6 @ 0.357 m x 0.357 m

Table 3H.4-2 Design of Type 2 (Non-Shear) Walls Exposed to HELB Loadings

Thickness (m)	Max. Height (m)	Area of Main Reinforcing Steel (E.W. & E.F.)				Shear Reinforcing	
		Calculated (cm^2/m)	Code Min (cm^2/m)	Required (cm^2/m)	Provided (cm^2/m)	Av_{REQ} (cm^2/cm^2)	As_{PROV}
0.25	3.00	20.1	7.0	20.1	25.2 #8 @ 0.203 m	None	None
0.40	3.20	12.7	11.4	12.7	16.7 #8 @ 0.305 m	None	None
0.50	5.80	33.4	14.8	33.4	49.5 #11 @ 0.203 m	None	None
0.55	6.50	38.5	16.5	38.5	49.5 #11 @ 0.203 m	0.000	None
0.60	7.50	47.2	18.2	47.2	49.5 #11 @ 0.203 m	0.000	None
0.70	6.50	31.1	21.4	31.1	33.0 #11 @ 0.305 m	None	None
0.80	5.80	22.9	24.8	24.8	25.2 #8 @ 0.203 m	None	None
0.90	5.80	21.4	27.9	27.9	33.0 #11 @ 0.305 m	None	None
1.00	6.50	24.8	31.3	31.3	33.0 #11 @ 0.305 m	None	None
1.10	3.30	7.8	34.7	34.7	49.5 #11 @ 0.203 m	None	None
1.20	5.80	19.0	37.9	37.9	49.5 #11 @ 0.203 m	None	None
1.30	6.50	22.4	41.3	41.3	49.5 #11 @ 0.203 m	None	None

Notes:

1. $As_{CODE\ MIN}$ is based on ρ_{MIN} = 200/fy from ACI 349-90 Section 10.5.1.

Table 3H.4-3 Design of Concrete Blocks for Removable Wall Exposed to HELB Loadings

Thickness (m)	Unsup. Len. (m)	Height (m)	Area of Main Reinforcing Steel (E.F.)			Shear Reinforcing	
			Calculated (cm^2/m)	Code Min (cm^2/m)	Provided (cm^2/m)	Av_{REQ} (cm^2/cm^2)	As_{PROV}
0.43	3.00	0.60	20.3	24.6	66.9 4 #8’s	None	#3 Ties @ 0.305
0.43	3.00	0.40	13.5	16.5	33.4 2 #8’s	None	#3 Ties @ 0.305

Notes:

1. $As_{CODE\ MIN}$ is based on ρ_{MIN} = 200/fy from ACI 349-90 Section 10.5.1.
2. Reinforcing is being calculated for the outer blocks; however, this reinforcing will conservatively be used for all blocks. This will provide reinforcing that is more than sufficient to resist all handling loads that the blocks will be exposed to.

Redacted Security-Sensitive Information

Figure 3H.4-1 Location of Walls Exposed to HELB, El. –8200 mm

Redacted Security-Sensitive Information

Figure 3H.4-2 Location of Walls Exposed to HELB, El. –5100 mm

Redacted Security-Sensitive Information

Figure 3H.4-3 Location of Walls Exposed to HELB, El. –1700 mm

Redacted Security-Sensitive Information

Figure 3H.4-4 Location of Walls Exposed to HELB, El. 1500 mm

Redacted Security-Sensitive Information

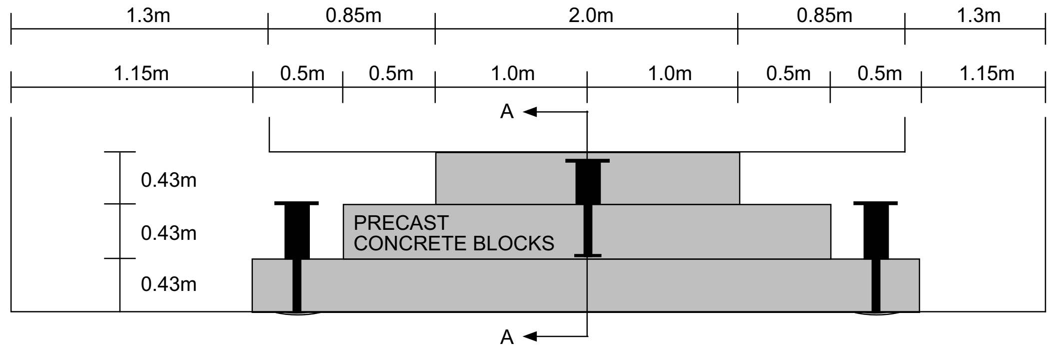
Figure 3H.4-5 Location of Walls Exposed to HELB, El. 4800 mm

Redacted Security-Sensitive Information

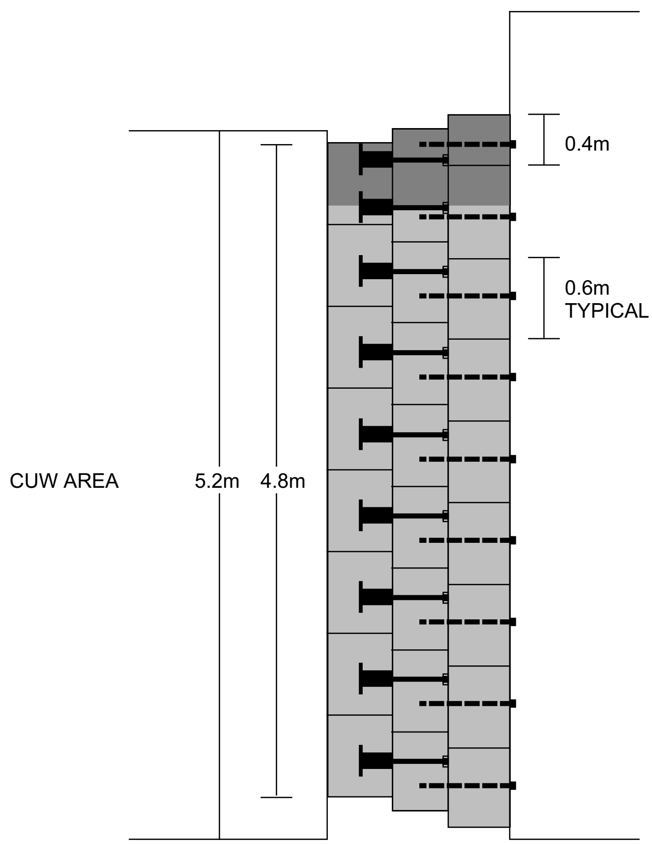
Figure 3H.4-6 Location of Walls Exposed to HELB, El. 8500 mm

Redacted Security-Sensitive Information

Figure 3H.4-7 Location of Walls Exposed to HELB, El. 12300 mm



NOTE: 1. SEE FIGURE 3H.4-3 FOR LOCATION OF WALL.
2. ALL BOLTS ARE 25 mm DIAMETER A36 BOLTS.



SECTION A – A

Figure 3H.4-8 Removable Precast Concrete Blocks

3H.5 Structural Analysis Reports

3H.5.1 Structural Analysis Report For The Reinforced Concrete Containment and the Containment Internal Structures

A structural analysis report will be prepared. It will document the following activities associated to the construction materials and as-built dimensions of the building:

(1) Review of construction records for material properties used in construction (i.e., in-process testing of concrete properties and procurement specifications for structural steel and reinforcing bars).

(2) Inspection of as-built building dimensions.

For material properties and dimensions, assess compliance of the as-built structure with design requirements in Subsections 3.8.1 and 3.8.3 and in the Detail design documents.

Construction deviations and design changes will be assessed to determine appropriate disposition.

This disposition will be accepted "as-is," provided the following acceptance criteria are met:

- The structural design meets the acceptance criteria and load combinations of Subsections 3.8.1 and 3.8.3.
- The dynamic responses (i.e., spectra, shear forces, axial forces and moments) of the as-built building are bounded by the spectra in Appendices 3A and 3G.

Depending upon the extent of the deviation or design changes, compliance with the acceptance criteria can be determined by either:

(a) Analyses or evaluations of construction deviations and design changes, or

(b) The design basis analyses will be repeated using the as-built condition.

3H.5.2 Structural Analysis Report For The Steel Containment

A structural analysis report will be prepared. It will document the following activities associated to the construction materials and as-built dimensions of the building:

(1) Review of construction records for material properties used in construction (i.e., procurement specifications for structural steel).

(2) Inspection of as-built building dimensions.

For material properties and dimensions, assess compliance of the as-built structure with design requirements in the Subsection 3.8.2 and in the detail design documents.

Construction deviations and design changes will be assessed to determine appropriate disposition.

This disposition will be accepted "as-is," provided the following acceptance criteria are met:

- The structural design meets the acceptance criteria and load combinations of Subsection 3.8.2.
- The dynamic responses (i.e., spectra, shear forces, axial forces and moments) of the as-built structure are bounded by the spectra in Appendices 3A and 3G.

Depending upon the extent of the deviation or design changes, compliance with the acceptance criteria can be determined by either:

(a) Analyses or evaluations of construction deviations and design changes, or

(b) The design basis analyses will be repeated using the as-built condition.

3H.5.3 Structural Analysis Report For The Reactor Building and Control Building (Including Seismic Category I Tunnels)

A structural analysis report will be prepared. It will document the following activities associated to the construction materials and as-built dimensions of the building:

(1) Review of construction records for material properties used in construction (i.e., in-process testing of concrete properties and procurement specifications for structural steel and reinforcing bars).

(2) Inspection of as-built building dimensions.

For material properties and dimensions, assess compliance of the as-built structure with design requirements in the Subsection 3.8.4 and in the detail design documents.

Construction deviations and design changes will be assessed to determine appropriate disposition.

This disposition will be accepted "as-is," provided the following acceptance criteria are met:

- The structural design meets the acceptance criteria and load combinations of Subsection 3.8.4.
- The dynamic responses (i.e., spectra, shear forces, axial forces and moments) of the as-built structure are bounded by the spectra in Appendices 3A and 3G.
- The as-built piping configuration as it relates to HELB design pressures has been accounted for in accepting the as-built building deviations.

Depending upon the extent of the deviation or design changes, compliance with the acceptance criteria can be determined by either:

(a) Analyses or evaluations of construction deviations and design changes, or

(b) The design basis analyses will be repeated using the as-built condition.

3H.5.4 Structural Analysis Report For The Reactor Building and Control Building Foundations

A structural analysis report will be prepared. It will document the following activities associated to the construction materials and as-built dimensions of the building:

(1) Review of construction records for material properties used in construction (i.e., in-process testing of concrete properties and procurement specifications for structural steel and reinforcing bars).

(2) Inspection of as-built building dimensions.

For material properties and dimensions, assess compliance of the as-built structure with design requirements in the Subsection 3.8.5 and in the detail design documents.

Construction deviations and design changes will be assessed to determine appropriate disposition.

This disposition will be accepted "as-is," provided the following acceptance criteria are met:

- The structural design meets the acceptance criteria and load combinations of Subsection 3.8.5.
- The dynamic responses (i.e., spectra, shear forces, axial forces and moments) of the as-built structure are bounded by the spectra in Appendices 3A and 3G.

Depending upon the extent of the deviation or design changes, compliance with the acceptance criteria can be determined by either:

(a) Analyses or evaluations of construction deviations and design changes, or

(b) The design basis analyses will be repeated using the as-built condition.

3H.5.5 Structural Analysis Report For The Radwaste Building (Including Radwaste Tunnels) and The Turbine Building

The T/B is not classified as a Seismic Category I structure. However, the building is designed such that damage to safety-related functions does not occur under seismic loads corresponding to the safe shutdown earthquake (SSE) ground acceleration. The RW/B is designed to meet or exceed applicable requirements of RG 1.143 Revision 2. Although, the RWB is classified as RW-IIb, it is designed conservatively for earthquake, tornado and wind loadings based on the

requirements for RW-IIa classification. Design for other loads is based on the requirements for RW-IIb classification. Due to its close proximity to safety-related seismic category I structures, the RWB structure is also designed to meet Seismic II/I requirements to ensure that the building does not collapse on the nearby safety-related buildings.

A structural analysis report will be prepared. It will document the following activities associated to the construction materials and as-built dimensions of the building:

(1) Review of construction records for material properties used in construction (i.e., in-process testing of concrete properties and procurement specifications for structural steel and reinforcing bars).

(2) Inspection of as-built building dimensions.

For material properties and dimensions, assess compliance of the as-built structure with design requirements in the International Building Code (IBC) for the Turbine Building and Regulatory Guide 1.143 for the Radwaste Building (including Radwaste Tunnels) and in Table 3.2-1 and paragraph 3.7.3.16.

Construction deviations and design changes will be assessed to determine appropriate disposition.

This disposition will be accepted "as-is," provided the following acceptance criteria are met:

- The structural design meets the acceptance criteria and load combinations of the IBC code for the Turbine Building and Regulatory Guide 1.143 for the Radwaste Building (including Radwaste Tunnels).

Depending upon the extent of the deviation or design changes, compliance with the acceptance criteria can be determined by either:

(a) Analyses or evaluations of construction deviations and design changes, or

(b) The design basis analysis will be repeated using the as-built condition.