Nuclear Innovation
North America LLC
4000 Avenue F, Suite A
Bay City, Texas 77414

July 6, 2011
U7-C-NINA-NRC-110096

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville MD 20852-2738

South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Supplemental Response to Request for Additional Information

During an audit on May 23-27, 2011, the NRC Staff requested that Nuclear Innovation North America LLC (NINA) provide additional information to support the review of the Combined License Application (COLA). Attached is a supplemental response to NRC staff question included in Request for Additional Information (RAI) 03.07.01-27 related to COLA Part 2, Tier 2, Section 3.7.

There are no commitments in this letter.

If you have any questions regarding these responses, please contact me at (361) 972-7136 or Bill Mookhoek at (361) 972-7274.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 7/6/11

Scott Head
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

jep

Attachment:
RAI 03.07.01-27, Supplement 4

D091
NRD

STI 32897419

cc: w/o attachment except*
(paper copy)

Director, Office of New Reactors
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064

Kathy C. Perkins, RN, MBA
Assistant Commissioner
Division for Regulatory Services
Texas Department of State Health Services
P. O. Box 149347
Austin, Texas 78714-9347

Alice Hamilton Rogers, P.E.
Inspection Unit Manager
Texas Department of State Health Services
P. O. Box 149347
Austin, Texas 78714-9347

*Steven P. Frantz, Esquire
A. H. Gutterman, Esquire
Morgan, Lewis & Bockius LLP
1111 Pennsylvania Ave. NW
Washington D.C. 20004

*Tom Tai
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852

(electronic copy)

*George F. Wunder
*Tom Tai
Charles Casto
U. S. Nuclear Regulatory Commission

Jamey Seely
Nuclear Innovation North America

Peter G. Nemeth
Crain, Caton and James, P.C.

Richard Peña
Kevin Pollo
L. D. Blaylock
CPS Energy

RAI 03.07.01-27, Supplement 4

QUESTION:

Follow-up Question to RAI 03.07.01-19 (STP-NRC-100093)

1. 10CFR50, Appendix S requires that evaluation for SSE must take into account soil-structure interaction (SSI) effects and the expected duration of vibratory motion. In the response to the first paragraph of RAI 03.07.01-19, the applicant has presented its approach for developing the input motion for the SSI analysis and design of the DGFOSV that takes into account the impact of the nearby heavy RB and RSW Pump House structures. The applicant also stated that *"Conservatively, a 3-dimensional SAP2000 response spectrum analysis was used to obtain the safe-shutdown earthquake (SSE) design forces due to structure inertia. The seismic induced dynamic soil pressure on DGFOSV walls were computed using the method of ASCE 4-98, Subsection 3.5.3.2"* The response, however, does not provide details as to how the SSI analysis of the DGFOSV are performed and how the input motion developed are subsequently specified in the SSI analysis of DGFOSV to develop the structural response and in-structure response spectra for any equipment and subsystems within DGFOSV. From the response it appears that the applicant has not included explicitly DGFOSV structural model in the SASSI model of the RB and RSW Pump House structures to properly evaluate the SSSI effect on the DGFOSV. In order for the staff to determine if the evaluation of DGFOSV for SSE has appropriately accounted SSI effects, the applicant is requested to provide in the FSAR the following information:

   (a) Describe in detail the method used for the SSI analysis of DGFOSV including the procedures for treatment of strain dependent backfill material properties in the model, input motion used and how it is specified in the analysis, variation of soil properties, and the computer programs used for SSI analysis.

   (b) Describe in detail how SAP2000 analysis of DGFOSV was performed including, how foundation soil/backfill material was represented, how many modes were extracted, what modal damping values were used, how the input motion was specified, and what type of boundary conditions were used.

   (c) Demonstrate that the DGFOSV foundation response spectra and dynamic soil pressure (on DGFOSV basement walls using ASCE 4-98 criteria) used in the design of DGFOSV will envelop the results of structure to structure (SSSI) interaction analysis which explicitly models DGFOSV structure in the SSI model of RB and the RSW Pump House structure.

   (d) Describe in detail if there is any Category I tunnel structure for transporting Diesel Fuel Oil between DGFOSV and the Diesel Generator located in other buildings including its layout and configuration and seismic analysis and design method.

2. In the response to Item 2 of RAI 03.07.01-19, the applicant has stated that the P-wave damping ratios are assigned the same values as those calculated for the S-wave damping ratios because of the upcoming recommendations of ASCE 4-09 standards. It is further stated that this recommendation is based on the recent observation of earthquake data and the realization that the waves generated due to SSI effects are mainly surface and shear waves. It is noted that the NRC has not endorsed ASCE 4-09 for estimating the P-wave damping. In general, the P-wave damping is primarily associated with the site response rather than SSI effects. Because the Pwave energy for the most part will travel in water within the saturated soil media at relatively high propagation speed and is not affected by shear strains of degraded soil, the P-wave damping will be small. As such, the applicant is requested to provide quantitative assessment by performing sensitivity analysis that shows that seismic responses of Category I structures are not adversely affected to a lower P-wave damping.

SUPPLEMENTAL RESPONSE:

The Supplement 3 response to this RAI was submitted with Nuclear Innovation North America (NINA) letter U7-C-NINA-NRC-110076, dated May 16, 2011. This supplement provides the response to the following action items discussed in the NRC audit performed during the week of May 23, 2011.

a. *Add in the FSAR that the Large Equipment Access Building (LEAB) foundation will be designed such that the surcharge on the DGFOSV located directly east of the LEAB will be negligible (Audit Action Item 3.8-31, Punch List Item 79)*

   See COLA mark-up for Section 3H.6.7 shown in the Enclosure.

b. *The COLA will be revised to refer to Figures 3H.6-212 through 3H.6-217 for RSW Piping Tunnel design (Audit Action Item 3.8-32, Punch List Item 80)*

   See COLA mark-up for Section 3H.6.4.3.3.3 shown in the Enclosure. Also included in the Enclosure are additional clarifications for Sections 3H.6.2, 3H.6.4.3.1.4 and 3H.7.4.3.1.3.

c. *Revise Figure 3H.6-219 to remove 2D 'Alone' soil pressure profile. Also revise the figure to provide seismic pressure profile used for design in lieu of static + dynamic. Also check other figures for the same issues (Audit Action Item 3.7-42, Punch List Item 87)*

   See revised soil pressure figures provided in the Enclosure. These revised figures replace the previous figures (with the same figure numbers) in entirety.

COLA changes due to this response are provided in the Enclosure.

Enclosure

COLA MARK-UPS

These COLA Part 2, Tier 2 mark-ups are based on COLA Revision 5 and subsequent mark-ups provided in RAI responses submitted through March 25, 2011.

3H.6.2 Summary

- Lateral soil pressures for design (Figures 3H.6-41 through 3H.6-~~4344) and~~, Figures 3H.6-218 through 3H.6-220, and Figures 3H.6-232 through 3H.6-240)

3H.6.4.3.1.4 Lateral Soil Pressures (H)

- Poisson's ratio (below groundwater) 0.47
- Surcharge load including the effect of adjacent structures, where applicable.

The calculated lateral soil pressures are presented in figures as indicated:

- Lateral soil pressures for design of UHS/RSW Pump House: ~~Figures 3H.6-41 through 3H.6-43 and~~ Figures 3H.6-232 through 3H.6-240.

3H.6.4.3.3.3 Lateral Soil Pressures Including the Effects of SSE (H')

The calculated lateral soil pressures including the effects of SSE are presented in figures as indicated:

- Lateral soil pressures for design of UHS/RSW Pump House: Figures 3H.6-41 through 3H.6-43 and Figures 3H.6-218~~232~~ through 3H.6-220~~240~~.
- Lateral Soil pressures for design of RSW Piping Tunnels: Figure 3H.6-44 and Figures 3H.6-212~~245~~ through 3H.6-217~~247~~.

3H.6.7 Diesel Generator Fuel Oil Storage Vaults (DGFOSV)

Lateral soil pressures used in design are shown in Figures 3H.6-241 through 3H.6-244.

The Large Equipment Access Building Foundation will be designed such that the surcharge load on the walls of the adjacent DGFOSV is insignificant.

3H.7.4.3.1.3 Lateral Soil Pressures (H)

Lateral soil pressure values are shown in Figures 3H.7-2 through 3H.7-~~48~~.

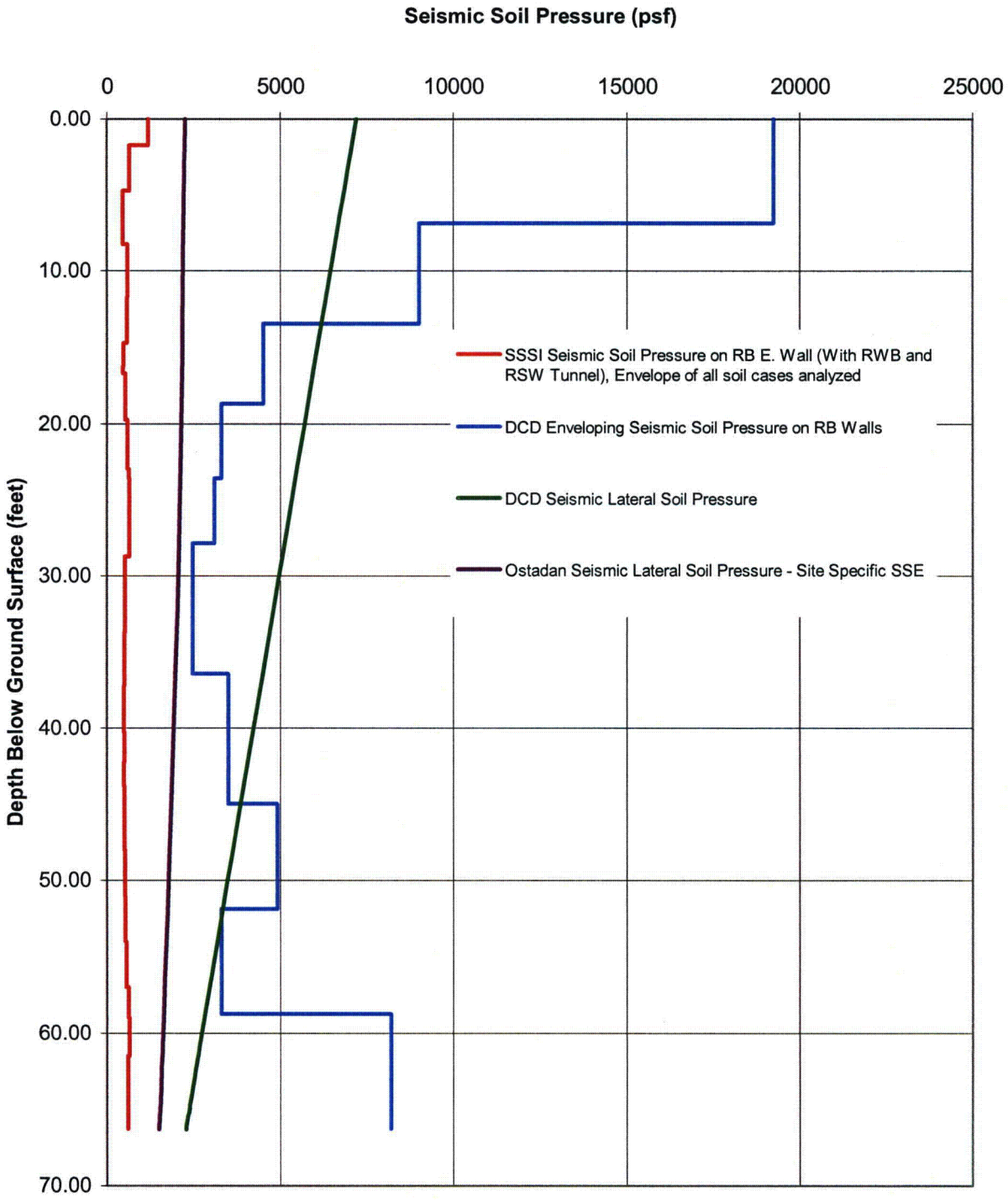

Figure 3H.1-1: Lateral Seismic Soil Pressure Comparison for RB East Wall (Considering RSW Tunnel & Radwaste Building)

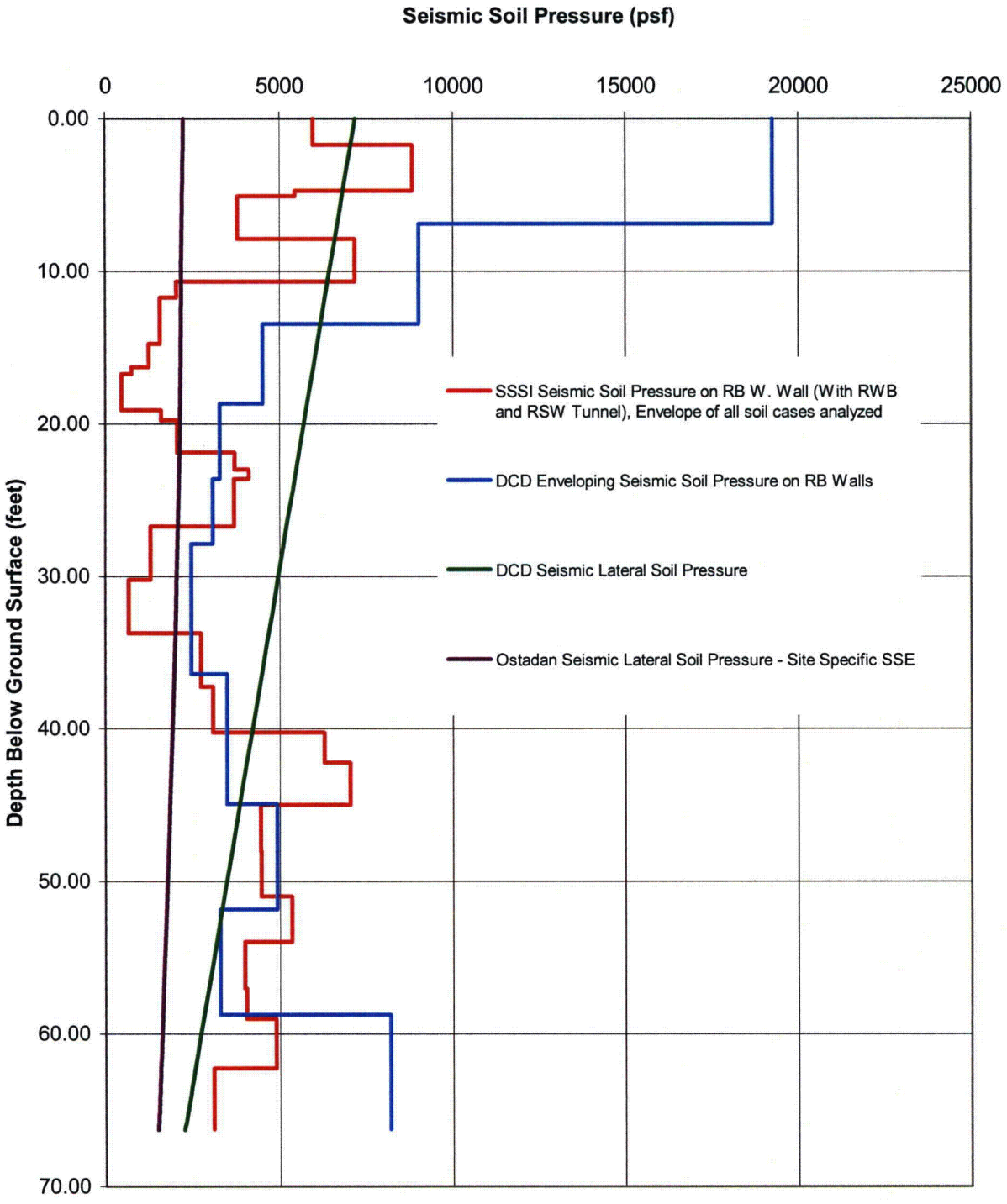

Figure 3H.1-2: Lateral Seismic Soil Pressure Comparison for RB West Wall (Considering RSW Tunnel & Radwaste Building)

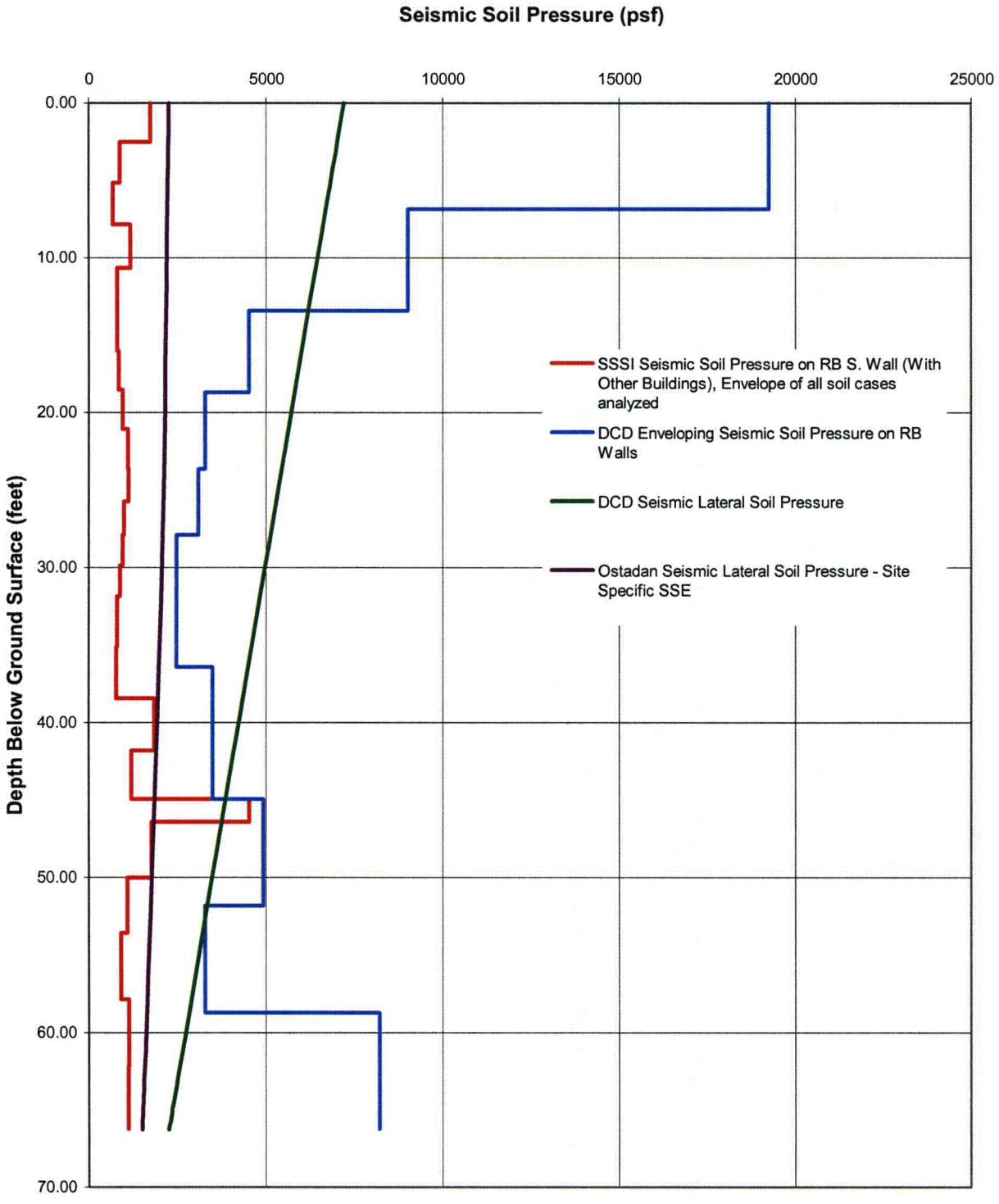

Figure 3H.1-3: Lateral Seismic Soil Pressure Comparison for RB South Wall (Considering DGFOSVs, RSW Tunnel & UHS/RSW Pump House Building)

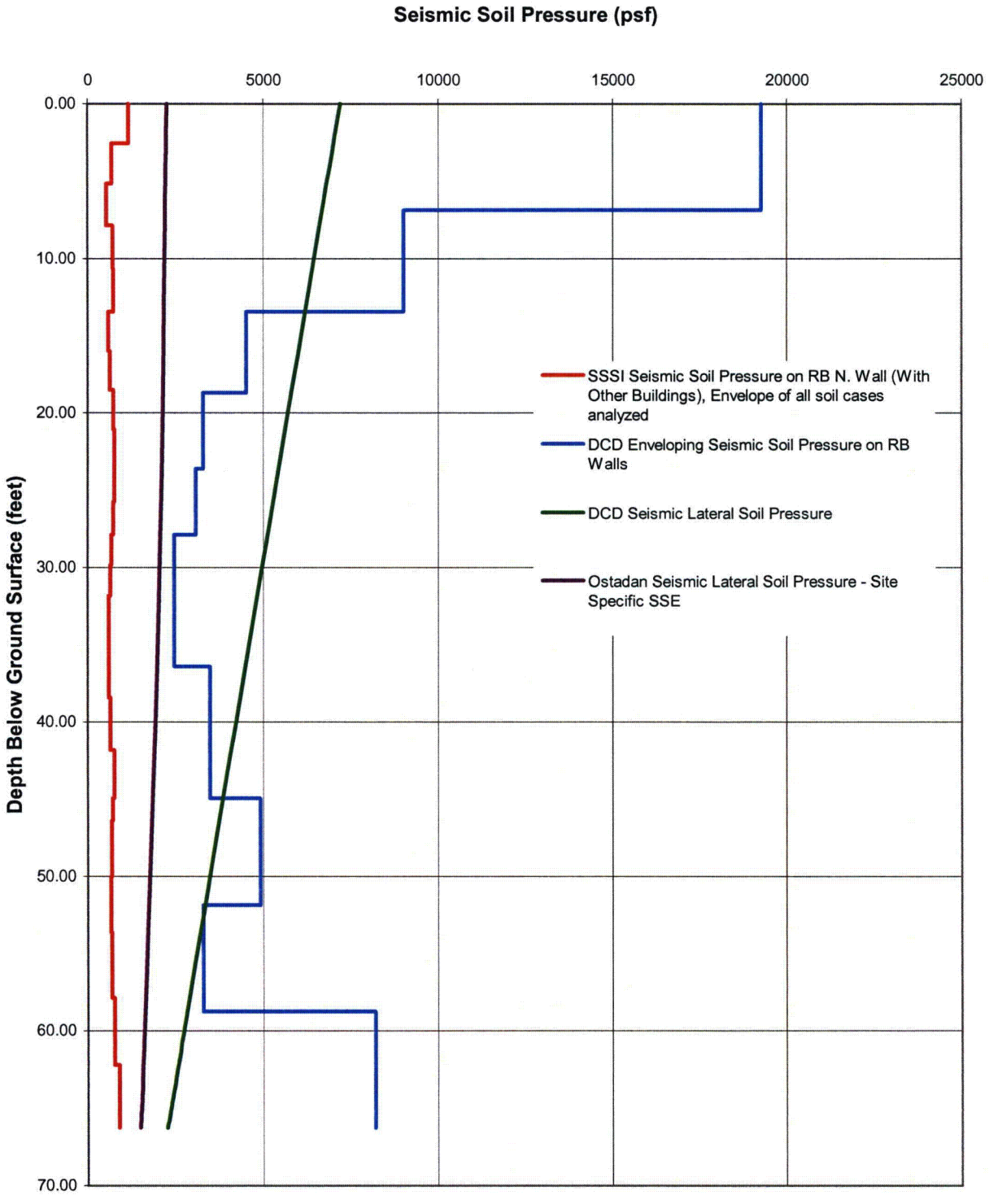

Figure 3H.1-4: Lateral Seismic Soil Pressure Comparison for RB North Wall (Considering DGFOSVs, RSW Tunnel & UHS/RSW Pump House Building)

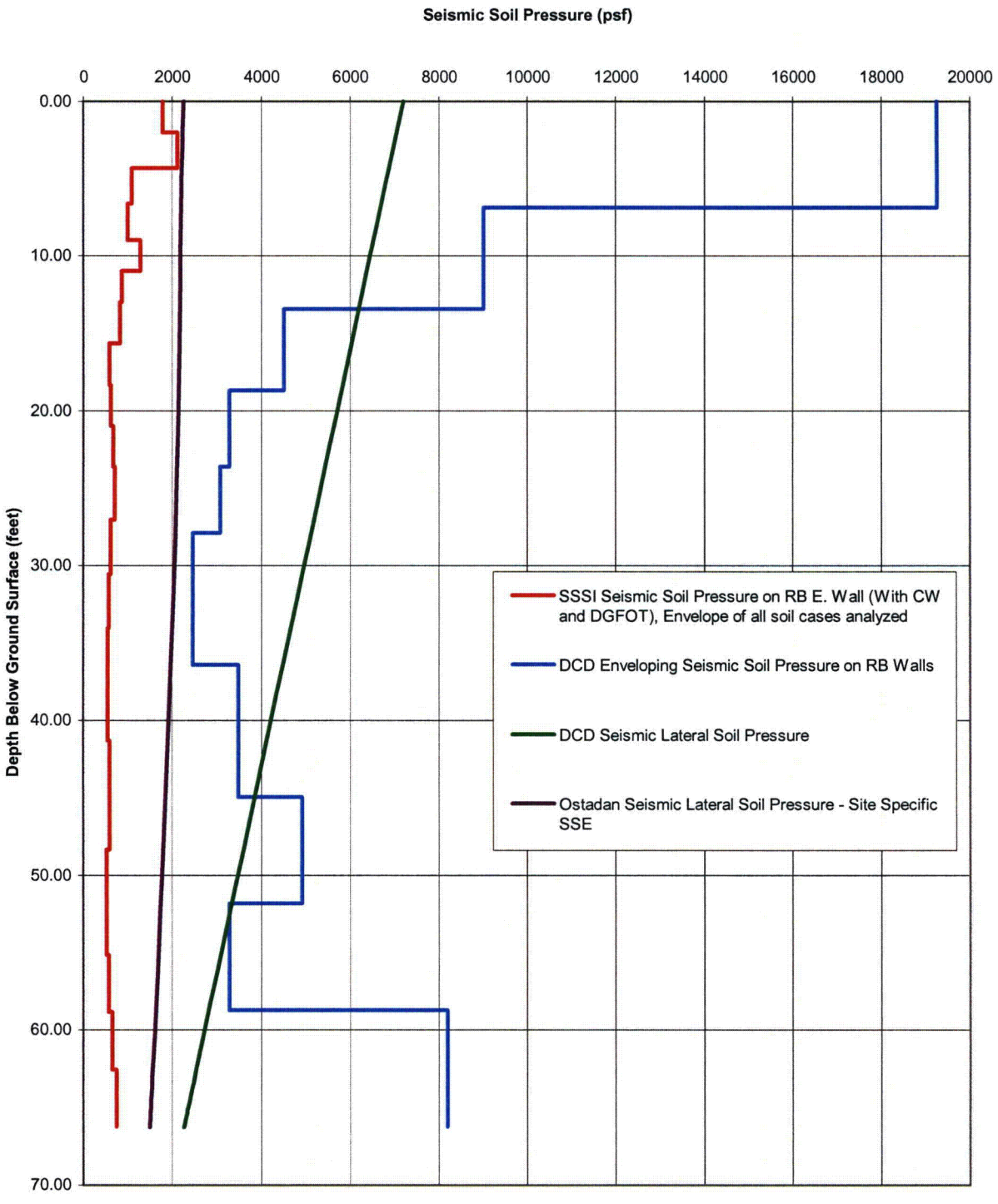

Figure 3H.1-5: Lateral Seismic Soil Pressure Comparison for RB East Wall (Considering DGFOT & Crane Wall)

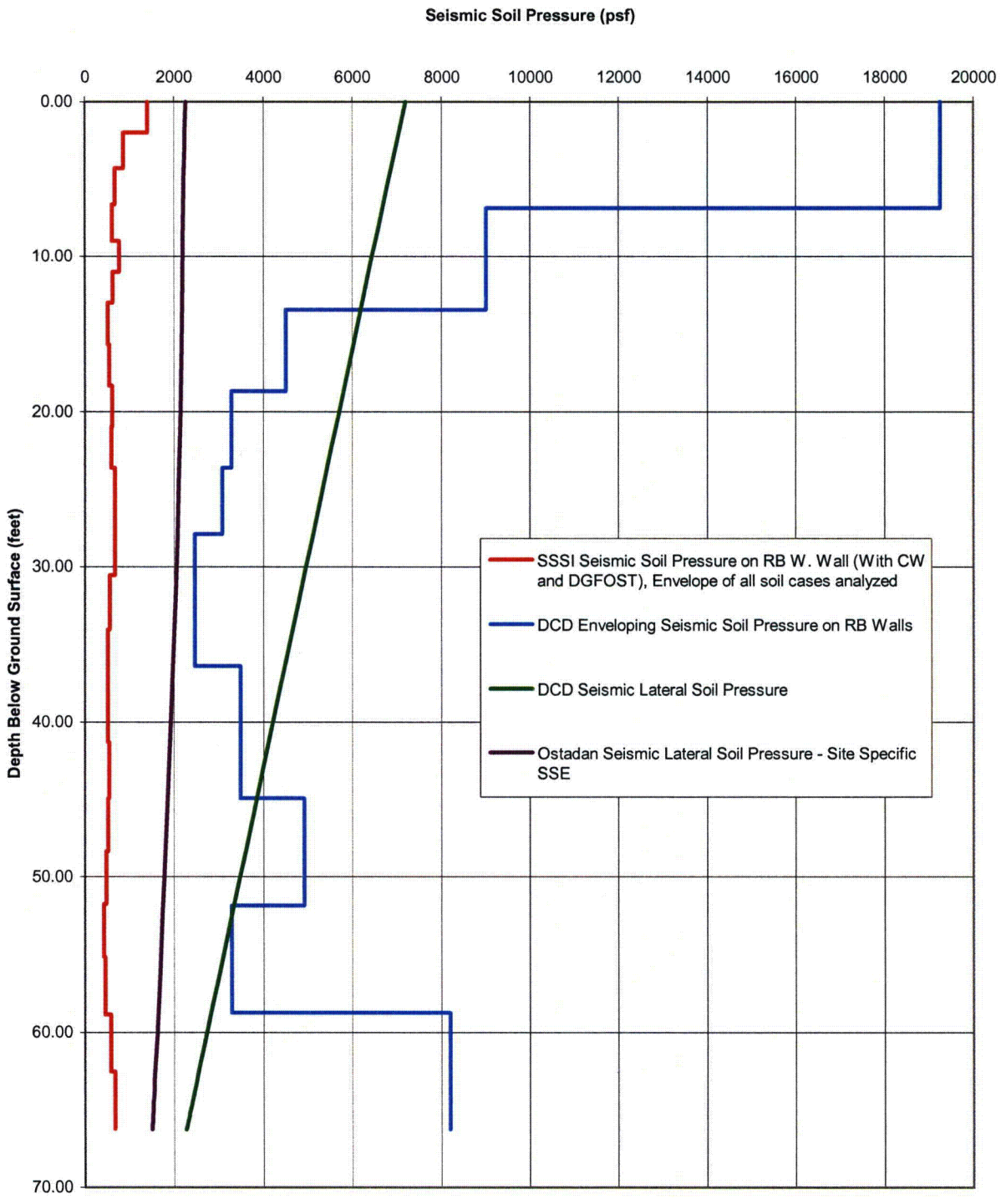

Figure 3H.1-6: Lateral Seismic Soil Pressure Comparison for RB West Wall (Considering DGFOT & Crane Wall)

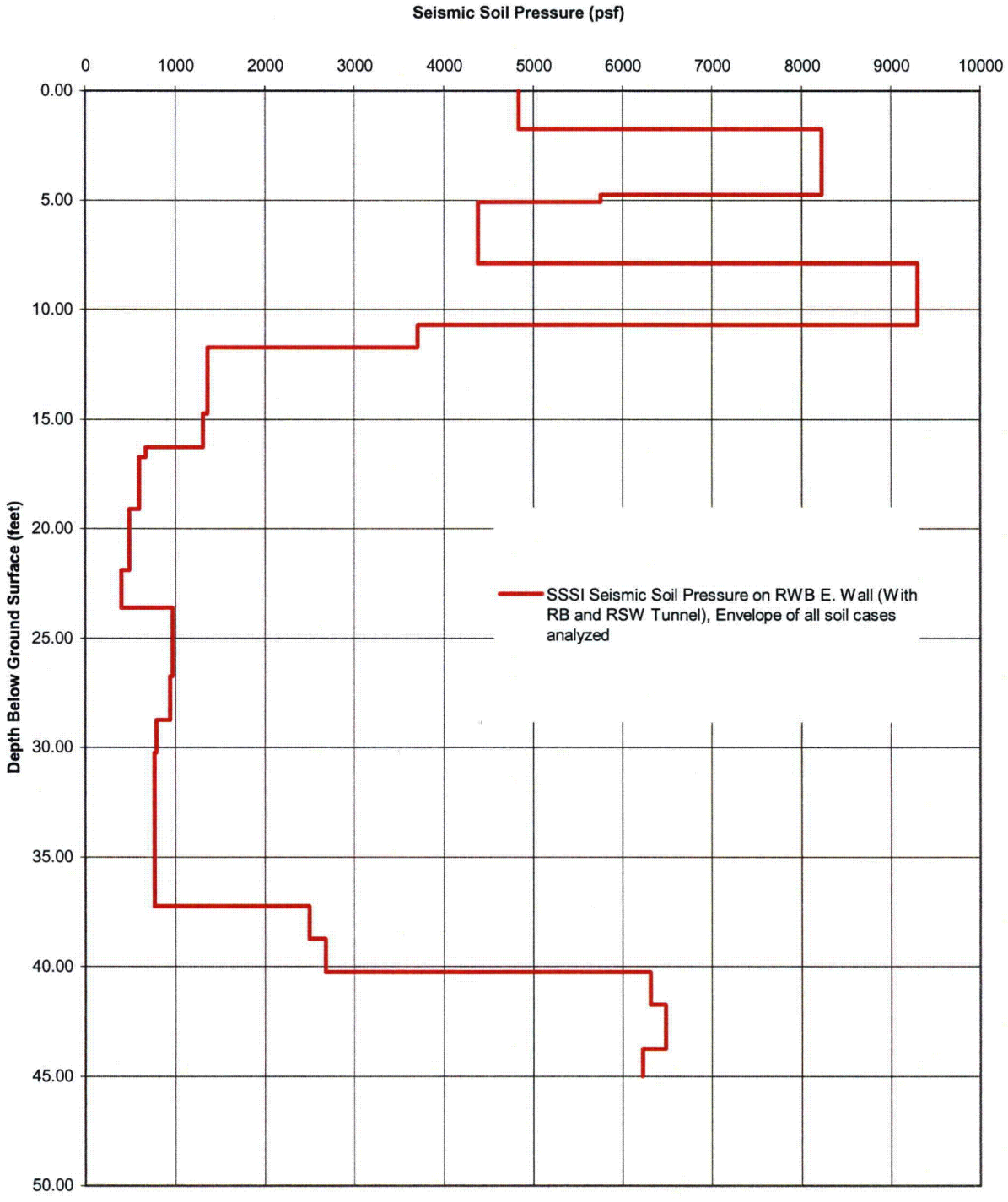

Figure 3H.3-50: ~~SSI and~~ SSSI Lateral Seismic Soil Pressure (psf) on Radwaste Building East Wall

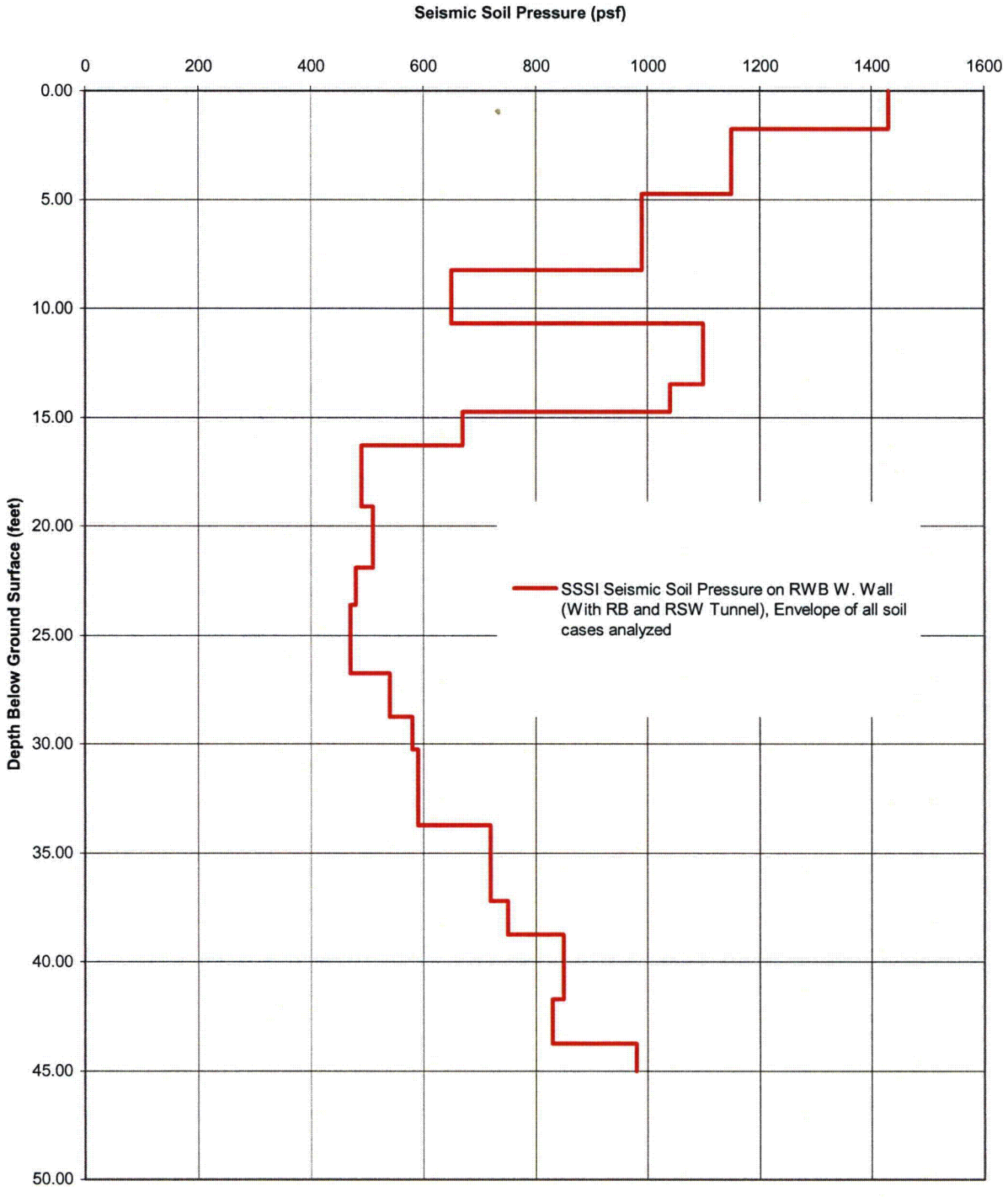

Figure 3H.3-51: ~~SSI and~~ SSSI Lateral Seismic Soil Pressure (psf) on Radwaste Building West Wall

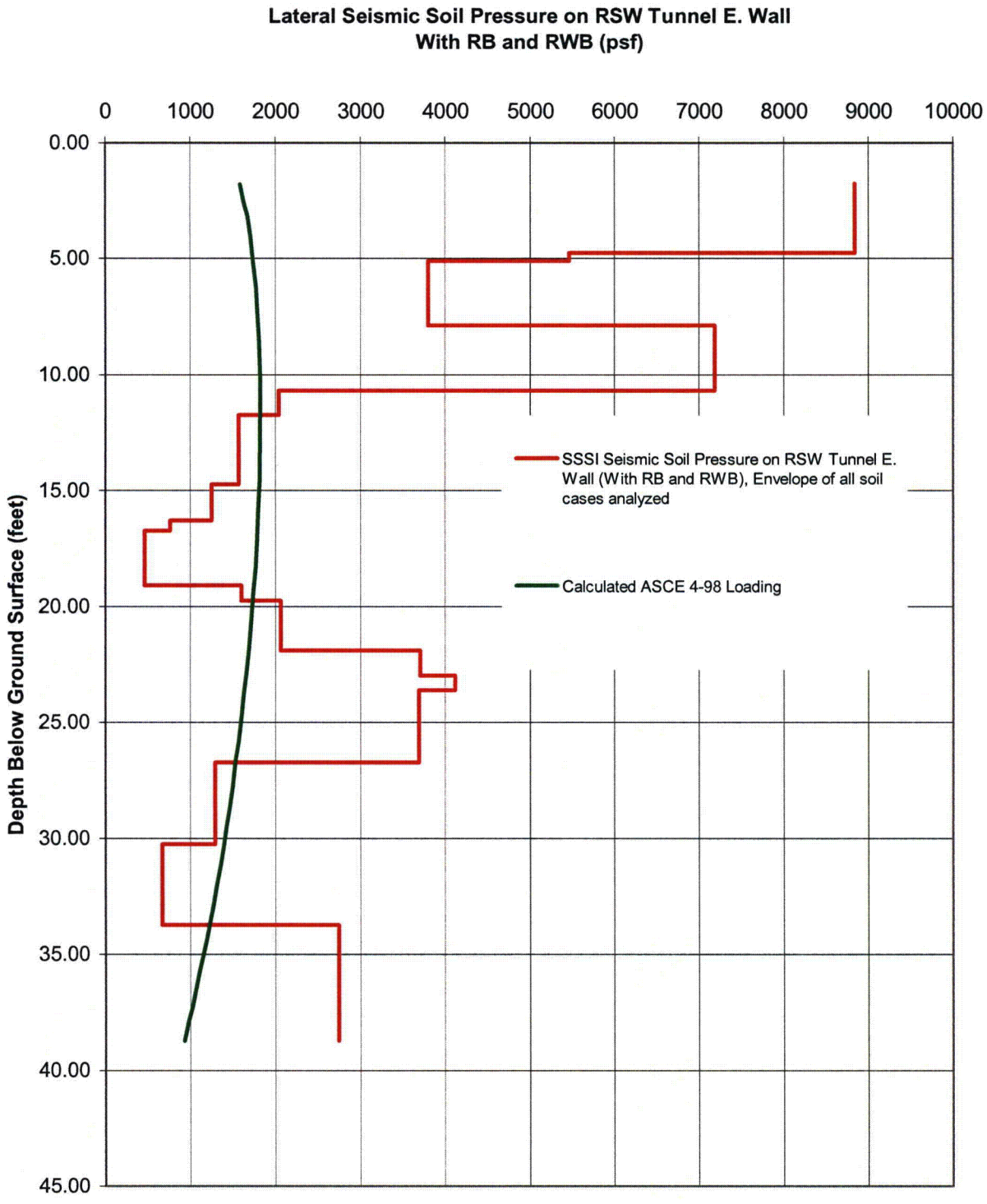

Figure 3H.6-212: Lateral Seismic Soil Pressure (psf) on RSW Piping Tunnel East Wall (Main Cross Section of RSW Piping Tunnel)

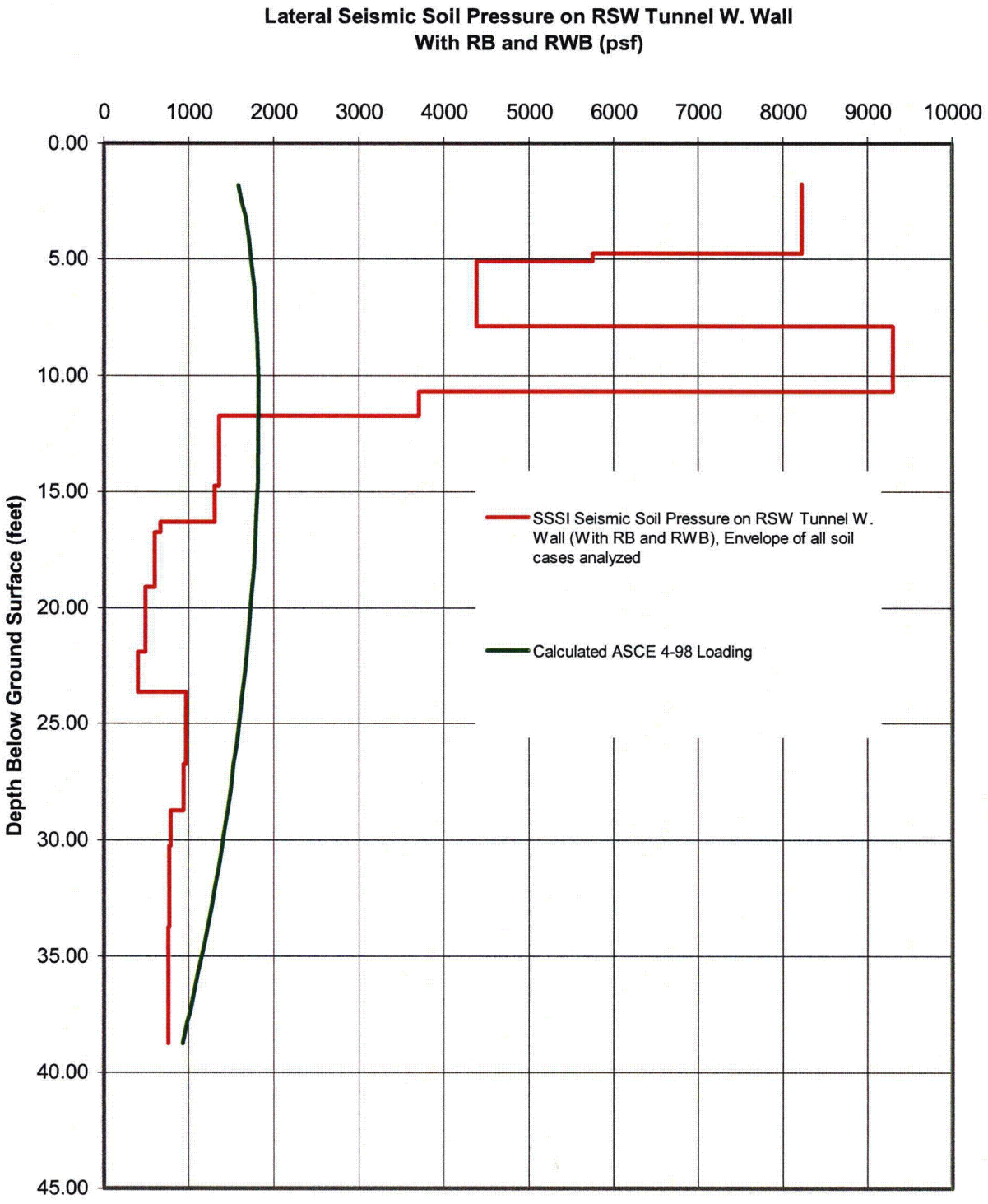

Figure 3H.6-213: Lateral Seismic Soil Pressure (psf) on RSW Piping Tunnel West Wall (Main Cross Section of RSW Piping Tunnel)

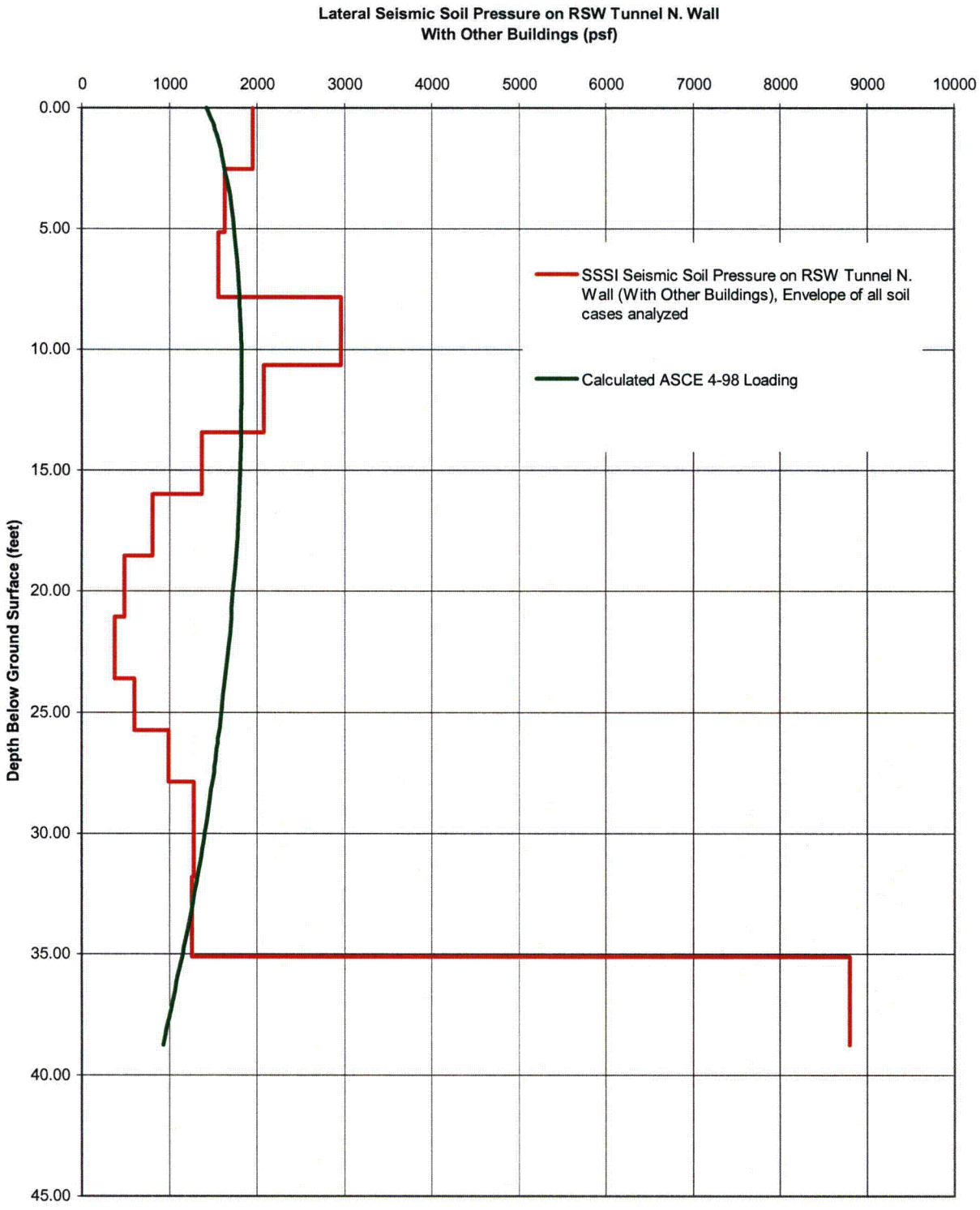

Figure 3H.6-214: Lateral Seismic Soil Pressure (psf) on RSW Piping Tunnel North Wall (RSW Piping Tunnel near UHS/RSW Pump House)

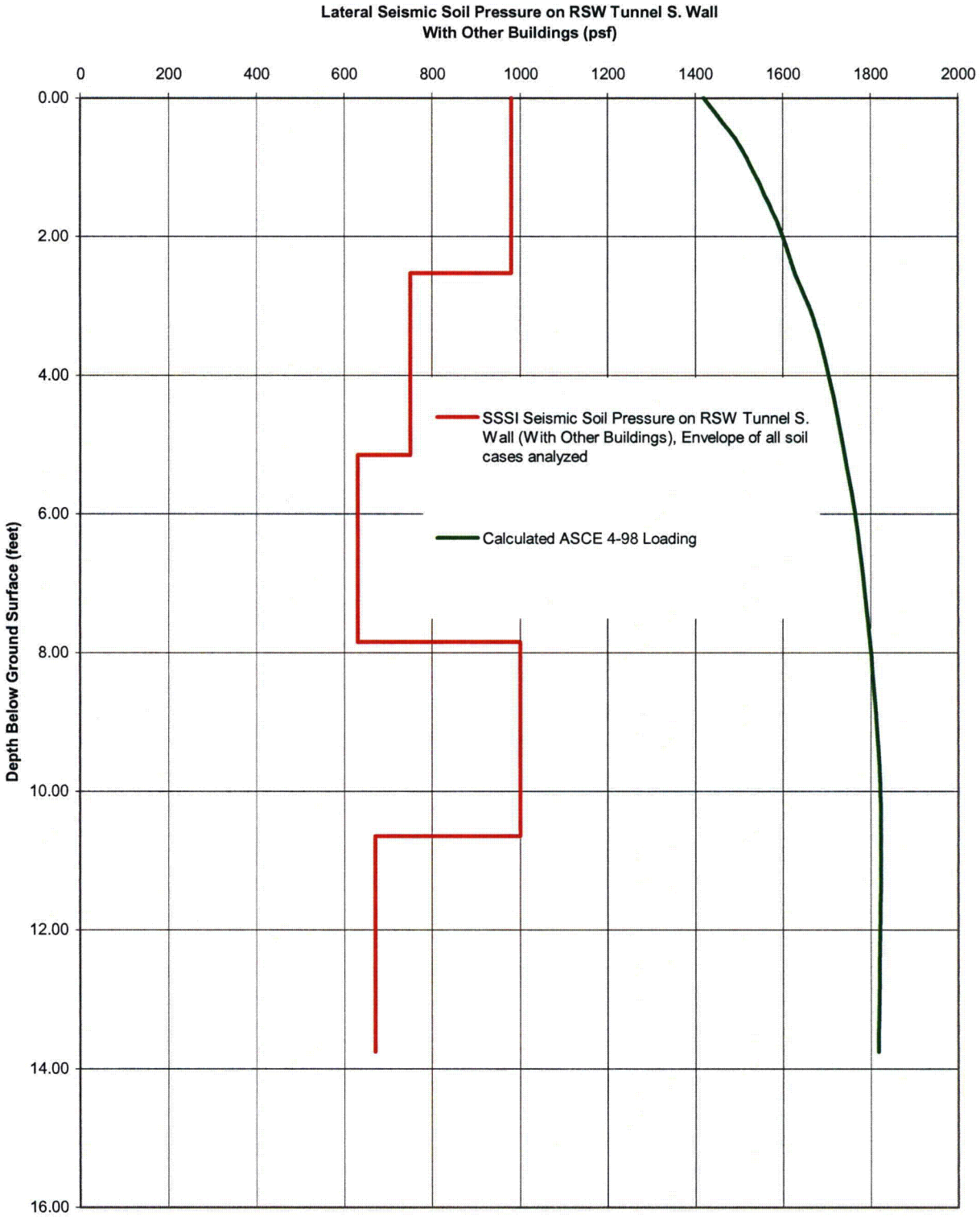

Figure 3H.6-215: Lateral Seismic Soil Pressure (psf) on RSW Piping Tunnel South Wall (RSW Piping Tunnel near UHS/RSW Pump House)

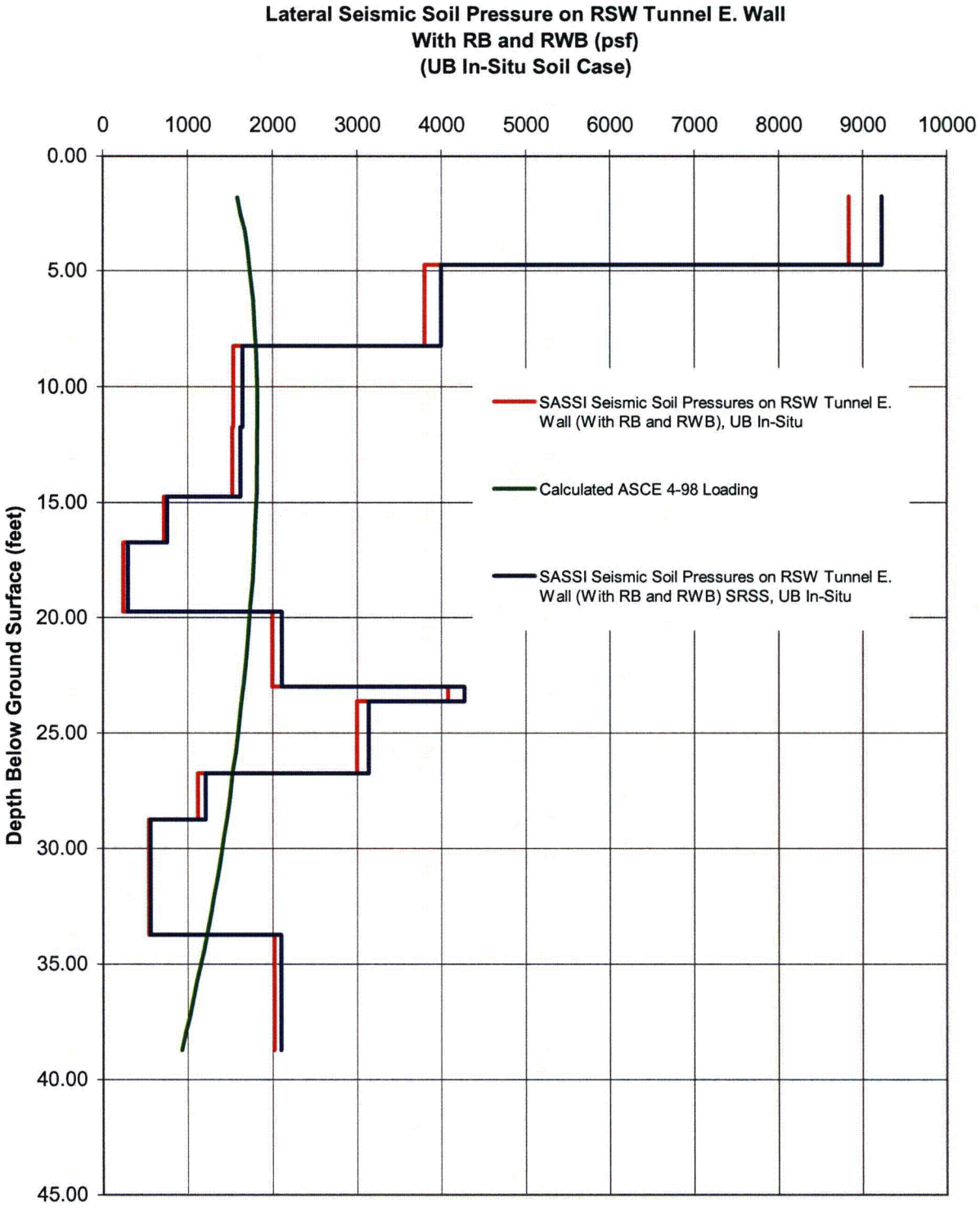

Figure 3H.6-216: Lateral Seismic Soil Pressure (psf) on RSW Piping Tunnel East Wall For UB In-Situ Soil Case (Main Cross Section of RSW Piping Tunnel, Including Effect of Vertical Excitation)

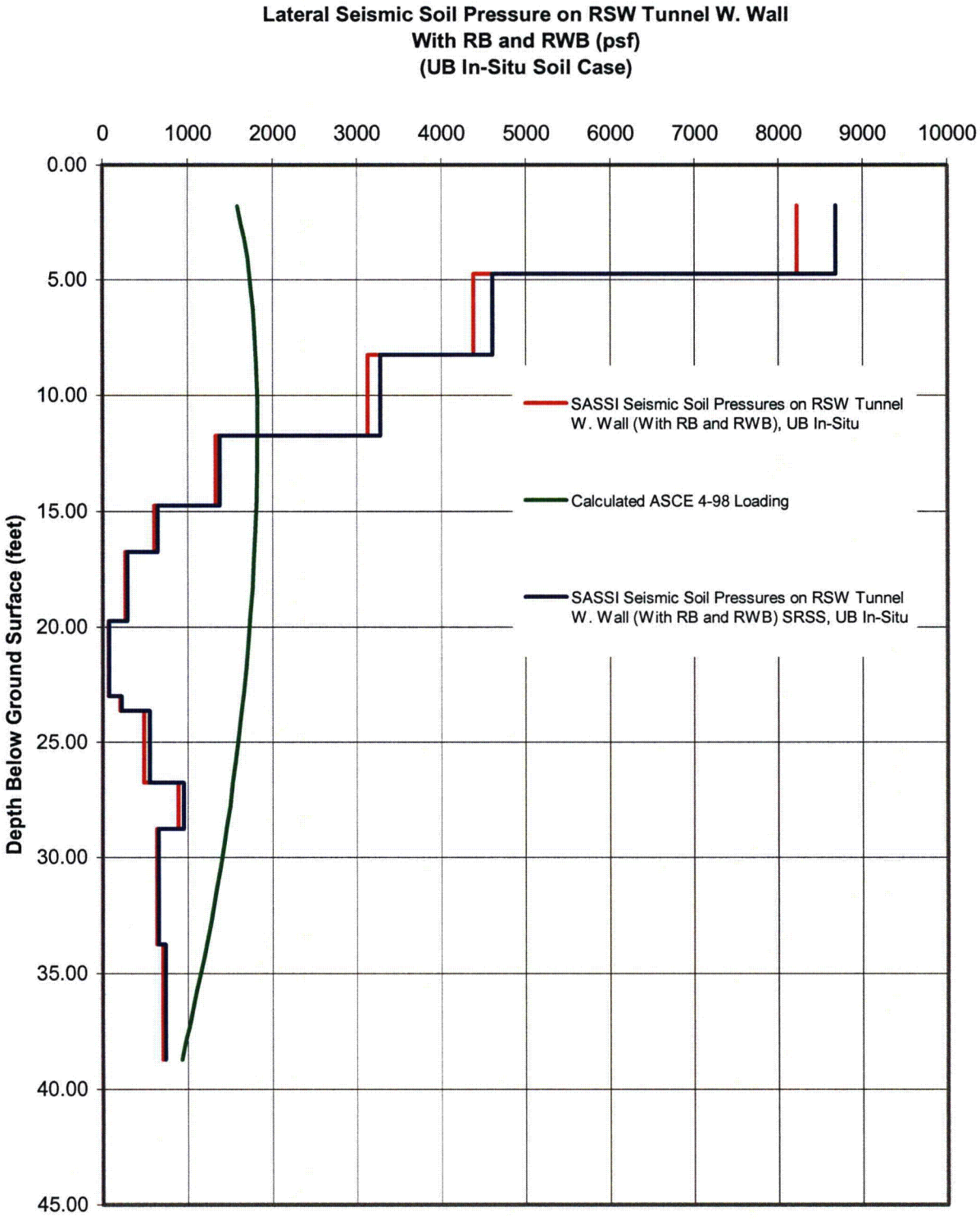

Figure 3H.6-217: Lateral Seismic Soil Pressure (psf) on RSW Piping Tunnel West Wall For UB In-Situ Soil Case (Main Cross Section of RSW Piping Tunnel, Including Effect of Vertical Excitation)

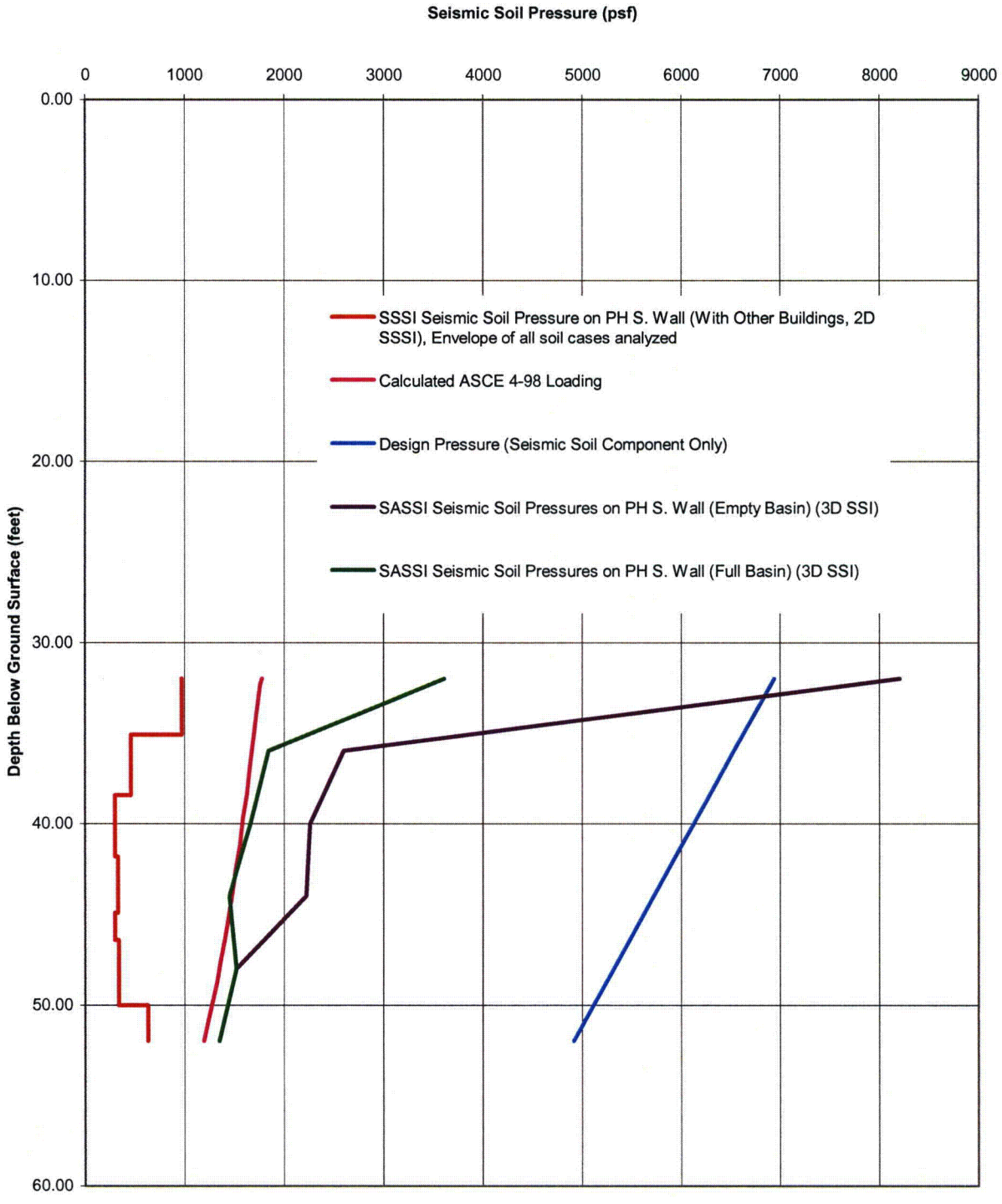

Figure 3H.6-218: SSI, SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures on RSW Pump House South Wall

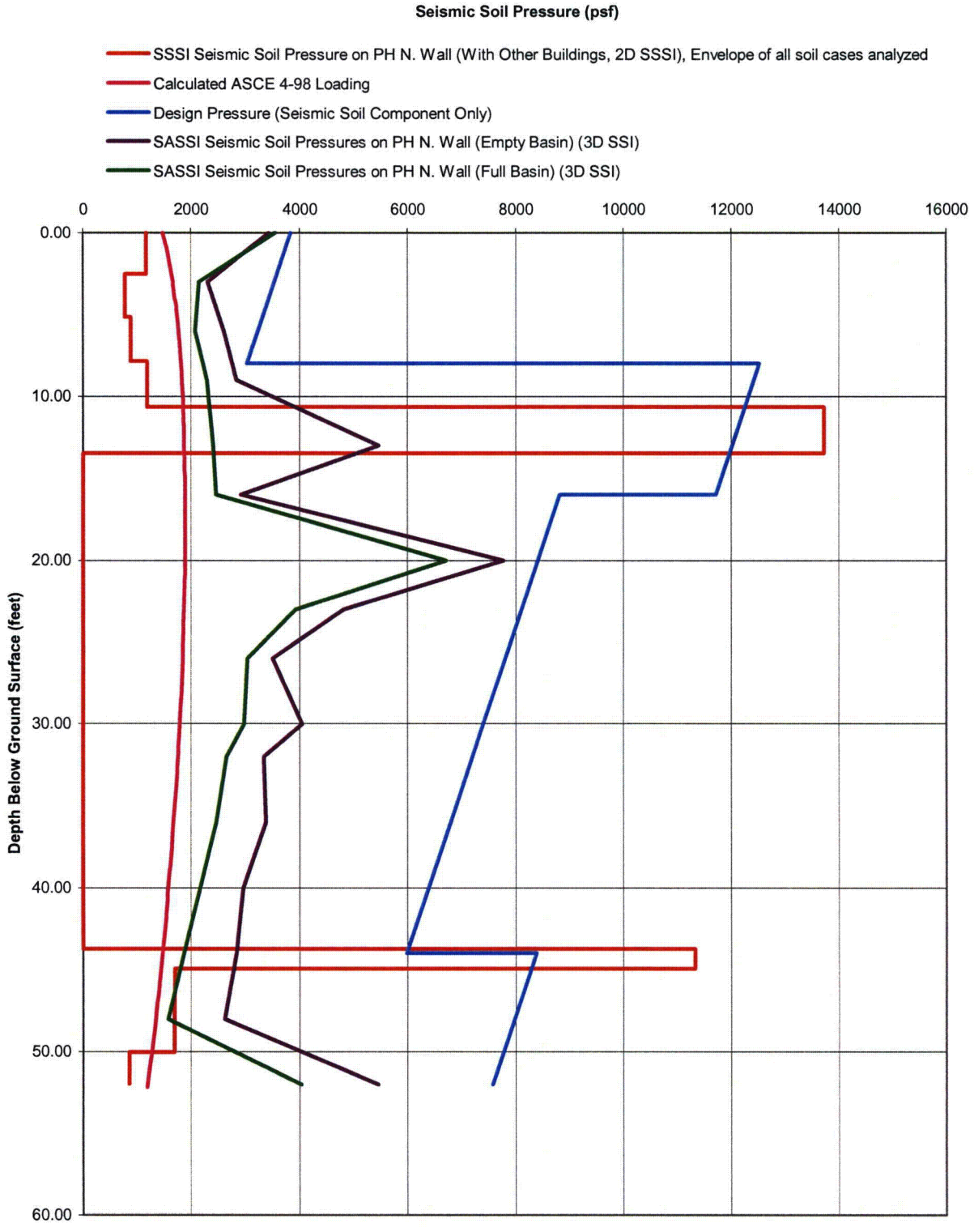

Figure 3H.6-219: SSI, SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures on RSW Pump House North Wall

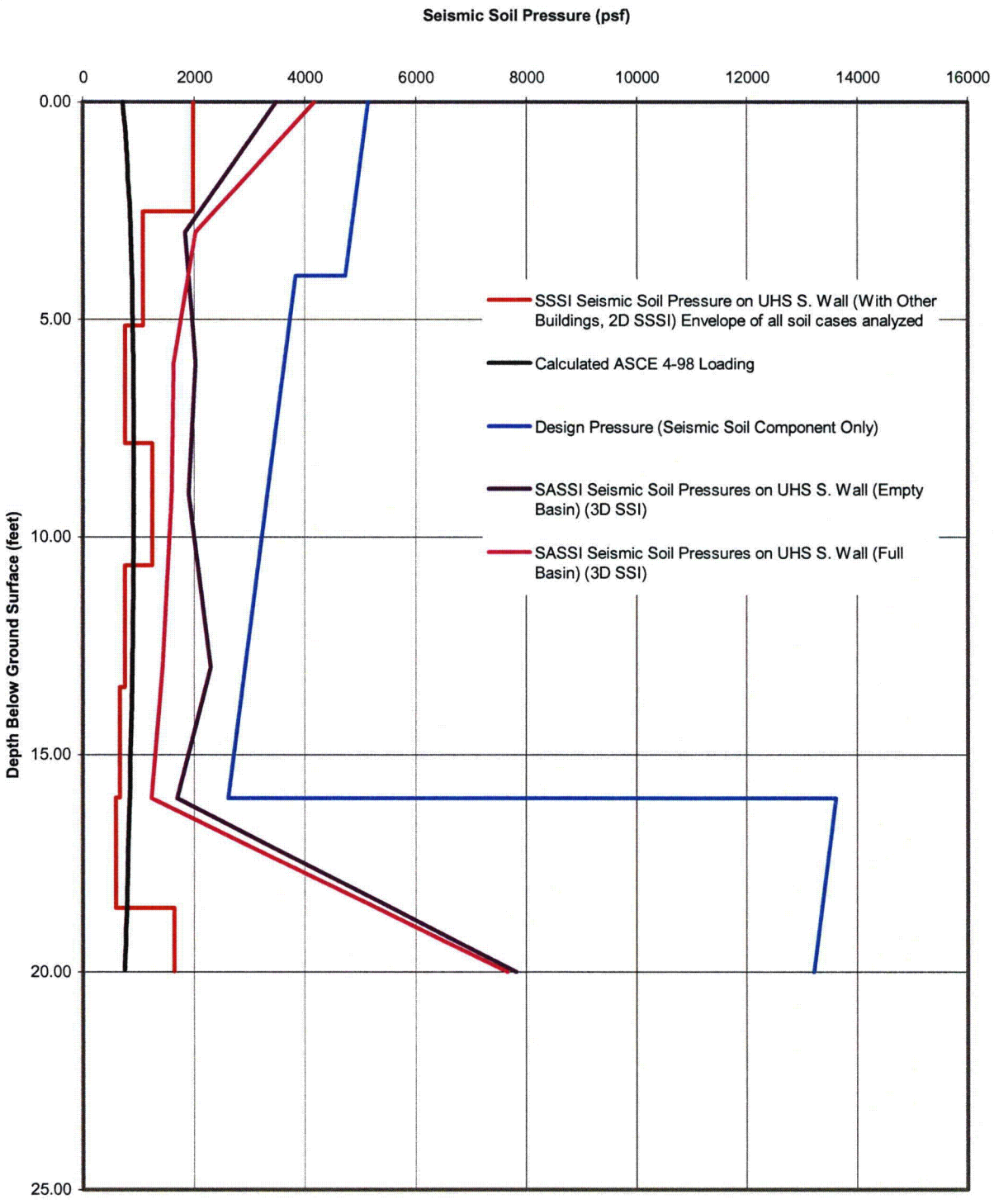

Figure 3H.6-220: SSI, SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures on Ultimate Heat Sink Basin South Wall

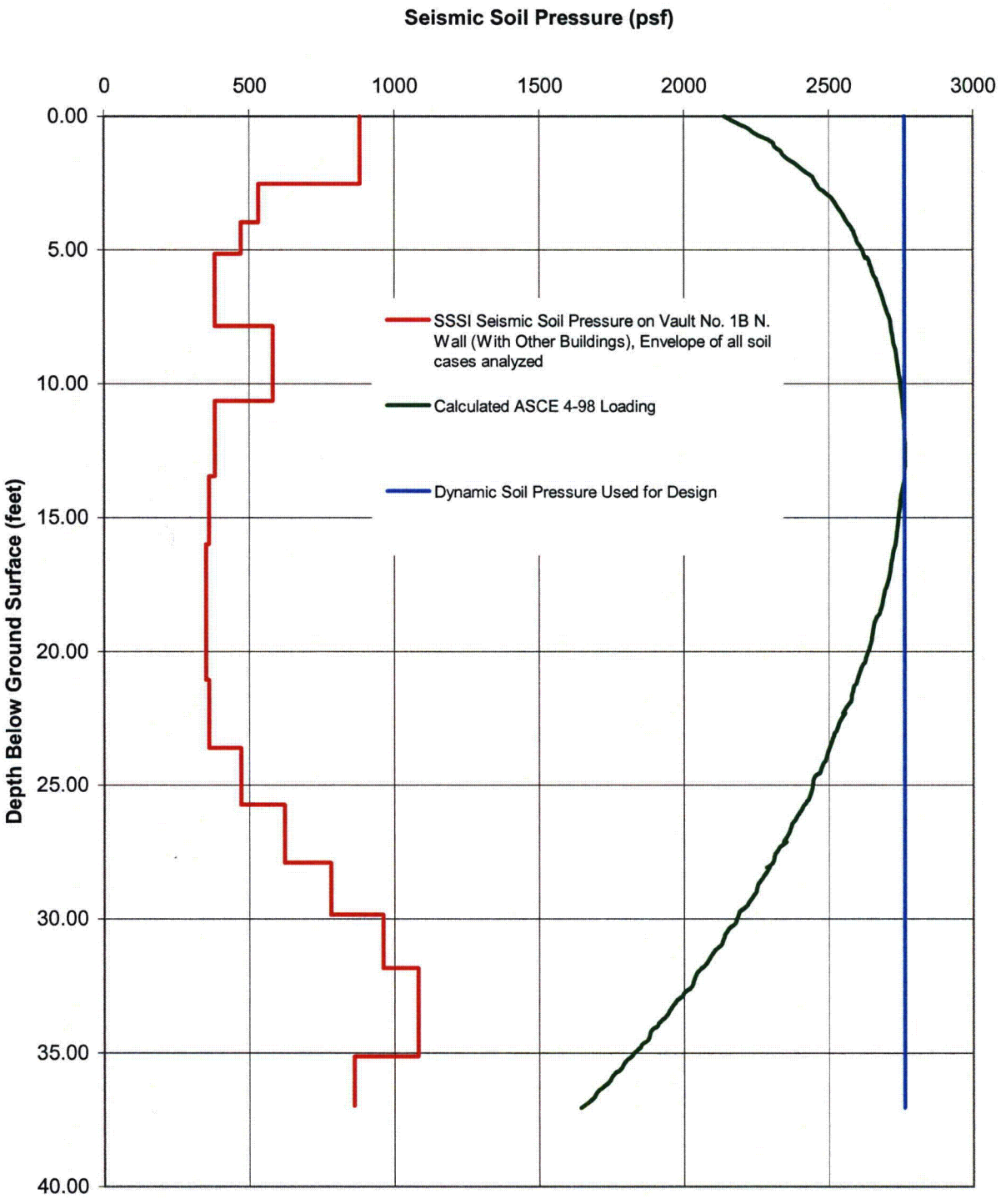

Figure 3H.6-226: ~~SSI~~ SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures on Diesel Generator Fuel Oil Storage Vault No. 1B North Wall

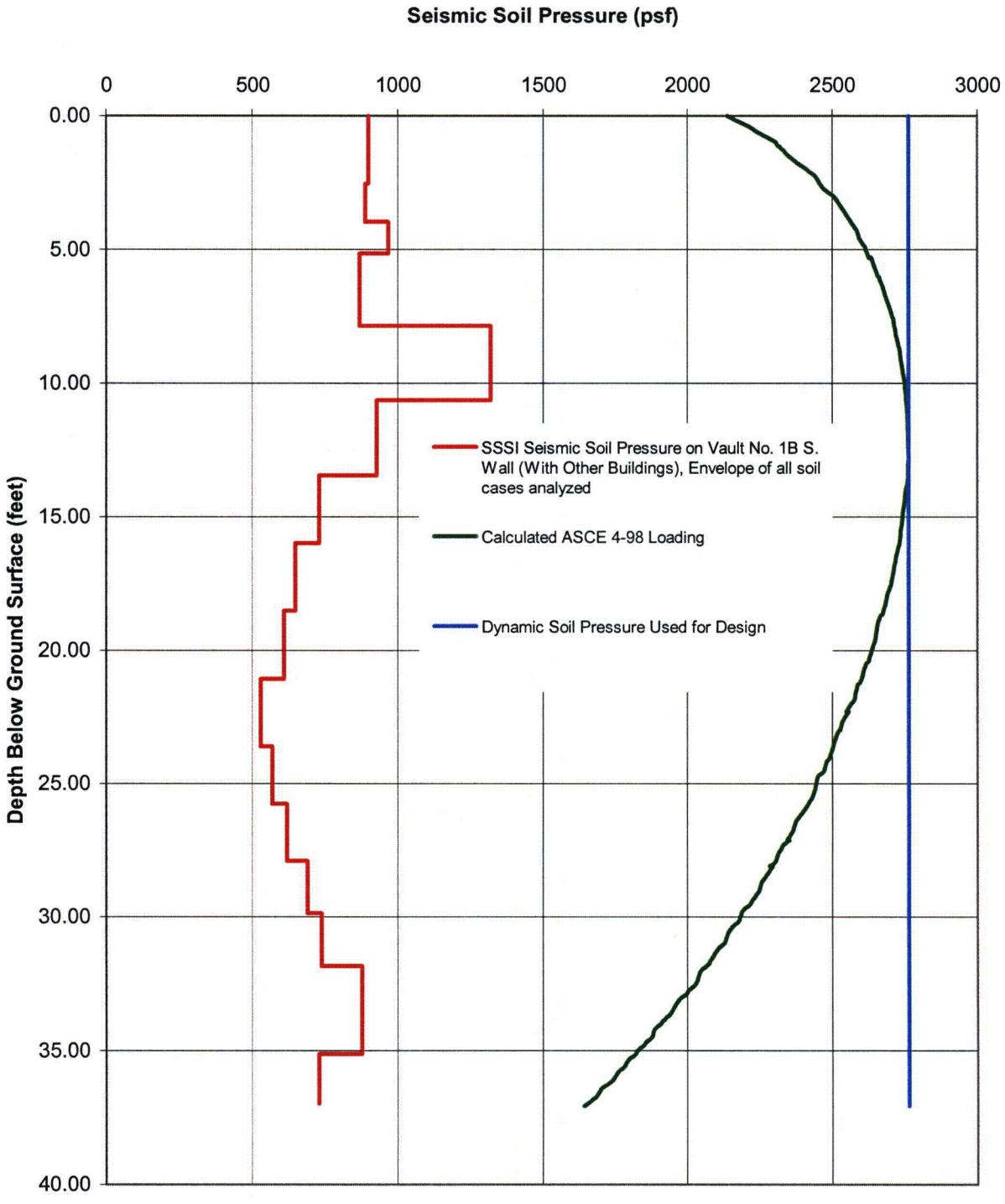

Figure 3H.6-227: ~~SSI,~~ SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures on Diesel Generator Fuel Oil Storage Vault No. 1B South Wall

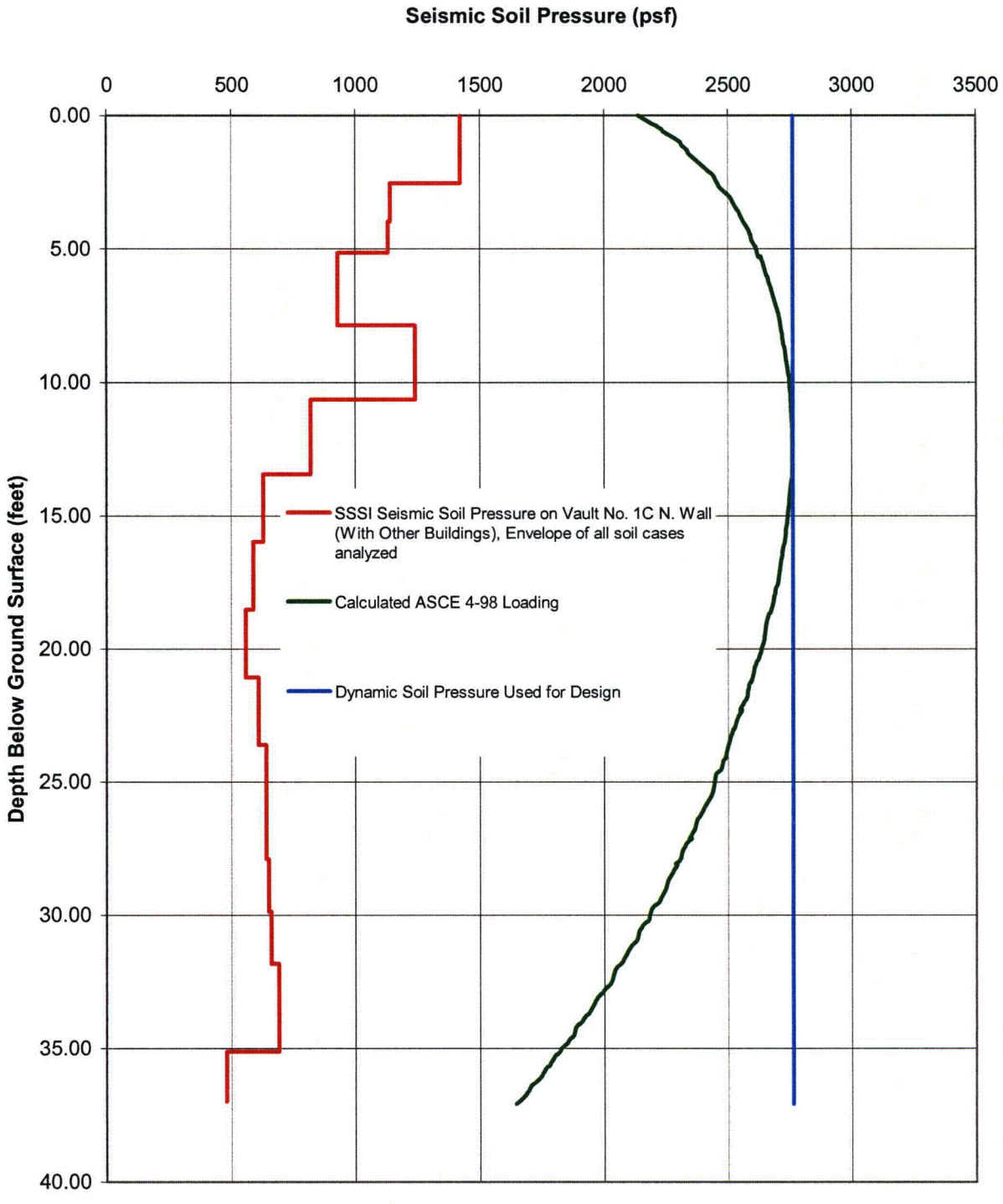

Figure 3H.6-228: ~~SSI,~~ SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures on Diesel Generator Fuel Oil Storage Vault No. 1C North Wall

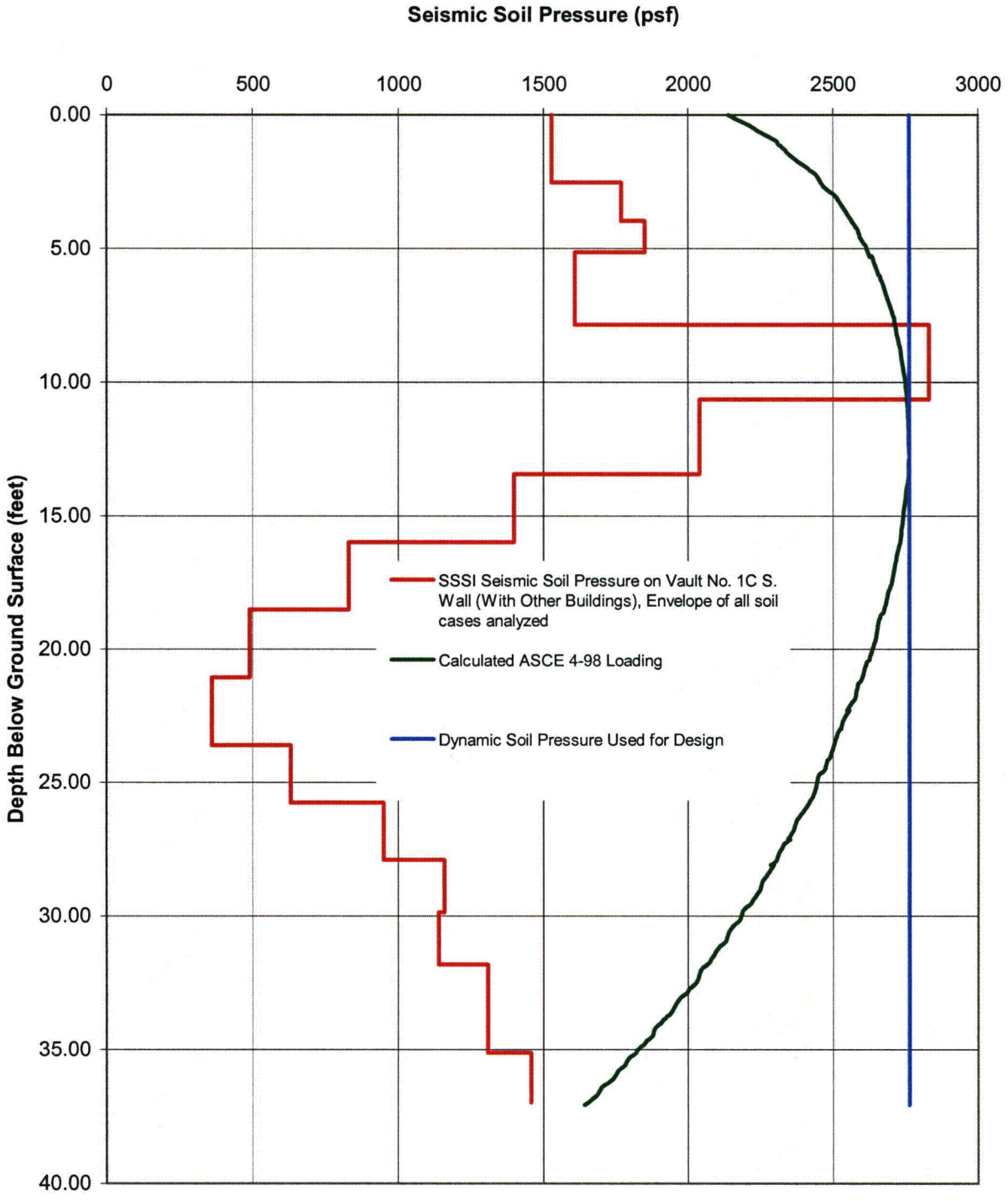

Figure 3H.6-229: ~~SSI,~~ SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures on Diesel Generator Fuel Oil Storage Vault No. 1C South Wall

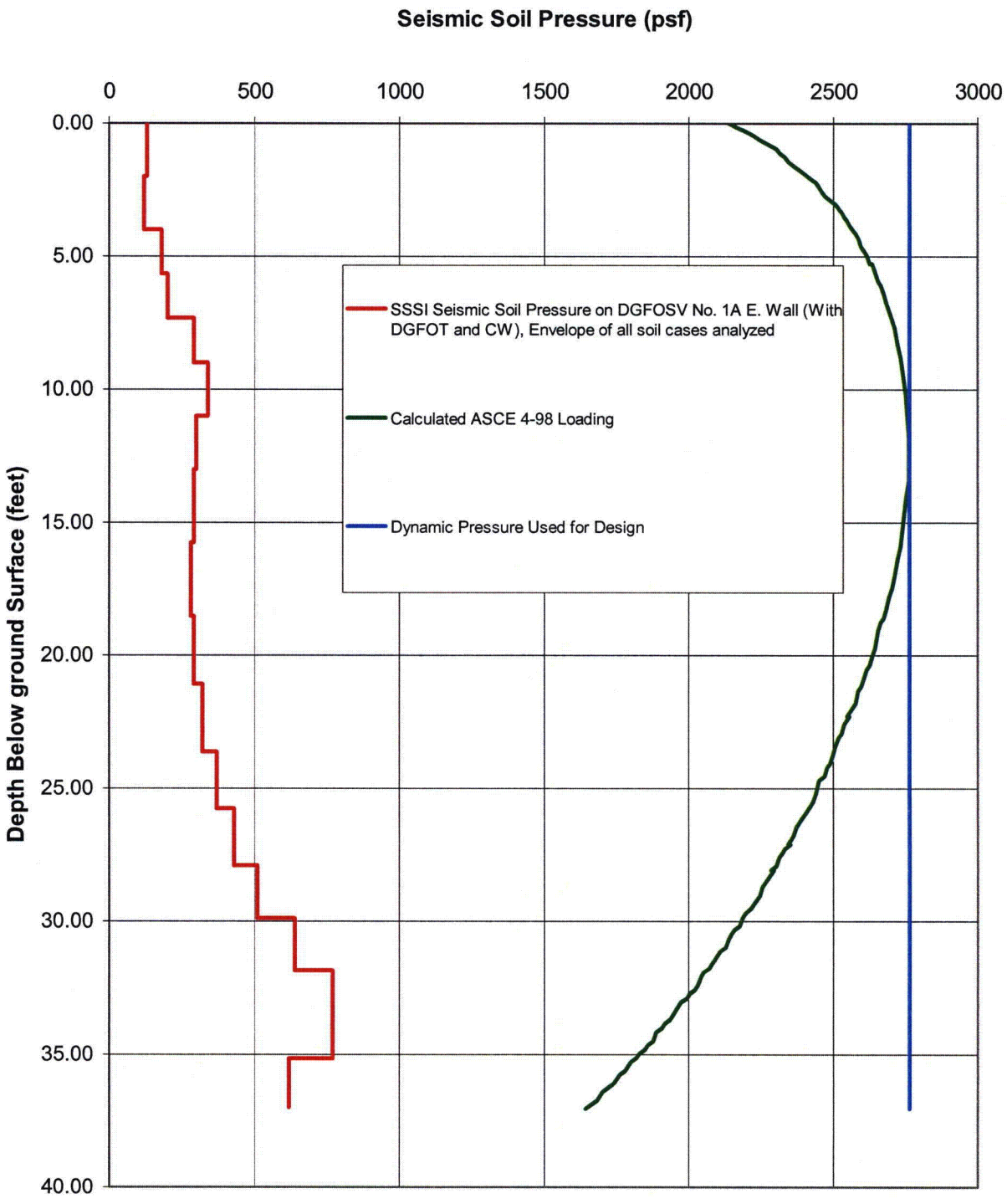

Figure 3H.6-230: ~~SSI,~~ SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures on Diesel Generator Fuel Oil Storage Vault No. 1A East Wall

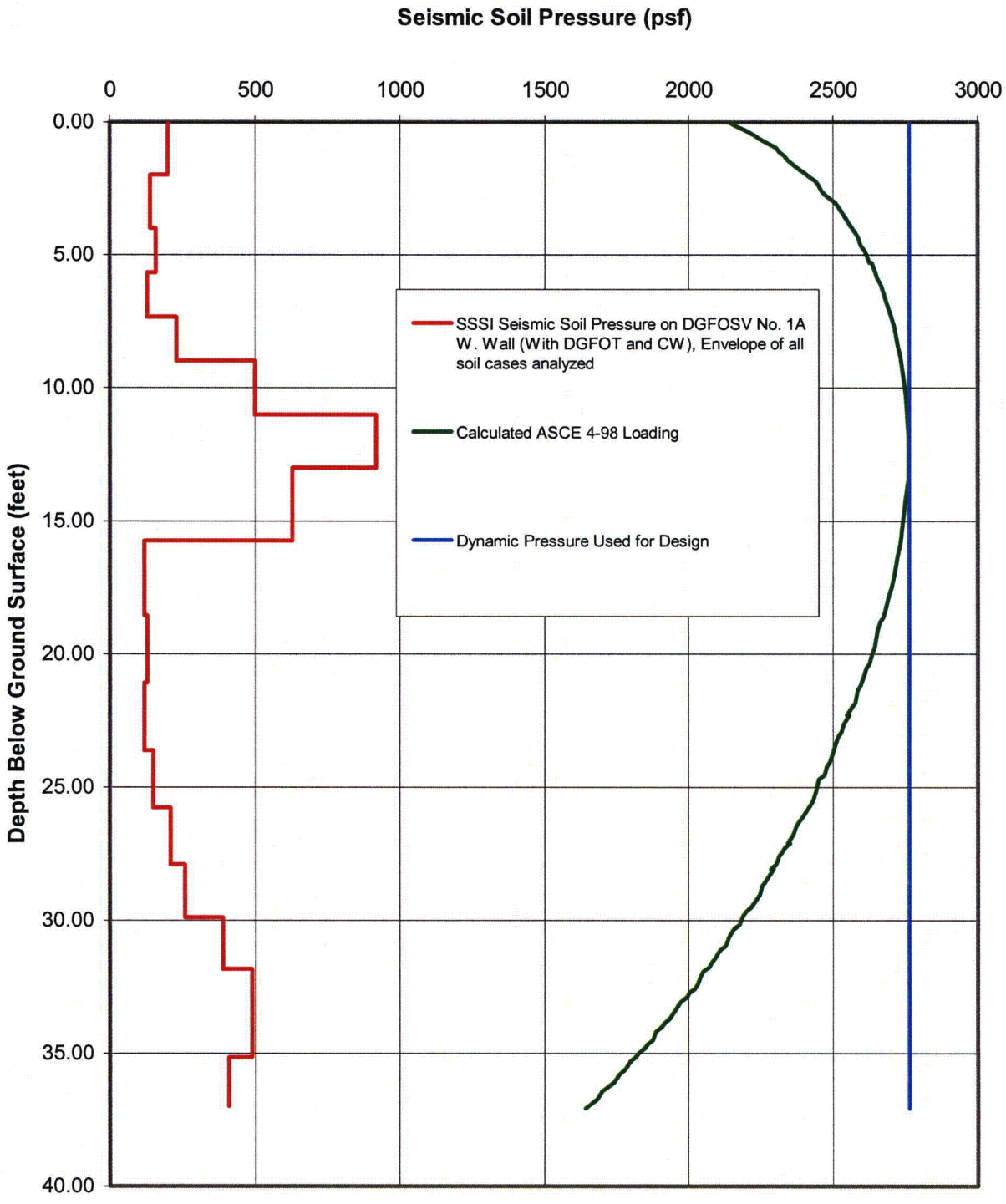

Figure 3H.6-231: ~~SSI~~ SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures on Diesel Generator Fuel Oil Storage Vault No. 1A West Wall

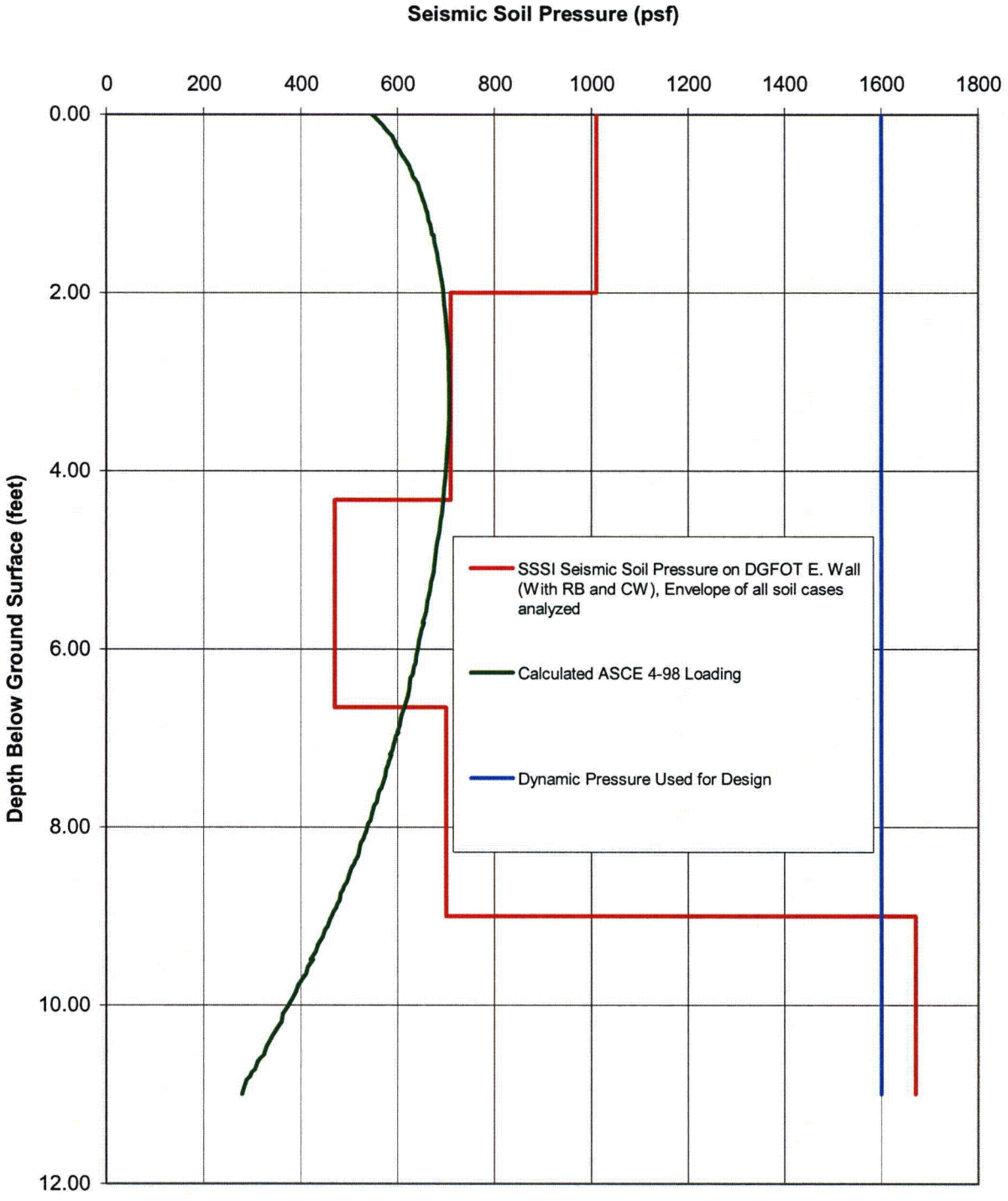

Figure 3H.7-5: ~~SSI~~ SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures (psf) on Fuel Oil Tunnel East Wall with Reactor Building and Crane Wall

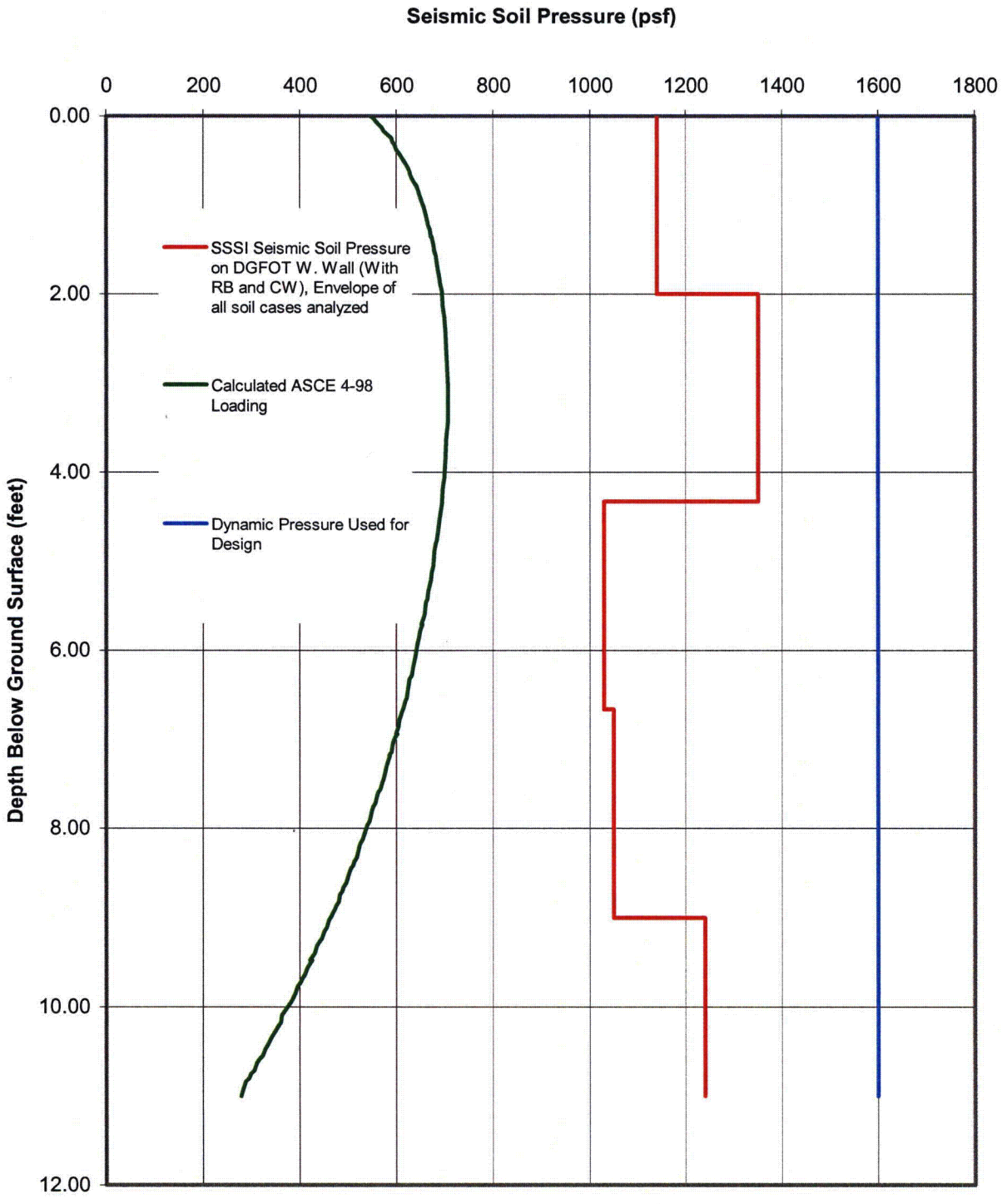

Figure 3H.7-6: ~~SSI,~~ SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures (psf) on Fuel Oil Tunnel West Wall with Reactor Building and Crane Wall

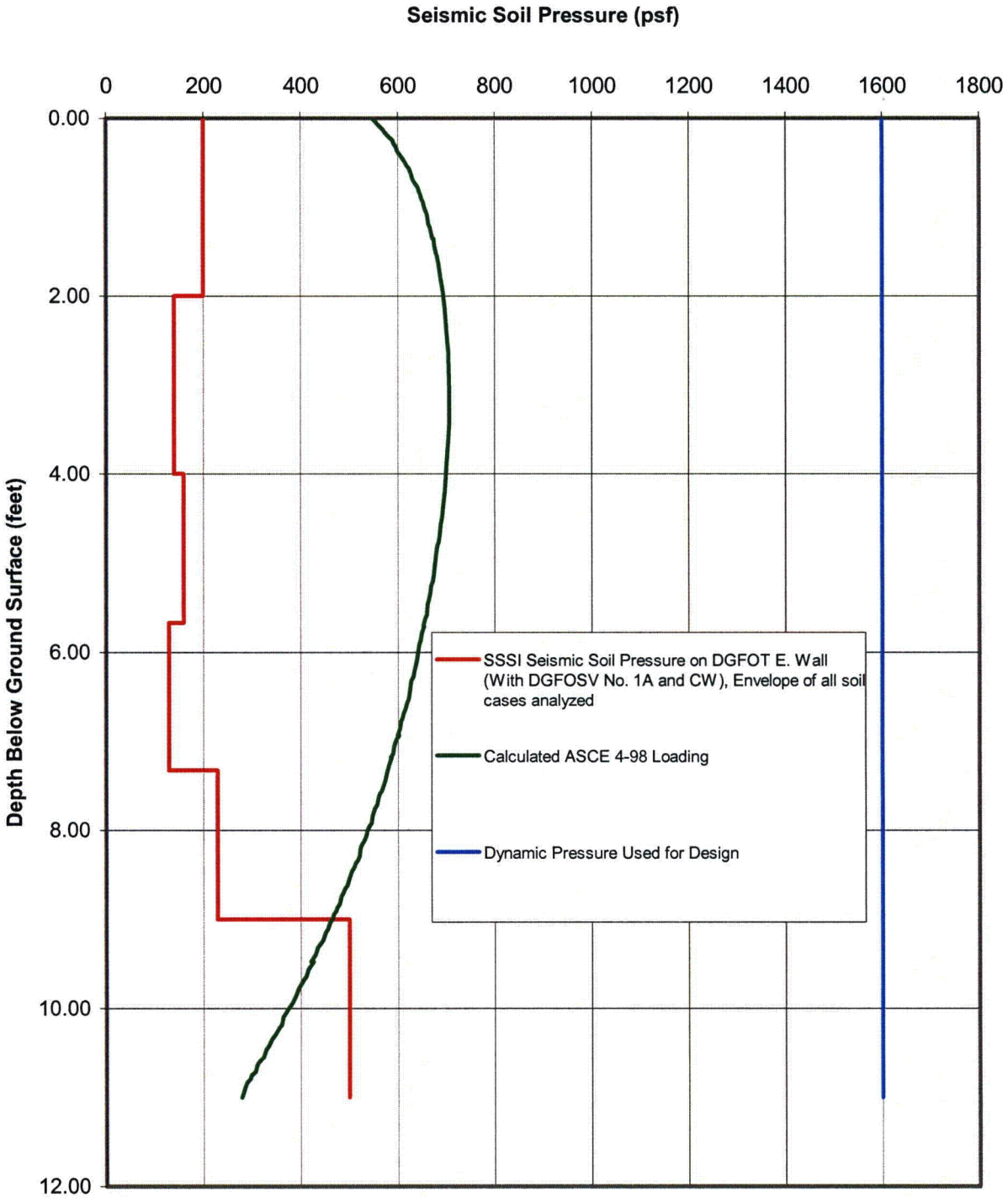

Figure 3H.7-7: ~~SSI,~~ SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures (psf) on Fuel Oil Tunnel East Wall with Diesel Generator Fuel Oil Storage Vault and Crane Wall

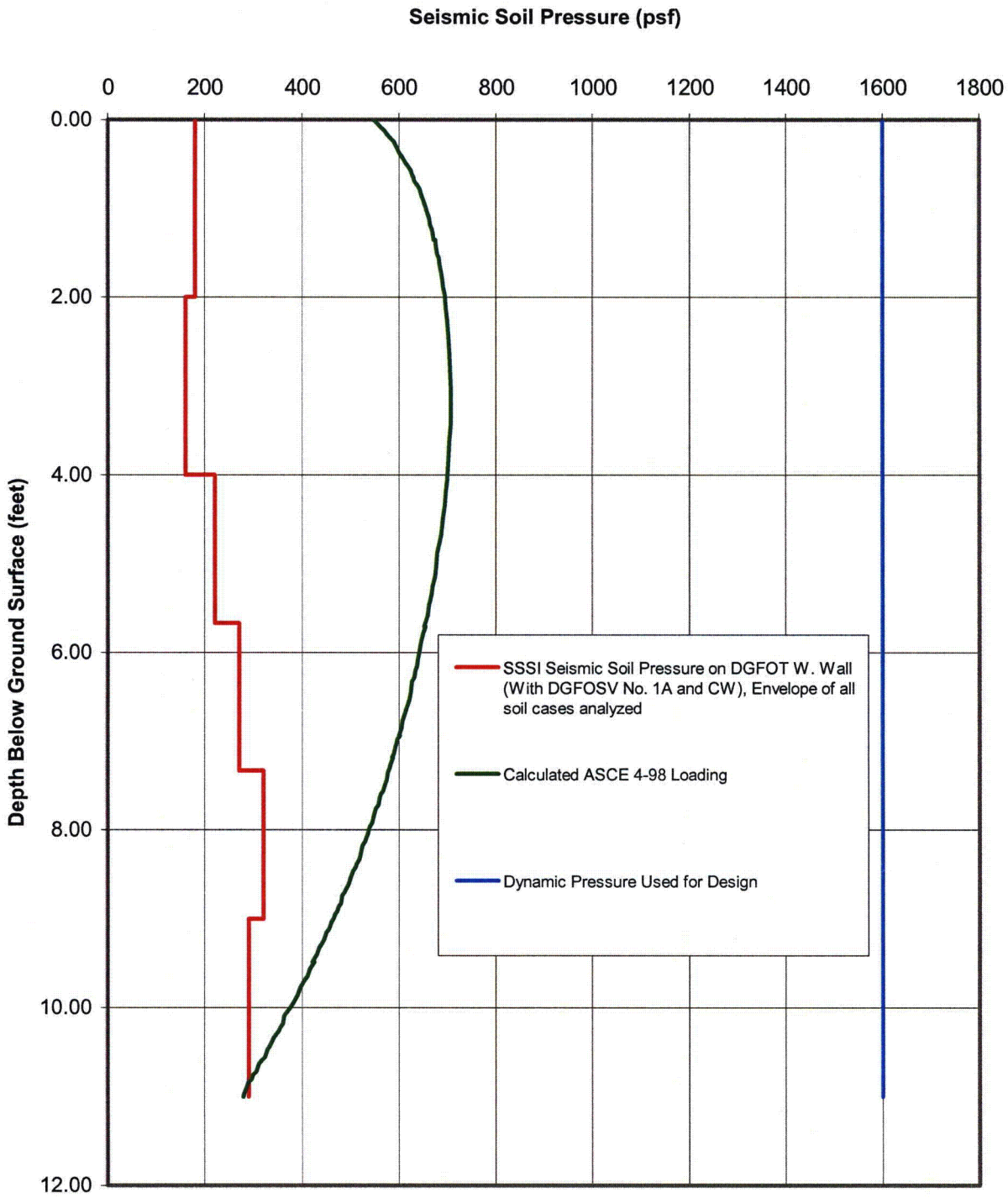

Figure 3H.7-8: ~~SSI,~~ SSSI, ASCE 4-98 and Design Lateral Seismic Soil Pressures (psf) on Fuel Oil Tunnel West Wall with Diesel Generator Fuel Oil Storage Vault and Crane Wall