3.7 Seismic Design

The information in this section of the reference ABWR DCD, including all subsections, tables, and figures, is incorporated by reference with the following departure and supplements.

STD DEP 1.8-1

STD DEP T1 2.15-1 (Table 3.7-6 and Figure 3.7-34)

The Ultimate Heat Sink and Reactor Service Water Piping Tunnel are designed to the site-specific SSE. The additional information requested by Standard Review Plans 3.7.1 and 3.7.2 for these structures is provided in section 3H.6.

3.7.1 Seismic Design Parameters

Site-specific SSE design response spectra for damping ratios of 2%, 3%, 4%, 5%, and 7% used for the site-specific SSI analysis and site-specific seismic analysis and design of site-specific structures (Ultimate Heat Sink, Reactor Service Water (RSW) Pump House, and RSW Piping Tunnel) are shown in Figures 3.7-1a, 3.7-1b, 3.7-2a, and 3.7-2b. Development of the 5% design SSE spectra, shown in Figures 3.7-1a and 3.7-2a, is discussed in Section 3H.6.5.1.1 of the Appendix 3H, where it is called ‘Input Spectrum’. The spectra for other damping values, shown in Figures 3.7-1b and 3.7-2b, were developed using the consistent time histories discussed in Section 3H.6.5.1.1. For the horizontal direction, the spectra generated from the X and Y direction time histories were enveloped.

The shear wave velocity at the STP 3 & 4 site does not meet the DCD Table 5.0 requirement for minimum shear wave velocity. STP DEP T1 5.0-1 describes this departure. The site-specific shear wave velocity data is provided in FSAR Table 2.5S.4-27.

A site-specific SSI analysis has been performed, as discussed in Appendix 3A, to confirm that the standard plant results included in the DCD envelop the results of the site-specific SSI.

Other Analyses

The liquefaction evaluation described in FSAR Section 2.5S.4.8 uses the measured shear wave velocities at the site, and concludes that the site is acceptable from liquefaction potential point of view. It should be noted that the liquefaction evaluation was performed using three different methods, as described in Section 2.5S.4.8, and all three methods reached the same conclusion regarding no liquefaction potential at the site.

Bearing capacity evaluations do not use shear wave velocities as an input for the calculations. Therefore, these calculations are not affected by variation in shear wave velocity. FSAR Subsection 2.5S.4 describes the evaluation of bearing capacity and concludes that the Tier 1 requirement of Table 5.0-1 for allowable bearing capacity of 15 ksf is met.

At-rest lateral earth pressure in non-yielding walls of structures with deep foundations such as the Reactor and Control Buildings will be determined using the method described in Reference 2.5S.4-62. In this method, the at-rest seismic lateral earth pressure computation will utilize site-specific shear wave velocity. The impact of site-specific shear wave velocity on the design of exterior walls of these structures is expected to be insignificant because their designs are controlled by the combination of requirements for in-plane and out-of-plane loads. The at-rest seismic lateral pressure only affects the out-of-plane load. Also, the at-rest pressure includes effect of hydrostatic load, surcharge load etc., in addition to the dynamic pressure caused by the earthquake.

In the development of settlement estimates, the representative shear wave velocity value for intervals within a soil column is only one input used in the derivation of the elastic modulus for layers within that column. Since this derived elastic modulus value is first adjusted for strain and then weighted with estimated values derived from either SPT tests (for granular material) or undrained shear strength tests (for cohesive soils) the effect of variability of shear wave velocity upon settlement calculations is significantly attenuated.

Based on above discussion, it is concluded that the shear wave velocities at the plant site do not impact the plant design.

3.7.1.4 Supporting Media for Seismic Category I Structures

STD DEP T1 2.15-1

The following ABWR Standard Plant Seismic Category I structures have concrete mat foundations supported on soil, rock or compacted backfill. The maximum value of the embedment depth below plant grade to the bottom of the base mat is given below for each structure:

(1) Reactor Building (including the enclosed primary containment vessel and reactor pedestal)—25.7m

(2) Control Building—23.2m

~~*(3) Radwaste Building Substructure—16m*~~

3.7.2.1.5.1.3 ~~Radwaste Building~~Not Used

STD DEP T1 2.15-1

~~*The Radwaste Building dynamic model is shown in Figure 3.7.34. The Radwaste Building is a box type shear wall system of reinforced concrete. The major walls between floor slabs are represented by beam elements of a box cross section. The shear rigidity in the direction of excitation is provided by the parallel walls. The bending rigidity includes the cross walls contribution. In the vertical direction a single mass point is used for each slab and is connected to the walls by spring elements. The spring element stiffness is determined so that the fundamental frequency of the slab in the vertical direction is maintained.*~~

3.7.2.2 Natural Frequencies and Response Loads

STD DEP T1 2.15-1

The natural frequencies up to 33 Hz for the Reactor ~~,~~and Control ~~and Radwaste~~ Buildings are presented in Tables 3.7-2 through 3.7-~~6~~5 for the fixed base condition.

Enveloped response loads at key locations in the Reactor Building complex and the control building due to SSE for the range of site conditions considered are presented in Appendix 3A. Response spectra at the major equipment elevations and support points are also given in Appendix 3A.

~~The design SSE loads for the Radwaste Building are given in Table 3H.3-1.~~

3.7.2.8 Interaction of Non-Seismic Category I Structures, Systems and Components with Seismic Category I Structures, Systems and Components

The Category I structures and their physical proximity to nearby non-Category I structures are shown in Figure 3.7-40. None of the non-Category I structures proposed as part of STP Units 3 and 4 is intended to meet Criterion (2) of DCD Section 3.7.2.8. Rather, for each non-Category I structure, either: (1) it is determined that the collapse of the non-Category I structure will not cause the non-Category I structure to strike a Category I structure; or (2) the non-Category I structure will be analyzed and designed to prevent its failure under SSE conditions in a manner such that the margin of safety of the structure is equivalent to that of Seismic Category I structures. Criterion (1) is met if the above-grade height of the non-Category I structure is less than the shortest horizontal distance between the non-Category I structure and the closest Category I structure. Based on this criterion, non-Category I structures that can interact with Seismic Category I structures include the Turbine Building (TB), Radwaste Building (RWB), Service Building (SB), Control Building Annex (CBA) and the stack on the Reactor Building roof. Other non-Category I structures shown in Figure 3.7-40 meet Criterion (1).

The seismic input motions for the II/I design of the non-seismic Category I structures noted above, except for the stack on the Reactor Building roof, are described in the following. The design of the stack on the Reactor Building roof is covered by the certified design of the Reactor Building.

- TB: 0.3g Regulatory Guide 1.60 spectra.
- RWB: as described in Sections 3.7.3.16 and 3H.3.5.3 and shown in Figures 3.7-41 through 3.7-43.
- SB: as described in Section 3.7.3.16 and shown in Figures 3.7-50 through 3.7-52.
- CBA: as described in Section 3.7.3.16 and shown in Figures 3.7-38 and 3.7-39.

The overall design of non-Category I structures is based on IBC-2006. However, the lateral load resisting system is designed to remain elastic under the extreme environmental loads shown in Table 3H.9-1 using the same loads, load combinations and design codes (i.e. ACI 349 and AISC N690) as those for the adjacent Category I structure. Also, see Section 3.7.3-16 for additional details.

The seismic input motions for II/I stability evaluations of TB, RWB, SB, and CBA are described in the following:

- TB: site-specific SSE (see Figures 3A-231a and 3A-232a)
- RWB: as described in Sections 3.7.3.16 and 3H.3.5.3 and shown in Figures 3.7-44 through 3.7-46
- SB: as described in Section 3.7.3.16 (see Figures 3.7-53 through 3.7-55)
- CBA: as described in Section 3.7.3.16 (see Figures 3.7-47 through 3.7-49)

The restoring forces and moments for sliding and overturning stability evaluations of TB, RWB, SB, and CBA are in accordance with the methodology outlined in Figure 3H.3-52.

Seismic demands along each orthogonal direction for stability evaluation of TB, RWB, and SB are determined using response spectrum analysis of a fixed base stick model representing each of these structures. The input motions for these response spectrum analyses are as described above. The base shears and moments from these response spectrum analyses are adjusted manually to account for the additional shears and moments due to basemat excitation which are calculated considering zero period acceleration (ZPA) of the input motions. The three orthogonal seismic demands of each structure are combined using the 100%-40%-40% rule as outlined in Regulatory Guide 1.92, Revision 2.

Seismic demands along each orthogonal direction for stability evaluation of the CBA are calculated using manual calculation where the CBA is idealized as a single degree of freedom structure. The three orthogonal seismic demands are combined using the 100%-40%-40% rule as outlined in Regulatory Guide 1.92, Revision 2.

Table 3H.6-14 provides sliding and overturning factors of safety under site-specific SSE for TB, RWB, SB, and CBA.

3.7.2.12 Comparison of Responses

STD DEP T1 2.15-1

The time history method of analysis is used for the Reactor and Control Buildings. A comparison of responses with the response spectrum method is therefore not required. ~~The Radwaste Building is analyzed using the response spectrum method, since the time history method needed for the generation of floor response spectra is not necessary because there are no safety-related components inside the building.~~

3.7.3.16 Analysis Procedure for Non-Seismic Structures in Lieu of Dynamic Analysis

STD DEP 1.8-1

For the overall *design of non-seismic Category I structures, the procedures described in the ~~Uniform Building Code (UBC)~~*International Building Code (IBC) *seismic design criteria shall be followed.* Considering the location of STP 3 & 4, the following seismic parameters are applicable:

- Occupancy Category IV
- Importance Factor of 1.5
- Seismic Design Category A

Where a structure is required to be designed to withstand a SSE, the design of the lateral load resisting system consisting of structural elements required for transfer of lateral loads to the foundation (i.e. shear walls, horizontal bracing members and their connections, vertical bracing members and their connections, diaphragm floors, beams and their connections required for transfer of lateral loads at each floor to vertical bracing or shear walls and the foundation) shall meet *the following limitations apply* in addition to meeting the IBC requirements*:*

*(1) ~~The seismic zone shall be "Zone 3".~~*The seismic acceleration shall be the SSE ground acceleration.

(2) The structure shall be classified as "Essential Facility"; thereby using appropriate importance factors for wind and seismic.

(3) For dual systems (i.e., shear wall with braced steel frame), one of the two systems must be designed to be capable of carrying all of the seismic or wind loading without collapse. No credit will be given for the other for resisting lateral loads.

(4) The design codes shall be the same as those for the adjacent Category I structure.

(5) The lateral load resisting system shall be capable of resisting the entire lateral load assuming that all components of the non-Category I structure,

with the exception of siding which may come off during a tornado event, will remain intact during the extreme environmental loading.

(6) The exterior wall of the non-Category I structure that is adjacent to the Category I structure shall be capable of resisting SSE loads using the same loads, load combinations and design codes as those for the adjacent Category I structure. This criterion is also applicable to the elements of the non-Category I structure which meet the following two conditions:

- The element is located within a story height of the exterior wall.
- The element may come in contact with the exterior wall upon its failure under SSE loads.

For the Control Building Annex (CBA) II/I design, the SSE input at the foundation level (Figures 3.7-38a, 3.7-38b and 3.7-39) is the envelope of 0.3g RG 1.60 response spectra and the induced acceleration response spectra due to site specific SSE that is determined from an SSI analysis which accounts for the impact of the nearby Control Building (CB). In this SSI analysis, five interaction nodes at the depth corresponding to the bottom elevation of the CBA foundation are added to the three dimensional SSI model of the CB. These five interaction nodes correspond to the four corners and the center of the CBA foundation. The average response of these five interaction nodes is enveloped with the 0.3g RG 1.60 spectra to determine the SSE input at the CBA foundation level.

For the stability evaluation of the CBA, the SSE input (see Figures 3.7-47 through 3.7-49) is the envelope of the average response of the five interaction nodes from the site-specific SSI analysis described above and the site specific SSE.

For the Radwaste Building (RWB) II/I design, the SSE input (see Figures 3.7-41 through 3.7-43) is the envelope of 0.3g RG 1.60 response spectrum and the induced acceleration response spectrum due to site-specific SSE that is determined from an SSI analysis which accounts for the impact of the nearby Reactor Building (RB). In this SSI analysis, five interaction nodes at the ground surface are added to the three dimensional SSI model of the RB. These five interaction nodes correspond to the four corners and the center of the RWB foundation. The average response of these five interaction nodes is enveloped with the 0.3g RG 1.60 spectra to determine the SSE input at the foundation level.

For the stability evaluation of the RWB, the SSE input (see Figures 3.7-44 through 3.7-46) is the envelope of the average response of the five interaction nodes from the SSI analysis described above and the site specific SSE.

For the Service Building (SB) II/I design, the SSE input (see Figures 3.7-50 through 3.7-52) is the envelope of 0.3g RG 1.60 response spectrum and the induced acceleration response spectrum due to site-specific SSE that is determined from an SSI analysis which accounts for the impact of the nearby CB Building. In this SSI analysis, five interaction nodes at the ground surface are added to the three dimensional SSI model of the CB. These five interaction nodes correspond to the four corners and the center of the SB foundation. The average response of these five interaction nodes is enveloped with the 0.3g RG 1.60 spectra to determine the SSE input at the foundation level.

For the stability evaluation of the SB, the SSE input (see Figures 3.7-53 through 3.7-55) is the envelope of the average response of the five interaction nodes from the site-specific SSI analysis described above and the site specific SSE.

3.7.5 COL License Information

3.7.5.1 Seismic Design Parameters

The following site-specific supplement addresses COL License Information Item 3.19.

The site-specific assessment ~~against the Tier 1 site requirements~~for SSE is provided in Subsection 2.5S.2. The comparison of site-specific SSE against the Tier 1 site requirements is presented in Table 2.0-2 and Appendix 3A. The site-specific soil structure interaction analysis for the Reactor Building and Control Building is provided in Appendix 3A.

3.7.5.2 Pre-Earthquake Planning and Post-Earthquake Actions

The following standard supplement addresses COL License Information Item 3.20.

The procedures for pre-earthquake planning and post-earthquake actions will be developed in accordance with Subsection 3.7.4 and Section 13.5 prior to fuel load. The procedures will implement the seismic instrumentation program specified in Subsection 3.7.4 and follow the guidelines recommended in EPRI Report NP-6695 (Reference 3.7-7), with the exceptions listed in Subsection 3.7.5.2 of the reference DCD. (COM 3.7-1)

3.7.5.3 Piping Analysis, Modeling of Piping Supports

The following standard supplement addresses COL License Information Item 3.21.

The method described in Subsection 3.7.3.3.1.6 will be used for determining pipe support stiffness. No other method will be used.

3.7.5.4 Assessment of Interaction Due to Seismic Effects

The following standard supplement addresses COL License Information Item 3.22.

Inside Category I structures, nonsafety-related SSCs that are located in the same room as safety-related SSCs will be reviewed to determine if their failure will impact the ability of the safety-related SSC to perform its safety function. Non-seismic Category 1 SSCs whose failure could jeopardize the function of a safety-related SSC will be analyzed to demonstrate that structural integrity will be maintained in an SSE.

Additional details are provided in the following paragraphs.

(a) The following non-safety-related commodities are routed on design drawings and designed to preclude failure under SSE seismic loading:

Large Bore Piping
Small Bore Piping
Cable Tray
Conduit (Except for field run conduit listed below)
HVAC Ducts
Instrumentation

This includes design of supports and support anchorages for SSE seismic loading. Layout guidelines specify minimum separation criteria between commodities. For analyzed commodities (i.e., piping), movements are calculated and are checked for interference on a case by case basis if they exceed the layout guidelines. For commodities routed by span criteria, maximum allowable movements corresponding to the separation guidelines are incorporated in the span calculations to ensure seismic movements do not exceed separation criteria.
Similarly, field run commodities are designed to preclude failure under SSE seismic loading. Field run commodities are limited to conduit and junction boxes for the following:

Communications
Security
Lighting
Fire Detection

This includes design of supports and support anchorages for SSE seismic loading. Layout guidelines specify minimum separation criteria between commodities. Maximum allowable movements corresponding to the separation guidelines are incorporated in the span calculations to ensure seismic movements do not exceed separation criteria.

The anchorages for individual non-safety-related SSCs not discussed above such as equipment and components are designed to preclude failure under SSE seismic loading.

(b) Criteria to be used for determining if the failure of non-safety-related SSCs will impact the ability of the safety-related SSCs to perform its safety function

Non-safety-related SSCs in the same room with safety-related SSCs are designed to preclude failure under SSE seismic loading. Therefore, no criteria has been developed for determining if the failure of non-safety-related SSCs will impact the ability of the safety-related SSCs to perform its safety function. If at the completion of detailed design, a limited number of non-safety-related SSCs cannot be shown to withstand an SSE event; failure of each SSC will be evaluated on case by case basis. Either adjacent safety-related SSCs will be shielded from the non-safety-related SSCs or an impact evaluation will be performed to demonstrate that the failure of the non-safety-related SSCs will not prevent safety-related SSCs from performing their safety function.

(c) Analysis/design criteria to be used for demonstrating structural integrity of nonseismic Category I SSCs

1. Non-safety-related piping and instrument lines inside any Category I structures will be designed to withstand an SSE event with pipe stresses limited to faulted allowable stresses.

2. Support span criteria used for non-safety-related cable trays, conduits, and HVAC ducts inside any Category I structure will be the same as for safety-related SSCs.

3. Supports for non-safety-related piping, instrument lines, cable trays, conduits, and HVAC ducts inside any Category 1 structures will be designed for loads that include SSE loads and self-excitation loads during an SSE event.

4. Anchorages for non-safety-related commodity supports, equipment, and components inside any Category I structure will be designed for loads that include SSE loads.

5. Within the Category I structures, both embedments and post installed anchors are safety-related. These are designed to the requirements for Category I components, regardless of the classification of the component attached to the structure.

A procedure to confirm that all nonsafety-related SSCs located in the same room as a safety-related SSC have been evaluated and correctly dispositioned for inspection of the as-built plant for II/I interactions will be developed in accordance with Section 13.5 and will be made available for inspection prior to fuel load. (COM 3.7-2)

This procedure will include the following elements as a minimum:

- The falling of a nonsafety-related SSE onto a safety-related SSC with particular emphasis on the adequate anchorage of the nonsafety-related SSC.
- The impact of a nonsafety-related SSC on a safety-related SSC with emphasis on seismic induced motion of an SSC on adjacent SSCs.

3.7.5.5 Response Spectra Amplification at Support Attachment Points

The following standard supplement addresses the COL License Information Item in Subsection 3.7.3.3.1.8.

The acceleration response spectra at piping attachment points are generated considering the drywell equipment and pipe support structure as part of the structure using the dynamic analysis methods described in Subsection 3.7.2.

3.7.5.6 Modeling of Special Engineered Pipe Supports

The following standard supplement addresses the COL License Information Item in Subsection 3.7.3.3.1.7.

STP 3 & 4 will not be using any special engineered pipe supports described in Subsection 3.9.3.4.1(6).

Table 3.7-6 ~~Natural Frequencies of the Radwaste Building - Fixed Base Condition~~Not Used

~~Mode No.~~	~~Frequency (HZ)~~	~~Direction~~
~~1~~	~~6.52~~	~~Y Horiz~~
~~2~~	~~7.19~~	~~X Horiz~~
~~3~~	~~11.98~~	~~Y Horiz~~
~~4~~	~~14.74~~	~~Z Vert~~
~~5~~	~~16.24~~	~~X Horiz~~
~~6~~	~~16.72~~	~~Y Horiz~~
~~7~~	~~21.49~~	~~X Horiz~~
~~8~~	~~26.28~~	~~Y Horiz~~
~~9~~	~~29.57~~	~~X Horiz~~
~~10~~	~~31.40~~	~~Z Vert~~

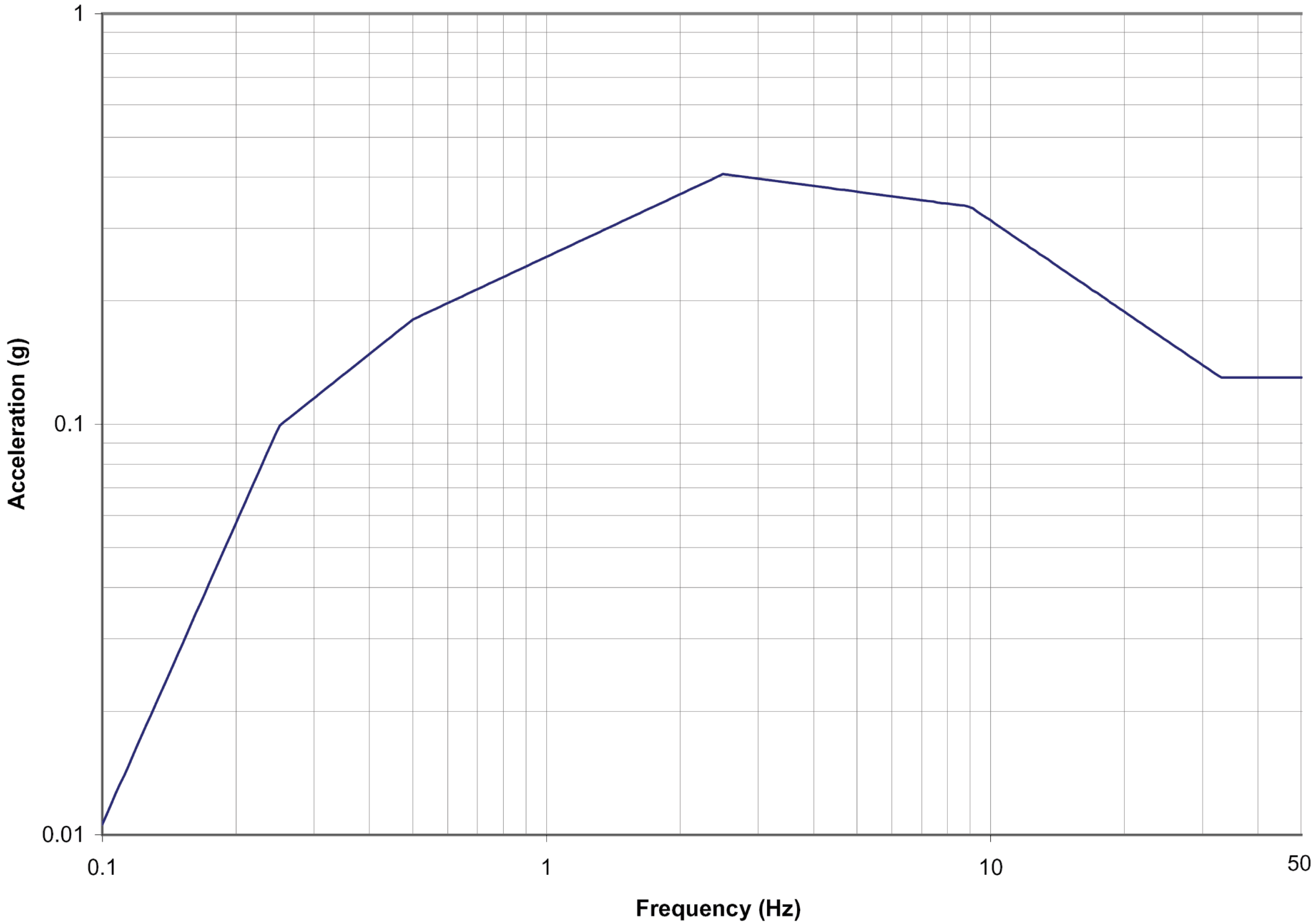


Figure 3.7-1a Site-Specific Design Response Spectrum for 5% Damping (Horizontal)

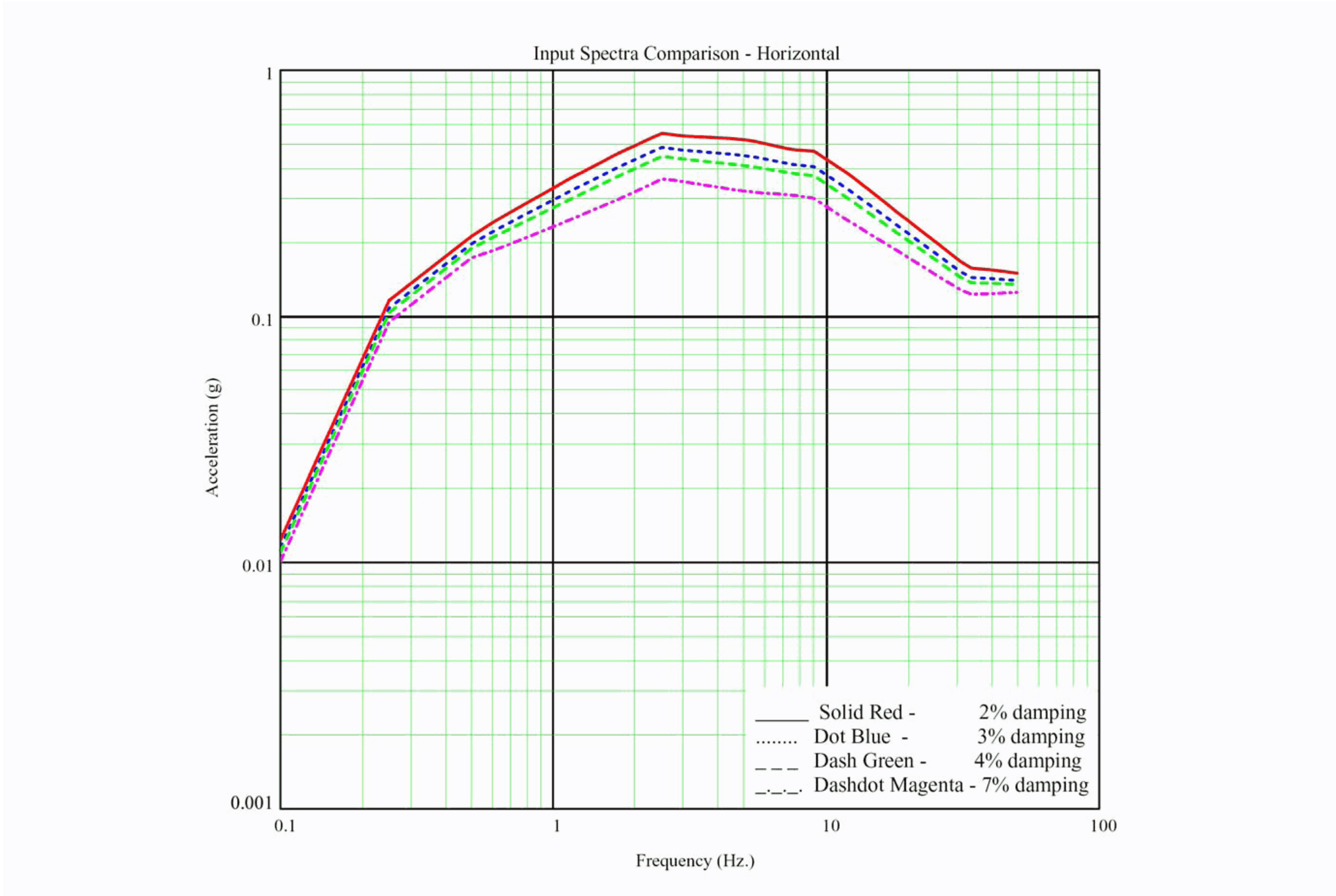


Figure 3.7-1b Plots of 2%, 3%, 4% and 7% Damped Input Response Spectrum – Horizontal Direction

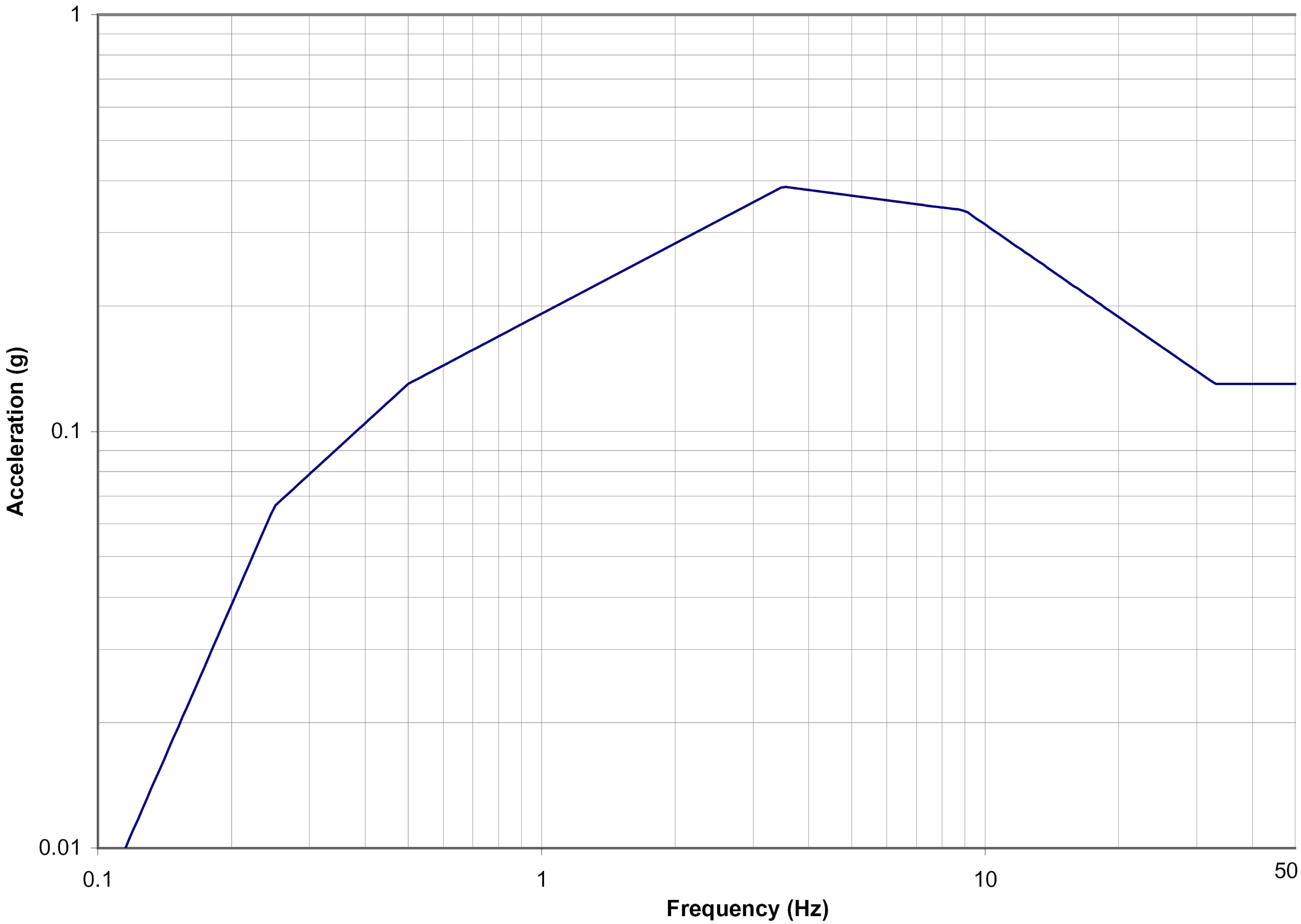


Figure 3.7-2a Site-Specific Design Response Spectrum for 5% Damping (Vertical)

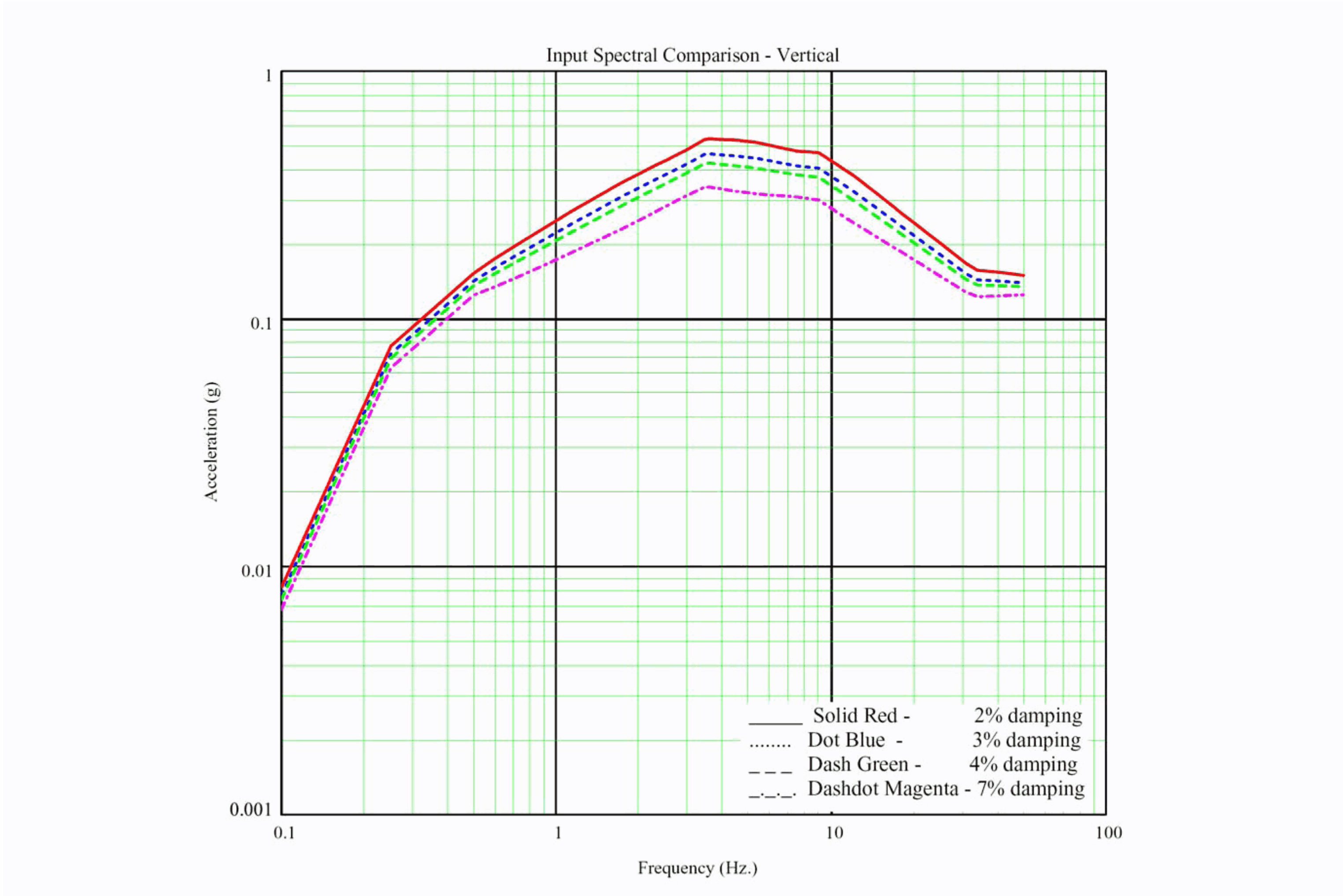


Figure 3.7-2b Plots of 2%, 3%, 4% and 7% Damped Input Response Spectrum – Vertical Direction

Figure 3.7-34 ~~Radwaste Building Seismic Model~~Not Used

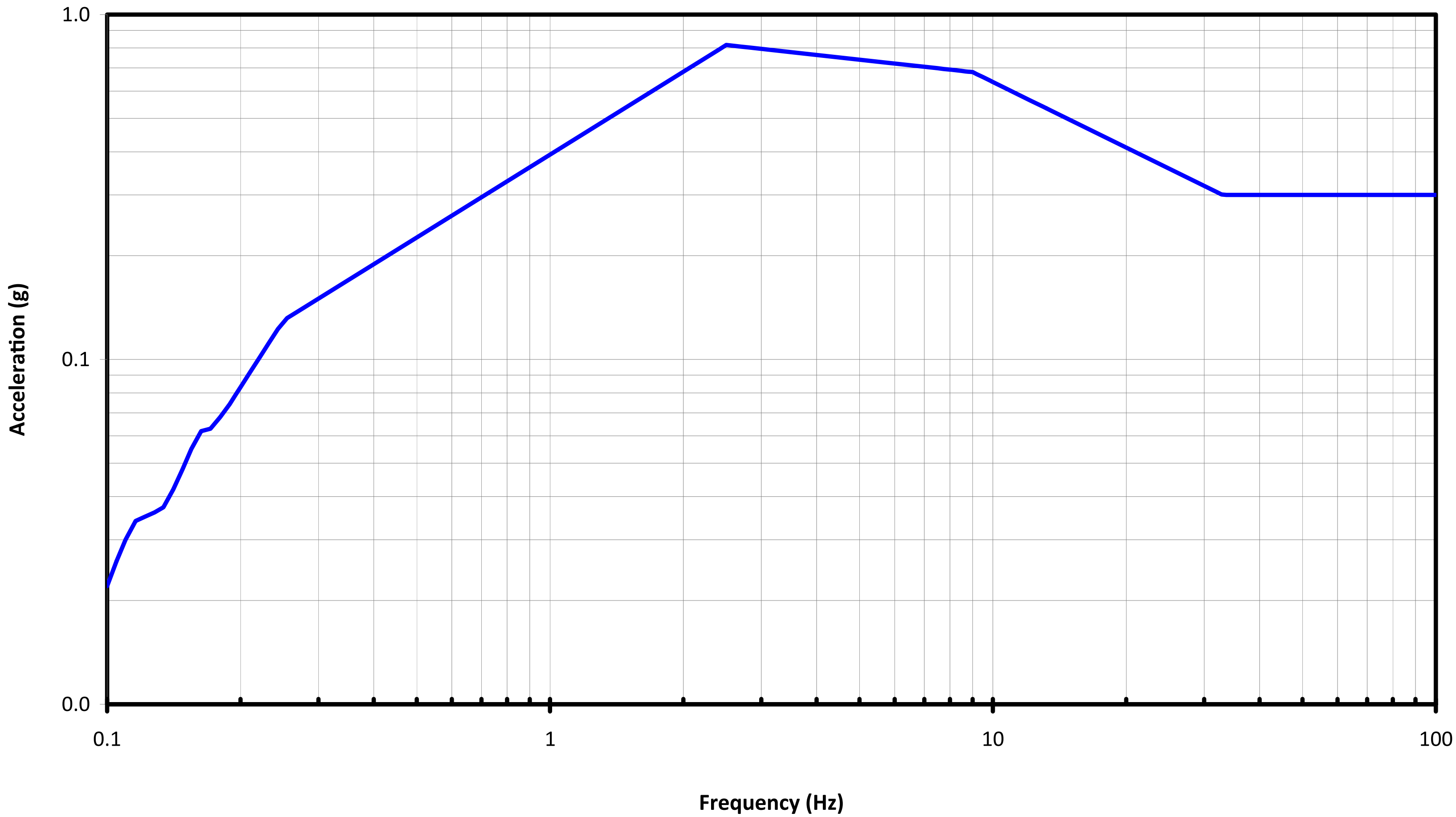


Figure 3.7-38a Horizontal (N-S) Control Building Annex Input Motion for II/I Design (7% Damping)

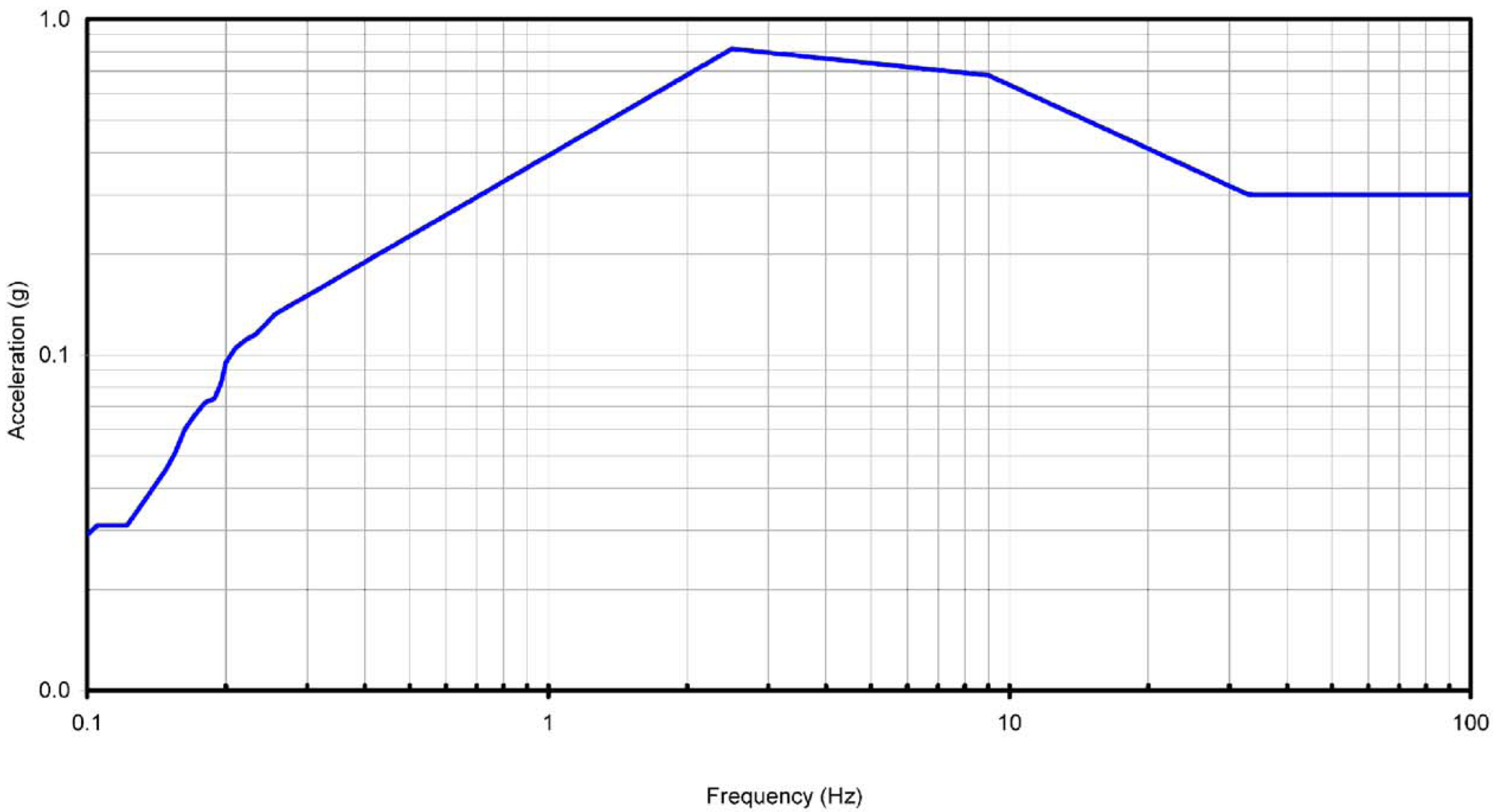


Figure 3.7-38b Horizontal (E-W) Control Building Annex Input Motion for II/I Design (7% Damping)

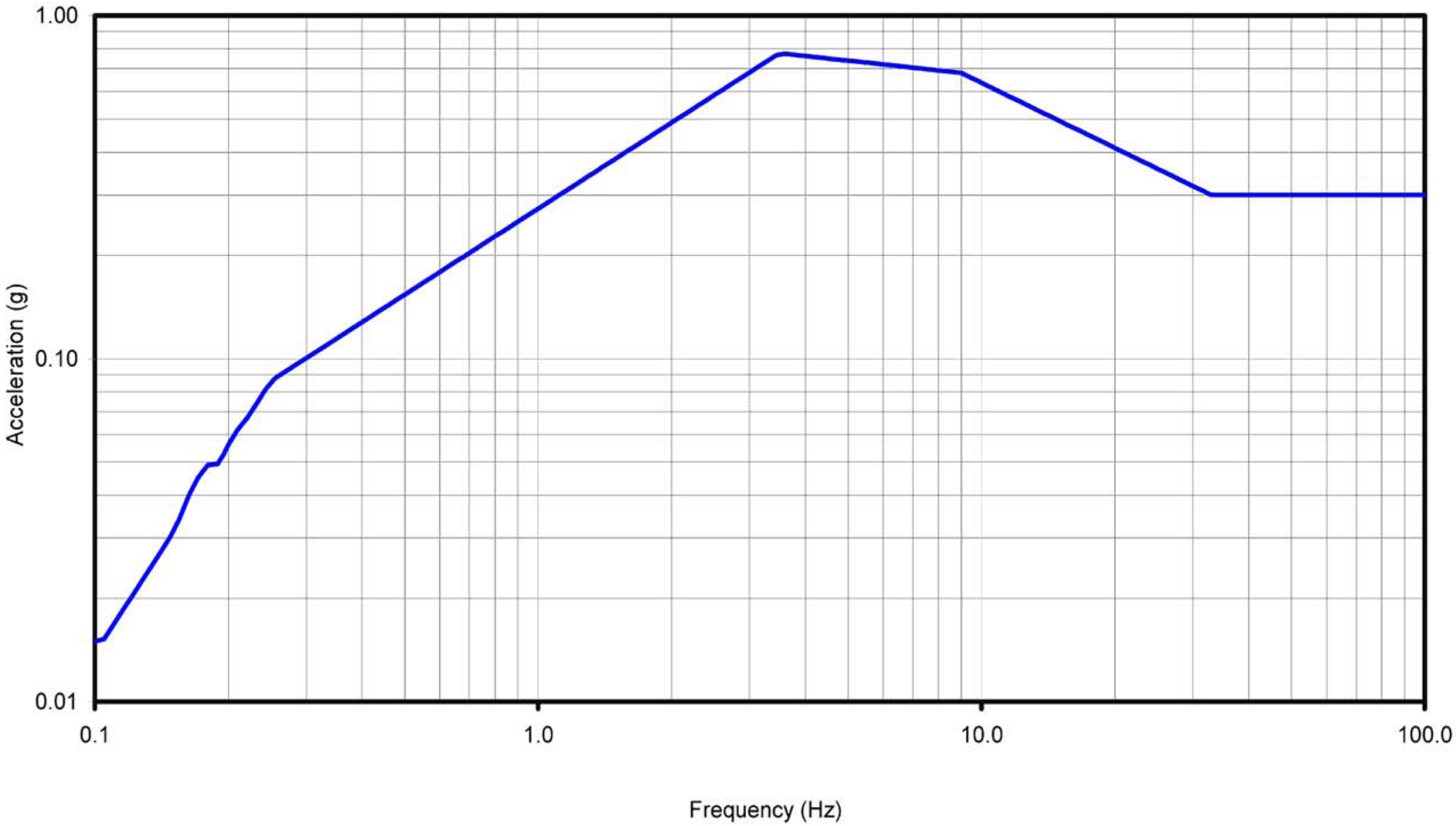
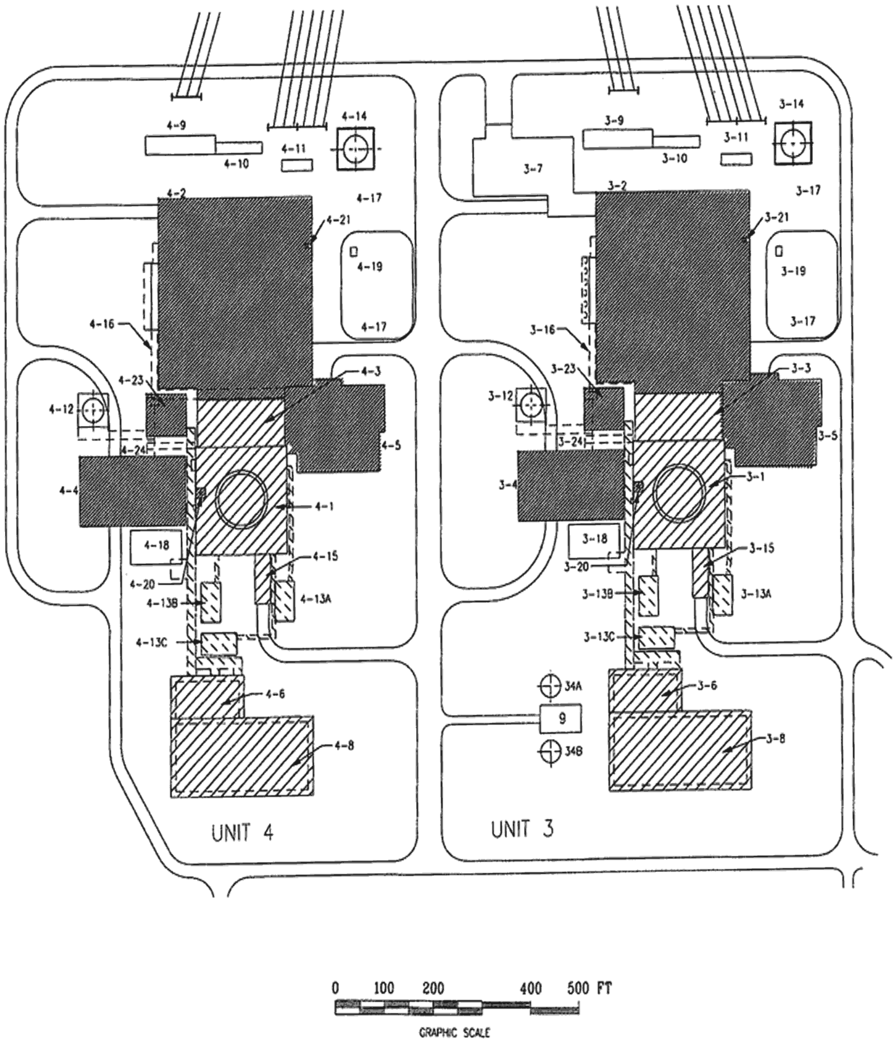


Figure 3.7-39 Vertical Control Building Annex Input Motion for II/I Design (7% Damping)



REF	LEGEND - UNIT 3 DESCRIPTION	NOTES	MAIN ROOF ELEVATION (FT.) (MSL)
3-1	REACTOR BUILDING	1	158
3-2	TURBINE BUILDING	2	166
3-3	CONTROL BUILDING	1	72
3-4	RADWASTE BUILDING	2	95
3-5	SERVICE BUILDING	2	76
3-6	RSW PUMPHOUSE	1	50
3-7	HOT MACHINE SHOP	3	81
3-8	ULTIMATE HEAT SINK/COOLING TOWER	1	153
3-9	MAIN TRANSFORMERS AREA	3	80
3-10	AUXILIARY TRANSFORMERS	3	65
3-11	RESERVE TRANSFORMERS	3	64
3-12	CONDENSATE STORAGE TANK	3	67
3-13	EMERGENCY D/G FUEL OIL TANKS A,B,C	1	BELOW GRADE
3-14	COMBUSTION TURBINE FUEL OIL TANKS	3	72
3-15	LARGE EQUIPMENT ACCESS BUILDING	1	62
3-16	RADWASTE TUNNEL	3	BELOW GRADE
3-17	NON-NUCLEAR MAINTENANCE LAYDOWN AREA	3	AT GRADE
3-18	FENCED RADWASTE STORAGE AREA	3	AT GRADE
3-19	COMBUSTION TURBINE GENERATOR AUXILIARY TRANSFORMER	3	47
3-20	PLANT STACK	2	284
3-21	COMBUSTION TURBINE EXHAUST STACK	3	108
3-23	CONTROL BUILDING ANNEX	2	59
3-24	WALKWAY FROM RADWASTE BUILDING TO CONTROL BUILDING	3	48

REF	LEGEND - UNIT 4 DESCRIPTION	NOTES	MAIN ROOF ELEVATION (FT.) (MSL)
4-1	REACTOR BUILDING	1	158
4-2	TURBINE BUILDING	2	166
4-3	CONTROL BUILDING	1	72
4-4	RADWASTE BUILDING	2	95
4-5	SERVICE BUILDING	2	76
4-6	RSW PUMPHOUSE	1	50
4-8	ULTIMATE HEAT SINK/COOLING TOWER	1	153
4-9	MAIN TRANSFORMERS AREA	3	80
4-10	AUXILIARY TRANSFORMERS	3	65
4-11	RESERVE TRANSFORMERS	3	64
4-12	CONDENSATE STORAGE TANK	3	67
4-13	EMERGENCY D/G FUEL OIL TANKS A,B,C	1	BELOW GRADE
4-14	COMBUSTION TURBINE FUEL OIL TANKS	3	72
4-15	LARGE EQUIPMENT ACCESS BUILDING	1	62
4-16	RADWASTE TUNNEL	3	BELOW GRADE
4-17	NON-NUCLEAR MAINTENANCE LAYDOWN AREA	3	AT GRADE
4-18	FENCED RADWASTE STORAGE AREA	3	AT GRADE
4-19	COMBUSTION TURBINE GENERATOR AUXILIARY TRANSFORMER	3	47
4-20	PLANT STACK	2	284
4-21	COMBUSTION TURBINE EXHAUST STACK	3	108
4-23	CONTROL BUILDING ANNEX	2	59
4-24	WALKWAY FROM RADWASTE BUILDING TO CONTROL BUILDING	3	48

REF	LEGEND DESCRIPTION	NOTES	MAIN ROOF ELEVATION (FT.) (MSL)
9	FIRE PROTECTION PUMPHOUSE	3	65
34A/B	FIREWATER STORAGE TANK A/B	3	77

NOMINAL EXTERIOR FINISHED GRADE EL. = 34.0 FEET (MSL)

NOTES/LEGEND

1. SEISMIC CATEGORY I
2. NON-SEISMIC CATEGORY I STRUCTURE SUBJECT TO DCD SECTION 3.7.2.8 II/I CRITERION #3 (NON-COLLAPSE)
3. NON-SEISMIC CATEGORY I

Figure 3.7-40 Plot Plan – Interaction of Seismic Category I Structures with Non-Seismic Category I Structures

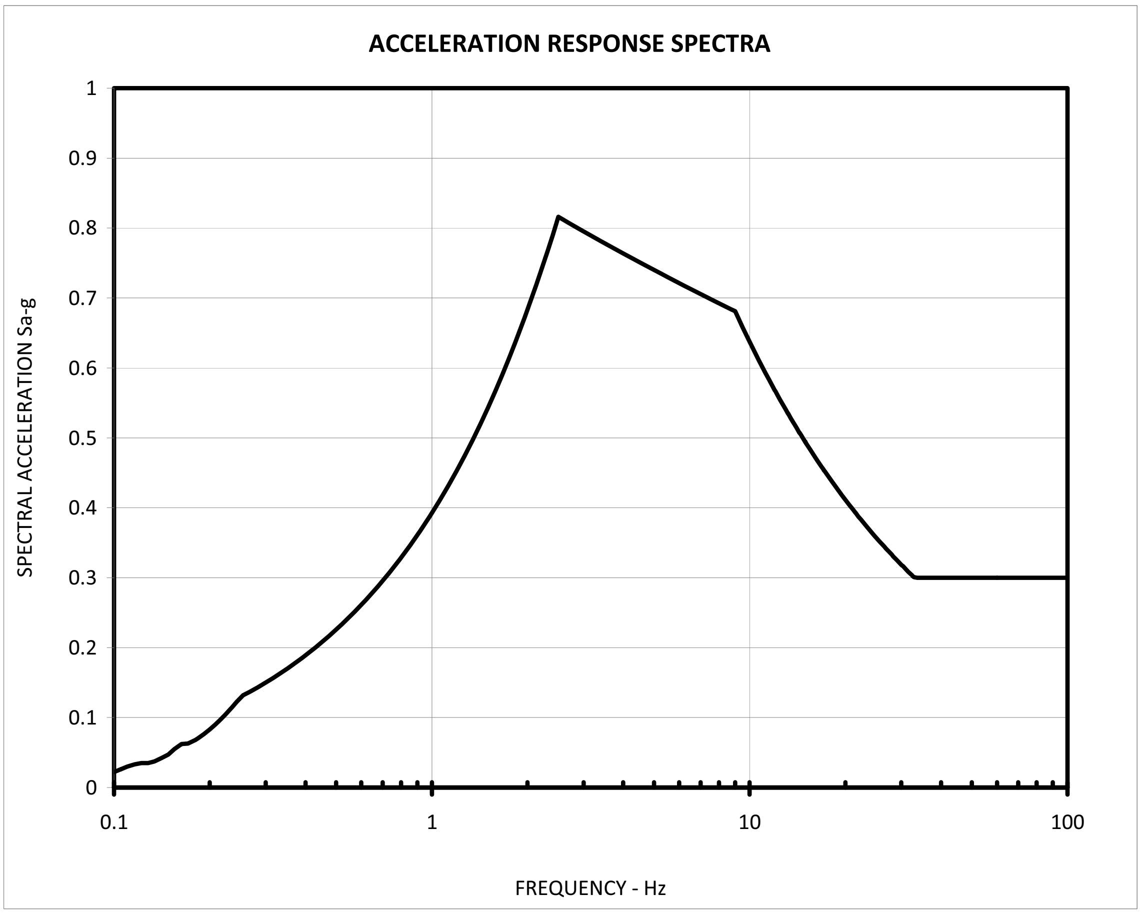


Figure 3.7-41 Horizontal (N-S) Radwaste Building Mat Foundation Response Spectrum (7% Damping)

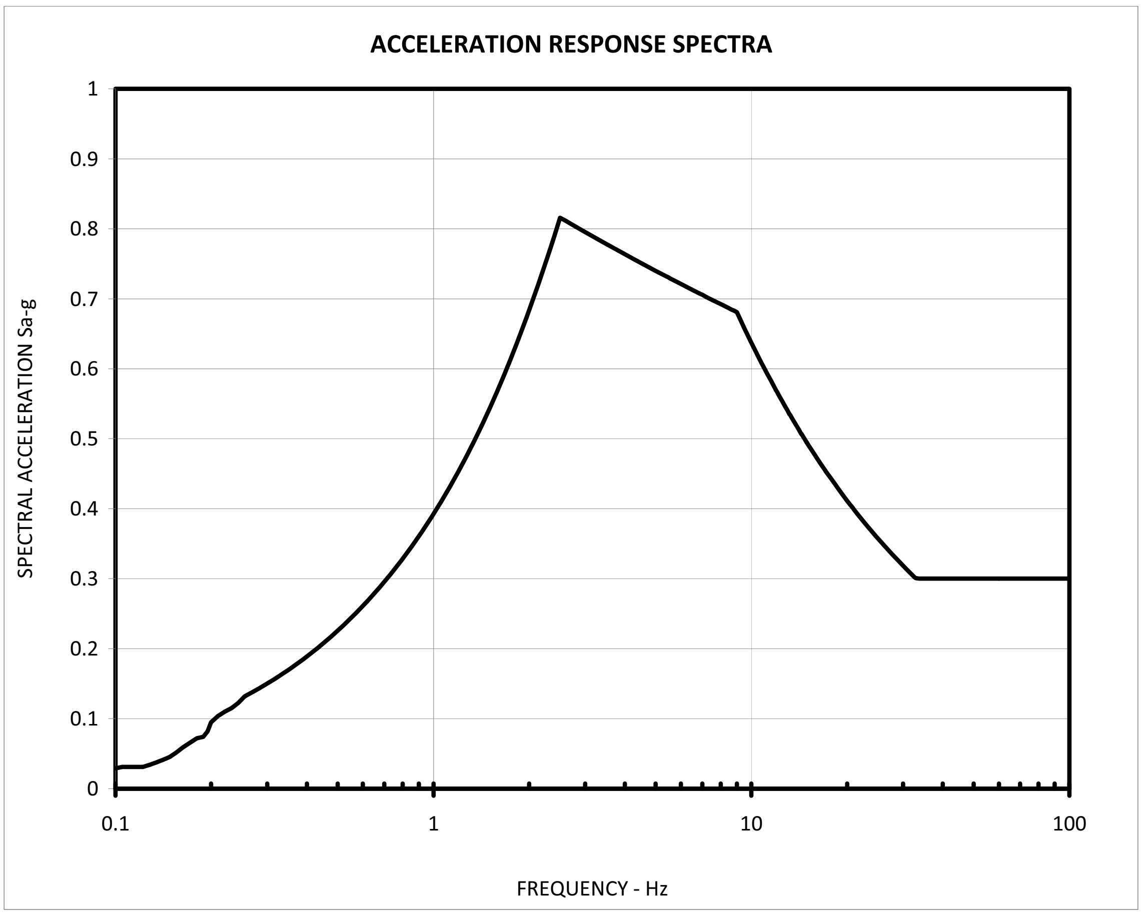


Figure 3.7-42 Horizontal (E-W) Radwaste Building Mat Foundation Response Spectrum (7% Damping)

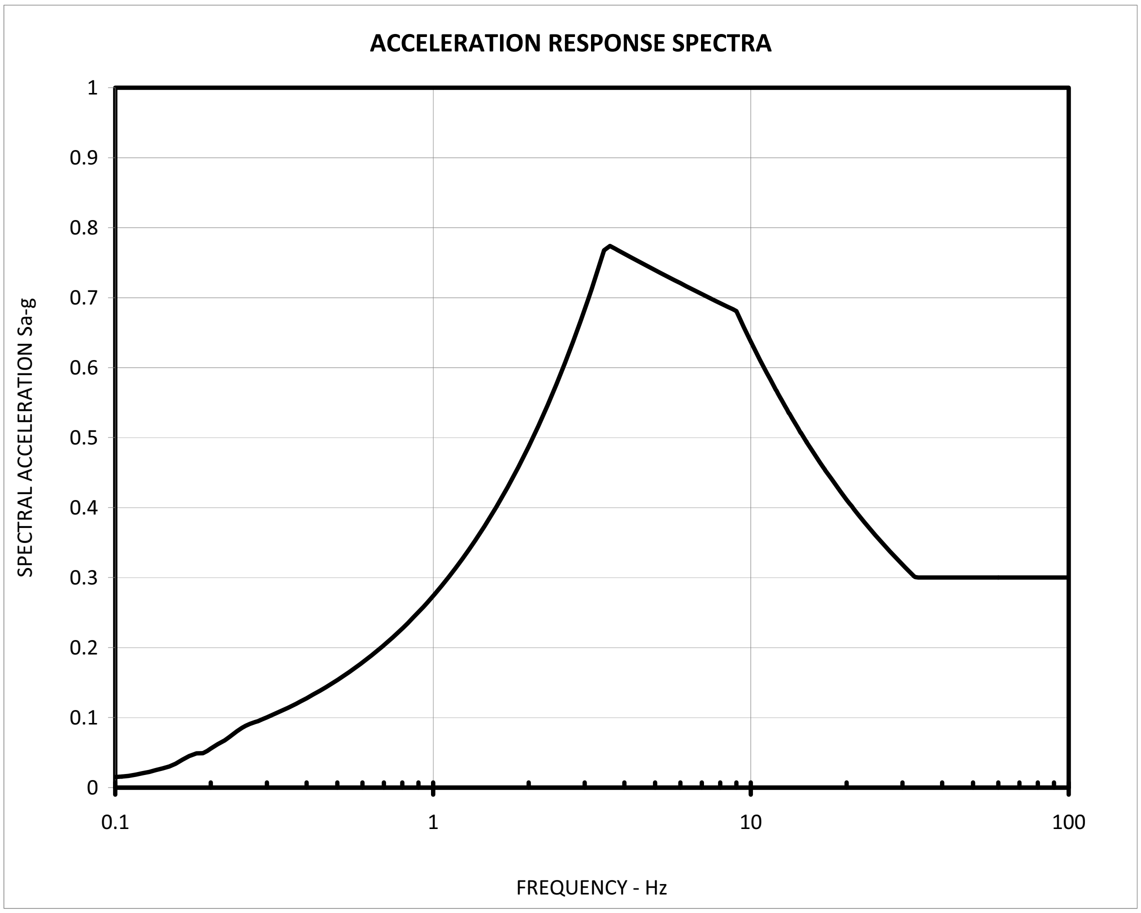


Figure 3.7-43 Vertical Radwaste Building Mat Foundation Response Spectrum (7% Damping)

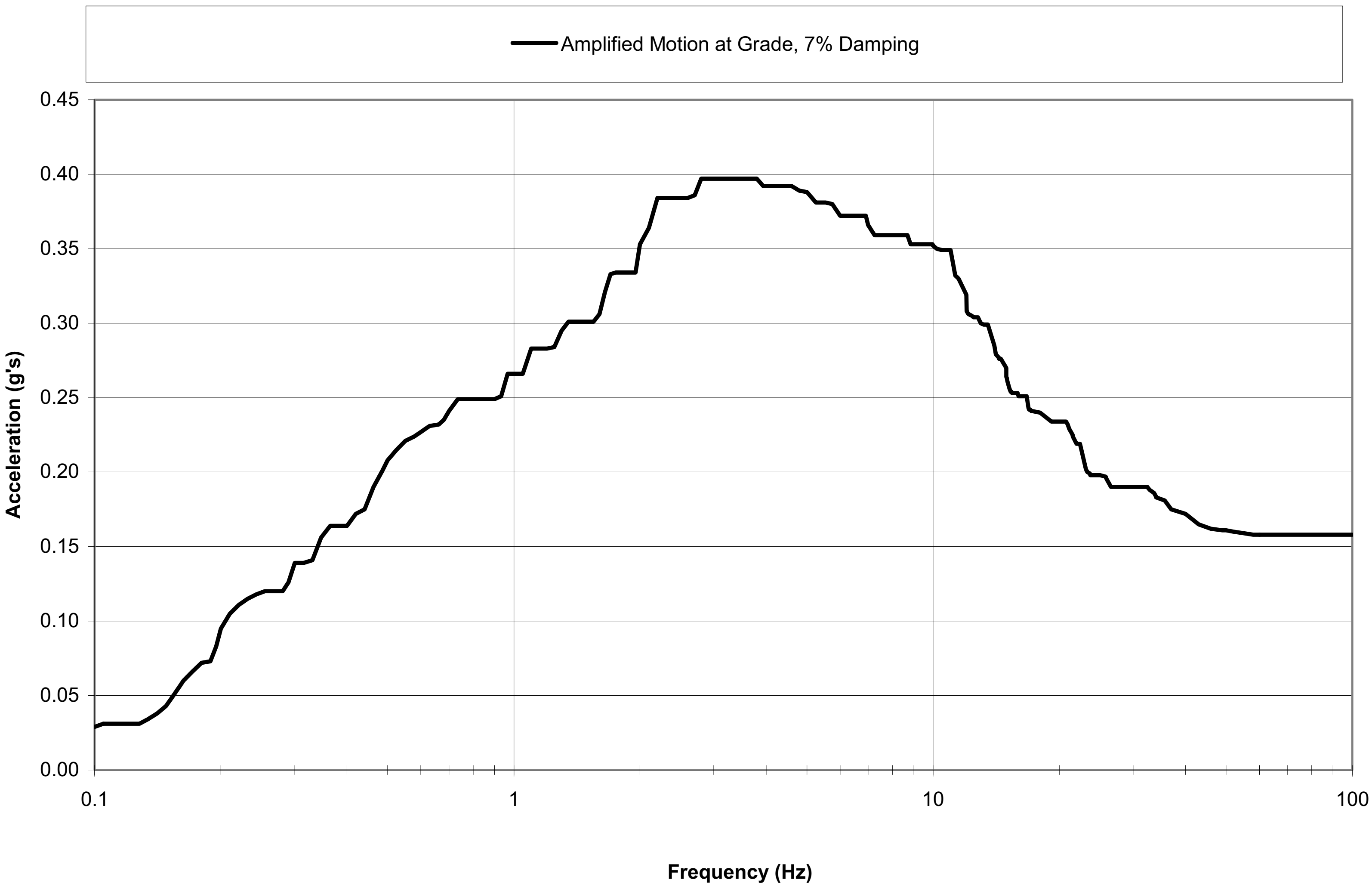


Figure 3.7-44 Radwaste Building East-West Input Motion for Stability Evaluations (7% Damping)

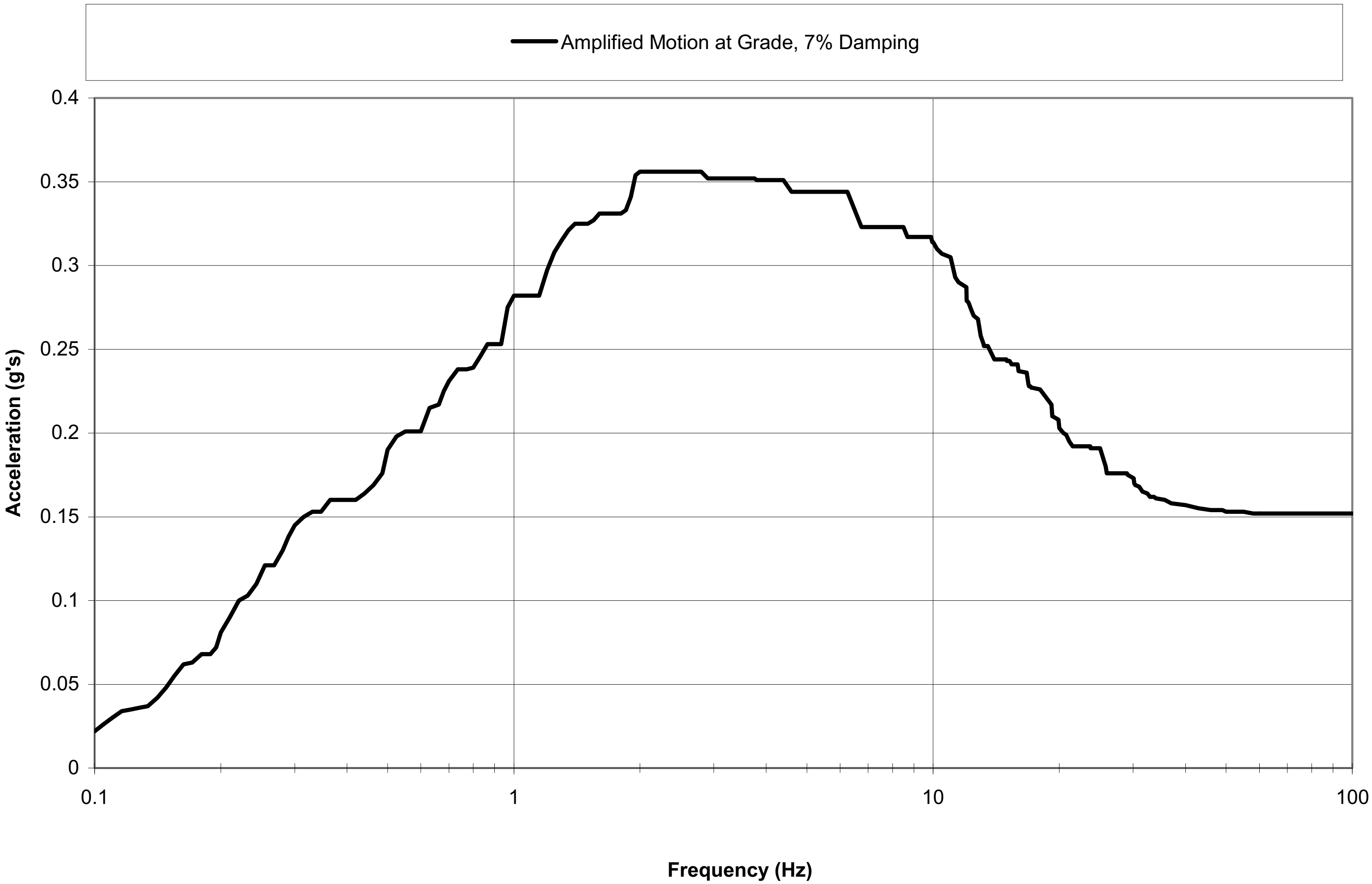


Figure 3.7-45 Radwaste Building North-South Input Motion for Stability Evaluations (7% Damping)

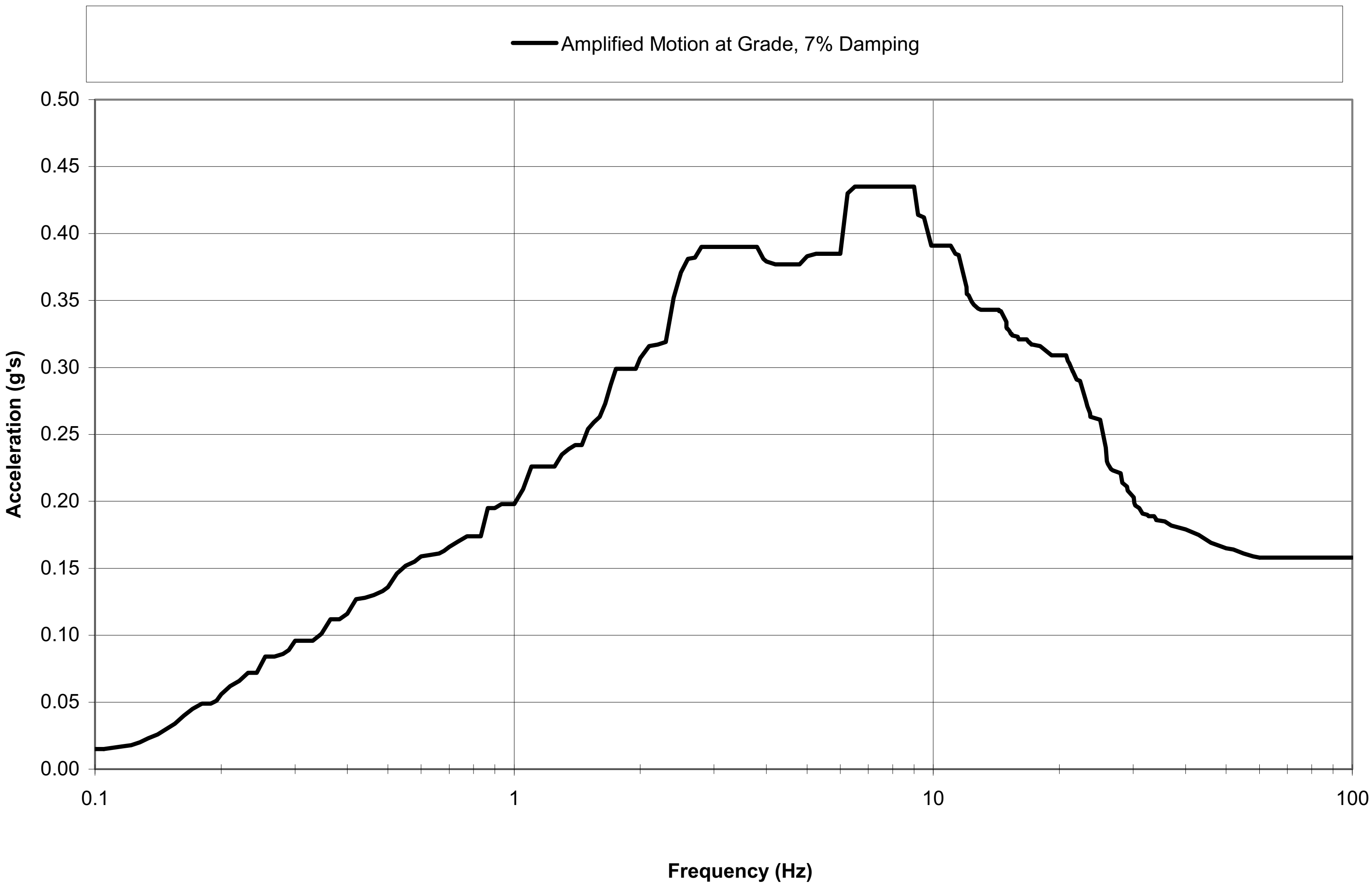


Figure 3.7-46 Radwaste Building Vertical Input Motion for Stability Evaluations (7% Damping)

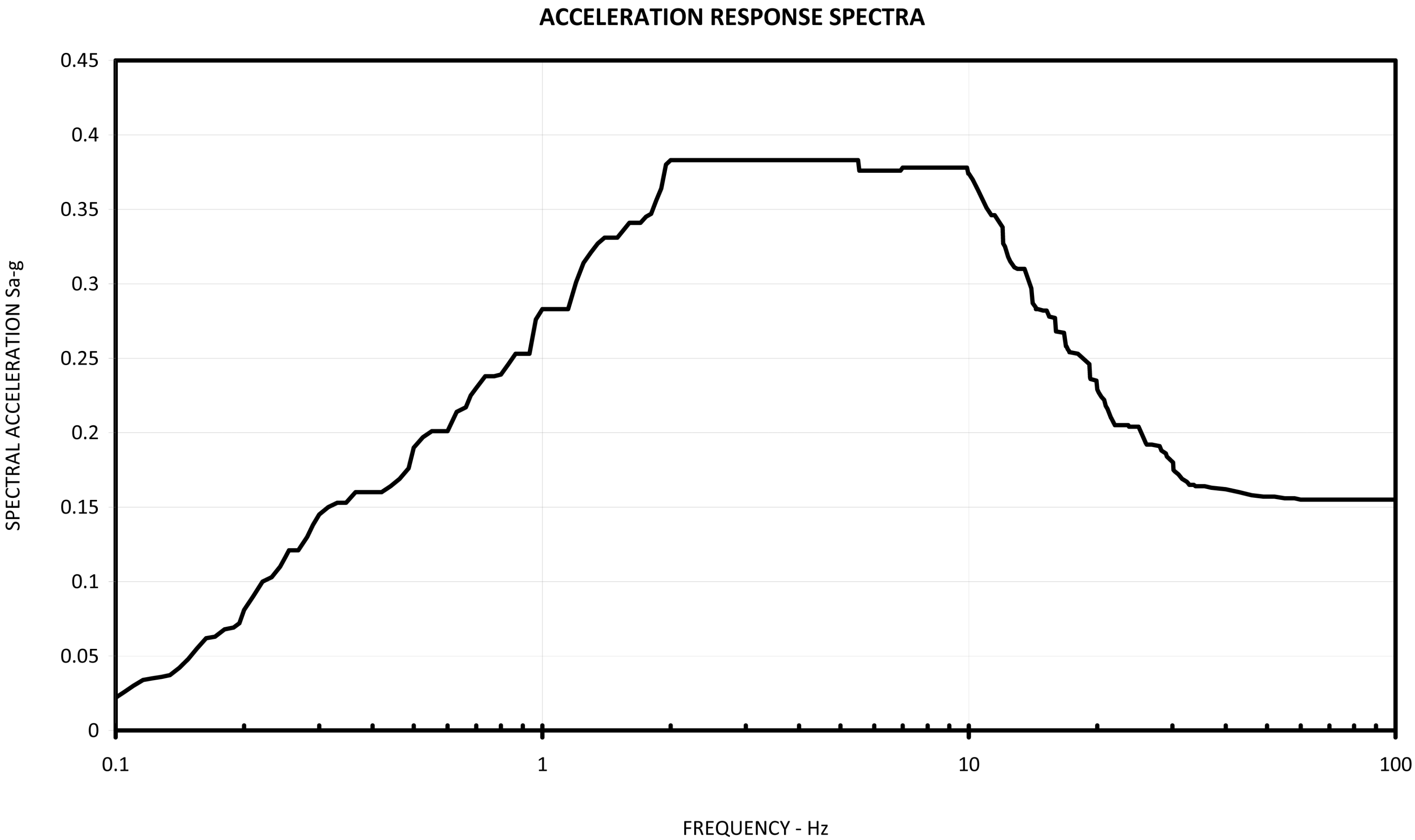


Figure 3.7-47 Control Building Annex North-South Input Motion for Stability Evaluations (7% Damping)

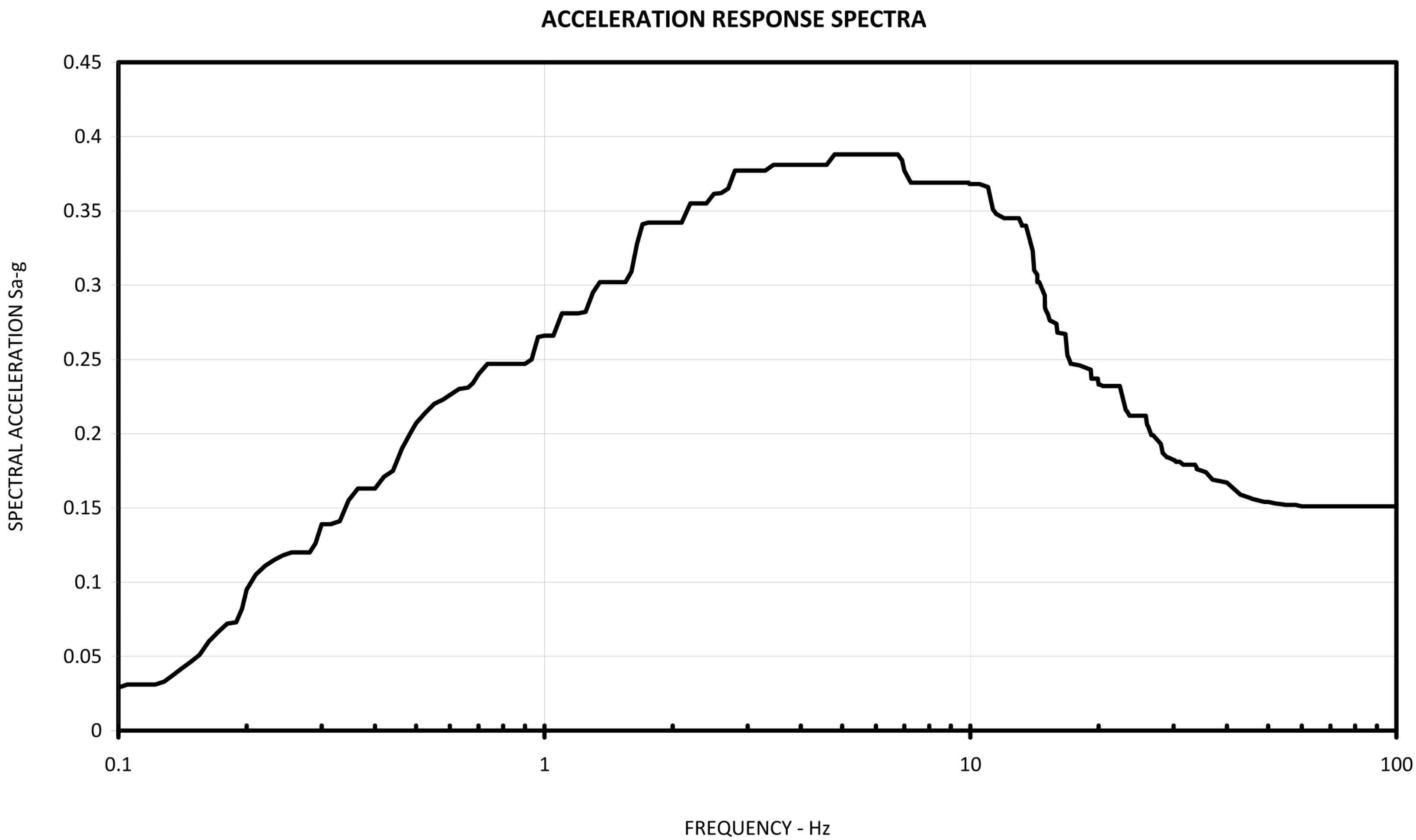


Figure 3.7-48 Control Building Annex East-West Input Motion for Stability Evaluations (7% Damping)

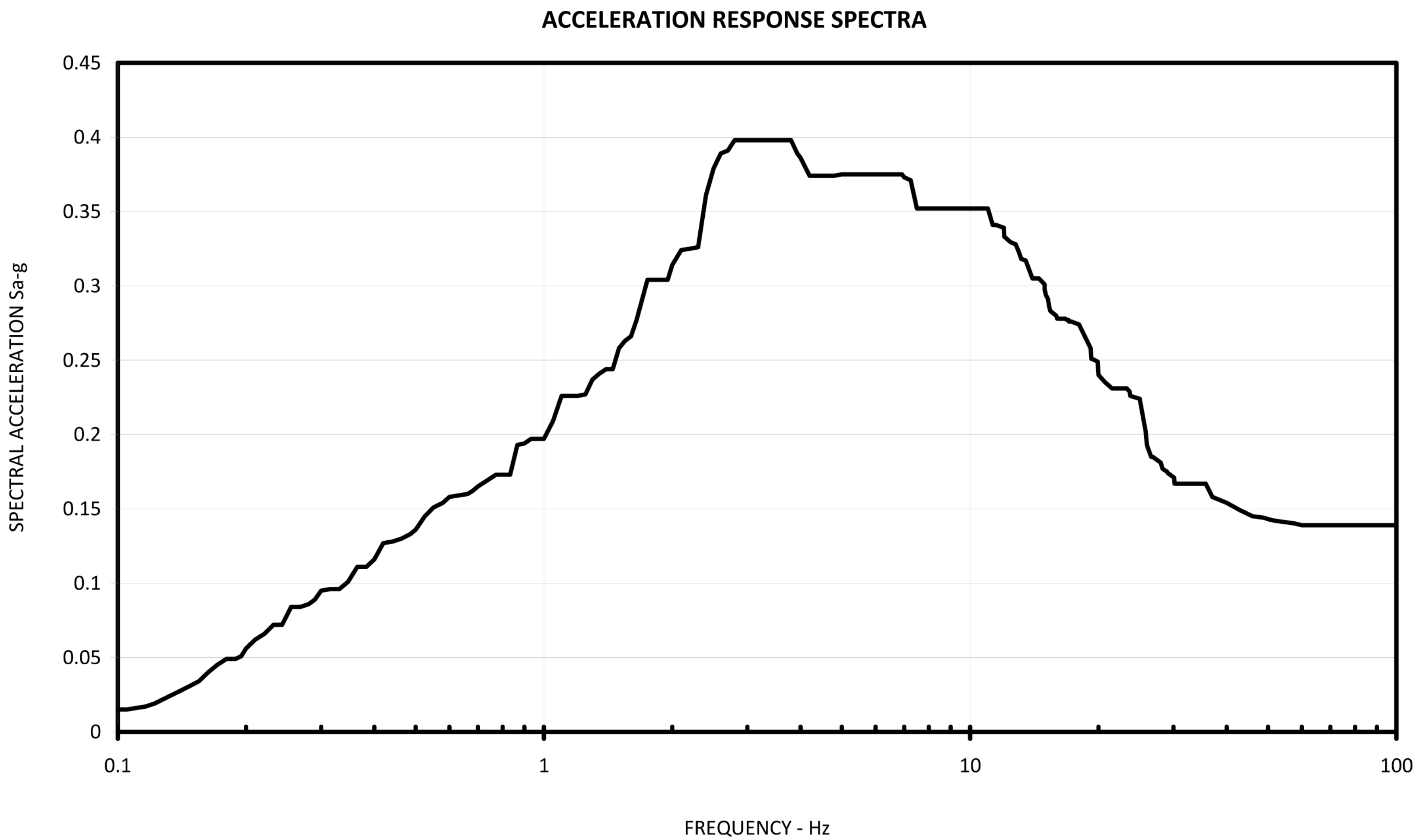


Figure 3.7-49 Control Building Annex Vertical Input Motion for Stability Evaluations (7% Damping)

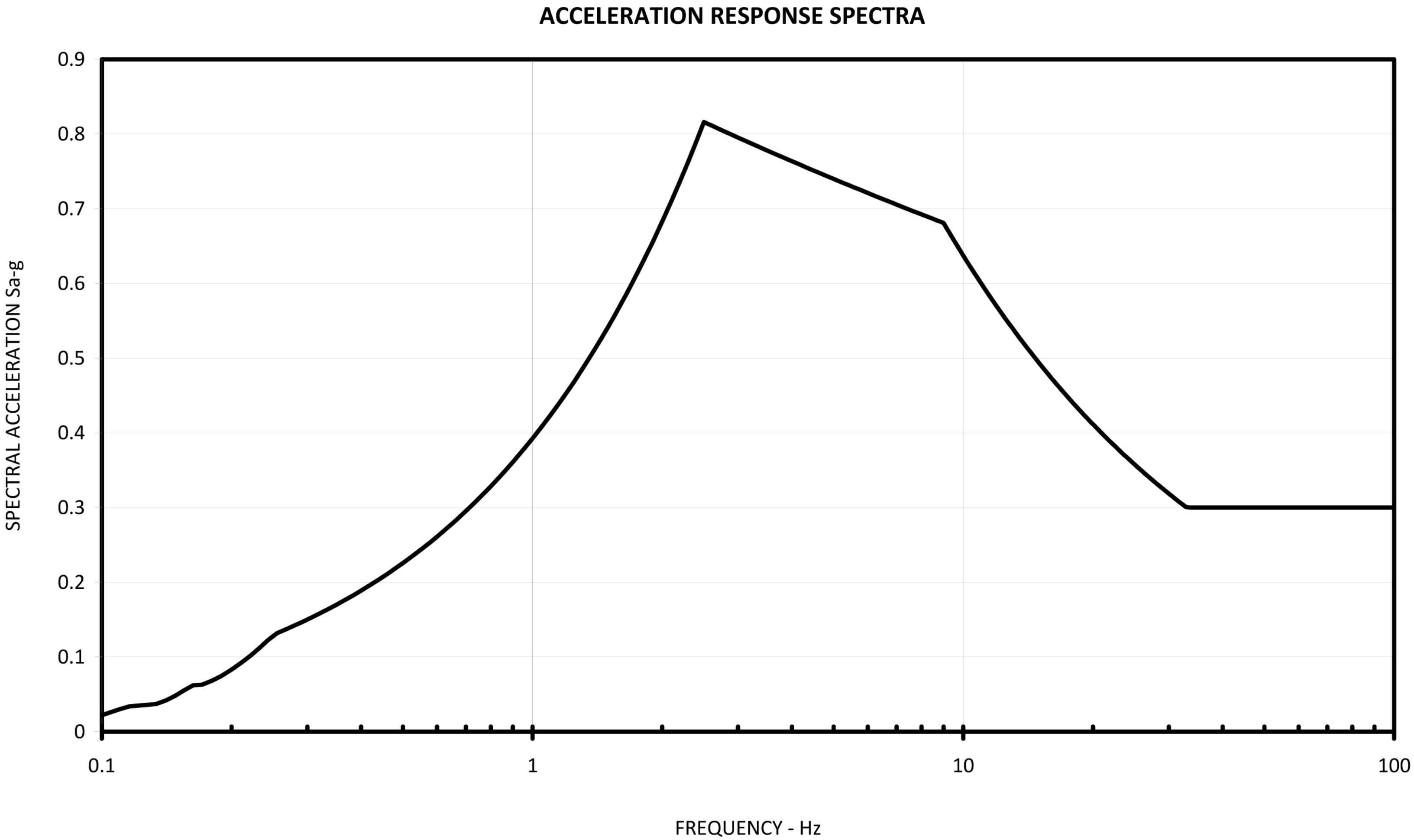


Figure 3.7-50 Service Building North-South Input Motion for II/I Design (7% Damping)

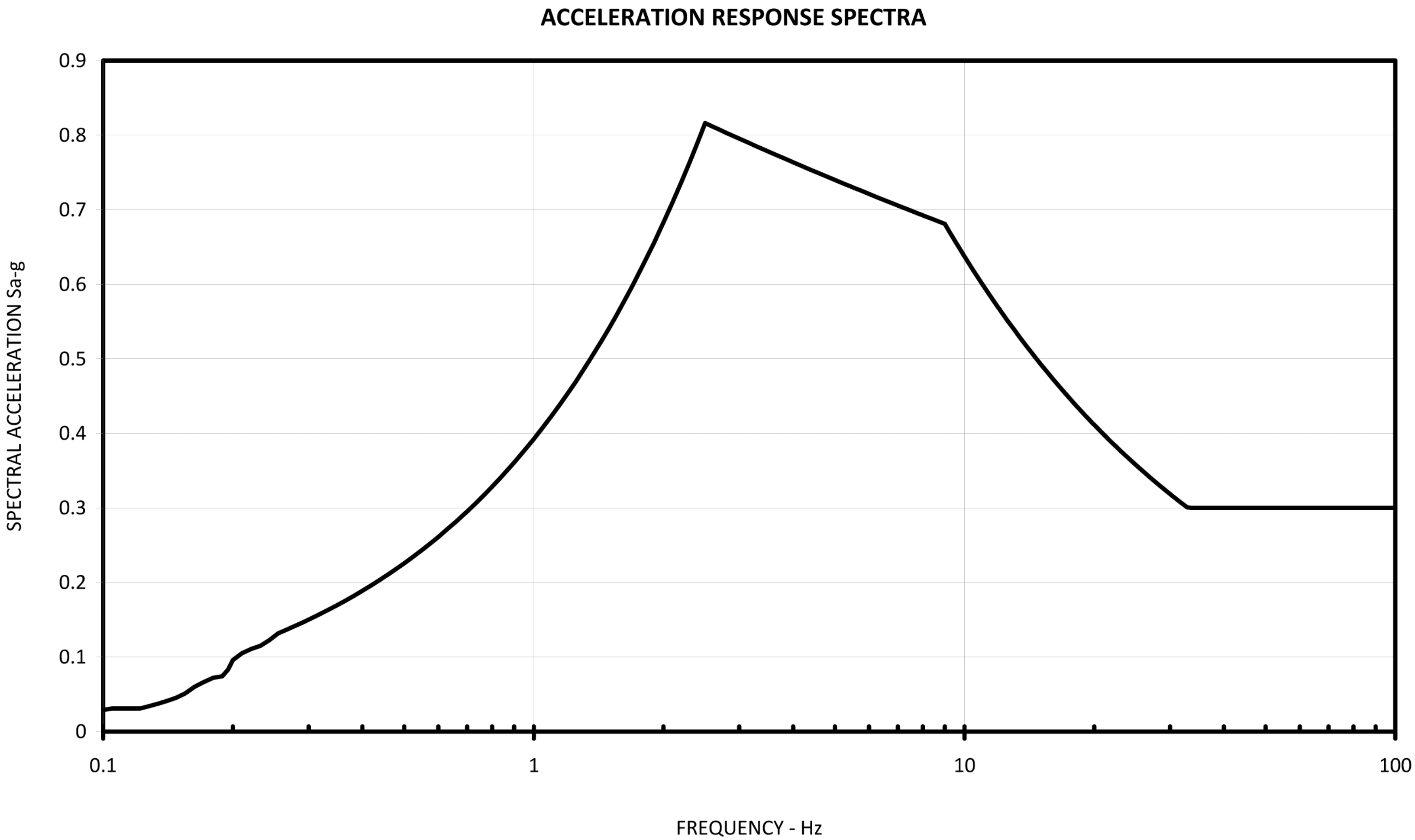


Figure 3.7-51 Service Building East-West Input Motion for II/I Design (7% Damping)

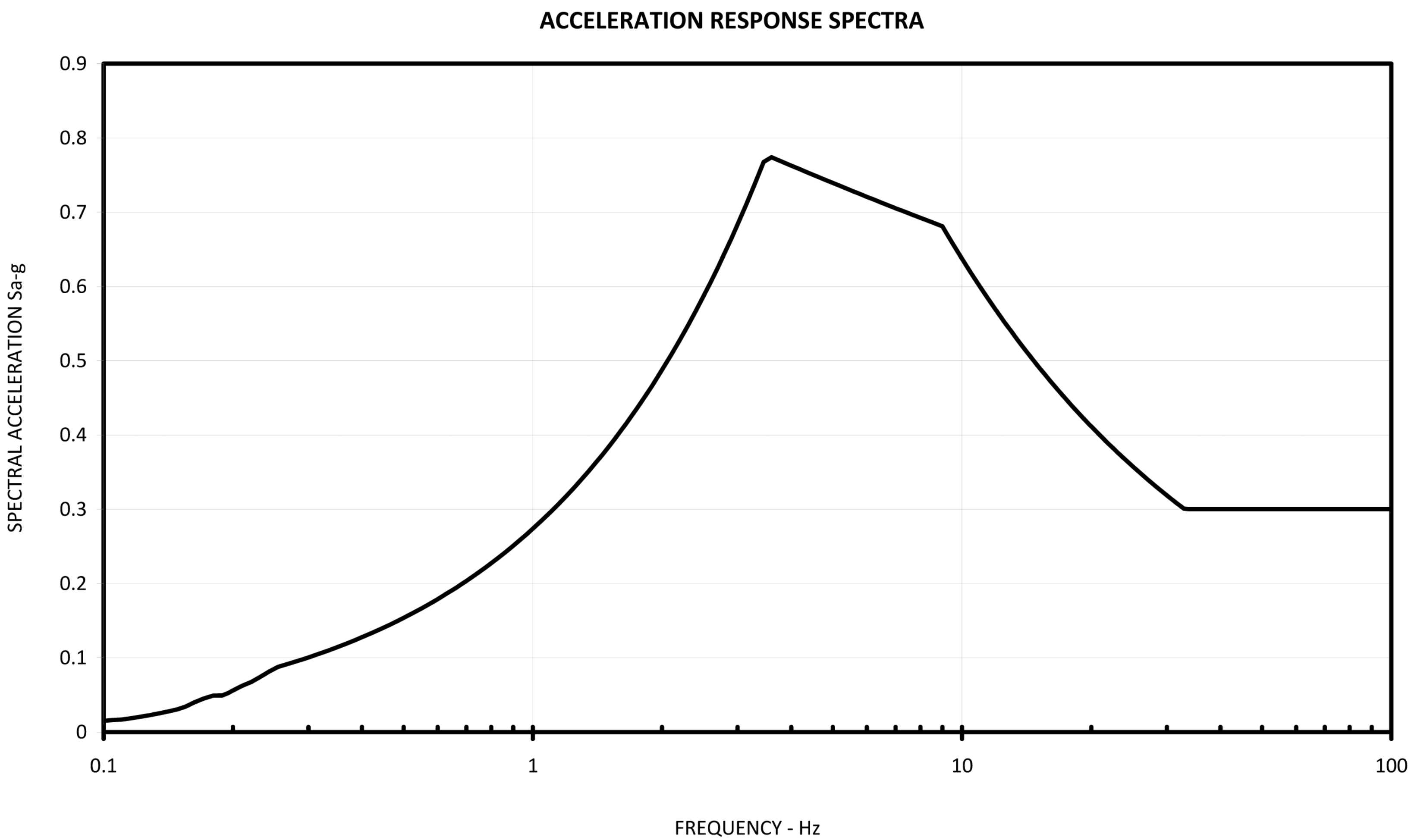


Figure 3.7-52 Service Building Vertical Input Motion for II/I Design (7% Damping)

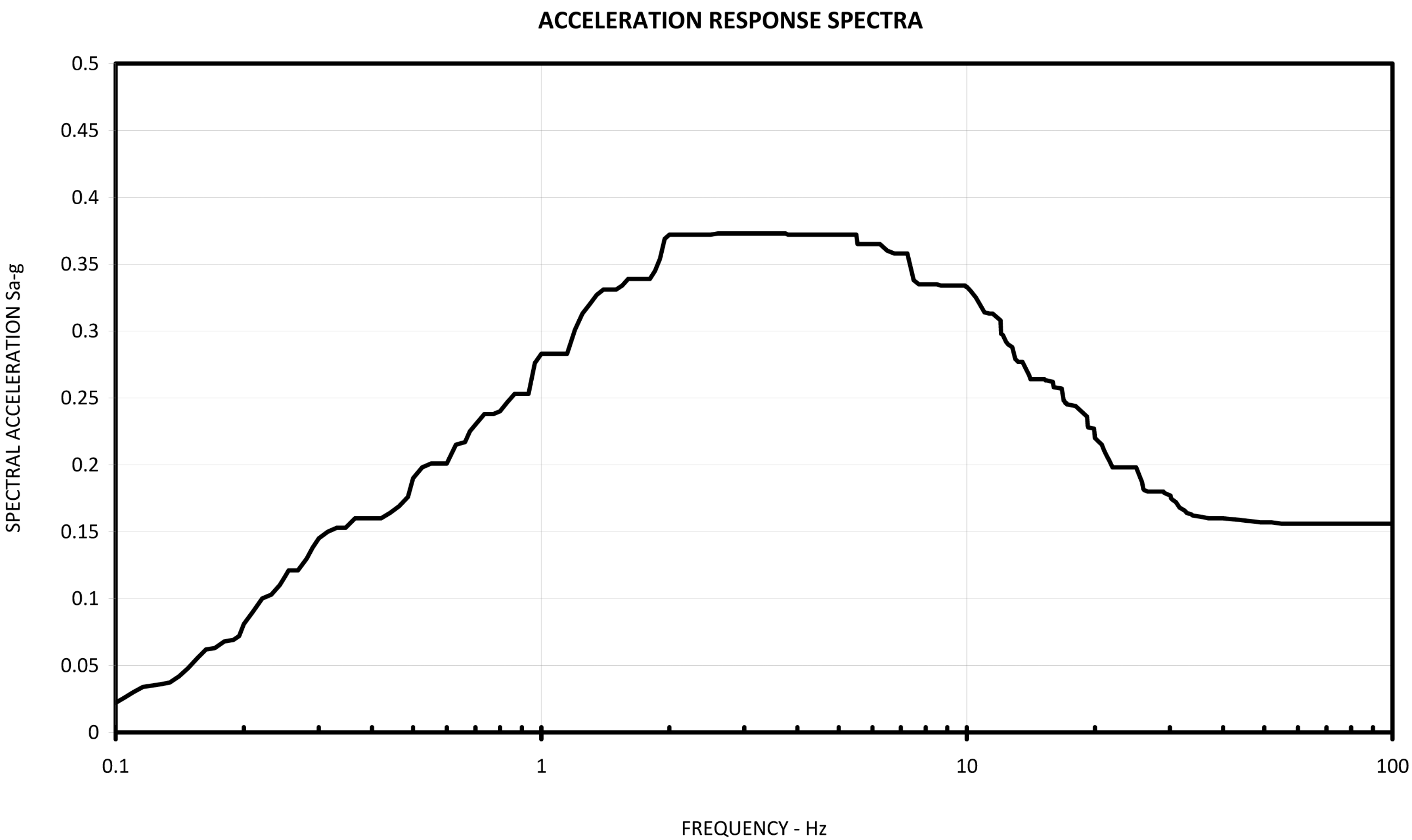


Figure 3.7-53 Service Building North-South Input Motion for Stability Evaluations (7% Damping)

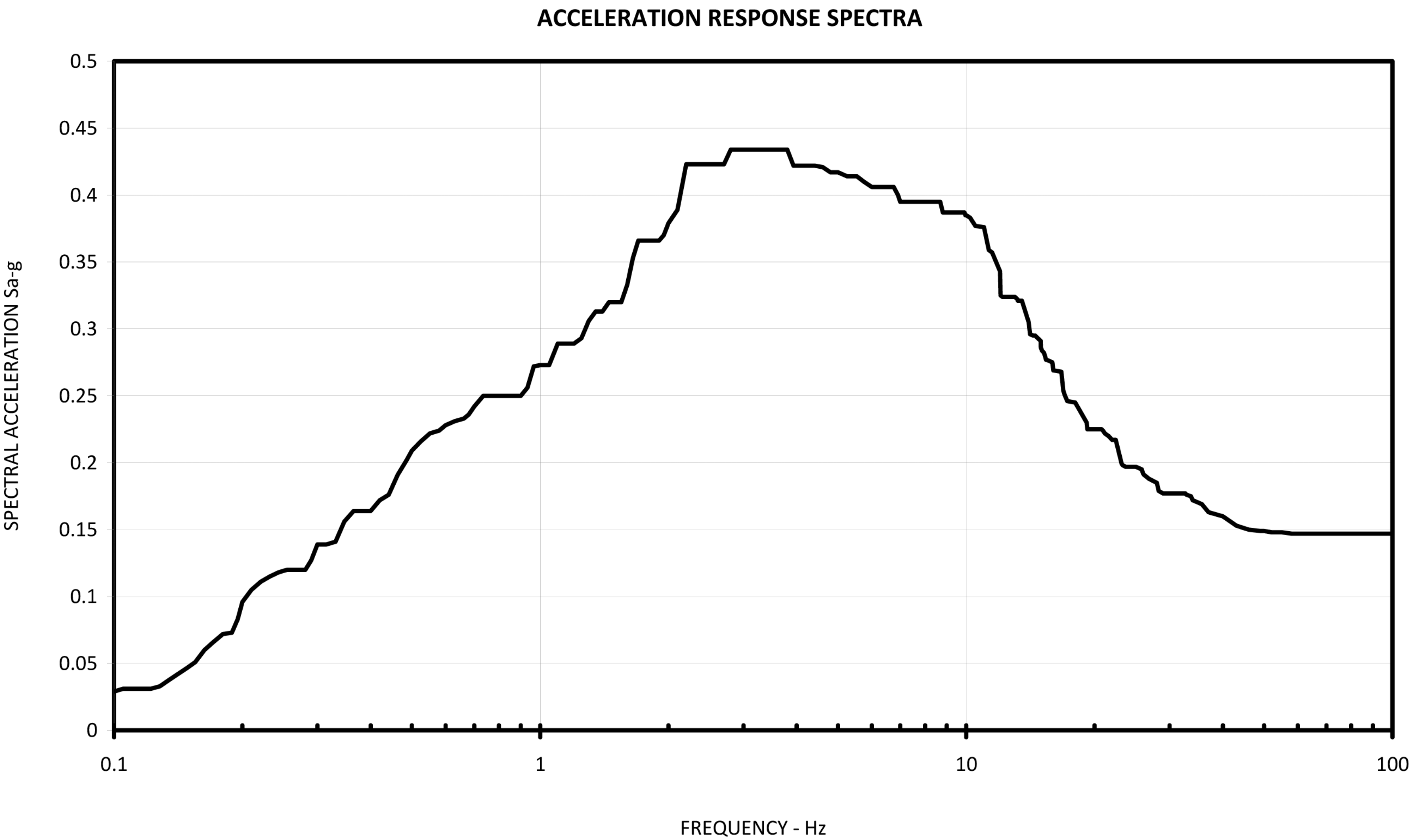


Figure 3.7-54 Service Building East-West Input Motion for Stability Evaluations (7% Damping)

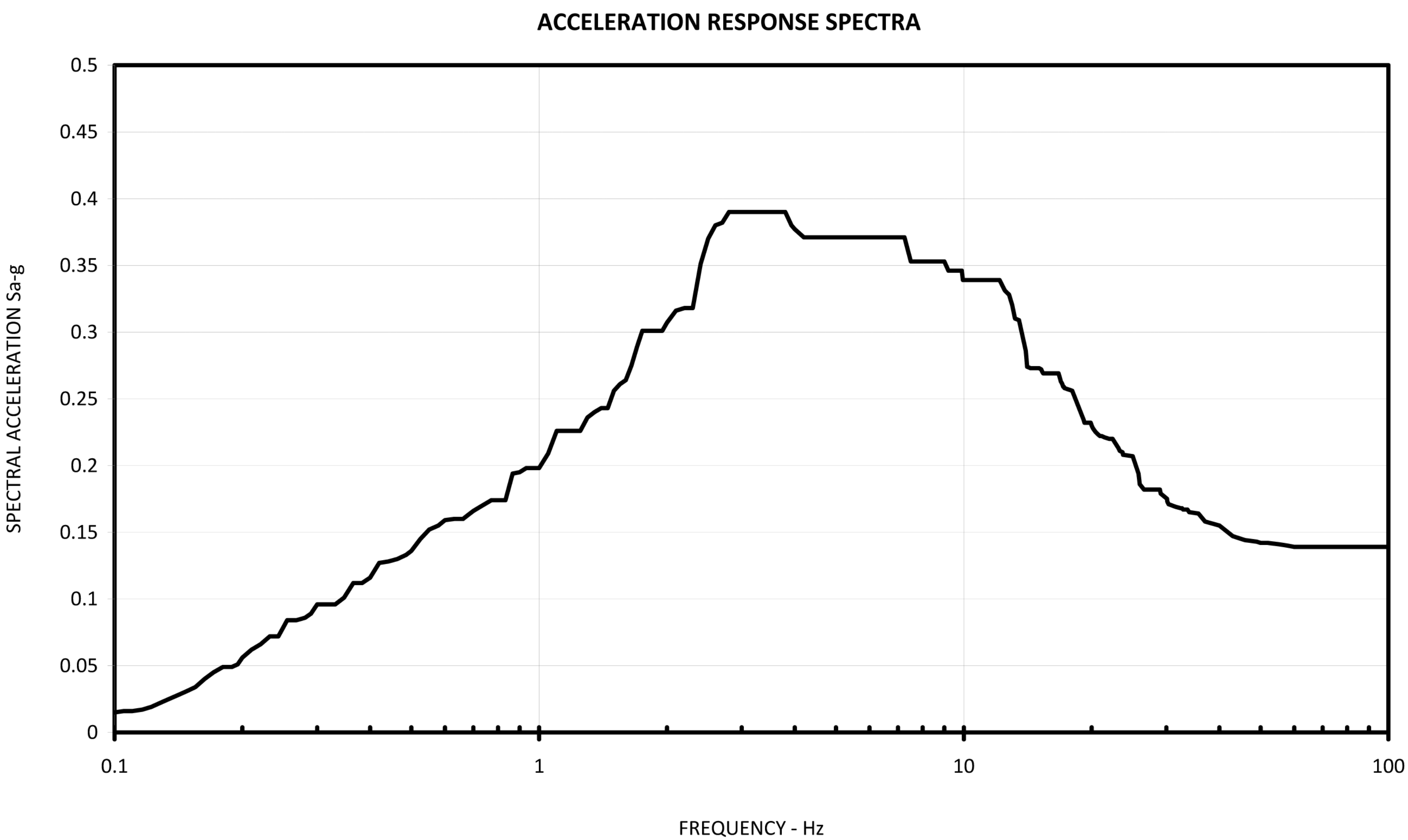


Figure 3.7-55 Service Building Vertical Input Motion for Stability Evaluations (7% Damping)