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DTE Energy

Detroit Edison

10 CFR 52.79

March 30, 2012
NRC3-12-0011

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

References:
1) Fermi 3
Docket No. 52-033
2) Letter from Jerry Hale (USNRC) to Jack M. Davis (Detroit Edison), "Request for Additional Information Letter No. 55 Related to the SRP Section 2.5.4 for the Fermi 3 Combined License Application," dated April 28, 2011
3) Letter from Peter W. Smith (Detroit Edison) to USRNC, "Detroit Edison Company Response to NRC Request for Additional Information Letter No. 55 and Submittal of Site-Specific Soil-Structure Interaction Analyses," dated June 17, 2011
4) Letter from Jerry Hale (USNRC) to Jack M. Davis (Detroit Edison), "Request for Additional Information Letter No. 70 Related to Chapters 2.0 and 3.0 for the Fermi 3 Combined License Application," dated January 18, 2012
5) Letter from Peter W. Smith (Detroit Edison) to USNRC, "Detroit Edison Company Response to NRC Request for Additional Information Letter No. 70," dated February 16, 2012

Subject: Detroit Edison Company Submittal of Revised Site-Specific Soil-Structure Interaction Analyses

In Reference 2, the NRC requested additional information to support the review of certain portions of the Fermi 3 Combined License Application (COLA). While developing responses to the Requests for Additional Information (RAIs) in Reference 2, RAIs 02.05.04-37 and 02.05.04-38, it was recognized that there is not a practical backfill design that would be satisfactory to NRC staff and would meet the DCD soil properties requirements. In the event that the general soil properties requirements cannot be met, the DCD allows the applicant to demonstrate the adequacy of the standard plant design by performing site-specific soil-structure interaction (SSI) analyses. In Reference 3, Detroit Edison submitted site-specific SSI analyses for the Fermi 3 site.

To address potential uncertainty in the subtraction method of the SASSI2000 code that was identified by the Defense Nuclear Facilities Safety Board, Detroit Edison initiated comparative SSI analyses utilizing the direct method. These analyses used the same seismic inputs as those

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used in the initial analyses. The results of these analyses for the Control Building (CB) were provided during the July 21, 2011, meeting with the staff, and the results for the Reactor Building/Fuel Building (RB/FB) were provided in the response to RAI 03.07.02-7 in Reference 5. For the Fermi 3 subsurface profile, the comparative analyses showed excellent agreement between the subtraction and direct methods.

As discussed with NRC staff at the July 21, 2011, public meeting, the soil column outcrop response (SCOR) foundation input response spectra (FIRS), an input into the site-specific SSI analyses, did not bound the performance-based surface response spectra (PBSRS) at all frequencies, as the guidance in Interim Staff Guidance DC/COL-ISG-017 suggests. While revising the site-specific seismic inputs to fully meet the applicable guidance, several other items were identified, including the Standard Review Plan (SRP) 3.7.1 non-conformance that was also identified in RAI 03.07.01-6, provided in Reference 4. The revisions to the seismic inputs were detailed in the response to RAI 03.07.01-6 in Reference 5, including markups to FSAR Subsection 3.7.1.

The revised site-specific SSI analyses have been completed, and the results are presented in Attachment 1 of this letter. In addition to using revised seismic inputs, the analyses were performed utilizing the direct method of the SASSI2000 code. The revised analyses show that Fermi 3 remains bounded by the DCD standard plant design with significant margin. The revised site-specific SSI analyses will be available for NRC audit in April 2012.

If you have any questions, or need additional information, please contact me at (313) 235-3341.

I state under penalty of perjury that the foregoing is true and correct. Executed on the 30th day of March 2012.

Sincerely,

Peter W. Smith, Director
Nuclear Development – Licensing and Engineering
Detroit Edison Company

Attachment: 1) COLA Markups Incorporating the Revised Site-Specific SSI Analyses

cc: Adrian Muniz, NRC Fermi 3 Project Manager
Jerry Hale, NRC Fermi 3 Project Manager
Michael Eudy, NRC Fermi 3 Project Manager (w/o attachments)
Bruce Olson, NRC Fermi 3 Environmental Project Manager (w/o attachments)
Fermi 2 Resident Inspector (w/o attachments)
NRC Region III Regional Administrator (w/o attachments)
NRC Region II Regional Administrator (w/o attachments)
Supervisor, Electric Operators, Michigan Public Service Commission (w/o attachments)
Michigan Department of Natural Resources and Environment
Radiological Protection Section (w/o attachments)

Attachment 1
NRC3-12-0011

COLA Markups Incorporating the
Revised Site-Specific SSI Analyses
(following 70 pages)

The following markup represents how Detroit Edison intends to reflect these changes in the next submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by responses to COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

The site-specific SSI analyses for the RB/FB and CB were performed using the direct method of the SASSI2000 computer program.

3.7.2 **Seismic System Analysis**

3.7.2.4 **Soil-Structure Interaction**

Add the following at the end of the first paragraph.

the same

EF3 SUP 3.7-4

This subsection of the Referenced DCD, including associated Appendix 3A in its entirety, is incorporated by reference with the following supplement for the Fermi 3 site-specific soil-structure interaction (SSI) analyses for the RB/FB and CB. The SSI analysis approach~~, model setup,~~ and ~~calibration of~~ the structural models are as presented in Appendix 3A of the Referenced DCD.

The FWSC is essentially a surface founded structure in the Referenced DCD, Subsection 3.7.1.1 and there are no embedded walls for the FWSC. Therefore, the Referenced DCD backfill requirements surrounding Seismic Category I structures are not applicable to FWSC embedded basemat (embedded 2.35 m (7.7 feet)). The FWSC is founded on fill concrete which meets the Referenced DCD requirements for backfill underneath Seismic Category I structures. Therefore, there is no site-specific SSI analysis performed for the FWSC.

Add the following subsections following Subsection 3.7.2.4.

3.7.2.4.1 **Fermi 3 Site-Specific Soil-Structure Interaction Analysis**

This subsection presents the Fermi 3 site-specific SSI analyses performed in accordance with SRP 3.7.2 for the Seismic Category I RB/FB and CB. The Fermi 3 site-specific foundation input response spectra (FIRS) developed in Subsection 2.5.2 is in accordance with Regulatory Guide 1.208. The Fermi 3 site-specific FIRS developed in Subsection 3.7.1 is in accordance with Regulatory Guide 1.208 and NRC Interim Staff Guidance (DC/COL-ISG-017) for ensuring hazard-consistent seismic input for site response and soil-structure interaction analyses. The Fermi 3 site-specific FIRS developed in Subsection 2.5.2 and Subsection 3.7.1 are fully enveloped, in all cases, by the ESBWR CSDRS as presented in Subsection 2.5.2.6.4 and Subsection 3.7.1.1.4.5, respectively. Therefore, the Fermi 3 site-specific SSI analyses were not performed to address an exceedance of the CSDRS by the FIRS; rather, the Fermi 3 site-specific SSI analyses were performed to address the following Fermi 3 site-specific conditions:

- Partial embedment in the Bass Islands Group bedrock of the RB/FB and CB Seismic Catagory I structures, as shown on Figure 2.5.4-202 and Figure 2.5.4-203, to confirm that the Referenced DCD design is applicable for this case.
- To demonstrate that the Referenced DCD requirements for the backfill surrounding Seismic Catagory I structures can be neglected for RB/FB and CB with the RB/FB and CB partially embedded in the bedrock at the Fermi 3 site.

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The Fermi 3 site-specific SSI analyses follow the same methodology used in the Referenced DCD for SSI analyses for the ESBWR Standard Plant using the SASSI2000 computer program. The SASSI2000 structural models are developed from the Referenced DCD lumped-mass stick models coupled with the Fermi 3 site-specific strain compatible dynamic subsurface properties developed in Subsection 3.7.1. In the SASSI2000 model for the Fermi 3 site-specific SSI analyses, the RB/FB and CB are modeled as partially embedded into the Bass Islands Group bedrock. The backfill above the top of the Bass Islands Group bedrock at Elevation 168.2 m (552.0 ft) NAVD 88 surrounding the RB/FB and CB was not included in the model. Therefore, the Fermi 3 site-specific SSI analyses do not take credit for the benefits provided by the backfill surrounding the RB/FB and CB. Fill concrete is used to backfill the gap between the RB/FB and CB and excavated bedrock up to the top of Bass Islands Group bedrock at Elevation 168.2 m (552.0 ft) NAVD 88. The gap between the RB/FB and the CB up to the top of the Bass Islands Group bedrock is also filled with fill concrete as shown on Figure 2.5.4-202 and Figure 2.5.4-203.

The site-specific SSI analyses results are presented and compared with the Referenced DCD seismic responses in the following subsections to confirm the applicability of the ESBWR Standard Plant for the RB/FB and CB. In addition, the foundation stability and the dynamic bearing pressure demands are evaluated in Subsection 3.8.5 for the RB/FB and CB based on the Fermi 3 site-specific SSI analyses results.

3.7.2.4.1.1 Strain Compatible Dynamic Subsurface Material Properties

The geology of the Fermi 3 site is discussed in detail in Subsection 2.5.1. The subsurface materials encountered and the engineering properties of subsurface materials at Fermi 3 site are discussed in detail in Subsection 2.5.4.

In accordance with SRP 3.7.2, three subsurface material profiles, a best estimate (BE) profile, a lower bound (LB) profile, and an upper bound (UB) profile, were developed and used in the SSI analyses to account for variability in the subsurface materials properties at the Fermi 3 site. The development of the Fermi 3 site-specific strain compatible dynamic subsurface material properties associated with the BE, LB, and UB profiles is discussed in Subsection 3.7.1.3. The strain compatible dynamic subsurface material properties of the BE, LB, and UB subsurface profiles used in the Fermi 3 site-specific SSI analyses are
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provided in Table 3.7.1-~~215~~ through Table 3.7.1-~~217~~. To demonstrate that the backfill surrounding the Seismic Category I RB/FB and CB above the top of the Bass Islands Group bedrock can be neglected, the BE, LB, and UB subsurface profiles used for the Fermi 3 SSI analyses do not include backfill that will be placed during construction above the Bass Islands Group bedrock at Elevation 168.2 m (552.0 ft) NAVD 88 to finished ground level grade at Elevation 179.6 m (589.3 ft) NAVD 88.

3.7.2.4.1.2 **FIRS Compatible Ground Motion Time HIstory**

Subsection 3.7.1.1.5 describes development of the Fermi 3 site-specific ground motion time histories used in the SSI analyses. The Fermi 3 site-specific SSI analyses used three orthogonal components (two horizontal and one vertical) of a single ground motion time history that were developed to be in-column motions at the bottom of RB/FB and CB basemat levels. The site-specific ground motion time histories are compatible with the SSI FIRS developed in Subsection 3.7.1 and are used as input motions applied at the bottom of RB/FB and CB basemat levels in the Fermi 3 site-specific SSI analyses.

3.7.2.4.1.3 **Soil-Structure Interaction Analysis Method**

INSERT A

~~The analysis method follows Referenced DCD Subsection 3A.5.2 for SSI analysis using the SASSI2000 computer program.~~ The SASSI2000 RB/FB and CB structural models are described in Subsection 3.7.2.4.1.4.

3.7.2.4.1.4 **Soil-Structure Interaction Analysis Structural Models**

The Fermi 3 site-specific SSI SASSI2000 structural models for the RB/FB and CB are constructed from the building stick models coupled with the

Insert A for Section 3.7.2.4.1.3

The Fermi 3 site-specific SSI analysis follows the methodology presented in DCD Section 3A.5.2 using the direct method of the SASSI2000 computer program. The SASSI2000 program uses finite elements with complex moduli for modeling the structure and foundation properties and is based on the frequency domain complex response method. The lumped mass-beam model described in DCD Section 3A.5.1 is coupled with the soil model using site-specific strain compatible dynamic subsurface properties in SASSI2000. Structural responses in terms of accelerations, forces, and moments are computed directly. Floor response spectra are obtained from the calculated response acceleration time histories.

The SSI analyses for the three directional ground motion time history components are performed separately. The maximum co-directional responses for each of the three ground motion time history components are combined using the algebraic sum in the time domain.

3.7.2.4.1.6 **Soil-Structure Interaction Analysis Results**

In the following subsections, the results of the Fermi 3 site-specific SSI analyses for the BE, LB, and UB subsurface profiles are presented and compared at key locations with the seismic design envelopes specified in Referenced DCD Subsection 3A.9 for maximum seismic structural loads and floor response spectra.

3.7.2.4.1.6.1 **SSI Enveloping Maximum Structural Loads**

For the RB/FB model, the enveloping seismic loads from the Fermi 3 site-specific SSI analyses based on the BE, LB, and UB subsurface profiles (herein called Fermi 3 site-specific SSI enveloping seismic loads) are presented in Table 3.7.2-203a through Table 3.7.2-203e.

The Fermi 3 site-specific SSI enveloping seismic loads for the RB/FB stick model are presented in Table 3.7.2-203a. The Fermi 3 site-specific SSI enveloping seismic loads are compared with the Referenced DCD enveloping seismic loads provided in Referenced DCD Table 3A.9-1a for
43 the RB/FB stick model. Table 3.7.2-203a also presents the percentage ratio of the Fermi 3 site-specific SSI enveloping seismic loads to the Referenced DCD enveloping seismic loads for the RB/FB stick model. Table 3.7.2-203a shows that the Fermi 3 site-specific SSI enveloping seismic loads for the RB/FB stick model are lower than the Referenced DCD enveloping seismic loads, with a maximum percentage ratio of approximately ~~55~~ percent. This indicates that the greatest Fermi 3 site-specific SSI enveloping seismic load is approximately ~~55~~ percent of the enveloping seismic loads used in the ESBWR Standard Plant for the RB/FB.

43 The Fermi 3 site-specific SSI enveloping seismic loads for the Reinforced Concrete Containment Vessel (RCCV) stick model are presented in Table 3.7.2-203b. The Fermi 3 site-specific SSI enveloping seismic loads are compared with the Referenced DCD enveloping seismic loads provided in Referenced DCD Table 3A.9-1b for the RCCV stick model. Table 3.7.2-203b also presents the percentage ratio of the Fermi 3 site-specific SSI enveloping seismic loads to the Referenced DCD enveloping seismic loads for the RCCV stick model. Table 3.7.2-203b shows that the Fermi 3 site-specific SSI enveloping seismic loads for the RCCV stick model are lower than the Referenced DCD enveloping seismic loads, with a maximum percentage ratio of approximately 45 percent. This indicates that the greatest Fermi 3 site specific SSI enveloping seismic load is

approximately 45 percent of the enveloping seismic loads used in the ESBWR Standard Plant for the RCCV.

The Fermi 3 site-specific SSI enveloping seismic loads for the Vent Wall/Pedestal stick model are presented in Table 3.7.2-203c. The Fermi 3 site-specific SSI enveloping seismic loads are compared with the Referenced DCD enveloping seismic loads provided in Referenced DCD Table 3A.9-1c for the Vent Wall/Pedestal stick model. Table 3.7.2-203c also presents the percentage ratio of the Fermi 3 site-specific SSI enveloping seismic loads to the Referenced DCD enveloping seismic loads for the Vent Wall/Pedestal stick model. Table 3.7.2-203c shows that the Fermi 3 site-specific SSI enveloping seismic loads for the Vent Wall/Pedestal stick model are lower than the Referenced DCD enveloping seismic loads, with a maximum percentage ratio of approximately ~~36~~ percent. This indicates that the greatest Fermi 3 site-specific SSI enveloping seismic load is approximately ~~36~~ percent of the enveloping seismic loads used in the ESBWR Standard Plant for the Vent Wall/Pedestal.

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The Fermi 3 site-specific SSI enveloping seismic loads for the Reactor Shield Wall (RSW) stick model are presented in Table 3.7.2-203d. The Fermi 3 site-specific SSI enveloping seismic loads are compared with the Referenced DCD enveloping seismic loads provided in Referenced DCD Table 3A.9-1d for the RSW stick model. Table 3.7.2-203d also presents the percentage ratio of the Fermi 3 site-specific SSI enveloping seismic loads to the Referenced DCD enveloping seismic loads for the RSW stick model. Table 3.7.2-203d shows that the Fermi 3 site-specific SSI enveloping seismic loads for the RSW stick model are lower than the Referenced DCD enveloping seismic loads, with a maximum percentage ratio of approximately 40 percent. This indicates that the greatest Fermi 3 site-specific SSI enveloping seismic load is approximately 40 percent of the enveloping seismic loads used in the ESBWR Standard Plant for the RSW.

The Fermi 3 site-specific SSI enveloping seismic loads for the Reactor Pressure Vessel (RPV) stick model are presented in Table 3.7.2-203e. The Fermi 3 site-specific SSI enveloping seismic loads are compared with the Referenced DCD SSI analysis enveloping seismic loads for the RPV stick model, which are not presented in the Referenced DCD. Table 3.7.2-203e presents the percentage ratio of the Fermi 3 site-specific SSI enveloping seismic loads to the Referenced DCD SSI analysis

56 enveloping seismic loads for the RPV stick model. Table 3.7.2-203e shows that the Fermi 3 site-specific SSI enveloping seismic loads for the RPV stick model are lower than the Referenced DCD SSI analysis enveloping seismic loads, with a maximum percentage ratio of approximately ~~60~~ percent. This indicates that the greatest Fermi 3 site-specific SSI enveloping seismic load is approximately ~~60~~ percent of the enveloping seismic loads actually used in the ESBWR Standard Plant for the RPV.

56 For the CB model, the Fermi 3 site-specific SSI enveloping seismic loads for CB stick model are presented in Table 3.7.2-204. The Fermi 3 site-specific SSI enveloping seismic loads are compared with the Referenced DCD enveloping seismic loads provided in Referenced DCD Table 3A.9-1f for the CB stick model. Table 3.7.2-204 also presents the percentage ratio of the Fermi 3 site-specific SSI enveloping seismic loads to the Referenced DCD enveloping seismic loads for the CB stick model. 46 Table 3.7.2-204 shows that the Fermi 3 site-specific SSI enveloping seismic loads for the CB stick model are lower than the Referenced DCD enveloping seismic loads, with a maximum percentage ratio of approximately ~~50~~ percent. This indicates that the greatest Fermi 3 site-specific SSI enveloping seismic load is approximately ~~50~~ percent of the enveloping seismic loads used in the ESBWR Standard Plant for the 46 CB.

The vertical loads are expressed in terms of enveloping absolute acceleration. For the RB/FB model, the enveloping maximum vertical acceleration from Fermi 3 site-specific SSI analyses based on the BE, LB, and UB subsurface profiles (herein called Fermi 3 site-specific SSI enveloping maximum vertical accelerations) are presented in Table 3.7.2-205a through Table 3.7.2-205e.

The Fermi 3 site-specific SSI enveloping maximum vertical accelerations for the RB/FB stick model are presented in Table 3.7.2-205a. The Fermi 3 site-specific SSI enveloping maximum vertical accelerations are compared with the Referenced DCD enveloping maximum vertical accelerations provided in Referenced DCD Table 3A.9-3a for the RB/FB stick model. Table 3.7.2-205a also presents the percentage ratio of the Fermi 3 site-specific SSI enveloping maximum vertical accelerations to the Referenced DCD enveloping maximum vertical accelerations for the RB/FB stick model. Table 3.7.2-205a shows that the Fermi 3 site-specific SSI enveloping maximum vertical accelerations for the RB/FB stick model are lower than the Referenced DCD enveloping maximum vertical accelerations, with a maximum percentage ratio of approximately ~~36~~ 39 percent. This indicates that the greatest Fermi 3 site-specific SSI enveloping maximum vertical acceleration is approximately ~~36~~ 39 percent of the enveloping maximum vertical acceleration used in the ESBWR Standard Plant for the RB/FB.

The Fermi 3 site-specific SSI enveloping maximum vertical accelerations for the RCCV stick model are presented in Table 3.7.2-205b. The Fermi 3 site-specific SSI enveloping maximum vertical accelerations are compared with the Referenced DCD enveloping maximum vertical accelerations provided in Referenced DCD Table 3A.9-3b for the RCCV stick model. Table 3.7.2-205b also presents the percentage ratio of the Fermi 3 site-specific SSI enveloping maximum vertical accelerations to the Referenced DCD enveloping maximum vertical accelerations for the RCCV stick model. Table 3.7.2-205b shows that the Fermi 3 site-specific SSI enveloping maximum vertical accelerations for the RCCV stick model are lower than the Referenced DCD enveloping maximum vertical accelerations, with a maximum percentage ratio of approximately ~~33~~ 36 percent. This indicates that the greatest Fermi 3 site-specific SSI enveloping maximum vertical acceleration is approximately ~~33~~ 36 percent of the enveloping maximum vertical acceleration used in the ESBWR Standard Plant for the RCCV.

The Fermi 3 site-specific SSI enveloping maximum vertical accelerations for the Vent Wall/Pedestal stick model are presented in Table 3.7.2-205c. The Fermi 3 site-specific SSI enveloping maximum vertical accelerations are compared with the Referenced DCD enveloping maximum vertical accelerations provided in Referenced DCD Table 3A.9-3c for the Vent Wall/Pedestal stick model. Table 3.7.2-205c also presents the percentage ratio of the Fermi 3 site-specific SSI enveloping maximum vertical accelerations to the Referenced DCD enveloping maximum vertical accelerations for the Vent Wall/Pedestal stick model. Table 3.7.2-205c shows that the Fermi 3 site-specific SSI enveloping maximum vertical accelerations for the Vent Wall/Pedestal stick model are lower than the Referenced DCD enveloping maximum vertical accelerations, with a maximum percentage ratio of approximately ~~34~~ 38 percent. This indicates that the greatest Fermi 3 site-specific SSI enveloping maximum vertical acceleration is approximately ~~34~~ 38 percent of the enveloping maximum vertical acceleration used in the ESBWR Standard Plant for the Vent Wall/Pedestal.

The Fermi 3 site-specific SSI enveloping maximum vertical accelerations for the RSW stick model are presented in Table 3.7.2-205d. The Fermi 3 site-specific SSI enveloping maximum vertical accelerations are compared with the Referenced DCD enveloping maximum vertical accelerations provided in Referenced DCD Table 3A.9-3d for the RSW stick model. Table 3.7.2-205d also presents the percentage ratio of the Fermi 3 site-specific SSI enveloping maximum vertical accelerations to the Referenced DCD enveloping maximum vertical accelerations for the RSW stick model. Table 3.7.2-205d shows that the Fermi 3 site-specific SSI enveloping maximum vertical accelerations for the RSW stick model are lower than the Referenced DCD enveloping maximum vertical accelerations, with a maximum percentage ratio of approximately ~~32~~ 36 percent. This indicates that the greatest Fermi 3 site-specific SSI enveloping maximum vertical acceleration is approximately ~~32~~ 36 percent of the enveloping maximum vertical acceleration used in the ESBWR Standard Plant for the RSW.

The Fermi 3 site-specific SSI enveloping maximum vertical accelerations for the RB/FB Flexible Slab Oscillators are presented in Table 3.7.2-205e. The Fermi 3 site-specific SSI enveloping maximum vertical accelerations are compared with the Referenced DCD enveloping maximum vertical accelerations provided in Referenced DCD Table 3A.9-3e for the RB/FB Flexible Slab Oscillators. Table 3.7.2-205e also presents the percentage ratio of the Fermi 3 site-specific SSI enveloping maximum vertical accelerations to the Referenced DCD enveloping maximum vertical accelerations for the RB/FB Flexible Slab Oscillators. Table 3.7.2-205e shows that the Fermi 3 site-specific SSI enveloping maximum vertical accelerations for the RB/FB Flexible Slab Oscillators are lower than the Referenced DCD enveloping maximum vertical accelerations, with a maximum percentage ratio of approximately ~~42~~ 55 percent. This indicates that the greatest Fermi 3 site-specific SSI enveloping maximum vertical acceleration is approximately ~~42~~ 55 percent of the enveloping maximum vertical acceleration used in the ESBWR Standard Plant for the RB/FB Flexible Slab Oscillators.

For the CB stick model, the Fermi 3 site-specific SSI enveloping maximum vertical accelerations are presented in Table 3.7.2-206. The Fermi 3 site-specific SSI enveloping maximum vertical accelerations for

the CB stick model are presented in Table 3.7.2-206. The SSI enveloping maximum vertical accelerations are compared with the Referenced DCD enveloping maximum vertical accelerations provided in Referenced DCD Table 3A.9-3g for the CB stick model. Table 3.7.2-206 also presents the percentage ratio of the Fermi 3 site-specific SSI enveloping maximum vertical accelerations to the Referenced DCD enveloping maximum vertical accelerations for the CB stick model. Table 3.7.2-206 shows that
48 the Fermi 3 site-specific SSI enveloping maximum vertical accelerations for the CB stick model are lower than the Referenced DCD enveloping maximum vertical accelerations, with a maximum percentage ratio of approximately ~~50~~ percent. This indicates that the greatest Fermi 3
48 site-specific SSI enveloping maximum vertical acceleration is approximately ~~50~~ percent of the enveloping maximum vertical acceleration used in the ESBWR Standard Plant for the CB.

3.7.2.4.1.6.2 **Comparison of the Site-Specific SSI Floor Response Spectra**

The site-specific floor response spectra for the BE, LB, and UB subsurface profiles are compared with the enveloping floor response spectra at 5 percent damping in Referenced DCD Subsection 3A.9.2.

For the RB/FB model, the floor response spectra at 5 percent damping obtained from Fermi 3 site-specific SSI analyses for the BE, LB, and UB subsurface profiles (herein called Fermi 3 site-specific SSI floor response spectra at 5 percent damping) are shown on Figure 3.7.2-207a through Figure 3.7.2-207f for the X-direction, on Figure 3.7.2-208a through Figure 3.7.2-208f for the Y-direction, and on Figure 3.7.2-209a through Figure 3.7.2-209f for the vertical direction. The Fermi 3 site-specific SSI floor response spectra at 5 percent damping are compared with the Referenced DCD Subsection 3A.9.2 enveloping floor response spectra at 5 percent damping on Figure 3.7.2-207a through Figure 3.7.2-209f (solid black lines). The Fermi 3 site-specific SSI floor response spectra at 5 percent damping at the locations presented in the Referenced DCD, Subsection 3A.9.2 for the RB/FB model are considerably lower than the DCD enveloping floor response spectra at 5 percent damping, indicating that the ESBWR Standard Plant for the RB/FB is acceptable at the Fermi 3 site.

For the CB model, Fermi 3 site-specific SSI floor response spectra at 5 percent damping are shown on Figure 3.7.2-210a and Figure 3.7.2-210b for the X-direction, on Figure 3.7.2-211a and Figure 3.7.2-211b for the

Based on the Fermi 3 site-specific SSI analyses, the following conclusions apply to the Fermi 3 site:

- The Referenced DCD standard plant design (ESBWR Standard Plant) is applicable to the RB/FB and CB Seismic Category I structures at the Fermi 3 site with partial embedment into bedrock and neglecting the contribution of the surrounding backfill.
- The DCD backfill requirements for the backfill above the top of the Bass Islands Group bedrock (Elevation 168.2 m [552 ft] NAVD 88) that surrounds the embedded walls of the Fermi 3 Seismic Category I structures are shown to be unnecessary. Therefore, the backfill above the top of the Bass Islands Group bedrock is not Seismic Category I backfill.

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- The following Fermi 3 site-specific SSI dynamic responses using the SSI FIRS and the BE, LB, and UB subsurface profiles are less than the corresponding dynamic responses in the referenced DCD using the CSDRS:

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  - o Fermi 3 site-specific SSI enveloping seismic loads are less than the Referenced DCD enveloping seismic loads. The Fermi 3 site-specific SSI enveloping seismic loads are a maximum of 60 and 60 percent of the Referenced DCD values for the RB/FB and CB, respectively.

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  - o Fermi 3 site-specific SSI enveloping maximum vertical accelerations are less than the Referenced DCD enveloping maximum vertical accelerations. The Fermi 3 site-specific SSI enveloping maximum vertical accelerations are a maximum of 42 and 60 percent of the Referenced DCD values for the RB/FB and CB, respectively.
  - o Fermi 3 site-specific SSI floor response spectra are considerably less than the Referenced DCD enveloping floor response spectra at the same locations.

- The Fermi 3 site-specific foundation stability (sliding and overturning) evaluation was performed without taking credit for the backfill located above the top of the Bass Islands Group bedrock that surrounds the embedded walls of the RB/FB and CB, and by neglecting the side frictional resistance along the sides of the basemats and the shear keys beneath the basemats. The Fermi 3 site-specific foundation stability evaluation demonstrated that the minimum Fermi 3

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site-specific factors of safety for sliding and overturning for the RB/FB and CB are ~~3.09~~ for sliding and ~~1,029~~ for overturning (presented in Subsection 3.8.5).

- The Fermi 3 RB/FB and CB are stable against floatation with a minimum factor of safety of 1.85 (presented in Subsection 3.8.5).
- The dynamic bearing demands from the Fermi 3 site-specific SSI analyses are considerably below the allowable dynamic bearing capacities for the Bass Islands Group bedrock at the Fermi 3 site (presented in Subsection 3.8.5).

3.7.2.8 Interaction of Non-Category I Structures with Seismic Category I Structures

Add the following at the end of this section.

EF3 SUP 3.7-5 The locations of structures are provided in Figure 2.1-204. Non-Category I structures within the scope of the DCD are addressed in the DCD. Non-Category I structures outside the scope of the DCD are located at least a distance of its height above grade from Seismic Category I structures. Thus, the collapse of any site specific non-Category I structure, system, or component will not cause the non-Category I structure, system, or component to strike a Seismic Category I structure, system, or component.

For the Seismic Category II structures and Radwaste Building, Fermi 3 site-specific analyses will be performed if the Referenced DCD backfill requirements are not met.

3.7.2.14 Determination of Seismic Category I Structure Overturning Moments

Add the following at the end of the Subsection 3.7.2.14.

The Fermi 3 site-specific stability evaluation against overturning is presented in Subsection 3.8.5.

Table 3.7.2-203a Ratio with DCD Enveloping Seismic Loads: RB/FB Stick model [EF3 SUP 3.7-4]

Elev. (m)	Elem No.	Node No.	Fermi 3 SSI Enveloping Seismic Loads: Shear X-Dir. (MN)	Shear Y-Dir. (MN)	Moment X-Dir. (MN-m)	Moment Y-Dir. (MN-m)	Torsion (MN-m)	Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads): Shear X-Dir.	Shear Y-Dir.	Moment X-Dir.	Moment Y-Dir.	Torsion
52.40 *	1110	110			904.0	915.4				55%	51%	
		109	60.8	70.2	1968.1	2035.5	552.8	40%	44%	46%	46%	40%
34.00	1109	109			2683.6	2694.0				48%	49%	
		108	67.7	61.1	2938.7	2956.9	812.3	35%	40%	45%	47%	34%
27.00	1108	108			3223.2	3354.1				42%	47%	
		107	155.0	143.7	3430.6	3807.8	1257.6	36%	36%	38%	44%	38%
22.50	1107	107			3722.4	4062.0				38%	44%	
		106	173.3	164.1	4407.7	4600.7	2267.1	36%	35%	38%	41%	37%
17.50	1106	106			4832.7	[illegible]				39%	41%	
		105	185.9	192.1	5422.2	[illegible]	[illegible]	35%	35%	39%	38%	39%
13.57	1105	105			5640.4	[illegible]				39%	38%	
		104	196.0	203.3	6320.8	[illegible]	[illegible]	34%	34%	38%	36%	41%
9.06	1104	104			6485.3	6186.0				38%	36%	
		103	211.6	213.4	7135.0	6737.9	2387.5	35%	33%	37%	34%	40%
4.65	1103	103			4685.8	3955.3				25%	20%	
		102	253.4	213.7	5608.5	4661.0	2872.2	30%	25%	24%	19%	25%
-1.00	1102	102			5720.4	4941.8				24%	20%	
		101	279.3	239.5	7017.3	5735.0	3184.9	32%	26%	25%	20%	28%
-6.40	1101	101			5137.1	4489.2				18%	15%	
-11.50		2	133.3	113.8	5338.8	4541.8	1957.5	14%	11%	17%	13%	17%

Replace Tables 3.7.2-203a through 3.7.2-206 with the following tables

Note: Total torsional moments are obtained by the absolute sum of the accidental torsional moments and the values of the geometric torsional moments shown. The accidental torsional moment is the product of the horizontal force component and an eccentricity of 5% of the larger horizontal dimension at various elevations.

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

MN = Mega Newton; MN-m = Mega Newton-meter; m = meter

Table 3.7.2-203a Ratio with DCD Enveloping Seismic Loads: RB/FB Stick

Elev. (m)	Elem No.	Node No.	Fermi 3 SSI Enveloping Seismic Loads: Shear X-Dir. (MN)	Shear Y-Dir. (MN)	Moment X-Dir. (MN-m)	Moment Y-Dir. (MN-m)	Torsion (MN-m)	Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads): Shear X-Dir.	Shear Y-Dir.	Moment X-Dir.	Moment Y-Dir.	Torsion
52.40 *	1110	110			701.5	703.7				43%	39%	
		109	63.1	59.8	1612.6	1653.9	441.2	42%	38%	37%	37%	32%
34.00	1109	109			2108.3	2171.5				38%	39%	
		108	73.4	59.7	2571.8	2557.2	665.0	38%	39%	40%	40%	28%
27.00	1108	108			2869.6	2958.5				37%	42%	
		107	177.4	137.8	3530.0	3493.0	1287.9	42%	34%	39%	41%	39%
22.50	1107	107			3853.5	3745.0				39%	41%	
		106	198.2	156.6	4719.7	4380.4	2433.8	41%	34%	41%	39%	40%
17.50	1106	106			5109.0	4580.2				41%	38%	
		105	206.6	186.0	5853.9	5137.2	2061.2	39%	33%	42%	37%	41%
13.57	1105	105			6078.0	5279.5				43%	37%	
		104	216.2	196.7	6977.0	5950.8	2176.5	38%	33%	42%	36%	41%
9.06	1104	104			7129.7	6069.0				42%	35%	
		103	233.0	205.5	8039.8	6751.4	2368.5	38%	31%	41%	34%	40%
4.65	1103	103			5255.2	3920.8				28%	19%	
		102	259.2	188.8	6511.3	4584.7	2882.3	31%	22%	28%	19%	25%
-1.00	1102	102			6764.6	4940.4				29%	20%	
		101	279.1	208.8	8107.4	5654.3	3209.1	32%	22%	29%	19%	28%
-6.40	1101	101			4766.1	3592.4				17%	12%	
-11.50		2	122.2	96.7	5286.3	3743.2	1861.8	13%	9%	16%	11%	16%

Note: Total torsional moments are obtained by the absolute sum of the accidental torsional moments and the values of the geometric torsional moments shown. The accidental torsional moment is the product of the horizontal force component and an eccentricity of 5% of the larger horizontal dimension at various elevations.

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

MN = Mega Newton; MN-m = Mega Newton-meter; m = meter

Table 3.7.2-203b Ratio with DCD Enveloping Seismic Loads: RCCV Stick

			Fermi 3 SSI Enveloping Seismic Loads					Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads)				
			Shear		Moment			Shear		Moment		
Elev. (m)	Elem No.	Node No.	X-Dir. (MN)	Y-Dir. (MN)	X-Dir. (MN-m)	Y-Dir. (MN-m)	Torsion (MN-m)	X-Dir.	Y-Dir.	X-Dir.	Y-Dir.	Torsion
34.00	1209	209			67.0	163.5				34%	28%	
		208	61.6	67.5	433.4	591.0	10.0	45%	37%	41%	40%	28%
27.00	1208	208			573.8	899.5				34%	36%	
		206	70.5	80.5	1114.7	1591.8	752.3	43%	32%	38%	36%	41%
17.50	1206	206			1206.3	1743.0				36%	37%	
		205	93.8	81.8	1507.7	2024.7	815.3	41%	28%	36%	35%	41%
13.57	1205	205			1546.5	2110.4				36%	35%	
		204	102.9	88.4	1956.1	2446.1	910.8	39%	27%	36%	34%	42%
9.06	1204	204			1999.4	2550.5				36%	34%	
		203	110.0	97.0	2438.3	2879.2	1040.5	36%	27%	36%	32%	40%
4.65	1203	203			2554.6	3005.1				37%	33%	
		202	57.4	54.7	2829.0	3189.3	773.9	25%	19%	36%	30%	27%
-1.00	1202	202			2948.6	3345.5				37%	31%	
		201	78.0	69.8	3311.9	3717.9	813.7	29%	21%	35%	30%	28%
-6.40	1201	201			3387.7	3766.1				36%	30%	
-11.50		2	29.3	23.8	3472.4	3857.5	312.5	11%	8%	32%	27%	16%

Note: Total torsional moments are obtained by the absolute sum of the accidental torsional moments and the values of the geometric torsional moments shown. The accidental torsional moment is the product of the horizontal force component and an eccentricity of 5% of the larger horizontal dimension at various elevations.

MN = Mega Newton; MN-m = Mega Newton-meter; m = meter

Table 3.7.2-203c Ratio with DCD Enveloping Seismic Loads: Vent Wall/Pedestal Stick

			Fermi 3 SSI Enveloping Seismic Loads					Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads)				
			Shear		Moment			Shear		Moment		
Elev. (m)	Elem No.	Node No.	X-Dir. (MN)	Y-Dir. (MN)	X-Dir. (MN-m)	Y-Dir. (MN-m)	Torsion (MN-m)	X-Dir.	Y-Dir.	X-Dir.	Y-Dir.	Torsion
17.50	701	701			22.9	18.1				30%	21%	
		702	6.5	6.7	26.0	21.4	12.4	19%	18%	23%	16%	11%
14.50	702	702			28.0	27.8				24%	19%	
		703	7.4	6.4	34.5	40.6	13.1	20%	16%	15%	16%	11%
11.50	703	703			38.5	43.2				17%	16%	
		704	8.1	7.1	52.0	60.0	14.0	22%	17%	15%	15%	12%
8.50	704	704			53.7	61.7				16%	16%	
		705	8.9	7.3	60.1	68.6	14.3	24%	16%	16%	16%	12%
7.4625	705	705			65.4	58.0				18%	13%	
		706,303	5.6	4.8	75.2	68.9	7.2	14%	12%	16%	13%	7%
4.65	1303	303			163.8	148.7				28%	24%	
		377	12.0	10.8	176.9	167.9	38.2	37%	24%	30%	25%	27%
2.4165	1377	377			218.2	206.2				30%	25%	
		302	17.6	15.9	246.3	262.5	46.4	36%	24%	32%	28%	27%
-1.00	1302	302			228.3	237.0				27%	25%	
		376	23.1	20.1	257.9	266.8	40.6	35%	25%	28%	25%	28%
-2.75	1376	376			258.0	266.8				28%	25%	
		301	23.3	20.2	326.4	334.3	40.6	35%	25%	29%	25%	28%
-6.40	1301	301			307.9	332.5				27%	25%	
-11.50		2	11.1	8.5	348.3	362.4	18.8	11%	7%	21%	18%	16%

Note: Total torsional moments are obtained by the absolute sum of the accidental torsional moments and the values of the geometric torsional moments shown. The accidental torsional moment is the product of the horizontal force component and an eccentricity of 5% of the larger horizontal dimension at various elevations.
MN = Mega Newton; MN-m = Mega Newton-meter; m = meter

Table 3.7.2-203d Ratio with DCD Enveloping Seismic Loads: RSW Stick

			Fermi 3 SSI Enveloping Seismic Loads					Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads)				
			Shear		Moment			Shear		Moment		
Elev. (m)	Elem No.	Node No.	X-Dir. (MN)	Y-Dir. (MN)	X-Dir. (MN-m)	Y-Dir. (MN-m)	Torsion (MN-m)	X-Dir.	Y-Dir.	X-Dir.	Y-Dir.	Torsion
24.18	707	707			0.61	0.68				29%	40%	
			0.84	0.67	3.94	3.34	0.15	28%	25%	30%	27%	37%
20.20	708	708			5.91	5.65				32%	34%	
			4.86	3.17	26.45	17.01	0.51	33%	26%	33%	25%	37%
15.775	709	709			27.63	17.74				34%	25%	
			5.30	3.50	51.21	32.71	0.72	31%	24%	32%	24%	38%
11.35	710	710			51.56	32.83				32%	24%	
			5.49	4.14	72.11	47.27	0.74	28%	25%	31%	24%	31%
7.4625	711	711			61.40	53.29				31%	29%	
			14.43	12.48	86.62	83.18	7.59	35%	35%	30%	33%	32%
4.65	712	712			34.94	30.29				28%	23%	
			5.26	4.63	40.46	38.19	8.17	37%	24%	30%	25%	27%
2.4165	713	713			1.18	1.02				33%	32%	
			0.44	0.37	0.97	0.86	0.06	29%	29%	33%	32%	24%
1.96	714	714			0.90	0.75				33%	32%	
-0.80		715	0.29	0.23	0.18	0.14	0.03	33%	31%	34%	27%	25%

Note: Total torsional moments are obtained by the absolute sum of the accidental torsional moments and the values of the geometric torsional moments shown. The accidental torsional moment is the product of the horizontal force component and an eccentricity of 5% of the larger horizontal dimension at various elevations.

MN = Mega Newton; MN-m = Mega Newton-meter; m = meter

Table 3.7.2-203e Ratio with DCD Enveloping Seismic Loads: RPV Stick (Sheet 1 of 7)

			Fermi 3 SSI Enveloping Seismic Loads				Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads)			
			Shear		Moment		Shear		Moment	
Elev. (m)	Elem No.	Node No.	X-Dir. (MN)	Y-Dir. (MN)	X-Dir. (MN-m)	Y-Dir. (MN-m)	X-Dir.	Y-Dir.	X-Dir.	Y-Dir.
27.64	801	801			0.0	0.0				
26.792		802	0.2	0.1	0.2	0.1	37%	25%	37%	25%
26.792	802	802			0.2	0.1			37%	25%
25.944		803	0.6	0.4	0.7	0.4	37%	25%	37%	25%
25.944	803	803			0.7	0.4			37%	25%
25.03		804	1.2	0.7	1.8	1.1	37%	24%	37%	25%
25.03	804	804			1.8	1.1			37%	25%
24.3188		805	1.5	1.0	2.9	1.8	35%	23%	36%	24%
24.3188	805	805			2.9	1.8			36%	24%
22.276		806	2.2	1.4	7.4	4.6	36%	23%	36%	24%
22.276	806	806			7.4	4.6			36%	24%
21.8247		807	3.0	1.8	8.7	5.5	37%	23%	36%	24%
21.8247	807	807			8.7	5.5			36%	24%
20.2		808	3.3	2.0	14.1	8.7	37%	23%	36%	23%
20.2	808	808			14.1	8.7			36%	23%
19.5278		809	1.1	0.7	14.8	9.1	30%	23%	36%	24%
19.5278	809	809			14.8	9.1			36%	24%
17.2677		810	1.8	1.0	18.8	11.0	35%	25%	37%	24%
17.2677	810	810			18.8	11.0			37%	24%
16.365		811	2.2	1.5	20.7	12.1	36%	29%	37%	24%
16.365	811	811			20.7	12.1			37%	24%
14.51		812	3.9	2.2	27.2	16.0	43%	28%	40%	25%

Table 3.7.2-203e Ratio with DCD Enveloping Seismic Loads: RPV Stick (Sheet 2 of 7)

Elev. (m)	Elem No.	Node No.	Fermi 3 SSI Enveloping Seismic Loads: Shear X-Dir. (MN)	Shear Y-Dir. (MN)	Moment X-Dir. (MN-m)	Moment Y-Dir. (MN-m)	Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads): Shear X-Dir.	Shear Y-Dir.	Moment X-Dir.	Moment Y-Dir.
14.51	812	812			27.2	16.0			40%	25%
12.491		813	3.6	2.2	34.1	20.3	37%	27%	40%	26%
12.491	813	813			34.1	20.3			40%	26%
10.472		814	3.5	2.3	40.4	24.2	34%	30%	39%	27%
10.472	814	814			40.4	24.2			39%	27%
8.453		815	4.2	2.8	45.0	28.2	41%	31%	36%	26%
8.453	815	815			31.8	23.0			44%	38%
7.8071		816	5.6	4.0	28.1	20.6	44%	35%	44%	38%
7.8071	816	816			28.1	20.6			44%	38%
7.111		817	5.6	3.7	24.1	18.1	44%	33%	44%	38%
7.111	817	817			24.1	18.1			44%	38%
6.401		818	5.5	3.3	20.4	15.7	45%	30%	43%	39%
6.401	818	818			20.4	15.7			43%	39%
5.691		819	5.3	3.0	17.4	13.4	45%	28%	42%	40%
5.691	819	819			17.4	13.4			42%	40%
4.981		820	5.3	2.8	15.4	11.5	47%	27%	42%	42%
4.981	820	820			15.4	11.5			42%	42%
4.2713		821	4.9	2.7	13.4	9.8	46%	27%	41%	44%
4.2713	821	821			13.4	9.8			41%	44%
3.7593		822	4.7	2.6	12.4	8.6	47%	27%	41%	41%
3.7593	822	822			12.4	8.6			41%	41%
3.215		823	4.6	2.5	11.6	7.7	48%	27%	42%	38%

Table 3.7.2-203e Ratio with DCD Enveloping Seismic Loads: RPV Stick (Sheet 3 of 7)

			Fermi 3 SSI Enveloping Seismic Loads				Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads)			
			Shear		Moment		Shear		Moment	
Elev. (m)	Elem No.	Node No.	X-Dir. (MN)	Y-Dir. (MN)	X-Dir. (MN-m)	Y-Dir. (MN-m)	X-Dir.	Y-Dir.	X-Dir.	Y-Dir.
3.215	823	823			11.6	7.7			42%	38%
2.365		824	4.5	2.4	11.3	6.6	49%	26%	46%	31%
2.365	824	824			3.4	2.8			40%	43%
1.785		825	2.4	1.8	2.1	1.7	41%	41%	40%	43%
1.785	825	825			2.1	1.7			40%	43%
1.2		826	2.1	1.7	0.8	0.7	42%	43%	39%	38%
1.2	826	826			0.8	0.7			39%	38%
0.7657		827	1.9	1.5	0.2	0.2	43%	44%	38%	35%
0.7657	827	827			0.2	0.2			35%	36%
-0.1315		828	1.4	1.1	1.4	1.0	44%	46%	45%	49%
8.453	871	815			56.0	43.5			39%	32%
7.4625		711	8.7	7.2	56.4	43.4	47%	40%	40%	32%
21.8247	828	829			0.0	0.0				
20.2		830	0.1	0.1	0.2	0.1	29%	17%	29%	17%
20.2	829	830			0.2	0.1			29%	17%
19.5278		831	0.3	0.2	0.7	0.4	33%	20%	56%	26%
19.5278	830	831			0.7	0.4			56%	26%
17.2677		832	0.4	0.2	1.3	0.6	34%	15%	32%	15%
17.2677	831	832			1.3	0.6			32%	15%
16.365		833	0.5	0.2	1.7	0.8	35%	14%	32%	15%
16.365	832	833			1.7	0.8			32%	15%
14.51		834	2.2	1.2	4.1	2.3	44%	24%	44%	23%

Table 3.7.2-203e Ratio with DCD Enveloping Seismic Loads: RPV Stick (Sheet 4 of 7)

Elev. (m)	Elem No.	Node No.	Fermi 3 SSI Enveloping Seismic Loads: Shear X-Dir. (MN)	Shear Y-Dir. (MN)	Moment X-Dir. (MN-m)	Moment Y-Dir. (MN-m)	Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads): Shear X-Dir.	Shear Y-Dir.	Moment X-Dir.	Moment Y-Dir.
14.51	833	834			4.1	2.3			44%	23%
12.491		835	1.6	0.7	6.9	3.5	52%	22%	47%	24%
12.491	834	835			6.9	3.5			47%	24%
10.472		836	0.6	0.5	8.1	3.9	38%	23%	50%	23%
10.472	835	836			8.1	3.9			50%	23%
8.453		837	1.3	0.9	6.1	2.5	50%	42%	42%	17%
8.453	836	837			6.1	2.5			42%	17%
7.8071		838	1.7	1.0	5.2	2.5	46%	32%	39%	17%
7.8071	837	838			5.2	2.5			39%	17%
7.111		839	1.9	1.2	4.3	2.2	48%	30%	38%	17%
7.111	838	839			4.3	2.2			38%	17%
6.401		840	2.2	1.2	3.6	2.4	49%	26%	34%	22%
6.401	839	840			3.6	2.4			34%	22%
5.691		841	2.5	1.2	2.9	2.6	49%	24%	28%	25%
5.691	840	841			2.9	2.6			28%	25%
4.981		842	2.8	1.2	3.8	2.8	50%	22%	41%	26%
4.981	841	842			3.8	2.8			41%	26%
4.2713		843	3.5	1.3	4.9	3.1	55%	23%	44%	29%
4.2713	842	843			4.9	3.1			44%	29%
3.7593		844	3.5	1.4	6.2	3.6	54%	23%	45%	29%
3.7593	843	844			6.2	3.6			45%	29%
3.215		845	3.1	1.7	7.3	3.8	44%	26%	45%	27%

Table 3.7.2-203e Ratio with DCD Enveloping Seismic Loads: RPV Stick (Sheet 5 of 7)

			Fermi 3 SSI Enveloping Seismic Loads				Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads)			
			Shear		Moment		Shear		Moment	
Elev. (m)	Elem No.	Node No.	X-Dir. (MN)	Y-Dir. (MN)	X-Dir. (MN-m)	Y-Dir. (MN-m)	X-Dir.	Y-Dir.	X-Dir.	Y-Dir.
3.215	844	845			7.3	3.8			45%	27%
2.365		846	3.2	1.7	10.2	4.6	44%	24%	48%	27%
0.7657	859	827			0.1	0.0			30%	18%
-0.788		861	0.1	0.1	0.1	0.1	43%	32%	41%	36%
-0.788	861	861			0.1	0.1			41%	36%
-1.443		863	0.0	0.0	0.1	0.1	37%	25%	45%	39%
-1.443	863	863			0.1	0.1			45%	39%
-2.098		865	0.0	0.0	0.1	0.1	37%	26%	52%	33%
-2.098	865	865			0.1	0.1			52%	33%
-2.753		867	0.1	0.1	0.1	0.1	36%	27%	51%	30%
-2.753	867	867			0.1	0.1			51%	30%
-3.4715		869	0.1	0.1	0.0	0.0	50%	31%	51%	29%
-3.4715	869	869			0.0	0.0			51%	29%
-4.2237		871	0.1	0.0	0.0	0.0	51%	29%	0%	0%
7.896	845	847			0.0	0.0				
7.8071		848	0.4	0.6	0.0	0.1	35%	52%	35%	52%
7.8071	846	848			0.0	0.1			35%	52%
7.111		849	0.4	0.6	0.3	0.4	41%	54%	40%	53%
7.111	847	849			0.3	0.4			40%	53%
6.401		850	0.3	0.3	0.5	0.7	45%	53%	42%	54%
6.401	848	850			0.5	0.7			42%	54%
5.691		851	0.1	0.1	0.5	0.7	47%	37%	42%	53%

Table 3.7.2-203e Ratio with DCD Enveloping Seismic Loads: RPV Stick (Sheet 6 of 7)

			Fermi 3 SSI Enveloping Seismic Loads				Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads)			
			Shear		Moment		Shear		Moment	
Elev. (m)	Elem No.	Node No.	X-Dir. (MN)	Y-Dir. (MN)	X-Dir. (MN-m)	Y-Dir. (MN-m)	X-Dir.	Y-Dir.	X-Dir.	Y-Dir.
5.691	849	851			0.5	0.7			42%	53%
4.981		852	0.3	0.3	0.3	0.4	45%	53%	40%	52%
4.981	850	852			0.3	0.4			40%	52%
4.2713		853	0.4	0.5	0.0	0.0	41%	52%	39%	46%
4.2713	851	853			0.0	0.0			39%	46%
4.1784		854	0.4	0.5	0.0	0.0	39%	46%	2%	4%
4.1784	852	854			0.0	0.0				
4.065		855	0.5	0.4	0.1	0.0	47%	50%	47%	50%
4.065	853	855			0.1	0.0			47%	50%
3.215		856	0.4	0.3	0.4	0.3	46%	50%	46%	50%
3.215	854	856			0.4	0.3			46%	50%
2.365		857	0.1	0.1	0.5	0.4	47%	44%	46%	49%
2.365	855	857			0.5	0.4			46%	49%
1.785		858	0.3	0.2	0.4	0.3	46%	50%	46%	49%
1.785	856	858			0.4	0.3			46%	49%
1.2		859	0.6	0.5	0.0	0.0	46%	49%	27%	22%
1.2	857	859			0.0	0.0			2%	2%
0.7657		860	0.9	0.7	0.4	0.3	46%	49%	46%	49%
0.7657	858	860			0.4	0.3			46%	49%
-0.1315		828	1.0	0.8	1.3	1.0	46%	50%	46%	50%
-0.1315	860	828			0.1	0.1			38%	34%
-0.788		862	0.1	0.1	0.1	0.1	40%	26%	43%	37%

Table 3.7.2-203e Ratio with DCD Enveloping Seismic Loads: RPV Stick (Sheet 7 of 7)

			Fermi 3 SSI Enveloping Seismic Loads				Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads)			
			Shear		Moment		Shear		Moment	
Elev. (m)	Elem No.	Node No.	X-Dir. (MN)	Y-Dir. (MN)	X-Dir. (MN-m)	Y-Dir. (MN-m)	X-Dir.	Y-Dir.	X-Dir.	Y-Dir.
-0.788	862	862			0.1	0.1			43%	37%
-1.443		864	0.0	0.0	0.1	0.1	33%	25%	44%	38%
-1.443	864	864			0.1	0.1			44%	38%
-2.098		866	0.0	0.0	0.1	0.1	37%	26%	46%	33%
-2.098	866	866			0.1	0.1			46%	33%
-2.753		868	0.1	0.1	0.1	0.1	42%	27%	47%	30%
-2.753	868	868			0.1	0.1			47%	30%
-3.4715		870	0.1	0.1	0.0	0.0	48%	30%	45%	29%
-3.4715	870	870			0.0	0.0			45%	29%
-4.2237		872	0.1	0.0	0.0	0.0	45%	29%	0	0

MN = Mega Newton; MN-m = Mega Newton-meter; m = meter

Table 3.7.2-204 Ratio with DCD Enveloping Seismic Loads: CB Stick

			Fermi 3 SSI Enveloping Seismic Loads					Ratio of (Fermi 3 SSI Enveloping Loads) to (DCD Enveloping Seismic Loads)				
			Shear		Moment			Shear		Moment		
Elev. (m)	Elem No.	Node No.	X-Dir. (MN)	Y-Dir. (MN)	X-Dir. (MN-m)	Y-Dir. (MN-m)	Torsion (MN-m)	X-Dir.	Y-Dir.	X-Dir.	Y-Dir.	Torsion
13.80		6			52.1	33.5				33%	27%	
	6		12.4	13.4	87.1	73.5	9.0	37%	46%	35%	37%	12%
9.06		5			118.2	90.7				33%	33%	
	5		23.9	25.2	209.3	195.2	19.9	45%	46%	37%	44%	16%
4.65		4			124.8	61.4				17%	11%	
	4		33.0	31.5	314.9	270.2	17.1	44%	39%	28%	27%	10%
-2.00		3			269.2	269.0				22%	26%	
-7.40	3	2	37.6	33.2	446.1	434.9	18.5	30%	33%	28%	29%	7%

Note: Total torsional moments are obtained by the absolute sum of the accidental torsional moments and the values of the geometric torsional moments shown. The accidental torsional moment is the product of the horizontal force component and an eccentricity of 5% of the larger horizontal dimension at various elevations.

MN = Mega Newton; MN-m = Mega Newton-meter; m = meter

Table 3.7.2-205a Ratio with DCD Enveloping Maximum Vertical Acceleration: RB/FB

			Fermi 3 SSI Enveloping Maximum Vertical Acceleration	Ratio of (Fermi 3 SSI Enveloping Maximum Vertical Acceleration) to (DCD Enveloping Maximum Vertical Acceleration)
Elev. (m)	Node No.	Stick Model	Max. Vertical Acceleration (g)	Max. Vertical Acceleration
52.40 *	110	RB/FB	0.38	30%
34.00	109	RB/FB	0.31	38%
27.00	108	RB/FB	0.29	39%
22.50	107	RB/FB	0.25	34%
17.50	106	RB/FB	0.24	33%
13.57	105	RB/FB	0.23	31%
9.06	104	RB/FB	0.21	29%
4.65	103	RB/FB	0.20	26%
-1.00	102	RB/FB	0.20	27%
-6.40	101	RB/FB	0.20	29%
-11.50	2	RB/FB	0.18	29%
-15.50	1	RB/FB	0.18	36%

Note: For structural design use only.

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

m = meter

Table 3.7.2-205b Ratio with DCD Enveloping Maximum Vertical Acceleration: RCCV

Elev. (m)	Node No.	Stick Model	Fermi 3 SSI Enveloping Maximum Vertical Acceleration Max. Vertical Acceleration (g)	Ratio of (Fermi 3 SSI Enveloping Maximum Vertical Acceleration) to (DCD Enveloping Maximum Vertical Acceleration) Max. Vertical Acceleration
34.00	209	RCCV	0.31	34%
27.00	208	RCCV	0.30	34%
17.50	206	RCCV	0.25	35%
13.57	205	RCCV	0.23	30%
9.06	204	RCCV	0.23	36%
4.65	203	RCCV	0.22	32%
-1.00	202	RCCV	0.21	36%
-6.40	201	RCCV	0.20	34%

Note: For structural design use only.
m = meter

Table 3.7.2-205c Ratio with DCD Enveloping Maximum Vertical Acceleration: VW/Pedestal

Elev. (m)	Node No.	Stick Model	Fermi 3 SSI Enveloping Maximum Vertical Acceleration	Ratio of (Fermi 3 SSI Enveloping Maximum Vertical Acceleration) to (DCD Enveloping Maximum Vertical Acceleration)
			Max. Vertical Acceleration (g)	Max. Vertical Acceleration
17.50	701	VW	0.26	24%
14.50	702	VW	0.26	25%
11.50	703	VW	0.26	28%
8.50	704	VW	0.25	33%
7.4625	705	VW	0.24	34%
4.65	706,303	Pedestal	0.23	34%
-1.00	302	Pedestal	0.20	35%
-6.40	301	Pedestal	0.19	38%

Note: For structural design use only.
m = meter

Table 3.7.2-205d Ratio with DCD Enveloping Maximum Vertical Acceleration: RSW

Elev. (m)	Node No.	Stick Model	Fermi 3 SSI Enveloping Maximum Vertical Acceleration: Max. Vertical Acceleration (g)	Ratio of (Fermi 3 SSI Enveloping Maximum Vertical Acceleration) to (DCD Enveloping Maximum Vertical Acceleration): Max. Vertical Acceleration
24.18	707	RSW	0.31	32%
20.20	708	RSW	0.31	33%
15.775	709	RSW	0.29	35%
11.35	710	RSW	0.27	36%
7.4625	711	RSW	0.24	34%
4.65	712	RSW	0.23	34%
2.4615	713	RSW	0.21	33%
1.96	714	RSW	0.21	33%
-0.80	715	RSW	0.22	34%

Note: For structural design use only.
m = meter

Table 3.7.2-205e Ratio with DCD Enveloping Maximum Vertical Acceleration: RB/FB Flexible Slab Oscillators (Sheet 1 of 2)

			Fermi 3 SSI Enveloping Maximum Vertical Acceleration	Ratio of (Fermi 3 SSI Enveloping Maximum Vertical Acceleration) to (DCD Enveloping Maximum Vertical Acceleration)
Elev. (m)	Node No.	Stick Model	Max. Vertical Acceleration (g)	Max. Vertical Acceleration
52.40*	9101	Oscillator	0.33	28%
	9102	Oscillator	0.73	40%
	9103	Oscillator	1.04	33%
	9104	Oscillator	0.69	28%
	9105	Oscillator	0.51	22%
	9106	Oscillator	0.70	23%
	9107	Oscillator	0.66	24%
	9108	Oscillator	0.56	21%
34.00	9091	Oscillator	0.41	32%
	9092	Oscillator	0.39	36%
27.00	9081	Oscillator	0.37	32%
	9082	Oscillator	0.37	37%
	9083	Oscillator	0.36	33%
	9084	Oscillator	0.39	29%
	9085	Oscillator	0.34	35%
22.50	9071	Oscillator	0.62	39%
	9072	Oscillator	0.72	55%
	9073	Oscillator	0.77	38%
	9074	Oscillator	0.42	32%
	9075	Oscillator	0.35	30%
17.50	9061	Oscillator	0.60	33%
	9062	Oscillator	0.52	35%
	9063	Oscillator	0.29	36%

Table 3.7.2-205e Ratio with DCD Enveloping Maximum Vertical Acceleration: RB/FB Flexible Slab Oscillators (Sheet 2 of 2)

			Fermi 3 SSI Enveloping Maximum Vertical Acceleration	Ratio of (Fermi 3 SSI Enveloping Maximum Vertical Acceleration) to (DCD Enveloping Maximum Vertical Acceleration)
Elev. (m)	Node No.	Stick Model	Max. Vertical Acceleration (g)	Max. Vertical Acceleration
	9064	Oscillator	0.63	34%
	9065	Oscillator	0.36	26%
13.57	9051	Oscillator	0.28	34%
	9052	Oscillator	0.35	24%
9.06	9041	Oscillator	0.26	30%
	9042	Oscillator	0.35	25%
4.65	9031	Oscillator	0.47	40%
	9032	Oscillator	0.31	32%
	9033	Oscillator	0.43	42%
	9034	Oscillator	0.51	34%
	9035	Oscillator	0.34	25%
-1.00	9021	Oscillator	0.43	39%
	9022	Oscillator	0.50	35%
	9023	Oscillator	0.38	38%
	9024	Oscillator	0.29	33%
	9025	Oscillator	0.37	28%
	9026	Oscillator	0.55	35%
	9027	Oscillator	0.26	30%
-6.40	9011	Oscillator	0.39	42%
	9012	Oscillator	0.34	37%
	9013	Oscillator	0.41	31%

Note: For structural design use only.

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

m = meter

Table 3.7.2-206 Ratio with DCD Enveloping Maximum Vertical Acceleration: CB

Elev. (m)	Node No.	Stick Model	Fermi 3 SSI Enveloping Maximum Vertical Acceleration			Ratio of (Fermi 3 SSI Enveloping Maximum Vertical Acceleration) to (DCD Enveloping Maximum Vertical Acceleration)		
			X-dir. (g)	Y-dir. (g)	Max. Vertical Acceleration (g)	X-dir.	Y-dir.	Max. Vertical Acceleration
13.80	6	CB	0.47	0.51	0.30	37%	46%	30%
9.06	5	CB	0.41	0.43	0.29	46%	48%	34%
4.65	4	CB	0.33	0.31	0.26	38%	38%	35%
-2.00	3	CB	0.25	0.24	0.21	32%	34%	37%
-7.40	2	CB	0.21	0.17	0.18	39%	32%	36%
-10.40	1	CB	0.21	0.18	0.18	39%	34%	36%
13.80	9001	Oscillator	---	---	0.87	---	---	40%
	9002	Oscillator	---	---	0.49	---	---	37%
	9003	Oscillator	---	---	0.48	---	---	34%
9.06	9101	Oscillator	---	---	0.81	---	---	41%
	9102	Oscillator	---	---	0.55	---	---	44%
	9103	Oscillator	---	---	0.46	---	---	32%
4.65	9201	Oscillator	---	---	0.45	---	---	35%
	9202	Oscillator	---	---	0.44	---	---	31%
-2.00	9301	Oscillator	---	---	0.50	---	---	36%

Note: For structural design use only.
m = meter

Figure 3.7.2-201 SASSI2000 Plate Element for RB/FB Basemat [EF3 SUP 3.7-4]

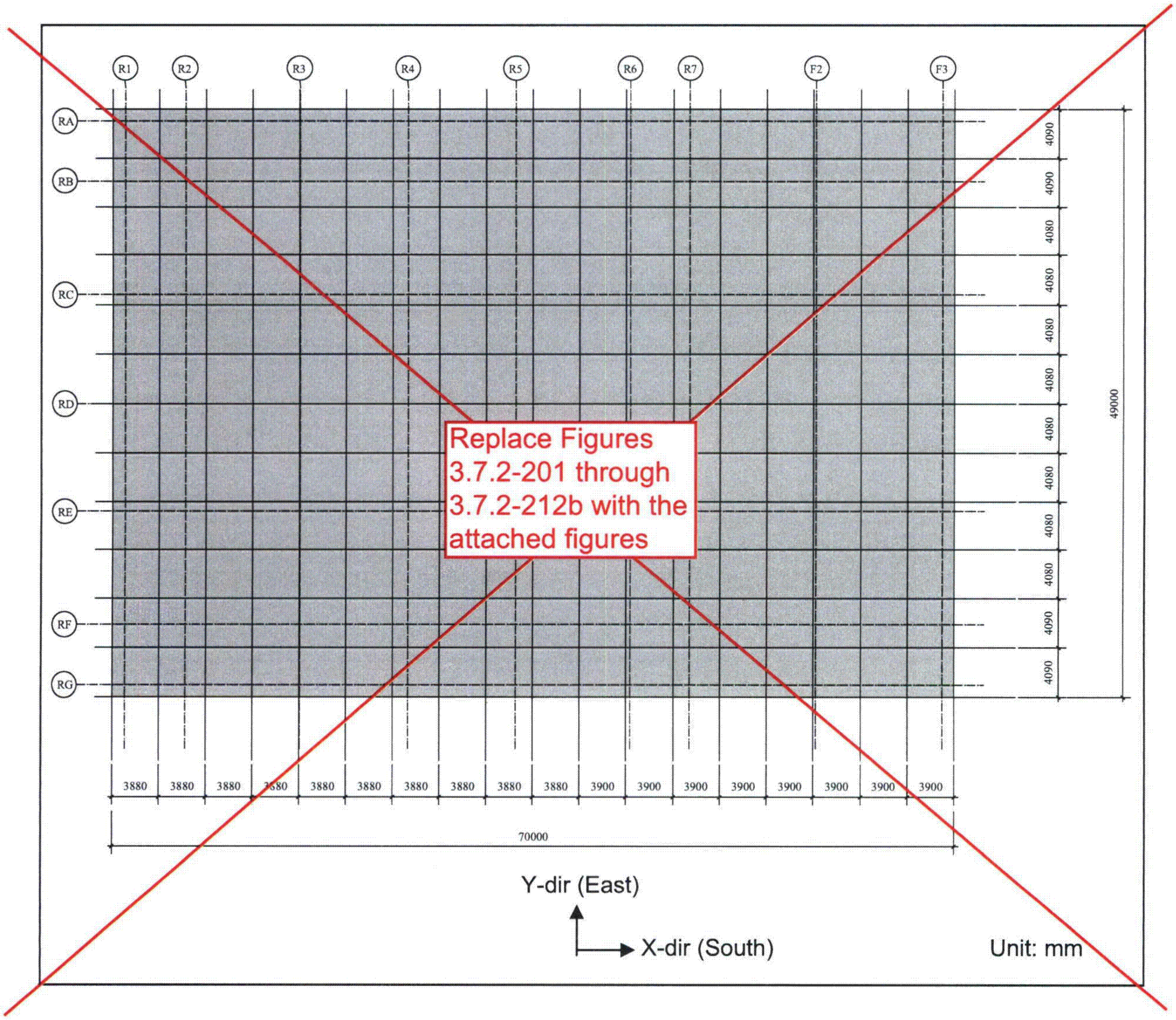


Figure 3.7.2-201 SASSI2000 Plate Elements for RB/FB Basemat

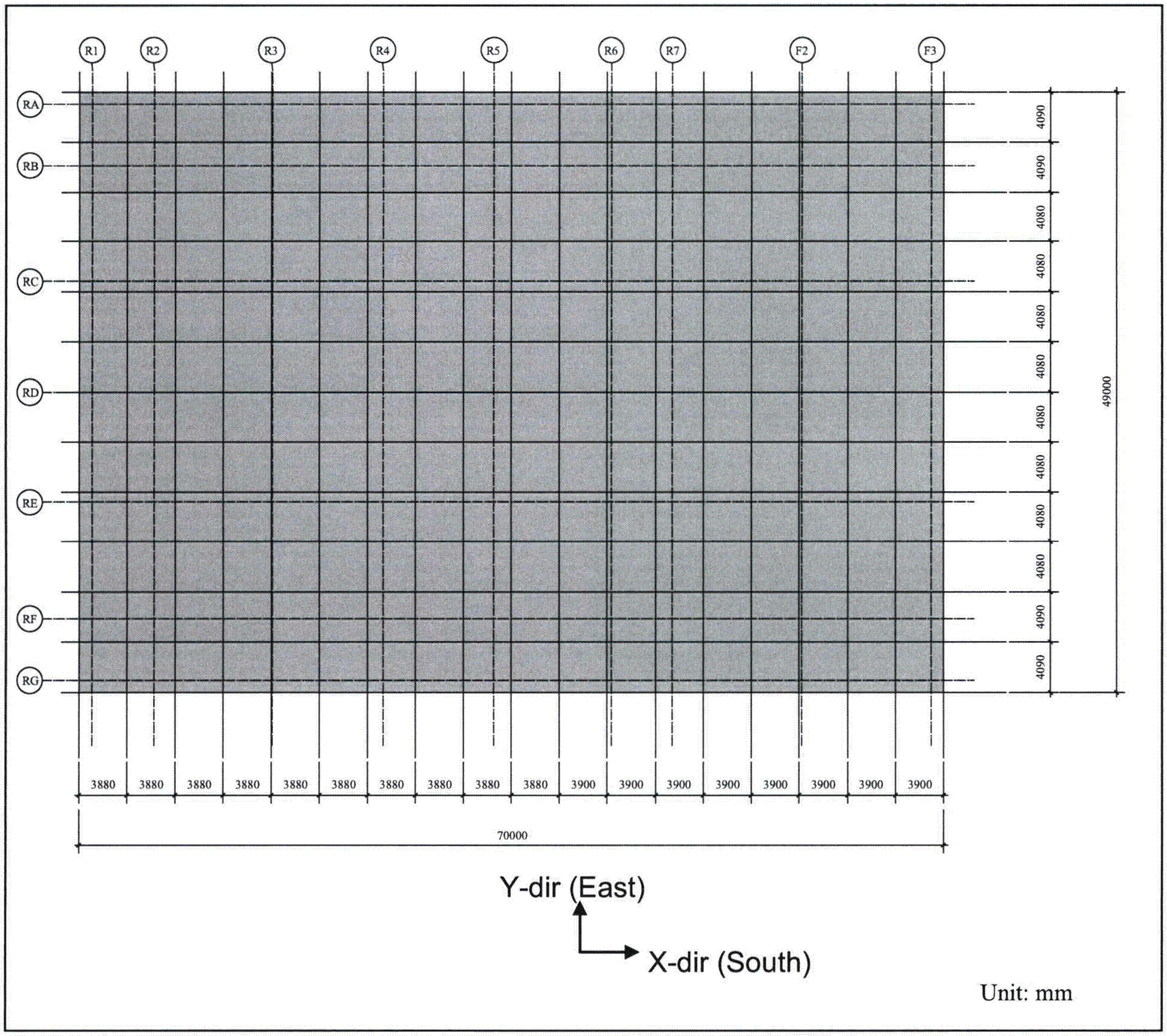
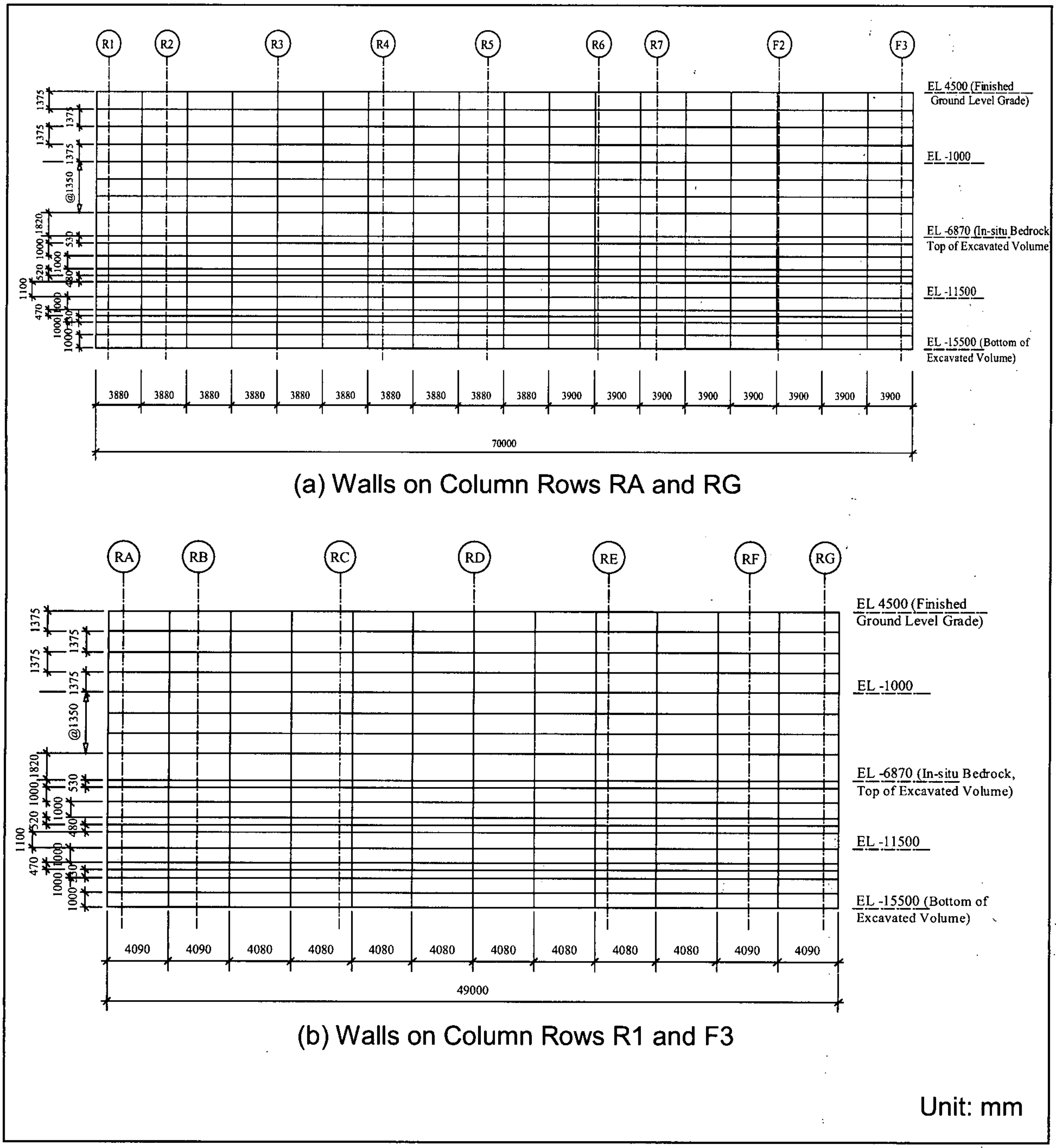


Figure 3.7.2-202 SASSI2000 Plate Elements for RB/FB Exterior Walls



(a) Walls on Column Rows RA and RG

(b) Walls on Column Rows R1 and F3

Figure 3.7.2-203 Overview of SASSI2000 SSI RB/FB Model

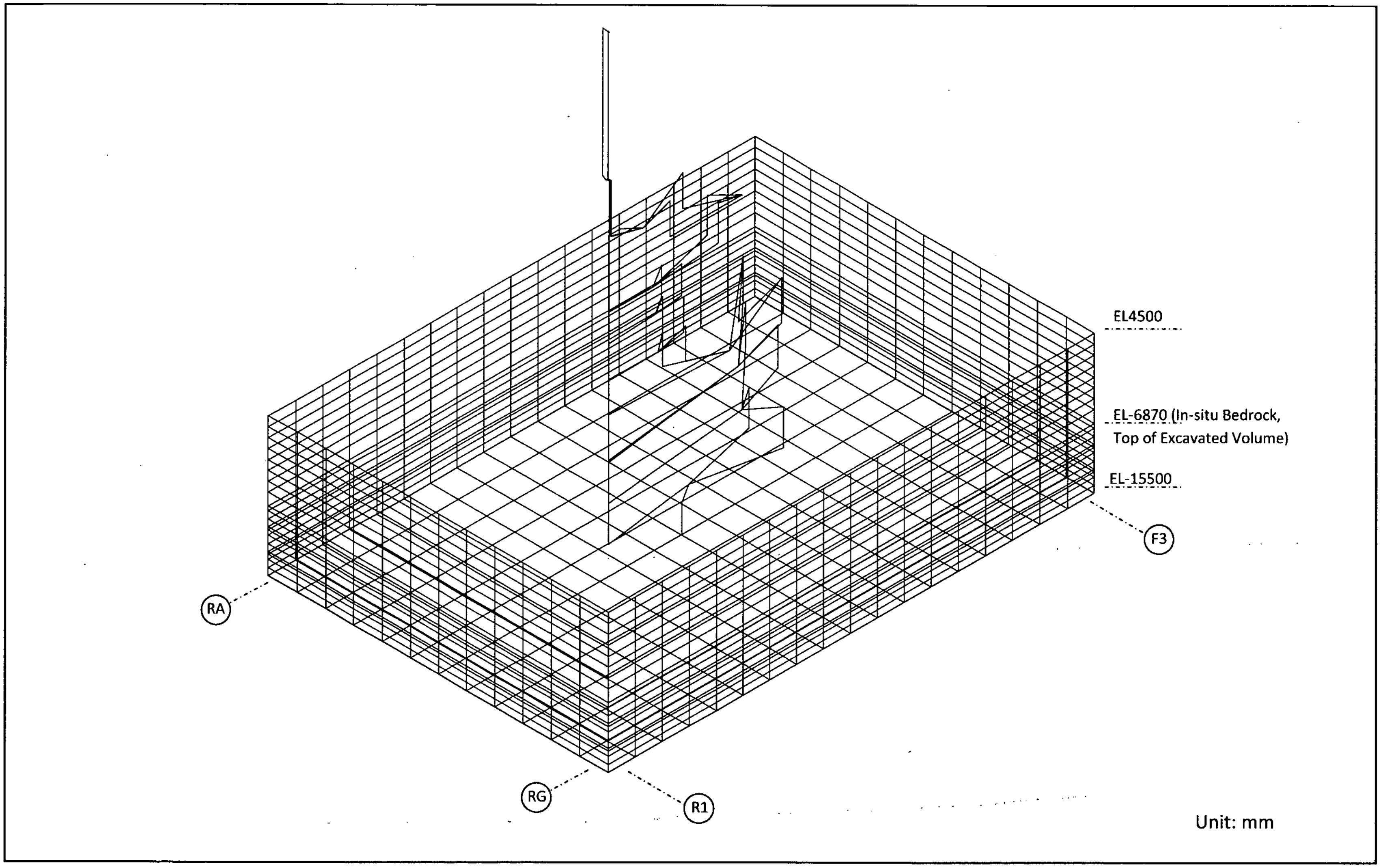


Figure 3.7.2-204 SASSI2000 Plate Elements for CB Basemat

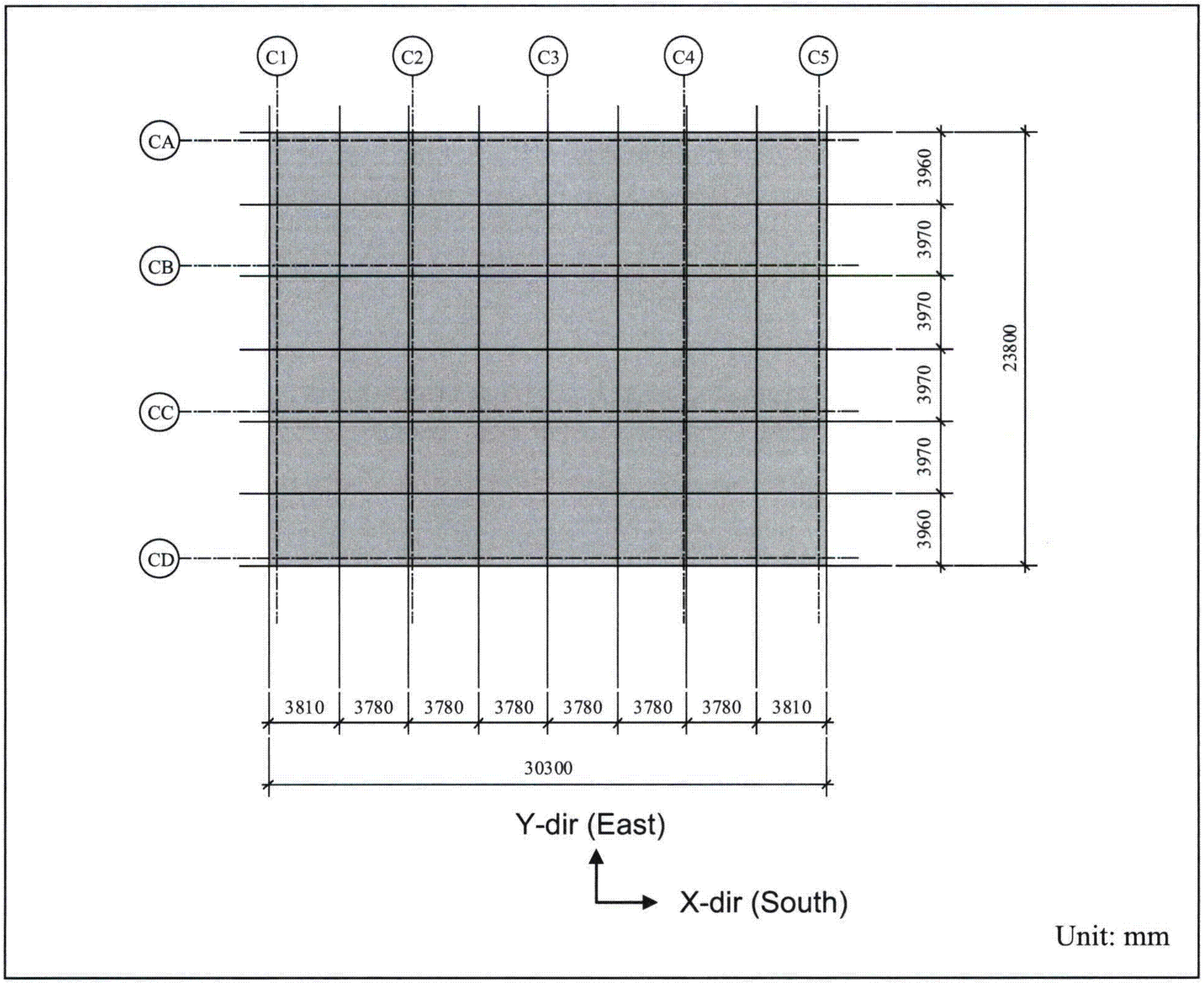
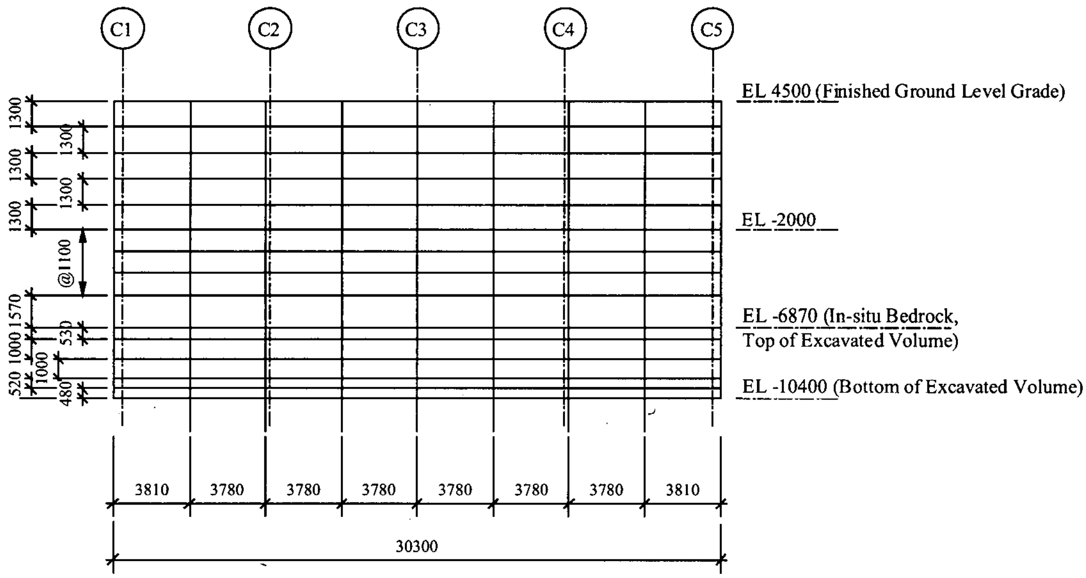
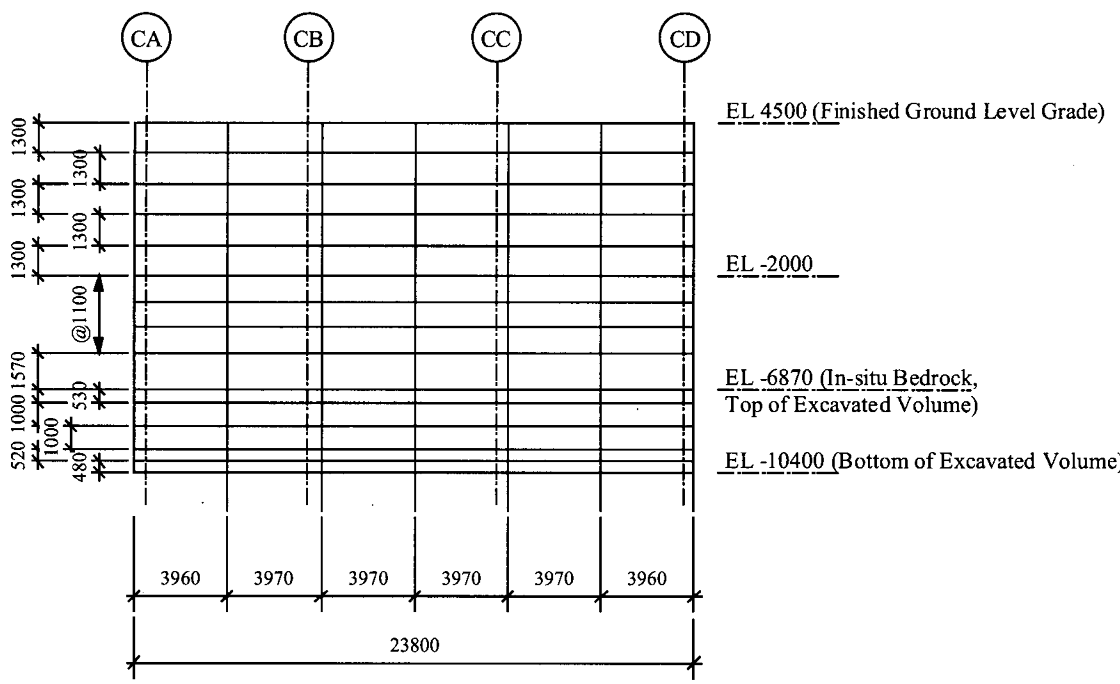


Figure 3.7.2-205 SASSI2000 Plate Elements for CB Exterior Walls



(a) Walls on Column Rows CA and CD



(b) Walls on Column Rows C1 and C5

Unit: mm

Figure 3.7.2-206 Overview of CB SASSI2000 SSI Model

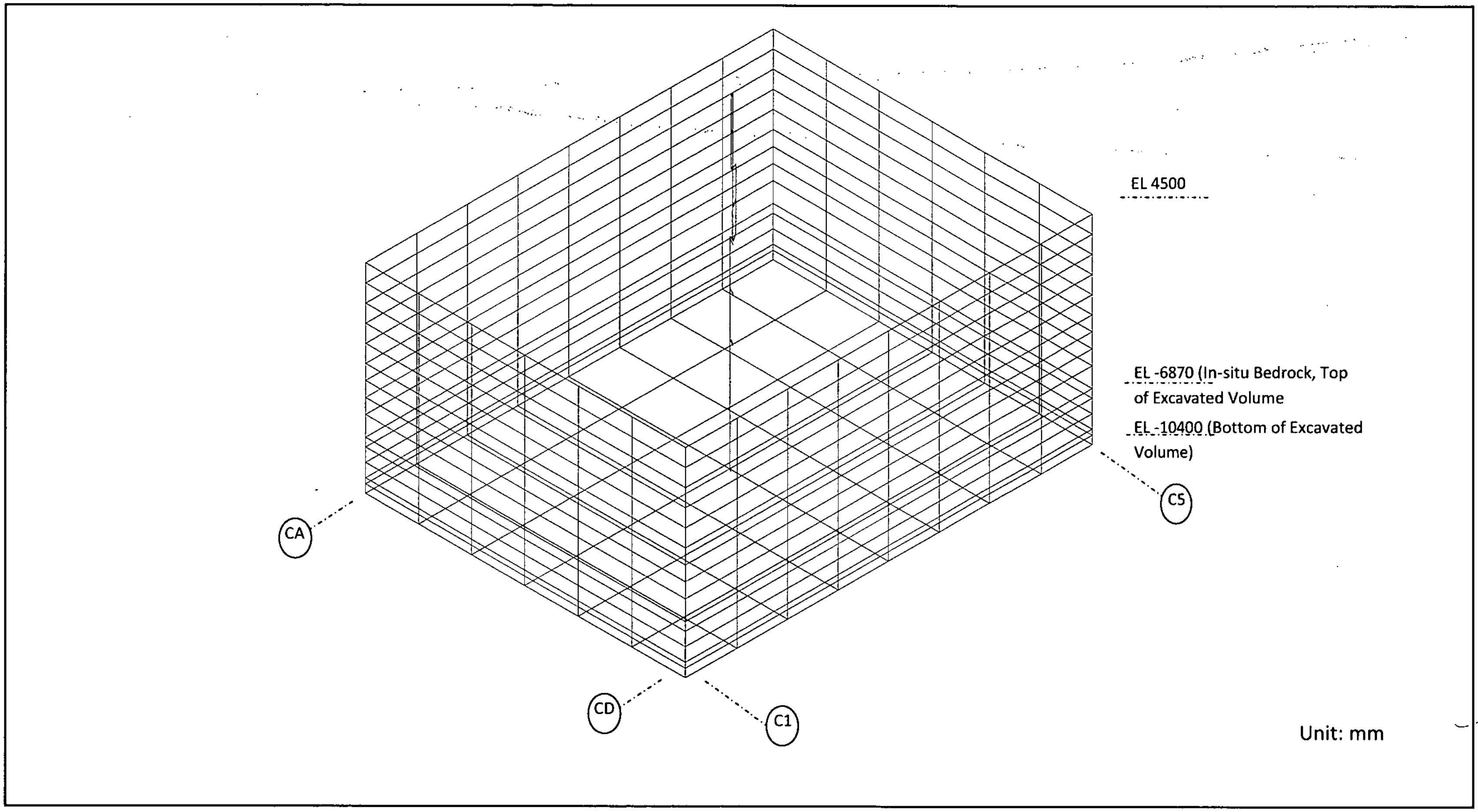
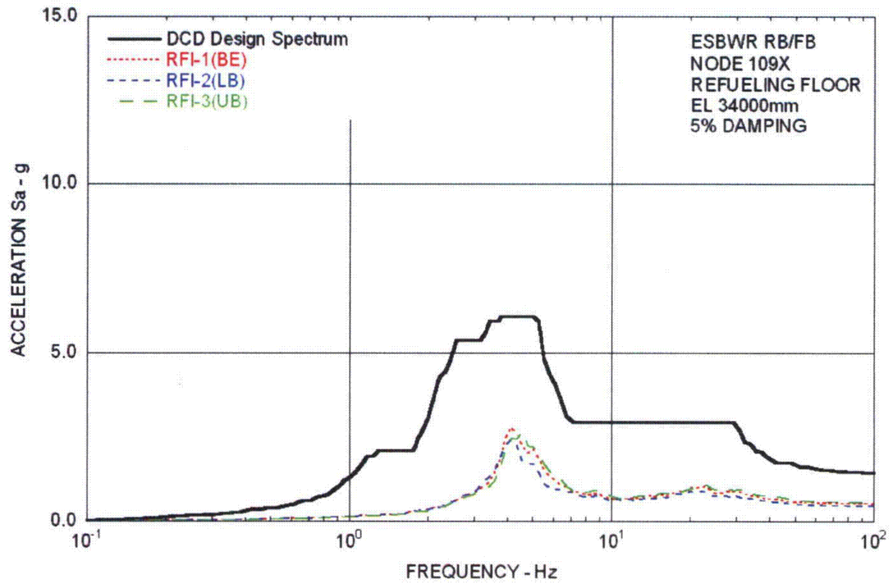
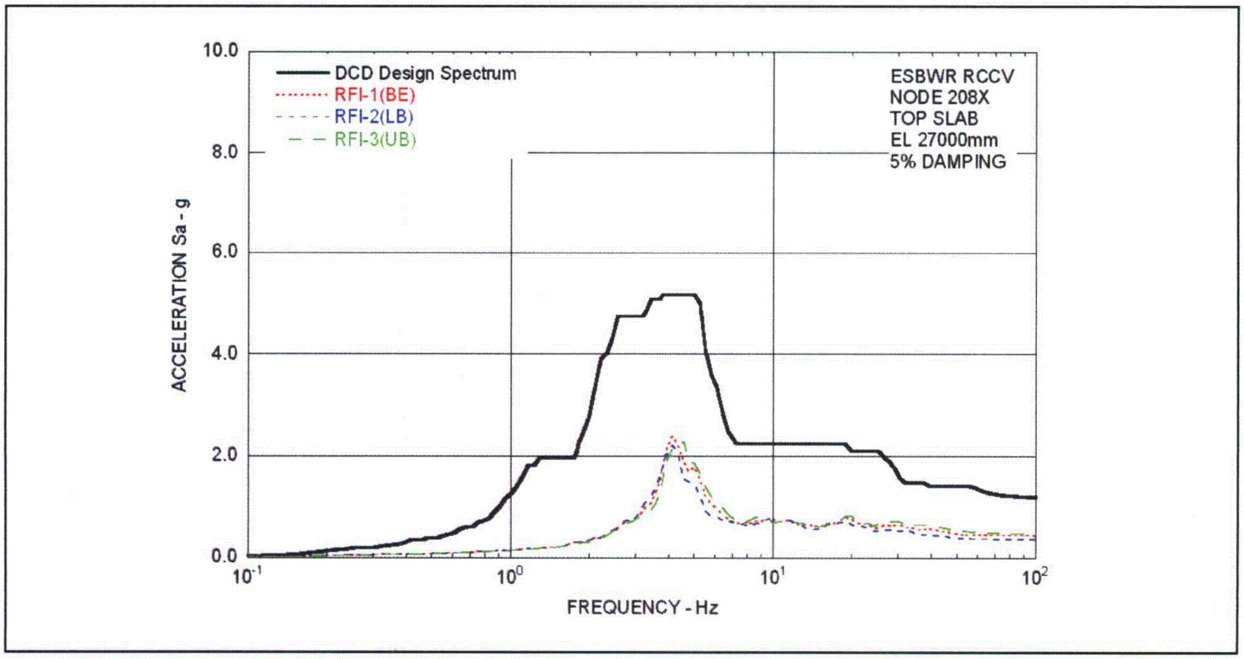


Figure 3.7.2-207a Comparison of Floor Response Spectra - RB/FB Refueling Floor in X-Direction



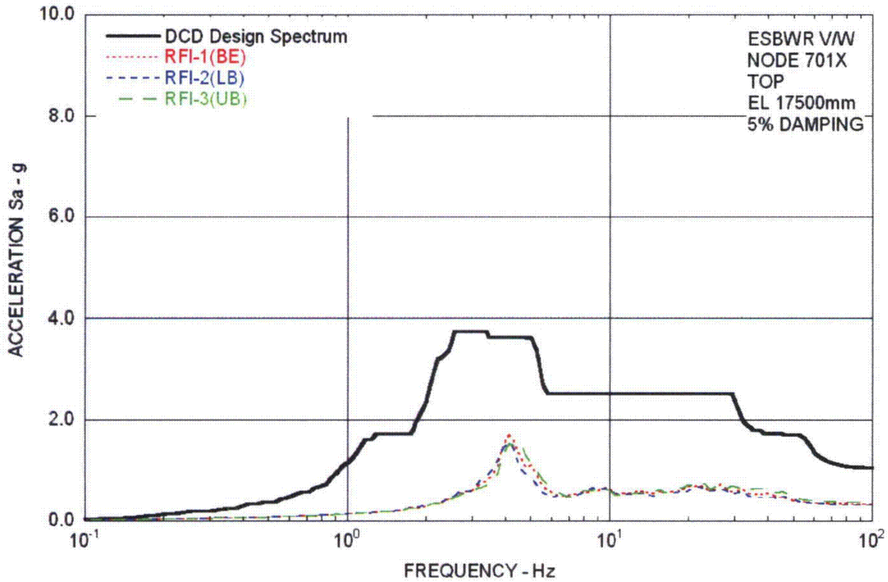
Note: Sa = Spectral Acceleration

Figure 3.7.2-207b Comparison of Floor Response Spectra - RCCV Top Slab in X-Direction



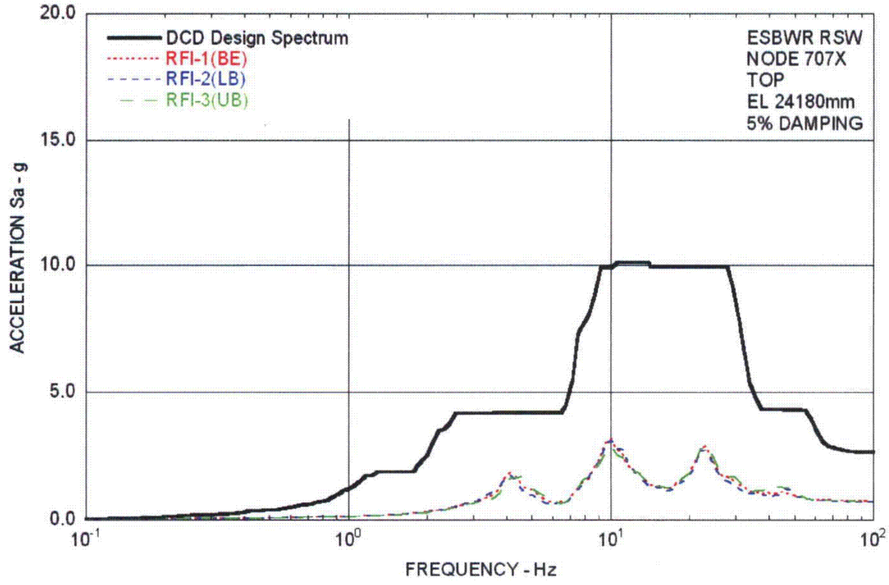
Note: Sa = Spectral Acceleration

Figure 3.7.2-207c Comparison of Floor Response Spectra - Vent Wall Top in X-Direction



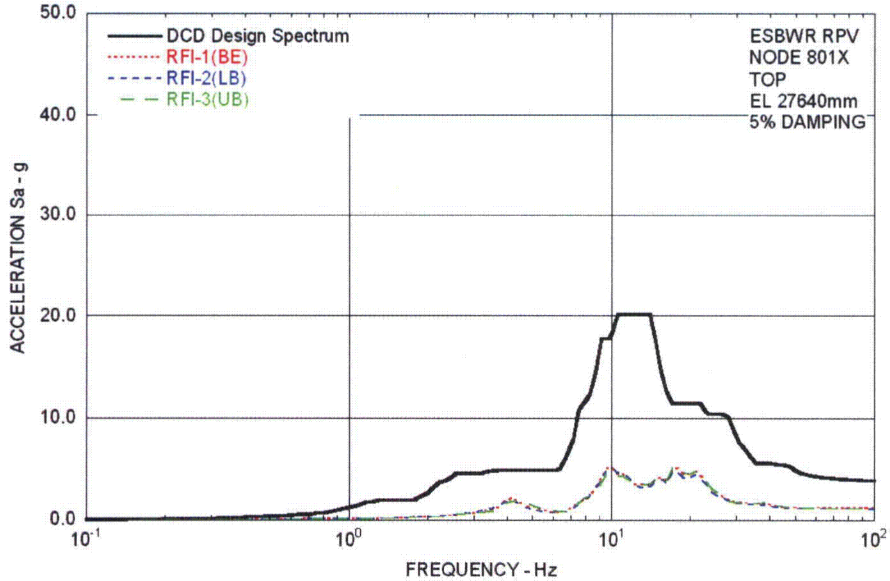
Note: Sa = Spectral Acceleration

Figure 3.7.2-207d Comparison of Floor Response Spectra - RSW Top in X-Direction



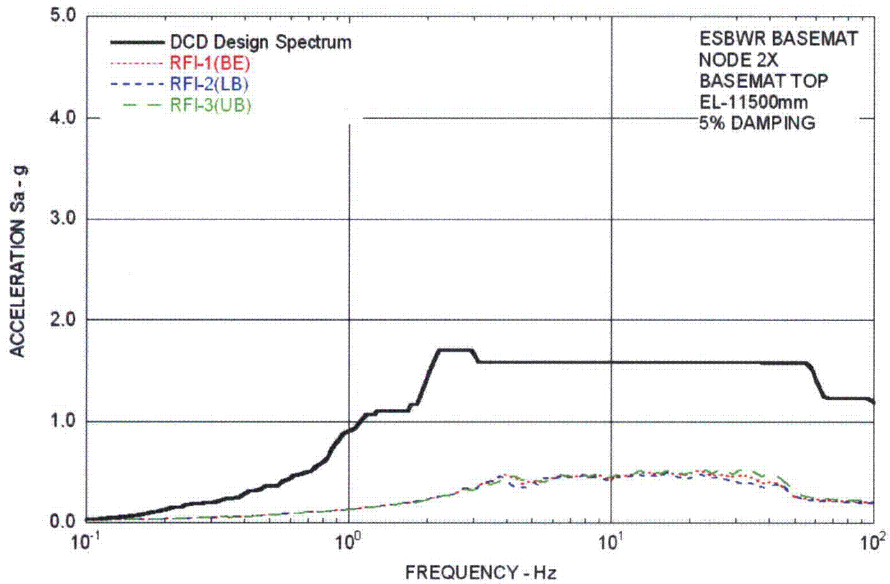
Note: Sa = Spectral Acceleration

Figure 3.7.2-207e Comparison of Floor Response Spectra - RPV Top in X-Direction



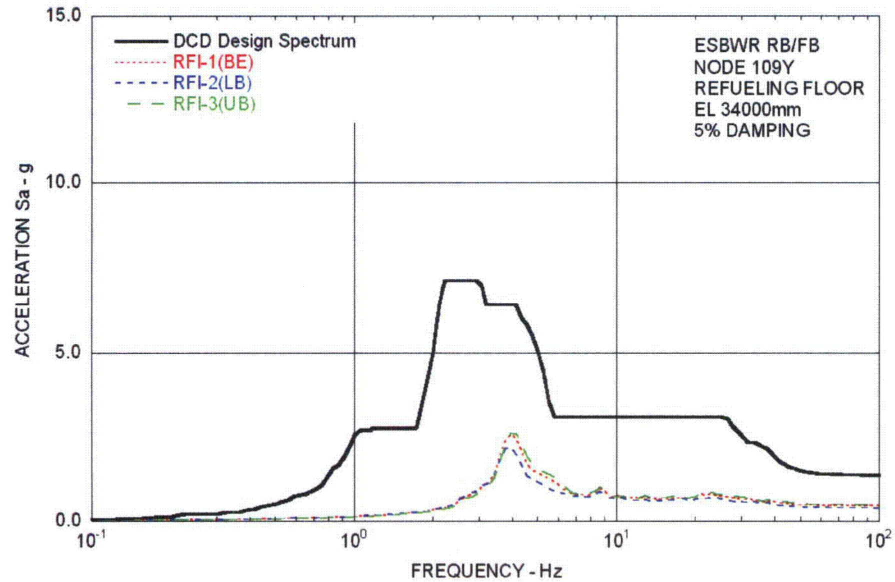
Note: Sa = Spectral Acceleration

Figure 3.7.2-207f Comparison of Floor Response Spectra - RB/FB Basemat in X-Direction



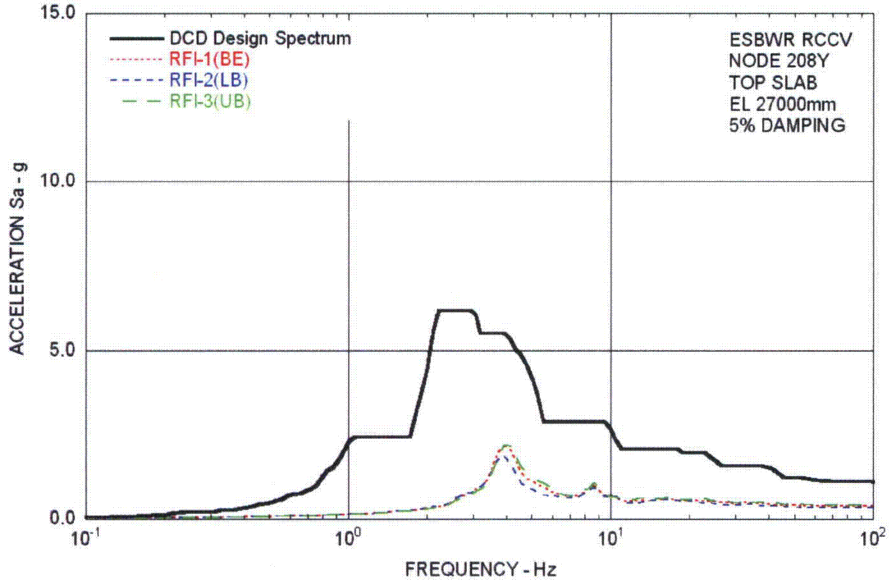
Note: Sa = Spectral Acceleration

Figure 3.7.2-208a Comparison of Floor Response Spectra - RB/FB Refueling Floor in Y-Direction



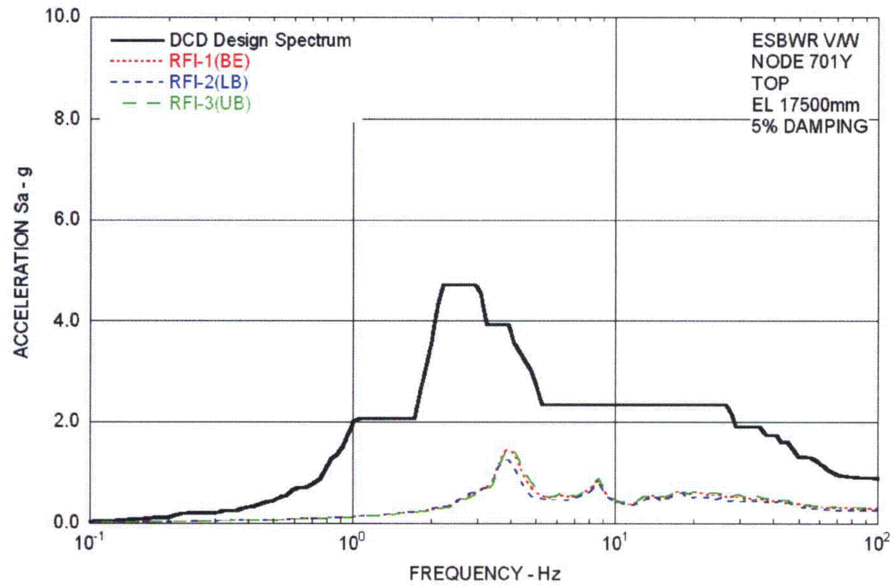
Note: Sa = Spectral Acceleration

Figure 3.7.2-208b Comparison of Floor Response Spectra - RCCV Top Slab in Y-Direction



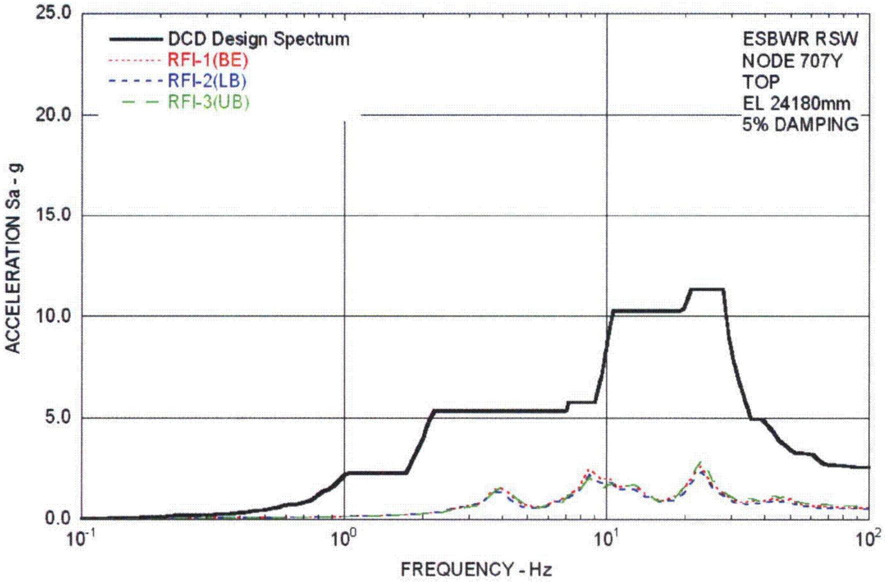
Note: Sa = Spectral Acceleration

Figure 3.7.2-208c Comparison of Floor Response Spectra - Vent Wall Top in Y-Direction



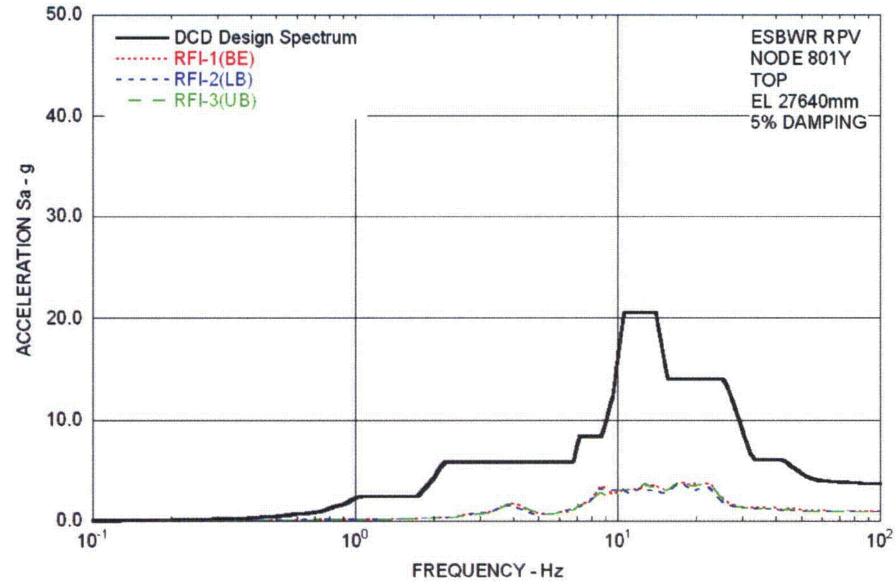
Note: Sa = Spectral Acceleration

Figure 3.7.2-208d Comparison of Floor Response Spectra - RSW Top in Y-Direction



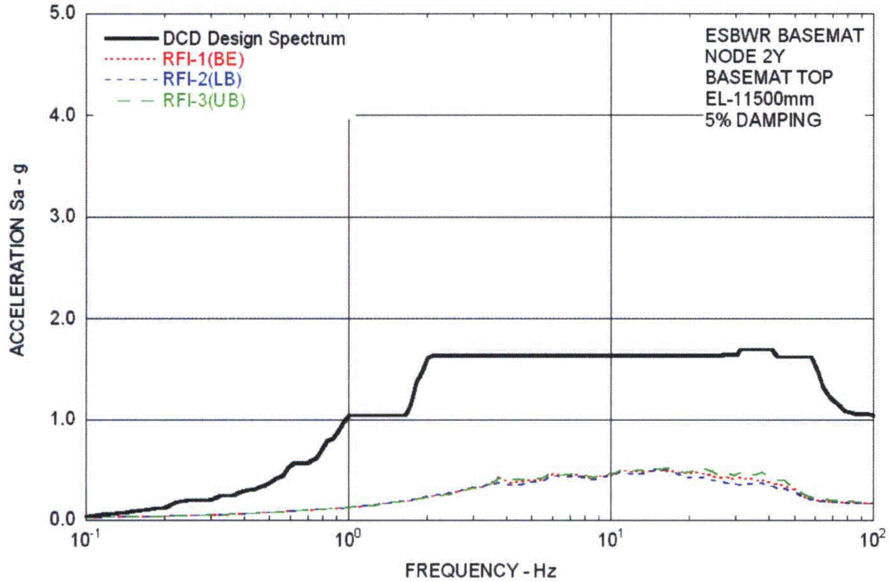
Note: Sa = Spectral Acceleration

Figure 3.7.2-208e Comparison of Floor Response Spectra - RPV Top in Y-Direction



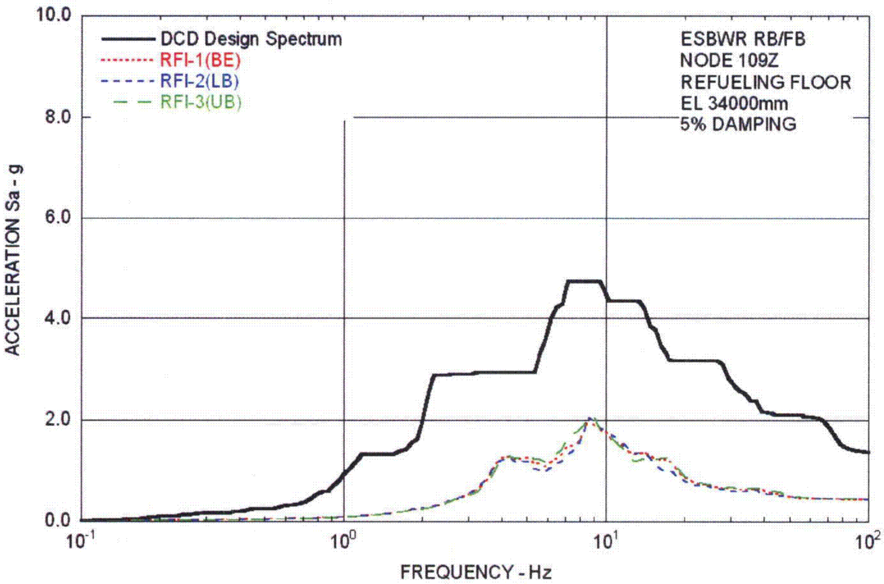
Note: Sa = Spectral Acceleration

Figure 3.7.2-208f Comparison of Floor Response Spectra - RB/FB Basemat in Y-Direction



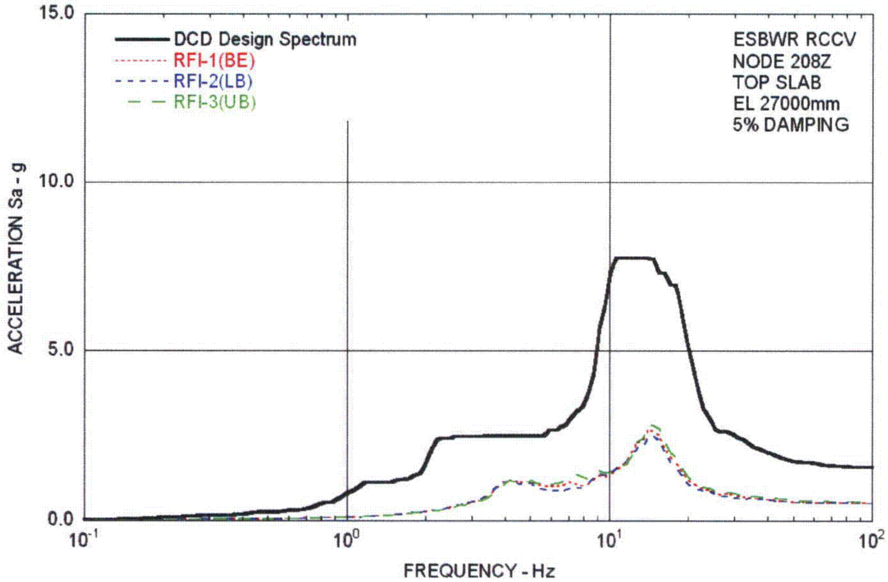
Note: Sa = Spectral Acceleration

Figure 3.7.2-209a Comparison of Floor Response Spectra - RB/FB Refueling Floor in Z-Direction



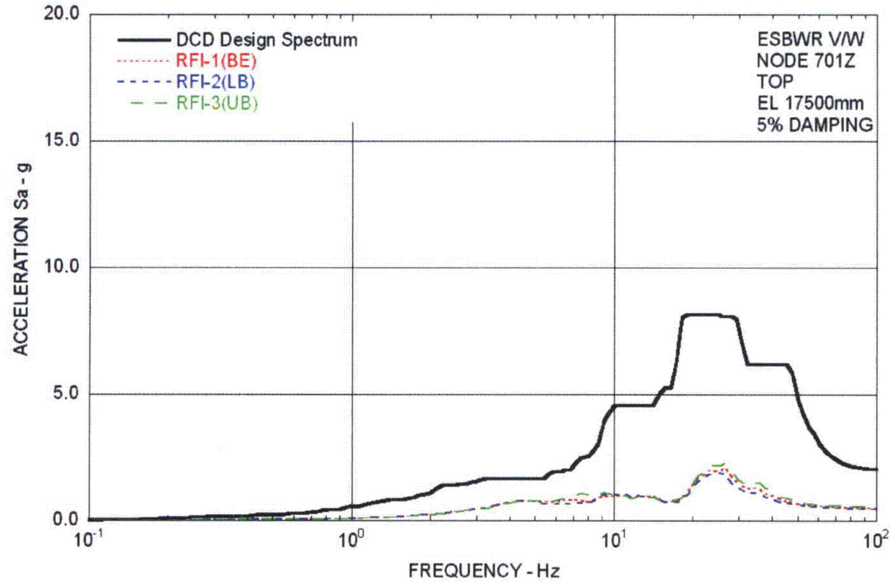
Note: Sa = Spectral Acceleration

Figure 3.7.2-209b Comparison of Floor Response Spectra - RCCV Top Slab in Z-Direction



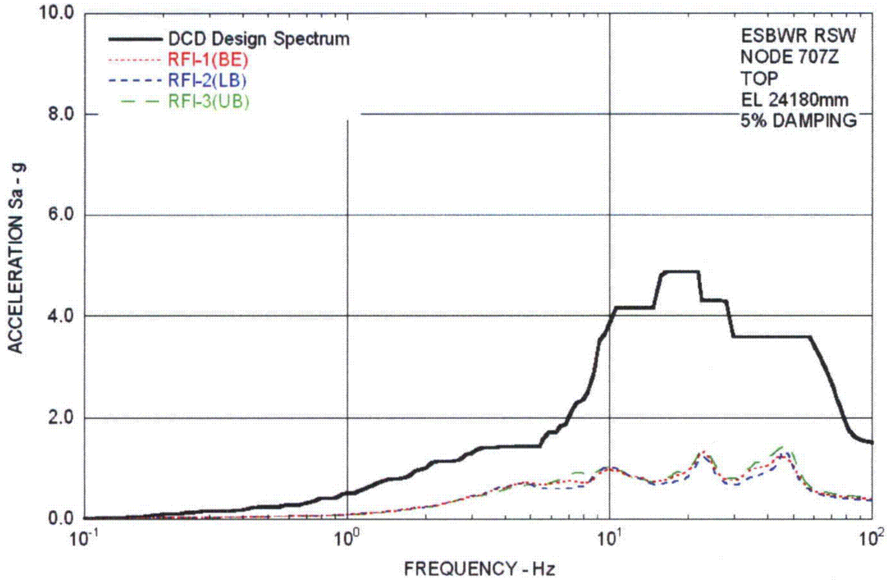
Note: Sa = Spectral Acceleration

Figure 3.7.2-209c Comparison of Floor Response Spectra - Vent Wall Top in Z-Direction



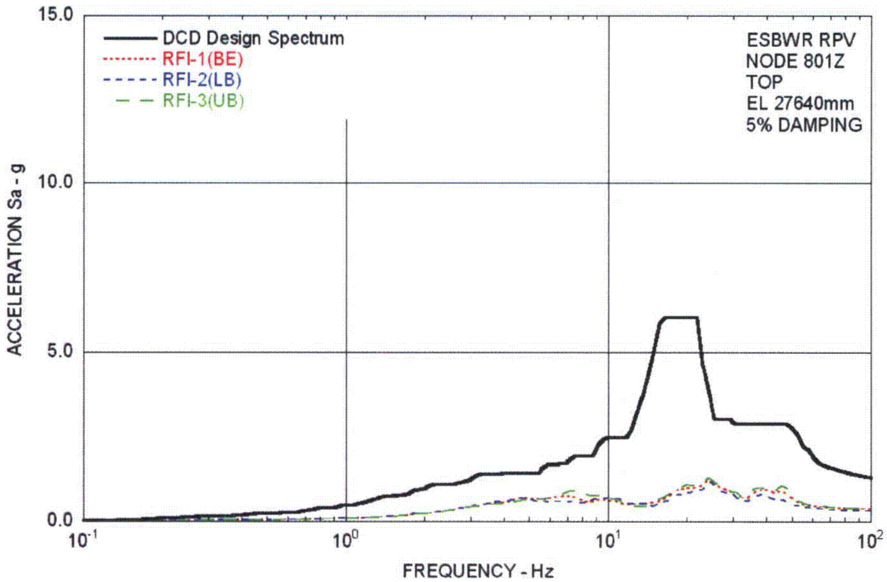
Note: Sa = Spectral Acceleration

Figure 3.7.2-209d Comparison of Floor Response Spectra - RSW Top in Z-Direction



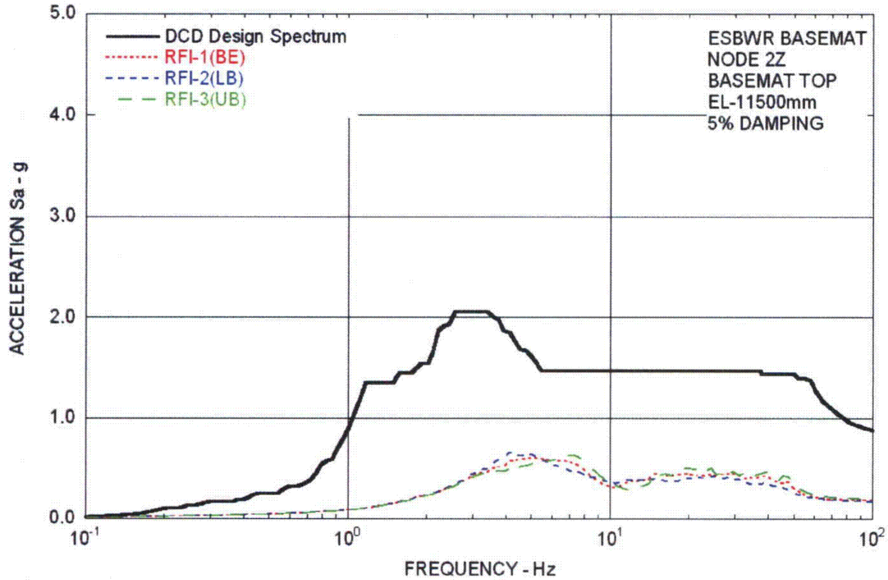
Note: Sa = Spectral Acceleration

Figure 3.7.2-209e Comparison of Floor Response Spectra - RPV Top in Z-Direction



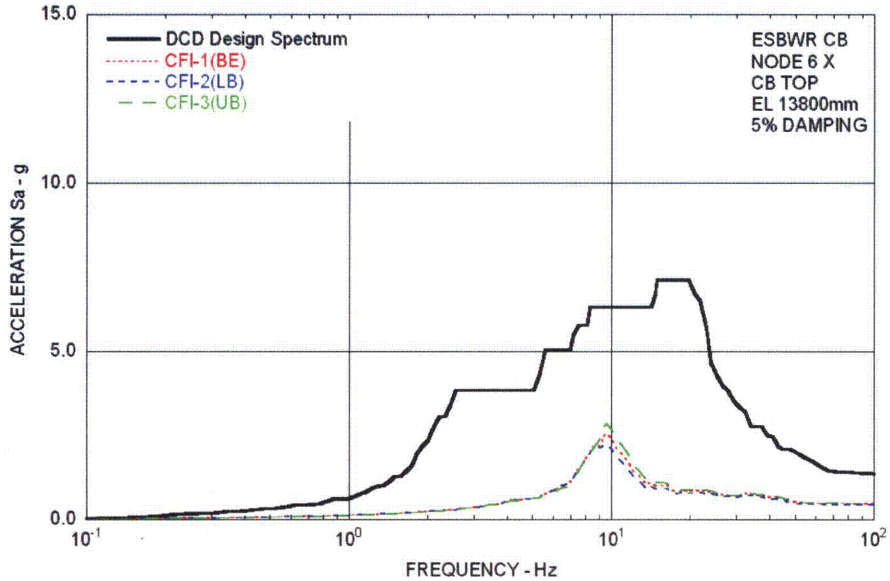
Note: Sa = Spectral Acceleration

Figure 3.7.2-209f Comparison of Floor Response Spectra - RB/FB Basemat in Z-Direction



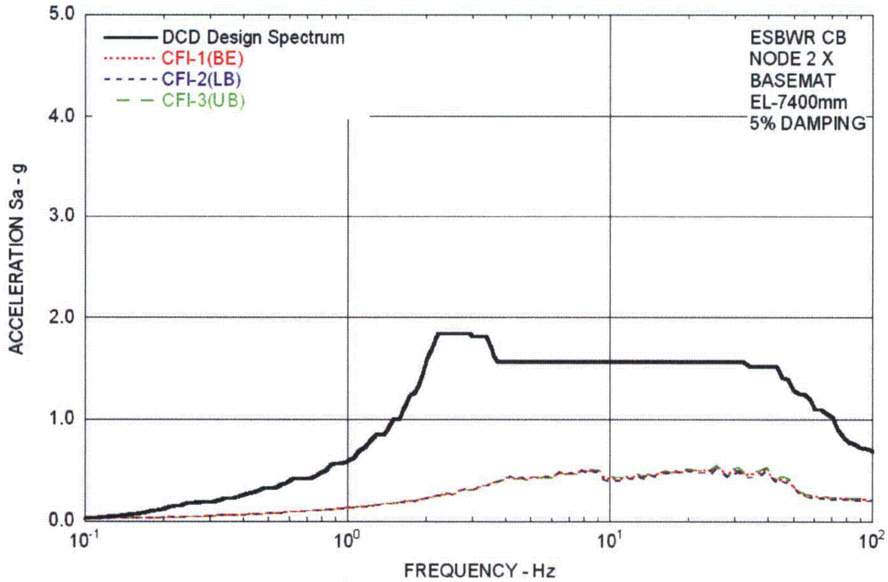
Note: Sa = Spectral Acceleration

Figure 3.7.2-210a Comparison of Floor Response Spectra - CB Top in X-Direction



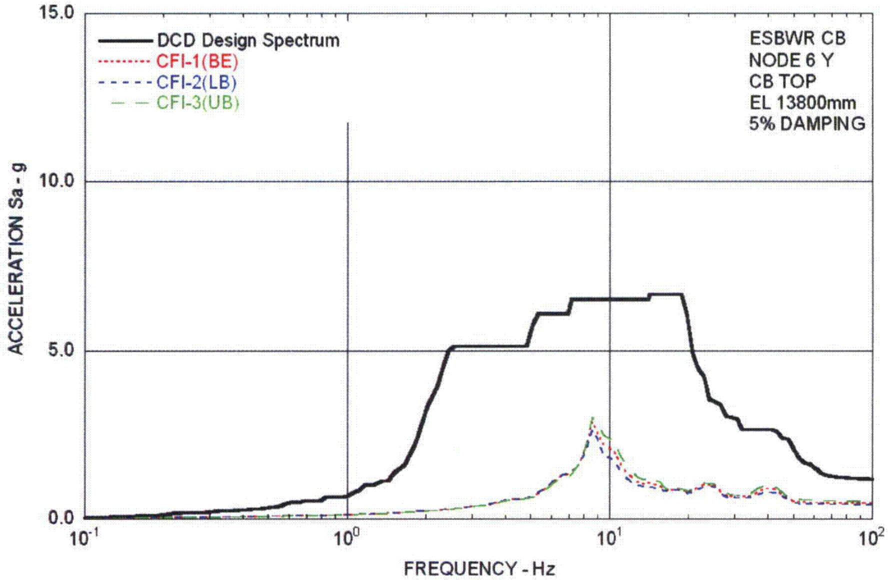
Note: Sa = Spectral Acceleration

Figure 3.7.2-210b Comparison of Floor Response Spectra - CB Basemat in X-Direction



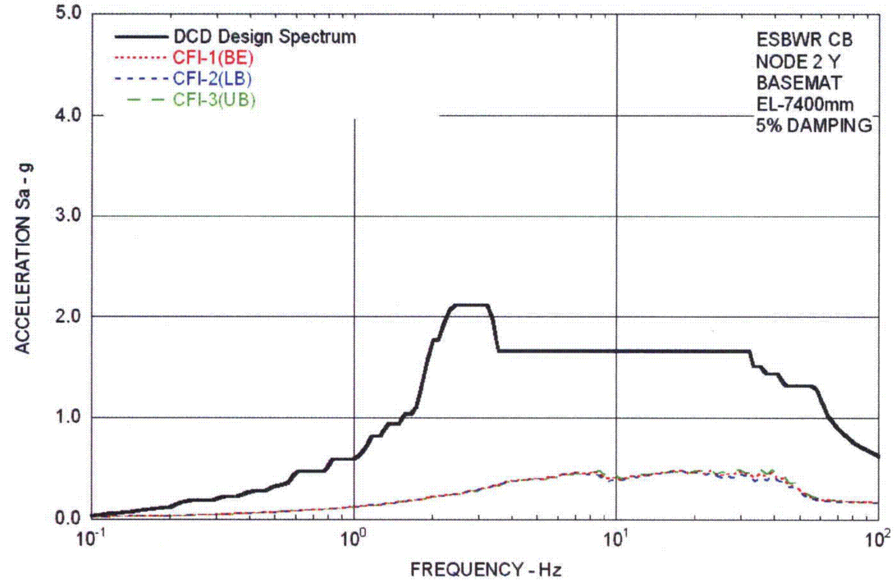
Note: Sa = Spectral Acceleration

Figure 3.7.2-211a Comparison of Floor Response Spectra - CB Top in Y-Direction



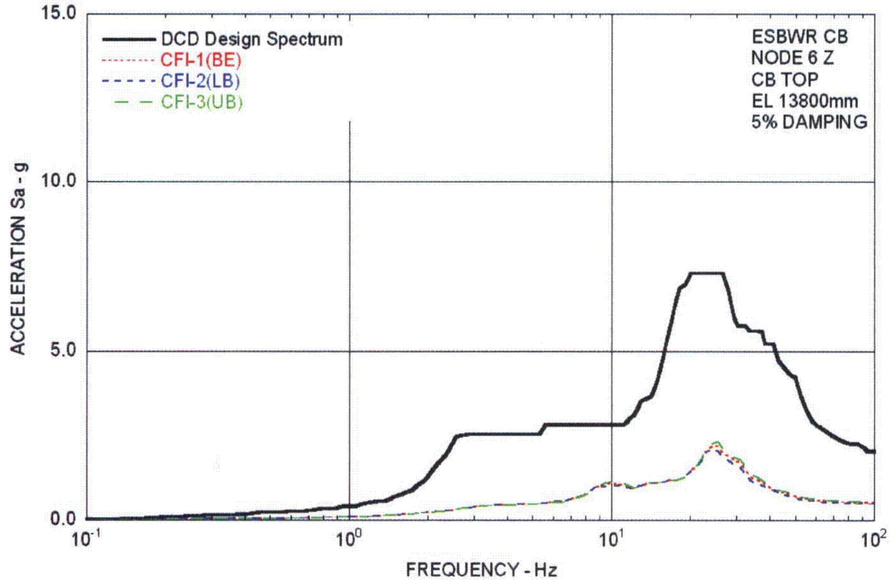
Note: Sa = Spectral Acceleration

Figure 3.7.2-211b Comparison of Floor Response Spectra - CB Basemat in Y-Direction



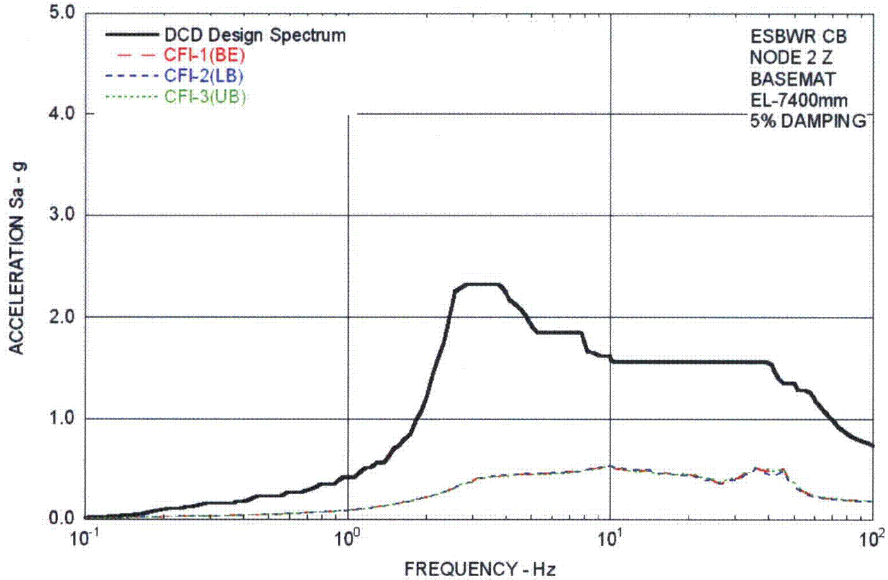
Note: Sa = Spectral Acceleration

Figure 3.7.2-212a Comparison of Floor Response Spectra - CB Top in Z-Direction



Note: Sa = Spectral Acceleration

Figure 3.7.2-212b Comparison of Floor Response Spectra - CB Basemat in Z-Direction



Note: Sa = Spectral Acceleration

3.7.4 Seismic Instrumentation

Add the following at the end of this section.

EF3 SUP 3.7-6

[START COM 3.7-001] The seismic monitoring program described in this subsection, including the necessary test and operating procedures, will be implemented prior to receipt of fuel on site. **[END COM 3.7-001]**

3.8 Seismic Category I Structures

This section of the Referenced DCD is incorporated by reference with the following departures and/or supplements.

3.8.5 Foundations

3.8.5.5 Structural Acceptance Certeria

Add the following subsections at the end of this section.

EF3 SUP 3.8-1

3.8.5.5.1 Foundation Stability

The Fermi 3 site-specific foundation stability for the RB/FB and CB are evaluated against overturning, sliding, and floatation based on the results from the Fermi 3 site-specific SSI analyses for the RB/FB and CB presented in Subsection 3.7.2.4.1. The stability calculations against overturning, sliding, and floatation are executed according to the procedure presented in Referenced DCD Section 3.8.5.5.

The factor of safety against overturning due to earthquake loading is determined by the energy approach described in Referenced DCD Subsection 3.7.2.14. The calculated Fermi 3 site-specific factors of safety against overturning based on the Fermi 3 site-specific SSI for the RB/FB and CB are shown in Table 3.8.5-201 and Table 3.8.5-202, respectively. It is shown that the Fermi 3 site-specific factors of safety against overturning for the RB/FB and CB are ~~1,907~~ 1,923 and ~~1,029~~ 1,715 (greater than 1.1 as required by SRP 3.8.5), respectively. These factors of safety indicate that the Fermi 3 RB/FB and CB are stable against overturning.

The Fermi 3 site-specific sliding evaluation is performed using forces generated during the Fermi 3 site-specific SSI analyses, which neglects the backfill above the top of the bedrock and with the RB/FB and CB in firm contact with the bedrock using fill concrete as backfill in the gap between the RB/FB and CB, and the bedrock up to the top of Bass Islands Group bedrock at Elevation 168.2 m (552.0 ft) NAVD 88. The gap between the RB/FB and CB up to the top of the Bass Islands Group bedrock at Elevation 168.2 m (552.0 ft) NAVD 88 is also filled with fill concrete. As the Fermi 3 site-specific SSI neglects the backfill above the top of the bedrock, forces associated with the backfill are not included in the sliding analysis; therefore, the bedrock alone supplies the resistance to sliding of both the RB/FB and the CB. In the sliding evaluation for the Fermi 3 RB/FB and CB, the following skin friction resistance forces are neglected:

1. F_{us} = Skin friction resistance force provided by basemat side parallel to the direction of motion (i.e., F_{us} = 0)
2. F_{us}' = Skin friction resistance force provided by shear key side parallel to the direction of motion (when shear keys are used (i.e., F_{us}' = 0).

The calculated Fermi 3 site-specific factors of safety against sliding for the RB/FB and CB are shown in Table 3.8.5-201 and Table 3.8.5-202, respectively. The Fermi 3 site-specific factors of safety against sliding for the RB/FB and CB are ~~5.48~~ [3.90] and ~~3.09~~ [2.59] (greater than minimum factor of safety of 1.1 as required by SRP 3.8.5), respectively. These factors of safety indicate that the Fermi 3 RB/FB and CB are stable against sliding.

The sliding of the FWSC was evaluated using the driving forces (the base shear time history forces) based on the governing factor of safety cases from the Referenced DCD SSI analysis results without crediting the backfill surrounding the basemat. The sliding evaluation also includes the fill concrete below the FWSC in which the shear keys are embedded. The presence of the shear keys results in potential failure occurring within the fill concrete. The fill concrete was evaluated in accordance with ACI 318 and the corresponding portions of ACI 349 considering the following:

- Failure of the fill concrete in compression from lateral pressure applied by the shear keys. This potential failure condition is checked using the ACI 318 Section 22.5.5.
- Failure through the fill concrete at or below the base of the shear keys considering the maximum amount of shear resistance from shear-friction reinforcement allowed in ACI 318, Section 11.6 and the corresponding portions of ACI 349, Section 11.7.

Table 3.8.5-201 Factors of Safety for RB/FB Foundation Stability [EF3 SUP 3.8-1]

	Overturning		Sliding		Floatation	
Load Combination	SRP 3.8.5 Minimum FS	Calculated FS	SRP 3.8.5 Minimum FS	Calculated FS	SRP 3.8.5 Minimum FS	Calculated FS
D + H + E'	1.1	1907	1.1	5.48	--	--
D + F'	--			--	1.1	3.48

Replace Tables 3.8.5-201 and 3.8.5-202 with the attached tables.

Where,
D = Dead Load
H = Lateral soil pressure
E' = Safe Shutdown Earthquake
F' = Buoyant forces of design basis flood
FS = Factor of Safety

Table 3.8.5-201 Factors of Safety for RB/FB Foundation Stability

	Overturning		Sliding		Floatation	
Load Combination	SRP 3.8.5 Minimum FS	Calculated FS	SRP 3.8.5 Minimum FS	Calculated FS	SRP 3.8.5 Minimum FS	Calculated FS
D + H + E'	1.1	1923	1.1	3.90	--	--
D + F'	--	--	--	--	1.1	3.48

Where,
D = Dead Load
H = Lateral soil pressure
E' = Safe Shutdown Earthquake
F' = Buoyant forces of design basis flood
FS = Factor of safety

Table 3.8.5-202 Factors of Safety for CB Foundation Stability

Load Combination	Overturning: SRP 3.8.5 Minimum FS	Overturning: Calculated FS	Sliding: SRP 3.8.5 Minimum FS	Sliding: Calculated FS	Floatation: SRP 3.8.5 Minimum FS	Floatation: Calculated FS
D + H + E'	1.1	1715	1.1	2.59	--	--
D + F'	--	--	--	--	1.1	1.85

Where,
D = Dead Load
H = Lateral soil pressure
E' = Safe Shutdown Earthquake
F' = Buoyant forces of design basis flood
FS = Factor of safety

Appendix 3A Seismic Soil-Structure Interaction Analysis

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

3A.1 Introduction

Replace the last sentence in the second paragraph with the following.

EF3 CDI Site-specific geotechnical data is described in Chapter 2. This data is compatible with the site enveloping parameters considered in the standard design.

3A.2 ESBWR Standard Plant Site Plan

Replace the first two sentences of the first paragraph with the following.

EF3 CDI The site plan is shown in Figure 2.1-204. The plan orientation is denoted on the figure.

INSERT B

Appendix 3B Containment Hydrodynamic Load Definitions

This section of the referenced DCD is incorporated by reference with no departures or supplements.

Appendix 3C Computer Programs Used in the Design and Analysis of Seismic Category I Structures

This section of the referenced DCD is incorporated by reference with no departures or supplements.

Appendix 3D Computer Programs Used in the Design of Components, Equipment, and Structures

This section of the referenced DCD is incorporated by reference with no departures or supplements.

Appendix 3E [Deleted]

Appendix 3F Response of Structures to Containment Loads

This section of the referenced DCD is incorporated by reference with no departures or supplements.

INSERT B

3A.5 *SOIL-STRUCTURE INTERACTION ANALYSIS METHOD*

3A.5.2 SASSI2000 Analysis Method

Replace the second sentence of the first paragraph with the following.

EF3 CDI

The program uses finite elements with complex moduli for modeling the structure and foundation properties and is based on the direct method and the frequency domain complex response method.