

ENCLOSURE 5

GEH Technical Report

WG3-T11-DRD-S-0001 Revision 1

RCCV Structural Design Report

**HITACHI****WG3-T11-DRD-S-0001**

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Gary Ehler GEH	Tanya B. Kirby GEH	11/09/2015

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**LIST OF ACRONYM**

CB	Control Building
CH	Chugging
CO	Condensation Oscillation
DBA	Design Basis Accident
DCD	Design Control Document
DF	Diaphragm Floor
DLF	Dynamic Load Factor
DW	Drywell
EW	East-West
FB	Fuel Building
FE	Finite Element
FWSC	Firewater Service Complex
GDCS	Gravity-Driven Cooling System
HELB	High Energy Line Break
IC/PCCS	Isolation Condenser/Passive Core Cooling System
LOCA	Loss of Coolant Accident
NA3	North Anna Unit 3
NS	North-South
PCCS	Passive Containment Cooling System
PS	Pool Swell
RB	Reactor Building
RB/FB	Reactor/Fuel Building Complex
RCCV	Reinforced Concrete Containment Vessel
RG	Regulatory Guides
RPV	Reactor Pressure Vessel
RSW	Reactor Shield Wall
S/P	Suppression Pool
SRP	Standard Review Plan
SRSS	Square Root of the Sum of the Squares
SRV	Safety Relief Valve
SSE	Safe Shutdown Earthquake
SSI	Soil-Structure Interaction
VW	Vent Wall
WW	Wetwell



1. SCOPE

This report describes the section design calculation results of the Reinforced Concrete Containment Vessel (RCCV) for North Anna Unit 3 (NA3) site-specific seismic load demands that exceed the seismic loads used for the standard design of the RCCV. The scope of the evaluation is the analysis and stress checks of the structure for site-specific seismic loads in combination with other design loads in critical seismic load combinations. The analysis is performed using the same NASTRAN models used for the standard design of the RCCV, which are further described in Section 6.2.2.1 of Reference 2.1.2-u. The design loads applied to the models are the same as those considered in the standard design, except for the Safe Shutdown Earthquake (SSE) loads that are obtained from Reference 2.1.2-t. The NA3 site-specific SSE loads are combined with non-seismic standard plant loads following the same standard design analysis methodology and acceptance criteria.

The RCCV is contained in the Reactor Building (RB). The RB and Fuel Building (FB) are integrated into one building in the ESBWR standard design. In the structural design of the RB, FB, and RCCV, stresses are evaluated using one Finite Element (FE) analysis model (RB/FB global model), which is shown in Figure 1-1. As described later in Chapter 6, the details of the FE analysis methods, such as analysis model and load application methods, are included in "Reactor Building Structural Design Report", Reference 2.1.2-u. Therefore, this report describes mainly the results of FE analyses and section design calculations of the RCCV.

The method using "thermal ratios" evaluated by 3D nonlinear analyses applied in the standard design, Reference 2.1.2-i, is not used for NA3. The effects of concrete cracking due to the thermal load are considered by reducing the thermal stress in SSDP-2D as noted in Section 6.4.1.

It should be noted that the following components attached to or contained in the RCCV are outside of the scope of this document and are described in other documents:

- RCCV internal structures
- RCCV liner plates
- Equipment/personnel hatches
- Penetration sleeves
- Drywell (DW) Head



2. APPLICABLE DOCUMENTS

2.1 Supporting and Supplemental Documents

The following documents form a part of this document:

2.1.1 Supporting Documents

Supporting documents are those documents that complete the requirements of this document and are referred to herein.

Designation

- a. 105E4054, RCCV Concrete Drawings T11-2010
- b. eDRF Section 0000-0102-0965, Deliverable to Structural Group for Steady State Heat Transfer and Stress Analysis, Revision 0

2.1.2 Supplemental Documents

Supplemental documents are those documents that are to be used in conjunction with this document.

Designation

- a. 105E3908, "ESBWR Nuclear Island General Arrangement Drawing", Revision 5
- b. SR3-1-A11-TRD-5201, Standard Review Plans and Regulatory Guides Design Specification, Revision 0 A11-5201
- c. SR3-1-A11-TRD-5202, Industry Codes and Standards Design Specification, Revision 0 A11-5202
- d. 26A6007, "Composite Design Specification", Revision 6 A11-5299
- e. 26A6561, "Seismic Design Input Design Specification", Revision 2 A25-4010
- f. 26A6642AL, "ESBWR Design Control Document Tier 2 Chapter 3 Appendices 3A – 3F", Revision 10
- g. 26A6642AN, "ESBWR Design Control Document Tier 2 Chapter 3 Appendices 3G – 3L", Revision 10
- h. DE-ES-0083, "Seismic Load Data for North Anna 3 from HGNE Analysis", Revision 0
- i. 26A6650, "ESBWR RCCV Structural Design Report", Revision 5
- j. 26A6651, "ESBWR Reactor Building Structural Design Report", Revision 5
- k. 26A6655, "ESBWR Fuel Building Structural Design Report", Revision 5
- l. 26A6558, "General Civil Design Criteria", Revision 4
- m. 26A6605, "Design Specification for Concrete Containment", Revision 4
- n. 26A6606, "Design Specification for Reactor Building", Revision 2
- o. 26A6608, "Design Specification for Fuel Building", Revision 2
- p. WG3-U71-ERD-S-0001, "North Anna 3 Reactor/Fuel Building Complex Seismic Analysis Report", Revision 4
- q. WG3-U71-ERD-S-0003, "North Anna 3 Reactor/Fuel Building Complex Stability Analysis Report", Revision 1
- r. SER-DMN-011, "Benchmarking of SASSI2010 MSM Results from NA3 Site-Specific SSI Analysis", Revision 1
- s. TODI WG3-A25-TDI-S-0004, "North Anna 3 RB/FB, CB & FWSC SSI Analyses EPRI 2013 GMPE Based Inputs", Revision 0



- t. SER-DMN-019, "RB/FB Seismic Analyses Bounding Results and In-Structure Response Spectra", Revision 1
- u. WG3-U71-ERD-S-0004, "Reactor Building Structural Design Report", Revision 1
- v. WG3-U97-ERD-S-0001, "Fuel Building Structural Design Report", Revision 1
- w. 234C7583, "Containment Liner & Anchorage Drawings", Revision 2
T11-2110
- x. 26A6657, "Design Specification for Containment Liner & Anchorage", Revision 3
T11-4030
- y. 26A6659, "Structural Design Report for Containment Metal Components", Revision 2
T11-5020

2.2 Industry Codes and Standards

The following industry codes and standards shall form a part of this document to the extent specified herein. Unless otherwise specified, the applicable revision of the industry codes and standards as indicated in the Industry Codes and Standards Design Specification (Reference 2.1.2-c) shall be used.

- a. ASME-2004: Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Power Plant Components, Division 2, Subsection CC, "Code for Concrete Reactor Vessels and Containments"
- b. ASCE 7-02: "Minimum Design Loads for Buildings and other Structures," 2002

2.3 Regulation and Regulatory Requirements

The following regulations and regulatory requirements shall form a part of this document to the extent specified herein. Unless otherwise specified, the applicable revision of the Standard Review Plans (SRP) and Regulatory Guides (RG) as indicated in the Standard Review Plans and Regulatory Guides Design Specification (Reference 2.1.2-b) shall be used.

- a. NUREG-0800 "Standard Review Plan for Review of Safety Analysis Reports for Nuclear Power Plants - LW Edition"

2.4 References

None.

3. STRUCTURAL DESCRIPTION AND GEOMETRY

3.1 Structural Geometry and Dimensions

The RCCV encloses the Reactor Pressure Vessel (RPV) and its related systems and components. The containment is divided into a DW region and a Suppression Pool/Wetwell (WW) region with an interconnecting vent system.

Figure 3-1 shows the configurations of the RCCV. The RCCV is a cylindrical wall structure, and its key dimensions are summarized in Table 3-1. The inside radius of the RCCV is 18.0 m at the upper DW and Suppression Pool/WW regions, and 5.6 m at the lower DW region. Its height is 35.0 m from the top of the basemat to the bottom of the Top Slab. The



reinforcing steel development details such as additional peripheral volume for anchoring of containment reinforcement and development length of containment reinforcement are considered in the detail design phase.

3.2 Key Structural Elements and Descriptions

Floor plans and sections of the RB including the RCCV and the FB are shown in Figures 3-2 through 3-7.

The containment structure boundary consists of the containment Top Slab with removable DW Head, the containment cylindrical wall that is also the outer wall of the Suppression Pool, the Suppression Pool floor slab, the RPV pedestal that encloses the volume under the RPV, and the basemat.

The containment cylindrical wall and the RPV pedestal are concentric cylindrical walls, and their thicknesses are 2.0 m and 2.5 m, respectively. The cylindrical wall supports the Diaphragm Floor (DF) slab and the Gravity Driven Cooling System (GDCS) pool walls that stand on the DF. The containment cylindrical wall extends below the Suppression Pool floor slab to the basemat. This extension is not part of the containment pressure boundary, however, it supports the upper containment cylinder. The RPV pedestal supports the Vent Wall (VW) that contains vent pipes and serves as a barrier between the DW and Suppression Pool regions in the RCCV. The Containment Wall and the RPV pedestal are connected with the RB by floor slabs at various intermediate floor levels as shown in Figures 3-6 and 3-7.

The Top Slab is a flat slab with a radius to the inner surface of the RCCV wall of 18.0 m, and contains the DW Head opening radius of 5.25 m. The Top Slab is 2.4 m thick. The Top Slab supports the Isolation Condenser/Passive Core Cooling System (IC/PCCS) pools, including their expansion pools, equipment storage pool, reactor well, and fuel buffer pool. The pool girders, which are integral with the Top Slab, extend beyond the Containment Walls, to the RB walls, thus providing an integrated structure.

The Suppression Pool slab is also a flat slab with a radius to the inner surface of the RCCV wall of 18.0 m. The thickness of the Suppression Pool slab is 2.0 m.

The RCCV basemat is a flat reinforced concrete slab, and it is integrated with the RB and FB basemat. Its thickness is 5.1 m in the region included in the RCCV, and it is reduced to 4.0 m in the surrounding region.

The concrete containment is lined with a steel liner for leak-tightness as described in References 2.1.2-w, 2.1.2-x and 2.1.2-y.

The major openings in the RCCV are the following:

- Upper DW equipment hatch and personnel airlock openings
- Lower DW equipment hatch and personnel airlock openings
- Suppression Pool/WW access hatch openings
- Main steam and feedwater pipe penetrations



3.3 Floor Layout and Elevations

Sections of the RCCV are shown in Figures 3-6 and 3-7.

The typical elevations of the RCCV are the following:

- EL -10,400: top of the basemat
- EL 4,650: top of the Suppression Pool slab
- EL 17,500: top of the DF
- EL 24,600: bottom of the Top Slab

3.4 Conditions of Vicinity and Support

In the ESBWR NA3 site-specific design, the buildings including the RCCV are designed under the condition that they are supported by the foundation soil that has the following properties corresponding to the Soft Site conditions described in Reference 2.1.2-j. The Soft Site conditions are conservative for NA3 rock site because softer soils lead to larger structural deformations.

- Shear wave velocity: 300 m/s
- Unit weight: 0.0196 MN/m³ (2.00 t/m³)
- Shear modulus: 180 MN/m² (1.835×10⁴ t/m²)
- Poisson's Ratio: 0.478

3.5 Special Structural Features

None.

4. STRUCTURAL MATERIAL REQUIREMENTS

4.1 Concrete

The specified compressive strengths, f'_c , of the concrete at 28 days, or earlier, are as follows:

- Basemat: 27.6 MPa (4,000 psi)
- Top Slab: 41.4 MPa (6,000 psi)
- Others: 34.5 MPa (5,000 psi)

The Young's modulus for the concrete and the reduction of concrete strength depending on the average temperature, T_d , are presented in Section 6.2.2.

4.2 Reinforcement

Reinforcing steel is deformed billet steel conforming to ASTM A-615 grade 60. Minimum yield strength, F_y , is 413.6 MPa (60,000 psi).



4.3 Structural Steel

4.3.1 Carbon Steel Plate and Shapes

Carbon steel plates that are used for the RCCV liner shall conform to ASME SA-516 Gr.-70.

4.3.2 Stainless Steel Plate

Stainless steel plates that are used for the RCCV liner shall conform to ASME SA-240 Type 304L.

5. STRUCTURAL LOADS

The structural loads considered in the design are described in detail in the Reactor Building Structural Design Report, Reference 2.1.2-u. The structural loads applied to the RCCV are summarized below.

5.1 Live Loads and Dead Loads

5.1.1 Dead Loads

Dead loads under normal operation condition are considered in the design. The following loads are included in the dead loads:

- Structural weight
- Equipment weights
- Weight of miscellaneous structures, piping, and commodities
- Pool water hydrostatic loads. Table 5.1.1-1 lists the depths of pool water and the maximum design load values for the various pools in the RB and the RCCV.

5.1.2 Live Loads

The following live loads are considered:

- Floor live loads enveloping snow loads
- Static soil pressure. Soil pressures applied to external walls are transferred to the RCCV through floor slabs.

5.2 Transient Loads

5.2.1 Pressure Loads

The containment pressure loads that act on the inner surface of the RCCV and IC/PCCS pools during normal operation, tests, and a Loss of Coolant Accident (LOCA) are considered. Figure 5.2.1-1 shows the transient curves representing the pressure envelopes for the Design Basis Accident (DBA).

The following events are considered for determining the design pressure loads, which are summarized in Table 5.2.1-1:

1. Normal operation
2. Test – maximum internal pressure



3. Test – maximum differential pressure
4. LOCA – 5 seconds after DBA
5. LOCA – 6 minutes after DBA
6. LOCA – 10 hours after DBA
7. LOCA – 72 hours after DBA

The pressure loads during a LOCA are defined for various times after an accident and are determined from time history curves of temperature and pressure conditions for several parts of the RCCV. Table 5.2.1-2 gives the reasons why the above four (4) LOCA times are selected.

In addition, the pressure load due to the High Energy Line Break (HELB) in the Main Steam tunnel room, 76.0 kPaG, is also considered in the RCCV design.

5.2.2 Thermal Loads

Thermal loads during normal operation and LOCA are considered. Both of summer and winter conditions are included in each phenomenon.

1. Normal operation
2. LOCA – 5 seconds after DBA
4. LOCA – 6 minutes after DBA
5. LOCA – 10 hours after DBA
6. LOCA – 72 hours after DBA

Figures 5.2.2-1 and 5.2.2-2, based on Reference 2.1.1-b, show the envelopes of transient temperatures during DBA. Tables 5.2.2-1 and 5.2.2-2 show the average temperature, T_d , and the surface temperature difference, T_g , in the RCCV regions that are shown in Figures 5.2.2-3 through 5.2.2-9. As indicated in Figures 5.2.2-4 and 5.2.2-5, the following three conditions are considered for the GDCS pool water depth during a DBA. Conditions 2 and 3 are performed assuming, in a conservative case, that there is no water in the GDCS pool.

- Condition 1: Depth = 4410 mm
- Condition 2: Depth = 792 mm
- Condition 3: Depth = 792 mm (during LOCA Flooding)

The stress-free design temperature used in the stress analyses is 15.5 °C.

The structural evaluation for TRACG (GEH proprietary version of the Transient Reactor Analysis Code) calculated LOCA temperature is described in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, including the thermal loads for the surrounding area of RB upper pool.



5.2.3 *Hydrodynamic Loads*

The following hydrodynamic loads due to dynamic disturbances of the Suppression Pool water during LOCA and Safety Relief Valve (SRV) discharges are considered as pressure loads in the design.

- SRV loads
- Chugging (CH)
- Condensation Oscillation (CO)
- Pool swell

Figures 5.2.3-1 through 5.2.3-5 show load values, load application patterns, and Dynamic Load Factors (DLFs). Figure 5.2.3-6 gives time-event relationship for a DBA.

Containment structures are analyzed for the following cases involving pool swell pressure, froth impact, and fallback drag loads.

Case 1. Pool swell occurs with pressures without froth impact and fallback drag loads. Containment structures are to be analyzed for pool swell pressure with pressure distribution shown in Figure 5.2.3-4.

Case 2. Pool swell occurs with pressures in conjunction with froth impact and fallback drag loads. Containment structures are to be analyzed for two cases involving pool swell pressure, froth impact, and fallback drag loads.

Case 2a. WW and bubble pressures defined in Figure 5.2.3-5 together with the froth impact pressure ($DLF = 1.60$) acting on the bottom face of DF and bottom face of the bottom flange of radial beams.

Case 2b. WW and bubble pressures defined in Figure 5.2.3-4 together with the fallback drag pressure ($DLF = 1.0$) acting on the top face of the bottom flange of the radial beams of DF with a magnitude obtained from the formula is shown above.

The worst results or the enveloping values of these cases are used as the Pool Swell (PS) values to be combined with other loads in the load combinations.

5.2.4 *RPV Reactions due to Hydrodynamic Loads*

Reactions of the RPV, which are applied to the RPV support bracket and the RPV stabilizer, and the GDSC pools during the SRV discharge and LOCA are regarded as hydrodynamic loads in the RCCV design. The RPV reaction due to SRV loads and LOCA loads are in Reference 2.1.2-i.

5.3 **Environmental Loads**

5.3.1 *Wind Loads*

Wind loads are not considered in the design of the RCCV since their effects are negligible.

5.3.2 *Tornado Loads*

Tornado loads are not considered in the design of the RCCV since their effects are negligible.



5.3.3 Seismic Loads

The seismic loads considered in the RCCV design are those generated by the SSE. They are applicable to all seismic load combinations including those for LOCA flooding inside the containment.

The design seismic loads are determined from the site-specific Soil-Structure Interaction (SSI) analysis results, which are described in the site-specific seismic analysis of the Reactor/Fuel Building Complex (Reference 2.1.2-p). Four components - two horizontal, one vertical, and one torsional - of the seismic loads are evaluated following the methodology used for the standard design of the RCCV in Reference 2.1.2-i.

The analysis cases of the RB/FB seismic analyses used to form the bounding NA3 site-specific seismic demands for this report are presented in Table 3-1 of Reference 2.1.2-t. These loads bound the effects of stiffness variation as described in Reference 2.1.2-p.

The site-specific seismic design loads applied to the RCCV and its internal structures are shown in the following tables. Node numbers in these tables are described in Figure 5.3.3-1.

- Horizontal seismic loads and torsion: Tables 5.3.3-1 through 5.3.3-3
- Vertical seismic loads: Tables 5.3.3-4 through 5.3.3-6

The following loads are also regarded as seismic loads, which are described in the Reactor Building Structural Design Report (Reference 2.1.2-u), and are considered in the RB design:

- Soil pressure due to an earthquake
- Seismic hydrodynamic loads in pools
- RPV reactions due to an earthquake

6. STRUCTURAL ANALYSIS AND DESIGN

6.1 General Description

The structural analysis and design of the RCCV are performed according to the following procedure. The flow chart of the RCCV design is shown in Figure 6.1-1.

1. Prepare a FE model for stress analyses considering structural characteristics and materials.
As stated in Section 1, the RB including RCCV and the FB are integrated into one building in the ESBWR plant. Therefore, the FE model includes the RCCV, RB, and FB (RB/FB global FE model).
2. Perform stress analyses for the design loads described in Chapter 5, and calculate the section forces.
3. Select the basic and critical load combinations as the selected design load combinations for the RCCV design.
4. Combine the section forces according to the selected design load combinations mentioned in Step 3 above, which are described later in Section 6.3.
5. Perform structural design calculations using the section forces for the selected design



load combinations.

The structural design of the RCCV is performed according to the specifications of ASME-2004, Reference 2.2-a.

6.2 Stress Analysis

An outline of the RB/FB global FE model analysis is summarized below since it is described in detail in the Reactor Building Structural Design Report, Reference 2.1.2-u.

6.2.1 Analysis Program

The computer program used for the stress analysis calculations is NASTRAN, Version 2013. It is a general-purpose stress analysis program, which is technically based on the finite element method. Analysis calculations are executed on Red Hat Enterprise Linux Server release 5.7 OS.

6.2.2 Analysis Model

Figure 1-1 shows the global FE model, which consists of SHELL elements for plane members such as the basemat, the RCCV, walls, and slabs and BAR elements for linear members such as beams and columns.

Structural components of the RCCV are modeled by SHELL elements. The FE models of the RCCV are shown in Figures 6.2.2-1 through 6.2.2-6.

The major openings in the RCCV described in Section 3.2 are included in the global FE model in order to take local reduction of the wall stiffness into consideration. The openings in the model are shown in Figures 6.2.2-3 and 6.2.2-4.

Section 6.2.2.1 of Reference 2.1.2-u describes how the original global finite element model for the standard design was updated for certain load cases to reflect the current pool gate design and design changes in the upper pools.

Table 6.2.2-1 shows the material constants for the concrete and steel used in the analysis.

The Young's modulus for concrete used in the thermal load analysis is reduced depending on the average temperature of each element, as described in Note 2 of Table 6.2.2-1. Young's modulus for the RCCV steel liners is set to a small value, 1/10000 of the normal value, in analysis calculations for non-thermal loads so that they do not bear any stresses.

6.2.3 Method of Applying Loads

Refer to the Reactor Building Structural Design Report, Reference 2.1.2-u, Subsection 6.2.3.

6.2.4 Analysis Results

Tables 6.2.4-1 through 6.2.4-13 show the forces and moments of the selected elements. The locations of the selected elements are illustrated in Figures 6.2.4-1 through 6.2.4-5. The elements for tabulation are selected, in principle, from the center and both ends of wall and slab, where it is reasonably expected that the critical stresses appear based on engineering experience and judgment. Element forces and moments listed in the tables are defined with relation to the element coordinate system shown in Figure 6.2.4-6.



6.3 Load Combinations

6.3.1 Code Requirements

Load combinations for the RCCV design are specified in Table 7.2-1 of the Design Specification for Concrete Containment (Reference 2.1.2-m), which comply with Table CC-3230-1 of ASME-2004 and Appendix A of the Standard Review Plan 3.8.1. The load combinations are shown in Table 6.3.1-1.

The SRSS method is used for the concrete containment structure to combine the maximum responses due to various dynamic loads such as seismic loads, SRV, CO, and CH for which the peak values do not occur at the same time.

6.3.2 Selection of Design Load Combinations

The following load combinations given in Table 6.3.1-1 need not be considered for the design because of the reasons described for each of the load combinations.

<u>No.</u>	<u>Reason</u>
CV-2	RCCV wall stresses due to wind loads W are negligibly small, and the combination CV-3 covers CV-2.
CV-4, 6	RCCV wall stresses due to wind loads W or tornado loads Wt are negligibly small, and these combinations are not critical for the RCCV design.
CV-5	This combination is covered by CV-11.
CV-8, 9	These combinations are covered by CV-7.
CV-10	RCCV wall stresses due to wind loads W are negligibly small, and the combination CV-7 covers CV-10.

Finally, the following load combinations are selected for the RCCV design:

- CV-1, CV-3, CV-7, CV-11

Detailed design load combinations are determined in terms of load patterns for the selected load combinations. Load patterns include time of year for thermal loads, time after an accident for LOCA pressure/thermal loads, and load application patterns for hydrodynamic loads. Table 6.3.2-1 shows the detailed load combinations determined in this way. The load combinations selected as critical combinations in Appendix 3G of the ESBWR Design Control Document (DCD) are identified in Table 6.3.2-1.

Some remarks concerning the determination of the detailed load combinations are mentioned below.

- Two kinds of thermal loads, summer and winter, are considered. Because of the uncertainties in the thermal loads, two combinations which differ only in including the thermal load or not are always included in the detailed load combinations.
- Seismic loads include the following:



- Seismic Hydrodynamic load of the spent fuel pool water
- RPV Reaction force due to earthquake
- Dynamic increment of soil pressure

Dynamic loads, i.e. seismic loads and hydrodynamic loads, are combined according to the SRSS method, as specified in Section 7.1.4 of the Design Specification for Concrete Containment (Reference 2.1.2-m). The basic concept for SRSS is shown below.

- 1) Algebraic sum of static component forces (dead, live, thermal, pressure, etc.): Retain sign for each force component. For example, $N_x (+)$, $N_y (-)$ and $N_{xy}(+)$ for axial forces in X and Y direction and in-plane shear force, respectively.
- 2) Seismic component forces (SRSS results of force due to each of 3 direction input): regardless of sign
- 3) SRV component forces (SRSS results of force due to each of 3 direction input): regardless of sign
- 4) LOCA component forces (SRSS results of force due to each of 3 direction input): regardless of sign
- 5) Total dynamic component forces (SRSS of Step-2, Step-3, and Step-4): regardless of sign
- 6) Assign signs to total dynamic component force to be the same as static force: refer to Step-1 example, $N_x (+)$, $N_y (-)$ and $N_{xy}(+)$
- 7) Total component forces (add Step-1 and Step-6): refer to Step-1 example, $N_x (+)$, $N_y (-)$ and $N_{xy}(+)$

And furthermore, the following concepts are also applied.

- 8) The case to reverse the signs of section forces is evaluated for total dynamic components which are described in Step-6 (the signs of static component forces in Step-1 are not reversed).
 - 9) Dynamic loads classified as Dynamic-3D in Table A.2-1 of Reference 2.1.2-i have spatial components, so the forces due to each spatial component load shall be combined using SRSS method.
 - 10) Dynamic loads classified as Dynamic-prescribed direction in Table A.2-1 of Reference 2.1.2-i do not have spatial components. (These are pressure loads or one dimensional loads.) SRSS method is applied for these loads when they are combined other dynamic loads.
 - 11) Before combining forces using SRSS, the forces due to the loads which act simultaneously (or it can be considered as a conservative assumption that these loads act simultaneously) are combined using the algebraic sum method.
- As for hydrodynamic loads, SRV, CO and CH, two patterns of loadings, i.e. full positive and negative, are considered in the design.



- The following loads are considered as LOCA hydrodynamic loads depending on the elapsed time after the LOCA.

<u>Time after LOCA</u>	<u>Load to be considered</u>
5 seconds	Pool Swell + SRV
6 minutes	CO + SRV
10 hours	CH + SRV
72 hours	CH + SRV

6.3.3 Result of Load Combination

Tables 6.3.3-1 through 6.3.3-5 summarize the section forces for the selected elements shown in Figures 6.2.4-1 through 6.2.4-5, which are calculated for several typical design load combinations selected from combinations shown in Table 6.3.2-1. Section forces due to the following loads are shown independently in the tables.

- OTHR: Loads other than thermal, seismic and hydrodynamic loads
- TEMP: Thermal loads
- SEIS: Seismic loads
- HYDR: Hydrodynamic loads

Element forces and moments listed in the tables are defined with relation to the element coordinate system shown in Figure 6.2.4-6.

6.4 Section Design Principles

This report describes the section design of the general portion of the RCCV as representative sections of the RCCV wall around openings.

Structural design of the RCCV is performed according to ASME-2004(Reference 2.2-a).

ASME-2004 requires that the section design be carried out for the following section forces and that either of two criteria be satisfied. One of the criteria is that concrete and rebar stresses are lower than the allowable values, and the other is that the rebar area is larger than the necessary value.

- Flexure and Membrane Forces
- Membrane Compressive Forces
- Shear
 - Radial (Transverse) Shear
 - Tangential Shear and Membrane Forces
 - Peripheral Shear



– Torsional Shear

Peripheral shear stress and torsional shear stress are produced by local externally applied forces or moments. Major local loads which generate peripheral and torsional shear stress in the RCCV are pipe reactions. Though pipe reaction loads should be considered in the design of the RCCV wall around penetrations, the design of the regions is out of scope of this report. Therefore, section design calculations for peripheral shear and torsional shear are not performed in this report.

The evaluation method for each of the section forces is described in the following subsections.

6.4.1 Section Design for Flexure and Membrane Forces

In this section design, it is confirmed that the concrete and rebar stresses due to flexure and membrane forces do not exceed the allowable stresses specified in CC-3420 and CC-3430 of ASME-2004.

Among the design loads, thermal loads are one of the most dominant loads for the RCCV design. As for stresses due to thermal loads, it is generally recognized that they are reduced in proportion to the reduction of concrete stiffness due to cracking. Therefore, it is important for the RCCV design to evaluate thermal stresses adequately taking account for the reduction of concrete stiffness due to cracking.

The standard design structural evaluation report (Reference 2.1.2-i) described two methods for reduction of thermal stresses. The SSDP-2D, with the thermal cracking option selected, was used to reduce thermal section forces. However, for LOCA thermal loads, the thermal ratios obtained by 3D nonlinear analyses were used to adjust the section forces for the RCCV (except for the basemat). Both the SSDP-2D and the 3D nonlinear methods were reviewed and approved by the NRC in its review and evaluation of the standard design certification for the ESBWR. The 3D nonlinear method is explained in detail in Reference 2.1.2-i, but this information is not repeated here because the method was not used in the site-specific RCCV structural evaluation.

A computer program, SSDP-2D, is used to calculate the concrete and rebar stresses. This method was used in the previous ABWR design works.

The SSDP-2D has the following characteristics:

- It calculates concrete and rebar stresses under two dimensional equilibrium conditions for six components of the section forces in a shell element – two axial forces, two bending moments, tangential shear, and torsional moment.
- It takes concrete cracks into account in the stress calculation. Cracked concrete is assumed not to bear tensile forces.
- It assumes concrete and rebars to be perfectly elastic.
- As for the thermal effects, section forces due to thermal loads, which are evaluated by NASTRAN analyses using uncracked concrete stiffness, are reduced considering the depth and direction of cracking. The cracked section properties are used in the calculation only for the cracked sections. Furthermore, compatibility between strain



distribution in a section and internal forces, including reduced thermal stress, is examined under an assumed crack condition. The calculations are continued until the compatibility of strain and internal forces are satisfied. During the iterative calculations, redistribution of internal forces and strains are considered adequately.

- Radial (transverse) shear is generated in an element but is not considered in the equilibrium conditions. Stresses of shear ties are not calculated with SSDP-2D. The amount of shear ties is determined so that it exceeds the amount required by ASME-2004, as described in Section 6.4.3.

For the thermal load, the updated thermal load for the RB upper pools described in Appendix E of Reference 2.1.2-j is applied to the RB/FB global FE model. The effects of concrete cracking due to the thermal load are considered by reducing the thermal stress in SSDP-2D.

Table 6.4.1-1 shows the material constants used for the stress calculation, and Tables 6.4.1-2 and 6.4.1-3 show the allowable stresses of concrete and rebars.

As specified in Section 9.1 of the Design Specification for Concrete Containment (Reference 2.1.2-m), strengths of concrete and rebars are reduced, taking effects of elevated temperatures into consideration.

Reduction of concrete strength due to high temperature is determined based upon the average value of the following upper bound and lower bound equations.

- Lower bound reduction factor
 - $\phi = 1.0 - 0.0030 (T-21.1)$ $21.1^{\circ}\text{C} (70^{\circ}\text{F}) \leq T \leq 121.1^{\circ}\text{C} (250^{\circ}\text{F})$
 - $\phi = 0.70 - 0.00083 (T-121.1)$ $121.1^{\circ}\text{C} (250^{\circ}\text{F}) \leq T$
- Upper bound reduction factor
 - $\phi = 1.0$ $T \leq 260.0^{\circ}\text{C} (500^{\circ}\text{F})$
 - $\phi = 1.0 - 0.00081 (T-260.0)$ $260.0^{\circ}\text{C} (500^{\circ}\text{F}) \leq T$

Reduction of reinforcing steel strength is based upon the following equation.

- Reduction Factor
 - $\phi = 1.0 - 0.000873 (T-21.1)$ $21.1^{\circ}\text{C} (70^{\circ}\text{F}) \leq T \leq 204.4^{\circ}\text{C} (400^{\circ}\text{F})$

Allowable stresses listed in Tables 6.4.1-2 and 6.4.1-3 are reduced using these factors in calculations for load combinations including thermal loads.

6.4.2 Section Design for Membrane Compressive Forces

In this section design, it is confirmed that the compressive stresses of the concrete due to membrane forces do not exceed the allowable stresses specified in CC-3420 and CC-3430 of ASME-2004.

The principal membrane compressive stress σ_c , which is calculated by the following equation, is used for the evaluation.



$$\sigma_c = \frac{\sigma_x + \sigma_y}{2} - \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2} \quad (- \text{ for compression, } + \text{ for tension})$$

$$\sigma_x = \frac{N_x}{h}$$

$$\sigma_y = \frac{N_y}{h}$$

$$\tau_{xy} = \frac{N_{xy}}{h}$$

where N_x : x-direction axial force per unit length (Tension is positive.)

N_y : y-direction axial force per unit length (Tension is positive.)

N_{xy} : tangential shear

h : element thickness

Table 6.4.2-1 shows the allowable membrane compressive stress of concrete. Reductions due to elevated temperatures described in Subsection 6.4.1 are applicable to these allowables.

6.4.3 Section Design for Radial (Transverse) Shear

The necessary area of shear reinforcing steel is calculated from the transverse shear acting on a section in accordance with CC-3521.2 and CC-3522 of ASME-2004. The necessary shear reinforcement ratio ρ_w is calculated by the following equation:

$$\rho_w = \frac{(v_u - v_c)}{f_a}$$

$$(v_u - v_c) < 8\sqrt{f'_c} \quad (\text{psi})$$

where v_u : nominal shear stress

$$v_u = \frac{V_u}{0.85bd} \quad : \text{ for factored loads}$$

$$= \frac{V_u}{bd} \quad : \text{ for service loads}$$

V_u : shear force

b : section width

d : distance from an extreme compression fiber to the centroid of the reinforcing steel

v_c : allowable shear stress of concrete

f_a : allowable tensile stress of rebars shown in Table 6.4.1-3

f'_c : compressive strength of concrete (psi)



The allowable shear stress of concrete is calculated in accordance with CC-3421.4.1 and CC-3431.3 of ASME-2004. The calculation method is shown in Figure 6.4.3-1. The transverse shear stress is evaluated in the direction of the maximum shear force, and the section forces for evaluation are calculated by the following equations.

$$V_u = \sqrt{Q_x^2 + Q_y^2}$$

$$M_u = M_x \sin^2 \theta + M_y \cos^2 \theta + 2M_{xy} \sin \theta \cos \theta$$

$$N_u = N_x \sin^2 \theta + N_y \cos^2 \theta + 2N_{xy} \sin \theta \cos \theta$$

$$\theta = \tan^{-1}(Q_x/Q_y)$$

In NASTRAN analyses, the transverse shear forces, i.e., Q_x and Q_y , are calculated independently in X and Y directions, respectively. The resultant transverse shear forces, i.e. the maximum transverse shear force (V_u), is calculated with the SRSS method in order to consider transverse shear forces in two directions simultaneously. The value θ is the direction of the maximum shear force. The values N_u and M_u are also evaluated in the direction of the maximum shear force.

6.4.4 Section Design for Tangential Shear and Membrane Forces

The necessary rebar area is calculated from the tangential (in-plane) shear and membrane forces acting on a section in accordance with CC-3521.1 and CC-3522 of ASME-2004.

$$A_{sh} + A_{si} = \frac{N_h + (N_{hl}^2 + V^2)^{1/2}}{f_a}$$

$$A_{sm} + A_{si} = \frac{N_m + (N_{ml}^2 + V^2)^{1/2}}{f_a}$$

where A_{sh} : rebar area in the circumferential direction

A_{sm} : rebar area in the meridian direction

A_{si} : diagonal rebar area

N_h, N_m : axial forces in the circumferential and meridian directions due to pressure and dead loads (Tension is positive.)

N_{hl}, N_{ml} : axial forces in the circumferential and meridian directions due to lateral loads such as earthquakes and wind

V : tangential shear due to lateral loads such as earthquakes and wind

f_a : allowable tensile stress of rebars shown in Table 6.4.1-3

The tangential shear V_{so} that orthogonal rebars bear is calculated by the following equation.

$$V_{so} = V_u - f_a \cdot A_{si} < \alpha(2.4\sqrt{f'_c})bt \quad ("f'_c" \text{ is in kgf/cm}^2)$$

where α : 1.0 for factored loads, 0.5 for service loads



t : member thickness (m)

Tangential shear is limited by the following equation.

$$V_u < (0.4f'_c b t - V_{so})$$

7. SUMMARY OF RESULTS

7.1 Required Sections

Figures 7.1-1 through 7.1-6 show representative sections of the RCCV including the basemat. Primary reinforcements are arranged orthogonally in two directions in each section. Figure 7.1-7 shows the locations of the primary reinforcement at representative sections which are determined for the section design. Shear reinforcements are also shown in Figures 7.1-1 through 7.1-6.

Standard rebar arrangements in the RCCV sections are summarized in Table 7.1-1.

7.2 Provided Sections

The sections of the RCCV which have been provided are identical to the required sections described in Section 7.1.

7.3 Tabulation of Allowable Stresses versus Calculated Stresses

7.3.1 Calculations for Flexure and Membrane Forces

The stresses of the concrete and reinforcing steel are calculated for flexure and membrane forces. The calculations are performed for the selected design load combinations shown in Table 6.3.2-1, and the summary in Tables 7.3.1-3 through 7.3.1-8 confirmed that all values are less than their allowable stresses.

The elements of the RCCV wall are classified into several zones for section design purposes as shown in Figures 7.3.1-1 through 7.3.1-5. Rebar arrangements in each zone are listed in Table 7.3.1-1.

The calculation results for the selected elements shown in Figures 6.2.4-1 through 6.2.4-5 are given in this report. The thickness and the rebar ratios used for the design calculation are listed in Table 7.3.1-2 for each element.

Calculated stresses and allowable stresses are compared in Tables 7.3.1-3 through 7.3.1-7 for several load combinations.

Table 7.3.1-8 shows a summary of the maximum stress ratios, which are ratios of the maximum stresses to the allowable stresses.

For Containment Wall including the RPV pedestal, Sections 1 through 9 are selected sections of the Containment Wall including the RPV pedestal. Maximum stress in the vertical rebar is found to be 224.7 MPa (32.58 ksi) at Section 7 near the bottom of the RCCV DW due to load combination CV-11b against the allowable stress of 360.2 MPa (52.23 ksi), as shown in Table 7.3.1-7. The maximum stress in the hoop rebar is found to be 209.7 MPa (30.41 ksi), which occurs at Section 8, the middle of the RCCV DW due to load combination CV-11b against the allowable stress of 360.2 MPa (52.23 ksi), as shown in Table 7.3.1-7. The



maximum concrete stress is found to be -21.0 MPa (-3.05 ksi), which occurs at Sections 7, 8, and 9 due to load combination CV-11b against the allowable stress of -27.7 MPa (-4.02 ksi), as shown in Table 7.3.1-7.

For Containment Top Slab and Suppression Pool Slab, Sections 12 through 17 are examined. The maximum rebar stresses are found to be 241.2 MPa (34.98 ksi) at Section 16 due to the load combination CV-11b against the allowable stress of 356.6 MPa (51.71 ksi) in the Top Slab, and 238.2 MPa (34.55 ksi) at Section 13 due to the combination CV-11b against the allowable stress of 364.4 MPa (52.84 ksi) in the Suppression Pool Slab as shown in Table 7.3.1-7. The maximum concrete stresses are -24.4 MPa (-3.54 ksi) at Section 15 due to the combination CV-11b against the allowable stress of -31.4 MPa (-4.55 ksi) in the Top Slab, and -26.1 MPa (-3.78 ksi) at Section 13 due to the combination CV-7b against the allowable stress of -28.3 MPa (-4.10 ksi) in the Suppression Pool Slab as shown in Tables 7.3.1-7 and 7.3.1-5, respectively.

For Containment Foundation Mat, Sections 10 and 11 are evaluated for the part of the concrete containment in the foundation mat. The maximum rebar stress is calculated as 69.5 MPa (10.08 ksi) at Section 11 due to the combination CV-7b against the allowable stress of 370.2 MPa (53.68 ksi) as shown in Table 7.3.1-5. The maximum concrete stress is found to be -7.7 MPa (-1.12 ksi), which occurs at Section 11 due to load combination CV-11a against the allowable stress of -23.2 MPa (-3.36 ksi), as shown in Table 7.3.1-6.

7.3.2 Calculations for Membrane Compressive Forces

The compressive stresses of concrete are calculated for membrane forces. The calculations are performed for the selected design load combinations shown in Table 6.3.2-1, and the summary in Table 7.3.2-1 confirmed that the compressive membrane stresses at the selected elements shown in Figures 6.2.4-1 through 6.2.4-5 are within their allowable stresses.

For Containment Wall including the RPV pedestal, Sections 1 through 9 are selected sections of the Containment Wall including the RPV pedestal. Maximum compressive stress of -9.652 MPa (-1.400 ksi) is found at Section 9 against the allowable stress of -25.9 MPa (-3.756 ksi) as shown in Table 7.3.2-1.

For Containment Top Slab and Suppression Pool Slab, Sections 12 through 17 are examined. Maximum compressive stress of -19.134 MPa (-2.774 ksi) is found at Section 15 against the allowable stress of -31.1 MPa (-4.510 ksi) in the Top Slab, and -6.662 MPa (-0.966 ksi) is found at Section 12 against the allowable stress of -25.9 MPa (-3.756 ksi) in the Suppression Pool Slab as shown in Tables 7.3.2-1.

For Containment Foundation Mat, Sections 10 and 11 are evaluated for the part of the concrete containment in the foundation mat. Maximum compressive stress of -1.902 MPa (-0.276 ksi) is found at Section 11 against the allowable stress of -12.4 MPa (-1.798 ksi) as shown in Table 7.3.2-1.

7.3.3 Calculations for Radial (Transverse) Shear

The required shear tie ratios are calculated and compared with the provided rebar ratios. Figures 7.3.1-1 through 7.3.1-5 and Table 7.3.1-1 show the provided shear ties in elements determined based on the arrangement shown in Figures 7.1-1 through 7.1-6. The calculations



are performed for the selected design load combinations shown in Table 6.3.2-1, and the summary in Tables 7.3.3-1 and 7.3.3-2 confirmed that the provided shear ties satisfy the required values.

Table 7.3.3-1 shows a summary of the examinations for selected elements shown in Figures 6.2.4-1 through 6.2.4-5. Table 7.3.3-2 shows the calculation results for the load combinations selected for the DCD that are indicated in Table 6.3.2-1.

For Containment Wall including RPV, the maximum transverse shear stress is found to be 4.38 MPa (0.64 ksi) at Section 1 for the load combination CV-7b. The amounts of shear ties provided satisfy the required values at all sections, as indicated in Table 7.3.3-2.

For Containment Top Slab and Suppression Pool Slab, the maximum transverse shear stresses are found to be 1.79 MPa (0.26 ksi) at Section 15 for the load combination CV-7b in the Top Slab, and 3.18 MPa (0.46 ksi) at Section 14 for the combination CV-7a in the Suppression Pool Slab. The amounts of shear ties provided satisfy the required values at all sections, as indicated in Table 7.3.3-2.

For Containment Foundation Mat, the maximum transverse shear stress of 0.95 MPa (0.14 ksi) is found also at the Section 11 for the load combination CV-11b.

7.3.4 Calculations for Tangential (In-plane) Shear and Membrane Forces

The required primary reinforcement area is calculated from the in-plane shear and membrane forces. The calculations are performed for the selected design load combinations shown in Table 6.3.2-1, and it is confirmed that the required primary reinforcement area is less than the provided area. In addition, the tangential shear stress, $v_{so}(= V_{so} / bt)$, that the orthogonal rebars bear is confirmed to be less than the allowable value calculated by the following equations.

$$\text{For factored loads: } 2.4\sqrt{f'_c} \text{ (kgf/cm}^2\text{)}$$

$$\text{For service loads: } 1.2\sqrt{f'_c} \text{ (kgf/cm}^2\text{)}$$

where, the concrete compressive strengths

$$\text{Basemat: } f'_c = 4000 \text{ psi} = 281.2 \text{ kg/cm}^2 (= 27.6 \text{ MPa})$$

$$\text{Top Slab: } f'_c = 6000 \text{ psi} = 421.8 \text{ kg/cm}^2 (= 41.4 \text{ MPa})$$

$$\text{Others: } f'_c = 5000 \text{ psi} = 351.5 \text{ kg/cm}^2 (= 34.5 \text{ MPa})$$

Shear stress, v_u , shall conform to the following equation.

$$v_u < 0.4 f'_c - v_{so} \text{ (MPa)}$$

Table 7.3.4-1 shows a summary of the examinations for selected elements shown in Figures 6.2.4-1 through 6.2.4-5. Table 7.3.4-2 shows the calculation results for the load combinations selected for the DCD that are indicated in Table 6.3.2-1.



For Containment Wall including RPV, the maximum tangential shear stress of 1.80 MPa (0.26 ksi) is found at Section 7, the bottom of the DW, due to the combinations CV-11a and CV-11b. The value is less than the allowable tangential shear stress provided by orthogonal reinforcement, which is described in Table 7.3.1-2. The amounts of reinforcement provided satisfy the required values at all sections as shown in Table 7.3.4-2.

8. CONCLUSIONS

The site-specific stress check calculations for the RCCV are performed to evaluate the structural integrity of the RCCV at the NA3 site per the specification of ASME-2004, Article CC-3000, following the same methodology as that used for the standard design. The stress checks are based on the results of the RB/FB global model analyses for the site-specific seismic loads combined together with the non-seismic load results. Based on comparison of calculated responses in section 7.3, the conclusions from the site-specific stress checks are summarized as follows:

- The stresses of the concrete and rebar are less than the allowable stresses specified in the code.
- The areas of the primary and shear reinforcement, which have been provided, satisfy the required values.

The comparisons between NA3 and the standard design are shown in Appendix A.

Therefore, it can be concluded that the standard design of the RCCV is adequate to resist the NA3 site-specific SSE loads in combination with non-seismic standard plant loads.


Table 3-1 Key Dimensions of RCCV

Portion	Dimension	Notes
Foundation Mat	Thickness = 5.1 m	
Containment Wall	Thickness = 2.0 m	
	Inside radius = 18.0 m	
	Height = 19.95 m	From the top of the Suppression Pool slab to the bottom of the top slab
RPV Pedestal (Part of Lower Containment)	Thickness = 2.5 m	
	Inside radius = 5.6 m	
	Height = 15.05 m	From the top of the foundation mat to the top of the Suppression Pool slab
Top Slab	Thickness = 2.4 m	
Suppression Pool Slab	Thickness = 2.0 m	

**Table 5.1.1-1 Dead Loads of Hydrostatic Loads in RB and RCCV
(Reproduced from Reference 2.1.2-i)**

Location	Water Depth (m)	Weight (kN/m ²)	Note
Reactor Well	6.7	66.0	
	2.9	28.0	On the Drywell Top Head
Equipment Storage Pool	6.7	66.0	
Fuel Buffer Pool	6.7	66.0	
IC/PCCS Pool	4.8	47.0	
IC/PCCS Expansion Pools	4.8	47.0	
GDCS Pools	6.8	67.0	
Lower Drywell	12.37	121.0	during LOCA Flooding
Suppression Pool	5.5	54.0	
	6.55	64.0	during LOCA Flooding



Table 5.2.1-1 Design Pressure Loads for Containment and IC/PCCS Pools
(Reproduced from Reference 2.1.2-i)

Event		Pressure (kPaG)		
		Drywell	Wetwell	IC/PCCS Pool
Normal Operation		9.0	9.0	34.5
Test	maximum internal pressure	356.8	356.8	0.0
	maximum differential pressure	310.0	32.5	0.0
LOCA	5 seconds after DBA	(345.0)*	(250.0)*	48.3
	6 minutes after DBA	257.0	241.0	48.3
	10 hours after DBA	310.0	310.0	48.3
	72 hours after DBA	310.0	310.0	48.3

*: The pressure loads at 5 seconds are considered in the load of Pool Swell pressure loads.

Table 5.2.1-2 Design Times for LOCAs
(Reproduced from Reference 2.1.2-i)

Selected Time	Reasons for Selection
5 seconds	Just after LOCA Combination including Pool Swell
6 minutes (0.1 hr.)	Containment temperatures reach their maximum values. Combination including Condensation Oscillation
10 hours	Containment pressures reach their maximum values. Combination including Chugging
72 hours	Concrete temperatures reach their maximum values. Combination including Chugging

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Table 5.2.2-1 Design Thermal Loads of RCCV: Summer
(Reproduced from Reference 2.1.2-i)

Event	Location	Index*	Boundary**		Thickness (mm)	Td (°C)	Tg (°C)	Note
			1	2				
Normal Operation	Basemat	BM2	DW	GR	5100	27.47	23.94	Below lower Drywell
		BM4	DW	FL	5100	-	-	At LOCA Flooding
	RCCV Wall	CV1	RM	RM	2000	40.00	0.00	Below Grade
		CV2	SP	RM	2000	41.66	2.68	Suppression Pool
		CV3	WW	RM	2000	41.50	2.43	Wetwell Air Space
		CV4	DW	RM	2000	48.50	13.77	Drywell General
		CV5	GP	RM	2000	41.66	2.69	Drywell GDCS Pool
		CV6	DW	MT	2000	57.00	0.00	Drywell MS Tunnel
	Suppression Pool Slab	SP1	SP	RM	2000	41.66	2.68	
	Top Slab	TS1	DW	DP	2400	49.38	12.75	Below DSP/FP
		TS2	DW	IP	2400	49.38	12.75	Below IC/PCCS
		TS3	DW	XP	2400	49.38	12.75	Below Expansion Pool
		TS4	DW	DP	2400	50.81	12.61	Around Drywell Head
		TS5	DW	RM	2400	48.50	14.23	Below Room
	RPV Pedestal	RP1	DW	RM	2400	48.50	14.23	
		RP2	FL	RM	2400	-	-	At LOCA Flooding
5 seconds after DBA	Basemat	BM2	DW	GR	5100	27.47	23.94	Below lower Drywell
		BM4	DW	FL	5100	27.47	23.94	At LOCA Flooding
	RCCV Wall	CV1	RM	RM	2000	40.00	0.00	Below Grade
		CV2	SP	RM	2000	41.66	2.69	Suppression Pool
		CV3	WW	RM	2000	41.61	3.06	Wetwell Air Space
		CV4	DW	RM	2000	48.84	15.79	Drywell General
		CV5	GP	RM	2000	41.66	2.69	Drywell GDCS Pool
		CV6	DW	MT	2000	57.33	1.97	Drywell MS Tunnel
	Suppression Pool Slab	SP1	SP	RM	2000	41.66	2.68	
	Top Slab	TS1	DW	DP	2400	49.72	14.76	Below DSP/FP
		TS2	DW	IP	2400	49.72	14.76	Below IC/PCCS
		TS3	DW	XP	2400	49.72	14.76	Below Expansion Pool
		TS4	DW	DP	2400	51.23	15.08	Around Drywell Head
		TS5	DW	RM	2400	48.84	16.23	Below Room
	RPV Pedestal	RP1	DW	RM	2400	48.84	16.23	
		RP2	FL	RM	2400	48.94	16.83	At LOCA Flooding
6 minutes after DBA	Basemat	BM2	DW	GR	5100	27.47	23.94	Below lower Drywell
		BM4	DW	FL	5100	27.47	23.94	At LOCA Flooding
	RCCV Wall	CV1	RM	RM	2000	40.00	0.00	Below Grade
		CV2	SP	RM	2000	42.20	5.89	Suppression Pool
		CV3	WW	RM	2000	42.36	7.49	Wetwell Air Space
		CV4	DW	RM	2000	49.67	20.71	Drywell General
		CV5	GP	RM	2000	41.66	2.69	Drywell GDCS Pool
		CV6	DW	MT	2000	58.16	6.84	Drywell MS Tunnel
	Suppression Pool Slab	SP1	SP	RM	2000	42.14	5.53	
	Top Slab	TS1	DW	DP	2400	50.40	18.79	Below DSP/FP
		TS2	DW	IP	2400	50.59	17.62	Below IC/PCCS
		TS3	DW	XP	2400	50.58	17.72	Below Expansion Pool
		TS4	DW	DP	2400	53.41	18.97	Around Drywell Head
		TS5	DW	RM	2400	49.52	20.25	Below Room
	RPV Pedestal	RP1	DW	RM	2400	49.52	20.25	
		RP2	FL	RM	2400	49.29	18.91	At LOCA Flooding

*: See Figures 5.2.2-3 through 5.2.2-9.

** : DW: Drywell WW: Wetwell
 IP: IC/PCCS Pool XP: Expansion Pool
 DP: DS/Fuel Pool, Reactor Well
 FL: Inside RCCV at LOCA Flooding

SP: Suppression Pool GP: GDCS Pool
 RM: Room GR: Ground
 MT: Main Steam Tunnel

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Table 5.2.2-1 Design Thermal Loads of RCCV: Summer (Continued)

Event	Location	Index*	Boundary**		Thickness (mm)	Td (°C)	Tg (°C)	Note
			1	2				
10 hours after DBA	Basemat	BM2	DW	GR	5100	27.47	23.94	Below lower Drywell
		BM4	DW	FL	5100	27.47	23.94	At LOCA Flooding
	RCCV Wall	CV1	RM	RM	2000	40.00	0.00	Below Grade
		CV2	SP	RM	2000	47.95	34.85	Suppression Pool
		CV3	WW	RM	2000	48.87	40.09	Wetwell Air Space
		CV4	DW	RM	2000	57.44	59.43	Drywell General
		CV5	GP	RM	2000	47.85	34.44	Drywell GDCS Pool
		CV6	DW	MT	2000	65.78	44.88	Drywell MS Tunnel
	Suppression Pool Slab	SP1	SP	RM	2000	47.94	34.81	
	Top Slab	TS1	DW	DP	2400	56.81	51.83	Below DSP/FP
		TS2	DW	IP	2400	61.94	24.80	Below IC/PCCS
		TS3	DW	XP	2400	61.85	25.20	Below Expansion Pool
		TS4	DW	DP	2400	68.65	48.56	Around Drywell Head
		TS5	DW	RM	2400	55.93	53.28	Below Room
	RPV Pedestal	RP1	DW	RM	2400	55.93	53.28	
		RP2	FL	RM	2400	55.52	51.16	At LOCA Flooding
72 hours after DBA	Basemat	BM2	DW	GR	5100	27.47	23.94	Below lower Drywell
		BM4	DW	FL	5100	27.47	23.94	At LOCA Flooding
	RCCV Wall	CV1	RM	RM	2000	40.00	0.00	Below Grade
		CV2	SP	RM	2000	58.58	63.97	Suppression Pool
		CV3	WW	RM	2000	61.28	74.05	Wetwell Air Space
		CV4	DW	RM	2000	72.43	100.39	Drywell General
		CV5	GP	RM	2000	58.55	63.96	Drywell GDCS Pool
		CV6	DW	MT	2000	80.52	85.14	Drywell MS Tunnel
	Suppression Pool Slab	SP1	SP	RM	2000	58.63	63.98	
	Top Slab	TS1	DW	DP	2400	69.29	92.58	Below DSP/FP
		TS2	DW	IP	2400	83.38	35.98	Below IC/PCCS
		TS3	DW	XP	2400	83.35	36.04	Below Expansion Pool
		TS4	DW	DP	2400	91.96	79.99	Around Drywell Head
		TS5	DW	RM	2400	68.39	94.07	Below Room
	RPV Pedestal	RP1	DW	RM	2400	68.39	94.07	
		RP2	FL	RM	2400	67.34	89.83	At LOCA Flooding

*: See Figures 5.2.2-3 through 5.2.2-9.

** : DW: Drywell WW: Wetwell
 IP: IC/PCCS Pool XP: Expansion Pool
 DP: DS/Fuel Pool, Reactor Well
 FL: Inside RCCV at LOCA Flooding

SP: Suppression Pool GP: GDCS Pool
 RM: Room GR: Ground
 MT: Main Steam Tunnel

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Table 5.2.2-2 Design Thermal Loads of RCCV: Winter
(Reproduced from Reference 2.1.2-i)

Event	Location	Index*	Boundary**		Thickness (mm)	Td (°C)	Tg (°C)	Note
			1	2				
Normal Operation	Basemat	BM2	DW	GR	5100	27.47	23.94	Below lower Drywell
		BM4	DW	FL	5100	-	-	At LOCA Flooding
	RCCV Wall	CV1	RM	RM	2000	10.00	0.00	Below Grade
		CV2	SP	RM	2000	28.22	29.53	Suppression Pool
		CV3	WW	RM	2000	26.50	26.73	Wetwell Air Space
		CV4	DW	RM	2000	33.50	38.08	Drywell General
		CV5	GP	RM	2000	28.23	29.54	Drywell GDCS Pool
		CV6	DW	MT	2000	57.00	0.00	Drywell MS Tunnel
	Suppression Pool Slab	SP1	SP	RM	2000	28.22	29.50	
	Top Slab	TS1	DW	DP	2400	49.38	12.75	Below DSP/FP
		TS2	DW	IP	2400	49.38	12.75	Below IC/PCCS
		TS3	DW	XP	2400	49.38	12.75	Below Expansion Pool
		TS4	DW	DP	2400	50.81	12.61	Around Drywell Head
		TS5	DW	RM	2400	33.50	39.33	Below Room
	RPV Pedestal	RP1	DW	RM	2400	33.50	39.33	
		RP2	FL	RM	2400	-	-	At LOCA Flooding
5 seconds after DBA	Basemat	BM2	DW	GR	5100	27.47	23.94	Below lower Drywell
		BM4	DW	FL	5100	27.47	23.94	At LOCA Flooding
	RCCV Wall	CV1	RM	RM	2000	10.00	0.00	Below Grade
		CV2	SP	RM	2000	28.22	29.53	Suppression Pool
		CV3	WW	RM	2000	26.61	27.42	Wetwell Air Space
		CV4	DW	RM	2000	33.85	40.18	Drywell General
		CV5	GP	RM	2000	28.23	29.54	Drywell GDCS Pool
		CV6	DW	MT	2000	57.33	1.97	Drywell MS Tunnel
	Suppression Pool Slab	SP1	SP	RM	2000	28.22	29.50	
	Top Slab	TS1	DW	DP	2400	49.72	14.76	Below DSP/FP
		TS2	DW	IP	2400	49.72	14.76	Below IC/PCCS
		TS3	DW	XP	2400	49.72	14.76	Below Expansion Pool
		TS4	DW	DP	2400	51.23	15.08	Around Drywell Head
		TS5	DW	RM	2400	33.85	41.41	Below Room
	RPV Pedestal	RP1	DW	RM	2400	33.85	41.41	
		RP2	FL	RM	2400	33.95	42.01	At LOCA Flooding
6 minutes after DBA	Basemat	BM2	DW	GR	5100	27.47	23.94	Below lower Drywell
		BM4	DW	FL	5100	27.47	23.94	At LOCA Flooding
	RCCV Wall	CV1	RM	RM	2000	10.00	0.00	Below Grade
		CV2	SP	RM	2000	28.77	32.74	Suppression Pool
		CV3	WW	RM	2000	27.38	31.96	Wetwell Air Space
		CV4	DW	RM	2000	34.70	45.19	Drywell General
		CV5	GP	RM	2000	28.23	29.54	Drywell GDCS Pool
		CV6	DW	MT	2000	58.16	6.84	Drywell MS Tunnel
	Suppression Pool Slab	SP1	SP	RM	2000	28.70	32.35	
	Top Slab	TS1	DW	DP	2400	50.40	18.79	Below DSP/FP
		TS2	DW	IP	2400	50.59	17.62	Below IC/PCCS
		TS3	DW	XP	2400	50.58	17.72	Below Expansion Pool
		TS4	DW	DP	2400	53.41	18.97	Around Drywell Head
		TS5	DW	RM	2400	34.54	45.48	Below Room
	RPV Pedestal	RP1	DW	RM	2400	34.54	45.48	
		RP2	FL	RM	2400	34.31	44.14	At LOCA Flooding

*: See Figures 5.2.2-3 through 5.2.2-9.

**.: DW: Drywell WW: Wetwell
 IP: IC/PCCS Pool XP: Expansion Pool
 DP: DS/Fuel Pool, Reactor well
 FL: Inside RCCV at LOCA Flooding

SP: Suppression Pool GP: GDCS Pool
 RM: Room GR: Ground
 MT: Main Steam Tunnel

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Table 5.2.2-2 Design Thermal Loads of RCCV: Winter (Continued)

Event	Location	Index*	Boundary**		Thickness (mm)	Td (°C)	Tg (°C)	Note
			1	2				
10 hours after DBA	Basemat	BM2	DW	GR	5100	27.47	23.94	Below lower Drywell
		BM4	DW	FL	5100	27.47	23.94	At LOCA Flooding
	RCCV Wall	CV1	RM	RM	2000	10.00	0.00	Below Grade
		CV2	SP	RM	2000	34.51	61.70	Suppression Pool
		CV3	WW	RM	2000	34.13	65.76	Wetwell Air Space
		CV4	DW	RM	2000	42.70	85.11	Drywell General
		CV5	GP	RM	2000	34.42	61.30	Drywell GDCS Pool
		CV6	DW	MT	2000	65.78	44.88	Drywell MS Tunnel
	Suppression Pool Slab	SP1	SP	RM	2000	34.51	61.63	
	Top Slab	TS1	DW	DP	2400	56.81	51.83	Below DSP/FP
		TS2	DW	IP	2400	61.94	24.80	Below IC/PCCS
		TS3	DW	XP	2400	61.85	25.20	Below Expansion Pool
		TS4	DW	DP	2400	68.65	48.56	Around Drywell Head
		TS5	DW	RM	2400	41.12	79.39	Below Room
	RPV Pedestal	RP1	DW	RM	2400	41.12	79.39	
		RP2	FL	RM	2400	40.71	77.28	At LOCA Flooding
72 hours after DBA	Basemat	BM2	DW	GR	5100	27.47	23.94	Below lower Drywell
		BM4	DW	FL	5100	27.47	23.94	At LOCA Flooding
	RCCV Wall	CV1	RM	RM	2000	10.00	0.00	Below Grade
		CV2	SP	RM	2000	45.15	90.82	Suppression Pool
		CV3	WW	RM	2000	47.00	100.95	Wetwell Air Space
		CV4	DW	RM	2000	58.15	127.30	Drywell General
		CV5	GP	RM	2000	45.12	90.82	Drywell GDCS Pool
		CV6	DW	MT	2000	80.52	85.14	Drywell MS Tunnel
	Suppression Pool Slab	SP1	SP	RM	2000	45.20	90.80	
	Top Slab	TS1	DW	DP	2400	69.29	92.58	Below DSP/FP
		TS2	DW	IP	2400	83.38	35.98	Below IC/PCCS
		TS3	DW	XP	2400	83.35	36.04	Below Expansion Pool
		TS4	DW	DP	2400	91.96	79.99	Around Drywell Head
		TS5	DW	RM	2400	53.91	121.24	Below Room
	RPV Pedestal	RP1	DW	RM	2400	53.91	121.24	
		RP2	FL	RM	2400	52.85	117.00	At LOCA Flooding

*: See Figures 5.2.2-3 through 5.2.2-9.

** : DW: Drywell WW: Wetwell
 IP: IC/PCCS Pool XP: Expansion Pool
 DP: DS/Fuel Pool, Reactor well
 FL: Inside RCCV at LOCA Flooding

SP: Suppression Pool GP: GDCS Pool
 RM: Room GR: Ground
 MT: Main Steam Tunnel

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Table 5.3.3-1 Design Seismic Loads for Horizontal SSE (RCCV)

Elev. (m)	Elem No.	Node No.	Shear		Moment		Calculated Torsion (MN-m)	Accidental Torsion (MN-m)	Design Torsion (MN-m)
			X-Dir. (MN)	Y-Dir. (MN)	X-Dir. (MN-m)	Y-Dir. (MN-m)			
34.00	1209	209	130.9	133.2	230 1029	510 1160	29	266	296
27.00	1208	208	141.1	151.9	2162 2938	2303 3071	1489	304	1793
17.50	1206	206	184.1	158.4	3259 3691	3667 3904	1591	368	1960
13.57	1205	205	207.9	173.4	3817 4389	4203 4491	1762	416	2178
9.06	1204	204	225.4	201.2	4481 5190	4853 5203	2062	451	2513
4.65	1203	203	109.2	125.7	5523 5740	5470 5824	1439	251	1691
-1.00	1202	202	67.6	68.1	6008 5924	6066 6035	690	136	826
-6.40	1201	201			6053	6141			
-11.50		2	70.7	55.1	5961	6127	349	141	490

Note: RB/FB Seismic Analyses Bounding Results and In-Structure Response Spectra. (Table 4.1-2 of Reference 2.1.2-t)

The node numbers in this table are described in Figure 5.3.3-1.

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Table 5.3.3-2 Design Seismic Loads for Horizontal SSE (RPV Pedestal and VW)

Elev. (m)	Elem No.	Node No.	Shear		Moment		Calculated Torsion (MN-m)	Accidental Torsion (MN-m)	Design Torsion (MN-m)
			X-dir. (MN)	Y-dir. (MN)	X-dir. (MN-m)	Y-dir. (MN-m)			
17.5	701	701			107	62			
			47.9	32.4	139	107	107	40	147
14.5	702	702			139	113			
			47.1	32.4	279	204	108	39	148
11.5	703	703			280	207			
			45.8	35.1	411	301	111	38	149
8.5	704	704			411	302			
			44.7	36.5	458	338	112	37	149
7.4625	705	705			440	352			
			39.1	29.4	513	427	92	33	125
4.65	1303	706,303			667	496			
			20.5	16.9	651	502	71	16	87
2.4165	1377	377			793	614			
			32.1	31.4	754	631	86	26	112
-1.00	1302	302			691	571			
			22.1	15.7	658	555	34	18	52
-2.75	1376	376			658	555			
			21.8	16.1	594	524	34	17	52
-6.40	1301	301			555	518			
-11.50		2	29.8	22.4	553	514	21	24	45

Note: RB/FB Seismic Analyses Bounding Results and In-Structure Response Spectra. (Tables 4.1-3 and 4.1-4 of Reference 2.1.2-t)

The node numbers in this table are described in Figure 5.3.3-1.



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Table 5.3.3-3 Design Seismic Loads for Horizontal SSE (RSW)

Elev. (m)	Elem No.	Node No.	Shear		Moment		Calculated Torsion (MN-m)	Accidental Torsion (MN-m)	Design Torsion (MN-m)
			X-dir. (MN)	Y-dir. (MN)	X-dir. (MN-m)	Y-dir. (MN-m)			
24.18	707	707			2.5	2.2			
			4.19	2.95	18.9	13.8	0.5	2.0	2.5
20.2	708	708			25.8	19.8			
			20.83	11.08	113.5	59.3	1.7	9.8	11.6
15.775	709	709			116.7	61.3			
			24.35	12.29	224.1	115.5	2.4	11.5	13.9
11.35	710	710			227.6	116.9			
			27.11	13.51	331.9	169.3	3.0	12.8	15.8
7.4625	711	711			135.4	125.5			
			26.62	22.22	169.6	151.7	22.9	12.6	35.5
4.65	712	712			156.8	142.3			
			14.27	13.53	147.3	132.8	15.2	6.7	21.9
2.4165	713	713			4.0	4.0			
1.96			1.55	1.55	3.3	3.3	0.2	0.7	0.9
1.96	714	714			3.0	3.0			
-0.8		715	0.92	0.92	0.7	0.6	0.1	0.4	0.5

Note: RB/FB Seismic Analyses Bounding Results and In-Structure Response Spectra. (Table 4.1-4 of Reference 2.1.2-t)

The node numbers in this table are described in Figure 5.3.3-1.

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Table 5.3.3-4 Maximum Vertical Accelerations (RCCV)

Elev. (m)	Node No.	Stick Model	Max. Vertical Acceleration (g)
34.00	209	RCCV	1.20
27.00	208	RCCV	1.12
17.50	206	RCCV	0.91
13.57	205	RCCV	0.82
9.06	204	RCCV	0.72
4.65	203	RCCV	0.65
-1.00	202	RCCV	0.58
-6.40	201	RCCV	0.55

Note: RB/FB Seismic Analyses Bounding Results and In-Structure Response Spectra. (Table 4.2-2 of Reference 2.1.2-t)

The node numbers in this table are described in Figure 5.3.3-1.

Table 5.3.3-5 Maximum Vertical Accelerations (RPV Pedestal and VW)

Elev. (m)	Node No.	Stick Model	Max. Vertical Acceleration (g)
17.50	701	VW	0.82
14.50	702	VW	0.86
11.50	703	VW	0.81
8.50	704	VW	0.72
7.4625	705	VW	0.67
4.65	706, 303	Pedestal	0.69
-1.00	302	Pedestal	0.59
-6.40	301	Pedestal	0.56

Note: RB/FB Seismic Analyses Bounding Results and In-Structure Response Spectra. (Tables 4.2-3 and 4.2-4 of Reference 2.1.2-t)

The node numbers in this table are described in Figure 5.3.3-1.

**Table 5.3.3-6 Maximum Vertical Accelerations (RSW)**

Elev. (m)	Node No.	Stick Model	Z-dir. (g)
24.18	707	RSW	1.30
20.20	708	RSW	1.23
15.775	709	RSW	0.99
11.35	710	RSW	0.78
7.4625	711	RSW	0.68
4.65	712	RSW	0.69
2.4615	713	RSW	0.64
1.96	714	RSW	0.64
-0.80	715	RSW	0.64

Note: RB/FB Seismic Analyses Bounding Results and In-Structure Response Spectra. (Table 4.2-4 of Reference 2.1.2-t)

The node numbers in this table are described in Figure 5.3.3-1.



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Table 6.2.2-1 Material Constants Used in Stress Analysis
(Reproduced from Reference 2.1.2-i)

			Reinforced Concrete			Steel			Note
			Basemat f'c=4000psi 27.6 MPa	Others f'c=5000psi 34.5 MPa	Top Slab f'c=6000psi 41.4 MPa	Carbon Steel Liner	Stainless Steel Liner	Structural Steel	
		Temperature (°C)							
Young's Modulus (MPa)	Thermal Loads*2	<21	2.49x10 ⁴	2.78x10 ⁴	3.04x10 ⁴	2.00x10 ⁵			Concrete: See Notes 1 & 2.
		93	1.81x10 ⁴	2.03x10 ⁴	2.22x10 ⁴				
		204	1.62x10 ⁴	1.81x10 ⁴	1.98x10 ⁴				
	Other Loads*1		2.49x10 ⁴	2.78x10 ⁴	3.04x10 ⁴	2.00x10 ^{1*3}		2.00x10 ⁵	
Poisson's Ratio			0.17			0.3			
Thermal Expansion (m/m°C)			9.90x10 ⁻⁶			1.17x10 ⁻⁵	1.52x10 ⁻⁵	1.17x10 ⁻⁵	
Weight Density (MN/m3)			0.0235			0.0770			

Notes *1: Young's modulus of concrete is calculated in accordance with ACI 349-01, Section 8.5.1. $E_c = 57,000\sqrt{f'_c}$

*2: Reduction factors of Young's modulus for concrete are determined based upon the average values of the following upper bound and lower bound equations.

Lower bound:

$$\phi = 1.0 - 0.0038(T - 70) \quad 70^\circ F \leq T \leq 200^\circ F$$

$$= 0.50 - 0.0005(T - 200) \quad 200^\circ F \leq T$$

Upper bound:

$$\phi = 1.0 - 0.00031(T - 70) \quad 70^\circ F \leq T \leq 400^\circ F$$

$$= 0.90 - 0.00084(T - 400) \quad 400^\circ F \leq T$$

*3: Except for the local thickened portions of the liner where the DF, VW and RPV support brackets are attached. The full value of the Young's modulus is considered for these thickened liners.



Table 6.2.4-1 Results of NASTRAN Analysis, Dead Load

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	0.083	-5.391	0.164	-0.164	-0.939	0.016	-0.024	-0.292
	5013	-0.323	-6.085	0.260	-0.106	-0.585	-0.001	-0.013	-0.089
	5024	-0.687	-6.064	0.011	-0.063	-0.437	0.002	0.010	-0.028
2 RPV Pedestal Mid-Height	6006	0.033	-5.295	0.277	0.010	0.017	0.029	0.038	-0.040
	6013	-0.028	-5.383	0.405	-0.053	-0.058	0.008	-0.014	0.014
	6024	0.068	-4.022	-0.430	0.013	-0.110	0.012	0.024	0.075
3 RPV Pedestal Top	6606	0.044	-3.889	0.724	0.241	1.713	0.150	0.008	-0.769
	6613	0.020	-3.948	-0.038	0.176	1.617	-0.180	0.021	-0.739
	6624	0.109	-3.801	0.256	0.202	1.593	0.184	-0.028	-0.715
4 RCCV Wetwell Bottom	1806	-0.455	-4.882	0.126	-0.007	-0.147	0.006	0.000	0.013
	1813	-0.565	-4.788	0.179	-0.018	-0.061	0.002	0.001	0.060
	1824	-0.455	-5.290	-0.079	-0.017	-0.099	0.003	-0.004	0.041
5 RCCV Wetwell Mid-Height	2606	-0.121	-4.419	0.166	0.007	-0.030	0.001	0.001	-0.073
	2613	-0.221	-4.373	0.170	-0.031	-0.068	0.001	-0.003	-0.036
	2624	-0.243	-4.735	-0.031	-0.009	-0.030	0.001	0.000	-0.067
6 RCCV Wetwell Top	3406	-0.095	-3.834	0.290	0.032	0.211	0.011	0.013	-0.096
	3413	-0.088	-4.030	0.106	-0.026	-0.102	-0.072	0.019	0.006
	3424	-0.104	-4.040	0.005	0.002	0.020	-0.009	0.029	-0.001
7 RCCV Drywell Bottom	3606	0.023	-3.471	0.209	-0.008	0.086	-0.001	0.017	0.107
	3613	0.032	-3.590	0.121	0.049	0.313	-0.072	-0.020	0.242
	3624	-0.071	-4.034	0.060	0.052	0.296	-0.006	0.025	0.137
8 RCCV Drywell Mid-Height	4006	0.378	-3.041	0.124	-0.150	-0.372	-0.024	0.012	0.191
	4013	0.367	-3.528	0.227	-0.052	-0.337	0.006	-0.013	0.130
	4976	-0.002	-3.284	0.150	-0.004	-0.181	-0.004	-0.009	0.097
9 RCCV Drywell Top	4406	0.237	-2.538	-0.162	-0.286	-1.429	-0.020	0.004	0.363
	4413	-0.192	-3.446	0.154	-0.188	-0.925	0.029	0.003	0.212
	4424	0.047	-2.597	0.115	-0.044	-0.446	0.006	0.002	0.085
10 Basemat @ Center	80003	-0.599	-0.820	0.122	4.974	5.396	-0.041	0.284	-0.230
	80007	-0.624	-0.845	0.111	4.993	5.396	-0.040	-0.040	-0.368
	80012	-0.617	-0.891	0.112	4.986	5.390	-0.038	-0.351	-0.054
11 Basemat Inside RPV Pedestal	80206	-0.518	-0.695	0.189	1.323	1.928	1.209	1.404	-1.315
	80213	-0.619	-0.873	0.199	2.541	0.318	-0.151	-0.074	-1.972
	80224	-0.697	-1.198	0.106	0.381	2.722	-0.227	-1.817	-0.166
12 S/P Slab @ RPV	83306	0.144	0.609	-0.219	1.365	0.970	-0.043	0.942	-0.028
	83313	0.361	0.489	-0.109	1.387	0.976	0.039	0.951	0.030
	83324	0.308	0.635	0.039	1.355	0.953	-0.043	0.937	-0.030
13 S/P Slab @ Center	83406	0.168	0.511	-0.202	-0.870	0.334	-0.009	0.329	0.000
	83413	0.439	0.346	-0.002	-0.859	0.321	0.000	0.335	0.001
	83424	0.360	0.525	-0.003	-0.866	0.314	-0.002	0.329	-0.001
14 S/P Slab @ RCCV	83506	0.188	0.412	-0.195	-0.893	-0.027	-0.011	-0.134	0.003
	83513	0.483	0.297	0.040	-0.911	-0.041	-0.002	-0.126	0.003
	83524	0.394	0.486	-0.005	-0.903	-0.037	-0.002	-0.132	-0.001
15 Top slab @ Drywell Head Opening	98120	1.036	0.302	0.400	-0.507	-0.113	-0.344	0.076	0.431
	98135	2.629	0.236	-0.219	-0.683	0.262	0.142	-0.059	0.367
	98104	0.101	0.824	-0.093	-0.262	-1.581	0.308	-0.005	0.235
16 Top slab @ Center	98149	1.638	-0.329	0.508	-0.766	-0.196	0.046	-0.001	-0.299
	98170	1.363	-0.014	0.037	-0.708	-0.786	0.077	0.002	0.056
	98109	0.160	0.566	0.005	-0.675	-0.939	0.178	0.114	0.097
17 Top slab @ RCCV	98174	0.788	-0.132	0.161	-0.738	-0.577	-0.281	-0.173	0.044
	98197	0.463	-0.011	-0.204	-0.267	1.160	0.167	0.066	0.707
	98103	-0.138	0.430	0.027	1.884	0.303	0.201	0.924	0.115

Note : Results are based on the RB/FB global FE model which is used in Appendix E of "ESBWR Reactor Building Structural Design Report", Reference 2.1.2-j.



Table 6.2.4-2 Results of NASTRAN Analysis, Drywell Unit Pressure (1 MPa)

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	-3.692	-4.673	-0.080	1.292	7.763	0.037	-0.012	3.420
	5013	-3.775	-4.284	-0.249	1.263	7.671	-0.004	-0.001	3.458
	5024	-3.620	-3.448	0.041	1.333	7.180	-0.035	0.030	3.104
2 RPV Pedestal Mid-Height	6006	4.552	-4.397	-0.461	-0.166	-0.606	-0.010	0.045	-0.492
	6013	4.465	-4.269	-0.257	-0.170	-0.653	-0.013	0.019	-0.488
	6024	5.184	-2.746	-0.360	0.187	-0.344	-0.003	-0.054	-0.211
3 RPV Pedestal Top	6606	2.349	-4.266	0.044	-0.251	-1.746	-0.296	0.225	1.030
	6613	1.814	-4.798	-0.361	-0.258	-1.239	0.272	-0.173	0.802
	6624	2.259	-4.596	0.023	-0.256	-1.862	-0.238	0.161	1.075
4 RCCV Wetwell Bottom	1806	0.542	3.820	-0.499	0.280	1.664	0.003	-0.002	0.217
	1813	0.530	2.932	-0.059	0.272	1.684	0.000	-0.002	0.272
	1824	0.649	4.287	-0.004	0.276	1.466	-0.007	0.003	0.201
5 RCCV Wetwell Mid-Height	2606	1.488	3.901	-0.536	0.010	0.522	0.038	-0.001	0.184
	2613	1.300	2.603	-0.027	0.046	0.416	-0.004	0.000	0.183
	2624	1.540	4.134	-0.068	0.150	0.339	-0.005	0.003	0.111
6 RCCV Wetwell Top	3406	4.376	4.152	0.018	-1.032	-5.673	1.334	-1.001	1.956
	3413	3.428	2.130	-0.403	-0.693	-4.057	-1.214	0.774	1.492
	3424	3.035	3.949	0.753	-0.660	-4.213	1.474	-0.897	1.502
7 RCCV Drywell Bottom	3606	4.484	7.907	0.075	0.156	1.134	1.449	-0.400	1.690
	3613	3.675	5.840	-0.352	0.370	2.279	-1.265	0.159	2.150
	3624	3.516	9.280	0.667	0.568	2.883	1.536	-0.153	1.910
8 RCCV Drywell Mid-Height	4006	1.389	8.462	0.074	0.083	0.853	0.150	0.270	-1.393
	4013	1.938	5.518	0.407	-0.212	-0.207	0.079	-0.020	-0.746
	4976	2.943	8.365	-0.517	0.111	0.447	0.002	0.000	-1.035
9 RCCV Drywell Top	4406	-0.103	8.718	1.068	1.411	9.610	-0.038	-0.038	-2.427
	4413	0.117	5.012	0.460	1.091	7.715	0.044	0.050	-2.680
	4424	2.672	7.154	-0.481	1.202	7.120	0.048	0.006	-2.118
10 Basemat @ Center	80003	2.628	2.950	-0.032	-17.315	-16.612	0.023	-0.451	0.334
	80007	2.658	2.968	-0.022	-17.304	-16.604	0.027	0.064	0.548
	80012	2.647	2.992	-0.017	-17.320	-16.597	0.026	0.542	0.073
11 Basemat Inside RPV Pedestal	80206	2.727	2.790	-0.003	-12.086	-12.107	-1.540	-1.229	0.878
	80213	2.780	3.014	-0.113	-13.858	-10.362	0.076	-0.011	1.558
	80224	2.780	2.767	-0.037	-10.780	-13.335	0.136	1.714	0.047
12 S/P Slab @ RPV	83306	-1.209	0.970	-0.143	-3.755	-2.155	-0.047	-1.321	0.018
	83313	-1.411	0.808	-0.013	-3.753	-2.180	0.026	-1.333	-0.001
	83324	-1.155	1.011	0.004	-3.795	-2.210	0.001	-1.351	-0.003
13 S/P Slab @ Center	83406	-0.657	0.341	-0.065	0.528	-1.314	-0.037	-0.919	-0.001
	83413	-0.708	0.323	-0.048	0.528	-1.337	0.010	-0.914	-0.002
	83424	-0.664	0.360	0.038	0.512	-1.313	0.005	-0.929	0.000
14 S/P Slab @ RCCV	83506	-0.454	0.104	-0.019	3.054	-0.095	-0.011	-0.700	-0.012
	83513	-0.455	0.187	-0.053	3.038	-0.116	0.005	-0.699	0.000
	83524	-0.537	0.106	0.040	3.062	-0.070	0.003	-0.711	0.000
15 Top slab @ Drywell Head Opening	98120	-3.150	1.277	1.710	4.429	2.161	2.392	0.700	-3.963
	98135	-10.174	-1.998	-0.613	4.070	-1.545	0.122	0.692	-4.596
	98104	-1.122	3.501	-1.772	3.419	13.462	-1.944	-1.146	-2.684
16 Top slab @ Center	98149	-5.521	4.268	-2.737	3.180	0.397	0.935	0.042	2.043
	98170	-4.759	2.307	-1.249	3.571	3.185	-0.300	-0.112	-0.752
	98109	0.143	2.115	-0.591	4.697	8.341	-1.314	-0.597	-1.348
17 Top slab @ RCCV	98174	-0.945	2.890	-0.854	2.822	2.603	2.043	0.821	-0.526
	98197	-0.851	3.297	-0.103	0.473	-7.759	-0.739	-0.371	-4.950
	98103	1.926	3.191	-0.430	-7.889	0.558	-1.512	-5.074	-0.925

Note : Results are based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j.



Table 6.2.4-3 Results of NASTRAN Analysis, Wetwell Unit Pressure (1 MPa)

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	-0.608	-1.083	0.029	0.142	0.845	0.001	0.002	0.392
	5013	-0.617	-0.943	0.106	0.139	0.837	0.000	-0.002	0.399
	5024	-0.648	-0.795	0.023	0.150	0.870	-0.006	0.003	0.415
2 RPV Pedestal Mid-Height	6006	-0.384	-1.219	0.051	-0.018	-0.160	0.004	0.005	-0.061
	6013	-0.437	-0.970	0.109	-0.023	-0.151	0.003	-0.013	-0.068
	6024	-0.506	-0.484	-0.011	-0.065	-0.150	-0.004	0.006	-0.037
3 RPV Pedestal Top	6606	0.237	-1.881	0.126	0.727	4.750	0.095	0.202	-1.285
	6613	0.388	-1.608	0.123	0.682	4.523	-0.104	-0.184	-1.197
	6624	0.307	-1.186	-0.018	0.732	4.717	0.085	0.176	-1.276
4 RCCV Wetwell Bottom	1806	2.191	4.346	-0.014	0.858	5.152	-0.001	0.002	1.950
	1813	2.118	4.003	-0.019	0.850	5.155	-0.006	-0.003	1.981
	1824	2.355	4.000	0.032	0.825	5.100	0.013	0.000	1.977
5 RCCV Wetwell Mid-Height	2606	6.313	4.394	-0.098	-0.457	-2.280	-0.022	0.011	-0.089
	2613	5.853	3.850	-0.012	-0.475	-2.074	-0.002	-0.011	-0.055
	2624	6.098	3.831	-0.009	-0.447	-2.088	-0.006	0.005	-0.184
6 RCCV Wetwell Top	3406	2.754	4.389	-0.503	0.794	4.638	-1.230	0.927	-1.768
	3413	2.723	3.932	0.480	0.473	3.724	1.170	-0.714	-1.511
	3424	2.813	4.030	-0.751	0.792	4.951	-1.376	0.827	-1.853
7 RCCV Drywell Bottom	3606	2.150	0.828	-0.635	-0.216	-1.326	-1.248	0.370	-0.671
	3613	2.173	0.388	0.653	-0.553	-2.290	1.254	-0.117	-0.875
	3624	2.298	-0.279	-0.867	-0.499	-2.559	-1.437	0.134	-0.801
8 RCCV Drywell Mid-Height	4006	1.901	0.297	-0.189	0.134	-0.523	-0.029	-0.222	-0.012
	4013	1.488	0.015	-0.047	-0.068	-0.130	-0.063	0.027	-0.381
	4976	1.538	-0.227	-0.005	-0.038	-0.037	0.006	-0.008	-0.373
9 RCCV Drywell Top	4406	0.799	-0.237	-0.081	0.442	0.439	0.107	0.023	-0.546
	4413	0.261	-0.220	-0.100	0.160	0.795	-0.017	-0.030	-0.158
	4424	0.471	-0.181	0.013	0.139	0.820	-0.005	-0.011	-0.219
10 Basemat @ Center	80003	0.419	0.445	-0.001	-2.041	-1.967	0.012	0.032	-0.004
	80007	0.423	0.441	-0.003	-2.018	-1.963	0.016	0.025	-0.009
	80012	0.421	0.435	-0.002	-2.006	-1.962	0.013	0.015	0.000
11 Basemat Inside RPV Pedestal	80206	0.447	0.446	0.020	-2.224	-2.074	0.075	0.083	-0.041
	80213	0.441	0.453	-0.001	-2.038	-2.119	0.102	0.079	-0.056
	80224	0.442	0.376	-0.011	-1.974	-2.015	0.003	0.005	-0.012
12 S/P Slab @ RPV	83306	1.804	1.743	-0.086	-0.726	1.217	-0.005	4.169	-0.060
	83313	1.989	1.722	0.090	-0.648	1.243	-0.016	4.194	0.064
	83324	1.729	1.766	-0.026	-0.671	1.256	0.000	4.190	-0.057
13 S/P Slab @ Center	83406	1.883	1.764	-0.034	-6.215	-1.485	-0.011	-0.326	0.000
	83413	2.056	1.713	0.041	-6.190	-1.475	-0.013	-0.318	0.001
	83424	1.869	1.842	-0.005	-6.201	-1.467	0.002	-0.318	0.001
14 S/P Slab @ RCCV	83506	1.884	1.743	-0.011	2.775	-0.379	-0.008	-3.774	-0.003
	83513	2.057	1.739	0.037	2.785	-0.378	-0.003	-3.771	-0.002
	83524	1.945	1.895	-0.022	2.773	-0.370	-0.001	-3.771	0.003
15 Top slab @ Drywell Head Opening	98120	0.422	0.617	0.348	-0.005	-0.004	-0.004	-0.011	-0.008
	98135	0.783	0.177	-0.205	-0.040	-0.006	0.006	-0.001	-0.001
	98104	0.185	1.159	-0.205	-0.001	-0.034	0.000	-0.001	0.004
16 Top slab @ Center	98149	0.497	0.728	0.027	-0.049	-0.063	0.027	0.011	-0.050
	98170	0.686	0.305	0.028	-0.064	-0.090	-0.017	-0.011	-0.013
	98109	0.400	0.774	-0.006	-0.055	-0.053	-0.006	-0.022	0.006
17 Top slab @ RCCV	98174	0.533	0.830	0.112	-0.230	-0.292	0.127	0.058	-0.074
	98197	0.400	0.299	-0.002	-0.158	-0.131	-0.045	-0.024	-0.002
	98103	0.352	0.616	0.040	-0.258	-0.074	-0.001	-0.031	-0.004

Note : Results are based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j.



Table 6.2.4-4 Results of NASTRAN Analysis, Thermal Load
(Normal Operation: Winter) – Load Case: TLW0
(Values obtained from Reference 2.1.2-i)

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	-3.414	-0.437	-0.228	-5.952	-6.232	-0.029	0.060	0.693
	5013	-3.146	-0.241	-0.176	-6.047	-6.552	-0.004	0.031	0.609
	5024	-3.281	-0.093	-0.019	-6.099	-6.210	-0.018	-0.023	0.615
2 RPV Pedestal Mid-Height	6006	-1.875	-0.191	0.024	-5.727	-5.302	0.158	0.038	-0.715
	6013	-1.957	-0.333	-0.227	-5.832	-5.203	-0.029	-0.014	-0.829
	6024	-2.018	-0.147	-0.008	-6.491	-3.983	-0.231	0.008	-0.730
3 RPV Pedestal Top	6606	-0.858	-0.117	0.191	-5.574	-3.404	0.002	-0.384	-1.766
	6613	-0.634	-0.136	-0.213	-5.548	-3.423	0.039	0.446	-1.793
	6624	-0.505	-0.240	0.051	-5.515	-3.228	0.021	-0.592	-1.763
4 RCCV Wetwell Bottom	1806	-2.364	-1.092	-0.393	-3.686	-5.547	0.063	0.068	-0.442
	1813	-2.821	-3.328	-0.369	-3.574	-5.568	-0.014	-0.006	-0.440
	1824	-2.275	-3.899	-0.016	-3.677	-5.571	0.012	-0.055	-0.438
5 RCCV Wetwell Mid-Height	2606	-2.866	-1.303	-0.392	-3.019	-2.343	-0.006	0.052	-0.092
	2613	-4.048	-4.123	-0.086	-2.641	-1.955	0.004	-0.051	0.067
	2624	-3.423	-4.642	-0.097	-2.943	-2.007	-0.020	0.049	0.035
6 RCCV Wetwell Top	3406	0.492	-1.701	0.000	-3.082	-3.562	-0.094	0.191	0.555
	3413	-1.540	-5.098	0.249	-2.834	-3.203	0.001	0.007	0.537
	3424	0.135	-5.952	0.243	-2.665	-1.585	-0.007	0.000	0.021
7 RCCV Drywell Bottom	3606	-2.410	-1.874	-0.297	-4.072	-4.078	0.067	0.185	0.021
	3613	-1.820	-5.897	0.873	-2.990	-2.673	-0.069	-0.021	0.188
	3624	-13.505	-7.187	0.027	0.195	1.095	0.041	0.025	1.816
8 RCCV Drywell Mid-Height	4006	0.447	-1.590	0.301	-4.004	-3.956	0.072	0.027	-0.043
	4013	0.903	-6.938	0.768	-3.142	-2.965	0.023	-0.090	0.112
	4976	-8.133	-6.545	0.419	-0.449	-1.750	0.005	0.009	-0.181
9 RCCV Drywell Top	4406	4.600	-0.749	0.402	-4.043	-4.593	0.240	0.298	0.471
	4413	0.766	-7.522	-0.121	-3.419	-4.182	0.246	-0.067	0.633
	4424	-8.592	-5.731	0.628	0.047	0.691	-0.018	-0.019	-1.557
10 Basemat @ Center	80003	-4.765	-5.524	0.028	-7.912	-7.859	-0.046	0.022	-0.007
	80007	-4.791	-5.484	0.065	-7.884	-7.854	-0.043	0.019	-0.008
	80012	-4.795	-5.414	0.049	-7.873	-7.859	-0.039	0.014	0.000
11 Basemat Inside RPV Pedestal	80206	-4.774	-5.871	0.133	-8.328	-8.170	-0.037	0.012	-0.033
	80213	-4.985	-5.528	0.163	-8.093	-8.299	-0.201	-0.065	-0.074
	80224	-4.885	-5.287	0.089	-8.086	-7.944	-0.042	-0.046	0.008
12 S/P Slab @ RPV	83306	-5.525	-1.106	-0.056	-2.905	-2.636	0.001	0.174	-0.008
	83313	-5.868	-0.744	0.011	-2.878	-2.650	-0.020	0.210	0.008
	83324	-5.754	-0.559	0.371	-2.799	-2.576	-0.007	0.259	0.008
13 S/P Slab @ Center	83406	-4.135	-2.452	-0.298	-3.149	-2.794	-0.008	0.095	0.006
	83413	-4.776	-1.972	0.275	-3.253	-2.844	-0.009	0.146	-0.001
	83424	-4.435	-1.799	0.040	-3.257	-2.800	-0.001	0.166	-0.001
14 S/P Slab @ RCCV	83506	-3.428	-2.905	-0.271	-3.337	-2.977	-0.028	0.042	0.008
	83513	-4.174	-2.746	0.323	-3.676	-3.030	-0.006	0.144	0.002
	83524	-3.662	-2.334	-0.010	-3.675	-3.022	0.013	0.132	-0.005
15 Top slab @ Drywell Head Opening	98120	-8.250	-6.148	-4.390	1.179	1.118	1.034	0.015	0.125
	98135	-12.847	-3.720	2.344	2.076	0.076	-0.350	0.159	-0.065
	98104	-3.426	-7.468	2.585	0.228	2.116	-0.471	0.061	-0.121
16 Top slab @ Center	98149	-8.128	-5.389	-1.915	1.754	1.864	0.380	0.073	0.276
	98170	-8.549	-5.044	-0.673	1.759	2.872	-0.007	0.032	0.317
	98109	-7.315	-4.905	1.127	1.235	1.959	0.002	0.227	-0.049
17 Top slab @ RCCV	98174	-6.914	-5.095	-0.760	2.420	3.569	0.007	-0.253	0.688
	98197	-10.272	-4.984	-0.945	1.536	2.498	0.194	0.164	-0.574
	98103	-8.143	-5.630	-0.071	3.116	2.695	0.101	0.446	0.082



Table 6.2.4-5 Results of NASTRAN Analysis, Thermal Load
(LOCA After 6 minutes: Winter) – Load Case: TLW6
(Values obtained from Reference 2.1.2-i)

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	-3.476	1.649	-0.329	-6.696	-6.462	-0.046	0.105	1.012
	5013	-3.121	1.796	-0.097	-6.854	-6.851	-0.006	0.027	0.925
	5024	-3.419	1.892	-0.003	-6.894	-6.129	-0.026	-0.036	1.045
2 RPV Pedestal Mid-Height	6006	0.080	1.775	0.154	-6.175	-4.043	0.264	0.065	-1.515
	6013	-0.061	1.444	-0.177	-6.419	-3.904	-0.057	-0.026	-1.669
	6024	-0.245	2.050	0.059	-7.408	-2.297	-0.304	-0.003	-1.547
3 RPV Pedestal Top	6606	20.997	2.192	0.564	-6.643	-5.510	-0.035	-1.941	0.870
	6613	21.088	1.964	-0.425	-6.702	-5.546	0.139	2.063	0.862
	6624	21.900	2.601	0.228	-6.671	-5.665	0.005	-2.338	1.055
4 RCCV Wetwell Bottom	1806	2.533	0.468	-0.194	-4.438	-8.138	0.077	0.083	-1.750
	1813	1.866	-2.167	-0.420	-4.274	-7.773	-0.025	-0.007	-1.523
	1824	2.926	-2.481	0.046	-4.432	-8.134	0.020	-0.085	-1.667
5 RCCV Wetwell Mid-Height	2606	1.379	0.586	-0.171	-3.308	-1.033	0.018	0.039	0.074
	2613	0.111	-2.544	-0.109	-3.090	-1.052	0.009	-0.075	0.370
	2624	0.965	-2.909	-0.087	-3.293	-0.935	-0.026	0.067	0.189
6 RCCV Wetwell Top	3406	11.723	1.461	0.327	-4.151	-8.468	-0.227	0.461	3.349
	3413	8.032	-3.439	0.044	-4.382	-9.151	-0.402	0.538	3.335
	3424	10.292	-4.166	0.471	-3.681	-5.045	-0.039	-0.006	2.165
7 RCCV Drywell Bottom	3606	8.504	1.377	0.674	-5.342	-9.036	0.607	0.534	-1.980
	3613	4.607	-4.161	1.005	-4.955	-6.227	-0.363	0.317	-0.820
	3624	-4.291	-6.043	0.252	-0.934	-2.498	0.068	0.000	0.351
8 RCCV Drywell Mid-Height	4006	5.952	2.178	0.212	-5.110	-5.057	0.011	-0.126	-0.683
	4013	4.287	-5.850	1.041	-4.672	-4.289	0.014	-0.132	-0.308
	4976	-2.660	-5.335	0.580	-0.954	-1.780	0.003	0.013	-0.584
9 RCCV Drywell Top	4406	6.433	1.711	-0.232	-4.475	-3.816	0.299	0.087	-0.150
	4413	0.711	-6.632	-0.292	-4.753	-4.467	0.253	-0.243	0.643
	4424	-5.846	-4.171	0.767	-0.363	1.129	-0.024	-0.022	-1.462
10 Basemat @ Center	80003	-4.270	-5.140	0.021	-8.130	-8.102	-0.039	0.029	-0.008
	80007	-4.296	-5.104	0.056	-8.096	-8.099	-0.037	0.028	-0.009
	80012	-4.302	-5.040	0.042	-8.079	-8.109	-0.032	0.024	-0.001
11 Basemat Inside RPV Pedestal	80206	-4.260	-5.523	0.137	-8.575	-8.460	0.003	0.005	-0.035
	80213	-4.445	-5.127	0.161	-8.289	-8.565	-0.151	-0.018	-0.103
	80224	-4.372	-4.948	0.081	-8.177	-8.193	-0.045	-0.038	0.010
12 S/P Slab @ RPV	83306	-10.607	10.981	0.454	-4.700	-2.770	0.032	-0.288	0.000
	83313	-10.822	11.242	-0.850	-4.737	-2.848	-0.039	-0.302	-0.028
	83324	-10.702	11.862	1.279	-4.487	-2.654	0.006	-0.156	0.046
13 S/P Slab @ Center	83406	-6.490	4.881	-0.530	-3.815	-3.181	-0.001	-0.306	0.016
	83413	-6.986	5.307	0.315	-3.900	-3.257	-0.015	-0.278	-0.011
	83424	-6.630	5.823	0.078	-3.895	-3.148	-0.003	-0.210	0.009
14 S/P Slab @ RCCV	83506	-3.948	2.320	-0.446	-2.906	-3.131	-0.038	-0.275	0.016
	83513	-4.567	2.419	0.440	-3.190	-3.174	-0.008	-0.192	-0.001
	83524	-4.038	3.201	-0.017	-3.278	-3.153	0.013	-0.168	-0.005
15 Top slab @ Drywell Head Opening	98120	-7.068	-4.258	-0.770	0.956	0.732	2.765	-0.161	-0.002
	98135	-8.729	-5.283	0.235	3.147	-2.057	-1.132	0.380	-0.267
	98104	-4.999	-1.752	0.585	-1.461	3.712	-1.500	0.185	-0.214
16 Top slab @ Center	98149	-6.075	-2.540	-1.137	2.229	2.310	0.496	0.037	0.048
	98170	-5.510	-3.566	-1.042	2.141	2.864	-0.042	0.030	0.389
	98109	-6.256	-0.887	0.773	1.219	2.564	-0.119	0.329	-0.005
17 Top slab @ RCCV	98174	-4.871	-2.689	-0.476	2.352	3.211	0.255	-0.023	0.434
	98197	-7.584	-2.926	-1.360	1.917	3.110	0.130	0.154	-0.447
	98103	-6.577	-2.458	-0.070	3.431	3.308	0.118	0.450	0.084

**HITACHI**

WG3-T11-DRD-S-0001

SH NO.49

REV. 1

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**Table 6.2.4-6 Results of NASTRAN Analysis, Thermal Load
(LOCA After 72 hours: Winter) – Load Case: TLW8
(Values obtained from Reference 2.1.2-i)**

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	-12.849	0.250	-0.523	-16.011	-12.625	-0.093	0.227	4.158
	5013	-12.356	0.343	-0.104	-16.288	-13.239	-0.007	0.021	4.062
	5024	-12.862	0.231	0.003	-16.285	-11.829	-0.073	-0.054	4.265
2 RPV Pedestal Mid-Height	6006	-2.408	0.615	0.443	-16.093	-14.923	0.436	0.146	-1.774
	6013	-2.624	0.212	-0.206	-16.582	-14.795	-0.048	-0.033	-2.015
	6024	-2.728	0.667	0.076	-18.533	-11.361	-0.661	0.020	-1.697
3 RPV Pedestal Top	6606	8.837	0.682	0.577	-16.163	-12.297	0.057	-1.395	-2.012
	6613	9.213	0.732	-0.359	-16.199	-12.536	0.030	1.518	-1.952
	6624	9.545	0.848	0.253	-16.174	-12.377	0.066	-1.768	-1.800
4 RCCV Wetwell Bottom	1806	-1.533	-1.021	-0.228	-10.248	-14.646	0.090	0.096	-1.555
	1813	-2.037	-4.249	-0.394	-10.039	-14.121	-0.043	-0.006	-1.254
	1824	-1.011	-4.103	0.136	-10.224	-14.384	0.028	-0.105	-1.321
5 RCCV Wetwell Mid-Height	2606	-4.269	-1.249	-0.234	-9.962	-7.559	0.001	0.044	0.117
	2613	-5.197	-5.323	-0.038	-9.725	-7.432	-0.015	-0.093	0.418
	2624	-4.923	-4.754	-0.111	-10.020	-7.637	-0.043	0.078	0.194
6 RCCV Wetwell Top	3406	5.196	-0.343	0.501	-10.839	-14.129	0.028	0.144	2.477
	3413	3.430	-7.154	0.362	-10.781	-14.124	-0.109	0.133	2.640
	3424	2.843	-6.398	0.484	-9.990	-9.736	0.045	-0.108	0.896
7 RCCV Drywell Bottom	3606	0.851	-0.258	0.079	-12.665	-14.960	0.282	0.179	-0.838
	3613	-0.941	-8.499	1.390	-12.337	-13.241	-0.243	0.024	-0.345
	3624	-10.577	-8.035	0.298	-7.210	-6.858	0.089	-0.061	1.477
8 RCCV Drywell Mid-Height	4006	1.893	0.841	-0.323	-12.242	-12.219	0.193	-0.154	-0.810
	4013	1.197	-10.529	1.292	-12.197	-11.585	0.046	-0.165	-0.457
	4976	-7.092	-6.953	0.638	-7.681	-8.655	0.012	0.039	-0.305
9 RCCV Drywell Top	4406	6.726	0.270	-1.390	-11.635	-9.864	0.510	0.460	-0.602
	4413	-0.989	-11.897	-0.372	-12.126	-10.994	0.411	-0.180	0.175
	4424	-10.172	-5.565	0.973	-7.107	-5.872	-0.070	-0.009	-1.761
10 Basemat @ Center	80003	-1.587	-2.420	-0.001	-8.464	-8.777	-0.040	0.022	-0.010
	80007	-1.600	-2.375	0.039	-8.444	-8.779	-0.040	0.014	-0.014
	80012	-1.607	-2.298	0.028	-8.433	-8.799	-0.031	0.005	0.001
11 Basemat Inside RPV Pedestal	80206	-1.604	-2.924	0.120	-8.962	-9.256	0.034	-0.007	-0.049
	80213	-1.721	-2.346	0.088	-8.685	-9.343	-0.166	-0.026	-0.164
	80224	-1.574	-2.175	0.061	-8.644	-8.932	-0.052	-0.105	0.019
12 S/P Slab @ RPV	83306	-11.672	3.835	0.218	-9.639	-8.194	0.035	-0.073	-0.040
	83313	-11.910	4.316	-0.426	-9.668	-8.271	-0.025	-0.075	0.011
	83324	-11.696	4.693	0.966	-9.530	-8.130	-0.002	0.004	0.007
13 S/P Slab @ Center	83406	-8.140	-0.574	-0.507	-9.101	-8.502	0.000	-0.107	0.016
	83413	-8.751	0.109	0.485	-9.199	-8.591	-0.012	-0.069	-0.008
	83424	-8.209	0.422	0.013	-9.166	-8.499	0.001	-0.043	0.006
14 S/P Slab @ RCCV	83506	-6.270	-2.431	-0.382	-8.852	-8.637	-0.050	-0.135	0.021
	83513	-7.033	-2.078	0.612	-9.208	-8.687	-0.011	-0.022	0.001
	83524	-6.237	-1.445	-0.080	-9.171	-8.643	0.017	-0.039	-0.005
15 Top slab @ Drywell Head Opening	98120	-11.465	-10.588	-5.034	7.058	5.009	5.155	-1.417	-1.082
	98135	-16.071	-6.982	2.437	10.528	-0.434	-1.821	1.058	-1.141
	98104	-6.701	-12.118	2.879	2.391	11.786	-3.140	0.876	-0.611
16 Top slab @ Center	98149	-11.277	-3.014	-1.862	5.796	8.885	0.958	0.550	-1.906
	98170	-9.611	-4.561	-0.870	4.301	5.407	-0.101	-0.114	0.048
	98109	-7.853	-1.643	0.877	9.057	11.508	-0.324	0.767	0.077
17 Top slab @ RCCV	98174	-9.261	-3.967	-1.472	5.055	6.597	0.112	-0.062	0.291
	98197	-11.733	-4.685	-1.499	4.215	6.202	0.220	0.358	-0.438
	98103	-7.870	-5.563	-0.327	12.878	12.662	0.251	0.583	0.155



**Table 6.2.4-7 Results of NASTRAN Analysis, Thermal Load
(LOCA After 72 hours: Winter) – Load Case: TWC1**

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	-12.863	0.278	-0.477	-16.014	-12.590	-0.097	0.221	4.170
	5013	-12.379	0.323	-0.124	-16.257	-13.178	-0.009	0.023	4.089
	5024	-13.034	-0.055	-0.006	-16.265	-11.643	-0.071	-0.056	4.349
2 RPV Pedestal Mid-Height	6006	-2.381	0.648	0.466	-16.153	-15.089	0.416	0.120	-1.707
	6013	-2.519	0.258	-0.161	-16.518	-14.911	-0.046	-0.036	-1.990
	6024	-2.776	0.418	0.052	-18.619	-11.445	-0.660	0.029	-1.660
3 RPV Pedestal Top	6606	7.828	0.571	0.514	-16.190	-12.147	0.104	-1.468	-2.174
	6613	8.597	0.779	-0.232	-16.133	-12.508	-0.013	1.473	-2.045
	6624	8.220	0.533	0.282	-16.220	-12.319	0.039	-1.645	-1.941
4 RCCV Wetwell Bottom	1806	-1.806	-1.391	-0.360	-10.206	-14.490	0.097	0.109	-1.488
	1813	-1.989	-4.605	-0.025	-10.031	-14.203	-0.066	-0.006	-1.308
	1824	-1.193	-3.566	0.287	-10.145	-13.817	0.032	-0.112	-1.149
5 RCCV Wetwell Mid-Height	2606	-4.381	-1.745	-0.382	-9.907	-7.440	-0.017	0.053	0.123
	2613	-4.977	-6.150	0.342	-9.634	-7.163	-0.021	-0.124	0.369
	2624	-3.990	-3.565	0.014	-10.028	-7.483	-0.050	0.068	0.313
6 RCCV Wetwell Top	3406	5.846	-0.995	0.611	-10.858	-13.726	0.173	-0.075	2.417
	3413	4.690	-8.375	0.548	-10.561	-12.891	0.095	-0.122	2.557
	3424	7.041	-5.379	0.226	-9.951	-10.370	0.067	-0.298	1.306
7 RCCV Drywell Bottom	3606	1.893	-0.899	-0.128	-12.610	-14.226	0.097	-0.045	-1.020
	3613	0.650	-10.093	1.485	-12.189	-12.181	-0.270	-0.183	-0.306
	3624	-6.592	-7.407	0.336	-6.982	-6.654	-0.012	-0.220	0.776
8 RCCV Drywell Mid-Height	4006	6.431	-0.150	-0.462	-11.973	-11.388	0.199	-0.221	-0.593
	4013	5.510	-11.362	1.039	-12.467	-11.539	0.089	-0.234	0.250
	4976	0.476	-6.780	0.396	-7.022	-6.960	0.058	-0.049	-0.186
9 RCCV Drywell Top	4406	17.194	-0.898	-1.575	-11.957	-11.854	0.610	0.468	1.037
	4413	5.578	-11.242	-1.024	-13.125	-15.530	0.528	-0.208	2.211
	4424	4.378	-6.226	0.558	-7.085	-6.634	0.041	0.016	0.048
10 Basemat @ Center	80003	-1.387	-2.563	0.001	-8.603	-8.942	-0.058	-0.014	-0.010
	80007	-1.407	-2.521	0.045	-8.614	-8.955	-0.066	-0.027	-0.014
	80012	-1.417	-2.450	0.036	-8.622	-8.987	-0.048	-0.036	0.001
11 Basemat Inside RPV Pedestal	80206	-1.375	-3.033	0.128	-9.074	-9.261	-0.030	-0.010	-0.008
	80213	-1.585	-2.518	0.148	-8.923	-9.452	-0.272	-0.092	-0.130
	80224	-1.409	-2.332	0.090	-9.100	-9.151	-0.070	-0.186	0.023
12 S/P Slab @ RPV	83306	-11.283	3.329	0.479	-9.531	-8.190	0.035	-0.022	-0.030
	83313	-11.558	4.113	-0.321	-9.571	-8.264	0.003	-0.024	0.001
	83324	-11.091	3.965	0.853	-9.689	-8.243	0.003	-0.110	0.002
13 S/P Slab @ Center	83406	-7.841	-0.835	-0.313	-9.100	-8.500	-0.005	-0.067	0.018
	83413	-8.623	0.097	0.577	-9.185	-8.592	0.008	-0.037	-0.009
	83424	-7.766	-0.010	-0.052	-9.081	-8.513	0.005	-0.115	0.007
14 S/P Slab @ RCCV	83506	-6.069	-2.603	-0.265	-8.957	-8.666	-0.057	-0.099	0.023
	83513	-7.035	-2.016	0.714	-9.277	-8.712	-0.007	0.008	0.006
	83524	-5.931	-1.710	-0.120	-8.938	-8.578	0.016	-0.104	-0.002
15 Top slab @ Drywell Head Opening	98120	-15.960	-22.072	-9.476	4.431	2.330	3.669	-1.086	-1.337
	98135	-30.538	-10.944	7.791	5.005	-0.130	-1.253	0.261	-0.282
	98104	-10.782	-29.517	7.027	0.326	5.448	-1.241	0.153	-0.246
16 Top slab @ Center	98149	-26.935	-16.562	1.835	4.430	5.459	1.273	-0.543	-0.210
	98170	-24.575	-14.574	0.622	4.385	6.101	-0.019	0.102	0.612
	98109	-21.084	-20.420	2.654	3.532	4.859	0.021	0.689	-0.121
17 Top slab @ RCCV	98174	-24.341	-16.231	-0.525	5.956	7.862	-0.379	-0.487	1.344
	98197	-28.708	-14.153	-1.482	4.297	5.736	0.291	0.369	-1.230
	98103	-23.625	-19.677	0.017	8.929	6.517	0.137	1.162	0.098

Note: TWC1 is the same as Case1 described in Appendix E of reference 2.1.2-j where the temperatures in all pools are at their respective maximum values

Results are based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j.



**Table 6.2.4-8 Results of NASTRAN Analysis, Thermal Load
(LOCA After 72 hours: Winter) – Load Case: TWC2**

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	-12.836	0.158	-0.477	-15.997	-12.488	-0.088	0.206	4.196
	5013	-12.337	0.228	-0.103	-16.245	-13.060	-0.010	0.027	4.124
	5024	-13.036	-0.026	-0.008	-16.238	-11.559	-0.072	-0.055	4.374
2 RPV Pedestal Mid-Height	6006	-2.406	0.526	0.489	-16.149	-15.088	0.444	0.146	-1.714
	6013	-2.616	0.135	-0.145	-16.604	-14.922	-0.047	-0.041	-1.979
	6024	-2.704	0.517	0.048	-18.534	-11.446	-0.663	0.025	-1.665
3 RPV Pedestal Top	6606	7.783	0.475	0.649	-16.163	-12.187	0.038	-1.274	-2.191
	6613	8.214	0.689	-0.259	-16.211	-12.582	0.024	1.433	-2.061
	6624	8.616	0.674	0.256	-16.176	-12.438	0.049	-1.671	-1.882
4 RCCV Wetwell Bottom	1806	-1.865	-1.611	-0.279	-10.200	-14.402	0.106	0.114	-1.461
	1813	-2.421	-4.656	-0.316	-10.013	-13.941	-0.052	-0.008	-1.156
	1824	-0.950	-4.361	0.213	-10.160	-14.014	0.026	-0.111	-1.198
5 RCCV Wetwell Mid-Height	2606	-4.253	-2.107	-0.216	-9.966	-7.527	-0.006	0.051	0.207
	2613	-5.780	-5.657	-0.158	-9.760	-7.425	-0.024	-0.107	0.458
	2624	-3.925	-4.848	-0.064	-10.012	-7.651	-0.047	0.069	0.379
6 RCCV Wetwell Top	3406	5.242	-1.427	0.927	-11.013	-14.087	0.194	-0.024	2.455
	3413	2.600	-7.217	-0.107	-10.647	-13.099	0.032	-0.077	2.331
	3424	5.577	-6.792	0.261	-10.044	-10.546	0.052	-0.228	1.288
7 RCCV Drywell Bottom	3606	1.017	-1.251	0.430	-12.845	-14.920	0.232	0.042	-0.518
	3613	-1.537	-8.305	0.635	-12.392	-13.230	-0.262	-0.150	0.314
	3624	-8.125	-8.876	0.177	-7.102	-6.886	0.007	-0.169	0.928
8 RCCV Drywell Mid-Height	4006	2.401	-0.502	0.587	-12.502	-13.511	0.056	-0.104	-0.330
	4013	0.604	-9.059	0.331	-12.753	-13.779	0.087	-0.152	0.180
	4976	-1.716	-8.581	0.235	-7.181	-7.284	0.013	-0.097	-0.375
9 RCCV Drywell Top	4406	4.319	-1.072	0.048	-12.084	-12.927	0.301	0.035	-0.152
	4413	-5.677	-8.654	-1.331	-12.889	-14.624	0.275	-0.201	0.333
	4424	1.499	-8.810	0.221	-6.955	-5.539	0.079	0.009	-0.709
10 Basemat @ Center	80003	-0.849	-2.230	0.004	-9.127	-9.219	-0.060	-0.004	-0.016
	80007	-0.881	-2.189	0.048	-9.132	-9.232	-0.068	-0.019	-0.021
	80012	-0.891	-2.120	0.035	-9.133	-9.263	-0.051	-0.032	-0.003
11 Basemat Inside RPV Pedestal	80206	-0.788	-2.715	0.153	-9.671	-9.585	-0.016	0.013	-0.026
	80213	-1.023	-2.193	0.204	-9.451	-9.788	-0.275	-0.079	-0.152
	80224	-0.933	-2.056	0.094	-9.603	-9.463	-0.073	-0.188	0.021
12 S/P Slab @ RPV	83306	-11.316	3.268	0.088	-9.600	-8.235	0.035	-0.057	-0.042
	83313	-11.475	3.760	-0.307	-9.654	-8.319	-0.005	-0.075	0.004
	83324	-11.210	4.307	0.896	-9.659	-8.233	0.001	-0.076	0.006
13 S/P Slab @ Center	83406	-7.936	-0.910	-0.602	-9.088	-8.531	-0.006	-0.092	0.017
	83413	-8.483	-0.243	0.586	-9.157	-8.615	0.002	-0.073	-0.008
	83424	-7.977	0.324	-0.014	-9.123	-8.526	0.004	-0.094	0.007
14 S/P Slab @ RCCV	83506	-6.168	-2.674	-0.491	-8.893	-8.672	-0.062	-0.117	0.024
	83513	-6.868	-2.366	0.724	-9.170	-8.699	-0.008	-0.027	0.004
	83524	-6.153	-1.392	-0.089	-9.029	-8.606	0.020	-0.082	-0.004
15 Top slab @ Drywell Head Opening	98120	-19.902	-26.667	-11.787	5.629	2.584	4.364	-2.001	-2.323
	98135	-39.294	-13.488	9.764	5.599	-0.234	-1.593	0.184	-0.375
	98104	-13.270	-35.829	8.792	0.352	6.123	-1.341	0.149	-0.199
16 Top slab @ Center	98149	-33.733	-21.119	4.825	5.213	5.993	1.060	-1.406	0.102
	98170	-34.893	-14.930	1.452	5.732	10.037	-0.064	-0.308	2.366
	98109	-25.371	-25.382	2.731	3.872	5.508	0.166	0.756	-0.215
17 Top slab @ RCCV	98174	-26.600	-14.222	8.993	10.857	12.992	1.314	-1.498	1.903
	98197	-13.284	-10.483	-1.148	17.845	17.217	0.071	0.069	-0.159
	98103	-27.839	-21.759	0.163	10.698	7.647	0.099	1.647	0.121

Note: TWC2 is the same as Case2 described in Appendix E of reference 2.1.2-j where the temperatures in all pools are at their respective minimum values.

Results are based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j.



**Table 6.2.4-9 Results of NASTRAN Analysis, Thermal Load
(LOCA After 72 hours: Winter) – Load Case: TWC3**

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	-12.857	0.207	-0.473	-16.000	-12.509	-0.094	0.217	4.194
	5013	-12.360	0.287	-0.123	-16.246	-13.099	-0.009	0.026	4.112
	5024	-12.998	-0.006	-0.008	-16.256	-11.609	-0.072	-0.056	4.353
2 RPV Pedestal Mid-Height	6006	-2.394	0.586	0.476	-16.154	-15.089	0.423	0.129	-1.709
	6013	-2.549	0.241	-0.172	-16.543	-14.919	-0.046	-0.037	-1.987
	6024	-2.762	0.446	0.050	-18.594	-11.442	-0.661	0.028	-1.663
3 RPV Pedestal Top	6606	7.804	0.529	0.542	-16.186	-12.183	0.087	-1.431	-2.171
	6613	8.514	0.780	-0.253	-16.160	-12.568	0.004	1.460	-2.036
	6624	8.321	0.559	0.274	-16.211	-12.353	0.042	-1.653	-1.925
4 RCCV Wetwell Bottom	1806	-1.897	-1.626	-0.384	-10.198	-14.407	0.091	0.114	-1.449
	1813	-2.115	-4.863	-0.210	-10.020	-14.100	-0.055	-0.007	-1.241
	1824	-1.235	-4.317	0.262	-10.143	-13.791	0.032	-0.111	-1.108
5 RCCV Wetwell Mid-Height	2606	-4.406	-1.917	-0.434	-9.938	-7.490	-0.031	0.050	0.168
	2613	-5.215	-6.342	0.040	-9.669	-7.258	-0.020	-0.112	0.423
	2624	-4.207	-4.502	0.006	-10.065	-7.602	-0.047	0.074	0.391
6 RCCV Wetwell Top	3406	5.602	-0.985	0.506	-10.911	-13.968	0.190	-0.094	2.458
	3413	3.916	-8.502	0.108	-10.596	-12.883	0.034	-0.085	2.481
	3424	5.864	-6.273	0.295	-10.036	-10.611	0.042	-0.249	1.323
7 RCCV Drywell Bottom	3606	1.558	-0.822	-0.340	-12.670	-14.538	0.114	-0.061	-0.954
	3613	-0.172	-10.146	0.847	-12.250	-12.261	-0.308	-0.154	-0.030
	3624	-7.805	-8.429	0.277	-7.031	-6.727	-0.021	-0.184	0.891
8 RCCV Drywell Mid-Height	4006	5.308	0.007	-0.848	-12.021	-11.788	0.214	-0.202	-0.644
	4013	4.038	-11.294	0.465	-12.712	-12.196	0.029	-0.251	0.338
	4976	-1.103	-7.943	0.249	-6.999	-7.089	0.009	-0.115	-0.378
9 RCCV Drywell Top	4406	14.861	-0.812	-1.723	-11.938	-11.572	0.469	0.298	0.637
	4413	1.995	-10.975	-1.565	-13.311	-15.944	0.553	-0.227	1.935
	4424	2.917	-8.266	0.166	-6.817	-5.524	0.090	0.019	-0.565
10 Basemat @ Center	80003	-1.071	-2.293	-0.004	-8.907	-9.197	-0.057	-0.004	-0.013
	80007	-1.094	-2.248	0.041	-8.911	-9.208	-0.064	-0.018	-0.018
	80012	-1.104	-2.172	0.031	-8.913	-9.238	-0.047	-0.029	-0.001
11 Basemat Inside RPV Pedestal	80206	-1.045	-2.778	0.132	-9.439	-9.549	-0.018	0.010	-0.019
	80213	-1.270	-2.243	0.160	-9.230	-9.751	-0.266	-0.081	-0.146
	80224	-1.108	-2.047	0.087	-9.369	-9.404	-0.068	-0.184	0.023
12 S/P Slab @ RPV	83306	-11.283	3.300	0.393	-9.579	-8.217	0.037	-0.045	-0.031
	83313	-11.530	4.033	-0.325	-9.610	-8.287	-0.005	-0.043	0.003
	83324	-11.127	4.055	0.865	-9.677	-8.246	0.001	-0.097	0.003
13 S/P Slab @ Center	83406	-7.865	-0.880	-0.370	-9.095	-8.515	-0.003	-0.084	0.018
	83413	-8.592	0.023	0.569	-9.183	-8.604	0.002	-0.051	-0.008
	83424	-7.817	0.078	-0.044	-9.097	-8.525	0.004	-0.107	0.007
14 S/P Slab @ RCCV	83506	-6.092	-2.659	-0.305	-8.913	-8.665	-0.055	-0.114	0.023
	83513	-7.002	-2.087	0.707	-9.247	-8.710	-0.009	-0.003	0.005
	83524	-5.968	-1.634	-0.120	-8.975	-8.596	0.017	-0.096	-0.003
15 Top slab @ Drywell Head Opening	98120	-15.482	-25.691	-9.974	5.489	2.234	4.322	-2.021	-2.368
	98135	-32.537	-12.430	9.556	4.505	-0.194	-1.508	0.066	-0.258
	98104	-12.512	-34.938	8.362	0.044	4.959	-1.046	0.084	-0.255
16 Top slab @ Center	98149	-28.675	-18.892	4.137	6.478	7.026	1.078	-2.189	-0.583
	98170	-25.010	-15.923	1.978	5.084	6.564	-0.038	0.234	0.414
	98109	-23.621	-24.363	2.681	3.361	4.562	0.150	0.762	-0.169
17 Top slab @ RCCV	98174	-22.078	-8.288	0.121	9.502	11.524	-0.392	-0.423	0.969
	98197	-32.845	-14.689	-0.677	3.897	4.991	0.352	0.353	-1.504
	98103	-26.644	-21.930	0.304	9.531	6.548	0.056	1.410	0.111

Note: TWC3 is the same as Case3 described in Appendix E of reference 2.1.2-j where the temperatures in individual pools are at either maximum or minimum values.

Results are based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j.



**Table 6.2.4-10 Results of NASTRAN Analysis, Thermal Load
(LOCA After 72 hours: Winter) – Load Case: TWC4**

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	-12.864	0.028	-0.509	-15.974	-12.361	-0.082	0.201	4.240
	5013	-12.331	0.154	-0.102	-16.237	-12.963	-0.011	0.031	4.154
	5024	-12.997	0.058	-0.006	-16.222	-11.522	-0.073	-0.055	4.380
2 RPV Pedestal Mid-Height	6006	-2.406	0.428	0.457	-16.142	-15.089	0.464	0.160	-1.717
	6013	-2.678	-0.008	-0.166	-16.662	-14.917	-0.049	-0.043	-1.973
	6024	-2.661	0.635	0.053	-18.474	-11.454	-0.666	0.022	-1.670
3 RPV Pedestal Top	6606	7.824	0.416	0.731	-16.144	-12.258	-0.005	-1.113	-2.178
	6613	7.919	0.557	-0.302	-16.272	-12.621	0.048	1.405	-2.067
	6624	8.944	0.821	0.232	-16.137	-12.529	0.061	-1.695	-1.837
4 RCCV Wetwell Bottom	1806	-1.857	-1.944	-0.223	-10.189	-14.343	0.123	0.114	-1.450
	1813	-2.716	-5.103	-0.533	-9.979	-13.599	-0.046	-0.007	-0.978
	1824	-0.970	-5.056	0.157	-10.181	-14.162	0.026	-0.106	-1.201
5 RCCV Wetwell Mid-Height	2606	-4.104	-2.623	-0.116	-9.979	-7.560	0.025	0.050	0.260
	2613	-6.211	-5.718	-0.465	-9.867	-7.589	-0.037	-0.093	0.582
	2624	-4.440	-5.815	-0.075	-10.059	-7.870	-0.039	0.080	0.440
6 RCCV Wetwell Top	3406	5.042	-2.066	1.100	-11.124	-14.550	0.227	0.048	2.575
	3413	1.540	-6.826	-0.391	-10.804	-13.585	-0.050	-0.023	2.367
	3424	2.709	-7.361	0.518	-10.232	-10.785	0.045	-0.112	1.196
7 RCCV Drywell Bottom	3606	0.584	-1.903	0.737	-12.994	-15.505	0.401	0.127	-0.366
	3613	-2.751	-7.749	0.384	-12.561	-13.864	-0.280	-0.100	0.522
	3624	-11.023	-9.080	0.221	-7.424	-7.651	0.100	-0.072	1.387
8 RCCV Drywell Mid-Height	4006	-0.270	-1.302	1.027	-12.740	-14.354	0.094	-0.005	-0.364
	4013	-2.219	-8.253	0.277	-12.917	-14.485	0.005	-0.111	-0.036
	4976	-9.449	-8.158	0.630	-7.824	-8.725	-0.008	0.004	-0.675
9 RCCV Drywell Top	4406	-2.590	-1.684	0.977	-12.039	-12.487	0.118	-0.172	-1.009
	4413	-10.588	-7.998	-1.096	-12.710	-13.118	0.154	-0.285	-0.732
	4424	-13.781	-7.077	0.885	-6.861	-3.909	-0.024	-0.006	-2.781
10 Basemat @ Center	80003	-0.533	-1.926	0.005	-9.558	-9.499	-0.059	0.019	-0.018
	80007	-0.567	-1.881	0.052	-9.544	-9.507	-0.064	0.003	-0.025
	80012	-0.579	-1.804	0.036	-9.533	-9.532	-0.052	-0.012	-0.005
11 Basemat Inside RPV Pedestal	80206	-0.442	-2.459	0.165	-10.177	-9.953	0.003	0.032	-0.052
	80213	-0.674	-1.879	0.223	-9.846	-10.137	-0.256	-0.054	-0.183
	80224	-0.633	-1.750	0.096	-9.903	-9.736	-0.074	-0.163	0.019
12 S/P Slab @ RPV	83306	-11.296	3.308	-0.219	-9.673	-8.280	0.032	-0.091	-0.053
	83313	-11.371	3.522	-0.312	-9.738	-8.371	-0.016	-0.124	0.010
	83324	-11.301	4.554	0.934	-9.600	-8.207	-0.001	-0.029	0.009
13 S/P Slab @ Center	83406	-7.984	-0.873	-0.828	-9.080	-8.563	-0.010	-0.115	0.017
	83413	-8.331	-0.445	0.572	-9.137	-8.634	-0.008	-0.106	-0.006
	83424	-8.115	0.505	0.012	-9.156	-8.528	0.003	-0.066	0.006
14 S/P Slab @ RCCV	83506	-6.232	-2.637	-0.659	-8.837	-8.683	-0.070	-0.133	0.024
	83513	-6.693	-2.543	0.706	-9.078	-8.684	-0.009	-0.058	0.001
	83524	-6.272	-1.292	-0.085	-9.124	-8.633	0.021	-0.057	-0.005
15 Top slab @ Drywell Head Opening	98120	-19.685	-9.620	-6.700	13.625	13.102	10.762	-0.910	-0.945
	98135	-32.643	-9.465	3.312	21.679	2.367	-4.692	1.311	-1.131
	98104	-8.235	-7.644	3.764	4.770	25.728	-6.165	0.516	-0.138
16 Top slab @ Center	98149	-21.295	-8.598	-2.582	17.374	16.424	1.478	-0.731	0.060
	98170	-22.487	-9.601	-1.177	18.047	16.314	-0.099	0.184	0.965
	98109	-14.161	-10.561	1.426	14.914	19.897	-0.725	0.771	-0.034
17 Top slab @ RCCV	98174	-18.223	-10.690	1.049	17.510	16.987	0.904	-0.266	0.393
	98197	-21.470	-6.681	-1.270	17.924	18.933	-0.016	-0.052	-0.217
	98103	-13.879	-12.975	-0.003	21.263	20.723	0.115	1.239	0.090

Note: TWC4 is the same as Case4 described in Appendix E of reference 2.1.2-j where the temperatures in all pools are at 0°C

Results are based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j.



**Table 6.2.4-11 Results of NASTRAN Analysis, Site-Specific Seismic Load
(Horizontal: North to South Direction)**

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	-0.146	-0.876	0.260	0.078	0.710	0.030	-0.034	0.223
	5013	0.148	0.459	0.492	0.096	0.550	-0.016	0.022	0.176
	5024	0.131	1.672	0.060	0.028	0.231	-0.003	0.002	0.051
2 RPV Pedestal Mid-Height	6006	-0.404	-2.737	0.365	0.017	0.415	0.085	0.120	-0.192
	6013	-0.279	0.626	0.464	-0.243	-0.120	0.020	-0.001	0.033
	6024	0.561	3.319	0.285	0.105	-0.422	-0.023	-0.019	0.174
3 RPV Pedestal Top	6606	-0.797	-3.344	0.116	0.040	-0.474	-0.119	0.441	0.035
	6613	-0.955	0.703	-0.536	-0.241	-0.445	0.240	-0.229	-0.041
	6624	1.043	4.876	-0.014	0.123	-0.120	0.048	-0.095	0.061
4 RCCV Wetwell Bottom	1806	-1.602	-2.000	-2.302	0.159	1.121	-0.052	0.035	0.471
	1813	-0.258	1.400	-2.584	-0.013	0.119	-0.024	0.015	0.077
	1824	1.276	3.896	-0.186	-0.152	-0.977	-0.005	0.001	-0.454
5 RCCV Wetwell Mid-Height	2606	-0.493	-1.845	-2.724	-0.044	-0.044	-0.098	-0.015	0.121
	2613	-0.637	1.330	-3.008	-0.063	-0.070	-0.038	-0.008	0.002
	2624	0.229	3.133	-0.220	0.071	0.152	0.000	-0.003	-0.210
6 RCCV Wetwell Top	3406	-0.230	-1.478	-2.608	-0.026	0.000	-0.026	-0.006	0.019
	3413	-0.569	1.163	-3.124	-0.021	0.049	-0.058	0.034	-0.063
	3424	-0.533	2.591	-0.092	0.120	0.880	0.030	0.006	-0.317
7 RCCV Drywell Bottom	3606	-0.191	-1.455	-2.773	0.064	0.520	0.005	0.015	0.169
	3613	-0.525	1.117	-3.091	-0.012	0.080	-0.048	0.036	0.072
	3624	-0.358	3.598	-0.139	-0.194	-0.823	0.047	0.024	-0.183
8 RCCV Drywell Mid-Height	4006	0.525	-1.153	-2.613	-0.066	-0.133	-0.055	0.018	0.217
	4013	-0.283	1.096	-3.011	-0.027	-0.094	-0.086	0.001	0.015
	4976	-0.299	2.887	-0.152	-0.120	-0.196	-0.024	0.020	-0.120
9 RCCV Drywell Top	4406	0.783	-0.848	-2.172	-0.204	-0.968	0.008	0.033	0.295
	4413	0.051	1.162	-2.839	0.044	-0.012	-0.024	-0.053	-0.045
	4424	-0.678	2.369	-0.122	-0.037	-0.103	-0.025	-0.011	-0.082
10 Basemat @ Center	80003	1.808	0.981	-0.103	-2.461	-1.800	0.043	0.054	0.027
	80007	1.767	0.946	-0.129	-2.342	-1.789	0.053	0.090	0.031
	80012	1.683	0.886	-0.072	-2.248	-1.790	0.033	0.107	0.003
11 Basemat Inside RPV Pedestal	80206	2.156	1.176	-0.252	-2.992	-1.539	0.250	0.277	0.095
	80213	1.824	0.867	-0.285	-2.073	-1.294	0.650	0.507	0.198
	80224	1.343	0.769	-0.070	-0.779	-1.267	0.057	0.479	0.019
12 S/P Slab @ RPV	83306	-0.211	-0.855	-0.980	-0.891	-0.493	-0.123	-0.330	0.048
	83313	-0.266	-1.018	0.678	-0.436	-0.283	-0.165	-0.146	0.066
	83324	-0.568	0.380	0.135	0.128	0.028	-0.013	0.082	0.007
13 S/P Slab @ Center	83406	-0.203	-1.174	-0.786	0.159	-0.256	-0.085	-0.230	-0.010
	83413	-0.144	-0.771	0.616	0.050	-0.182	-0.104	-0.108	0.002
	83424	-0.672	0.469	0.092	-0.064	-0.061	-0.008	0.046	0.000
14 S/P Slab @ RCCV	83506	-0.131	-1.313	-0.537	0.802	0.039	0.000	-0.177	-0.022
	83513	-0.084	-0.558	0.601	0.351	-0.037	-0.006	-0.085	-0.020
	83524	-0.634	0.504	0.072	-0.203	-0.124	-0.002	0.041	-0.002
15 Top slab @ Drywell Head Opening	98120	-0.029	-0.053	-0.040	-0.078	-0.066	-0.063	0.008	0.016
	98135	0.536	0.065	-0.132	-0.091	0.006	-0.011	-0.024	0.009
	98104	-0.059	-1.429	0.077	-0.019	-0.187	0.018	-0.008	0.026
16 Top slab @ Center	98149	0.034	0.416	0.158	-0.067	0.029	-0.087	-0.004	-0.017
	98170	-0.072	-0.265	0.073	-0.065	-0.096	-0.047	-0.015	-0.018
	98109	0.117	-1.213	-0.056	-0.156	-0.248	-0.020	-0.063	0.042
17 Top slab @ RCCV	98174	-0.283	0.965	0.110	0.005	-0.015	-0.163	-0.021	0.007
	98197	-0.328	-0.331	0.424	0.008	-0.002	-0.107	0.035	0.082
	98103	-0.122	-1.346	0.058	-1.101	-0.457	0.014	-0.254	0.016

Note : Results are based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building
Structural Design Report, Reference 2.1.2-j.



**Table 6.2.4-12 Results of NASTRAN Analysis, Site-Specific Seismic Load
(Horizontal: East to West Direction)**

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	-0.776	-1.841	-0.090	0.065	0.689	0.013	-0.048	0.305
	5013	-0.768	-2.776	-0.020	0.216	1.052	0.011	-0.034	0.455
	5024	-0.071	-0.270	-0.166	0.018	0.080	-0.001	0.053	0.034
2 RPV Pedestal Mid-Height	6006	-0.091	-2.233	0.135	0.040	0.284	0.030	-0.017	-0.098
	6013	-0.174	-3.410	-0.125	0.032	0.440	0.030	-0.001	-0.131
	6024	-0.012	-0.314	-0.419	-0.003	0.021	-0.053	0.016	-0.011
3 RPV Pedestal Top	6606	0.013	-2.249	0.593	-0.042	-0.397	-0.083	0.042	0.165
	6613	-0.177	-3.441	-0.071	-0.121	-0.612	0.046	0.059	0.261
	6624	-0.025	-0.251	-1.014	-0.015	-0.020	0.117	-0.140	0.012
4 RCCV Wetwell Bottom	1806	-0.416	-2.735	1.954	0.116	0.545	0.023	-0.002	0.211
	1813	-0.919	-3.805	-0.510	0.181	1.064	0.020	-0.001	0.474
	1824	-0.113	-0.330	-3.252	0.010	0.063	-0.054	0.023	0.025
5 RCCV Wetwell Mid-Height	2606	-0.039	-2.221	1.963	-0.005	-0.014	0.037	0.010	0.069
	2613	-0.202	-3.215	-0.517	-0.025	-0.061	0.018	0.005	0.211
	2624	-0.037	-0.208	-3.193	-0.007	-0.019	-0.072	-0.018	0.009
6 RCCV Wetwell Top	3406	0.182	-1.740	1.953	-0.015	-0.098	0.048	-0.028	0.074
	3413	-0.020	-2.735	-0.584	-0.057	-0.319	-0.015	0.038	0.218
	3424	0.121	-0.150	-2.874	-0.016	-0.041	-0.007	-0.012	0.011
7 RCCV Drywell Bottom	3606	0.210	-1.633	1.740	0.033	0.187	0.035	-0.026	0.011
	3613	-0.068	-2.987	-0.696	0.100	0.605	0.015	0.036	0.212
	3624	0.088	-0.215	-3.064	0.023	0.064	-0.003	-0.009	0.031
8 RCCV Drywell Mid-Height	4006	0.420	-1.205	1.674	-0.007	0.015	0.045	0.011	0.090
	4013	0.378	-2.370	-0.617	-0.054	-0.182	-0.012	-0.001	0.234
	4976	-0.063	-0.127	-3.147	-0.020	-0.019	-0.010	-0.018	0.008
9 RCCV Drywell Top	4406	0.658	-0.814	1.537	-0.080	-0.327	0.016	0.025	0.155
	4413	0.406	-1.837	-0.474	-0.193	-0.965	0.018	-0.018	0.250
	4424	-0.149	-0.100	-3.329	-0.023	0.008	0.004	-0.017	-0.018
10 Basemat @ Center	80003	0.066	-0.095	-0.953	0.035	-0.035	0.256	-0.012	-0.253
	80007	0.017	-0.020	-0.852	-0.051	-0.107	0.188	-0.006	-0.238
	80012	0.068	-0.103	-0.806	0.072	0.073	0.095	-0.002	-0.250
11 Basemat Inside RPV Pedestal	80206	0.047	0.121	-1.148	-0.483	-1.319	0.919	0.065	-0.654
	80213	-0.191	0.100	-0.773	-0.934	-2.066	0.274	0.046	-0.628
	80224	0.013	-0.092	-0.227	-0.057	-0.045	-0.362	-0.038	-0.333
12 S/P Slab @ RPV	83306	0.220	0.115	-0.281	-0.443	-0.205	0.143	-0.176	-0.065
	83313	0.476	-0.011	-0.086	-0.681	-0.331	-0.023	-0.269	0.000
	83324	0.029	-0.005	0.626	-0.029	-0.010	-0.191	-0.014	0.093
13 S/P Slab @ Center	83406	0.112	0.028	-0.125	0.086	-0.075	0.097	-0.116	-0.001
	83413	0.436	-0.154	-0.087	0.122	-0.126	-0.018	-0.177	0.001
	83424	0.025	-0.006	0.327	0.009	0.001	-0.125	-0.008	-0.004
14 S/P Slab @ RCCV	83506	-0.021	0.038	-0.095	0.425	0.074	0.006	-0.095	0.022
	83513	0.363	-0.196	-0.079	0.614	0.109	-0.015	-0.138	-0.001
	83524	0.015	-0.013	0.223	0.036	0.012	0.009	-0.008	-0.034
15 Top slab @ Drywell Head Opening	98120	0.841	0.713	0.603	0.037	0.284	0.104	0.049	0.071
	98135	-0.092	-0.257	0.422	0.094	0.113	-0.059	-0.030	0.051
	98104	-0.301	-0.430	0.441	-0.026	0.155	0.021	-0.034	0.127
16 Top slab @ Center	98149	0.638	0.271	0.354	0.053	0.209	0.017	-0.027	-0.067
	98170	0.634	-0.078	0.637	-0.016	-0.045	0.004	-0.007	-0.025
	98109	-0.071	-0.002	0.590	0.037	0.126	0.032	0.012	0.063
17 Top slab @ RCCV	98174	0.878	0.240	0.431	0.185	0.132	-0.056	-0.090	0.066
	98197	0.866	-0.055	0.566	-0.033	-0.203	0.047	0.035	-0.076
	98103	0.102	-0.091	0.817	0.035	0.026	0.122	-0.026	0.022

Note : Results are based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j.



**Table 6.2.4-13 Results of NASTRAN Analysis, Site-Specific Seismic Load
(Vertical: Upward Direction)**

Location	Element ID	N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	1.587	-2.124	0.189	-0.477	-2.741	0.009	-0.021	-1.153
	5013	1.264	-2.852	0.274	-0.402	-2.398	0.000	-0.016	-0.980
	5024	0.884	-3.230	0.019	-0.361	-2.133	0.009	0.003	-0.864
2 RPV Pedestal Mid-Height	6006	-0.178	-2.240	0.282	0.016	0.073	0.030	0.025	-0.016
	6013	-0.186	-2.446	0.415	-0.024	0.026	0.013	-0.016	0.030
	6024	-0.040	-1.884	-0.192	0.006	-0.036	0.008	0.016	0.063
3 RPV Pedestal Top	6606	-0.395	-1.898	0.399	0.433	2.895	0.105	0.103	-0.971
	6613	-0.393	-1.931	0.239	0.375	2.773	-0.126	-0.068	-0.923
	6624	-0.245	-1.889	0.065	0.397	2.768	0.135	0.057	-0.897
4 RCCV Wetwell Bottom	1806	-0.512	-5.207	0.202	-0.096	-0.639	0.008	0.001	-0.122
	1813	-0.642	-5.112	0.208	-0.101	-0.545	0.005	0.000	-0.079
	1824	-0.554	-5.759	-0.036	-0.097	-0.572	0.003	-0.004	-0.095
5 RCCV Wetwell Mid-Height	2606	-0.236	-4.884	0.236	0.010	-0.021	0.002	0.000	-0.083
	2613	-0.337	-4.787	0.198	-0.033	-0.065	0.003	-0.002	-0.051
	2624	-0.353	-5.307	0.018	-0.006	-0.009	0.001	-0.002	-0.092
6 RCCV Wetwell Top	3406	-0.275	-4.370	0.324	0.116	0.661	-0.078	0.104	-0.222
	3413	-0.182	-4.504	0.165	0.023	0.237	0.037	-0.048	-0.091
	3424	-0.176	-4.612	0.031	0.029	0.224	-0.080	0.086	-0.050
7 RCCV Drywell Bottom	3606	-0.092	-4.201	0.197	-0.001	0.056	-0.087	0.076	0.131
	3613	-0.032	-4.449	0.180	-0.011	0.002	0.050	-0.029	0.095
	3624	-0.132	-4.935	0.096	0.022	0.187	-0.083	0.045	0.145
8 RCCV Drywell Mid-Height	4006	0.585	-3.805	0.098	-0.171	-0.641	-0.043	-0.008	0.277
	4013	0.484	-4.470	0.228	-0.065	-0.457	-0.001	-0.007	0.154
	4976	0.021	-4.097	0.252	-0.038	-0.319	-0.006	-0.011	0.108
9 RCCV Drywell Top	4406	0.366	-3.280	-0.269	-0.332	-1.923	-0.013	0.008	0.393
	4413	-0.258	-4.428	0.120	-0.203	-1.250	-0.003	0.002	0.249
	4424	-0.063	-3.278	0.204	-0.074	-0.614	0.006	0.000	0.085
10 Basemat @ Center	80003	-1.125	-1.390	0.065	8.634	8.865	-0.033	0.261	-0.210
	80007	-1.152	-1.418	0.051	8.641	8.862	-0.033	-0.045	-0.340
	80012	-1.148	-1.468	0.052	8.634	8.855	-0.030	-0.335	-0.048
11 Basemat Inside RPV Pedestal	80206	-1.062	-1.220	0.106	5.665	6.166	0.969	1.133	-0.998
	80213	-1.159	-1.466	0.159	6.623	4.831	-0.108	-0.049	-1.566
	80224	-1.268	-1.689	0.057	4.779	6.676	-0.173	-1.527	-0.123
12 S/P Slab @ RPV	83306	0.137	0.402	-0.250	2.170	1.502	-0.007	1.187	-0.029
	83313	0.335	0.300	-0.062	2.167	1.495	0.012	1.185	0.025
	83324	0.328	0.466	-0.025	2.153	1.488	-0.016	1.179	-0.026
13 S/P Slab @ Center	83406	0.207	0.378	-0.176	-0.960	0.696	0.001	0.552	0.000
	83413	0.442	0.229	-0.011	-0.946	0.679	0.000	0.551	0.002
	83424	0.407	0.409	-0.008	-0.947	0.675	-0.002	0.549	-0.001
14 S/P Slab @ RCCV	83506	0.207	0.335	-0.162	-1.732	0.004	-0.008	0.105	0.005
	83513	0.461	0.211	0.023	-1.728	-0.009	-0.004	0.109	0.004
	83524	0.406	0.404	-0.003	-1.725	-0.008	-0.002	0.106	-0.001
15 Top slab @ Drywell Head Opening	98120	1.352	0.331	0.495	-0.699	-0.196	-0.487	0.105	0.592
	98135	3.422	0.257	-0.220	-0.935	0.350	0.198	-0.083	0.500
	98104	0.064	0.747	-0.032	-0.364	-2.248	0.431	-0.004	0.310
16 Top slab @ Center	98149	2.131	-0.495	0.697	-1.021	-0.219	0.050	0.006	-0.410
	98170	1.784	-0.103	0.129	-0.947	-1.003	0.101	0.003	0.080
	98109	0.140	0.533	0.069	-0.939	-1.360	0.241	0.150	0.137
17 Top slab @ RCCV	98174	0.967	-0.193	0.237	-0.997	-0.753	-0.377	-0.221	0.055
	98197	0.563	-0.132	-0.190	-0.366	1.547	0.214	0.085	0.939
	98103	-0.238	0.328	0.096	2.430	0.330	0.277	1.234	0.156

Note : Results are based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j.



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Table 6.3.1-1 Load Combinations, Load Factors and Acceptance Criteria for Reinforced Concrete Containment

Description	No. *2	Load Conditions *1																Acceptance Criteria *6
		D	L	Pt	Po	Pa*3	Tt	To	Ta*3	E*7	W	W'	Ro	Ra	Y*4	SRV*7	LOCA *5*7	
Service																		
Test	CV-1	1.0	1.0	1.0	-	-	1.0	-	-	-	-	-	-	-	-	-	-	S
Construction	CV-2	1.0	1.0	-	-	-	-	1.0	-	-	1.0	-	-	-	-	-	-	S
Normal	CV-3	1.0	1.0	-	1.0	-	-	1.0	-	-	-	-	1.0	-	-	1.0	-	S
Factored																		
Severe Environmental	CV-4	1.0	1.3	-	1.0	-	-	1.0	-	-	1.5	-	1.0	-	-	1.3	-	U
Extreme Environmental	CV-5	1.0	1.0	-	1.0	-	-	1.0	-	1.0	-	-	1.0	-	-	1.0	-	U
	CV-6	1.0	1.0	-	1.0	-	-	1.0	-	-	-	1.0	1.0	-	-	1.0	-	U
Abnormal	CV-7	1.0	1.0	-	-	1.5	-	-	1.0	-	-	-	-	1.0	-	1.25	Note *5	U
	CV-8	1.0	1.0	-	-	1.0	-	-	1.0	-	-	-	-	1.25	-	1.0	Note *5	U
	CV-9	1.0	1.0	-	-	1.25	-	-	1.0	-	-	-	-	1.0	-	1.25	Note *5	U
Abnormal/Severe Environmental	CV-10	1.0	1.0	-	-	1.25	-	-	1.0	-	1.25	-	-	1.0	-	1.0	Note *5	U
Abnormal/Extreme Environmental	CV-11	1.0	1.0	-	-	1.0	-	-	1.0	1.0	-	-	-	1.0	1.0	1.0	Note *5	U

Notes:

*1: The loads are described in Section 5. The allowable stresses of concrete and reinforcing steel shall be in accordance with ASME Code Section III, Division 2, Subsection CC-3400 (except for tangential shear stress carried by orthogonal reinforcement which shall be limited to $0.830\sqrt{f'_c}$ in MPa for factored load combinations, where f'_c is concrete compressive strength). Inclined reinforcement shall not be used to resist tangential shear.

*2: 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.

*3: Because Pa, Ta, SRV and LOCA are time-dependent loads, their effects are superimposed accordingly.

*4: Y includes Yj, Ym and Yr.

*5: LOCA loads, CO, CHUG and PS are time-dependent loads for which DLF may be used. The sequence of occurrence is shown in Figure 5.2.3-6. The load factor for LOCA loads shall be the same as the corresponding pressure load Pa. LOCA loads shall include hydrostatic pressure (with a load factor of 1.0) due to containment flooding.

*6: S = Allowable Stress as in ASME Section III, Div. 2, Subsection CC-3430 for Service Load Combination. U = Allowable Stress as in ASME Section III, Div. 2, Subsection CC-3420 for Factored Load Combination.

*7: The peak responses of dynamic loads do not occur at the same instant. SRSS method to combine peak dynamic responses is acceptable for concrete structures.

Table 6.3.2-1 Detail Load Combinations for RCCV Design

		Candidate No. 2022		Dead Load		Live Load		Thermal Load										Seismic Load		Pipe Load		Hydrodynamic Load										Wind Load		Tornado Load																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
				Prevent Load		LOCA (ECCS Conditions)*1)										LOCA (ECCS Conditions)*2)										LOCA Flooding		LOCA & LOFT		SW LOFT		Reaction		Reaction		Reaction																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
				LOCA		Normal Operation										Normal Operation										Normal Operation		Normal Operation		Normal Operation		Normal Operation		Normal Operation		Normal Operation		Normal Operation																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
				LOCA	Prevent Load	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal 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Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation

Note *1: GDSC Pool Water Depth is 4.48 m.

*2: GDSC Pool Water Depth is 0.792 m.

Dynamic loads, i.e. seismic loads and hydrodynamic loads are combined according to the SRSS method, as specified in Section 6.3.2.

Opposite signs of stresses due to the hydrodynamic load or combination of hydrodynamic and seismic load to the other loads is considered. In that case, 500 is added to the original LOAD ID.

For acceptance criteria, S = Allowable Stress as in ASME Section III, Div. 2, Subsection CC-3430 for Service Load Combination. U = Allowable Stress as in ASME Section III, Div. 2, Subsection CC-3420 for Factored Load Combination.

For unit load cases which are shaded in the table, the results of stress analysis are based on the RB/FB global FE model which is used in Appendix E of "ESBWR Reactor Building Structural Design Report", Reference 2.1.2-j.

Table 6.3.2-1 Detail Load Combinations for RCCV Design (Continued)

[illegible]

Note *1: GDCS Pool Water Depth is 4.48 m.

*2: GDCS Pool Water Depth is 0.792 mm

Dynamic loads, i.e. seismic loads and hydrodynamic loads are combined according to the SRSS method, as specified in Section 6.3.2.

Opposite signs of stresses due to the hydrodynamic load or combination of hydrodynamic and seismic load to the other loads is considered. In that case, 500 is added to the original LOAD ID.

For acceptance criteria, S = Allowable Stress as in ASME Section III, Div. 2, Subsection CC-3430 for Service Load Combination. U = Allowable Stress as in ASME Section III, Div. 2, Subsection CC-3420 for Factored Load Combination.

For unit load cases which are shaded in the table, the results of stress analysis are based on the RB/FB global FE model which is used in Appendix E of "ESBWR Reactor Building Structural Design Report", Reference 2.1.2-j.

Table 6.3.2-1 Detail Load Combinations for RCCV Design (Continued)

[illegible]

Note *1: GDCS Pool Water Depth is 4.48 m

*2: GDCS Pool Water Depth is 0.792 mm

Dynamic loads, i.e. seismic loads and hydrodynamic loads are combined according to the SRSS method, as specified in Section 6.3.2

Opposite signs of stresses due to the hydrodynamic load or combination of hydrodynamic and seismic load to the other loads is considered. In that case, 500 is added to the original LOAD ID.

For acceptance criteria, S = Allowable Stress as in ASME Section III, Div. 2, Subsection CC-3430 for Service Load Combination. U = Allowable Stress as in ASME Section III, Div. 2, Subsection CC-3420 for Factored Load Combination.

For unit load cases which are shaded in the table, the results of stress analysis are based on the RB/FB global FE model which is used in Appendix E of "ESBWR Reactor Building Structural Design Report", Reference 2.1.2-].

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Table 6.3.3-1 Combined Forces and Moments, Test – Load ID = 1100
(Selected Load Combination CV-1)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	OTHR	-2.160	-7.673	-0.041	0.367	2.150	0.033	-0.011	1.247
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	5013	OTHR	-2.686	-8.084	0.051	0.306	2.352	-0.003	-0.005	1.435
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	5024	OTHR	-2.531	-7.503	0.051	0.479	2.105	-0.010	0.011	1.231
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2 RPV Pedestal Mid-Height	6006	OTHR	1.177	-7.414	0.012	-0.050	-0.209	0.024	0.075	-0.347
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	6013	OTHR	0.888	-7.385	0.193	-0.206	-0.269	0.004	-0.002	-0.328
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	6024	OTHR	1.234	-5.442	-0.516	0.296	0.070	0.015	-0.008	-0.264
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3 RPV Pedestal Top	6606	OTHR	0.577	-6.197	0.796	0.434	2.820	0.036	0.233	-0.999
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	6613	OTHR	0.260	-6.383	-0.095	0.294	2.846	-0.106	-0.092	-1.053
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	6624	OTHR	0.814	-6.035	0.318	0.410	2.506	0.145	0.061	-0.809
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4 RCCV Wetwell Bottom	1806	OTHR	0.295	-2.016	-0.054	0.369	2.198	0.018	0.011	0.782
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1813	OTHR	0.093	-2.409	0.195	0.362	2.322	-0.001	-0.003	0.893
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1824	OTHR	0.527	-2.331	0.001	0.362	2.107	0.008	-0.005	0.825
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5 RCCV Wetwell Mid-Height	2606	OTHR	2.629	-1.556	-0.108	-0.166	-0.663	-0.002	0.008	-0.046
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2613	OTHR	2.279	-2.166	0.178	-0.194	-0.684	0.000	-0.007	0.011
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2624	OTHR	2.607	-1.849	-0.015	-0.122	-0.697	-0.003	0.004	-0.081
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6 RCCV Wetwell Top	3406	OTHR	2.448	-0.900	0.085	-0.068	-0.229	0.067	-0.031	-0.013
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3413	OTHR	2.089	-1.959	0.113	-0.109	-0.249	-0.096	0.048	0.012
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3424	OTHR	2.082	-1.171	0.049	0.021	0.078	0.058	-0.018	-0.057
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7 RCCV Drywell Bottom	3606	OTHR	2.395	-0.361	-0.019	-0.019	0.079	0.095	0.002	0.487
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3613	OTHR	2.099	-1.462	0.188	-0.008	0.357	-0.084	-0.001	0.712
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3624	OTHR	2.064	-0.777	0.039	0.110	0.556	0.059	0.011	0.565
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8 RCCV Drywell Mid-Height	4006	OTHR	1.551	0.065	0.050	-0.071	-0.240	0.018	0.032	-0.300
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4013	OTHR	1.592	-1.630	0.318	-0.151	-0.453	0.009	-0.011	-0.261
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4976	OTHR	1.587	-0.337	-0.012	0.034	-0.017	0.001	-0.013	-0.379
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9 RCCV Drywell Top	4406	OTHR	0.504	0.467	0.159	0.362	2.110	0.002	-0.001	-0.675
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4413	OTHR	-0.037	-1.799	0.252	0.253	2.072	0.037	0.009	-0.787
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4424	OTHR	1.163	-0.073	-0.032	0.428	2.331	0.023	0.002	-0.725
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

OTHR: Loads other than thermal loads

TEMP: Thermal loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

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**Table 6.3.3-1 Combined Forces and Moments, Test – Load ID = 1100
(Selected Load Combination CV-1) (Continued)**

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
10 Basemat @ Center	80003	OTHR	-2.863	-1.599	0.149	-0.569	0.018	-0.045	0.165	-0.112
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	80007	OTHR	-2.890	-1.607	0.134	-0.493	0.040	-0.027	0.004	-0.181
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	80012	OTHR	-2.942	-1.596	0.135	-0.487	0.043	-0.031	-0.154	-0.018
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11 Basemat Inside RPV Pedestal	80206	OTHR	-2.529	-1.750	0.231	-2.485	-2.262	0.712	0.971	-1.148
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	80213	OTHR	-2.632	-1.602	0.090	-1.593	-3.038	-0.112	-0.079	-1.534
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	80224	OTHR	-3.117	-2.017	0.060	-2.699	-1.674	-0.162	-1.224	-0.144
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12 S/P Slab @ RPV	83306	OTHR	0.001	1.185	-0.425	-0.250	0.620	-0.066	1.940	-0.038
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	83313	OTHR	0.202	0.928	-0.092	-0.191	0.635	0.041	1.953	0.051
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	83324	OTHR	0.233	1.419	0.053	-0.286	0.586	-0.038	1.901	-0.055
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13 S/P Slab @ Center	83406	OTHR	0.250	0.885	-0.316	-2.855	-0.665	-0.030	-0.129	0.003
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	83413	OTHR	0.582	0.670	-0.019	-2.827	-0.672	-0.005	-0.119	0.002
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	83424	OTHR	0.422	1.104	0.029	-2.796	-0.663	0.005	-0.150	0.000
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14 S/P Slab @ RCCV	83506	OTHR	0.379	0.731	-0.242	1.265	-0.177	-0.026	-1.740	0.000
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	83513	OTHR	0.751	0.610	0.004	1.249	-0.184	-0.005	-1.730	0.002
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	83524	OTHR	0.488	0.997	0.030	1.374	-0.131	-0.001	-1.759	0.001
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15 Top slab @ Drywell Head Opening	98120	OTHR	0.108	1.013	1.166	1.063	0.649	0.502	0.321	-0.987
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	98135	OTHR	-0.703	-0.422	-0.496	0.741	-0.293	0.189	0.187	-1.273
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	98104	OTHR	-0.244	2.463	-0.780	0.955	3.198	-0.384	-0.415	-0.725
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16 Top slab @ Center	98149	OTHR	-0.126	1.468	-0.434	0.340	-0.094	0.389	0.016	0.409
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	98170	OTHR	-0.063	0.913	-0.363	0.526	0.280	-0.036	-0.043	-0.224
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	98109	OTHR	0.348	1.588	-0.183	0.977	2.009	-0.295	-0.107	-0.383
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17 Top slab @ RCCV	98174	OTHR	0.659	1.205	-0.087	0.182	0.228	0.484	0.133	-0.169
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	98197	OTHR	0.336	1.260	-0.207	-0.156	-1.637	-0.112	-0.072	-1.045
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	98103	OTHR	0.668	1.772	-0.090	-1.030	0.462	-0.341	-0.899	-0.217
		TEMP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

OTHR: Loads other than thermal loads

TEMP: Thermal loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

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Table 6.3.3-2 Combined Forces and Moments, LOCA After 6 minutes (1.5Pa): Winter
– Load ID = 6241 (Selected Load Combination CV-7a)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	OTHR	-2.269	-7.811	-0.043	0.405	2.376	0.034	-0.011	1.347
		TEMP	-3.476	1.649	-0.329	-6.696	-6.462	-0.046	0.105	1.012
		HYDR	1.879	5.303	0.129	0.382	2.323	0.017	0.024	1.086
	5013	OTHR	-2.798	-8.211	0.045	0.343	2.575	-0.003	-0.005	1.536
		TEMP	-3.121	1.796	-0.097	-6.854	-6.851	-0.006	0.027	0.925
		HYDR	2.099	5.570	0.515	0.426	2.519	0.001	0.018	1.220
	5024	OTHR	-2.639	-7.607	0.052	0.518	2.316	-0.011	0.012	1.322
		TEMP	-3.419	1.892	-0.003	-6.894	-6.129	-0.026	-0.036	1.045
		HYDR	2.282	5.413	0.243	0.434	2.450	0.013	0.024	1.195
2 RPV Pedestal Mid-Height	6006	OTHR	1.305	-7.546	-0.001	-0.055	-0.227	0.024	0.076	-0.362
		TEMP	0.080	1.775	0.154	-6.175	-4.043	0.264	0.065	-1.515
		HYDR	0.446	5.872	0.309	0.056	0.390	0.033	0.047	0.082
	6013	OTHR	1.015	-7.511	0.186	-0.210	-0.288	0.004	-0.002	-0.343
		TEMP	-0.061	1.444	-0.177	-6.419	-3.904	-0.057	-0.026	-1.669
		HYDR	0.466	5.457	0.487	0.105	0.375	0.012	0.016	0.079
	6024	OTHR	1.380	-5.524	-0.526	0.300	0.059	0.015	-0.010	-0.270
		TEMP	-0.245	2.050	0.059	-7.408	-2.297	-0.304	-0.003	-1.547
		HYDR	0.457	4.341	0.599	0.078	0.360	0.027	0.026	0.028
3 RPV Pedestal Top	6606	OTHR	0.646	-6.328	0.797	0.430	2.792	0.028	0.239	-0.976
		TEMP	20.997	2.192	0.564	-6.643	-5.510	-0.035	-1.941	0.870
		HYDR	0.816	5.248	0.908	0.710	4.278	0.198	0.644	1.214
	6613	OTHR	0.317	-6.528	-0.104	0.290	2.832	-0.099	-0.098	-1.035
		TEMP	21.088	1.964	-0.425	-6.702	-5.546	0.139	2.063	0.862
		HYDR	0.797	4.919	0.398	0.627	4.016	0.173	0.420	1.197
	6624	OTHR	0.878	-6.173	0.319	0.405	2.474	0.138	0.067	-0.784
		TEMP	21.900	2.601	0.228	-6.671	-5.665	0.005	-2.338	1.055
		HYDR	0.728	5.071	0.435	0.617	3.907	0.196	0.555	1.147
4 RCCV Wetwell Bottom	1806	OTHR	0.322	-1.893	-0.072	0.381	2.269	0.018	0.011	0.797
		TEMP	2.533	0.468	-0.194	-4.438	-8.138	0.077	0.083	-1.750
		HYDR	0.961	1.171	0.676	0.558	3.366	0.014	0.008	1.396
	1813	OTHR	0.120	-2.310	0.197	0.374	2.394	-0.001	-0.003	0.910
		TEMP	1.866	-2.167	-0.420	-4.274	-7.773	-0.025	-0.007	-1.523
		HYDR	0.921	1.191	0.607	0.561	3.342	0.011	0.005	1.422
	1824	OTHR	0.554	-2.179	0.002	0.374	2.176	0.008	-0.005	0.841
		TEMP	2.926	-2.481	0.046	-4.432	-8.134	0.020	-0.085	-1.667
		HYDR	1.036	0.822	0.573	0.563	3.392	0.013	0.010	1.440
5 RCCV Wetwell Mid-Height	2606	OTHR	2.704	-1.438	-0.131	-0.167	-0.659	-0.001	0.008	-0.041
		TEMP	1.379	0.586	-0.171	-3.308	-1.033	0.018	0.039	0.074
		HYDR	1.233	0.863	0.779	0.072	0.415	0.034	0.005	0.255
	2613	OTHR	2.344	-2.077	0.181	-0.196	-0.683	0.000	-0.007	0.017
		TEMP	0.111	-2.544	-0.109	-3.090	-1.052	0.009	-0.075	0.370
		HYDR	1.197	0.898	0.639	0.061	0.325	0.032	0.014	0.207
	2624	OTHR	2.676	-1.697	-0.016	-0.121	-0.697	-0.003	0.004	-0.079
		TEMP	0.965	-2.909	-0.087	-3.293	-0.935	-0.026	0.067	0.189
		HYDR	1.396	0.751	0.518	0.094	0.326	0.008	0.009	0.195
6 RCCV Wetwell Top	3406	OTHR	2.592	-0.791	0.071	-0.092	-0.369	0.099	-0.057	0.035
		TEMP	11.723	1.461	0.327	-4.151	-8.468	-0.227	0.461	3.349
		HYDR	0.925	0.689	0.833	0.140	0.541	0.198	0.231	0.288
	3413	OTHR	2.192	-1.875	0.104	-0.124	-0.327	-0.126	0.066	0.041
		TEMP	8.032	-3.439	0.044	-4.382	-9.151	-0.402	0.538	3.335
		HYDR	0.721	0.752	0.525	0.073	0.374	0.097	0.102	0.243
	3424	OTHR	2.180	-1.017	0.068	0.006	-0.015	0.094	-0.040	-0.024
		TEMP	10.292	-4.166	0.471	-3.681	-5.045	-0.039	-0.006	2.165
		HYDR	0.751	0.626	0.408	0.032	0.340	0.055	0.081	0.216

OTHR: Loads other than thermal and hydrodynamic loads

TEMP: Thermal loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.



Table 6.3.3-2 Combined Forces and Moments, LOCA After 6 minutes (1.5Pa): Winter
– Load ID = 6241 (Selected Load Combination CV-7a) (Continued)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
7 RCCV Drywell Bottom	3606	OTHR	2.542	-0.167	-0.030	-0.012	0.108	0.128	-0.010	0.525
		TEMP	8.504	1.377	0.674	-5.342	-9.036	0.607	0.534	-1.980
		HYDR	0.961	0.714	0.535	0.125	0.496	0.056	0.221	0.186
	3613	OTHR	2.209	-1.284	0.178	0.004	0.439	-0.116	0.003	0.778
		TEMP	4.607	-4.161	1.005	-4.955	-6.227	-0.363	0.317	-0.820
		HYDR	0.665	0.611	0.213	0.107	0.486	0.119	0.106	0.166
	3624	OTHR	2.177	-0.488	0.054	0.124	0.630	0.096	0.007	0.615
		TEMP	-4.291	-6.043	0.252	-0.934	-2.498	0.068	0.000	0.351
		HYDR	0.597	0.407	0.433	0.100	0.456	0.040	0.074	0.135
8 RCCV Drywell Mid-Height	4006	OTHR	1.632	0.236	0.038	-0.054	-0.194	0.021	0.034	-0.348
		TEMP	5.952	2.178	0.212	-5.110	-5.057	0.011	-0.126	-0.683
		HYDR	0.956	0.591	0.256	0.050	0.486	0.032	0.165	0.156
	4013	OTHR	1.687	-1.435	0.322	-0.162	-0.464	0.011	-0.011	-0.274
		TEMP	4.287	-5.850	1.041	-4.672	-4.289	0.014	-0.132	-0.308
		HYDR	0.706	0.748	0.111	0.058	0.105	0.052	0.061	0.119
	4976	OTHR	1.699	-0.079	-0.030	0.039	0.001	0.001	-0.013	-0.411
		TEMP	-2.660	-5.335	0.580	-0.954	-1.780	0.003	0.013	-0.584
		HYDR	0.283	0.329	0.312	0.043	0.045	0.019	0.008	0.096
9 RCCV Drywell Top	4406	OTHR	0.565	0.574	0.186	0.425	2.455	0.013	-0.002	-0.757
		TEMP	6.433	1.711	-0.232	-4.475	-3.816	0.299	0.087	-0.150
		HYDR	0.301	0.362	0.066	0.108	0.442	0.083	0.088	0.339
	4413	OTHR	0.070	-1.593	0.264	0.271	2.235	0.039	0.011	-0.842
		TEMP	0.711	-6.632	-0.292	-4.753	-4.467	0.253	-0.243	0.643
		HYDR	0.754	0.888	0.339	0.335	0.363	0.254	0.118	0.389
	4424	OTHR	1.278	0.144	-0.048	0.465	2.539	0.024	0.001	-0.783
		TEMP	-5.846	-4.171	0.767	-0.363	1.129	-0.024	-0.022	-1.462
		HYDR	0.183	0.262	0.219	0.052	0.309	0.004	0.007	0.128
10 Basemat @ Center	80003	OTHR	-2.788	-1.513	0.148	-1.074	-0.468	-0.044	0.152	-0.102
		TEMP	-4.270	-5.140	0.021	-8.130	-8.102	-0.039	0.029	-0.008
		HYDR	1.283	1.173	0.112	4.575	4.159	0.065	0.277	0.266
	80007	OTHR	-2.813	-1.521	0.133	-0.998	-0.446	-0.026	0.006	-0.165
		TEMP	-4.296	-5.104	0.056	-8.096	-8.099	-0.037	0.028	-0.009
		HYDR	1.280	1.155	0.094	4.490	4.145	0.068	0.228	0.317
	80012	OTHR	-2.866	-1.509	0.134	-0.992	-0.442	-0.030	-0.138	-0.016
		TEMP	-4.302	-5.040	0.042	-8.079	-8.109	-0.032	0.024	-0.001
		HYDR	1.250	1.127	0.072	4.442	4.108	0.058	0.351	0.201
11 Basemat Inside RPV Pedestal	80206	OTHR	-2.450	-1.668	0.231	-2.841	-2.619	0.668	0.936	-1.123
		TEMP	-4.260	-5.523	0.137	-8.575	-8.460	0.003	0.005	-0.035
		HYDR	1.472	1.255	0.219	6.569	5.991	0.976	0.802	0.838
	80213	OTHR	-2.552	-1.514	0.086	-1.999	-3.346	-0.109	-0.079	-1.490
		TEMP	-4.445	-5.127	0.161	-8.289	-8.565	-0.151	-0.018	-0.103
		HYDR	1.362	1.183	0.128	5.525	6.846	0.593	0.475	1.091
	80224	OTHR	-3.037	-1.937	0.059	-3.018	-2.067	-0.158	-1.175	-0.143
		TEMP	-4.372	-4.948	0.081	-8.177	-8.193	-0.045	-0.038	0.010
		HYDR	1.226	0.902	0.114	6.560	5.212	0.461	1.049	0.380

OTHR: Loads other than thermal and hydrodynamic loads

TEMP: Thermal loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.



**Table 6.3.3-2 Combined Forces and Moments, LOCA After 6 minutes (1.5Pa): Winter
– Load ID = 6241 (Selected Load Combination CV-7a) (Continued)**

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
12 S/P Slab @ RPV	83306	OTHR	-0.024	1.222	-0.426	-0.361	0.565	-0.067	1.922	-0.037
		TEMP	-10.607	10.981	0.454	-4.700	-2.770	0.032	-0.288	0.000
		HYDR	1.543	1.102	0.524	1.382	0.906	0.093	2.882	0.066
	83313	OTHR	0.171	0.963	-0.092	-0.302	0.578	0.042	1.935	0.051
		TEMP	-10.822	11.242	-0.850	-4.737	-2.848	-0.039	-0.302	-0.028
		HYDR	1.473	1.129	0.322	1.340	0.825	0.152	2.839	0.054
	83324	OTHR	0.209	1.453	0.052	-0.399	0.528	-0.038	1.881	-0.056
		TEMP	-10.702	11.862	1.279	-4.487	-2.654	0.006	-0.156	0.046
		HYDR	1.528	1.190	0.345	1.265	0.729	0.108	2.762	0.063
13 S/P Slab @ Center	83406	OTHR	0.240	0.904	-0.315	-2.869	-0.710	-0.032	-0.157	0.003
		TEMP	-6.490	4.881	-0.530	-3.815	-3.181	-0.001	-0.306	0.016
		HYDR	1.511	1.103	0.306	4.347	1.357	0.069	0.408	0.004
	83413	OTHR	0.571	0.691	-0.020	-2.841	-0.717	-0.004	-0.147	0.002
		TEMP	-6.986	5.307	0.315	-3.900	-3.257	-0.015	-0.278	-0.011
		HYDR	1.444	1.138	0.180	4.326	1.324	0.080	0.394	0.004
	83424	OTHR	0.414	1.120	0.030	-2.810	-0.708	0.005	-0.179	0.000
		TEMP	-6.630	5.823	0.078	-3.895	-3.148	-0.003	-0.210	0.009
		HYDR	1.507	1.226	0.182	4.294	1.302	0.068	0.386	0.004
14 S/P Slab @ RCCV	83506	OTHR	0.375	0.744	-0.240	1.364	-0.182	-0.026	-1.778	-0.001
		TEMP	-3.948	2.320	-0.446	-2.906	-3.131	-0.038	-0.275	0.016
		HYDR	1.408	1.094	0.225	2.419	0.376	0.023	2.689	0.014
	83513	OTHR	0.747	0.626	0.002	1.348	-0.190	-0.005	-1.767	0.002
		TEMP	-4.567	2.419	0.440	-3.190	-3.174	-0.008	-0.192	-0.001
		HYDR	1.347	1.138	0.178	2.366	0.364	0.023	2.683	0.010
	83524	OTHR	0.485	1.006	0.031	1.476	-0.134	-0.001	-1.797	0.001
		TEMP	-4.038	3.201	-0.017	-3.278	-3.153	0.013	-0.168	-0.005
		HYDR	1.417	1.245	0.172	2.365	0.340	0.020	2.677	0.010
15 Top slab @ Drywell Head Opening	98120	OTHR	0.091	1.055	1.249	1.198	0.705	0.574	0.344	-1.096
		TEMP	-7.068	-4.258	-0.770	0.956	0.732	2.765	-0.161	-0.002
		HYDR	0.343	0.110	0.142	0.073	0.106	0.053	0.013	0.028
	98135	OTHR	-0.800	-0.457	-0.538	0.860	-0.338	0.193	0.208	-1.406
		TEMP	-8.729	-5.283	0.235	3.147	-2.057	-1.132	0.380	-0.267
		HYDR	0.547	0.079	0.114	0.098	0.030	0.024	0.007	0.012
	98104	OTHR	-0.267	2.476	-0.841	1.049	3.560	-0.434	-0.447	-0.805
		TEMP	-4.999	-1.752	0.585	-1.461	3.712	-1.500	0.185	-0.214
		HYDR	0.101	0.422	0.164	0.030	0.178	0.039	0.008	0.065
16 Top slab @ Center	98149	OTHR	-0.159	1.774	-0.514	0.485	0.010	0.423	0.010	0.369
		TEMP	-6.075	-2.540	-1.137	2.229	2.310	0.496	0.037	0.048
		HYDR	0.506	0.266	0.055	0.068	0.053	0.037	0.023	0.029
	98170	OTHR	-0.061	1.251	-0.419	0.638	0.436	-0.043	-0.021	-0.159
		TEMP	-5.510	-3.566	-1.042	2.141	2.864	-0.042	0.030	0.389
		HYDR	0.367	0.263	0.176	0.052	0.074	0.017	0.007	0.007
	98109	OTHR	0.392	1.659	-0.204	1.122	2.234	-0.329	-0.121	-0.419
		TEMP	-6.256	-0.887	0.773	1.219	2.564	-0.119	0.329	-0.005
		HYDR	0.065	0.222	0.272	0.041	0.120	0.037	0.007	0.019
17 Top slab @ RCCV	98174	OTHR	0.766	1.501	-0.104	0.350	0.385	0.526	0.153	-0.110
		TEMP	-4.871	-2.689	-0.476	2.352	3.211	0.255	-0.023	0.434
		HYDR	0.430	0.275	0.097	0.162	0.179	0.117	0.059	0.053
	98197	OTHR	0.478	1.656	-0.206	-0.162	-1.986	-0.133	-0.076	-1.114
		TEMP	-7.584	-2.926	-1.360	1.917	3.110	0.130	0.154	-0.447
		HYDR	0.602	0.383	0.154	0.104	0.187	0.049	0.023	0.052
	98103	OTHR	0.747	1.921	-0.097	-1.258	0.473	-0.382	-1.047	-0.244
		TEMP	-6.577	-2.458	-0.070	3.431	3.308	0.118	0.450	0.084
		HYDR	0.085	0.251	0.323	0.127	0.113	0.021	0.033	0.002

OTHR: Loads other than thermal and hydrodynamic loads

TEMP: Thermal loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

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Table 6.3.3-3 Combined Forces and Moments, LOCA After 72 hours (1.5Pa): Winter
– Load ID = 6441 (Selected Load Combination CV-7b)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	OTHR	-2.625	-8.295	-0.047	0.522	3.081	0.037	-0.012	1.659
		TEMP	-12.849	0.250	-0.523	-16.011	-12.625	-0.093	0.227	4.158
		HYDR	1.386	3.966	0.120	0.281	1.716	0.012	0.017	0.800
	5013	OTHR	-3.162	-8.649	0.036	0.458	3.272	-0.003	-0.005	1.852
		TEMP	-12.356	0.343	-0.104	-16.288	-13.239	-0.007	0.021	4.062
		HYDR	1.546	4.064	0.486	0.313	1.855	0.001	0.012	0.897
	5024	OTHR	-2.994	-7.963	0.058	0.639	2.977	-0.015	0.014	1.612
		TEMP	-12.862	0.231	0.003	-16.285	-11.829	-0.073	-0.054	4.265
		HYDR	1.685	3.975	0.243	0.322	1.818	0.009	0.017	0.885
2 RPV Pedestal Mid-Height	6006	OTHR	1.628	-8.021	-0.032	-0.070	-0.292	0.023	0.080	-0.407
		TEMP	-2.408	0.615	0.443	-16.093	-14.923	0.436	0.146	-1.774
		HYDR	0.355	4.530	0.223	0.040	0.318	0.025	0.036	0.059
	6013	OTHR	1.325	-7.951	0.177	-0.226	-0.355	0.003	-0.002	-0.389
		TEMP	-2.624	0.212	-0.206	-16.582	-14.795	-0.048	-0.033	-2.015
		HYDR	0.348	4.059	0.457	0.077	0.290	0.008	0.011	0.058
	6024	OTHR	1.739	-5.793	-0.556	0.309	0.016	0.015	-0.013	-0.291
		TEMP	-2.728	0.667	0.076	-18.533	-11.361	-0.661	0.020	-1.697
		HYDR	0.347	3.315	0.485	0.055	0.280	0.022	0.018	0.024
3 RPV Pedestal Top	6606	OTHR	0.857	-6.862	0.814	0.485	3.145	0.015	0.278	-1.027
		TEMP	8.837	0.682	0.577	-16.163	-12.297	0.057	-1.395	-2.012
		HYDR	0.734	3.973	0.751	0.565	3.241	0.197	0.624	0.881
	6613	OTHR	0.502	-7.076	-0.120	0.341	3.201	-0.088	-0.131	-1.095
		TEMP	9.213	0.732	-0.359	-16.199	-12.536	0.030	1.518	-1.952
		HYDR	0.698	3.604	0.413	0.487	2.967	0.148	0.400	0.865
	6624	OTHR	1.089	-6.661	0.319	0.461	2.814	0.128	0.098	-0.831
		TEMP	9.545	0.848	0.253	-16.174	-12.377	0.066	-1.768	-1.800
		HYDR	0.656	3.799	0.358	0.487	2.933	0.184	0.530	0.838
4 RCCV Wetwell Bottom	1806	OTHR	0.592	-1.140	-0.113	0.492	2.935	0.018	0.011	1.016
		TEMP	-1.533	-1.021	-0.228	-10.248	-14.646	0.090	0.096	-1.555
		HYDR	0.744	0.794	0.484	0.391	2.348	0.010	0.006	0.984
	1813	OTHR	0.382	-1.663	0.190	0.484	3.061	-0.002	-0.003	1.136
		TEMP	-2.037	-4.249	-0.394	-10.039	-14.121	-0.043	-0.006	-1.254
		HYDR	0.721	0.812	0.419	0.394	2.340	0.009	0.005	0.997
	1824	OTHR	0.849	-1.425	0.005	0.481	2.820	0.009	-0.005	1.062
		TEMP	-1.011	-4.103	0.136	-10.224	-14.384	0.028	-0.105	-1.321
		HYDR	0.813	0.553	0.410	0.403	2.410	0.011	0.009	1.025
5 RCCV Wetwell Mid-Height	2606	OTHR	3.476	-0.674	-0.184	-0.213	-0.854	0.000	0.009	-0.036
		TEMP	-4.269	-1.249	-0.234	-9.962	-7.559	0.001	0.044	0.117
		HYDR	0.909	0.588	0.546	0.055	0.314	0.023	0.003	0.189
	2613	OTHR	3.054	-1.472	0.177	-0.241	-0.865	-0.001	-0.008	0.026
		TEMP	-5.197	-5.323	-0.038	-9.725	-7.432	-0.015	-0.093	0.418
		HYDR	0.872	0.617	0.438	0.046	0.247	0.021	0.010	0.154
	2624	OTHR	3.429	-0.971	-0.022	-0.155	-0.886	-0.004	0.005	-0.090
		TEMP	-4.923	-4.754	-0.111	-10.020	-7.637	-0.043	0.078	0.194
		HYDR	1.010	0.508	0.363	0.067	0.252	0.006	0.007	0.149
6 RCCV Wetwell Top	3406	OTHR	3.225	-0.006	0.021	-0.092	-0.340	0.078	-0.041	0.007
		TEMP	5.196	-0.343	0.501	-10.839	-14.129	0.028	0.144	2.477
		HYDR	0.656	0.480	0.585	0.102	0.399	0.139	0.162	0.204
	3413	OTHR	2.746	-1.299	0.122	-0.130	-0.264	-0.101	0.054	0.003
		TEMP	3.430	-7.154	0.362	-10.781	-14.124	-0.109	0.133	2.640
		HYDR	0.505	0.527	0.365	0.052	0.272	0.071	0.073	0.167
	3424	OTHR	2.713	-0.285	0.050	0.036	0.163	0.069	-0.026	-0.097
		TEMP	2.843	-6.398	0.484	-9.990	-9.736	0.045	-0.108	0.896
		HYDR	0.515	0.430	0.287	0.022	0.227	0.039	0.057	0.148

OTHR: Loads other than thermal and hydrodynamic loads

TEMP: Thermal loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

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Table 6.3.3-3 Combined Forces and Moments, LOCA After 72 hours (1.5Pa): Winter
- Load ID = 6441 (Selected Load Combination CV-7b) (Continued)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
7 RCCV Drywell Bottom	3606	OTHR	3.121	0.547	-0.089	-0.022	0.061	0.114	-0.003	0.590
		TEMP	0.851	-0.258	0.079	-12.665	-14.960	0.282	0.179	-0.838
		HYDR	0.686	0.499	0.370	0.087	0.343	0.037	0.156	0.129
	3613	OTHR	2.726	-0.779	0.218	-0.024	0.383	-0.086	0.004	0.858
		TEMP	-0.941	-8.499	1.390	-12.337	-13.241	-0.243	0.024	-0.345
		HYDR	0.472	0.428	0.150	0.074	0.339	0.084	0.076	0.116
	3624	OTHR	2.695	0.220	0.017	0.118	0.594	0.069	0.009	0.684
		TEMP	-10.577	-8.035	0.298	-7.210	-6.858	0.089	-0.061	1.477
		HYDR	0.410	0.275	0.305	0.071	0.324	0.028	0.052	0.095
8 RCCV Drywell Mid-Height	4006	OTHR	1.939	0.939	0.024	-0.033	-0.180	0.030	0.033	-0.460
		TEMP	1.893	0.841	-0.323	-12.242	-12.219	0.193	-0.154	-0.810
		HYDR	0.681	0.411	0.172	0.035	0.337	0.023	0.117	0.109
	4013	OTHR	1.995	-0.995	0.350	-0.186	-0.494	0.010	-0.010	-0.372
		TEMP	1.197	-10.529	1.292	-12.197	-11.585	0.046	-0.165	-0.457
		HYDR	0.500	0.530	0.072	0.039	0.071	0.037	0.044	0.082
	4976	OTHR	2.092	0.563	-0.071	0.044	0.033	0.002	-0.014	-0.532
		TEMP	-7.092	-6.953	0.638	-7.681	-8.655	0.012	0.039	-0.305
		HYDR	0.194	0.228	0.217	0.029	0.033	0.013	0.006	0.069
9 RCCV Drywell Top	4406	OTHR	0.640	1.242	0.262	0.583	3.265	0.021	-0.002	-1.007
		TEMP	6.726	0.270	-1.390	-11.635	-9.864	0.510	0.460	-0.602
		HYDR	0.216	0.252	0.050	0.075	0.309	0.059	0.062	0.235
	4413	OTHR	0.106	-1.217	0.291	0.374	2.930	0.040	0.012	-1.071
		TEMP	-0.989	-11.897	-0.372	-12.126	-10.994	0.411	-0.180	0.175
		HYDR	0.515	0.626	0.245	0.237	0.250	0.181	0.084	0.270
	4424	OTHR	1.539	0.694	-0.085	0.575	3.189	0.028	0.001	-0.974
		TEMP	-10.172	-5.565	0.973	-7.107	-5.872	-0.070	-0.009	-1.761
		HYDR	0.128	0.188	0.151	0.037	0.220	0.003	0.005	0.087
10 Basemat @ Center	80003	OTHR	-2.535	-1.233	0.146	-2.661	-1.992	-0.041	0.119	-0.076
		TEMP	-1.587	-2.420	-0.001	-8.464	-8.777	-0.040	0.022	-0.010
		HYDR	0.927	0.853	0.083	3.426	3.125	0.057	0.241	0.224
	80007	OTHR	-2.558	-1.239	0.131	-2.582	-1.969	-0.023	0.014	-0.123
		TEMP	-1.600	-2.375	0.039	-8.444	-8.779	-0.040	0.014	-0.014
		HYDR	0.925	0.836	0.072	3.359	3.115	0.061	0.210	0.259
	80012	OTHR	-2.612	-1.226	0.133	-2.577	-1.965	-0.027	-0.093	-0.010
		TEMP	-1.607	-2.298	0.028	-8.433	-8.799	-0.031	0.005	0.001
		HYDR	0.901	0.812	0.055	3.323	3.083	0.048	0.293	0.182
11 Basemat Inside RPV Pedestal	80206	OTHR	-2.187	-1.400	0.233	-4.032	-3.796	0.554	0.847	-1.058
		TEMP	-1.604	-2.924	0.120	-8.962	-9.256	0.034	-0.007	-0.049
		HYDR	1.081	0.938	0.151	4.965	4.512	0.804	0.639	0.640
	80213	OTHR	-2.285	-1.228	0.077	-3.312	-4.389	-0.093	-0.072	-1.372
		TEMP	-1.721	-2.346	0.088	-8.685	-9.343	-0.166	-0.026	-0.164
		HYDR	0.989	0.860	0.085	4.109	5.137	0.558	0.450	0.810
	80224	OTHR	-2.770	-1.678	0.055	-4.079	-3.336	-0.147	-1.039	-0.140
		TEMP	-1.574	-2.175	0.061	-8.644	-8.932	-0.052	-0.105	0.019
		HYDR	0.883	0.637	0.082	4.962	3.893	0.423	0.799	0.352

OTHR: Loads other than thermal and hydrodynamic loads

TEMP: Thermal loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.



Table 6.3.3-3 Combined Forces and Moments, LOCA After 72 hours (1.5Pa): Winter
– Load ID = 6441 (Selected Load Combination CV-7b) (Continued)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
12 S/P Slab @ RPV	83306	OTHR	0.066	1.480	-0.446	-0.735	0.519	-0.071	2.248	-0.042
		TEMP	-11.672	3.835	0.218	-9.639	-8.194	0.035	-0.073	-0.040
		HYDR	1.298	0.806	0.476	1.029	0.690	0.081	2.027	0.049
	83313	OTHR	0.264	1.205	-0.084	-0.667	0.534	0.042	2.263	0.058
		TEMP	-11.910	4.316	-0.426	-9.668	-8.271	-0.025	-0.075	0.011
		HYDR	1.213	0.820	0.328	1.005	0.623	0.139	1.996	0.041
	83324	OTHR	0.296	1.717	0.050	-0.770	0.483	-0.038	2.207	-0.062
		TEMP	-11.696	4.693	0.966	-9.530	-8.130	-0.002	0.004	0.007
		HYDR	1.256	0.871	0.342	0.951	0.560	0.098	1.945	0.048
13 S/P Slab @ Center	83406	OTHR	0.383	1.114	-0.324	-3.471	-0.968	-0.036	-0.263	0.003
		TEMP	-8.140	-0.574	-0.507	-9.101	-8.502	0.000	-0.107	0.016
		HYDR	1.234	0.820	0.265	3.030	0.974	0.060	0.303	0.004
	83413	OTHR	0.727	0.894	-0.020	-3.440	-0.976	-0.005	-0.252	0.002
		TEMP	-8.751	0.109	0.485	-9.199	-8.591	-0.012	-0.069	-0.008
		HYDR	1.150	0.845	0.178	3.015	0.946	0.074	0.292	0.004
	83424	OTHR	0.554	1.339	0.033	-3.411	-0.964	0.006	-0.285	0.000
		TEMP	-8.209	0.422	0.013	-9.166	-8.499	0.001	-0.043	0.006
		HYDR	1.203	0.917	0.178	2.995	0.931	0.063	0.287	0.004
14 S/P Slab @ RCCV	83506	OTHR	0.534	0.932	-0.243	1.894	-0.229	-0.028	-2.224	-0.002
		TEMP	-6.270	-2.431	-0.382	-8.852	-8.637	-0.050	-0.135	0.021
		HYDR	1.115	0.816	0.196	1.745	0.260	0.020	1.878	0.011
	83513	OTHR	0.923	0.821	0.002	1.878	-0.238	-0.005	-2.213	0.002
		TEMP	-7.033	-2.078	0.612	-9.208	-8.687	-0.011	-0.022	0.001
		HYDR	1.042	0.850	0.169	1.702	0.249	0.023	1.873	0.009
	83524	OTHR	0.643	1.210	0.032	2.007	-0.178	0.000	-2.244	0.002
		TEMP	-6.237	-1.445	-0.080	-9.171	-8.643	0.017	-0.039	-0.005
		HYDR	1.097	0.937	0.164	1.708	0.232	0.020	1.870	0.009
15 Top slab @ Drywell Head Opening	98120	OTHR	-0.116	1.220	1.421	1.549	0.876	0.764	0.398	-1.412
		TEMP	-11.465	-10.588	-5.034	7.058	5.009	5.155	-1.417	-1.082
		HYDR	0.239	0.081	0.101	0.050	0.074	0.036	0.009	0.019
	98135	OTHR	-1.528	-0.597	-0.608	1.179	-0.461	0.203	0.263	-1.771
		TEMP	-16.071	-6.982	2.437	10.528	-0.434	-1.821	1.058	-1.141
		HYDR	0.374	0.055	0.078	0.068	0.021	0.017	0.005	0.009
	98104	OTHR	-0.337	2.874	-1.003	1.321	4.626	-0.589	-0.539	-1.018
		TEMP	-6.701	-12.118	2.879	2.391	11.786	-3.140	0.876	-0.611
		HYDR	0.069	0.289	0.113	0.021	0.123	0.026	0.005	0.047
16 Top slab @ Center	98149	OTHR	-0.546	2.189	-0.729	0.733	0.035	0.500	0.014	0.527
		TEMP	-11.277	-3.014	-1.862	5.796	8.885	0.958	0.550	-1.906
		HYDR	0.350	0.186	0.040	0.047	0.037	0.026	0.016	0.020
	98170	OTHR	-0.368	1.466	-0.516	0.916	0.680	-0.069	-0.031	-0.221
		TEMP	-9.611	-4.561	-0.870	4.301	5.407	-0.101	-0.114	0.048
		HYDR	0.252	0.185	0.120	0.035	0.051	0.012	0.005	0.005
	98109	OTHR	0.445	1.908	-0.252	1.490	2.892	-0.434	-0.170	-0.525
		TEMP	-7.853	-1.643	0.877	9.057	11.508	-0.324	0.767	0.077
		HYDR	0.042	0.153	0.192	0.028	0.083	0.027	0.005	0.013
17 Top slab @ RCCV	98174	OTHR	0.746	1.816	-0.160	0.551	0.562	0.702	0.224	-0.159
		TEMP	-9.261	-3.967	-1.472	5.055	6.597	0.112	-0.062	0.291
		HYDR	0.298	0.192	0.069	0.113	0.126	0.079	0.041	0.038
	98197	OTHR	0.452	1.949	-0.214	-0.141	-2.616	-0.196	-0.109	-1.508
		TEMP	-11.733	-4.685	-1.499	4.215	6.202	0.220	0.358	-0.438
		HYDR	0.414	0.266	0.108	0.072	0.133	0.034	0.017	0.035
	98103	OTHR	0.937	2.239	-0.127	-1.911	0.510	-0.503	-1.454	-0.318
		TEMP	-7.870	-5.563	-0.327	12.878	12.662	0.251	0.583	0.155
		HYDR	0.056	0.174	0.229	0.090	0.079	0.016	0.023	0.001

OTHR: Loads other than thermal and hydrodynamic loads

TEMP: Thermal loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

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Table 6.3.3-4 Combined Forces and Moments, LOCA + SSE After 6 minutes: Winter
– Load ID = 7241 (Site-Specific Seismic Load Combination CV-11a)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	OTHR	-1.721	-7.080	-0.037	0.221	1.277	0.029	-0.010	0.861
		TEMP	-3.476	1.649	-0.329	-6.696	-6.462	-0.046	0.105	1.012
		SEIS	2.142	2.953	0.758	0.503	2.930	0.088	0.072	1.275
		HYDR	1.333	3.785	0.094	0.270	1.646	0.012	0.017	0.770
	5013	OTHR	-2.238	-7.547	0.064	0.164	1.489	-0.002	-0.005	1.043
		TEMP	-3.121	1.796	-0.097	-6.854	-6.851	-0.006	0.027	0.925
		SEIS	2.267	4.399	0.665	0.679	2.926	0.030	0.054	1.264
		HYDR	1.490	3.953	0.386	0.302	1.787	0.001	0.012	0.866
	5024	OTHR	-2.095	-7.067	0.044	0.328	1.288	-0.006	0.008	0.873
		TEMP	-3.419	1.892	-0.003	-6.894	-6.129	-0.026	-0.036	1.045
		SEIS	1.619	3.950	0.225	0.506	2.294	0.012	0.056	0.960
		HYDR	1.625	3.854	0.189	0.309	1.745	0.009	0.017	0.851
2 RPV Pedestal Mid-Height	6006	OTHR	0.767	-6.834	0.052	-0.032	-0.130	0.024	0.070	-0.291
		TEMP	0.080	1.775	0.154	-6.175	-4.043	0.264	0.065	-1.515
		SEIS	0.998	4.294	0.936	0.123	0.554	0.191	0.396	0.349
		HYDR	0.321	4.221	0.218	0.039	0.284	0.023	0.033	0.059
	6013	OTHR	0.494	-6.846	0.206	-0.186	-0.186	0.005	-0.003	-0.272
		TEMP	-0.061	1.444	-0.177	-6.419	-3.904	-0.057	-0.026	-1.669
		SEIS	1.250	4.275	0.811	1.159	0.874	0.069	0.070	0.403
		HYDR	0.331	3.890	0.369	0.074	0.270	0.008	0.011	0.057
	6024	OTHR	0.775	-5.113	-0.478	0.284	0.121	0.016	-0.003	-0.239
		TEMP	-0.245	2.050	0.059	-7.408	-2.297	-0.304	-0.003	-1.547
		SEIS	1.065	4.010	0.662	1.124	0.972	0.065	0.078	0.486
		HYDR	0.328	3.114	0.438	0.055	0.261	0.019	0.019	0.021
3 RPV Pedestal Top	6606	OTHR	0.315	-5.553	0.777	0.375	2.444	0.055	0.186	-0.953
		TEMP	20.997	2.192	0.564	-6.643	-5.510	-0.035	-1.941	0.870
		SEIS	1.630	4.534	1.370	0.480	2.986	0.635	1.412	1.063
		HYDR	0.601	3.767	0.658	0.515	3.067	0.157	0.498	0.865
	6613	OTHR	0.036	-5.718	-0.072	0.241	2.446	-0.122	-0.054	-0.994
		TEMP	21.088	1.964	-0.425	-6.702	-5.546	0.139	2.063	0.862
		SEIS	2.808	4.079	0.671	0.852	2.909	0.361	0.380	1.057
		HYDR	0.579	3.509	0.305	0.452	2.863	0.129	0.324	0.851
	6624	OTHR	0.552	-5.439	0.318	0.350	2.145	0.159	0.025	-0.769
		TEMP	21.900	2.601	0.228	-6.671	-5.665	0.005	-2.338	1.055
		SEIS	2.451	5.382	1.109	0.760	2.776	0.235	0.259	0.966
		HYDR	0.534	3.632	0.319	0.447	2.797	0.153	0.426	0.817
4 RCCV Wetwell Bottom	1806	OTHR	-0.012	-2.905	-0.005	0.242	1.435	0.017	0.011	0.534
		TEMP	2.533	0.468	-0.194	-4.438	-8.138	0.077	0.083	-1.750
		SEIS	2.179	6.277	3.312	0.270	1.493	0.128	0.035	0.581
		HYDR	0.703	0.817	0.455	0.397	2.392	0.010	0.005	0.996
	1813	OTHR	-0.204	-3.168	0.205	0.237	1.557	0.000	-0.002	0.636
		TEMP	1.866	-2.167	-0.420	-4.274	-7.773	-0.025	-0.007	-1.523
		SEIS	1.545	6.550	2.983	0.262	1.242	0.044	0.024	0.545
		HYDR	0.673	0.829	0.413	0.399	2.377	0.008	0.004	1.013
	1824	OTHR	0.188	-3.215	-0.001	0.239	1.372	0.008	-0.006	0.577
		TEMP	2.926	-2.481	0.046	-4.432	-8.134	0.020	-0.085	-1.667
		SEIS	1.768	6.994	3.460	0.274	1.171	0.058	0.038	0.552
		HYDR	0.756	0.570	0.387	0.403	2.421	0.009	0.007	1.029

OTHR: Loads other than thermal, seismic and hydrodynamic loads

TEMP: Thermal loads

SEIS: Seismic loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.



**Table 6.3.3-4 Combined Forces and Moments, LOCA + SSE After 6 minutes: Winter
– Load ID = 7241 (Site-Specific Seismic Load Combination CV-11a) (Continued)**

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
5 RCCV Wetwell Mid-Height	2606	OTHR	1.751	-2.464	-0.048	-0.114	-0.452	-0.003	0.007	-0.054
		TEMP	1.379	0.586	-0.171	-3.308	-1.033	0.018	0.039	0.074
		SEIS	0.699	5.697	3.529	0.070	0.088	0.136	0.023	0.160
		HYDR	0.888	0.605	0.524	0.052	0.296	0.023	0.004	0.184
	2613	OTHR	1.472	-2.874	0.184	-0.144	-0.486	0.000	-0.006	0.000
		TEMP	0.111	-2.544	-0.109	-3.090	-1.052	0.009	-0.075	0.370
		SEIS	1.262	6.011	3.383	0.139	0.173	0.054	0.014	0.230
		HYDR	0.859	0.630	0.432	0.044	0.234	0.021	0.010	0.149
	2624	OTHR	1.745	-2.695	-0.006	-0.086	-0.489	-0.002	0.003	-0.071
		TEMP	0.965	-2.909	-0.087	-3.293	-0.935	-0.026	0.067	0.189
		SEIS	0.738	6.218	3.359	0.129	0.236	0.080	0.025	0.270
		HYDR	0.999	0.525	0.348	0.067	0.237	0.006	0.006	0.142
6 RCCV Wetwell Top	3406	OTHR	1.696	-1.843	0.133	-0.056	-0.200	0.076	-0.040	-0.003
		TEMP	11.723	1.461	0.327	-4.151	-8.468	-0.227	0.461	3.349
		SEIS	0.447	4.938	3.456	0.113	0.667	0.203	0.177	0.230
		HYDR	0.630	0.484	0.561	0.095	0.369	0.133	0.156	0.196
	3413	OTHR	1.426	-2.624	0.098	-0.093	-0.262	-0.111	0.053	0.033
		TEMP	8.032	-3.439	0.044	-4.382	-9.151	-0.402	0.538	3.335
		SEIS	0.861	5.510	3.417	0.079	0.438	0.116	0.116	0.271
		HYDR	0.491	0.532	0.354	0.050	0.255	0.066	0.069	0.166
	3424	OTHR	1.452	-2.017	0.061	-0.004	-0.072	0.071	-0.024	0.007
		TEMP	10.292	-4.166	0.471	-3.681	-5.045	-0.039	-0.006	2.165
		SEIS	0.849	5.373	2.995	0.130	1.059	0.090	0.088	0.375
		HYDR	0.520	0.441	0.274	0.022	0.234	0.037	0.056	0.151
7 RCCV Drywell Bottom	3606	OTHR	1.704	-1.271	0.041	-0.007	0.121	0.093	-0.002	0.391
		TEMP	8.504	1.377	0.674	-5.342	-9.036	0.607	0.534	-1.980
		SEIS	0.323	4.755	3.582	0.115	0.737	0.097	0.167	0.403
		HYDR	0.652	0.500	0.361	0.085	0.342	0.038	0.149	0.126
	3613	OTHR	1.477	-2.084	0.146	0.022	0.413	-0.104	-0.003	0.604
		TEMP	4.607	-4.161	1.005	-4.955	-6.227	-0.363	0.317	-0.820
		SEIS	0.756	5.564	3.380	0.137	0.701	0.052	0.107	0.379
		HYDR	0.450	0.433	0.143	0.075	0.341	0.080	0.072	0.114
	3624	OTHR	1.448	-1.655	0.073	0.111	0.567	0.072	0.011	0.467
		TEMP	-4.291	-6.043	0.252	-0.934	-2.498	0.068	0.000	0.351
		SEIS	0.615	6.166	3.204	0.219	0.861	0.100	0.055	0.234
		HYDR	0.411	0.284	0.291	0.071	0.323	0.027	0.050	0.094
8 RCCV Drywell Mid-Height	4006	OTHR	1.214	-0.863	0.055	-0.085	-0.248	0.006	0.028	-0.165
		TEMP	5.952	2.178	0.212	-5.110	-5.057	0.011	-0.126	-0.683
		SEIS	1.109	4.148	3.283	0.174	0.735	0.103	0.094	0.349
		HYDR	0.646	0.410	0.173	0.035	0.329	0.021	0.111	0.106
	4013	OTHR	1.248	-2.158	0.278	-0.125	-0.420	0.008	-0.012	-0.135
		TEMP	4.287	-5.850	1.041	-4.672	-4.289	0.014	-0.132	-0.308
		SEIS	0.926	5.260	3.257	0.119	0.629	0.088	0.042	0.289
		HYDR	0.476	0.531	0.075	0.039	0.073	0.035	0.041	0.083
	4976	OTHR	1.129	-1.133	0.038	0.029	-0.054	0.000	-0.012	-0.233
		TEMP	-2.660	-5.335	0.580	-0.954	-1.780	0.003	0.013	-0.584
		SEIS	0.398	5.070	3.298	0.138	0.389	0.035	0.029	0.176
		HYDR	0.193	0.232	0.209	0.030	0.031	0.013	0.005	0.069

OTHR: Loads other than thermal, seismic and hydrodynamic loads

TEMP: Thermal loads

SEIS: Seismic loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.



**Table 6.3.3-4 Combined Forces and Moments, LOCA + SSE After 6 minutes: Winter
– Load ID = 7241 (Site-Specific Seismic Load Combination CV-11a) (Continued)**

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
9 RCCV Drywell Top	4406	OTHR	0.462	-0.470	0.060	0.184	1.145	0.001	0.000	-0.376
		TEMP	6.433	1.711	-0.232	-4.475	-3.816	0.299	0.087	-0.150
		SEIS	1.163	3.470	2.775	0.368	2.106	0.071	0.091	0.443
		HYDR	0.203	0.252	0.046	0.073	0.300	0.056	0.059	0.229
	4413	OTHR	-0.011	-2.231	0.217	0.116	1.168	0.035	0.008	-0.486
		TEMP	0.711	-6.632	-0.292	-4.753	-4.467	0.253	-0.243	0.643
		SEIS	0.636	5.001	2.883	0.239	1.502	0.148	0.018	0.269
		HYDR	0.516	0.629	0.230	0.226	0.253	0.171	0.080	0.264
	4424	OTHR	0.866	-0.757	0.013	0.293	1.525	0.019	0.002	-0.486
		TEMP	-5.846	-4.171	0.767	-0.363	1.129	-0.024	-0.022	-1.462
		SEIS	0.708	4.101	3.512	0.102	0.660	0.030	0.024	0.142
		HYDR	0.123	0.187	0.147	0.037	0.220	0.003	0.005	0.090
10 Basemat @ Center	80003	OTHR	-3.175	-1.946	0.153	1.397	1.904	-0.049	0.206	-0.145
		TEMP	-4.270	-5.140	0.021	-8.130	-8.102	-0.039	0.029	-0.008
		SEIS	2.115	1.714	1.074	9.349	9.265	0.289	0.274	0.336
		HYDR	0.908	0.831	0.076	3.250	2.955	0.047	0.202	0.192
	80007	OTHR	-3.205	-1.955	0.136	1.469	1.925	-0.032	-0.005	-0.235
		TEMP	-4.296	-5.104	0.056	-8.096	-8.099	-0.037	0.028	-0.009
		SEIS	2.096	1.715	0.945	9.322	9.269	0.226	0.114	0.420
		HYDR	0.906	0.817	0.065	3.190	2.945	0.049	0.168	0.228
	80012	OTHR	-3.256	-1.946	0.137	1.475	1.927	-0.035	-0.209	-0.025
		TEMP	-4.302	-5.040	0.042	-8.079	-8.109	-0.032	0.024	-0.001
		SEIS	2.025	1.725	0.877	9.282	9.261	0.139	0.356	0.258
		HYDR	0.885	0.797	0.050	3.157	2.919	0.041	0.254	0.145
11 Basemat Inside RPV Pedestal	80206	OTHR	-2.854	-2.080	0.229	-1.020	-0.813	0.857	1.084	-1.231
		TEMP	-4.260	-5.523	0.137	-8.575	-8.460	0.003	0.005	-0.035
		SEIS	2.387	1.714	1.373	7.475	7.088	1.409	1.372	1.504
		HYDR	1.044	0.895	0.149	4.683	4.269	0.707	0.579	0.597
	80213	OTHR	-2.961	-1.956	0.101	0.027	-1.759	-0.131	-0.087	-1.683
		TEMP	-4.445	-5.127	0.161	-8.289	-8.565	-0.151	-0.018	-0.103
		SEIS	2.167	1.715	0.967	7.791	6.098	0.775	0.532	1.811
		HYDR	0.965	0.838	0.086	3.929	4.879	0.437	0.351	0.777
	80224	OTHR	-3.447	-2.337	0.065	-1.395	-0.110	-0.176	-1.396	-0.147
		TEMP	-4.372	-4.948	0.081	-8.177	-8.193	-0.045	-0.038	0.010
		SEIS	1.838	1.861	0.338	5.314	6.997	0.454	1.698	0.407
		HYDR	0.869	0.635	0.079	4.696	3.714	0.336	0.750	0.279

OTHR: Loads other than thermal, seismic and hydrodynamic loads

TEMP: Thermal loads

SEIS: Seismic loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

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Table 6.3.3-4 Combined Forces and Moments, LOCA + SSE After 6 minutes: Winter
– Load ID = 7241 (Site-Specific Seismic Load Combination CV-11a) (Continued)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
12 S/P Slab @ RPV	83306	OTHR	-0.087	0.887	-0.398	0.209	0.695	-0.060	1.589	-0.033
		TEMP	-10.607	10.981	0.454	-4.700	-2.770	0.032	-0.288	0.000
		SEIS	0.341	0.981	1.083	2.394	1.598	0.197	1.249	0.097
		HYDR	1.136	0.794	0.394	0.982	0.646	0.066	2.051	0.046
	83313	OTHR	0.112	0.650	-0.101	0.259	0.709	0.040	1.601	0.044
		TEMP	-10.822	11.242	-0.850	-4.737	-2.848	-0.039	-0.302	-0.028
		SEIS	0.645	1.083	0.731	2.325	1.562	0.169	1.238	0.076
		HYDR	1.082	0.810	0.252	0.956	0.588	0.111	2.021	0.039
	83324	OTHR	0.148	1.112	0.055	0.170	0.661	-0.038	1.550	-0.048
		TEMP	-10.702	11.862	1.279	-4.487	-2.654	0.006	-0.156	0.046
		SEIS	0.657	0.611	0.701	2.158	1.488	0.194	1.187	0.103
		HYDR	1.121	0.856	0.266	0.907	0.523	0.078	1.968	0.045
13 S/P Slab @ Center	83406	OTHR	0.098	0.648	-0.304	-2.188	-0.362	-0.026	0.001	0.003
		TEMP	-6.490	4.881	-0.530	-3.815	-3.181	-0.001	-0.306	0.016
		SEIS	0.317	1.270	0.838	0.985	0.747	0.153	0.614	0.023
		HYDR	1.106	0.797	0.225	3.093	0.966	0.049	0.290	0.003
	83413	OTHR	0.414	0.442	-0.019	-2.163	-0.368	-0.004	0.009	0.002
		TEMP	-6.986	5.307	0.315	-3.900	-3.257	-0.015	-0.278	-0.011
		SEIS	0.638	0.839	0.651	0.985	0.723	0.112	0.602	0.005
		HYDR	1.054	0.819	0.140	3.078	0.943	0.058	0.281	0.003
	83424	OTHR	0.273	0.853	0.026	-2.129	-0.363	0.004	-0.021	0.000
		TEMP	-6.630	5.823	0.078	-3.895	-3.148	-0.003	-0.210	0.009
		SEIS	0.790	0.631	0.380	0.971	0.683	0.128	0.555	0.006
		HYDR	1.100	0.884	0.137	3.056	0.928	0.049	0.276	0.003
14 S/P Slab @ RCCV	83506	OTHR	0.207	0.520	-0.237	0.638	-0.124	-0.024	-1.233	0.001
		TEMP	-3.948	2.320	-0.446	-2.906	-3.131	-0.038	-0.275	0.016
		SEIS	0.260	1.392	0.583	1.985	0.119	0.059	0.235	0.044
		HYDR	1.024	0.791	0.166	1.721	0.267	0.017	1.913	0.010
	83513	OTHR	0.558	0.392	0.005	0.623	-0.129	-0.005	-1.223	0.002
		TEMP	-4.567	2.419	0.440	-3.190	-3.174	-0.008	-0.192	-0.001
		SEIS	0.592	0.654	0.631	1.978	0.198	0.024	0.221	0.020
		HYDR	0.978	0.820	0.137	1.684	0.258	0.017	1.909	0.008
	83524	OTHR	0.318	0.765	0.028	0.748	-0.081	-0.001	-1.251	0.001
		TEMP	-4.038	3.201	-0.017	-3.278	-3.153	0.013	-0.168	-0.005
		SEIS	0.759	0.654	0.269	1.792	0.218	0.014	0.132	0.035
		HYDR	1.028	0.899	0.128	1.687	0.241	0.015	1.906	0.007

OTHR: Loads other than thermal, seismic and hydrodynamic loads

TEMP: Thermal loads

SEIS: Seismic loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

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**Table 6.3.3-4 Combined Forces and Moments, LOCA + SSE After 6 minutes: Winter
– Load ID = 7241 (Site-Specific Seismic Load Combination CV-11a) (Continued)**

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
15 Top slab @ Drywell Head Opening	98120	OTHR	0.421	0.816	0.977	0.627	0.430	0.266	0.254	-0.587
		TEMP	-7.068	-4.258	-0.770	0.956	0.732	2.765	-0.161	-0.002
		SEIS	1.607	0.813	0.799	0.700	0.353	0.496	0.146	0.603
		HYDR	0.234	0.076	0.098	0.050	0.072	0.037	0.009	0.019
	98135	OTHR	0.349	-0.229	-0.427	0.341	-0.139	0.176	0.119	-0.815
		TEMP	-8.729	-5.283	0.235	3.147	-2.057	-1.132	0.380	-0.267
		SEIS	3.466	0.367	0.494	0.943	0.391	0.204	0.095	0.513
		HYDR	0.372	0.053	0.077	0.068	0.020	0.017	0.005	0.008
	98104	OTHR	-0.148	1.917	-0.586	0.611	1.842	-0.186	-0.300	-0.460
		TEMP	-4.999	-1.752	0.585	-1.461	3.712	-1.500	0.185	-0.214
		SEIS	0.309	1.677	0.439	0.369	2.260	0.434	0.051	0.327
		HYDR	0.068	0.287	0.110	0.021	0.123	0.027	0.005	0.044
16 Top slab @ Center	98149	OTHR	0.450	1.078	-0.165	0.065	-0.064	0.297	0.006	0.146
		TEMP	-6.075	-2.540	-1.137	2.229	2.310	0.496	0.037	0.048
		SEIS	2.231	0.717	0.804	1.033	0.301	0.080	0.064	0.404
		HYDR	0.345	0.181	0.037	0.047	0.036	0.026	0.016	0.020
	98170	OTHR	0.423	0.828	-0.255	0.184	0.016	-0.003	-0.013	-0.090
		TEMP	-5.510	-3.566	-1.042	2.141	2.864	-0.042	0.030	0.389
		SEIS	1.905	0.288	0.656	0.950	1.003	0.111	0.024	0.090
		HYDR	0.250	0.178	0.120	0.036	0.051	0.012	0.005	0.005
	98109	OTHR	0.313	1.292	-0.126	0.521	1.173	-0.161	-0.042	-0.247
		TEMP	-6.256	-0.887	0.773	1.219	2.564	-0.119	0.329	-0.005
		SEIS	0.210	1.333	0.569	0.967	1.400	0.244	0.165	0.160
		HYDR	0.044	0.151	0.182	0.029	0.084	0.025	0.005	0.013
17 Top slab @ RCCV	98174	OTHR	0.779	0.960	-0.010	-0.014	0.058	0.254	0.042	-0.058
		TEMP	-4.871	-2.689	-0.476	2.352	3.211	0.255	-0.023	0.434
		SEIS	1.356	1.025	0.528	1.016	0.770	0.408	0.240	0.098
		HYDR	0.293	0.187	0.067	0.110	0.121	0.081	0.040	0.036
	98197	OTHR	0.484	1.096	-0.194	-0.198	-0.931	-0.033	-0.028	-0.502
		TEMP	-7.584	-2.926	-1.360	1.917	3.110	0.130	0.154	-0.447
		SEIS	1.120	0.360	0.727	0.383	1.561	0.243	0.095	0.941
		HYDR	0.411	0.261	0.107	0.072	0.127	0.034	0.016	0.036
	98103	OTHR	0.450	1.419	-0.048	-0.213	0.412	-0.189	-0.391	-0.124
		TEMP	-6.577	-2.458	-0.070	3.431	3.308	0.118	0.450	0.084
		SEIS	0.268	1.393	0.788	2.654	0.600	0.298	1.252	0.160
		HYDR	0.058	0.171	0.217	0.090	0.080	0.014	0.023	0.002

OTHR: Loads other than thermal, seismic and hydrodynamic loads

TEMP: Thermal loads

SEIS: Seismic loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.



Table 6.3.3-5 Combined Forces and Moments, LOCA + SSE After 72 hours: Winter
– Load ID = 7441 (Site-Specific Seismic Load Combination CV-11b)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
1 RPV Pedestal Bottom	5006	OTHR	-1.959	-7.403	-0.039	0.300	1.747	0.031	-0.011	1.069
		TEMP	-12.849	0.250	-0.523	-16.011	-12.625	-0.093	0.227	4.158
		SEIS	2.142	2.953	0.758	0.503	2.930	0.088	0.072	1.275
		HYDR	1.030	2.969	0.088	0.208	1.273	0.009	0.012	0.595
	5013	OTHR	-2.481	-7.839	0.058	0.240	1.953	-0.002	-0.005	1.254
		TEMP	-12.356	0.343	-0.104	-16.288	-13.239	-0.007	0.021	4.062
		SEIS	2.267	4.399	0.665	0.679	2.926	0.030	0.054	1.264
		HYDR	1.150	3.029	0.369	0.232	1.379	0.001	0.009	0.668
	5024	OTHR	-2.332	-7.305	0.048	0.409	1.729	-0.008	0.009	1.066
		TEMP	-12.862	0.231	0.003	-16.285	-11.829	-0.073	-0.054	4.265
		SEIS	1.619	3.950	0.225	0.506	2.294	0.012	0.056	0.960
		HYDR	1.260	2.975	0.188	0.241	1.360	0.007	0.012	0.662
2 RPV Pedestal Mid-Height	6006	OTHR	0.981	-7.151	0.031	-0.042	-0.173	0.024	0.072	-0.321
		TEMP	-2.408	0.615	0.443	-16.093	-14.923	0.436	0.146	-1.774
		SEIS	0.998	4.294	0.936	0.123	0.554	0.191	0.396	0.349
		HYDR	0.266	3.408	0.166	0.030	0.241	0.019	0.027	0.044
	6013	OTHR	0.700	-7.139	0.200	-0.196	-0.231	0.005	-0.003	-0.302
		TEMP	-2.624	0.212	-0.206	-16.582	-14.795	-0.048	-0.033	-2.015
		SEIS	1.250	4.275	0.811	1.159	0.874	0.069	0.070	0.403
		HYDR	0.259	3.036	0.351	0.057	0.219	0.006	0.009	0.045
	6024	OTHR	1.014	-5.292	-0.498	0.290	0.093	0.016	-0.006	-0.253
		TEMP	-2.728	0.667	0.076	-18.533	-11.361	-0.661	0.020	-1.697
		SEIS	1.065	4.010	0.662	1.124	0.972	0.065	0.078	0.486
		HYDR	0.261	2.491	0.369	0.041	0.212	0.016	0.014	0.019
3 RPV Pedestal Top	6606	OTHR	0.456	-5.909	0.788	0.412	2.680	0.046	0.212	-0.987
		TEMP	8.837	0.682	0.577	-16.163	-12.297	0.057	-1.395	-2.012
		SEIS	1.630	4.534	1.370	0.480	2.986	0.635	1.412	1.063
		HYDR	0.552	2.994	0.564	0.428	2.438	0.156	0.487	0.661
	6613	OTHR	0.159	-6.083	-0.083	0.275	2.692	-0.114	-0.076	-1.034
		TEMP	9.213	0.732	-0.359	-16.199	-12.536	0.030	1.518	-1.952
		SEIS	2.808	4.079	0.671	0.852	2.909	0.361	0.380	1.057
		HYDR	0.519	2.708	0.314	0.367	2.223	0.114	0.313	0.649
	6624	OTHR	0.692	-5.765	0.318	0.387	2.372	0.152	0.045	-0.800
		TEMP	9.545	0.848	0.253	-16.174	-12.377	0.066	-1.768	-1.800
		SEIS	2.451	5.382	1.109	0.760	2.776	0.235	0.259	0.966
		HYDR	0.491	2.860	0.273	0.368	2.206	0.145	0.411	0.629
4 RCCV Wetwell Bottom	1806	OTHR	0.168	-2.403	-0.032	0.316	1.878	0.017	0.011	0.680
		TEMP	-1.533	-1.021	-0.228	-10.248	-14.646	0.090	0.096	-1.555
		SEIS	2.179	6.277	3.312	0.270	1.493	0.128	0.035	0.581
		HYDR	0.574	0.582	0.330	0.296	1.771	0.007	0.004	0.746
	1813	OTHR	-0.030	-2.736	0.201	0.310	2.002	-0.001	-0.003	0.787
		TEMP	-2.037	-4.249	-0.394	-10.039	-14.121	-0.043	-0.006	-1.254
		SEIS	1.545	6.550	2.983	0.262	1.242	0.044	0.024	0.545
		HYDR	0.555	0.592	0.291	0.298	1.767	0.007	0.004	0.755
	1824	OTHR	0.385	-2.712	0.001	0.310	1.802	0.008	-0.005	0.724
		TEMP	-1.011	-4.103	0.136	-10.224	-14.384	0.028	-0.105	-1.321
		SEIS	1.768	6.994	3.460	0.274	1.171	0.058	0.038	0.552
		HYDR	0.623	0.400	0.281	0.305	1.826	0.008	0.007	0.778

OTHR: Loads other than thermal, seismic and hydrodynamic loads

TEMP: Thermal loads

SEIS: Seismic loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

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Table 6.3.3-5 Combined Forces and Moments, LOCA + SSE: 72 hr. after: Winter:
– Load ID = 7441 (Site-Specific Seismic Load Combination CV-11b) (Continued)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
5 RCCV Wetwell Mid-Height	2606	OTHR	2.266	-1.954	-0.083	-0.145	-0.581	-0.003	0.007	-0.051
		TEMP	-4.269	-1.249	-0.234	-9.962	-7.559	0.001	0.044	0.117
		SEIS	0.699	5.697	3.529	0.070	0.088	0.136	0.023	0.160
		HYDR	0.693	0.434	0.372	0.042	0.234	0.016	0.002	0.144
	2613	OTHR	1.945	-2.471	0.182	-0.174	-0.607	0.000	-0.007	0.006
		TEMP	-5.197	-5.323	-0.038	-9.725	-7.432	-0.015	-0.093	0.418
		SEIS	1.262	6.011	3.383	0.139	0.173	0.054	0.014	0.230
		HYDR	0.662	0.456	0.300	0.035	0.187	0.014	0.008	0.117
	2624	OTHR	2.247	-2.211	-0.011	-0.109	-0.615	-0.002	0.003	-0.078
		TEMP	-4.923	-4.754	-0.111	-10.020	-7.637	-0.043	0.078	0.194
		SEIS	0.738	6.218	3.359	0.129	0.236	0.080	0.025	0.270
		HYDR	0.765	0.373	0.246	0.051	0.193	0.005	0.005	0.115
6 RCCV Wetwell Top	3406	OTHR	2.118	-1.320	0.100	-0.056	-0.180	0.062	-0.029	-0.022
		TEMP	5.196	-0.343	0.501	-10.839	-14.129	0.028	0.144	2.477
		SEIS	0.447	4.938	3.456	0.113	0.667	0.203	0.177	0.230
		HYDR	0.457	0.355	0.398	0.070	0.277	0.095	0.111	0.142
	3413	OTHR	1.796	-2.240	0.110	-0.097	-0.220	-0.094	0.045	0.008
		TEMP	3.430	-7.154	0.362	-10.781	-14.124	-0.109	0.133	2.640
		SEIS	0.861	5.510	3.417	0.079	0.438	0.116	0.116	0.271
		HYDR	0.351	0.394	0.249	0.037	0.189	0.049	0.050	0.117
	3424	OTHR	1.807	-1.530	0.049	0.015	0.047	0.054	-0.015	-0.042
		TEMP	2.843	-6.398	0.484	-9.990	-9.736	0.045	-0.108	0.896
		SEIS	0.849	5.373	2.995	0.130	1.059	0.090	0.088	0.375
		HYDR	0.371	0.320	0.194	0.016	0.163	0.027	0.040	0.108
7 RCCV Drywell Bottom	3606	OTHR	2.090	-0.794	0.001	-0.014	0.090	0.084	0.002	0.435
		TEMP	0.851	-0.258	0.079	-12.665	-14.960	0.282	0.179	-0.838
		SEIS	0.323	4.755	3.582	0.115	0.737	0.097	0.167	0.403
		HYDR	0.472	0.366	0.253	0.061	0.246	0.025	0.107	0.089
	3613	OTHR	1.822	-1.747	0.172	0.003	0.376	-0.084	-0.003	0.658
		TEMP	-0.941	-8.499	1.390	-12.337	-13.241	-0.243	0.024	-0.345
		SEIS	0.756	5.564	3.380	0.137	0.701	0.052	0.107	0.379
		HYDR	0.324	0.321	0.101	0.054	0.250	0.057	0.052	0.082
	3624	OTHR	1.793	-1.183	0.048	0.107	0.543	0.054	0.012	0.513
		TEMP	-10.577	-8.035	0.298	-7.210	-6.858	0.089	-0.061	1.477
		SEIS	0.615	6.166	3.204	0.219	0.861	0.100	0.055	0.234
		HYDR	0.292	0.201	0.206	0.053	0.242	0.019	0.036	0.069
8 RCCV Drywell Mid-Height	4006	OTHR	1.419	-0.394	0.046	-0.072	-0.239	0.012	0.027	-0.239
		TEMP	1.893	0.841	-0.323	-12.242	-12.219	0.193	-0.154	-0.810
		SEIS	1.109	4.148	3.283	0.174	0.735	0.103	0.094	0.349
		HYDR	0.466	0.297	0.118	0.025	0.231	0.015	0.079	0.076
	4013	OTHR	1.453	-1.865	0.296	-0.141	-0.440	0.008	-0.011	-0.201
		TEMP	1.197	-10.529	1.292	-12.197	-11.585	0.046	-0.165	-0.457
		SEIS	0.926	5.260	3.257	0.119	0.629	0.088	0.042	0.289
		HYDR	0.341	0.398	0.050	0.027	0.051	0.025	0.030	0.059
	4976	OTHR	1.391	-0.705	0.011	0.032	-0.033	0.001	-0.013	-0.313
		TEMP	-7.092	-6.953	0.638	-7.681	-8.655	0.012	0.039	-0.305
		SEIS	0.398	5.070	3.298	0.138	0.389	0.035	0.029	0.176
		HYDR	0.135	0.170	0.146	0.021	0.023	0.009	0.004	0.052

OTHR: Loads other than thermal, seismic and hydrodynamic loads

TEMP: Thermal loads

SEIS: Seismic loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.



Table 6.3.3-5 Combined Forces and Moments, LOCA + SSE After 72 hours: Winter
– Load ID = 7441 (Site-Specific Seismic Load Combination CV-11b) (Continued)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
9 RCCV Drywell Top	4406	OTHR	0.512	-0.025	0.111	0.289	1.684	0.007	0.000	-0.543
		TEMP	6.726	0.270	-1.390	-11.635	-9.864	0.510	0.460	-0.602
		SEIS	1.163	3.470	2.775	0.368	2.106	0.071	0.091	0.443
		HYDR	0.148	0.182	0.036	0.052	0.214	0.040	0.043	0.162
	4413	OTHR	0.013	-1.981	0.235	0.185	1.632	0.036	0.008	-0.639
		TEMP	-0.989	-11.897	-0.372	-12.126	-10.994	0.411	-0.180	0.175
		SEIS	0.636	5.001	2.883	0.239	1.502	0.148	0.018	0.269
		HYDR	0.363	0.469	0.168	0.162	0.182	0.123	0.057	0.187
	4424	OTHR	1.040	-0.391	-0.012	0.367	1.959	0.021	0.002	-0.613
		TEMP	-10.172	-5.565	0.973	-7.107	-5.872	-0.070	-0.009	-1.761
		SEIS	0.708	4.101	3.512	0.102	0.660	0.030	0.024	0.142
		HYDR	0.087	0.142	0.101	0.028	0.166	0.002	0.003	0.064
10 Basemat @ Center	80003	OTHR	-3.007	-1.759	0.151	0.338	0.888	-0.047	0.184	-0.127
		TEMP	-1.587	-2.420	-0.001	-8.464	-8.777	-0.040	0.022	-0.010
		SEIS	2.115	1.714	1.074	9.349	9.265	0.289	0.274	0.336
		HYDR	0.689	0.634	0.057	2.545	2.321	0.042	0.180	0.166
	80007	OTHR	-3.035	-1.767	0.135	0.412	0.909	-0.029	0.000	-0.206
		TEMP	-1.600	-2.375	0.039	-8.444	-8.779	-0.040	0.014	-0.014
		SEIS	2.096	1.715	0.945	9.322	9.269	0.226	0.114	0.420
		HYDR	0.688	0.622	0.051	2.496	2.314	0.045	0.157	0.193
	80012	OTHR	-3.087	-1.757	0.136	0.418	0.912	-0.033	-0.180	-0.021
		TEMP	-1.607	-2.298	0.028	-8.433	-8.799	-0.031	0.005	0.001
		SEIS	2.025	1.725	0.877	9.282	9.261	0.139	0.356	0.258
		HYDR	0.671	0.603	0.038	2.471	2.290	0.035	0.219	0.134
11 Basemat Inside RPV Pedestal	80206	OTHR	-2.678	-1.902	0.230	-1.814	-1.598	0.781	1.025	-1.187
		TEMP	-1.604	-2.924	0.120	-8.962	-9.256	0.034	-0.007	-0.049
		SEIS	2.387	1.714	1.373	7.475	7.088	1.409	1.372	1.504
		HYDR	0.804	0.702	0.105	3.702	3.366	0.602	0.480	0.476
	80213	OTHR	-2.784	-1.765	0.095	-0.848	-2.454	-0.120	-0.083	-1.605
		TEMP	-1.721	-2.346	0.088	-8.685	-9.343	-0.166	-0.026	-0.164
		SEIS	2.167	1.715	0.967	7.791	6.098	0.775	0.532	1.811
		HYDR	0.736	0.640	0.058	3.062	3.834	0.416	0.337	0.605
	80224	OTHR	-3.269	-2.165	0.062	-2.102	-0.956	-0.169	-1.305	-0.146
		TEMP	-1.574	-2.175	0.061	-8.644	-8.932	-0.052	-0.105	0.019
		SEIS	1.838	1.861	0.338	5.314	6.997	0.454	1.698	0.407
		HYDR	0.659	0.470	0.058	3.723	2.907	0.313	0.598	0.262

OTHR: Loads other than thermal, seismic and hydrodynamic loads

TEMP: Thermal loads

SEIS: Seismic loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

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Table 6.3.3-5 Combined Forces and Moments, LOCA + SSE After 72 hours: Winter
– Load ID = 7441 (Site-Specific Seismic Load Combination CV-11b) (Continued)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
12 S/P Slab @ RPV	83306	OTHR	-0.026	1.059	-0.412	-0.040	0.665	-0.063	1.807	-0.036
		TEMP	-11.672	3.835	0.218	-9.639	-8.194	0.035	-0.073	-0.040
		SEIS	0.341	0.981	1.083	2.394	1.598	0.197	1.249	0.097
		HYDR	0.990	0.616	0.366	0.765	0.514	0.058	1.530	0.036
	83313	OTHR	0.175	0.812	-0.096	0.015	0.679	0.041	1.819	0.048
		TEMP	-11.910	4.316	-0.426	-9.668	-8.271	-0.025	-0.075	0.011
		SEIS	0.645	1.083	0.731	2.325	1.562	0.169	1.238	0.076
		HYDR	0.927	0.623	0.255	0.751	0.465	0.104	1.507	0.030
	83324	OTHR	0.206	1.287	0.054	-0.078	0.631	-0.038	1.767	-0.052
		TEMP	-11.696	4.693	0.966	-9.530	-8.130	-0.002	0.004	0.007
		SEIS	0.657	0.611	0.701	2.158	1.488	0.194	1.187	0.103
		HYDR	0.959	0.664	0.265	0.716	0.420	0.072	1.470	0.036
13 S/P Slab @ Center	83406	OTHR	0.193	0.787	-0.310	-2.589	-0.534	-0.028	-0.070	0.003
		TEMP	-8.140	-0.574	-0.507	-9.101	-8.502	0.000	-0.107	0.016
		SEIS	0.317	1.270	0.838	0.985	0.747	0.153	0.614	0.023
		HYDR	0.941	0.627	0.200	2.291	0.733	0.043	0.226	0.003
	83413	OTHR	0.519	0.577	-0.019	-2.562	-0.540	-0.004	-0.061	0.002
		TEMP	-8.751	0.109	0.485	-9.199	-8.591	-0.012	-0.069	-0.008
		SEIS	0.638	0.839	0.651	0.985	0.723	0.112	0.602	0.005
		HYDR	0.879	0.643	0.139	2.280	0.712	0.055	0.218	0.003
	83424	OTHR	0.367	0.999	0.028	-2.529	-0.533	0.005	-0.092	0.000
		TEMP	-8.209	0.422	0.013	-9.166	-8.499	0.001	-0.043	0.006
		SEIS	0.790	0.631	0.380	0.971	0.683	0.128	0.555	0.006
		HYDR	0.919	0.699	0.135	2.265	0.703	0.046	0.216	0.003
14 S/P Slab @ RCCV	83506	OTHR	0.313	0.645	-0.239	0.991	-0.155	-0.025	-1.531	0.000
		TEMP	-6.270	-2.431	-0.382	-8.852	-8.637	-0.050	-0.135	0.021
		SEIS	0.260	1.392	0.583	1.985	0.119	0.059	0.235	0.044
		HYDR	0.849	0.624	0.149	1.309	0.196	0.015	1.419	0.008
	83513	OTHR	0.675	0.522	0.004	0.976	-0.161	-0.005	-1.521	0.002
		TEMP	-7.033	-2.078	0.612	-9.208	-8.687	-0.011	-0.022	0.001
		SEIS	0.592	0.654	0.631	1.978	0.198	0.024	0.221	0.020
		HYDR	0.795	0.647	0.132	1.278	0.187	0.017	1.416	0.007
	83524	OTHR	0.424	0.901	0.029	1.102	-0.110	-0.001	-1.549	0.001
		TEMP	-6.237	-1.445	-0.080	-9.171	-8.643	0.017	-0.039	-0.005
		SEIS	0.759	0.654	0.269	1.792	0.218	0.014	0.132	0.035
		HYDR	0.836	0.714	0.124	1.287	0.175	0.015	1.415	0.006

OTHR: Loads other than thermal, seismic and hydrodynamic loads

TEMP: Thermal loads

SEIS: Seismic loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

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Table 6.3.3-5 Combined Forces and Moments, LOCA + SSE After 72 hours: Winter
– Load ID = 7441 (Site-Specific Seismic Load Combination CV-11b) (Continued)

Location	Element ID		N _x (MN/m)	N _y (MN/m)	N _{xy} (MN/m)	M _x (MNm/m)	M _y (MNm/m)	M _{xy} (MNm/m)	Q _x (MN/m)	Q _y (MN/m)
15 Top slab @ Drywell Head Opening	98120	OTHR	0.283	0.926	1.091	0.861	0.544	0.392	0.290	-0.798
		TEMP	-11.465	-10.588	-5.034	7.058	5.009	5.155	-1.417	-1.082
		SEIS	1.607	0.813	0.799	0.700	0.353	0.496	0.146	0.603
		HYDR	0.167	0.057	0.071	0.036	0.052	0.026	0.006	0.014
	98135	OTHR	-0.136	-0.322	-0.474	0.554	-0.221	0.183	0.155	-1.059
		TEMP	-16.071	-6.982	2.437	10.528	-0.434	-1.821	1.058	-1.141
		SEIS	3.466	0.367	0.494	0.943	0.391	0.204	0.095	0.513
		HYDR	0.259	0.037	0.053	0.049	0.015	0.012	0.004	0.006
	98104	OTHR	-0.195	2.182	-0.694	0.792	2.553	-0.289	-0.361	-0.602
		TEMP	-6.701	-12.118	2.879	2.391	11.786	-3.140	0.876	-0.611
		SEIS	0.309	1.677	0.439	0.369	2.260	0.434	0.051	0.327
		HYDR	0.047	0.201	0.077	0.015	0.089	0.019	0.004	0.032
16 Top slab @ Center	98149	OTHR	0.191	1.354	-0.308	0.230	-0.048	0.349	0.009	0.251
		TEMP	-11.277	-3.014	-1.862	5.796	8.885	0.958	0.550	-1.906
		SEIS	2.231	0.717	0.804	1.033	0.301	0.080	0.064	0.404
		HYDR	0.245	0.130	0.028	0.034	0.026	0.019	0.012	0.014
	98170	OTHR	0.218	0.971	-0.319	0.369	0.178	-0.020	-0.020	-0.131
		TEMP	-9.611	-4.561	-0.870	4.301	5.407	-0.101	-0.114	0.048
		SEIS	1.905	0.288	0.656	0.950	1.003	0.111	0.024	0.090
		HYDR	0.176	0.127	0.084	0.025	0.036	0.009	0.003	0.004
	98109	OTHR	0.348	1.457	-0.158	0.767	1.612	-0.231	-0.076	-0.318
		TEMP	-7.853	-1.643	0.877	9.057	11.508	-0.324	0.767	0.077
		SEIS	0.210	1.333	0.569	0.967	1.400	0.244	0.165	0.160
		HYDR	0.030	0.106	0.129	0.021	0.060	0.018	0.004	0.009
17 Top slab @ RCCV	98174	OTHR	0.766	1.170	-0.048	0.120	0.176	0.371	0.089	-0.091
		TEMP	-9.261	-3.967	-1.472	5.055	6.597	0.112	-0.062	0.291
		SEIS	1.356	1.025	0.528	1.016	0.770	0.408	0.240	0.098
		HYDR	0.208	0.134	0.049	0.078	0.086	0.057	0.028	0.026
	98197	OTHR	0.467	1.292	-0.199	-0.183	-1.351	-0.075	-0.049	-0.764
		TEMP	-11.733	-4.685	-1.499	4.215	6.202	0.220	0.358	-0.438
		SEIS	1.120	0.360	0.727	0.383	1.561	0.243	0.095	0.941
		HYDR	0.290	0.186	0.078	0.051	0.091	0.024	0.011	0.026
	98103	OTHR	0.576	1.630	-0.068	-0.649	0.436	-0.269	-0.662	-0.174
		TEMP	-7.870	-5.563	-0.327	12.878	12.662	0.251	0.583	0.155
		SEIS	0.268	1.393	0.788	2.654	0.600	0.298	1.252	0.160
		HYDR	0.039	0.121	0.155	0.068	0.059	0.011	0.018	0.001

OTHR: Loads other than thermal, seismic and hydrodynamic loads

TEMP: Thermal loads

SEIS: Seismic loads

HYDR: Hydrodynamic loads

Note : Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.



Table 6.4.1-1 Material Constants for Stress Calculations

Material	Property	Value	
Concrete	Compressive strength, f_c'	Basemat	27.6 MPa
		Top Slab	41.4 MPa
		Others	34.5 MPa
	Young's modulus	Basemat	2.49×10^4 MPa
		Top Slab	3.04×10^4 MPa
		Others	2.78×10^4 MPa
	Poisson's ratio	0.17	
Reinforcement	Yield stress, f_y	413.6 MPa	
	Young's modulus	2.00×10^5 MPa	

Table 6.4.1-2 Allowable Stress of Concrete for Membrane Plus Bending

Load Category	Load Condition	Allowable Compressive Stress (MPa)		
Factored	Primary	Basemat	20.7	$(0.75 f_c')$
		Top Slab	31.1	
		Others	25.9	
	Primary plus secondary	Basemat	23.5	$(0.85 f_c')$
		Top Slab	35.2	
		Others	29.3	
Service	Primary	Basemat	12.4	$(0.45 f_c')$
		Top Slab	18.6	
		Others	15.5	
	Primary plus secondary	Basemat	16.6	$(0.60 f_c')$
		Top Slab	24.8	
		Others	20.7	

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Table 6.4.1-3 Allowable Stress of Reinforcement for Membrane Plus Bending

	Load Category	Load Condition	Allowable Stress (MPa)
Tension	Factored	Primary	372.2 (0.90 f_y)
		Primary plus secondary	
	Service	SIT	310.2 (0.75 f_y)
		Primary plus secondary	273.0 (0.66 f_y)
		Other	206.8 (0.50 f_y)
Compression	Factored	Primary	372.2 (0.90 f_y)
		Primary plus secondary	
	Service	SIT	273.0 (0.66 f_y)
		Primary plus secondary	
		Other	206.8 (0.50 f_y)

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Table 6.4.2-1 Allowable Stress of Concrete for Membrane Compressive Forces

Load Category	Load Condition	Allowable Compressive Stress (MPa)		
Factored	Primary	Basemat	16.6	(0.60 f_c')
		Top Slab	24.8	
		Others	20.7	
	Primary plus secondary	Basemat	20.7	(0.75 f_c')
		Top Slab	31.1	
		Others	25.9	
Service	Primary	Basemat	8.3	(0.30 f_c')
		Top Slab	12.4	
		Others	10.4	
	Primary plus secondary	Basemat	12.4	(0.45 f_c')
		Top Slab	18.6	
		Others	15.5	

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Table 7.1-1 Summary of Standard Rebar Arrangements in the RCCV Sections

Portion	Primary Reinforcement					Shear Reinforcement
	Size	Direction 1		Direction 2		
		Direction	Pitch	Direction	Pitch	Size
Basemat Top	#11	N-S	120 mm	E-W	120 mm	#11
Bottom	#11	N-S	200 mm	E-W	200 mm	
RCCV Wall	#18	Hoop	300 mm	Vertical	0.9°	#9
RPV Pedestal	#18	Hoop	300 mm	Vertical	1.8°	#9
Suppression Pool Slab	#18	Circum-ferential	300 mm	Radial	0.9° 1.8°	#9
Top Slab	#14	N-S	300 mm	E-W	300 mm	#9

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Table 7.3.1-1 Rebar Arrangements of RCCV

Structure	SECT_ID ^{*1}	Primary Reinforcement				
		Direction 1 ^{*2}		Direction 2 ^{*2}		Shear Tie
		Position	Arrangement ^{*3}	Position	Arrangement ^{*3}	Arrangement
RCCV	101	Inside	2-#18@300+1-#18@600	Inside	3-#18@0.9° (+1-#18@3.6°)	#9@1.2°x300
		Outside	3-#18@300	Outside	3-#18@0.9° (+1-#18@1.8°)	
	102	Inside	2-#18@300+1-#18@600	Inside	2-#18@0.9°	#9@1.2°x600
		Outside	3-#18@300+1-#18@600	Outside	3-#18@0.9°+1-#18@0.9°	
	103	Inside	2-#18@300+1-#18@600	Inside	2-#18@0.9°	#9@1.2°x600
		Outside	3-#18@300+1-#18@600	Outside	3-#18@0.9°+1-#18@0.9°	
	104	Inside	2-#18@300+1-#18@600	Inside	2-#18@0.9°	#9@1.2°x300
		Outside	3-#18@300+1-#18@600	Outside	3-#18@0.9°+1-#18@0.9°	
	105	Inside	2-#18@300+1-#18@600 (1-#18@300+1-#18@600)	Inside	2-#18@0.9°	#9@0.9°x300
		Outside	3-#18@300+1-#18@600 (+2-#18@600)	Outside	3-#18@0.9°+1-#18@0.9°	
	106	Inside	2-#18@300+1-#18@600 (+2-#18@600)	Inside	2-#18@0.9°	#9@0.9°x300
		Outside	3-#18@300+1-#18@600 (1-#18@300+1-#18@600)	Outside	3-#18@0.9°+1-#18@0.9°	
	107	Inside	2-#18@300	Inside	2-#18@0.9°	#9@1.2°x300
		Outside	3-#18@300	Outside	3-#18@0.9°+1-#18@1.8°	
	108	Inside	2-#18@300	Inside	2-#18@0.9° (+1-#18@1.8°)	#9@1.2°x300
		Outside	3-#18@300	Outside	3-#18@0.9°	
Pedestal	201	Inside	2-#18@300	Inside	3-#18@3.6°	#9@3.6°x600
		Outside	3-#18@300	Outside	3-#18@1.8°	
	202	Inside	2-#18@300	Inside	3-#18@3.6° (+1-#18@3.6°)	#9@1.8°x300
		Outside	3-#18@300	Outside	3-#18@1.8° (+1-#18@1.8°)	
	203	Inside	2-#18@300 (+1-#18@300)	Inside	3-#18@3.6°	#9@1.8°x300
		Outside	3-#18@300 (+1-#18@300)	Outside	3-#18@1.8°	

Note *1: See Figures 7.3.1-1 through 7.3.1-5.

Note *2: RCCV, Pedestal Direction1: Hoop, Direction2: Vertical,
S/P Slab Direction1: Radial, Direction2: Circumferential,
Top slab Direction1: N-S, Direction2: E-W,
Basemat @center Direction1: N-S, Direction2: E-W,

Basemat Inside RPV Pedestal Direction1: Top: Radial, Bottom: N-S, Direction2 Top: Circumferential, Bottom: E-W

Note *3: Rebar in parentheses indicates additional bars locally required

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Table 7.3.1-1 Rebar Arrangements of RCCV (Continued)

Structure	SECT_ID ^{*1}	Primary Reinforcement				
		Direction 1 ^{*2}		Direction 2 ^{*2}		Shear Tie Arrangement
		Position	Arrangement	Position	Arrangement	
Suppression Pool Slab	301	Top	2-#18@1.8°	Top	2-#18@300	#9@1.2°x300
		Bottom	2-#18@1.8°	Bottom	2-#18@300	
	302	Top	2-#18@1.8°	Top	2-#18@300	#9@1.2°x300
		Bottom	2-#18@1.8°	Bottom	2-#18@300	
	303	Top	2-#18@1.8°	Top	2-#18@300	#9@1.8°x600
		Bottom	2-#18@0.9°	Bottom	2-#18@300	
	304	Top	2-#18@0.9°	Top	2-#18@300	#9@1.8°x600
		Bottom	2-#18@0.9°	Bottom	2-#18@300	
	305	Top	2-#18@0.9°	Top	2-#18@300	#9@1.8°x300
		Bottom	2-#18@0.9°	Bottom	2-#18@300	
	306	Top	2-#18@0.9°	Top	2-#18@300	#9@0.72°x300
		Bottom	2-#18@0.9°	Bottom	2-#18@300	
	307	Top	2-#18@0.9°	Top	2-#18@300	#9@0.72°x300
		Bottom	2-#18@0.9°	Bottom	2-#18@300	

Note *1: See Figures 7.3.1-1 through 7.3.1-5.

Note *2: RCCV, Pedestal Direction1: Hoop, Direction2: Vertical,
 S/P Slab Direction1: Radial, Direction2: Circumferential,
 Top slab Direction1: N-S, Direction2: E-W,
 Basemat @center Direction1: N-S, Direction2: E-W,
 Basemat Inside RPV Pedestal Direction1: Top: Radial, Bottom: N-S, Direction2 Top : Circumferential, Bottom : E-W

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Table 7.3.1-1 Rebar Arrangements of RCCV (Continued)

Structure	SECT_ID ^{*1}	Primary Reinforcement				
		Direction 1 ^{*2}		Direction 2 ^{*2}		Shear Tie
		Position	Arrangement ^{*4}	Position	Arrangement ^{*4}	Arrangement
Top Slab ^{*3}	401	Top	3-#14@300	Top	3-#14@300	#9@600x600
		Bottom	3-#14@300	Bottom	3-#14@300	
	402	Top	3-#14@300	Top	3-#14@300 (1-#14@300+1-#14@600)	#9@600x600
		Bottom	3-#14@300	Bottom	3-#14@300	
	403	Top	3-#14@300	Top	3-#14@300	#9@600x300
		Bottom	3-#14@300	Bottom	3-#14@300	
	404	Top	3-#14@300	Top	3-#14@300 (1-#14@300+1-#14@600)	#9@600x300
		Bottom	3-#14@300	Bottom	3-#14@300	
	405	Top	3-#14@300	Top	3-#14@300	#9@300x300
		Bottom	3-#14@300	Bottom	3-#14@300	
	406	Top	3-#14@300	Top	3-#14@300 (1-#14@300+1-#14@600)	#9@300x300
		Bottom	3-#14@300	Bottom	3-#14@300	
	407	Top	3-#14@300 (+1-#14@600)	Top	3-#14@300 (1-#14@300+1-#14@600)	#9@600x600
		Bottom	3-#14@300	Bottom	3-#14@300	
	408	Top	3-#14@300 (+1-#14@600)	Top	3-#14@300 (1-#14@300+1-#14@600)	#9@300x300
		Bottom	3-#14@300	Bottom	3-#14@300	

Note *1: See Figures 7.3.1-1 through 7.3.1-5.

Note *2: RCCV, Pedestal Direction1: Hoop, Direction2: Vertical,
 S/P Slab Direction1: Radial, Direction2: Circumferential,
 Top slab Direction1: N-S, Direction2: E-W,
 Basemat @center Direction1: N-S, Direction2: E-W,

Basemat Inside RPV Pedestal Direction1: Top: Radial, Bottom: N-S, Direction2 Top : Circumferential, Bottom : E-W

Note *3: As described in Section 5.2.2, the rebar arrangement of the Top Slab is partially revised due to the TRACG calculated LOCA temperature. See Reactor Building Structural Design Report , Reference 2.1.2-u.

Note *4: Rebar in parentheses indicates additional bars locally required.

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Table 7.3.1-1 Rebar Arrangements of RCCV (Continued)

Structure	SECT ID *1	Primary Reinforcement				
		Direction 1 *2		Direction 2 *2		Shear Tie Arrangement
		Position	Arrangement *3	Position	Arrangement *3	
Basemat	801	Top	3-#11@120	Top	3-#11@120	#9@600x600
		Bottom	5-#11@200	Bottom	5-#11@200	
	802	Top	5-#11@1.8°	Top	4-#11@200+1-#11@400	#11@7.2°x400
		Bottom	5-#11@200	Bottom	5-#11@200	
	803	Top	5-#11@1.8°	Top	4-#11@200+1-#11@400	#11@1.8°x400
		Bottom	5-#11@200	Bottom	5-#11@200	
	804	Top	5-#11@1.8°	Top	4-#11@200+1-#11@400	#11@1.8°x400
		Bottom	5-#11@200 (+1-#11@200)	Bottom	5-#11@200 (+1-#11@200)	
	805	Top	5-#11@1.8°	Top	4-#11@200+1-#11@400	#11@1.8°x400
		Bottom	5-#11@200	Bottom	5-#11@200	
	806	Top	5-#11@1.8°	Top	4-#11@200+1-#11@400	#11@1.8°x400
		Bottom	5-#11@200	Bottom	5-#11@200	
	807	Top	5-#11@0.9°	Top	4-#11@200+1-#11@400	#11@1.8°x400
		Bottom	5-#11@200	Bottom	5-#11@200	
	808	Top	5-#11@0.9°	Top	4-#11@200	#11@0.9°x400
		Bottom	5-#11@200	Bottom	5-#11@200	
	809	Top	4-#11@200	Top	4-#11@200	#11@400x400
		Bottom	5-#11@200	Bottom	5-#11@200	
	810	Top	4-#11@200	Top	4-#11@200	#11@400x200
		Bottom	5-#11@200	Bottom	5-#11@200	
	811	Top	4-#11@200 (+2-#11@200)	Top	4-#11@200 (+2-#11@200)	#11@400x400
		Bottom	5-#11@200	Bottom	5-#11@200	
	812	Top	4-#11@200 (+2-#11@200)	Top	4-#11@200 (+2-#11@200)	#11@400x200
		Bottom	5-#11@200	Bottom	5-#11@200	

Note *1: See Figures 7.3.1-1 through 7.3.1-5.

Note *2: RCCV, Pedestal Direction1: Hoop, Direction2: Vertical,
 S/P Slab Direction1: Radial, Direction2: Circumferential,
 Top slab Direction1: N-S, Direction2: E-W,
 Basemat @center Direction1: N-S, Direction2: E-W,

Basemat Inside RPV Pedestal Direction1: Top: Radial, Bottom: N-S, Direction2 Top: Circumferential, Bottom: E-W

Note *3: Rebar in parentheses indicates additional bars locally required.

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Table 7.3.1-2 Sectional Thicknesses and Rebar Ratios of RCCV Used in the Evaluation

Location	Element ID	Thickness (m)	Primary Reinforcement				Shear Tie		
			Position	Direction 1 ¹		Direction2 ¹			
				Arrangement ²	Ratio (%)	Arrangement ²	Ratio (%)	Arrangement	Ratio (%)
1 RPV Pedestal Bottom	5006 5013 5024	2.4	Inside	2-#18@300	0.717	3-#18@3.6° (+1-#18@3.6°)	1.007	#9@1.8°x300	1.007
			Outside	3-#18@300	1.075	3-#18@1.8° (+1-#18@1.8°)	2.013		
2 RPV Pedestal Mid-Height	6006 6013 6024	2.4	Inside	2-#18@300	0.717	3-#18@3.6°	0.755	#9@3.6°x600	0.252
			Outside	3-#18@300	1.075	3-#18@1.8°	1.510		
3 RPV Pedestal Top	6606 6613 6624	2.4	Inside	2-#18@300 (+1-#18@300)	1.075	3-#18@3.6°	0.755	#9@1.8°x300	1.007
			Outside	3-#18@300 (+1-#18@300)	1.434	3-#18@1.8°	1.510		
4 RCCV Wetwell Bottom	1806 1813 1824	2.0	Inside	2-#18@300 +1-#18@600	1.075	3-#18@0.9° (+1-#18@3.6°)	1.405	#9@1.2°x300	0.540
			Outside	3-#18@300	1.290	3-#18@0.9° (+1-#18@1.8°)	1.513		
5 RCCV Wetwell Mid-Height	2606 2613 2624	2.0	Inside	2-#18@300 +1-#18@600	1.075	2-#18@0.9°	0.865	#9@1.2°x600	0.270
			Outside	3-#18@300 +1-#18@600	1.505	3-#18@0.9° +1-#18@0.9°	1.729		
6 RCCV Wetwell Top	3406 3413 3424	2.0	Inside	2-#18@300 +1-#18@600 (+1-#18@300 +1-#18@600)	1.720	2-#18@0.9°	0.865	#9@0.9°x300	0.721
			Outside	3-#18@300 +1-#18@600 (+2-#18@600)	1.935	3-#18@0.9° +1-#18@0.9°	1.729		
7 RCCV Drywell Bottom	3606 3613 3624	2.0	Inside	2-#18@300 +1-#18@600 (+2-#18@600)	1.505	2-#18@0.9°	0.865	#9@0.9°x300	0.721
			Outside	3-#18@300 +1-#18@600 (+1-#18@300 +1-#18@600)	2.151	3-#18@0.9° +1-#18@0.9°	1.729		
8 RCCV Drywell Mid-Height	4006 4013 4976	2.0	Inside	2-#18@300 +1-#18@600	1.075	2-#18@0.9°	0.865	#9@1.2°x600	0.270
			Outside	3-#18@300 +1-#18@600	1.505	3-#18@0.9° +1-#18@0.9°	1.729		
9 RCCV Drywell Top	4406 4413	2.0	Inside	2-#18@300 +1-#18@600	1.075	2-#18@0.9°	0.865	#9@1.2°x300	0.540
			Outside	3-#18@300 +1-#18@600	1.505	3-#18@0.9° +1-#18@0.9°	1.729		
	4424	2.0	Inside	2-#18@300	0.860	2-#18@0.9° (+1-#18@1.8°)	1.081	#9@1.2°x300	0.540
			Outside	3-#18@300	1.290	3-#18@0.9°	1.297		

Note *1: RCCV, Pedestal
S/P Slab
Top slab
Basemat @center
Basemat Inside RPV Pedestal

Direction1: Hoop,
Direction1: Radial,
Direction1: N-S,
Direction1: N-S,
Direction1: Top:Radial, Bottom: N-S,

Direction2: Vertical,
Direction2: Circumferential,
Direction2: E-W,
Direction2: E-W,
Direction2 Top : Circumferential, Bottom : E-W

Note *2: Rebar in parentheses indicates additional bars locally required.

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Table 7.3.1-2 Sectional Thicknesses and Rebar Ratios of RCCV Used in the Evaluation (Continued)

Location	Element ID	Thickness (m)	Position	Primary Reinforcement				Shear Tie	
				Direction 1 ¹		Direction 2 ¹		Arrangement	Ratio (%)
				Arrangement ²	Ratio (%)	Arrangement ²	Ratio (%)		
10 Basemat @ Center	80003 80007 80012	5.1	Top	3-#11@120	0.493	3-#11@120	0.493	#9@600x600	0.179
			Bottom	5-#11@200	0.493	5-#11@200	0.493		
11 Basemat Inside RPV Pedestal	80206 80213 80224	5.1	Top	5-#11@1.8°	0.507	4-#11@200 +1-#11@400	0.444	#11@1.8°x400	1.292
			Bottom	5-#11@200	0.493	5-#11@200	0.493		
12 S/P Slab @ RPV	83306 83313 83324	2.0	Top	2-#18@1.8°	0.913	2-#18@300	0.860	#9@1.2°x300	1.141
			Bottom	2-#18@1.8°	0.913	2-#18@300	0.860		
13 S/P Slab @ Center	83406 83413 83424	2.0	Top	2-#18@0.9°	1.264	2-#18@300	0.860	#9@1.8°x600	0.263
			Bottom	2-#18@0.9°	1.264	2-#18@300	0.860		
14 S/P Slab @ RCCV	83506 83513 83524	2.0	Top	2-#18@0.9°	0.966	2-#18@300	0.860	#9@0.72°x300	1.007
			Bottom	2-#18@0.9°	0.966	2-#18@300	0.860		
15 Top Slab @ Drywell Head Opening	98120	2.4	Top	3-#14@300	0.605	3-#14@300	0.605	#9@600x300	0.358
			Bottom	3-#14@300	0.605	3-#14@300	0.605		
	98135	2.4	Top	3-#14@300	0.605	3-#14@300	0.605	#9@600x300	0.358
			Bottom	3-#14@300 (+2-#14@300)	1.008	3-#14@300	0.605		
	98104	2.4	Top	3-#14@300	0.605	3-#14@300 (+2-#14@300 +1-#14@600)	1.109	#9@600x300	0.358
			Bottom	3-#14@300	0.605	3-#14@300 (+2-#14@300)	1.008		
16 Top Slab @ Center	98149 98109	2.4	Top	3-#14@300 (+1-#14@300)	0.806	3-#14@300 (+1-#14@300 +1-#14@600)	0.907	#9@600x600	0.179
			Bottom	3-#14@300	0.605	3-#14@300	0.605		
	98170	2.4	Top	3-#14@300	0.605	3-#14@300	0.605	#9@600x600	0.179
			Bottom	3-#14@300	0.605	3-#14@300	0.605		

Note *1: RCCV, Pedestal

S/P Slab

Top slab

Basemat @center

Basemat Inside RPV Pedestal

Direction1: Hoop,

Direction1: Radial,

Direction1: N-S,

Direction1: N-S,

Direction1: Top:Radial, Bottom: N-S,

Direction2: Vertical,

Direction2: Circumferential,

Direction2: E-W,

Direction2: E-W,

Direction2 Top : Circumferential, Bottom : E-W

Note *2: Rebar in parentheses indicates additional bars locally required.



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Table 7.3.1-2 Sectional Thicknesses and Rebar Ratios of RCCV Used in the Evaluation (Continued)

Location	Element ID	Thickness (m)	Primary Reinforcement				Shear Tie		
			Position	Direction 1 ¹		Direction 2 ¹			
				Arrangement ²	Ratio (%)	Arrangement ²	Ratio (%)	Arrangement	Ratio (%)
17 Top Slab @ RCCV	98174	2.4	Top	3-#14@300 (+1-#14@300)	0.806	3-#14@300 (+1-#14@300 +1-#14@600)	0.907	#9@600x600	0.179
			Bottom	3-#14@300	0.605	3-#14@300	0.605		
	98197 98103	2.4	Top	3-#14@300 (+1-#14@300)	0.806	3-#14@300 (+1-#14@300 +1-#14@600)	0.907	#9@300x300	0.717
			Bottom	3-#14@300	0.605	3-#14@300	0.605		

Note *1: RCCV, Pedestal
S/P Slab
Top slab
Basemat @center
Basemat Inside RPV Pedestal

Direction1: Hoop,
Direction1: Radial,
Direction1: N-S,
Direction1: N-S,
Direction1: Top:Radial, Bottom: N-S,

Direction2: Vertical,
Direction2: Circumferential,
Direction2: E-W,
Direction2: E-W,
Direction2 Top : Circumferential, Bottom : E-W

Note *2: Rebar in parentheses indicates additional bars locally required.

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Table 7.3.1-3 Rebar and Concrete Stresses of RCCV, Test -- Load ID = 1100
(Selected Load Combination CV-1)

Location	Element ID	Concrete Stress (MPa)		Primary Reinforcement Stress (MPa)				
		Calculated	Allowable	Calculated				Allowable
				Direction 1*		Direction 2*		
				In/Top	Out/Bottom	In/Top	Out/Bottom	
1 RPV Pedestal Bottom	5006	-4.3	-15.5	-2.6	-3.2	-11.3	-23.8	310.2
	5013	-4.6	-15.5	-4.3	-4.0	-11.3	-25.2	310.2
	5024	-4.2	-15.5	-3.2	-4.7	-10.9	-23.1	310.2
2 RPV Pedestal Mid-Height	6006	-3.1	-15.5	33.4	23.2	-21.0	-17.4	310.2
	6013	-3.1	-15.5	19.3	21.6	-21.2	-17.1	310.2
	6024	-2.1	-15.5	49.0	17.1	-13.8	-12.9	310.2
3 RPV Pedestal Top	6606	-4.7	-15.5	25.8	6.3	-0.7	-25.3	310.2
	6613	-4.6	-15.5	12.1	3.8	-5.1	-26.0	310.2
	6624	-4.4	-15.5	27.5	7.1	-4.6	-24.0	310.2
4 RCCV Wetwell Bottom	1806	-5.2	-15.5	20.2	3.3	25.2	-14.9	310.2
	1813	-5.4	-15.5	15.8	2.5	23.9	-16.2	310.2
	1824	-4.9	-15.5	26.1	5.0	18.6	-16.0	310.2
5 RCCV Wetwell Mid-Height	2606	-1.4	-15.5	56.7	46.6	-13.1	0.8	310.2
	2613	-1.7	-15.5	47.2	42.1	-16.4	0.3	310.2
	2624	-1.7	-15.5	57.9	44.7	-10.3	-2.7	310.2
6 RCCV Wetwell Top	3406	-0.9	-15.5	37.0	30.4	1.1	-4.6	310.2
	3413	-0.9	-15.5	28.9	28.4	-16.9	0.9	310.2
	3424	-0.5	-15.5	34.2	23.3	0.8	-6.0	310.2
7 RCCV Drywell Bottom	3606	-0.6	-15.5	40.6	27.1	-6.3	2.6	310.2
	3613	-1.3	-15.5	36.1	24.0	-6.5	-2.1	310.2
	3624	-2.1	-15.5	41.5	19.1	8.1	-4.7	310.2
8 RCCV Drywell Mid-Height	4006	-0.2	-15.5	35.0	26.8	-3.6	7.7	310.2
	4013	-1.3	-15.5	33.3	30.6	-7.0	-1.3	310.2
	4976	-0.2	-15.5	39.8	24.0	-1.2	-0.8	310.2
9 RCCV Drywell Top	4406	-5.8	-15.5	30.1	7.5	93.7	6.3	310.2
	4413	-5.2	-15.5	11.9	3.2	38.9	-9.7	310.2
	4424	-5.7	-15.5	54.2	12.1	74.9	-6.4	310.2
10 Basemat @ Center	80003	-0.7	-12.4	-4.2	-2.9	-1.6	-1.8	310.2
	80007	-0.7	-12.4	-4.2	-3.0	-1.6	-1.8	310.2
	80012	-0.7	-12.4	-4.3	-3.1	-1.6	-1.8	310.2
11 Basemat Inside RPV Pedestal	80206	-1.2	-12.4	-4.4	0.2	-2.9	1.7	310.2
	80213	-1.2	-12.4	-2.6	-1.7	-4.2	6.0	310.2
	80224	-1.2	-12.4	-5.4	-0.5	-3.0	-0.4	310.2
12 S/P Slab @ RPV	83306	-0.7	-15.5	14.9	19.9	73.6	11.6	310.2
	83313	-0.2	-15.5	1.8	17.8	56.5	0.4	310.2
	83324	-0.2	-15.5	-2.2	21.4	68.4	15.3	310.2
13 S/P Slab @ Center	83406	-6.0	-15.5	-7.0	81.9	13.3	60.5	310.2
	83413	-5.6	-15.5	-4.9	83.3	5.6	46.1	310.2
	83424	-5.8	-15.5	-7.3	79.4	11.0	59.5	310.2
14 S/P Slab @ RCCV	83506	-3.7	-15.5	66.6	-12.8	25.8	18.4	310.2
	83513	-3.1	-15.5	69.3	-8.3	13.5	10.9	310.2
	83524	-3.9	-15.5	65.7	-14.3	28.6	19.2	310.2
15 Top slab @ Drywell Head Opening	98120	-4.9	-18.6	114.9	22.4	115.9	24.1	310.2
	98135	-1.1	-18.6	10.1	-4.8	-10.9	9.9	310.2
	98104	-8.3	-18.6	87.8	13.9	151.5	20.7	310.2
16 Top slab @ Center	98149	-1.9	-18.6	7.1	28.5	33.8	69.5	310.2
	98170	-2.4	-18.6	40.9	-2.0	55.8	21.5	310.2
	98109	-5.1	-18.6	61.2	7.3	108.8	6.2	310.2
17 Top slab @ RCCV	98174	-3.2	-18.6	24.6	57.3	57.5	26.9	310.2
	98197	-3.4	-18.6	10.2	24.2	15.0	104.8	310.2
	98103	-3.7	-18.6	32.3	57.8	61.9	39.6	310.2

Note: Negative value means compression.

Load combination including the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, are shown in Table 6.3.2-1.

Note *: RCCV, Pedestal Direction1: Hoop, Direction2: Vertical,
S/P Slab Direction1: Radial, Direction2: Circumferential,
Top slab Direction1: N-S, Direction2: E-W,
Basemat @center Direction1: N-S, Direction2: E-W,
Basemat Inside RPV Pedestal Direction1: Top: Radial, Bottom: N-S, Direction2 Top: Circumferential, Bottom: E-W



Table 7.3.1-4 Rebar and Concrete Stresses of RCCV, LOCA After 6 minutes (1.5Pa):
Winter – Load ID = 6241 (Selected Load Combination CV-7a)

Location	Element ID	Concrete Stress (MPa)		Primary Reinforcement Stress (MPa)				
		Calculated	Allowable	Calculated				Allowable
				Direction 1*		Direction 2*		
				In/Top	Out/Bottom	In/Top	Out/Bottom	
1 RPV Pedestal Bottom	5006	-9.5	-28.7	-29.7	23.5	-44.8	-8.4	367.9
	5013	-10.0	-28.7	-31.4	26.7	-47.1	-8.3	367.9
	5024	-9.3	-28.7	-32.6	24.6	-43.1	-7.7	367.9
2 RPV Pedestal Mid-Height	6006	-8.0	-28.7	8.6	84.5	-45.3	48.2	367.9
	6013	-8.0	-28.7	4.9	86.2	-44.8	38.7	367.9
	6024	-5.3	-28.7	5.4	92.5	-27.7	37.3	367.9
3 RPV Pedestal Top	6606	-10.2	-28.7	54.3	119.9	-60.1	-26.8	367.9
	6613	-10.4	-28.7	51.5	106.7	-58.1	-34.7	367.9
	6624	-10.6	-28.7	67.6	113.2	-58.2	-16.0	367.9
4 RCCV Wetwell Bottom	1806	-11.6	-29.0	23.6	80.8	49.1	78.8	369.7
	1813	-13.6	-29.0	20.1	74.2	-42.2	64.2	369.7
	1824	-14.7	-29.0	28.6	64.3	-46.6	70.9	369.7
5 RCCV Wetwell Mid-Height	2606	-7.1	-29.1	59.7	107.4	-29.7	32.6	370.2
	2613	-4.7	-29.1	33.0	101.3	-27.1	-5.9	370.2
	2624	-4.2	-29.1	73.7	92.8	-25.0	-8.6	370.2
6 RCCV Wetwell Top	3406	-14.1	-29.1	79.1	105.8	-57.1	77.9	370.2
	3413	-10.9	-29.1	56.7	84.8	-63.9	42.2	370.2
	3424	-7.2	-29.1	74.0	86.1	-70.3	17.2	370.2
7 RCCV Drywell Bottom	3606	-12.7	-28.7	67.2	95.0	-50.5	84.4	367.8
	3613	-10.3	-28.7	40.3	89.0	-45.9	19.5	367.8
	3624	-6.2	-27.7	-7.0	-2.6	-34.1	-12.4	360.2
8 RCCV Drywell Mid-Height	4006	-5.4	-28.7	41.8	95.3	-13.0	73.9	367.8
	4013	-9.6	-28.7	34.4	104.7	-51.2	10.6	367.8
	4976	-5.2	-27.7	10.3	39.5	-29.0	-7.9	360.2
9 RCCV Drywell Top	4406	-8.1	-28.7	42.8	54.7	131.4	9.4	367.8
	4413	-7.8	-28.7	8.3	67.2	-42.4	-17.8	367.8
	4424	-9.5	-27.7	-12.8	-10.7	83.9	-21.8	360.2
10 Basemat @ Center	80003	-4.9	-23.2	-16.7	13.8	-14.7	13.3	370.2
	80007	-4.8	-23.2	-16.8	12.9	-14.6	13.2	370.2
	80012	-4.8	-23.2	-16.9	12.5	-14.3	13.5	370.2
11 Basemat Inside RPV Pedestal	80206	-7.3	-23.2	-8.1	37.1	-13.0	37.2	370.2
	80213	-7.2	-23.2	-5.1	25.3	-13.3	56.0	370.2
	80224	-6.5	-23.2	-11.5	34.1	-11.2	29.9	370.2
12 S/P Slab @ RPV	83306	-14.5	-29.0	-72.7	21.8	170.5	77.9	369.8
	83313	-14.0	-29.0	-75.7	29.5	157.3	67.0	369.8
	83324	-13.6	-29.0	-73.5	26.5	170.5	85.1	369.8
13 S/P Slab @ Center	83406	-21.9	-29.0	-60.3	172.0	38.5	198.8	369.8
	83413	-22.2	-29.0	-62.5	176.6	32.8	188.0	369.8
	83424	-21.7	-29.0	-62.4	174.0	40.7	200.3	369.8
14 S/P Slab @ RCCV	83506	-8.7	-29.0	-31.9	40.3	27.8	124.1	369.8
	83513	-9.3	-29.0	-34.9	37.5	27.7	122.0	369.8
	83524	-8.1	-29.0	-35.3	29.4	42.1	117.0	369.8
15 Top slab @ Drywell Head Opening	98120	-9.3	-33.5	36.6	-10.5	88.2	4.6	361.7
	98135	-7.8	-33.5	-6.6	-35.1	-22.9	1.9	361.7
	98104	-12.1	-33.5	2.9	-7.2	186.8	16.3	361.7
16 Top slab @ Center	98149	-5.9	-33.6	-7.3	-13.3	56.7	56.0	362.7
	98170	-5.9	-33.6	12.4	-21.4	88.9	3.6	362.7
	98109	-7.1	-33.6	-8.2	-21.2	139.2	3.5	362.7
17 Top slab @ RCCV	98174	-7.5	-33.6	29.6	-15.3	79.9	4.2	362.7
	98197	-4.6	-33.6	-11.8	-20.8	18.5	118.0	362.7
	98103	-5.2	-33.6	-8.8	-22.2	96.3	8.8	362.7

Note: Negative value means compression.

Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

Note *: RCCV, Pedestal Direction1: Hoop, Direction2: Vertical,
S/P Slab Direction1: Radial, Direction2: Circumferential,
Top slab Direction1: N-S, Direction2: E-W,
Basemat @center Direction1: N-S, Direction2: E-W,
Basemat Inside RPV Pedestal Direction1: Top: Radial, Bottom: N-S, Direction2 Top: Circumferential, Bottom: E-W

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Table 7.3.1-5 Rebar and Concrete Stresses of RCCV, LOCA After 72 hours (1.5Pa):
Winter – Load ID = 6441 (Selected Load Combination CV-7b)

Location	Element ID	Concrete Stress (MPa)		Primary Reinforcement Stress (MPa)				
		Calculated	Allowable	Calculated				Allowable
				Direction 1*		Direction 2*		
				In/Top	Out/Bottom	In/Top	Out/Bottom	
1 RPV Pedestal Bottom	5006	-16.7	-27.9	-77.2	48.7	-46.0	7.8	361.6
	5013	-17.0	-27.9	-78.6	48.7	-47.7	7.2	361.6
	5024	-17.1	-27.9	-80.7	48.3	-43.7	4.9	361.6
2 RPV Pedestal Mid-Height	6006	-12.1	-27.9	-15.8	153.6	-59.2	64.4	361.6
	6013	-12.7	-27.9	-18.9	156.6	-59.8	61.0	361.6
	6024	-10.8	-27.9	-20.9	173.9	-40.6	49.1	361.6
3 RPV Pedestal Top	6606	-13.1	-27.9	23.0	163.1	-61.0	25.3	361.6
	6613	-12.4	-27.9	19.9	155.0	-60.7	11.5	361.6
	6624	-12.3	-27.9	23.9	160.9	-60.0	12.0	361.6
4 RCCV Wetwell Bottom	1806	-12.9	-28.3	-5.7	92.5	-22.9	87.4	364.4
	1813	-14.6	-28.3	-9.5	85.6	-41.7	62.7	364.4
	1824	-14.9	-28.3	7.5	123.4	-41.6	73.8	364.4
5 RCCV Wetwell Mid-Height	2606	-12.9	-28.2	10.4	170.2	-27.6	84.9	363.8
	2613	-13.7	-28.2	-12.3	148.8	-45.8	39.2	363.8
	2624	-12.8	-28.2	-8.3	160.5	-44.5	49.1	363.8
6 RCCV Wetwell Top	3406	-14.4	-28.2	52.4	149.4	-43.0	123.8	363.8
	3413	-18.5	-28.2	43.6	139.0	-71.8	72.7	363.8
	3424	-12.3	-28.2	38.7	129.3	-51.9	40.3	363.8
7 RCCV Drywell Bottom	3606	-15.9	-27.7	33.9	144.6	-30.8	152.5	360.2
	3613	-19.7	-27.7	25.9	134.2	-70.6	65.5	360.2
	3624	-12.6	-26.7	-24.2	45.3	-41.5	18.5	352.9
8 RCCV Drywell Mid-Height	4006	-12.4	-27.7	16.0	164.4	-19.6	135.0	360.2
	4013	-18.7	-27.7	18.7	172.3	-81.2	51.5	360.2
	4976	-13.0	-26.7	-15.8	81.5	-43.9	54.9	352.9
9 RCCV Drywell Top	4406	-6.0	-27.7	12.2	134.0	11.0	40.7	360.2
	4413	-15.7	-27.7	-8.2	112.2	-79.5	-12.6	360.2
	4424	-11.0	-26.7	-39.7	48.9	-23.3	7.1	352.9
10 Basemat @ Center	80003	-4.2	-23.2	-9.1	25.7	-5.9	30.0	370.2
	80007	-4.2	-23.2	-9.3	24.7	-5.8	30.0	370.2
	80012	-4.2	-23.2	-9.6	24.0	-5.6	30.2	370.2
11 Basemat Inside RPV Pedestal	80206	-6.4	-23.2	-3.6	46.4	-6.6	52.9	370.2
	80213	-6.4	-23.2	5.3	36.6	-6.0	69.5	370.2
	80224	-5.9	-23.2	-4.8	46.1	-3.8	47.1	370.2
12 S/P Slab @ RPV	83306	-18.6	-28.3	-68.9	92.5	39.5	166.2	364.4
	83313	-19.2	-28.3	-68.8	93.8	37.8	158.0	364.4
	83324	-17.2	-28.3	-76.1	93.7	51.7	148.6	364.4
13 S/P Slab @ Center	83406	-25.9	-28.3	-61.8	219.1	15.4	235.2	364.4
	83413	-26.1	-28.3	-65.1	220.2	13.8	222.8	364.4
	83424	-25.3	-28.3	-64.3	218.6	19.8	237.5	364.4
14 S/P Slab @ RCCV	83506	-12.2	-28.3	-34.8	66.8	-13.6	164.3	364.4
	83513	-12.9	-28.3	-36.7	70.4	-13.1	162.3	364.4
	83524	-11.3	-28.3	-35.9	58.4	9.6	172.1	364.4
15 Top slab @ Drywell Head Opening	98120	-19.3	-31.4	141.5	-1.9	159.8	-5.4	349.2
	98135	-16.6	-31.4	29.8	-59.6	-20.7	-2.3	349.2
	98104	-24.2	-31.4	28.9	-10.1	231.5	-16.3	349.2
16 Top slab @ Center	98149	-11.8	-31.9	-5.5	-47.6	123.0	9.4	352.0
	98170	-9.7	-31.9	3.8	-40.8	129.8	3.6	352.0
	98109	-16.7	-32.6	86.6	-24.7	216.9	-6.5	356.6
17 Top slab @ RCCV	98174	-10.1	-31.9	25.4	-31.4	108.0	-1.3	352.0
	98197	-7.9	-31.9	-16.8	-40.8	17.8	124.8	352.0
	98103	-11.6	-32.6	39.1	-23.6	155.2	-8.9	356.6

Note: Negative value means compression.

Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

Note *: RCCV, Pedestal Direction1: Hoop, Direction2: Vertical,
 S/P Slab Direction1: Radial, Direction2: Circumferential,
 Top slab Direction1: N-S, Direction2: E-W,
 Basemat @center Direction1: N-S, Direction2: E-W,
 Basemat Inside RPV Pedestal Direction1: Top: Radial, Bottom: N-S, Direction2 Top: Circumferential, Bottom: E-W

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**Table 7.3.1-6 Rebar and Concrete Stresses of RCCV, LOCA After 6 minutes + SSE:
Winter – Load ID = 7241 (Site-Specific Seismic Load Combination CV-11a)**

Location	Element ID	Concrete Stress (MPa)		Primary Reinforcement Stress (MPa)				
		Calculated	Allowable	Calculated				Allowable
				Direction 1*		Direction 2*		
				In/Top	Out/Bottom	In/Top	Out/Bottom	
1 RPV	5006	-10.6	-28.7	-29.4	39.3	-46.9	3.3	367.9
Pedestal Bottom	5013	-11.1	-28.7	-31.5	40.0	-50.4	6.2	367.9
	5024	-9.8	-28.7	-31.1	30.8	-44.5	4.8	367.9
	2 RPV	6006	-7.8	-28.7	9.1	88.8	-43.5	59.4
Pedestal Mid-Height	6013	-8.4	-28.7	-4.2	115.9	-44.5	44.8	367.9
	6024	-6.2	-28.7	-22.7	117.1	35.8	40.4	367.9
	3 RPV	6606	-10.8	-28.7	67.6	130.7	118.6	-22.1
Pedestal Top	6613	-10.5	-28.7	73.9	139.7	72.2	-4.8	367.9
	6624	-10.8	-28.7	86.7	141.7	104.4	2.1	367.9
	4 RCCV	1806	-12.8	-29.0	51.1	132.4	137.6	81.0
Wetwell Bottom	1813	-14.5	-29.0	37.4	108.2	-60.6	79.3	369.7
	1824	-15.1	-29.0	64.1	124.0	-65.2	92.1	369.7
	5 RCCV	2606	-6.0	-29.1	80.0	115.0	127.7	130.5
Wetwell Mid-Height	2613	-7.4	-29.1	39.5	114.5	-39.9	83.9	370.2
	2624	-7.5	-29.1	63.9	111.9	53.9	81.9	370.2
	6 RCCV	3406	-8.6	-29.1	109.3	108.5	-40.1	167.4
Wetwell Top	3413	-15.1	-29.1	58.6	100.1	-74.3	157.6	370.2
	3424	-11.3	-29.1	71.0	97.2	-71.4	107.1	370.2
	7 RCCV	3606	-7.9	-28.7	102.6	97.5	-44.9	171.8
Drywell Bottom	3613	-13.0	-28.7	47.6	104.4	-63.3	112.0	367.8
	3624	-10.5	-27.7	-6.8	27.7	-58.5	43.8	360.2
	8 RCCV	4006	-5.6	-28.7	81.1	139.5	122.1	136.8
Drywell Mid-Height	4013	-13.7	-28.7	51.4	130.5	-72.0	65.0	367.8
	4976	-9.1	-27.7	19.8	64.3	-48.5	59.4	360.2
	9 RCCV	4406	-3.8	-28.7	97.7	130.1	78.2	169.6
Drywell Top	4413	-13.1	-28.7	16.2	85.2	-70.1	28.3	367.8
	4424	-9.3	-27.7	22.9	-9.6	101.4	-40.6	360.2
	10 Basemat @ Center	80003	-7.0	-23.2	-19.5	27.7	-18.2	28.8
	80007	-6.9	-23.2	-19.7	25.7	-18.3	27.7	370.2
	80012	-6.8	-23.2	-19.8	24.7	-18.4	27.4	370.2
	11 Basemat Inside RPV Pedestal	80206	-7.6	-23.2	-19.4	27.0	-13.1	27.8
	80213	-7.7	-23.2	-8.5	31.6	-16.4	43.6	370.2
	80224	-6.7	-23.2	-16.1	20.9	-16.8	23.4	370.2
	12 S/P Slab @ RPV	83306	-15.4	-29.0	-75.4	41.9	211.4	91.0
	83313	-14.5	-29.0	-82.6	54.2	197.2	76.5	369.8
	83324	-13.6	-29.0	-81.6	53.8	196.5	98.7	369.8
	13 S/P Slab @ Center	83406	-18.4	-29.0	-52.6	135.3	43.3	192.1
	83413	-19.0	-29.0	-54.5	134.4	32.3	166.3	369.8
	83424	-18.2	-29.0	-57.6	126.8	48.1	170.0	369.8
	14 S/P Slab @ RCCV	83506	-11.1	-29.0	-34.3	69.2	40.4	132.7
	83513	-10.9	-29.0	-35.4	62.1	27.9	112.8	369.8
	83524	-9.3	-29.0	-38.5	46.5	34.4	104.3	369.8
	15 Top slab @ Drywell Head Opening	98120	-9.8	-33.5	34.1	-13.4	71.9	-2.2
	98135	-8.7	-33.5	-9.8	-40.5	-23.2	3.3	361.7
	98104	-12.9	-33.5	-12.9	-9.6	212.3	20.9	361.7
	16 Top slab @ Center	98149	-7.1	-33.6	-3.7	-29.6	72.2	9.4
	98170	-7.2	-33.6	15.6	-25.0	87.8	-5.3	362.7
	98109	-7.2	-33.6	-12.5	-23.1	162.4	8.2	362.7
	17 Top slab @ RCCV	98174	-7.3	-33.6	4.0	-22.9	92.4	3.8
	98197	-5.4	-33.6	-10.7	-17.6	37.8	132.6	362.7
	98103	-12.0	-33.6	47.9	-33.6	132.8	17.6	362.7

Note: Negative value means compression.

Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

Note *: RCCV, Pedestal Direction1: Hoop, Direction2: Vertical,
S/P Slab Direction1: Radial, Direction2: Circumferential,
Top slab Direction1: N-S, Direction2: E-W,
Basemat @center Direction1: N-S, Direction2: E-W,
Basemat Inside RPV Pedestal Direction1: Top: Radial, Bottom: N-S, Direction2 Top: Circumferential, Bottom: E-W

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**Table 7.3.1-7 Rebar and Concrete Stresses of RCCV, LOCA After 72 hours + SSE:
Winter – Load ID = 7441 (Site-Specific Seismic Load Combination CV-11b)**

Location	Element ID	Concrete Stress (MPa)		Primary Reinforcement Stress (MPa)				
		Calculated	Allowable	Calculated				Allowable
				Direction 1*		Direction 2*		
				In/Top	Out/Bottom	In/Top	Out/Bottom	
1 RPV Pedestal Bottom	5006	-16.8	-27.9	-75.9	66.5	-49.7	11.4	361.6
	5013	-17.4	-27.9	-77.9	63.7	-55.9	14.7	361.6
	5024	-17.2	-27.9	-78.2	57.5	-49.3	9.7	361.6
2 RPV Pedestal Mid-Height	6006	-12.9	-27.9	-19.7	157.8	-61.2	94.7	361.6
	6013	-13.9	-27.9	-28.0	141.0	-60.0	77.0	361.6
	6024	-12.7	-27.9	-30.1	156.9	-43.2	65.4	361.6
3 RPV Pedestal Top	6606	-13.6	-27.9	28.4	176.6	-63.2	30.9	361.6
	6613	-13.3	-27.9	32.0	192.8	-64.3	15.7	361.6
	6624	-13.0	-27.9	35.0	193.6	-64.2	30.9	361.6
4 RCCV Wetwell Bottom	1806	-15.5	-28.3	20.6	187.0	59.0	153.9	364.4
	1813	-17.1	-28.3	17.4	154.1	-63.6	133.5	364.4
	1824	-16.9	-28.3	22.6	168.5	-62.7	143.4	364.4
5 RCCV Wetwell Mid-Height	2606	-11.4	-28.2	5.2	169.3	-38.8	177.4	363.8
	2613	-14.2	-28.2	-14.1	183.0	-62.2	158.1	363.8
	2624	-13.6	-28.2	15.0	189.7	-59.3	171.4	363.8
6 RCCV Wetwell Top	3406	-13.7	-28.2	54.3	159.6	-50.0	214.9	363.8
	3413	-19.3	-28.2	50.7	156.1	-84.2	174.8	363.8
	3424	-15.4	-28.2	43.7	141.5	-70.9	132.2	363.8
7 RCCV Drywell Bottom	3606	-14.7	-27.7	36.4	160.2	-45.0	224.7	360.2
	3613	-21.0	-27.7	32.8	153.7	-88.5	126.1	360.2
	3624	-15.0	-26.7	-26.3	66.3	-69.8	101.2	352.9
8 RCCV Drywell Mid-Height	4006	-12.9	-27.7	28.3	209.7	-35.0	207.1	360.2
	4013	-21.0	-27.7	28.9	199.8	-97.2	103.9	360.2
	4976	-15.3	-26.7	-13.2	115.1	-64.0	140.2	352.9
9 RCCV Drywell Top	4406	-12.3	-27.7	38.4	196.8	131.5	115.6	360.2
	4413	-21.0	-27.7	-4.3	138.0	-105.8	36.7	360.2
	4424	-13.0	-26.7	-39.8	85.5	-40.3	77.2	352.9
10 Basemat @ Center	80003	-7.4	-23.2	17.9	52.5	26.1	57.6	370.2
	80007	-7.2	-23.2	13.6	49.9	23.7	55.6	370.2
	80012	-7.1	-23.2	-10.8	48.6	25.0	54.3	370.2
11 Basemat Inside RPV Pedestal	80206	-6.9	-23.2	18.8	40.3	-3.7	45.2	370.2
	80213	-7.4	-23.2	2.3	50.0	-7.6	62.7	370.2
	80224	-6.4	-23.2	-7.9	33.5	-8.4	41.3	370.2
12 S/P Slab @ RPV	83306	-20.9	-28.3	-69.7	122.0	58.4	205.7	364.4
	83313	-22.1	-28.3	-71.5	118.6	46.9	210.5	364.4
	83324	-21.8	-28.3	-72.0	113.9	74.8	191.3	364.4
13 S/P Slab @ Center	83406	-23.1	-28.3	-54.4	191.2	21.2	238.2	364.4
	83413	-23.7	-28.3	-55.6	190.1	16.2	215.5	364.4
	83424	-22.5	-28.3	-61.1	178.8	17.4	214.2	364.4
14 S/P Slab @ RCCV	83506	-14.8	-28.3	-35.1	117.6	-10.3	150.0	364.4
	83513	-16.1	-28.3	-37.1	124.8	-5.9	128.6	364.4
	83524	-13.9	-28.3	-37.6	98.2	-10.9	162.8	364.4
15 Top slab @ Drywell Head Opening	98120	-20.0	-31.4	128.9	-8.3	128.1	-14.9	349.2
	98135	-16.6	-31.4	65.6	-62.9	-21.0	-6.2	349.2
	98104	-24.4	-31.4	30.2	-11.9	187.9	-30.7	349.2
16 Top slab @ Center	98149	-12.5	-31.9	-7.9	-53.1	123.2	6.7	352.0
	98170	-10.8	-31.9	-6.3	-45.0	114.9	-5.4	352.0
	98109	-17.4	-32.6	89.9	-22.4	241.2	-8.1	356.6
17 Top slab @ RCCV	98174	-10.1	-31.9	7.0	-39.8	78.7	-11.1	352.0
	98197	-9.5	-31.9	-15.1	-43.5	64.1	-9.4	352.0
	98103	-17.3	-32.6	143.3	-22.8	146.1	-10.6	356.6

Note: Negative value means compression.

Load combination includes the results of NASTRAN based on the RB/FB global FE model which is used in Appendix E of ESBWR Reactor Building Structural Design Report, Reference 2.1.2-j, as shown in Table 6.3.2-1.

Note *: RCCV, Pedestal Direction1: Hoop, Direction2: Vertical,
 S/P Slab Direction1: Radial, Direction2: Circumferential,
 Top slab Direction1: N-S, Direction2: E-W,
 Basemat @center Direction1: N-S, Direction2: E-W,
 Basemat Inside RPV Pedestal Direction1: Top: Radial, Bottom: N-S, Direction2 Top: Circumferential, Bottom: E-W

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Table 7.3.1-8 Maximum Stress Ratios for Flexure and Membrane Forces

Location	Element ID	Concrete		Primary Reinforcement							
		σ/σ_a	Load ID	Direction 1*				Direction 2*			
				Inside		Outside		Inside		Outside	
				σ/σ_a	Load ID	σ/σ_a	Load ID	σ/σ_a	Load ID	σ/σ_a	Load ID
1 RPV Pedestal Bottom	5006	0.609	7481	0.244	6481	0.179	7941	0.141	8514	0.123	6251
	5013	0.679	7481	0.261	6481	0.176	7941	0.156	7482	0.129	6251
	5024	0.626	6481	0.260	6481	0.155	7941	0.145	2021	0.120	6251
2 RPV Pedestal Mid-Height	6006	0.447	8514	0.211	6152	0.449	7471	0.169	8514	0.273	7921
	6013	0.500	7482	0.169	6152	0.543	7471	0.169	7471	0.216	7971
	6024	0.436	8511	0.397	7152	0.562	7471	0.126	7721	0.176	9014
3 RPV Pedestal Top	6606	0.465	8512	0.262	7351	0.489	8514	0.468	7711	0.188	7761
	6613	0.477	7482	0.268	7351	0.533	7421	0.373	7761	0.159	7991
	6624	0.446	8512	0.294	7351	0.520	7421	0.435	7761	0.178	7991
4 RCCV Wetwell Bottom	1806	0.544	8512	0.376	7991	0.504	7921	0.438	7761	0.440	7701
	1813	0.626	8514	0.306	7851	0.426	7971	0.397	7761	0.384	7701
	1824	0.664	2021	0.346	7351	0.487	7971	0.415	7761	0.425	7982
5 RCCV Wetwell Mid-Height	2606	0.454	6421	0.343	7801	0.461	6421	0.488	7731	0.482	7971
	2613	0.529	8514	0.307	8061	0.510	9014	0.422	7711	0.449	7921
	2624	0.491	8514	0.342	7633	0.510	7982	0.447	7731	0.461	7941
6 RCCV Wetwell Top	3406	0.568	6261	0.341	7761	0.439	7971	0.498	7851	0.593	7982
	3413	0.687	7441	0.294	7761	0.435	7482	0.431	7851	0.512	7861
	3424	0.572	8514	0.285	7761	0.405	8511	0.476	7701	0.389	9011
7 RCCV Drywell Bottom	3606	0.619	6421	0.343	7761	0.455	7421	0.375	7663	0.636	7971
	3613	0.733	8511	0.302	7711	0.422	8511	0.368	7603	0.472	7861
	3624	0.578	8514	0.300	7761	0.304	7961	0.433	7653	0.430	7961
8 RCCV Drywell Mid-Height	4006	0.552	8507	0.355	7133	0.591	7471	0.474	7632	0.624	7371
	4013	0.731	8513	0.270	7851	0.566	8511	0.402	7603	0.439	9014
	4976	0.580	8514	0.326	7611	0.395	7961	0.488	7653	0.486	7961
9 RCCV Drywell Top	4406	0.571	8514	0.353	7351	0.610	8511	0.857	7161	0.517	7341
	4413	0.804	8513	0.247	7701	0.472	8511	0.491	7731	0.326	7711
	4424	0.573	8514	0.402	7351	0.474	7981	0.556	7661	0.404	7981

Note: Negative value means compression.

Note *: RCCV, Pedestal Direction1: Hoop, Direction2: Vertical,
S/P Slab Direction1: Radial, Direction2: Circumferential,
Top slab Direction1: N-S, Direction2: E-W,

Basemat @center Direction1: N-S, Direction2: E-W,

Basemat Inside RPV Pedestal Direction1: Top: Radial, Bottom: N-S, Direction2 Top: Circumferential, Bottom: E-W

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Table 7.3.1-8 Maximum Stress Ratios for Flexure and Membrane Forces (Continued)

Location	Element ID	Concrete		Primary Reinforcement							
		σ/σ_a	Load ID	Direction 1*				Direction 2*			
				Inside		Outside		Inside		Outside	
				σ/σ_a	Load ID	σ/σ_a	Load ID	σ/σ_a	Load ID	σ/σ_a	Load ID
10 Basemat @ Center	80003	0.460	7501	0.483	7731	0.516	7461	0.502	7731	0.514	7461
	80007	0.457	7501	0.464	7831	0.487	7481	0.476	7612	0.474	7481
	80012	0.461	7991	0.450	7811	0.474	7481	0.476	7612	0.468	7461
11 Basemat Inside RPV Pedestal	80206	0.330	7501	0.497	7761	0.412	7411	0.301	7961	0.354	7461
	80213	0.361	7271	0.326	7612	0.485	7431	0.477	7731	0.474	7461
	80224	0.312	7271	0.278	7961	0.363	7481	0.385	7631	0.414	7481
12 S/P Slab @ RPV	83306	0.712	7421	0.526	7501	0.349	7471	0.628	7231	0.581	7471
	83313	0.781	7421	0.531	2001	0.446	7351	0.604	7231	0.593	7471
	83324	0.751	8507	0.522	2001	0.439	7351	0.595	7211	0.555	7471
13 S/P Slab @ Center	83406	0.897	8507	0.229	2501	0.602	6251	0.324	7511	0.655	8514
	83413	0.923	6441	0.179	6441	0.613	6471	0.262	7491	0.621	6471
	83424	0.865	6471	0.173	6421	0.592	8501	0.273	2011	0.641	6471
14 S/P Slab @ RCCV	83506	0.556	6211	0.574	6251	0.362	7311	0.234	7231	0.452	8507
	83513	0.581	8512	0.565	6251	0.405	2001	0.184	7261	0.447	6471
	83524	0.569	7261	0.561	6251	0.265	7421	0.216	6261	0.465	6471
15 Top slab @ Drywell Head Opening	98120	0.789	8514	0.633	7351	0.422	7501	0.771	7261	0.353	7501
	98135	0.885	8507	0.673	7211	0.570	7501	0.168	7501	0.180	7251
	98104	0.878	8507	0.342	7351	0.260	7501	0.934	8507	0.464	7501
16 Top slab @ Center	98149	0.637	8514	0.384	7131	0.627	7501	0.392	9007	0.360	7351
	98170	0.751	8514	0.627	7131	0.541	7501	0.546	7111	0.239	7501
	98109	0.696	8507	0.507	6461	0.240	7491	0.753	7481	0.419	7501
17 Top slab @ RCCV	98174	0.732	8514	0.432	7111	0.466	7501	0.421	8507	0.246	7231
	98197	0.659	8514	0.363	7231	0.301	7501	0.424	8514	0.502	7351
	98103	0.720	8514	0.664	7411	0.489	7351	0.722	7481	0.191	8512

Note *: RCCV, Pedestal

S/P Slab

Top slab

Basemat @center

Basemat Inside RPV Pedestal

Direction1: Hoop,

Direction1: Radial,

Direction1: N-S,

Direction1: N-S,

Direction1: Top :Radial, Bottom: N-S,

Direction2: Vertical

Direction2: Circumferential

Direction2: E-W

Direction2: E-W

Direction2 Top : Circumferential, Bottom : E-W



Table 7.3.2-1 Membrane Compressive Forces of RCCV

Location	Element ID	Load ID	Section Forces (MN/m)			Thickness h (m)	Calculated Concrete Stress (MPa)				Allowable Stress σ_a (MPa)	σ_c/σ_a
			N_x	N_y	N_{xy}		σ_x	σ_y	τ_{xy}	σ_c		
1 RPV Pedestal Bottom	5006	2001	-1.487	-8.113	-0.091	2.4	-0.620	-3.381	-0.038	-3.381	-10.4	0.327
	5013	2001	-2.084	-8.717	0.421	2.4	-0.868	-3.632	0.176	-3.643	-10.4	0.352
	5024	2001	-2.078	-8.475	0.203	2.4	-0.866	-3.531	0.085	-3.534	-10.4	0.341
2 RPV Pedestal Mid-Height	6006	2001	-0.494	-8.315	0.285	2.4	-0.206	-3.465	0.119	-3.469	-10.4	0.335
	6013	2001	-0.722	-8.054	0.561	2.4	-0.301	-3.356	0.234	-3.374	-10.4	0.326
	6024	2001	-0.611	-6.399	-0.710	2.4	-0.255	-2.666	-0.296	-2.702	-10.4	0.261
3 RPV Pedestal Top	6606	2001	-0.784	-6.584	1.207	2.4	-0.326	-2.743	0.503	-2.844	-10.4	0.275
	6613	2001	-0.920	-6.414	-0.285	2.4	-0.383	-2.672	-0.119	-2.679	-10.4	0.259
	6624	2001	-0.481	-6.428	0.555	2.4	-0.200	-2.678	0.231	-2.700	-10.4	0.261
4 RCCV Wetwell Bottom	1806	7501	-2.859	-11.209	3.445	2.0	-1.429	-5.605	1.722	-6.223	-20.7	0.301
	1813	7501	-2.393	-11.428	3.214	2.0	-1.197	-5.714	1.607	-6.227	-20.7	0.301
	1824	7581	-3.723	-16.086	-3.484	2.0	-1.862	-8.043	-1.742	-8.500	-25.9	0.329
5 RCCV Wetwell Mid-Height	2606	7501	-0.855	-10.217	3.650	2.0	-0.427	-5.108	1.825	-5.736	-20.7	0.277
	2613	7521	-4.871	-14.598	3.570	2.0	-2.436	-7.299	1.785	-7.884	-25.9	0.305
	2624	7581	-3.267	-15.553	-3.415	2.0	-1.634	-7.777	-1.707	-8.219	-25.9	0.318
6 RCCV Wetwell Top	3406	7501	-0.546	-8.890	3.717	2.0	-0.273	-4.445	1.858	-5.153	-20.7	0.249
	3413	2021	-1.047	-9.489	0.431	2.0	-0.523	-4.745	0.216	-4.755	-15.5	0.306
	3424	2021	0.438	-10.145	0.314	2.0	0.219	-5.072	0.157	-5.077	-15.5	0.327
7 RCCV Drywell Bottom	3606	7501	0.349	-8.238	3.766	2.0	0.174	-4.119	1.883	-4.828	-20.7	0.233
	3613	8511	3.293	-16.204	4.553	2.0	1.647	-8.102	2.276	-8.607	-25.9	0.333
	3624	2021	-13.644	-11.230	0.199	2.0	-6.822	-5.615	0.100	-6.830	-15.5	0.440
8 RCCV Drywell Mid-Height	4006	7561	1.485	-7.205	3.391	2.0	0.743	-3.602	1.696	-4.186	-20.7	0.202
	4013	2021	1.063	-10.811	0.958	2.0	0.532	-5.406	0.479	-5.444	-15.5	0.351
	4976	2021	-8.166	-9.841	0.629	2.0	-4.083	-4.921	0.314	-5.025	-15.5	0.324
9 RCCV Drywell Top	4406	7501	1.416	-6.034	-2.969	2.0	0.708	-3.017	-1.484	-3.536	-20.7	0.171
	4413	7471	-0.735	-18.823	2.989	2.0	-0.367	-9.412	1.494	-9.652	-25.9	0.373
	4424	8514	-12.164	-11.570	4.388	2.0	-6.082	-5.785	2.194	-8.132	-25.9	0.314
10 Basemat @ Center	80003	2021	-9.240	-8.814	0.217	5.1	-1.812	-1.728	0.043	-1.830	-12.4	0.147
	80007	2021	-9.304	-8.776	0.238	5.1	-1.824	-1.721	0.047	-1.842	-12.4	0.148
	80012	2021	-9.343	-8.684	0.212	5.1	-1.832	-1.703	0.042	-1.844	-12.4	0.148
11 Basemat Inside RPV Pedestal	80206	2021	-9.053	-9.321	0.410	5.1	-1.775	-1.828	0.080	-1.886	-12.4	0.152
	80213	2021	-9.331	-8.850	0.311	5.1	-1.830	-1.735	0.061	-1.860	-12.4	0.150
	80224	2021	-9.657	-8.763	0.203	5.1	-1.894	-1.718	0.040	-1.902	-12.4	0.153
12 S/P Slab @ RPV	83306	6172	-13.099	3.122	-1.015	2.0	-6.550	1.561	-0.508	-6.581	-25.9	0.254
	83313	6172	-13.239	2.852	-1.162	2.0	-6.620	1.426	-0.581	-6.662	-25.9	0.257
	83324	7172	-12.949	3.158	1.821	2.0	-6.474	1.579	0.911	-6.576	-25.9	0.254
13 S/P Slab @ Center	83406	7172	-8.241	2.587	-1.505	2.0	-4.120	1.293	-0.753	-4.223	-25.9	0.163
	83413	7172	-8.214	2.185	0.819	2.0	-4.107	1.092	0.410	-4.139	-25.9	0.160
	83424	7172	-8.047	2.453	0.533	2.0	-4.024	1.227	0.266	-4.037	-25.9	0.156
14 S/P Slab @ RCCV	83506	7172	-6.466	1.904	-1.157	2.0	-3.233	0.952	-0.578	-3.312	-25.9	0.128
	83513	7172	-6.946	1.236	1.038	2.0	-3.473	0.618	0.519	-3.538	-25.9	0.137
	83524	7172	-6.778	1.808	0.357	2.0	-3.389	0.904	0.179	-3.396	-25.9	0.131
15 Top slab @ Drywell Head Opening	98120	8512	-21.235	-26.555	-11.503	2.4	-8.848	-11.065	-4.793	-14.876	-31.1	0.479
	98135	8512	-42.905	-14.179	9.787	2.4	-17.877	-5.908	4.078	-19.134	-31.1	0.616
	98104	8512	-13.772	-35.339	8.544	2.4	-5.739	-14.724	3.560	-15.964	-31.1	0.514
16 Top slab @ Center	98149	8512	-35.784	-20.488	5.321	2.4	-14.910	-8.537	2.217	-15.606	-31.1	0.503
	98170	8512	-36.593	-8.643	1.729	2.4	-15.247	-3.601	0.720	-15.292	-31.1	0.492
	98109	8512	-25.232	-25.257	3.157	2.4	-10.513	-10.524	1.315	-11.834	-31.1	0.381
17 Top slab @ RCCV	98174	8512	-26.742	-9.786	9.476	2.4	-11.142	-4.078	3.948	-12.908	-31.1	0.416
	98197	8513	-33.537	-13.805	-1.608	2.4	-13.974	-5.752	-0.670	-14.028	-31.1	0.452
	98103	8512	-27.531	-21.528	0.870	2.4	-11.471	-8.970	0.362	-11.523	-31.1	0.371

Note: Positive value means tension.

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Table 7.3.3-1 Transverse Shear of RCCV

Location	Element ID	LOAD ID	Shear Force Q (MN/m)	d (m)	Shear Stress (MPa)			Shear Tie Ratio (%)	
					V _u	V _c	V _s	required	provided
1 RPV Pedestal Bottom	5006	7481	7.85	1.83	5.05	2.64	2.41	0.582	1.010
	5013	8507	6.90	1.83	4.44	2.65	1.79	0.443	1.010
	5024	8507	6.88	1.83	4.42	2.66	1.76	0.425	1.010
2 RPV Pedestal Mid-Height	6006	6721	1.77	1.94	1.08	0.95	0.12	0.030	0.252
	6013	6941	2.35	1.94	1.43	1.37	0.06	0.014	0.252
	6024	6721	1.79	1.94	1.09	0.87	0.22	0.053	0.252
3 RPV Pedestal Top	6606	8511	2.88	1.93	1.75	1.37	0.38	0.093	1.010
	6613	6611	0.32	1.93	0.20	0.20	0.00	0.000	1.010
	6624	6605	0.40	1.93	0.24	0.24	0.00	0.000	1.010
4 RCCV Wetwell Bottom	1806	6251	2.21	1.54	1.69	1.25	0.45	0.109	0.540
	1813	6251	2.36	1.54	1.80	1.29	0.51	0.123	0.540
	1824	6251	2.30	1.54	1.76	1.26	0.50	0.120	0.540
5 RCCV Wetwell Mid-Height	2606	6625	0.02	1.56	0.02	0.02	0.00	0.000	0.270
	2613	6935	0.02	1.55	0.01	0.01	0.00	0.000	0.270
	2624	6615	0.00	1.56	0.00	0.00	0.00	0.000	0.270
6 RCCV Wetwell Top	3406	7721	2.98	1.43	2.45	0.50	1.95	0.472	0.721
	3413	7861	2.36	1.43	1.95	0.52	1.42	0.353	0.721
	3424	7731	1.97	1.43	1.62	0.56	1.06	0.257	0.721
7 RCCV Drywell Bottom	3606	7711	2.00	1.43	1.65	0.55	1.10	0.274	0.721
	3613	7711	0.81	1.43	0.67	0.55	0.12	0.029	0.721
	3624	7652	0.33	1.43	0.27	0.12	0.15	0.036	0.721
8 RCCV Drywell Mid-Height	4006	8501	1.17	1.43	0.96	0.80	0.16	0.039	0.270
	4013	7601	0.09	1.66	0.06	0.06	0.00	0.000	0.270
	4976	7761	0.62	1.43	0.51	0.42	0.09	0.023	0.270
9 RCCV Drywell Top	4406	7341	1.04	1.44	0.86	0.32	0.53	0.131	0.540
	4413	7611	0.06	1.45	0.05	0.05	0.00	0.000	0.540
	4424	8507	3.84	1.54	2.95	2.32	0.63	0.156	0.540
10 Basemat @ Center	80003	6611	0.31	3.54	0.10	0.10	0.00	0.000	0.179
	80007	6611	0.31	3.53	0.10	0.10	0.00	0.000	0.179
	80012	6611	0.36	3.54	0.12	0.12	0.00	0.000	0.179
11 Basemat Inside RPV Pedestal	80206	7431	3.68	4.63	0.94	0.83	0.11	0.026	1.290
	80213	7481	3.61	4.61	0.92	0.70	0.22	0.053	1.290
	80224	7481	3.18	4.65	0.81	0.76	0.05	0.011	1.290
12 S/P Slab @ RPV	83306	6301	4.28	1.76	2.87	0.78	2.09	0.505	1.140
	83313	6201	4.78	1.76	3.20	0.75	2.46	0.594	1.140
	83324	6201	4.64	1.76	3.11	0.73	2.38	0.576	1.140
13 S/P Slab @ Center	83406	1100	0.13	1.76	0.07	0.07	0.00	0.000	0.263
	83413	1100	0.12	1.76	0.07	0.07	0.00	0.000	0.263
	83424	1100	0.15	1.76	0.09	0.09	0.00	0.000	0.263
14 S/P Slab @ RCCV	83506	6261	4.64	1.53	3.58	0.76	2.83	0.683	1.010
	83513	6261	4.73	1.53	3.65	0.72	2.93	0.722	1.010
	83524	6261	4.73	1.53	3.65	0.75	2.90	0.701	1.010
15 Top slab @ Drywell Head Opening	98120	6361	1.83	1.95	1.11	1.02	0.09	0.022	0.358
	98135	6501	0.37	1.95	0.23	0.23	0.00	0.000	0.358
	98104	7361	1.07	1.73	0.73	0.55	0.18	0.046	0.358
16 Top slab @ Center	98149	1200	0.33	2.00	0.17	0.17	0.00	0.000	0.179
	98170	1100	0.23	1.95	0.12	0.12	0.00	0.000	0.179
	98109	2000	0.14	1.95	0.07	0.07	0.00	0.000	0.179
17 Top slab @ RCCV	98174	1100	0.22	1.97	0.11	0.11	0.00	0.000	0.179
	98197	7331	1.71	1.82	1.11	0.83	0.28	0.068	0.717
	98103	7521	2.45	1.79	1.61	1.28	0.33	0.079	0.717

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Table 7.3.3-2 Transverse Shear of RCCV for DCD Load Combinations

Location	Element ID	LOAD ID	Shear Force Q (MN/m)	d (m)	Shear Stress (MPa)			Shear Tie Ratio (%)	
					V _u	V _c	V _s	required	provided
1 RPV Pedestal Bottom	5006	CV-11b	6.64	1.83	4.27	2.63	1.63	0.395	1.010
	5013	CV-7b	6.81	1.83	4.38	2.63	1.75	0.436	1.010
	5024	CV-7b	6.76	1.83	4.35	2.65	1.70	0.410	1.010
2 RPV Pedestal Mid-Height	6006	CV-7a	1.77	1.94	1.08	0.97	0.11	0.027	0.252
	6013	CV-7b	2.35	1.94	1.43	1.37	0.06	0.014	0.252
	6024	CV-7a	1.79	1.94	1.09	0.87	0.21	0.052	0.252
3 RPV Pedestal Top	6606	CV-11b	2.85	1.93	1.74	1.37	0.37	0.090	1.010
	6613	CV-7a	0.22	1.92	0.14	0.14	0.00	0.000	1.010
	6624	CV-7b	0.03	1.93	0.02	0.02	0.00	0.000	1.010
4 RCCV Wetwell Bottom	1806	CV-11a	1.00	1.54	0.77	0.48	0.29	0.070	0.540
	1813	CV-11a	0.29	1.48	0.23	0.23	0.00	0.000	0.540
	1824	CV-7a	2.25	1.48	1.79	1.64	0.15	0.035	0.540
5 RCCV Wetwell Mid-Height	2606	CV-11a	0.24	1.43	0.20	0.20	0.00	0.000	0.270
	2613	CV-11a	0.12	1.47	0.09	0.09	0.00	0.000	0.270
	2624	CV-11a	0.19	1.43	0.15	0.15	0.00	0.000	0.270
6 RCCV Wetwell Top	3406	CV-11b	2.18	1.43	1.80	0.44	1.36	0.329	0.721
	3413	CV-11a	2.97	1.43	2.45	1.38	1.07	0.259	0.721
	3424	CV-11a	1.77	1.43	1.46	1.55	0.00	0.000	0.721
7 RCCV Drywell Bottom	3606	CV-11b	0.41	1.43	0.34	0.21	0.14	0.034	0.721
	3613	CV-11b	0.12	1.40	0.10	0.10	0.00	0.000	0.721
	3624	CV-11b	1.45	1.43	1.19	1.26	0.00	0.000	0.721
8 RCCV Drywell Mid-Height	4006	CV-11a	0.14	1.57	0.11	0.11	0.00	0.000	0.270
	4013	CV-7b	0.66	1.43	0.54	1.86	0.00	0.000	0.270
	4976	CV-7b	0.80	1.43	0.66	1.23	0.00	0.000	0.270
9 RCCV Drywell Top	4406	CV-7b	1.26	1.43	1.04	0.74	0.30	0.075	0.540
	4413	CV-1	0.79	1.68	0.47	0.87	0.00	0.000	0.540
	4424	CV-11a	1.48	1.61	1.08	0.94	0.14	0.035	0.540
10 Basemat @ Center	80003	CV-7b	0.48	4.63	0.12	1.02	0.00	0.000	0.179
	80007	CV-11b	0.71	4.61	0.18	0.98	0.00	0.000	0.179
	80012	CV-11b	0.67	4.64	0.17	0.94	0.00	0.000	0.179
11 Basemat Inside RPV Pedestal	80206	CV-11b	3.73	4.63	0.95	1.62	0.00	0.000	1.290
	80213	CV-11b	3.68	4.61	0.94	1.13	0.00	0.000	1.290
	80224	CV-7b	1.96	4.65	0.50	1.04	0.00	0.000	1.290
12 S/P Slab @ RPV	83306	CV-11b	3.73	1.76	2.50	1.68	0.82	0.199	1.140
	83313	CV-11b	3.71	1.76	2.49	1.91	0.58	0.144	1.140
	83324	CV-11b	3.66	1.76	2.46	2.22	0.24	0.057	1.140
13 S/P Slab @ Center	83406	CV-1	0.13	1.76	0.07	0.07	0.00	0.000	0.263
	83413	CV-1	0.12	1.76	0.07	0.07	0.00	0.000	0.263
	83424	CV-1	0.15	1.76	0.09	0.09	0.00	0.000	0.263
14 S/P Slab @ RCCV	83506	CV-7a	4.74	1.76	3.18	2.24	0.94	0.227	1.010
	83513	CV-7a	4.64	1.76	3.11	2.25	0.87	0.211	1.010
	83524	CV-7a	4.64	1.76	3.11	2.24	0.87	0.211	1.010
15 Top slab @ Drywell Head Opening	98120	CV-7b	1.87	1.95	1.13	1.33	0.00	0.000	0.358
	98135	CV-7b	2.96	1.95	1.79	2.63	0.00	0.000	0.358
	98104	CV-7b	1.32	1.73	0.90	1.08	0.00	0.000	0.358
16 Top slab @ Center	98149	CV-7a	0.35	1.82	0.23	0.23	0.00	0.000	0.179
	98170	CV-1	0.23	1.95	0.12	0.12	0.00	0.000	0.179
	98109	CV-7b	0.55	1.81	0.36	0.89	0.00	0.000	0.179
17 Top slab @ RCCV	98174	CV-1	0.22	1.97	0.11	0.11	0.00	0.000	0.179
	98197	CV-7b	1.66	2.00	0.98	0.88	0.10	0.023	0.717
	98103	CV-11b	1.66	1.79	1.09	1.20	0.00	0.000	0.717



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Table 7.3.4-1 Tangential Shear of RCCV

Location	Element ID	Load ID	Section Forces			Thickness t (m)	Rebar Area (cm ² /m)		r _{A_s/p} A _s	v _{so} (MPa)		v _u (MPa)	
			N _x /N _y (MN/m)	N _{xl} /N _{yl} (MN/m)	V (MN/m)		Required r _{A_s}	Provided p _{A_s}		Calculated	Allowable	Calculated	Allowable 0.4f _c '-v _{so}
1 RPV Pedestal Bottom	5006	8001	-0.625	1.795	0.357	2.40	32.4	431.3	0.075	0.15	4.88	0.15	13.65
		7711	-5.326	4.797	0.369	2.40	14.2	724.8	0.020	0.15	4.77	0.15	13.05
	5013	8001	-1.119	1.494	-0.572	2.40	12.9	431.3	0.030	0.24	4.88	0.24	13.56
		7721	-5.726	5.631	0.690	2.40	1.4	724.8	0.002	0.29	4.83	0.29	13.23
	5024	2501	-1.047	1.031	-0.174	2.40	0.0	431.3	0.000	0.07	4.88	0.07	13.73
		7221	-5.144	-5.308	0.273	2.40	4.6	724.8	0.006	0.11	4.83	0.11	13.40
2 RPV Pedestal Mid-Height	6006	6162	2.455	0.336	-0.495	2.40	84.1	431.3	0.195	0.21	4.77	0.21	13.01
		7721	-5.011	5.947	-0.536	2.40	26.1	543.6	0.048	0.22	4.83	0.22	13.29
	6013	6162	2.173	0.308	0.492	2.40	75.8	431.3	0.176	0.20	4.77	0.20	13.01
		7721	-5.357	5.760	-0.753	2.40	12.3	543.6	0.023	0.31	4.83	0.31	13.20
	6024	6662	2.716	-0.282	0.951	2.40	102.1	431.3	0.237	0.40	4.77	0.40	12.82
		7721	-3.009	4.940	0.740	2.40	54.0	543.6	0.099	0.31	4.83	0.31	13.21
3 RPV Pedestal Top	6606	6731	4.412	-0.816	-0.908	2.40	155.2	602.4	0.258	0.38	4.77	0.38	12.82
		7492	-4.163	-5.126	0.868	2.40	28.1	543.6	0.052	0.36	4.83	0.36	13.18
	6613	7871	3.936	-1.189	0.705	2.40	145.4	602.4	0.241	0.29	4.80	0.29	13.09
		7492	-4.216	-4.607	-0.688	2.40	12.0	543.6	0.022	0.29	4.83	0.29	13.25
	6624	7711	4.474	-1.217	-1.112	2.40	168.7	602.4	0.280	0.46	4.77	0.46	12.74
		7992	-4.238	5.766	-1.092	2.40	44.3	543.6	0.081	0.45	4.83	0.45	13.08
4 RCCV Wetwell Bottom	1806	7831	1.129	-1.858	3.110	2.00	130.7	474.0	0.276	1.55	4.77	1.55	11.68
		7861	-2.231	6.243	3.110	2.00	130.5	584.0	0.223	1.55	4.77	1.55	11.68
	1813	7331	0.917	1.294	2.772	2.00	109.4	474.0	0.231	1.39	4.77	1.39	11.85
		7951	-2.571	6.555	-2.772	2.00	122.1	584.0	0.209	1.39	4.88	1.39	12.41
	1824	7221	1.214	1.595	3.434	2.00	135.2	474.0	0.285	1.72	4.85	1.72	11.92
		7351	-2.605	-6.971	-3.424	2.00	138.7	584.0	0.237	1.71	4.88	1.71	12.09

Note : Top and bottom lines for each element indicate evaluation results for hoop and vertical rebars, respectively.

Nomenclature:

N_x, N_y: axial forces in the hoop and vertical directions due to pressure and dead loads, respectively

N_{xl}, N_{yl}: axial forces in the hoop and vertical directions due to lateral loads, respectively

V: tangential shear due to lateral loads

v_{so}: tangential shear stress borne by orthogonal rebars (Refer to Table 3.8-3.)



Table 7.3.4-1 Tangential Shear of RCCV (Continued)

Location	Element ID	Load ID	Section Forces			Thickness t (m)	Rebar Area (cm ² /m)		r _A /p _A s	v _{so} (MPa)		v _u (MPa)	
			N _x /N _y (MN/m)	N _x /N _y (MN/m)	V (MN/m)		Required r _A s	Provided p _A s		Calculated	Allowable	Calculated	Allowable 0.4f _c '-v _{so}
5 RCCV Wetwell Mid-Height	2606	7331	2.910	0.903	-3.453	2.00	178.4	518.0	0.344	1.73	4.77	1.73	11.49
		7361	-1.794	-5.692	-3.453	2.00	133.8	519.0	0.258	1.73	4.77	1.73	11.51
	2613	7331	2.688	1.014	3.173	2.00	165.7	518.0	0.320	1.59	4.77	1.59	11.63
		7711	-2.081	5.952	-3.188	2.00	127.9	519.0	0.246	1.59	4.80	1.59	11.76
	2624	7861	2.960	-0.875	3.343	2.00	176.5	518.0	0.341	1.67	4.77	1.67	11.56
		7951	-2.134	6.173	3.343	2.00	131.3	519.0	0.253	1.67	4.88	1.67	12.13
6 RCCV Wetwell Top	3406	7761	5.505	-0.757	-3.429	2.00	246.8	732.0	0.337	1.71	4.80	1.71	11.64
		7461	-1.207	-4.942	3.406	2.00	133.5	519.0	0.257	1.70	4.72	1.70	11.25
	3413	7761	5.022	-0.778	-3.309	2.00	230.5	732.0	0.315	1.65	4.80	1.65	11.70
		7351	-2.028	-5.404	3.299	2.00	115.6	519.0	0.223	1.65	4.88	1.65	12.15
	3424	7261	4.974	0.779	3.005	2.00	221.1	732.0	0.302	1.50	4.80	1.50	11.85
		7351	-1.485	-5.297	2.999	2.00	123.6	519.0	0.238	1.50	4.88	1.50	12.30
7 RCCV Drywell Bottom	3606	7861	4.825	-0.559	-3.535	2.00	233.1	732.0	0.319	1.77	4.74	1.77	11.27
		7361	-0.316	-4.761	3.535	2.00	155.7	519.0	0.300	1.77	4.74	1.77	11.27
	3613	7911	4.923	-0.622	-3.315	2.00	230.4	732.0	0.315	1.66	4.73	1.66	11.35
		7633	-1.849	5.459	-3.314	2.00	124.9	519.0	0.241	1.66	4.77	1.66	11.56
	3624	7761	2.985	-0.571	-3.215	2.00	173.5	732.0	0.237	1.61	4.74	1.61	11.41
		7153	-1.101	-6.108	3.203	2.00	155.7	519.0	0.300	1.60	4.88	1.60	12.20
8 RCCV Drywell Mid-Height	4006	8511	3.740	1.188	-3.186	2.00	191.8	518.0	0.370	1.59	4.88	1.59	12.21
		7831	0.063	-4.153	3.186	2.00	147.0	519.0	0.283	1.59	4.74	1.59	11.44
	4013	7921	3.904	-0.915	-3.202	2.00	198.5	518.0	0.383	1.60	4.79	1.60	11.69
		7301	-1.865	-5.164	3.202	2.00	113.1	519.0	0.218	1.60	4.88	1.60	12.20
	4976	7761	1.694	-0.360	-3.294	2.00	139.0	518.0	0.268	1.65	4.74	1.65	11.37
		7153	-0.649	-5.014	3.287	2.00	143.6	519.0	0.277	1.64	4.88	1.64	12.16
9 RCCV Drywell Top	4406	9011	5.654	-1.158	2.663	2.00	229.9	518.0	0.444	1.33	4.88	1.33	12.47
		7123	0.262	3.470	2.663	2.00	125.9	519.0	0.243	1.33	4.83	1.33	12.20
	4413	9011	2.633	-0.674	2.842	2.00	149.2	518.0	0.288	1.42	4.88	1.42	12.38
		7211	-2.047	-4.940	2.846	2.00	100.7	519.0	0.194	1.42	4.77	1.42	11.77
	4424	9011	2.443	-0.703	-3.503	2.00	161.6	430.0	0.376	1.75	4.88	1.75	12.05
		7861	-0.528	4.052	-3.503	2.00	135.0	476.0	0.284	1.75	4.71	1.75	11.11

Note : Top and bottom lines for each element indicate evaluation results for hoop and vertical rebars, respectively.

Nomenclature:

N_x, N_y : axial forces in the hoop and vertical directions due to pressure and dead loads, respectively

N_{xl}, N_{yl} : axial forces in the hoop and vertical directions due to lateral loads, respectively

V: tangential shear due to lateral loads

v_{so} : tangential shear stress borne by orthogonal rebars (Refer to Table 3.8-3.)



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Table 7.3.4-2 Tangential Shear of RCCV for DCD Load Combinations

Location	Element ID	Load ID	Section Forces			Thickness t (m)	Rebar Area (cm ² /m)		$A_s/p A_s$	v_{so} (MPa)		v_u (MPa)	
			N_x/N_y (MN/m)	N_{xl}/N_{yl} (MN/m)	V (MN/m)		Required $r A_s$	Provided $p A_s$		Calculated	Allowable	Calculated	Allowable $0.4f_c' - v_{so}$
1 RPV Pedestal Bottom	5006	CV-11a	-4.296	-2.523	-0.764	2.40	-45.1	431.3	-0.105	0.32	4.83	0.32	13.20
		CV-11a	-5.498	-4.800	-0.764	2.40	-17.3	724.8	-0.024	0.32	4.83	0.32	13.20
	5013	CV-11a	-4.646	2.713	0.769	2.40	-49.6	431.3	-0.115	0.32	4.83	0.32	13.20
		CV-11a	-5.787	-5.914	-0.769	2.40	4.8	724.8	0.007	0.32	4.83	0.32	13.20
	5024	CV-11a	-4.772	-2.294	0.293	2.40	-66.8	431.3	-0.155	0.12	4.83	0.12	13.39
		CV-11a	-5.217	-5.518	0.293	2.40	8.4	724.8	0.012	0.12	4.83	0.12	13.39
2 RPV Pedestal Mid-Height	6006	CV-11a	0.767	1.048	0.961	2.40	59.5	431.3	0.138	0.40	4.83	0.40	13.12
		CV-11a	-5.109	6.021	-0.961	2.40	26.9	543.6	0.049	0.40	4.83	0.40	13.12
	6013	CV-11a	0.441	-1.294	-0.891	2.40	54.7	431.3	0.127	0.37	4.83	0.37	13.15
		CV-11a	-5.415	-5.780	0.891	2.40	11.8	543.6	0.022	0.37	4.83	0.37	13.15
	6024	CV-7a	1.268	0.457	-0.599	2.40	55.0	431.3	0.127	0.25	4.83	0.25	13.27
		CV-11a	-3.063	5.077	0.793	2.40	56.4	543.6	0.104	0.33	4.83	0.33	13.19
3 RPV Pedestal Top	6606	CV-11a	4.066	-1.737	-1.520	2.40	173.3	602.4	0.288	0.63	4.83	0.63	12.88
		CV-11a	-5.553	-5.895	1.520	2.40	14.5	543.6	0.027	0.63	4.83	0.63	12.88
	6613	CV-11a	3.790	-2.867	0.737	2.40	183.5	602.4	0.305	0.31	4.83	0.31	13.21
		CV-11a	-5.718	5.381	0.737	2.40	-7.8	543.6	-0.014	0.31	4.83	0.31	13.21
	6624	CV-11a	4.435	-2.509	-1.154	2.40	195.6	602.4	0.325	0.48	4.83	0.48	13.04
		CV-11a	-5.439	-6.493	1.154	2.40	31.4	543.6	0.058	0.48	4.83	0.48	13.04
4 RCCV Wetwell Bottom	1806	CV-11a	0.859	2.290	-3.343	2.00	132.8	474.0	0.280	1.67	4.85	1.67	11.97
		CV-11a	-2.803	6.330	3.343	2.00	117.8	584.0	0.202	1.67	4.85	1.67	11.97
	1813	CV-11a	0.589	1.685	3.011	2.00	109.3	474.0	0.230	1.51	4.85	1.51	12.13
		CV-11a	-5.295	-6.602	3.011	2.00	53.0	584.0	0.091	1.51	4.85	1.51	12.13
	1824	CV-11a	1.199	1.923	3.481	2.00	140.0	474.0	0.295	1.74	4.85	1.74	11.90
		CV-11a	-5.691	7.017	-3.481	2.00	57.9	584.0	0.099	1.74	4.85	1.74	11.90

Note : Top and bottom lines for each element indicate evaluation results for hoop and vertical rebars, respectively.

Nomenclature:

N_x, N_y : axial forces in the hoop and vertical directions due to pressure and dead loads, respectively

N_{xl}, N_{yl} : axial forces in the hoop and vertical directions due to lateral loads, respectively

V: tangential shear due to lateral loads

v_{so} : tangential shear stress borne by orthogonal rebars



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Table 7.3.4-2 Tangential Shear of RCCV for DCD Load Combinations (Continued)

Location	Element ID	Load ID	Section Forces			Thickness t (m)	Rebar Area (cm ² /m)		rA_s/pA_s	v_{so} (MPa)		v_u (MPa)	
			N_x/N_y (MN/m)	N_x/N_{yl} (MN/m)	V (MN/m)		Required rA_s	Provided pA_s		Calculated	Allowable	Calculated	Allowable $0.4f_c' - v_{so}$
5 RCCV Wetwell Mid-Height	2606	CV-11a	2.146	1.130	-3.568	2.00	159.1	518.0	0.307	1.78	4.85	1.78	11.88
		CV-11a	-2.078	5.729	3.568	2.00	126.2	519.0	0.243	1.78	4.85	1.78	11.88
	2613	CV-11a	1.583	-1.527	-3.410	2.00	143.7	518.0	0.277	1.71	4.85	1.71	11.96
		CV-11a	-5.418	-6.044	3.410	2.00	41.1	519.0	0.079	1.71	4.85	1.71	11.96
	2624	CV-11a	2.137	1.242	-3.377	2.00	154.9	518.0	0.299	1.69	4.85	1.69	11.98
		CV-11b	-5.248	-6.229	-3.368	2.00	50.4	519.0	0.097	1.68	4.78	1.68	11.57
6 RCCV Wetwell Top	3406	CV-11a	4.780	0.773	3.501	2.00	226.0	732.0	0.309	1.75	4.85	1.75	11.92
		CV-11b	-1.662	4.951	-3.479	2.00	120.6	519.0	0.232	1.74	4.78	1.74	11.51
	3413	CV-11b	3.745	0.930	3.426	2.00	200.5	732.0	0.274	1.71	4.78	1.71	11.54
		CV-11a	-5.982	-5.535	3.436	2.00	14.4	519.0	0.028	1.72	4.85	1.72	11.95
	3424	CV-11a	4.349	0.996	3.007	2.00	203.0	732.0	0.277	1.50	4.85	1.50	12.16
		CV-11a	-6.183	5.391	-3.007	2.00	-0.3	519.0	-0.001	1.50	4.85	1.50	12.16
7 RCCV Drywell Bottom	3606	CV-11a	3.888	-0.728	-3.600	2.00	205.6	732.0	0.281	1.80	4.82	1.80	11.71
		CV-11b	-0.932	-4.769	3.591	2.00	139.9	519.0	0.270	1.80	4.74	1.80	11.22
	3613	CV-11a	3.334	0.880	3.383	2.00	185.7	732.0	0.254	1.69	4.82	1.69	11.82
		CV-11a	-6.245	5.581	-3.383	2.00	7.7	519.0	0.015	1.69	4.82	1.69	11.82
	3624	CV-1	2.064	0.000	0.000	2.00	66.5	732.0	0.091	0.00	4.88	0.00	13.80
		CV-11b	-7.608	-6.169	3.211	2.00	-18.5	519.0	-0.036	1.61	4.65	1.61	10.94
8 RCCV Drywell Mid-Height	4006	CV-11a	2.755	-1.283	-3.288	2.00	170.9	518.0	0.330	1.64	4.82	1.64	11.87
		CV-11b	-0.081	-4.158	-3.286	2.00	144.9	519.0	0.279	1.64	4.74	1.64	11.37
	4013	CV-11a	2.614	-1.041	-3.258	2.00	164.1	518.0	0.317	1.63	4.82	1.63	11.88
		CV-11a	-8.008	-5.287	3.258	2.00	-48.9	519.0	-0.094	1.63	4.82	1.63	11.88
	4976	CV-11a	-0.357	-0.442	3.305	2.00	82.7	518.0	0.160	1.65	4.74	1.65	11.37
		CV-11b	-5.670	-5.073	3.302	2.00	10.9	519.0	0.021	1.65	4.65	1.65	10.89
9 RCCV Drywell Top	4406	CV-11b	2.910	1.173	-2.776	2.00	164.4	518.0	0.317	1.39	4.74	1.39	11.63
		CV-11a	0.150	-3.479	-2.776	2.00	125.1	519.0	0.241	1.39	4.82	1.39	12.13
	4413	CV-11a	0.524	0.819	2.892	2.00	96.0	518.0	0.185	1.45	4.82	1.45	12.07
		CV-1	-1.799	0.000	0.000	2.00	-58.0	519.0	-0.112	0.00	4.88	0.00	13.80
	4424	CV-1	1.163	0.000	0.000	2.00	37.5	430.0	0.087	0.00	4.88	0.00	13.80
		CV-11a	-4.086	4.105	-3.515	2.00	36.6	476.0	0.077	1.76	4.74	1.76	11.26

Note : Top and bottom lines for each element indicate evaluation results for hoop and vertical rebars, respectively.

Nomenclature:

N_x, N_y : axial forces in the hoop and vertical directions due to pressure and dead loads, respectively

N_{xl}, N_{yl} : axial forces in the hoop and vertical directions due to lateral loads, respectively

V: tangential shear due to lateral loads

v_{so} : tangential shear stress borne by orthogonal rebars



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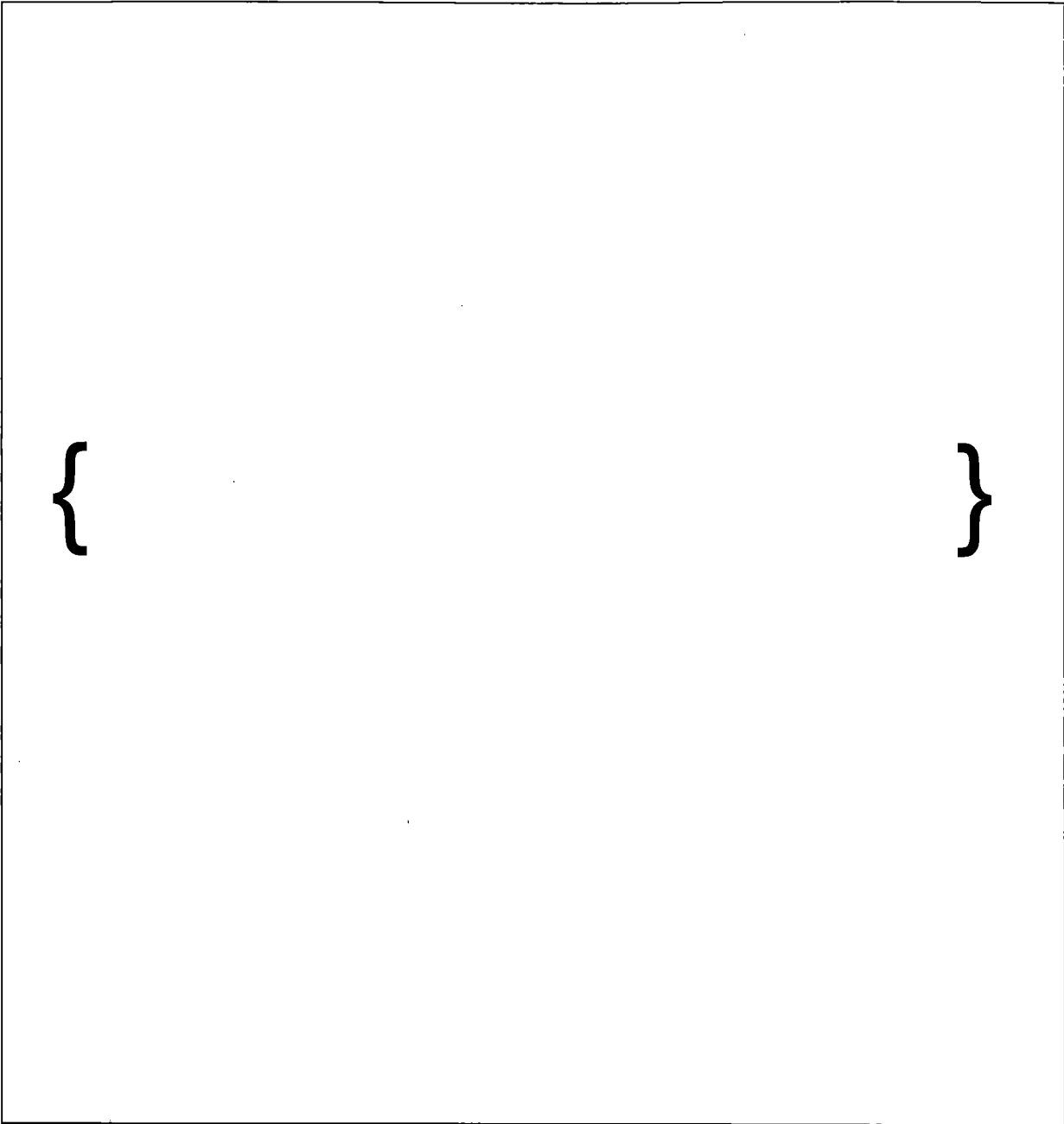


Figure 1-1 RB/FB Global FE Analysis Model

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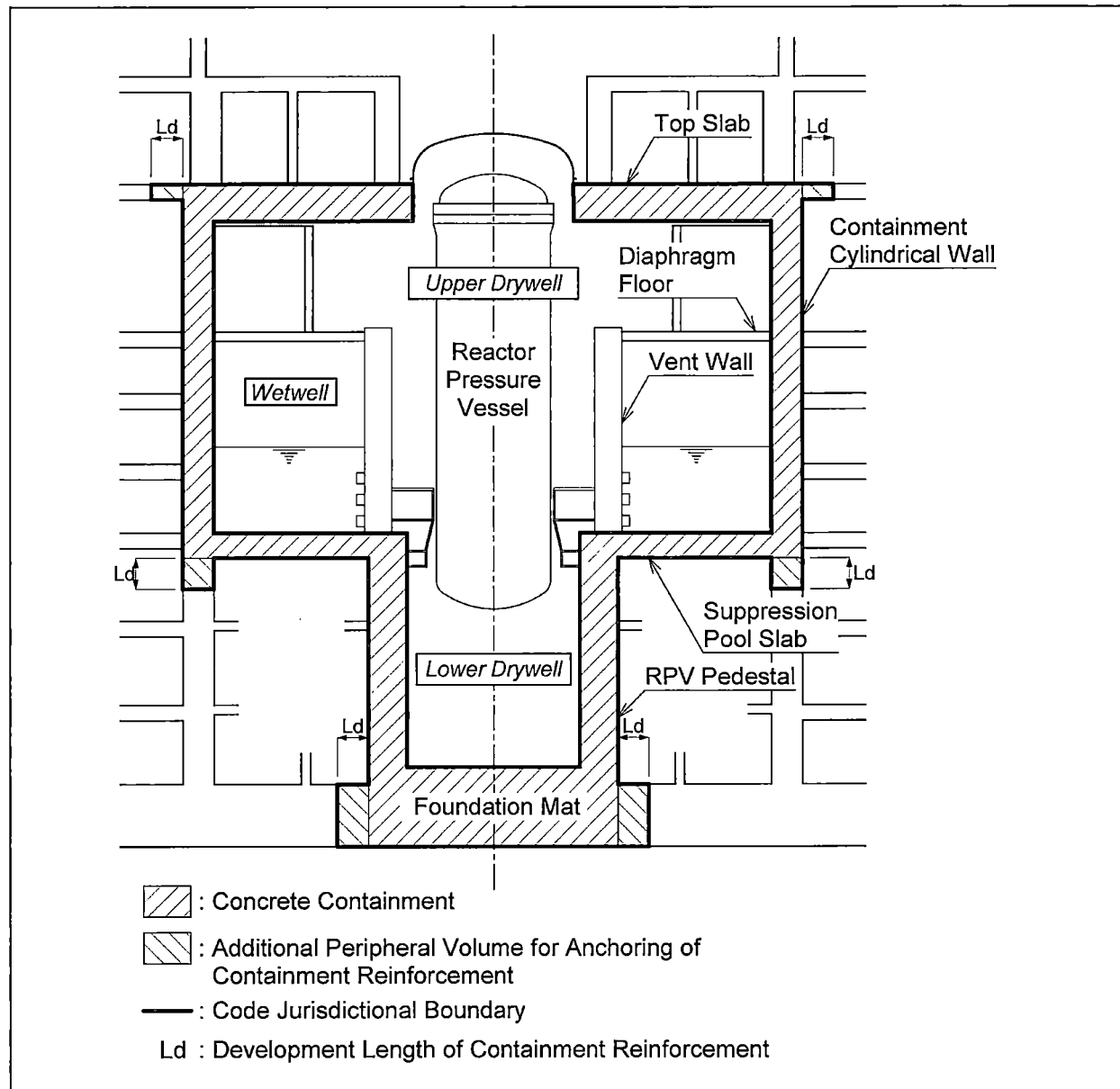


Figure 3-1 Configuration of RCCV

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Figure 3-2 RB and FB Concrete Outline Plan at EL -11,500

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Figure 3.3. RB and FB Concrete Outline Plan at EL+4.650
{{{Security-Related Information - Withheld Under 10 C.F.R. 2.390}}}

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}

Figure 3-4 RB and FB Concrete Outline Plan at EL 17,500
{{{Security-Related Information - Withheld Under 10 CFR-2.390}}}

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}

Figure 3-5 RB and FB Concrete Outline Plan at EL 27,000

{{{Security-Related Information - Withheld Under 10 CFR-2.390}}}

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Figure 3-6 RB and FB Concrete Outline NS Section

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Figure 3-7 RB and FB Concrete Outline EW Section
{{{Security-Related Information - Withheld Under 10 CFR-2.390}}}

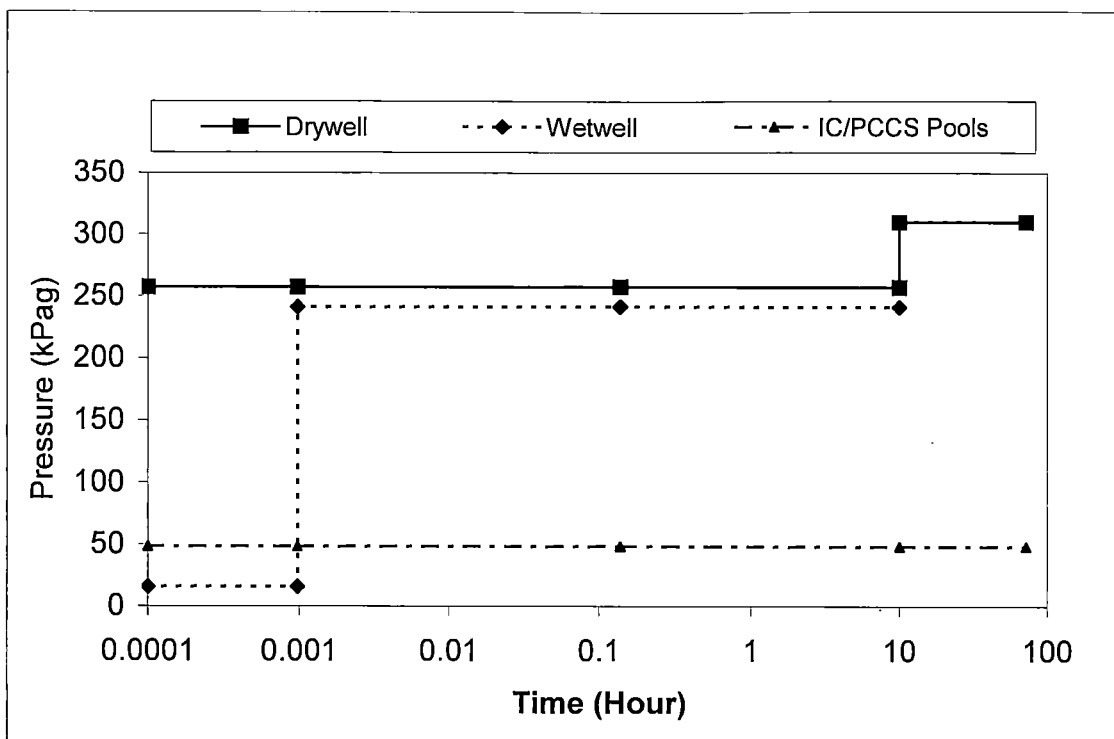


Figure 5.2.1-1 Envelopes of Transient Pressure Curves at DBA



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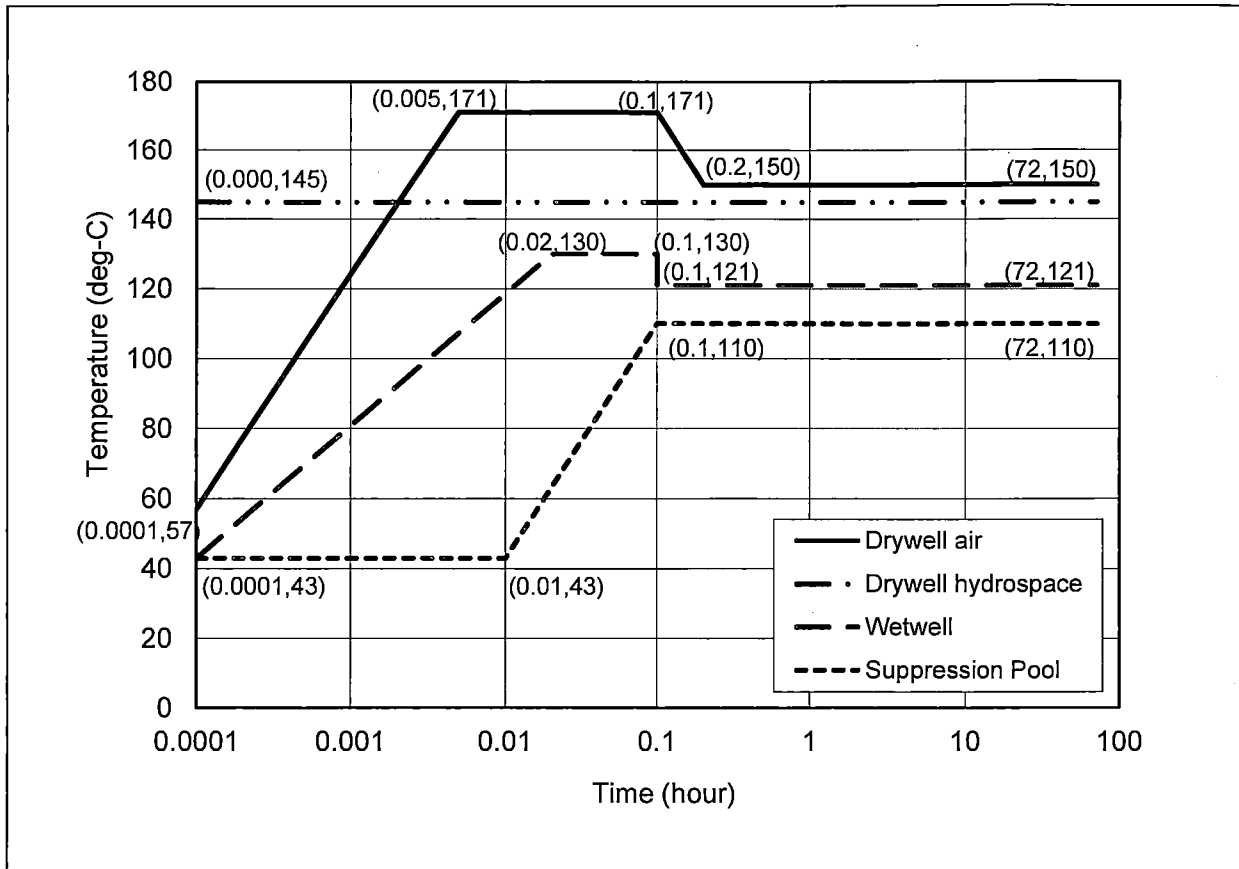
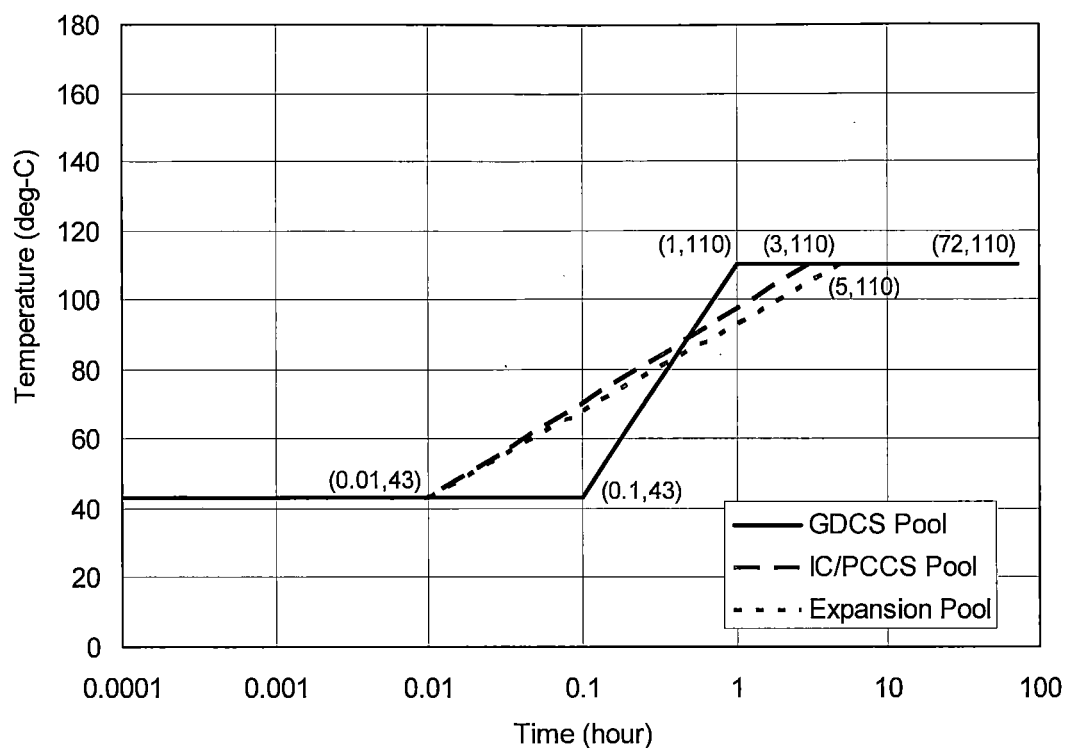


Figure 5.2.2-1 Envelopes of Transient Temperature Curves - Inside RCCV during DBA



Note: The structural evaluation for TRACG calculated LOCA temperature curves are described in Appendix E of Reference 2.1.2-j.

Figure 5.2.2-2 Envelopes of Transient Temperature Curves – Other Pools during DBA

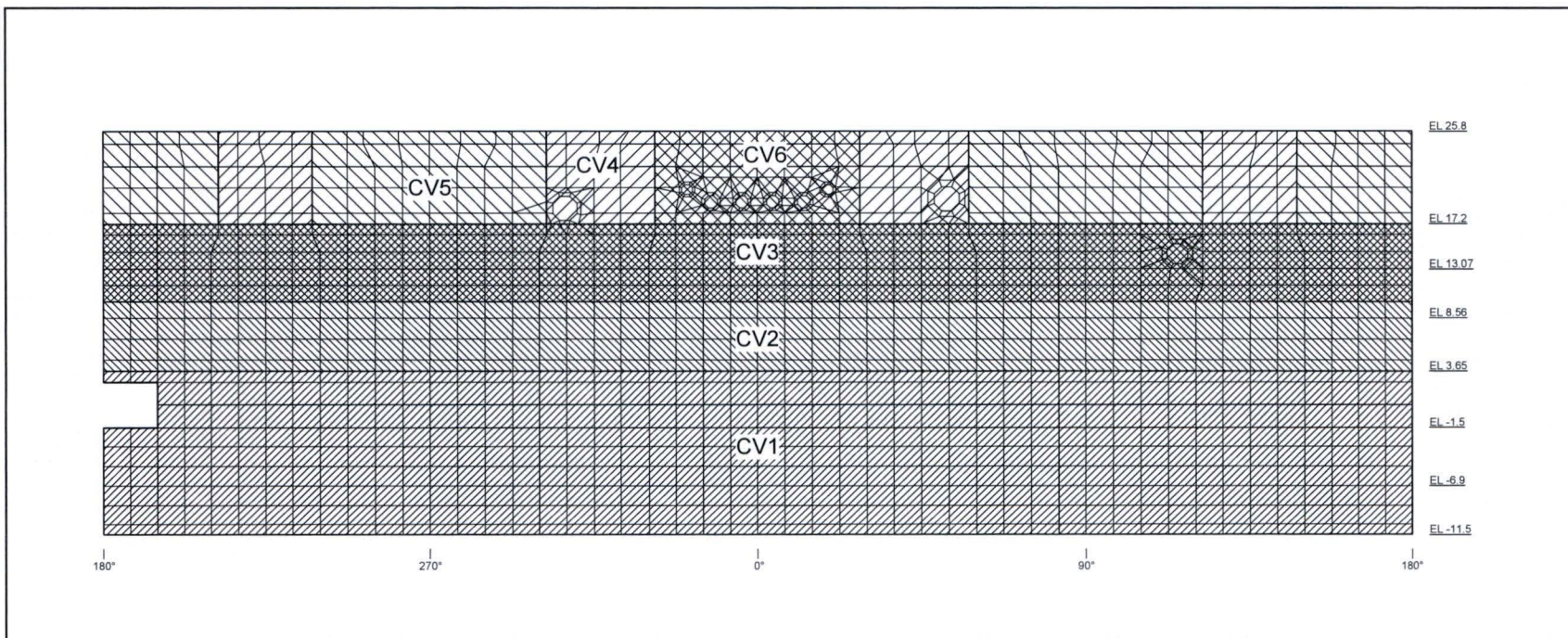


Figure 5.2.2-3 Application Thermal Load on the RCCV Wall (Normal Operation)

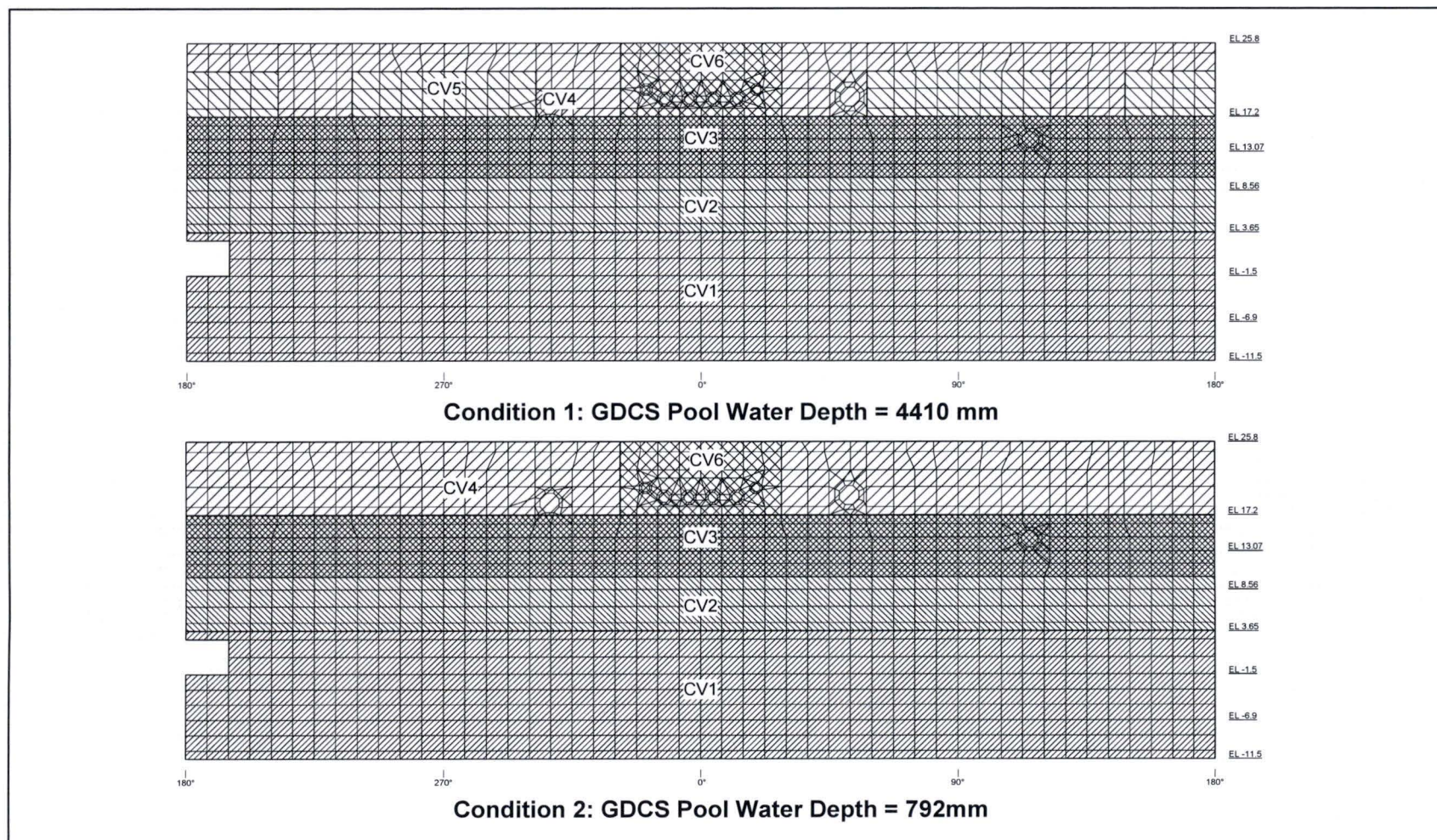


Figure 5.2.2-4 Application of Thermal Load on the RCCV Wall (DBA)

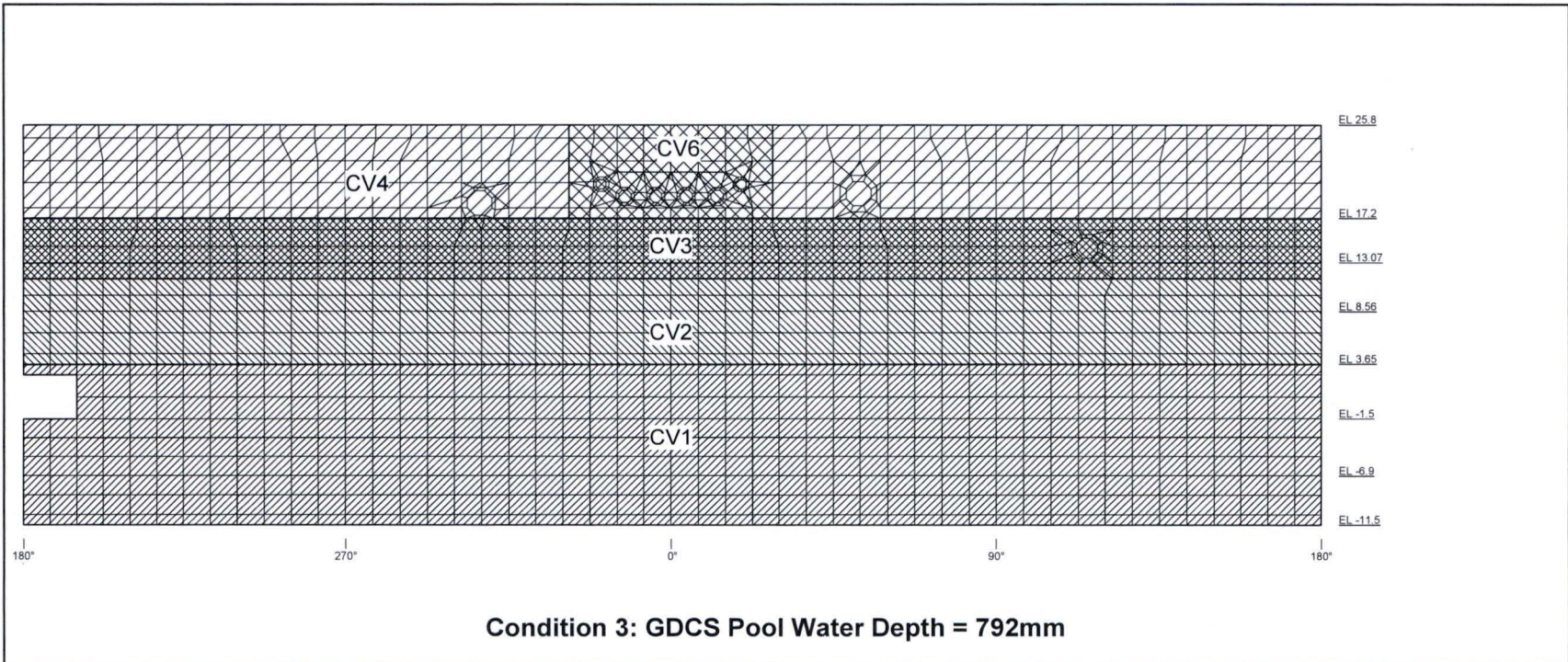


Figure 5.2.2-5 Application Thermal Load on the RCCV Wall (LOCA Flooding)



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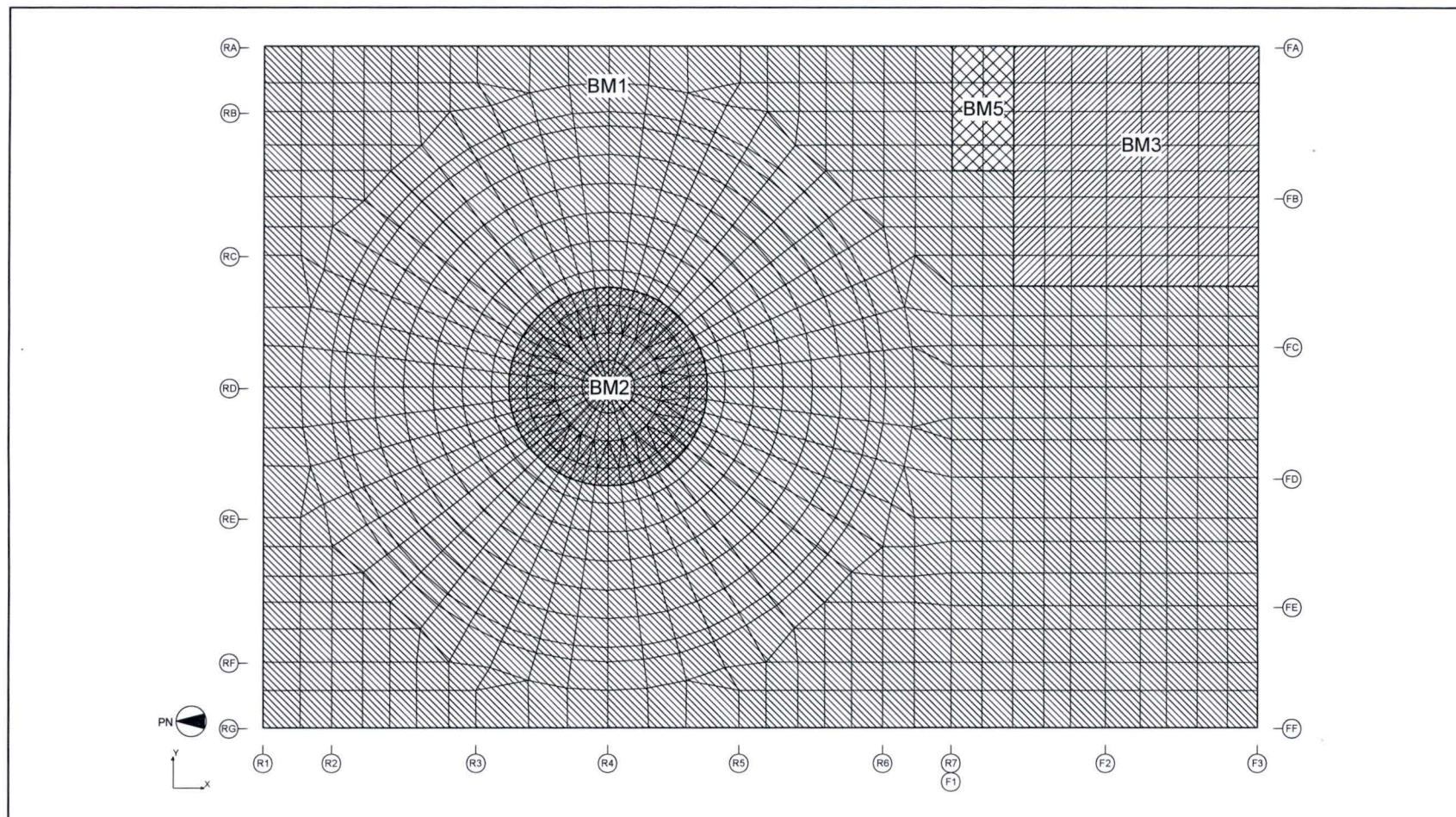


Figure 5.2.2-6 Application of Thermal Load on the Basemat (Normal Operation and DBA)



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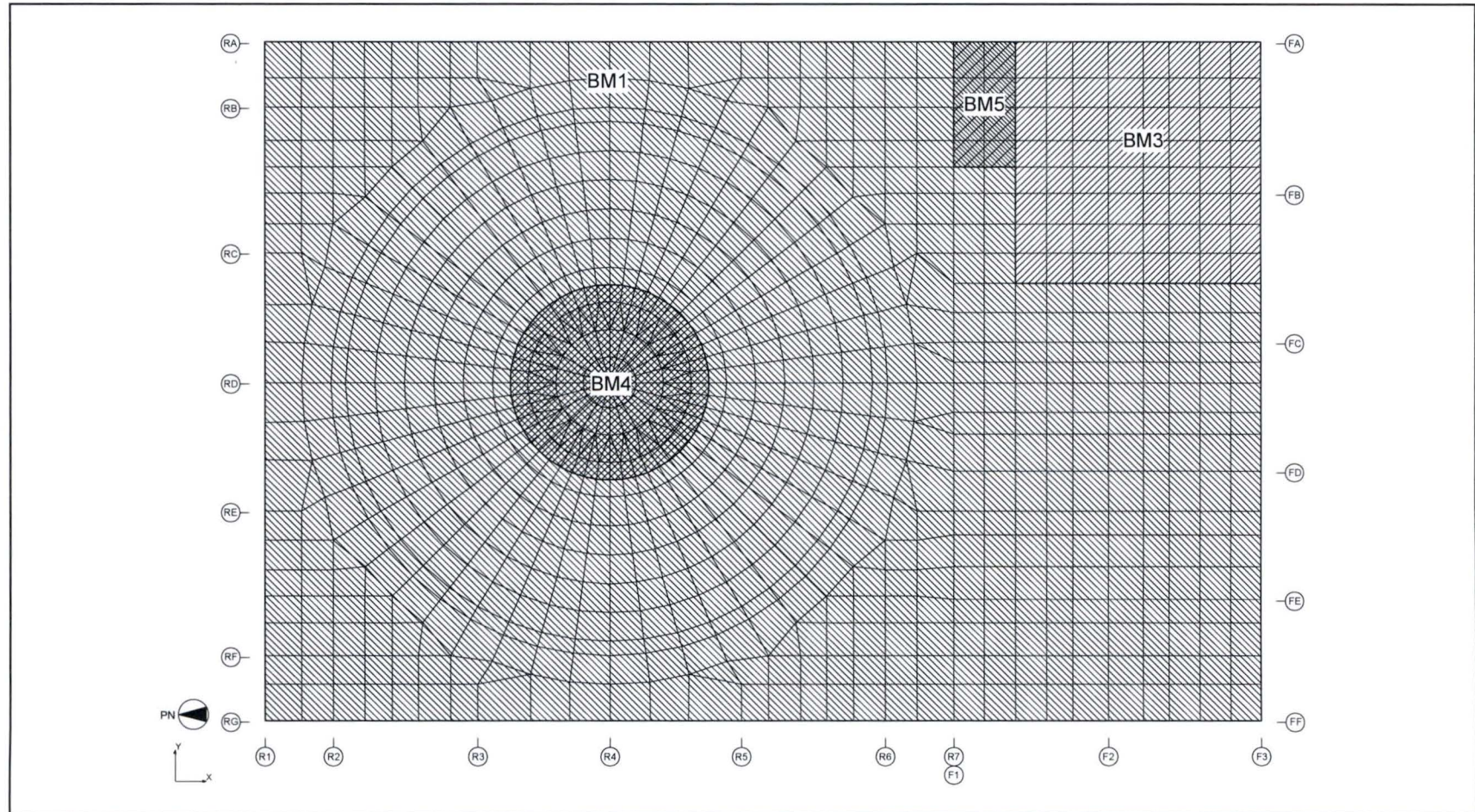


Figure 5.2.2-7 Application of Thermal Load on the Basemat (LOCA Flooding)



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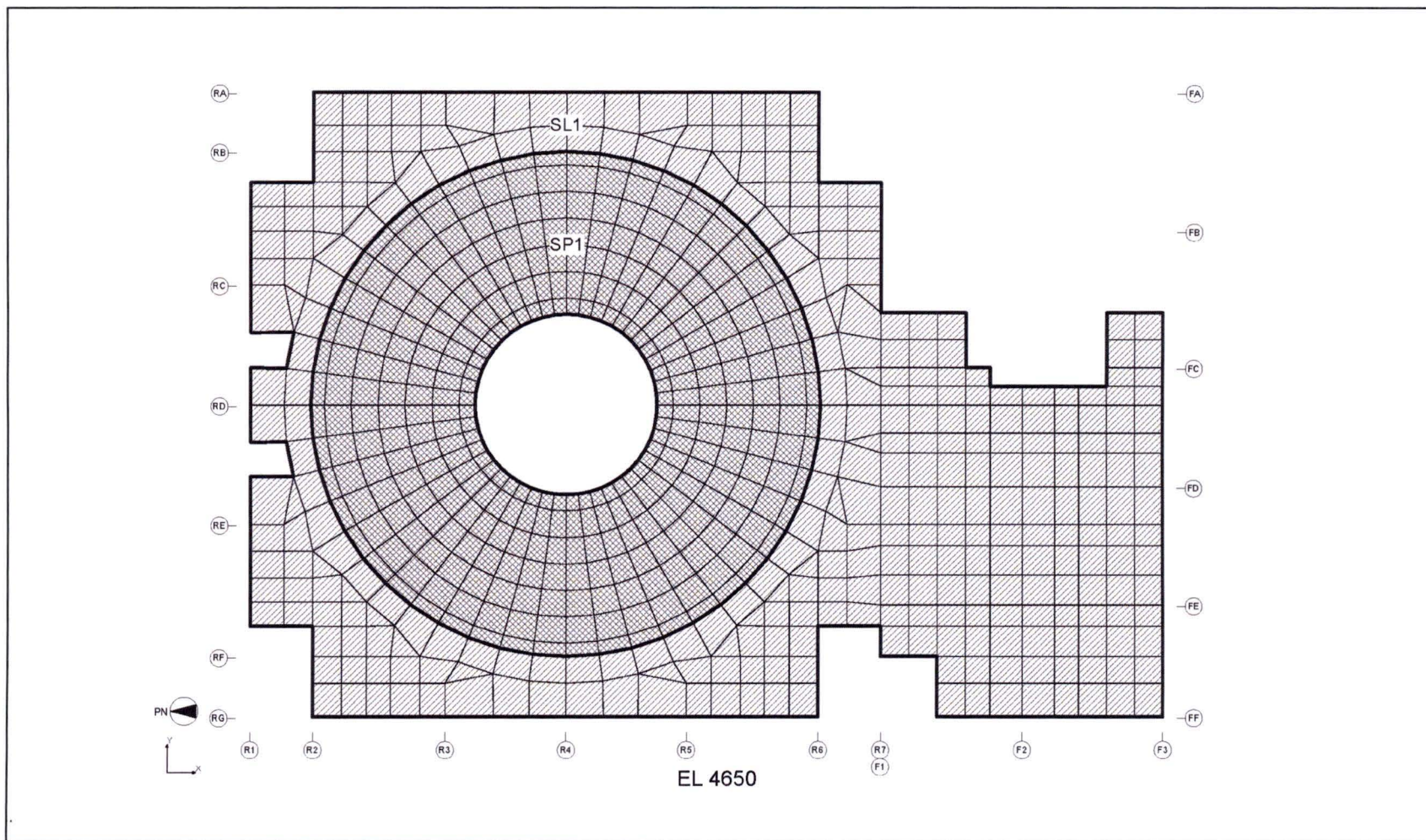


Figure 5.2.2-8 Application of Thermal Load on the Suppression Pool Slab (EL 4,650)



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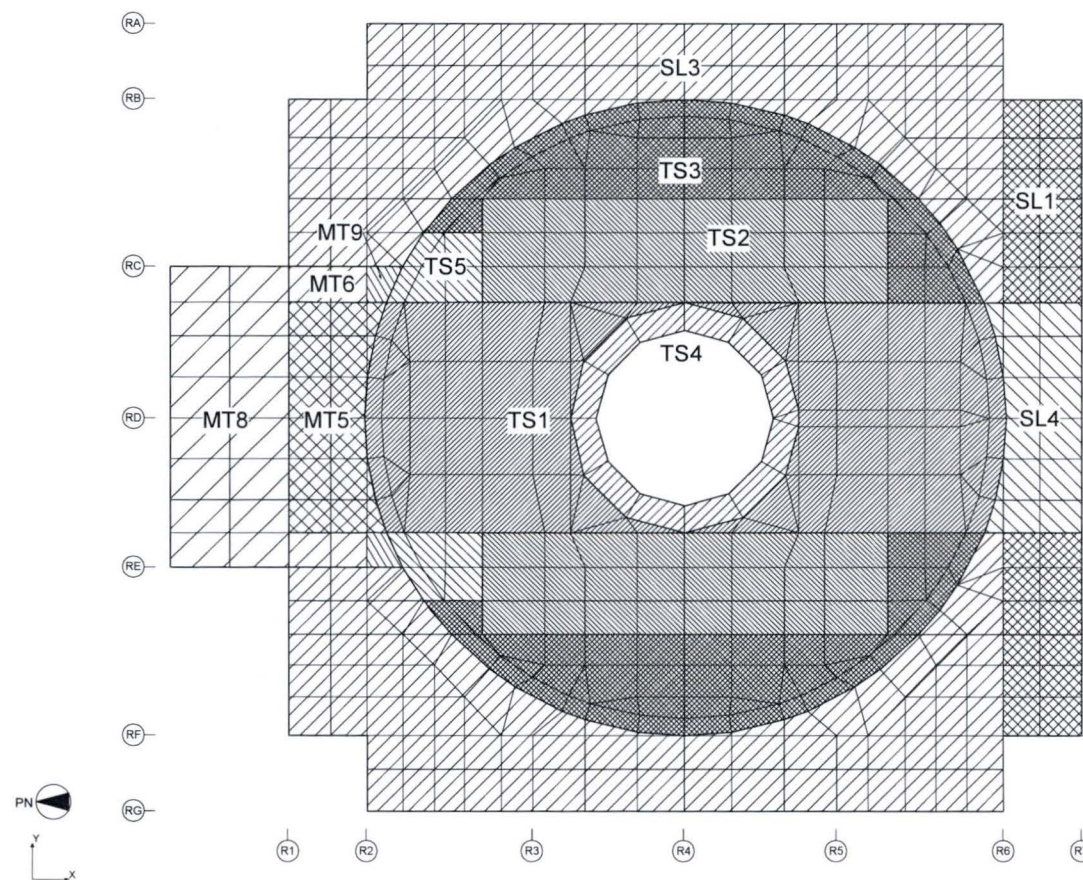
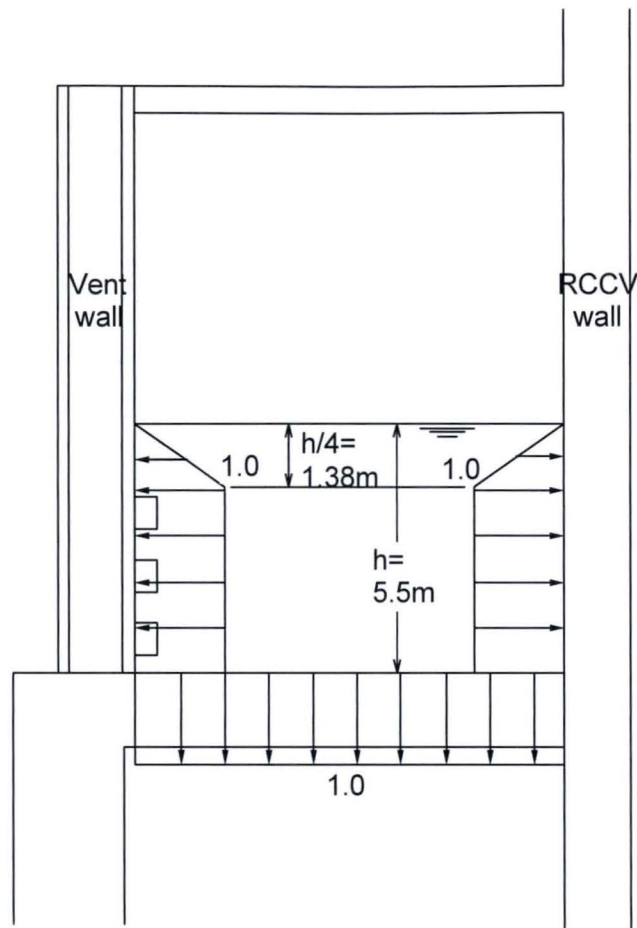


Figure 5.2.2-9 Application of Thermal Load on the Top Slab (EL 27,000)



SRV Peak Positive Pressure = 152 kPaG

SRV Peak Negative Pressure = -63 kPaG

Dynamic Load Factor (DLF) = 2.0

Figure 5.2.3-1 Safety Relief Valve Pressure Loads

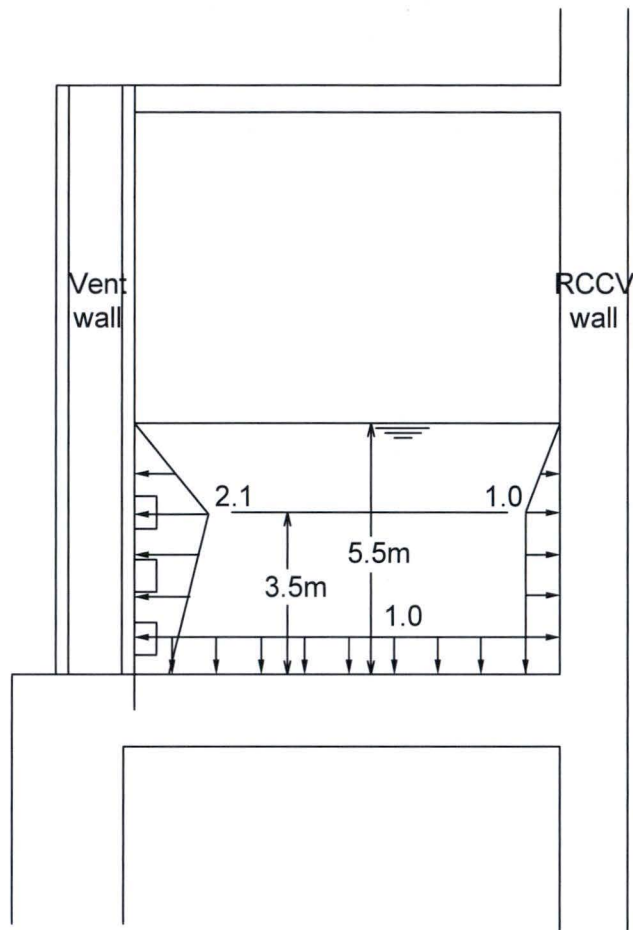


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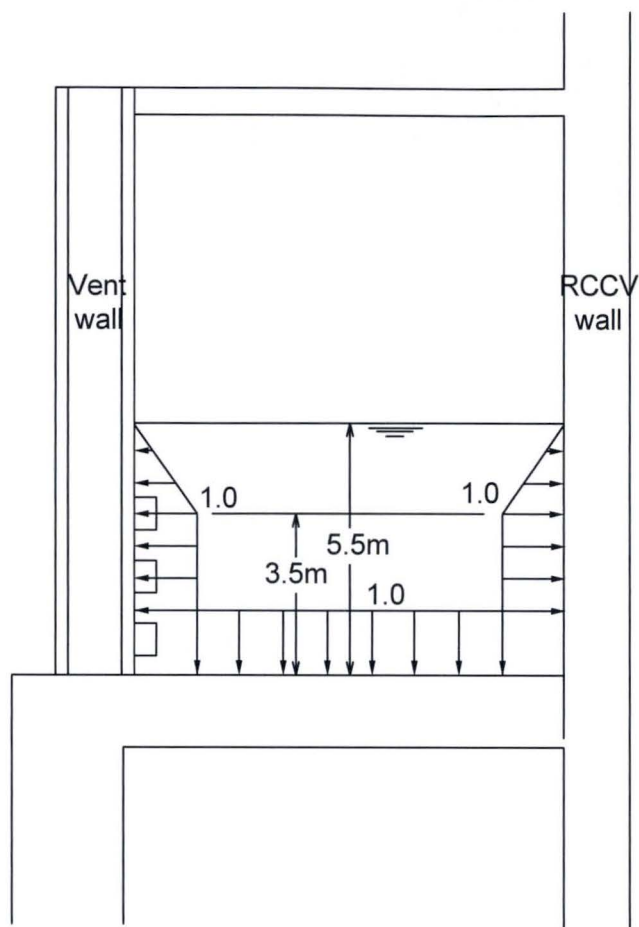
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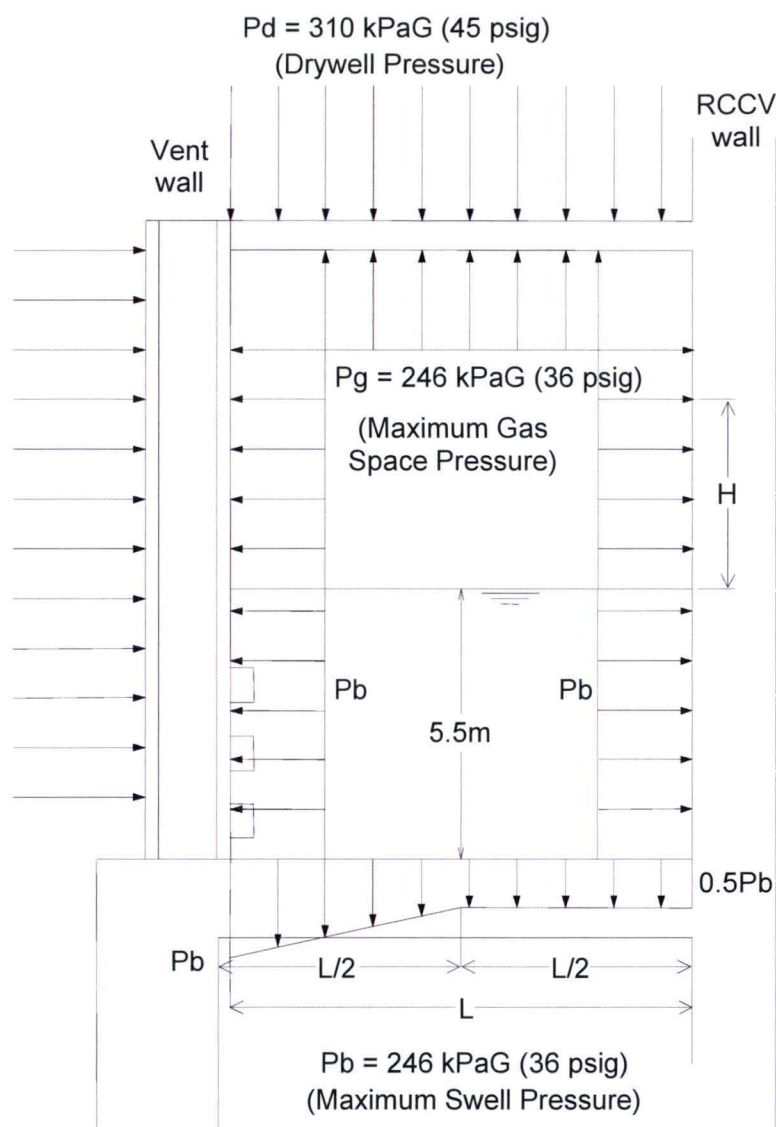
CH Peak Positive Pressure = 91 kPaG
CH Peak Negative Pressure = -66 kPaG
Dynamic Load Factor (DLF) = 2.0

Figure 5.2.3-2 Chugging Pressure Loads



CO Peak Positive Pressure = 186 kPaG
CO Peak Negative Pressure = -186 kPaG
Dynamic Load Factor (DLF) = 2.0

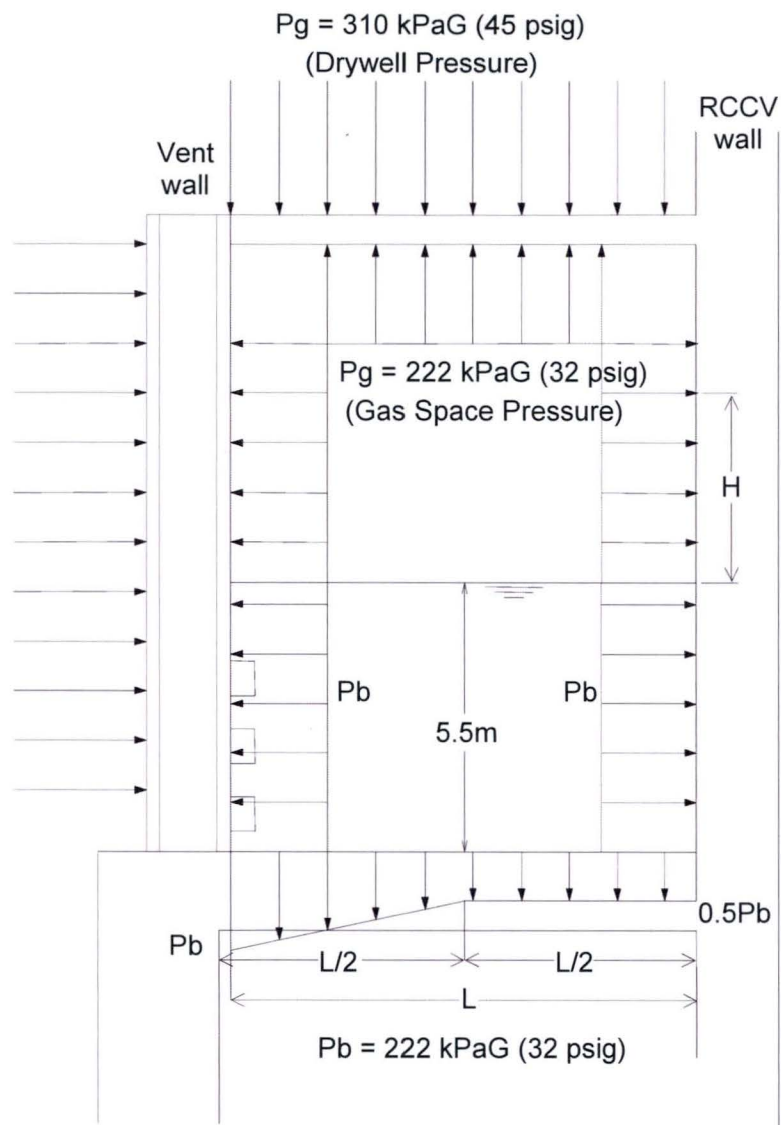
Figure 5.2.3-3 Condensation Oscillation Pressure Loads



Note:

1. Pool swell height H is 4.5 m.
2. The differential pressure between the DW and WW is 64 kPa_d as wetwell gas space is at its peak pressure during pool swell.

Figure 5.2.3-4 Pool Swell Pressure Loads



Note:

1. Pool swell height H is 4.5 m.
2. The differential pressure between the DW and WW is 88 kPaG as concurrent to the duration of the froth impact during pool swell.

Figure 5.2.3-5 Pool Swell Pressure Concurrent with Froth Impact Loads

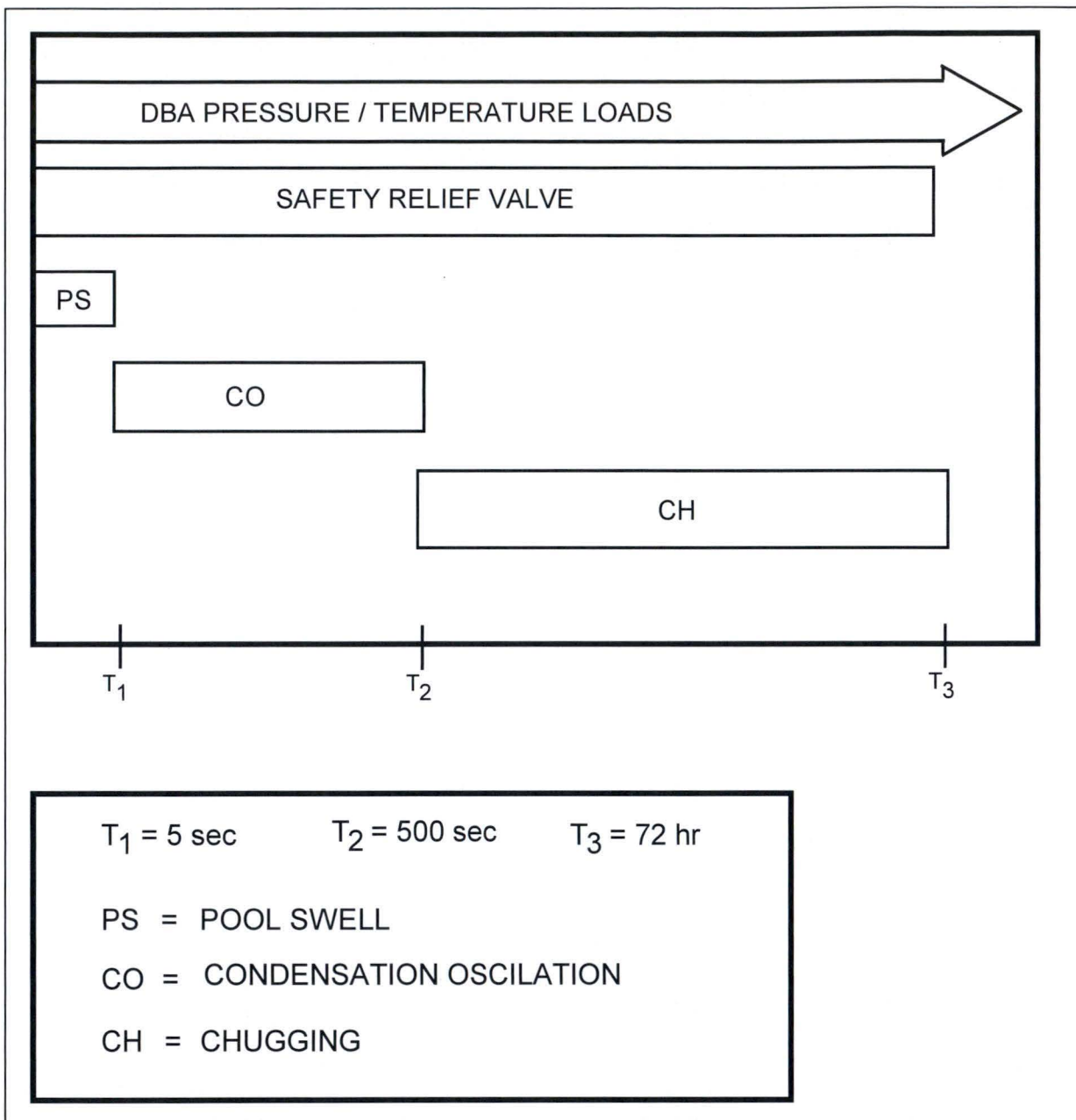


Figure 5.2.3-6 Typical Event – Time Relationship for a DBA

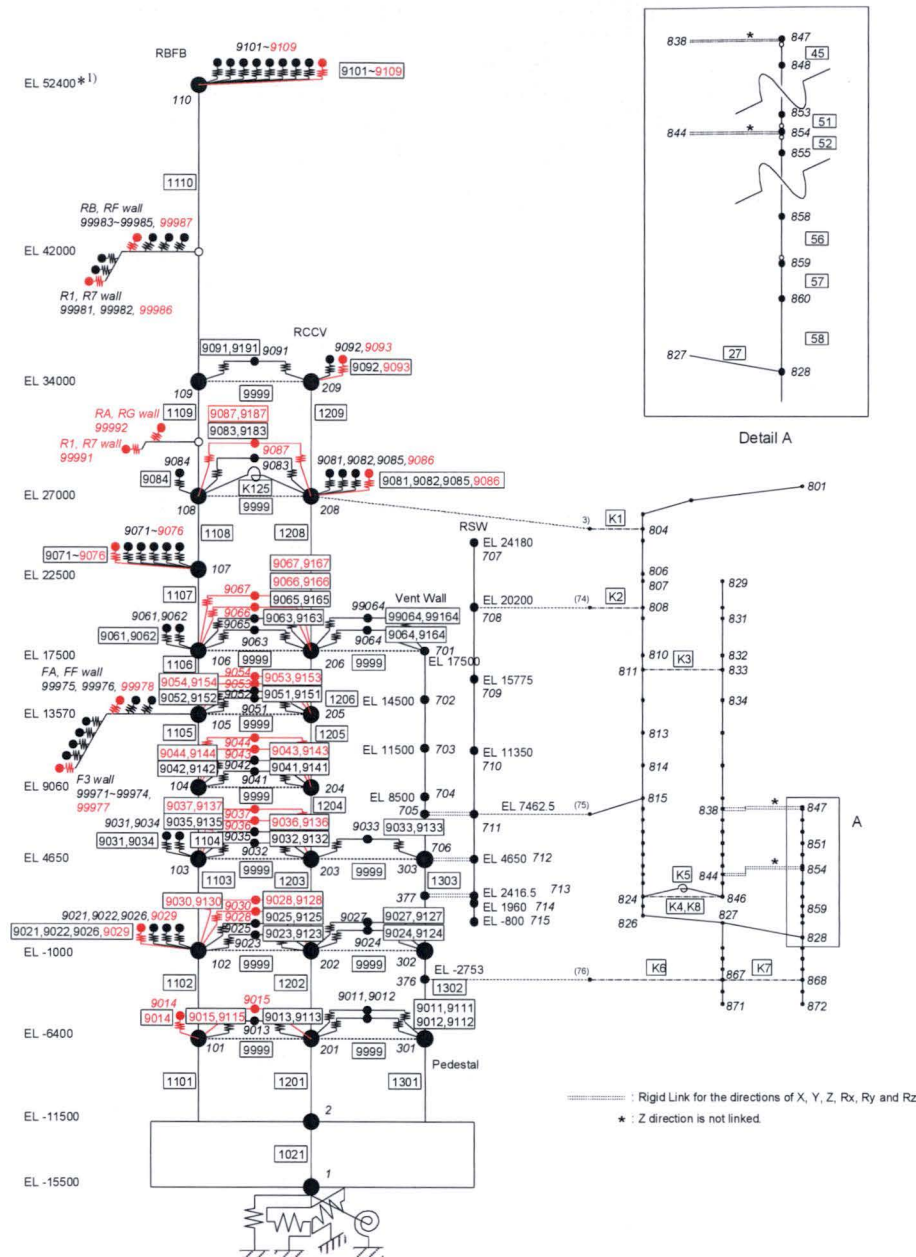


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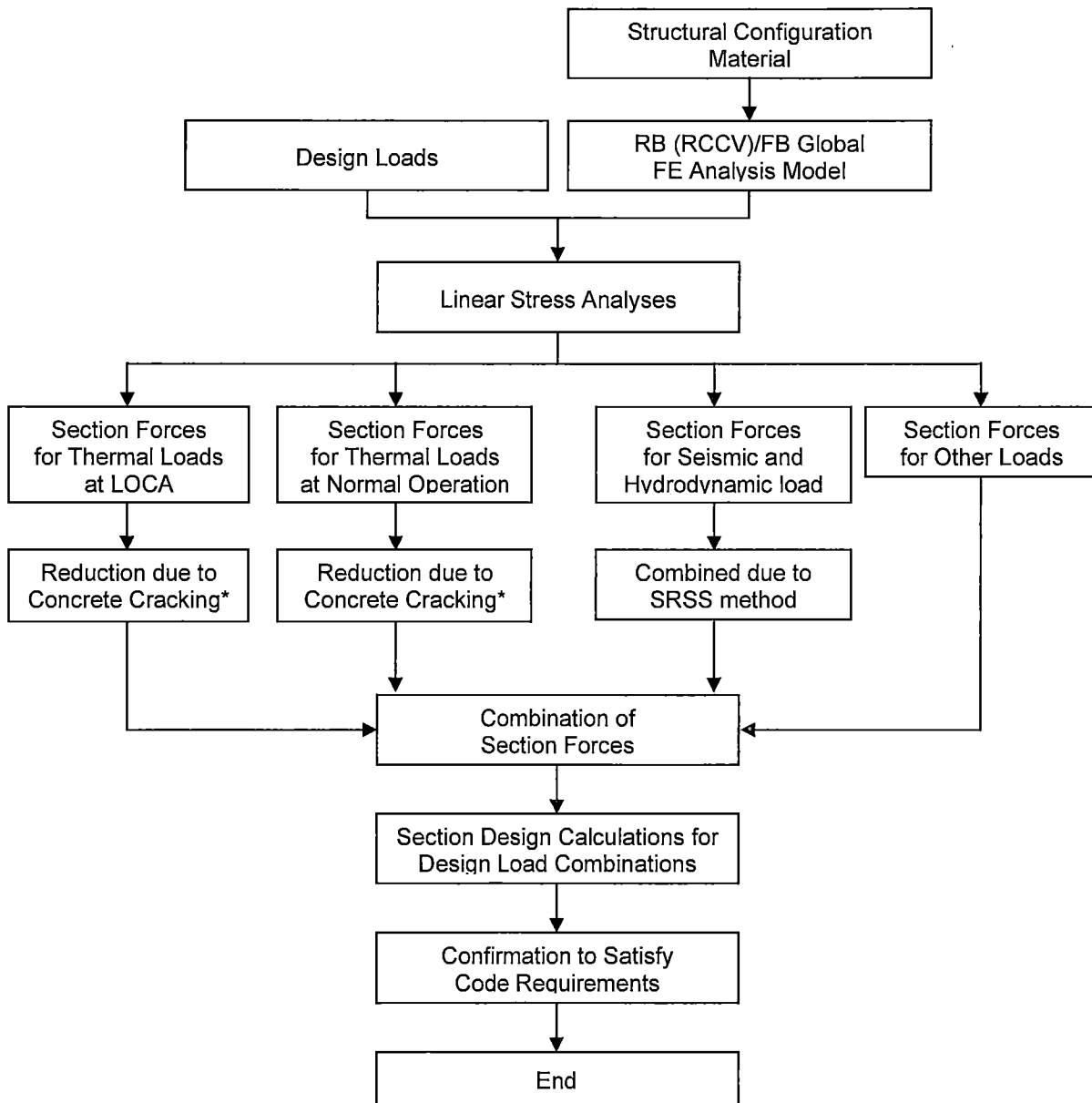
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Note: *1) The difference between the modeled elevation 52.4 m and the actual elevation 52.7 m at the RB roof is negligibly small. Slab oscillator node 99064 is only for the model considering 0% (CR00) and 50% (CR50) of infill concrete stiffness of the VW and DF. Additional oscillators for cracked model are shown in red.

Figure 5.3.3-1 Dynamic Analysis Model



*: Thermal section forces are reduced using the section design calculation program, SSDP-2D, with thermal cracking option selected.

Figure 6.1-1 Flow Chart of RCCV Design



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Figure 6.2.2-1 FE Model of the Basemat

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Figure 6.2.2-2 FE Model of the Basemat inside the Containment

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Figure 6.2.2-3 FE Model of the RCCV Cylinder Wall and the wall below RCCV

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Figure 6.2.2-4 FE Model of the RPV Pedestal

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Figure 6.2.2-5 FE Model of the Top Slab

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Figure 6.2.2-6 FE Model of the Suppression Pool Slab

{{{Security-Related Information - Withheld Under 10 CFR-2.390}}}



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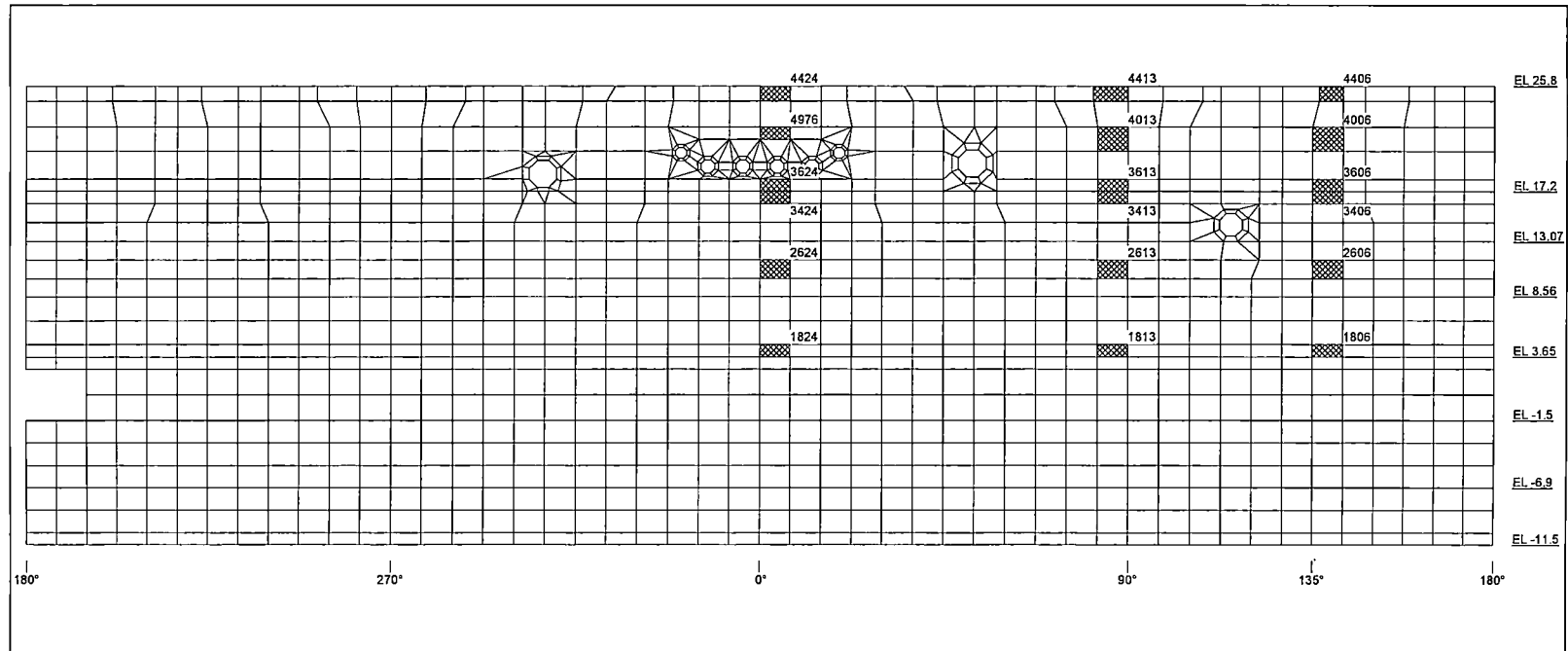


Figure 6.2.4-1 Elements Selected for Tabulation (RCCV Cylinder Wall)



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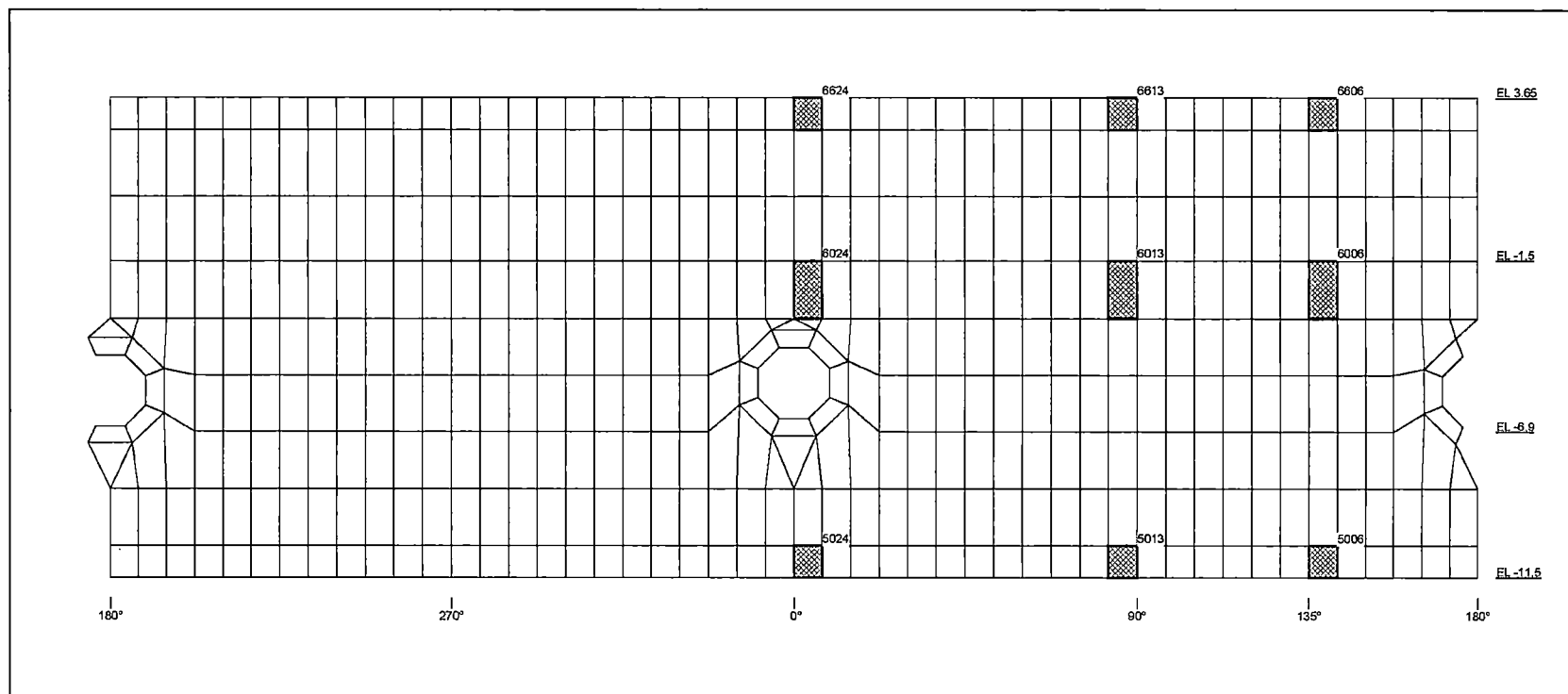


Figure 6.2.4-2 Elements Selected for Tabulation (RPV Pedestal)



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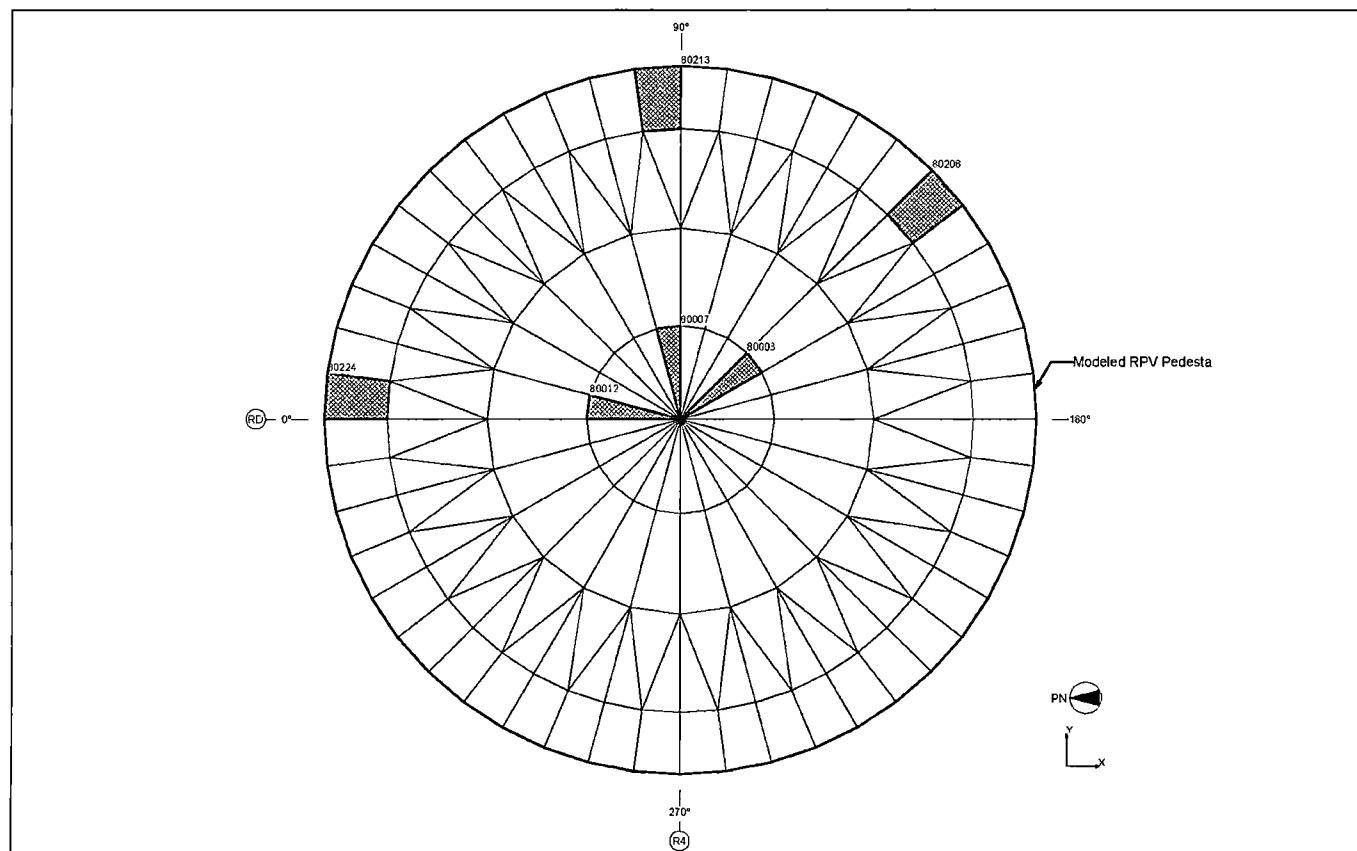


Figure 6.2.4-3 Elements Selected for Tabulation (Basemat inside RPV Pedestal)



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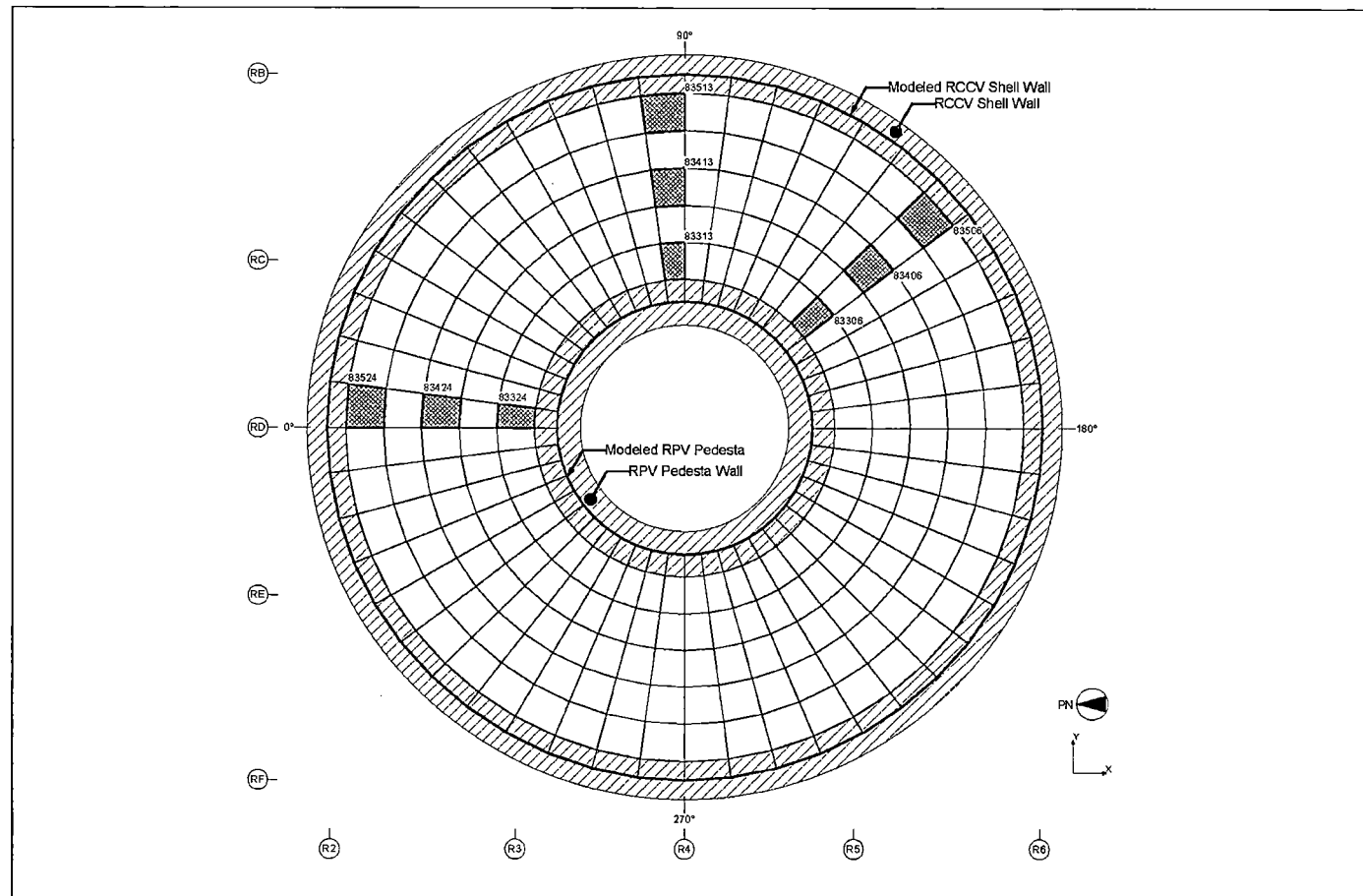


Figure 6.2.4-4 Elements Selected for Tabulation (Suppression Pool Slab)



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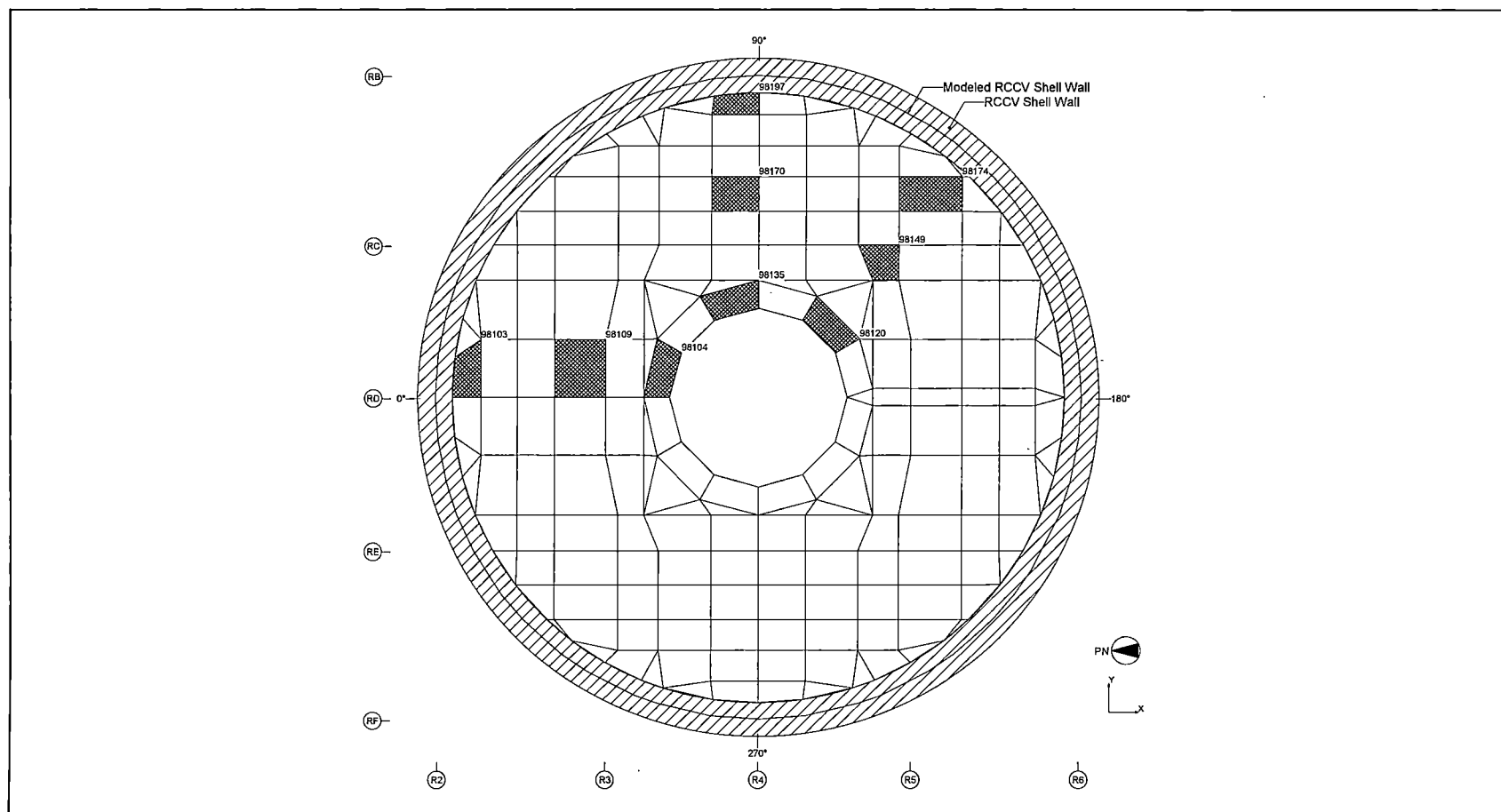
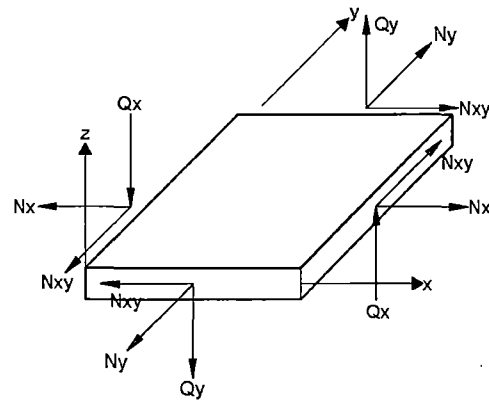
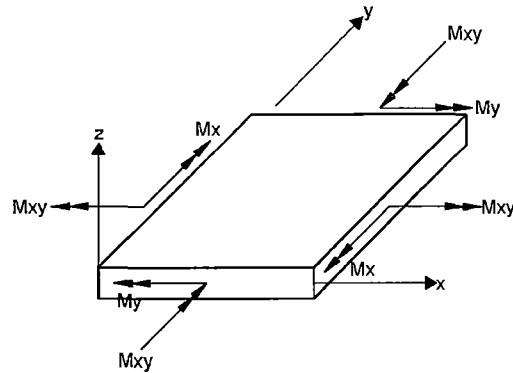


Figure 6.2.4-5 Elements Selected for Tabulation (Top Slab)



Membrane and Shear Forces



Moments

Definition of Element Coordinate System

Structure	x	y	z
RCCV Wall RPV Pedestal External Wall	horizontal	vertical	outward
Wall in N-S Direction	horizontal	vertical	toward West
Wall in E-W Direction	horizontal	vertical	toward South
Foundation Mat Floor Slab Top Slab	toward South	toward West	downward
Suppression Pool Slab	radial	circumferential	downward

Figure 6.2.4-6 Force and Moment in Shell Element

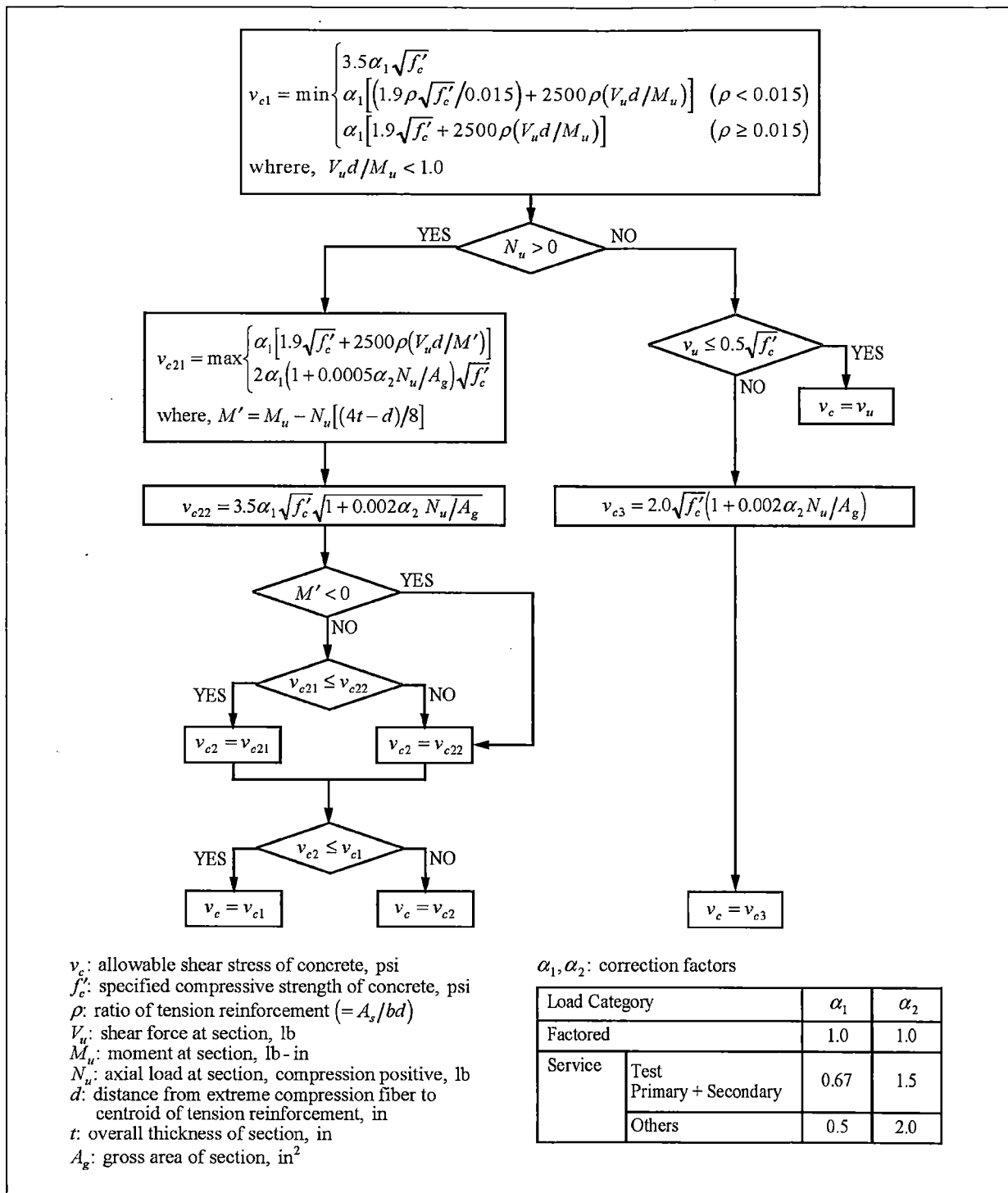


Figure 6.4.3-1 Calculation Method of Concrete Allowable Stress for Radial Shear

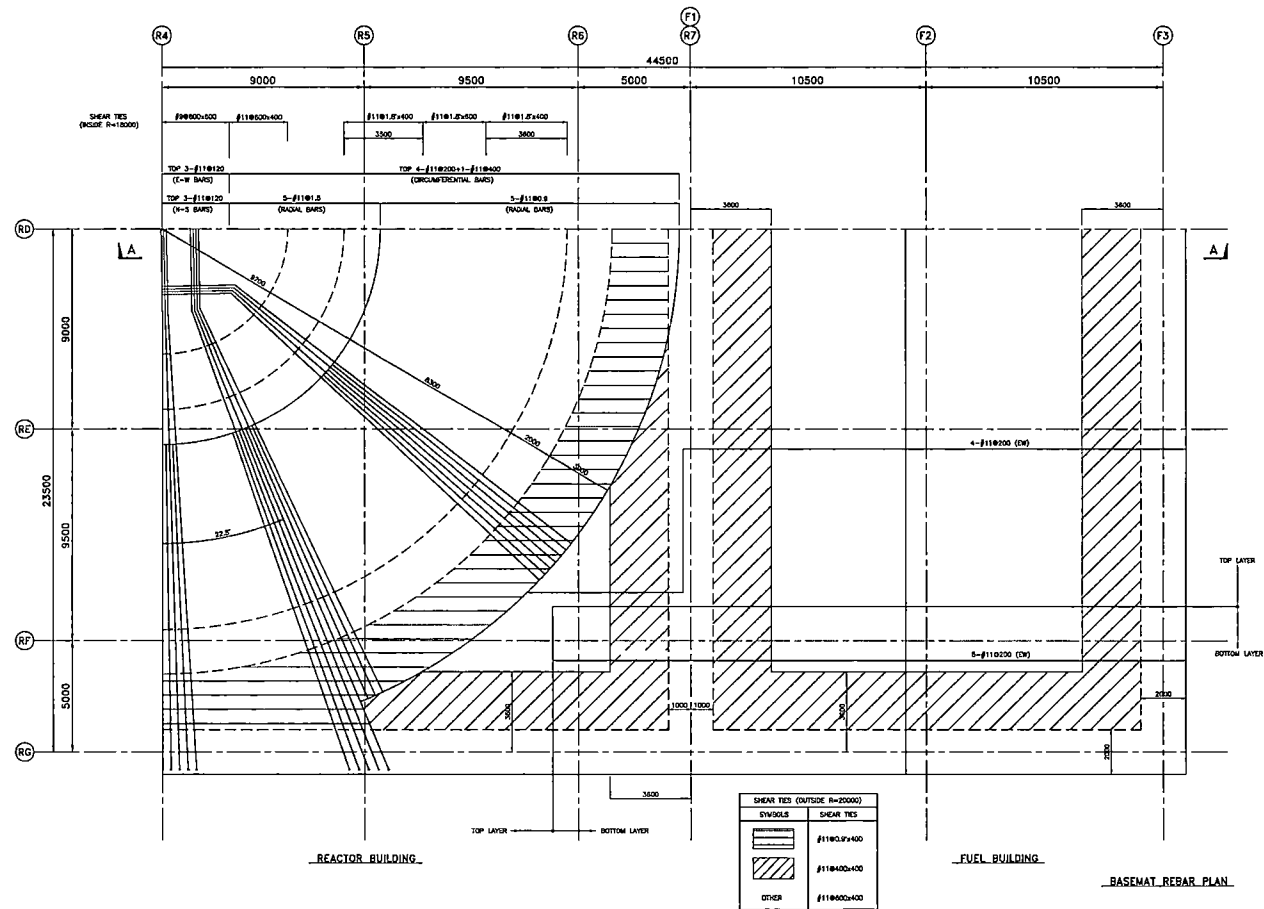


Figure 7.1-1 Reinforcing Steel of Foundation Mat: Plan

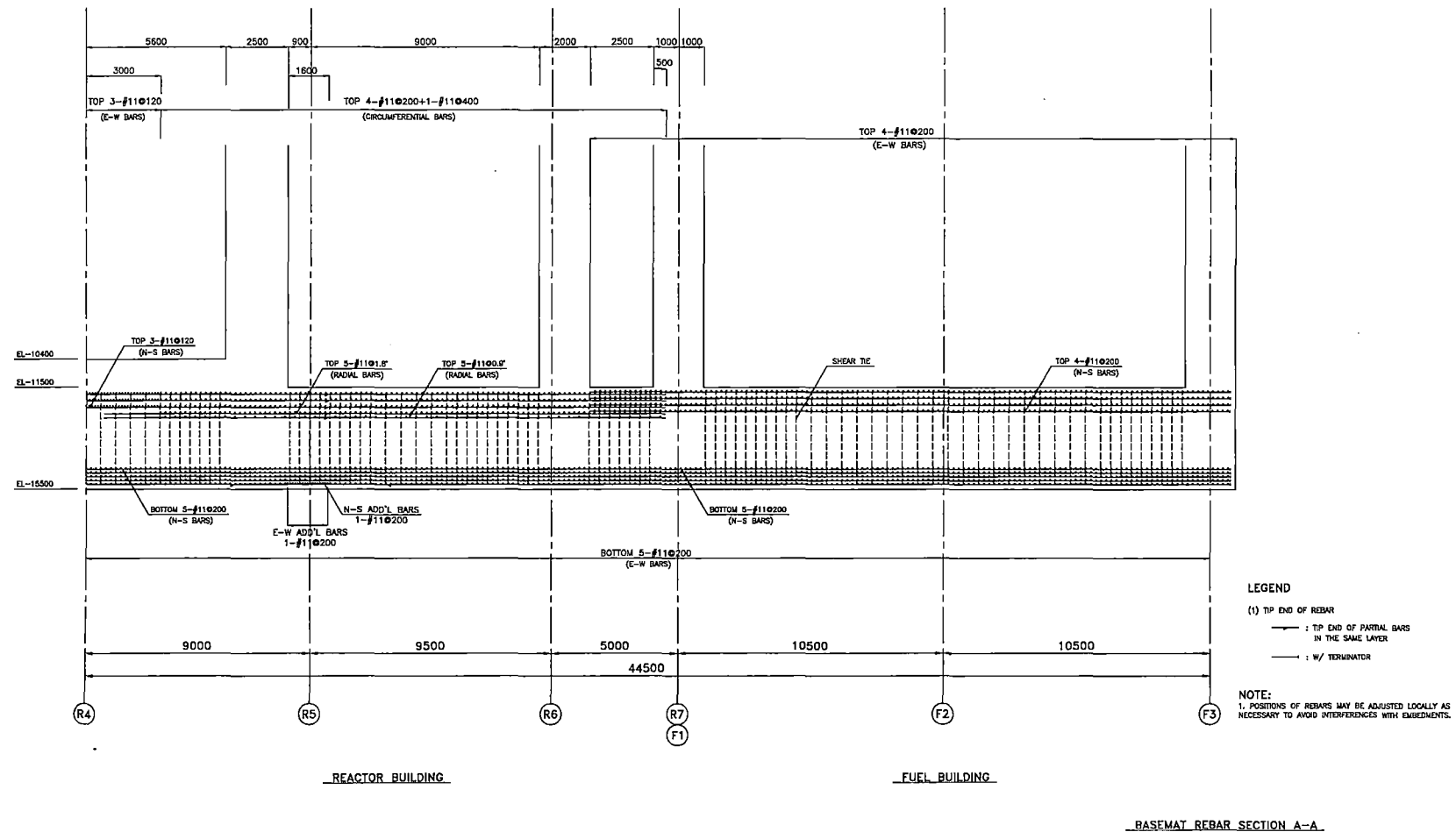


Figure 7.1-2 Reinforcing Steel of Foundation Mat: Section A-A

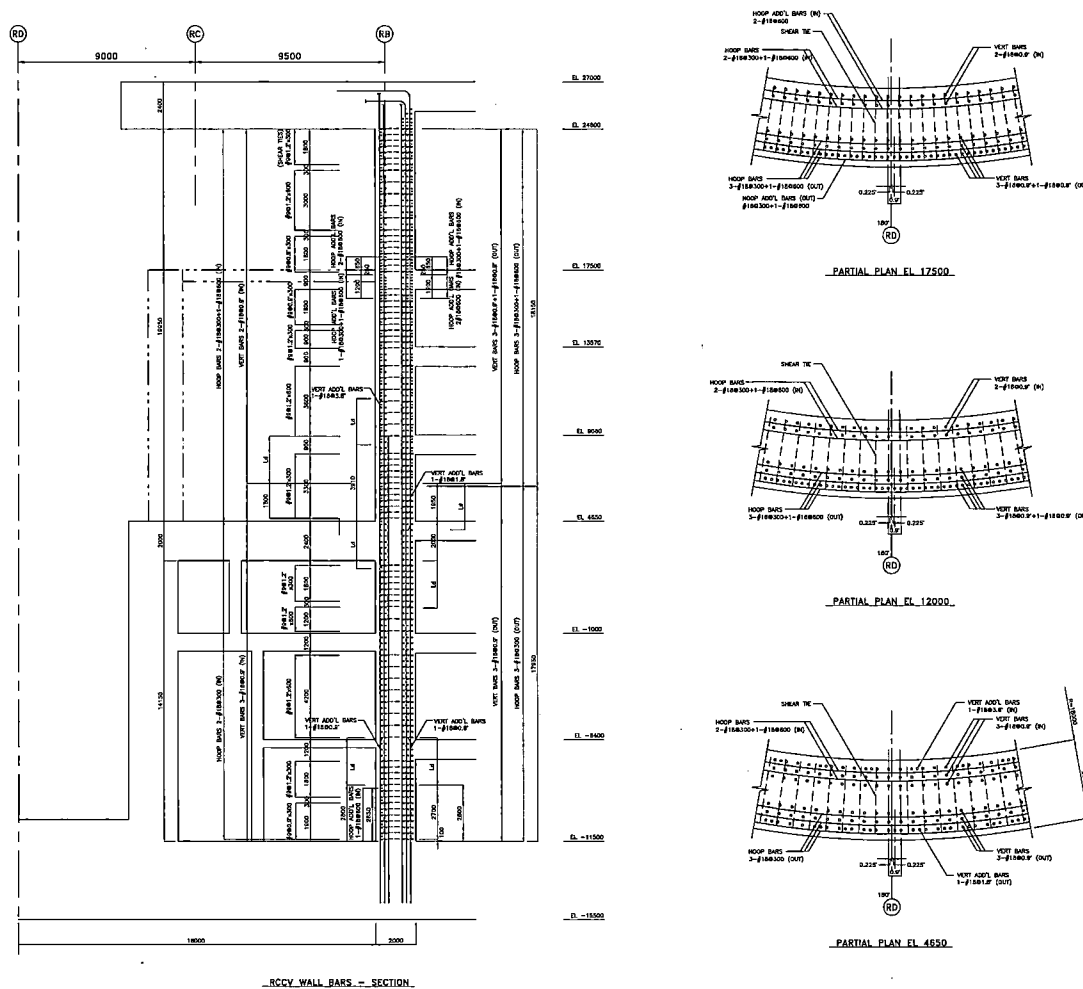
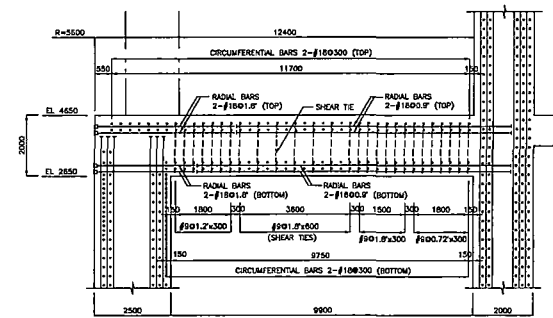
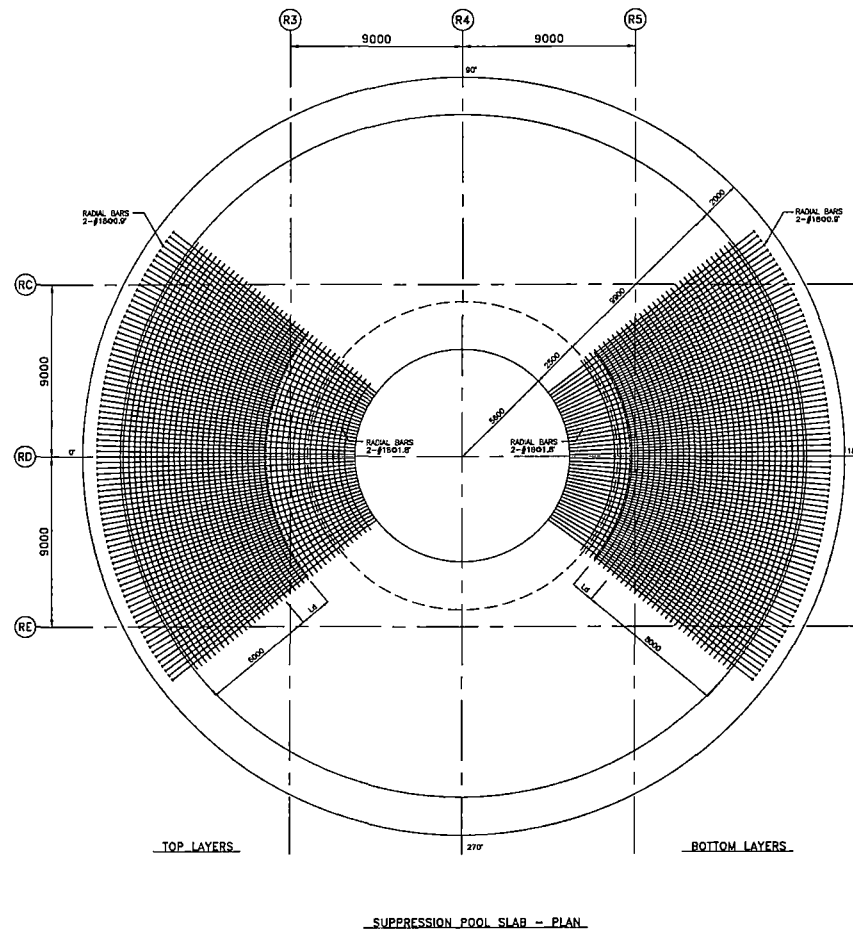


Figure 7.1-3 Reinforcing Steel of RCCV Wall



LEGEND
(1) TOP END OF REBAR
— : W/ TERMINATOR
(2) Ld : DEVELOPMENT LENGTH

NOTE:
1. POSITIONS OF REBARS MAY BE ADJUSTED
LOCALLY AS NECESSARY TO AVOID
INTERFERENCES WITH EMBEDMENTS.

Figure 7.1-4 Reinforcing Steel of Suppression Pool Slab

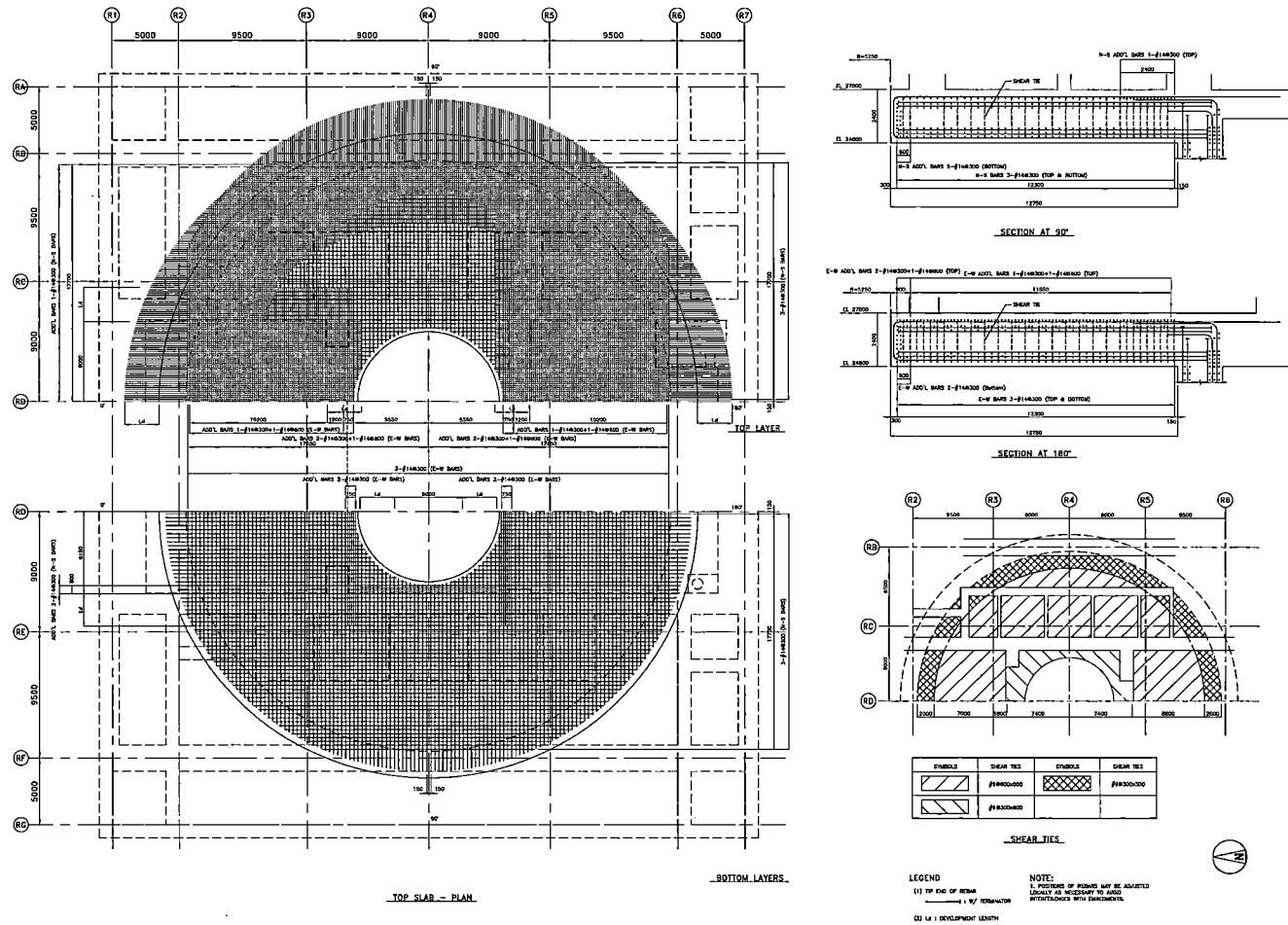
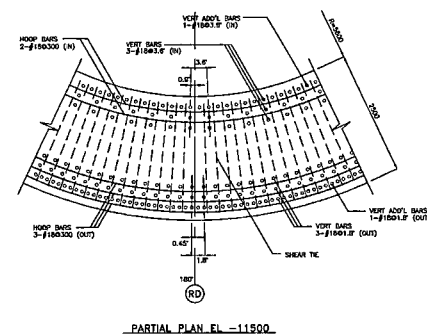
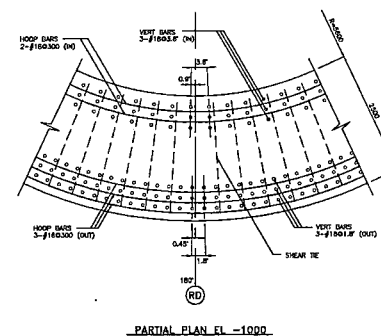
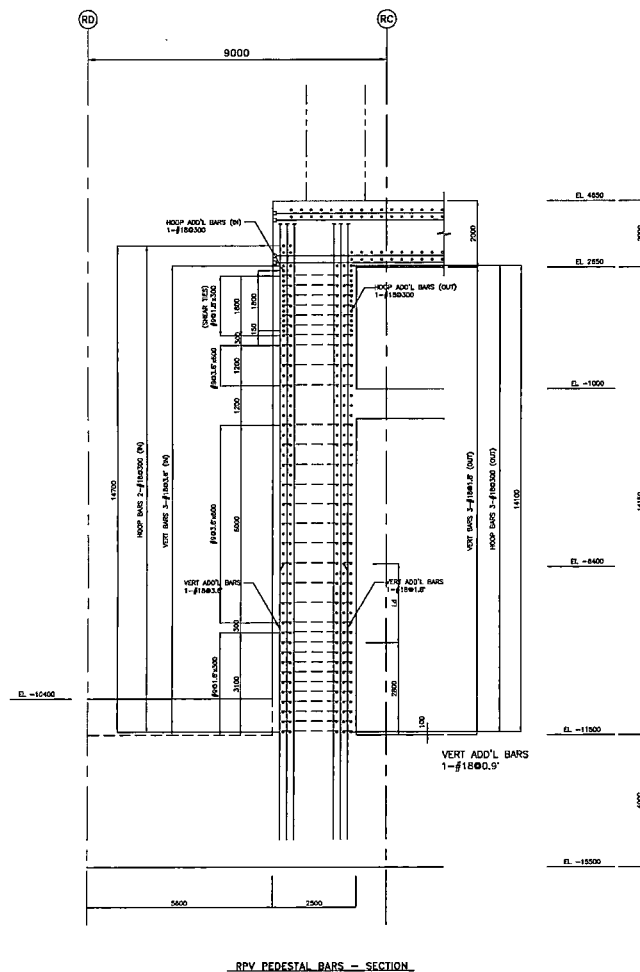


Figure 7.1-5 Reinforcing Steel of Top Slab



LEGEND
(1) TOP END OF REBAR
— 1/4" TERMINATOR

NOTE:
1. POSITIONS OF REBAR MAY BE ADJUSTED LOCALLY AS NECESSARY TO AVOID INTERFERENCES WITH EMBLEMENTS.

Figure 7.1-6 Reinforcing Steel of RPV Pedestal



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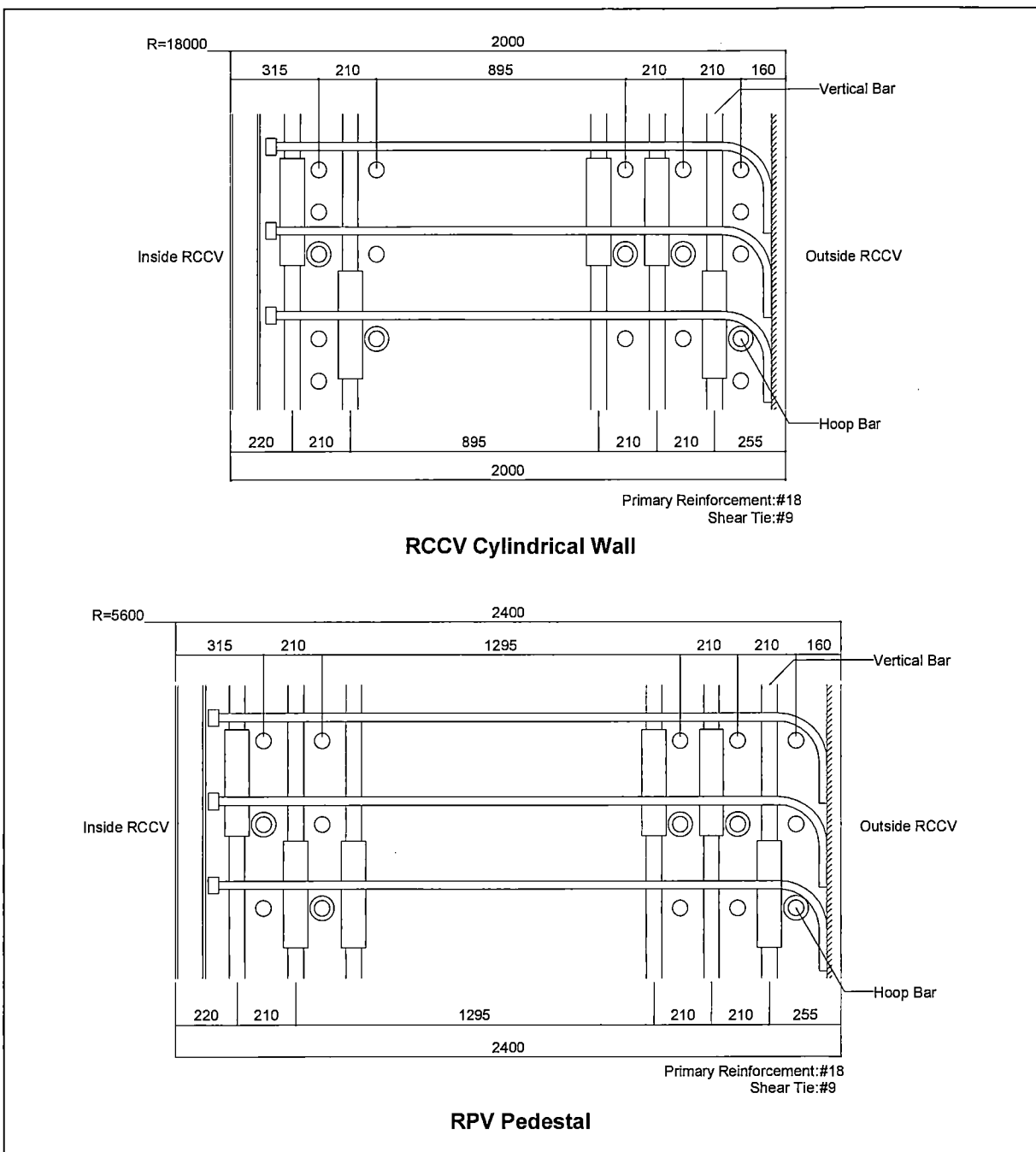
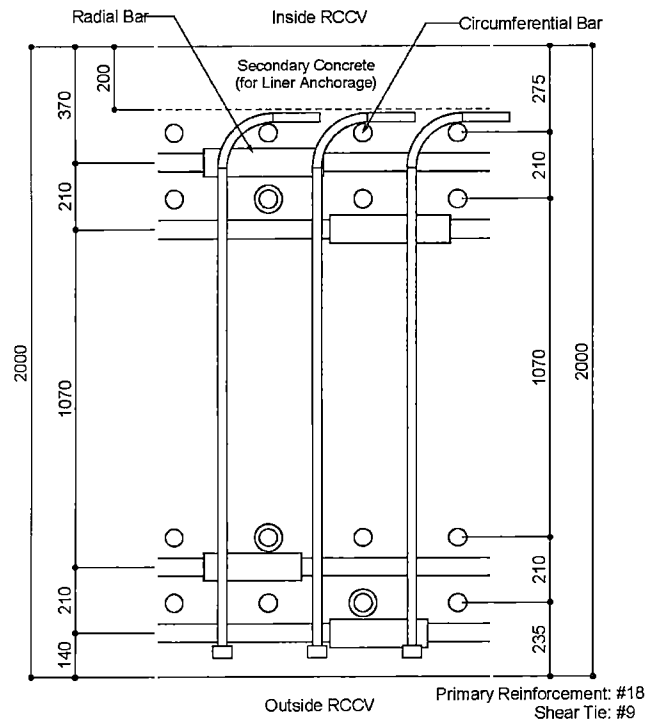


Figure 7.1-7 Representative Sections of RCCV

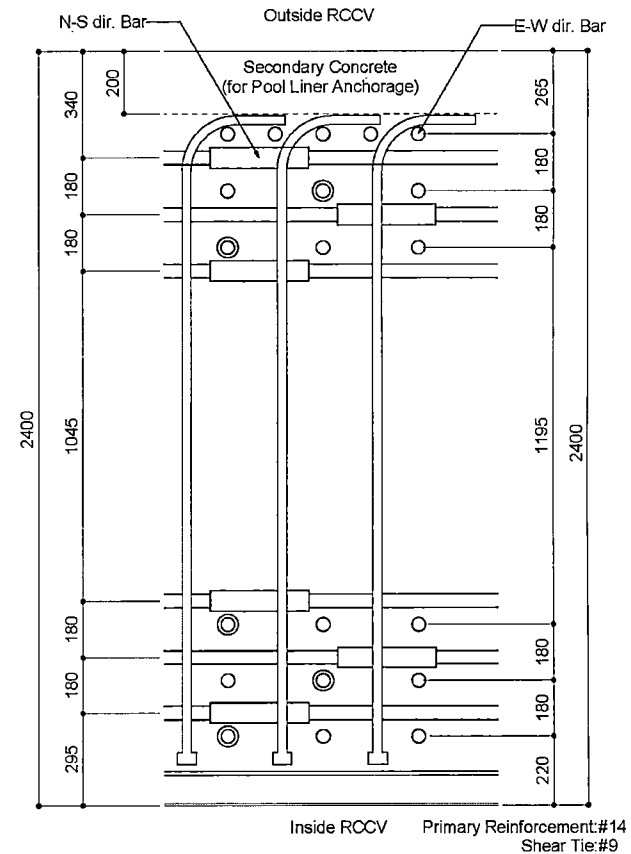


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Suppression Pool Slab



Top Slab

Figure 7.1-7 Representative Sections of RCCV (Continued)



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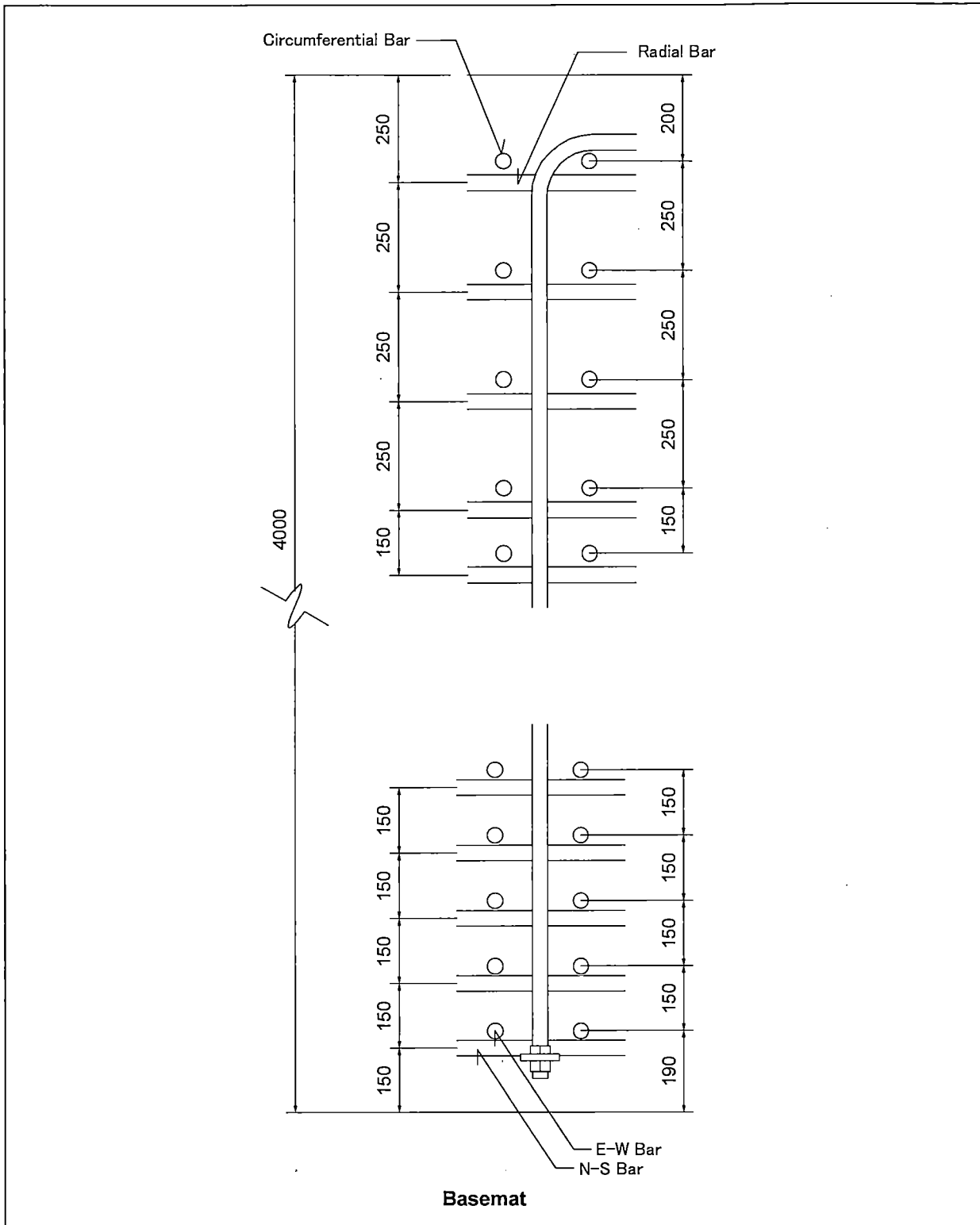


Figure 7.1-7 Representative Sections of RCCV (Continued)



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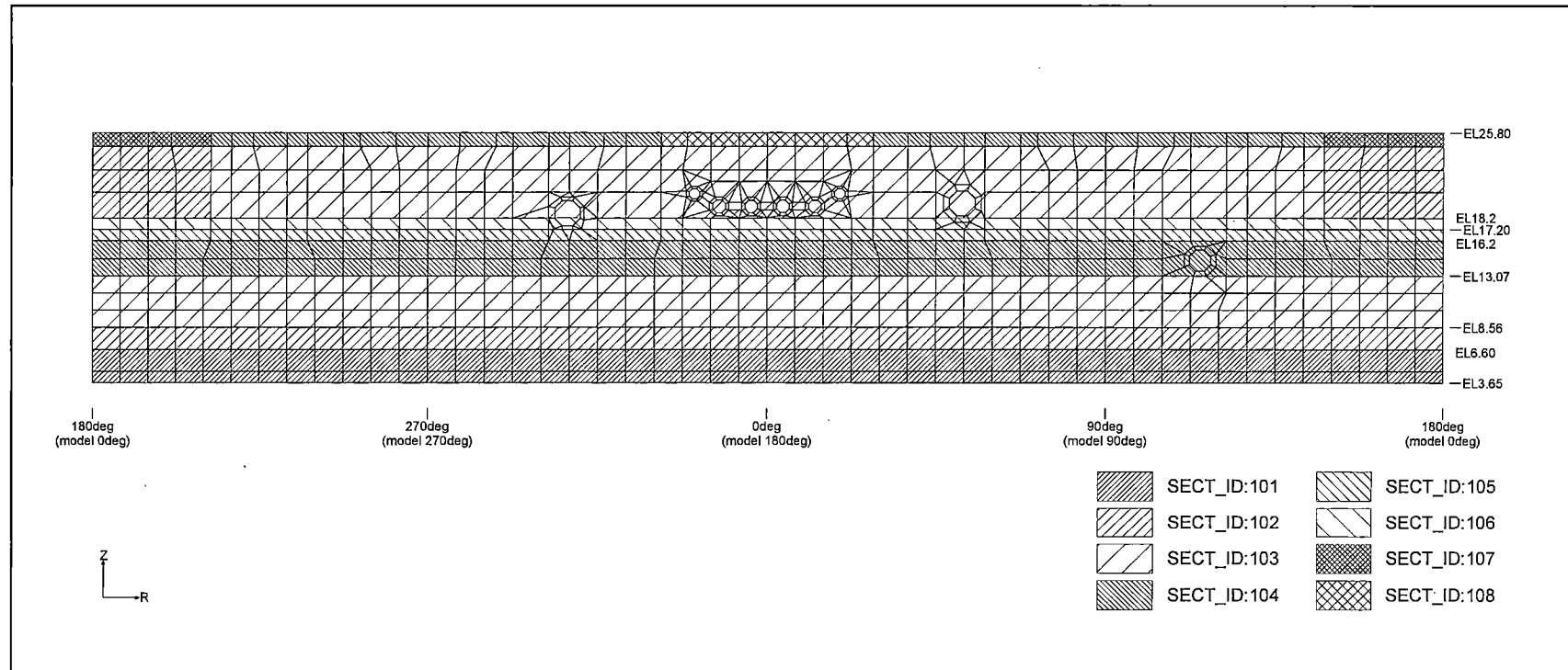


Figure 7.3.1-1 Reinforcement Provided in Elements (RCCV Cylindrical Wall)



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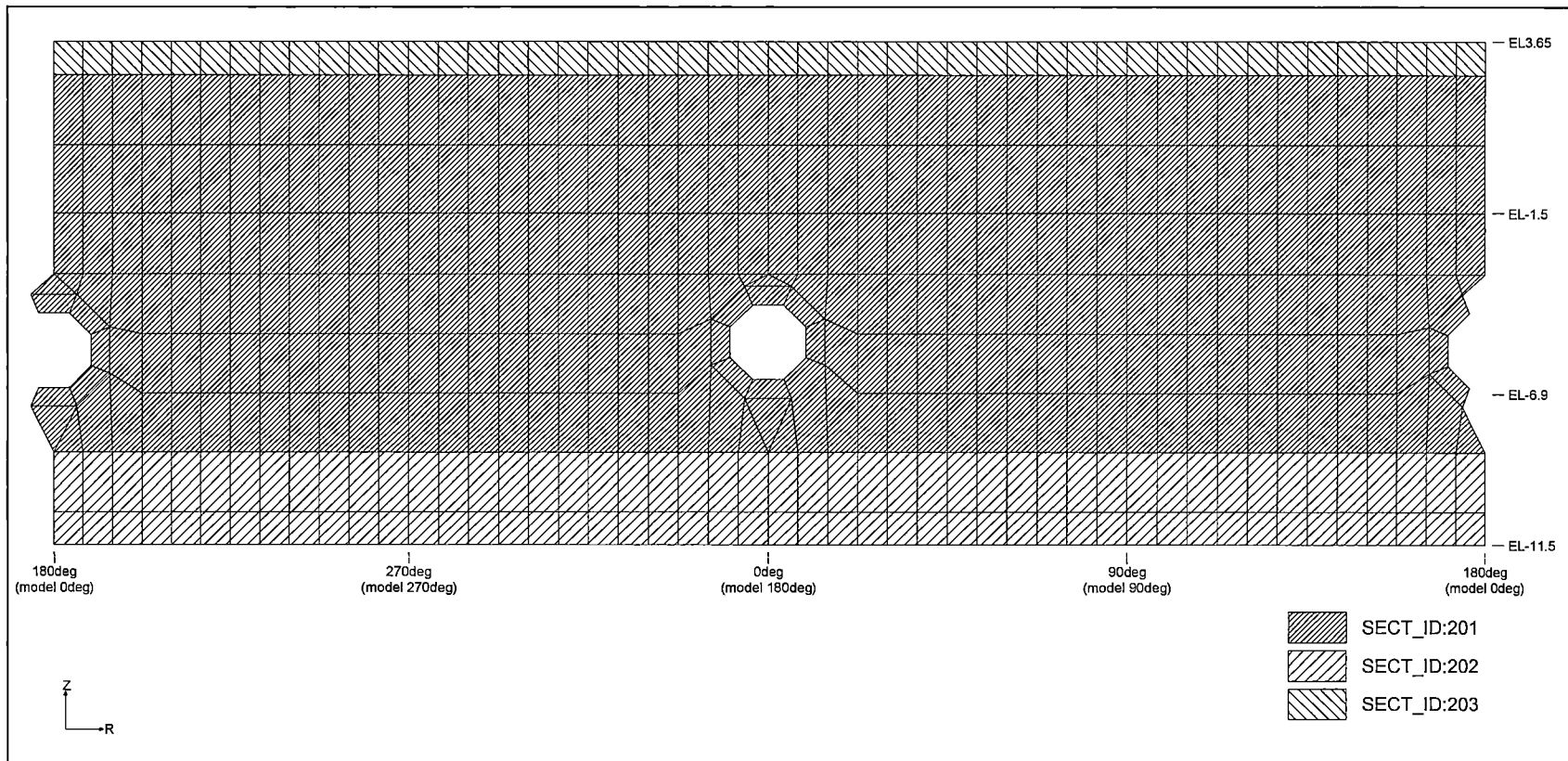


Figure 7.3.1-2 Reinforcement Provided in Elements (RPV Pedestal)



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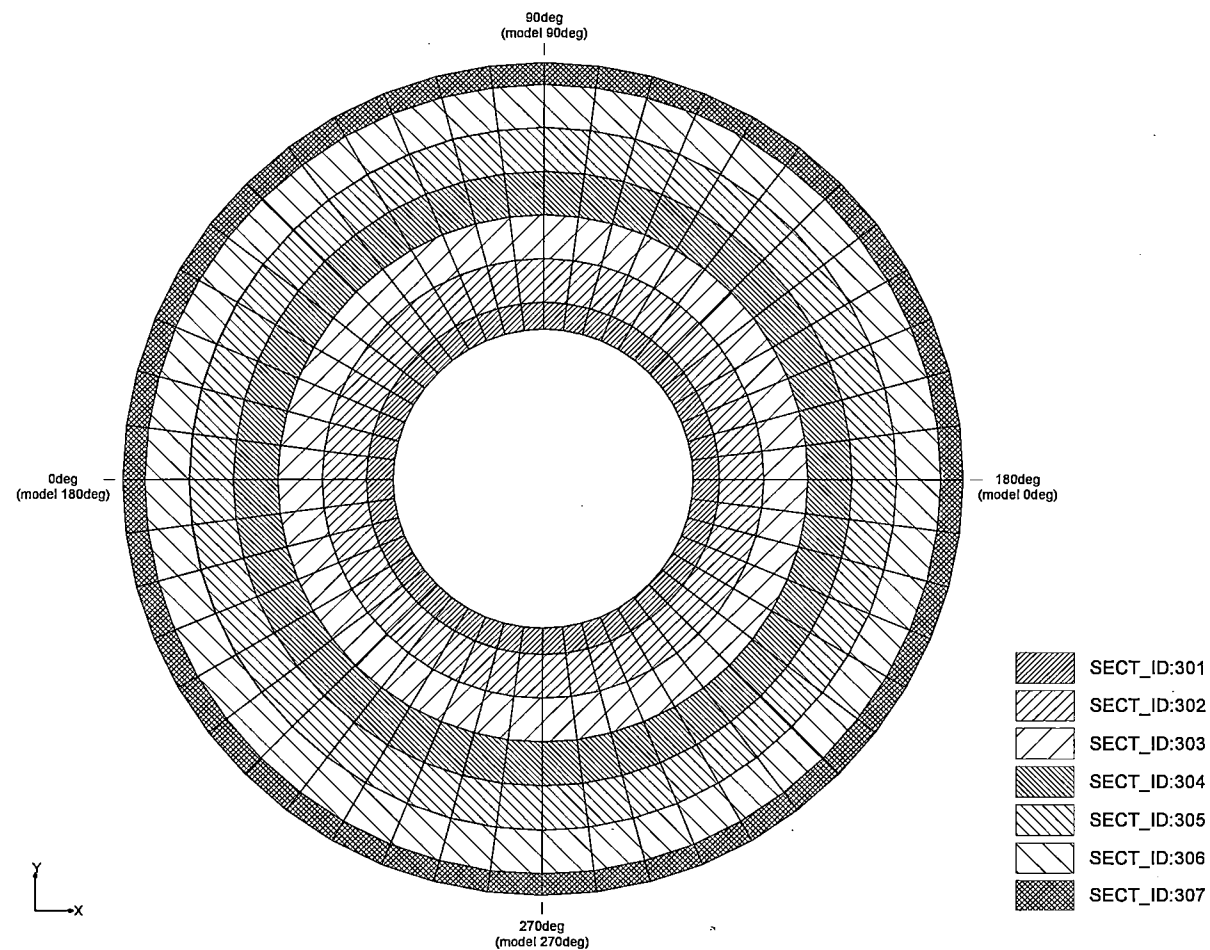


Figure 7.3.1-3 Reinforcement Provided in Elements (Suppression Pool Slab)



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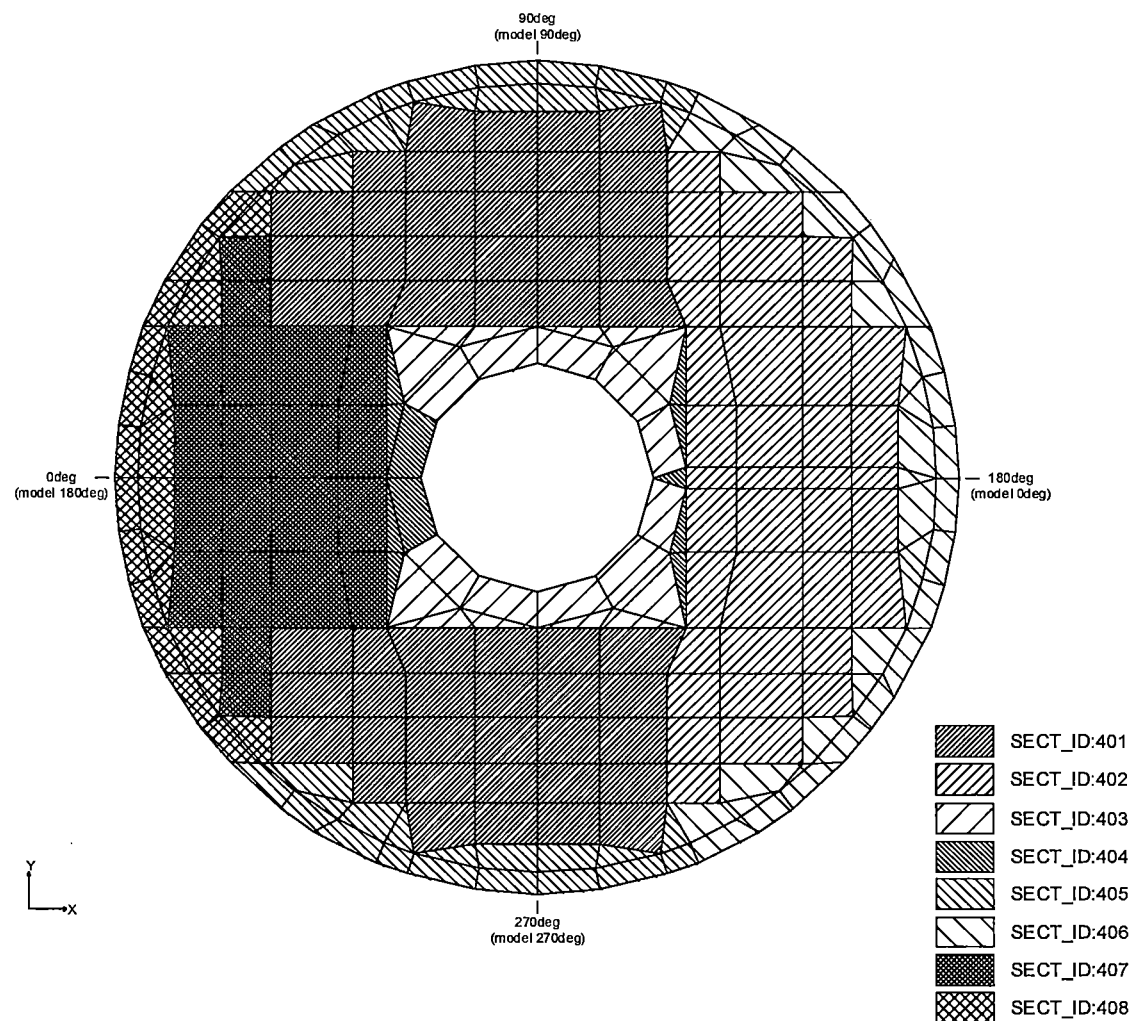


Figure 7.3.1-4 Reinforcement Provided in Elements (Top Slab)



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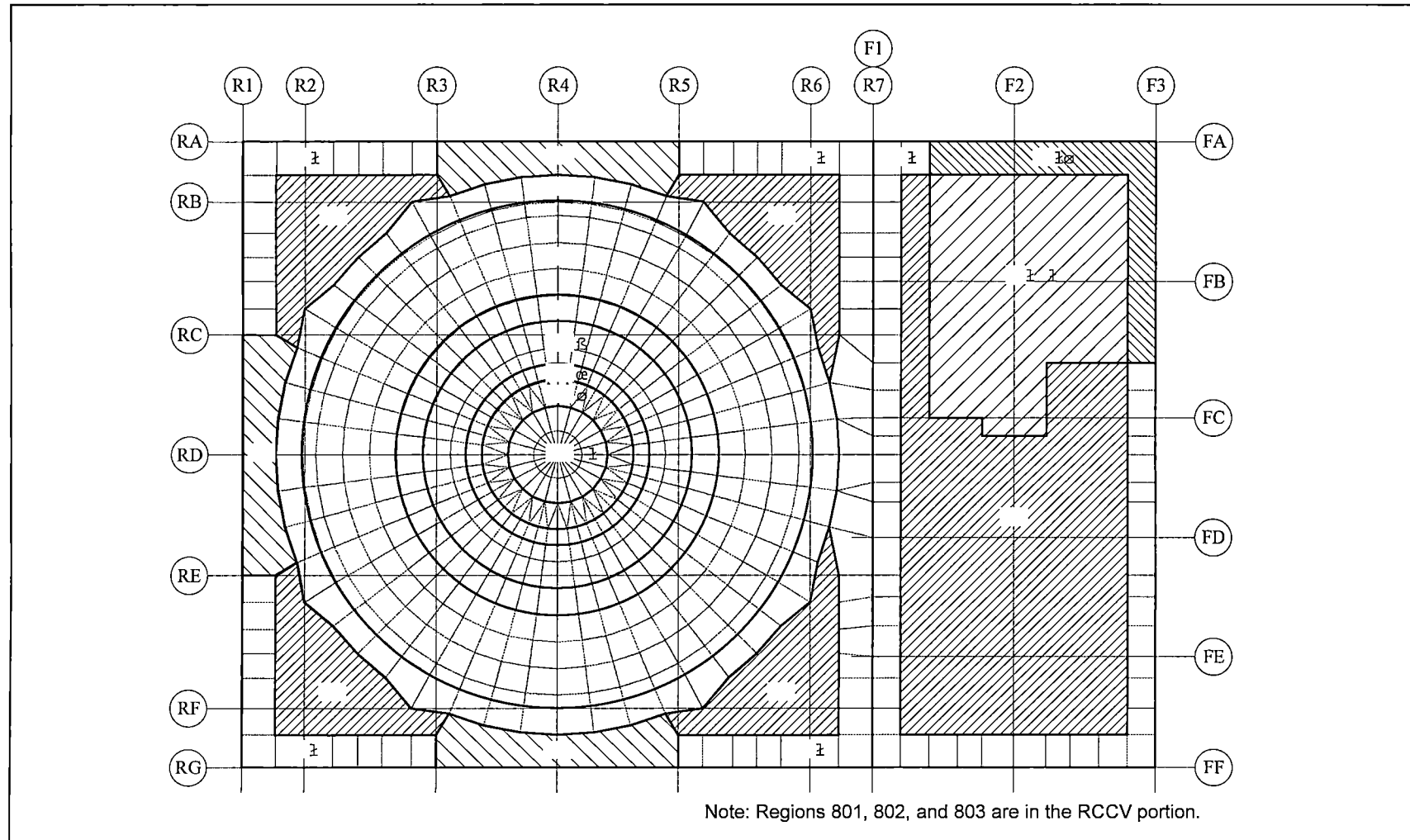


Figure 7.3.1-5 Reinforcement Provided in Elements (Basemat)



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APPENDIX A
COMPARISON WITH DCD DATA

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Table A-1.1 Design Seismic Shear Loads for Horizontal**(a) RCCV**

Elev. (m)	Elem No.	Node No.	NS-direction			EW-direction		
			NA3 (MN)	DCD (MN)	Ratio (NA3/DCD)	NA3 (MN)	DCD (MN)	Ratio (NA3/DCD)
34	1209	209						
		208	130.9	137.0	0.96	133.2	183.2	0.73
27	1208	208						
		206	141.1	164.9	0.86	151.9	248.5	0.61
17.5	1206	206						
		205	184.1	230.2	0.80	158.4	290.2	0.55
13.57	1205	205						
		204	207.9	263.4	0.79	173.4	326.2	0.53
9.06	1204	204						
		203	225.4	304.2	0.74	201.2	365.8	0.55
4.65	1203	203						
		202	109.2	225.8	0.48	125.7	289.4	0.43
-1	1202	202						
		201	67.6	271.7	0.25	68.1	330.6	0.21
-6.4 -11.5	1201	201						
		2	70.7	261.5	0.27	55.1	303.5	0.18

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Table A-1.1 Design Seismic Shear Loads for Horizontal (Continued)**(b) RPV Pedestal and VW**

Elev. (m)	Elem No.	Node No.	NS-direction			EW-direction		
			NA3 (MN)	DCD (MN)	Ratio (NA3/DCD)	NA3 (MN)	DCD (MN)	Ratio (NA3/DCD)
17.5	701	701						
		702	47.9	28.0	1.71	32.4	28.4	1.14
14.5	702	702						
		703	47.1	29.5	1.60	32.4	30.5	1.06
11.5	703	703						
		704	45.8	30.1	1.52	35.1	33.2	1.06
8.5	704	704						
		705	44.7	30.4	1.47	36.5	35.3	1.03
7.4625	705	705						
		706	39.1	31.0	1.26	29.4	29.4	1.00
4.65	1303	303						
		377	20.5	32.8	0.63	16.9	44.8	0.38
2.4165	1377	377						
		302	32.1	48.1	0.67	31.4	66.3	0.47
-1	1302	302						
		376	22.1	65.6	0.34	15.7	81.4	0.19
-2.75	1376	376						
		301	21.8	66.0	0.33	16.1	81.7	0.20
-6.4	1301	301						
-11.5		2	29.8	104.4	0.29	22.4	121.2	0.18

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Table A-1.1 Design Seismic Shear Loads for Horizontal (Continued)**(c) RSW**

Elev. (m)	Elem No.	Node No.	NS-direction			EW-direction		
			NA3 (MN)	DCD (MN)	Ratio (NA3/DCD)	NA3 (MN)	DCD (MN)	Ratio (NA3/DCD)
24.18	707	707						
		708	4.2	2.9	1.44	3.0	2.7	1.09
20.2	708	708						
		709	20.8	14.6	1.43	11.1	11.7	0.95
15.775	709	709						
		710	24.4	17.3	1.41	12.3	13.7	0.90
11.35	710	710						
		711	27.1	19.9	1.36	13.5	15.9	0.85
7.4625	711	711						
		712	26.6	41.1	0.65	22.2	35.6	0.62
4.65	712	712						
		713	14.3	14.3	1.00	13.5	19.5	0.69
2.4165	713	713						
		714	1.6	1.5	1.03	1.6	1.2	1.29
1.96 -0.8	714	714						
		715	0.9	0.8	1.15	0.9	0.7	1.31



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Table A-1.1 Design Seismic Shear Loads for Horizontal (Continued)

(d) RPV

Elev. (m)	Elem No.	Node No.	NS-direction			EW-direction		
			NA3 (MN)	DCD (MN)	Ratio (NA3/DCD)	NA3 (MN)	DCD (MN)	Ratio (NA3/DCD)
3.215	844	845						
2.365		846	18.6	7.2	2.59	7.9	7.0	1.13
8.453	871	815						
7.4625		711	29.8	18.6	1.60	18.8	17.9	1.05

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Table A-1.2 Design Seismic Moment Loads for Horizontal**(a) RCCV**

Elev. (m)	Elem No.	Node No.	NS-direction			EW-direction		
			NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)	NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)
34	1209	209	230	195	1.18	510	577	0.88
		208	1029	1057	0.97	1160	1496	0.78
27	1208	208	2162	1708	1.27	2303	2532	0.91
		206	2938	2959	0.99	3071	4368	0.70
17.5	1206	206	3259	3315	0.98	3667	4715	0.78
		205	3691	4147	0.89	3904	5761	0.68
13.57	1205	205	3817	4327	0.88	4203	5949	0.71
		204	4389	5404	0.81	4491	7264	0.62
9.06	1204	204	4481	5628	0.80	4853	7519	0.65
		203	5190	6785	0.76	5203	8909	0.58
4.65	1203	203	5523	6992	0.79	5470	9171	0.60
		202	5740	7958	0.72	5824	10581	0.55
-1	1202	202	6008	8076	0.74	6066	10738	0.56
		201	5924	9417	0.63	6035	12523	0.48
-6.4 -11.5	1201	201	6053	9534	0.63	6141	12651	0.49
		2	5961	10836	0.55	6127	14200	0.43

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Table A-1.2 Design Seismic Moment Loads for Horizontal (Continued)**(b) RPV Pedestal and VW**

Elev. (m)	Elem No.	Node No.	NS-direction			EW-direction		
			NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)	NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)
17.5	701	701	107	78	1.37	62	85	0.73
		702	139	100	1.39	107	122	0.88
14.5	702	702	139	119	1.17	113	139	0.81
		703	279	184	1.52	204	217	0.94
11.5	703	703	280	185	1.51	207	225	0.92
		704	411	276	1.49	301	316	0.95
8.5	704	704	411	276	1.49	302	320	0.94
		705	458	307	1.49	338	352	0.96
7.4625	705	705	440	288	1.53	352	341	1.03
		706	513	356	1.44	427	407	1.05
4.65	1303	303	667	547	1.22	496	552	0.90
		377	651	567	1.15	502	594	0.85
2.4165	1377	377	793	694	1.14	614	730	0.84
		302	754	748	1.01	631	868	0.73
-1	1302	302	691	813	0.85	571	900	0.63
		376	658	903	0.73	555	1033	0.54
-2.75	1376	376	658	903	0.54	555	1033	0.39
		301	594	1091	0.54	524	1330	0.39
-6.4	1301	301	555	1131	0.34	518	1346	0.26
-11.5		2	553	1638	0.34	514	1963	0.26

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Table A-1.2 Design Seismic Moment Loads for Horizontal (Continued)**(c) RSW**

Elev. (m)	Elem No.	Node No.	NS-direction			EW-direction		
			NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)	NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)
24.18	707	707	2.5	2.1	1.19	2.2	1.7	1.29
		708	18.9	13.0	1.45	13.8	12.2	1.13
20.2	708	708	25.8	18.4	1.40	19.8	16.2	1.22
		709	113.5	79.0	1.44	59.3	64.3	0.92
15.775	709	709	116.7	81.9	1.42	61.3	66.8	0.92
		710	224.1	158.4	1.41	115.5	125.5	0.92
11.35	710	710	227.6	159.1	1.43	116.9	128.3	0.91
		711	331.9	236.2	1.41	169.3	187.6	0.90
7.4625	711	711	135.4	197.0	0.69	125.5	183.6	0.68
		712	169.6	292.4	0.58	151.7	251.3	0.60
4.65	712	712	156.8	117.5	1.33	142.3	118.8	1.20
		713	147.3	126.3	1.17	132.8	136.0	0.98
2.4165	713	713	4.0	3.3	1.21	4.0	3.2	1.25
		714	3.3	2.7	1.22	3.3	2.7	1.22
1.96 -0.8	714	714	3.0	2.5	1.20	3.0	2.4	1.25
		715	0.7	0.5	1.40	0.6	0.5	1.20



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Table A-1.2 Design Seismic Moment Loads for Horizontal (Continued)

(d) RPV

Elev. (m)	Elem No.	Node No.	NS-direction			EW-direction		
			NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)	NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)
3.215	844	845	29.9	16.2	1.85	15.6	14.3	1.09
2.365		846	44.5	21.3	2.09	18.9	17.3	1.09
8.453	871	815	182.7	143.8	1.27	151.9	135.5	1.12
7.4625		711	176.6	141.3	1.25	147.4	132.9	1.11



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Table A-1.3 Design Seismic Torsion Loads for Horizontal

(a) RCCV

Elev. (m)	Elem No.	Node No.	Calculated Torsion			Accidental Torsion			Design Torsion		
			NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)	NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)	NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)
34	1209	209									
		208	29	36	0.81	266	366	0.73	296	402	0.73
27	1208	208									
		206	1489	1814	0.82	304	497	0.61	1793	2311	0.78
17.5	1206	206									
		205	1591	1982	0.80	368	580	0.63	1960	2562	0.76
13.57	1205	205									
		204	1762	2186	0.81	416	652	0.64	2178	2838	0.77
9.06	1204	204									
		203	2062	2616	0.79	451	732	0.62	2513	3348	0.75
4.65	1203	203									
		202	1439	2870	0.50	251	579	0.43	1691	3449	0.49
-1	1202	202									
		201	690	2926	0.24	136	661	0.21	826	3587	0.23
-6.4 -11.5	1201	201									
		2	349	1962	0.18	141	607	0.23	490	2569	0.19



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Table A-1.3 Design Seismic Torsion Loads for Horizontal (Continued)

(b) RPV Pedestal and VW

Elev. (m)	Elem No.	Node No.	Calculated Torsion			Accidental Torsion			Design Torsion		
			NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)	NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)	NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)
17.5	701	701									
		702	107	73	1.47	40	12	3.38	147	85	1.74
14.5	702	702									
		703	108	75	1.44	39	13	3.09	148	88	1.68
11.5	703	703									
		704	111	77	1.44	38	14	2.76	149	91	1.64
8.5	704	704									
		705	112	78	1.44	37	15	2.53	149	93	1.61
7.4625	705	705									
		706	92	59	1.56	33	13	2.53	125	72	1.74
4.65	1303	303									
		377	71	142	0.50	16	36	0.46	87	177	0.49
2.4165	1377	377									
		302	86	172	0.50	26	53	0.48	112	225	0.50
-1	1302	302									
		376	34	146	0.23	18	65	0.27	52	211	0.25
-2.75	1376	376									
		301	34	146	0.23	17	65	0.27	52	212	0.25
-6.4	1301	301									
-11.5		2	21	118	0.18	24	97	0.25	45	215	0.21



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Table A-1.3 Design Seismic Torsion Loads for Horizontal (Continued)

(c) RSW

Elev. (m)	Elem No.	Node No.	Calculated Torsion			Accidental Torsion			Design Torsion		
			NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)	NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)	NA3 (MN-m)	DCD (MN-m)	Ratio (NA3/DCD)
24.18	707	707									
		708	0.5	0.4	1.25	2.0	1.4	1.38	2.5	1.8	1.40
20.2	708	708									
		709	1.7	1.4	1.21	9.8	6.9	1.43	11.6	8.3	1.39
15.775	709	709									
		710	2.4	1.9	1.26	11.5	8.2	1.41	13.9	10.1	1.38
11.35	710	710									
		711	3.0	2.4	1.25	12.8	9.4	1.36	15.8	11.8	1.34
7.4625	711	711									
		712	22.9	22.0	1.04	12.6	19.4	0.65	35.5	41.4	0.86
4.65	712	712									
		713	15.2	30.3	0.50	6.7	9.2	0.73	21.9	39.5	0.56
2.4165	713	713									
		714	0.2	0.2	1.00	0.7	0.7	1.03	0.9	0.9	0.98
1.96 -0.8	714	714									
		715	0.1	0.1	1.00	0.4	0.4	1.05	0.5	0.5	1.09

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Table A-1.4 Vertical Acceleration**(a) RCCV**

Elev. (m)	Node No.	Stick Model	NA3 (g)	DCD (g)	Ratio (NA3/DCD)
34	209	RCCV	1.20	0.90	1.33
27	208	RCCV	1.12	0.88	1.27
17.5	206	RCCV	0.91	0.73	1.25
13.57	205	RCCV	0.82	0.78	1.05
9.06	204	RCCV	0.72	0.65	1.11
4.65	203	RCCV	0.65	0.69	0.94
-1	202	RCCV	0.58	0.59	0.98
-6.4	201	RCCV	0.55	0.59	0.93

(b) RPV Pedestal and VW

Elev. (m)	Node No.	Stick Model	NA3 (g)	DCD (g)	Ratio (NA3/DCD)
17.5	701	VW	0.82	1.10	0.75
14.5	702	VW	0.86	1.04	0.83
11.5	703	VW	0.81	0.92	0.88
8.5	704	VW	0.72	0.77	0.93
7.4625	705	VW	0.67	0.70	0.95
4.65	706, 303	Pedestal	0.69	0.67	1.02
-1	302	Pedestal	0.59	0.59	1.01
-6.4	301	Pedestal	0.56	0.50	1.11

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Table A-1.4 Vertical Acceleration (Continued)**(c) RSW**

Elev. (m)	Node No.	Stick Model	NA3 (g)	DCD (g)	Ratio (NA3/DCD)
24.18	707	RSW	1.30	0.97	1.35
20.2	708	RSW	1.23	0.94	1.31
15.775	709	RSW	0.99	0.84	1.18
11.35	710	RSW	0.78	0.76	1.02
7.4625	711	RSW	0.68	0.70	0.96
4.65	712	RSW	0.69	0.67	1.02
2.4615	713	RSW	0.64	0.64	1.00
1.96	714	RSW	0.64	0.64	1.00
-0.8	715	RSW	0.64	0.65	0.99



Table A-1.4 Vertical Acceleration (Continued)

(d) Slab Oscillator

Elev. (m)	Node No.	Stick Model	NA3 (g)	DCD (g)	Ratio (NA3/DCD)
52.4*	9101	Oscillator	0.33	1.20	0.28
	9102	Oscillator	1.33	1.82	0.73
	9103	Oscillator	6.27	3.14	2.00
	9104	Oscillator	2.62	2.26	1.16
	9105	Oscillator	2.42	2.32	1.04
	9106	Oscillator	3.74	2.99	1.25
	9107	Oscillator	3.22	2.80	1.15
	9108	Oscillator	2.50	2.61	0.96
	9109	Oscillator	1.53	---	---
34.00	9091	Oscillator	1.61	1.29	1.25
	9092	Oscillator	1.61	1.06	1.52
	9093	Oscillator	1.12	---	---
27.00	9081	Oscillator	1.64	1.16	1.41
	9082	Oscillator	1.52	0.99	1.54
	9083	Oscillator	1.30	1.09	1.19
	9084	Oscillator	1.67	1.31	1.27
	9085	Oscillator	1.46	0.97	1.51
	9086	Oscillator	1.12	---	---
	9087	Oscillator	1.03	---	---
22.50	9071	Oscillator	1.15	1.60	0.72
	9072	Oscillator	1.79	1.31	1.37
	9073	Oscillator	4.47	2.03	2.20
	9074	Oscillator	1.67	1.31	1.27
	9075	Oscillator	1.51	1.16	1.30
	9076	Oscillator	1.65	---	---
17.50	9061	Oscillator	3.65	1.79	2.04
	9062	Oscillator	2.62	1.49	1.76
	9063	Oscillator	1.17	0.82	1.43
	9064	Oscillator	2.56	1.84	1.39
	9065	Oscillator	1.28	1.42	0.90
	99064	Oscillator	0.99	1.07	0.93
	9066	Oscillator	1.09	---	---
	9067	Oscillator	0.91	---	---

* The difference between the modeled elevation 52.4 m and the actual elevation 52.7 m at the RB roof is negligibly small.

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Table A-1.4 Vertical Acceleration (Continued)**(d) Slab Oscillator**

Elev. (m)	Node No.	Stick Model	NA3 (g)	DCD (g)	Ratio (NA3/DCD)
13.57	9051	Oscillator	1.11	0.81	1.37
	9052	Oscillator	1.25	1.46	0.86
	9053	Oscillator	0.99	---	---
	9054	Oscillator	0.83	---	---
9.06	9041	Oscillator	1.02	0.88	1.16
	9042	Oscillator	1.26	1.42	0.89
	9043	Oscillator	0.93	---	---
	9044	Oscillator	0.80	---	---
4.65	9031	Oscillator	1.62	1.17	1.38
	9032	Oscillator	0.89	0.97	0.92
	9033	Oscillator	1.12	1.02	1.10
	9034	Oscillator	1.81	1.51	1.20
	9035	Oscillator	1.09	1.38	0.79
	9036	Oscillator	0.94	---	---
	9037	Oscillator	0.82	---	---
-1.00	9021	Oscillator	0.97	1.12	0.87
	9022	Oscillator	2.07	1.45	1.43
	9023	Oscillator	0.98	1.01	0.97
	9024	Oscillator	1.12	0.89	1.26
	9025	Oscillator	1.21	1.34	0.90
	9026	Oscillator	1.63	1.57	1.04
	9027	Oscillator	0.93	0.88	1.06
	9028	Oscillator	0.96	---	---
	9029	Oscillator	1.30	---	---
	9030	Oscillator	0.87	---	---
-6.40	9011	Oscillator	0.84	0.92	0.91
	9012	Oscillator	1.17	0.92	1.27
	9013	Oscillator	1.52	1.35	1.13
	9014	Oscillator	1.19	---	---
	9015	Oscillator	1.03	---	---

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Table A-1.5 Soil Pressure Due to an Earthquake

Elevation (m)	R1 and F3 Wall			RA and RG Wall			Note
	NA3 (MPa)	DCD (MPa)	Ratio (NA3/DCD)	NA3 (MPa)	DCD (MPa)	Ratio (NA3/DCD)	
4.65							Grade
	0.56	0.30	1.87	0.45	0.33	1.36	
-1							
	0.28	0.29	0.97	0.29	0.29	1.00	
-6.4							
	0.24	0.25	0.96	0.22	0.23	0.96	
-11.5							
	0.94	0.29	3.24	0.76	0.26	2.92	
-15.5							

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Table A-1.6 Seismic Hydrodynamic Loads for GDCS Pool**(a) Longitudinal Direction Motion**

Wall				Floor			
Depth d/H	Pressure			Distance x/(L/2)	Pressure		
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)		NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
0.0	9.7	9.7	1.00	0.0	0.0	0.0	---
0.2	21.0	21.0	1.00	0.2	6.1	6.1	1.00
0.4	35.8	35.8	1.00	0.4	13.1	13.1	1.00
0.6	46.6	46.6	1.00	0.6	22.2	22.2	1.00
0.8	53.1	53.1	1.00	0.8	35.1	35.1	1.00
1.0	55.3	55.3	1.00	1.0	55.3	55.3	1.00

(b) Transversal Direction Motion

Wall				Floor			
Depth d/H	Pressure			Distance x/(L/2)	Pressure		
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)		NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
0.0	9.8	9.8	1.00	0.0	0.0	0.0	---
0.2	15.6	15.6	1.00	0.2	4.3	4.3	1.00
0.4	23.8	23.8	1.00	0.4	8.8	8.8	1.00
0.6	26.1	26.1	1.00	0.6	13.7	13.7	1.00
0.8	26.1	26.1	1.00	0.8	19.4	19.4	1.00
1.0	26.1	26.1	1.00	1.0	26.1	26.1	1.00

(c) Vertical Motion

Depth d/H	Wall			Floor		
	Pressure			NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)			
0.0	0.0	0.0	---	68.0 for all floor area	53.4 for all floor area	1.27
0.2	13.6	10.7	1.27			
0.4	27.2	21.3	1.27			
0.6	40.8	32.0	1.27			
0.8	54.4	42.7	1.27			
1.0	68.0	53.4	1.27			

Note: 1) "d" is depth from the top of water. "H" is water height of the pool.
 2) "x" is distance from the center of the pool. "L" is width of the pool.

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Table A-1.7 Seismic Hydrodynamic Loads for RPV Cavity / Dryer Separator / Fuel Buffer Pool**(a) NS / EW Motion**

Wall				Floor			
Depth d/H	Pressure			Distance x/(L/2)	Pressure		
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)		NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
0.0	15.2	15.2	1.00	0.0	0.0	0.0	—
0.2	23.1	23.1	1.00	0.2	8.0	8.0	1.00
0.4	37.0	37.0	1.00	0.4	16.7	16.7	1.00
0.6	47.8	47.8	1.00	0.6	27.0	27.0	1.00
0.8	54.5	54.5	1.00	0.8	39.9	39.9	1.00
1.0	56.7	56.7	1.00	1.0	56.7	56.7	1.00

(b) Vertical Motion

Depth d/H	Wall			Floor		
	Pressure			NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)			
0.0	0.0	0.0	---	76.2 for all floor area	58.5 for all floor area	1.30
0.2	15.2	11.7	1.30			
0.4	30.5	23.4	1.30			
0.6	45.7	35.1	1.30			
0.8	61.0	46.8	1.30			
1.0	76.2	58.5	1.30			

Note: 1) "d" is depth from the top of water. "H" is water height of the pool.
 2) "x" is distance from the center of the pool. "L" is width of the pool.

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Table A-1.8 Seismic Hydrodynamic Loads for IC / PCCS Pool**(a) NS / EW Motion**

Wall				Floor			
Depth d/H	Pressure			Distance x/(L/2)	Pressure		
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)		NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
0.0	9.1	9.1	1.00	0.0	0.0	0.0	---
0.2	13.6	13.6	1.00	0.2	4.6	4.6	1.00
0.4	21.7	21.7	1.00	0.4	9.5	9.5	1.00
0.6	26.7	26.7	1.00	0.6	14.8	14.8	1.00
0.8	28.2	28.2	1.00	0.8	21.0	21.0	1.00
1.0	28.2	28.2	1.00	1.0	28.2	28.2	1.00

(b) Vertical Motion

Depth d/H	Wall			Floor		
	Pressure			NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)			
0.0	0.0	0.0	---	54.6 for all floor area	41.9 for all floor area	1.30
0.2	10.9	8.4	1.30			
0.4	21.8	16.8	1.30			
0.6	32.8	25.1	1.30			
0.8	43.7	33.5	1.30			
1.0	54.6	41.9	1.30			

Note: 1) "d" is depth from the top of water. "H" is water height of the pool.
2) "x" is distance from the center of the pool. "L" is width of the pool.



Table A-1.9 Seismic Hydrodynamic Loads for Extension Pool A

(a) NS Motion

Wall				Floor			
Depth d/H	Pressure			Distance x/(L/2)	Pressure		
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)		NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
0.0	4.8	4.8	1.00	0.0	0.0	0.0	---
0.2	16.5	16.5	1.00	0.2	1.3	1.3	1.00
0.4	28.6	28.6	1.00	0.4	2.7	2.7	1.00
0.6	37.3	37.3	1.00	0.6	4.7	4.7	1.00
0.8	42.5	42.5	1.00	0.8	12.3	12.3	1.00
1.0	44.3	44.3	1.00	1.0	44.3	44.3	1.00

(b) EW Motion

Wall				Floor			
Depth d/H	Pressure			Distance x/(L/2)	Pressure		
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)		NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
0.0	7.8	7.8	1.00	0.0	0.0	0.0	---
0.2	12.9	12.9	1.00	0.2	3.9	3.9	1.00
0.4	20.3	20.3	1.00	0.4	8.1	8.1	1.00
0.6	23.8	23.8	1.00	0.6	12.6	12.6	1.00
0.8	24.0	24.0	1.00	0.8	17.8	17.8	1.00
1.0	24.0	24.0	1.00	1.0	24.0	24.0	1.00

(c) Vertical Motion

Depth d/H	Wall			Floor		
	Pressure			NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)			
0.0	0.0	0.0	---	54.6 for all floor area	41.9 for all floor area	1.30
0.2	10.9	8.4	1.30			
0.4	21.8	16.8	1.30			
0.6	32.8	25.1	1.30			
0.8	43.7	33.5	1.30			
1.0	54.6	41.9	1.30			

Note: 1) "d" is depth from the top of water. "H" is water height of the pool.
 2) "x" is distance from the center of the pool. "L" is width of the pool.

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Table A-1.10 Seismic Hydrodynamic Loads for Extension Pool B**(a) NS Motion**

Wall				Floor			
Depth d/H	Pressure			Distance x/(L/2)	Pressure		
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)		NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
0.0	7.8	7.8	1.00	0.0	0.0	0.0	---
0.2	12.5	12.5	1.00	0.2	3.5	3.5	1.00
0.4	19.2	19.2	1.00	0.4	7.2	7.2	1.00
0.6	21.5	21.5	1.00	0.6	11.3	11.3	1.00
0.8	21.5	21.5	1.00	0.8	16.0	16.0	1.00
1.0	21.5	21.5	1.00	1.0	21.5	21.5	1.00

(b) EW Motion

Wall				Floor			
Depth d/H	Pressure			Distance x/(L/2)	Pressure		
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)		NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
0.0	13.7	13.7	1.00	0.0	0.0	0.0	----
0.2	18.2	18.2	1.00	0.2	5.5	5.5	1.00
0.4	27.8	27.8	1.00	0.4	11.7	11.7	1.00
0.6	35.5	35.5	1.00	0.6	19.1	19.1	1.00
0.8	40.3	40.3	1.00	0.8	28.7	28.7	1.00
1.0	41.9	41.9	1.00	1.0	41.9	41.9	1.00

(c) Vertical Motion

Depth d/H	Wall			Floor		
	Pressure			NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)			
0.0	0.0	0.0	---	54.6 for all floor area	41.9 for all floor area	1.30
0.2	10.9	8.4	1.30			
0.4	21.8	16.8	1.30			
0.6	32.8	25.1	1.30			
0.8	43.7	33.5	1.30			
1.0	54.6	41.9	1.30			

Note: 1) "d" is depth from the top of water. "H" is water height of the pool.
 2) "x" is distance from the center of the pool. "L" is width of the pool.

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Table A-1.11 Seismic Hydrodynamic Loads for Spent Fuel Pool**(a) NS Motion**

Wall				Floor			
Depth d/H	Pressure			Distance x/(L/2)	Pressure		
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)		NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
0.0	12.3	12.3	1.00	0.0	0.0	0.0	---
0.2	23.6	22.6	1.04	0.2	7.4	7.1	1.04
0.4	37.8	36.1	1.05	0.4	15.2	14.5	1.05
0.6	44.6	42.6	1.05	0.6	23.7	22.7	1.05
0.8	45.2	43.2	1.05	0.8	33.6	32.1	1.05
1.0	45.2	43.2	1.05	1.0	45.2	43.2	1.05

(b) EW Motion

Wall				Floor			
Depth d/H	Pressure			Distance x/(L/2)	Pressure		
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)		NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
0.0	11.8	11.8	1.00	0.0	0.0	0.0	---
0.2	24.2	23.2	1.04	0.2	8.5	8.2	1.04
0.4	40.0	38.2	1.05	0.4	17.5	16.7	1.05
0.6	49.4	47.2	1.05	0.6	27.4	26.2	1.05
0.8	52.2	49.8	1.05	0.8	38.7	37.0	1.05
1.0	52.2	49.8	1.05	1.0	52.2	49.8	1.05

(c) Vertical Motion

Depth d/H	Wall			Floor		
	Pressure			NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)
	NA3 (kN/m ²)	DCD (kN/m ²)	Ratio (NA3/DCD)			
0.0	0.0	0.0	---	98.5 for all floor area	98.5 for all floor area	1.00
0.2	19.7	19.7	1.00			
0.4	39.4	39.4	1.00			
0.6	59.1	59.1	1.00			
0.8	78.8	78.8	1.00			
1.0	98.5	98.5	1.00			

Note: 1) "d" is depth from the top of water. "H" is water height of the pool.
2) "x" is distance from the center of the pool. "L" is width of the pool.



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Table A-2.1 Maximum Stress Ratios for Flexure and Membrane Forces: RCCV

Location	Element ID	Concrete				
		NA3		DCD		Ratio (NA3/DCD)
		σ/σ_a	Load ID	σ/σ_a	Load ID	
1 RPV	5006	0.609	7481	0.657	7482	0.93
Pedestal	5013	0.679	7481	0.700	7421	0.97
Bottom	5024	0.626	6481	0.645	7482	0.97
2 RPV	6006	0.447	8514	0.468	7482	0.95
Pedestal	6013	0.500	7482	0.496	7482	1.01
Mid-Height	6024	0.436	8511	0.510	7482	0.86
3 RPV	6606	0.465	8512	0.886	7341	0.52
Pedestal	6613	0.477	7482	0.913	7161	0.52
Top	6624	0.446	8512	0.916	6331	0.49
4 RCCV	1806	0.544	8512	0.634	7421	0.86
Wetwell	1813	0.626	8514	0.612	2021	1.02
Bottom	1824	0.664	2021	0.653	2021	1.02
5 RCCV	2606	0.454	6421	0.373	6441	1.22
Wetwell	2613	0.529	8514	0.420	7441	1.26
Mid-Height	2624	0.491	8514	0.420	7492	1.17
6 RCCV	3406	0.568	6261	0.666	6982	0.85
Wetwell	3413	0.687	7441	0.973	7221	0.71
Top	3424	0.572	8514	0.665	7172	0.86
7 RCCV	3606	0.619	6421	0.664	7421	0.93
Drywell	3613	0.733	8511	0.964	7271	0.76
Bottom	3624	0.578	8514	0.793	7411	0.73
8 RCCV	4006	0.552	8507	0.474	7421	1.16
Drywell	4013	0.731	8513	0.621	6421	1.18
Mid-Height	4976	0.580	8514	0.395	7581	1.47
9 RCCV	4406	0.571	8514	0.484	7521	1.18
Drywell	4413	0.804	8513	0.603	2021	1.33
Top	4424	0.573	8514	0.362	1100	1.58



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Table A-2.1 Maximum Stress Ratios for Flexure and Membrane Forces: RCCV (Continued)

Location	Element ID	Concrete				
		NA3		DCD		Ratio (NA3/DCD)
		σ/σ_a	Load ID	σ/σ_a	Load ID	
10 Basemat @ Center	80003	0.460	7501	0.499	7501	0.92
	80007	0.457	7501	0.463	7501	0.99
	80012	0.461	7991	0.454	7501	1.02
11 Basemat Inside RPV Pedestal	80206	0.330	7501	0.528	7501	0.63
	80213	0.361	7271	0.442	7321	0.82
	80224	0.312	7271	0.311	6271	1.00
12 S/P Slab @ RPV	83306	0.712	7421	0.657	7633	1.08
	83313	0.781	7421	0.848	7151	0.92
	83324	0.751	8507	0.574	7482	1.31
13 S/P Slab @ Center	83406	0.897	8507	0.765	6471	1.17
	83413	0.923	6441	0.763	6471	1.21
	83424	0.865	6471	0.698	6211	1.24
14 S/P Slab @ RCCV	83506	0.556	6211	0.637	7941	0.87
	83513	0.581	8512	0.882	7241	0.66
	83524	0.569	7261	0.617	6231	0.92
15 Top slab @ Drywell Head Opening	98120	0.789	8514	0.833	7002	0.95
	98135	0.885	8507	0.939	6004	0.94
	98104	0.878	8507	0.809	6004	1.09
16 Top slab @ Center	98149	0.637	8514	0.691	6004	0.92
	98170	0.751	8514	0.759	7004	0.99
17 Top slab @ RCCV	98109	0.696	8507	0.714	6004	0.98
	98174	0.732	8514	0.732	7002	1.00
	98197	0.659	8514	0.699	7004	0.94
	98103	0.720	8514	0.766	7002	0.94



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Table A-2.1 Maximum Stress Ratios for Flexure and Membrane Forces: RCCV (Continued)

Location	Element ID	Primary Reinforcement																			
		Direction 1'										Direction 2'									
		In/Top					Out/Bottom					In/Top					Out/Bottom				
		NA3		DCD		Ratio (NA3 /DCD)	NA3		DCD		Ratio (NA3 /DCD)	NA3		DCD		Ratio (NA3 /DCD)	NA3		DCD		Ratio (NA3 /DCD)
		σ/σ_a	Load ID	σ/σ_a	Load ID		σ/σ_a	Load ID	σ/σ_a	Load ID		σ/σ_a	Load ID	σ/σ_a	Load ID		σ/σ_a	Load ID	σ/σ_a	Load ID	
1 RPV Pedestal Bottom	5006	0.244	6481	0.639	8001	0.38	0.179	7941	0.761	7321	0.23	0.141	8514	0.785	7622	0.18	0.123	6251	0.385	7612	0.32
	5013	0.261	6481	0.611	8001	0.43	0.176	7941	0.551	7841	0.32	0.156	7482	0.907	8061	0.17	0.129	6251	0.476	7612	0.27
	5024	0.260	6481	0.464	8061	0.56	0.155	7941	0.570	7821	0.27	0.145	2021	0.501	7672	0.29	0.120	6251	0.242	7701	0.50
2 RPV Pedestal Mid-Height	6006	0.211	6152	0.283	8001	0.75	0.449	7471	0.489	7371	0.92	0.169	8514	0.266	7701	0.63	0.273	7921	0.341	7921	0.80
	6013	0.169	6152	0.277	8001	0.61	0.543	7471	0.539	7371	1.01	0.169	7471	0.249	7612	0.68	0.216	7971	0.349	7982	0.62
	6024	0.397	7152	0.544	7151	0.73	0.562	7471	0.656	7371	0.86	0.126	7721	0.487	7612	0.26	0.176	9014	0.373	7921	0.47
3 RPV Pedestal Top	6606	0.262	7351	0.733	7221	0.36	0.489	8514	0.698	7221	0.70	0.468	7711	0.730	7221	0.64	0.188	7761	0.392	6231	0.48
	6613	0.268	7351	0.645	7241	0.42	0.533	7421	0.735	7241	0.73	0.373	7761	0.726	7161	0.51	0.159	7991	0.449	7231	0.35
	6624	0.294	7351	0.760	7211	0.39	0.520	7421	0.703	7221	0.74	0.435	7761	0.635	7211	0.69	0.178	7991	0.639	7831	0.28
4 RCCV Wetwell Bottom	1806	0.376	7991	0.584	7211	0.64	0.504	7921	0.631	7921	0.80	0.438	7761	0.734	7731	0.60	0.440	7701	0.642	7701	0.69
	1813	0.306	7851	0.519	7231	0.59	0.426	7971	0.581	7982	0.73	0.397	7761	0.651	7831	0.61	0.384	7701	0.676	7711	0.57
	1824	0.346	7351	0.610	7211	0.57	0.487	7971	0.636	7441	0.77	0.415	7761	0.751	7731	0.55	0.425	7982	0.694	7921	0.61
5 RCCV Wetwell Mid-Height	2606	0.343	7801	0.633	7731	0.54	0.461	6421	0.605	7421	0.76	0.488	7731	0.794	7731	0.62	0.482	7971	0.569	7941	0.85
	2613	0.307	8061	0.601	7461	0.51	0.510	9014	0.748	7461	0.68	0.422	7711	0.719	7711	0.59	0.449	7921	0.552	7921	0.81
	2624	0.342	7633	0.684	7731	0.50	0.510	7982	0.666	7982	0.77	0.447	7731	0.907	7612	0.49	0.461	7941	0.607	7982	0.76
6 RCCV Wetwell Top	3406	0.341	7761	0.889	7271	0.38	0.439	7971	0.818	7271	0.54	0.498	7851	0.638	7801	0.78	0.593	7982	0.557	7911	1.06
	3413	0.294	7761	0.840	7271	0.35	0.435	7482	0.860	7481	0.51	0.431	7851	0.588	7801	0.73	0.512	7861	0.536	7731	0.96
	3424	0.285	7761	0.891	7271	0.32	0.405	8511	0.909	7271	0.45	0.476	7701	0.879	7661	0.54	0.389	9011	0.833	7411	0.47
7 RCCV Drywell Bottom	3606	0.343	7761	0.605	7271	0.57	0.455	7421	0.592	7321	0.77	0.375	7663	0.592	7132	0.63	0.636	7971	0.744	7371	0.86
	3613	0.302	7711	0.828	7421	0.36	0.422	8511	0.916	7421	0.46	0.368	7603	0.655	7662	0.56	0.472	7861	0.974	7371	0.49
	3624	0.300	7761	0.488	7261	0.61	0.304	7961	0.556	7411	0.55	0.433	7653	0.778	7643	0.56	0.430	7961	0.925	7321	0.46
8 RCCV Drywell Mid-Height	4006	0.355	7133	0.721	7171	0.49	0.591	7471	0.790	7482	0.75	0.474	7632	0.554	7801	0.86	0.624	7371	0.724	7482	0.86
	4013	0.270	7851	0.690	7121	0.39	0.566	8511	0.773	7421	0.73	0.402	7603	0.636	7113	0.63	0.439	9014	0.525	7112	0.84
	4976	0.326	7611	0.669	7231	0.49	0.395	7961	0.584	7421	0.68	0.488	7653	0.696	7603	0.70	0.486	7961	0.562	7941	0.86
9 RCCV Drywell Top	4406	0.353	7351	0.537	7121	0.66	0.610	8511	0.772	7482	0.79	0.857	7161	0.902	7231	0.95	0.517	7341	0.585	7441	0.88
	4413	0.247	7701	0.358	7631	0.69	0.472	8511	0.448	7921	1.05	0.491	7731	0.593	7811	0.83	0.326	7711	0.336	7861	0.97
	4424	0.402	7351	0.683	7111	0.59	0.474	7981	0.690	7411	0.69	0.556	7661	0.656	7631	0.85	0.404	7981	0.579	7921	0.70



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Table A-2.1 Maximum Stress Ratios for Flexure and Membrane Forces: RCCV (Continued)

Location	Element ID	Primary Reinforcement																			
		Direction 1'										Direction 2'									
		In/Top					Out/Bottom					In/Top					Out/Bottom				
		NA3		DCD		Ratio (NA3 /DCD)	NA3		DCD		Ratio (NA3 /DCD)	NA3		DCD		Ratio (NA3 /DCD)	NA3		DCD		Ratio (NA3 /DCD)
		σ/σ_a	Load ID	σ/σ_a	Load ID		σ/σ_a	Load ID	σ/σ_a	Load ID		σ/σ_a	Load ID	σ/σ_a	Load ID		σ/σ_a	Load ID	σ/σ_a	Load ID	
10 Basemat @ Center	80003	0.483	7731	0.654	7731	0.74	0.516	7461	0.641	7411	0.81	0.502	7731	0.647	7731	0.78	0.514	7461	0.613	7411	0.84
	80007	0.464	7831	0.598	7991	0.78	0.487	7481	0.597	7481	0.82	0.476	7612	0.600	7632	0.79	0.474	7481	0.574	7481	0.83
	80012	0.450	7811	0.550	7991	0.82	0.474	7481	0.557	7481	0.85	0.476	7612	0.610	7631	0.78	0.468	7461	0.564	7481	0.83
11 Basemat Inside RPV Pedestal	80206	0.497	7761	0.914	7633	0.54	0.412	7411	0.644	7411	0.64	0.301	7961	0.494	7931	0.61	0.354	7461	0.480	7411	0.74
	80213	0.326	7612	0.631	7612	0.52	0.485	7431	0.720	7431	0.67	0.477	7731	0.846	7731	0.56	0.474	7461	0.714	7431	0.66
	80224	0.278	7961	0.397	7831	0.70	0.363	7481	0.500	7481	0.73	0.385	7631	0.697	7811	0.55	0.414	7481	0.617	7481	0.67
12 S/P Slab @ RPV	83306	0.526	7501	0.843	7621	0.62	0.349	7471	0.970	7173	0.36	0.628	7231	0.808	7111	0.78	0.581	7471	0.966	7173	0.60
	83313	0.531	2001	0.610	7621	0.87	0.446	7351	0.924	7123	0.48	0.604	7231	0.980	7231	0.62	0.593	7471	0.980	7341	0.61
	83324	0.522	2001	0.617	7621	0.85	0.439	7351	0.945	7173	0.46	0.595	7211	0.942	7211	0.63	0.555	7471	0.986	7321	0.56
13 S/P Slab @ Center	83406	0.229	2501	0.229	2501	1.00	0.602	6251	0.602	6251	1.00	0.324	7511	0.440	7731	0.74	0.655	8514	0.887	7421	0.74
	83413	0.179	6441	0.209	6761	0.86	0.613	6471	0.594	6251	1.03	0.262	7491	0.314	7491	0.83	0.621	6471	0.865	7441	0.72
	83424	0.173	6421	0.263	7731	0.66	0.592	8501	0.585	6251	1.01	0.273	2011	0.423	7731	0.65	0.641	6471	0.871	6471	0.74
14 S/P Slab @ RCCV	83506	0.574	6251	0.745	7261	0.77	0.362	7311	0.454	7491	0.80	0.234	7231	0.427	7211	0.55	0.452	8507	0.638	7311	0.71
	83513	0.565	6251	0.633	7211	0.89	0.405	2001	0.460	7142	0.88	0.184	7261	0.298	7231	0.62	0.447	6471	0.536	7341	0.83
	83524	0.561	6251	0.576	6261	0.97	0.265	7421	0.312	7211	0.85	0.216	6261	0.294	6211	0.73	0.465	6471	0.540	6421	0.86
15 Top slab @ Drywell Head Opening	98120	0.633	7351	0.240	7004	2.64	0.422	7501	0.200	7002	2.11	0.771	7261	0.550	6004	1.40	0.353	7501	0.210	7002	1.68
	98135	0.673	7211	0.240	7004	2.80	0.570	7501	0.380	6004	1.50	0.168	7501	0.080	7002	2.10	0.180	7251	0.030	7003	6.01
	98104	0.342	7351	0.070	7002	4.89	0.260	7501	0.070	6002	3.71	0.934	8507	0.950	6004	0.98	0.464	7501	0.360	7002	1.29
16 Top slab @ Center	98149	0.384	7131	0.180	7002	2.13	0.627	7501	0.300	7002	2.09	0.392	9007	0.420	6004	0.93	0.360	7351	0.180	7003	2.00
	98170	0.627	7131	0.220	7004	2.85	0.541	7501	0.320	7002	1.69	0.546	7111	0.530	6004	1.03	0.239	7501	0.180	7003	1.49
	98109	0.507	6461	0.290	6004	1.75	0.240	7491	0.200	6002	1.20	0.753	7481	0.680	6004	1.11	0.419	7501	0.250	7002	1.68
17 Top slab @ RCCV	98174	0.432	7111	0.260	6004	1.66	0.466	7501	0.270	7002	1.73	0.421	8507	0.440	6004	0.96	0.246	7231	0.170	7001	1.44
	98197	0.363	7231	0.320	6002	1.13	0.301	7501	0.270	7003	1.11	0.424	8514	0.420	7004	1.01	0.502	7351	0.120	7001	4.18
	98103	0.664	7411	0.510	7004	1.30	0.489	7351	0.300	7002	1.63	0.722	7481	0.520	7004	1.39	0.191	8512	0.210	7002	0.91



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Table A-2.2 Maximum Stress Ratios for Membrane Compressive Forces: RCCV

Location	Element ID	Thickness (m) h	NA3					DCD					Ratio (NA3/DCD)			
			Load ID	Calculated Concrete Stress (MPa)				Load ID	Calculated Concrete Stress (MPa)				σ_x	σ_y	τ_{xy}	σ_c
				σ_x	σ_y	τ_{xy}	σ_c		σ_x	σ_y	τ_{xy}	σ_c				
1 RPV Pedestal Bottom	2001	-0.620	-3.381	-0.038	-3.381	7482	-10.620	-6.996	-1.283	-11.028	0.06	0.48	0.03	0.31	2001	-0.620
	2001	-0.868	-3.632	0.176	-3.643	7482	-11.501	-8.791	-0.725	-11.683	0.08	0.41	-0.24	0.31	2001	-0.868
	2001	-0.866	-3.531	0.085	-3.534	7482	-11.249	-6.711	1.417	-11.655	0.08	0.53	0.06	0.30	2001	-0.866
2 RPV Pedestal Mid-Height	2001	-0.206	-3.465	0.119	-3.469	2001	-0.205	-3.459	0.118	-3.464	1.00	1.00	1.00	1.00	2001	-0.206
	2001	-0.301	-3.356	0.234	-3.374	2001	-0.300	-3.349	0.231	-3.367	1.00	1.00	1.01	1.00	2001	-0.301
	2001	-0.255	-2.666	-0.296	-2.702	7481	-7.143	-4.265	-2.328	-8.440	0.04	0.63	0.13	0.32	2001	-0.255
3 RPV Pedestal Top	2001	-0.326	-2.743	0.503	-2.844	7421	-17.507	-4.164	1.740	-17.730	0.02	0.66	0.29	0.16	2001	-0.326
	2001	-0.383	-2.672	-0.119	-2.679	2001	-0.382	-2.665	-0.120	-2.672	1.00	1.00	0.99	1.00	2001	-0.383
	2001	-0.200	-2.678	0.231	-2.700	2001	-0.200	-2.674	0.231	-2.695	1.00	1.00	1.00	1.00	2001	-0.200
4 RCCV Wetwell Bottom	7501	-1.429	-5.605	1.722	-6.223	7501	-1.424	-6.029	3.256	-7.715	1.00	0.93	0.53	0.81	7501	-1.429
	7501	-1.197	-5.714	1.607	-6.227	7501	-1.185	-6.780	2.586	-7.792	1.01	0.84	0.62	0.80	7501	-1.197
	7581	-1.862	-8.043	-1.742	-8.500	7561	-0.847	-6.539	-3.712	-8.370	2.20	1.23	0.47	1.02	7581	-1.862
5 RCCV Wetwell Mid-Height	7501	-0.427	-5.108	1.825	-5.736	7501	-0.339	-5.001	3.051	-6.510	1.26	1.02	0.60	0.88	7501	-0.427
	7521	-2.436	-7.299	1.785	-7.884	7521	-2.363	-7.848	2.537	-8.842	1.03	0.93	0.70	0.89	7521	-2.436
	7581	-1.634	-7.777	-1.707	-8.219	7581	-1.528	-7.864	-3.422	-9.359	1.07	0.99	0.50	0.88	7581	-1.634
6 RCCV Wetwell Top	7501	-0.273	-4.445	1.858	-5.153	7421	-6.145	-3.559	2.835	-7.968	0.04	1.25	0.66	0.65	7501	-0.273
	2021	-0.523	-4.745	0.216	-4.755	7371	-12.771	-6.230	2.403	-13.559	0.04	0.76	0.09	0.35	2021	-0.523
	2021	0.219	-5.072	0.157	-5.077	7371	-14.546	3.995	2.851	-14.974	-0.02	-1.27	0.06	0.34	2021	0.219
7 RCCV Drywell Bottom	7501	0.174	-4.119	1.883	-4.828	7501	0.274	-3.577	2.746	-5.005	0.64	1.15	0.69	0.96	7501	0.174
	8511	1.647	-8.102	2.276	-8.607	7441	-1.505	-9.255	2.919	-10.232	-1.09	0.88	0.78	0.84	8511	1.647
	2021	-6.822	-5.615	0.100	-6.830	7411	5.722	-17.845	2.987	-18.218	-1.19	0.31	0.03	0.37	2021	-6.822
8 RCCV Drywell Mid-Height	7561	0.743	-3.602	1.696	-4.186	7561	1.070	-2.853	2.452	-4.032	0.69	1.26	0.69	1.04	7561	0.743
	2021	0.532	-5.406	0.479	-5.444	2021	0.594	-5.496	0.507	-5.537	0.90	0.98	0.95	0.98	2021	0.532
	2021	-4.083	-4.921	0.314	-5.025	7581	-4.366	-7.033	3.208	-9.174	0.94	0.70	0.10	0.55	2021	-4.083
9 RCCV Drywell Top	7501	0.708	-3.017	-1.484	-3.536	7501	1.182	-2.199	-1.985	-3.116	0.60	1.37	0.75	1.13	7501	0.708
	7471	-0.367	-9.412	1.494	-9.652	2021	0.272	-5.833	0.100	-5.835	-1.35	1.61	14.94	1.65	7471	-0.367
	8514	-6.082	-5.785	2.194	-8.132	7581	-4.796	-5.793	3.481	-8.811	1.27	1.00	0.63	0.92	8514	-6.082



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Table A-2.2 Maximum Stress Ratios for Membrane Compressive Forces: RCCV (Continued)

Location	Element ID	Thickness (m) h	NA3					DCD					Ratio (NA3/DCD)			
			Load ID	Calculated Concrete Stress (MPa)				Load ID	Calculated Concrete Stress (MPa)				σ_x	σ_y	τ_{xy}	σ_c
				σ_x	σ_y	τ_{xy}	σ_c		σ_x	σ_y	τ_{xy}	σ_c				
10 Basemat @ Center	80003	5.1	2021	-1.812	-1.728	0.043	-1.830	2021	-1.812	-1.726	0.043	-1.829	1.00	1.00	1.00	1.00
	80007	5.1	2021	-1.824	-1.721	0.047	-1.842	2021	-1.824	-1.719	0.047	-1.842	1.00	1.00	1.00	1.00
	80012	5.1	2021	-1.832	-1.703	0.042	-1.844	2021	-1.832	-1.701	0.042	-1.844	1.00	1.00	1.00	1.00
11 Basemat Inside RPV Pedestal	80206	5.1	2021	-1.775	-1.828	0.080	-1.886	2021	-1.775	-1.826	0.080	-1.885	1.00	1.00	1.00	1.00
	80213	5.1	2021	-1.830	-1.735	0.061	-1.860	2021	-1.830	-1.733	0.061	-1.859	1.00	1.00	1.01	1.00
	80224	5.1	2021	-1.894	-1.718	0.040	-1.902	2021	-1.893	-1.715	0.040	-1.901	1.00	1.00	1.00	1.00
12 S/P Slab @ RPV	83506	2.0	7172	-3.233	0.952	-0.578	-3.312	2021	-1.337	-1.265	-0.316	-1.619	2.42	-0.75	1.83	2.05
	83513	2.0	7172	-3.473	0.618	0.519	-3.538	7241	-22.406	1.248	0.577	-22.420	0.16	0.50	0.90	0.16
	83524	2.0	7172	-3.389	0.904	0.179	-3.396	2021	-1.299	-0.693	0.060	-1.305	2.61	-1.31	3.00	2.60
13 S/P Slab @ Center	83406	2.0	7172	-4.120	1.293	-0.753	-4.223	7421	-4.109	0.938	-1.117	-4.345	1.00	1.38	0.67	0.97
	83413	2.0	7172	-4.107	1.092	0.410	-4.139	2021	-1.817	-0.839	0.126	-1.833	2.26	-1.30	3.24	2.26
	83424	2.0	7172	-4.024	1.227	0.266	-4.037	2021	-1.961	-0.510	0.087	-1.966	2.05	-2.40	3.05	2.05
14 S/P Slab @ RCCV	83306	2.0	6172	-6.550	1.561	-0.508	-6.581	7421	-6.094	-2.780	-0.991	-6.367	1.07	-0.56	0.51	1.03
	83313	2.0	6172	-6.620	1.426	-0.581	-6.662	7421	-5.514	-2.625	-0.677	-5.665	1.20	-0.54	0.86	1.18
	83324	2.0	7172	-6.474	1.579	0.911	-6.576	2021	-3.286	0.487	0.337	-3.316	1.97	3.24	2.70	1.98
15 Top slab @ Drywell Head Opening	98174	2.4	8512	-11.142	-4.078	3.948	-12.908	7002	-11.242	-4.196	4.046	-13.084	0.99	0.97	0.98	0.99
	98197	2.4	8513	-13.974	-5.752	-0.670	-14.028	7003	-14.093	-5.840	-0.762	-14.163	0.99	0.98	0.88	0.99
	98103	2.4	8512	-11.471	-8.970	0.362	-11.523	7002	-11.486	-9.093	0.560	-11.611	1.00	0.99	0.65	0.99
16 Top slab @ Center	98149	2.4	8512	-14.910	-8.537	2.217	-15.606	7002	-14.746	-8.494	2.200	-15.443	1.01	1.01	1.01	1.01
	98170	2.4	8512	-15.247	-3.601	0.720	-15.292	7002	-15.123	-3.633	0.830	-15.183	1.01	0.99	0.87	1.01
	98109	2.4	8512	-10.513	-10.524	1.315	-11.834	7002	-10.497	-10.610	1.412	-11.967	1.00	0.99	0.93	0.99
17 Top slab @ RCCV	98120	2.4	8512	-8.848	-11.065	-4.793	-14.876	7002	-8.839	-11.200	-4.868	-15.029	1.00	0.99	0.98	0.99
	98135	2.4	8512	-17.877	-5.908	4.078	-19.134	7002	-17.520	-5.925	4.130	-18.841	1.02	1.00	0.99	1.02
	98104	2.4	8512	-5.739	-14.724	3.560	-15.964	7002	-5.788	-14.864	3.632	-16.138	0.99	0.99	0.98	0.99

Notes: Positive value means tension.



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Table A-2.2 Maximum Stress Ratios for Membrane Compressive Forces: RCCV (Continued)

Location	Element ID	Thickness (m) h	NA3			DCD			Ratio (NA3/DCD)
			Load ID	Allowable Stress (MPa) σ_a	σ_c/σ_a	Load ID	Allowable Stress (MPa) σ_a	σ_c/σ_a	σ_c/σ_a
1 RPV Pedestal Bottom	5006	2.4	2001	-10.4	0.327	7482	-25.9	0.426	0.766
	5013	2.4	2001	-10.4	0.352	7482	-25.9	0.452	0.780
	5024	2.4	2001	-10.4	0.341	7482	-25.9	0.450	0.758
2 RPV Pedestal Mid-Height	6006	2.4	2001	-10.4	0.335	2001	-10.4	0.335	1.002
	6013	2.4	2001	-10.4	0.326	2001	-10.4	0.325	1.002
	6024	2.4	2001	-10.4	0.261	7481	-25.9	0.326	0.800
3 RPV Pedestal Top	6606	2.4	2001	-10.4	0.275	7421	-25.9	0.685	0.401
	6613	2.4	2001	-10.4	0.259	2001	-10.4	0.258	1.003
	6624	2.4	2001	-10.4	0.261	2001	-10.4	0.260	1.002
4 RCCV Wetwell Bottom	1806	2.0	7501	-20.7	0.301	7501	-20.7	0.373	0.807
	1813	2.0	7501	-20.7	0.301	7501	-20.7	0.376	0.799
	1824	2.0	7581	-25.9	0.329	7561	-20.7	0.404	0.812
5 RCCV Wetwell Mid-Height	2606	2.0	7501	-20.7	0.277	7501	-20.7	0.314	0.881
	2613	2.0	7521	-25.9	0.305	7521	-25.9	0.342	0.892
	2624	2.0	7581	-25.9	0.318	7581	-25.9	0.362	0.878
6 RCCV Wetwell Top	3406	2.0	7501	-20.7	0.249	7421	-25.9	0.308	0.808
	3413	2.0	2021	-15.5	0.306	7371	-25.9	0.524	0.585
	3424	2.0	2021	-15.5	0.327	7371	-25.9	0.579	0.565
7 RCCV Drywell Bottom	3606	2.0	7501	-20.7	0.233	7501	-20.7	0.242	0.965
	3613	2.0	8511	-25.9	0.333	7441	-25.9	0.395	0.841
	3624	2.0	2021	-15.5	0.440	7411	-25.9	0.704	0.625
8 RCCV Drywell Mid-Height	4006	2.0	7561	-20.7	0.202	7561	-20.7	0.195	1.038
	4013	2.0	2021	-15.5	0.351	2021	-15.5	0.357	0.983
	4976	2.0	2021	-15.5	0.324	7581	-25.9	0.355	0.913
9 RCCV Drywell Top	4406	2.0	7501	-20.7	0.171	7501	-20.7	0.151	1.135
	4413	2.0	7471	-25.9	0.373	2021	-15.5	0.376	0.993
	4424	2.0	8514	-25.9	0.314	7581	-25.9	0.341	0.923

Notes: Positive value means tension.



Table A-2.2 Maximum Stress Ratios for Membrane Compressive Forces: RCCV (Continued)

Location	Element ID	Thickness (m) h	NA3			DCD			Ratio (NA3/DCD) σ_c/σ_a
			Load ID	Allowable Stress (MPa) σ_a	σ_c/σ_a	Load ID	Allowable Stress (MPa) σ_a	σ_c/σ_a	
10 Basemat @ Center	80003	5.1	2021	-12.4	0.147	2021	-12.4	0.147	1.000
	80007	5.1	2021	-12.4	0.148	2021	-12.4	0.148	1.000
	80012	5.1	2021	-12.4	0.148	2021	-12.4	0.148	1.000
11 Basemat Inside RPV Pedestal	80206	5.1	2021	-12.4	0.152	2021	-12.4	0.152	1.001
	80213	5.1	2021	-12.4	0.150	2021	-12.4	0.150	1.000
	80224	5.1	2021	-12.4	0.153	2021	-12.4	0.153	1.000
12 S/P Slab @ RPV	83506	2.0	7172	-25.9	0.128	2021	-15.5	0.104	1.227
	83513	2.0	7172	-25.9	0.137	7241	-25.9	0.866	0.158
	83524	2.0	7172	-25.9	0.131	2021	-15.5	0.084	1.562
13 S/P Slab @ Center	83406	2.0	7172	-25.9	0.163	7421	-25.9	0.168	0.972
	83413	2.0	7172	-25.9	0.160	2021	-15.5	0.118	1.355
	83424	2.0	7172	-25.9	0.156	2021	-15.5	0.127	1.232
14 S/P Slab @ RCCV	83306	2.0	6172	-25.9	0.254	7421	-25.9	0.246	1.034
	83313	2.0	6172	-25.9	0.257	7421	-25.9	0.219	1.176
	83324	2.0	7172	-25.9	0.254	2021	-15.5	0.214	1.190
15 Top slab @ Drywell Head Opening	98174	2.4	8512	-31.1	0.416	7002	-31.1	0.421	0.987
	98197	2.4	8513	-31.1	0.452	7003	-31.1	0.456	0.991
	98103	2.4	8512	-31.1	0.371	7002	-31.1	0.374	0.992
16 Top slab @ Center	98149	2.4	8512	-31.1	0.503	7002	-31.1	0.497	1.011
	98170	2.4	8512	-31.1	0.492	7002	-31.1	0.489	1.007
	98109	2.4	8512	-31.1	0.381	7002	-31.1	0.385	0.990
17 Top slab @ RCCV	98120	2.4	8512	-31.1	0.479	7002	-31.1	0.484	0.990
	98135	2.4	8512	-31.1	0.616	7002	-31.1	0.607	1.015
	98104	2.4	8512	-31.1	0.514	7002	-31.1	0.520	0.989

Notes: Positive value means tension.



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Table A-2.3 Calculation Results for Maximum Transverse Shear: RCCV

Location	Element ID	NA3			DCD			NA3				DCD				Ratio (NA3/DCD)				Shear Tie Ratio (%)
		LOAD ID	Shear Force (MN/m)	d (m)	LOAD ID	Shear Force (MN/m)	d (m)	Shear Stress (MPa)			Shear Tie Ratio (%)	Shear Stress (MPa)			Shear Tie Ratio (%)	Shear Stress			Shear Tie Ratio	
								V _u	V _c	V _s		V _u	V _c	V _s		V _u	V _c	V _s		
			Q			Q				required				required				required	provided	
1 RPV	5006	7481	7.85	1.83	7482	7.54	1.99	5.05	2.64	2.41	0.582	4.47	2.92	1.55	0.386	1.13	0.91	1.55	1.51	1.010
Pedestal	5013	8507	6.90	1.83	7741	3.43	2.02	4.44	2.65	1.79	0.443	2.00	0.14	1.86	0.455	2.22	19.35	0.96	0.97	1.010
Bottom	5024	8507	6.88	1.83	7673	3.36	2.02	4.42	2.66	1.76	0.425	1.96	0.71	1.25	0.305	2.26	3.75	1.41	1.39	1.010
2 RPV	6006	6721	1.77	1.94	7921	2.02	1.94	1.08	0.95	0.12	0.030	1.23	0.90	0.33	0.083	0.88	1.06	0.37	0.36	0.252
Pedestal	6013	6941	2.35	1.94	7721	2.82	1.94	1.43	1.37	0.06	0.014	1.72	0.77	0.95	0.232	0.83	1.78	0.06	0.06	0.252
Mid-Height	6024	6721	1.79	1.94	7921	2.60	1.94	1.09	0.87	0.22	0.053	1.58	0.88	0.70	0.175	0.69	0.99	0.31	0.30	0.252
3 RPV	6606	8511	2.88	1.93	7211	6.17	1.98	1.75	1.37	0.38	0.093	3.67	1.83	1.84	0.455	0.48	0.75	0.21	0.20	1.010
Pedestal	6613	6611	0.32	1.93	7111	2.52	1.98	0.20	0.20	0.00	0.000	1.50	1.18	0.32	0.079	0.13	0.17	0.00	0.00	1.010
Top	6624	6605	0.40	1.93	7731	1.83	1.94	0.24	0.24	0.00	0.000	1.11	0.52	0.58	0.145	0.22	0.46	0.00	0.00	1.010
4 RCCV	1806	6251	2.21	1.54	7741	1.16	1.59	1.69	1.25	0.45	0.109	0.86	0.22	0.64	0.155	1.98	5.68	0.70	0.70	0.540
Wetwell	1813	6251	2.36	1.54	7731	1.18	1.57	1.80	1.29	0.51	0.123	0.89	0.16	0.73	0.180	2.03	8.12	0.70	0.68	0.540
Bottom	1824	6251	2.30	1.54	7761	1.02	1.57	1.76	1.26	0.50	0.120	0.77	0.30	0.47	0.115	2.29	4.15	1.07	1.04	0.540
5 RCCV	2606	6625	0.02	1.56	6625	0.05	1.61	0.02	0.02	0.00	0.000	0.04	0.04	0.00	0.000	0.44	0.44	1.00	1.00	0.270
Wetwell	2613	6935	0.02	1.55	7801	0.33	1.59	0.01	0.01	0.00	0.000	0.25	0.20	0.04	0.011	0.05	0.06	0.00	0.00	0.270
Mid-Height	2624	6615	0.00	1.56	6666	0.01	1.65	0.00	0.00	0.00	0.000	0.01	0.01	0.00	0.000	0.38	0.38	1.00	1.00	0.270
6 RCCV	3406	7721	2.98	1.43	6241	2.21	1.59	2.45	0.50	1.95	0.472	1.63	0.65	0.99	0.240	1.50	0.77	1.98	1.97	0.721
Wetwell	3413	7861	2.36	1.43	7671	1.45	1.59	1.95	0.52	1.42	0.353	1.07	0.27	0.80	0.194	1.81	1.91	1.78	1.82	0.721
Top	3424	7731	1.97	1.43	7371	4.11	1.59	1.62	0.56	1.06	0.257	3.04	0.25	2.79	0.683	0.53	2.21	0.38	0.38	0.721
7 RCCV	3606	7711	2.00	1.43	6425	3.00	1.66	1.65	0.55	1.10	0.274	2.13	0.31	1.83	0.456	0.77	1.79	0.60	0.60	0.721
Drywell	3613	7711	0.81	1.43	7321	0.99	1.59	0.67	0.55	0.12	0.029	0.73	0.00	0.73	0.179	0.91	1.00	0.16	0.16	0.721
Bottom	3624	7652	0.33	1.43	7421	2.71	1.59	0.27	0.12	0.15	0.036	2.01	0.02	1.99	0.507	0.13	5.95	0.08	0.07	0.721
8 RCCV	4006	8501	1.17	1.43	6365	1.54	1.64	0.96	0.80	0.16	0.039	1.11	0.53	0.58	0.144	0.87	1.51	0.28	0.27	0.270
Drywell	4013	7601	0.09	1.66	7111	0.54	1.59	0.06	0.06	0.00	0.000	0.40	0.00	0.40	0.098	0.15	1.00	0.00	0.00	0.270
Mid-Height	4976	7761	0.62	1.43	6701	0.31	1.59	0.51	0.42	0.09	0.023	0.23	0.23	0.00	0.000	2.20	1.81	1.00	1.00	0.270



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Table A-2.3 Calculation Results for Maximum Transverse Shear: RCCV (Continued)

Location	Element ID	NA3			DCD			NA3				DCD				Ratio (NA3/DCD)				Shear Tie Ratio (%)
		LOAD ID	Shear Force (MN/m) Q	d (m)	LOAD ID	Shear Force (MN/m) Q	d (m)	Shear Stress (MPa)			Shear Tie Ratio (%) required	Shear Stress (MPa)			Shear Tie Ratio (%) required	Shear Stress			Shear Tie Ratio	
								V _u	V _c	V _s		V _u	V _c	V _s		V _u	V _c	V _s		
9 RCCV Drywell Top	4406	7341	1.04	1.44	7461	1.73	1.61	0.86	0.32	0.53	0.131	1.26	0.00	1.26	0.319	0.68	1.00	0.42	0.41	0.540
	4413	7611	0.06	1.45	7621	1.76	1.59	0.05	0.05	0.00	0.000	1.30	0.64	0.67	0.163	0.04	0.08	0.00	0.00	0.540
	4424	8507	3.84	1.54	6341	1.52	1.61	2.95	2.32	0.63	0.156	1.11	0.90	0.21	0.052	2.66	2.57	3.04	3.00	0.540
10 Basemat @ Center	80003	6611	0.31	3.54	7941	0.92	3.54	0.10	0.10	0.00	0.000	0.31	0.86	0.00	0.000	0.34	0.12	1.00	1.00	0.179
	80007	6611	0.31	3.53	7941	1.00	3.53	0.10	0.10	0.00	0.000	0.33	0.91	0.00	0.000	0.31	0.11	1.00	1.00	0.179
	80012	6611	0.36	3.54	7941	1.12	3.53	0.12	0.12	0.00	0.000	0.37	0.99	0.00	0.000	0.32	0.12	1.00	1.00	0.179
11 Basemat Inside RPV Pedestal	80206	7431	3.68	4.63	7441	4.23	4.63	0.94	0.83	0.11	0.026	1.08	1.57	0.00	0.000	0.87	0.53	1.00	1.00	1.290
	80213	7481	3.61	4.61	7441	4.74	4.61	0.92	0.70	0.22	0.053	1.21	1.07	0.14	0.034	0.76	0.66	1.55	1.56	1.290
	80224	7481	3.18	4.65	7441	3.96	4.65	0.81	0.76	0.05	0.011	1.00	1.78	0.00	0.000	0.80	0.43	1.00	1.00	1.290
12 S/P Slab @ RPV	83306	6301	4.28	1.76	6301	4.27	1.76	2.87	0.78	2.09	0.505	2.86	0.78	2.09	0.504	1.00	1.00	1.00	1.00	1.140
	83313	6201	4.78	1.76	6201	4.77	1.76	3.20	0.75	2.46	0.594	3.20	0.75	2.45	0.593	1.00	1.00	1.00	1.00	1.140
	83324	6201	4.64	1.76	6201	4.64	1.76	3.11	0.73	2.38	0.576	3.11	0.73	2.38	0.574	1.00	1.00	1.00	1.00	1.140
13 S/P Slab @ Center	83406	1100	0.13	1.76	7231	1.86	1.73	0.07	0.07	0.00	0.000	1.26	0.61	0.65	0.160	0.06	0.12	0.00	0.00	0.263
	83413	1100	0.12	1.76	7172	1.96	1.76	0.07	0.07	0.00	0.000	1.32	0.65	0.67	0.162	0.05	0.10	0.00	0.00	0.263
	83424	1100	0.15	1.76	1100	0.16	1.76	0.09	0.09	0.00	0.000	0.09	0.09	0.00	0.000	0.97	0.97	1.00	1.00	0.263
14 S/P Slab @ RCCV	83506	6261	4.64	1.53	6261	4.82	1.53	3.58	0.76	2.83	0.683	3.72	0.73	2.99	0.736	0.96	1.03	0.95	0.93	1.010
	83513	6261	4.73	1.53	6361	6.00	1.53	3.65	0.72	2.93	0.722	4.63	0.76	3.87	0.958	0.79	0.94	0.76	0.75	1.010
	83524	6261	4.73	1.53	6261	4.76	1.53	3.65	0.75	2.90	0.701	3.67	0.72	2.95	0.728	0.99	1.05	0.98	0.96	1.010
15 Top slab @ Drywell Head Opening	98120	6361	1.83	1.95	6004	1.95	0.36	1.11	1.02	0.09	0.022	1.79	2.17	2.89	4.300	0.62	0.47	0.03	0.01	0.358
	98135	6501	0.37	1.95	6004	1.94	0.36	0.23	0.23	0.00	0.000	3.10	5.57	2.88	7.180	0.07	0.04	0.00	0.00	0.358
	98104	7361	1.07	1.73	7504	1.97	0.36	0.73	0.55	0.18	0.046	0.24	0.28	2.92	2.720	3.03	1.95	0.06	0.02	0.358
16 Top slab @ Center	98149	1200	0.33	2.00	7003	1.93	0.18	0.17	0.17	0.00	0.000	2.36	6.88	1.43	7.060	0.07	0.02	0.00	0.00	0.179
	98170	1100	0.23	1.95	7002	1.95	0.18	0.12	0.12	0.00	0.000	1.46	5.16	1.44	5.610	0.08	0.02	0.00	0.00	0.179
	98109	2000	0.14	1.95	7004	1.97	0.18	0.07	0.07	0.00	0.000	0.67	2.41	1.46	3.280	0.11	0.03	0.00	0.00	0.179
17 Top slab @ RCCV	98174	1100	0.22	1.97	7002	1.96	0.18	0.11	0.11	0.00	0.000	2.12	7.31	1.45	7.440	0.05	0.01	0.00	0.00	0.179
	98197	7331	1.71	1.82	6004	1.99	0.72	1.11	0.83	0.28	0.068	1.62	2.31	5.91	6.990	0.68	0.36	0.05	0.01	0.717
	98103	7521	2.45	1.79	7004	1.93	0.72	1.61	1.28	0.33	0.079	1.05	2.39	5.72	6.900	1.53	0.54	0.06	0.01	0.717