BSC

Design Calculation or Analysis Cover Sheet

Complete only applicable items.

1. QA: QA
2. Page 1

3. System	4. Document Identifier
Receipt Facility (RF)	200-SYC-RF00-01100-000-00A

5. Title
RF Seismic Analysis – 2007 Seismic Input Ground Motions

6. Group
Engineering-Civil/Structural/Architectural

7. Document Status Designation
☐ Preliminary ☒ Committed ☐ Confirmed ☐ Cancelled/Superseded

8. Notes/Comments: none

Attachments	Total Number of Pages
See Calculation Section 5	76

RECORD OF REVISIONS

9. No.	10. Reason For Revision	11. Total # of Pgs.	12. Last Pg. #	13. Originator (Print/Sign/Date)	14. Checker (Print/Sign/Date)	15. EGS (Print/Sign/Date)	16. Approved/Accepted (Print/Sign/Date)
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DISCLAIMER

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TABLES

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ACRONYMS

3D	Three-dimensional
BDBGM	Beyond Design Basis Ground Motion
C.G.	Center of Gravity
DBGM-2	Design Basis Ground Motion
DL	Dead Load
FE	Finite element
FEM	Finite element model
IBC	International Building Code
ITS	Important To Safety
LL	Live Load
PDC	Project Design Criteria
RF	Receipt Facility
SRSS	Square Root of Sum of Squares
SSI	Soil Structure Interaction
TAD	Transport, Aging, and Disposal
T.I.F	Torsional Increase Factor
YMP	Yucca Mountain Project

1. PURPOSE

The purpose of this calculation is to perform Tier-1 seismic analysis of the Receipt Facility using 2007 site-specific design response spectra (Ref. 2.2.9 – 2.2.10). This calculation is performed using results from 200-SYC-RF00-00100-000-00A, *Receipt Facility (RF) Mass Properties* (Ref. 2.2.2) and 200-SYC-RF00-00900-000-00A, *Receipt Facility Soil Springs and Damping by New Soil Data* (Ref. 2.2.3), along with the lumped mass multi-beam-stick SAP2000 model from 200-SYC-RF00-00400-000-00B, *RF Seismic Analysis* (Ref. 2.2.11). The basis of design for the RF is defined in 000-3DR-MGR0-00300-000-000, *Basis of Design for the TAD Canister-Based Repository Design Concept* (Ref. 2.2.5).

Results of the response spectra analyses will yield the shear wall seismic demand forces, and in-structure accelerations. These results will be compared to results from *RF Seismic Analysis* (Ref. 2.2.11) which is based on the 2004 soil and input spectra. This comparison will be the purpose of a subsequent calculation.

2. REFERENCES

2.1 PROJECT PROCEDURES/DIRECTIVES

2.1.1 EG-PRO-3DP-G04B-00037, Rev. 9. *Calculations and Analyses*. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20070717.0004

2.1.2 IT-PRO-0011 Rev.7. *Software Management.* Las Vegas, Nevada, Bechtel SAIC Company. ACC: DOC.20070905.0007

2.1.3 ORD (Office of Repository Development) 2007. *Repository Project Management Automation Plan.* 000-PLN-MGR0-00200-000 Rev. 00E. Las Vegas, Nevada: U.S. Department of Energy, Office of Repository Development. ACC: ENG.20070326.0019

2.1.4 BSC (Bechtel SAIC Company) 2007. IT-PRO-0012 Rev. 4, *Qualification of Software.* Las Vegas, Nevada: Bechtel SAIC Company. ACC: DOC.20070319.0014

2.2 DESIGN INPUTS

2.2.1 ASCE 4-98. 2000. *Seismic Analysis of Safety-Related Nuclear Structures and Commentary.* Reston, VA: American Society of Civil Engineers. TIC: 253158. [ISBN: 0-7844-0433-X]

2.2.2 BSC (Bechtel SAIC Company) 2006. *Receipt Facility (RF) Mass Properties* 200-SYC-RF00-00100-000-00A. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20061206.0001

2.2.3 BSC (Bechtel SAIC Company) 2007. *Receipt Facility Soil Springs and Damping by New Soil Data* 200-SYC-RF00-00900-000-00A. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20070810.0007

2.2.4 BSC (Bechtel SAIC Company) 2006. *Project Design Criteria Document.* 000-3DR-MGR0-00100-000 REV 006. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20061201.0005.

2.2.5 BSC (Bechtel SAIC Company) 2006. *Basis of Design for the TAD Canister-Based Repository Design Concept.* 000-3DR-MGR0-00300-000-000. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20061023.0002.

2.2.6 DOE (U.S. Department of Energy) 2005. *Software Validation Report for: SAP2000 Version 9.1.4.* Document ID: 11198-SVR-9.1.4-00-Win2000. Las Vegas, Nevada: U.S. Department of Energy, Office of Repository Development. ACC: MOL.20051012.0425. [DIRS 176790]

2.2.7 BSC (Bechtel SAIC Company) 2006. *Seismic Analysis and Design Approach Document.* 000-30R-MGR0-02000-000-000. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20061214.0008.

2.2.8 ICC (International Code Council) 2003. *International Building Code 2000*, *with Errata to the 2000 International Building Code.* Falls Church, Virginia: International Code Council. TIC: 251054; 257198. [ISBN: 1-892395-25-8]

2.2.9 MO0706DSDR5E4A.001. *Seismic Design Spectra for the Surface Facilities Area at 5E-4 APE for Multiple Dampings*. Submittal date: 6/14/2007. [DIRS 181422] (TBV-8739)

2.2.10 MO0706DSDR1E4A.001. *Seismic Design Spectra for the Surface Facilities Area at 1E-4 APE for Multiple Dampings*. Submittal date: 6/14/2007. [DIRS 181421] (TBV-8738)

2.2.11 BSC (Bechtel SAIC Company) 2007. *RF Seismic Analysis* 200-SYC-RF00-00400-000-00B. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20070614.0017

2.2.12 SAP2000 V.9.1.4. 2005. WINDOWS 2000. STN: 11198-9.1.4-00 [DIRS 178238]

2.3 DESIGN CONSTRAINTS

None

2.4 DESIGN OUTPUTS

Results from this calculation will be used in a calculation comparing the results of this calculation to the results of the *RF Seismic Analysis* (Ref. 2.2.11).

3. ASSUMPTIONS

3.1 ASSUMPTIONS REQUIRING VERIFICATION

None

3.2 ASSUMPTIONS NOT REQUIRING VERIFICATION

None

4. METHODOLOGY

4.1 QUALITY ASSURANCE

This calculation was prepared in accordance with EG-PRO-3DP-G04B-00037-009, *Calculations and Analyses* (Ref. 2.1.1). Section 6.1.2 of the Basis of Design for the TAD Canister-Based Repository Design Concept (Ref. 2.2.5) classifies the RF structure as Important to Safety (ITS). Therefore the approved version of this calculation is designated as QA: QA.

4.2 USE OF SOFTWARE

All software used in this calculation is operated on a Dell OPTIPLEX GX260 PC running the Microsoft Windows 2000 operating system. Microsoft Office 2000 Professional and Microsoft Windows 2000 are listed on the *Repository Project Management Automation Plan* (Ref. 2.1.3).

4.2.1 SAP2000 Version 9.1.4

SAP2000, Version 9.1.4, as used in this calculation is qualified in accordance with IT-PRO-0012, *Qualification of Software*, (Ref. 2.1.4) and is classified as Level 1 usage as defined in IT-PRO-0011 (Ref. 2.1.2). This software is a commercially available computer program qualified to perform static and dynamic analysis of structural systems. This software is listed in the Qualified and Controlled Software Report as qualified with Software Tracking Number 11198-9.1.4-00. The SAP2000 Software Validation is contained in Ref. 2.2.6 and SAP2000 software is documented in Ref. 2.2.12.

4.2.2 Microsoft Excel 2000

Microsoft Excel 2000, as used in this calculation, is classified as Level 2 usage as defined in IT-PRO-0011, (Ref. 2.1.2). Microsoft Excel 2000, which is part of the Microsoft Office 2000 Professional suite of programs, is used to develop SAP2000 model input and calculation tables for documentation purposes. This software is listed in the Level 2 Usage Controlled Software

Report as controlled with Software Tracking Number 610236-2000-00. Excel 2000 output was checked by visual inspection and hand calculations.

4.3 ANALYSIS METHOD

The process of developing the finite element model consists of the following steps.

Copy the SAP2000 lumped mass multi-beam-stick, or stick, model from 200-SYC-RF00-00400-000-00B, *RF Seismic Analysis* (Ref. 2.2.11). Attachment A includes floor plans and wall elevations that show the location of the stick model elements. Lumped masses that are used were computed in 200-SYC-RF00-00100-000-00A, *Receipt Facility (RF) Mass Properties* (Ref. 2.2.2).

Change the boundary conditions applied to the base-mat (SAP2000 joint 99), using frequency independent soil springs computed in calculation 200-SYC-RF00-00900-000-00A, *Receipt Facility Soil Springs and Damping by New Soil Data* (Ref. 2.2.3).

Perform modal analyses for 130' depth of alluvium for DBGM-2 and BDBGM lower bound, median bound, and upper bound soil cases.

Develop hybrid response spectra to reflect the following:

DBGM-2: 20% damping (Ref. 2.2.3, Section 7.1.2.7) for Soil Structure Interaction (SSI) modes and 7% damping (Ref. 2.2.7, Table 7-1) for all other modes

BDBGM: 20% damping (Ref. 2.2.3, Section 7.2.2.7) for Soil Structure Interaction (SSI) modes and 10% damping (Ref. 2.2.7, Table 7-1) for all other modes

Perform a response spectrum analysis for the following cases:

DBGM-2: Lower Bound Soil Condition for 130' alluvium
DBGM-2: Median Soil Condition for 130' alluvium
DBGM-2: Upper Bound Soil Condition for 130' alluvium

BDBGM: Lower Bound Soil Condition for 130' alluvium
BDBGM: Median Soil Condition for 130' alluvium
BDBGM: Upper Bound Soil Condition for 130' alluvium

The seismic design basis (DBGM-2 and BDBGM) in terms of annual probability of exceedance for ITS SSCs is specified in Table 5-1 of the Seismic Analysis and Design Approach Document (Ref. 2.2.7).

5. LIST OF ATTACHMENTS

6. BODY OF CALCULATION

6.1 SEISMIC MODELING AND ANALYSIS

The SAP2000 stick model, generated in 200-SYC-RF00-00400-000-00B, *RF Seismic Analysis* (Ref. 2.2.11), is used for analyses in this calculation. The mass for each floor is lumped at a dedicated node located at the coordinates of the center of mass. The lumped mass at each floor level is taken from 200-SYC-RF00-00100-000-00A, *Receipt Facility (RF) Mass Properties* (Ref. 2.2.2). The location of the center of mass at each elevation is documented in Reference 2.2.2 and converted for the stick model in Section 6.1 of Reference 2.2.11. Attachment A shows the wall elevations with the SAP2000 representative beam-stick elements and joints labeled for the Receipt Facility.

Soil structure interaction (SSI) is considered using frequency independent soil springs with six degrees of freedom. The springs are placed at the center of mass (SAP2000 node 99) of the base-mat. The spring properties calculated for 2,000 and 10,000-year return period seismic events are used to analyze DBGM-2 and BDBGM design basis ground motions, respectively. Six sets of springs were calculated to define lower, median, and upper bound stiffness values for 130ft. depth of alluvium for each seismic event. These boundary conditions were computed in calculation 200-SYC-RF00-00900-000-00A, *Receipt Facility Soil Springs and Damping by New Soil Data* (Ref. 2.2.3).

In this calculation, the SAP2000 stick model will be utilized to perform the following analyses:

Modal analysis utilizing the lower bound, median and upper bound soil cases for 130' alluvium depth for the Design Basis Ground Motion (DBGM-2).

Modal analysis utilizing the lower bound, median, and upper bound soil cases for 130' alluvium depth for the Beyond Design Basis Ground Motion (BDBGM).

Response Spectrum Analysis for the DBGM-2 cases utilizing results from the DBGM-2 modal analysis. In accordance with Section 3.2.7.1.1 (c) of Reference 2.2.1, the response spectrum analysis will utilize the Ten-percent method for combining modal responses. In accordance with Section 7.2.7 of the Seismic Analysis and Design Approach Document (Ref. 2.2.7) the response spectrum analysis will utilize the SRSS method for combining the North-South (Global Y-direction), East-West (Global X-direction), and Vertical (Global Z-direction) spectral case responses.

Response Spectrum Analysis for the BDBGM cases utilizing results from the BDBGM modal analysis. In accordance with Section 3.2.7.1.1 (c) of Reference 2.2.1, the response spectrum analysis will utilize the Ten-percent method for combining modal responses. In accordance with Section 7.2.7 of the Seismic Analysis and Design Approach Document (Ref. 2.2.7) the response spectrum analysis will utilize the SRSS method for combining the North-South (Global Y-direction), East-West (Global X-direction), and Vertical (Global Z-direction) spectral case responses.

1 g gravity load to determine the DL + 25%LL linear static analysis case (Ref. 2.2.7, Section 7.1.1) for the 130' lower, median, and upper bound DBGM-2 soil cases, along with the 130' lower, median, and upper bound BDBGM soil case. The seismic mass, DL + 25%LL, calculated in 200-SYC-RF00-00100-000-00A, *Receipt Facility (RF) Mass Properties* (Ref. 2.2.2) and used in this calculation is computed in accordance with Sections 7.2.1 and 8.3.1 of the Seismic Analysis and Design Approach Document (Ref. 2.2.7)

The modal analysis results for DBGM-2 soil cases are listed in Tables C1-C3. The modal analysis results for BDGBM soil cases are listed in Tables D1-D3. From the modal analysis results for the various soil cases mentioned, it is observed that the first three modes are SSI dominated modes. Based on these results, damping values of 20% (Ref. 2.2.3, Section 7.1.2.7) are utilized for the first three, SSI, modes and 7% damping according to Table 7-1 of the Seismic Analysis and Design Approach Document (Ref. 2.2.7) will be used for the remaining structural modes in the response spectrum analysis for DBGM-2. For the BDBGM response spectrum analysis, damping values of 20% (Ref. 2.2.3, Section 7) will be used for the first three, SSI, modes and 10% damping according to Table 7-1 of the Seismic Analysis and Design Approach Document (Ref. 2.2.7) will be used for the remaining structural modes. A sufficient number of modes have been included in the analysis to ensure that at least 90% of the total mass, in each of the three orthogonal directions is included per section 7.2.6 of the Seismic Analysis and Design Approach Document (Ref. 2.2.7).

SAP2000 only allows the input of a single response spectrum curve for a given response spectrum analysis case. To consider the effect of different damping values for each mode, hybrid design response spectra are required. These "hybrid" spectra are developed by combining the 20% and 7% damped spectra defined in Reference 2.2.9 for DBGM-2 analysis. Likewise the 20% and 10% damped spectra defined in Reference 2.2.10 are used in developing the hybrid spectra for the BDBGM analysis. Since the first three modes are soil deformation dominant, the 20% damped spectra is applied to these modes. The hybrid spectra consists of the 20% damped spectra up to the frequency of the third mode and the 7% / 10% damped spectra at frequencies above the third mode. Since the third mode frequency varies for each of the soil conditions, a series of hybrid spectra are developed to be used for the various soil conditions.

The 20%, 10%, and 7% response spectra data used in the development of hybrid were taken from Reference 2.2.9 (DBGM-2) and Reference 2.2.10 (BDBGM) as cited above. The results from the modal analysis (Tables C1-C3 and D1-D3) are used in the development of "hybrid" response spectra.

The resulting DBGM-2 hybrid spectra are shown in Figures C1-C6. The resulting BDBGM hybrid spectra are shown in Figures D1-D6.

7. RESULTS AND CONCLUSIONS

7.1 RESULTS

The results from this calculation are:

Modal analysis results for DBGM-2 and BDBGM soil cases.

Member forces and diaphragm accelerations for DBGM-2 and BDBGM seismic events

Member forces for 1g DL + 25%LL linear static analysis for DBGM-2 and BDBGM soil cases

Story shear calculations for DBGM-2 and BDBGM seismic events due to loads in global X and Y directions

Story Drifts for DBGM-2 and BDBGM seismic events due to loads in global X and Y directions

SAP2000 output from the following runs are contained in the attachments as listed:

Attachment E	DBGM-2 130' Lower Bound Alluvium Modal, Response Spectra, and DL+25%LL Analyses
Attachment F	DBGM-2 130' Median Alluvium Modal, Response Spectra, and DL+25%LL Analyses
Attachment G	DBGM-2 130' Upper Bound Alluvium Modal, Response Spectra, and DL+25%LL Analyses
Attachment H	BDBGM 130' Lower Bound Alluvium Modal, Response Spectra, and DL+25%LL Analyses
Attachment I	BDBGM 130' Median Alluvium Modal, Response Spectra, and DL+25%LL Analyses
Attachment J	BDBGM 130' Upper Bound Alluvium Modal, Response Spectra, and DL+25%LL Analyses

Results of the analyses indicate that the upper bound soil case provides the highest reactions and accelerations. The values for this controlling case will be used in subsequent design and analysis work.

Global X, Y, and Z diaphragm accelerations at the center of mass of each diaphragm (SAP2000 joints 99, 399, 599, 699, and 799) for the DBGM-2 130' upper bound, controlling case, soil condition are summarized in Table C4. Global X, Y, and Z diaphragm accelerations at the center of mass of each diaphragm for the BDBGM 130' upper bound, controlling case, soil condition are summarized in Table D4. The accelerations in Table C4 and Table D4 are responses based on individual response spectra (loading) applied in each of the three orthogonal directions. Global X (East-West) and global Y (North-South) horizontal accelerations are displayed in Figure C7 for DBGM-2 130' upper bound soil case. Global X and Y horizontal accelerations are displayed in Figure D7 for BDBGM 130' upper bound soil case. Global X (East-West) diaphragm accelerations (Tables C4 and D4) displayed in Figures C7 and D7 are accelerations resulting from X-direction loading. Global Y (North-South) response accelerations (Tables C4 and D4) displayed in Figures C7 and D7 are accelerations resulting from Y-direction loading.

SRSS diaphragm accelerations at the center of mass of each diaphragm (SAP2000 joints 99, 399, 599, 699, and 799) for the DBGM-2 130' upper bound, controlling case, soil condition are summarized in Table C5. SRSS diaphragm accelerations at the center of mass of each diaphragm for the BDBGM 130' upper bound, controlling case, soil condition are summarized in Table D5.

Story drift is the relative displacement between diaphragms. Story drift for the DBGM-2 upper bound soil case are documented in Table C6. Story drift for the BDBGM upper bound soil case are documented in Table D6. East-West displacements are responses due to loading in the global X-direction. North-South displacements are responses due to loading in the global Y-direction. A story drift ratio is also computed by dividing the story drift by the story height. This value is then compared to the allowable limit of 0.004 presented in section 4.2.11.4.10 of the Project Design Criteria document (Ref. 2.2.4). It states that for ITS structures in which shear is the primary contributor to drift, the calculated story drift shall not exceed 0.004 times that story height. Results from Tables C6 and D6 indicate that this requirement is met. East-West diaphragm (Tables C6 and D6) displacements resulting from X-direction are plotted relative to elevation in Figure C8 (DBGM-2) and Figure D8 (BDBGM). North-South diaphragm (Tables C6 and D6) displacements resulting from Y-direction are plotted relative to elevation in Figure C8 (DBGM-2) and Figure D8 (BDBGM).

The story shears for DBGM-2 soil cases are computed in Attachment K and the results are summarized in Table C7. The story shears for BDBGM soil cases are computed in Attachment L and the results are summarized in Table D7. East –West story shears are calculated based on response from X-direction loading. North-South story shears are calculated based on response from Y-direction loading. Story shears listed in Table C7 for the DBGM-2 upper bound soil case and Table D7 for the BDBGM upper bound soil case are plotted in Figures C9 and D9, respectively.

Attachment Q computes the RF base shear using the equivalent static method defined in IBC 2000 (Ref. 2.2.8). Comparison of the maximum story shear at Elevation 0'-0" for DBGM-2, (Table C7) to the IBC base shear computed in Attachment Q indicate that the YMP shear wall design forces are less than, but comparable to those obtained using the equivalent static method of the IBC.

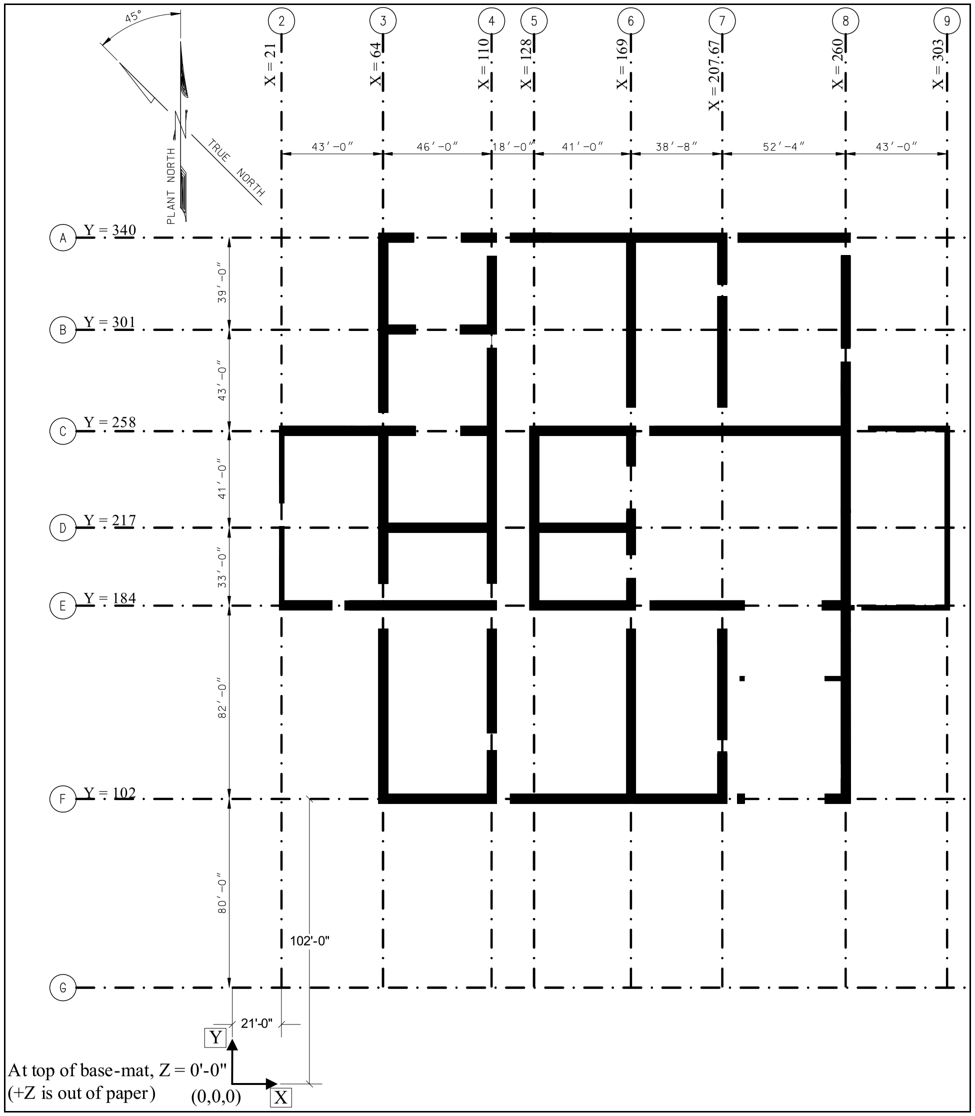
The results from the SAP2000 seismic analysis are reasonable based on the defined inputs. Results from this calculation will form the basis for the subsequent structural design calculations of the Receipt Facility.

7.2 CONCLUSIONS

Results from this calculation are consistent with the results obtained in the *RF Seismic Analysis* (Ref. 2.2.11). As a result of soil springs with decreased stiffness (Ref. 2.2.3), the fundamental frequencies obtained in this calculation are lower than those obtained in Reference 2.2.11.

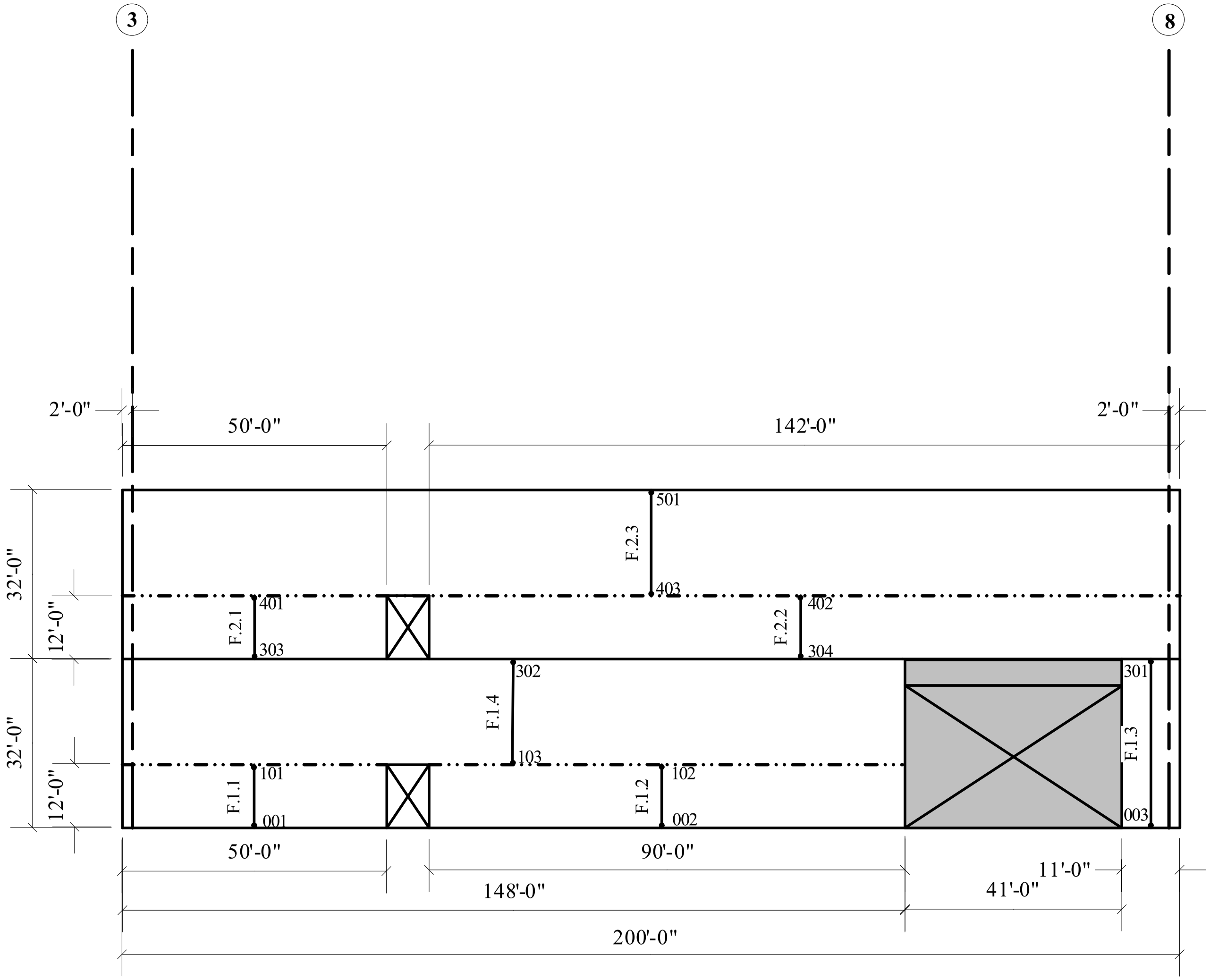
This calculation develops the required information to perform a comparison calculation with *RF Seismic Analysis* (Ref. 2.2.11) based on the 2004 strain compatible soil properties and free field ground input spectra. Results from the comparison calculation will determine if the existing RF structural designs are adequate, or if the structural designs require modification to accommodate results from this calculation.

ATTACHMENT A
FLOOR PLAN AND WALL ELEVATIONS



NOTE: Figure is copied from Attachment A of Reference 2.2.11

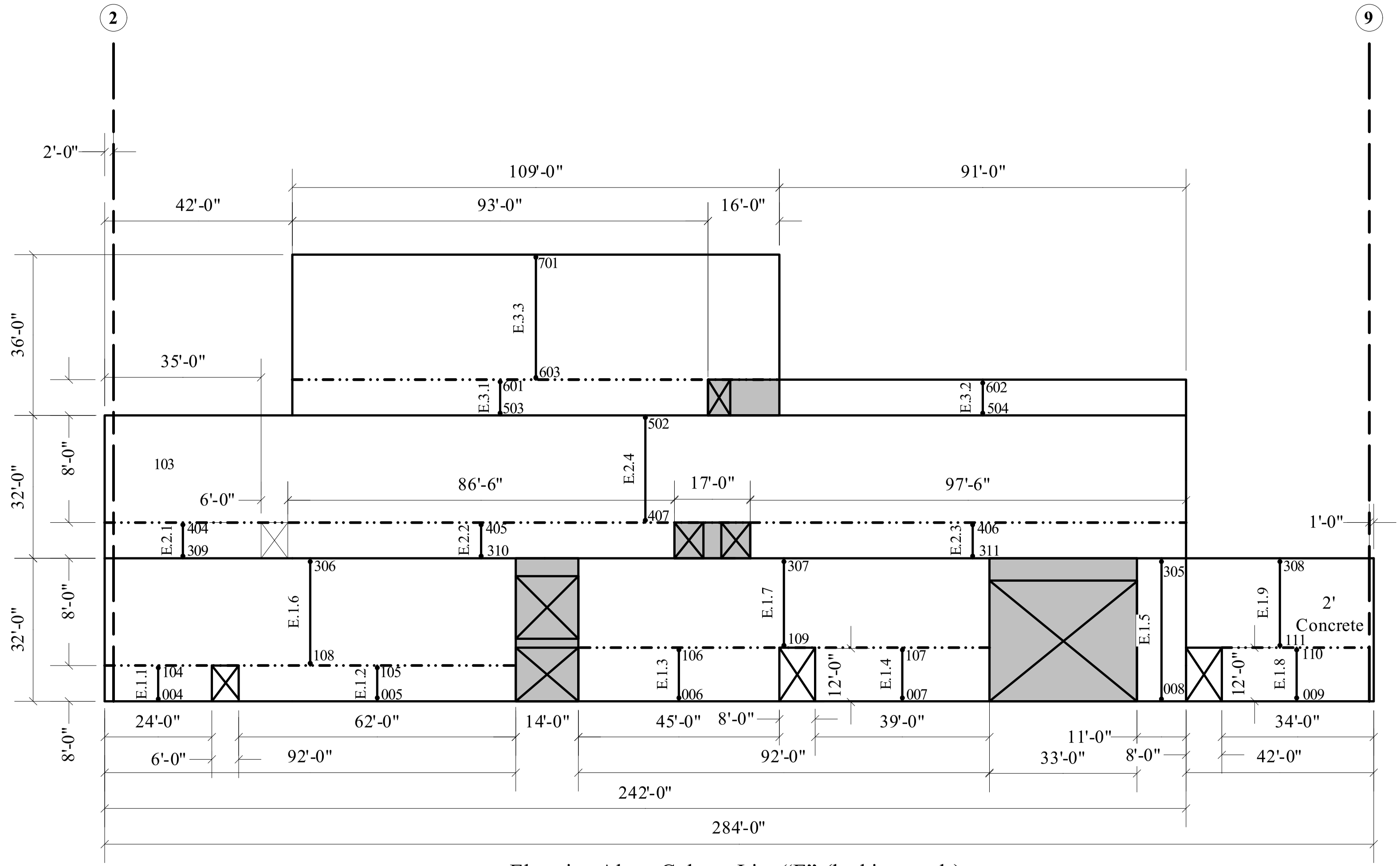
Figure A1. Ground Floor Plan



Elevation Along Column Line “F” (looking north)

NOTE: Figure is copied from Attachment A of Reference 2.2.11

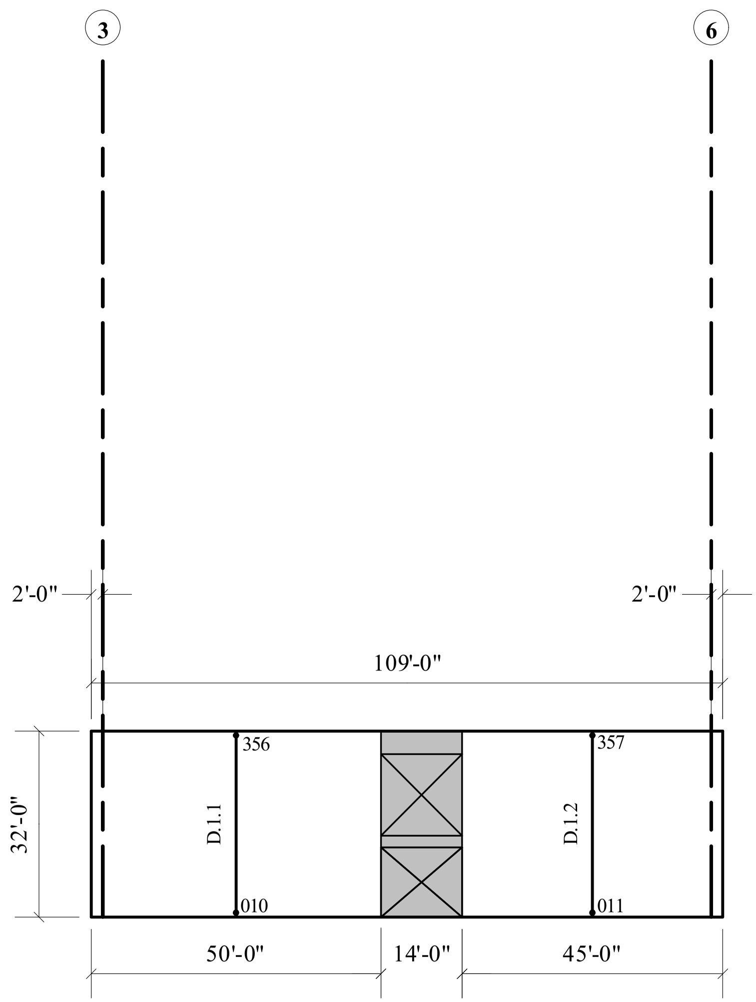
Figure A2. Elevation Along Column Line F



Elevation Along Column Line "E" (looking north)

NOTE: Figure is copied from Attachment A of Reference 2.2.11

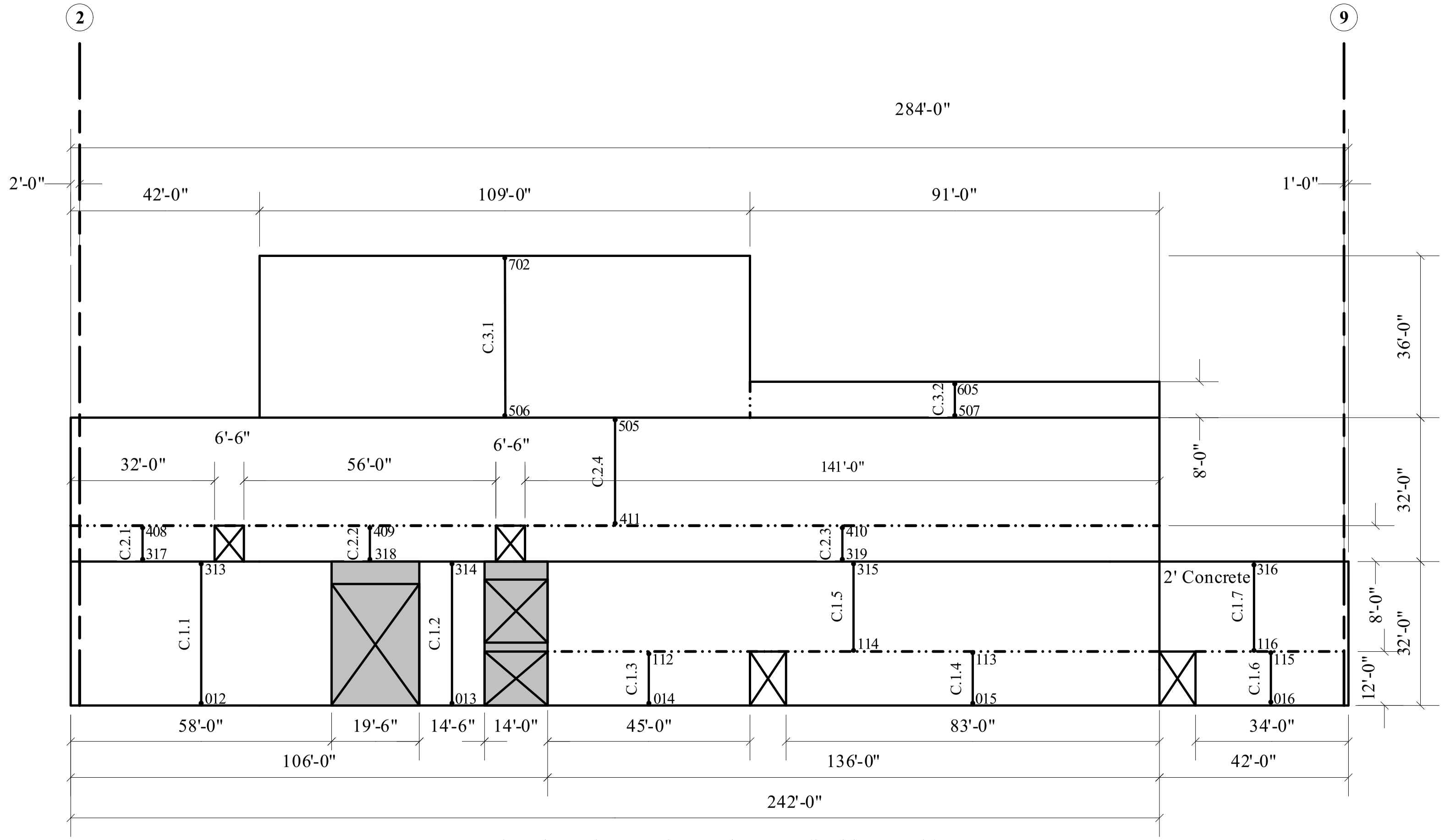
Figure A3. Elevation Along Column Line E



Elevation Along Column Line “D” (looking north)

NOTE: Figure is copied from Attachment A of Reference 2.2.11

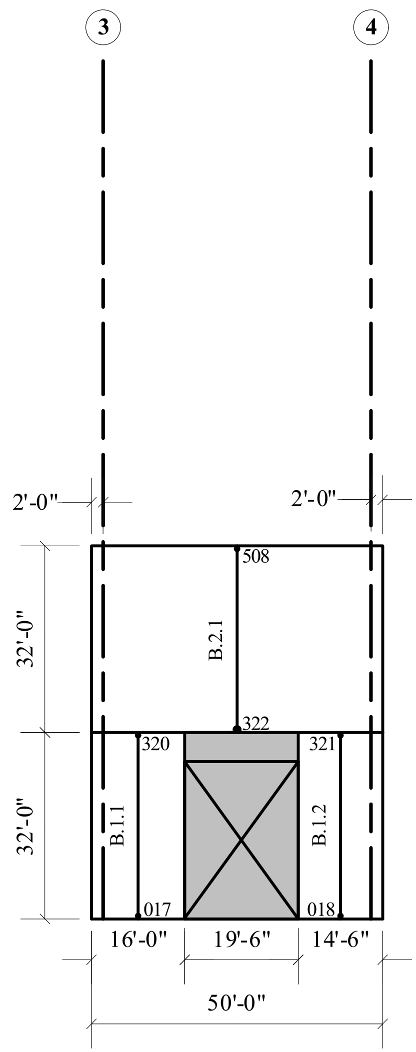
Figure A4. Elevation Along Column Line D



Elevation Along Column Line “C” (looking north)

NOTE: Figure is copied from Attachment A of Reference 2.2.11

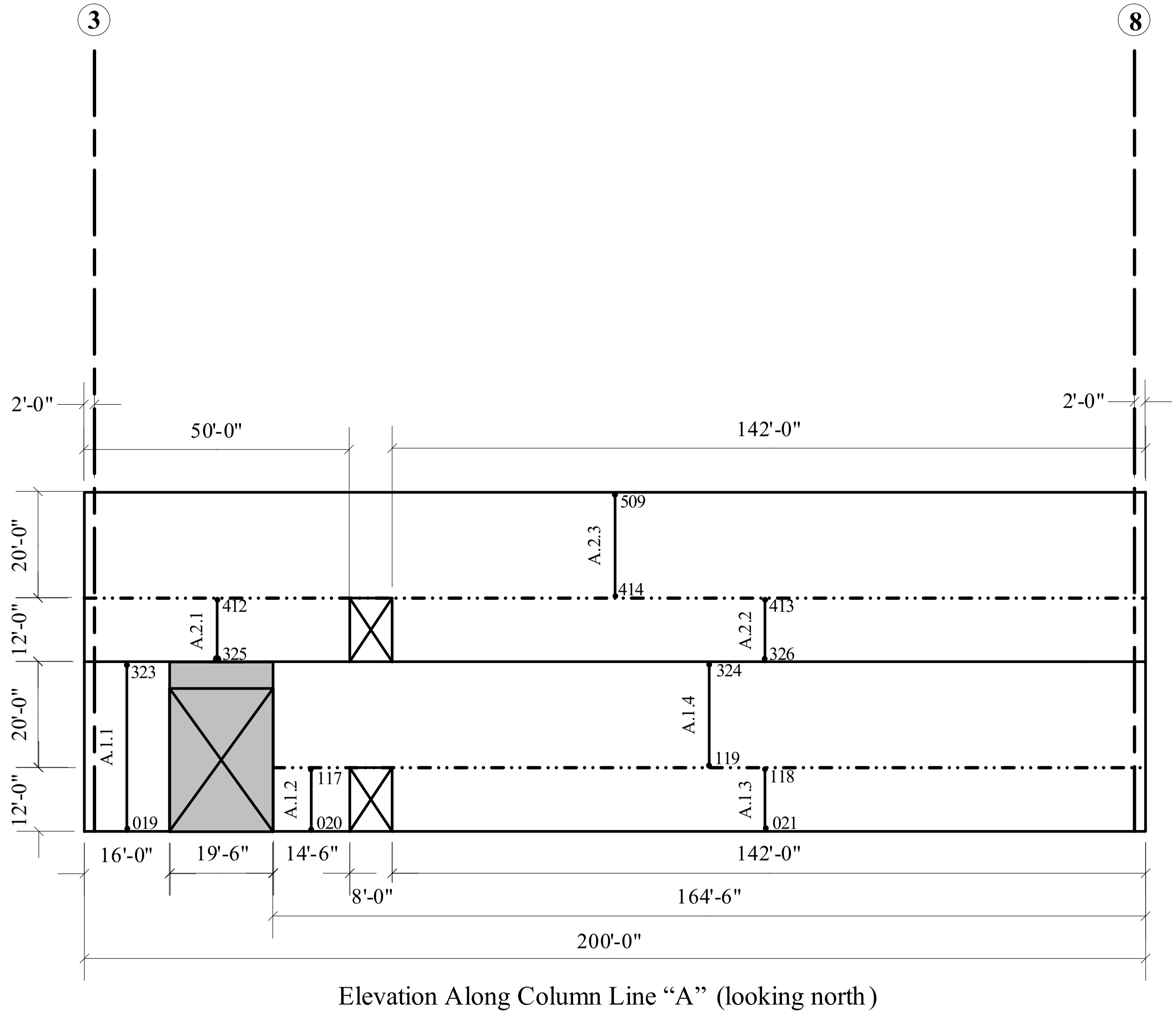
Figure A5. Elevation Along Column Line C



Elevation Along Column Line “B” (looking north)

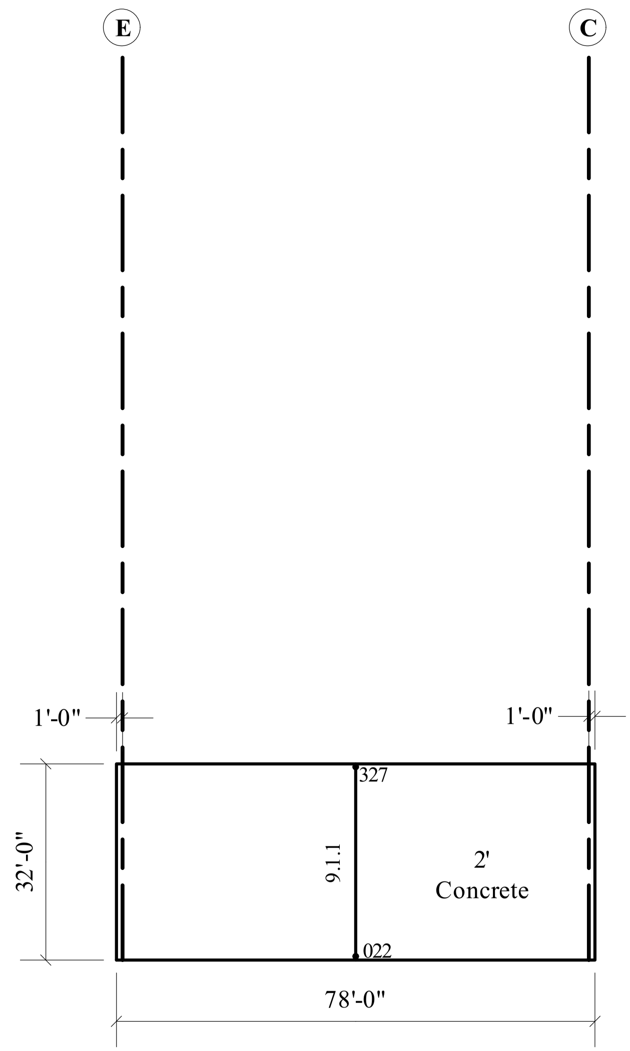
NOTE: Figure is copied from Attachment A of Reference 2.2.11

Figure A6. Elevation Along Column Line B



NOTE: Figure is copied from Attachment A of Reference 2.2.11

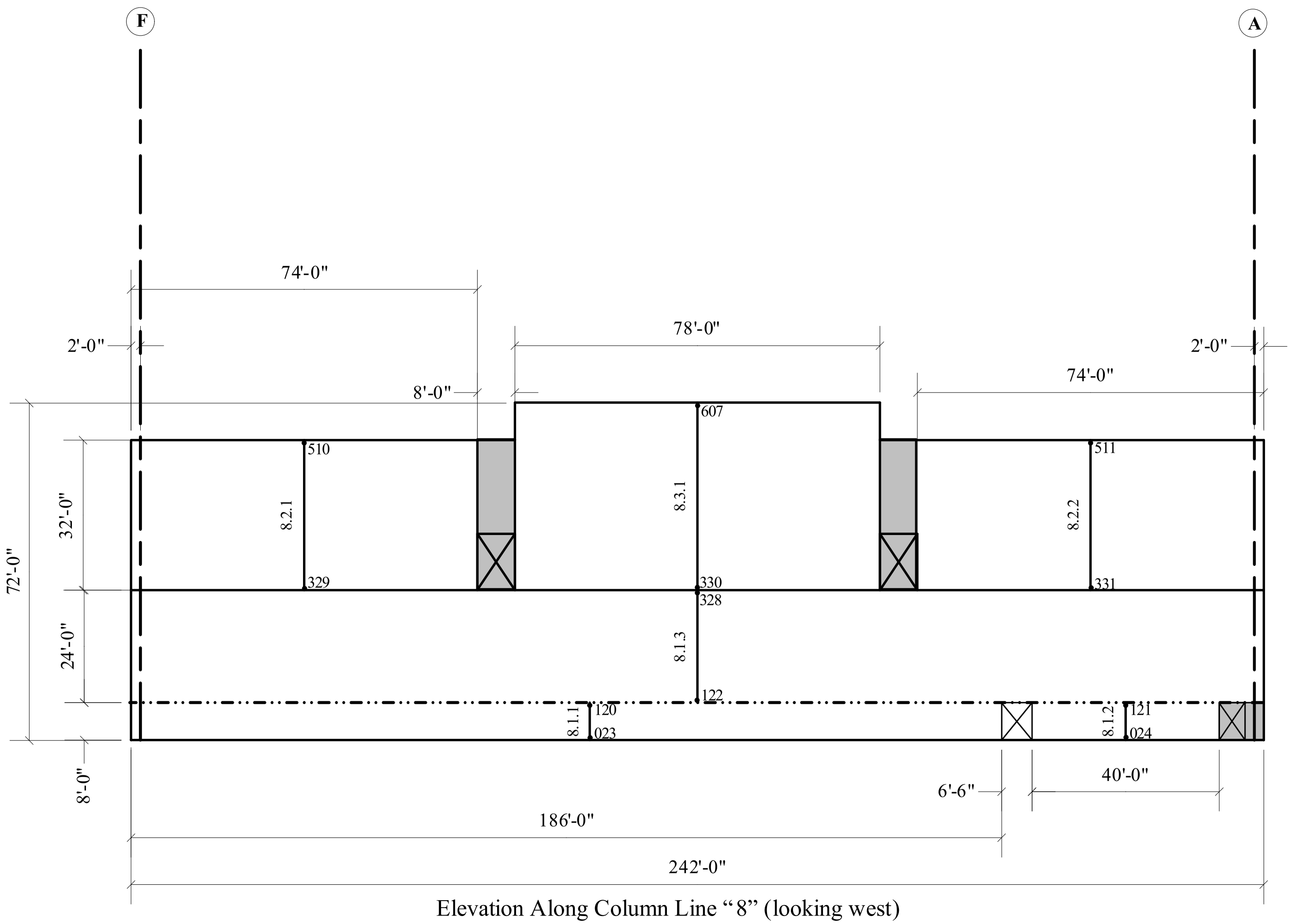
Figure A7. Elevation Along Column Line A



Elevation Along Column Line "9" (looking west)

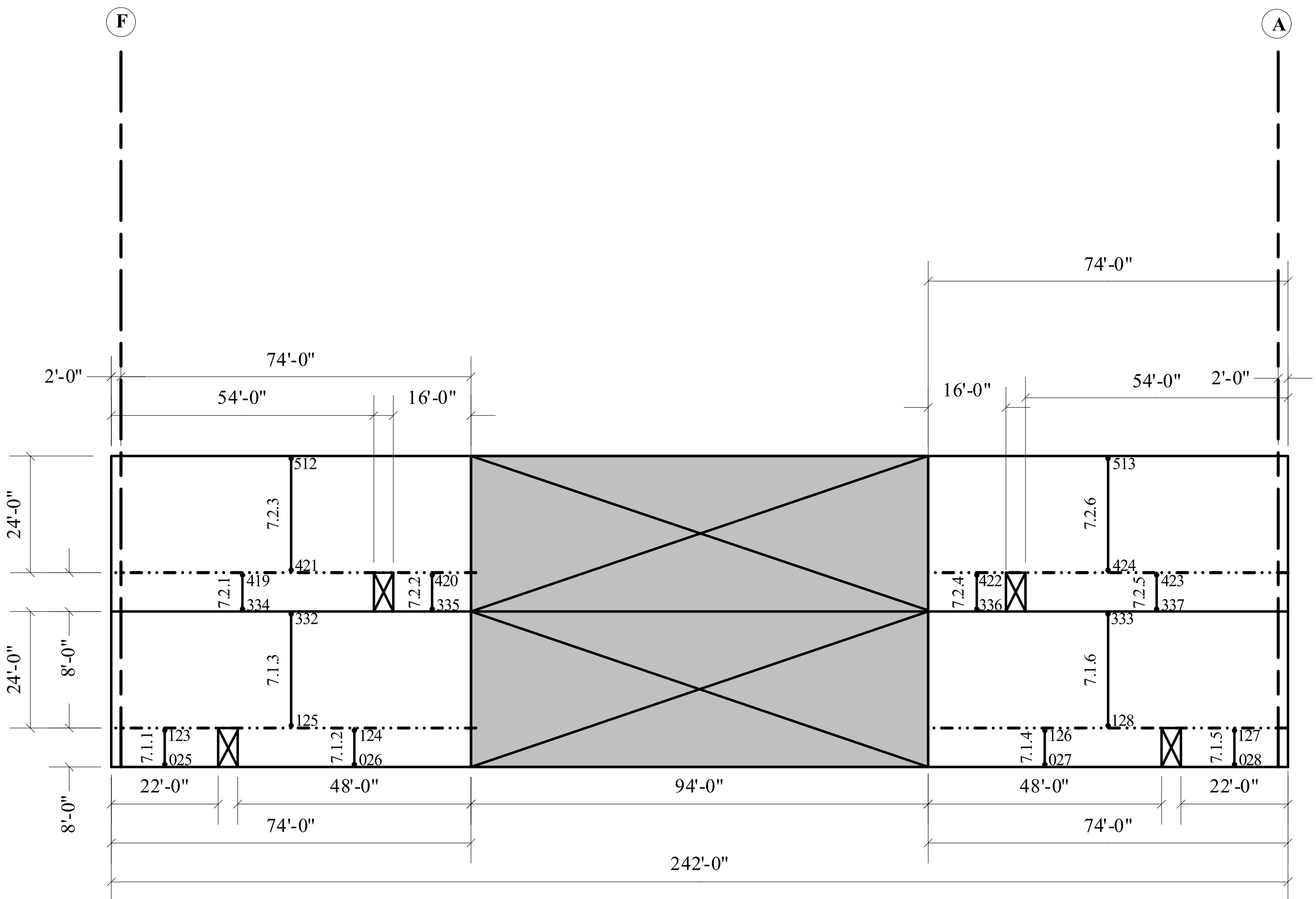
NOTE: Figure is copied from Attachment A of Reference 2.2.11

Figure A8. Elevation Along Column Line 9



NOTE: Figure is copied from Attachment A of Reference 2.2.11

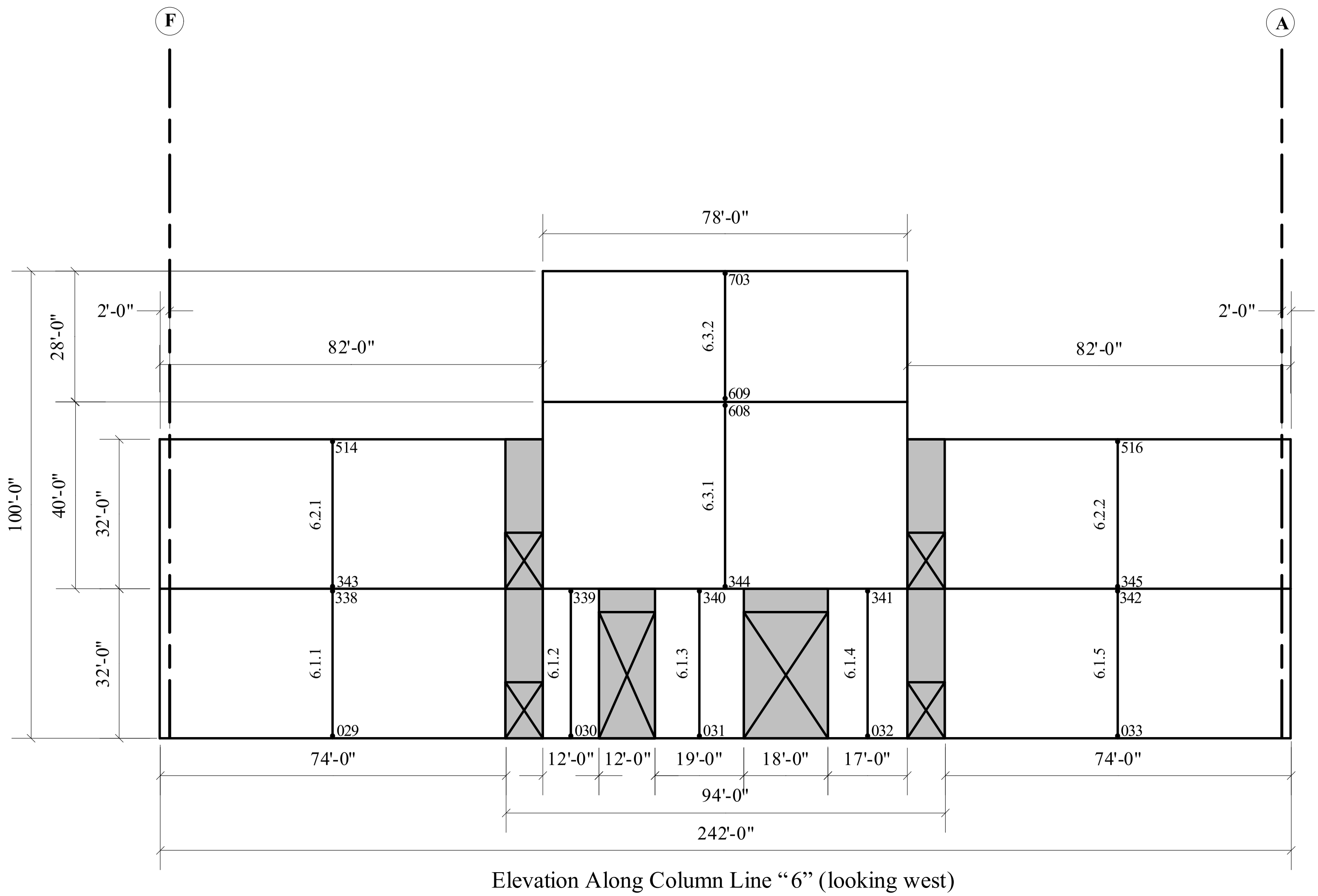
Figure A9. Elevation Along Column Line 8



Elevation Along Column Line "7" (looking west)

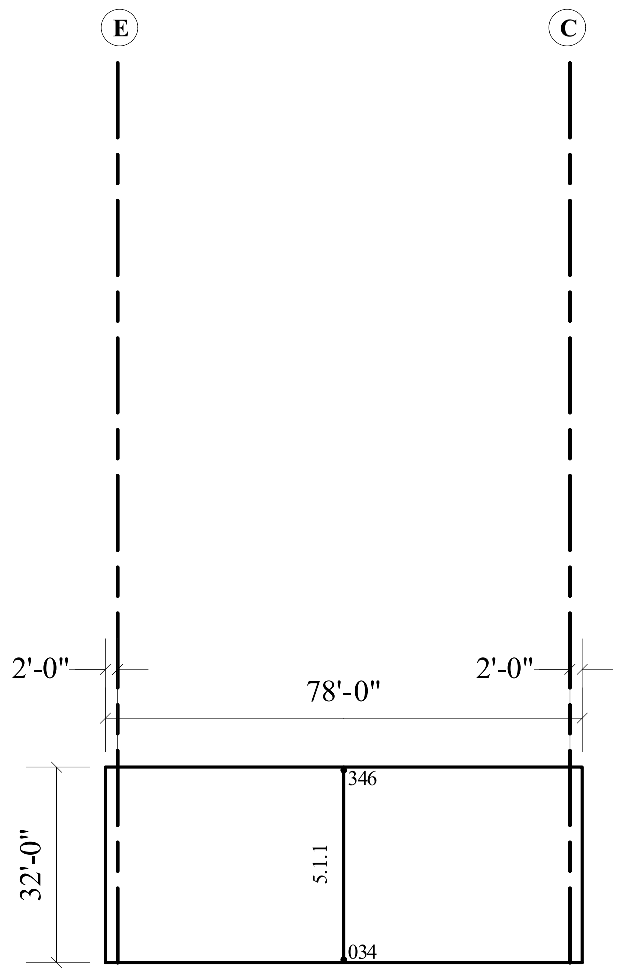
NOTE: Figure is copied from Attachment A of Reference 2.2.11

Figure A10. Elevation Along Column Line 7



NOTE: Figure is copied from Attachment A of Reference 2.2.11

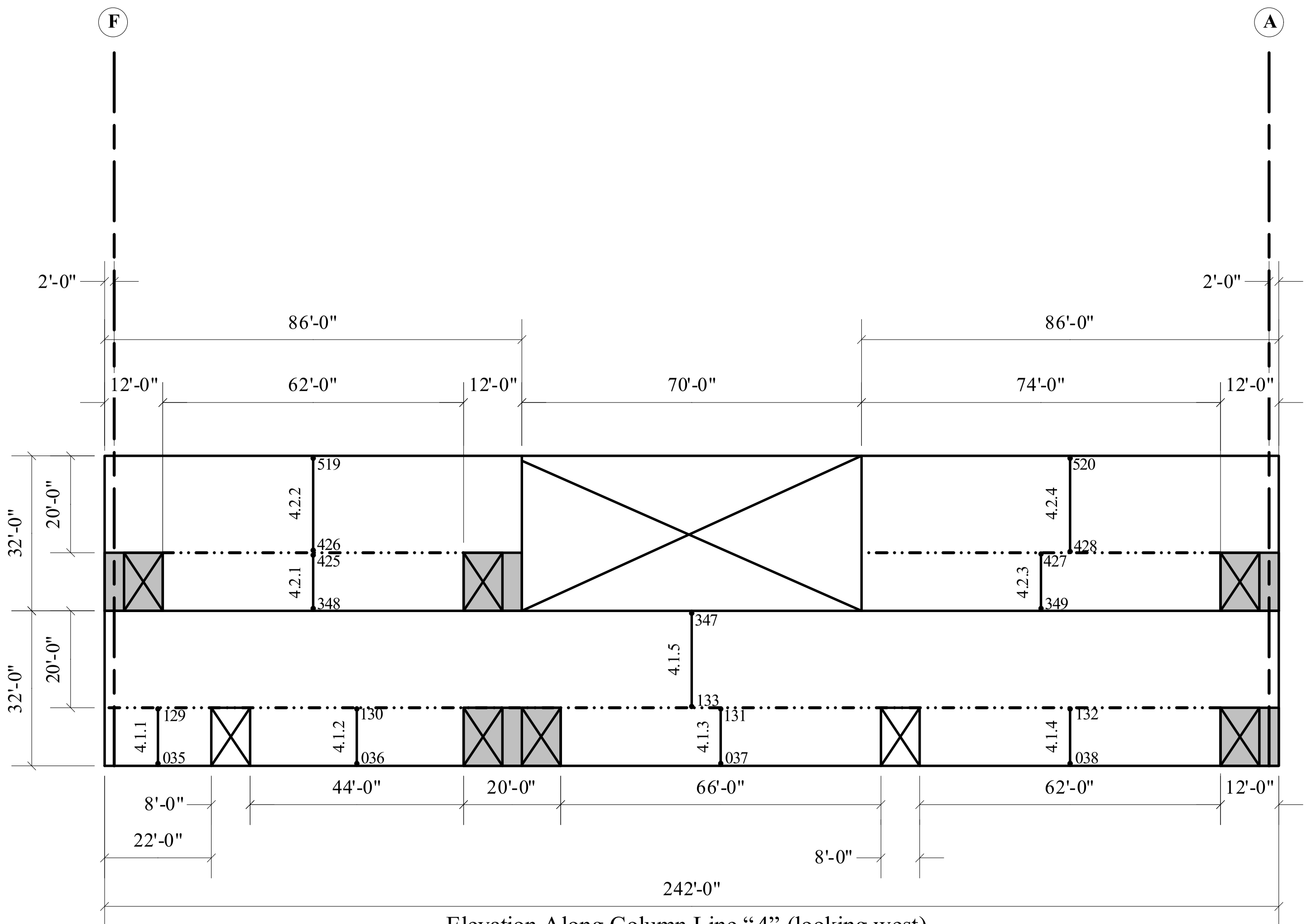
Figure A11. Elevation Along Column Line 6



Elevation Along Column Line “5” (looking west)

NOTE: Figure is copied from Attachment A of Reference 2.2.11

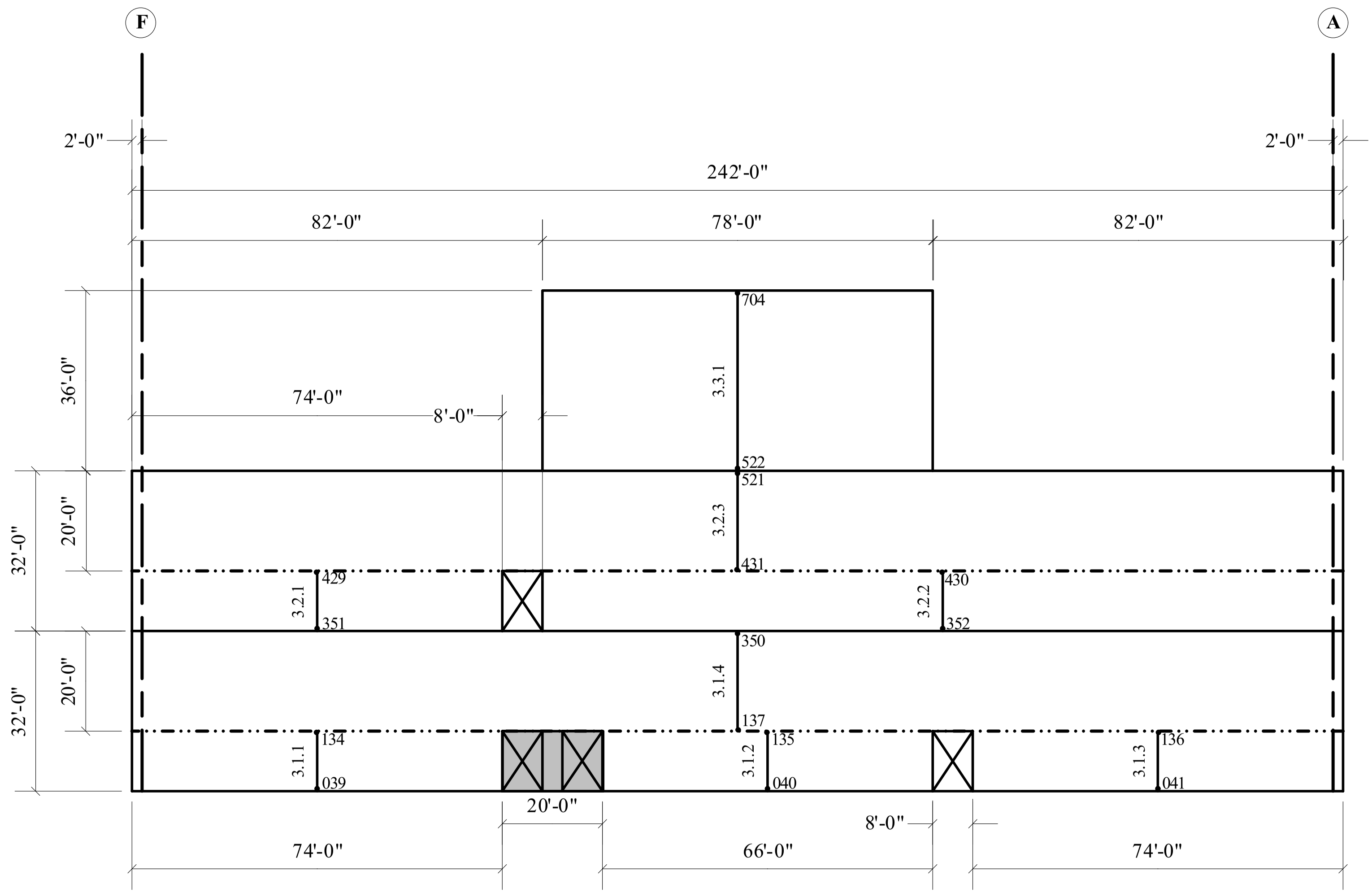
Figure A12. Elevation Along Column Line 5



Elevation Along Column Line “4” (looking west)

NOTE: Figure is copied from Attachment A of Reference 2.2.11

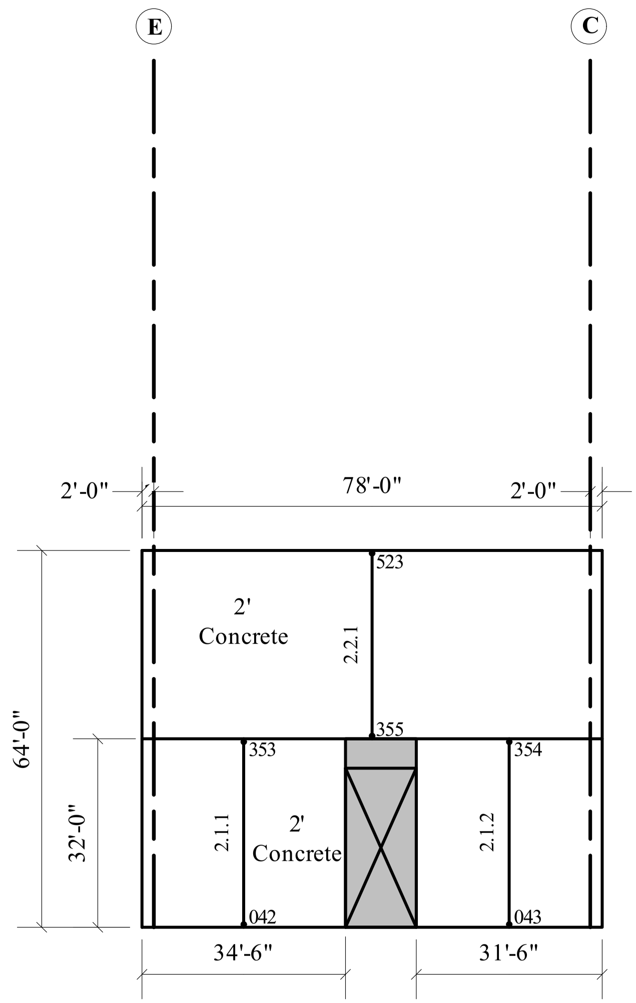
Figure A13. Elevation Along Column Line 4



Elevation Along Column Line "3" (looking west)

NOTE: Figure is copied from Attachment A of Reference 2.2.11

Figure A14. Elevation Along Column Line 3



Elevation Along Column Line "2" (looking west)

NOTE: Figure is copied from Attachment A of Reference 2.2.11

Figure A15. Elevation Along Column Line 2

ATTACHMENT B
SAP2000 DATABASE INPUT FILES

Table B1. Project Information

Item Text	Data Text
Company Name	Bechtel SAIC Company
Client Name	DOE
Project Name	Yucca Mountain Project
Project Number	
Model Name	RF SAP 2000
Model Description	Stick Model
Revision Number	00A
Frame Type	
Engineer	R. Rast
Checker	W. Chang
Supervisor	T. Frankert
Issue Code	
Design Code	

Table B2. Program Control

Program Name Text	Version Text	Current Units Text
SAP2000	9.1.4	Kip, ft, F

Source: Attachment B of Reference 2.2.11

Table B3. Material Properties 01 – General

Material Text	Type Text	DesignType Text	UnitMass Kip-s2/ft4	UnitWeight [(1)] Kip/ft3	E Kip/ft2	U Unitless	A 1/F
5ksi_conc	Isotropic	None	0.004657	0.000000001	617300	0.17	1
E = Modulus of Elasticity				Section 4.2.11.6.6 (Ref. 2.2.4)			
U = Poisson's Ratio				Section 4.2.11.6.6 (Ref. 2.2.4)			
A = Coefficient of Thermal Expansion							

(1) The Concrete weights are included in Receipt Facility (RF) Mass Properties calculation, (Ref. 2.2.2), therefore a very small value of unit weight is assigned to the 5ksi_conc material. The value for the unit mass for the 5ksi_conc can be disregarded because the mass source for the model is defined as from the loads only.

Table B4. Joint Coordinates

Joint Text	CoordSys Text	CoordType Text	XorR ft	Y ft	Z ft	SpecialJt Yes/No
1	GLOBAL	Cartesian	87	102	0	Yes
2	GLOBAL	Cartesian	165	102	0	Yes
3	GLOBAL	Cartesian	256.5	102	0	Yes
4	GLOBAL	Cartesian	32	184	0	Yes
5	GLOBAL	Cartesian	81	184	0	Yes
6	GLOBAL	Cartesian	148.5	184	0	Yes
7	GLOBAL	Cartesian	198.5	184	0	Yes
8	GLOBAL	Cartesian	256.5	184	0	Yes
9	GLOBAL	Cartesian	287	184	0	Yes
10	GLOBAL	Cartesian	87	217	0	Yes
11	GLOBAL	Cartesian	148.5	217	0	Yes
12	GLOBAL	Cartesian	49	258	0	Yes
13	GLOBAL	Cartesian	104.75	258	0	Yes
14	GLOBAL	Cartesian	148.5	258	0	Yes
15	GLOBAL	Cartesian	220.5	258	0	Yes
16	GLOBAL	Cartesian	287	258	0	Yes
17	GLOBAL	Cartesian	70	301	0	Yes
18	GLOBAL	Cartesian	104.75	301	0	Yes
19	GLOBAL	Cartesian	70	340	0	Yes
20	GLOBAL	Cartesian	104.75	340	0	Yes
21	GLOBAL	Cartesian	191	340	0	Yes
22	GLOBAL	Cartesian	303	221	0	Yes
23	GLOBAL	Cartesian	260	193	0	Yes
24	GLOBAL	Cartesian	260	312.5	0	Yes
25	GLOBAL	Cartesian	207.67	111	0	Yes
26	GLOBAL	Cartesian	207.67	150	0	Yes
27	GLOBAL	Cartesian	207.67	292	0	Yes
28	GLOBAL	Cartesian	207.67	331	0	Yes
29	GLOBAL	Cartesian	169	137	0	Yes
30	GLOBAL	Cartesian	169	188	0	Yes
31	GLOBAL	Cartesian	169	215.5	0	Yes
32	GLOBAL	Cartesian	169	251.5	0	Yes
33	GLOBAL	Cartesian	169	305	0	Yes
34	GLOBAL	Cartesian	128	221	0	Yes
35	GLOBAL	Cartesian	110	111	0	Yes
36	GLOBAL	Cartesian	110	152	0	Yes
37	GLOBAL	Cartesian	110	227	0	Yes
38	GLOBAL	Cartesian	110	299	0	Yes
39	GLOBAL	Cartesian	64	137	0	Yes
40	GLOBAL	Cartesian	64	227	0	Yes
41	GLOBAL	Cartesian	64	305	0	Yes
42	GLOBAL	Cartesian	21	199.25	0	Yes
43	GLOBAL	Cartesian	21	244.25	0	Yes

Table B4. Joint Coordinates (Continued)

Joint Text	CoordSys Text	CoordType Text	XorR ft	Y ft	Z ft	SpecialJt Yes/No
99	GLOBAL	Cartesian	160.49	221.38	0	Yes
101	GLOBAL	Cartesian	87	102	12	Yes
102	GLOBAL	Cartesian	165	102	12	Yes
103	GLOBAL	Cartesian	136	102	12	Yes
104	GLOBAL	Cartesian	32	184	8	Yes
105	GLOBAL	Cartesian	81	184	8	Yes
106	GLOBAL	Cartesian	148.5	184	12	Yes
107	GLOBAL	Cartesian	198.5	184	12	Yes
108	GLOBAL	Cartesian	66	184	8	Yes
109	GLOBAL	Cartesian	172	184	12	Yes
110	GLOBAL	Cartesian	287	184	12	Yes
111	GLOBAL	Cartesian	283	184	12	Yes
112	GLOBAL	Cartesian	148.5	258	12	Yes
113	GLOBAL	Cartesian	220.5	258	12	Yes
114	GLOBAL	Cartesian	194	258	12	Yes
115	GLOBAL	Cartesian	287	258	12	Yes
116	GLOBAL	Cartesian	283	258	12	Yes
117	GLOBAL	Cartesian	104.75	340	12	Yes
118	GLOBAL	Cartesian	191	340	12	Yes
119	GLOBAL	Cartesian	179.75	340	12	Yes
120	GLOBAL	Cartesian	260	193	8	Yes
121	GLOBAL	Cartesian	260	312.5	8	Yes
122	GLOBAL	Cartesian	260	221	8	Yes
123	GLOBAL	Cartesian	207.67	111	8	Yes
124	GLOBAL	Cartesian	207.67	150	8	Yes
125	GLOBAL	Cartesian	207.67	137	8	Yes
126	GLOBAL	Cartesian	207.67	292	8	Yes
127	GLOBAL	Cartesian	207.67	331	8	Yes
128	GLOBAL	Cartesian	207.67	305	8	Yes
129	GLOBAL	Cartesian	110	111	12	Yes
130	GLOBAL	Cartesian	110	152	12	Yes
131	GLOBAL	Cartesian	110	227	12	Yes
132	GLOBAL	Cartesian	110	299	12	Yes
133	GLOBAL	Cartesian	110	221	12	Yes
134	GLOBAL	Cartesian	64	137	12	Yes
135	GLOBAL	Cartesian	64	227	12	Yes
136	GLOBAL	Cartesian	64	305	12	Yes
137	GLOBAL	Cartesian	64	221	12	Yes
301	GLOBAL	Cartesian	256.5	102	32	Yes
302	GLOBAL	Cartesian	136	102	32	Yes
303	GLOBAL	Cartesian	87	102	32	Yes
304	GLOBAL	Cartesian	191	102	32	Yes
305	GLOBAL	Cartesian	256.5	184	32	Yes
306	GLOBAL	Cartesian	66	184	32	Yes

Table B4. Joint Coordinates (Continued)

Joint Text	CoordSys Text	CoordType Text	XorR ft	Y ft	Z ft	SpecialJt Yes/No
307	GLOBAL	Cartesian	172	184	32	Yes
308	GLOBAL	Cartesian	283	184	32	Yes
309	GLOBAL	Cartesian	37.5	184	32	Yes
310	GLOBAL	Cartesian	104.25	184	32	Yes
311	GLOBAL	Cartesian	213.25	184	32	Yes
313	GLOBAL	Cartesian	49	258	32	Yes
314	GLOBAL	Cartesian	104.75	258	32	Yes
315	GLOBAL	Cartesian	194	258	32	Yes
316	GLOBAL	Cartesian	283	258	32	Yes
317	GLOBAL	Cartesian	36	258	32	Yes
318	GLOBAL	Cartesian	86.5	258	32	Yes
319	GLOBAL	Cartesian	191.5	258	32	Yes
320	GLOBAL	Cartesian	70	301	32	Yes
321	GLOBAL	Cartesian	104.75	301	32	Yes
322	GLOBAL	Cartesian	87	301	32	Yes
323	GLOBAL	Cartesian	70	340	32	Yes
324	GLOBAL	Cartesian	179.75	340	32	Yes
325	GLOBAL	Cartesian	87	340	32	Yes
326	GLOBAL	Cartesian	191	340	32	Yes
327	GLOBAL	Cartesian	303	221	32	Yes
328	GLOBAL	Cartesian	260	221	32	Yes
329	GLOBAL	Cartesian	260	137	32	Yes
330	GLOBAL	Cartesian	260	221	32	Yes
331	GLOBAL	Cartesian	260	305	32	Yes
332	GLOBAL	Cartesian	207.67	137	32	Yes
333	GLOBAL	Cartesian	207.67	305	32	Yes
334	GLOBAL	Cartesian	207.67	127	32	Yes
335	GLOBAL	Cartesian	207.67	166	32	Yes
336	GLOBAL	Cartesian	207.67	276	32	Yes
337	GLOBAL	Cartesian	207.67	315	32	Yes
338	GLOBAL	Cartesian	169	137	32	Yes
339	GLOBAL	Cartesian	169	188	32	Yes
340	GLOBAL	Cartesian	169	215.5	32	Yes
341	GLOBAL	Cartesian	169	251.5	32	Yes
342	GLOBAL	Cartesian	169	305	32	Yes
343	GLOBAL	Cartesian	169	137	32	Yes
344	GLOBAL	Cartesian	169	221	32	Yes
345	GLOBAL	Cartesian	169	305	32	Yes
346	GLOBAL	Cartesian	128	221	32	Yes
347	GLOBAL	Cartesian	110	221	32	Yes
348	GLOBAL	Cartesian	110	143	32	Yes
349	GLOBAL	Cartesian	110	293	32	Yes
350	GLOBAL	Cartesian	64	221	32	Yes
351	GLOBAL	Cartesian	64	137	32	Yes

Table B4. Joint Coordinates (Continued)

Joint Text	CoordSys Text	CoordType Text	XorR ft	Y ft	Z ft	SpecialJt Yes/No
352	GLOBAL	Cartesian	64	262	32	Yes
353	GLOBAL	Cartesian	21	199.25	32	Yes
354	GLOBAL	Cartesian	21	244.25	32	Yes
355	GLOBAL	Cartesian	21	221	32	Yes
356	GLOBAL	Cartesian	87	217	32	Yes
357	GLOBAL	Cartesian	148.5	217	32	Yes
399	GLOBAL	Cartesian	155.01	221.2	32	Yes
401	GLOBAL	Cartesian	87	102	44	Yes
402	GLOBAL	Cartesian	191	102	44	Yes
403	GLOBAL	Cartesian	162	102	44	Yes
404	GLOBAL	Cartesian	37.5	184	40	Yes
405	GLOBAL	Cartesian	104.25	184	40	Yes
406	GLOBAL	Cartesian	213.25	184	40	Yes
407	GLOBAL	Cartesian	141	184	40	Yes
408	GLOBAL	Cartesian	36	258	40	Yes
409	GLOBAL	Cartesian	86.5	258	40	Yes
410	GLOBAL	Cartesian	191.5	258	40	Yes
411	GLOBAL	Cartesian	141	258	40	Yes
412	GLOBAL	Cartesian	87	340	44	Yes
413	GLOBAL	Cartesian	191	340	44	Yes
414	GLOBAL	Cartesian	162	340	44	Yes
419	GLOBAL	Cartesian	207.67	127	40	Yes
420	GLOBAL	Cartesian	207.67	166	40	Yes
421	GLOBAL	Cartesian	207.67	137	40	Yes
422	GLOBAL	Cartesian	207.67	276	40	Yes
423	GLOBAL	Cartesian	207.67	315	40	Yes
424	GLOBAL	Cartesian	207.67	305	40	Yes
425	GLOBAL	Cartesian	110	143	44	Yes
426	GLOBAL	Cartesian	110	143	44	Yes
427	GLOBAL	Cartesian	110	293	44	Yes
428	GLOBAL	Cartesian	110	299	44	Yes
429	GLOBAL	Cartesian	64	137	44	Yes
430	GLOBAL	Cartesian	64	262	44	Yes
431	GLOBAL	Cartesian	64	221	44	Yes
501	GLOBAL	Cartesian	162	102	64	Yes
502	GLOBAL	Cartesian	141	184	64	Yes
503	GLOBAL	Cartesian	108.5	184	64	Yes
504	GLOBAL	Cartesian	216.5	184	64	Yes
505	GLOBAL	Cartesian	141	258	64	Yes
506	GLOBAL	Cartesian	116.5	258	64	Yes
507	GLOBAL	Cartesian	216.5	258	64	Yes
508	GLOBAL	Cartesian	87	301	64	Yes
509	GLOBAL	Cartesian	162	340	64	Yes
510	GLOBAL	Cartesian	260	137	64	Yes

Table B4. Joint Coordinates (Continued)

Joint Text	CoordSys Text	CoordType Text	XorR ft	Y ft	Z ft	SpecialJt Yes/No
511	GLOBAL	Cartesian	260	305	64	Yes
512	GLOBAL	Cartesian	207.67	137	64	Yes
513	GLOBAL	Cartesian	207.67	305	64	Yes
514	GLOBAL	Cartesian	169	137	64	Yes
516	GLOBAL	Cartesian	169	305	64	Yes
519	GLOBAL	Cartesian	110	143	64	Yes
520	GLOBAL	Cartesian	110	299	64	Yes
521	GLOBAL	Cartesian	64	221	64	Yes
522	GLOBAL	Cartesian	64	221	64	Yes
523	GLOBAL	Cartesian	21	221	64	Yes
599	GLOBAL	Cartesian	148.32	219.75	64	Yes
601	GLOBAL	Cartesian	108.5	184	72	Yes
602	GLOBAL	Cartesian	216.5	184	72	Yes
603	GLOBAL	Cartesian	116.5	184	72	Yes
605	GLOBAL	Cartesian	216.5	258	72	Yes
607	GLOBAL	Cartesian	260	221	72	Yes
608	GLOBAL	Cartesian	169	221	72	Yes
609	GLOBAL	Cartesian	169	221	72	Yes
699	GLOBAL	Cartesian	217.37	221	72	Yes
701	GLOBAL	Cartesian	116.5	184	100	Yes
702	GLOBAL	Cartesian	116.5	258	100	Yes
703	GLOBAL	Cartesian	169	221	100	Yes
704	GLOBAL	Cartesian	64	221	100	Yes
799	GLOBAL	Cartesian	116.5	221	100	Yes

Source: Attachment B of Reference 2.2.11

Table B5. Connectivity – Frame

Frame Text	JointI Text	JointJ Text	IsCurved Yes/No	Length ft	CentroidX ft	CentroidY ft	CentroidZ ft
2.1.1	42	353	No	32	21	199.25	16
2.1.2	43	354	No	32	21	244.25	16
2.2.1	355	523	No	32	21	221	48
3.1.1	39	134	No	12	64	137	6
3.1.2	40	135	No	12	64	227	6
3.1.3	41	136	No	12	64	305	6
3.1.4	137	350	No	20	64	221	22
3.2.1	351	429	No	12	64	137	38
3.2.2	352	430	No	12	64	262	38
3.2.3	431	521	No	20	64	221	54
3.3.1	522	704	No	36	64	221	82
4.1.1	35	129	No	12	110	111	6
4.1.2	36	130	No	12	110	152	6
4.1.3	37	131	No	12	110	227	6
4.1.4	38	132	No	12	110	299	6
4.1.5	133	347	No	20	110	221	22
4.2.1	348	425	No	12	110	143	38
4.2.2	426	519	No	20	110	143	54
4.2.3	349	427	No	12	110	293	38
4.2.4	428	520	No	20	110	299	54
5.1.1	34	346	No	32	128	221	16
6.1.1	29	338	No	32	169	137	16
6.1.2	30	339	No	32	169	188	16
6.1.3	31	340	No	32	169	215.5	16
6.1.4	32	341	No	32	169	251.5	16
6.1.5	33	342	No	32	169	305	16
6.2.1	343	514	No	32	169	137	48
6.2.2	345	516	No	32	169	305	48
6.3.1	344	608	No	40	169	221	52
6.3.2	609	703	No	28	169	221	86
7.1.1	25	123	No	8	207.67	111	4
7.1.2	26	124	No	8	207.67	150	4
7.1.3	125	332	No	24	207.67	137	20
7.1.4	27	126	No	8	207.67	292	4
7.1.5	28	127	No	8	207.67	331	4
7.1.6	128	333	No	24	207.67	305	20
7.2.1	334	419	No	8	207.67	127	36
7.2.2	335	420	No	8	207.67	166	36
7.2.3	421	512	No	24	207.67	137	52
7.2.4	336	422	No	8	207.67	276	36

Table B5. Connectivity – Frame (Continued)

Frame Text	JointI Text	JointJ Text	IsCurved Yes/No	Length ft	CentroidX ft	CentroidY ft	CentroidZ ft
7.2.5	337	423	No	8	207.67	315	36
7.2.6	424	513	No	24	207.67	305	52
8.1.1	23	120	No	8	260	193	4
8.1.2	24	121	No	8	260	312.5	4
8.1.3	122	328	No	24	260	221	20
8.2.1	329	510	No	32	260	137	48
8.2.2	331	511	No	32	260	305	48
8.3.1	330	607	No	40	260	221	52
9.1.1	22	327	No	32	303	221	16
A.1.1	19	323	No	32	70	340	16
A.1.2	20	117	No	12	104.75	340	6
A.1.3	21	118	No	12	191	340	6
A.1.4	119	324	No	20	179.75	340	22
A.2.1	325	412	No	12	87	340	38
A.2.2	326	413	No	12	191	340	38
A.2.3	414	509	No	20	162	340	54
B.1.1	17	320	No	32	70	301	16
B.1.2	18	321	No	32	104.75	301	16
B.2.1	322	508	No	32	87	301	48
C.1.1	12	313	No	32	49	258	16
C.1.2	13	314	No	32	104.75	258	16
C.1.3	14	112	No	12	148.5	258	6
C.1.4	15	113	No	12	220.5	258	6
C.1.5	114	315	No	20	194	258	22
C.1.6	16	115	No	12	287	258	6
C.1.7	116	316	No	20	283	258	22
C.2.1	317	408	No	8	36	258	36
C.2.2	318	409	No	8	86.5	258	36
C.2.3	319	410	No	8	191.5	258	36
C.2.4	411	505	No	24	141	258	52
C.3.1	506	702	No	36	116.5	258	82
C.3.2	507	605	No	8	216.5	258	68
D.1.1	10	356	No	32	87	217	16
D.1.2	11	357	No	32	148.5	217	16
E.1.1	4	104	No	8	32	184	4
E.1.2	5	105	No	8	81	184	4
E.1.3	6	106	No	12	148.5	184	6
E.1.4	7	107	No	12	198.5	184	6
E.1.5	8	305	No	32	256.5	184	16
E.1.6	108	306	No	24	66	184	20
E.1.7	109	307	No	20	172	184	22

Table B5. Connectivity – Frame (Continued)

Frame Text	JointI Text	JointJ Text	IsCurved Yes/No	Length ft	CentroidX ft	CentroidY ft	CentroidZ ft
E.1.8	9	110	No	12	287	184	6
E.1.9	111	308	No	20	283	184	22
E.2.1	309	404	No	8	37.5	184	36
E.2.2	310	405	No	8	104.25	184	36
E.2.3	311	406	No	8	213.25	184	36
E.2.4	407	502	No	24	141	184	52
E.3.1	503	601	No	8	108.5	184	68
E.3.2	504	602	No	8	216.5	184	68
E.3.3	603	701	No	28	116.5	184	86
F.1.1	1	101	No	12	87	102	6
F.1.2	2	102	No	12	165	102	6
F.1.3	3	301	No	32	256.5	102	16
F.1.4	103	302	No	20	136	102	22
F.2.1	303	401	No	12	87	102	38
F.2.2	304	402	No	12	191	102	38
F.2.3	403	501	No	20	162	102	54

Source: Attachment B of Reference 2.2.11

Table B6. Frame Local Axes Assignments 01 – Typical (see Attachment A)

Frame Text	Angle Degrees	MirrorAbt2 Yes/No	MirrorAbt3 Yes/No
2.1.1	90	No	No
2.1.2	90	No	No
2.2.1	90	No	No
3.1.1	90	No	No
3.1.2	90	No	No
3.1.3	90	No	No
3.1.4	90	No	No
3.2.1	90	No	No
3.2.2	90	No	No
3.2.3	90	No	No
3.3.1	90	No	No
4.1.1	90	No	No
4.1.2	90	No	No
4.1.3	90	No	No
4.1.4	90	No	No
4.1.5	90	No	No
4.2.1	90	No	No
4.2.2	90	No	No
4.2.3	90	No	No
4.2.4	90	No	No
5.1.1	90	No	No
6.1.1	90	No	No
6.1.2	90	No	No
6.1.3	90	No	No
6.1.4	90	No	No
6.1.5	90	No	No
6.2.1	90	No	No
6.2.2	90	No	No
6.3.1	90	No	No
6.3.2	90	No	No
7.1.1	90	No	No
7.1.2	90	No	No
7.1.3	90	No	No
7.1.4	90	No	No
7.1.5	90	No	No
7.1.6	90	No	No
7.2.1	90	No	No
7.2.2	90	No	No
7.2.3	90	No	No
7.2.4	90	No	No

Table B7. Frame Section Assignments (Continued)

Frame Text	Angle Degrees	MirrorAbt2 Yes/No	MirrorAbt3 Yes/No
7.2.5	90	No	No
7.2.6	90	No	No
8.1.1	90	No	No
8.1.2	90	No	No
8.1.3	90	No	No
8.2.1	90	No	No
8.2.2	90	No	No
8.3.1	90	No	No
9.1.1	90	No	No

Source: Attachment B of Reference 2.2.11

Table B7. Frame Section Assignments

Frame Text	AutoSelect Text	AnalSect Text	MatProp Text
2.1.1	N.A.	2.1.1	Default
2.1.2	N.A.	2.1.2	Default
2.2.1	N.A.	2.2.1	Default
3.1.1	N.A.	3.1.1	Default
3.1.2	N.A.	3.1.2	Default
3.1.3	N.A.	3.1.3	Default
3.1.4	N.A.	3.1.4	Default
3.2.1	N.A.	3.2.1	Default
3.2.2	N.A.	3.2.2	Default
3.2.3	N.A.	3.2.3	Default
3.3.1	N.A.	3.3.1	Default
4.1.1	N.A.	4.1.1	Default
4.1.2	N.A.	4.1.2	Default
4.1.3	N.A.	4.1.3	Default
4.1.4	N.A.	4.1.4	Default
4.1.5	N.A.	4.1.5	Default
4.2.1	N.A.	4.2.1	Default
4.2.2	N.A.	4.2.2	Default
4.2.3	N.A.	4.2.3	Default
4.2.4	N.A.	4.2.4	Default
5.1.1	N.A.	5.1.1	Default
6.1.1	N.A.	6.1.1	Default
6.1.2	N.A.	6.1.2	Default
6.1.3	N.A.	6.1.3	Default
6.1.4	N.A.	6.1.4	Default
6.1.5	N.A.	6.1.5	Default
6.2.1	N.A.	6.2.1	Default
6.2.2	N.A.	6.2.2	Default
6.3.1	N.A.	6.3.1	Default
6.3.2	N.A.	6.3.2	Default
7.1.1	N.A.	7.1.1	Default
7.1.2	N.A.	7.1.2	Default
7.1.3	N.A.	7.1.3	Default
7.1.4	N.A.	7.1.4	Default
7.1.5	N.A.	7.1.5	Default
7.1.6	N.A.	7.1.6	Default
7.2.1	N.A.	7.2.1	Default
7.2.2	N.A.	7.2.2	Default
7.2.3	N.A.	7.2.3	Default
7.2.4	N.A.	7.2.4	Default

Table B7. Frame Section Assignments (Continued)

Frame Text	AutoSelect Text	AnalSect Text	MatProp Text
7.2.5	N.A.	7.2.5	Default
7.2.6	N.A.	7.2.6	Default
8.1.1	N.A.	8.1.1	Default
8.1.2	N.A.	8.1.2	Default
8.1.3	N.A.	8.1.3	Default
8.2.1	N.A.	8.2.1	Default
8.2.2	N.A.	8.2.2	Default
8.3.1	N.A.	8.3.1	Default
9.1.1	N.A.	9.1.1	Default
A.1.1	N.A.	A.1.1	Default
A.1.2	N.A.	A.1.2	Default
A.1.3	N.A.	A.1.3	Default
A.1.4	N.A.	A.1.4	Default
A.2.1	N.A.	A.2.1	Default
A.2.2	N.A.	A.2.2	Default
A.2.3	N.A.	A.2.3	Default
B.1.1	N.A.	B.1.1	Default
B.1.2	N.A.	B.1.2	Default
B.2.1	N.A.	B.2.1	Default
C.1.1	N.A.	C.1.1	Default
C.1.2	N.A.	C.1.2	Default
C.1.3	N.A.	C.1.3	Default
C.1.4	N.A.	C.1.4	Default
C.1.5	N.A.	C.1.5	Default
C.1.6	N.A.	C.1.6	Default
C.1.7	N.A.	C.1.7	Default
C.2.1	N.A.	C.2.1	Default
C.2.2	N.A.	C.2.2	Default
C.2.3	N.A.	C.2.3	Default
C.2.4	N.A.	C.2.4	Default
C.3.1	N.A.	C.3.1	Default
C.3.2	N.A.	C.3.2	Default
D.1.1	N.A.	D.1.1	Default
D.1.2	N.A.	D.1.2	Default
E.1.1	N.A.	E.1.1	Default
E.1.2	N.A.	E.1.2	Default
E.1.3	N.A.	E.1.3	Default
E.1.4	N.A.	E.1.4	Default
E.1.5	N.A.	E.1.5	Default
E.1.6	N.A.	E.1.6	Default

Table B7. Frame Section Assignments (Continued)

Frame Text	AutoSelect Text	AnalSect Text	MatProp Text
E.1.7	N.A.	E.1.7	Default
E.1.8	N.A.	E.1.8	Default
E.1.9	N.A.	E.1.9	Default
E.2.1	N.A.	E.2.1	Default
E.2.2	N.A.	E.2.2	Default
E.2.3	N.A.	E.2.3	Default
E.2.4	N.A.	E.2.4	Default
E.3.1	N.A.	E.3.1	Default
E.3.2	N.A.	E.3.2	Default
E.3.3	N.A.	E.3.3	Default
F.1.1	N.A.	F.1.1	Default
F.1.2	N.A.	F.1.2	Default
F.1.3	N.A.	F.1.3	Default
F.1.4	N.A.	F.1.4	Default
F.2.1	N.A.	F.2.1	Default
F.2.2	N.A.	F.2.2	Default
F.2.3	N.A.	F.2.3	Default

Source: Attachment B of Reference 2.2.11

Table B8. Frame Section Properties 01 – General

SectionName Text	Material Text	Area ft2	TorsConst ft4	I33 ft4	I22 ft4	AS2 ft2	AS3 ft2
2.1.1	5ksi_conc	69	92.00	6843.94	23.00	57.50	0.001
2.1.2	5ksi_conc	63	84.00	5209.31	21.00	52.50	0.001
2.2.1	5ksi_conc	156	208.00	79092.00	52.00	130.00	0.001
3.1.1	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
3.1.2	5ksi_conc	264	1408.00	95832.00	352.00	220.00	0.001
3.1.3	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
3.1.4	5ksi_conc	968	5162.67	4724162.67	1290.67	806.67	0.001
3.2.1	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
3.2.2	5ksi_conc	640	3413.33	1365333.33	853.33	533.33	0.001
3.2.3	5ksi_conc	968	5162.67	4724162.67	1290.67	806.67	0.001
3.3.1	5ksi_conc	312	1664.00	158184.00	416.00	260.00	0.001
4.1.1	5ksi_conc	88	469.33	3549.33	117.33	73.33	0.001
4.1.2	5ksi_conc	176	938.67	28394.67	234.67	146.67	0.001
4.1.3	5ksi_conc	264	1408.00	95832.00	352.00	220.00	0.001
4.1.4	5ksi_conc	248	1322.67	79442.67	330.67	206.67	0.001
4.1.5	5ksi_conc	968	5162.67	4724162.67	1290.67	806.67	0.001
4.2.1	5ksi_conc	248	1322.67	79442.67	330.67	206.67	0.001
4.2.2	5ksi_conc	344	1834.67	212018.67	458.67	286.67	0.001
4.2.3	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
4.2.4	5ksi_conc	344	1834.67	212018.67	458.67	286.67	0.001
5.1.1	5ksi_conc	312	1664.00	158184.00	416.00	260.00	0.001
6.1.1	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
6.1.2	5ksi_conc	48	256.00	576.00	64.00	40.00	0.001
6.1.3	5ksi_conc	76	405.33	2286.33	101.33	63.33	0.001
6.1.4	5ksi_conc	68	362.67	1637.67	90.67	56.67	0.001
6.1.5	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
6.2.1	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
6.2.2	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
6.3.1	5ksi_conc	312	1664.00	158184.00	416.00	260.00	0.001
6.3.2	5ksi_conc	312	1664.00	158184.00	416.00	260.00	0.001
7.1.1	5ksi_conc	88	469.33	3549.33	117.33	73.33	0.001
7.1.2	5ksi_conc	192	1024.00	36864.00	256.00	160.00	0.001
7.1.3	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
7.1.4	5ksi_conc	192	1024.00	36864.00	256.00	160.00	0.001
7.1.5	5ksi_conc	88	469.33	3549.33	117.33	73.33	0.001
7.1.6	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
7.2.1	5ksi_conc	216	1152.00	52488.00	288.00	180.00	0.001
7.2.2	5ksi_conc	64	341.33	1365.33	85.33	53.33	0.001
7.2.3	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
7.2.4	5ksi_conc	64	341.33	1365.33	85.33	53.33	0.001

Table B8. Frame Section Properties 01 – General (Continued)

SectionName Text	Material Text	Area ft2	TorsConst ft4	I33 ft4	I22 ft4	AS2 ft2	AS3 ft2
7.2.5	5ksi_conc	216	1152.00	52488.00	288.00	180.00	0.001
7.2.6	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
8.1.1	5ksi_conc	744	3968.00	2144952.00	992.00	620.00	0.001
8.1.2	5ksi_conc	160	853.33	21333.33	213.33	133.33	0.001
8.1.3	5ksi_conc	968	5162.67	4724162.67	1290.67	806.67	0.001
8.2.1	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
8.2.2	5ksi_conc	296	1578.67	135074.67	394.67	246.67	0.001
8.3.1	5ksi_conc	312	1664.00	158184.00	416.00	260.00	0.001
9.1.1	5ksi_conc	156	208.00	79092.00	52.00	130.00	0.001
A.1.1	5ksi_conc	64	341.33	1365.33	85.33	53.33	0.001
A.1.2	5ksi_conc	58	309.33	1016.21	77.33	48.33	0.001
A.1.3	5ksi_conc	568	3029.33	954429.33	757.33	473.33	0.001
A.1.4	5ksi_conc	658	3509.33	1483803.71	877.33	548.33	0.001
A.2.1	5ksi_conc	200	1066.67	41666.67	266.67	166.67	0.001
A.2.2	5ksi_conc	568	3029.33	954429.33	757.33	473.33	0.001
A.2.3	5ksi_conc	800	4266.67	2666666.67	1066.67	666.67	0.001
B.1.1	5ksi_conc	64	341.33	1365.33	85.33	53.33	0.001
B.1.2	5ksi_conc	58	309.33	1016.21	77.33	48.33	0.001
B.2.1	5ksi_conc	200	1066.67	41666.67	266.67	166.67	0.001
C.1.1	5ksi_conc	232	1237.33	65037.33	309.33	193.33	0.001
C.1.2	5ksi_conc	58	309.33	1016.21	77.33	48.33	0.001
C.1.3	5ksi_conc	180	960.00	30375.00	240.00	150.00	0.001
C.1.4	5ksi_conc	332	1770.67	190595.67	442.67	276.67	0.001
C.1.5	5ksi_conc	544	2901.33	838485.33	725.33	453.33	0.001
C.1.6	5ksi_conc	68	90.67	6550.67	22.67	56.67	0.001
C.1.7	5ksi_conc	84	112.00	12348.00	28.00	70.00	0.001
C.2.1	5ksi_conc	128	682.67	10922.67	170.67	106.67	0.001
C.2.2	5ksi_conc	224	1194.67	58538.67	298.67	186.67	0.001
C.2.3	5ksi_conc	564	3008.00	934407.00	752.00	470.00	0.001
C.2.4	5ksi_conc	968	5162.67	4724162.67	1290.67	806.67	0.001
C.3.1	5ksi_conc	436	2325.33	431676.33	581.33	363.33	0.001
C.3.2	5ksi_conc	364	1941.33	251190.33	485.33	303.33	0.001
D.1.1	5ksi_conc	200	1066.67	41666.67	266.67	166.67	0.001
D.1.2	5ksi_conc	180	960.00	30375.00	240.00	150.00	0.001
E.1.1	5ksi_conc	96	512.00	4608.00	128.00	80.00	0.001
E.1.2	5ksi_conc	248	1322.67	79442.67	330.67	206.67	0.001
E.1.3	5ksi_conc	180	960.00	30375.00	240.00	150.00	0.001
E.1.4	5ksi_conc	156	832.00	19773.00	208.00	130.00	0.001
E.1.5	5ksi_conc	44	234.67	443.67	58.67	36.67	0.001
E.1.6	5ksi_conc	368	1962.67	259562.67	490.67	306.67	0.001
E.1.7	5ksi_conc	368	1962.67	259562.67	490.67	306.67	0.001

Table B8. Frame Section Properties 01 – General (Continued)

SectionName Text	Material Text	Area ft2	TorsConst ft4	I33 ft4	I22 ft4	AS2 ft2	AS3 ft2
E.1.8	5ksi_conc	68	90.67	6550.67	22.67	56.67	0.001
E.1.9	5ksi_conc	84	112.00	12348.00	28.00	70.00	0.001
E.2.1	5ksi_conc	140	746.67	14291.67	186.67	116.67	0.001
E.2.2	5ksi_conc	346	1845.33	215738.21	461.33	288.33	0.001
E.2.3	5ksi_conc	390	2080.00	308953.13	520.00	325.00	0.001
E.2.4	5ksi_conc	968	5162.67	4724162.67	1290.67	806.67	0.001
E.3.1	5ksi_conc	372	1984.00	268119.00	496.00	310.00	0.001
E.3.2	5ksi_conc	364	1941.33	251190.33	485.33	303.33	0.001
E.3.3	5ksi_conc	436	2325.33	431676.33	581.33	363.33	0.001
F.1.1	5ksi_conc	200	1066.67	41666.67	266.67	166.67	0.001
F.1.2	5ksi_conc	360	1920.00	243000.00	480.00	300.00	0.001
F.1.3	5ksi_conc	44	234.67	443.67	58.67	36.67	0.001
F.1.4	5ksi_conc	592	3157.33	1080597.33	789.33	493.33	0.001
F.2.1	5ksi_conc	200	1066.67	41666.67	266.67	166.67	0.001
F.2.2	5ksi_conc	568	3029.33	954429.33	757.33	473.33	0.001
F.2.3	5ksi_conc	800	4266.67	2666666.67	1066.67	666.67	0.001

Source: Attachment B of Reference 2.2.11

Table B9. Joint Constraint Assignments

Joint Text	Constraint Text	Type Text
1	1000	Body
2	1000	Body
3	1000	Body
4	1000	Body
5	1000	Body
6	1000	Body
7	1000	Body
8	1000	Body
9	1000	Body
10	1000	Body
11	1000	Body
12	1000	Body
13	1000	Body
14	1000	Body
15	1000	Body
16	1000	Body
17	1000	Body
18	1000	Body
19	1000	Body
20	1000	Body
21	1000	Body
22	1000	Body
23	1000	Body
24	1000	Body
25	1000	Body
26	1000	Body
27	1000	Body
28	1000	Body
29	1000	Body
30	1000	Body
31	1000	Body
32	1000	Body
33	1000	Body
34	1000	Body
35	1000	Body
36	1000	Body
37	1000	Body
38	1000	Body
39	1000	Body
40	1000	Body
41	1000	Body
42	1000	Body
43	1000	Body

Table B9. Joint Constraint Assignments (Continued)

Joint Text	Constraint Text	Type Text
101	F.1	Body
102	F.1	Body
103	F.1	Body
104	E.1a	Body
105	E.1a	Body
106	E.1b	Body
107	E.1b	Body
108	E.1a	Body
109	E.1b	Body
110	E.1c	Body
111	E.1c	Body
112	C.1a	Body
113	C.1a	Body
114	C.1a	Body
115	C.1b	Body
116	C.1b	Body
117	A.1	Body
118	A.1	Body
119	A.1	Body
120	8.1	Body
121	8.1	Body
122	8.1	Body
123	7.1a	Body
124	7.1a	Body
125	7.1a	Body
126	7.1b	Body
127	7.1b	Body
128	7.1b	Body
129	4.1	Body
130	4.1	Body
131	4.1	Body
132	4.1	Body
133	4.1	Body
134	3.1	Body
135	3.1	Body
136	3.1	Body
137	3.1	Body
301	2000	Body
302	2000	Body
303	2000	Body
304	2000	Body
305	2000	Body
306	2000	Body
307	2000	Body

Table B9. Joint Constraint Assignments (Continued)

Joint Text	Constraint Text	Type Text
308	2000	Body
309	2000	Body
310	2000	Body
311	2000	Body
313	2000	Body
314	2000	Body
315	2000	Body
316	2000	Body
317	2000	Body
318	2000	Body
319	2000	Body
320	2000	Body
321	2000	Body
322	2000	Body
323	2000	Body
324	2000	Body
325	2000	Body
326	2000	Body
327	2000	Body
328	2000	Body
329	2000	Body
330	2000	Body
331	2000	Body
332	2000	Body
333	2000	Body
334	2000	Body
335	2000	Body
336	2000	Body
337	2000	Body
338	2000	Body
339	2000	Body
340	2000	Body
341	2000	Body
342	2000	Body
343	2000	Body
344	2000	Body
345	2000	Body
346	2000	Body
347	2000	Body
348	2000	Body
349	2000	Body
350	2000	Body
351	2000	Body
352	2000	Body

Table B9. Joint Constraint Assignments (Continued)

Joint Text	Constraint Text	Type Text
353	2000	Body
354	2000	Body
355	2000	Body
356	2000	Body
357	2000	Body
401	F.2	Body
402	F.2	Body
403	F.2	Body
404	E.2	Body
405	E.2	Body
406	E.2	Body
407	E.2	Body
408	C.2	Body
409	C.2	Body
410	C.2	Body
411	C.2	Body
412	A.2	Body
413	A.2	Body
414	A.2	Body
419	7.2a	Body
420	7.2a	Body
421	7.2a	Body
422	7.2b	Body
423	7.2b	Body
424	7.2b	Body
425	4.2a	Body
426	4.2a	Body
427	4.2b	Body
428	4.2b	Body
429	3.2	Body
430	3.2	Body
431	3.2	Body
501	3000	Body
502	3000	Body
503	3000	Body
504	3000	Body
505	3000	Body
506	3000	Body
507	3000	Body
508	3000	Body
509	3000	Body
510	3000	Body
511	3000	Body
512	3000	Body

Table B9. Joint Constraint Assignments (Continued)

Joint Text	**Constraint Text**	**Type Text**
513	3000	Body
514	3000	Body
516	3000	Body
519	3000	Body
520	3000	Body
521	3000	Body
522	3000	Body
523	3000	Body
601	4000	Body
602	4000	Body
603	4000	Body
605	4000	Body
607	4000	Body
609	4000	Body
608	4000	Body
701	5000	Body
702	5000	Body
703	5000	Body
704	5000	Body
99	1000	Body
399	2000	Body
599	3000	Body
699	4000	Body
799	5000	Body

Source: Attachment B of Reference 2.2.11

Table B10. Constraint Definitions – Body

Name Text	CoordSys Text	UX Yes/No	UY Yes/No	UZ Yes/No	RX Yes/No	RY Yes/No	RZ Yes/No
1000	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
2000	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
3000	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
4000	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
5000	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
3.1	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
3.2	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
4.1	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
4.2a	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
4.2b	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
7.1a	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
7.1b	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
7.2a	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
7.2b	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
8.1	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
A.1	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
A.2	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
C.1a	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
C.1b	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
C.2	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
E.1a	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
E.1b	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
E.1c	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
E.2	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
F.2	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes
F.1	GLOBAL	Yes	Yes	Yes	Yes	Yes	Yes

Source: Attachment B of Reference 2.2.11

Table B11. Joint Spring Assignments 1

DBGM-2 130' Lower Bound Alluvium

Joint	CoordSys	U1 (K_X)	U2 (K_Y)	U3 (K_Z)	R1 ($K_{\Psi X}$)	R2 ($K_{\Psi Y}$)	R3 ($K_{\Psi Z}$)
Text	Text	Kip/ft	Kip/ft	Kip/ft	Kip-ft/rad	Kip-ft/rad	Kip-ft/rad
99	Local	3.935E+06	4.186E+06	5.102E+06	5.881E+10	6.555E+10	8.703E+10

DBGM-2 130' Median Bound Alluvium

Joint	CoordSys	U1 (K_X)	U2 (K_Y)	U3 (K_Z)	R1 ($K_{\Psi X}$)	R2 ($K_{\Psi Y}$)	R3 ($K_{\Psi Z}$)
Text	Text	Kip/ft	Kip/ft	Kip/ft	Kip-ft/rad	Kip-ft/rad	Kip-ft/rad
99	Local	7.555E+06	8.037E+06	9.794E+06	1.129E+11	1.258E+11	1.671E+11

DBGM-2 130' Upper Bound Alluvium

Joint	CoordSys	U1 (K_X)	U2 (K_Y)	U3 (K_Z)	R1 ($K_{\Psi X}$)	R2 ($K_{\Psi Y}$)	R3 ($K_{\Psi Z}$)
Text	Text	Kip/ft	Kip/ft	Kip/ft	Kip-ft/rad	Kip-ft/rad	Kip-ft/rad
99	Local	1.434E+07	1.525E+07	1.858E+07	2.142E+11	2.388E+11	3.170E+11

BDBGM 130' Lower Bound Alluvium

Joint	CoordSys	U1 (K_X)	U2 (K_Y)	U3 (K_Z)	R1 ($K_{\Psi X}$)	R2 ($K_{\Psi Y}$)	R3 ($K_{\Psi Z}$)
Text	Text	Kip/ft	Kip/ft	Kip/ft	Kip-ft/rad	Kip-ft/rad	Kip-ft/rad
99	Local	2.664E+06	2.834E+06	3.491E+06	4.024E+10	4.485E+10	5.825E+10

BDBGM 130' Median Bound Alluvium

Joint	CoordSys	U1 (K_X)	U2 (K_Y)	U3 (K_Z)	R1 ($K_{\Psi X}$)	R2 ($K_{\Psi Y}$)	R3 ($K_{\Psi Z}$)
Text	Text	Kip/ft	Kip/ft	Kip/ft	Kip-ft/rad	Kip-ft/rad	Kip-ft/rad
99	Local	5.255E+06	5.591E+06	6.886E+06	7.939E+10	8.848E+10	1.149E+11

BDBGM 130' Upper Bound Alluvium

Joint	CoordSys	U1 (K_X)	U2 (K_Y)	U3 (K_Z)	R1 ($K_{\Psi X}$)	R2 ($K_{\Psi Y}$)	R3 ($K_{\Psi Z}$)
Text	Text	Kip/ft	Kip/ft	Kip/ft	Kip-ft/rad	Kip-ft/rad	Kip-ft/rad
99	Local	1.028E+07	1.093E+07	1.347E+07	1.552E+11	1.730E+11	2.247E+11

Source: Ref. 2.2.3 Section 6.2.1.2 thru 6.2.1.7 for DBGM-2, Section 6.3.1.2 thru 6.3.1.7 for BDBGM

Table B12. Masses 1 – Mass Source

MassFrom Text	LoadCase Text	Multiplier Unitless
Loads	xload	1
Loads	yload	1
Loads	zload	1

Source: Attachment B of Reference 2.2.11

Table B13. Joint Loads – Force

Joint Text	LoadCase Text	CoordSys Text	F1 Kip	F2 Kip	F3 Kip	M1 Kip-ft	M2 Kip-ft	M3 Kip-ft
99	xload	GLOBAL	83932.9	0	0	0	0	0
99	yload	GLOBAL	0	83932.9	0	0	0	0
99	zload	GLOBAL	0	0	-83932.9	0	0	0
599	xload	GLOBAL	36334.1	0	0	0	0	0
599	yload	GLOBAL	0	36334.1	0	0	0	0
599	zload	GLOBAL	0	0	-36334.1	0	0	0
699	xload	GLOBAL	2819	0	0	0	0	0
699	yload	GLOBAL	0	2819	0	0	0	0
699	zload	GLOBAL	0	0	-2819	0	0	0
799	xload	GLOBAL	6425.7	0	0	0	0	0
799	yload	GLOBAL	0	6425.7	0	0	0	0
799	zload	GLOBAL	0	0	-6425.7	0	0	0
399	xload	GLOBAL	60165.5	0	0	0	0	0
399	yload	GLOBAL	0	60165.5	0	0	0	0
399	zload	GLOBAL	0	0	-60165.5	0	0	0

Source: Ref. 2.2.2

ATTACHMENT C
DBGM-2 GROUND MOTION DATA AND RESULTS

Table C1. Modal Analysis Results for DBGM-2 130' Lower Bound Alluvium

Modal Periods And Frequencies

OutputCase	StepType	StepNum	Period	Frequency	CircFreq	Eigenvalue
Text	Text	Unitless	Sec	Cyc/sec	rad/sec	rad2/sec2
MODAL	Mode	1	0.257738	3.8799	24.378	594.3
MODAL	Mode	2	0.249444	4.0089	25.189	634.47
MODAL	Mode	3	0.215061	4.6498	29.216	853.56
MODAL	Mode	4	0.077762	12.86	80.8	6528.6
MODAL	Mode	5	0.077131	12.965	81.461	6635.9
MODAL	Mode	6	0.048749	20.513	128.89	16612
MODAL	Mode	7	0.038299	26.11	164.05	26914
MODAL	Mode	8	0.033242	30.083	189.02	35727
MODAL	Mode	9	0.029486	33.915	213.09	45408
MODAL	Mode	10	0.028534	35.046	220.2	48488
MODAL	Mode	11	0.025066	39.895	250.67	62836
MODAL	Mode	12	0.017715	56.45	354.69	125800

Modal Participating Mass Ratios

OutputCase	StepType	StepNum	UX	UY	UZ	SumUX	SumUY	SumUZ
Text	Text	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless
MODAL	Mode	1	0.98772	0.00002157	0.00065	0.98772	0.00002157	0.00065
MODAL	Mode	2	0.00002139	0.98853	0.00001268	0.98774	0.98855	0.00066
MODAL	Mode	3	0.00071	0.00001267	0.99902	0.98846	0.98857	0.99968
MODAL	Mode	4	0.01026	0.00109	0.00014	0.99871	0.98965	0.99982
MODAL	Mode	5	0.00109	0.00984	0.00002756	0.9998	0.99949	0.99985
MODAL	Mode	6	8.275E-07	0.00043	4.433E-09	0.9998	0.99992	0.99985
MODAL	Mode	7	0.00018	1.751E-07	9.827E-07	0.99998	0.99992	0.99985
MODAL	Mode	8	7.012E-08	0.00003968	7.026E-09	0.99998	0.99996	0.99985
MODAL	Mode	9	0.00001758	1.597E-07	1.456E-06	1	0.99996	0.99985
MODAL	Mode	10	3.198E-08	0.00003952	2.58E-09	1	1	0.99985
MODAL	Mode	11	1.048E-06	6.955E-09	0.00013	1	1	0.99998
MODAL	Mode	12	9.334E-08	9.042E-10	0.00002083	1	1	1

Source: Attachment R (1_Modal_Results_Tables.xls)

Table C2. Modal Analysis Results for DBGM-2 130' Median Alluvium

Modal Periods And Frequencies

OutputCase	StepType	StepNum	Period	Frequency	CircFreq	Eigenvalue
Text	Text	Unitless	Sec	Cyc/sec	rad/sec	rad2/sec2
MODAL	Mode	1	0.192304	5.2001	32.673	1067.5
MODAL	Mode	2	0.185031	5.4045	33.957	1153.1
MODAL	Mode	3	0.156106	6.4059	40.25	1620
MODAL	Mode	4	0.066631	15.008	94.298	8892.1
MODAL	Mode	5	0.066178	15.111	94.944	9014.4
MODAL	Mode	6	0.047966	20.848	130.99	17159
MODAL	Mode	7	0.038124	26.231	164.81	27163
MODAL	Mode	8	0.031926	31.322	196.8	38732
MODAL	Mode	9	0.029425	33.984	213.53	45595
MODAL	Mode	10	0.027935	35.797	224.92	50588
MODAL	Mode	11	0.024265	41.212	258.94	67051
MODAL	Mode	12	0.017381	57.535	361.5	130680

Modal Participating Mass Ratios

OutputCase	StepType	StepNum	UX	UY	UZ	SumUX	SumUY	SumUZ
Text	Text	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless
MODAL	Mode	1	0.97411	0.00004841	0.00051	0.97411	0.00004841	0.00051
MODAL	Mode	2	0.00004973	0.97675	0.00001325	0.97416	0.9768	0.00053
MODAL	Mode	3	0.0006	0.00001348	0.99876	0.97475	0.97682	0.99929
MODAL	Mode	4	0.01126	0.01123	0.00005981	0.98601	0.98804	0.99935
MODAL	Mode	5	0.01326	0.00934	0.00012	0.99927	0.99738	0.99946
MODAL	Mode	6	3.993E-06	0.00231	3.657E-08	0.99928	0.99969	0.99946
MODAL	Mode	7	0.00066	6.278E-07	1.753E-06	0.99993	0.99969	0.99946
MODAL	Mode	8	1.071E-07	0.00021	2.589E-08	0.99993	0.9999	0.99946
MODAL	Mode	9	0.00006326	6.462E-08	1.893E-06	1	0.9999	0.99947
MODAL	Mode	10	2.628E-09	0.0001	4.446E-10	1	1	0.99947
MODAL	Mode	11	1.643E-06	1.184E-08	0.00046	1	1	0.99993
MODAL	Mode	12	1.637E-07	1.557E-09	0.00006383	1	1	0.99999

Source: Attachment R (1_Modal_Results_Tables.xls)

Table C3. Modal Analysis Results for DBGM-2 130' Upper Bound Alluvium

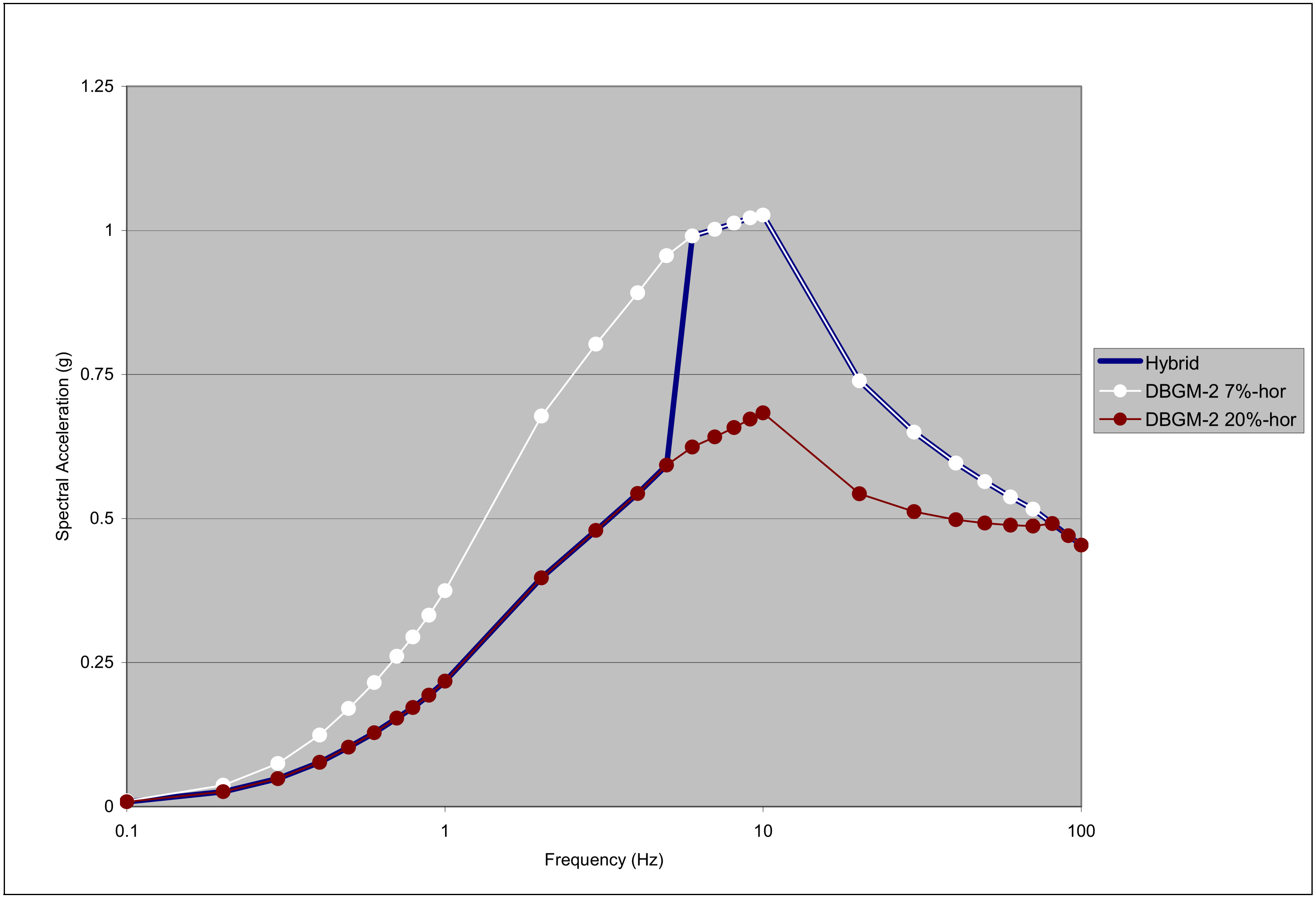
Modal Periods And Frequencies

OutputCase	StepType	StepNum	Period	Frequency	CircFreq	Eigenvalue
Text	Text	Unitless	Sec	Cyc/sec	rad/sec	rad2/sec2
MODAL	Mode	1	0.148544	6.732	42.298	1789.2
MODAL	Mode	2	0.141471	7.0686	44.413	1972.5
MODAL	Mode	3	0.114562	8.7289	54.845	3008
MODAL	Mode	4	0.059685	16.755	105.27	11082
MODAL	Mode	5	0.058028	17.233	108.28	11724
MODAL	Mode	6	0.046498	21.506	135.13	18259
MODAL	Mode	7	0.037841	26.427	166.04	27570
MODAL	Mode	8	0.031285	31.964	200.83	40335
MODAL	Mode	9	0.029368	34.051	213.95	45773
MODAL	Mode	10	0.027437	36.448	229.01	52445
MODAL	Mode	11	0.023545	42.473	266.86	71216
MODAL	Mode	12	0.017093	58.502	367.58	135120

Modal Participating Mass Ratios

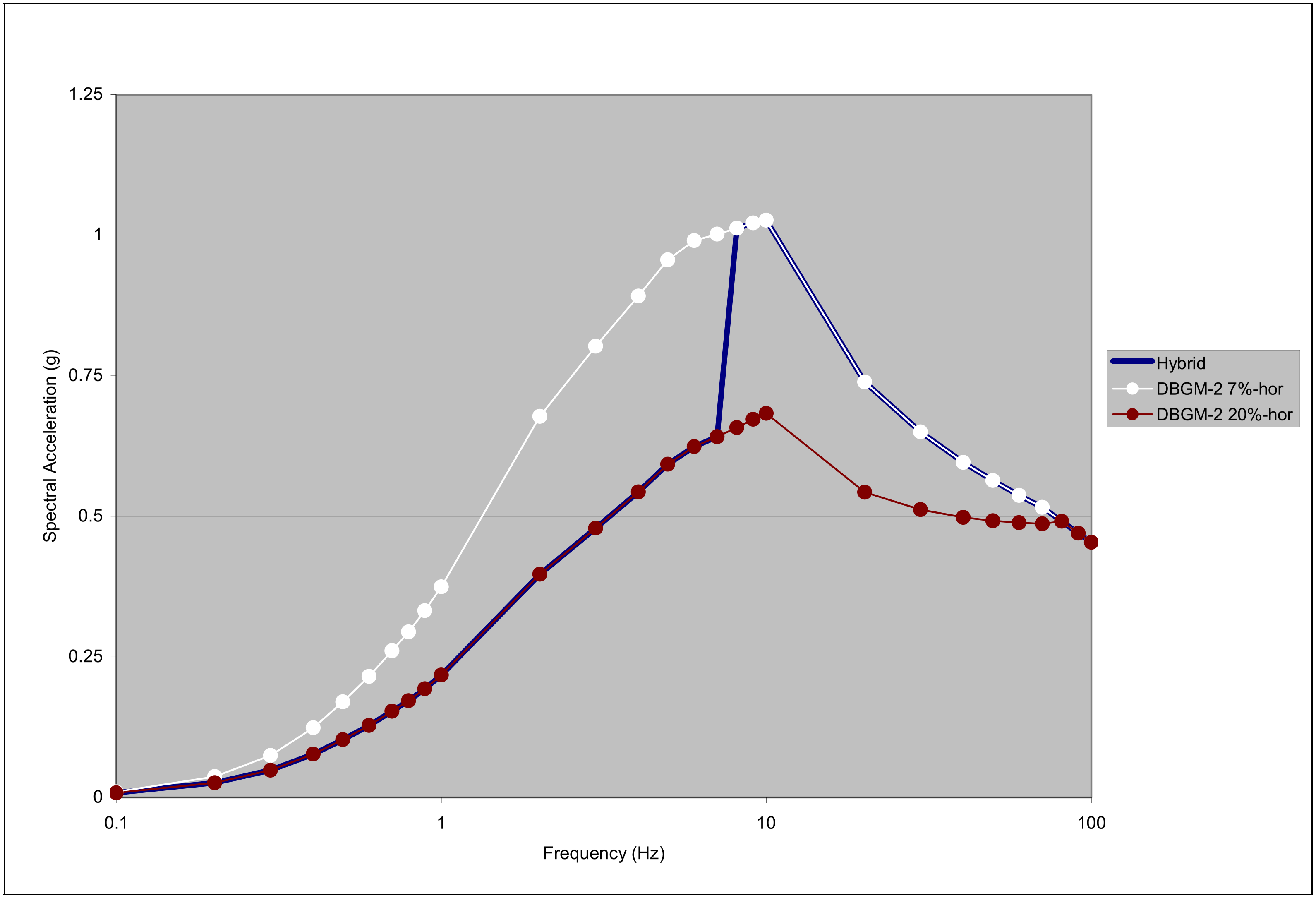
OutputCase	StepType	StepNum	UX	UY	UZ	SumUX	SumUY	SumUZ
Text	Text	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless
MODAL	Mode	1	0.93982	0.00009783	0.00035	0.93982	0.00009783	0.00035
MODAL	Mode	2	0.00011	0.94706	0.00001358	0.93992	0.94716	0.00036
MODAL	Mode	3	0.00045	0.0000148	0.99761	0.94037	0.94718	0.99797
MODAL	Mode	4	0.0015	0.03781	3.897E-08	0.94188	0.98498	0.99797
MODAL	Mode	5	0.05517	0.00101	0.00019	0.99705	0.98599	0.99816
MODAL	Mode	6	0.00001715	0.01272	2.715E-07	0.99707	0.99871	0.99816
MODAL	Mode	7	0.00268	2.568E-06	2.452E-06	0.99975	0.99871	0.99816
MODAL	Mode	8	1.875E-07	0.001	7.334E-08	0.99975	0.99972	0.99816
MODAL	Mode	9	0.00025	4.355E-10	2.153E-06	1	0.99972	0.99817
MODAL	Mode	10	2.177E-08	0.00028	1.746E-08	1	1	0.99817
MODAL	Mode	11	2.158E-06	1.782E-08	0.00161	1	1	0.99978
MODAL	Mode	12	2.373E-07	2.605E-09	0.0002	1	1	0.99998

Source: Attachment R (1_Modal_Results_Tables.xls)



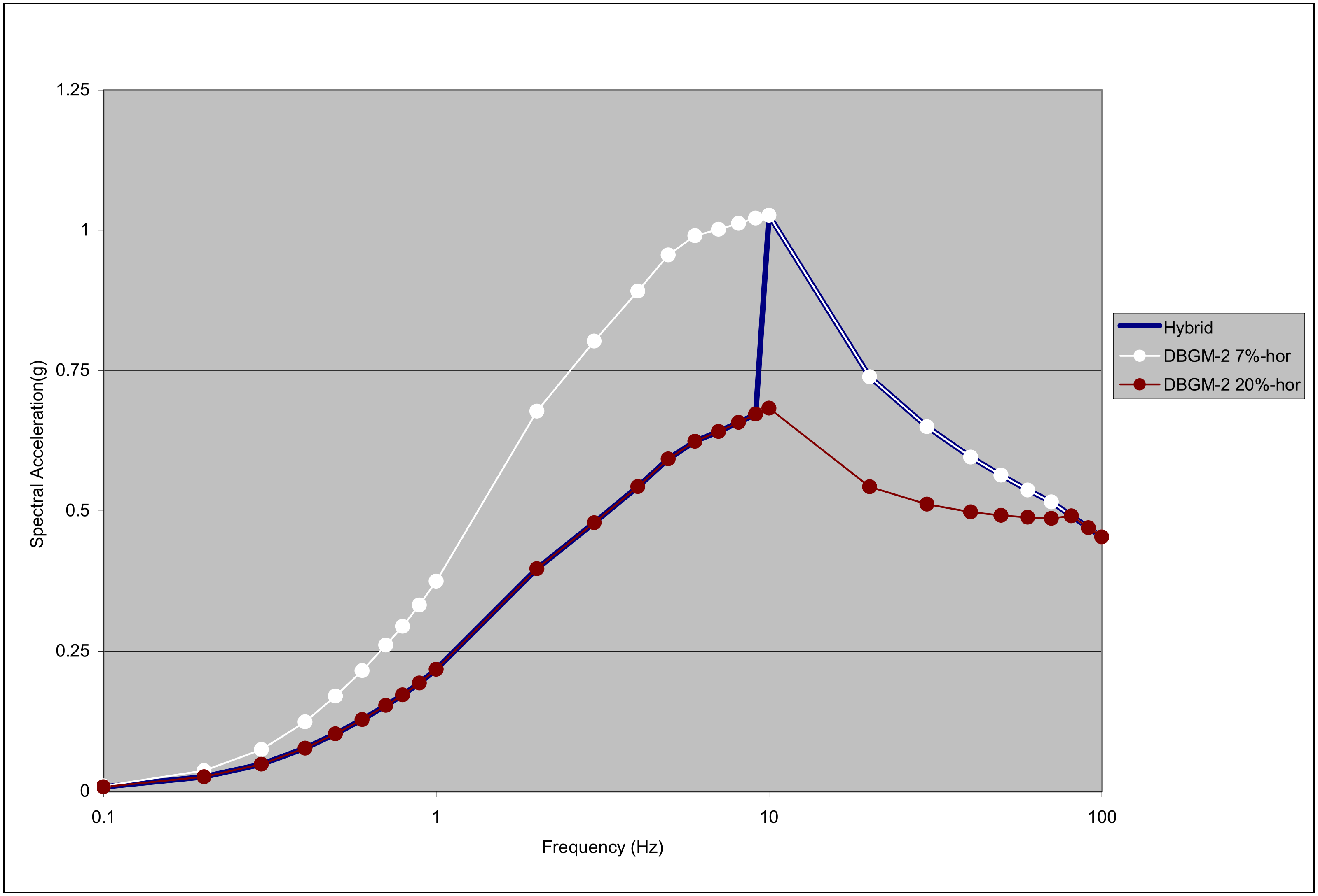
NOTE: "hybrid" spectra generated in Excel file contained in Attachment M (*DBGM-2 Hybrid Response Spectra.xls – in the DBGM-2 worksheet*)
Source data for "hybrid" spectra generation is Reference 2.2.9

Figure C1. DBGM-2 130' Lower Bound Alluvium 7%, 20%, and Hybrid Horizontal Response Spectra



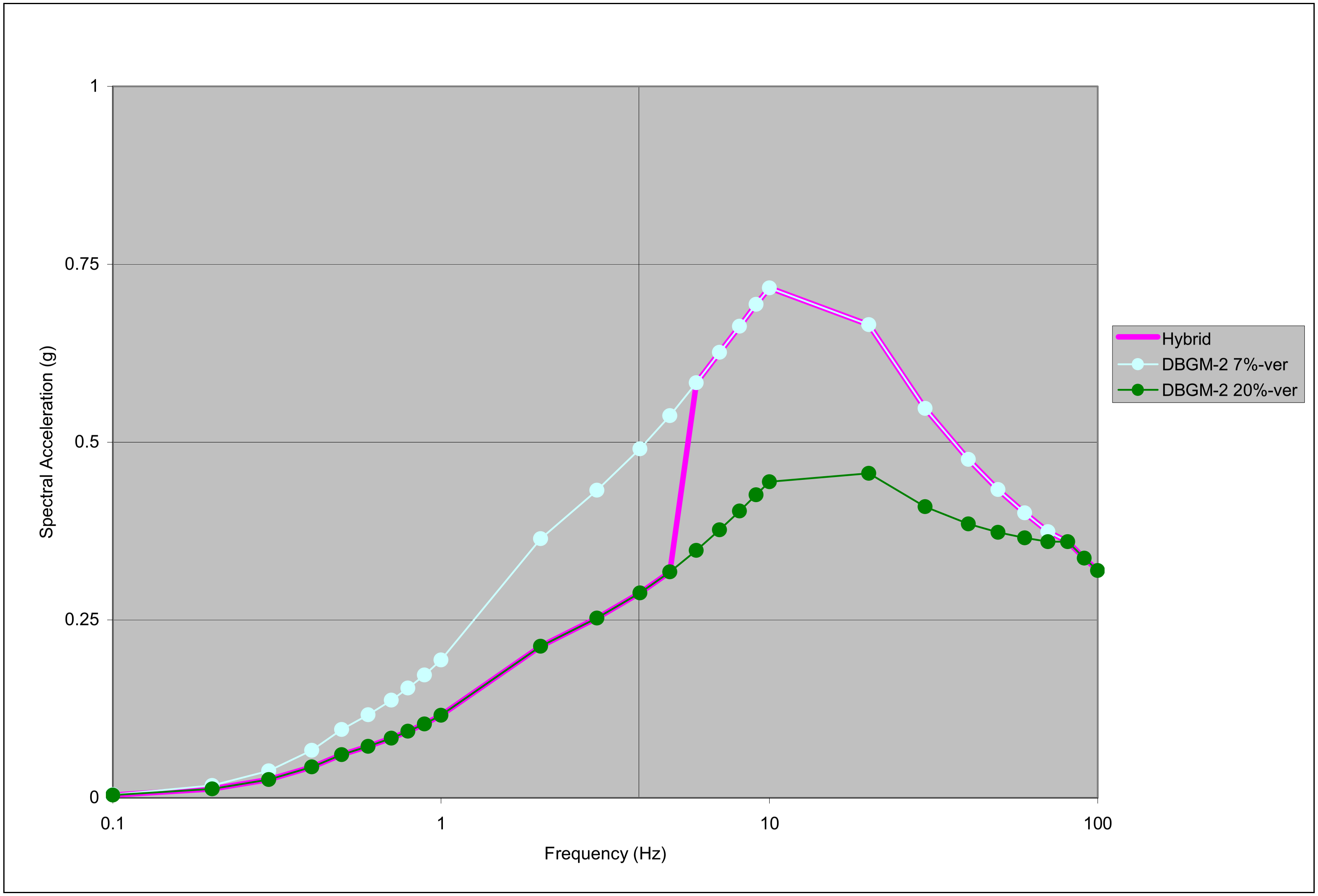
NOTE: “hybrid” spectra generated in Excel file contained in Attachment M (*DBGM-2 Hybrid Response Spectra.xls – in the DBGM-2 worksheet*)
Source data for “hybrid” spectra generation is Reference 2.2.9

Figure C2. DBGM-2 130’ Median Alluvium 7%, 20%, and Hybrid Horizontal Response Spectra



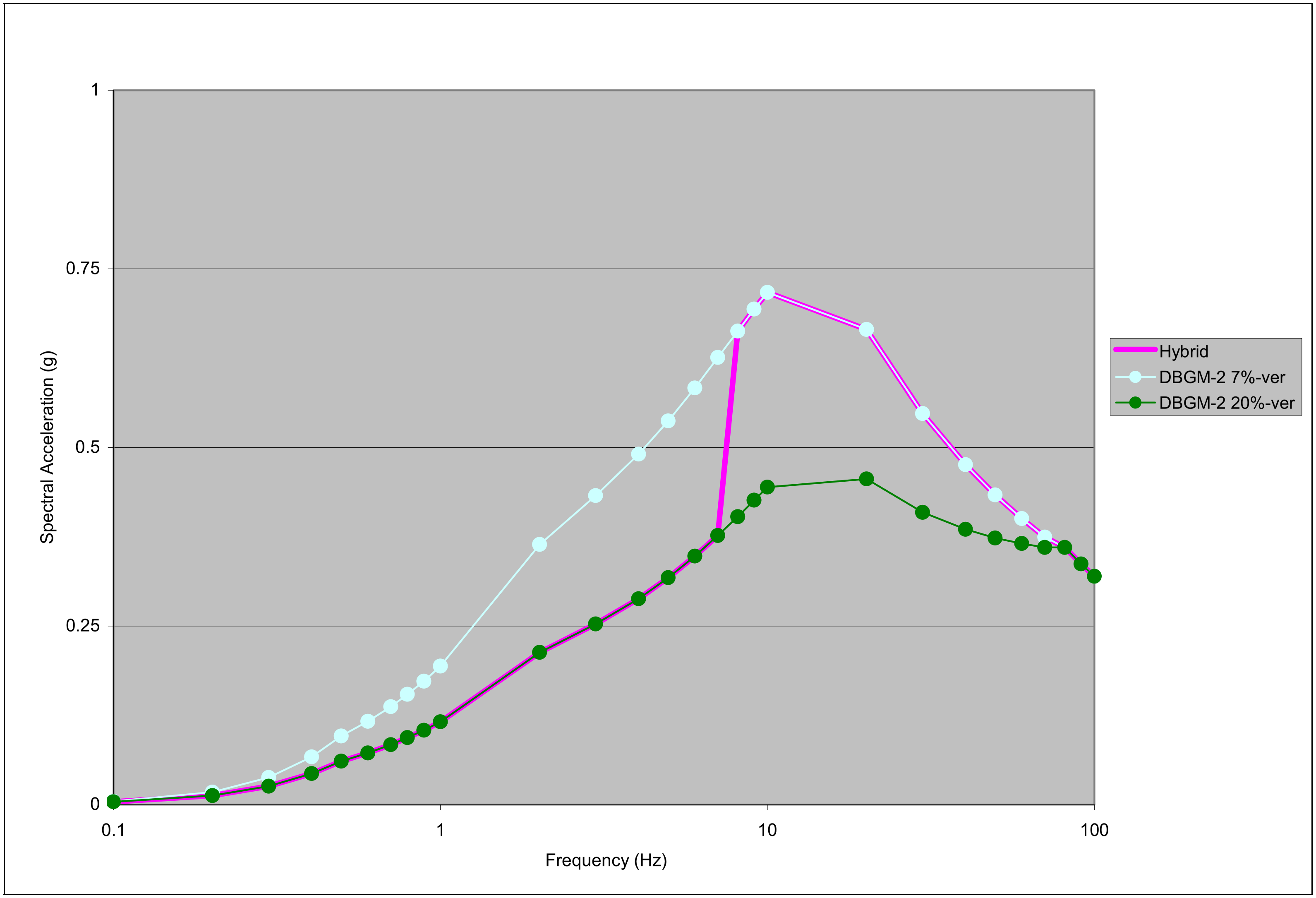
NOTE: “hybrid” spectra generated in Excel file contained in Attachment M (*DBGM-2 Hybrid Response Spectra.xls – in the DBGM-2 worksheet*)
Source data for “hybrid” spectra generation is Reference 2.2.9

Figure C3. DBGM-2 130’ Upper Bound Alluvium 7%, 20%, and Hybrid Horizontal Response Spectra



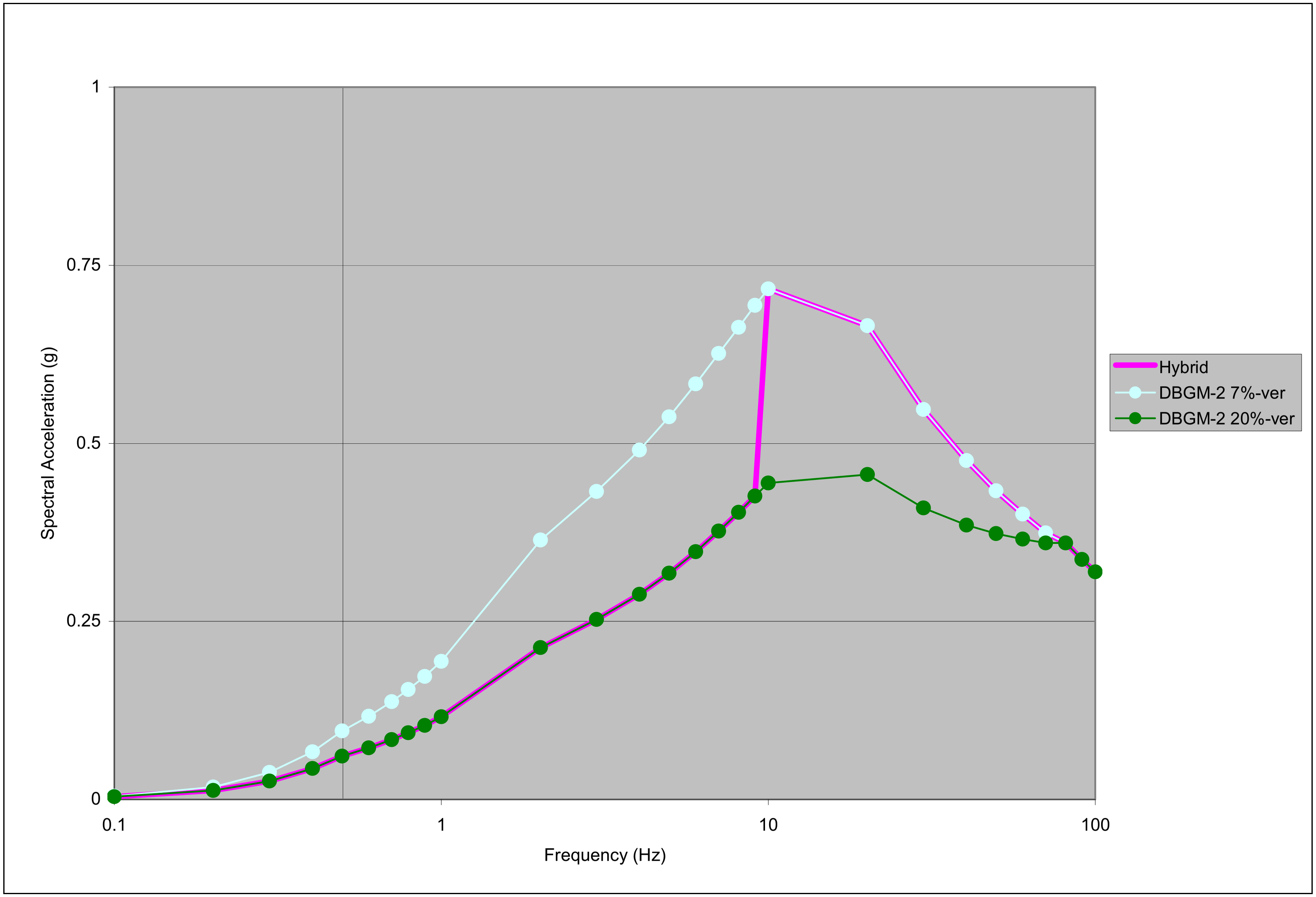
NOTE: "hybrid" spectra generated in Excel file contained in Attachment M (*DBGM-2 Hybrid Response Spectra.xls – in the DBGM-2 worksheet*)
Source data for "hybrid" spectra generation is Reference 2.2.9

Figure C4. DBGM-2 130' Lower Bound Alluvium 7%, 20%, and Hybrid Vertical Response Spectra



NOTE: “hybrid” spectra generated in Excel file contained in Attachment M (*DBGM-2 Hybrid Response Spectra.xls – in the DBGM-2 worksheet*)
Source data for “hybrid” spectra generation is Reference 2.2.9

Figure C5. DBGM-2 130’ Median Alluvium 7%, 20%, and Hybrid Vertical Response Spectra



NOTE: “hybrid” spectra generated in Excel file contained in Attachment M (*DBGM-2 Hybrid Response Spectra.xls – in the DBGM-2 worksheet*)
Source data for “hybrid” spectra generation is Reference 2.2.9

Figure C6. DBGM-2 130’ Upper Bound Alluvium 7%, 20%, and Hybrid Vertical Response Spectra

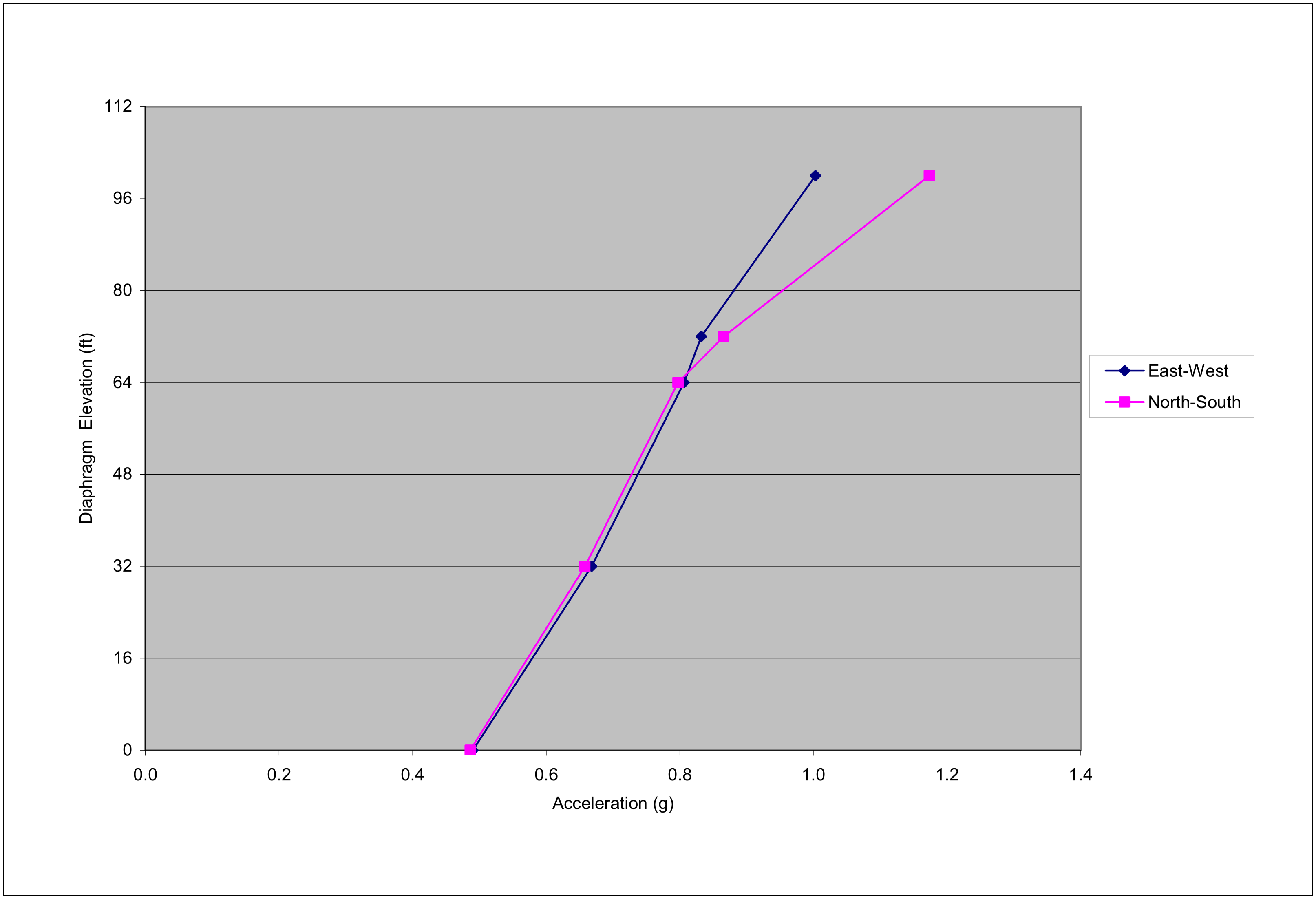
Table C4. Diaphragm Accelerations for DBGM-2 130' Upper Bound Alluvium

130' Upper Bound Alluvium Accelerations Resulting from X-Direction Loading							
Diaphragm Elevation (ft)	SAP2000 Joint	East-West		North-South		Vertical	
		X-acceleration		Y-acceleration		Z-acceleration	
		ft /sec^2	g	ft /sec^2	g	ft /sec^2	g
0	99	15.7812	0.49	1.233	0.04	0.5732	0.02
32	399	21.5028	0.67	0.4356	0.01	0.6103	0.02
64	599	25.9656	0.81	0.8774	0.03	0.8496	0.03
72	699	26.8003	0.83	2.7892	0.09	3.8893	0.12
100	799	32.2911	1.00	5.1168	0.16	2.8894	0.09

130' Upper Bound Alluvium Accelerations Resulting from Y-Direction Loading							
Diaphragm Elevation (ft)	SAP2000 Joint	East-West		North-South		Vertical	
		X-acceleration		Y-acceleration		Z-Acceleration	
		ft /sec^2	g	ft /sec^2	g	ft /sec^2	g
0	99	1.3112	0.04	15.6626	0.49	0.103	0.00
32	399	0.3377	0.01	21.1847	0.66	0.1135	0.00
64	599	1.1823	0.04	25.6774	0.80	0.1795	0.01
72	699	1.4055	0.04	27.879	0.87	0.6371	0.02
100	799	2.6845	0.08	37.7828	1.17	0.4284	0.01

130' Upper Bound Alluvium Accelerations Resulting from Z-Direction Loading							
Diaphragm Elevation (ft)	SAP2000 Joint	East-West		North-South		Vertical	
		X-acceleration		Y-acceleration		Z-acceleration	
		ft /sec^2	g	ft /sec^2	g	ft /sec^2	g
0	99	0.516	0.02	0.084	0.00	12.8201	0.40
32	399	0.3894	0.01	0.0765	0.00	13.6936	0.43
64	599	0.4522	0.01	0.0772	0.00	14.1508	0.44
72	699	0.4797	0.01	0.1281	0.00	13.8206	0.43
100	799	0.7987	0.02	0.2141	0.01	14.7906	0.46

Source: Attachment R (*3_Acceleration_Results_Table.xls*) g = 32.2 ft/sec^2



NOTE: Acceleration plot generated from data presented in Table C4

Figure C7. DBGM-2 Horizontal Accelerations (East-West and North-South) for 130’ Upper Bound Alluvium

Table C5. SRSS Diaphragm Accelerations for DBGM-2 130' Upper Bound Alluvium

Diaphragm Elevation (ft)	SAP2000 Joint	East-West		North-South		Vertical	
		X-acceleration		Y-acceleration		Y-acceleration	
		ft /sec^2	g	ft /sec^2	g	ft /sec^2	g
0	99	15.844	0.4920	15.7113	0.4879	12.8333	0.3985
32	399	21.5089	0.6680	21.1893	0.6581	13.7076	0.4257
64	599	25.9965	0.8073	25.6925	0.7979	14.1774	0.4403
72	699	26.8414	0.8336	28.0184	0.8701	14.3716	0.4463
100	799	32.4124	1.0066	38.1283	1.1841	15.0762	0.4682

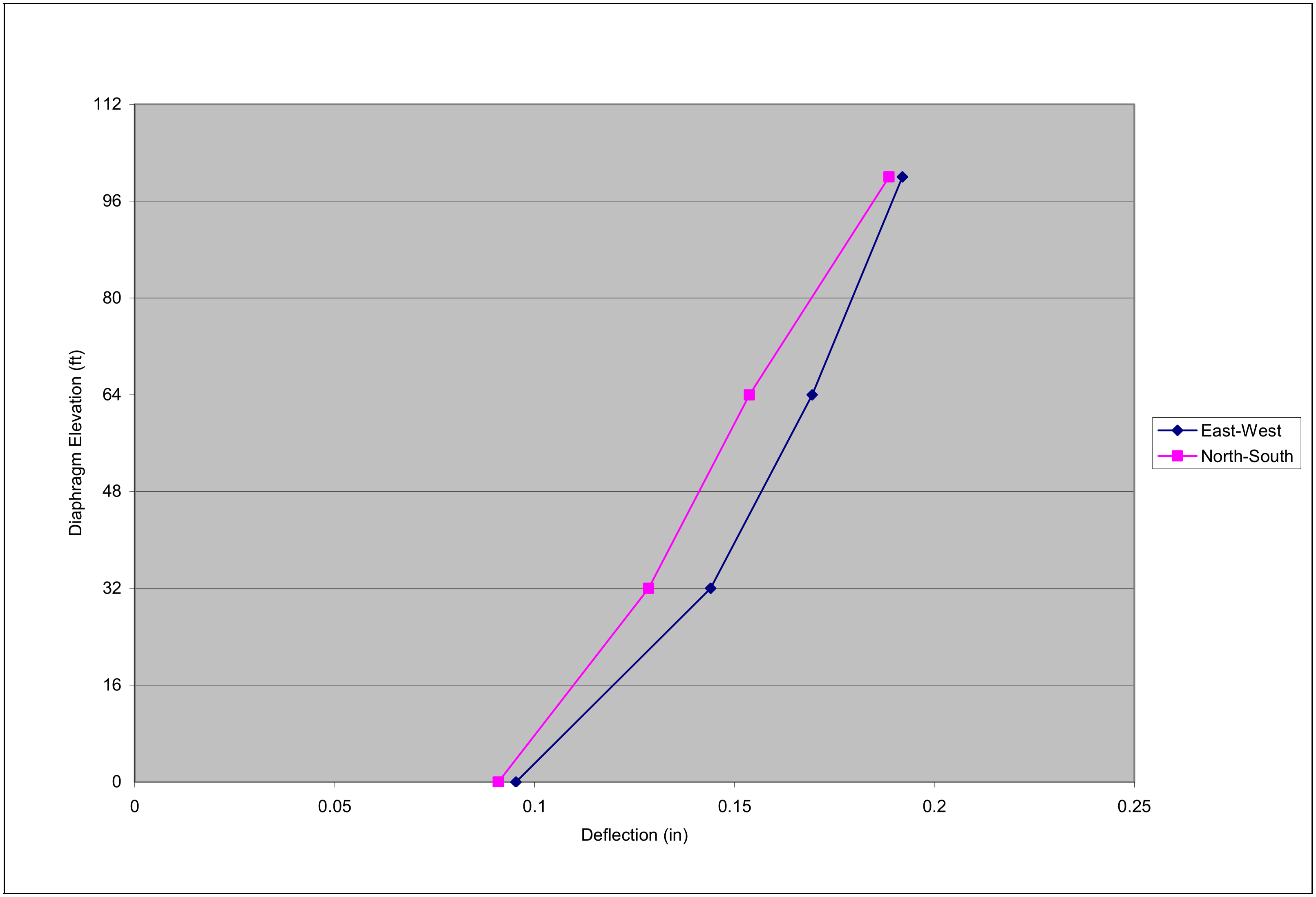
Source: Attachment R (*3_Acceleration_Results_Table.xls*) g = 32.2 ft/sec^2

Table C6. Story Drifts for DBGM-2 130' Upper Bound Alluvium

Diaphragm Elevation (ft)	Story Displacement, Δ (inches)	Story Drift (inches)	Story Height (ft)	Drift Ratio (story drift / story height)
	East-West (Global X)	East-West (Global X)	(feet)	East-West (Global X)
100'-0" (SAP2000 Joint 799)	0.192	100'-0" (Δ799-Δ599)		(Δ799-Δ599)/36/12in/ft
		0.023	36	5.22E-05
64'-0" (SAP2000 Joint 599)	0.169	64'-0" (Δ599-Δ399)		(Δ599-Δ399)/32/12in/ft
		0.025	32	6.62E-05
32'-0" (SAP2000 Joint 399)	0.144	32'-0" (Δ399-Δ99)		(Δ399-Δ99)/32/12in/ft
		0.049	32	1.27E-04
0'-0" (SAP2000 Joint 99)	0.095			

Diaphragm Elevation (ft)	Story Displacement, Δ (inches)	Story Drift (inches)	Story Height (ft)	Drift Ratio (story drift / story height)
	North-South (Global Y)	North-South (Global Y)	(feet)	North-South (Global Y)
100'-0" (SAP2000 Joint 799)	0.189	100'-0" (Δ799-Δ599)		(Δ799-Δ599)/36/12in/ft
		0.035	36	8.09E-05
64'-0" (SAP2000 Joint 599)	0.154	64'-0" (Δ599-Δ399)		(Δ599-Δ399)/32/12in/ft
		0.025	32	6.56E-05
32'-0" (SAP2000 Joint 399)	0.129	32'-0" (Δ399-Δ99)		(Δ399-Δ99)/32/12in/ft
		0.038	32	9.80E-05
0'-0" (SAP2000 Joint 99)	0.091			

Source: Attachment R (*2_Drift_Results_Table.xls*)



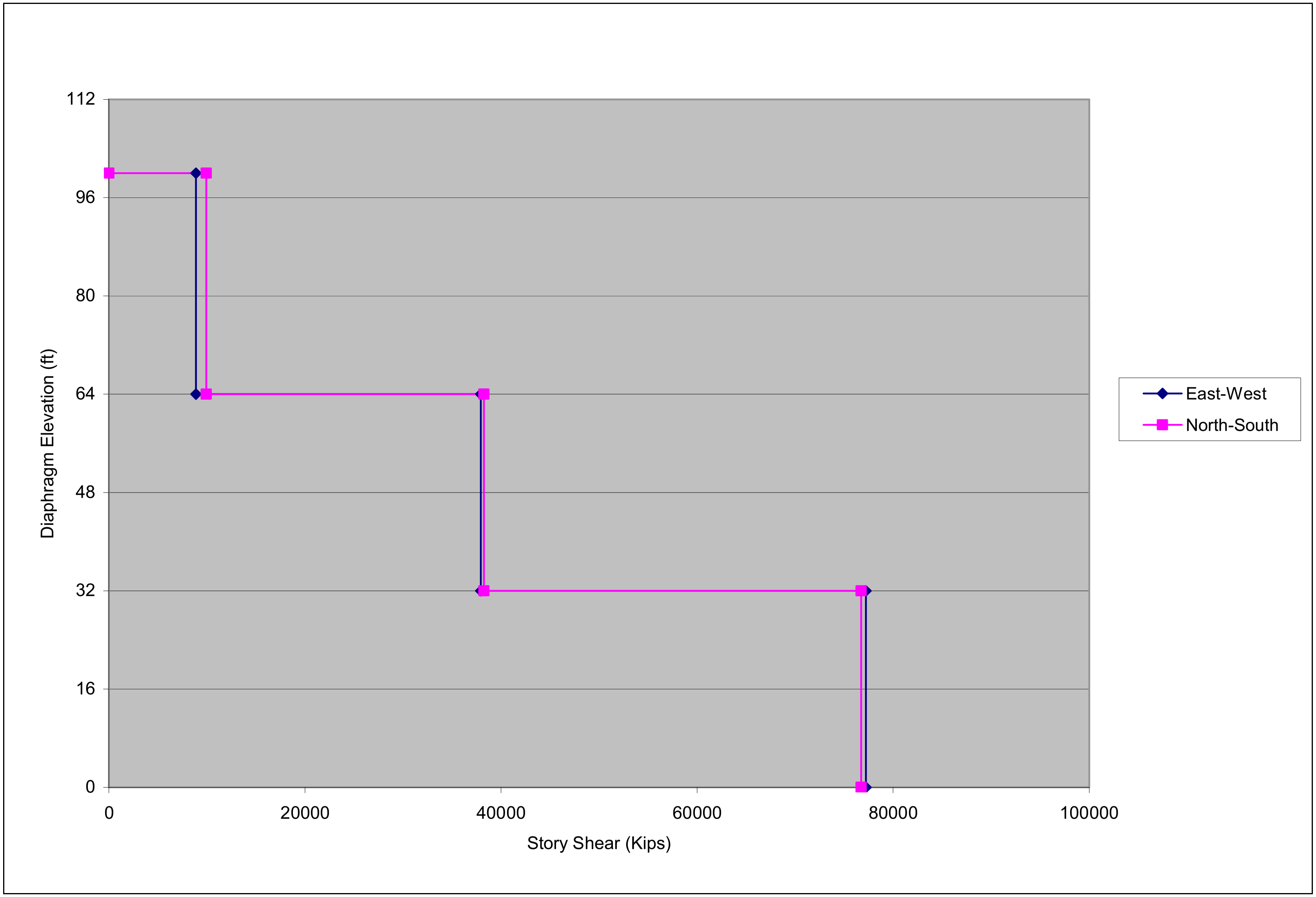
NOTE: Deflection plot generated from data presented in Table C6

Figure C8. Diaphragm Deflections for DBGM-2 130' Upper Bound Alluvium

Table C7. Story Shears for DBGM-2 Ground Motion

ELEVATION 0'-0"		
Soil Case	North/South (Global Y) kips	East/West (Global X) kips
130' Lower Bound Alluvium	61776	61235
130' Median Alluvium	70744	70575
130' Upper Bound Alluvium	76733	77228
ELEVATION 32'-0"		
Soil Case	North/South (Global Y) kips	East/West (Global X) kips
130' Lower Bound Alluvium	28859	28335
130' Median Alluvium	33828	33382
130' Upper Bound Alluvium	38252	37928
ELEVATION 64'-0"		
Soil Case	North/South (Global Y) kips	East/West (Global X) kips
130' Lower Bound Alluvium	6536	6178
130' Median Alluvium	8046	7555
130' Upper Bound Alluvium	9946	8879

Source: Attachment K (*Story Shear for DBGM-2 Ground Motions.xls*)



NOTE: Story shear plot generated from data presented in Table C7

Figure C9. Story Shears for DBGM-2 130' Upper Bound Alluvium

ATTACHMENT D
BDBGM GROUND MOTION DATA AND RESULTS

Table D1. Modal Analysis Results for BDBGM 130' Lower Bound Alluvium

Modal Periods And Frequencies

OutputCase	StepType	StepNum	Period	Frequency	CircFreq	Eigenvalue
Text	Text	Unitless	Sec	Cyc/sec	rad/sec	rad2/sec2
MODAL	Mode	1	0.309558	3.2304	20.297	411.98
MODAL	Mode	2	0.300201	3.3311	20.93	438.06
MODAL	Mode	3	0.259488	3.8537	24.214	586.31
MODAL	Mode	4	0.086812	11.519	72.377	5238.4
MODAL	Mode	5	0.086117	11.612	72.961	5323.3
MODAL	Mode	6	0.049046	20.389	128.11	16412
MODAL	Mode	7	0.038378	26.057	163.72	26804
MODAL	Mode	8	0.034729	28.795	180.92	32733
MODAL	Mode	9	0.029527	33.868	212.8	45282
MODAL	Mode	10	0.028856	34.655	217.74	47411
MODAL	Mode	11	0.025528	39.173	246.13	60581
MODAL	Mode	12	0.017901	55.864	351.01	123210

Participating Mass Ratios

OutputCase	StepType	StepNum	UX	UY	UZ	SumUX	SumUY	SumUZ
Text	Text	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless
MODAL	Mode	1	0.99149	0.00001355	0.00066	0.99149	0.00001355	0.00066
MODAL	Mode	2	0.00001322	0.99188	0.00001145	0.9915	0.99189	0.00067
MODAL	Mode	3	0.00071	0.00001145	0.99909	0.99222	0.9919	0.99977
MODAL	Mode	4	0.00724	0.00048	0.00014	0.99946	0.99238	0.99991
MODAL	Mode	5	0.00045	0.00742	0.00001811	0.99991	0.9998	0.99993
MODAL	Mode	6	3.233E-07	0.00016	1.251E-09	0.99991	0.99996	0.99993
MODAL	Mode	7	0.00008287	9.341E-08	6.388E-07	0.99999	0.99996	0.99993
MODAL	Mode	8	7.086E-08	0.00001361	2.267E-09	0.99999	0.99998	0.99993
MODAL	Mode	9	0.000008403	2.086E-07	0.000001151	1	0.99998	0.99993
MODAL	Mode	10	5.39E-08	0.0000218	7.514E-09	1	1	0.99993
MODAL	Mode	11	6.962E-07	4.611E-09	0.00006048	1	1	0.99999
MODAL	Mode	12	5.878E-08	6.037E-10	0.00001083	1	1	1

Source: Attachment H (*BDBGM 130' Lower Bound (Modal).xls*)

Table D2. Modal Analysis Results for BDBGM 130' Median Alluvium

Modal Periods And Frequencies

OutputCase	StepType	StepNum	Period	Frequency	CircFreq	Eigenvalue
Text	Text	Unitless	Sec	Cyc/sec	rad/sec	rad2/sec2
MODAL	Mode	1	0.225686	4.4309	27.84	775.08
MODAL	Mode	2	0.217936	4.5885	28.83	831.19
MODAL	Mode	3	0.185518	5.3903	33.868	1147.1
MODAL	Mode	4	0.072115	13.867	87.128	7591.2
MODAL	Mode	5	0.071585	13.969	87.772	7703.9
MODAL	Mode	6	0.048449	20.64	129.69	16818
MODAL	Mode	7	0.038229	26.158	164.36	27013
MODAL	Mode	8	0.032551	30.721	193.03	37260
MODAL	Mode	9	0.029457	33.948	213.3	45497
MODAL	Mode	10	0.028279	35.362	222.19	49367
MODAL	Mode	11	0.024692	40.499	254.46	64751
MODAL	Mode	12	0.01756	56.948	357.81	128030

Participating Mass Ratios

OutputCase	StepType	StepNum	UX	UY	UZ	SumUX	SumUY	SumUZ
Text	Text	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless
MODAL	Mode	1	0.98344	0.00003115	0.00056	0.98344	0.00003115	0.00056
MODAL	Mode	2	0.00003142	0.98478	0.00001207	0.98347	0.98481	0.00057
MODAL	Mode	3	0.00063	0.00001214	0.99899	0.9841	0.98482	0.99956
MODAL	Mode	4	0.01268	0.00267	0.00012	0.99678	0.9875	0.99968
MODAL	Mode	5	0.00287	0.01147	0.0000477	0.99965	0.99896	0.99973
MODAL	Mode	6	0.000001674	0.00089	1.174E-08	0.99966	0.99985	0.99973
MODAL	Mode	7	0.00031	3.029E-07	0.00000132	0.99997	0.99985	0.99973
MODAL	Mode	8	8.497E-08	0.00008492	1.303E-08	0.99997	0.99994	0.99973
MODAL	Mode	9	0.00003066	1.252E-07	0.000001676	1	0.99994	0.99973
MODAL	Mode	10	1.748E-08	0.00006006	4.223E-10	1	1	0.99973
MODAL	Mode	11	0.000001299	8.826E-09	0.00023	1	1	0.99996
MODAL	Mode	12	1.218E-07	1.15E-09	0.00003479	1	1	1

Source: Attachment I (*BDBGM 130' Median Bound (Modal).xls*)

Table D3. Modal Analysis Results for BDBGM 130' Upper Bound Alluvium

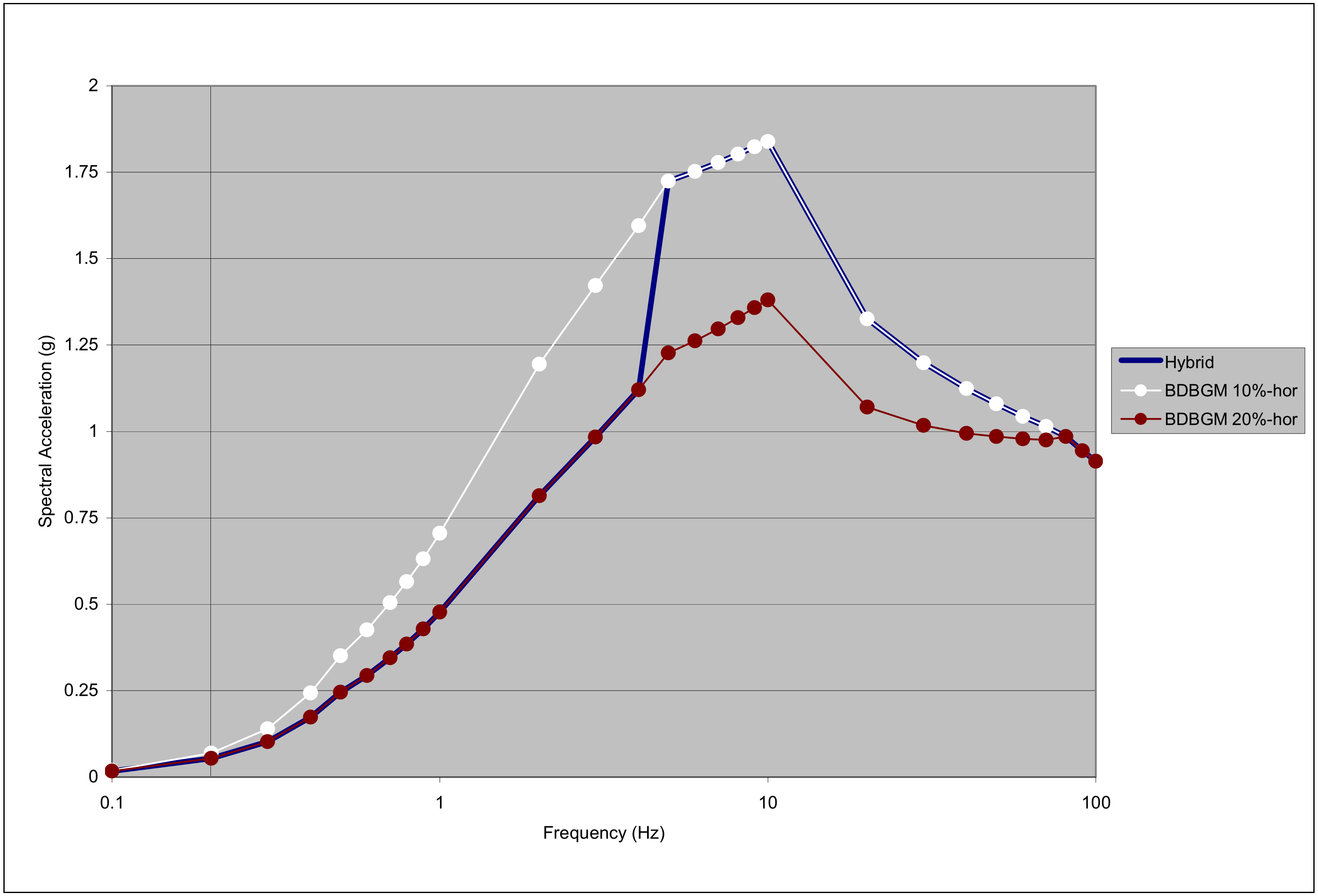
Modal Periods And Frequencies

OutputCase	StepType	StepNum	Period	Frequency	CircFreq	Eigenvalue
Text	Text	Unitless	Sec	Cyc/sec	rad/sec	rad2/sec2
MODAL	Mode	1	0.169006	5.9169	37.177	1382.2
MODAL	Mode	2	0.161948	6.1748	38.798	1505.2
MODAL	Mode	3	0.133709	7.4789	46.992	2208.2
MODAL	Mode	4	0.062832	15.915	100	10000
MODAL	Mode	5	0.062043	16.118	101.27	10256
MODAL	Mode	6	0.047376	21.108	132.62	17589
MODAL	Mode	7	0.038008	26.31	165.31	27328
MODAL	Mode	8	0.031584	31.661	198.93	39574
MODAL	Mode	9	0.029398	34.016	213.73	45679
MODAL	Mode	10	0.027685	36.121	226.95	51507
MODAL	Mode	11	0.023898	41.844	262.91	69124
MODAL	Mode	12	0.01723	58.038	364.66	132980

Modal Participating Mass Ratios

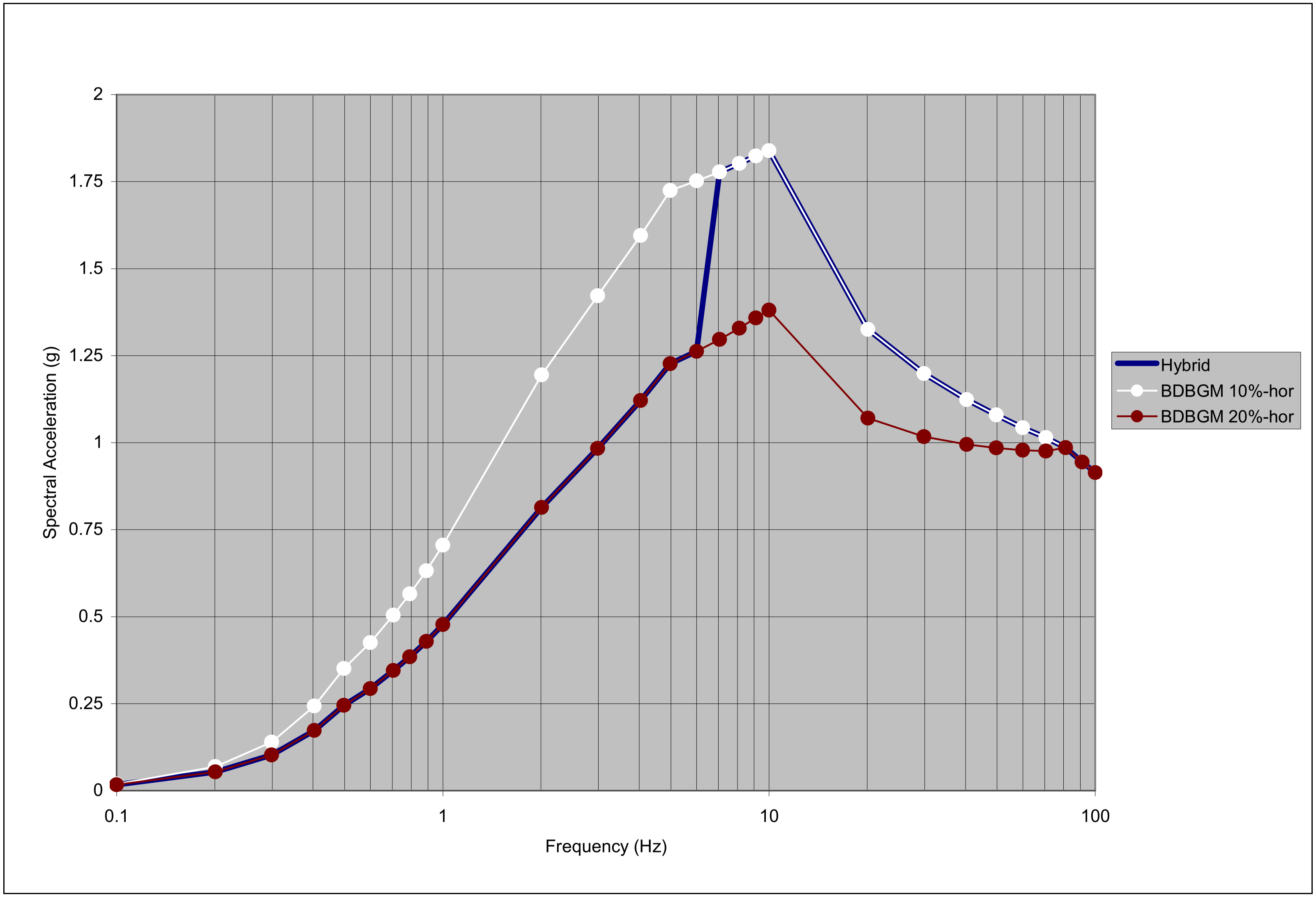
OutputCase	StepType	StepNum	UX	UY	UZ	SumUX	SumUY	SumUZ
Text	Text	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless	Unitless
MODAL	Mode	1	0.96154	0.00006996	0.00041	0.96154	0.00006996	0.00041
MODAL	Mode	2	0.00007337	0.96601	0.00001271	0.96161	0.96608	0.00043
MODAL	Mode	3	0.0005	0.00001329	0.9984	0.96212	0.96609	0.99882
MODAL	Mode	4	0.00399	0.02503	0.000007441	0.96611	0.99112	0.99883
MODAL	Mode	5	0.0325	0.003	0.00018	0.99861	0.99412	0.99901
MODAL	Mode	6	0.000008201	0.00527	9.944E-08	0.99862	0.99939	0.99901
MODAL	Mode	7	0.00126	0.000001211	0.000002159	0.99988	0.99939	0.99901
MODAL	Mode	8	1.421E-07	0.00045	4.385E-08	0.99988	0.99984	0.99901
MODAL	Mode	9	0.00012	2.44E-08	0.00000205	1	0.99984	0.99901
MODAL	Mode	10	8.338E-10	0.00016	4.971E-09	1	1	0.99901
MODAL	Mode	11	0.000001862	1.428E-08	0.00086	1	1	0.99988
MODAL	Mode	12	1.955E-07	1.95E-09	0.00011	1	1	0.99999

Source: Attachment J (*BDBGM 130' Upper Bound (Modal).xls*)



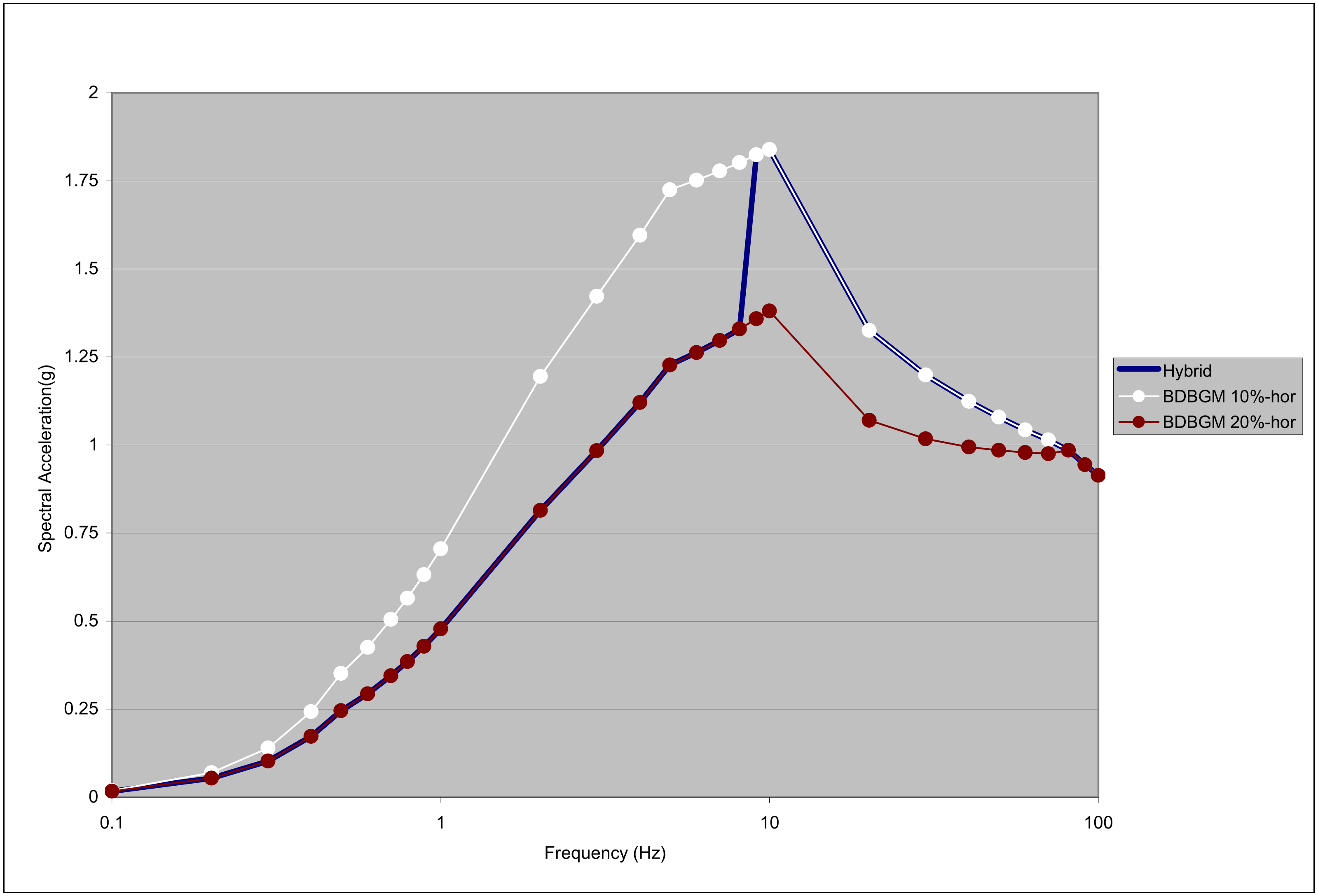
NOTE: "hybrid" spectra generated in Excel file contained in Attachment N (*BDBGM Hybrid Response Spectra.xls – in the BDBGM worksheet*)
Source data for "hybrid" spectra generation is Reference 2.2.10

Figure D1. BDBGM 130' Lower Bound Alluvium 10%, 20%, and Hybrid Horizontal Response Spectra



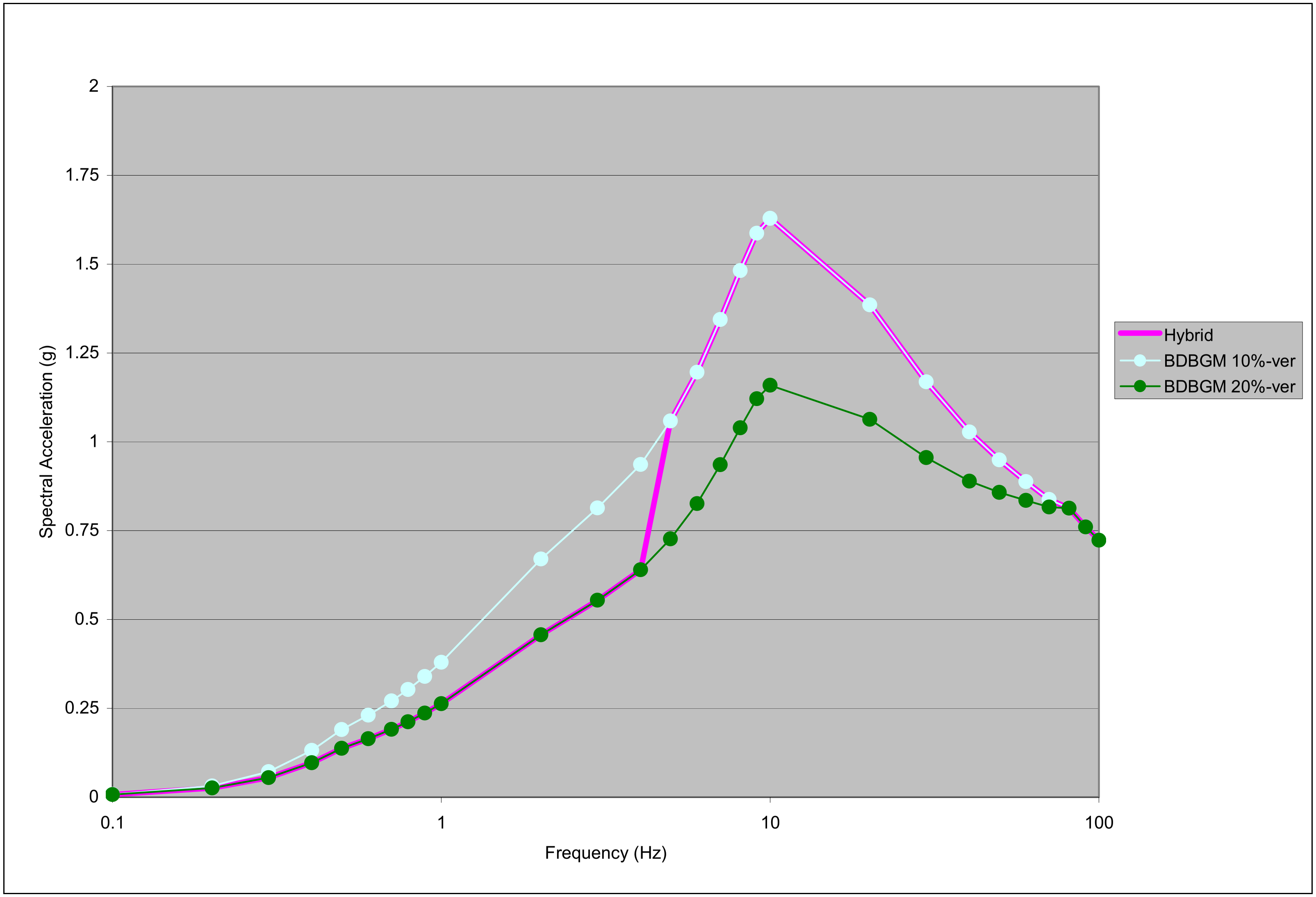
NOTE: “hybrid” spectra generated in Excel file contained in Attachment N (*BDBGM Hybrid Response Spectra.xls – in the BDBGM worksheet*)
Source data for “hybrid” spectra generation is Reference 2.2.10

Figure D2. BDBGM 130’ Median Alluvium 10%, 20%, and Hybrid Horizontal Response Spectra



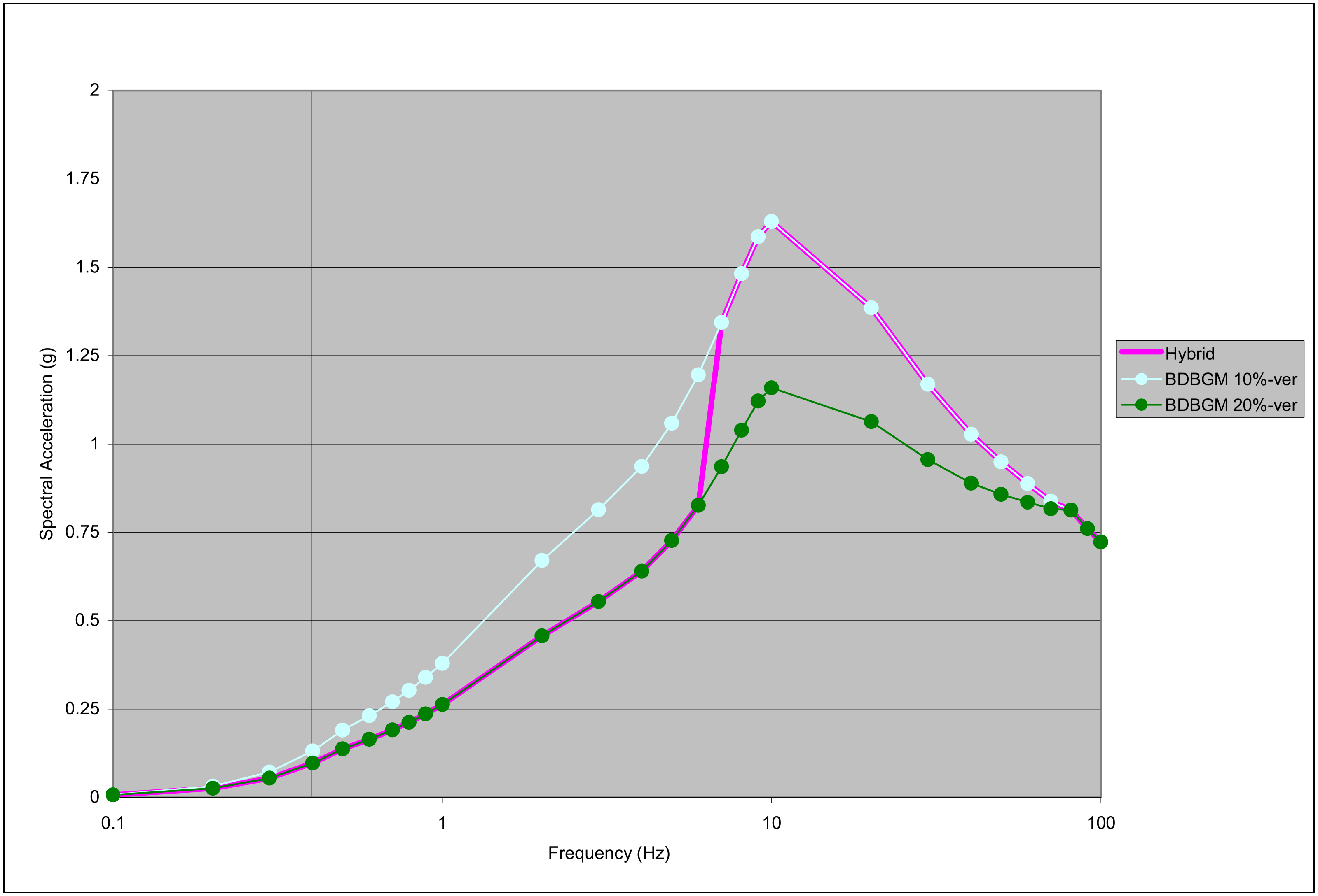
NOTE: “hybrid” spectra generated in Excel file contained in Attachment N (*BDBGM Hybrid Response Spectra.xls – in the BDBGM worksheet*)
Source data for “hybrid” spectra generation is Reference 2.2.10

Figure D3. BDBGM 130’ Upper Bound Alluvium 10%, 20%, and Hybrid Horizontal Response Spectra



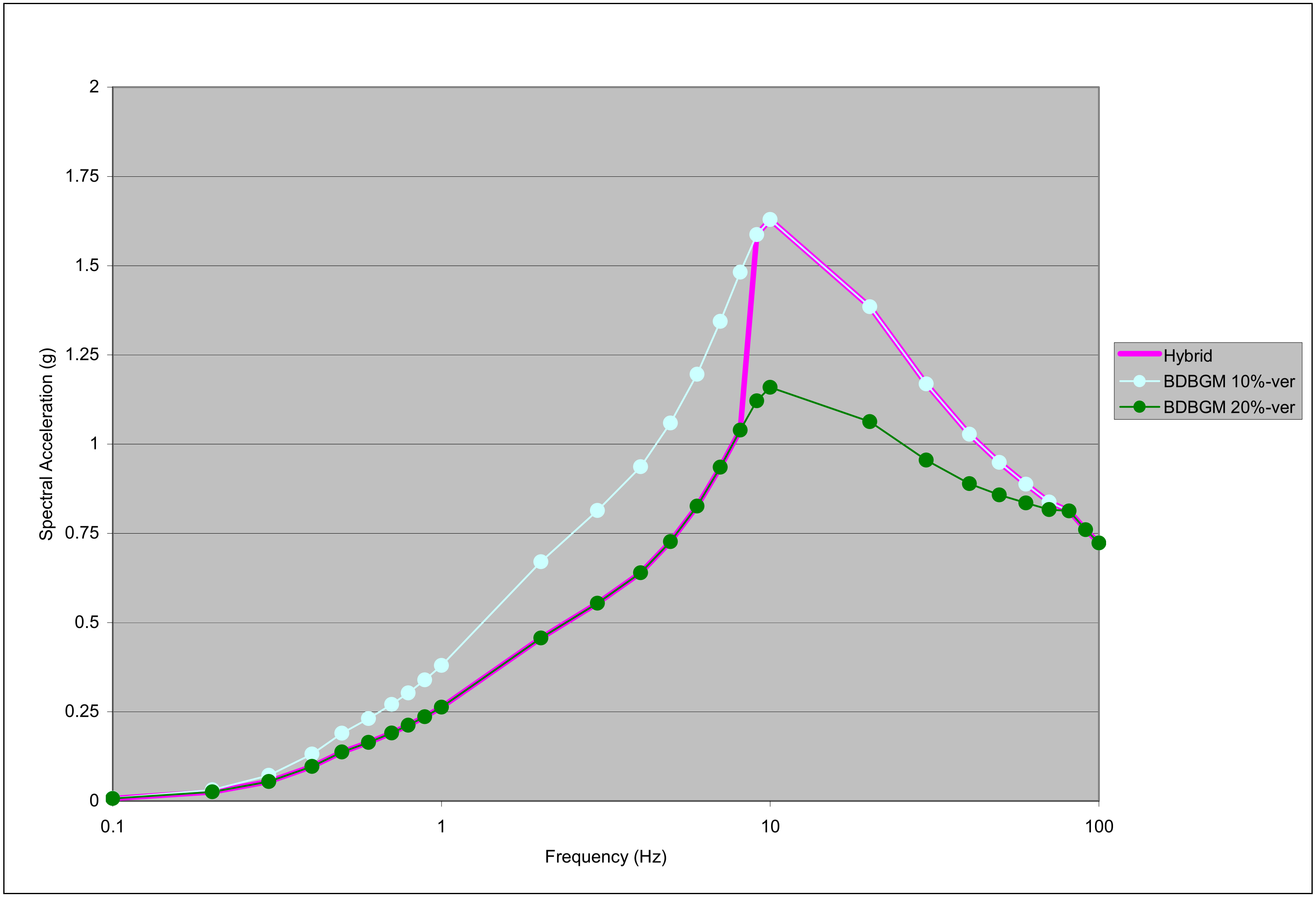
NOTE: “hybrid” spectra generated in Excel file contained in Attachment N (*BDBGM Hybrid Response Spectra.xls – in the BDBGM worksheet*)
Source data for “hybrid” spectra generation is Reference 2.2.10

Figure D4. BDBGM 130’ Lower Bound Alluvium 10%, 20%, and Hybrid Vertical Response Spectra



NOTE: “hybrid” spectra generated in Excel file contained in Attachment N (*BDBGM Hybrid Response Spectra.xls – in the BDBGM worksheet*)
Source data for “hybrid” spectra generation is Reference 2.2.10

Figure D5. BDBGM 130’ Median Alluvium 10%, 20%, and Hybrid Vertical Response Spectra



NOTE: “hybrid” spectra generated in Excel file contained in Attachment N (*BDBGM Hybrid Response Spectra.xls – in the BDBGM worksheet*)
Source data for “hybrid” spectra generation is Reference 2.2.10

Figure D6. BDBGM 130’ Upper Bound Alluvium 10%, 20%, and Hybrid Vertical Response Spectra

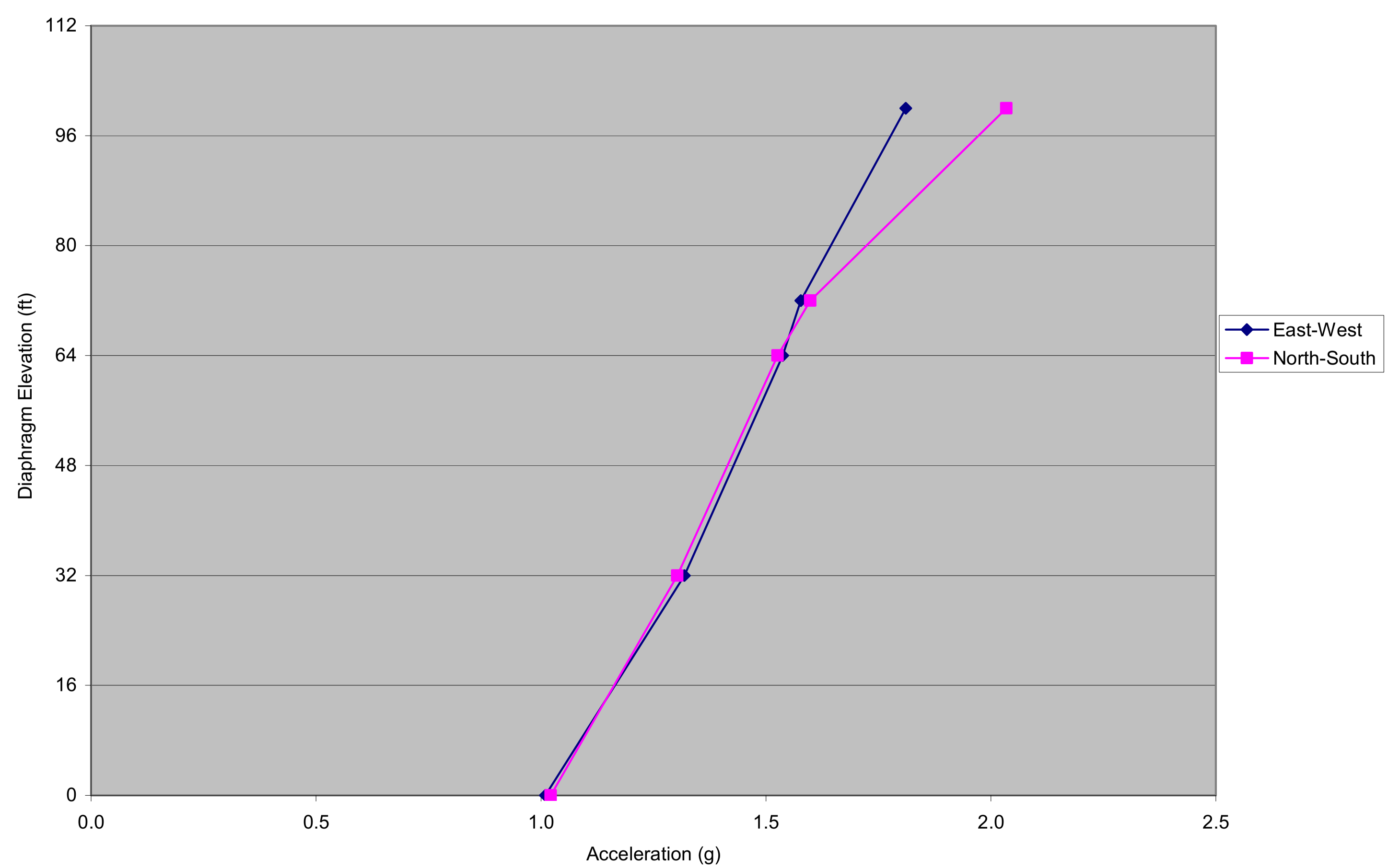
Table D4. Diaphragm Accelerations for BDBGM 130' Upper Bound Alluvium

130' Upper Bound Alluvium Accelerations Resulting From X-Direction Loading							
Diaphragm Elevation (ft)	SAP2000 Joint	East-West X-acceleration		North-South Y-acceleration		Vertical Z-acceleration	
		ft/sec2	g	ft/sec2	g	ft/sec2	g
0	99	32.5149	1.0098	3.6308	0.1128	1.1713	0.0364
32	399	42.4591	1.3186	0.7789	0.0242	1.2851	0.0399
64	599	49.4981	1.5372	2.8779	0.0894	1.7486	0.0543
72	699	50.8020	1.5777	6.9948	0.2172	6.9875	0.2170
100	799	58.3057	1.8107	14.3942	0.4470	5.4047	0.1678

130' Upper Bound Alluvium Accelerations Resulting From Y-Direction Loading							
Diaphragm Elevation (ft)	SAP2000 Joint	East-West X-acceleration		North-South Y-acceleration		Vertical Z-acceleration	
		ft/sec2	g	ft/sec2	g	ft/sec2	g
0	99	3.8604	0.1199	32.9006	1.0218	0.2729	0.0085
32	399	0.5399	0.0168	41.9636	1.3032	0.2133	0.0066
64	599	3.6835	0.1144	49.1441	1.5262	0.3793	0.0118
72	699	4.4039	0.1368	51.4789	1.5987	2.2761	0.0707
100	799	8.0379	0.2496	65.5187	2.0347	1.4990	0.0466

130' Upper Bound Alluvium Accelerations Resulting From Z-Direction Loading							
Diaphragm Elevation (ft)	SAP2000 Joint	East-West X-acceleration		North-South Y-acceleration		Vertical Z-acceleration	
		ft/sec2	g	ft/sec2	g	ft/sec2	g
0	99	1.2160	0.0378	0.2994	0.0093	30.4766	0.9465
32	399	0.9296	0.0289	0.1672	0.0052	31.9929	0.9936
64	599	1.0364	0.0322	0.2454	0.0076	32.7805	1.0180
72	699	1.0894	0.0338	0.5080	0.0158	32.0249	0.9946
100	799	1.6945	0.0526	1.0316	0.0320	33.8794	1.0522

Source: Attachment J (*BDBGM 130' Upper Bound (RSA) Components.xls*) $g = 32.2$ ft/sec^2



NOTE: Acceleration plot generated from data presented in Table D4

Figure D7. BDBGM Horizontal Accelerations (East-West and North-South) for 130’ Upper Bound Alluvium

Table D5. SRSS Diaphragm Accelerations for BDBGM 130’ Upper Bound Alluvium

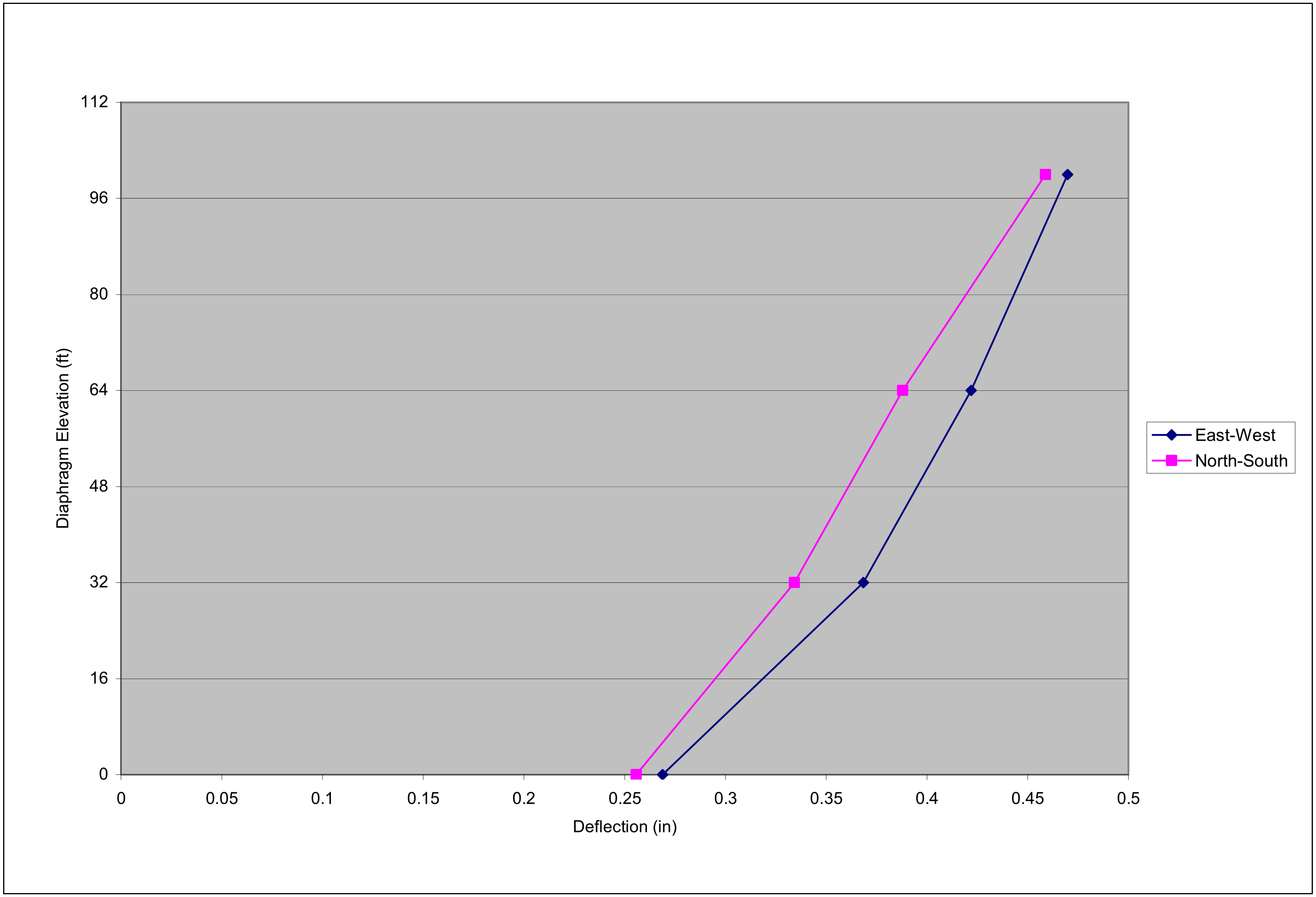
Diaphragm Elevation (ft)	SAP2000 Joint	East-West X-acceleration		North-South Y-acceleration		Vertical Z-acceleration	
		ft/sec^2	g	ft/sec^2	g	ft/sec^2	g
0	99	32.7658	1.0176	33.1017	1.0280	30.5004	0.9472
32	399	42.4727	1.3190	41.9711	1.3035	32.0194	0.9944
64	599	49.6458	1.5418	49.2289	1.5288	32.8293	1.0195
72	699	51.0042	1.5840	51.9545	1.6135	32.8573	1.0204
100	799	58.8815	1.8286	67.0891	2.0835	34.3405	1.0665

Source: Attachment J (*BDBGM 130’ Upper Bound (RSA) SRSS.xls*) g = 32.2 ft/sec^2

Table D6. Story Drifts for BDBGM 130' Upper Bound Alluvium

Diaphragm Elevation	Story Displacement, Δ (inches)	Story Drift (inches)	Story Height	Drift Ratio (story drift / story height)
	East-West (Global X)	East-West (Global X)	(feet)	East-West (Global X)
100'-0" (SAP2000 joint 799)	0.470	100'-0" (Δ799-Δ599)		(Δ799-Δ599)/36/12in/ft
		0.048	36	1.11E-04
64'-0" (SAP2000 joint 599)	0.422	64'-0" (Δ599-Δ399)		(Δ599-Δ399)/32/12in/ft
		0.053	32	1.39E-04
32'-0" (SAP2000 joint 399)	0.368	32'-0" (Δ399-Δ99)		(Δ399-Δ99)/32/12in/ft
		0.100	32	2.60E-04
0'-0" (SAP2000 joint 99)	0.269			
Diaphragm Elevation	Story Displacement, Δ (inches)	Story Drift (inches)	Story Height	Drift Ratio (story drift / story height)
	North-South (Global Y)	North-South (Global Y)	(feet)	North-South (Global Y)
100'-0" (SAP2000 joint 799)	0.459	100'-0" (Δ799-Δ599)		(Δ799-Δ599)/36/12in/ft
		0.071	36	1.64E-04
64'-0" (SAP2000 joint 599)	0.388	64'-0" (Δ599-Δ399)		(Δ599-Δ399)/32/12in/ft
		0.054	32	1.40E-04
32'-0" (SAP2000 joint 399)	0.334	32'-0" (Δ399-Δ99)		(Δ399-Δ99)/32/12in/ft
		0.079	32	2.05E-04
0'-0" (SAP2000 joint 99)	0.256			

Source: Attachment J (*BDBGM 130' Upper Bound (RSA) Components.xls*)



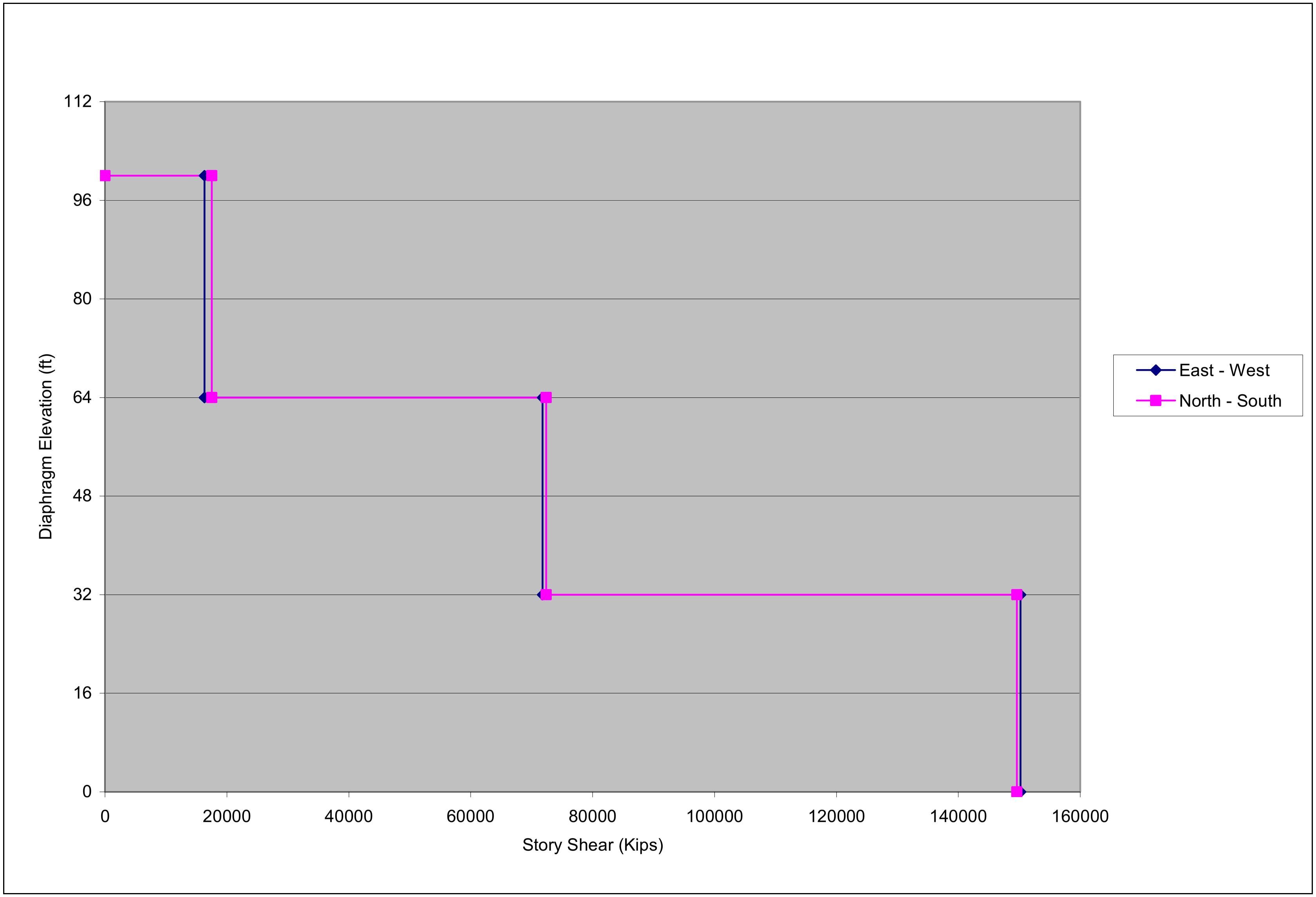
NOTE: Deflection plot generated from data presented in Table D6

Figure D8. Diaphragm Deflections for BDBGM 130’ Upper Bound Alluvium

Table D7. Story Shears for BDBGM Ground Motion

ELEVATION 0'-0"		
Soil Case	North/South (Global Y) kips	East/West (Global X) kips
130' Lower Bound Alluvium	117130	115426
130' Median Alluvium	136463	135083
130' Upper Bound Alluvium	149602	150213
ELEVATION 32'-0"		
Soil Case	North/South (Global Y) kips	East/West (Global X) kips
130' Lower Bound Alluvium	54046	52793
130' Median Alluvium	63960	62718
130' Upper Bound Alluvium	72382	71780
ELEVATION 64'-0"		
Soil Case	North/South (Global Y) kips	East/West (Global X) kips
130' Lower Bound Alluvium	11936	11373
130' Median Alluvium	14527	13682
130' Upper Bound Alluvium	17541	16313

Source: Attachment L (*BDBGM 130' Lower Bound Story Shear.xls*)



NOTE: Story shear plot generated from data presented in Table D7

Figure D9. Story Shears for BDBGM 130' Upper Bound Alluvium