APPENDIX A
Results for Maximum Seismic Forces, Accelerations and Displacements

LIST OF TABLES

Table A-1 RB/FB Maximum Stick Member Forces and Moments (BE)

(a) RB/FB

Element			BE Partial Column Profile					BE Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN) NS	Shear (MN) EW	Bending (MN-m) NS*)	Bending (MN-m) EW*)	Torsion (MN-m)	Shear (MN) NS	Shear (MN) EW	Bending (MN-m) NS*)	Bending (MN-m) EW*)	Torsion (MN-m)
52.40	1110	110	143.6	118.6	2210	1977	1009	172.3	124.5	2335	1784	843
		109			4488	4051				5105	3812	
34.00	1109	109	129.0	88.6	6440	5054	1556	173.2	99.3	7089	4806	1507
		108			6872	5088				7680	5283	
27.00	1108	108	274.9	184.9	7492	5782	2024	373.1	218.6	8396	5965	2432
		107			7608	5954				8689	6668	
22.50	1107	107	302.5	224.7	8707	6423	3210	408.4	245.8	10170	7029	4135
		106			8798	6615				10442	7900	
17.50	1106	106	290.9	278.5	9274	7031	2887	406.5	288.0	11078	8345	3432
		105			9375	7425				11971	8959	
13.57	1105	105	289.1	309.6	9947	7680	3141	415.3	309.2	12427	9322	3632
		104			10386	8108				13651	10176	
9.06	1104	104	306.9	342.7	10778	8255	3445	411.4	331.2	13904	10394	4005
		103			11821	8702				15231	11450	
4.65	1103	103	356.1	329.0	7498	4813	3927	454.7	313.7	9392	5948	4821
		102			8960	5351				10952	7173	
-1.00	1102	102	225.4	215.9	6545	4118	2461	227.5	168.3	6374	4095	2302
		101			7303	4551				6781	4488	
-6.40	1101	101	190.6	189.0	4748	3026	1723	221.8	200.4	4351	2778	1592
-11.50		2			5053	3141				4259	2705	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-1 RB/FB Maximum Stick Member Forces and Moments (BE) (Continued)

(b) RCCV

Element			BE Partial Column Profile					BE Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
			NS	EW	NS*)	EW*)		NS	EW	NS*)	EW*)	
34.00	1209	209	101.5	120.3	182	397	23	128.3	122.8	183	352	23
		208			811	996				991	1072	
27.00	1208	208	105.4	112.6	1748	1817	1030	139.5	137.9	2033	1773	1315
		206			2266	2292				2938	2488	
17.50	1206	206	128.4	139.0	2612	2620	1141	173.0	141.0	3259	2841	1358
		205			2870	2759				3691	3078	
13.57	1205	205	136.7	163.6	3026	3010	1315	189.9	152.7	3817	3284	1521
		204			3354	3257				4389	3599	
9.06	1204	204	153.5	187.8	3545	3570	1514	200.4	167.9	4461	3892	1759
		203			3899	3818				5082	4185	
4.65	1203	203	87.7	112.6	4267	4095	1085	105.0	92.8	5269	4452	1315
		202			4444	4248				5553	4608	
-1.00	1202	202	66.5	62.9	4733	4430	624	67.4	58.7	5767	4781	585
		201			4781	4495				5730	4727	
-6.40	1201	201	61.5	49.1	4940	4583	290	61.2	55.1	5884	4819	267
-11.50		2			4927	4634				5937	4833	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-1 RB/FB Maximum Stick Member Forces and Moments (BE) (Continued)

(c) Pedestal

Element			BE Partial Column Profile					BE Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN) NS	Shear (MN) EW	Bending (MN-m) NS*)	Bending (MN-m) EW*)	Torsion (MN-m)	Shear (MN) NS	Shear (MN) EW	Bending (MN-m) NS*)	Bending (MN-m) EW*)	Torsion (MN-m)
4.65	1303	303	17.4	13.2	439	396	53	18.4	11.5	592	426	65
		377			425	396				575	435	
2.42	1377	377	26.5	20.4	519	484	65	27.7	17.6	702	533	79
		302			484	515				673	544	
-1.00	1302	302	20.9	15.2	465	446	31	21.2	15.7	638	480	29
		376			457	455				610	461	
-2.75	1376	376	21.3	14.8	457	455	31	21.4	15.9	610	461	29
		301			451	481				566	446	
-6.40	1301	301	27.0	19.1	434	472	17	25.8	22.4	540	439	16
-11.50		2			471	512				553	473	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-1 RB/FB Maximum Stick Member Forces and Moments (BE) (Continued)

(d) Vent Wall

Element			BE Partial Column Profile					BE Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
			NS	EW	NS*)	EW*)		NS	EW	NS*)	EW*)	
17.50	701	701	33.0	25.0	57	44	78	43.8	31.3	69	35	92
		702			94	80				121	97	
14.50	702	702	32.5	24.7	96	84	80	43.6	31.5	123	103	94
		703			189	145				242	183	
11.50	703	703	32.8	25.5	190	147	82	43.6	32.3	246	187	95
		704			282	208				367	272	
8.50	704	704	32.9	27.5	282	207	83	43.3	33.6	365	275	95
		705			313	235				407	303	
7.4625	705	705	30.7	26.2	292	257	69	35.4	27.3	380	325	78
4.65		706,303			327	307				454	388	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-1 RB/FB Maximum Stick Member Forces and Moments (BE) (Continued)

(e) RSW

Element			BE Partial Column Profile					BE Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN) NS	Shear (MN) EW	Bending (MN-m) NS*)	Bending (MN-m) EW*)	Torsion (MN-m)	Shear (MN) NS	Shear (MN) EW	Bending (MN-m) NS*)	Bending (MN-m) EW*)	Torsion (MN-m)
24.18	707	707	3.5	2.9	2.1	2.0	0.3	3.7	2.5	2.0	1.5	0.3
		708			15.7	13.5				16.6	11.4	
20.20	708	708	13.3	8.4	21.1	19.1	1.0	16.3	7.7	21.8	15.7	0.9
		709			76.5	48.4				91.9	44.5	
15.775	709	709	15.9	9.8	79.3	51.2	1.4	19.7	9.3	95.4	46.1	1.2
		710			150.0	91.9				181.9	88.7	
11.35	710	710	18.3	10.5	152.7	94.8	1.8	22.7	10.3	184.4	88.6	1.5
		711			223.2	135.1				271.9	129.2	
7.4625	711	711	17.5	15.0	69.7	56.6	16.0	20.2	15.6	84.4	72.0	18.1
		712			93.5	85.0				128.6	107.1	
4.65	712	712	7.3	5.8	97.2	87.4	11.5	8.0	5.0	132.1	94.1	13.9
		713			91.2	86.4				123.9	96.0	
2.4615	713	713	1.3	1.0	3.4	2.3	0.1	1.2	0.8	3.1	2.0	0.1
		714			2.8	2.0				2.6	1.7	
1.96	714	714	0.8	0.6	2.5	1.7	0.1	0.7	0.5	2.3	1.5	0.0
-0.80		715			0.5	0.4				0.5	0.4	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-2 RB/FB Maximum Stick Member Forces and Moments (LB)

(a) RB/FB

Element			LB Partial Column Profile					LB Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
			NS	EW	NS*)	EW*)		NS	EW	NS*)	EW*)	
52.40	1110	110	123.7	90.5	1856	1547	751	151.0	109.2	1814	1337	719
		109			3873	3116				4063	2895	
34.00	1109	109	111.7	84.8	5321	3959	1264	141.7	113.7	5549	3660	1164
		108			5700	3993				6213	4232	
27.00	1108	108	233.6	181.5	6267	4545	1669	287.3	259.4	6831	4801	2062
		107			6478	4760				7640	5694	
22.50	1107	107	265.7	200.6	7371	5095	3012	315.4	288.3	8576	6131	4243
		106			7562	5551				9517	7180	
17.50	1106	106	274.9	211.4	8042	5925	2503	334.7	316.5	10018	7566	3135
		105			8555	6368				10868	8448	
13.57	1105	105	285.3	233.3	8948	6914	2602	358.2	330.9	11401	8697	3314
		104			9686	7252				12431	10031	
9.06	1104	104	298.5	258.6	10018	7428	2851	380.1	343.1	12850	10240	3772
		103			10767	8140				13922	11698	
4.65	1103	103	328.7	259.1	6883	4473	3436	413.9	307.9	8827	6240	4934
		102			7846	5325				10259	7759	
-1.00	1102	102	240.0	203.1	6019	4119	2330	233.8	181.4	6482	4819	2718
		101			6603	4578				6988	5358	
-6.40	1101	101	197.4	185.9	4388	2973	1732	237.7	196.4	4416	3132	2079
-11.50		2			4708	3125				4592	3356	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-2 RB/FB Maximum Stick Member Forces and Moments (LB) (Continued)

(b) RCCV

Element			LB Partial Column Profile					LB Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
			NS	EW	NS*)	EW*)		NS	EW	NS*)	EW*)	
34.00	1209	209	79.7	89.7	147	298	19	103.0	116.1	143	282	17
		208			647	796				795	959	
27.00	1208	208	100.1	103.2	1459	1519	927	105.5	149.9	1632	1555	1245
		206			1992	2074				2389	2609	
17.50	1206	206	115.7	107.6	2375	2336	991	133.9	153.2	2742	2889	1240
		205			2589	2547				3116	3311	
13.57	1205	205	123.5	126.4	2758	2672	1090	152.0	165.4	3260	3469	1387
		204			3031	2931				3739	4108	
9.06	1204	204	138.4	146.0	3192	3090	1252	174.2	173.0	3899	4311	1657
		203			3533	3465				4415	4967	
4.65	1203	203	79.0	86.6	3728	3674	943	93.4	90.4	4557	5157	1347
		202			3844	3907				4825	5530	
-1.00	1202	202	61.3	56.2	3940	4084	591	66.1	54.3	4990	5715	690
		201			4055	4141				5127	5739	
-6.40	1201	201	61.1	47.2	4157	4230	291	70.7	53.7	5245	5817	349
-11.50		2			4280	4238				5369	5818	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-2 RB/FB Maximum Stick Member Forces and Moments (LB) (Continued)

(c) Pedestal

Element			LB Partial Column Profile					LB Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
			NS	EW	NS*)	EW*)		NS	EW	NS*)	EW*)	
4.65	1303	303	11.8	11.2	402	346	46	13.4	10.1	458	496	66
		377			405	349				463	502	
2.42	1377	377	18.5	17.0	497	426	56	20.4	15.2	565	614	81
		302			484	427				578	631	
-1.00	1302	302	18.3	13.3	443	387	30	19.5	15.2	527	571	34
		376			446	379				521	555	
-2.75	1376	376	18.1	13.8	446	379	30	19.8	15.3	521	555	34
		301			449	372				513	524	
-6.40	1301	301	26.2	18.4	419	373	18	29.8	22.1	481	518	21
-11.50		2			464	423				518	514	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-2 RB/FB Maximum Stick Member Forces and Moments (LB) (Continued)

(d) Vent Wall

Element			LB Partial Column Profile					LB Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
			NS	EW	NS*)	EW*)		NS	EW	NS*)	EW*)	
17.50	701	701	27.6	21.8	50	29	66	34.2	28.4	54	19	86
		702			71	75				87	81	
14.50	702	702	27.9	23.3	73	80	67	35.0	30.3	88	86	87
		703			148	137				182	173	
11.50	703	703	27.1	23.9	148	141	68	35.8	32.1	179	176	88
		704			228	206				286	272	
8.50	704	704	27.6	24.0	227	203	68	36.2	32.9	284	274	88
		705			254	229				322	308	
7.4625	705	705	28.6	21.2	265	242	56	30.2	28.8	315	345	73
4.65		706,303			310	286				388	416	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-2 RB/FB Maximum Stick Member Forces and Moments (LB) (Continued)

(e) RSW

Element			LB Partial Column Profile					LB Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN) NS	Shear (MN) EW	Bending (MN-m) NS*)	Bending (MN-m) EW*)	Torsion (MN-m)	Shear (MN) NS	Shear (MN) EW	Bending (MN-m) NS*)	Bending (MN-m) EW*)	Torsion (MN-m)
24.18	707	707	2.2	1.9	1.6	1.4	0.3	2.3	1.7	1.2	1.0	0.1
		708			10.3	9.1				10.4	7.6	
20.20	708	708	9.9	6.2	14.6	12.8	0.9	11.5	5.9	13.8	10.3	0.3
		709			54.5	36.4				64.8	32.7	
15.775	709	709	11.5	7.0	56.3	38.0	1.2	13.7	6.9	66.7	33.9	0.4
		710			106.0	68.6				127.2	64.1	
11.35	710	710	13.4	8.0	108.0	69.6	1.5	15.3	7.4	131.5	65.3	0.6
		711			158.0	98.2				188.6	95.2	
7.4625	711	711	16.3	12.1	63.1	54.4	13.0	17.2	16.4	70.3	75.7	16.9
		712			84.8	78.1				109.6	115.6	
4.65	712	712	5.1	4.9	88.0	75.0	9.9	5.8	4.4	99.4	108.1	14.2
		713			89.6	76.2				101.6	110.8	
2.4615	713	713	1.0	0.8	2.6	1.9	0.1	0.8	0.6	2.3	1.7	0.1
		714			2.1	1.6				1.9	1.4	
1.96	714	714	0.6	0.5	1.9	1.4	0.0	0.5	0.4	1.7	1.2	0.0
-0.80		715			0.3	0.3				0.4	0.3	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-3 RB/FB Maximum Stick Member Forces and Moments (UB)

(a) RB/FB

Element			UB Partial Column Profile					UB Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
			NS	EW	NS*)	EW*)		NS	EW	NS*)	EW*)	
52.40	1110	110	159.9	124.1	2613	2142	1284	192.2	140.0	2724	2083	1126
		109			5115	4288				5838	4488	
34.00	1109	109	143.9	99.9	7053	5457	1786	171.1	113.9	8196	5821	1938
		108			7585	5460				8719	6389	
27.00	1108	108	315.6	211.6	8236	6222	2074	396.0	251.3	9400	7162	2799
		107			8297	6307				9599	7958	
22.50	1107	107	343.1	231.0	9325	6786	3600	436.4	291.8	11216	8328	4678
		106			9359	7348				11424	9227	
17.50	1106	106	333.3	280.1	9977	7836	3154	438.4	343.5	12105	9408	4023
		105			10150	8363				12349	10195	
13.57	1105	105	326.9	317.7	10593	8723	3432	450.7	363.7	12839	10255	4211
		104			10722	9305				13397	11216	
9.06	1104	104	330.9	358.8	11202	9583	3742	454.6	383.4	13803	11338	4694
		103			11441	10090				15047	12506	
4.65	1103	103	372.1	360.1	7542	5653	3762	447.4	346.8	8869	6302	5248
		102			8281	5985				10381	7550	
-1.00	1102	102	229.5	226.6	6008	4721	2279	197.5	156.5	5474	4053	2150
		101			6543	4771				5764	4257	
-6.40	1101	101	172.0	164.7	4390	3351	1516	207.2	153.2	3768	2732	1376
-11.50		2			4422	3253				3572	2543	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-3 RB/FB Maximum Stick Member Forces and Moments (UB) (Continued)

(b) RCCV

Element			UB Partial Column Profile					UB Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN) NS	Shear (MN) EW	Bending (MN-m) NS*)	Bending (MN-m) EW*)	Torsion (MN-m)	Shear (MN) NS	Shear (MN) EW	Bending (MN-m) NS*)	Bending (MN-m) EW*)	Torsion (MN-m)
34.00	1209	209	103.4	124.6	230	510	27	130.9	133.2	221	442	29
		208			884	992				1029	1160	
27.00	1208	208	122.7	125.8	2162	2255	1120	141.1	151.9	2006	2303	1489
		206			2581	2682				2713	3071	
17.50	1206	206	147.2	145.4	2916	3321	1249	184.1	158.4	3119	3667	1591
		205			3153	3415				3456	3904	
13.57	1205	205	158.5	171.8	3273	3713	1437	207.9	173.4	3672	4203	1762
		204			3636	3825				4182	4491	
9.06	1204	204	170.8	201.2	3743	4152	1644	225.4	186.7	4481	4853	2062
		203			4169	4366				5190	5203	
4.65	1203	203	95.7	125.7	4437	4735	1043	109.2	102.3	5523	5470	1439
		202			4586	4833				5740	5824	
-1.00	1202	202	65.6	68.1	4873	5091	579	67.6	56.9	6008	6066	546
		201			4926	5096				5924	6035	
-6.40	1201	201	55.1	46.7	5084	5215	255	65.3	46.4	6053	6141	231
-11.50		2			5077	5218				5961	6127	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-3 RB/FB Maximum Stick Member Forces and Moments (UB) (Continued)

(c) Pedestal

Element			UB Partial Column Profile					UB Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN) NS	Shear (MN) EW	Bending (MN-m) NS*)	Bending (MN-m) EW*)	Torsion (MN-m)	Shear (MN) NS	Shear (MN) EW	Bending (MN-m) NS*)	Bending (MN-m) EW*)	Torsion (MN-m)
4.65	1303	303	20.5	16.9	540	384	51	18.5	13.1	667	486	71
		377			518	370				651	495	
2.42	1377	377	30.9	25.4	631	452	63	28.6	20.2	793	605	86
		302			577	513				754	623	
-1.00	1302	302	20.9	15.0	551	438	29	22.1	15.3	691	567	27
		376			530	446				658	545	
-2.75	1376	376	21.6	14.9	530	446	29	21.8	16.1	658	544	27
		301			491	469				594	505	
-6.40	1301	301	23.9	17.6	474	456	15	27.6	17.9	555	502	14
-11.50		2			492	496				508	512	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-3 RB/FB Maximum Stick Member Forces and Moments (UB) (Continued)

(d) Vent Wall

Element			UB Partial Column Profile					UB Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
			NS	EW	NS*)	EW*)		NS	EW	NS*)	EW*)	
17.50	701	701	38.5	30.9	73	48	87	47.9	32.4	74	56	107
		702			111	94				139	107	
14.50	702	702	38.8	31.0	121	97	88	47.1	32.4	139	113	108
		703			209	175				279	204	
11.50	703	703	39.4	30.0	208	178	90	45.8	35.1	280	207	111
		704			339	254				411	301	
8.50	704	704	39.8	33.5	325	255	90	44.7	36.5	411	302	112
		705			346	280				458	338	
7.4625	705	705	39.1	28.8	362	264	74	36.8	29.4	440	352	92
4.65		706,303			426	325				513	427	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-3 RB/FB Maximum Stick Member Forces and Moments (UB) (Continued)

(e) RSW

Element			UB Partial Column Profile					UB Full Column Profile				
Elevation (m)	No.	Nodes No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
			NS	EW	NS*)	EW*)		NS	EW	NS*)	EW*)	
24.18	707	707	4.2	3.0	2.5	2.2	0.5	4.1	2.4	2.5	1.7	0.5
		708			18.9	13.8				18.7	11.3	
20.20	708	708	16.1	10.4	25.2	19.8	1.6	20.8	8.6	25.8	15.7	1.7
		709			92.4	59.2				113.5	49.3	
15.775	709	709	19.4	11.9	95.5	61.3	2.3	24.4	10.2	116.7	51.2	2.4
		710			181.3	113.9				224.1	94.2	
11.35	710	710	21.8	12.7	184.1	116.1	2.8	27.1	11.1	227.6	95.9	3.0
		711			269.3	165.6				331.9	140.2	
7.4625	711	711	22.4	16.5	81.6	62.7	17.2	21.0	16.8	99.3	77.7	21.4
		712			117.3	92.3				141.3	119.0	
4.65	712	712	8.9	7.4	120.7	84.5	11.0	8.0	5.7	147.6	105.2	15.2
		713			110.3	83.5				139.8	109.0	
2.4615	713	713	1.4	1.1	3.9	2.9	0.1	1.4	1.0	3.4	2.4	0.1
		714			3.2	2.3				2.8	2.0	
1.96	714	714	0.9	0.7	2.8	2.1	0.1	0.8	0.6	2.5	1.8	0.1
-0.80		715			0.7	0.6				0.5	0.4	

Note: *) NS and EW represent moments for bending in NS or EW direction, respectively.

Table A-4 RB/FB Maximum Absolute Accelerations (BE)

(a) RB/FB

Elev. (m)	Node No.	BE Partial Column Profile			BE Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
52.40	110	1.59	1.36	0.97	1.88	1.36	1.25
34.00	109	0.80	0.61	0.81	1.00	0.69	0.98
27.00	108	0.67	0.58	0.68	0.89	0.57	0.83
22.50	107	0.59	0.59	0.60	0.76	0.55	0.75
17.50	106	0.64	0.59	0.55	0.68	0.52	0.62
13.57	105	0.66	0.54	0.50	0.61	0.46	0.56
9.06	104	0.67	0.49	0.46	0.60	0.43	0.54
4.65	103	0.65	0.50	0.48	0.56	0.41	0.49
-1.00	102	0.56	0.45	0.49	0.46	0.37	0.49
-6.40	101	0.44	0.31	0.44	0.39	0.30	0.46
-11.50	2	0.34	0.29	0.35	0.33	0.26	0.42
-15.50	1	0.35	0.29	0.36	0.33	0.26	0.41

Note: The presented values are the maximum accelerations at floor lumped mass locations.

(b) RCCV

Elev. (m)	Node No.	BE Partial Column Profile			BE Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
34.00	209	0.80	0.61	0.81	1.00	0.69	0.97
27.00	208	0.67	0.58	0.75	0.89	0.57	1.00
17.50	206	0.64	0.60	0.60	0.68	0.53	0.76
13.57	205	0.66	0.55	0.58	0.61	0.46	0.70
9.06	204	0.67	0.49	0.53	0.60	0.43	0.62
4.65	203	0.65	0.50	0.48	0.56	0.41	0.54
-1.00	202	0.56	0.44	0.44	0.46	0.36	0.46
-6.40	201	0.44	0.33	0.38	0.39	0.32	0.46

Note: The presented values are the maximum accelerations at floor lumped mass locations.

Table A-4 RB/FB Maximum Absolute Accelerations (BE) (Continued)

(c) Vent Wall and Pedestal

Elev. (m)	Node No.	BE Partial Column Profile			BE Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
17.50	701	0.64	0.61	0.59	0.68	0.53	0.67
14.50	702	0.64	0.55	0.58	0.59	0.48	0.64
11.50	703	0.64	0.49	0.56	0.61	0.44	0.63
8.50	704	0.63	0.45	0.53	0.58	0.41	0.63
7.4625	705	0.62	0.47	0.52	0.58	0.41	0.62
4.65	706, 303	0.65	0.50	0.51	0.56	0.41	0.59
-1.00	302	0.56	0.44	0.44	0.46	0.36	0.48
-6.40	301	0.44	0.33	0.38	0.39	0.32	0.45

Note: The presented values are the maximum accelerations at mass center.

(d) RSW

Elev. (m)	Node No.	BE Partial Column Profile			BE Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
24.18	707	2.98	2.46	0.68	3.15	2.11	0.72
20.20	708	2.35	1.73	0.66	2.52	1.57	0.72
15.775	709	1.63	1.03	0.60	1.73	0.99	0.69
11.35	710	0.88	0.57	0.55	0.97	0.54	0.66
7.4625	711	0.62	0.47	0.52	0.58	0.41	0.62
4.65	712	0.65	0.50	0.51	0.56	0.41	0.59
2.4615	713	0.64	0.49	0.47	0.53	0.39	0.55
1.96	714	0.66	0.50	0.47	0.55	0.40	0.55
-0.80	715	0.76	0.55	0.47	0.66	0.45	0.55

Note: The presented values are the maximum accelerations at mass center.

Table A-4 RB/FB Maximum Absolute Accelerations (BE) (Continued)

(e) RPV Fuel

Elev. (m)	Node No.	BE Partial Column Profile			BE Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
7.8071	848	1.44	0.71	1.29	1.64	0.66	1.37
7.111	849	0.76	0.44	1.28	0.88	0.45	1.36
6.401	850	0.49	0.52	1.25	0.58	0.61	1.33
5.691	851	0.79	0.62	1.21	0.74	0.69	1.29
4.981	852	1.35	1.15	1.16	1.08	0.75	1.22
4.2713	853	2.10	1.61	1.09	1.69	1.15	1.14

Note: The presented values are the maximum accelerations at mass center.

Table A-5 RB/FB Maximum Absolute Accelerations (LB)

(a) RB/FB

Elev. (m)	Node No.	LB Partial Column Profile			LB Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
52.40	110	1.36	1.04	0.83	1.64	1.18	1.00
34.00	109	0.66	0.55	0.70	0.77	0.72	0.83
27.00	108	0.56	0.49	0.57	0.68	0.60	0.68
22.50	107	0.54	0.48	0.52	0.61	0.47	0.65
17.50	106	0.52	0.44	0.48	0.58	0.42	0.53
13.57	105	0.55	0.41	0.47	0.54	0.38	0.52
9.06	104	0.53	0.40	0.43	0.49	0.34	0.52
4.65	103	0.48	0.39	0.41	0.41	0.31	0.45
-1.00	102	0.43	0.32	0.40	0.36	0.29	0.45
-6.40	101	0.35	0.28	0.36	0.30	0.24	0.42
-11.50	2	0.29	0.26	0.31	0.26	0.23	0.37
-15.50	1	0.29	0.25	0.31	0.26	0.23	0.38

Note: The presented values are the maximum accelerations at floor lumped mass locations.

(b) RCCV

Elev. (m)	Node No.	LB Partial Column Profile			LB Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
34.00	209	0.66	0.54	0.70	0.77	0.72	0.83
27.00	208	0.56	0.49	0.66	0.67	0.60	0.80
17.50	206	0.52	0.46	0.52	0.58	0.43	0.61
13.57	205	0.55	0.44	0.49	0.54	0.39	0.56
9.06	204	0.53	0.41	0.46	0.49	0.34	0.54
4.65	203	0.48	0.38	0.42	0.41	0.30	0.52
-1.00	202	0.43	0.32	0.36	0.36	0.28	0.49
-6.40	201	0.35	0.28	0.32	0.30	0.24	0.45

Note: The presented values are the maximum accelerations at floor lumped mass locations.

Table A-5 RB/FB Maximum Absolute Accelerations (LB) (Continued)

(c) Vent Wall and Pedestal

Elev. (m)	Node No.	LB Partial Column Profile			LB Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
17.50	701	0.52	0.46	0.48	0.58	0.43	0.55
14.50	702	0.51	0.46	0.47	0.54	0.39	0.53
11.50	703	0.50	0.46	0.45	0.51	0.36	0.52
8.50	704	0.51	0.42	0.43	0.48	0.35	0.51
7.4625	705	0.52	0.39	0.43	0.47	0.34	0.51
4.65	706, 303	0.48	0.39	0.42	0.41	0.30	0.51
-1.00	302	0.43	0.32	0.37	0.36	0.28	0.49
-6.40	301	0.35	0.28	0.32	0.30	0.24	0.45

Note: The presented values are the maximum accelerations at mass center.

(d) RSW

Elev. (m)	Node No.	LB Partial Column Profile			LB Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
24.18	707	1.89	1.65	0.54	1.95	1.41	0.54
20.20	708	1.43	1.15	0.52	1.53	1.06	0.54
15.775	709	1.03	0.72	0.48	1.05	0.68	0.53
11.35	710	0.62	0.48	0.44	0.60	0.40	0.52
7.4625	711	0.52	0.39	0.43	0.47	0.34	0.51
4.65	712	0.48	0.39	0.42	0.41	0.30	0.51
2.4615	713	0.48	0.37	0.41	0.40	0.30	0.51
1.96	714	0.49	0.38	0.41	0.40	0.31	0.51
-0.80	715	0.57	0.44	0.41	0.47	0.37	0.51

Note: The presented values are the maximum accelerations at mass center.

Table A-5 RB/FB Maximum Absolute Accelerations (LB) (Continued)

(e) RPV Fuel

Elev. (m)	Node No.	LB Partial Column Profile			LB Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
7.8071	848	1.14	0.62	1.00	1.19	0.58	0.87
7.111	849	0.62	0.41	0.99	0.73	0.47	0.86
6.401	850	0.45	0.51	0.97	0.53	0.58	0.85
5.691	851	0.68	0.55	0.94	0.70	0.64	0.84
4.981	852	1.26	0.95	0.89	1.05	0.82	0.82
4.2713	853	2.02	1.39	0.84	1.66	1.19	0.80

Note: The presented values are the maximum accelerations at mass center.

Table A-6 RB/FB Maximum Absolute Accelerations (UB)

(a) RB/FB

Elev. (m)	Node No.	UB Partial Column Profile			UB Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
52.40	110	1.77	1.42	1.28	2.13	1.55	1.56
34.00	109	1.02	0.69	0.94	0.95	0.81	1.20
27.00	108	0.84	0.66	0.78	0.96	0.69	1.02
22.50	107	0.63	0.63	0.77	0.83	0.73	0.92
17.50	106	0.76	0.65	0.68	0.80	0.59	0.80
13.57	105	0.77	0.62	0.64	0.79	0.53	0.72
9.06	104	0.70	0.54	0.55	0.76	0.51	0.62
4.65	103	0.70	0.56	0.54	0.76	0.49	0.56
-1.00	102	0.62	0.51	0.55	0.59	0.41	0.57
-6.40	101	0.50	0.42	0.50	0.47	0.43	0.50
-11.50	2	0.40	0.33	0.40	0.43	0.37	0.47
-15.50	1	0.40	0.33	0.39	0.44	0.37	0.46

Note: The presented values are the maximum accelerations at floor lumped mass locations.

(b) RCCV

Elev. (m)	Node No.	UB Partial Column Profile			UB Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
34.00	209	1.02	0.69	0.96	0.95	0.81	1.20
27.00	208	0.84	0.66	0.86	0.96	0.69	1.12
17.50	206	0.76	0.66	0.69	0.80	0.59	0.91
13.57	205	0.77	0.63	0.66	0.79	0.53	0.82
9.06	204	0.70	0.54	0.59	0.76	0.53	0.72
4.65	203	0.70	0.55	0.56	0.76	0.49	0.65
-1.00	202	0.59	0.52	0.52	0.59	0.40	0.58
-6.40	201	0.50	0.42	0.44	0.47	0.44	0.50

Note: The presented values are the maximum accelerations at floor lumped mass locations.

Table A-6 RB/FB Maximum Absolute Accelerations (UB) (Continued)

(c) Vent Wall and Pedestal

Elev. (m)	Node No.	UB Partial Column Profile			UB Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
17.50	701	0.76	0.66	0.66	0.80	0.60	0.82
14.50	702	0.70	0.61	0.63	0.77	0.54	0.77
11.50	703	0.72	0.55	0.60	0.77	0.49	0.71
8.50	704	0.69	0.53	0.57	0.74	0.49	0.68
7.4625	705	0.68	0.52	0.56	0.75	0.48	0.67
4.65	706, 303	0.70	0.55	0.56	0.76	0.49	0.65
-1.00	302	0.59	0.52	0.52	0.59	0.40	0.59
-6.40	301	0.50	0.42	0.43	0.47	0.44	0.49

Note: The presented values are the maximum accelerations at mass center.

(d) RSW

Elev. (m)	Node No.	UB Partial Column Profile			UB Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
24.18	707	3.45	2.51	0.79	3.61	2.12	1.19
20.20	708	2.66	1.82	0.78	2.81	1.50	1.14
15.775	709	1.75	1.23	0.72	1.77	1.04	0.99
11.35	710	1.01	0.68	0.64	1.00	0.69	0.78
7.4625	711	0.68	0.52	0.56	0.75	0.48	0.67
4.65	712	0.70	0.55	0.56	0.76	0.49	0.65
2.4615	713	0.68	0.55	0.55	0.69	0.45	0.64
1.96	714	0.69	0.57	0.55	0.70	0.46	0.64
-0.80	715	0.83	0.65	0.55	0.79	0.54	0.64

Note: The presented values are the maximum accelerations at mass center.

Table A-6 RB/FB Maximum Absolute Accelerations (UB) (Continued)

(e) RPV Fuel

Elev. (m)	Node No.	UB Partial Column Profile			UB Full Column Profile		
		NS (g)	EW (g)	Vert. (g)	NS (g)	EW (g)	Vert. (g)
7.8071	848	1.67	0.82	1.49	1.91	0.86	1.48
7.111	849	0.85	0.43	1.47	1.00	0.49	1.47
6.401	850	0.52	0.49	1.44	0.62	0.64	1.45
5.691	851	0.85	0.62	1.39	0.79	0.74	1.41
4.981	852	1.61	1.13	1.32	1.42	1.08	1.36
4.2713	853	2.52	1.74	1.23	2.38	1.65	1.31

Note: The presented values are the maximum accelerations at mass center.

Table A-7 RB/FB Maximum Relative Displacement

(a) BE

Location	Nodes No.		BE Partial Column Profile			BE Full Column Profile		
	i	j	NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
Fuel top to fuel center	847	850	0.46	0.39	0.00	0.38	0.33	0.00
Fuel center to fuel bottom	850	853	0.42	0.39	0.01	0.35	0.35	0.00
Core plate to vessel bottom	844	828	0.15	0.08	0.01	0.13	0.08	0.01
Top guide to vessel	838	816	0.29	0.08	0.04	0.24	0.09	0.04
Top guide to vessel bottom	838	828	0.35	0.17	0.03	0.31	0.16	0.02
Fuel center to vessel bottom	850	828	0.53	0.47	0.01	0.44	0.42	0.01
CRD housing to bottom head	868	828	0.20	0.13	0.00	0.25	0.17	0.00
CRD housing to bottom head	867	827	0.20	0.12	0.00	0.24	0.16	0.00
RCCV - RPV	206	807	0.49	0.22	0.04	0.40	0.25	0.04
RCCV - Lower Part in the VW	206	706	0.29	0.25	0.05	0.21	0.24	0.04
RPV - Lower Part in the VW	807	706	0.66	0.38	0.03	0.53	0.38	0.03

(b) LB

Location	Nodes No.		LB Partial Column Profile			LB Full Column Profile		
	i	j	NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
Fuel top to fuel center	847	850	0.37	0.33	0.00	0.33	0.28	0.00
Fuel center to fuel bottom	850	853	0.35	0.37	0.00	0.33	0.30	0.00
Core plate to vessel bottom	844	828	0.14	0.09	0.01	0.13	0.07	0.01
Top guide to vessel	838	816	0.20	0.07	0.03	0.17	0.08	0.03
Top guide to vessel bottom	838	828	0.31	0.19	0.02	0.29	0.16	0.02
Fuel center to vessel bottom	850	828	0.46	0.47	0.01	0.43	0.38	0.01
CRD housing to bottom head	868	828	0.20	0.15	0.00	0.23	0.16	0.00
CRD housing to bottom head	867	827	0.19	0.14	0.00	0.23	0.15	0.00
RCCV - RPV	206	807	0.34	0.17	0.03	0.30	0.19	0.03
RCCV - Lower Part in the VW	206	706	0.26	0.29	0.04	0.21	0.19	0.04
RPV – Lower Part in the VW	807	706	0.53	0.44	0.02	0.43	0.34	0.02

Table A-7 RB/FB Maximum Relative Displacement (Continued)

(c) UB

Location	Nodes No.		UB Partial Column Profile			UB Full Column Profile		
	i	j	NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
Fuel top to fuel center	847	850	0.64	0.42	0.00	0.41	0.34	0.00
Fuel center to fuel bottom	850	853	0.56	0.37	0.01	0.41	0.35	0.01
Core plate to vessel bottom	844	828	0.18	0.10	0.02	0.15	0.08	0.02
Top guide to vessel	838	816	0.38	0.10	0.04	0.29	0.09	0.04
Top guide to vessel bottom	838	828	0.41	0.20	0.03	0.37	0.18	0.03
Fuel center to vessel bottom	850	828	0.68	0.45	0.01	0.52	0.41	0.01
CRD housing to bottom head	868	828	0.28	0.18	0.00	0.28	0.19	0.00
CRD housing to bottom head	867	827	0.27	0.17	0.00	0.28	0.19	0.00
RCCV - RPV	206	807	0.60	0.24	0.04	0.48	0.30	0.04
RCCV - Lower Part in the VW	206	706	0.30	0.27	0.06	0.23	0.23	0.05
RPV - Lower Part in the VW	807	706	0.75	0.43	0.03	0.59	0.44	0.03

Table A-8 RB/FB Maximum Displacement Relative to Free-Field (BE)

(a) RB/FB

Elev. (m)	Node No.	BE Partial Column Profile			BE Full Column Profile		
		NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
52.40	110	0.94	1.09	0.65	1.26	1.46	0.75
34.00	109	0.64	0.72	0.55	0.84	0.86	0.66
27.00	108	0.53	0.64	0.46	0.69	0.72	0.56
22.50	107	0.45	0.56	0.39	0.56	0.59	0.49
17.50	106	0.36	0.45	0.32	0.45	0.45	0.40
13.57	105	0.29	0.38	0.27	0.36	0.36	0.33
9.06	104	0.22	0.29	0.20	0.26	0.26	0.24
4.65	103	0.15	0.19	0.12	0.16	0.16	0.14
-1.00	102	0.09	0.10	0.09	0.09	0.09	0.10
-6.40	101	0.05	0.05	0.07	0.06	0.05	0.08
-11.50	2	0.03	0.03	0.05	0.04	0.03	0.06
-15.50	1	0.02	0.03	0.05	0.03	0.02	0.06

(b) RCCV

Elev. (m)	Node No.	BE Partial Column Profile			BE Full Column Profile		
		NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
34.00	209	0.64	0.71	0.36	0.83	0.84	0.45
27.00	208	0.53	0.63	0.34	0.68	0.70	0.42
17.50	206	0.36	0.44	0.28	0.44	0.44	0.34
13.57	205	0.29	0.37	0.26	0.36	0.35	0.31
9.06	204	0.22	0.28	0.23	0.26	0.25	0.27
4.65	203	0.15	0.19	0.19	0.16	0.17	0.23
-1.00	202	0.09	0.10	0.14	0.09	0.09	0.17
-6.40	201	0.05	0.05	0.09	0.06	0.05	0.11

Table A-8 RB/FB Maximum Displacement Relative to Free-Field (BE) (Continued)

(c) Vent Wall and Pedestal

Elev. (m)	Node No.	BE Partial Column Profile			BE Full Column Profile		
		NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
17.50	701	0.35	0.42	0.18	0.44	0.40	0.24
14.50	702	0.30	0.36	0.17	0.37	0.34	0.23
11.50	703	0.25	0.30	0.17	0.31	0.28	0.22
8.50	704	0.21	0.25	0.16	0.24	0.23	0.21
7.4625	705	0.19	0.23	0.16	0.22	0.21	0.21
4.65	706, 303	0.14	0.17	0.14	0.16	0.16	0.19
-1.00	302	0.09	0.09	0.11	0.09	0.08	0.14
-6.40	301	0.05	0.05	0.06	0.06	0.05	0.09

(d) RSW

Elev. (m)	Node No.	BE Partial Column Profile			BE Full Column Profile		
		NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
24.18	707	0.56	0.49	0.15	0.71	0.51	0.20
20.20	708	0.47	0.42	0.15	0.60	0.44	0.20
15.775	709	0.36	0.34	0.15	0.45	0.35	0.19
11.35	710	0.26	0.28	0.13	0.32	0.27	0.18
7.4625	711	0.19	0.22	0.12	0.22	0.20	0.16
4.65	712	0.14	0.17	0.12	0.16	0.15	0.15
2.4615	713	0.12	0.14	0.11	0.13	0.12	0.14
1.96	714	0.12	0.13	0.11	0.13	0.12	0.14
-0.80	715	0.09	0.10	0.11	0.10	0.09	0.14

Table A-8 RB/FB Maximum Displacement Relative to Free-Field (BE) (Continued)

(e) RPV

Node No.	BE Partial Column Profile			BE Full Column Profile		
	NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
801	0.85	0.64	0.11	1.05	0.65	0.14
806	0.67	0.51	0.18	0.83	0.52	0.22
807	0.66	0.50	0.18	0.80	0.51	0.22
809	0.57	0.45	0.18	0.70	0.46	0.22
810	0.49	0.40	0.17	0.60	0.41	0.21
813	0.34	0.30	0.15	0.42	0.31	0.19
814	0.29	0.28	0.14	0.35	0.27	0.18
815	0.24	0.26	0.13	0.29	0.23	0.17
827	0.24	0.20	0.12	0.24	0.16	0.16
828	0.25	0.20	0.11	0.24	0.16	0.15
831	0.57	0.66	1.03	0.74	0.73	1.19
832	0.47	0.39	0.19	0.59	0.40	0.24
833	0.45	0.38	0.19	0.56	0.38	0.24
834	0.43	0.36	0.18	0.52	0.34	0.24
844	0.28	0.24	0.14	0.31	0.20	0.18
846	0.25	0.21	0.14	0.25	0.18	0.18
847	0.40	0.28	0.14	0.46	0.25	0.17
851	0.44	0.45	0.29	0.48	0.55	0.34
854	0.28	0.24	0.13	0.31	0.20	0.17
867	0.13	0.09	0.48	0.12	0.09	0.40

Table A-9 RB/FB Maximum Displacement Relative to Free-Field (LB)

(a) RB/FB

Elev. (m)	Node No.	LB Partial Column Profile			LB Full Column Profile		
		NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
52.40	110	0.93	1.12	0.57	1.20	1.55	0.69
34.00	109	0.62	0.71	0.50	0.76	1.04	0.63
27.00	108	0.53	0.59	0.43	0.62	0.87	0.56
22.50	107	0.45	0.49	0.37	0.53	0.73	0.50
17.50	106	0.37	0.39	0.32	0.43	0.57	0.41
13.57	105	0.31	0.33	0.27	0.36	0.46	0.35
9.06	104	0.24	0.25	0.21	0.27	0.34	0.31
4.65	103	0.17	0.17	0.14	0.19	0.22	0.18
-1.00	102	0.11	0.11	0.11	0.12	0.13	0.14
-6.40	101	0.07	0.07	0.09	0.08	0.08	0.12
-11.50	2	0.05	0.05	0.07	0.06	0.06	0.10
-15.50	1	0.05	0.04	0.07	0.06	0.05	0.10

(b) RCCV

Elev. (m)	Node No.	LB Partial Column Profile			LB Full Column Profile		
		NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
34.00	209	0.61	0.69	0.35	0.75	1.02	0.43
27.00	208	0.52	0.57	0.33	0.61	0.85	0.40
17.50	206	0.37	0.38	0.27	0.43	0.55	0.34
13.57	205	0.31	0.32	0.24	0.35	0.44	0.31
9.06	204	0.24	0.25	0.22	0.27	0.33	0.28
4.65	203	0.17	0.17	0.18	0.19	0.21	0.24
-1.00	202	0.11	0.10	0.14	0.12	0.12	0.18
-6.40	201	0.07	0.06	0.10	0.08	0.08	0.13

Table A-9 RB/FB Maximum Displacement Relative to Free-Field (LB) (Continued)

(c) Vent Wall and Pedestal

Elev. (m)	Node No.	LB Partial Column Profile			LB Full Column Profile		
		NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
17.50	701	0.36	0.35	0.18	0.42	0.51	0.23
14.50	702	0.32	0.31	0.18	0.36	0.43	0.22
11.50	703	0.27	0.26	0.17	0.30	0.36	0.21
8.50	704	0.22	0.21	0.16	0.25	0.28	0.20
7.4625	705	0.21	0.20	0.16	0.23	0.26	0.20
4.65	706, 303	0.16	0.16	0.15	0.18	0.20	0.18
-1.00	302	0.11	0.10	0.11	0.12	0.12	0.14
-6.40	301	0.07	0.06	0.07	0.08	0.08	0.10

(d) RSW

Elev. (m)	Node No.	LB Partial Column Profile			LB Full Column Profile		
		NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
24.18	707	0.57	0.45	0.15	0.63	0.62	0.18
20.20	708	0.49	0.39	0.15	0.54	0.54	0.18
15.775	709	0.38	0.31	0.15	0.42	0.43	0.17
11.35	710	0.28	0.25	0.14	0.30	0.33	0.16
7.4625	711	0.21	0.19	0.12	0.23	0.25	0.16
4.65	712	0.16	0.15	0.12	0.18	0.19	0.15
2.4615	713	0.14	0.13	0.11	0.16	0.16	0.14
1.96	714	0.14	0.13	0.11	0.15	0.15	0.14
-0.80	715	0.12	0.10	0.11	0.12	0.12	0.14

Table A-9 RB/FB Maximum Displacement Relative to Free-Field (LB) (Continued)

(e) RPV

Node No.	LB Partial Column Profile			LB Full Column Profile		
	NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
801	0.77	0.59	0.11	0.88	0.78	0.14
806	0.60	0.48	0.16	0.69	0.64	0.20
807	0.59	0.47	0.16	0.68	0.62	0.20
809	0.51	0.42	0.16	0.60	0.55	0.19
810	0.44	0.38	0.16	0.52	0.49	0.19
813	0.32	0.29	0.15	0.38	0.37	0.18
814	0.28	0.25	0.14	0.32	0.32	0.17
815	0.25	0.22	0.13	0.27	0.28	0.16
827	0.26	0.19	0.12	0.26	0.19	0.15
828	0.26	0.18	0.11	0.26	0.18	0.14
831	0.60	0.75	1.15	0.76	0.79	2.09
832	0.45	0.38	0.16	0.51	0.48	0.19
833	0.44	0.37	0.16	0.50	0.47	0.19
834	0.43	0.35	0.16	0.47	0.43	0.19
844	0.29	0.21	0.15	0.29	0.23	0.18
846	0.27	0.20	0.14	0.27	0.21	0.17
847	0.34	0.26	0.13	0.39	0.29	0.16
851	0.43	0.47	0.30	0.48	0.57	0.32
854	0.29	0.21	0.13	0.29	0.22	0.16
867	0.13	0.11	0.45	0.14	0.13	0.39

Table A-10 RB/FB Maximum Displacement Relative to Free-Field (UB)

(a) RB/FB

Elev. (m)	Node No.	UB Partial Column Profile			UB Full Column Profile		
		NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
52.40	110	0.93	1.21	0.68	1.20	1.57	0.80
34.00	109	0.64	0.72	0.57	0.83	0.90	0.69
27.00	108	0.53	0.62	0.48	0.70	0.74	0.58
22.50	107	0.43	0.54	0.41	0.57	0.61	0.49
17.50	106	0.34	0.44	0.33	0.44	0.46	0.41
13.57	105	0.28	0.37	0.27	0.34	0.37	0.33
9.06	104	0.21	0.28	0.20	0.23	0.26	0.23
4.65	103	0.13	0.18	0.11	0.13	0.15	0.12
-1.00	102	0.07	0.09	0.08	0.06	0.07	0.08
-6.40	101	0.03	0.04	0.05	0.03	0.03	0.05
-11.50	2	0.02	0.02	0.03	0.02	0.02	0.04
-15.50	1	0.01	0.02	0.03	0.02	0.01	0.04

(b) RCCV

Elev. (m)	Node No.	UB Partial Column Profile			UB Full Column Profile		
		NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
34.00	209	0.64	0.70	0.37	0.83	0.88	0.43
27.00	208	0.53	0.61	0.35	0.69	0.72	0.40
17.50	206	0.34	0.43	0.28	0.43	0.45	0.32
13.57	205	0.28	0.36	0.26	0.34	0.36	0.30
9.06	204	0.21	0.27	0.23	0.23	0.25	0.26
4.65	203	0.13	0.18	0.19	0.13	0.15	0.22
-1.00	202	0.07	0.09	0.14	0.06	0.07	0.16
-6.40	201	0.03	0.04	0.08	0.03	0.03	0.09

Table A-10 RB/FB Maximum Displacement Relative to Free-Field (UB) (Continued)

(c) Vent Wall and Pedestal

Elev. (m)	Node No.	UB Partial Column Profile			UB Full Column Profile		
		NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
17.50	701	0.34	0.41	0.19	0.42	0.41	0.24
14.50	702	0.29	0.35	0.18	0.35	0.35	0.23
11.50	703	0.24	0.29	0.18	0.28	0.28	0.22
8.50	704	0.19	0.24	0.17	0.21	0.22	0.21
7.4625	705	0.17	0.22	0.17	0.19	0.20	0.20
4.65	706, 303	0.13	0.16	0.15	0.13	0.14	0.18
-1.00	302	0.07	0.08	0.11	0.06	0.06	0.13
-6.40	301	0.03	0.04	0.06	0.03	0.03	0.07

(d) RSW

Elev. (m)	Node No.	UB Partial Column Profile			UB Full Column Profile		
		NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
24.18	707	0.62	0.46	0.17	0.82	0.55	0.21
20.20	708	0.51	0.39	0.17	0.67	0.46	0.20
15.775	709	0.37	0.32	0.16	0.47	0.36	0.20
11.35	710	0.24	0.26	0.14	0.29	0.27	0.18
7.4625	711	0.17	0.21	0.13	0.18	0.19	0.16
4.65	712	0.13	0.16	0.12	0.13	0.14	0.15
2.4615	713	0.10	0.13	0.11	0.10	0.11	0.14
1.96	714	0.10	0.12	0.11	0.09	0.10	0.14
-0.80	715	0.08	0.09	0.11	0.07	0.07	0.14

Table A-10 RB/FB Maximum Displacement Relative to Free-Field (UB) (Continued)

(e) RPV

Node No.	UB Partial Column Profile			UB Full Column Profile		
	NS (cm)	EW (cm)	Vert. (cm)	NS (cm)	EW (cm)	Vert. (cm)
801	0.93	0.68	0.11	1.21	0.73	0.14
806	0.71	0.51	0.19	0.91	0.58	0.24
807	0.69	0.50	0.19	0.88	0.57	0.23
809	0.60	0.43	0.18	0.74	0.50	0.23
810	0.51	0.36	0.17	0.62	0.44	0.22
813	0.36	0.29	0.16	0.42	0.31	0.20
814	0.29	0.27	0.15	0.33	0.26	0.18
815	0.24	0.25	0.14	0.26	0.22	0.17
827	0.29	0.21	0.13	0.26	0.19	0.16
828	0.29	0.22	0.11	0.27	0.19	0.15
831	0.61	0.63	0.87	0.76	0.70	1.12
832	0.50	0.36	0.21	0.61	0.43	0.28
833	0.48	0.35	0.21	0.59	0.41	0.28
834	0.46	0.33	0.21	0.56	0.37	0.27
844	0.31	0.24	0.15	0.34	0.19	0.19
846	0.29	0.22	0.15	0.28	0.18	0.18
847	0.42	0.28	0.15	0.48	0.26	0.18
851	0.41	0.41	0.35	0.45	0.56	0.39
854	0.31	0.24	0.13	0.34	0.19	0.17
867	0.12	0.11	0.56	0.11	0.11	0.58

APPENDIX B
Evaluation of Structural Stiffness Variation Effects

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B.1 SCOPE

This appendix presents the site-specific sensitivity evaluations of the effects of structural stiffness variation on the SSI response of the NA3 RB/FB. The evaluation is based on the comparisons of the results obtained from the structures with:

- Site-specific SSI analyses of models with upper bound stiffness properties and OBE damping (analyses Cases 1 to 6 in Table 4.2-1) that are presented in Sections 5.0 and 6.0
- Site-specific sensitivity SSI analyses of models with reduced stiffness properties and SSE damping (analyses Cases S1 to S12 in Table 4.2-1) that are presented in Sections B.3 and B.4 of this appendix

The evaluation considers the effects of concrete cracking on the response of the reinforced concrete members and the out-of-plane vibrations of the flexible slabs and walls. The effects of the in-fill concrete stiffness on the stiffness of the concrete-filled VW and D/F steel structures are also considered following an approach that is consistent with the approach used for the standard design in Reference 2-k by performing sensitivity SSI analysis on separate models representing 0% and 50% in-fill concrete stiffness contributions to the stiffness of these concrete-filled steel structures.

B.2 ANALYSES

The site-specific evaluations of structural stiffness variations on the response of the RB/FB are based on the results of the sensitivity seismic response analyses of the following two models:

CR00 Model with SSE damping representing:

- Fully cracked reinforced concrete structures with 50% reduced shear and bending stiffness
- No (0%) in-fill concrete contribution to the stiffness of the concrete-filled VW and D/F steel structures

CR50 Model with SSE damping representing:

- Fully cracked reinforced concrete structures with 50% reduced shear and bending stiffness
- 50% in-fill concrete contribution to the stiffness of the concrete-filled VW and D/F steel structures

SSE damping values are assigned to the concrete and steel structural members in the CR00 and CR50 models in conjunction with the reduced (cracked concrete) stiffness properties to represent the higher dissipation of energy in the RB/FB structures when subjected to high stresses corresponding to the fully cracked concrete condition. SSE damping is also assigned to the RPV LMSM to represent the higher dissipation of energy in the RPV and its internals when subjected to high stresses corresponding to the fully cracked concrete

condition. Table 4.1-1 provides the SSE damping values assigned to the different structural members and equipment.

In order to address the effects of different embedment configurations and subgrade property variations on the response of the RB/FB structures with reduced stiffness, the analyses of the CR00 and CR50 models are performed for all of the six subgrade (LB, BE, and UB partial and full column) profiles described in Section 3.1. Table B.2-1 presents a list of frequencies used for each one of the twelve sensitivity analysis cases (Cases S1 to S12 in Table 4.2-1) performed for the evaluation of the structural stiffness variations effects.

In accordance with ASCE 43-05 (Reference 2-w), the effects of concrete cracking on the shear and flexural stiffness of the reinforced concrete walls are captured by reducing the section properties for the shear areas, torsional moment of inertia, and flexural moments of inertia of the stick elements by 50%. In order to simulate the full (100%) axial stiffness of the cracked walls, as recommended by ASCE 43-05 (Reference 2-w), the axial areas of the stick members are the same as the areas of the stick members in the RB/FB model with upper bound stiffness properties (Section 4.3). The overall stiffness of the shell elements modeling the below grade exterior walls and basemat are reduced by 50%, resulting in reduced shear, flexural, and axial stiffness of these walls. Since the contribution of the exterior walls to the axial stiffness of the below grade portion of the RB/FB is small, this deviation from the ASCE 43-05 (Reference 2-w) recommendations has negligible effect on the vertical response of the RB/FB reinforced concrete structures under fully cracked conditions.

The cracking of the concrete reduces the flexural stiffness of the walls and slabs thus lowering their natural frequencies of out-of-plane vibrations. ASCE 43-05 (Reference 2-w) recommends a 50% reduction of the flexural stiffness of the slabs and walls under fully cracked conditions resulting in the reduction of the natural frequencies of the out-of-plane vibrations of the slabs and walls by $\sqrt{2}$. The SDOF oscillators in the UC100 model described in Section 4.1 are adequate to capture the out-of-plane modes of vibration of the slabs and walls up to 50 Hz under full (uncracked) stiffness conditions. Therefore, besides applying the 50% reduction to the stiffness of all existing SDOF oscillators in the UC100 model, additional SDOF oscillators are added to the CR00 and CR50 models to capture the modes of out-of-plane vibrations of the cracked slabs and walls with frequencies ranging from 35 Hz $(\frac{50}{\sqrt{2}})$ to 50 Hz. Figure B.2-1 depicts the configuration of the CR00 and CR50 LMSMs with the additional SDOF oscillators shown in red.

The development of these additional SDOF oscillators representing the out-of-plane vibrations of the flexible slabs and walls under fully cracked conditions is presented in Reference 2-aa. The properties of the additional oscillators are developed based on the results of the eigenvalue analyses following the same methodology as the one used in the standard design for the development of oscillators for the out-of-plane vibrations of slabs and walls under uncracked concrete conditions. The floor lumped mass inertia properties are adjusted to account for the mass of the additional oscillators as described in Reference 2-aa.

The other characteristics of the CR00 and CR50 models, such as the locations of interaction nodes in the HOUSE module input file, wave types and location of input control motion in

the SITE module input file, and the point radius value in the POINT module input file, are the same as the ones used for the UC100 model presented in Section 4.1.

B.3 RESULTS FROM SENSITIVITY SSI ANALYSES OF CR00 AND CR50 MODELS

This section presents the results of the site-specific sensitivity analyses of the RB/FB CR00 and CR50 models for acceleration transfer functions, outcrop motion transfer functions, maximum accelerations, and maximum displacements. The plots of the interpolated and calculated acceleration transfer functions demonstrate the numerical accuracy of results obtained from the SSI analyses of the RB/FB CR00 and CR50 models. The comparisons of the outcrop transfer functions obtained from the analyses of the CR00 and CR50 models, with those obtained from the analysis of the UC100 model, illustrate how the variations of structural stiffness, embedment configuration, and subgrade properties affect the seismic response of the RB/FB structures. The results of the SSI analysis of the CR00 and CR50 models for maximum acceleration are also presented to show the effect of variations of embedment configuration and subgrade properties on the seismic response of the RB/FB models with reduced stiffness properties.

Figures B.3-1 through B.3-36 present plots of the amplitudes of the acceleration transfer functions obtained from the analysis of the CR00 and CR50 models for the six subgrade profiles. The plots present the responses of the RB/FB at the same key locations as the ones listed in Section 5.1. Each figure includes three plots presenting the RB/FB responses in the three orthogonal directions due to the three earthquake components. The computed values of the transfer functions in these plots are depicted with dots. The interpolated values of the transfer functions are depicted by solid lines. The plots generally have no numerical anomalies in the interpolated transfer functions (e.g., sharp narrow spikes) that can potentially impact the accuracy of the frequency domain SSI analyses results. It was determined in Reference 2-cc, by using additional frequencies of analysis, that the isolated apparent anomaly in a few of the transfer function interpolations does not affect the accuracy of the corresponding responses.

Figures B.3-37 through B.3-48 present the transfer functions of the responses at the top elevations of the RB/FB, RCCV, VW, and RSW LMSMs relative to the outcrop design motion. The outcrop motion transfer functions represent the responses of the RB/FB structures in the direction of the applied input ground motion. The outcrop motion transfer functions obtained from the sensitivity analyses of the CR00 and CR50 models are compared with the corresponding outcrop transfer functions in Section 5.1 that are obtained from the analyses of the UC100 model with upper bound stiffness properties. In order to illustrate how the peak frequency shifts affect the responses of the RB/FB structures, the plots in Figures B.3-37 through B.3-48 also include the spectra defining the partial and full column design ground motion for the SSI analyses of the RB/FB.

The comparisons of the outcrop motion transfer functions obtained from the sensitivity analyses of the CR00 and CR50 models for different subgrade profiles confirm that the different embedment configurations and the variations of subgrade properties have a very small effect on the RB/FB response at the NA3 site. The sharp peaks in some of the outcrop

function plots obtained from the analyses of the CR00 and CR50 RB/FB models are due to the anomaly of the SASSI transfer function interpolation. These transfer function interpolation anomalies do not affect the accuracy of the calculated responses.

The comparison of the outcrop motion transfer functions obtained from the analyses of the CR00 and CR50 models with those obtained from the UC100 model clearly illustrate how the reduced stiffness shifts the response of the RB/FB structures to lower frequencies where the energy of the site-specific input ground motion is lower. Since the concrete cracking does not affect the vertical stiffness of the reinforced concrete structures, the frequency shifts in the vertical responses are small. The outcrop transfer function results show differences between the results of the CR00 and CR50 models for the responses of steel structures only.

Figures B.3-49 through B.3-58 present comparisons of the results for maximum absolute accelerations at the RB/FB floor mass locations from the analyses of the RB/FB CR00 and CR50 models for each soil profile. The results of the sensitivity analyses for maximum acceleration are consistent with the outcrop motion transfer function results and the maximum acceleration results from the analyses of the UC100 upper bound model presented in Section 5.2. The comparisons in Figures B.3-49 through B.3-58 indicate that the analyses of the UB full column profiles also govern the maximum responses of the RB/FB structures with reduced stiffness and SSE damping.

Tables B.3-1 and B.3-2 present the results of the sensitivity SSI analyses of the CR00 and CR50 models for maximum accelerations of the SDOF oscillators representing the out-of-plane vibration of the cracked slabs and walls, respectively. The additional oscillators that are added to the CR00 and CR50 models are marked in red. These tables also show the enveloping maximum accelerations of the SDOF oscillators obtained from the SSI analyses of the UC100 model with upper bound stiffness. The comparison of the maximum accelerations of the SDOF oscillators show that, with a few exceptions, the oscillators representing the out-of-plane vibration of the RB/FB slabs and walls under full (uncracked concrete) stiffness condition yield higher maximum accelerations than the corresponding oscillators for cracked slabs and walls.

Table B.3-3 presents the results of the sensitivity analyses of the CR00 and CR50 models for the maximum displacements of the RB/FB floor masses relative to the free-field motion. The maximum displacements of the CR00 and CR50 models with reduced stiffness are compared with the enveloping maximum displacements in Section 5.5 obtained from the analysis of the UC100 model and the corresponding standard design maximum displacements. Tables B.3-4 and B.3-5 present the results of the sensitivity analyses of the CR00 and CR50 models for the maximum displacements of the SDOF oscillators representing the maximum out-of-plane displacements of the RB/FB slabs and walls under cracked concrete conditions.

The comparisons presented in Tables B.3-3 through B.3-5 show that the models with reduced stiffness provide maximum horizontal displacements at higher floor elevations that exceed those calculated from the UC100 model with UB stiffness. The comparisons also show that the displacements of the RB/FB structures with reduced stiffness still remain bounded by the standard design values.

B.4 EVALUATION OF STRUCTURAL STIFFNESS VARIATION EFFECTS

Section 6.0 presents the site-specific enveloping responses that form the basis for site-specific design and evaluation of the NA3 RB/FB. These enveloping responses are obtained as envelopes of the results from the SSI analyses of the UC100 model with upper bound stiffness properties and OBE damping representing dynamic properties of uncracked, reinforced concrete structures and 100% in-fill concrete contribution to the stiffness of concrete-filled VW and D/F steel structures. The OBE damping values assigned to the UC100 model reflect the lower dissipation of energy in the structures experiencing lower stress levels associated with the uncracked concrete condition. The enveloping responses in Section 6.0 are compared with the responses obtained from the sensitivity SSI analyses of the CR00 and CR50 models to evaluate the effects of structural stiffness variation on the site-specific design of the RB/FB.

B.4.1 Effect of Stiffness Variation on Site-Specific Structural Load Demands

Tables B.4-1 through B.4-10 present the envelope of the maximum accelerations at floor lumped mass locations obtained from the sensitivity SSI analyses of the CR00 and CR50 models for the LB, BE, and UB subgrade properties. The maximum accelerations obtained from the partially embedded and fully embedded CR00 and CR50 models are compared with the corresponding enveloping accelerations presented in Section 6.1. Tables B.4-11 through B.4-20 provide comparisons of the seismic shear forces, bending moments, and torsions obtained from the sensitivity analyses of the partially embedded and fully embedded CR00 and CR50 models with the corresponding enveloping forces and moments obtained from the analyses of the UC100 model in Section 6.1. Tables B.4-21 and B.4-22 present the vertical and horizontal out-of-plane load demands on the cracked flexible slabs and walls, respectively.

Figures B.4-1 through B.4-5 show the comparisons of the site-specific shear and torsion load demands on the RB/FB structures with reduced stiffness to the corresponding site-specific enveloping load demands from Section 6.1 and the horizontal loads used for the standard design of the RB/FB structures. The comparison of the site-specific vertical load demands on the RB/FB structures with reduced stiffness to the corresponding site-specific enveloping load demands and standard design loads are presented in Figures B.4-6 through B.4-9. The comparisons show that the enveloping site-specific load demands obtained from the SSI analysis of the UC100 model with upper bound stiffness bound the effects of stiffness variation with the exception of loads on the RSW steel structure and pedestal and the vertical loads on the VW. The seismic loads used for standard design of the RB/FB envelope almost all of these small exceedances of localized stiffness variation effects that are mainly due to the redistribution of loads from the softer cracked reinforced concrete structures to the steel internal structures.

Tables B.4-21 and B.4-22, respectively, present the results of the sensitivity analyses of the CR00 and CR50 models for the amplitudes of site-specific out-of-plane loads on the RB/FB flexible walls and slabs. Appendix D presents the methodology used for the calculation of the out-of-plane loads on flexible slabs and walls under cracked concrete conditions. In Tables

B.4-21 and B.4-22, the out-of-plane loads on cracked walls and slabs are compared with the enveloping out-of-plane loads presented in Section 6.1 and the standard design out-of-plane loads that are calculated considering full (uncracked concrete) stiffness of the RB/FB slabs and walls. The comparisons show that the models representing uncracked slabs and walls provide site-specific out-of-plane loads that bound effects of concrete cracking. The only exceptions are some of the RB/FB slabs at elevation -6.4 m and the D/F slab for which the sensitivity analyses of CR00 and CR50 models yielded out-of-plane loads with higher magnitude.

The results from the analyses of the CR00, CR50 and UC100 models for the seismic horizontal forces and overturning moments on the top of the basemat as well as the vertical accelerations are compared to evaluate the effects of the structural stiffness variations on the RB/FB stability and dynamic bearing pressures. The seismic demands that govern the stability evaluations and the calculations of the dynamic bearing pressures are proportional to the sum of the corresponding forces and moments that the three LMSMs representing the RB/FB structures (see Figure B.2-1) transfer to the basemat. The difference of the shear force demands at the below grade level illustrates the concrete stiffness effect on the lateral seismic pressures on the exterior walls.

Figures B.4-1 through B.4-9 show that:

- The reduction of the concrete stiffness results in a 20% to 40% reduction in the horizontal shear force demands and a 50% reduction in the overturning moment demands on the top of the RB/FB basemat (elevation -11.5 m).
- The vertical accelerations obtained from the cracked cases (CR00 and CR50) are bounded by the ones obtained from uncracked cases (UC100) by a large magnitude for the RB/FB and RCCV sticks at above-grade elevations, and only slightly exceed the UC100 envelope at below-grade elevations (Figure B.4-6 and B.4-7). For the VW and Pedestal and RSW, as shown in Figures B.4-8 and B.4-9, the accelerations obtained from the cracked cases slightly exceed the accelerations obtained from the uncracked cases. Considering that the RB/FB and the RCCV represent a majority of the total weight/mass, it is reasonably expected that the uncracked cases will provide a bounding vertical seismic demand.
- The licensing basis analyses of the UC100 model with upper bound stiffness properties provide bounding horizontal shear force demands at the below grade level.

The seismic driving forces used for the evaluation of the RB/FB stability are proportional to the shear force, vertical force and bending moment demands on the top of the RB/FB basemat. The dynamic bearing pressure demands are proportional to the overturning moment and vertical seismic force demands. The lateral seismic loads on the below grade walls are proportional to the seismic shear demands along the embedment depth. Therefore, it can be concluded, based on the observations above, that the licensing basis analyses of the UC100 model provide seismic demands, for the RB/FB foundation stability and dynamic bearing pressure evaluations and the calculations of the lateral dynamic pressures on the embedded exterior walls, that bound the effects of structural stiffness variation.

B.4.2 Effect of Stiffness Variation on ISRS

Following the procedure described in Section 5.4, 5% damped ISRS are developed from the results of the sensitivity SSI analyses of the CR00 and CR50 models with reduced stiffness and SSE damping values. Figures B.4-10 through B.4-22 present the envelope of the ISRS results obtained from the analyses of the CR00 and CR50 models for partial and full column profiles for the responses of the RB/FB at the same selected locations as the ones presented in Section 5.1. These spectra are compared with the 5% damped site-specific design ISRS presented in Section 6.3 and the corresponding standard design spectra.

The comparisons show that the ±15% broadened and valley filled ISRS obtained from the site-specific SSI analysis of the UC100 model with upper bound stiffness and OBE damping values envelope the structural stiffness variation effects with exception of:

- The peaks in the ISRS for the horizontal response of the RSW and RPV that exceed the site-specific design spectra at the 10 Hz to 15 Hz frequency range but are enveloped by the standard design ISRS
- The peaks in the vertical ISRS of the RB/FB basemat and RSW at frequencies higher than 50 Hz
- The peaks in the RPV vertical ISRS that exceed the site-specific design spectra at the 20 Hz to 30 Hz frequency range
- The peaks in the RB/FB basemat horizontal ISRS that exceed the site-specific design spectra above 30 Hz but are enveloped by the standard design ISRS
- The peaks in the Vent Wall vertical ISRS that exceed the site-specific design spectra above 25 Hz but are enveloped by the standard design ISRS

Per DC/COL ISG-01 (Reference 2-u), the ISRS used for the design and qualification of equipment and components must include responses for frequencies up to 50 Hz. The peak exceedances in vertical ISRS obtained from the analysis of the CR00 and CR50 models are at frequencies higher than the ones deemed important for the design. Therefore, these exceedances are not important for the site-specific design of equipment and components, and can be neglected.

Figures B.4-16 through B.4-21 present the envelope of the ISRS results obtained from the analyses of the CR00 and CR50 models for partial and full column profiles for the SDOF oscillators representing the out-of-plane responses of the flexible slabs at floor elevations of -1.0 m and 17.5 m. Figure B.4-22 shows the ISRS for out-of-plane responses of the FB flexible walls located at column line (CL) F3 between elevations 4.5 m and 17.5 m. SDOF ISRS are presented for locations within the RB/FB that, based on the maximum acceleration results presented in Tables B.3-1 and B.3-2, were identified as the most affected by the stiffness variation effects.

In Figures B.4-16 through B.4-22, the slabs and walls are grouped in regions based on their dynamic properties (i.e. the SDOF oscillators that represent their out-of-plane vibrations). Figures 3.4.1-2 and 3.4.1-6 in Reference 2-aa depict the slab grouping at floor elevations

-1.0 m and 17.5 m, respectively, and provide the list of SDOF oscillators that represent the out-of-plane vibrations of each region of the flexible slabs. The SDOF oscillators that represent the out-of-plane vibrations of different walls at CL F3 are presented in Figure 3.4.1-11 of Reference 2-aa.

Figures B.4-16 through B.4-22 compare the 5% damped ISRS representing out-of-plane responses of the cracked slabs and walls with the ±15% broadened ISRS that define the seismic loads for site-specific and standard design of equipment and components supported by the selected regions of the slabs and walls. These design ISRS are the envelope of the design ISRS of all SDOF oscillators associated with the particular region of slabs or walls.

The comparisons in Figures B.4-16 through B.4-22 show that the ISRS obtained from the site-specific SSI analysis of the RB/FB UC100 model with upper bound stiffness properties and OBE damping values, in general, envelop the effects of concrete cracking on the out-of-plane response of slabs and walls. The figures show that the ISRS obtained from the additional oscillators added to the CR00 and CR50 models (marked in red in the figures) are all enveloped by the ISRS obtained from the model with uncracked properties. The figures indicate that shifts of the ISRS peaks to lower frequencies can sometimes lead to resonance effects that can amplify the response of the cracked slab or wall and result in ISRS that exceed both the site-specific and standard design ISRS.

B.5 CONCLUSIONS

The results of the NA3 site-specific evaluation presented in this appendix show that the site-specific SSI analyses of the model with upper bound stiffness and OBE damping values provide site-specific seismic demands on the RB/FB structures that envelope structural stiffness variation effects with a few exceedances that are small and have a local effect. The site-specific evaluation of the RB/FB structures will address the effects of stiffness variation by using amplified input seismic loads that bound the exceedances of:

- the horizontal and vertical seismic loads on the RSW, VW, pedestal structures, and
- the out-of-plane vertical loads on the RB/FB slabs.

In Reference 2-n, the site-specific enveloping load demands on these structural members, presented in Section 6.1, are amplified by enveloping them with the results of the sensitivity SSI analyses of the reduced stiffness CR00 and CR50 models presented in Section B.4.1.

The site-specific evaluation presented in this appendix also shows that the licensing basis analyses of the UC100 model provide seismic demands, for the RB/FB foundation stability and dynamic bearing pressure evaluations and the calculations of the lateral dynamic pressures on the embedded exterior walls, that bound the effects of structural stiffness variation.

The site-specific SSI analyses of the RB/FB model with upper bound structural stiffness properties and OBE damping values provide site-specific design ISRS that in general envelope the effects of structural stiffness variation on design and qualification of equipment and components. The exceptions are the small sharp peak exceedances noted in Section B.4.2

and the exceedances observed in some of the SDOF oscillator ISRS. In order to address these exceedances, the NA3 site-specific design and qualification of equipment and components use the enhanced ISRS presented in Reference 2-n that bound the effects of structural stiffness variation.

The site-specific design ISRS are enhanced if any of the sensitivity analyses of the CR00 and CR50 models with reduced stiffness properties yield 5% damped ARS that exceed the corresponding broadened ISRS by more than 10% at frequencies below and equal to 50 Hz.

The vertical ISRS used for site-specific design and qualification of equipment and components supported by flexible slabs will be developed as follows:

a. The site-specific design ISRS in Section 6.3 for out-of-plane slab response are grouped and enveloped based on the SDOF oscillator slab region grouping provided in Reference 2-aa.
b. The ±15% broadened design ISRS developed in step a. is compared to the envelope of the ISRS representing the out-of-plane responses of the slab under fully cracked conditions.
c. If the comparisons in step b. show that the cracked slab ISRS exceed the design ISRS at frequencies below 50 Hz by more than 10%, the design ISRS are adjusted to bound the exceedances.

The 10% exceedance criterion that is used for the enhancement of the site-specific ISRS is reasonable considering the conservatisms introduced in these evaluations of stiffness variation effects. Due to the impracticality of performing an analysis that accurately considers the variations of concrete stiffness as a function of the member stresses, a conservative approach is used to address the effects of concrete stiffness variations. The conditions considered in the sensitivity analyses where the stiffness of all concrete elements throughout their length is reduced by at least 50% is conservative because during a SSE event, many concrete elements will not crack and, for most cracked elements, cracking will be limited to the vicinity of the highly stressed portions of the element length. ISG-01 (Reference 2-u) requires the design ISRS to accurately represent the response of the structures up to 50 Hz. Therefore, exceedances occurring at frequencies higher than 50 Hz are not addressed because they are not important for the design and the evaluations of components and equipment.

Table B.2-1 List of Frequencies of Analyses

Freq. (Hz)											
Partial Column						Full Column					
Freq. No.	BE	Freq. No.	UB	Freq. No.	LB	Freq. No.	BE	Freq. No.	UB	Freq. No.	LB
1	0.0244	1	0.0244	1	0.0244	1	0.0244	1	0.0244	1	0.0244
41	1.0010	41	1.0010	41	1.0010	41	1.0010	41	1.0010	41	1.0010
82	2.0020	82	2.0020	82	2.0020	82	2.0020	82	2.0020	82	2.0020
102	2.4902	102	2.4902	102	2.4902	102	2.4902	102	2.4902	102	2.4902
123	3.0029	123	3.0029	123	3.0029	123	3.0029	123	3.0029	123	3.0029
143	3.4912	143	3.4912	143	3.4912	143	3.4912	143	3.4912	143	3.4912
164	4.0039	164	4.0039	164	4.0039	164	4.0039	164	4.0039	164	4.0039
184	4.4922	184	4.4922	184	4.4922	184	4.4922	184	4.4922	184	4.4922
205	5.0049	205	5.0049	205	5.0049	205	5.0049	205	5.0049	205	5.0049
225	5.4932	225	5.4932	225	5.4932	225	5.4932	225	5.4932	225	5.4932
246	6.0059	246	6.0059	246	6.0059	246	6.0059	246	6.0059	246	6.0059
266	6.4941	266	6.4941	266	6.4941	266	6.4941	266	6.4941	266	6.4941
287	7.0068	287	7.0068	287	7.0068	287	7.0068	287	7.0068	287	7.0068
307	7.4951	307	7.4951	307	7.4951	307	7.4951	307	7.4951	307	7.4951
328	8.0078	328	8.0078	328	8.0078	328	8.0078	328	8.0078	328	8.0078
348	8.4961	348	8.4961	348	8.4961	348	8.4961	348	8.4961	348	8.4961
369	9.0088	369	9.0088	369	9.0088	369	9.0088	369	9.0088	369	9.0088
389	9.4971	389	9.4971	389	9.4971	389	9.4971	389	9.4971	389	9.4971
410	10.0098	410	10.0098	410	10.0098	410	10.0098	410	10.0098	410	10.0098
430	10.4980	430	10.4980	430	10.4980	430	10.4980	430	10.4980	430	10.4980
451	11.0107	451	11.0107	451	11.0107	451	11.0107	451	11.0107	451	11.0107
471	11.4990	471	11.4990	471	11.4990	471	11.4990	471	11.4990	471	11.4990
492	12.0117	492	12.0117	492	12.0117	492	12.0117	492	12.0117	492	12.0117
512	12.5000	512	12.5000	512	12.5000	512	12.5000	512	12.5000	512	12.5000
532	12.9883	532	12.9883	532	12.9883	532	12.9883	532	12.9883	532	12.9883
573	13.9893	573	13.9893	573	13.9893	573	13.9893	573	13.9893	573	13.9893
614	14.9902	614	14.9902	614	14.9902	614	14.9902	614	14.9902	614	14.9902
655	15.9912	655	15.9912	655	15.9912	655	15.9912	655	15.9912	655	15.9912
696	16.9922	696	16.9922	696	16.9922	696	16.9922	696	16.9922	696	16.9922
737	17.9932	737	17.9932	737	17.9932	717	17.5049	737	17.9932	737	17.9932
778	18.9941	778	18.9941	778	18.9941	737	17.9932	778	18.9941	778	18.9941
819	19.9951	819	19.9951	819	19.9951	778	18.9941	799	19.5068	819	19.9951
860	20.9961	860	20.9961	860	20.9961	819	19.9951	819	19.9951	860	20.9961
901	21.9971	901	21.9971	901	21.9971	860	20.9961	840	20.5078	901	21.9971
942	22.9980	942	22.9980	942	22.9980	901	21.9971	860	20.9961	942	22.9980
983	23.9990	983	23.9990	983	23.9990	942	22.9980	901	21.9971	983	23.9990
1024	25.0000	1024	25.0000	1024	25.0000	983	23.9990	942	22.9980	1024	25.0000
1065	26.0010	1065	26.0010	1065	26.0010	1004	24.5117	983	23.9990	1065	26.0010
1106	27.0020	1106	27.0020	1106	27.0020	1024	25.0000	1024	25.0000	1106	27.0020
1147	28.0029	1147	28.0029	1147	28.0029	1065	26.0010	1065	26.0010	1147	28.0029
1188	29.0039	1188	29.0039	1188	29.0039	1106	27.0020	1106	27.0020	1188	29.0039
1229	30.0049	1229	30.0049	1229	30.0049	1147	28.0029	1147	28.0029	1229	30.0049
1270	31.0059	1270	31.0059	1270	31.0059	1188	29.0039	1188	29.0039	1270	31.0059
1311	32.0068	1311	32.0068	1311	32.0068	1229	30.0049	1229	30.0049	1311	32.0068
1352	33.0078	1352	33.0078	1352	33.0078	1270	31.0059	1270	31.0059	1352	33.0078
1393	34.0088	1393	34.0088	1393	34.0088	1311	32.0068	1311	32.0068		
1434	35.0098	1434	35.0098	1434	35.0098	1352	33.0078	1352	33.0078		
1475	36.0107	1475	36.0107	1475	36.0107	1393	34.0088	1393	34.0088		
1516	37.0117	1516	37.0117	1516	37.0117	1413	34.4971	1434	35.0098		
1557	38.0127	1557	38.0127	1557	38.0127	1423	34.7412	1475	36.0107		
1598	39.0137	1598	39.0137	1598	39.0137	1434	35.0098	1516	37.0117		
1639	40.0146	1639	40.0146	1639	40.0146	1444	35.2539	1557	38.0127		
1680	41.0156	1680	41.0156	1680	41.0156	1454	35.4980	1598	39.0137		
1721	42.0166	1721	42.0166	1721	42.0166	1475	36.0107	1618	39.5020		
1762	43.0176	1762	43.0176	1762	43.0176	1495	36.4990	1639	40.0146		
1803	44.0186	1803	44.0186	1803	44.0186	1505	36.7432	1659	40.5029		
1844	45.0195	1844	45.0195	1844	45.0195	1516	37.0117	1680	41.0156		

Table B.2-1 List of Frequencies of Analysis (Continued)

Freq. (Hz)											
Partial Column						Full Column					
Freq. No.	BE	Freq. No.	UB	Freq. No.	LB	Freq. No.	BE	Freq. No.	UB	Freq. No.	LB
1885	46.0205	1885	46.0205	1885	46.0205	1536	37.5000	1721	42.0166		
1926	47.0215	1926	47.0215	1926	47.0215	1557	38.0127	1762	43.0176		
1966	47.9980	1966	47.9980	1966	47.9980	1577	38.5010	1803	44.0186		
2007	48.9990	2007	48.9990	2007	48.9990	1598	39.0137	1823	44.5068		
2048	50.0000	2048	50.0000	2048	50.0000	1618	39.5020	1844	45.0195		
2089	51.0010	2089	51.0010	2089	51.0010	1628	39.7461	1885	46.0205		
2130	52.0020	2130	52.0020	2130	52.0020	1639	40.0146	1926	47.0215		
2171	53.0029	2171	53.0029	2171	53.0029	1659	40.5029	1966	47.9980		
2212	54.0039	2212	54.0039	2212	54.0039	1680	41.0156	2007	48.9990		
2233	54.5166	2233	54.5166	2233	54.5166	1700	41.5039	2048	50.0000		
2253	55.0049	2253	55.0049	2253	55.0049	1721	42.0166	2089	51.0010		
2294	56.0059	2294	56.0059	2294	56.0059	1762	43.0176	2116	52.0020		
2335	57.0068	2335	57.0068	2335	57.0068	1803	44.0186	2117	53.0029		
2376	58.0078	2376	58.0078	2376	58.0078	1844	45.0195	2118	53.4912		
2417	59.0088	2417	59.0088	2417	59.0088	1885	46.0205	2119	54.0039		
2458	60.0098	2458	60.0098	2458	60.0098	1926	47.0215	2120	54.4922		
2499	61.0107	2499	61.0107	2499	61.0107	1966	47.9980	2121	55.0049		
2540	62.0117	2540	62.0117	2540	62.0117	2007	48.9990	2122	55.4932		
2581	63.0127	2581	63.0127			2048	50.0000	2123	56.0059		
2622	64.0137	2622	64.0137					2124	57.0068		
2663	65.0146	2663	65.0146					2125	57.4951		
2703	65.9912	2703	65.9912					2126	58.0078		
2744	66.9922	2744	66.9922					2127	59.0088		
2785	67.9932	2785	67.9932					2128	60.0098		
2826	68.9941	2826	68.9941					2129	61.0107		
2867	69.9951	2867	69.9951					2130	62.0117		
								2131	63.0127		
								2132	64.0137		
								2133	65.0146		
								2134	65.9912		
								2135	66.9921		
								2136	67.9932		
								2137	68.9941		
								2138	69.9951		

Table B.3-1 Maximum Accelerations of Cracked Slabs SDOF Oscillators

SDOF Oscillator		Vertical Acceleration (g)												
		CR00 Model						CR50 Model						NA3 Env.
Elev. (m)	Node No.	Full Column			Partial Column			Full Column			Partial Column			
		LB	BE	UB	LB	BE	UB	LB	BE	UB	LB	BE	UB	
52.4	9101	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.16	0.16	0.17	0.17	0.16	0.33
	9102	0.52	0.52	0.53	0.37	0.38	0.38	0.52	0.52	0.52	0.37	0.38	0.38	1.33
	9103	2.50	2.43	2.25	1.53	1.56	1.51	2.46	2.35	2.18	1.54	1.55	1.50	6.27
	9104	1.82	2.29	2.57	1.48	1.79	2.01	1.79	2.22	2.46	1.47	1.76	1.93	2.62
	9105	1.41	1.58	1.62	1.24	1.38	1.44	1.39	1.67	1.83	1.21	1.32	1.39	2.42
	9106	1.31	1.38	1.42	1.21	1.29	1.33	1.38	1.43	1.39	1.27	1.36	1.34	3.74
	9107	1.23	1.34	1.34	1.07	1.24	1.25	1.25	1.35	1.48	1.11	1.27	1.26	3.22
	9108	1.31	1.40	1.62	1.09	1.27	1.61	1.33	1.39	1.71	1.12	1.29	1.62	2.50
	9109	0.99	1.22	1.47	1.02	1.34	1.53	1.00	1.26	1.52	1.08	1.36	1.52	-
34.0	9091	1.00	1.01	1.12	0.79	0.84	0.96	1.01	1.08	1.17	0.81	0.89	1.02	1.61
	9092	0.94	0.97	1.07	0.78	0.83	0.88	0.96	0.96	1.10	0.80	0.83	0.88	1.61
	9093	0.85	0.91	1.09	0.78	0.92	0.96	0.85	0.92	1.12	0.79	0.93	0.95	-
27.0	9081	1.18	1.35	1.49	0.99	1.09	1.13	1.16	1.48	1.64	0.97	1.12	1.24	1.60
	9082	0.91	0.96	1.05	0.75	0.83	0.86	0.91	1.02	1.15	0.76	0.81	0.87	1.52
	9083	0.89	0.96	0.98	0.73	0.80	0.85	0.90	0.93	1.05	0.74	0.80	0.83	1.30
	9084	0.90	0.94	1.00	0.70	0.76	0.86	0.91	0.94	1.12	0.71	0.77	0.87	1.67
	9085	0.87	0.93	1.01	0.72	0.79	0.87	0.87	0.94	1.16	0.72	0.77	0.86	1.46
	9086	0.79	0.91	1.01	0.68	0.75	0.77	0.79	0.92	1.12	0.66	0.73	0.86	-
	9087	0.76	0.84	0.92	0.68	0.73	0.77	0.76	0.84	1.03	0.68	0.73	0.76	-
22.5	9071	0.46	0.46	0.47	0.33	0.34	0.34	0.46	0.46	0.46	0.33	0.34	0.34	1.15
	9072	0.81	0.78	0.76	0.46	0.44	0.43	0.81	0.78	0.75	0.46	0.44	0.42	1.79
	9073	2.31	2.37	2.21	1.40	1.47	1.46	2.35	2.41	2.26	1.43	1.49	1.47	4.47
	9074	1.17	1.39	1.52	0.97	1.16	1.27	1.22	1.43	1.67	0.99	1.20	1.32	1.53
	9075	0.99	1.08	1.17	0.85	0.95	0.98	0.97	1.10	1.25	0.86	0.93	1.00	1.51
	9076	0.73	1.16	1.54	0.79	0.84	1.31	0.74	1.17	1.65	0.78	0.86	1.37	-
17.5	9061	2.23	2.23	2.06	1.30	1.34	1.31	2.25	2.25	2.07	1.33	1.35	1.32	3.65
	9062	0.75	0.89	0.95	0.69	0.78	0.82	0.81	0.89	0.98	0.72	0.82	0.84	2.62
	9063	0.88	0.96	1.06	0.71	0.77	0.82	0.89	1.05	1.17	0.72	0.77	0.84	1.13
	9064	1.60	2.15	2.56	1.13	1.47	1.75	0.90	1.10	1.23	0.74	0.81	0.87	1.53
	9065	0.81	0.96	1.19	0.73	0.83	1.07	0.81	0.97	1.22	0.71	0.83	1.10	1.28
	99064	0.58	0.80	0.99	0.59	0.73	0.82	0.54	0.64	0.79	0.47	0.57	0.57	-
	9066	0.60	0.92	1.04	0.61	0.69	0.98	0.61	0.94	1.09	0.62	0.75	1.04	-
	9067	0.57	0.75	0.83	0.56	0.68	0.77	0.58	0.78	0.91	0.57	0.70	0.84	-

Note: Node numbers of oscillators added to the CR00 and CR50 models are shown in red.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.3-1 Maximum Accelerations of Cracked Slabs SDOF Oscillators (Continue)

SDOF Oscillator		Vertical Acceleration (g)												
		CR00 Model						CR50 Model						NA3 Env.
Elev. (m)	Node No.	Full Column			Partial Column			Full Column			Partial Column			
		LB	BE	UB	LB	BE	UB	LB	BE	UB	LB	BE	UB	
13.6	9051	0.85	0.90	0.98	0.70	0.74	0.76	0.87	0.97	1.10	0.71	0.75	0.77	1.11
	9052	0.80	0.95	1.19	0.70	0.84	1.10	0.79	0.95	1.22	0.71	0.86	1.13	1.25
	9053	0.60	0.83	0.94	0.54	0.63	0.88	0.61	0.86	0.99	0.55	0.69	0.94	-
	9054	0.56	0.72	0.83	0.57	0.71	0.75	0.57	0.75	0.83	0.60	0.71	0.78	-
9.06	9041	0.80	0.86	0.90	0.65	0.71	0.72	0.81	0.89	1.02	0.67	0.71	0.72	0.95
	9042	0.81	0.95	1.18	0.64	0.87	1.03	0.81	0.97	1.21	0.64	0.88	1.05	1.26
	9043	0.62	0.70	0.88	0.50	0.63	0.81	0.63	0.73	0.93	0.51	0.66	0.84	-
	9044	0.56	0.67	0.80	0.60	0.70	0.73	0.57	0.68	0.79	0.64	0.69	0.74	-
4.65	9031	0.84	0.91	0.92	0.73	0.82	0.84	0.84	0.89	0.90	0.73	0.82	0.84	1.62
	9032	0.75	0.81	0.86	0.61	0.68	0.69	0.76	0.80	0.89	0.63	0.69	0.69	0.89
	9033	0.79	0.84	0.95	0.66	0.71	0.73	0.80	0.91	1.07	0.67	0.72	0.74	1.12
	9034	0.77	1.23	1.39	0.73	1.21	1.36	0.77	1.24	1.41	0.73	1.21	1.36	1.81
	9035	0.79	0.92	1.06	0.68	0.85	1.06	0.80	0.93	1.07	0.69	0.86	1.09	1.07
	9036	0.58	0.70	0.91	0.49	0.61	0.88	0.60	0.70	0.94	0.49	0.64	0.91	-
	9037	0.52	0.63	0.78	0.56	0.64	0.81	0.53	0.64	0.81	0.58	0.63	0.82	-
-1.00	9021	0.65	0.74	0.90	0.59	0.66	0.68	0.67	0.78	0.90	0.60	0.66	0.67	0.97
	9022	0.74	0.81	0.86	0.70	0.81	0.84	0.74	0.81	0.85	0.69	0.82	0.86	2.07
	9023	0.75	0.76	0.78	0.61	0.66	0.64	0.74	0.76	0.77	0.62	0.66	0.65	0.98
	9024	0.74	0.80	0.85	0.66	0.75	0.78	0.76	0.80	0.85	0.67	0.76	0.79	1.12
	9025	0.83	0.88	1.07	0.66	0.85	1.10	0.84	0.89	1.08	0.66	0.85	1.09	1.21
	9026	0.81	1.06	1.38	0.74	1.04	1.53	0.82	1.05	1.38	0.75	1.03	1.53	1.63
	9027	0.68	0.81	0.89	0.60	0.74	0.92	0.68	0.82	0.85	0.62	0.71	0.93	0.68
	9028	0.55	0.71	0.93	0.56	0.65	0.95	0.56	0.70	0.94	0.54	0.67	0.96	-
	9029	0.48	0.92	1.23	0.97	0.90	1.30	0.49	0.94	1.24	0.96	0.88	1.30	-
	9030	0.48	0.69	0.86	0.71	0.71	0.84	0.49	0.67	0.87	0.70	0.71	0.81	-
-6.40	9011	0.71	0.66	0.73	0.54	0.58	0.62	0.69	0.66	0.72	0.55	0.58	0.61	0.84
	9012	0.75	0.81	0.87	0.68	0.74	0.77	0.75	0.79	0.82	0.69	0.75	0.76	1.17
	9013	0.63	0.83	0.86	0.63	0.87	0.85	0.64	0.86	0.91	0.63	0.88	0.86	1.52
	9014	0.54	0.82	1.12	0.68	0.85	1.19	0.54	0.81	1.11	0.67	0.83	1.19	-
	9015	0.45	0.77	0.98	0.73	0.71	0.96	0.46	0.78	1.03	0.72	0.69	0.97	-

Note: Node numbers of oscillators added to the CR00 and CR50 models are shown in red.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.3-2 Maximum Accelerations of Cracked Walls SDOF Oscillators

SDOF Oscillator			Horizontal Acceleration (g)												
			CR00 Model						CR50 Model						NA3 Env.
Elev. (m)	Node No.	Dir.	Full Column			Partial Column			Full Column			Partial Column			
			LB	BE	UB	LB	BE	UB	LB	BE	UB	LB	BE	UB	
42.0	99981	NS (X)	1.61	2.17	2.51	1.22	1.57	1.74	1.70	2.35	2.71	1.26	1.65	1.85	2.66
	99982		0.80	0.99	1.12	0.65	0.93	0.88	0.81	0.99	1.15	0.67	0.92	0.86	1.54
	99986		0.67	0.82	0.88	0.56	0.66	0.66	0.68	0.84	0.89	0.57	0.68	0.67	-
34.0	99991		0.45	0.51	0.58	0.44	0.43	0.47	0.44	0.50	0.57	0.44	0.43	0.48	-
13.6	99971		0.96	1.06	1.07	0.85	0.93	0.95	0.95	1.03	1.04	0.85	0.93	0.94	2.11
	99972		1.06	1.32	1.66	1.40	1.56	1.83	1.04	1.32	1.67	1.38	1.55	1.96	2.29
	99973		0.74	0.82	1.10	0.76	1.02	1.09	0.76	0.86	1.13	0.77	1.06	1.13	1.88
	99974		0.51	0.68	0.84	0.59	0.77	1.13	0.50	0.66	0.83	0.58	0.81	1.06	1.10
	99977		0.45	0.56	0.82	0.59	0.68	0.87	0.44	0.55	0.89	0.60	0.65	0.85	-
42.0	99983	EW (Y)	0.93	1.19	1.32	0.82	0.95	1.03	1.04	1.31	1.45	0.92	1.07	1.17	1.86
	99984		0.58	0.68	0.80	0.70	0.72	0.79	0.58	0.71	0.82	0.63	0.68	0.75	1.02
	99985		0.52	0.59	0.58	0.55	0.54	0.58	0.52	0.61	0.60	0.55	0.55	0.56	1.00
	99987		0.50	0.55	0.57	0.51	0.51	0.51	0.50	0.57	0.59	0.51	0.51	0.51	-
34.0	99992		0.42	0.48	0.52	0.47	0.48	0.56	0.42	0.48	0.52	0.47	0.48	0.56	-
13.6	99975		0.81	0.94	1.03	0.84	0.91	0.98	0.84	1.02	1.12	0.90	1.00	1.08	2.16
	99976		0.46	0.61	0.73	0.55	0.77	0.93	0.46	0.65	0.77	0.54	0.76	0.88	0.92
	99978		0.44	0.57	0.78	0.60	0.71	0.97	0.44	0.60	0.74	0.61	0.71	0.97	-

Note: Node numbers of oscillators added to the CR00 and CR50 models are shown in red.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.3-3 RB/FB Maximum Displacements Relative to Free Field

(a) RB/FB

Elev. (m)	Node No.	Displacement (cm)											
		CR00			CR50			NA3 Enveloping			Standard Design		
		NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.
52.4	110	1.33	1.64	0.78	1.33	1.66	0.80	1.26	1.57	0.80	7.18	12.34	1.26
34.0	109	0.92	0.93	0.66	0.92	0.94	0.68	0.84	1.04	0.69	5.98	9.42	1.25
27.0	108	0.79	0.75	0.56	0.78	0.76	0.58	0.70	0.87	0.58	5.52	8.34	1.18
22.5	107	0.67	0.60	0.49	0.67	0.60	0.50	0.57	0.73	0.50	5.21	7.58	1.27
17.5	106	0.54	0.44	0.39	0.54	0.44	0.40	0.45	0.57	0.41	4.87	6.84	1.09
13.6	105	0.44	0.33	0.32	0.44	0.33	0.33	0.36	0.46	0.35	4.60	6.23	1.07
9.06	104	0.32	0.26	0.25	0.32	0.25	0.25	0.27	0.34	0.31	4.29	5.54	1.07
4.65	103	0.19	0.18	0.16	0.19	0.17	0.16	0.19	0.22	0.18	3.99	4.85	1.12
-1.00	102	0.11	0.10	0.11	0.11	0.10	0.11	0.12	0.13	0.14	3.63	4.02	1.10
-6.40	101	0.07	0.06	0.09	0.07	0.06	0.09	0.08	0.08	0.12	3.29	3.24	1.15
-11.5	2	0.03	0.03	0.07	0.03	0.03	0.07	0.06	0.06	0.10	2.99	2.60	0.98
-15.5	1	0.03	0.03	0.07	0.03	0.03	0.07	0.06	0.05	0.10	2.80	2.24	1.02

(b) RCCV

Elev. (m)	Node No.	Displacement (cm)											
		CR00			CR50			NA3 Enveloping			Standard Design		
		NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.
34.0	209	0.92	0.90	0.45	0.91	0.91	0.44	0.83	1.02	0.45	5.98	9.42	1.19
27.0	208	0.78	0.73	0.42	0.78	0.73	0.40	0.69	0.85	0.42	5.52	8.34	1.14
17.5	206	0.54	0.42	0.34	0.53	0.42	0.34	0.44	0.55	0.34	4.87	6.85	1.13
13.6	205	0.43	0.32	0.32	0.43	0.32	0.31	0.36	0.44	0.31	4.60	6.25	1.16
9.06	204	0.31	0.25	0.28	0.31	0.25	0.28	0.27	0.33	0.28	4.29	5.56	1.15
4.65	203	0.19	0.18	0.24	0.19	0.18	0.24	0.19	0.21	0.24	3.99	4.88	1.15
-1.00	202	0.11	0.10	0.18	0.11	0.10	0.18	0.12	0.12	0.18	3.63	4.04	1.15
-6.40	201	0.07	0.06	0.12	0.07	0.05	0.12	0.08	0.08	0.13	3.29	3.25	1.15

Table B.3-3 RB/FB Maximum Displacements Relative to Free Field (Continued)

(c) Vent Wall and Pedestal

Elev. (m)	Node No.	Displacement (cm)											
		CR00			CR50			NA3 Enveloping			Standard Design		
		NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.
17.5	701	0.53	0.39	0.26	0.53	0.40	0.26	0.44	0.51	0.24	4.87	6.86	1.18
14.5	702	0.45	0.32	0.26	0.45	0.33	0.26	0.37	0.43	0.23	4.67	6.40	1.18
11.5	703	0.37	0.26	0.25	0.37	0.26	0.25	0.31	0.36	0.22	4.46	5.94	1.18
8.50	704	0.29	0.22	0.23	0.29	0.22	0.24	0.25	0.28	0.21	4.25	5.47	1.18
7.46	705	0.26	0.20	0.23	0.26	0.20	0.23	0.23	0.26	0.21	4.18	5.31	1.18
4.65	706, 303	0.19	0.17	0.20	0.19	0.16	0.21	0.18	0.20	0.19	3.99	4.88	1.18
1.00	302	0.11	0.09	0.15	0.11	0.09	0.16	0.12	0.12	0.14	3.63	4.04	1.17
-6.40	301	0.06	0.05	0.10	0.06	0.05	0.10	0.08	0.08	0.10	3.29	3.25	1.17

(d) RSW

Elev. (m)	Node No.	Displacement (cm)											
		CR00			CR50			NA3 Enveloping			Standard Design		
		NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.
24.2	707	0.72	0.52	0.20	0.72	0.52	0.20	0.82	0.62	0.21	5.32	7.86	1.18
20.2	708	0.61	0.44	0.20	0.61	0.44	0.20	0.67	0.54	0.20	5.05	7.26	1.18
15.8	709	0.48	0.34	0.20	0.48	0.34	0.20	0.47	0.43	0.20	4.75	6.58	1.18
11.3	710	0.36	0.25	0.19	0.36	0.26	0.19	0.32	0.33	0.18	4.44	5.90	1.18
7.46	711	0.26	0.20	0.18	0.26	0.20	0.18	0.23	0.25	0.16	4.18	5.31	1.18
4.65	712	0.19	0.16	0.17	0.19	0.16	0.17	0.18	0.19	0.15	3.99	4.88	1.18
2.46	713	0.16	0.14	0.16	0.16	0.13	0.16	0.16	0.16	0.14	3.84	4.55	1.17
1.96	714	0.15	0.14	0.16	0.15	0.13	0.16	0.15	0.15	0.14	3.81	4.48	1.17
-0.80	715	0.13	0.12	0.16	0.12	0.11	0.16	0.12	0.12	0.14	3.65	4.09	1.17

Table B.3-3 RB/FB Maximum Displacements Relative to Free Field (Continued)

(e) RPV

Node No.	Displacement (cm)											
	CR00			CR50			NA3 Enveloping			Standard Design		
	NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.
801	0.83	0.68	0.13	0.94	0.68	0.14	1.21	0.78	0.14	5.60	8.44	1.18
806	0.67	0.55	0.20	0.74	0.54	0.20	0.91	0.64	0.24	5.22	7.61	1.18
807	0.66	0.53	0.20	0.72	0.53	0.20	0.88	0.62	0.23	5.19	7.54	1.18
809	0.59	0.47	0.20	0.64	0.47	0.20	0.74	0.55	0.23	5.03	7.18	1.18
810	0.53	0.42	0.20	0.57	0.42	0.19	0.62	0.49	0.22	4.87	6.83	1.18
813	0.41	0.31	0.18	0.43	0.31	0.18	0.42	0.37	0.20	4.54	6.10	1.18
814	0.36	0.26	0.18	0.37	0.27	0.18	0.35	0.32	0.18	4.40	5.79	1.18
815	0.31	0.23	0.17	0.32	0.23	0.17	0.29	0.28	0.17	4.26	5.48	1.18
827	0.23	0.18	0.15	0.23	0.18	0.16	0.29	0.21	0.16	3.78	4.34	1.18
828	0.24	0.19	0.13	0.24	0.18	0.14	0.29	0.22	0.15	3.73	4.21	1.18
831	0.88	0.63	0.87	0.91	0.67	0.94	0.76	0.79	2.09	5.23	7.36	1.18
832	0.52	0.41	0.19	0.56	0.41	0.20	0.61	0.48	0.28	4.87	6.83	1.18
833	0.50	0.39	0.19	0.54	0.40	0.20	0.59	0.47	0.28	4.81	6.69	1.18
834	0.46	0.37	0.19	0.50	0.37	0.20	0.56	0.43	0.27	4.69	6.41	1.18
844	0.25	0.20	0.18	0.26	0.21	0.18	0.34	0.24	0.19	3.98	4.79	1.18
846	0.22	0.18	0.17	0.22	0.18	0.17	0.29	0.22	0.18	3.88	4.58	1.18
847	0.34	0.27	0.17	0.37	0.28	0.17	0.48	0.29	0.18	4.24	5.39	1.18
851	0.51	0.66	0.38	0.50	0.65	0.37	0.48	0.57	0.39	4.28	5.05	1.18
854	0.25	0.20	0.16	0.26	0.21	0.16	0.34	0.24	0.17	3.98	4.79	1.18
867	0.12	0.13	0.44	0.11	0.12	0.45	0.14	0.13	0.58	3.53	3.80	1.18

Table B.3-4 Maximum Displacements of Cracked Slabs SDOF Oscillators

SDOF Oscillator		Vertical Displacement Relative to Free Field Motion (cm)													
		CR00 Model						CR50 Model						NA3 Env.	Stand. Design
Elev. (m)	Node No.	Full Column			Partial Column			Full Column			Partial Column				
		LB	BE	UB	LB	BE	UB	LB	BE	UB	LB	BE	UB		
52.4	9101	1.06	1.04	1.08	1.09	1.08	1.08	1.06	1.04	1.03	1.08	1.08	1.07	1.03	4.99
	9102	0.84	0.81	0.61	0.63	0.62	0.61	0.83	0.81	0.80	0.63	0.62	0.61	1.15	2.08
	9103	1.10	1.07	0.61	0.68	0.64	0.61	1.09	1.07	1.00	0.67	0.63	0.60	1.38	1.27
	9104	0.46	0.48	0.37	0.35	0.36	0.37	0.44	0.48	0.49	0.34	0.35	0.36	0.43	1.27
	9105	0.34	0.33	0.26	0.26	0.26	0.26	0.34	0.33	0.33	0.27	0.25	0.26	0.32	1.26
	9106	0.31	0.29	0.23	0.24	0.24	0.23	0.31	0.29	0.28	0.25	0.24	0.23	0.34	1.26
	9107	0.29	0.29	0.22	0.23	0.23	0.22	0.29	0.29	0.26	0.23	0.23	0.21	0.31	1.26
	9108	0.27	0.27	0.21	0.21	0.22	0.21	0.27	0.27	0.26	0.22	0.21	0.21	0.30	1.26
	9109	0.25	0.25	0.20	0.20	0.20	0.20	0.25	0.25	0.24	0.20	0.20	0.19	-	-
34.0	9091	0.26	0.27	0.19	0.20	0.20	0.19	0.27	0.27	0.23	0.20	0.20	0.19	0.27	1.23
	9092	0.25	0.24	0.18	0.19	0.19	0.18	0.25	0.24	0.23	0.19	0.19	0.18	0.26	1.20
	9093	0.25	0.24	0.18	0.18	0.19	0.18	0.24	0.24	0.22	0.19	0.18	0.17	-	-
27.0	9081	0.30	0.29	0.21	0.23	0.23	0.21	0.30	0.29	0.30	0.23	0.22	0.23	0.27	1.14
	9082	0.24	0.24	0.18	0.19	0.19	0.18	0.24	0.24	0.22	0.19	0.18	0.17	0.25	1.14
	9083	0.23	0.23	0.17	0.18	0.18	0.17	0.23	0.23	0.21	0.18	0.18	0.17	0.23	1.16
	9084	0.22	0.22	0.17	0.17	0.18	0.17	0.22	0.22	0.21	0.18	0.17	0.17	0.22	1.18
	9085	0.24	0.23	0.18	0.18	0.18	0.18	0.23	0.23	0.21	0.18	0.18	0.17	0.24	1.14
	9086	0.23	0.22	0.17	0.17	0.18	0.17	0.23	0.22	0.20	0.18	0.17	0.16	-	-
	9087	0.22	0.22	0.16	0.17	0.17	0.16	0.22	0.22	0.20	0.17	0.17	0.16	-	-
22.5	9071	0.78	0.76	0.57	0.59	0.58	0.57	0.78	0.76	0.75	0.59	0.58	0.58	1.02	1.74
	9072	0.81	0.79	0.44	0.46	0.45	0.44	0.80	0.79	0.78	0.46	0.45	0.44	0.99	1.36
	9073	0.86	0.84	0.48	0.49	0.49	0.48	0.87	0.84	0.78	0.49	0.49	0.47	0.84	1.31
	9074	0.24	0.27	0.22	0.19	0.21	0.22	0.25	0.27	0.27	0.20	0.21	0.23	0.23	1.28
	9075	0.22	0.22	0.17	0.18	0.18	0.17	0.22	0.22	0.21	0.18	0.18	0.17	0.20	1.27
	9076	0.18	0.17	0.13	0.14	0.14	0.13	0.18	0.17	0.17	0.14	0.14	0.13	-	-
17.5	9061	0.85	0.83	0.45	0.47	0.47	0.45	0.86	0.83	0.76	0.47	0.46	0.44	0.69	1.13
	9062	0.18	0.18	0.14	0.14	0.14	0.14	0.18	0.18	0.16	0.14	0.14	0.13	0.17	1.10
	9063	0.24	0.23	0.17	0.18	0.18	0.17	0.24	0.23	0.23	0.19	0.18	0.17	0.20	1.11
	9064	0.40	0.47	0.36	0.26	0.32	0.36	0.25	0.47	0.53	0.19	0.19	0.18	0.28	1.18
	9065	0.17	0.17	0.13	0.13	0.13	0.13	0.17	0.17	0.16	0.13	0.13	0.12	0.19	1.11
	99064	0.18	0.17	0.12	0.14	0.13	0.12	0.17	0.17	0.16	0.13	0.12	0.11	-	-
	9066	0.17	0.16	0.12	0.13	0.13	0.12	0.17	0.16	0.14	0.13	0.12	0.11	-	-
	9067	0.17	0.16	0.11	0.13	0.12	0.11	0.17	0.16	0.14	0.13	0.12	0.11	-	-

Note: Node numbers of oscillators added to the CR00 and CR50 models are shown in red.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.3-4 Maximum Displacements of Cracked Slabs SDOF Oscillators (Continue)

SDOF Oscillator		Vertical Displacement Relative to Free Field Motion (cm)													
		CR00 Model						CR50 Model						NA3 Env.	Stand. Design
Elev. (m)	Node No.	Full Column			Partial Column			Full Column			Partial Column				
		LB	BE	UB	LB	BE	UB	LB	BE	UB	LB	BE	UB		
13.6	9051	0.22	0.22	0.16	0.17	0.17	0.16	0.22	0.22	0.20	0.17	0.17	0.16	0.18	1.12
	9052	0.16	0.15	0.12	0.12	0.12	0.12	0.16	0.15	0.14	0.12	0.12	0.11	0.15	1.12
	9053	0.16	0.15	0.10	0.12	0.11	0.10	0.16	0.15	0.13	0.12	0.11	0.10	-	-
	9054	0.16	0.14	0.10	0.11	0.11	0.10	0.16	0.14	0.12	0.12	0.11	0.10	-	-
9.06	9041	0.21	0.20	0.15	0.16	0.16	0.15	0.21	0.20	0.19	0.16	0.16	0.15	0.15	1.11
	9042	0.14	0.14	0.11	0.11	0.11	0.11	0.14	0.14	0.13	0.11	0.11	0.11	0.13	1.11
	9043	0.14	0.13	0.09	0.10	0.10	0.09	0.14	0.13	0.11	0.10	0.10	0.09	-	-
	9044	0.14	0.12	0.09	0.10	0.10	0.09	0.14	0.12	0.11	0.10	0.10	0.08	-	-
4.65	9031	0.14	0.14	0.11	0.12	0.12	0.11	0.14	0.14	0.13	0.12	0.12	0.11	0.11	1.13
	9032	0.18	0.17	0.13	0.14	0.14	0.13	0.18	0.17	0.15	0.14	0.14	0.13	0.12	1.08
	9033	0.20	0.19	0.15	0.16	0.15	0.15	0.21	0.19	0.18	0.16	0.16	0.15	0.16	1.17
	9034	0.10	0.10	0.08	0.07	0.08	0.08	0.10	0.10	0.10	0.08	0.08	0.08	0.09	1.13
	9035	0.12	0.11	0.09	0.08	0.09	0.09	0.12	0.11	0.10	0.09	0.09	0.09	0.11	1.07
	9036	0.12	0.10	0.07	0.08	0.08	0.07	0.12	0.10	0.08	0.09	0.08	0.07	-	-
	9037	0.11	0.10	0.07	0.08	0.08	0.07	0.12	0.10	0.08	0.09	0.08	0.07	-	-
-1.00	9021	0.14	0.14	0.11	0.11	0.11	0.11	0.13	0.14	0.13	0.11	0.11	0.11	0.09	1.11
	9022	0.09	0.09	0.08	0.08	0.08	0.08	0.09	0.09	0.08	0.08	0.08	0.08	0.09	1.11
	9023	0.15	0.14	0.11	0.12	0.12	0.11	0.15	0.14	0.13	0.12	0.12	0.11	0.10	1.03
	9024	0.14	0.14	0.11	0.11	0.11	0.11	0.14	0.14	0.13	0.11	0.11	0.11	0.12	1.17
	9025	0.10	0.09	0.07	0.07	0.07	0.07	0.10	0.09	0.08	0.07	0.07	0.07	0.09	1.02
	9026	0.09	0.06	0.06	0.06	0.05	0.06	0.09	0.06	0.06	0.06	0.05	0.06	0.07	1.11
	9027	0.11	0.09	0.07	0.08	0.07	0.07	0.12	0.09	0.09	0.08	0.07	0.08	0.11	1.16
	9028	0.09	0.07	0.05	0.07	0.06	0.05	0.09	0.07	0.06	0.07	0.06	0.05	-	-
	9029	0.07	0.05	0.04	0.05	0.05	0.04	0.08	0.05	0.04	0.06	0.04	0.04	-	-
	9030	0.09	0.07	0.05	0.07	0.06	0.05	0.09	0.07	0.06	0.07	0.06	0.05	-	-
-6.40	9011	0.14	0.12	0.10	0.11	0.10	0.10	0.14	0.12	0.11	0.11	0.10	0.10	0.11	1.17
	9012	0.12	0.11	0.09	0.10	0.10	0.09	0.12	0.11	0.11	0.10	0.10	0.09	0.10	1.17
	9013	0.08	0.07	0.05	0.06	0.06	0.05	0.08	0.07	0.06	0.06	0.06	0.05	0.08	1.01
	9014	0.07	0.05	0.03	0.05	0.04	0.03	0.07	0.05	0.04	0.05	0.04	0.04	-	-
	9015	0.07	0.05	0.03	0.05	0.04	0.03	0.07	0.05	0.04	0.06	0.04	0.04	-	-

Note: Node numbers of oscillators added to the CR00 and CR50 models are shown in red.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.3-5 Maximum Displacements of Cracked Walls SDOF Oscillators

SDOF Oscillator			Horizontal Displacement Relative to Free Field Motion (cm)												
			CR00 Model						CR50 Model						NA3 Env.
Elev. (m)	Node No.	Dir.	Full Column			Partial Column			Full Column			Partial Column			
			LB	BE	UB	LB	BE	UB	LB	BE	UB	LB	BE	UB	
42.0	99981	NS (X)	1.23	1.27	1.26	0.97	0.98	0.99	1.23	1.27	1.26	0.96	0.98	0.98	1.13
	99982		1.08	1.09	1.09	0.86	0.86	0.86	1.08	1.09	1.09	0.86	0.85	0.86	1.02
	99986		1.07	1.08	1.06	0.86	0.85	0.85	1.07	1.08	1.06	0.85	0.85	0.84	-
34.0	99991		0.84	0.83	0.81	0.68	0.67	0.66	0.84	0.83	0.81	0.68	0.67	0.65	-
13.6	99971		0.57	0.55	0.51	0.46	0.43	0.41	0.57	0.55	0.51	0.45	0.42	0.40	0.55
	99972		0.51	0.52	0.52	0.46	0.46	0.46	0.51	0.52	0.52	0.46	0.46	0.48	0.41
	99973		0.44	0.41	0.39	0.38	0.36	0.34	0.44	0.41	0.39	0.38	0.36	0.33	0.36
	99974		0.43	0.41	0.38	0.37	0.34	0.33	0.43	0.41	0.38	0.37	0.34	0.33	0.36
	99977		0.43	0.40	0.37	0.36	0.33	0.32	0.43	0.40	0.37	0.37	0.33	0.32	-
42.0	99983	EW (Y)	1.09	1.12	1.18	1.03	0.99	0.98	1.08	1.12	1.18	1.03	1.01	1.03	1.24
	99984		1.00	1.04	1.11	0.96	0.90	0.86	0.99	1.04	1.11	0.96	0.90	0.85	1.17
	99985		0.98	1.02	1.08	0.94	0.89	0.84	0.97	1.02	1.08	0.94	0.88	0.83	1.14
	99987		0.97	1.01	1.08	0.93	0.88	0.83	0.96	1.01	1.08	0.93	0.87	0.83	-
34.0	99992		0.64	0.65	0.69	0.59	0.55	0.54	0.64	0.65	0.69	0.59	0.55	0.54	-
13.6	99975		0.40	0.46	0.48	0.42	0.43	0.44	0.40	0.46	0.48	0.42	0.46	0.47	0.52
	99976		0.30	0.28	0.28	0.29	0.27	0.26	0.30	0.28	0.28	0.29	0.27	0.26	0.37
	99978		0.29	0.27	0.27	0.29	0.27	0.25	0.29	0.27	0.27	0.29	0.27	0.26	-

Note: Node numbers of oscillators added to the CR00 and CR50 models are shown in red.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-1 RPV Fuel Maximum Accelerations from CR00 Model

Elev. (m)	Node No.	NA3 Enveloping			PE Envelope CR00			FE Envelope CR00		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
7.81	848	1.91	0.86	1.49	0.90	0.88	1.54	0.94	0.83	1.51
7.11	849	1.00	0.49	1.47	0.71	0.61	1.53	0.71	0.70	1.49
6.40	850	0.62	0.64	1.45	0.65	0.72	1.49	0.69	0.82	1.47
5.69	851	0.85	0.74	1.41	0.80	0.84	1.44	0.85	0.85	1.42
4.98	852	1.61	1.15	1.36	1.22	1.07	1.36	1.15	1.09	1.36
4.27	853	2.52	1.74	1.31	1.68	1.57	1.28	1.58	1.53	1.30

Note: The presented values are the maximum accelerations at mass center.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-2 RPV Fuel Maximum Accelerations from CR50 Model

Elev. (m)	Node No.	NA3 Enveloping			PE Envelope CR50			FE Envelope CR50		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
7.81	848	1.91	0.86	1.49	0.96	0.98	1.51	1.00	0.92	1.53
7.11	849	1.00	0.49	1.47	0.75	0.64	1.50	0.75	0.73	1.52
6.40	850	0.62	0.64	1.45	0.62	0.70	1.47	0.67	0.81	1.50
5.69	851	0.85	0.74	1.41	0.76	0.81	1.43	0.84	0.86	1.45
4.98	852	1.61	1.15	1.36	1.18	1.03	1.37	1.11	1.00	1.39
4.27	853	2.52	1.74	1.31	1.70	1.46	1.30	1.56	1.49	1.32

Note: The presented values are the maximum accelerations at mass center.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-3 RB/FB Maximum Accelerations from CR00 Model

Elev. (m)	Node No.	NA3 Enveloping			PE Envelope CR00			FE Envelope CR00		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
52.40	110	2.13	1.55	1.56	1.05	0.84	0.92	1.49	0.99	1.04
34.00	109	1.02	0.81	1.20	0.59	0.54	0.74	0.63	0.54	0.86
27.00	108	0.96	0.69	1.02	0.49	0.42	0.67	0.54	0.43	0.77
22.50	107	0.83	0.73	0.92	0.55	0.53	0.67	0.48	0.46	0.84
17.50	106	0.80	0.65	0.80	0.58	0.58	0.51	0.55	0.55	0.64
13.57	105	0.79	0.62	0.72	0.64	0.61	0.50	0.58	0.55	0.62
9.06	104	0.76	0.54	0.62	0.69	0.70	0.50	0.60	0.60	0.58
4.65	103	0.76	0.56	0.56	0.72	0.77	0.46	0.74	0.59	0.56
-1.00	102	0.62	0.51	0.57	0.59	0.62	0.52	0.62	0.57	0.55
-6.40	101	0.50	0.43	0.50	0.53	0.55	0.49	0.53	0.53	0.53
-11.50	2	0.43	0.37	0.47	0.39	0.33	0.40	0.42	0.36	0.48
-15.50	1	0.44	0.37	0.46	0.40	0.33	0.39	0.43	0.35	0.47

Note: The presented values are the maximum accelerations at floor lumped mass locations.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-4 RB/FB Maximum Accelerations from CR50 Model

Elev. (m)	Node No.	NA3 Enveloping			PE Envelope CR50			FE Envelope CR50		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
52.40	110	2.13	1.55	1.56	1.08	0.83	0.91	1.53	1.02	1.07
34.00	109	1.02	0.81	1.20	0.59	0.55	0.73	0.61	0.54	0.90
27.00	108	0.96	0.69	1.02	0.46	0.42	0.66	0.53	0.44	0.83
22.50	107	0.83	0.73	0.92	0.48	0.51	0.67	0.48	0.45	0.86
17.50	106	0.80	0.65	0.80	0.58	0.54	0.52	0.53	0.54	0.66
13.57	105	0.79	0.62	0.72	0.64	0.64	0.51	0.57	0.57	0.63
9.06	104	0.76	0.54	0.62	0.69	0.69	0.49	0.60	0.60	0.57
4.65	103	0.76	0.56	0.56	0.71	0.76	0.46	0.73	0.58	0.55
-1.00	102	0.62	0.51	0.57	0.60	0.63	0.52	0.63	0.57	0.54
-6.40	101	0.50	0.43	0.50	0.52	0.54	0.49	0.52	0.54	0.52
-11.50	2	0.43	0.37	0.47	0.39	0.33	0.40	0.42	0.36	0.51
-15.50	1	0.44	0.37	0.46	0.40	0.33	0.39	0.44	0.36	0.52

Note: The presented values are the maximum accelerations at floor lumped mass locations.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-5 RCCV Maximum Accelerations from CR00 Model

Elev. (m)	Node No.	NA3 Enveloping			PE Envelope CR00			FE Envelope CR00		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
34.00	209	1.02	0.81	1.20	0.59	0.54	0.74	0.63	0.54	0.86
27.00	208	0.96	0.69	1.12	0.49	0.42	0.63	0.54	0.43	0.83
17.50	206	0.80	0.66	0.91	0.58	0.57	0.57	0.55	0.56	0.72
13.57	205	0.79	0.63	0.82	0.64	0.61	0.55	0.58	0.54	0.67
9.06	204	0.76	0.54	0.72	0.69	0.68	0.51	0.60	0.59	0.65
4.65	203	0.76	0.55	0.65	0.72	0.73	0.46	0.75	0.58	0.61
-1.00	202	0.59	0.52	0.58	0.59	0.61	0.44	0.62	0.58	0.58
-6.40	201	0.50	0.44	0.50	0.53	0.56	0.39	0.53	0.55	0.55

Note: The presented values are the maximum accelerations at floor lumped mass locations.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-6 RCCV Maximum Accelerations from CR50 Model

Elev. (m)	Node No.	NA3 Enveloping			PE Envelope CR50			FE Envelope CR50		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
34.00	209	1.02	0.81	1.20	0.59	0.55	0.73	0.61	0.54	0.90
27.00	208	0.96	0.69	1.12	0.46	0.43	0.62	0.53	0.43	0.86
17.50	206	0.80	0.66	0.91	0.58	0.55	0.57	0.53	0.54	0.77
13.57	205	0.79	0.63	0.82	0.64	0.64	0.52	0.57	0.57	0.69
9.06	204	0.76	0.54	0.72	0.69	0.67	0.48	0.60	0.58	0.61
4.65	203	0.76	0.55	0.65	0.71	0.73	0.47	0.73	0.57	0.57
-1.00	202	0.59	0.52	0.58	0.60	0.62	0.45	0.63	0.58	0.58
-6.40	201	0.50	0.44	0.50	0.52	0.55	0.40	0.52	0.55	0.54

Note: The presented values are the maximum accelerations at floor lumped mass locations.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-7 VW & Pedestal Maximum Accelerations from CR00 Model

Elev. (m)	Node No.	NA3 Enveloping X-Dir. (g)	NA3 Enveloping Y-Dir. (g)	NA3 Enveloping Z-Dir. (g)	PE Envelope CR00 X-Dir. (g)	PE Envelope CR00 Y-Dir. (g)	PE Envelope CR00 Z-Dir. (g)	FE Envelope CR00 X-Dir. (g)	FE Envelope CR00 Y-Dir. (g)	FE Envelope CR00 Z-Dir. (g)
17.50	701	0.80	0.66	0.82	0.58	0.57	0.60	0.55	0.56	0.79
14.50	702	0.77	0.61	0.77	0.80	0.70	0.66	0.67	0.61	0.86
11.50	703	0.77	0.55	0.71	0.84	0.74	0.65	0.76	0.59	0.81
8.50	704	0.74	0.53	0.68	0.72	0.72	0.63	0.70	0.63	0.68
7.4625	705	0.75	0.52	0.67	0.67	0.67	0.62	0.68	0.59	0.66
4.65	706,303	0.76	0.55	0.65	0.72	0.73	0.56	0.74	0.58	0.69
1.00	302	0.59	0.52	0.59	0.59	0.61	0.46	0.62	0.58	0.59
6.40	301	0.50	0.44	0.49	0.53	0.56	0.39	0.53	0.55	0.56

Note: The presented values are the maximum accelerations at mass center.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-8 VW & Pedestal Maximum Accelerations from CR50 Model

Elev. (m)	Node No.	NA3 Enveloping X-Dir. (g)	NA3 Enveloping Y-Dir. (g)	NA3 Enveloping Z-Dir. (g)	PE Envelope CR50 X-Dir. (g)	PE Envelope CR50 Y-Dir. (g)	PE Envelope CR50 Z-Dir. (g)	FE Envelope CR50 X-Dir. (g)	FE Envelope CR50 Y-Dir. (g)	FE Envelope CR50 Z-Dir. (g)
17.50	701	0.80	0.66	0.82	0.58	0.55	0.63	0.53	0.53	0.80
14.50	702	0.77	0.61	0.77	0.53	0.52	0.65	0.53	0.52	0.81
11.50	703	0.77	0.55	0.71	0.68	0.67	0.63	0.61	0.59	0.77
8.50	704	0.74	0.53	0.68	0.72	0.67	0.59	0.60	0.55	0.72
7.4625	705	0.75	0.52	0.67	0.69	0.63	0.57	0.63	0.53	0.67
4.65	706,303	0.76	0.55	0.65	0.71	0.73	0.54	0.74	0.57	0.62
1.00	302	0.59	0.52	0.59	0.60	0.62	0.46	0.63	0.58	0.57
6.40	301	0.50	0.44	0.49	0.52	0.55	0.40	0.52	0.55	0.54

Note: The presented values are the maximum accelerations at mass center.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-9 RSW Maximum Accelerations from CR00 Model

Elev. (m)	Node No.	NA3 Enveloping			PE Envelope CR00			FE Envelope CR00		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
24.18	707	3.61	2.51	1.19	1.59	1.86	0.93	1.65	1.52	1.30
20.20	708	2.81	1.82	1.14	1.20	1.38	0.91	1.28	1.23	1.23
15.775	709	1.77	1.23	0.99	0.75	0.91	0.83	0.86	0.91	0.98
11.35	710	1.01	0.69	0.78	0.69	0.79	0.72	0.76	0.81	0.77
7.4625	711	0.75	0.52	0.67	0.67	0.67	0.62	0.68	0.59	0.66
4.65	712	0.76	0.55	0.65	0.72	0.73	0.56	0.74	0.58	0.69
2.4615	713	0.69	0.55	0.64	0.71	0.69	0.53	0.73	0.52	0.63
1.96	714	0.70	0.57	0.64	0.73	0.71	0.53	0.74	0.54	0.64
-0.80	715	0.83	0.65	0.64	0.82	0.83	0.53	0.82	0.62	0.64

Note: The presented values are the maximum accelerations at mass center.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-10 RSW Maximum Accelerations from CR50 Model

Elev. (m)	Node No.	NA3 Enveloping			PE Envelope CR50			FE Envelope CR50		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
24.18	707	3.61	2.51	1.19	1.86	2.03	0.87	1.77	1.86	1.22
20.20	708	2.81	1.82	1.14	1.34	1.63	0.84	1.34	1.43	1.15
15.775	709	1.77	1.23	0.99	0.91	1.17	0.75	0.95	0.95	0.92
11.35	710	1.01	0.69	0.78	0.62	0.67	0.63	0.65	0.69	0.72
7.4625	711	0.75	0.52	0.67	0.69	0.63	0.57	0.63	0.53	0.68
4.65	712	0.76	0.55	0.65	0.71	0.73	0.54	0.74	0.57	0.62
2.4615	713	0.69	0.55	0.64	0.72	0.70	0.50	0.73	0.53	0.58
1.96	714	0.70	0.57	0.64	0.75	0.73	0.50	0.75	0.55	0.58
-0.80	715	0.83	0.65	0.64	0.88	0.88	0.50	0.86	0.67	0.58

Note: The presented values are the maximum accelerations at mass center.
The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-11 RB/FB Maximum Forces and Moments from CR00 Model

Element		NA3 Enveloping					PE Envelope CR00 Model					FE Envelope CR00				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
52.4	110	192.2	140.0	2724	2142	1284	96.9	74.2	1812	1843	996	134.6	88.3	2201	2045	920
	109			5838	4488				3006	2758				3705	3124	
34.0	109	173.2	113.9	8196	5821	1938	77.7	61.2	3936	2879	1235	109.7	70.0	4836	3478	1284
	108			8719	6389				4013	3013				5089	3773	
27.0	108	396.0	259.4	9400	7162	2799	157.4	129.7	3728	3476	1456	205.4	143.6	4840	4113	1692
	107			9599	7958				3766	3478				5098	4236	
22.5	107	436.4	291.8	11216	8328	4678	175.1	151.0	4286	3780	2319	224.6	164.3	5828	4472	2860
	106			11424	9227				4391	4150				6104	4711	
17.5	106	438.4	343.5	12105	9408	4023	188.8	168.8	4967	4453	1787	234.2	188.3	6993	4951	2348
	105			12349	10195				5349	4734				7280	5508	
13.57	105	450.7	363.7	12839	10255	4211	195.0	177.4	5585	4898	1893	245.1	199.1	7771	5678	2558
	104			13651	11216				6032	5236				8219	6329	
9.06	104	454.6	383.4	13904	11338	4694	205.5	184.8	6158	5349	2032	260.7	203.8	8779	6436	2753
	103			15231	12506				6757	5708				9206	7103	
4.65	103	454.7	360.1	9392	6302	5248	235.3	178.7	3946	3051	2053	286.3	192.2	5132	3423	2914
	102			10952	7759				4855	3460				5834	3927	
-1.00	102	240.0	226.6	6545	4819	2718	131.1	124.9	2963	2292	974	134.4	130.6	2624	1879	930
	101			7303	5358				3412	2437				3055	1952	
-6.40	101	237.7	200.4	4748	3351	2079	120.1	120.7	1946	1435	620	140.8	158.4	1990	1225	656
-11.5	2			5053	3356				2053	1485				1593	1099	

Table B.4-12 RB/FB Maximum Forces and Moments from CR50 Model

Element		NA3 Enveloping					PE Envelope CR50 Model					FE Envelope CR50				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
52.4	110	192.2	140.0	2724	2142	1284	98.7	74.1	1916	1943	974	137.9	90.4	2379	2143	929
	109			5838	4488				3016	2777				3783	3116	
34.0	109	173.2	113.9	8196	5821	1938	82.5	62.1	4013	2938	1237	116.1	72.0	4967	3512	1303
	108			8719	6389				4060	3051				5189	3819	
27.0	108	396.0	259.4	9400	7162	2799	158.1	133.3	3802	3487	1457	207.9	145.6	4911	4096	1680
	107			9599	7958				3815	3482				5152	4228	
22.5	107	436.4	291.8	11216	8328	4678	172.3	154.7	4412	3817	2235	227.4	169.1	5963	4522	2901
	106			11424	9227				4463	4137				6237	4785	
17.5	106	438.4	343.5	12105	9408	4023	182.8	163.2	5090	4431	1737	230.8	185.9	7193	5027	2270
	105			12349	10195				5422	4697				7519	5572	
13.57	105	450.7	363.7	12839	10255	4211	188.3	174.0	5659	4879	1864	239.7	196.7	8110	5758	2495
	104			13651	11216				6097	5217				8539	6409	
9.06	104	454.6	383.4	13904	11338	4694	201.3	181.5	6260	5327	1964	254.2	204.0	9120	6530	2748
	103			15231	12506				6861	5667				9545	7183	
4.65	103	454.7	360.1	9392	6302	5248	240.0	184.0	3903	3030	2105	291.8	188.5	5203	3454	2964
	102			10952	7759				4901	3439				5920	3994	
-1.00	102	240.0	226.6	6545	4819	2718	130.9	124.9	2907	2273	997	135.9	130.6	2607	1884	956
	101			7303	5358				3412	2419				3049	1931	
-6.40	101	237.7	200.4	4748	3351	2079	120.2	120.8	1915	1416	632	140.2	157.9	2006	1232	676
-11.5	2			5053	3356				2054	1467				1605	1085	

Note: The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-13 RCCV Maximum Forces and Moments from CR00 Model

Element		NA3 Enveloping					PE Envelope CR00					FE Envelope CR00				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
34.00	209	130.9	133.2	230	510	29	73.3	67.7	188	381	18	94.3	80.0	204	409	19
	208			1029	1160				622	729				746	808	
27.00	208	141.1	151.9	2162	2303	1489	78.2	75.3	1339	1347	706	97.1	92.2	1393	1389	845
	207			2938	3071				1362	1435				1583	1673	
17.50	206	184.1	158.4	3259	3667	1591	108.4	75.3	1516	1730	706	124.9	93.1	1847	1959	927
	205			3691	3904				1445	1830				1921	2050	
13.57	205	207.9	173.4	3817	4203	1762	114.5	79.3	1609	2056	791	132.9	101.3	2118	2252	1068
	204			4389	4491				1759	2192				2320	2389	
9.06	204	225.4	201.2	4481	4853	2062	120.1	92.1	1886	2485	890	141.5	104.6	2601	2646	1207
	203			5190	5203				2060	2609				2821	2767	
4.65	203	109.2	125.7	5523	5470	1439	65.3	69.7	2277	2889	547	73.8	69.4	3050	3003	782
	202			5740	5824				2347	2830				2899	2934	
1.00	202	67.6	68.1	6008	6066	690	38.7	39.2	2537	2927	247	44.5	40.3	3019	3067	236
	201			5924	6035				2526	2807				2910	2946	
-6.40	201	70.7	55.1	6053	6141	349	39.7	30.3	2631	2864	104	47.7	40.6	2988	3010	110
-11.5	2			5961	6127				2608	2770				3033	2935	

Table B.4-14 RCCV Maximum Forces and Moments from CR50 Model

Element		NA3 Enveloping					PE Envelope CR50 Model					FE Envelope CR50				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
34.00	209	130.9	133.2	230	510	29	73.7	66.5	194	373	19	95.8	79.6	212	419	20
	208			1029	1160				614	731				746	819	
27.00	208	141.1	151.9	2162	2303	1489	77.2	70.5	1359	1385	678	96.1	94.6	1401	1445	855
	207			2938	3071				1394	1473				1583	1695	
17.50	206	184.1	158.4	3259	3667	1591	103.3	72.2	1522	1811	686	120.9	91.5	1855	2040	896
	205			3691	3904				1448	1893				1919	2105	
13.57	205	207.9	173.4	3817	4203	1762	109.7	78.1	1603	2124	779	128.1	99.4	2118	2306	1042
	204			4389	4491				1781	2235				2333	2408	
9.06	204	225.4	201.2	4481	4853	2062	115.9	90.7	1919	2555	861	137.3	104.2	2605	2679	1204
	203			5190	5203				2078	2643				2832	2769	
4.65	203	109.2	125.7	5523	5470	1439	67.2	70.5	2252	2939	559	75.4	68.5	3061	3012	796
	202			5740	5824				2323	2886				2945	2941	
1.00	202	67.6	68.1	6008	6066	690	38.5	39.9	2497	3034	253	44.3	40.7	3079	3092	243
	201			5924	6035				2484	2908				2974	2971	
-6.40	201	70.7	55.1	6053	6141	349	39.8	31.1	2590	2981	106	48.0	40.4	3067	3046	114
-11.5	2			5961	6127				2562	2885				3117	2970	

Table B.4-15 VW Maximum Forces and Moments from CR00 Model

Element		NA3 Enveloping					PE Envelope CR00					FE Envelope CR00				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
17.50	701	47.9	32.4	74	56	107	15.7	17.0	81	55	25	19.9	17.5	77	44	35
	702			139	107				79	82				88	81	
14.50	702	47.1	32.4	139	113	108	15.1	15.5	89	89	25	19.0	16.8	98	85	33
	703			279	204				119	135				141	135	
11.50	703	45.8	35.1	280	207	111	16.7	16.1	131	138	27	21.0	16.6	151	137	37
	704			411	301				148	177				190	182	
8.50	704	44.7	36.5	411	302	112	18.0	16.7	154	177	27	21.9	17.2	195	182	38
	705			458	338				157	189				203	195	
7.4625	705	39.1	29.4	440	352	92	9.1	9.1	130	112	14	11.5	9.6	149	139	20
4.65	706, 303			513	427				136	125				159	148	

Note: The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-16 VW Maximum Forces and Moments from CR50 Model

Element		NA3 Enveloping					PE Envelope CR50					FE Envelope CR50				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
17.50	701	47.9	32.4	74	56	107	21.6	23.8	91	62	59	29.1	26.3	107	50	79
	702			139	107				108	99				108	100	
14.50	702	47.1	32.4	139	113	108	22.7	24.7	119	106	60	30.0	26.6	116	106	80
	703			279	204				153	173				173	178	
11.50	703	45.8	35.1	280	207	111	23.4	25.6	159	178	61	29.9	26.7	183	181	82
	704			411	301				191	242				254	254	
8:50	704	44.7	36.5	411	302	112	23.4	25.7	192	244	61	31.2	26.7	259	253	83
	705			458	338				213	266				283	279	
7.4625	705	39.1	29.4	440	352	92	19.6	14.7	204	181	45	25.7	19.6	239	226	62
4.65	706, 303			513	427				254	201				301	262	

Note: The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-17 Pedestal Maximum Forces and Moments from CR00 Model

Element		NA3 Enveloping					PE Envelope CR00					FE Envelope CR00				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
4.65	303	20.5	16.9	667	496	71	16.3	14.5	269	244	24	15.0	12.0	275	250	35
	377			651	502				244	221				275	247	
2.42	377	30.9	25.4	793	614	86	32.1	29.2	347	318	35	29.4	24.1	398	356	49
	302			754	631				341	301				408	357	
1.00	302	22.1	15.7	691	571	34	14.2	12.0	271	220	12	16.1	11.3	328	291	12
	376			658	555				266	215				322	274	
2.75	376	21.8	16.1	658	555	34	14.7	12.9	265	215	12	16.7	11.9	322	274	12
	301			594	524				264	205				308	234	
6.40	301	29.8	22.4	555	518	21	17.8	12.9	225	192	6	20.8	16.8	267	228	7
-11.5	2			553	514				232	214				280	211	

Note: The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-18 Pedestal Maximum Forces and Moments from CR50 Model

Element		NA3 Enveloping					PE Envelope CR50					FE Envelope CR50				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
4.65	303	20.5	16.9	667	496	71	13.6	15.6	280	285	25	14.4	13.3	339	316	35
	377			651	502				279	251				332	304	
2.42	377	30.9	25.4	793	614	86	27.8	31.4	403	362	35	29.3	26.5	480	439	50
	302			754	631				399	341				482	418	
1.00	302	22.1	15.7	691	571	34	15.7	13.7	305	252	13	19.6	14.1	371	347	12
	376			658	555				303	245				361	323	
2.75	376	21.8	16.1	658	555	34	16.3	14.5	303	245	13	20.2	14.4	361	323	12
	301			594	524				297	231				345	273	
6.40	301	29.8	22.4	555	518	21	18.4	12.9	252	217	6	21.7	16.3	293	266	7
-11.5	2			553	514				258	223				307	226	

Note: The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-19 RSW Maximum Forces and Moments from CR00 Model

Element		NA3 Enveloping					PE Envelope CR00					FE Envelope CR00				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
24.18	707	4.2	3.0	2.5	2.2	0.5	1.9	2.2	1.6	1.5	0.4	1.9	1.8	1.5	1.4	0.4
	708			18.9	13.8				8.7	10.1				9.0	8.3	
20.20	708	20.8	10.4	25.8	19.8	1.7	11.2	10.3	12.3	14.1	1.5	11.0	9.2	13.3	11.9	1.5
	709			113.5	59.2				60.0	56.6				60.1	49.7	
15.775	709	24.4	11.9	116.7	61.3	2.4	12.1	11.0	62.1	58.7	2.1	12.2	10.5	62.5	51.2	2.0
	710			224.1	113.9				115.8	107.3				116.1	97.5	
11.35	710	27.1	12.7	227.6	116.1	3.0	12.3	12.1	118.7	109.6	2.7	13.0	11.7	118.8	99.2	2.2
	711			331.9	165.6				165.8	151.1				168.3	144.6	
7.4625	711	22.4	16.8	99.3	77.7	21.4	20.9	20.9	120.9	101.6	13.7	26.6	22.2	135.4	125.5	19.4
	712			141.3	119.0				140.4	127.9				169.6	151.7	
4.65	712	8.9	7.4	147.6	108.1	15.2	14.3	12.5	121.2	112.5	10.2	12.9	10.3	121.4	111.0	14.7
	713			139.8	110.8				100.3	94.1				122.3	108.4	
2.4615	713	1.4	1.1	3.9	2.9	0.1	1.5	1.5	3.7	3.6	0.1	1.5	1.1	3.5	2.7	0.1
	714			3.2	2.3				3.1	2.9				2.8	2.2	
1.96	714	0.9	0.7	2.8	2.1	0.1	0.9	0.9	2.7	2.7	0.1	0.9	0.7	2.6	2.0	0.1
-0.8	715			0.7	0.6				0.5	0.4				0.5	0.4	

Note: The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-20 RSW Maximum Forces and Moments from CR50 Model

Element		NA3 Enveloping					PE Envelope CR50					FE Envelope CR50				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
24.18	707	4.2	3.0	2.5	2.2	0.5	2.2	2.4	1.8	1.7	0.3	2.1	2.1	1.6	1.6	0.2
	708			18.9	13.8				10.4	10.9				9.8	9.7	
20.20	708	20.8	10.4	25.8	19.8	1.7	11.6	11.1	15.2	15.0	1.0	11.3	9.5	14.1	13.9	0.9
	709			113.5	59.2				63.9	59.3				61.8	53.7	
15.775	709	24.4	11.9	116.7	61.3	2.4	12.8	12.3	65.7	61.2	1.4	12.7	11.4	63.7	55.6	1.2
	710			224.1	113.9				122.9	115.5				120.0	105.6	
11.35	710	27.1	12.7	227.6	116.1	3.0	13.2	13.5	124.5	116.9	1.8	13.8	12.7	121.7	107.6	1.5
	711			331.9	165.6				175.7	169.3				173.4	157.2	
7.4625	711	22.4	16.8	99.3	77.7	21.4	18.1	13.5	68.3	68.2	16.8	23.7	17.9	84.7	86.1	22.9
	712			141.3	119.0				114.0	87.5				137.7	117.6	
4.65	712	8.9	7.4	147.6	108.1	15.2	11.9	13.5	124.2	132.9	10.4	12.6	11.6	156.8	142.3	15.0
	713			139.8	110.8				123.1	106.0				147.3	132.8	
2.4615	713	1.4	1.1	3.9	2.9	0.1	1.6	1.6	4.0	4.0	0.2	1.5	1.2	3.8	3.1	0.1
	714			3.2	2.3				3.3	3.3				3.1	2.6	
1.96	714	0.9	0.7	2.8	2.1	0.1	0.9	0.9	3.0	3.0	0.1	0.9	0.7	2.8	2.3	0.1
-0.8	715			0.7	0.6				0.5	0.6				0.5	0.5	

Note: The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-21 Vertical Out-of-Plane Loads on Flexible Slabs

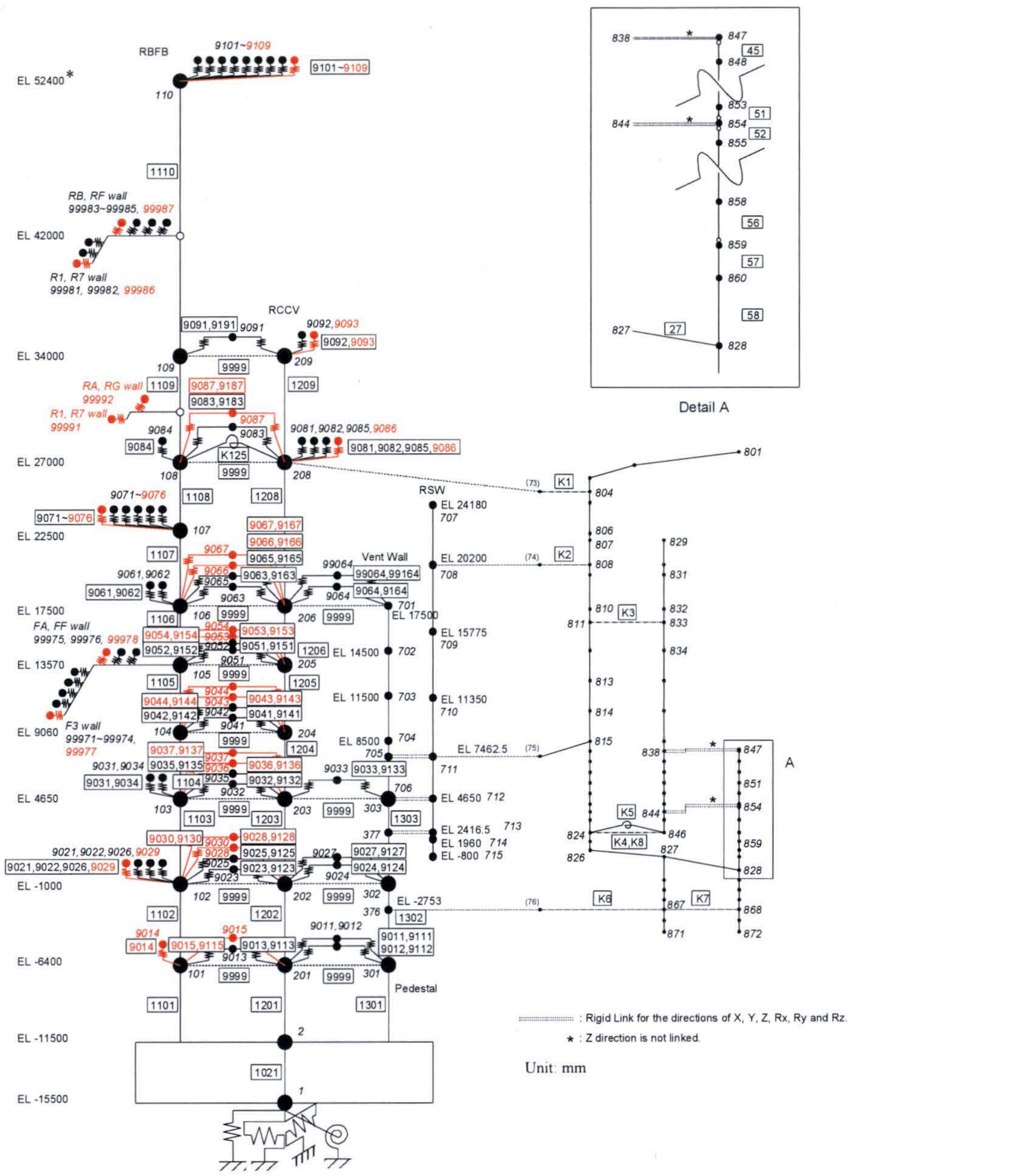
Elev. (m)	Location	Equivalent Average Vertical Acceleration (g)					
		PE CR50	PE CR00	FE CR50	FE CR00	NA3 Enveloping	Standard Design
-6.4	RCCV-Pedestal	0.46	0.46	0.59	0.61	0.60	0.63
	RB-RCCV	0.59	0.59	0.66	0.65	0.57	0.71
	FB	0.55	0.55	0.57	0.58	-	-
-1.0	FB	0.67	0.68	0.69	0.70	0.71	0.88
	RB-RCCV	0.63	0.63	0.69	0.70	0.73	0.85
	RCCV-Pedestal	0.65	0.64	0.70	0.72	0.70	0.71
4.65	FB	0.74	0.74	0.81	0.82	1.11	1.03
	RB-RCCV	0.70	0.70	0.86	0.84	0.87	0.95
	S/P	0.61	0.61	0.77	0.77	0.82	0.80
9.06	RB-RCCV	0.63	0.63	0.78	0.76	0.79	0.82
13.6	RB-RCCV	0.67	0.65	0.84	0.79	0.89	0.84
17.5	MS Tunnel	0.79	0.78	1.14	1.15	1.74	1.10
	RCCV	0.62	0.63	0.84	0.79	0.94	0.78
	D/F	0.87	1.64	1.23	2.38	1.53	1.84
22.5	FB Roof	0.57	0.56	0.77	0.74	1.31	1.47
27.0	Top Slab	0.89	0.85	1.19	1.09	1.37	0.98
	RB-RCCV	0.69	0.70	0.90	0.81	1.06	0.77
	MS Tunnel	0.68	0.68	0.88	0.80	1.13	0.82
34.0	RB-RCCV	0.75	0.75	0.93	0.88	1.23	0.90
	RCCV	0.80	0.81	1.00	0.95	1.30	0.93
52.4	RB Roof	0.60	0.61	0.74	0.75	1.51	1.64

Note: The shaded values are exceedances from the UC100 model enveloping results.

Table B.4-22 Horizontal Out-of-Plane Loads on Flexible Walls

Elev. (m)	Column Line Location	Direction	Equivalent Horizontal Acceleration (g)					
			PE CR50	PE CR00	FE CR50	FE CR00	NA3 Enveloping	Standard Design
42.0	R1 and R7	NS	1.33	1.27	1.88	1.77	2.10	1.48
	RB and RF	EW	0.79	0.77	0.91	0.87	1.27	1.52
30.5	R1 and R7s	NS	0.50	0.51	0.57	0.58	-	-
	RA and RGs	EW	0.54	0.54	0.51	0.51	-	-
13.57	F3	NS	0.95	0.94	0.93	0.94	1.48	1.19
	FA and FF	EW	0.95	0.89	0.93	0.87	1.55	1.09

Note: The shaded values are exceedances from the UC100 model enveloping results.



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

Note: Slab oscillator node 99064 is only for the model considering 0% (CR00) and 50% (CR50) of infill concrete stiffness of the vent wall and diaphragm floor.
Additional oscillators for crack model are shown in red.

Figure B.2-1 RB/FB Lumped Mass Stick CR00 and CR50 Models

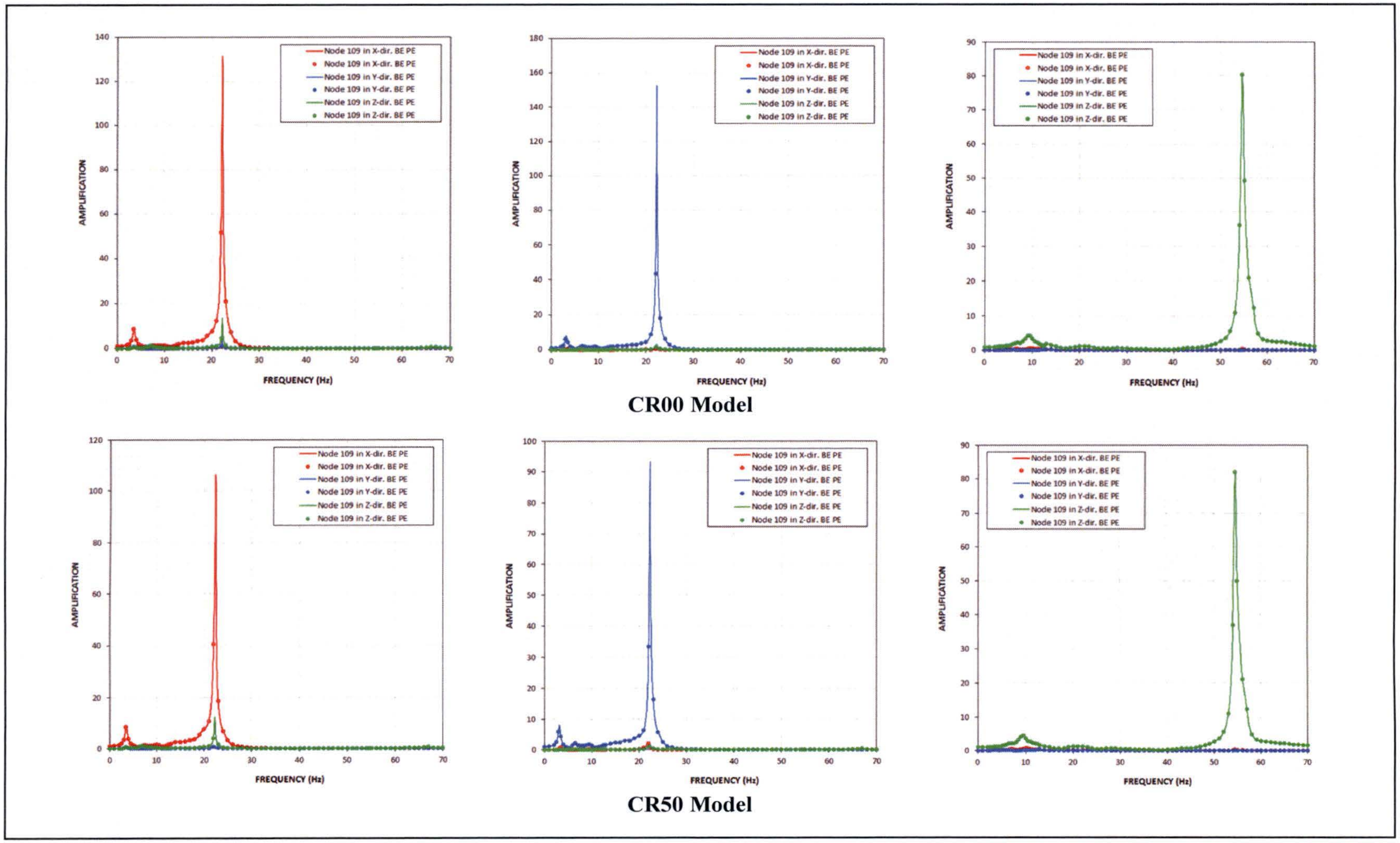


Figure B.3-1 Transfer Functions of RB/FB Refueling Floor Response from Analysis of BE Partial Column Profile

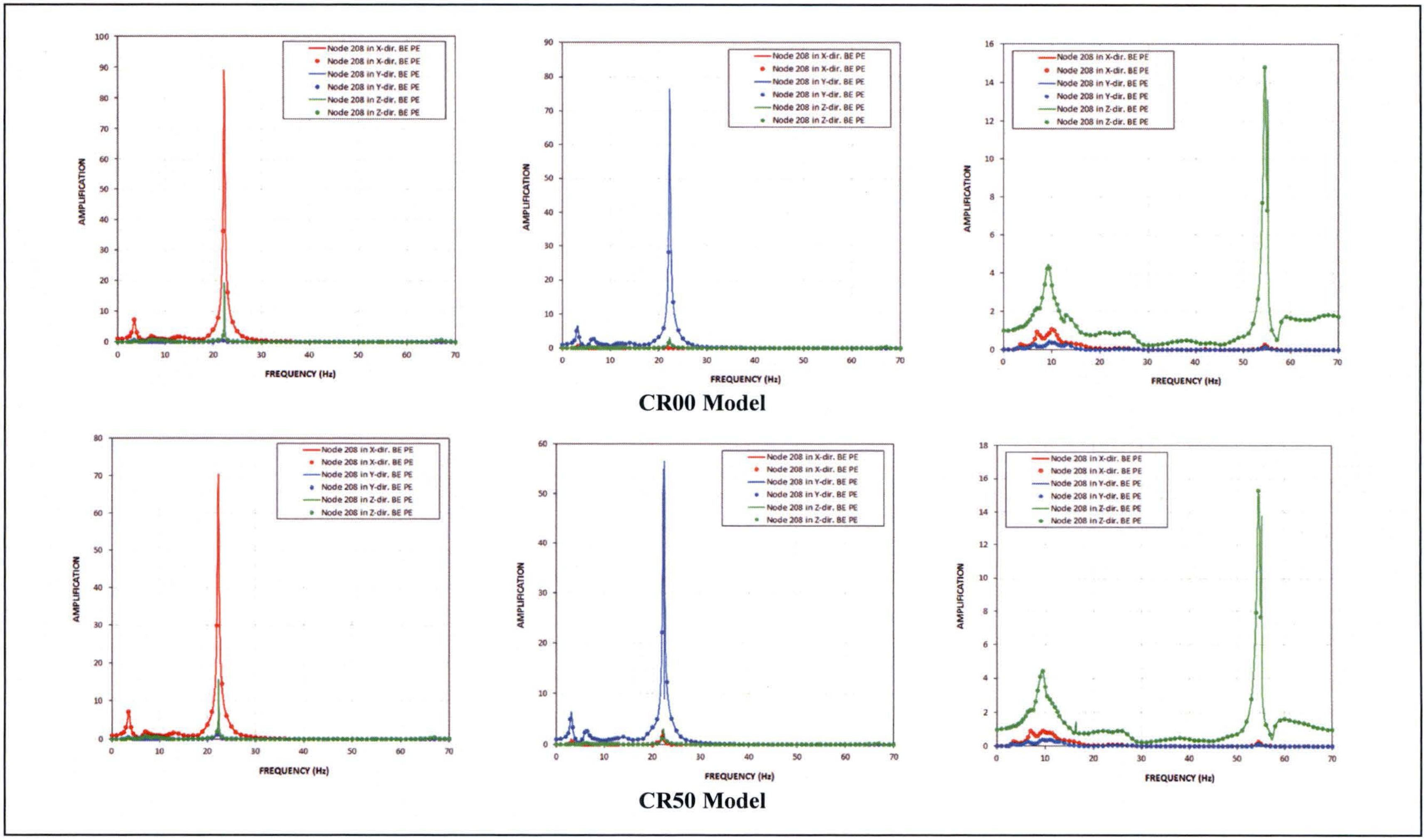


Figure B.3-2 Transfer Functions of RCCV Top Slab Response from Analysis of BE Partial Column Profile

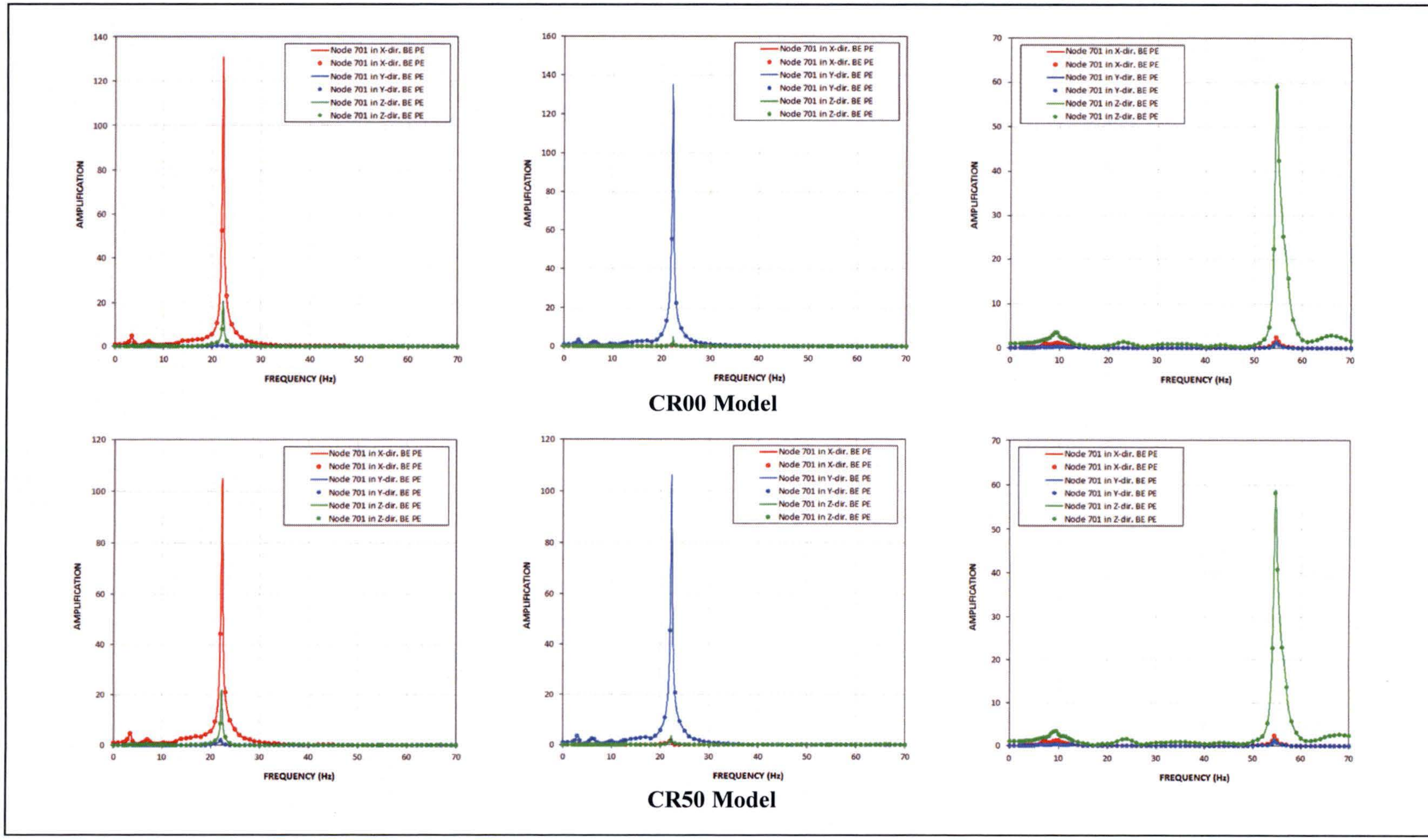
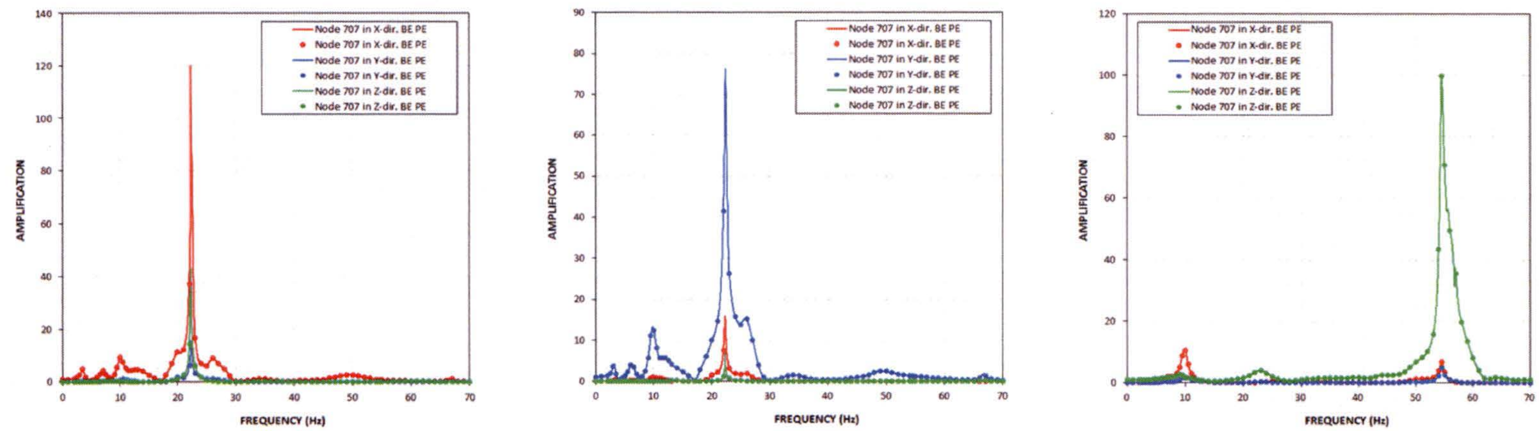
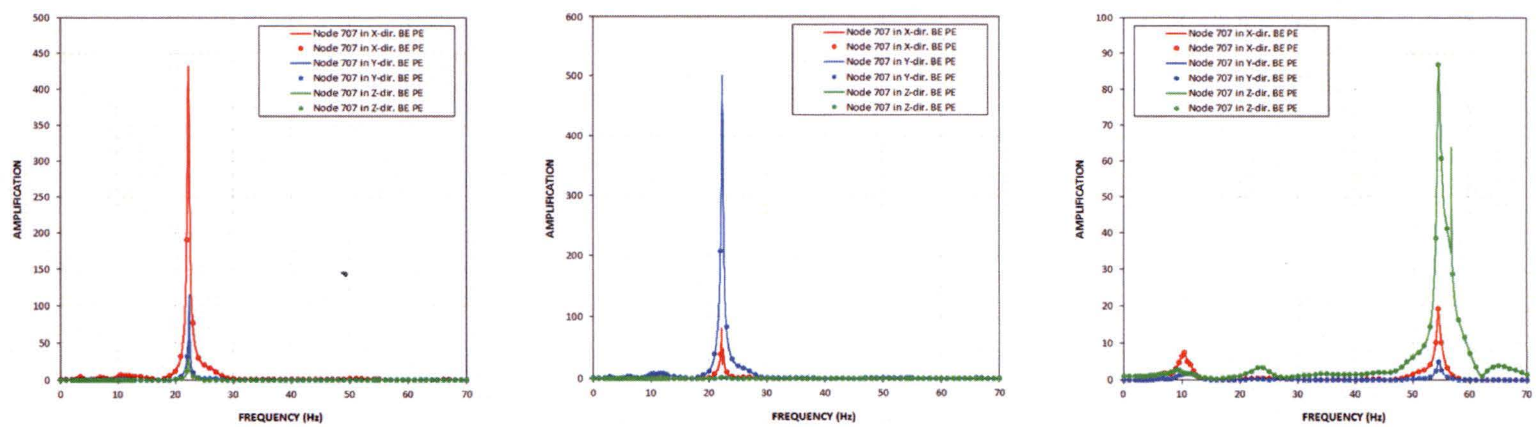


Figure B.3-3 Transfer Functions of Vent Wall Top Response from Analysis of BE Partial Column Profile



CR00 Model



CR50 Model

Figure B.3-4 Transfer Functions of RSW Top Response from Analysis of BE Partial Column Profile

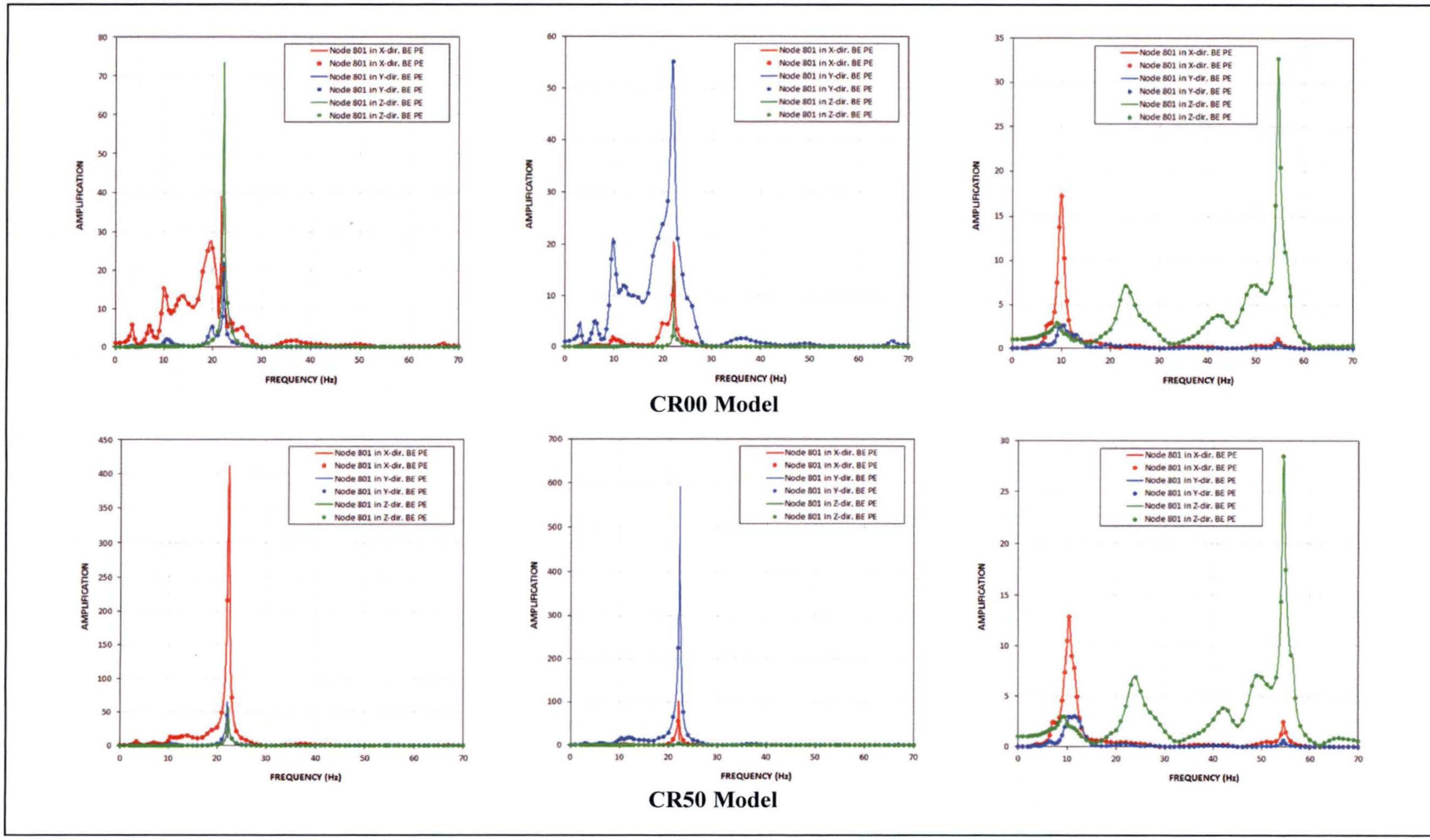


Figure B.3-5 Transfer Functions of RPV Top Response from Analysis of BE Partial Column Profile

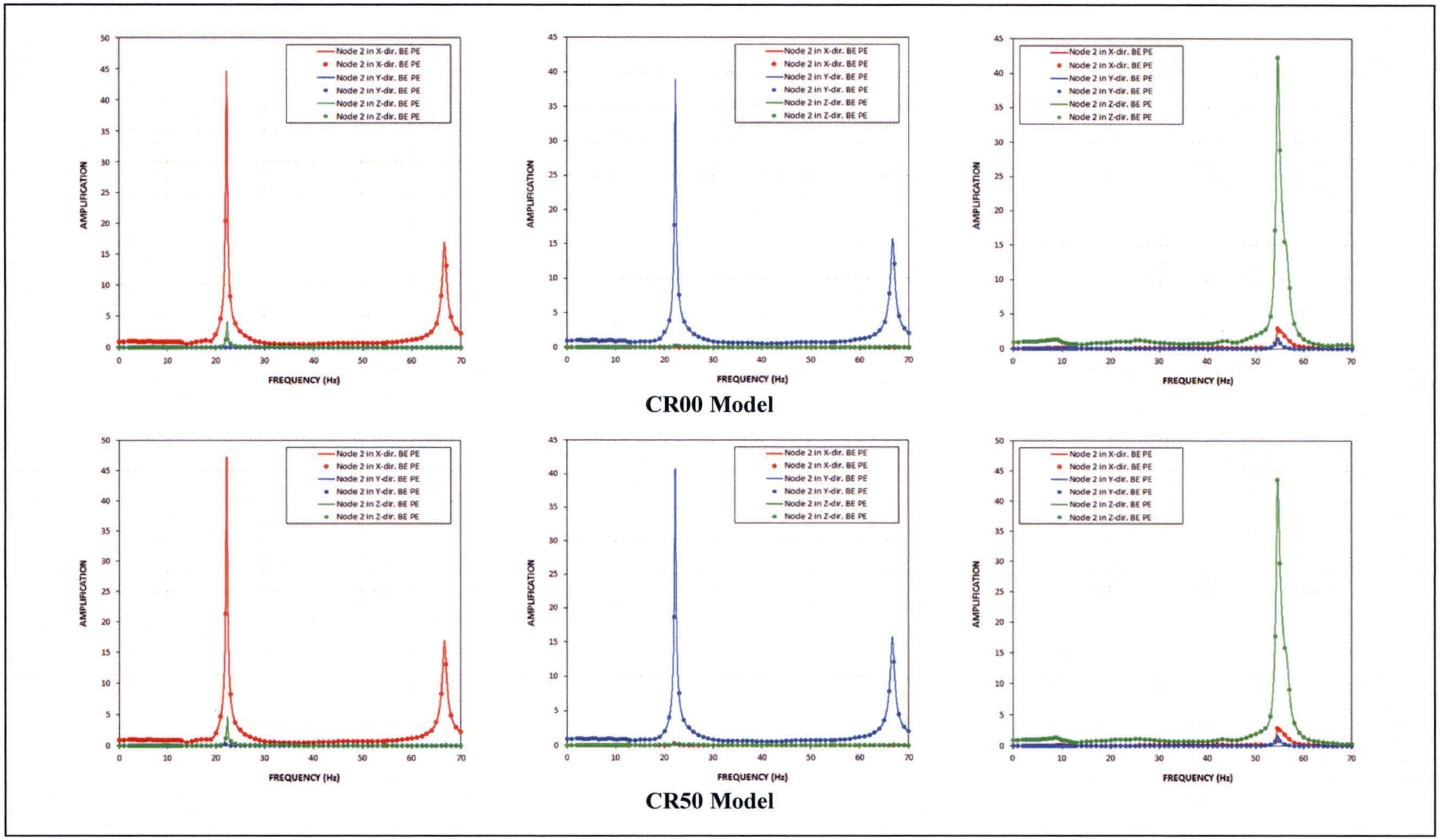


Figure B.3-6 Transfer Functions of RB/FB Basemat Response from Analysis of BE Partial Column Profile

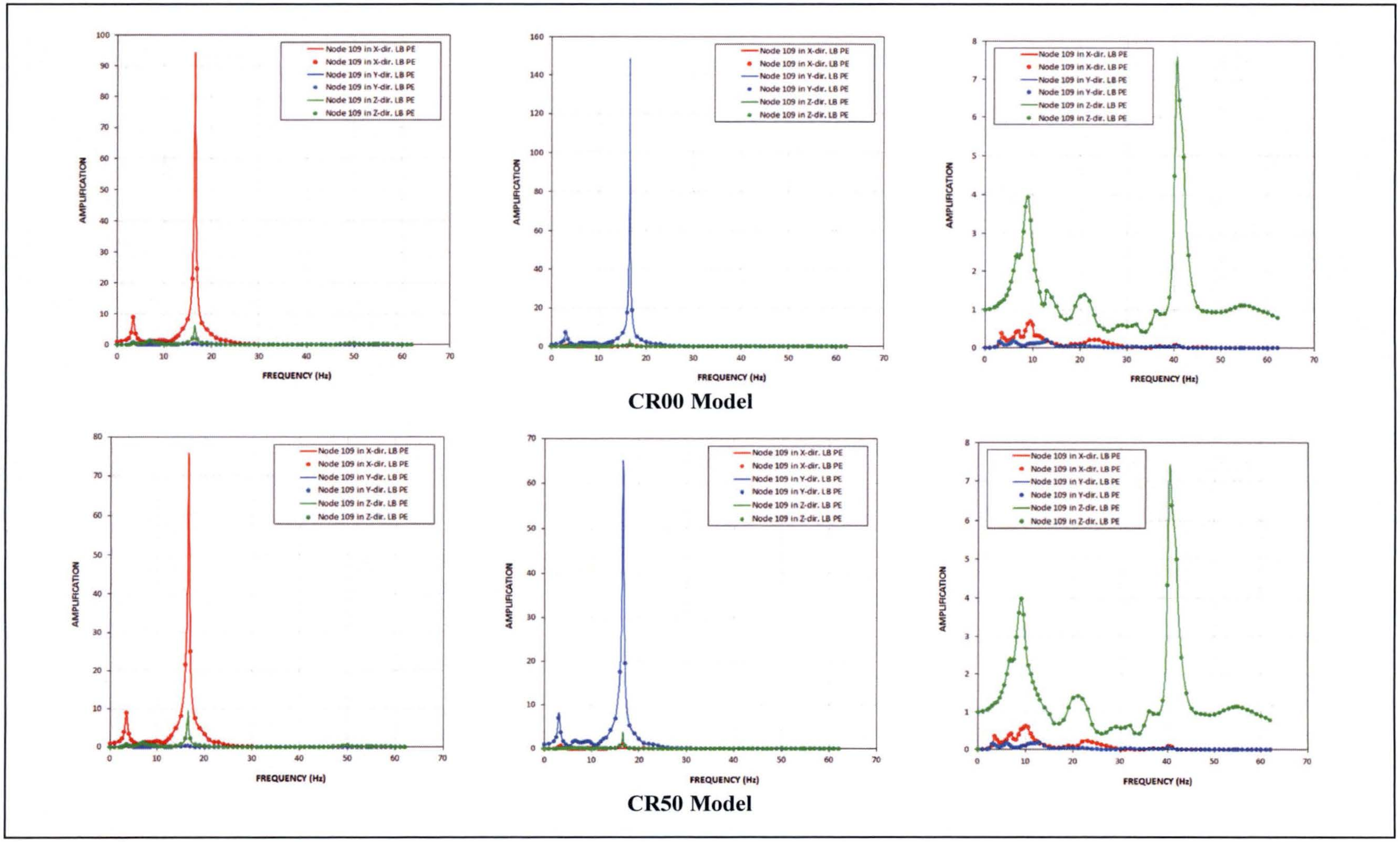


Figure B.3-7 Transfer Functions of RB/FB Refueling Floor Response from Analysis of LB Partial Column Profile

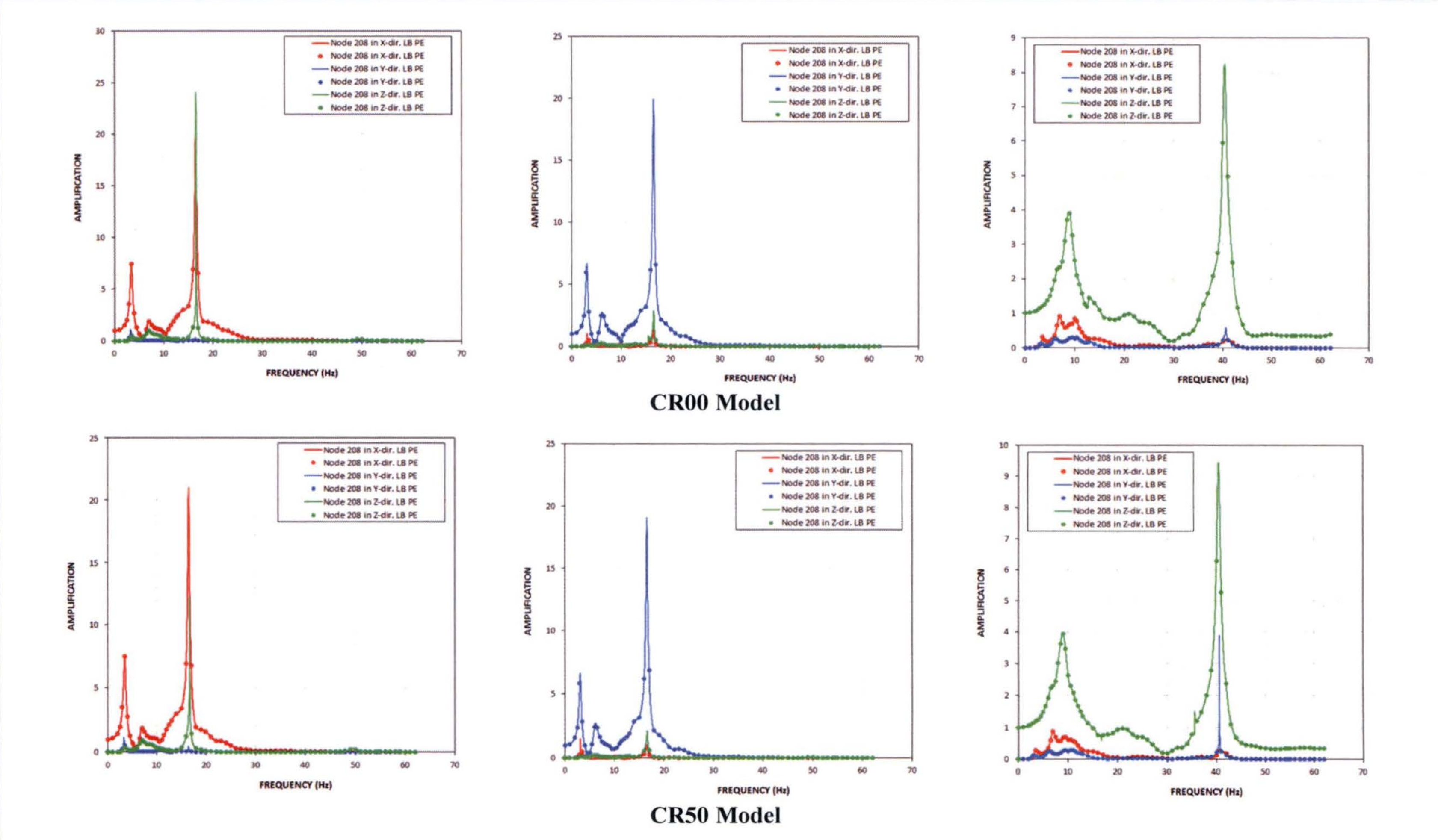


Figure B.3-8 Transfer Functions of RCCV Top Slab Response from Analysis of LB Partial Column Profile

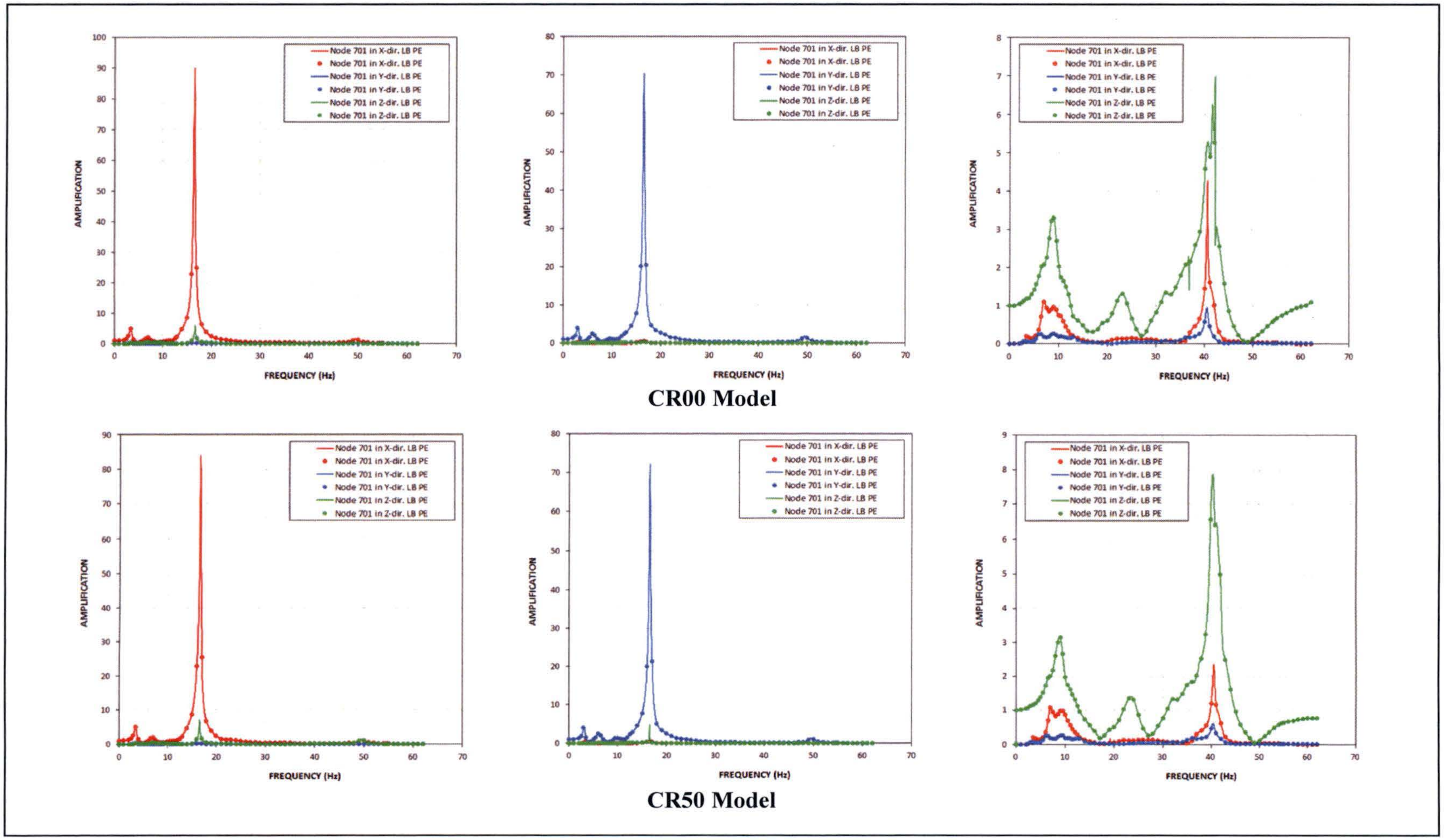


Figure B.3-9 Transfer Functions of Vent Wall Top Response from Analysis of LB Partial Column Profile

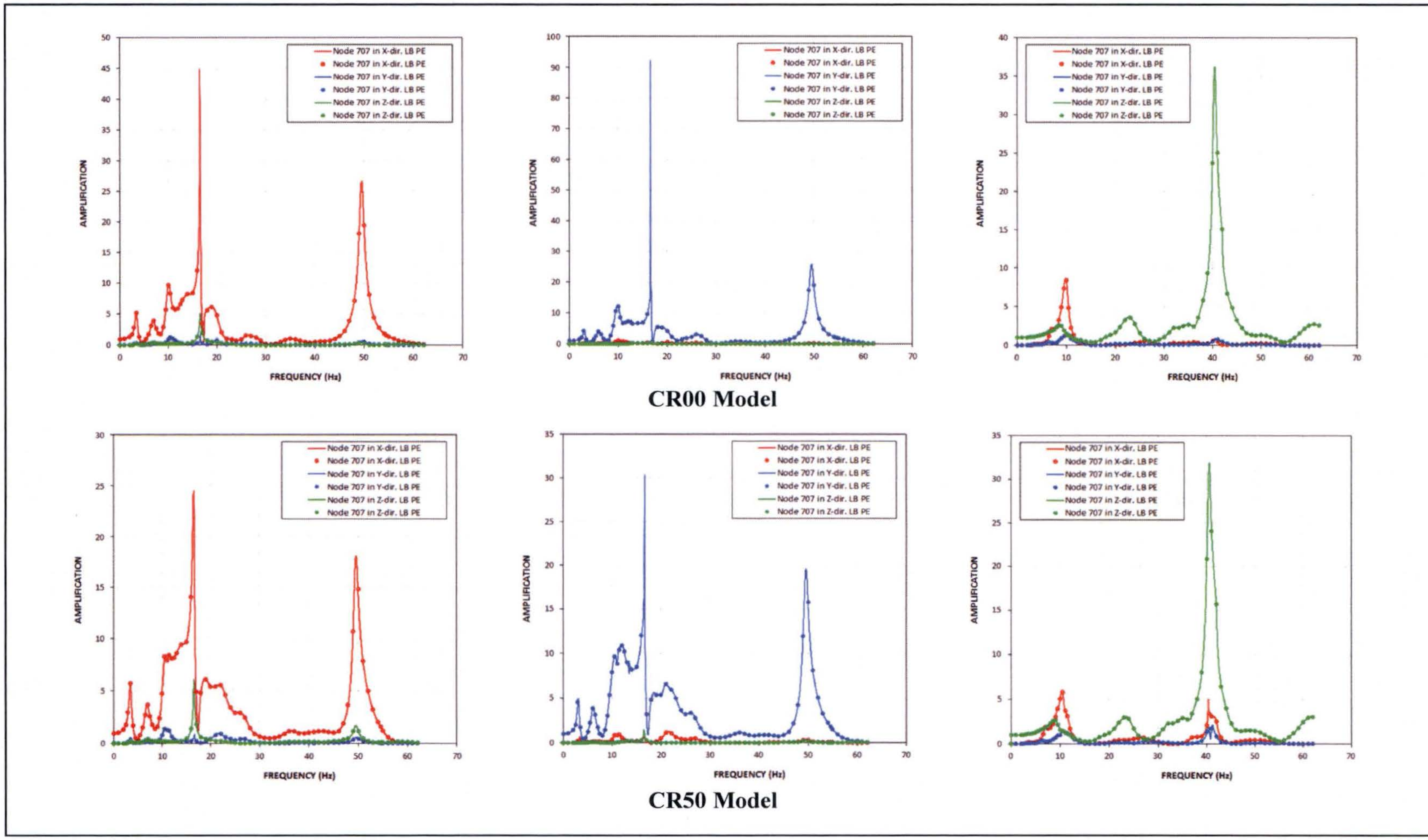
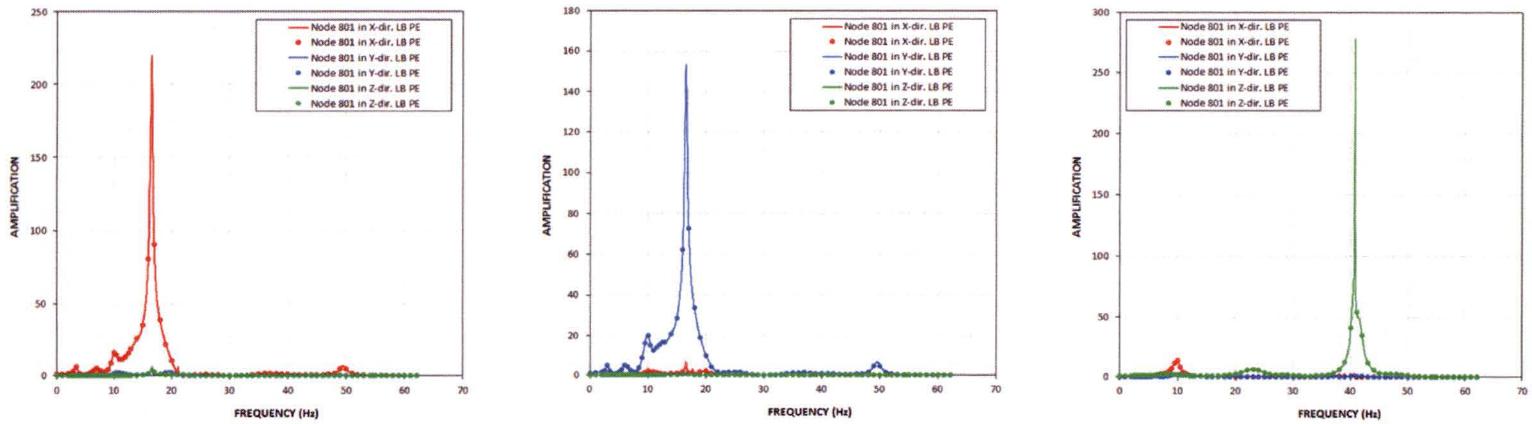
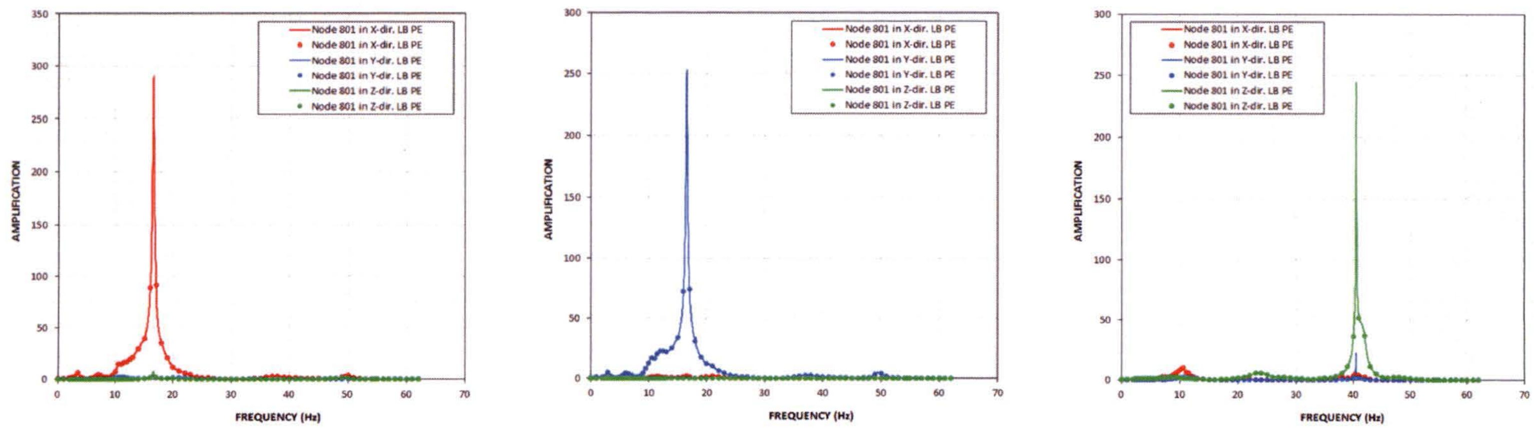


Figure B.3-10 Transfer Functions of RSW Top Response from Analysis of LB Partial Column Profile



CR00 Model



CR50 Model

Figure B.3-11 Transfer Functions of RPV Top Response from Analysis of LB Partial Column Profile

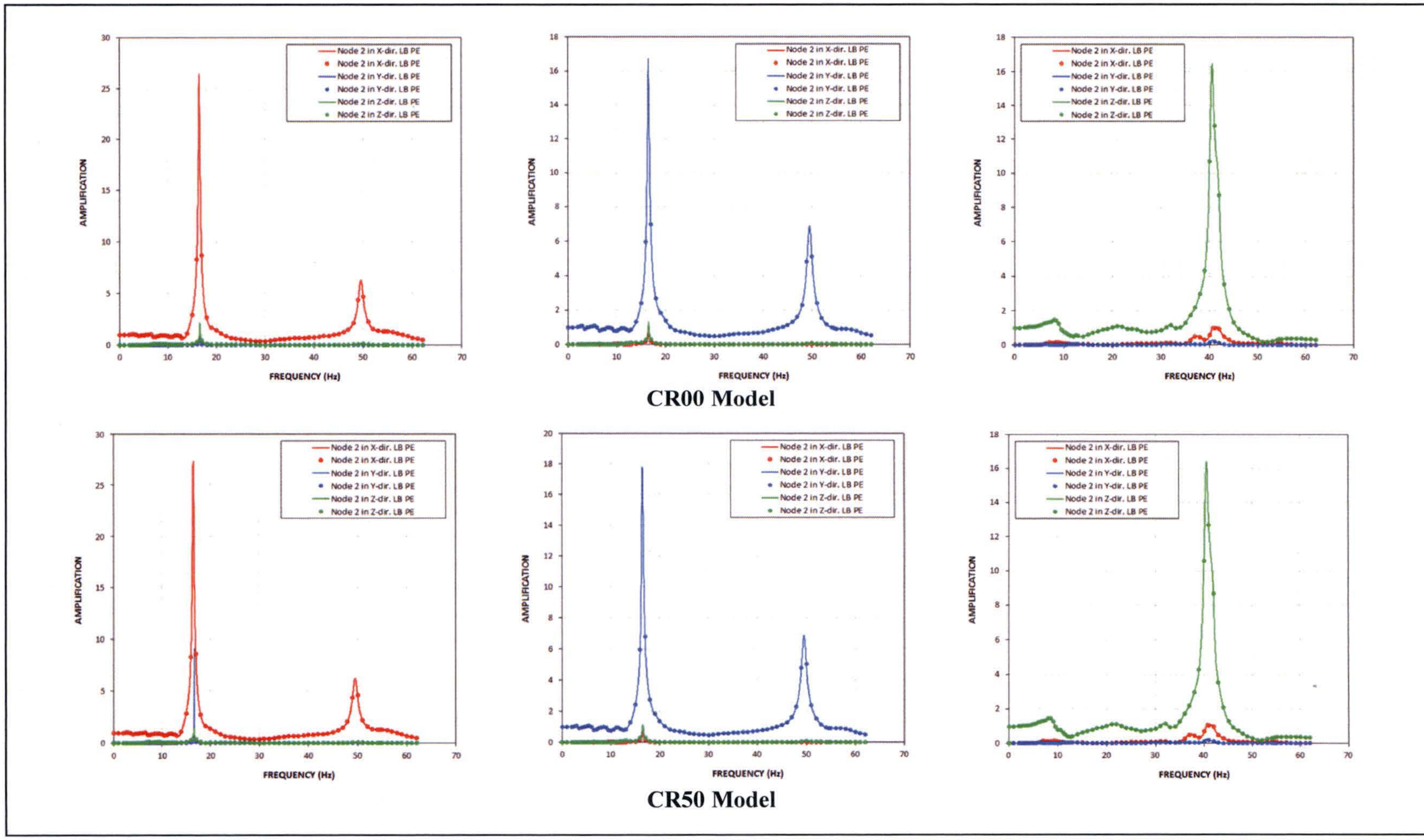


Figure B.3-12 Transfer Functions of RB/FB Basemat Response from Analysis of LB Partial Column Profile

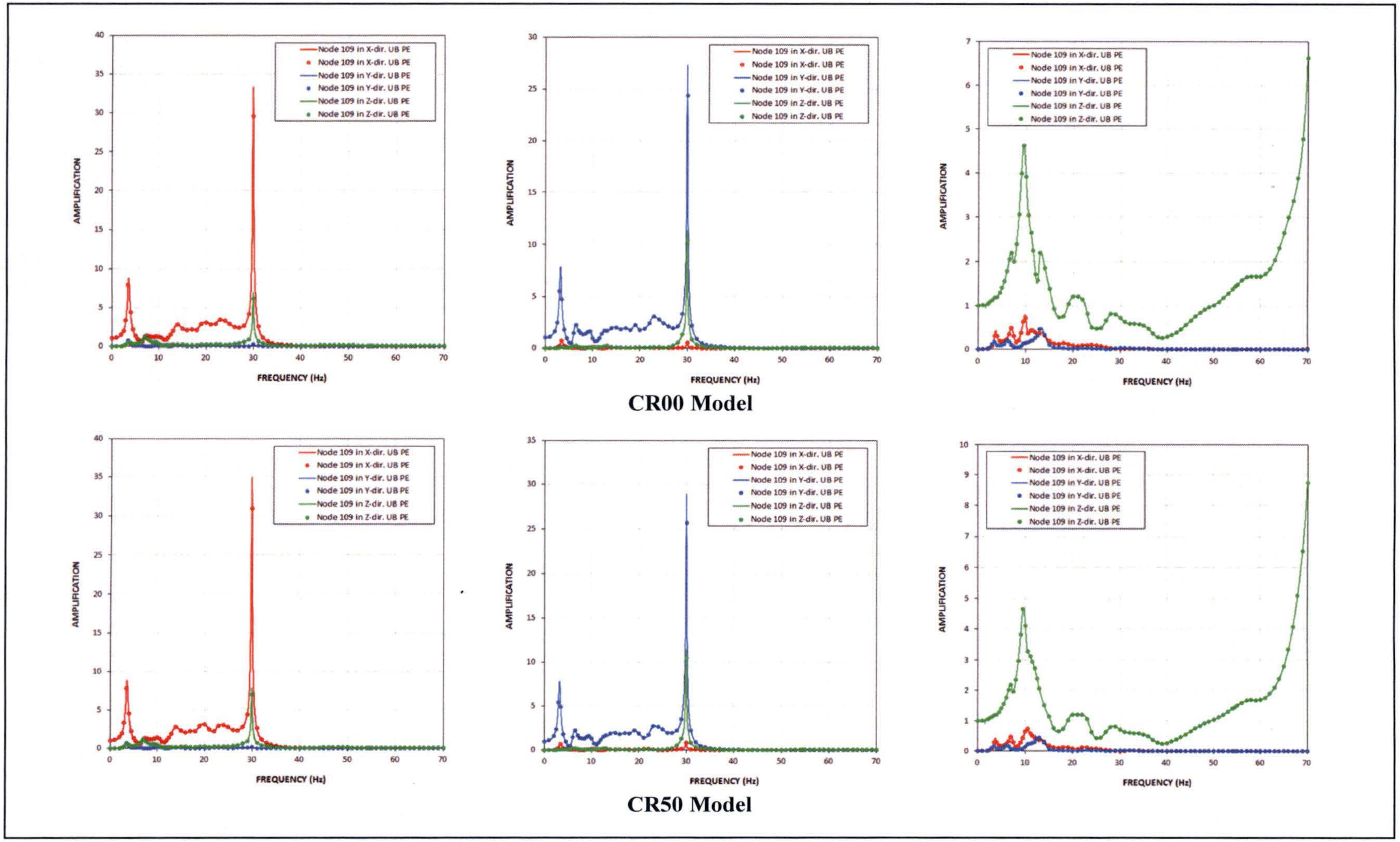


Figure B.3-13 Transfer Functions of RB/FB Refueling Floor Response from Analysis of UB Partial Column

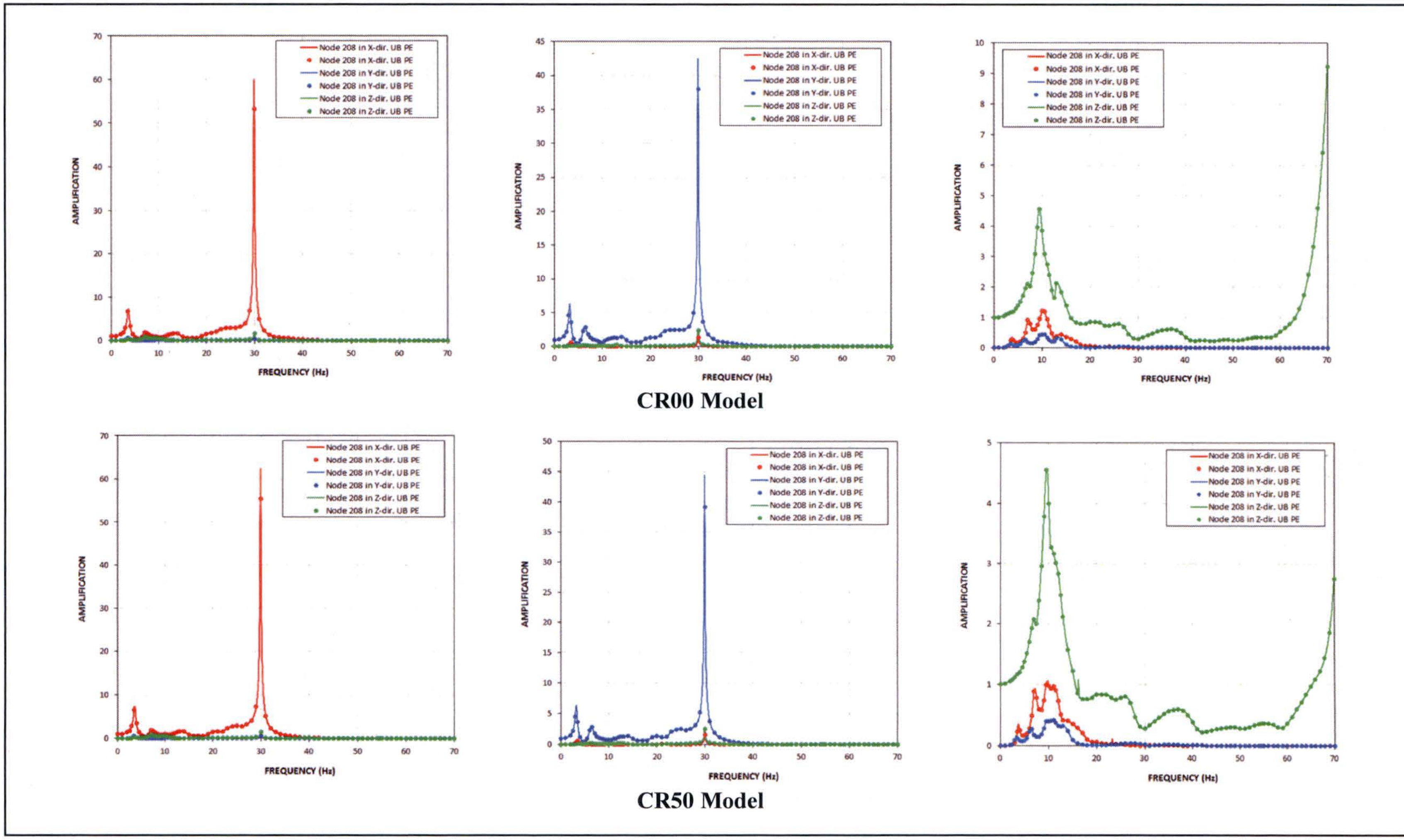


Figure B.3-14 Transfer Functions of RCCV Top Slab Response from Analysis of UB Partial Column Profile

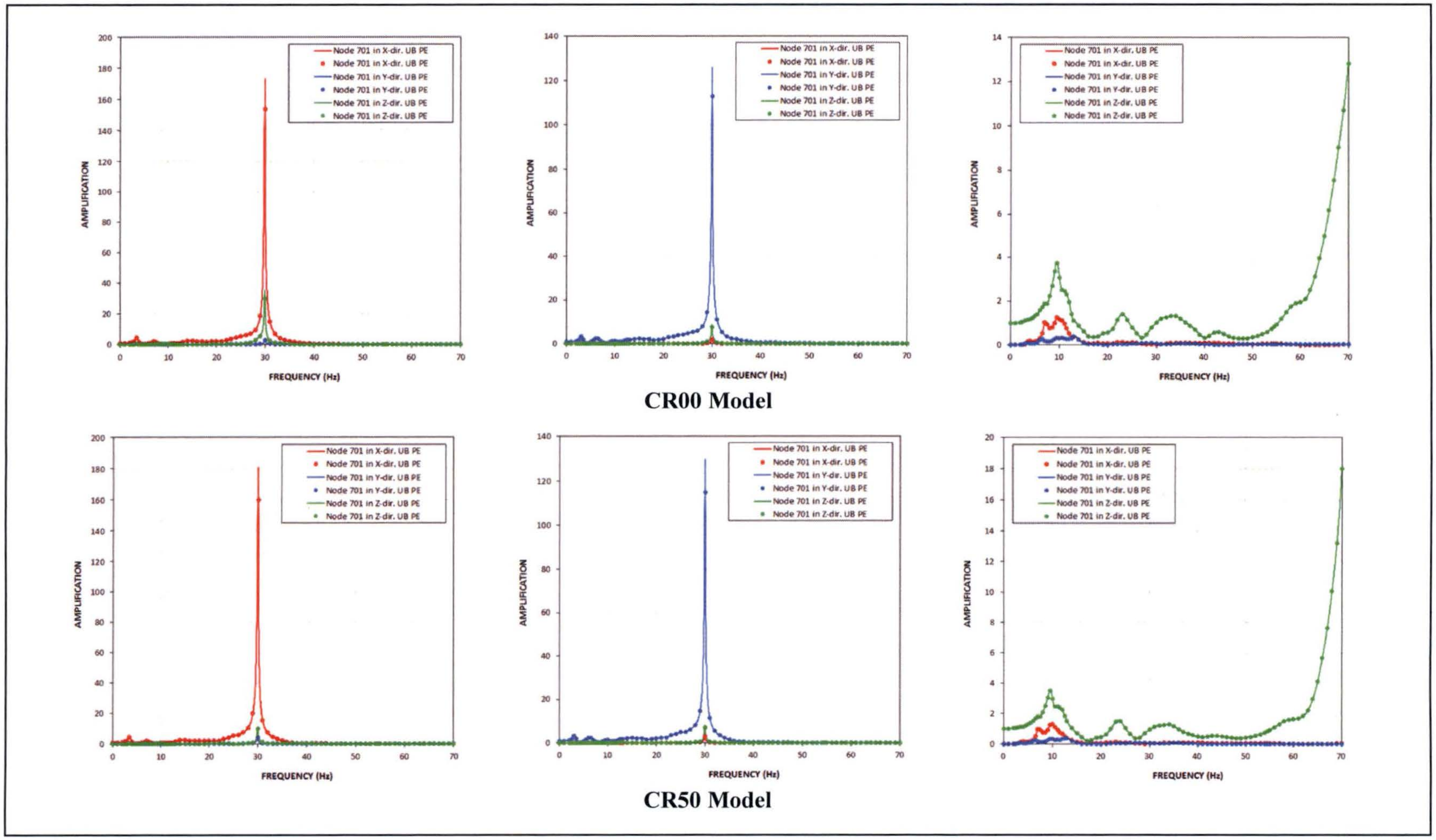


Figure B.3-15 Transfer Functions of Vent Wall Top Response from Analysis of UB Partial Column Profile

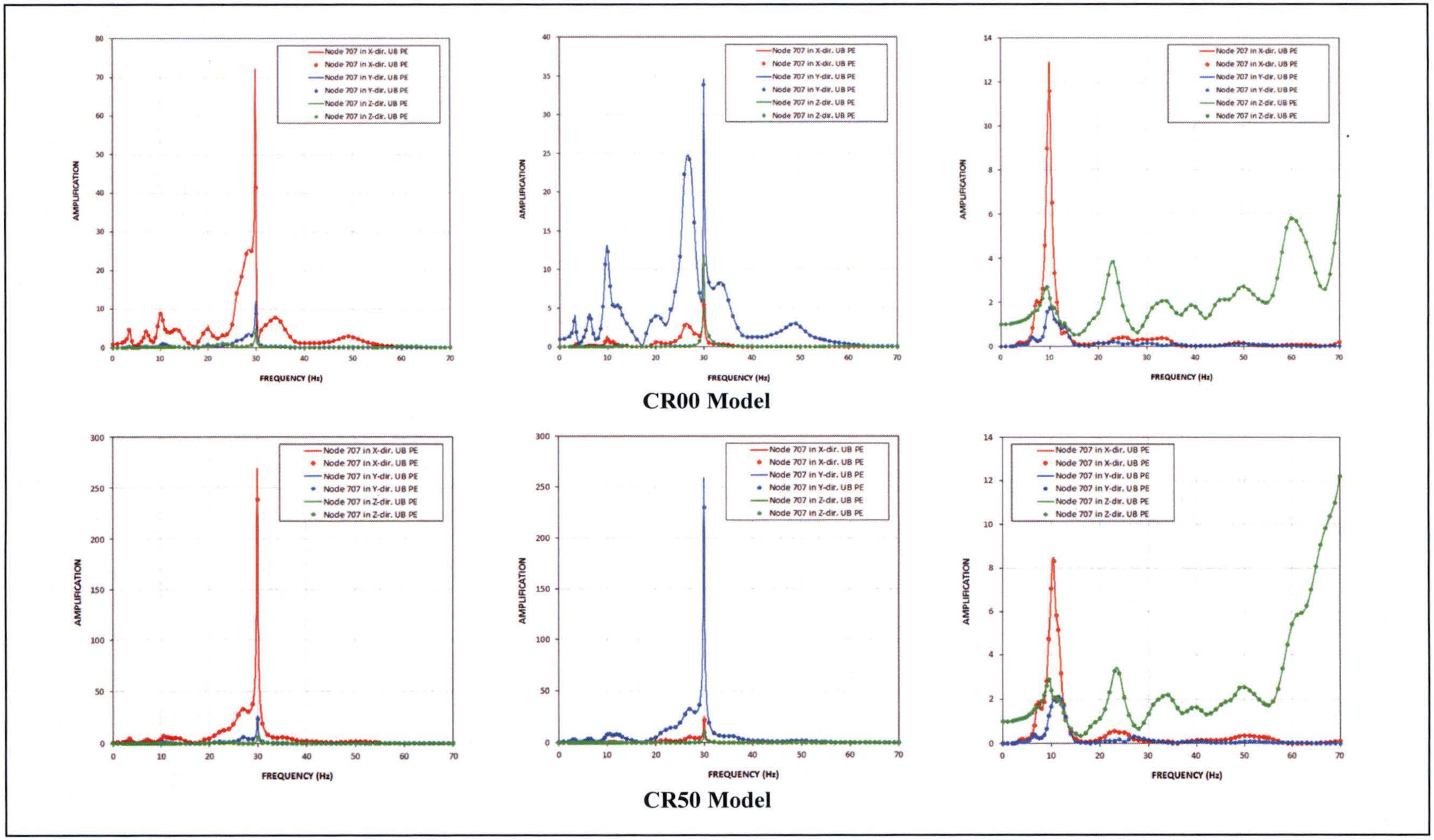


Figure B.3-16 Transfer Functions of RSW Top Response from Analysis of UB Partial Column

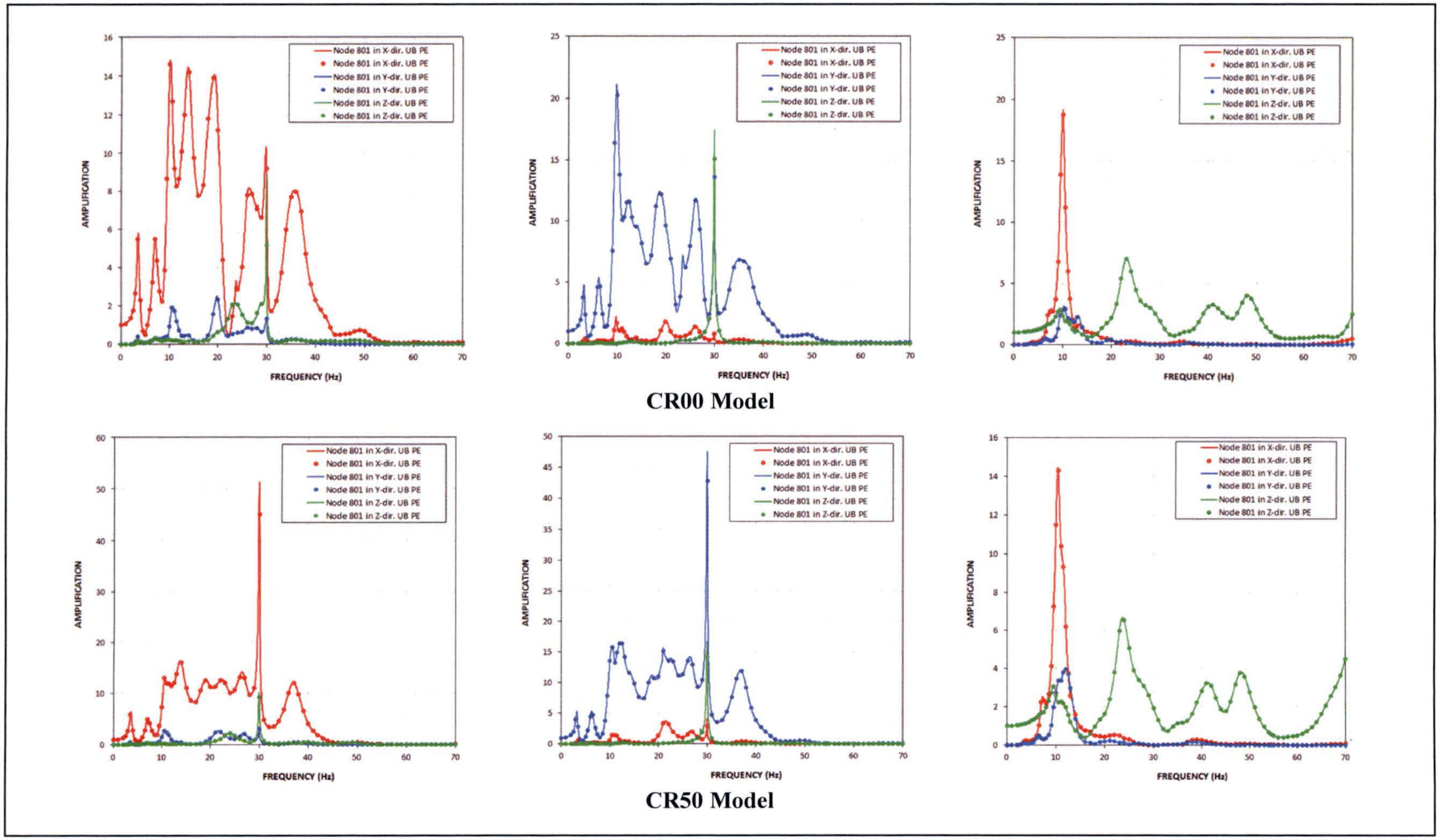
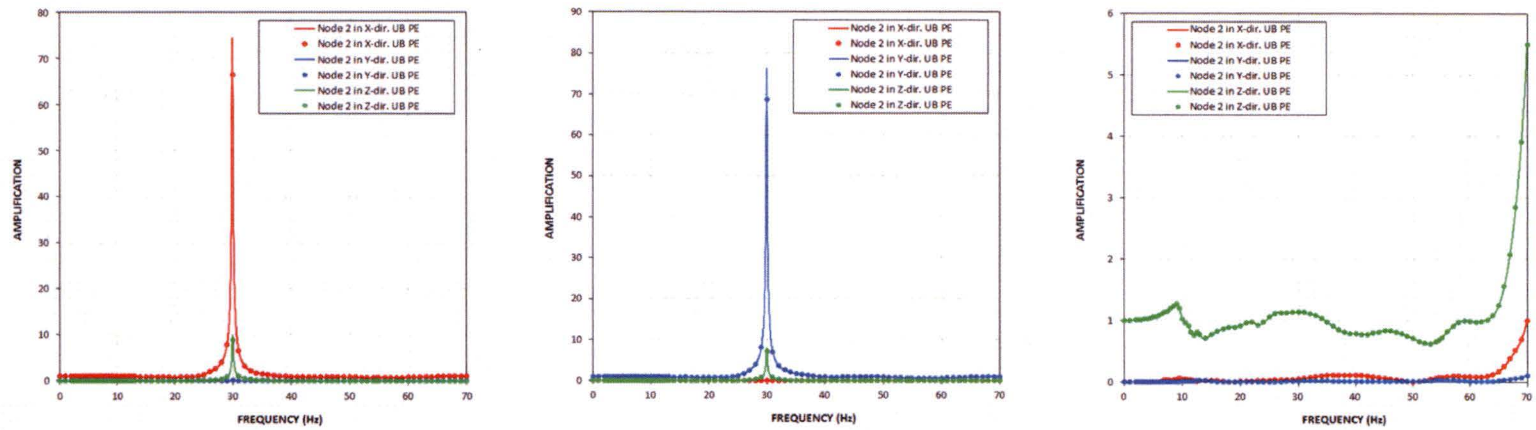
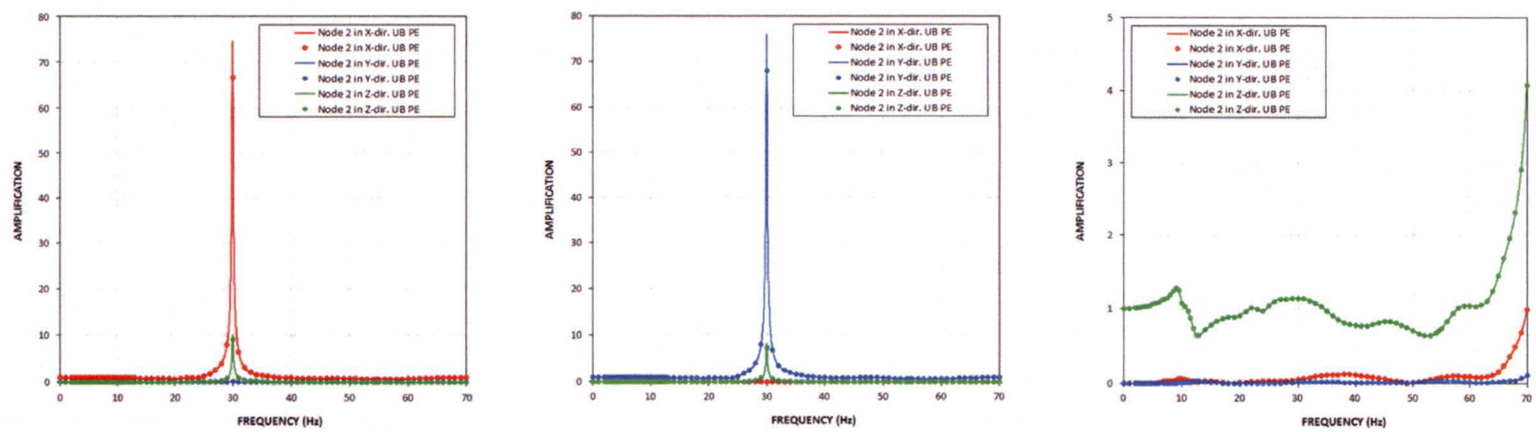


Figure B.3-17 Transfer Functions of RPV Top Response from Analysis of UB Partial Column Profile



CR00 Model



CR50 Model

Figure B.3-18 Transfer Functions of RB/FB Basemat Response from Analysis of UB Partial Column Profile

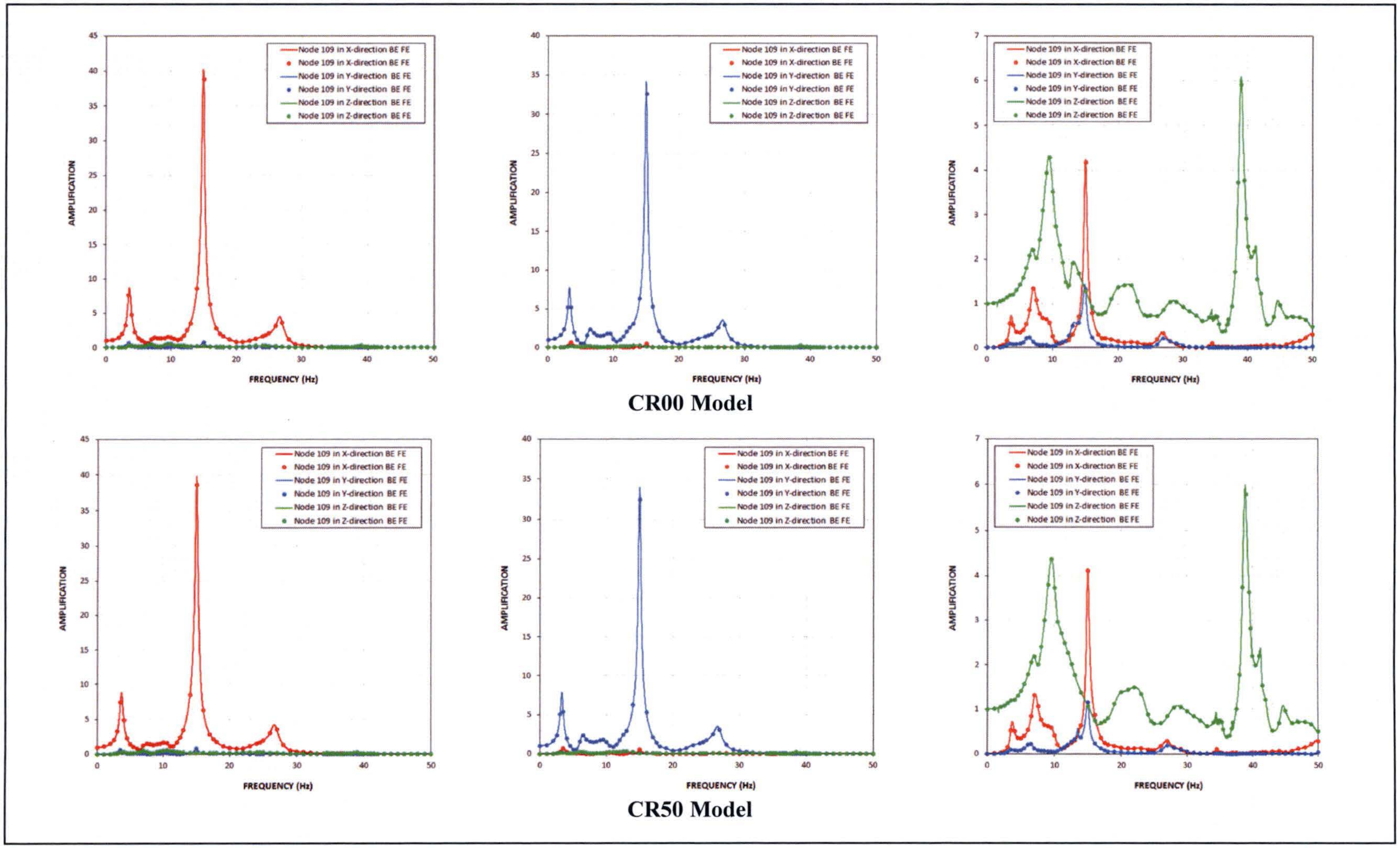
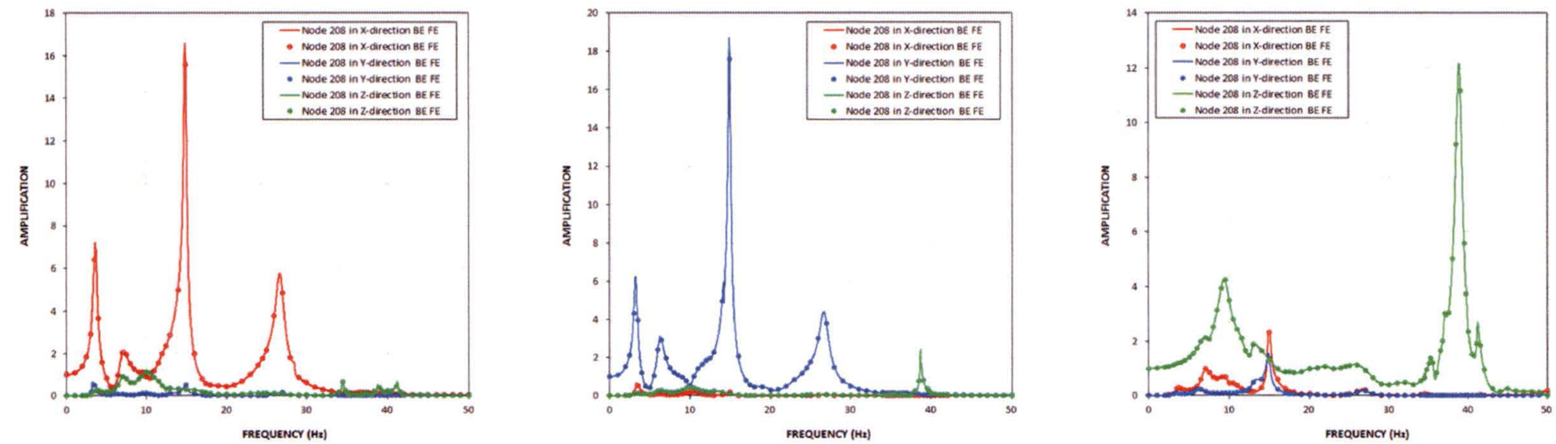
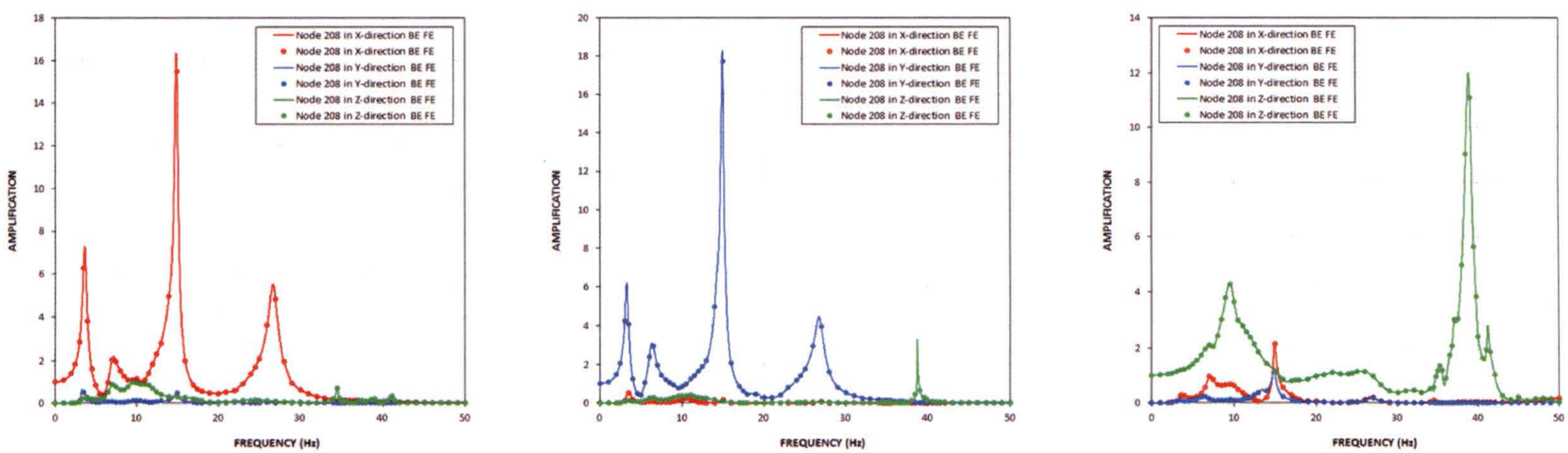


Figure B.3-19 Transfer Functions of RB/FB Refueling Floor Response from Analysis of BE Full Column Profile



CR00 Model



CR50 Model

Figure B.3-20 Transfer Functions of RCCV Top Slab Response from Analysis of BE Full Column Profile

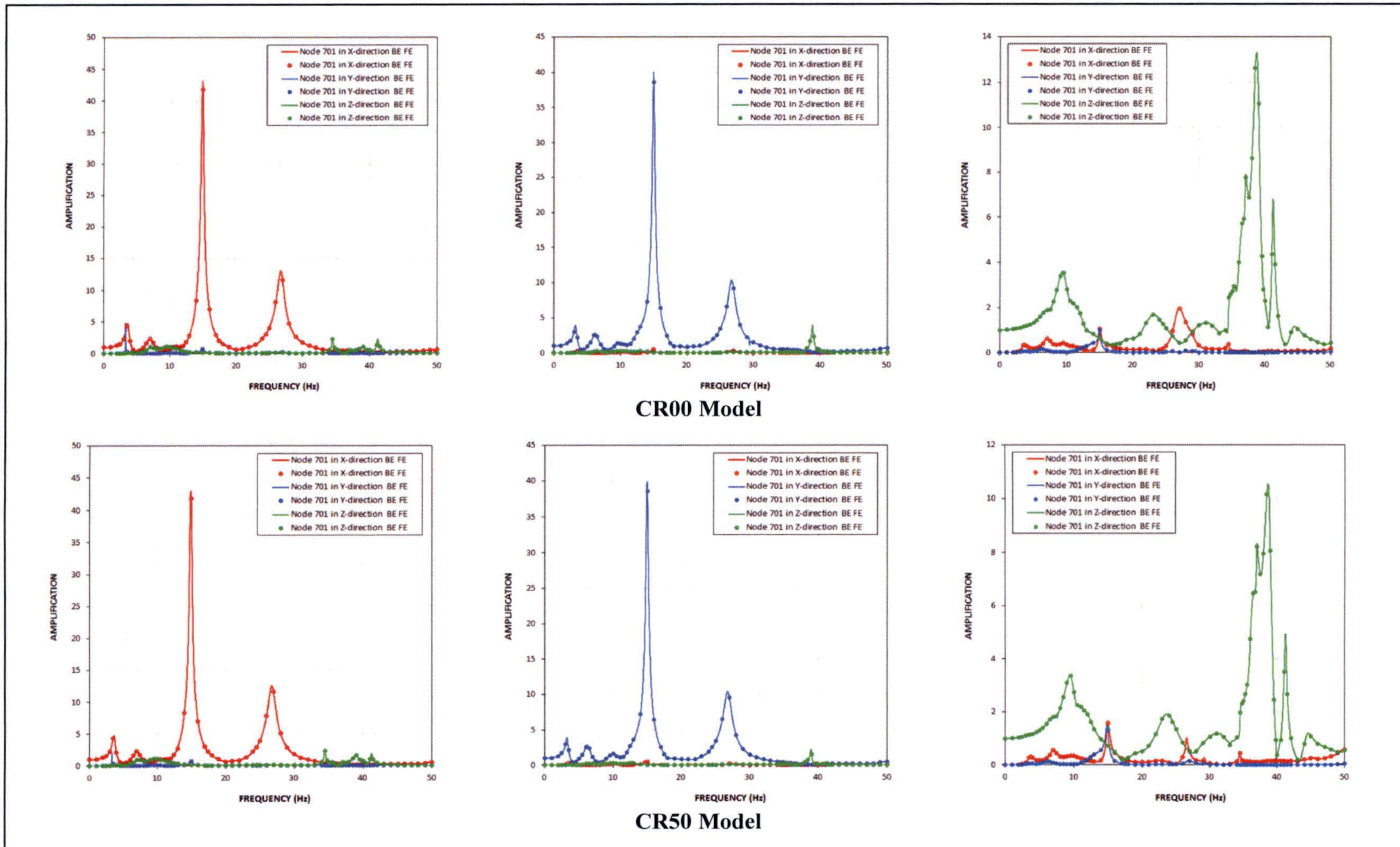


Figure B.3-21 Transfer Functions of Vent Wall Top Response from Analysis of BE Full Column Profile

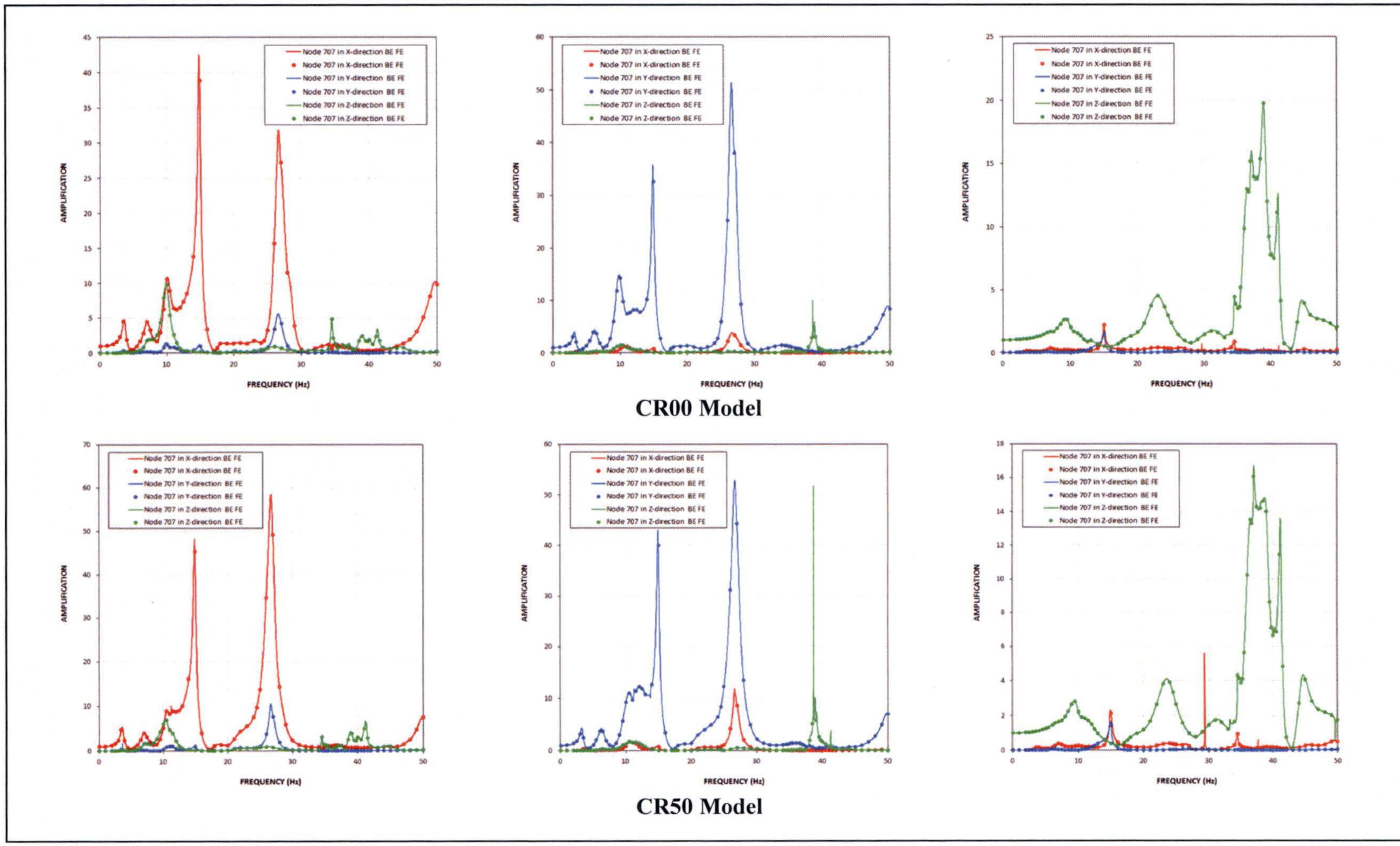
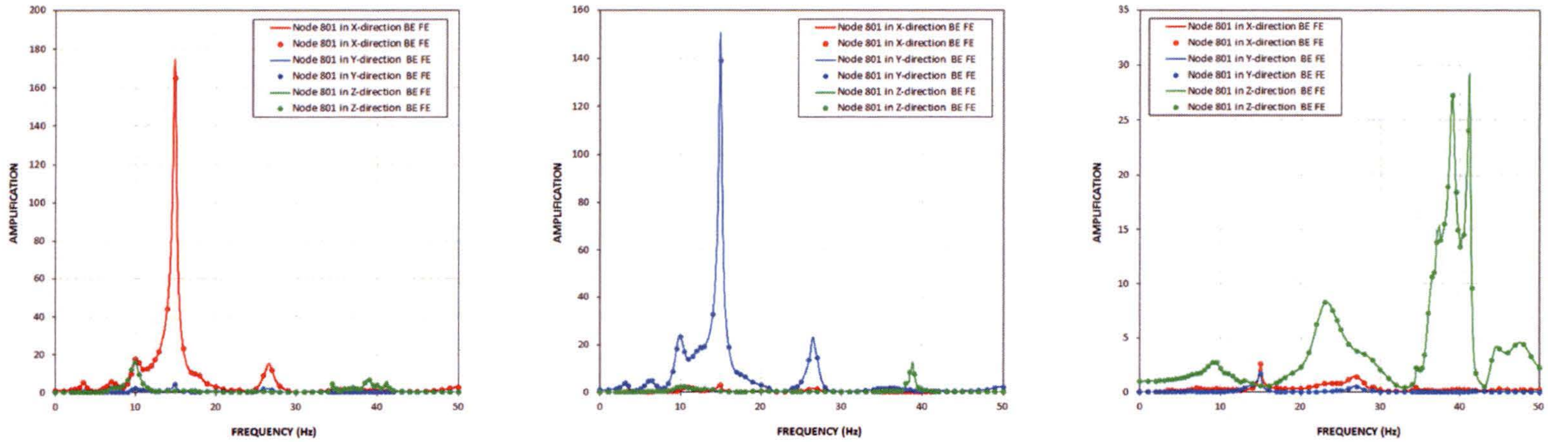
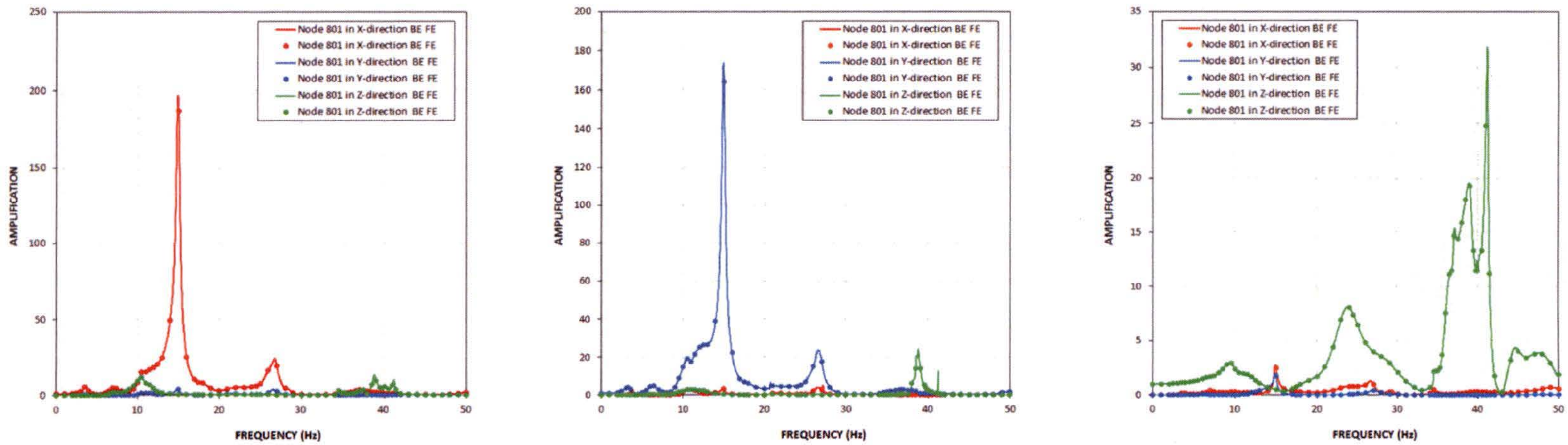


Figure B.3-22 Transfer Functions of RSW Top Response from Analysis of BE Full Column Profile

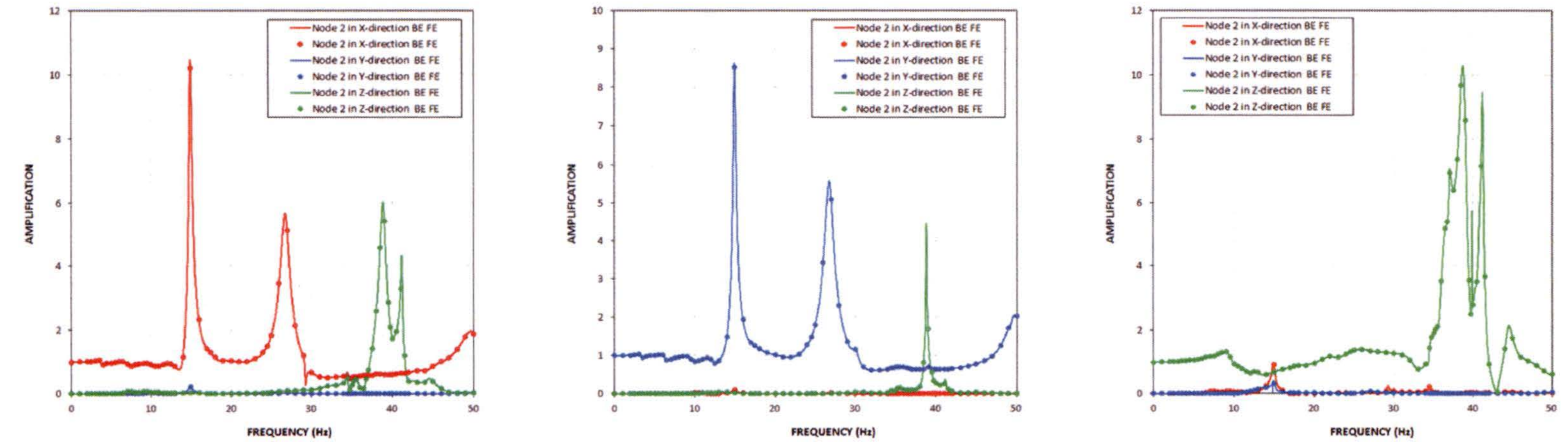


CR00 Model

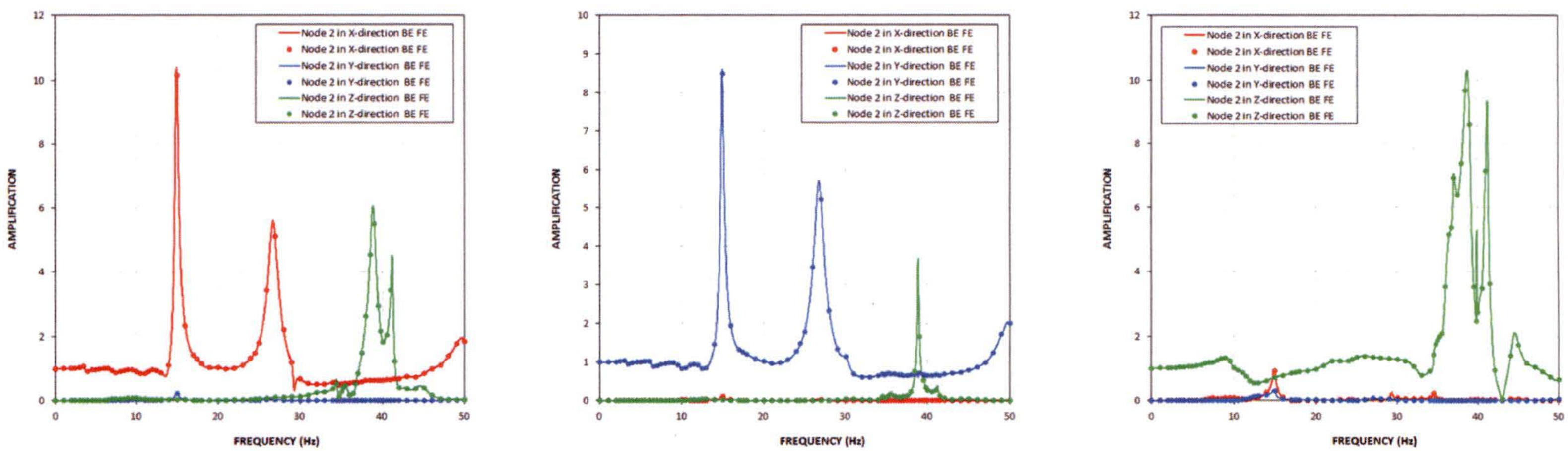


CR50 Model

Figure B.3-23 Transfer Functions of RPV Top Response from Analysis of BE Full Column Profile

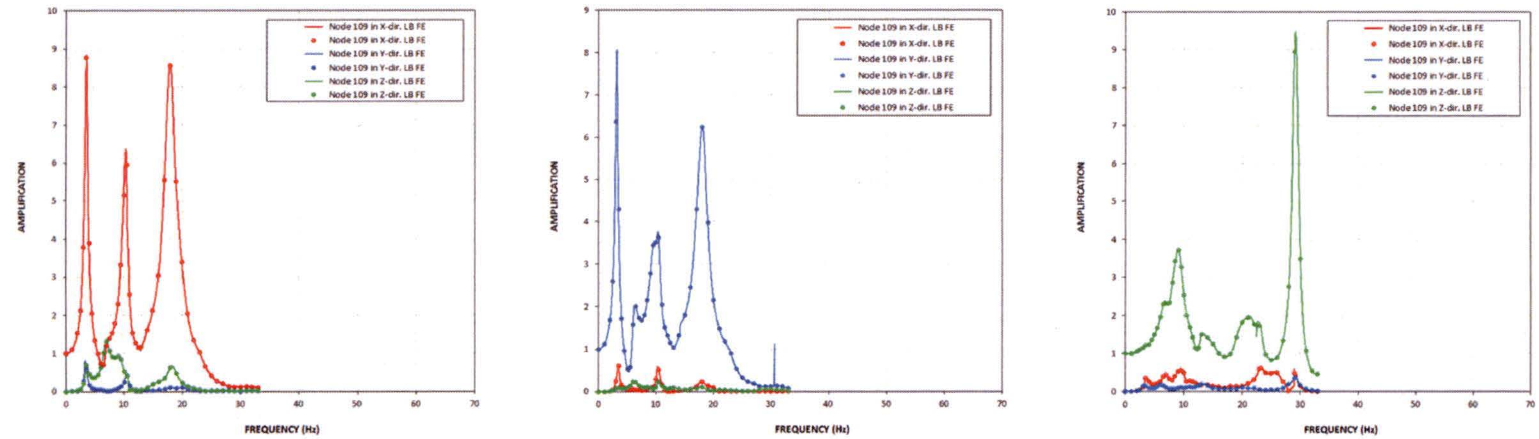


CR00 Model

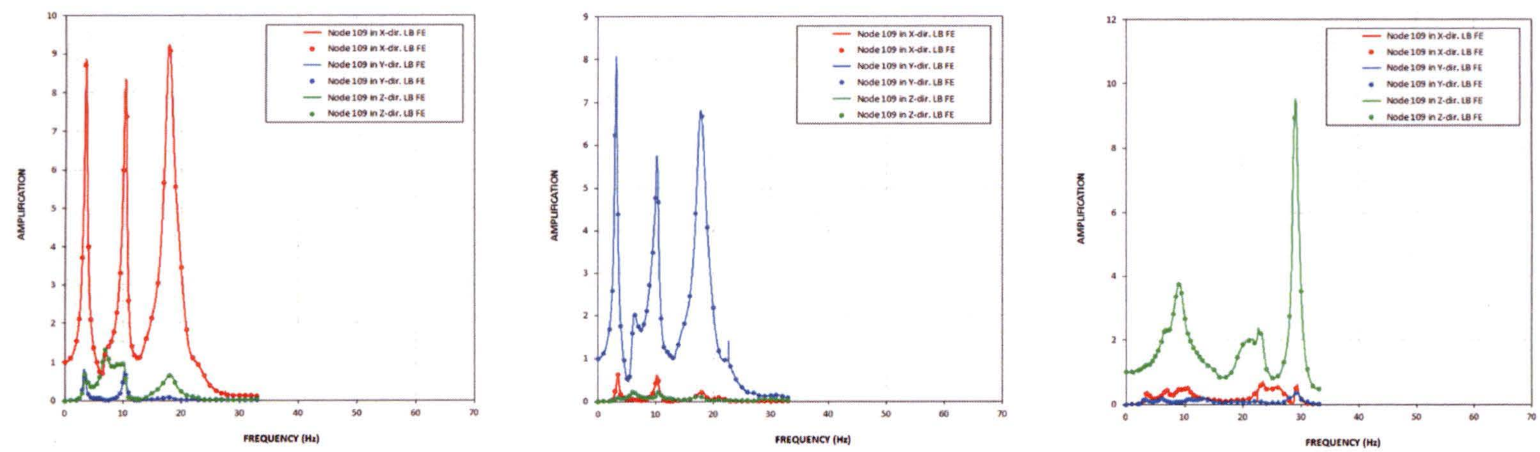


CR50 Model

Figure B.3-24 Transfer Functions of RB/FB Basemat Response from Analysis of BE Full Column Profile



CR00 Model



CR50 Model

Figure B.3-25 Transfer Functions of RB/FB Refueling Floor Response from Analysis of LB Full Column Profile

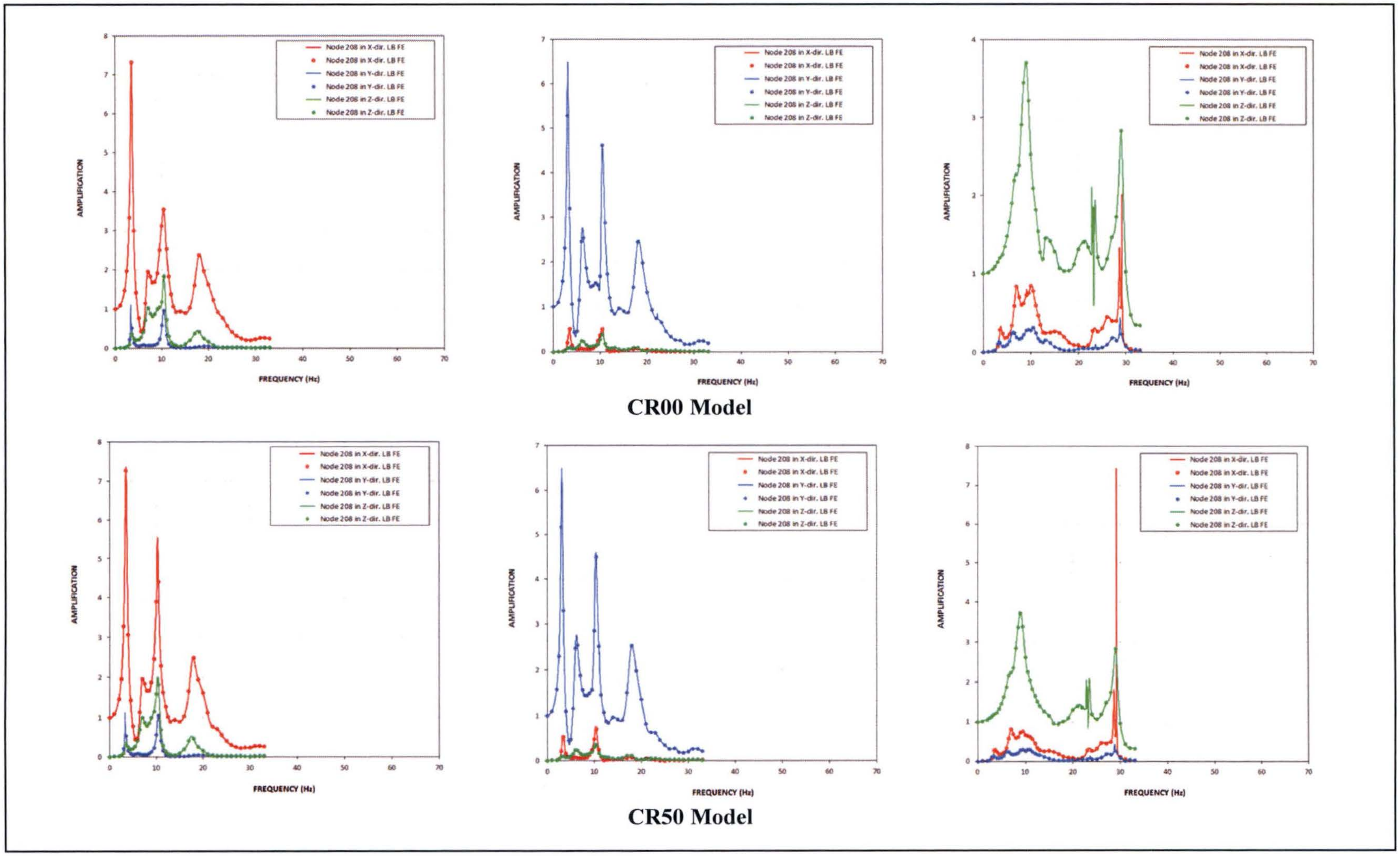


Figure B.3-26 Transfer Functions of RCCV Top Slab Response from Analysis of LB Full Column Profile

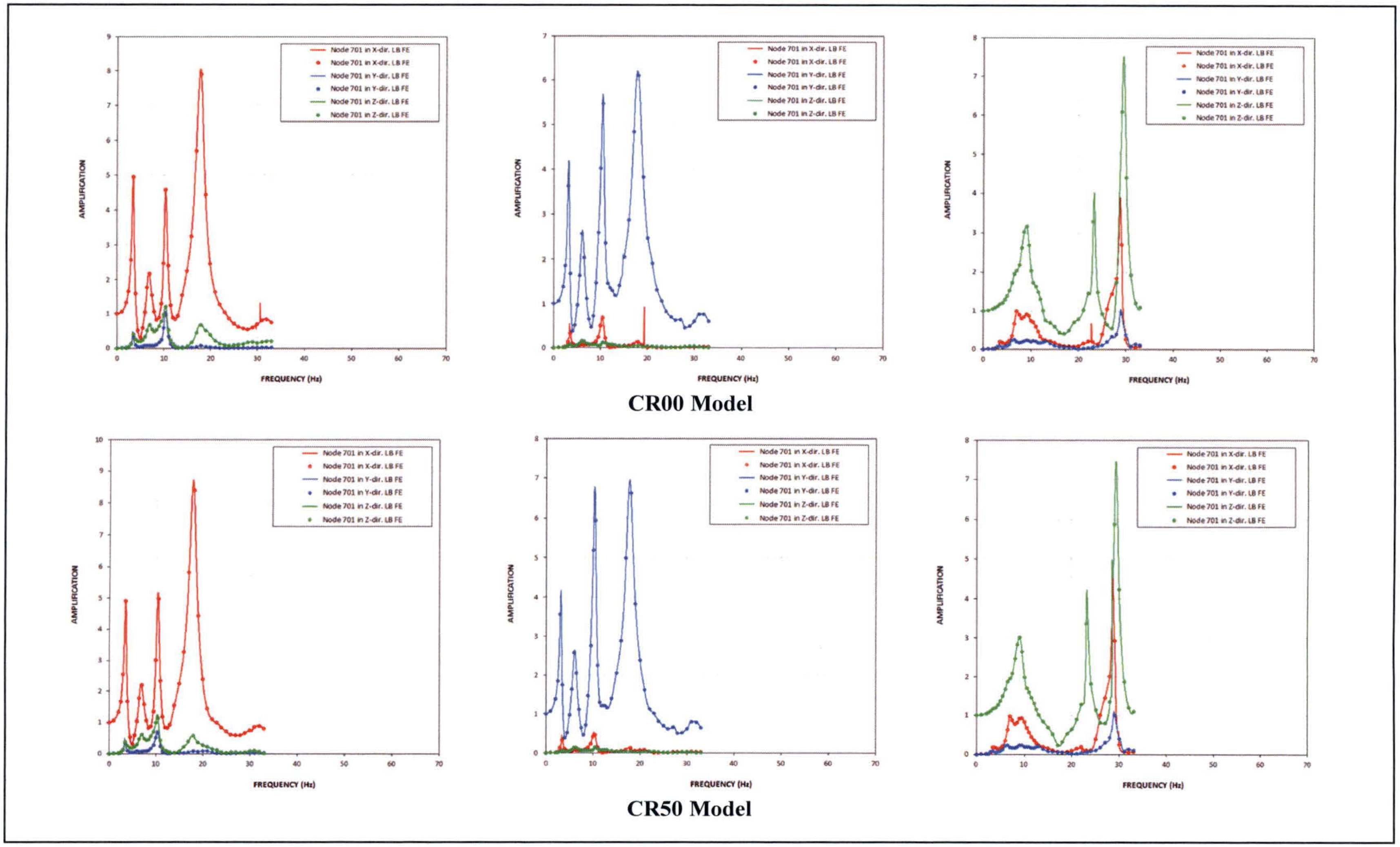


Figure B.3-27 Transfer Functions of Vent Wall Top Response from Analysis of LB Full Column Profile

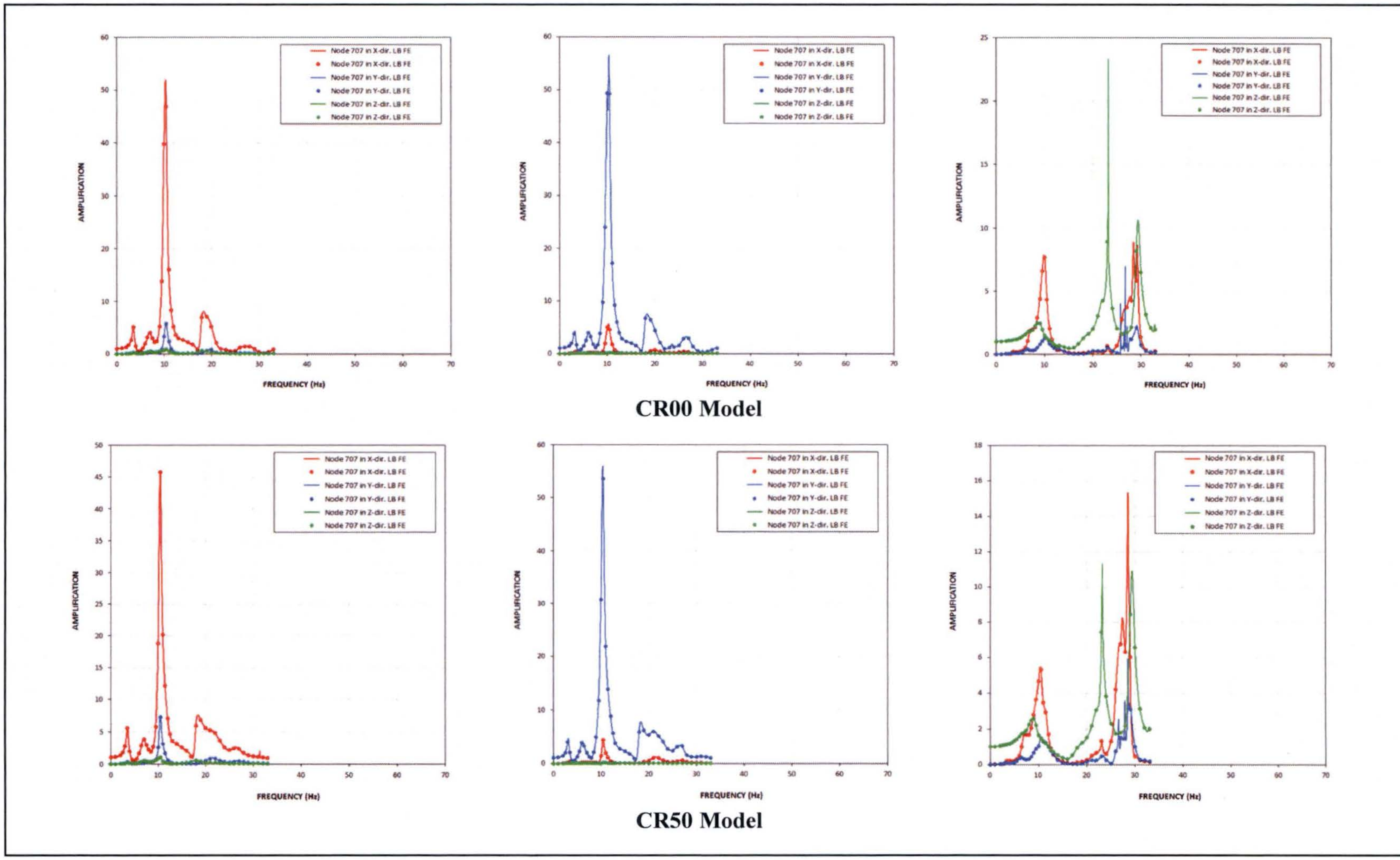


Figure B.3-28 Transfer Functions of RSW Top Response from Analysis of LB Full Column Profile

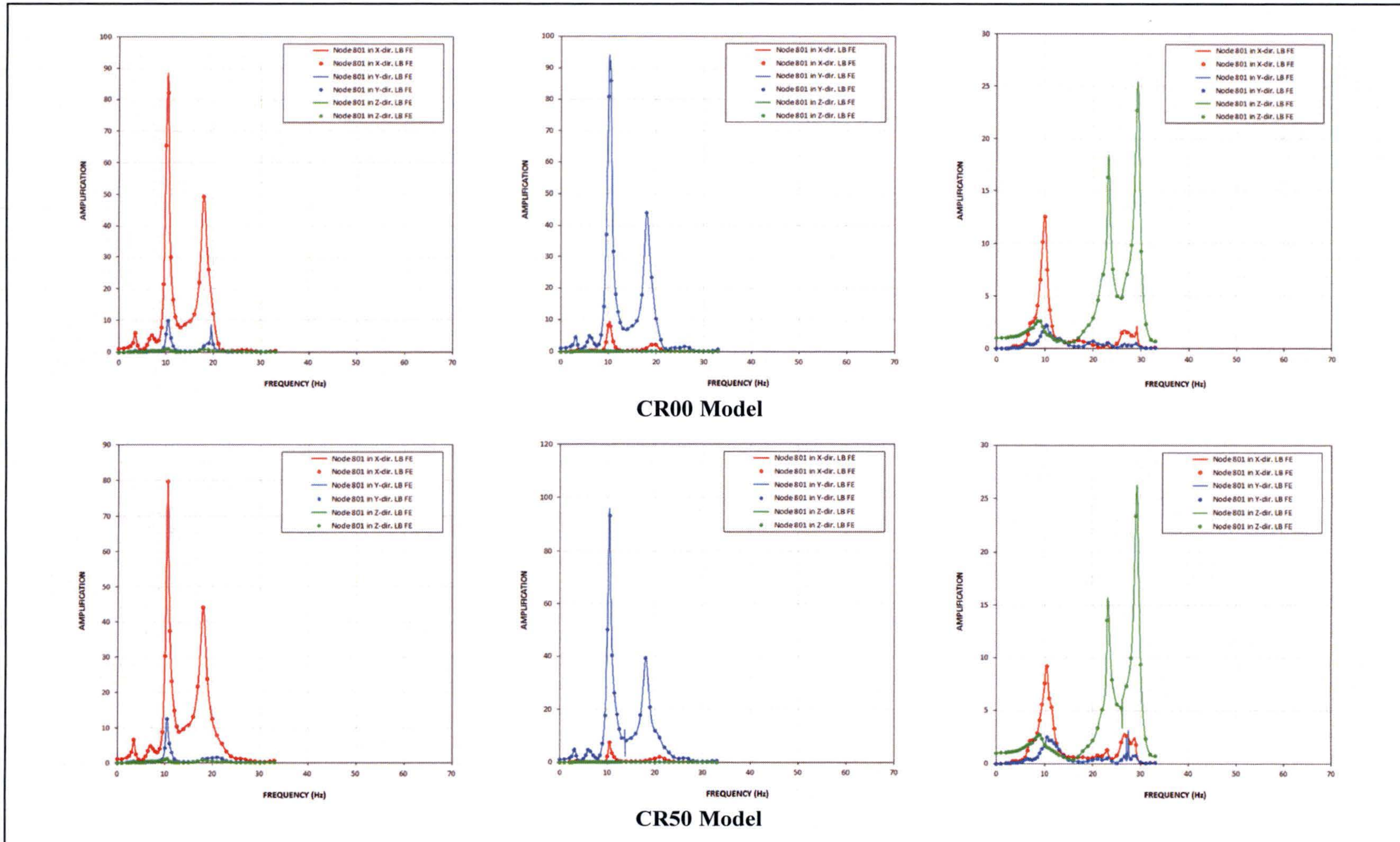


Figure B.3-29 Transfer Functions of RPV Top Response from Analysis of LB Full Column Profile

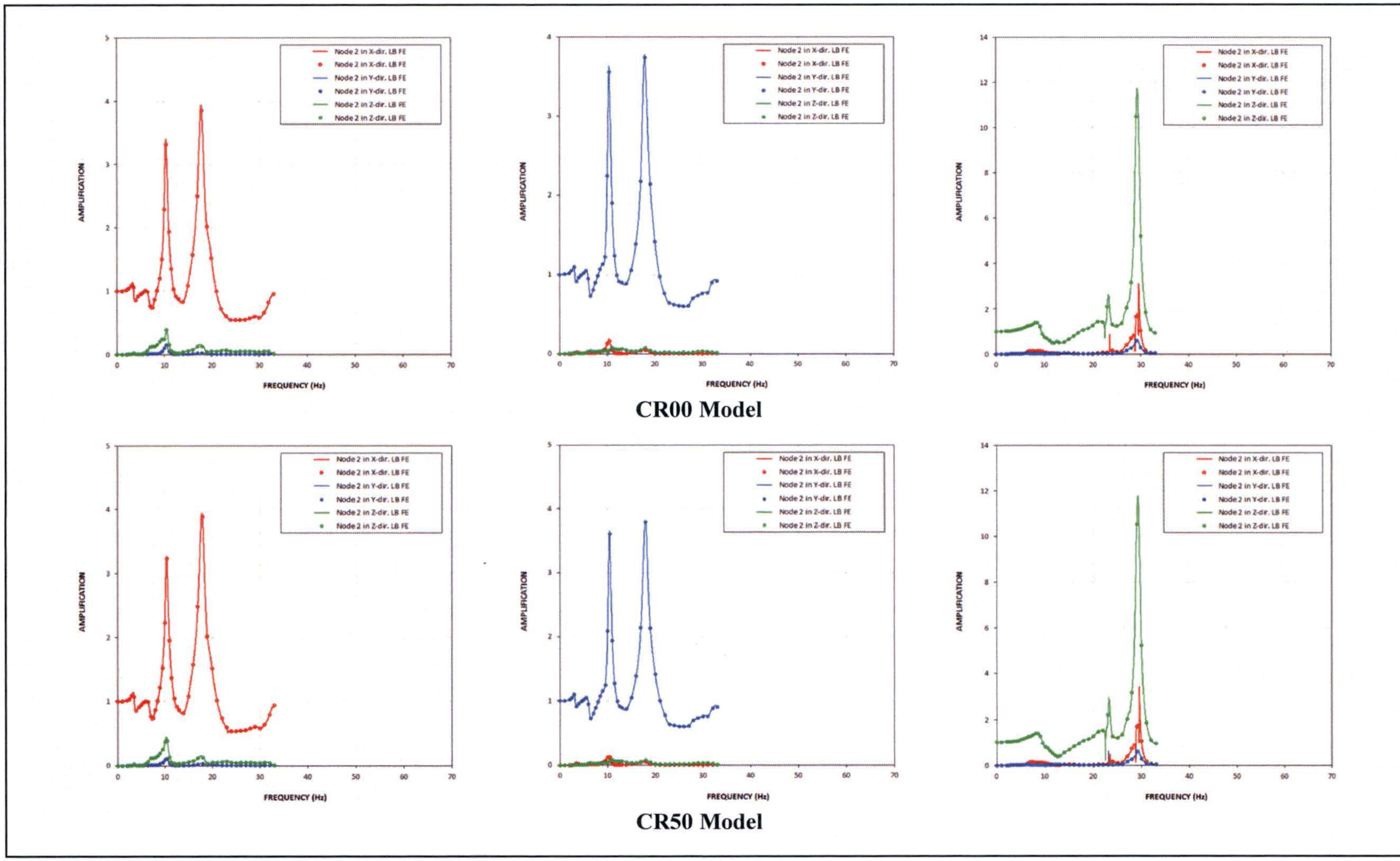


Figure B.3-30 Transfer Functions of RB/FB Basemat Response from Analysis of LB Full Column Profile

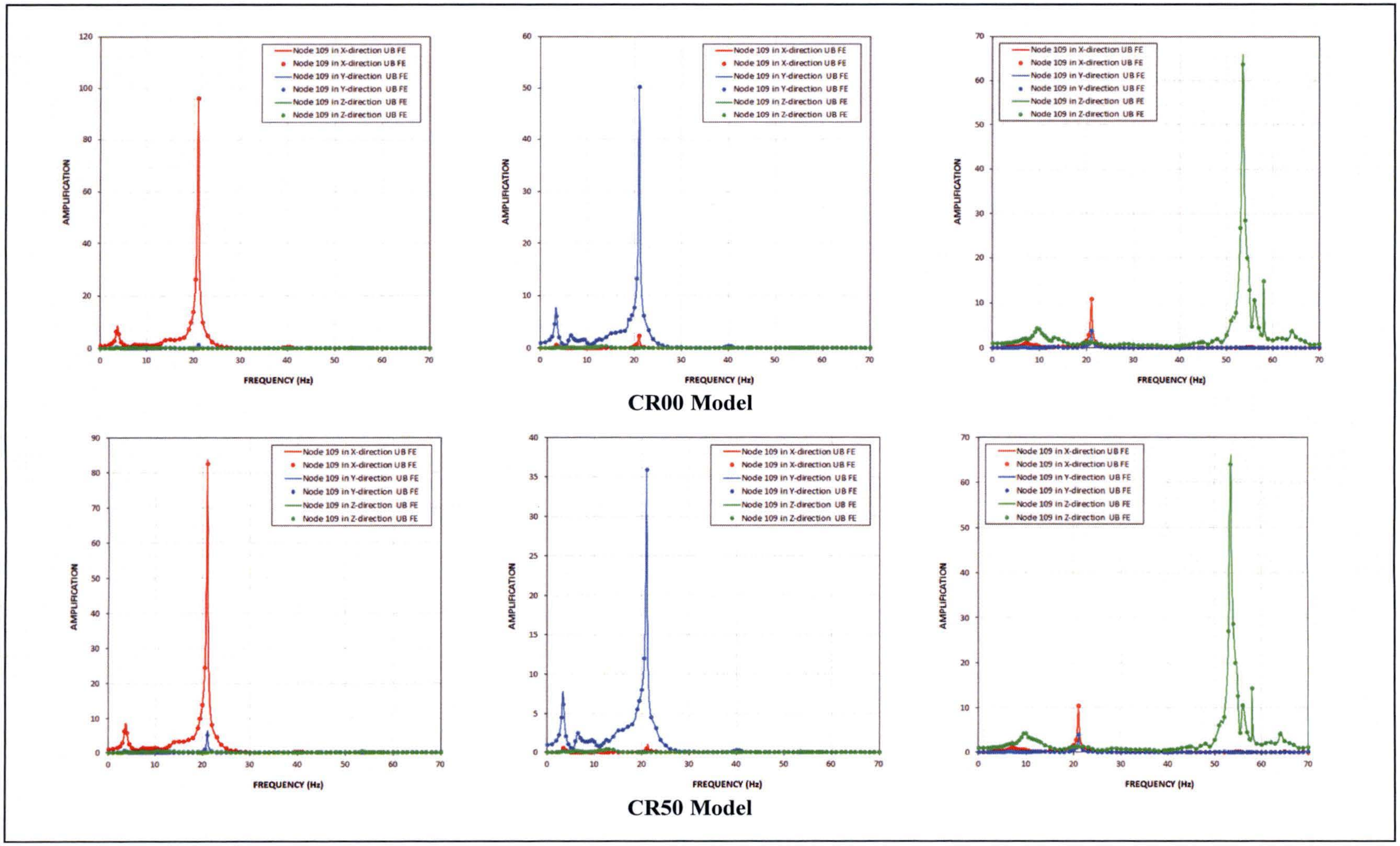


Figure B.3-31 Transfer Functions of RB/FB Refueling Floor Response from Analysis of UB Full Column

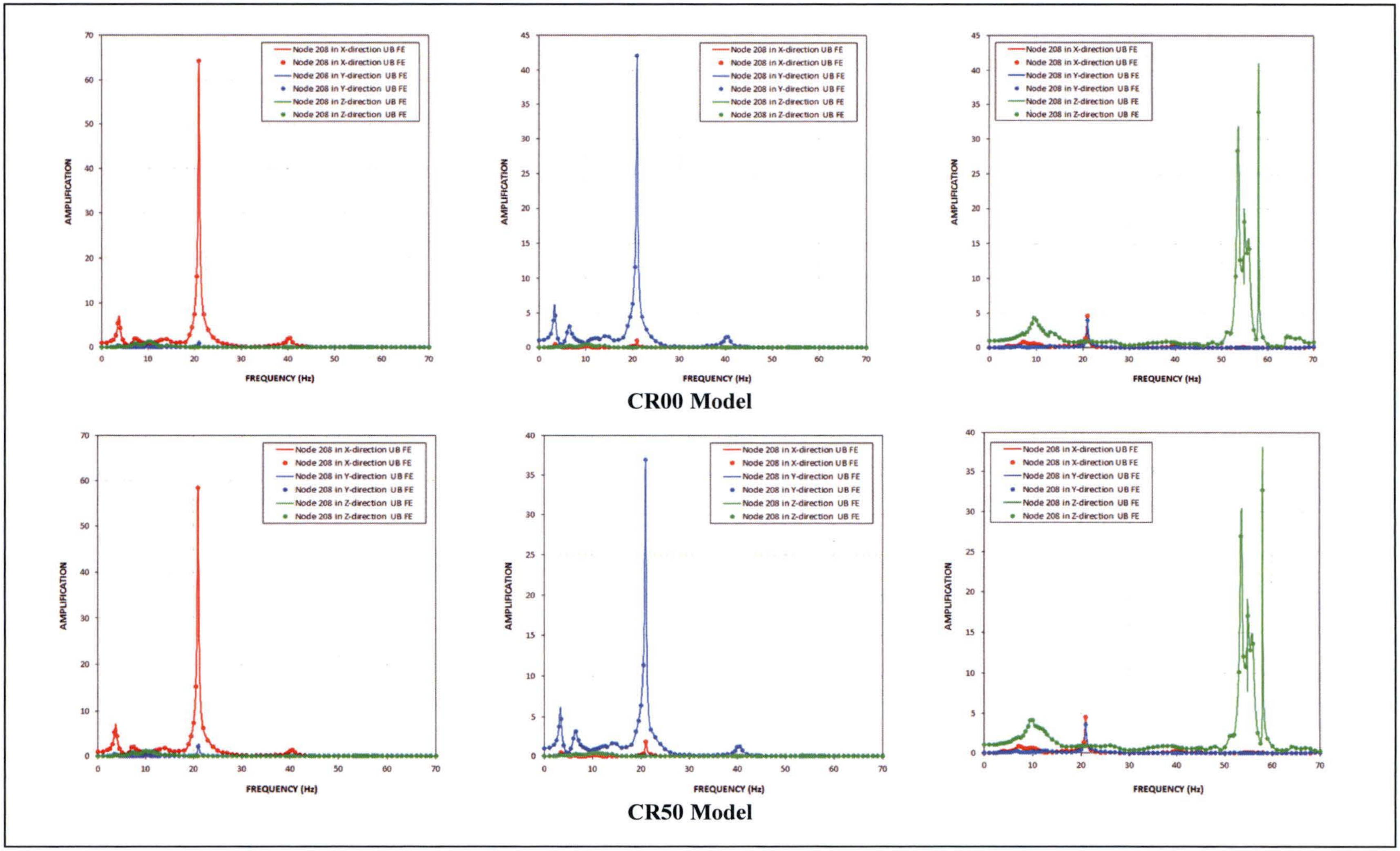


Figure B.3-32 Transfer Functions of RCCV Top Slab Response from Analysis of UB Full Column Profile

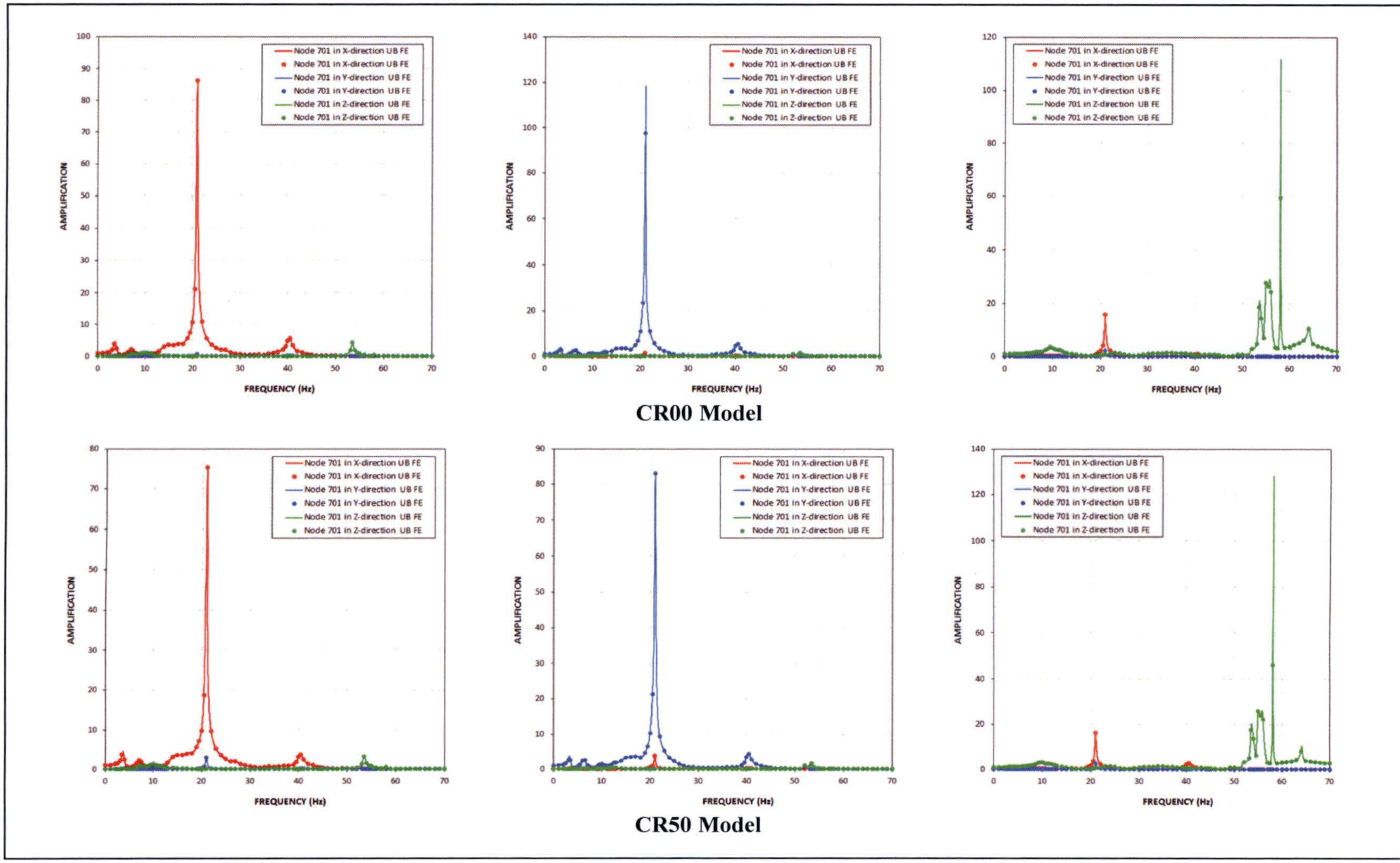


Figure B.3-33 Transfer Functions of Vent Wall Top Response from Analysis of UB Full Column Profile

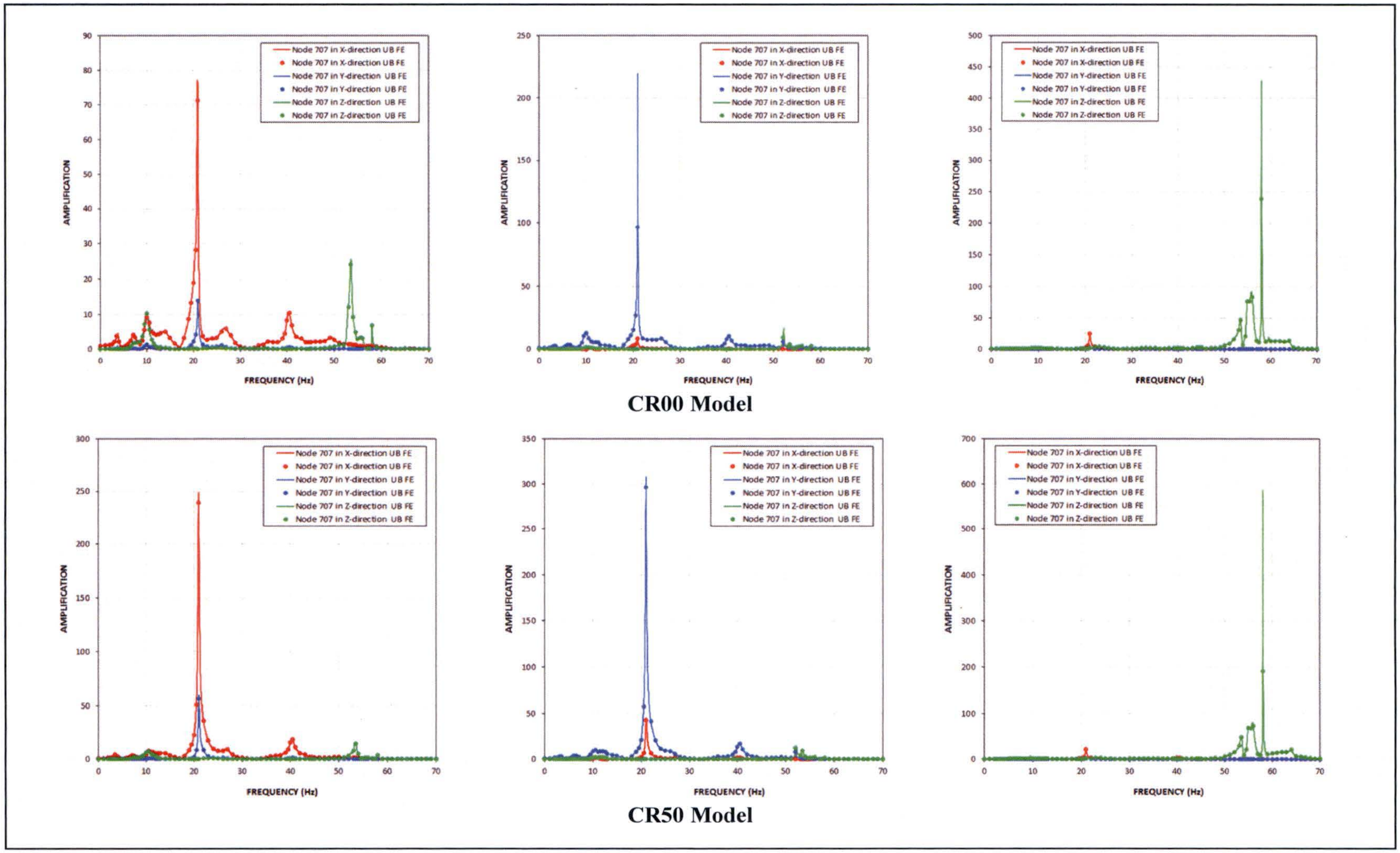
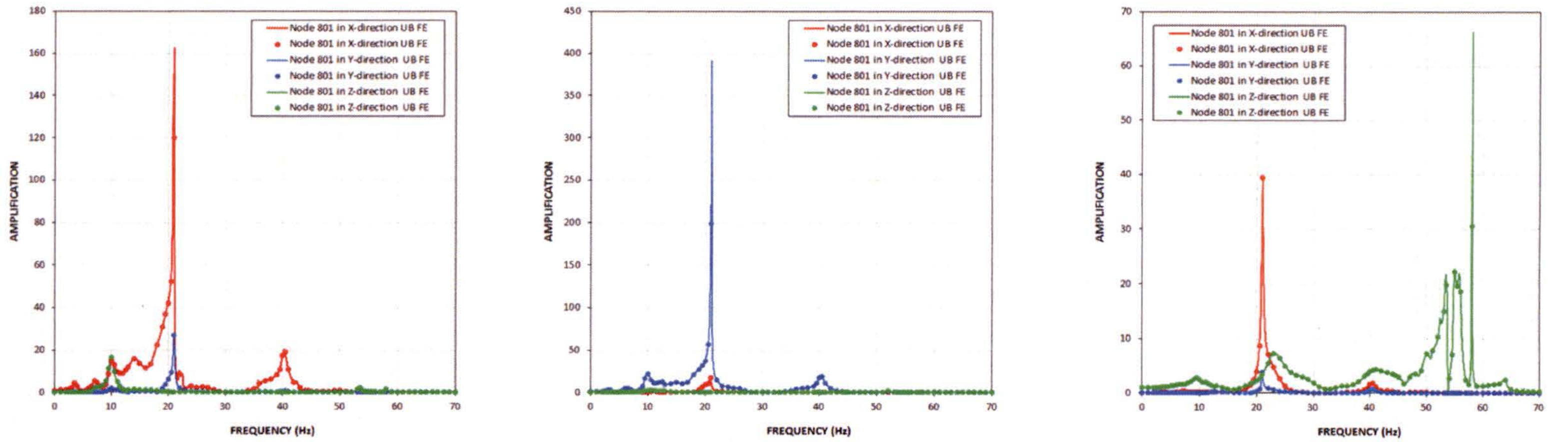
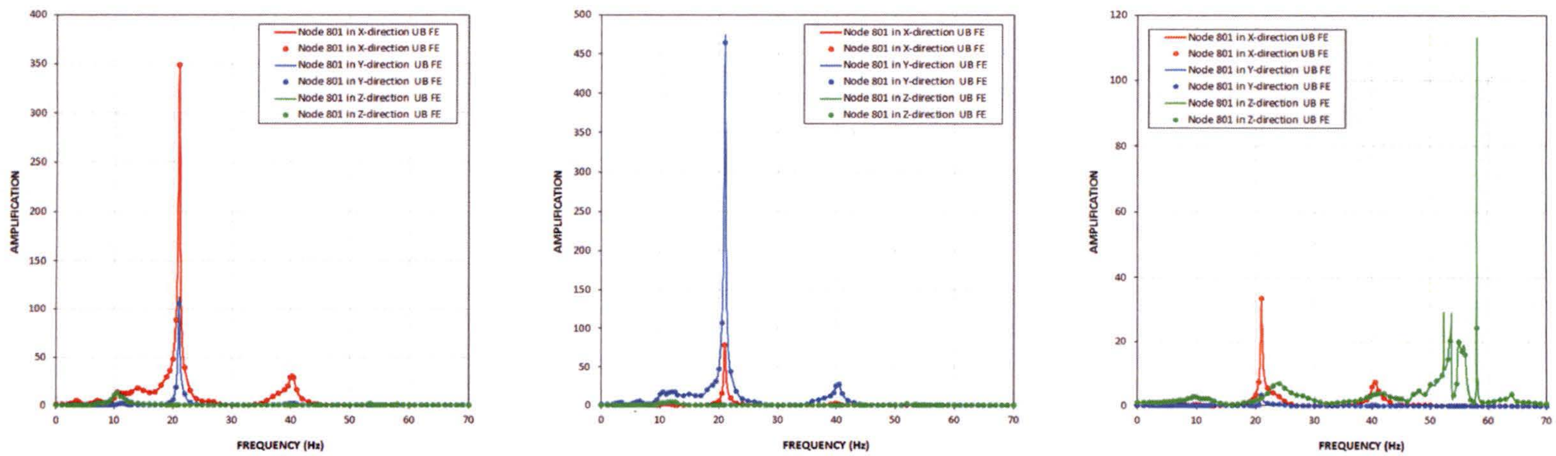


Figure B.3-34 Transfer Functions of RSW Top Response from Analysis of UB Full Column



CR00 Model



CR50 Model

Figure B.3-35 Transfer Functions of RPV Top Response from Analysis of UB Full Column Profile

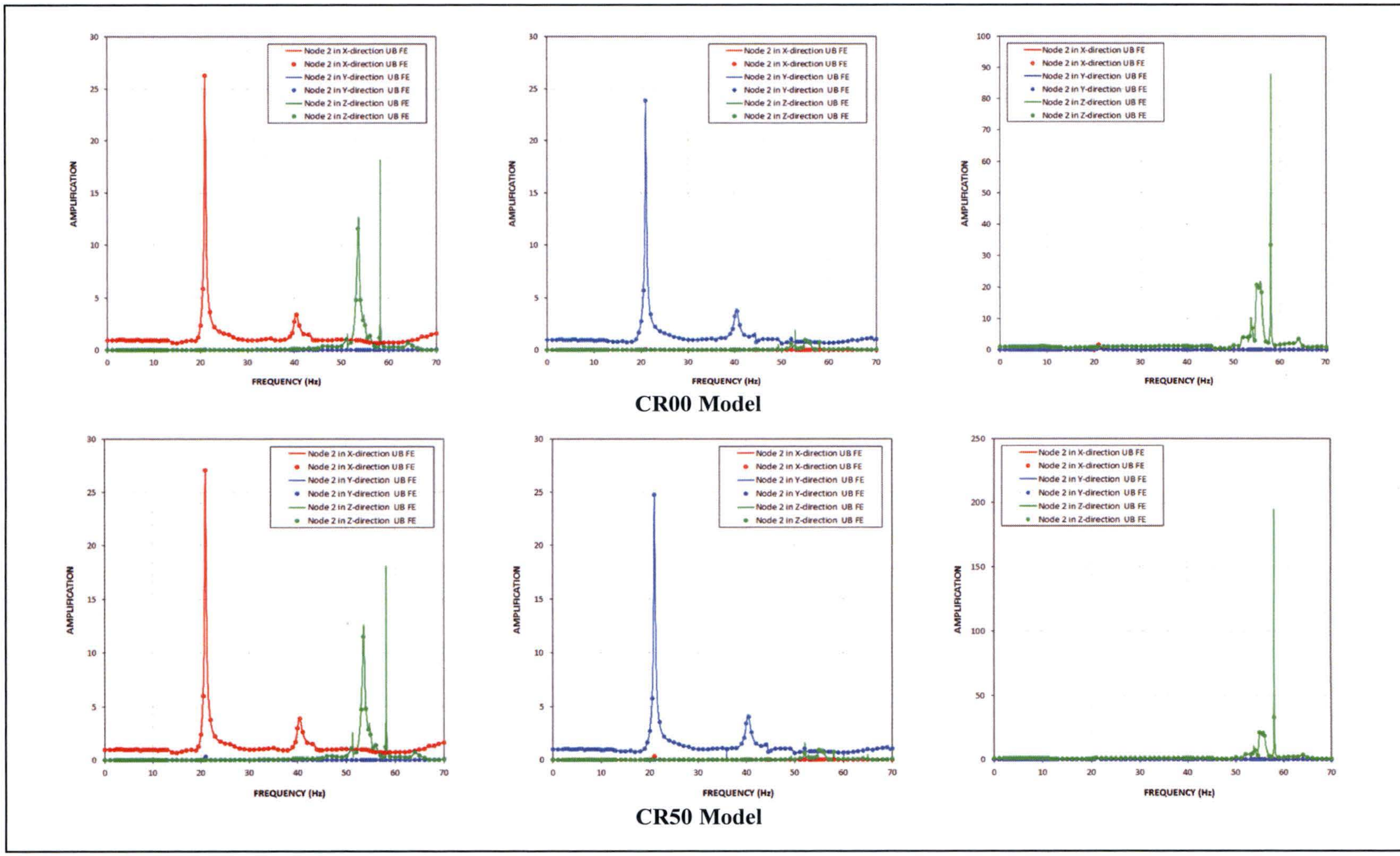
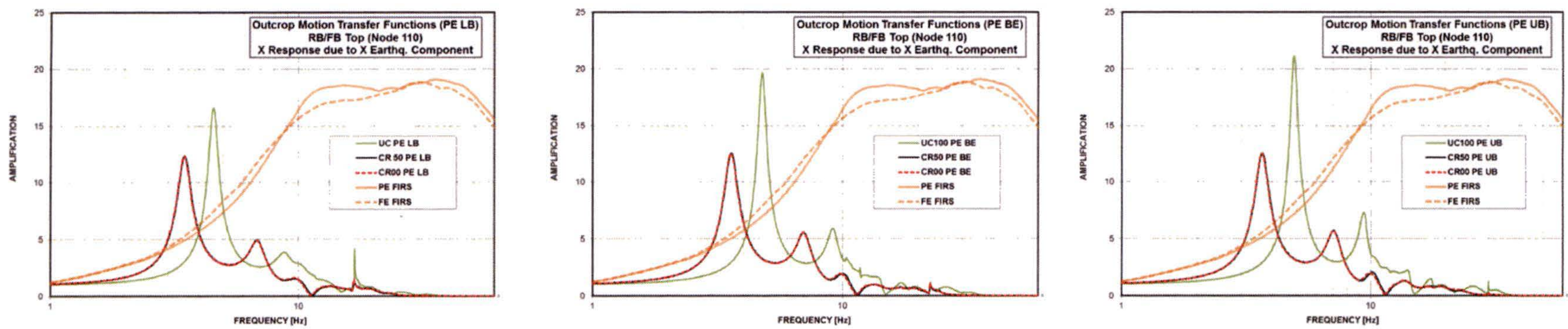
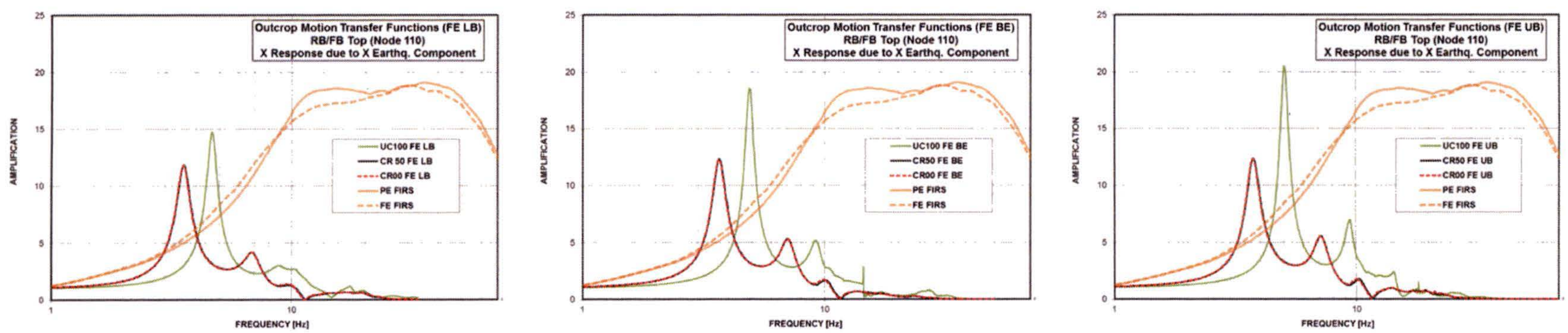


Figure B.3-36 Transfer Functions of RB/FB Basemat Response from Analysis of UB Full Column Profile



Partial Column Profiles



Full Column Profiles

Figure B.3-37 Outcrop Motion Transfer Functions for RB/FB Response in NS Direction Due to NS Earthquake

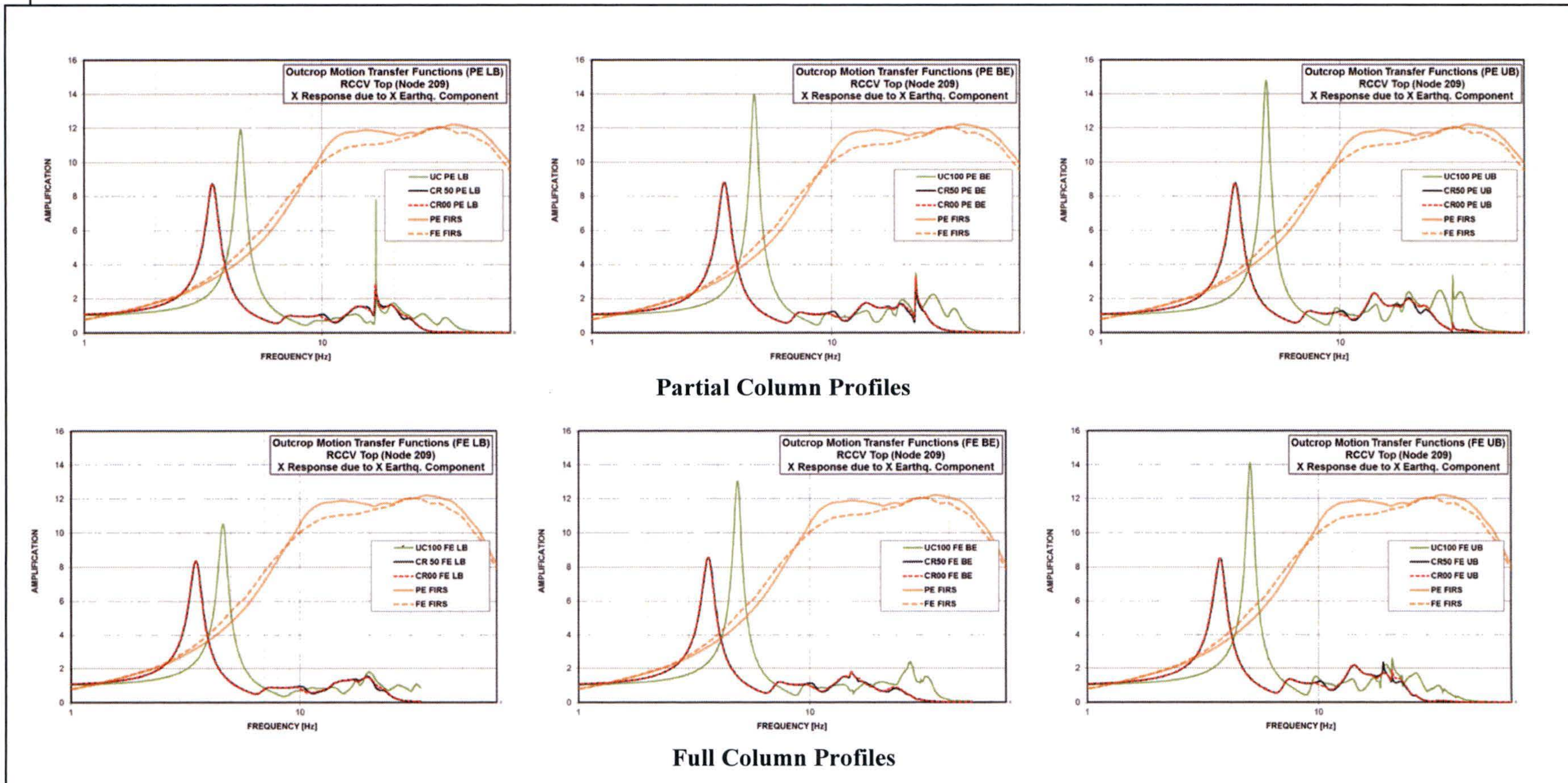


Figure B.3-38 Outcrop Motion Transfer Functions for RCCV Response in NS Direction Due to NS Earthquake

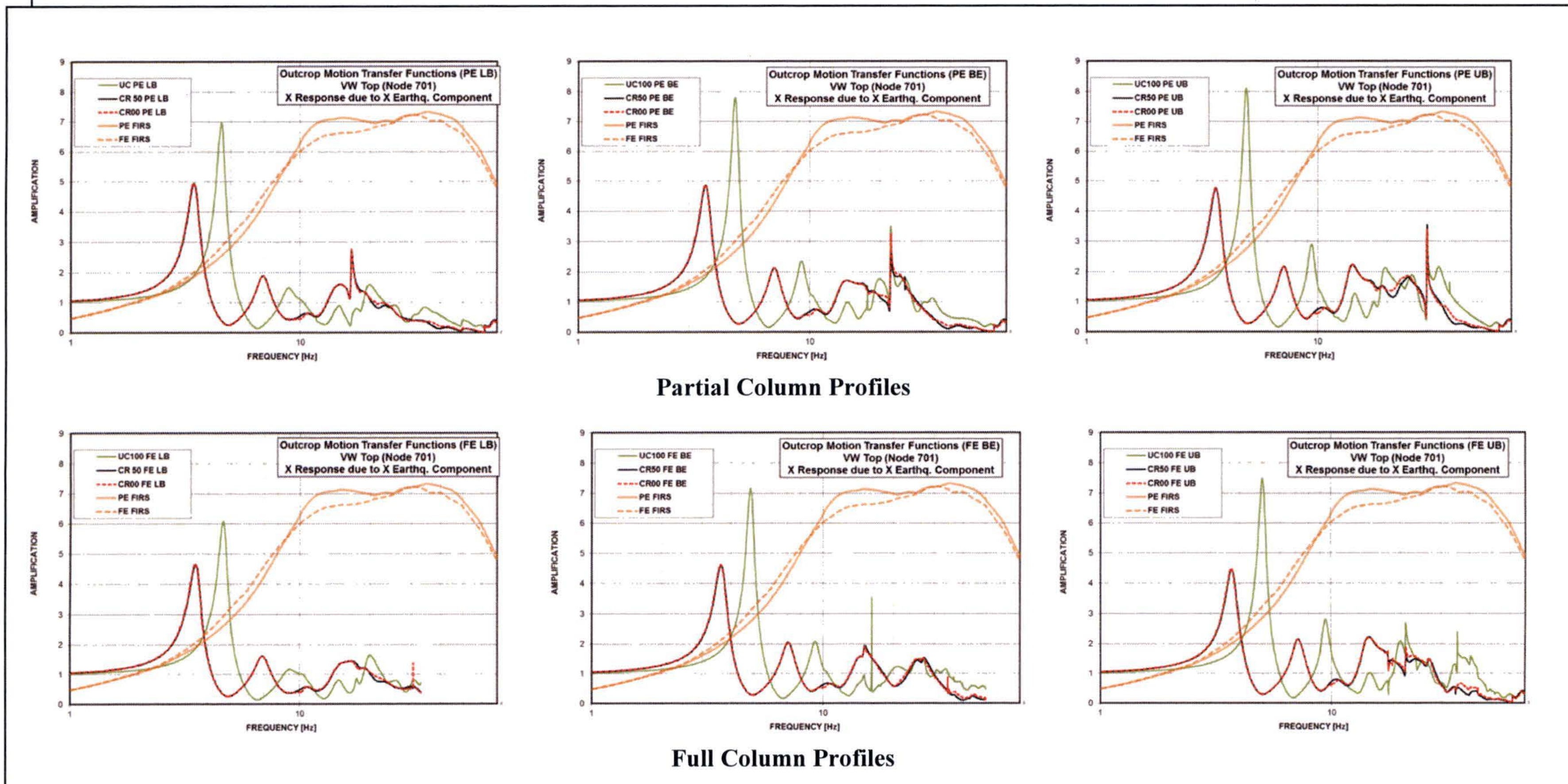
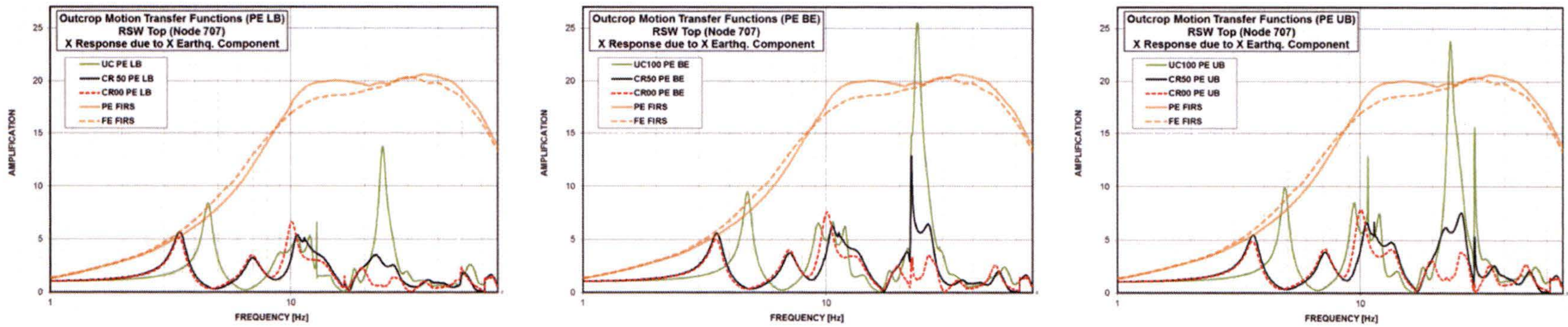
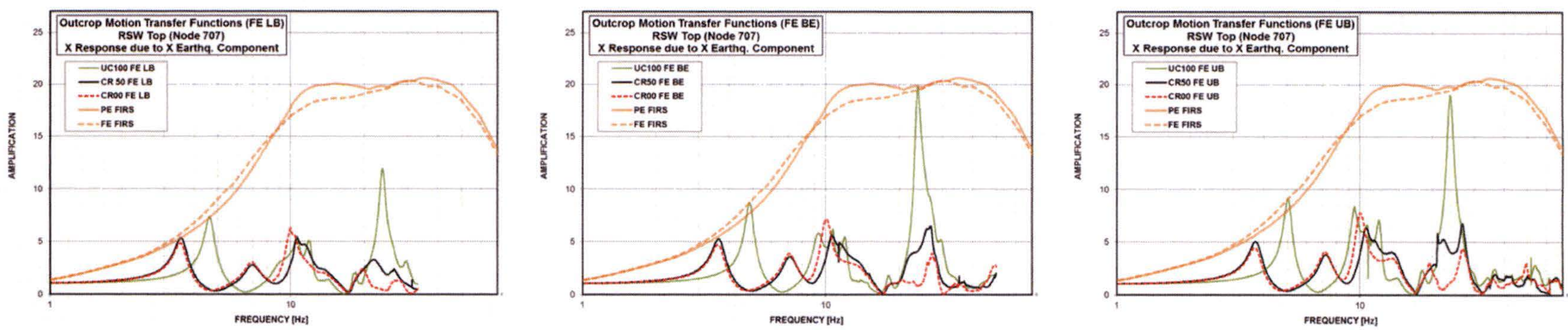


Figure B.3-39 Outcrop Motion Transfer Functions of VW Response in NS Direction Due to NS Earthquake



Partial Column Profiles



Full Column Profiles

Figure B.3-40 Outcrop Motion Transfer Functions of RSW Response in NS Direction Due to NS Earthquake

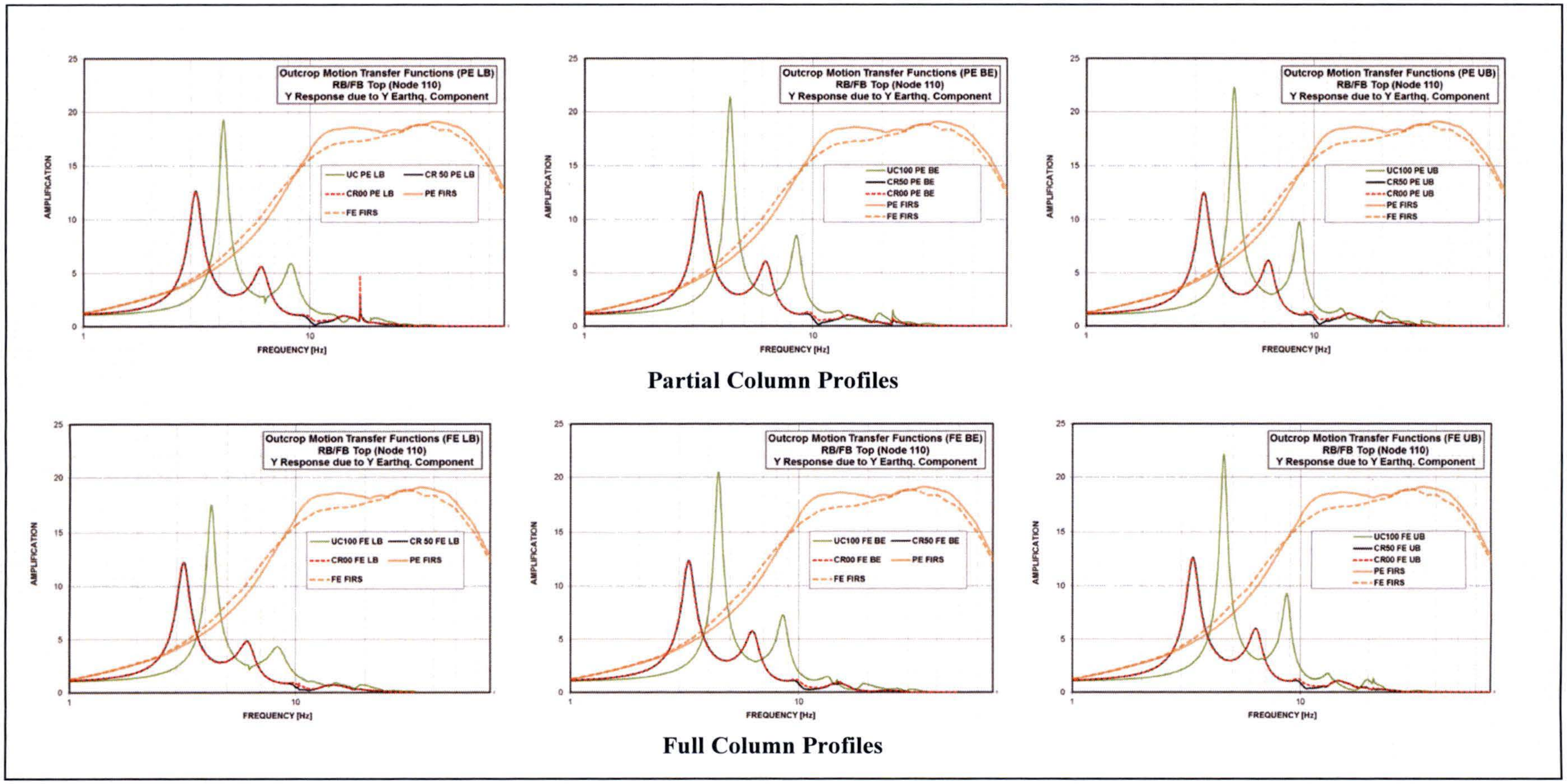


Figure B.3-41 Outcrop Motion Transfer Functions for RB/FB Response in EW Direction Due to EW Earthquake

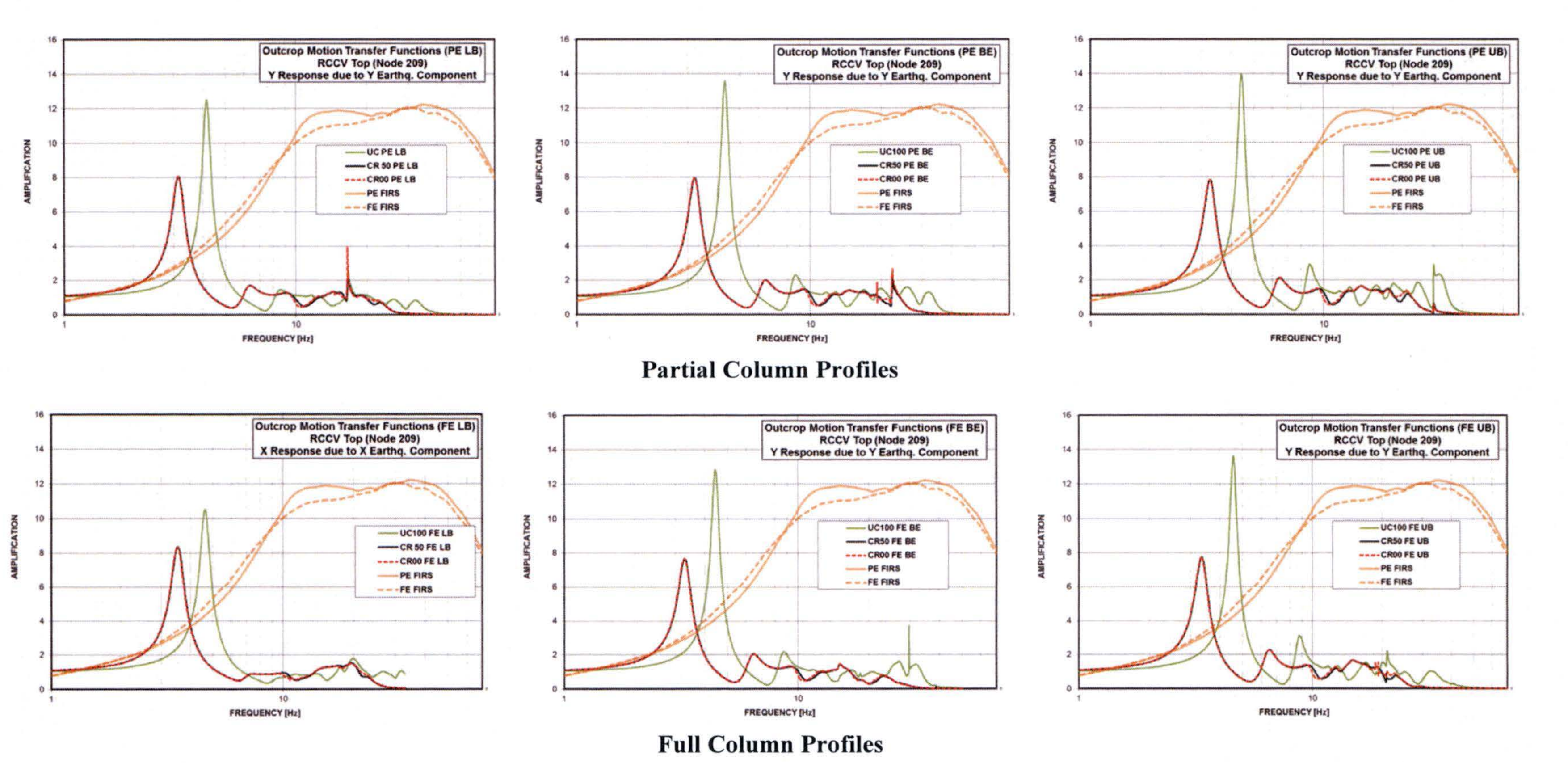
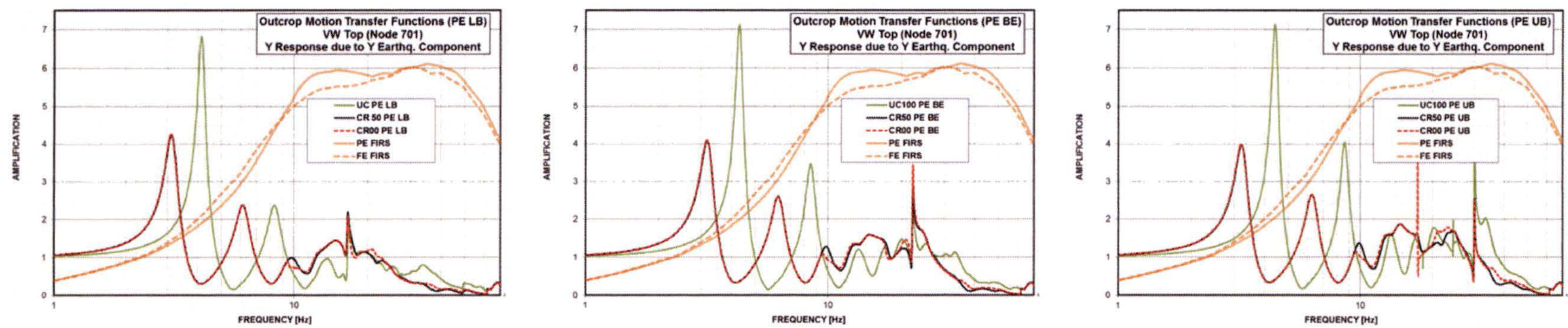
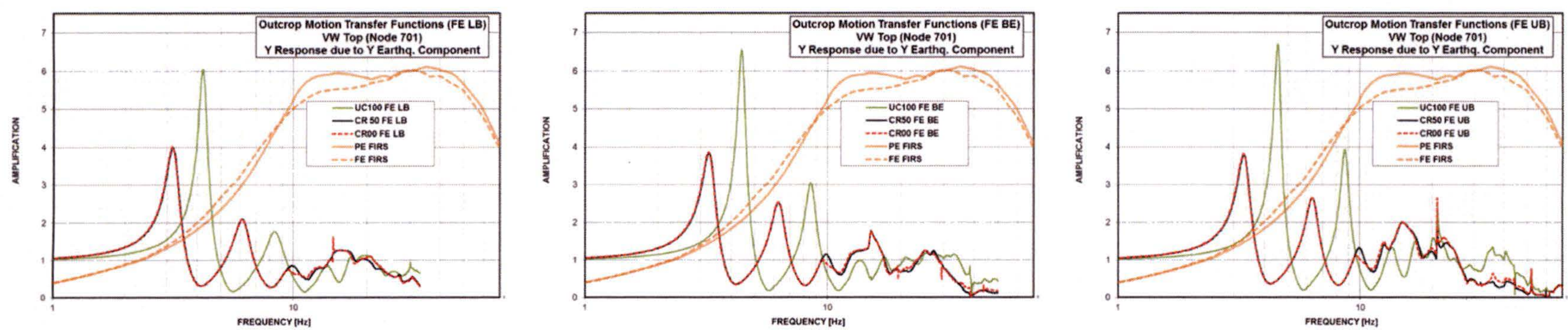


Figure B.3-42 Outcrop Motion Transfer Functions for RCCV Response in EW Direction Due to EW Earthquake



Partial Column Profiles



Full Column Profiles

Figure B.3-43 Outcrop Motion Transfer Functions of VW Response in EW Direction Due to EW Earthquake

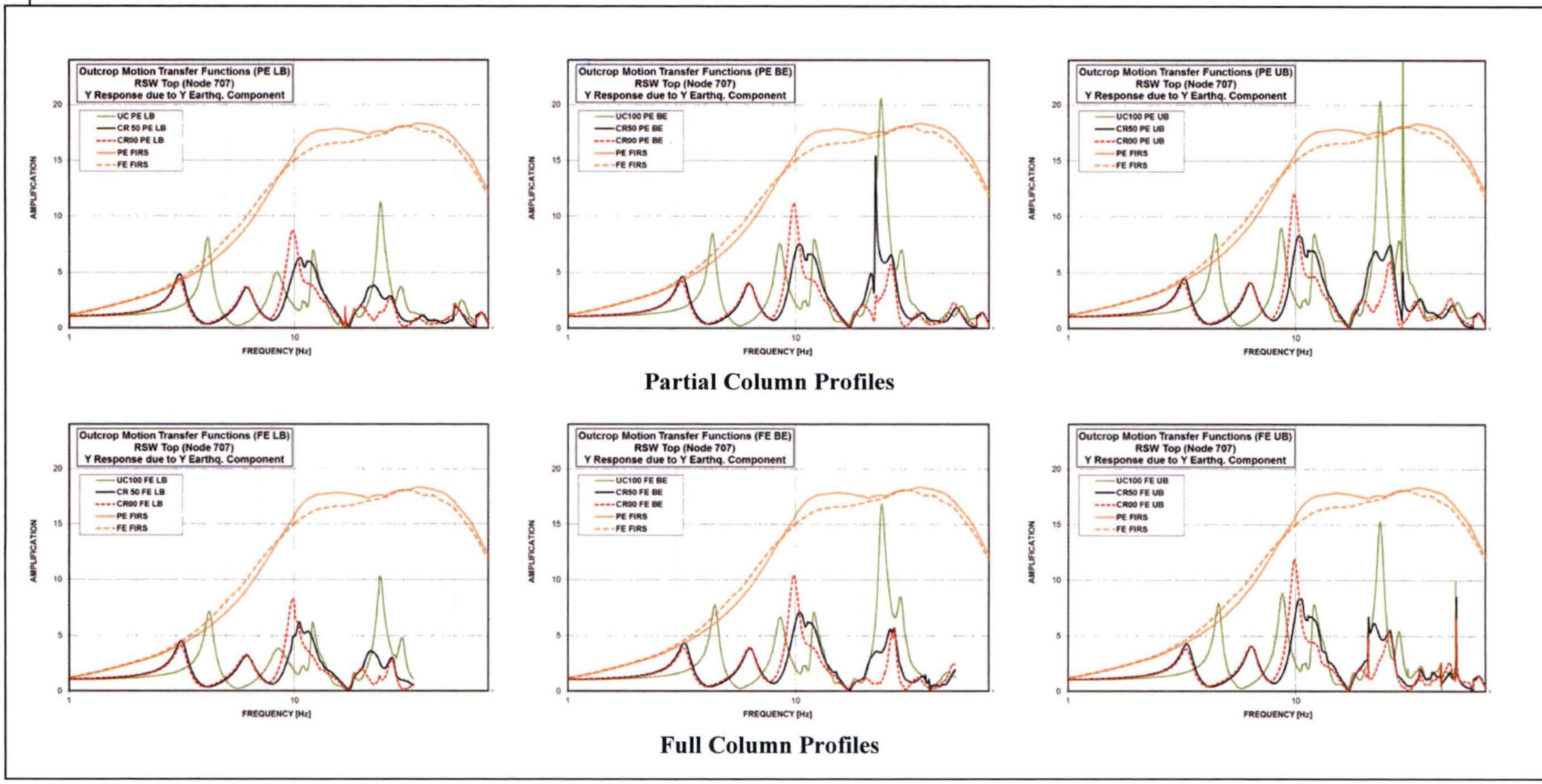


Figure B.3-44 Outcrop Motion Transfer Functions of RSW Response in EW Direction Due to EW Earthquake

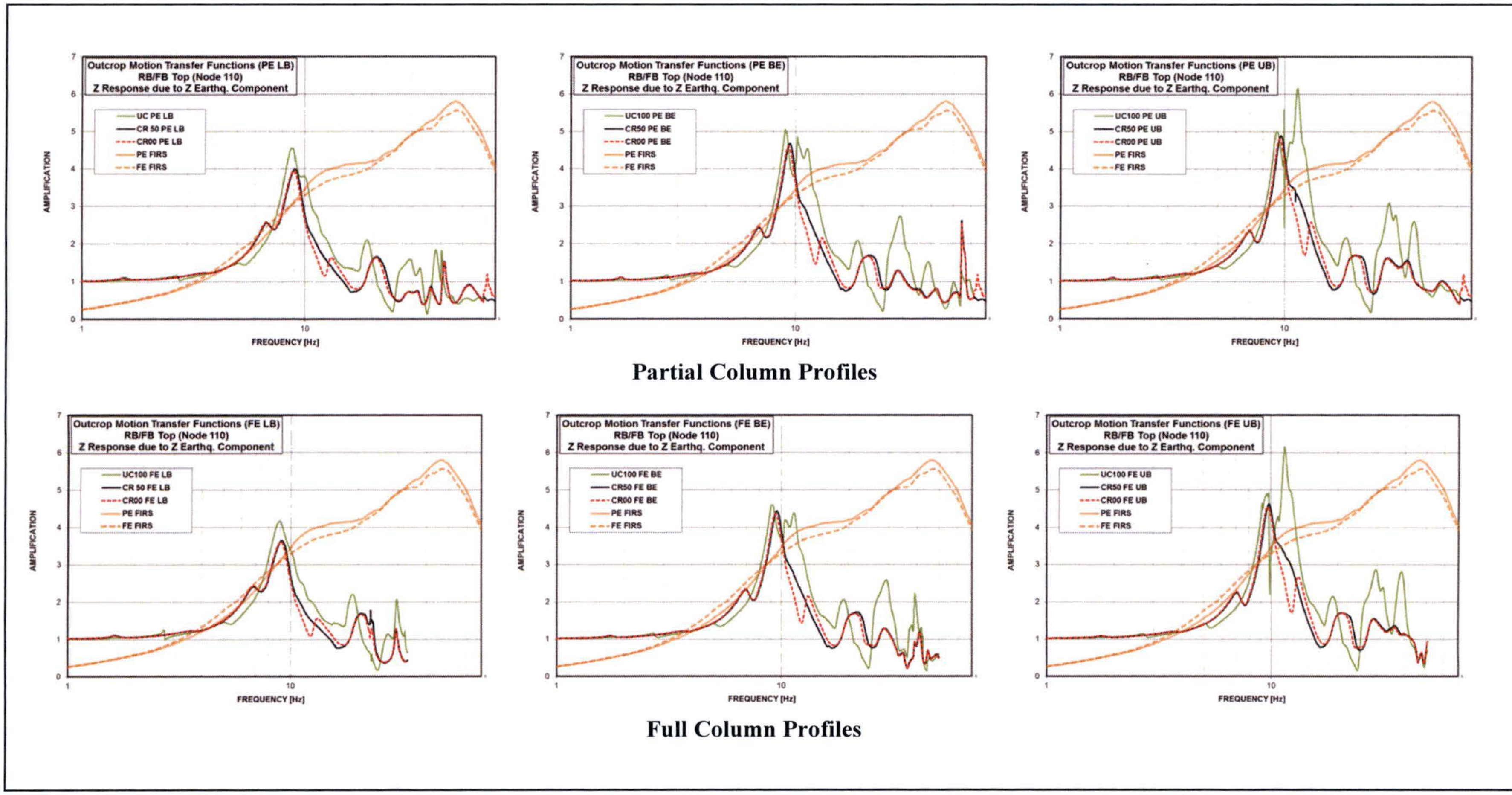


Figure B.3-45 Outcrop Motion Transfer Functions for RB/FB Response in Vert. Direction Due to Vert. Earthquake

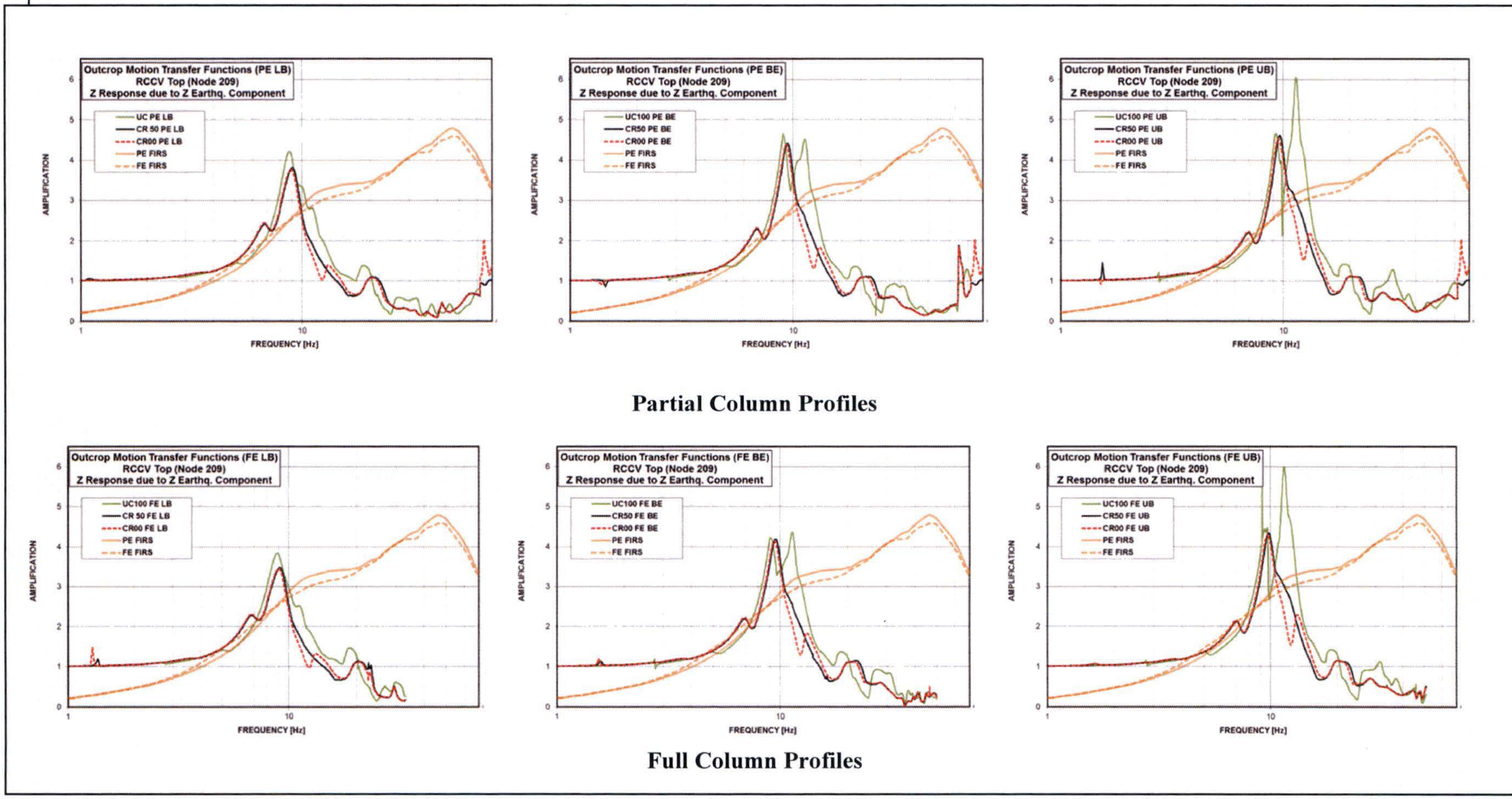
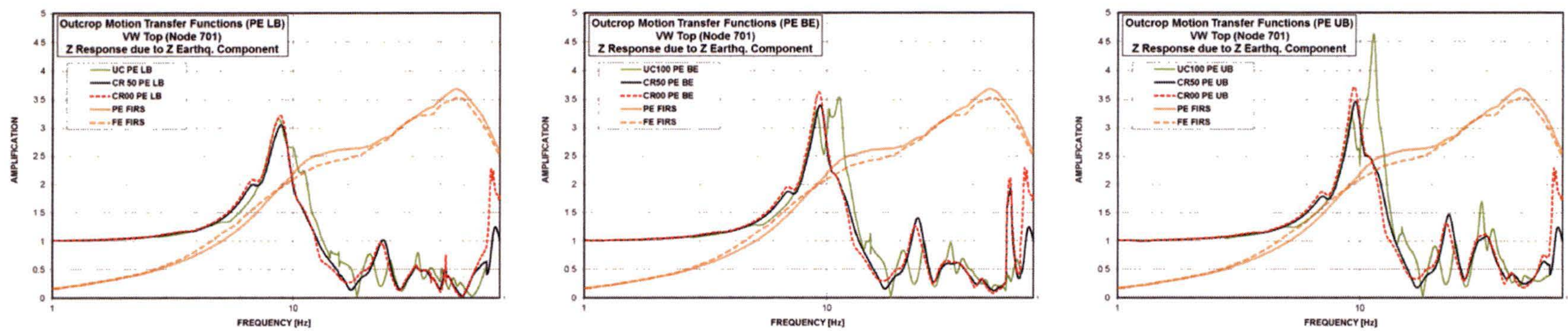
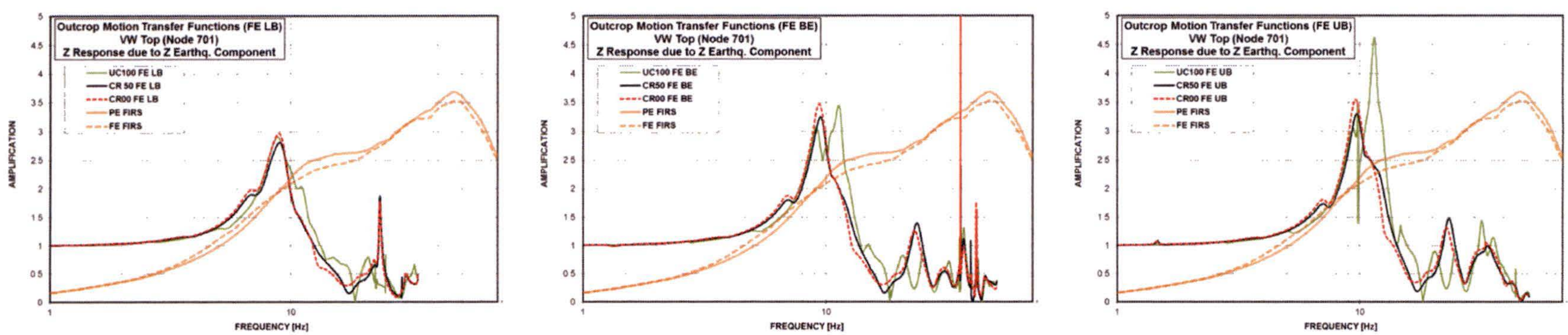


Figure B.3-46 Outcrop Motion Transfer Functions for RCCV Response in Vert. Direction Due to Vert. Earthquake

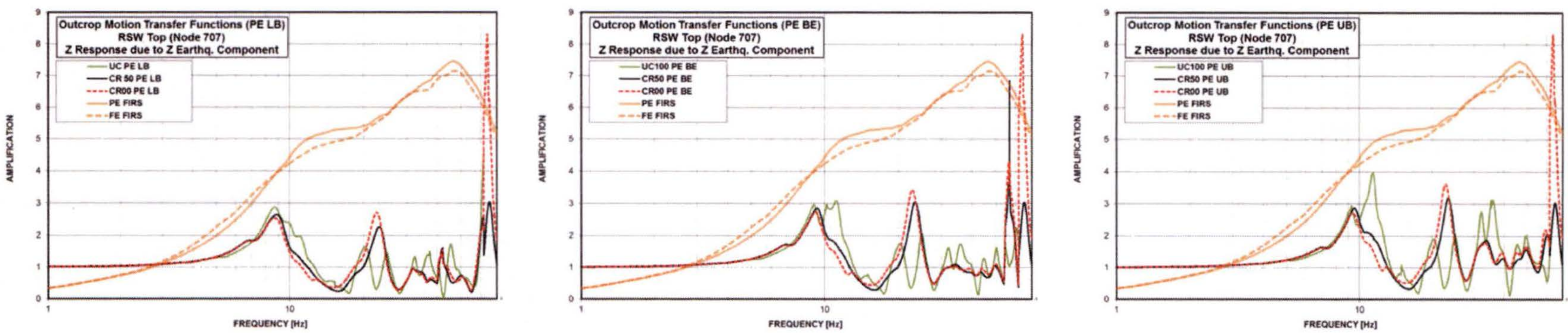


Partial Column Profiles

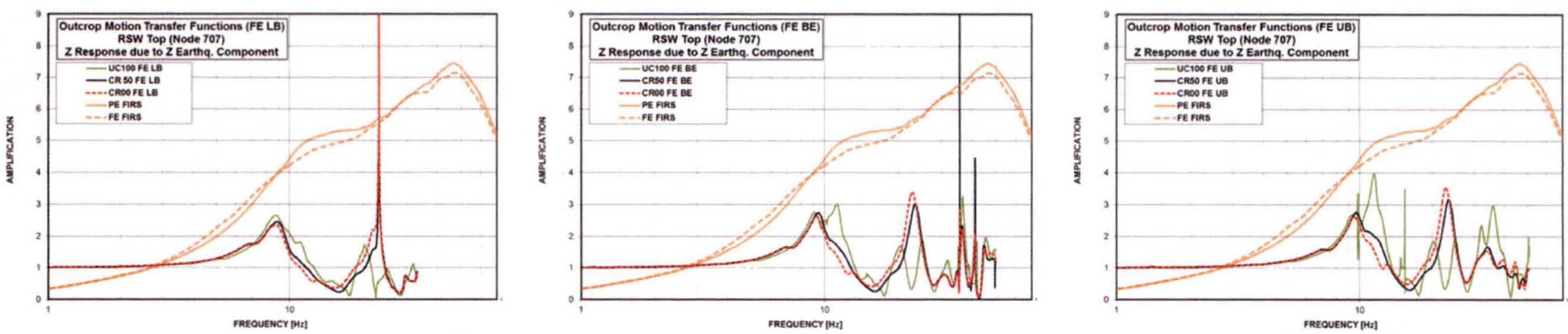


Full Column Profiles

Figure B.3-47 Outcrop Motion Transfer Functions of VW Response in Vert. Direction Due to Vert. Earthquake



Partial Column Profiles



Full Column Profiles

Figure B.3-48 Outcrop Motion Transfer Functions of RSW Vert. Direction Due to Vert. Earthquake

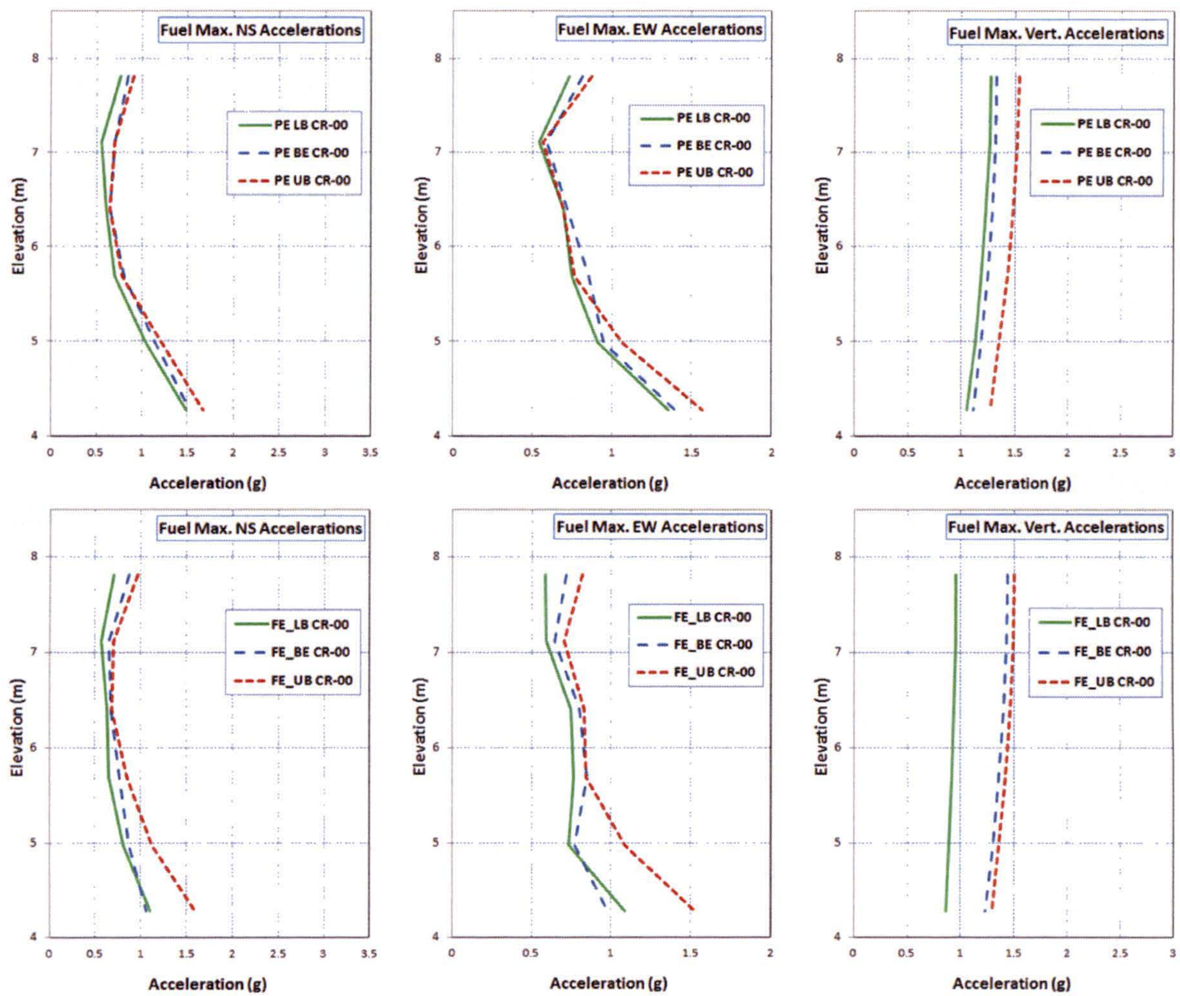


Figure B.3-49 Maximum RPV Fuel Acceleration Results from Analyses of CR00 Model

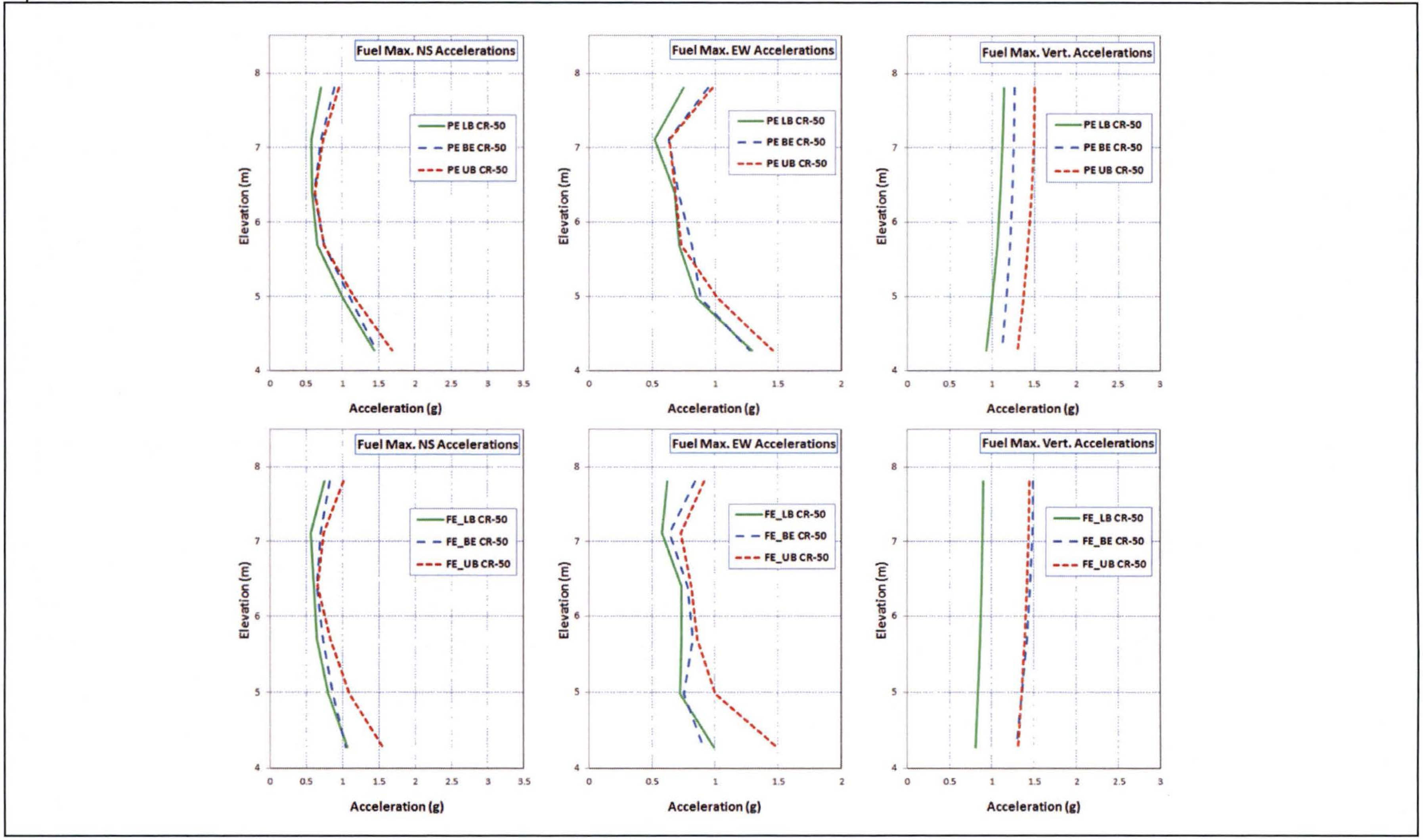


Figure B.3-50 Maximum RPV Fuel Acceleration Results from Analyses of CR50 Model

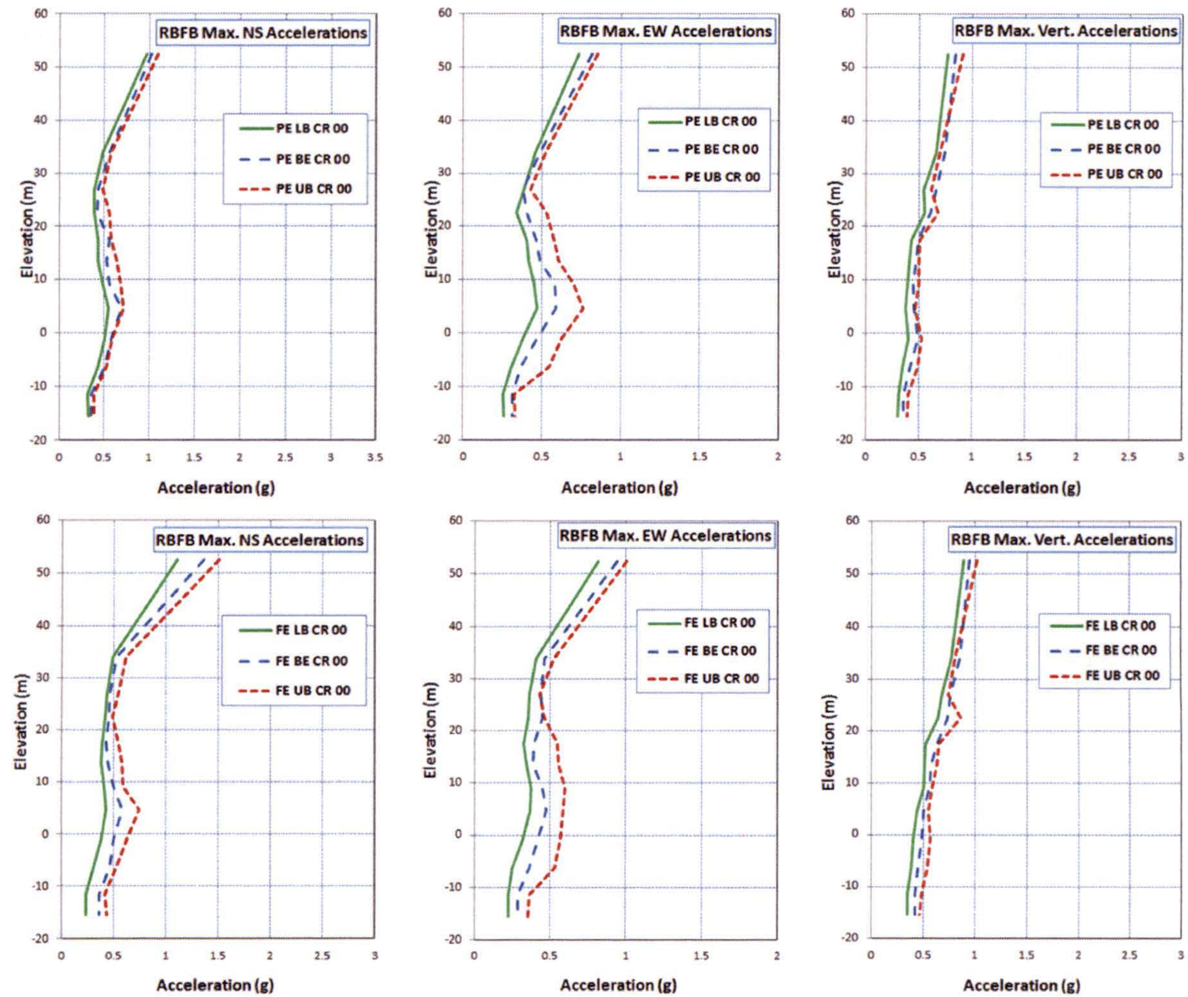


Figure B.3-51 Maximum RB/FB Acceleration Results from Analyses of CR00 Model

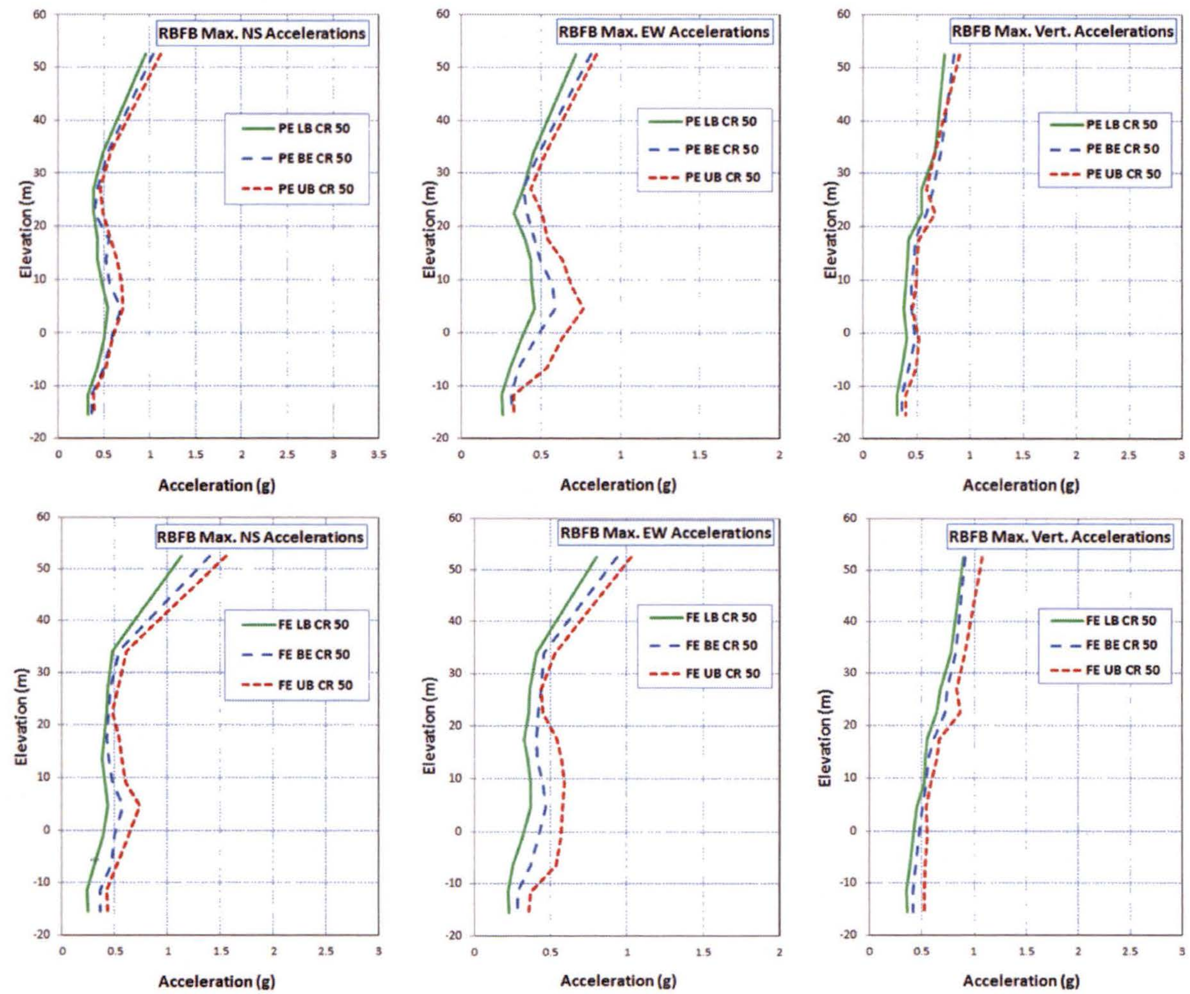


Figure B.3-52 Maximum RB/FB Acceleration Results from Analyses of CR50 Model

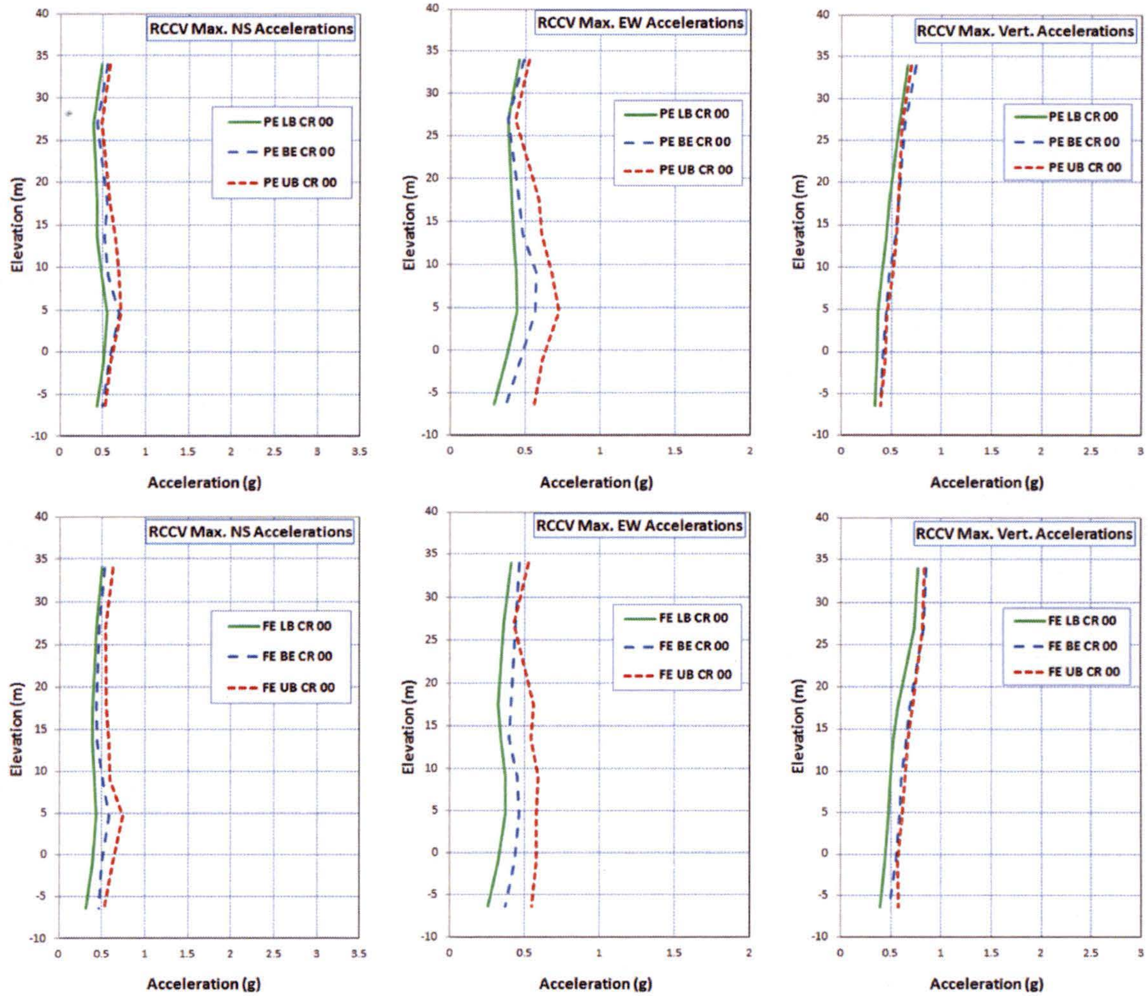


Figure B.3-53 Maximum RCCV Acceleration Results from Analyses of CR00 Model

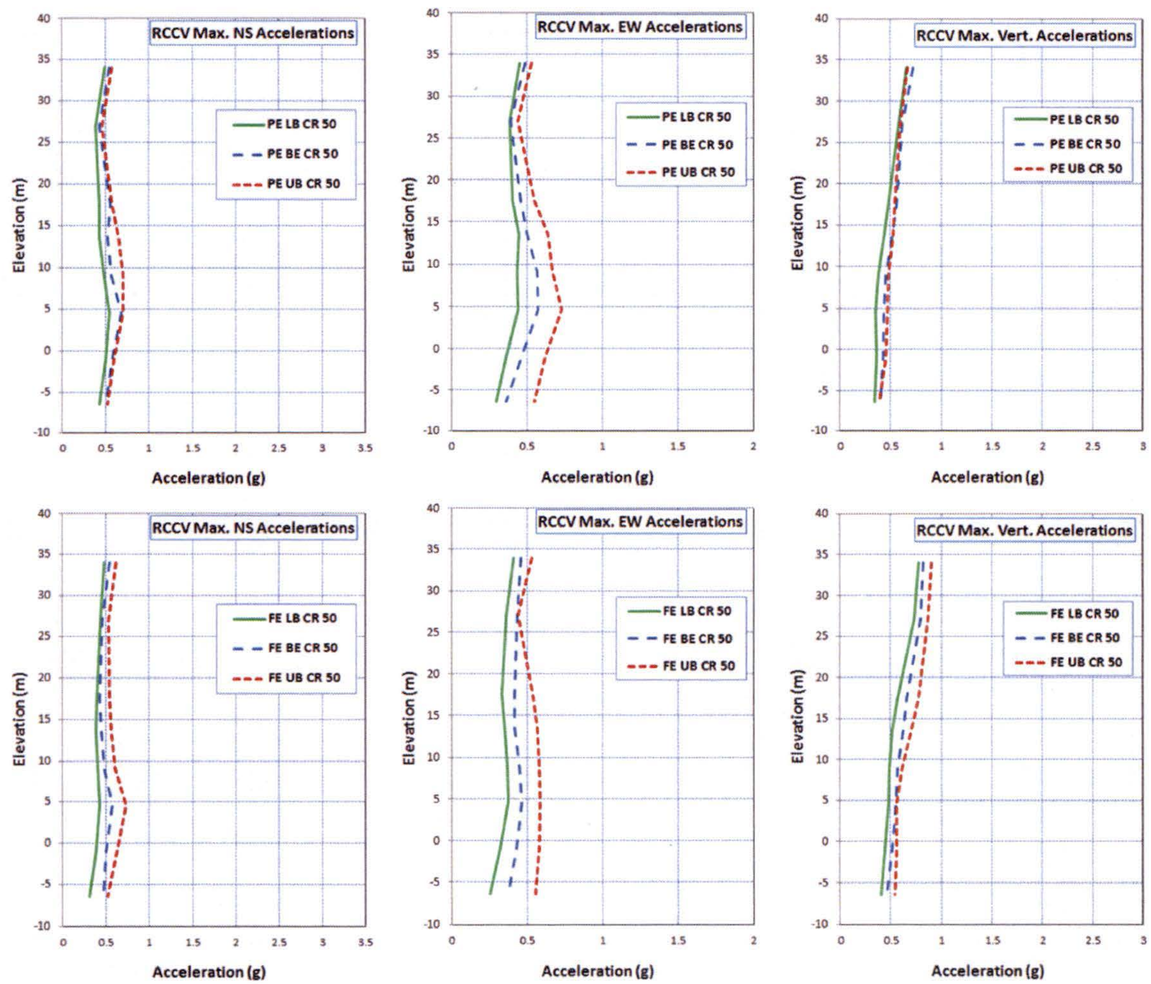


Figure B.3-54 Maximum RCCV Acceleration Results from Analyses of CR50 Model

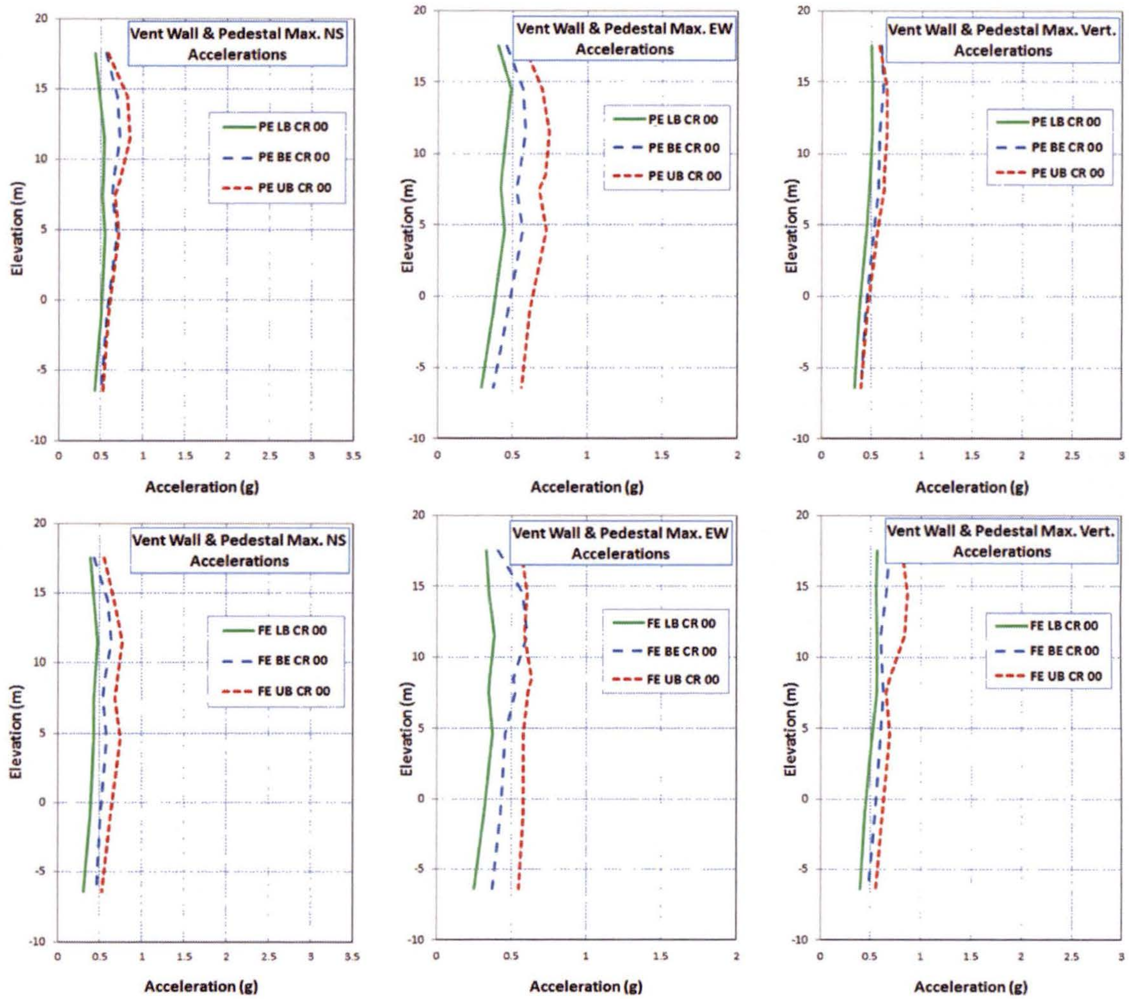


Figure B.3-55 Maximum VW/Pedestal Acceleration Results from Analyses of CR00 Model

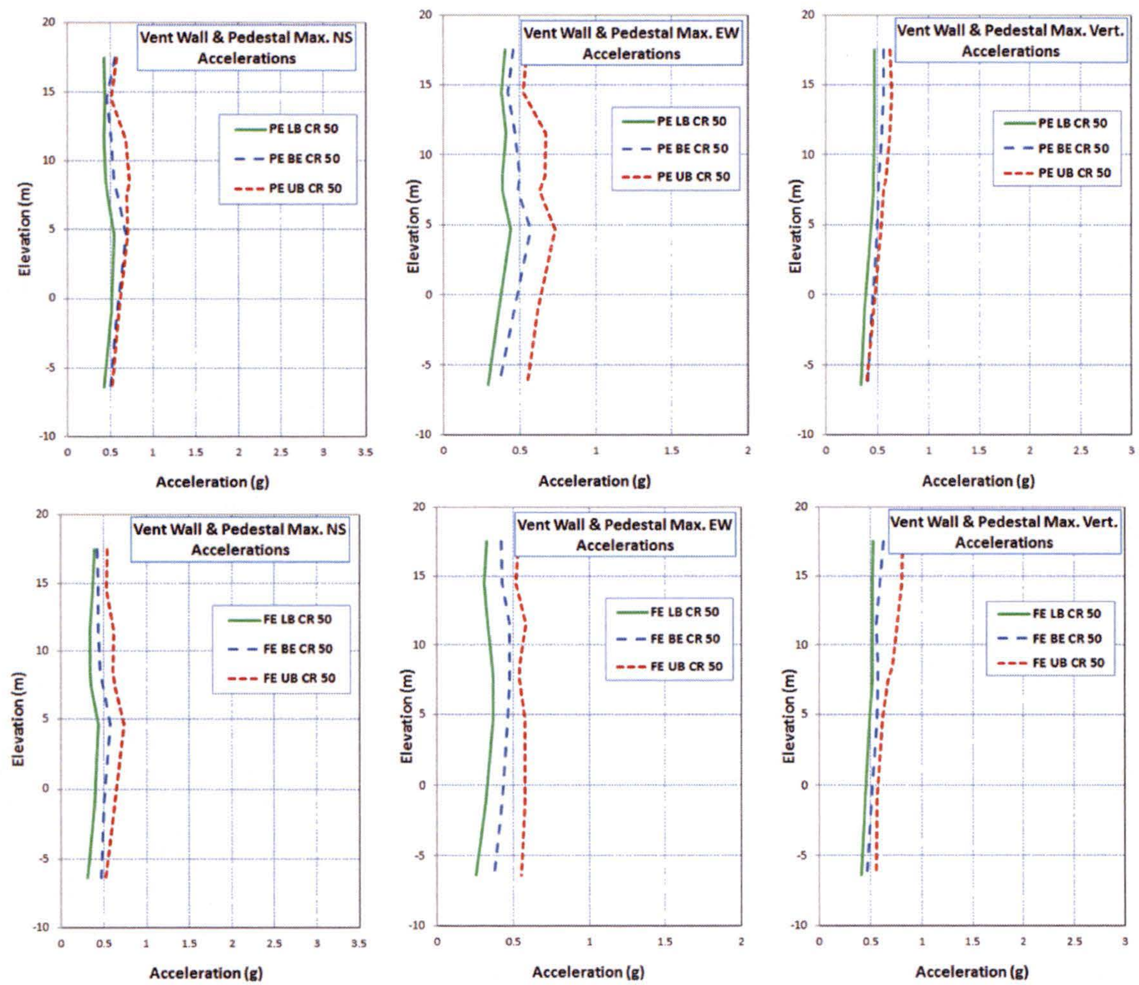


Figure B.3-56 Maximum VW/Pedestal Acceleration Results from Analyses of CR50 Model

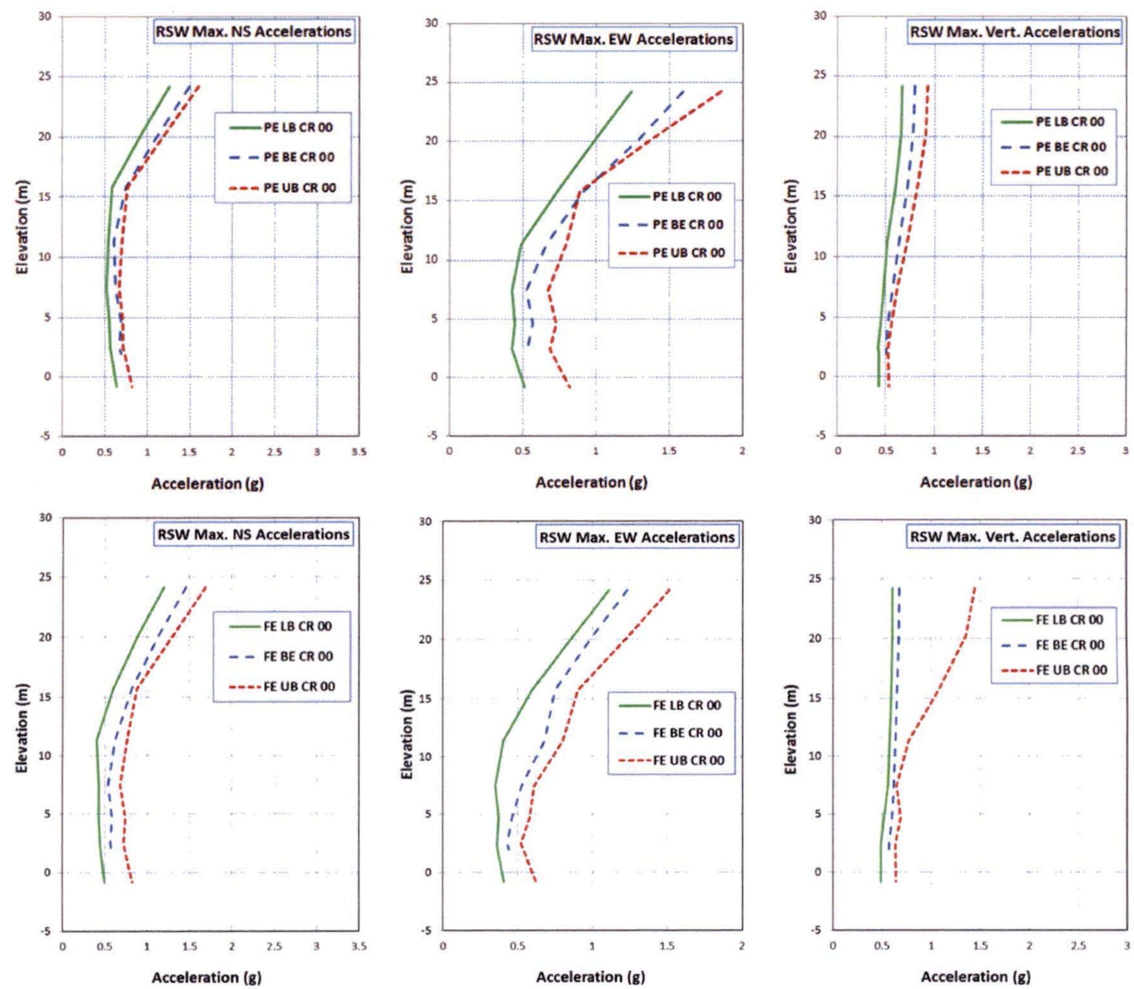


Figure B.3-57 Maximum RSW Acceleration Results from Analyses of CR00 Model

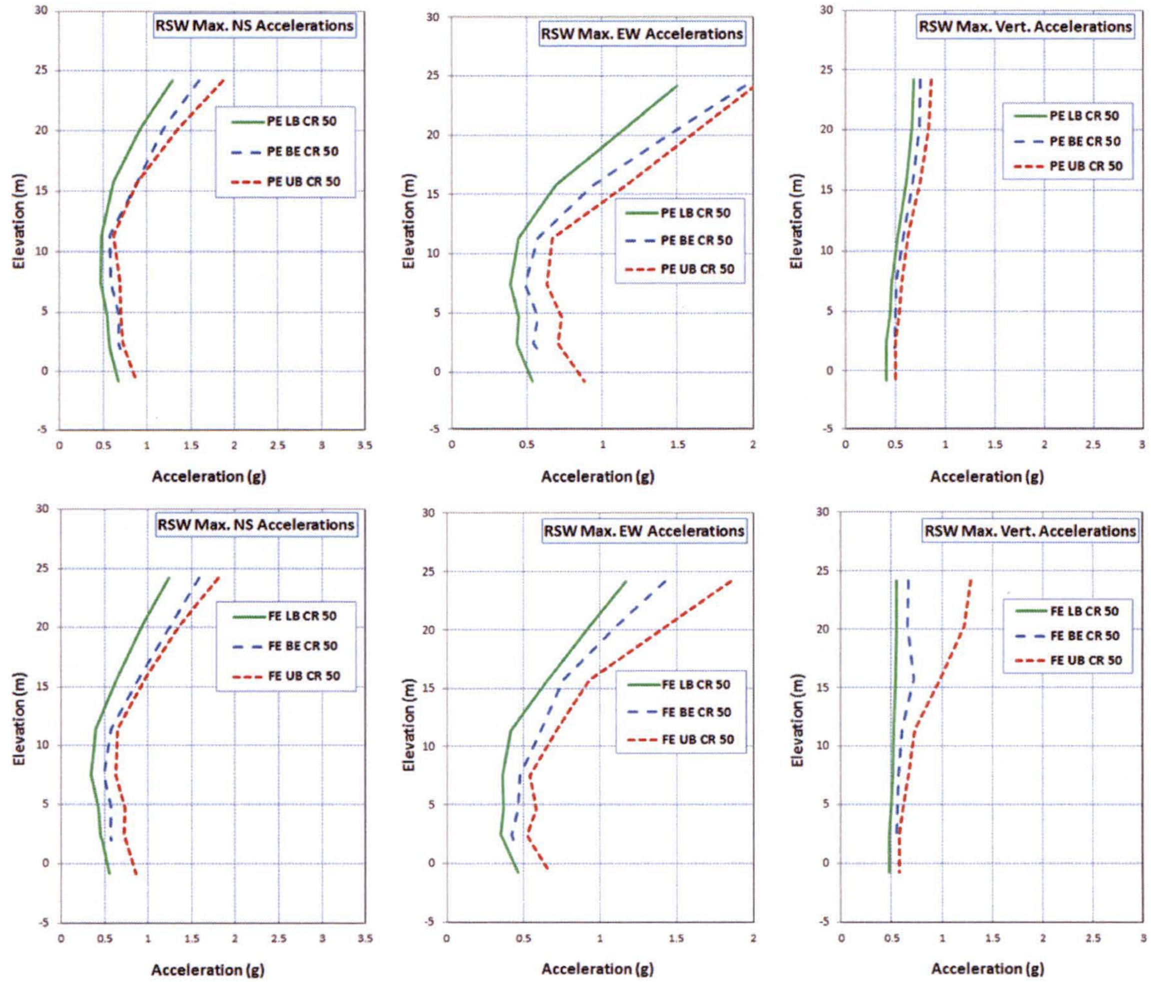


Figure B.3-58 Maximum RSW Acceleration Results from Analyses of CR50 Model

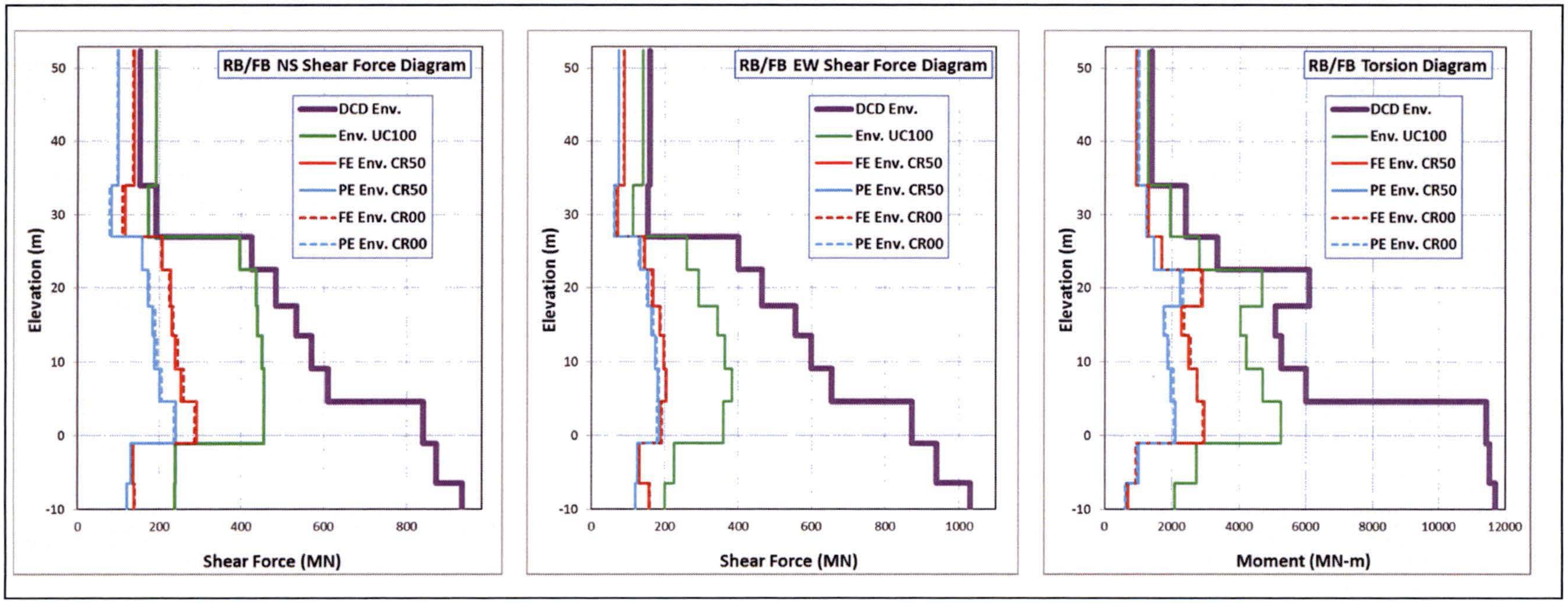


Figure B.4-1 Comparison of Horizontal Seismic Load Demands on RB/FB

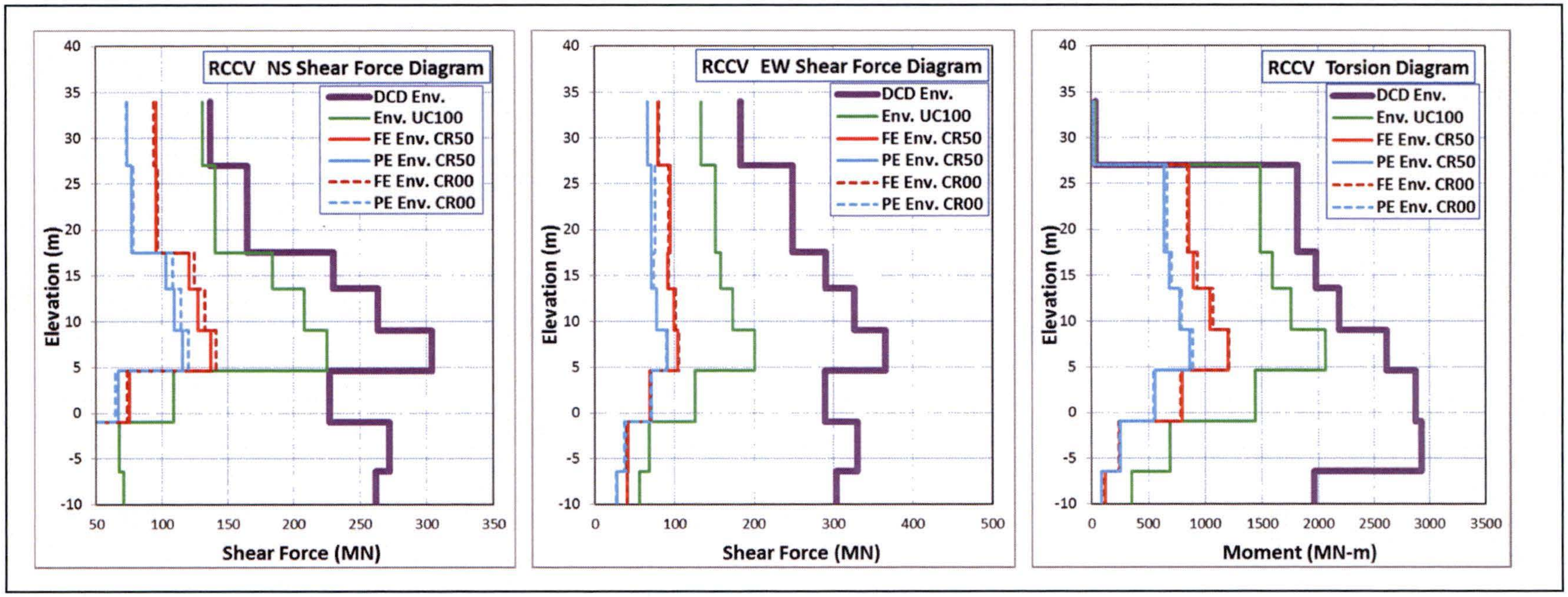


Figure B.4-2 Comparison of Horizontal Seismic Load Demands on RCCV

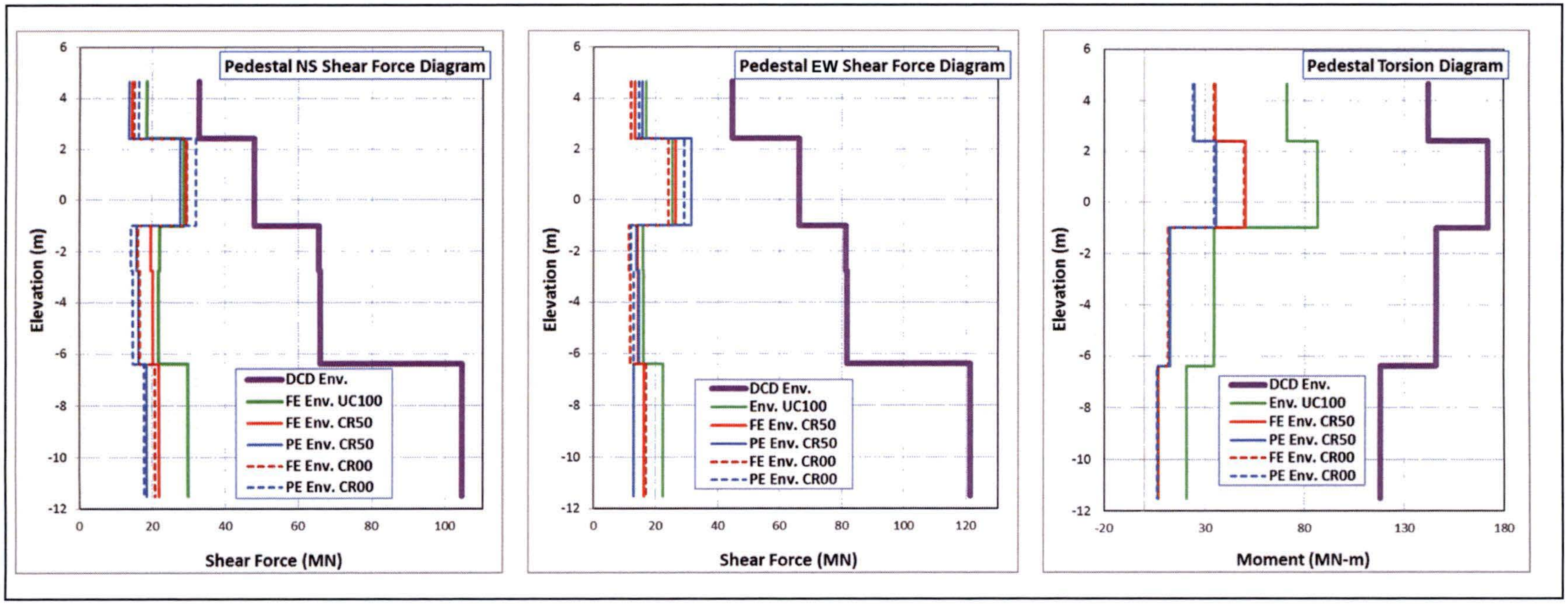


Figure B.4-3 Comparison of Horizontal Seismic Load Demands on Pedestal

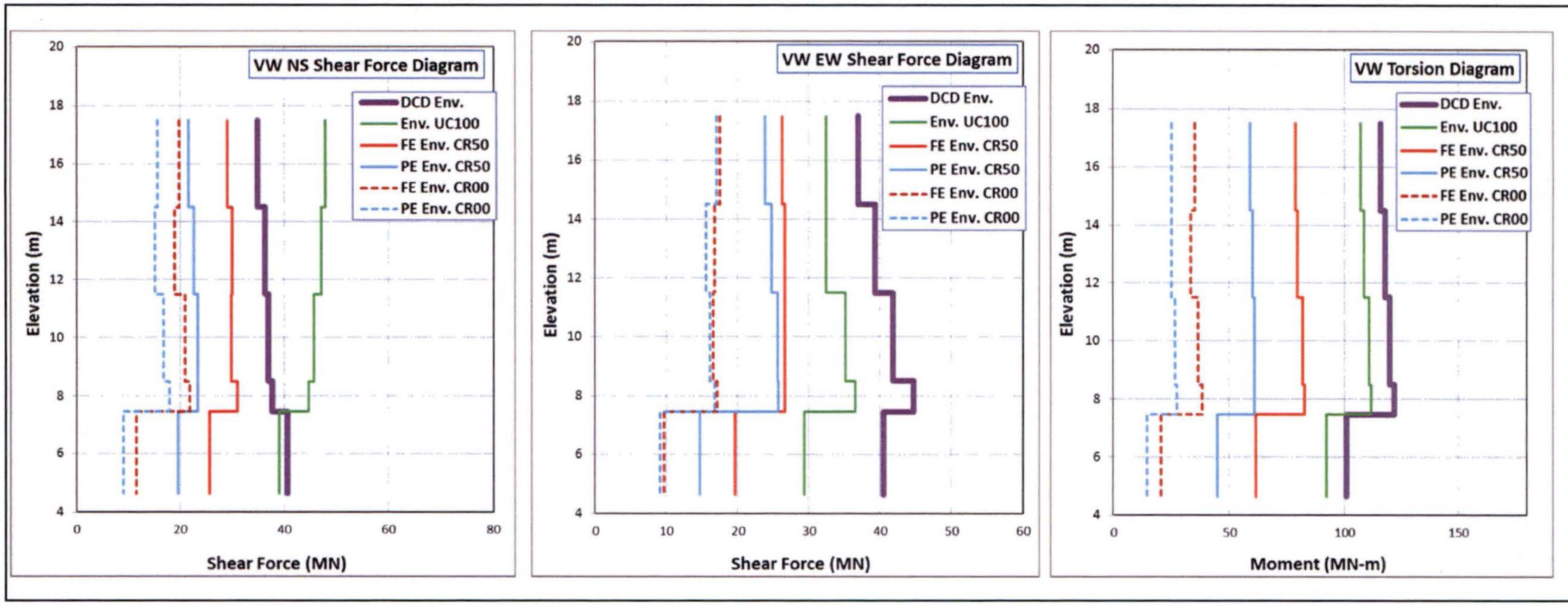


Figure B.4-4 Comparison of Horizontal Seismic Load Demands on VW

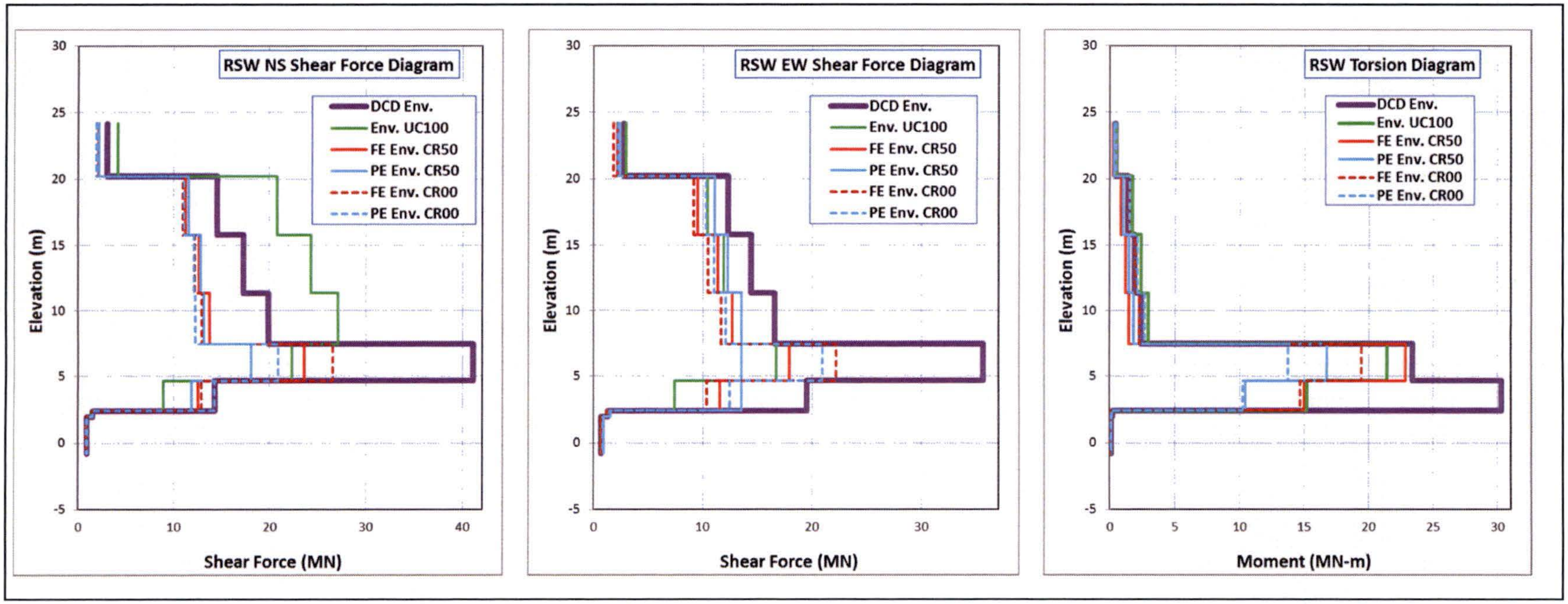


Figure B.4-5 Comparison of Horizontal Seismic Load Demands on RSW

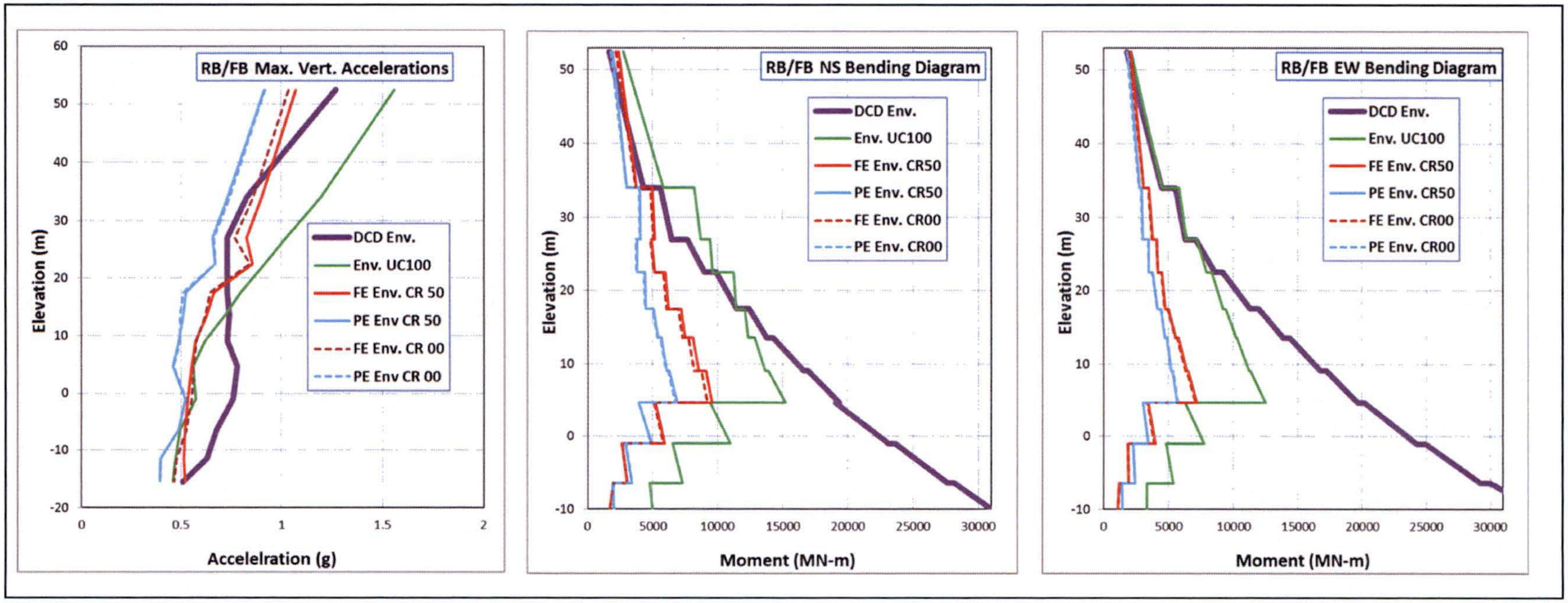


Figure B.4-6 Comparison of Vertical Seismic Load Demands on RB/FB

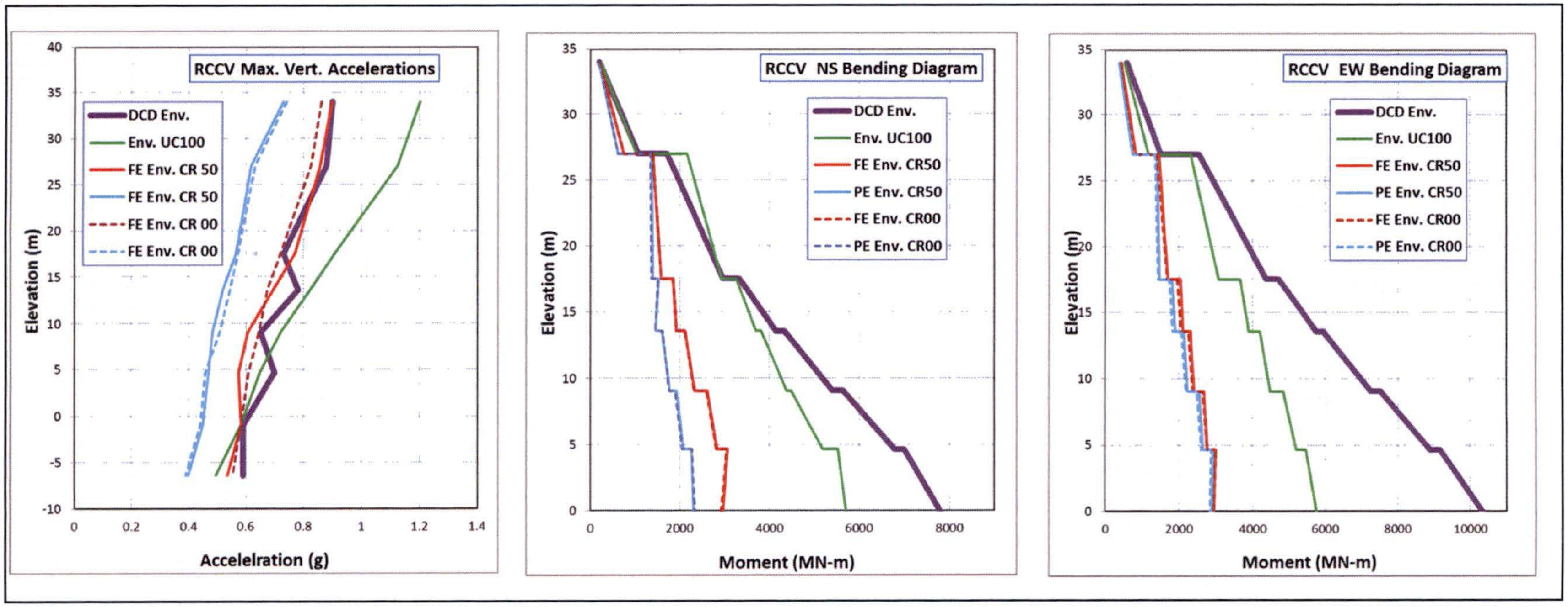


Figure B.4-7 Comparison of Vertical Seismic Load Demands on RCCV

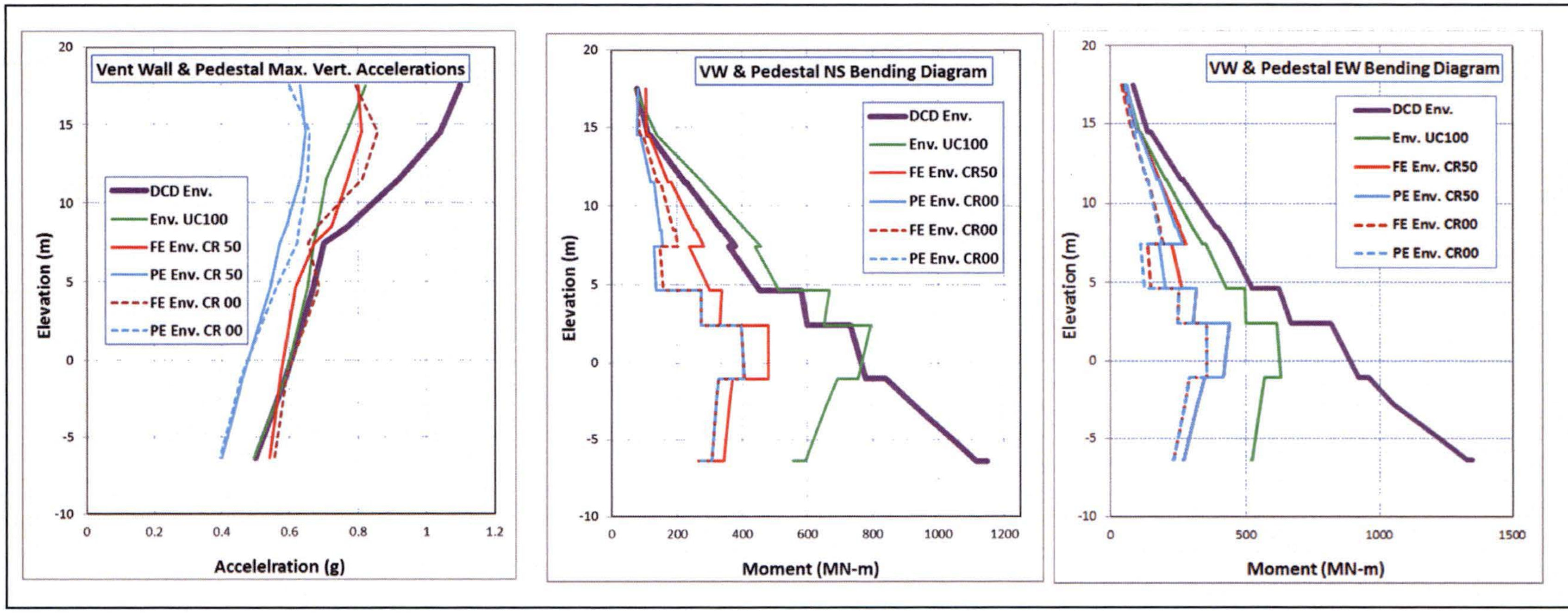


Figure B.4-8 Comparison of Vertical Seismic Load Demands on VW and Pedestal

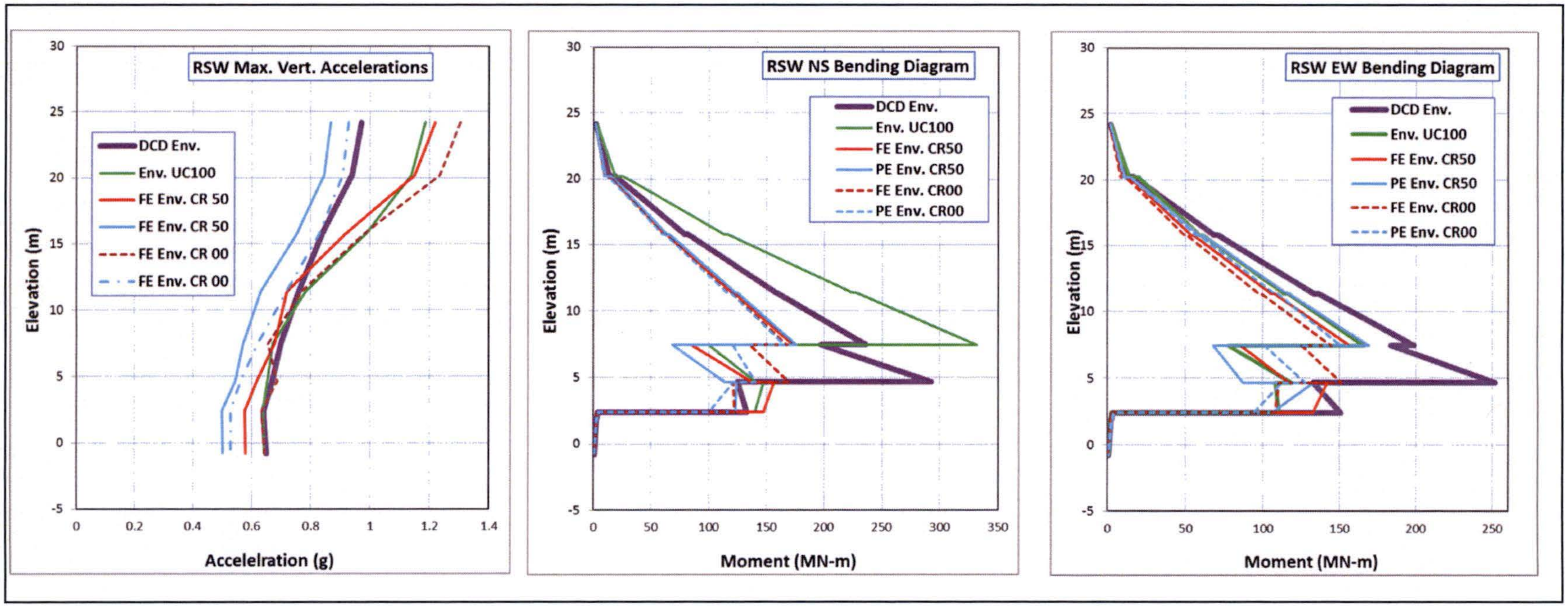
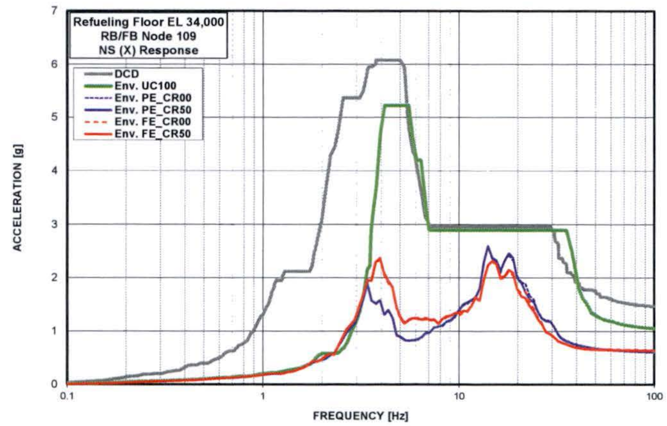
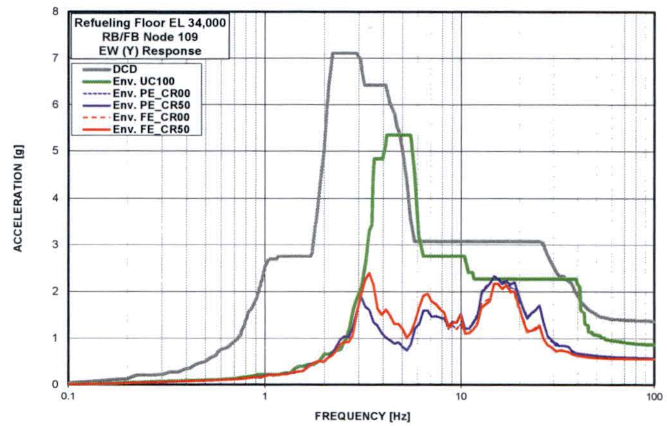


Figure B.4-9 Comparison of Vertical Seismic Load Demands on RSW





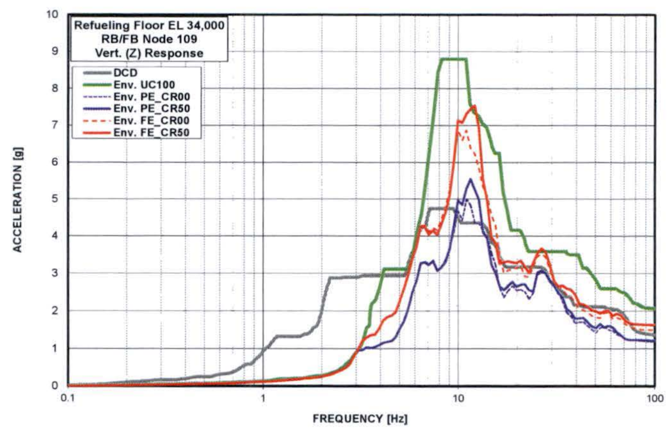


Figure B.4-10 Comparison of ISRS – RB/FB Refueling Floor

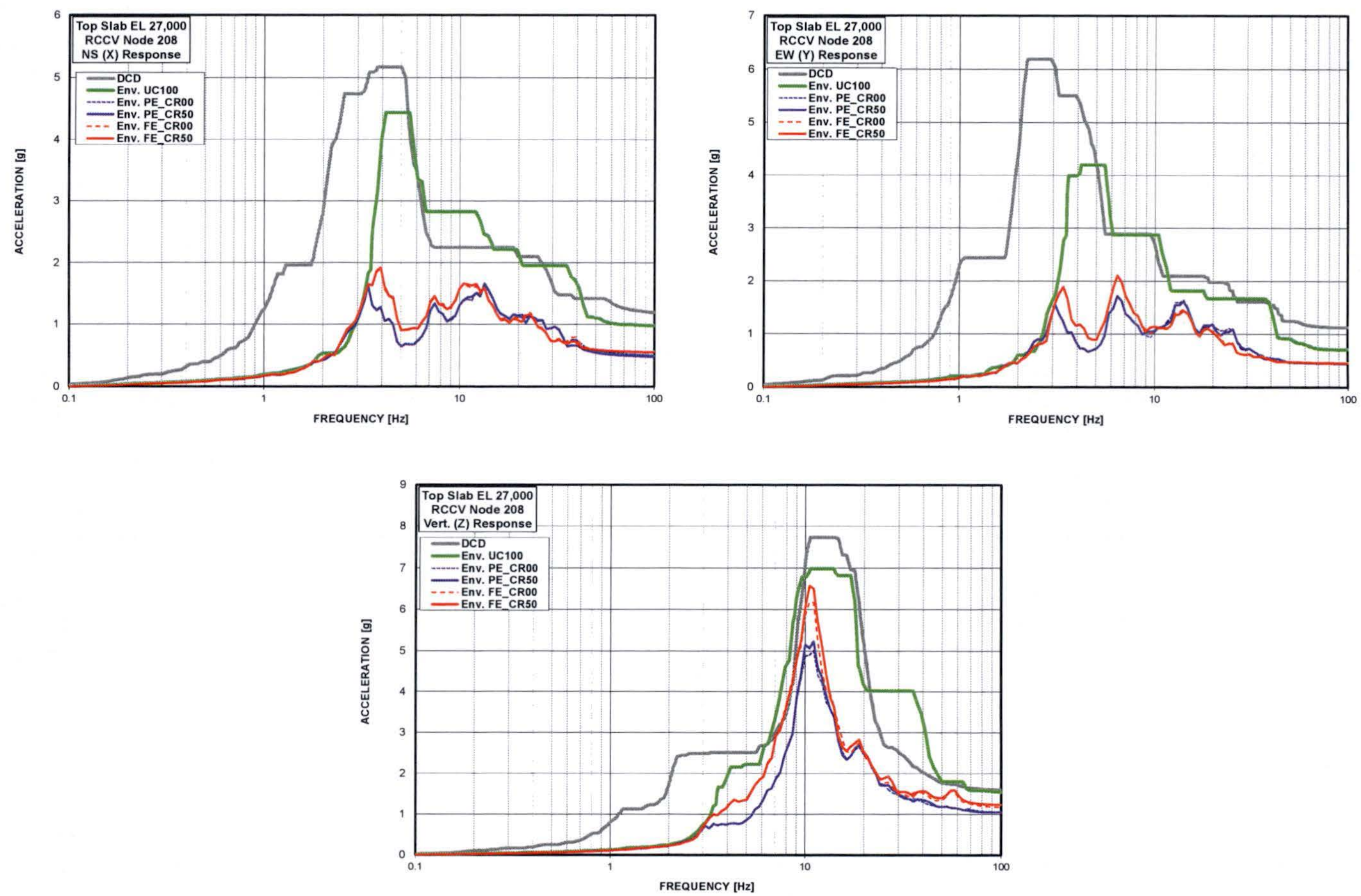


Figure B.4-11 Comparison of ISRS – RCCV Top Slab

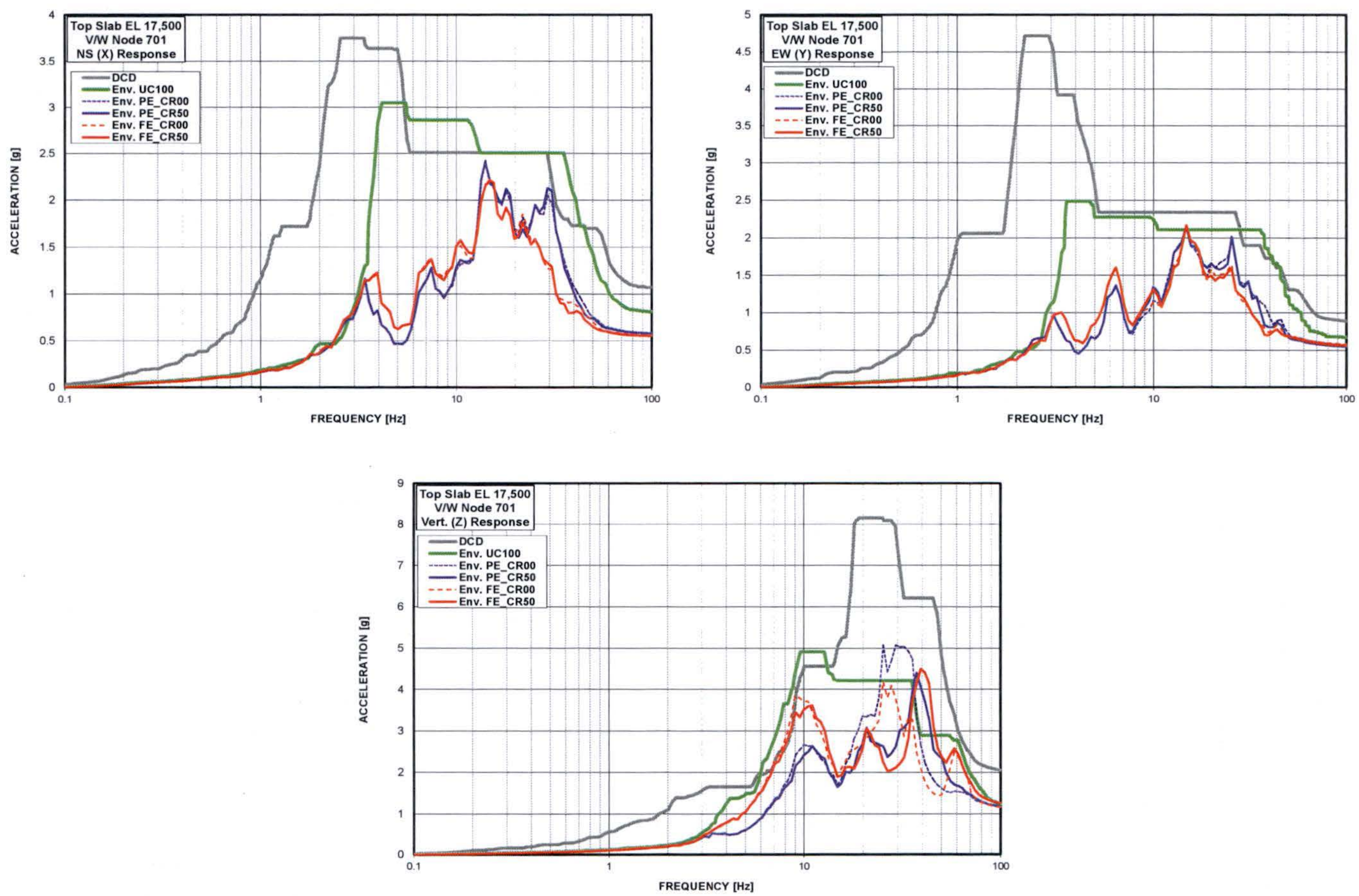


Figure B.4-12 Comparison of ISRS – Vent Wall Top

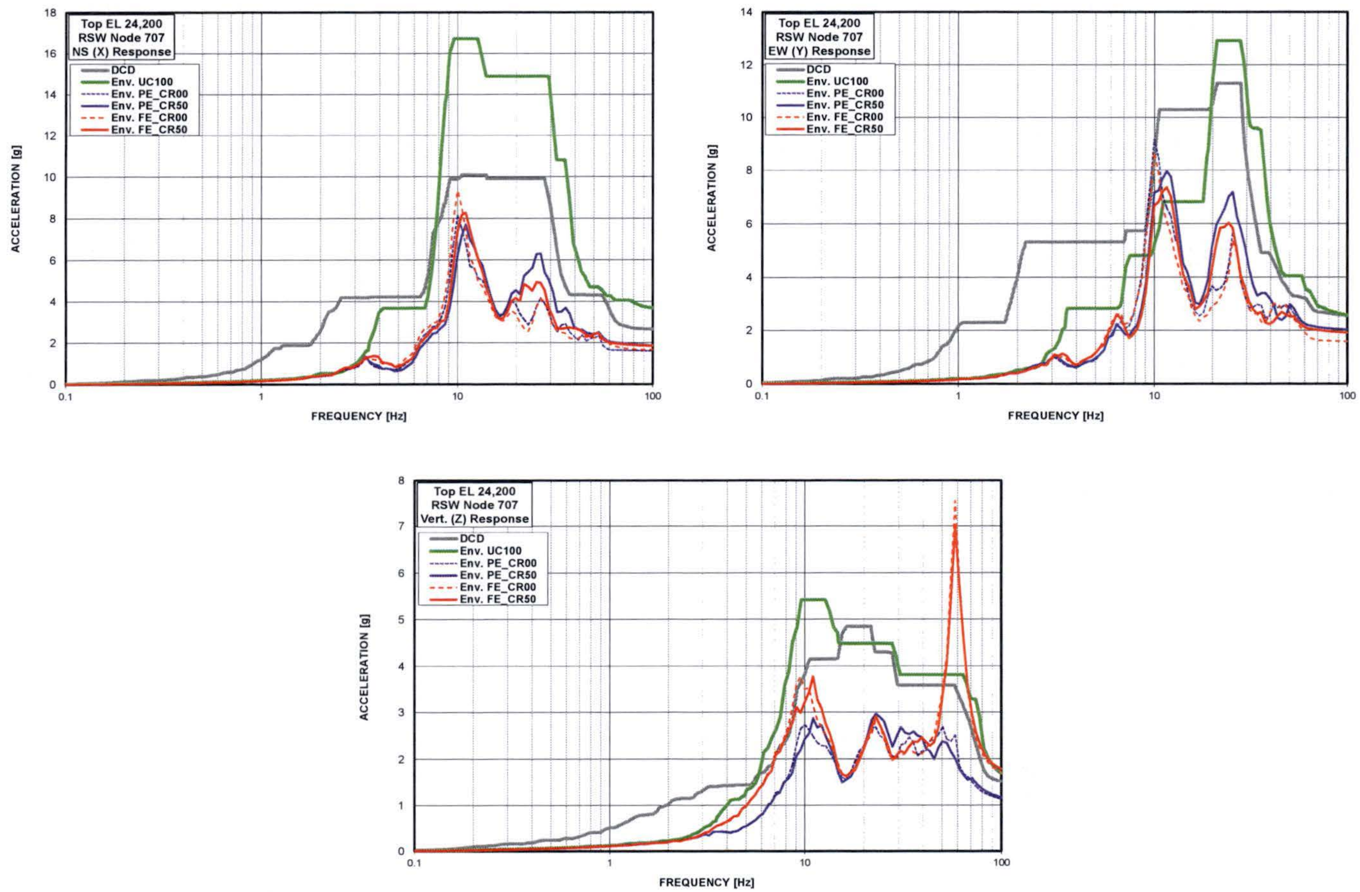


Figure B.4-13 Comparison of ISRS – RSW Top

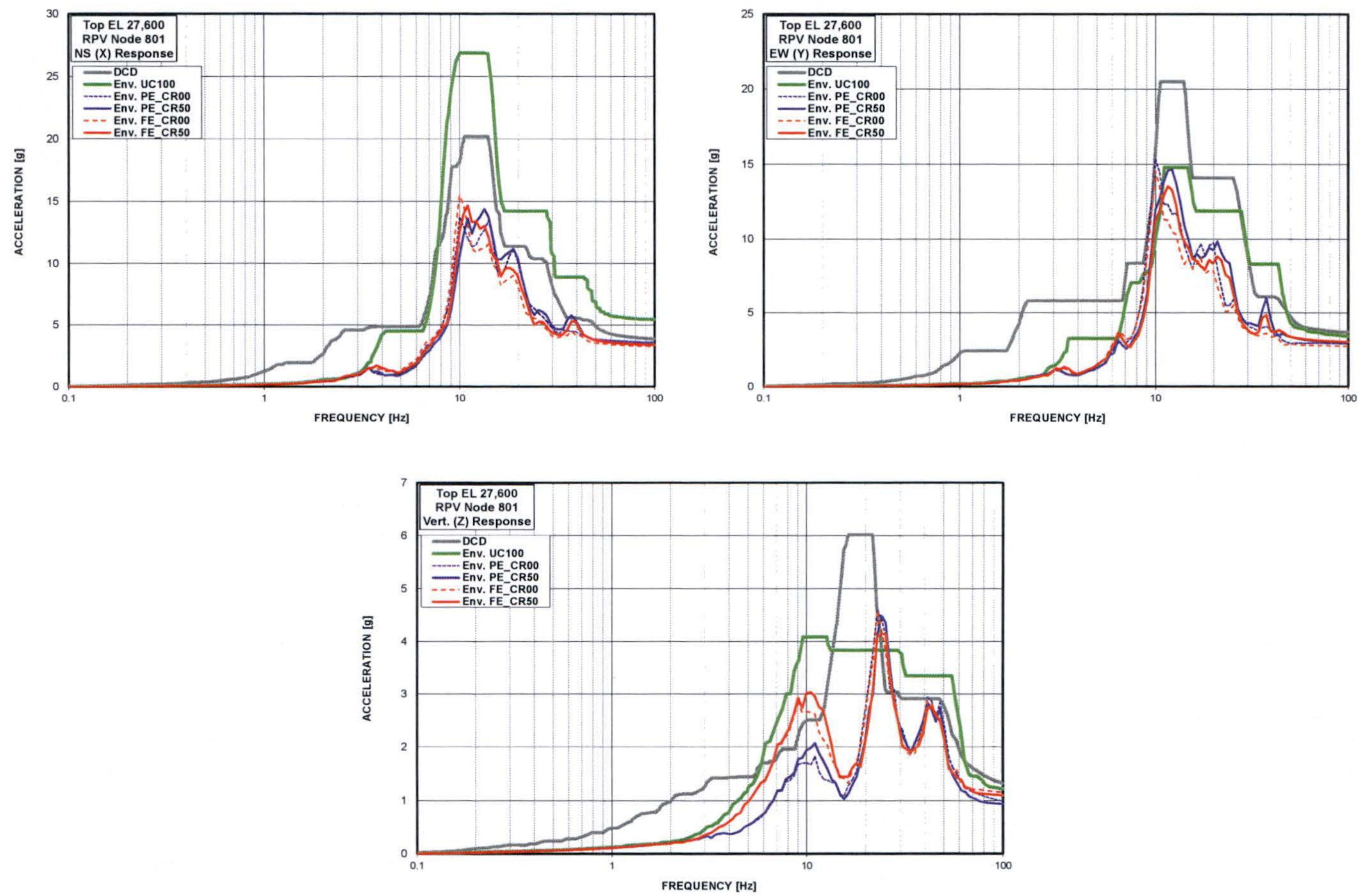


Figure B.4-14 Comparison of ISRS – RPV Top

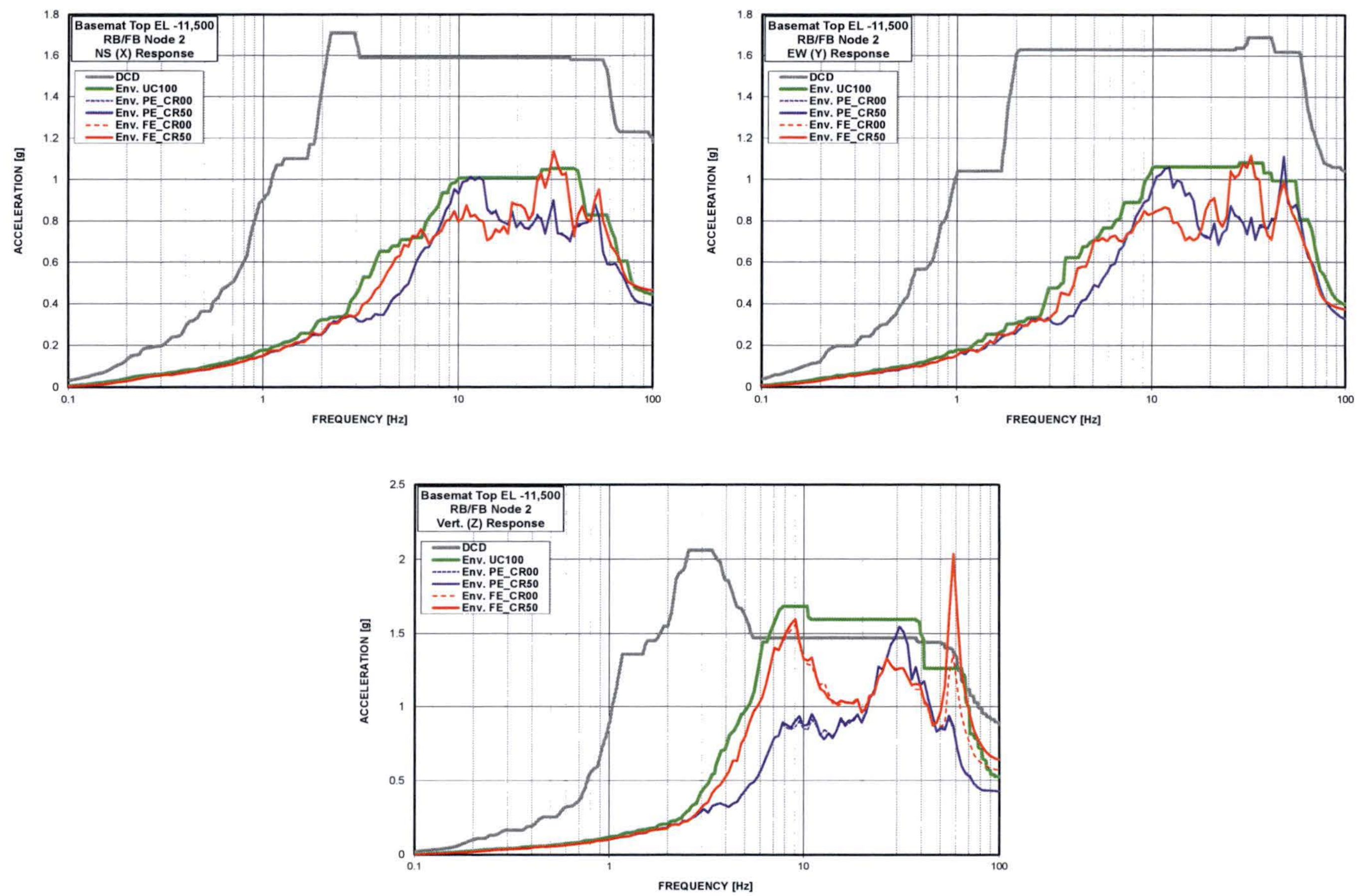
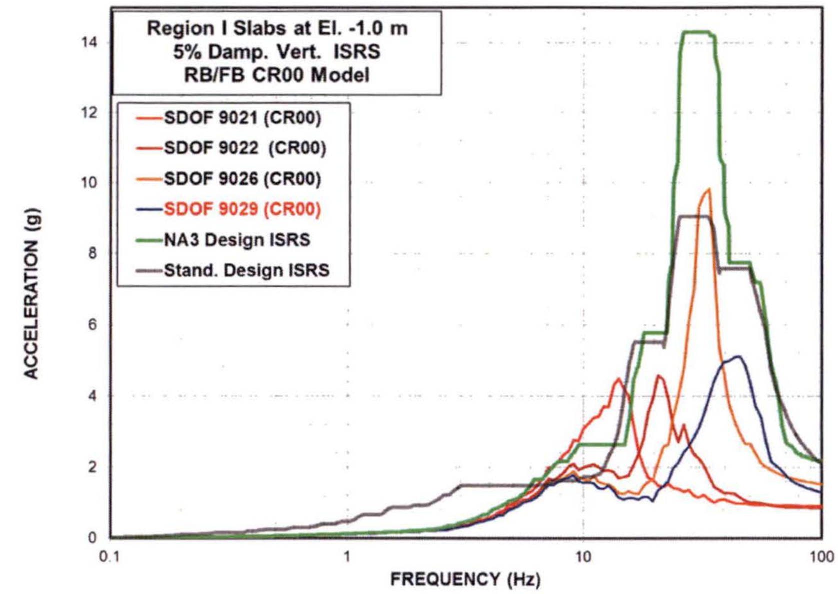
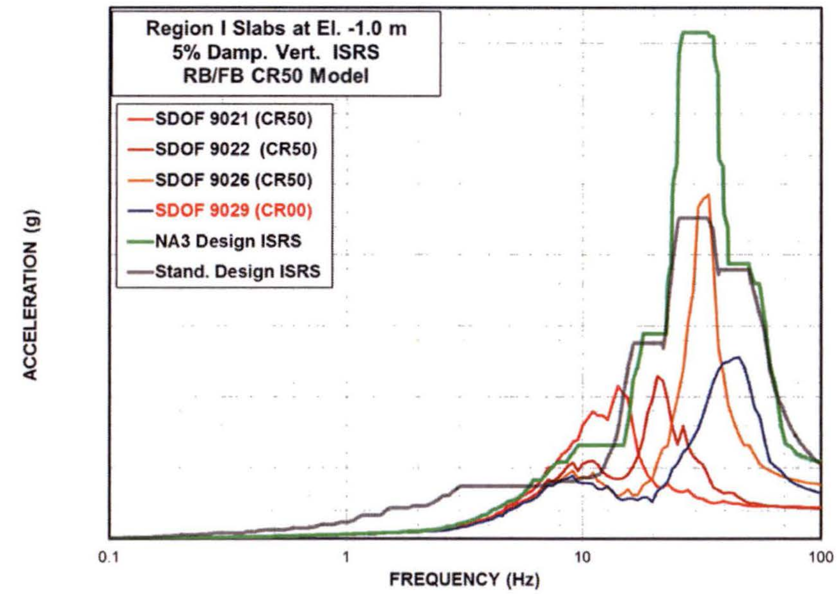


Figure B.4-15 Comparison of ISRS – RB/FB Basemat

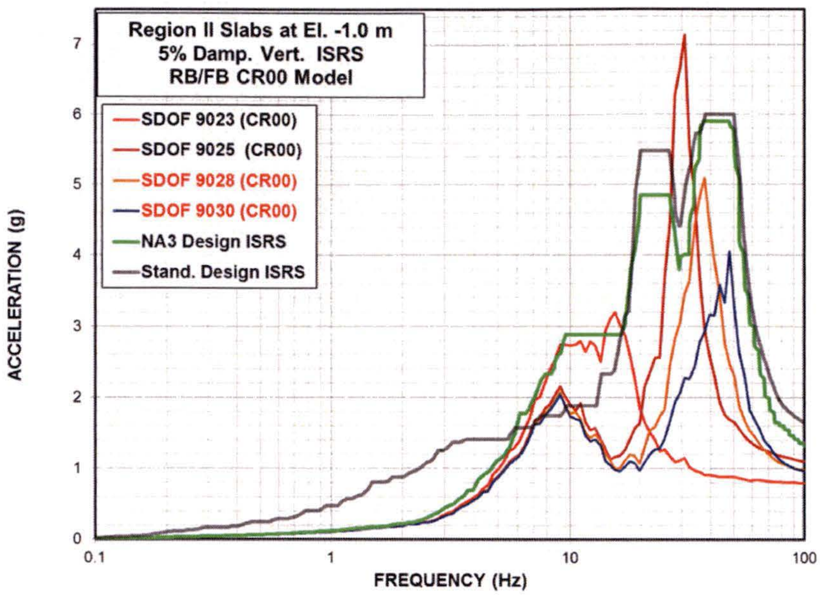


CR00 Model Results

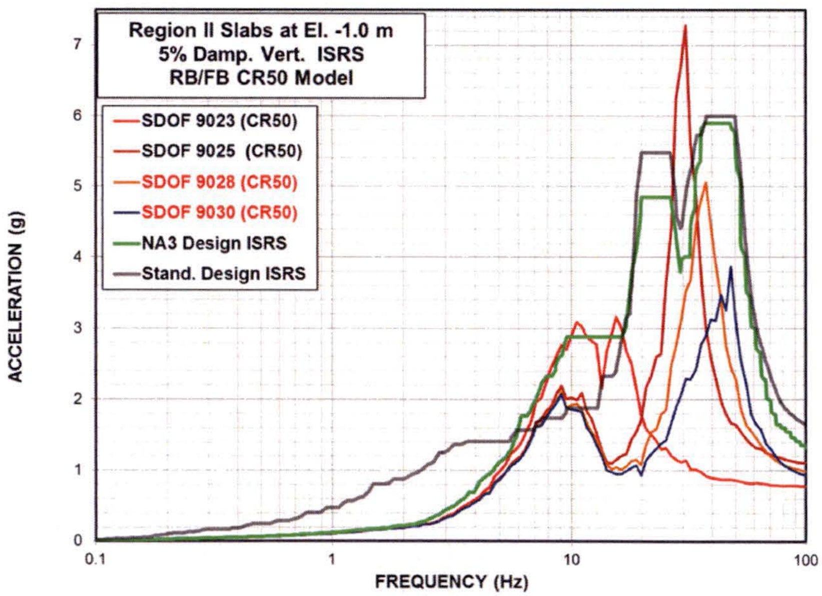


CR50 Model Results

Figure B.4-16 Comparison of Out-of-Plane ISRS for Region I Slabs at EL -1,000

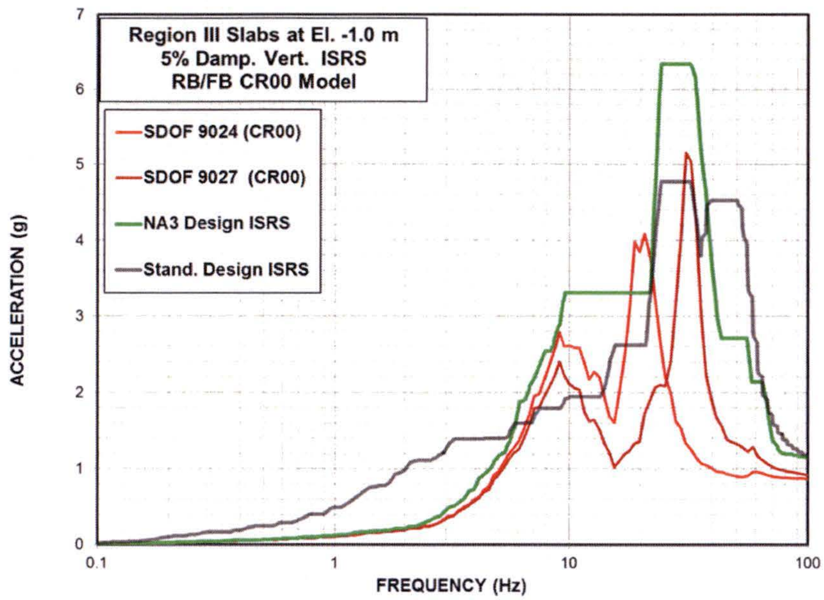


CR00 Model Results

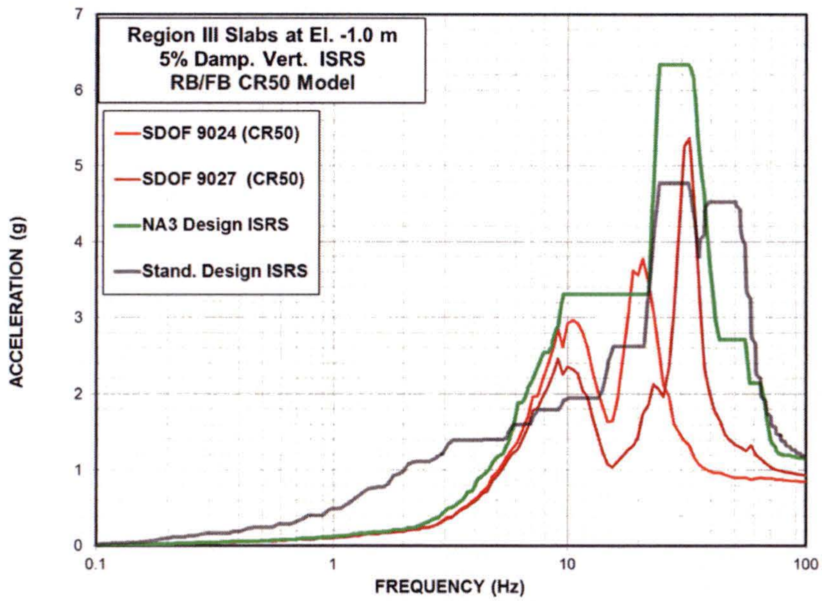


CR50 Model Results

Figure B.4-17 Comparison of Out-of-Plane ISRS for Region II Slabs at EL -1,000

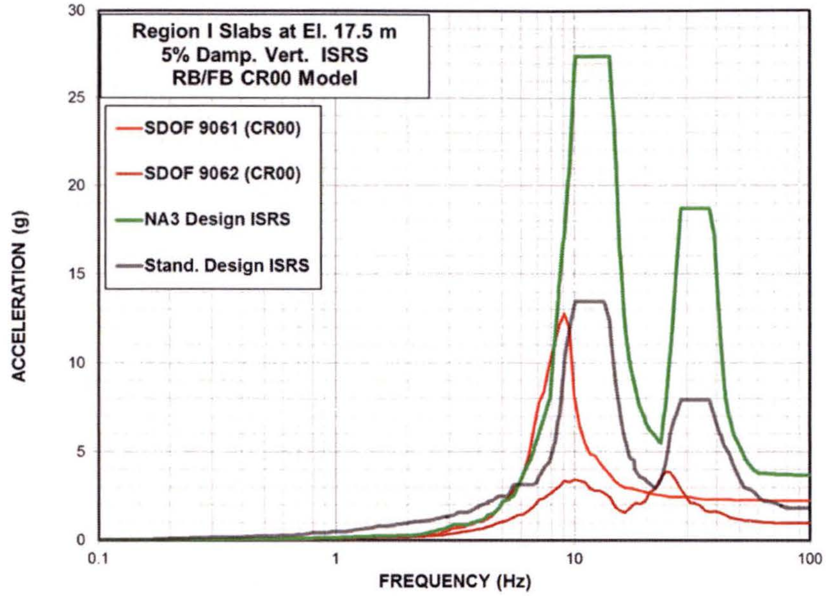


CR00 Model Results

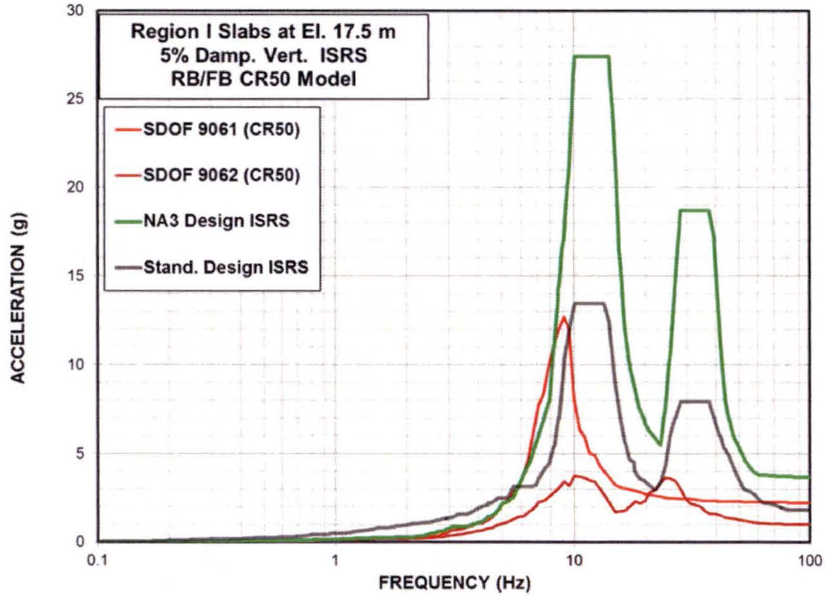


CR50 Model Results

Figure B.4-18 Comparison of Out-of-Plane ISRS for Region III Slabs at EL -1,000

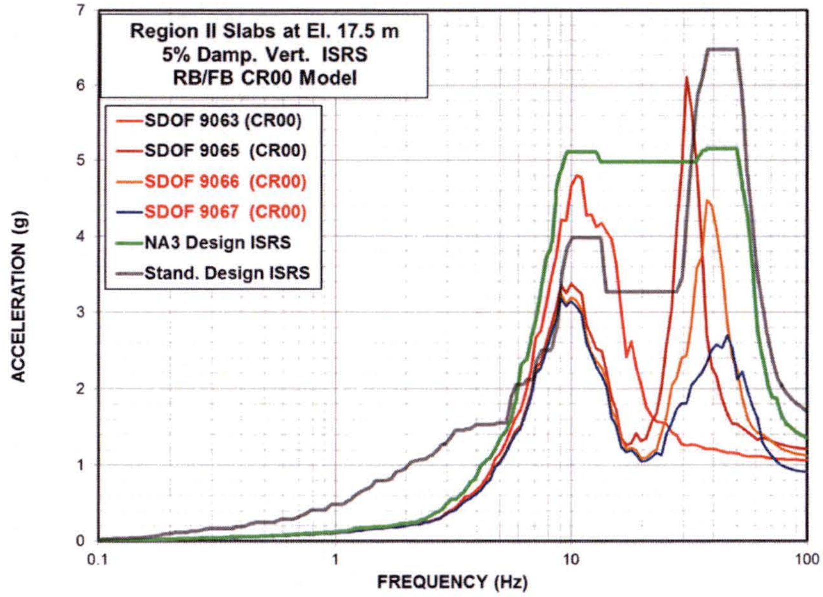


CR00 Model Results

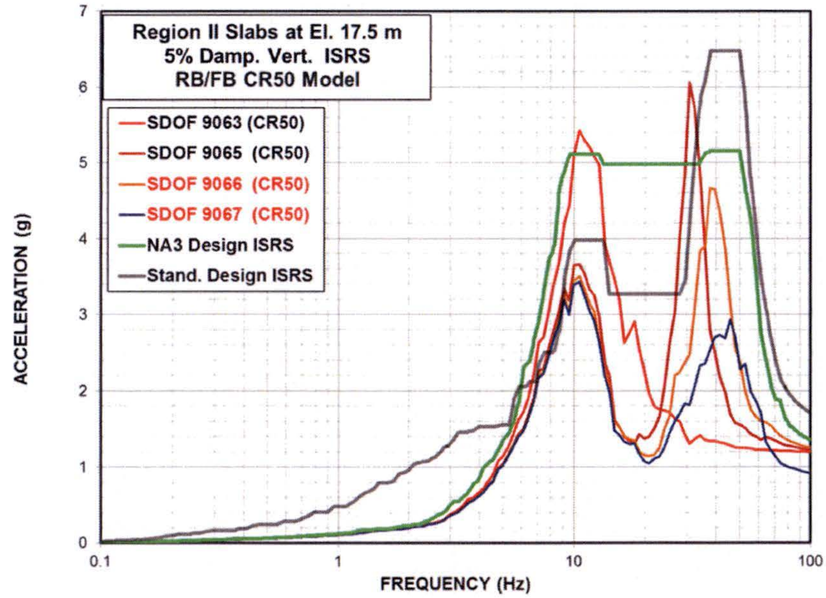


CR50 Model Results

Figure B.4-19 Comparison of Out-of-Plane ISRS for Region I Slabs at EL 17,500

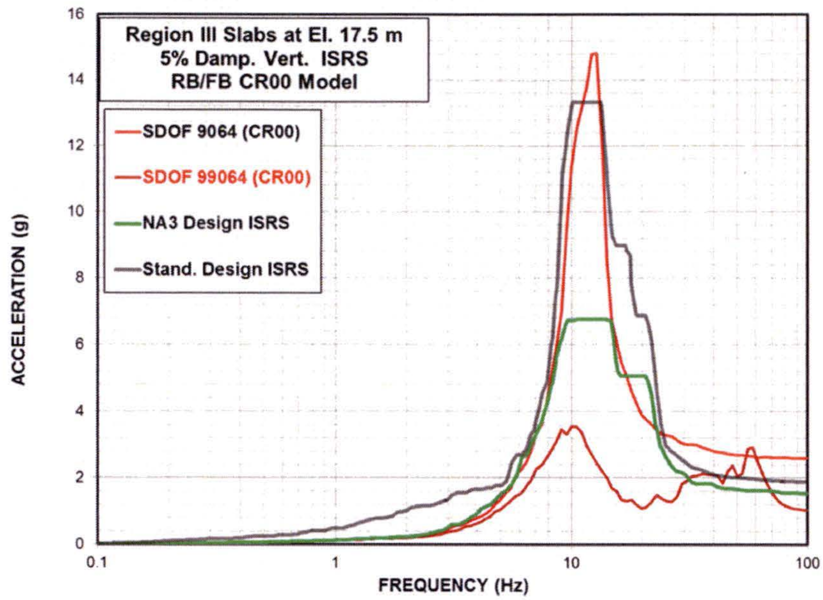


CR00 Model Results

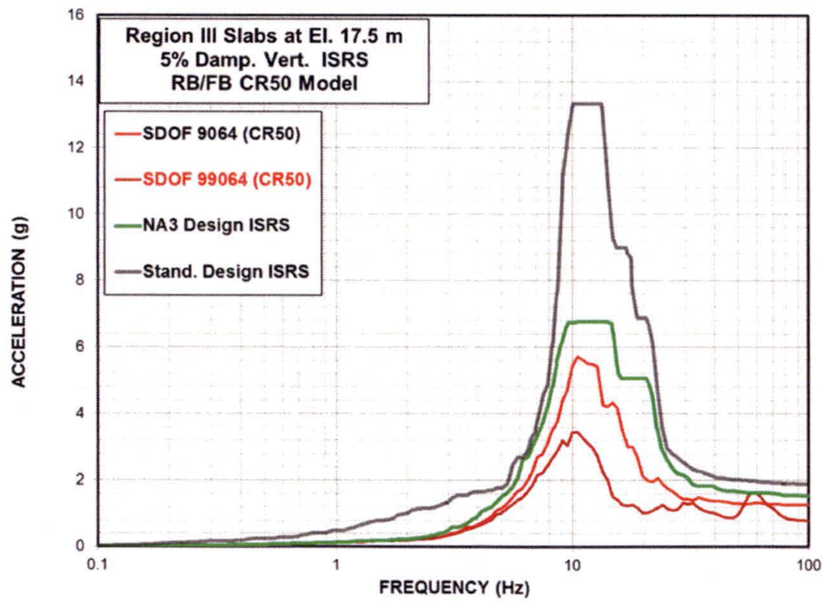


CR50 Model Results

Figure B.4-20 Comparison of Out-of-Plane ISRS for Region II Slabs at EL 17,500

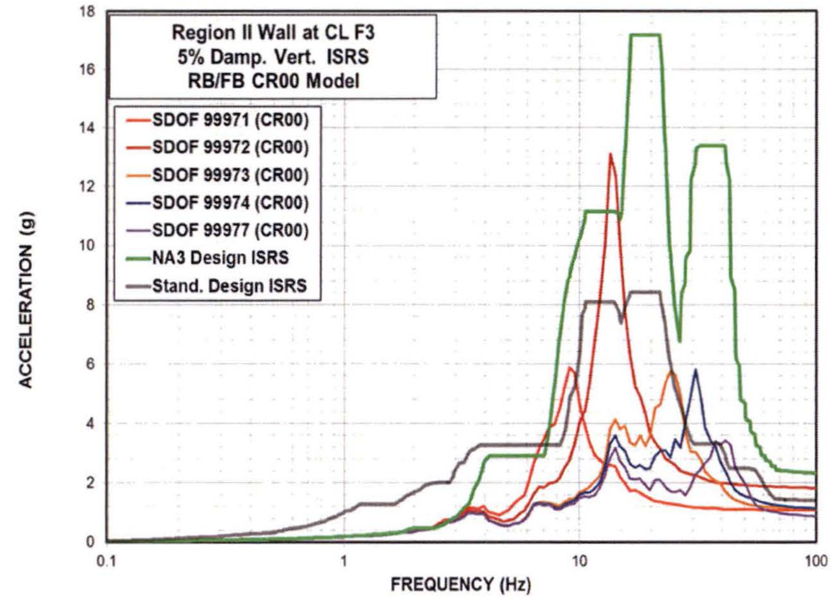


CR00 Model Results

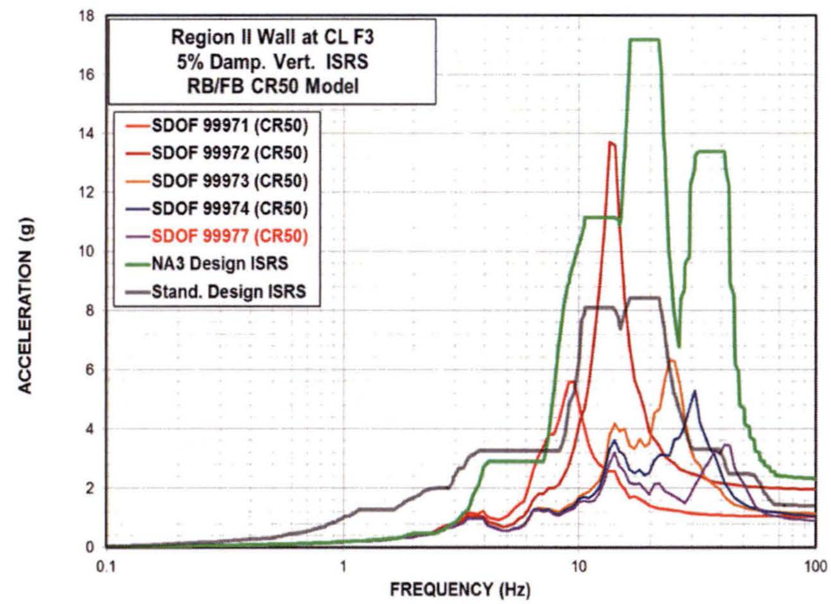


CR50 Model Results

Figure B.4-21 Comparison of Out-of-Plane ISRS for Region III Slabs at EL 17,500



CR00 Model Results



CR50 Model Results

Figure B.4-22 Comparison of Out-of-Plane ISRS for Region II Walls at CL F3

APPENDIX C

Fully Embedded Model Point Radius Benchmarking Evaluation

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C.1 SCOPE

The fully embedded RB/FB model requires a refined mesh for the soil layers above the Zone III rock level in order to capture sufficient input motion energy at high frequencies. It also requires a coarser mesh for the soil layers below the Zone III rock level to keep the total number of interaction nodes below the SASSI2010 limit of 20,000. As such, non-uniform mesh and triangular elements are used in the transitional layers.

In this appendix, a point-load radius sensitivity study is performed to evaluate the adequacy of the re-meshed model based on responses obtained from the SSI analyses of the UB full column profile of:

- **NM R=3.40 m** re-meshed RB/FB model with input point radius of 3.4 m calculated based on mesh size of rock portion of excavated volume model
- **NM R=0.86 m** re-meshed RB/FB model with input point radius of 0.86 m calculated based on mesh size of soil portion of excavated volume model
- **UM R=0.90 m** original RB/FB model with uniform mesh (as shown in Figure C-1) and input point radius of 0.9 m

Results from SSI analysis **UM R=0.90 m** of the RB/FB model with uniform mesh are used as reference for the validations.

C.2 ANALYSES AND RESULTS

The original uniform fully embedded model can transmit the UB full column profile seismic waves with frequencies up to 50 Hz. Table C-1 provides a list of frequencies of analysis used for all the three cases mentioned above. Comparisons of maximum accelerations are given in Figures C-2 through C-6 and comparisons of 5% damped ISRS results are provided in Figures C-7 through C-12.

C.3 CONCLUSIONS

Comparisons of maximum accelerations and 5% damped ISRS results demonstrate that the analysis of re-meshed RB/FB fully embedded model with input point radius of 3.4 m and the re-meshed model using non-uniform irregular elements produces results with adequate accuracy as compared to the results of the reference (UM R=0.90 m) case.

Table C-1 List of Frequencies of Analyses

Freq. No.	Freq. (Hz)
1	0.0244
41	1.0010
82	2.0020
102	2.4902
123	3.0029
143	3.4912
164	4.0039
184	4.4922
205	5.0049
225	5.4932
246	6.0059
266	6.4941
287	7.0068
307	7.4951
328	8.0078
348	8.4961
369	9.0088
389	9.4971
410	10.010
430	10.498
451	11.011
471	11.499
492	12.012
512	12.500
532	12.988
573	13.989
614	14.990
655	15.991
696	16.992
737	17.993
778	18.994
819	19.995
860	20.996
901	21.997
942	22.998
983	23.999
1024	25.000
1065	26.001
1106	27.002
1147	28.003
1188	29.004
1229	30.005
1270	31.006
1311	32.007
1352	33.008
1393	34.009
1434	35.010
1475	36.011
1516	37.012
1557	38.013
1598	39.014
1639	40.015
1680	41.016
1721	42.017
1762	43.018
1803	44.019
1844	45.020
1885	46.021
1926	47.022
1966	47.998
2007	48.999
2048	50.000

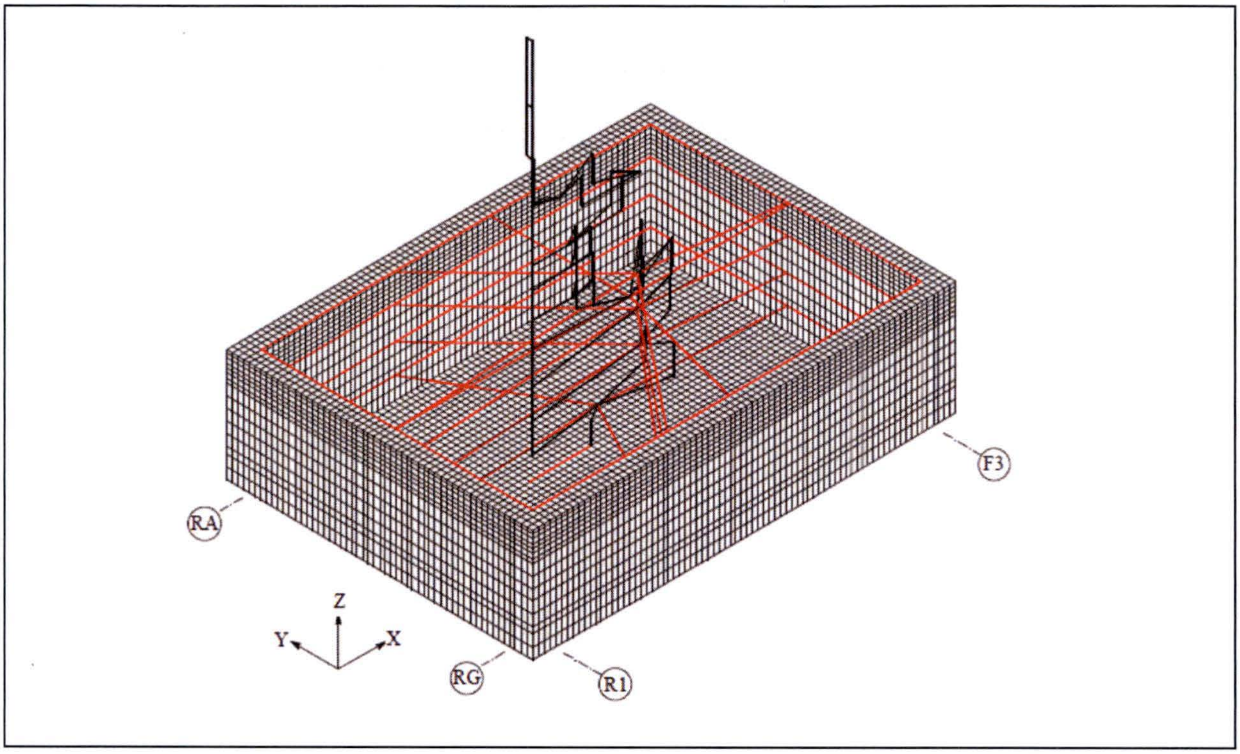


Figure C-1 Original RB/FB Fully Embedded Model with Uniform Mesh

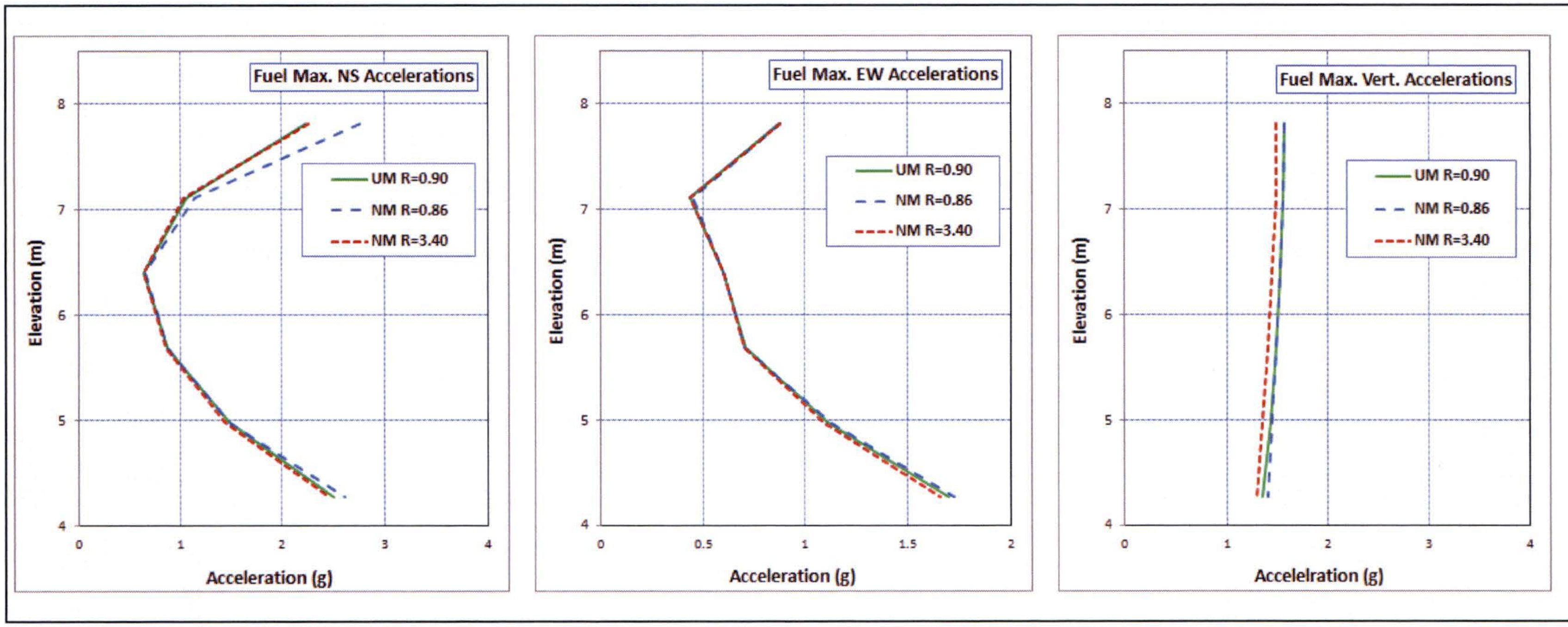


Figure C-2 Comparison of Maximum Accelerations – Fuel

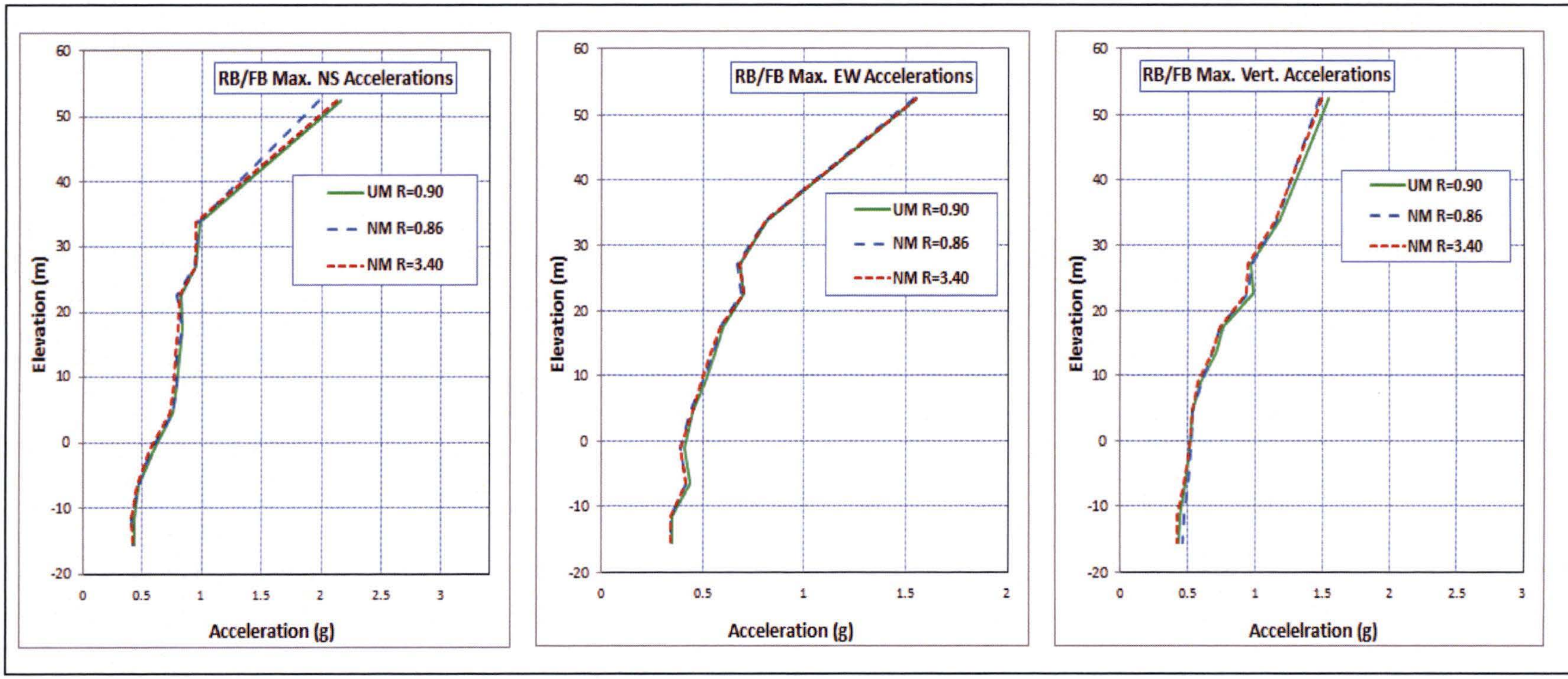


Figure C-3 Comparison of Maximum Accelerations – RB/FB

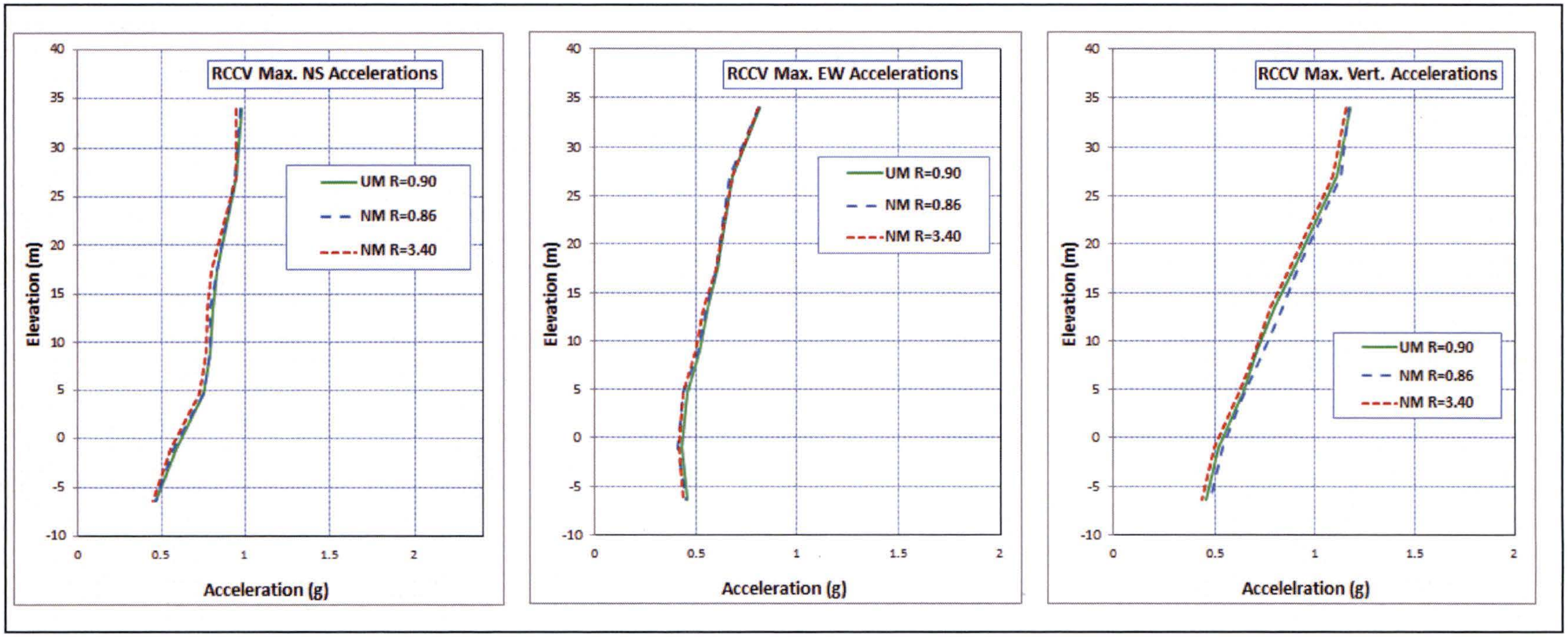


Figure C-4 Comparison of Maximum Accelerations – RCCV

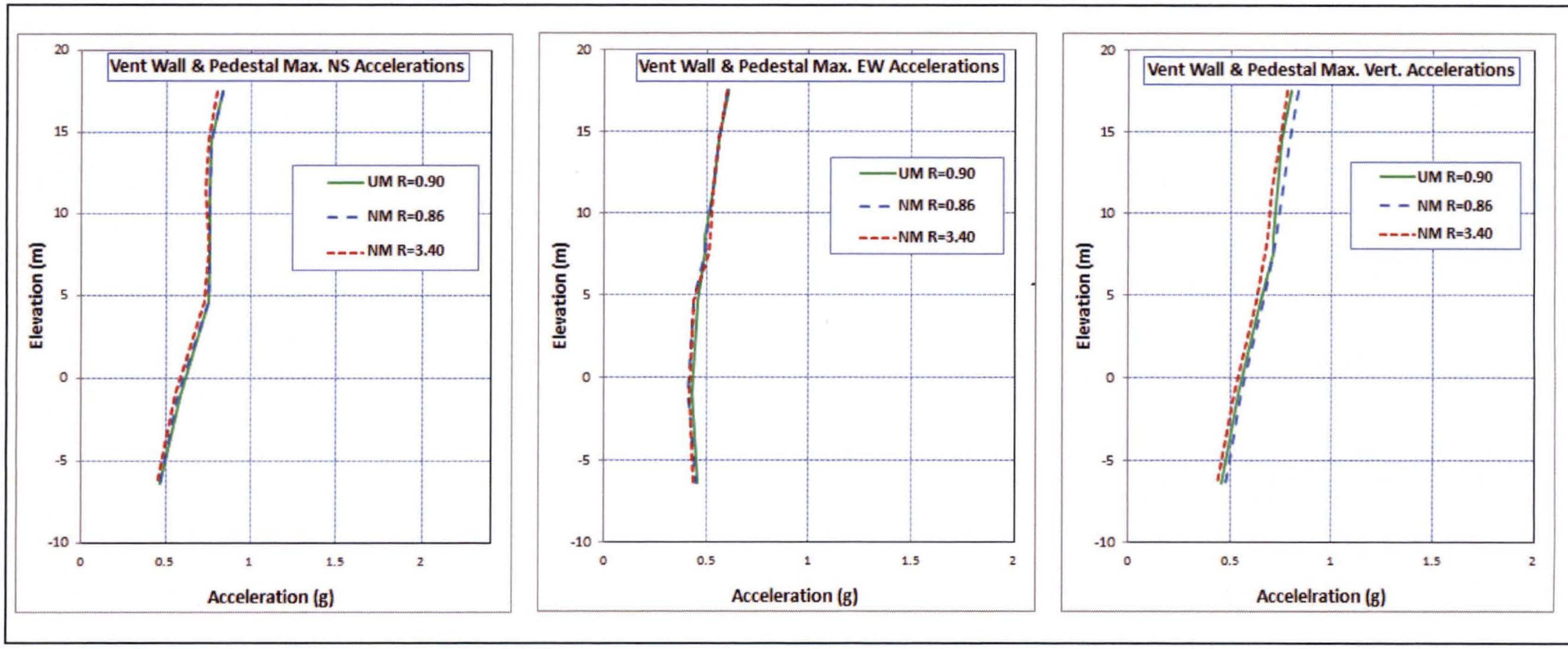


Figure C-5 Comparison of Maximum Accelerations – VW

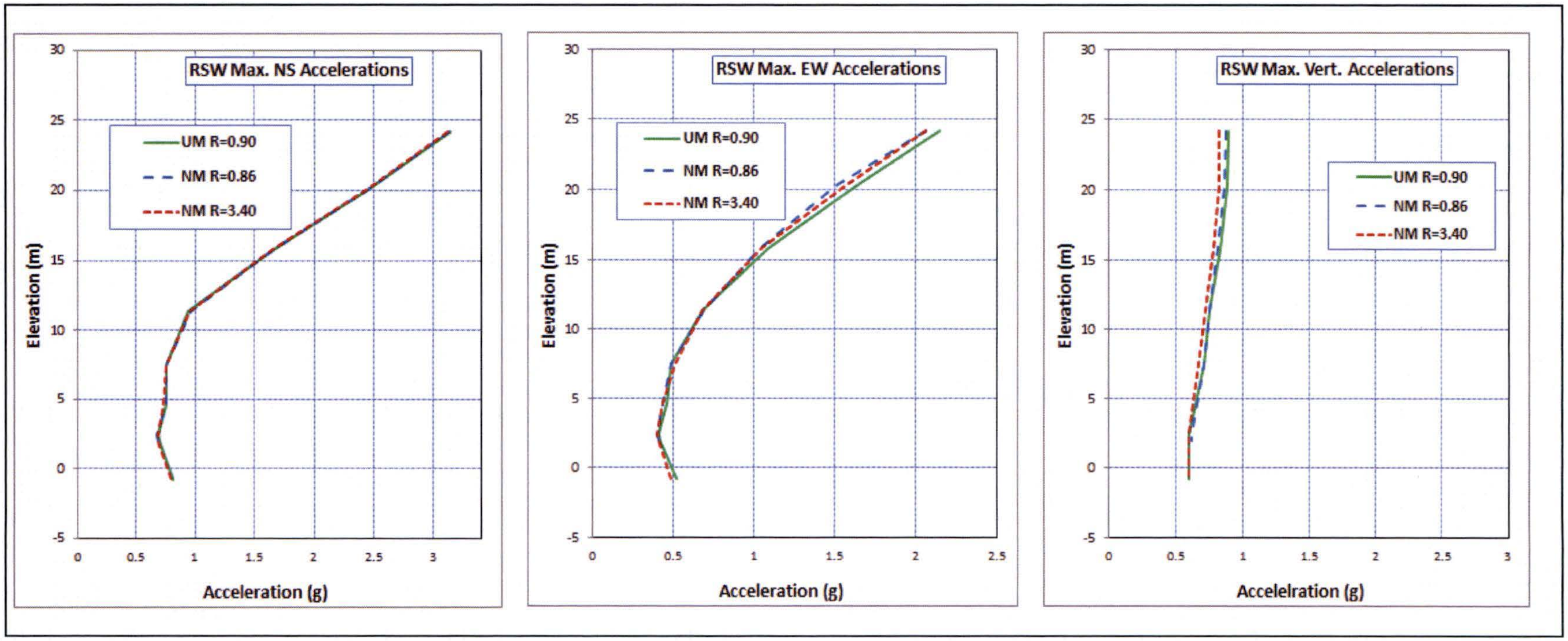
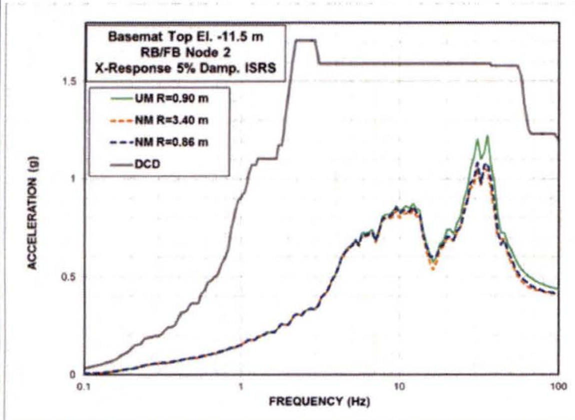
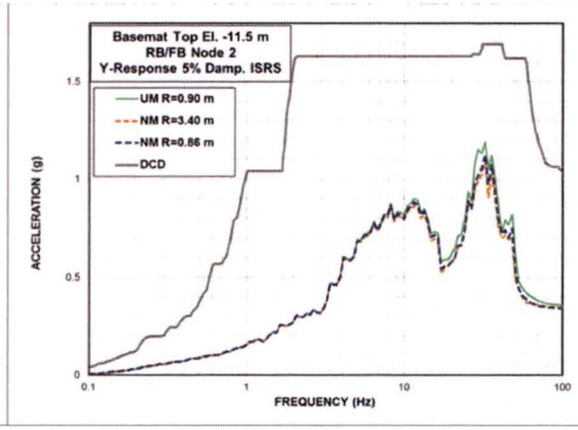


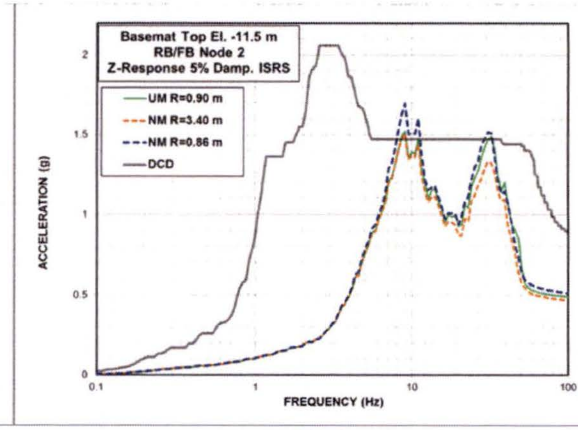
Figure C-6 Comparison of Maximum Accelerations – RSW



(a) X-Direction

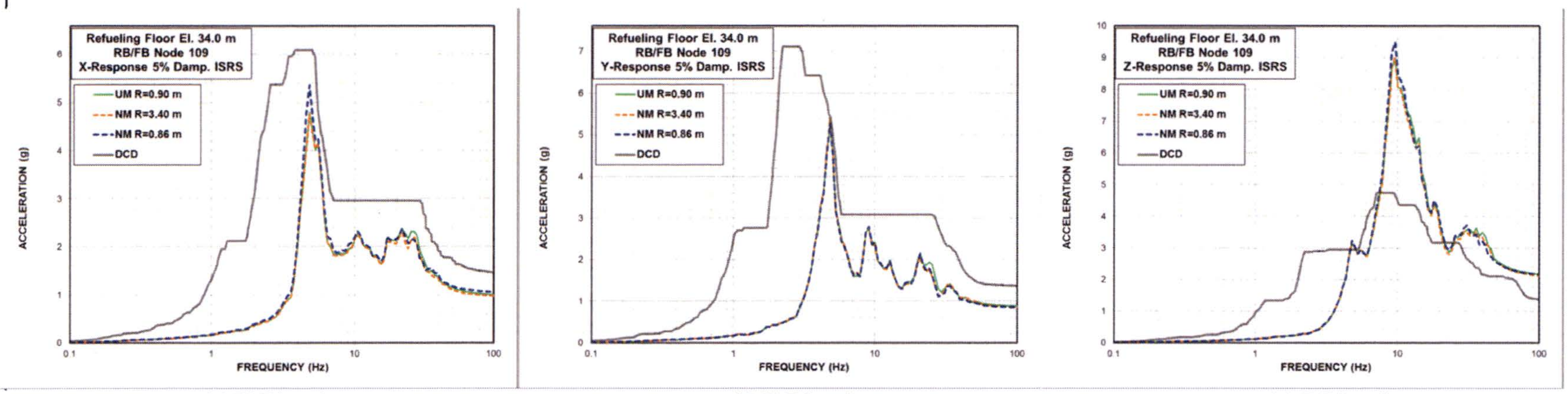


(b) Y-Direction



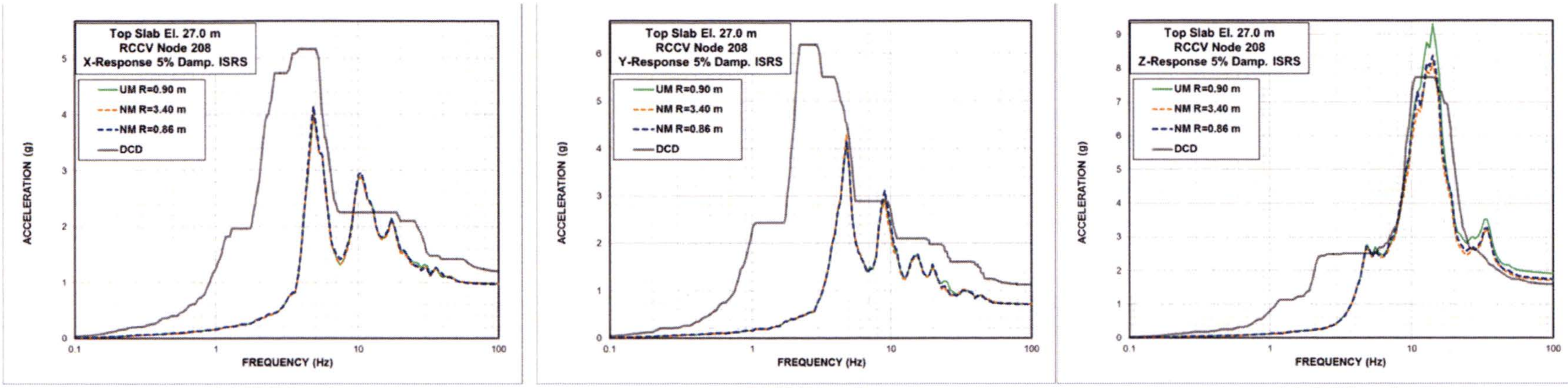
(c) Z-Direction

Figure C-7 Comparison of ISRS – RB/FB Basemat Top El. -11.5 m



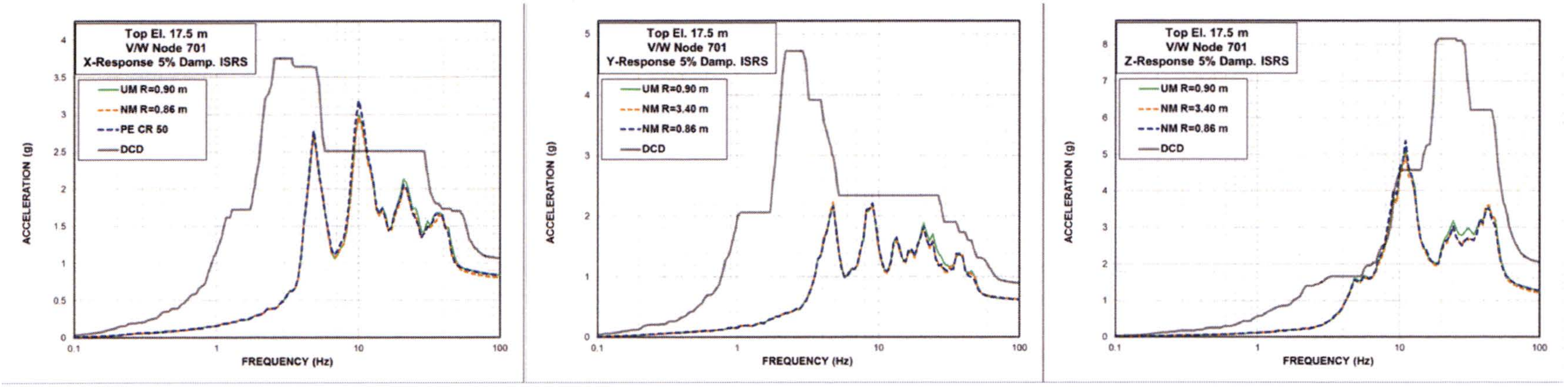
(a) X-Direction (b) Y-Direction (c) Z-Direction

Figure C-8 Comparison of ISRS – RB/FB Refueling Floor El. 34.0 m



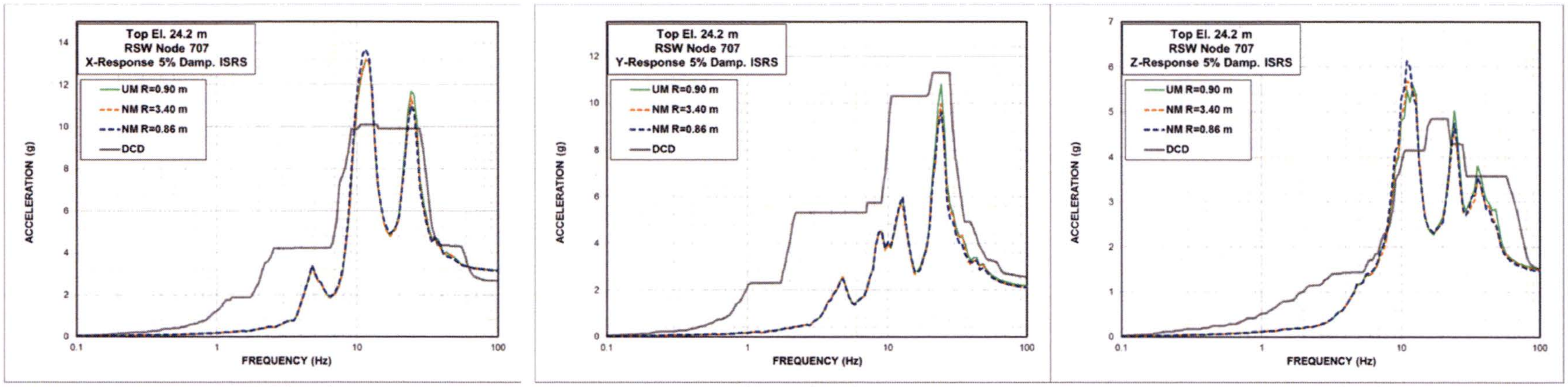
(a) X-Direction (b) Y-Direction (c) Z-Direction

Figure C-9 Comparison of ISRS – RCCV Top Slab El. 27.0 m



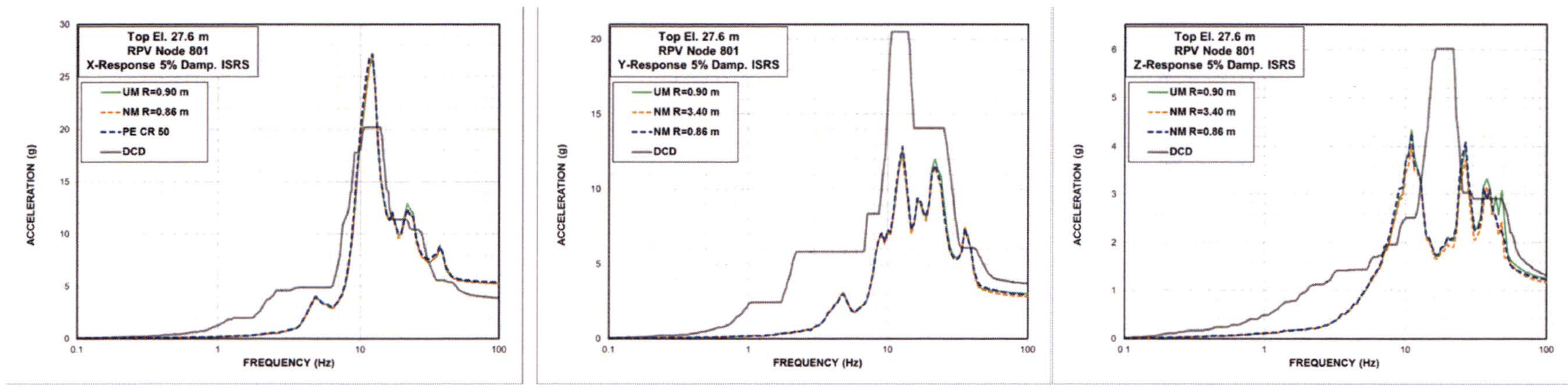
(a) X-Direction (b) Y-Direction (c) Z-Direction

Figure C-10 Comparison of ISRS – VW Top El. 17.5 m



(a) X-Direction (b) Y-Direction (c) Z-Direction

Figure C-11 Comparison of ISRS – RSW Top El. 24.2 m



(a) X-Direction (b) Y-Direction (c) Z-Direction

Figure C-12 Comparison of ISRS – RPV Top El. 27.6 m

APPENDIX D

Site-Specific Out-of-Plane Loads on RB/FB Flexible Slabs and Walls

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D.1 SCOPE

This Appendix presents the methodology used for calculation of out-of-plane seismic loads on the RB/FB flexible slabs and walls.

D.2 METHODOLOGY

The calculations of site-specific out-of-plane loads on flexible slabs and walls use methodology identical to the methodology used in Reference 2-l for the development of out-of-plane loads on flexible slabs and walls for the standard design. For each site-specific analysis case performed for RB/FB, out-of-plane loads are calculated using the results of SSI analyses for the maximum accelerations of floor lumped masses and SDOF oscillator masses.

The out-of-plane loads acting on flexible slabs and walls are calculated in terms of weighted average out-of-plane accelerations that include the contribution of both:

- Flexible modes of vibrations represented by the maximum accelerations of SDOF oscillators
- Rigid modes of vibration represented by the maximum accelerations of the floor lumped mass

The flexible modes of vibration (modes with frequencies below 50 Hz) of particular slab or wall in the dynamic model are represented by one or more SDOF oscillators. Figures A.3.3.5.4-28 through A.3.3.5.4-37 in Reference 2-k, RB/FB seismic analysis standard design report, identify the RB/FB flexible slabs' locations and the SDOF oscillators representing their flexible out-of-plane modes of vibration. The locations of RB/FB flexible walls and the SDOF oscillators representing their flexible modes of vibrations are identified in Figures A.3.3.8-9 and A.3.3.8-10 of Reference 2-k. The RB/FB seismic analysis standard design report (Reference 2-k) presents only the dynamic properties of RB/FB flexible slabs and walls representative of full (uncracked concrete) stiffness condition. The SDOF oscillators representing the dynamic properties of RB/FB slabs and walls under fully cracked conditions are identified in Reference 2-aa.

The acceleration A_{FM} representing the out-of-plane acceleration of all flexible modes of vibrations of particular slab or the wall is calculated as weighted average using the following equation:

$$A_{FM} = \frac{\sum {}_{SDOF}A_i \cdot {}_{SDOF}W_i}{\sum {}_{SDOF}W_i}$$

where ${}_{SDOF}A_i$ and ${}_{SDOF}W_i$ are the maximum acceleration and mass of the i-th oscillator.

The mass associated with the rigid modes of vibration of the flexible slab or wall is calculated as:

$$W_{RM} = W_T - \sum {}_{SDOF}W_i$$

where W_T is the mass of the flexible wall or slab.

The rigid mode acceleration A_{RM} representing the out-of-plane responses in modes which frequencies are equal to or larger than 50 Hz is calculated using the results of the SSI analysis for maximum accelerations of floor lumped masses. The rigid mode acceleration A_{RM} representing the rigid mode of vibration of the slab is obtained as the maximum vertical accelerations of the supporting LMSM at the floor elevation where the slab is supported. If the slab is supported by two or more LMSMs, A_{RM} is calculated as weighted average of the maximum accelerations of the supporting LMSMs at the slab's floor elevation. For example, the rigid mode acceleration of a slab supported by both RB/FB and RCCV LMSMs is calculated as:

$$A_{RM} = \frac{{}_{RBFB}A \cdot {}_{RBFB}W + {}_{RCCV}A \cdot {}_{RCCV}W}{{}_{RBFB}W + {}_{RCCV}W}$$

where ${}_{RBFB}A$ and ${}_{RBFB}W$ are the maximum acceleration and vertical rigid mode mass of the RB/FB LMSM. ${}_{RCCV}A$ and ${}_{RCCV}W$ are the maximum acceleration and vertical rigid mode mass of the RCCV LMSM.

For flexible walls, the rigid mode acceleration A_{RM} is taken as average acceleration of the maximum horizontal accelerations of supporting floor slabs. For example, for wall located between two floors with maximum horizontal accelerations A_{floor_i} and A_{floor_j}, the wall rigid mode acceleration A_{RM} is calculated as:

$$A_{RM} = \frac{A_{floor\_i} + A_{floor\_j}}{2}$$

The equivalent average acceleration A_{ave} representing the out-of-plane seismic load on the flexible slab or wall is calculated as follows:

$$A_{ave} = \frac{A_{FM} \cdot \sum {}_{SDOF}W_i + A_{RM} W_{RM}}{\sum {}_{SDOF}W_i + W_{RM}}$$

D.3 SAMPLE CALCULATIONS

Table D.3-1 presents a sample of the calculations of out-of-plane loads on the RB/FB flexible slabs under full (uncracked concrete) stiffness condition. Table D.3-2 presents a sample of the calculations of out-of-plane loads on the RB/FB flexible walls under full (uncracked concrete) stiffness condition. The calculations in Tables D.3-1 and D.3-2 are based on the

results of the critical SSI analysis of fully embedded (FE) RB/FB model with upper bound stiffness properties and OBE damping for the UB full column profile that yielded enveloping out-of-plane loads.

Table D.3-3 presents a sample of the calculations of out-of-plane loads on the RB/FB flexible slabs under fully cracked condition. Table D.3-4 presents a sample of the calculations of out-of-plane loads on the RB/FB flexible walls under fully cracked condition. The calculations in Tables D.3-3 and D.3-4 are based on the results of the SSI analysis of FE RB/FB CR00 model with reduced stiffness properties (0% concrete stiffness contribution to concrete filled steel structures) for the UB full column profile.

Table D.3-1 Calculation of Uncracked Slabs Out-of-Plane Loads (UB FE Model Analysis)

Slab		SDOF Oscillator			Flex. Mode Acc. (g)	LMSM		Rigid Mode Weight (kN)	Rigid Mode Acc. (g)	Eq. Ave. Acc. (g)
Elev. (m)	Location	Weight (kN)	Mass Node	Acc. (g)		Mass Node	Acc. (g)			
-6.40	RCCV-Pedestal	3704	9011	0.84	1.00	201	0.50	18039	0.49	0.60
		3622	9012	1.17		301	0.49	10513		
	RB-RCCV	4424	9013	1.35	1.35	101	0.50	27585	0.50	0.57
						201	0.50	18039		
-1.00	FB	3655	9021	0.97	1.25	102	0.57	29902	0.57	0.71
		1086	9022	1.90						
		2783	9026	1.38						
	RB-RCCV	10996	9023	0.98	1.03	102	0.57	20115	0.58	0.73
		4685	9025	1.14		202	0.58	8894		
	RCCV-Pedestal	5993	9024	1.12	0.86	202	0.58	8894	0.58	0.70
		8144	9027	0.67		302	0.59	9631		
4.65	FB	11025	9031	1.62	1.66	103	0.56	16193	0.56	1.11
		5407	9034	1.73						
	RB-RCCV	51608	9032	0.89	0.91	103	0.56	0	0.65	0.87
		5579	9035	1.07		203	0.65	11812		
	S/P	32416	9033	1.12	1.12	203	0.65	11812	0.65	0.82
						303	0.65	48175	0.65	
9.06	RB-RCCV	11090	9041	0.95	1.04	104	0.62	20346	0.65	0.79
		4816	9042	1.26		204	0.72	8117		
13.57	RB-RCCV	10042	9051	1.11	1.15	105	0.72	19081	0.75	0.89
		4333	9052	1.25		205	0.82	9154		
17.50	MS Tunnel	5798	9061	3.65	3.40	106	0.80	12732	0.80	1.74
		1465	9062	2.40						
	RB-RCCV	9707	9063	1.13	1.18	106	0.80	12732	0.88	0.94
		3877	9065	1.28		206	0.91	46092		
	D/F	33373	9064	1.53	1.53					1.53
22.50	FB Roof	20024	9071	1.15	1.34	107	0.92	2345	0.92	1.31
		2679	9072	1.64						
		707	9073	4.47						
		3442	9074	1.53						
		1196	9075	1.51						
27.00	Top slab	39043	9081	1.60	1.55	208	1.12	69949	1.12	1.37
		52533	9082	1.52						
		5413	9085	1.46						
	RB-RCCV	8768	9083	1.30	1.30	108	1.02	66452	1.02	1.06
	MS Tunnel	9163	9084	1.67	1.67	108	1.02	48004	1.02	1.13
34.00	RB-RCCV	4918	9091	1.61	1.61	109	1.20	27885	1.20	1.23
						209	1.20	29053	1.20	
	RCCV	9165	9092	1.61	1.61	209	1.20	29053	1.20	1.30
52.40	RB Roof	29394	9101	0.32	1.51	110	1.56	5180	1.56	1.51
		4406	9102	1.28						
		5859	9103	6.27						
		2726	9104	2.62						
		186	9105	2.42						
		1211	9106	3.52						
		824	9107	3.22						
		909	9108	2.50						

Table D.3-2 Calculation of Uncracked Walls Out-of-Plane Loads (UB FE Model Analysis)

Wall		Load Dir.	SDOF Oscillator			Flex. Mode Acc. (g)	LMSM		Rigid Mode Weight (kN)	Rigid Mode Acc. (g)	Eq. Ave. Acc. (g)
Elev. (m)	Column Lines		Weight (kN)	Mass Node	Acc. (g)		Mass Node	Acc. (g)			
42.00	R1&R2	NS	8.13	99981	2.66	2.59	110	2.13	7.58	1.54	2.10
			0.54	99982	1.54		109	0.95			
	RB	EW	4.56	99983	1.86	1.34	110	1.55	8.48	1.18	1.27
			5.10	99984	1.02		109	0.81			
			2.28	99985	1.00						
13.57	F3	NS	8.09	99971	2.11	2.05	105	0.79	8.87	0.79	1.48
			2.38	99972	2.00						
			0.23	99973	1.35						
			0.21	99974	1.04						
	FA&FF	EW	4.93	99975	1.66	1.53	105	0.53	2.69	0.53	1.21
			0.86	99976	0.78						

Table D.3-3 Calculation of Cracked Slabs Out-of-Plane Loads (UB FE Model Analysis)

Slab		SDOF Oscillator			Flex. Mode Acc. (g)	LMSM		Rigid Mode Weight (kN)	Rigid Mode Acc. (g)	Eq. Ave. Acc. (g)
Elev. (m)	Location	Weight (kN)	Mass Node	Acc. (g)		Mass Node	Acc. (g)			
-6.40	RCCV-Pedestal	3704	9011	0.73	0.80	201	0.55	13113	0.55	0.61
		3622	9012	0.87		301	0.56	10513		
	RB-RCCV	4424	9013	0.86	0.94	101	0.53	22680	0.54	0.65
		9811	9015	0.98		201	0.55	13133		
	FB	3377	9014	1.12	1.12	101	0.53	37488	0.53	0.58
-1.00	FB	3655	9021	0.90	1.11	102	0.55	27411	0.55	0.70
		1086	9022	0.86						
		2783	9026	1.38						
		2490	9029	1.23						
	RB-RCCV	10996	9023	0.78	0.87	102	0.55	18192	0.56	0.70
		4685	9025	1.07		202	0.58	6971		
		2207	9028	0.93						
		1639	9030	0.86						
	RCCV-Pedestal	5993	9024	0.85	0.87	202	0.58	6971	0.59	0.72
		8144	9027	0.89		302	0.59	9631		
4.65	FB	11025	9031	0.92	1.08	103	0.56	16193	0.56	0.82
		5407	9034	1.39						
	RB-RCCV	51608	9032	0.86	0.87	103	0.56	0	0.61	0.84
		5579	9035	1.06		203	0.61	9691		
		2118	9036	0.91						
		2124	9037	0.78						
	S/P	32416	9033	0.95	0.95	203	0.61	9691	0.68	0.77
						303	0.69	48175		
9.06	RB-RCCV	11090	9041	0.90	0.96	104	0.58	18573	0.60	0.76
		4816	9042	1.18		204	0.65	6344		
		2040	9043	0.88						
		1506	9044	0.80						
13.57	RB-RCCV	10042	9051	0.98	1.02	105	0.62	17473	0.64	0.79
		4333	9052	1.19		205	0.67	7547		
		1897	9053	0.94						
		1317	9054	0.83						

Note: The red numbers show the additional oscillators for the cracked models.

Table D.3-3 Calculation of Cracked Slabs Out-of-Plane Loads (UB FE Model Analysis) (Continued)

Slab		SDOF Oscillator			Flex. Mode Acc. (g)	LMSM		Rigid Mode Weight (kN)	Rigid Mode Acc. (g)	Eq. Ave. Acc. (g)
Elev. (m)	Location	Weight (kN)	Mass Node	Acc. (g)		Mass Node	Acc. (g)			
17.5	MS Tunnel	5798	9061	2.06	1.83	106	0.64	11556	0.64	1.10
		1465	9062	0.95						
	RB-RCCV	9707	9063	1.06	1.07	106	0.64	11556	0.70	0.79
		3877	9065	1.19		206	0.72	44916		
		1341	9066	1.04						
		1010	9067	0.83						
	D/F	37619	9064	2.56	2.38					2.38
		4884	99064	0.99						
22.5	FB Roof	20024	9071	0.47	0.74	107	0.84	761	0.84	0.74
		2679	9072	0.76						
		707	9073	2.21						
		3442	9074	1.52						
		1196	9075	1.17						
		1585	9076	1.54						
27.0	Top slab	39043	9081	1.49	1.19	208	0.82	41240	0.82	1.09
		52533	9082	1.05						
		5413	9085	1.01						
		18496	9086	1.01						
	RB-RCCV	8768	9083	0.98	0.94	108	0.73	56239	0.73	0.80
		20427	9087	0.92						
	MS Tunnel	9163	9084	1.00	1.00	108	0.73	37791	0.73	0.79
34.0	RB-RCCV	4918	9091	1.12	1.12	109	0.83	27885	0.83	0.86
						209	0.83	19474		
	RCCV	9165	9092	1.07	1.08	209	0.83	19474	0.83	0.95
		9580	9093	1.09						
52.4	RB Roof	29394	9101	0.16	0.73	110	1.04	3705	1.04	0.75
		4406	9102	0.53						
		5859	9103	2.25						
		2726	9104	2.57						
		186	9105	1.62						
		1211	9106	1.42						
		824	9107	1.34						
		909	9108	1.62						
		1475	9109	1.47						

Note: The red numbers show the additional oscillators for the cracked models.

Table D.3-4 Calculation of Cracked Walls Out-of-Plane Loads (UB FE Model Analysis)

Wall		Load Dir.	SDOF Oscillator			Flex. Mode Acc. (g)	LMSM		Rigid Mode Weight (kN)	Rigid Mode Acc. (g)	Eq. Ave. Acc. (g)
Elev. (m)	Column Lines		Weight (kN)	Mass Node	Acc. (g)		Mass Node	Acc. (g)			
42.00	R1&R2	NS	8.13	99981	2.51	2.21	110	1.49	6.21	1.06	1.77
			0.54	99982	1.12		109	0.63			
			1.37	99986	0.88						
	RB	EW	4.56	99983	1.32	0.92	110	0.99	7.06	0.77	0.87
			5.10	99984	0.80		109	0.54			
			2.28	99985	0.58						
			1.42	99987	0.57						
34.27	R1&R2	NS	3.51	99991	0.58	0.58	109	0.63	3.11	0.59	0.58
							108	0.54			
	RB	EW	4.77	99992	0.52	0.52	109	0.54	1.65	0.49	0.51
							108	0.43			
13.57	F3	NS	8.09	99971	1.07	1.15	105	0.58	7.36	0.58	0.94
			2.38	99972	1.66						
			0.23	99973	1.10						
			0.21	99974	0.84						
			1.51	99977	0.82						
	FA&FF	EW	4.93	99975	1.03	0.96	105	0.55	1.89	0.55	0.87
			0.86	99976	0.73						
			0.80	99978	0.78						

Note: The red numbers show the additional oscillators for the cracked models.

APPENDIX E
Site-Specific In-Structure Response Spectra

LIST OF TABLES

LIST OF FIGURES

Table E-1 Figure Numbers for Site-Specific In-Structure Response Spectra

Structure	Elevation (m)	Node Number	Figure Number of Floor Response Spectra X (NS)	Y (EW)	Z (Vrt)
	-11.5	2	E-1	E-58	E-115
RB/FB	52.4	110	E-11	E-68	E-125
	34.0	109	E-10	E-67	E-124
	27.0	108	E-9	E-66	E-123
	22.5	107	E-8	E-65	E-122
	17.5	106	E-7	E-64	E-121
	13.57	105	E-6	E-63	E-120
	9.06	104	E-5	E-62	E-119
	4.65	103	E-4	E-61	E-118
	-1.0	102	E-3	E-60	E-117
	-6.4	101	E-2	E-59	E-116
RCCV	34.0	209	E-19	E-76	E-133
	27.0	208	E-18	E-75	E-132
	17.5	206	E-17	E-74	E-131
	13.57	205	E-16	E-73	E-130
	9.06	204	E-15	E-72	E-129
	4.65	203	E-14	E-71	E-128
	-1.0	202	E-13	E-70	E-127
	-6.4	201	E-12	E-69	E-126
Pedestal	4.65	303	E-22	E-79	E-136
	-1.0	302	E-21	E-78	E-135
	-6.4	301	E-20	E-77	E-134
Vent Wall	17.5	701	E-27	E-84	E-141
	14.5	702	E-26	E-83	E-140
	11.5	703	E-25	E-82	E-139
	8.5	704	E-24	E-81	E-138
	7.4625	705	E-23	E-80	E-137
RSW	24.180	707	E-36	E-93	E-150
	20.2	708	E-35	E-92	E-149
	15.775	709	E-34	E-91	E-148
	11.350	710	E-33	E-90	E-147
	7.4625	711	E-32	E-89	E-146
	4.650	712	E-31	E-88	E-145
	2.4165	713	E-30	E-87	E-144
	1.960	714	E-29	E-86	E-143
	-0.8	715	E-28	E-85	E-142

Table E-1 Figure Numbers for Site-Specific In-Structure Response Spectra (Continued)

Structure	Elevation (m)	Node Number	Figure Number of Floor Response Spectra		
			X (NS)	**Y (EW)**	**Z (Vrt)**
RPV	27.640	801	E-37	E-94	E-151
	22.276	806	E-38	E-95	E-152
	21.8247	807	E-39	E-96	E-153
	19.5278	809	E-40	E-97	E-154
	19.5278	831	E-47	E-104	E-161
	17.2677	810	E-41	E-98	E-155
	17.2677	832	E-48	E-105	E-162
	16.365	833	E-49	E-106	E-163
	14.510	834	E-50	E-107	E-164
	12.491	813	E-42	E-99	E-156
	10.472	814	E-43	E-100	E-157
	8.453	815	E-44	E-101	E-158
	7.896	847	E-53	E-110	E-167
	5.691	851	E-54	E-111	E-168
	4.1784	854	E-55	E-112	E-169
	3.7593	844	E-51	E-108	E-165
	2.365	846	E-52	E-109	E-166
	0.7657	827	E-45	E-102	E-159
	-0.1315	828	E-46	E-103	E-160
	-2.753	867	E-56	E-113	E-170
	-2.753	868	E-57	E-114	E-171
Slab Oscillator [1)]	52.4	9101	-	-	E-208
	52.4	9102	-	-	E-209
	52.4	9103	-	-	E-210
	52.4	9104	-	-	E-211
	52.4	9105	-	-	E-212
	52.4	9106	-	-	E-213
	52.4	9107	-	-	E-214
	52.4	9108	-	-	E-215
	34.0	9091	-	-	E-206
	34.0	9092	-	-	E-207
	27.0	9081	-	-	E-201
	27.0	9082	-	-	E-202
	27.0	9083	-	-	E-203
	27.0	9084	-	-	E-204
	27.0	9085	-	-	E-205

1) The regions of floor slab vertical responses are shown in Figures A.3.3.5.4-28 through A.3.3.5.4-37 of Reference 2-k and Figures 3.4.1-1 through 3.4.1-10 of Reference 2-aa.

Table E-1 Figure Numbers for Site-Specific In-Structure Response Spectra (Continued)

	Elevation (m)	Node Number	Figure Number of Floor Response Spectra		
			X (NS)	Y (EW)	Z (Vrt)
Slab Oscillator 1)	22.5	9071	-	-	E-196
	22.5	9072	-	-	E-197
	22.5	9073	-	-	E-198
	22.5	9074	-	-	E-199
	22.5	9075	-	-	E-200
	17.5	9061	-	-	E-191
	17.5	9062	-	-	E-192
	17.5	9063	-	-	E-193
	17.5	9064	-	-	E-194
	17.5	9065	-	-	E-195
	13.570	9051	-	-	E-189
	13.570	9052	-	-	E-190
	9.060	9041	-	-	E-187
	9.060	9042	-	-	E-188
	4.650	9031	-	-	E-182
	4.650	9032	-	-	E-183
	4.650	9033	-	-	E-184
	4.650	9034	-	-	E-185
	4.650	9035	-	-	E-186
	-1.0	9021	-	-	E-175
	-1.0	9022	-	-	E-176
	-1.0	9023	-	-	E-177
	-1.0	9024	-	-	E-178
	-1.0	9025	-	-	E-179
	-1.0	9026	-	-	E-180
	-1.0	9027	-	-	E-181
	-6.4	9011	-	-	E-172
	-6.4	9012	-	-	E-173
	-6.4	9013	-	-	E-174
Wall Oscillator 2)	42.0	99981	E-222	-	-
	42.0	99982	E-223	-	-
	42.0	99983	-	E-224	-
	42.0	99984	-	E-225	-
	42.0	99985	-	E-226	-
	13.570	99971	E-216	-	-
	13.570	99972	E-217	-	-
	13.570	99973	E-218	-	-
	13.570	99974	E-219	-	-
	13.570	99975	-	E-220	-
	13.570	99976	-	E-221	-

1) The regions of floor slab vertical responses are shown in Figures A.3.3.5.4-28 through A.3.3.5.4-37 of Reference 2-k and Figures 3.4.1-1 through 3.4.1-10 of Reference 2-aa.

2) The regions of out-of-plane wall responses are shown in Figures A.3.3.8-9 and A.3.3.8-10 of Reference 2-k and Figures 3.4.1-11 and 3.4.1-12 of Reference 2-aa.

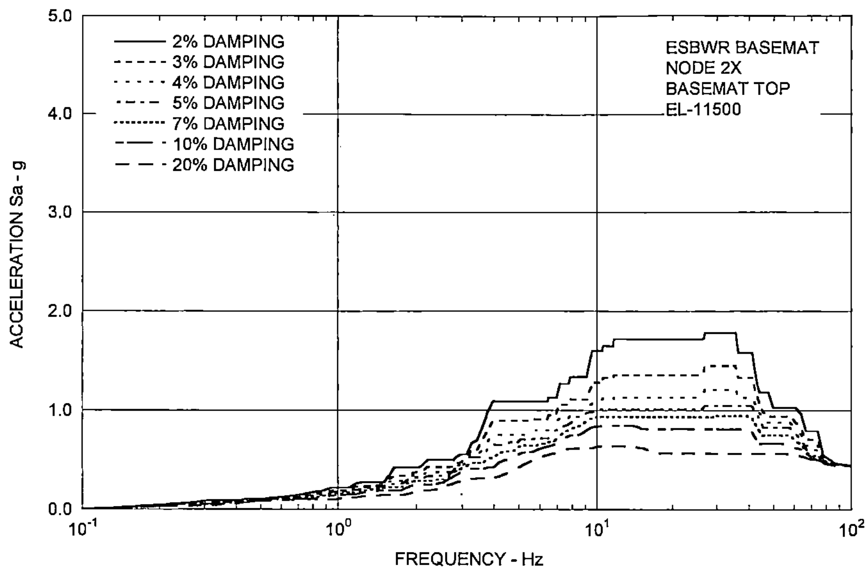

Figure E-1 Site-Specific In-Structure Response Spectra - RB/FB Basemat Node 2X -

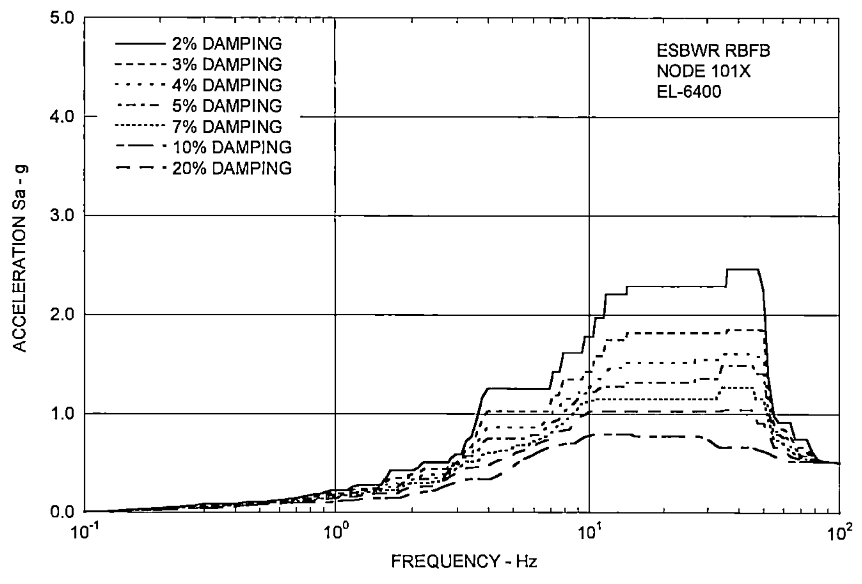

Figure E-2 Site-Specific In-Structure Response Spectra - RB/FB Node 101X -

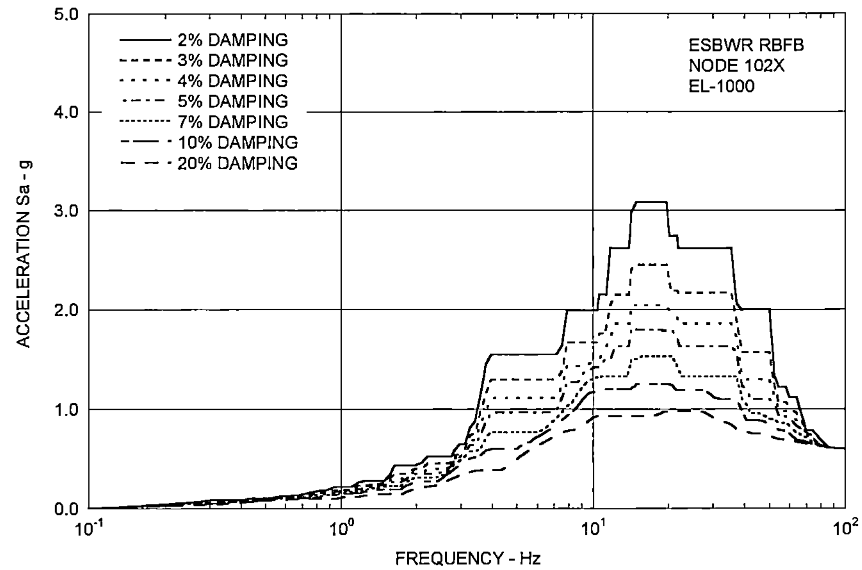

Figure E-3 Site-Specific In-Structure Response Spectra - RB/FB Node 102X -

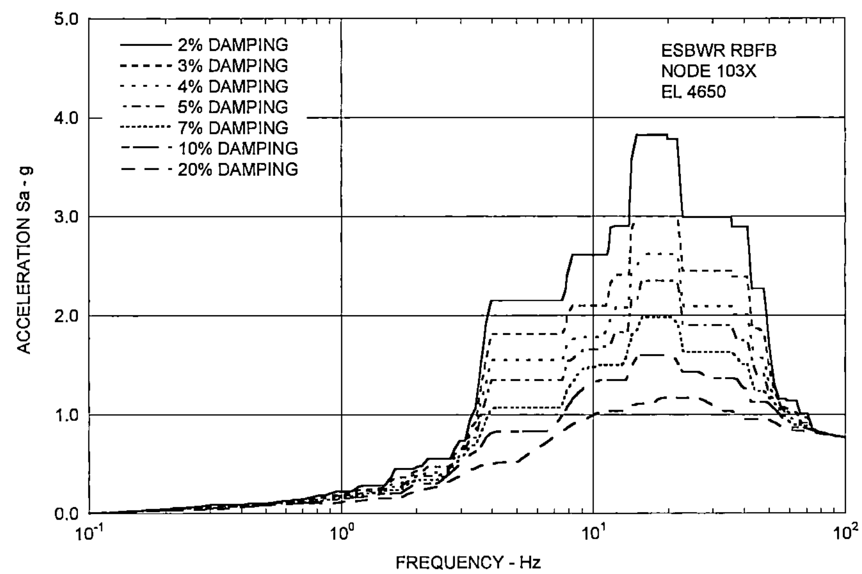

Figure E-4 Site-Specific In-Structure Response Spectra - RB/FB Node 103X -

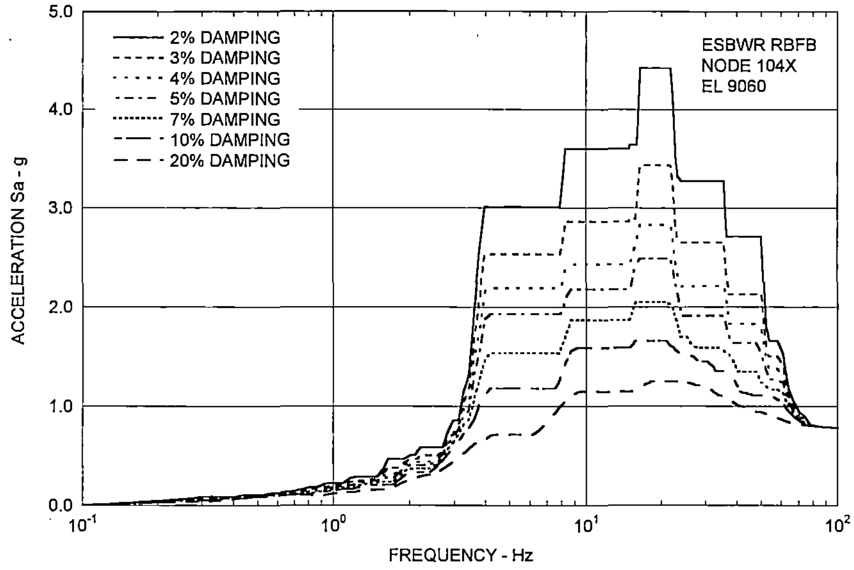

Figure E-5 Site-Specific In-Structure Response Spectra - RB/FB Node 104X -

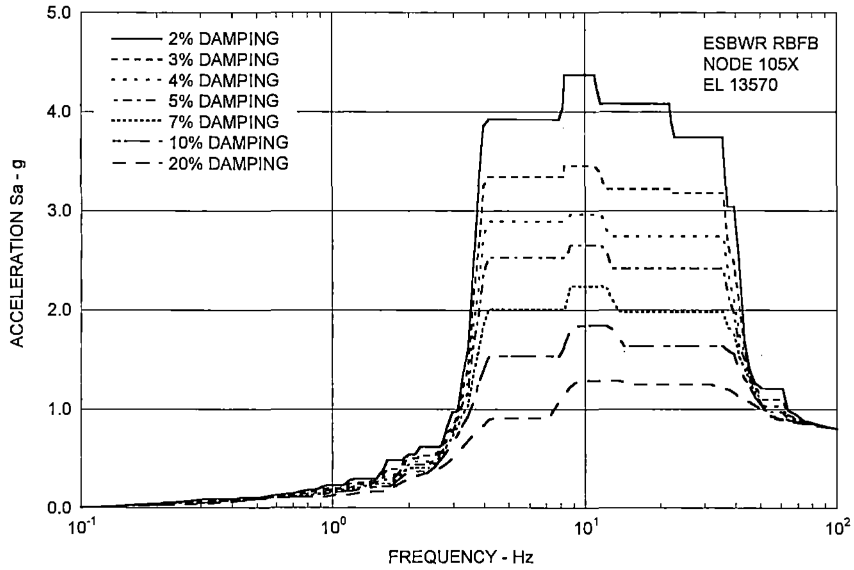

Figure E-6 Site-Specific In-Structure Response Spectra - RB/FB Node 105X -

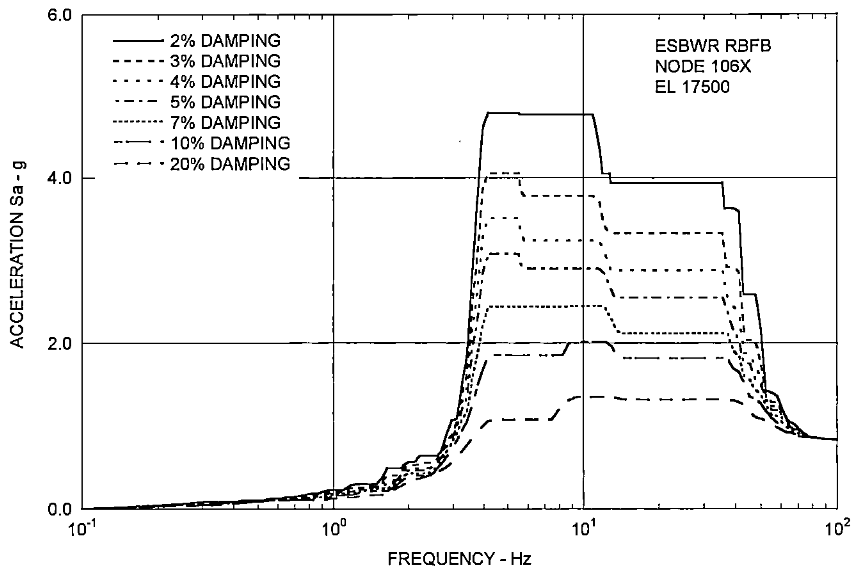

Figure E-7 Site-Specific In-Structure Response Spectra - RB/FB Node 106X -

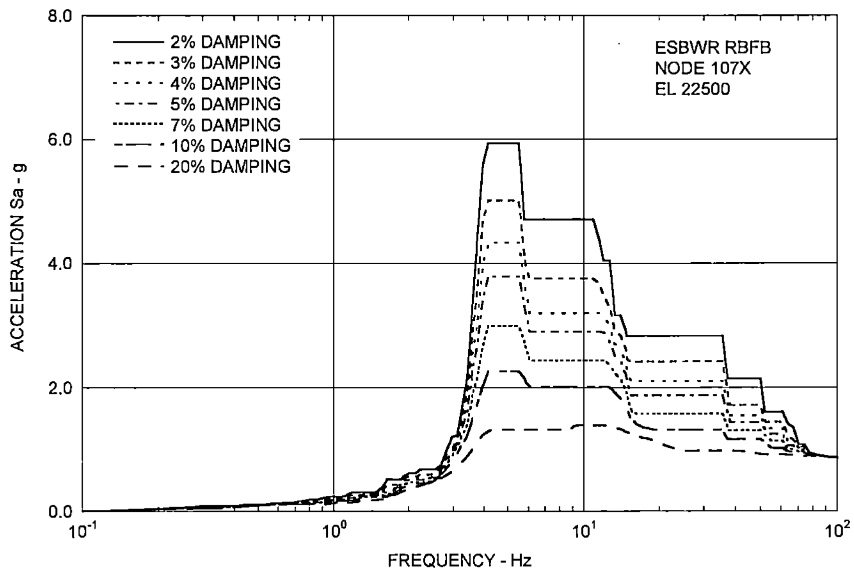

Figure E-8 Site-Specific In-Structure Response Spectra - RB/FB Node 107X -

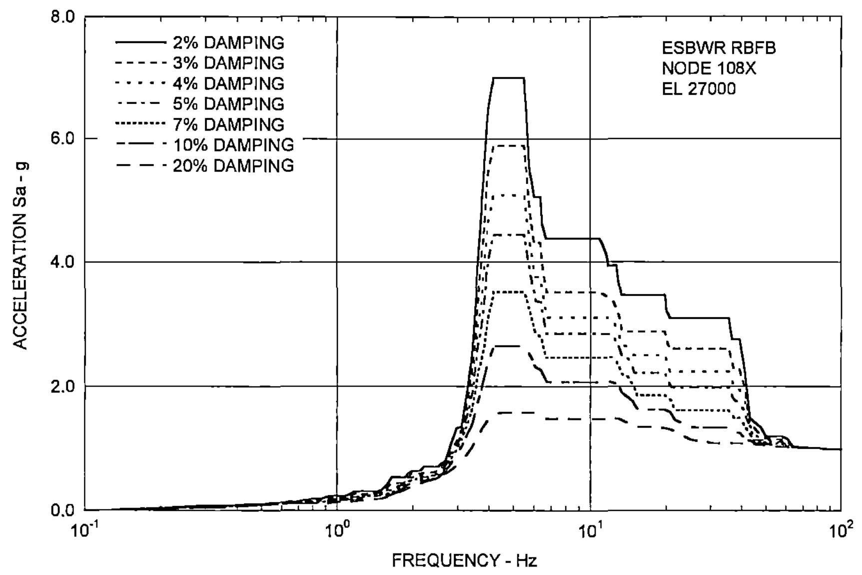

Figure E-9 Site-Specific In-Structure Response Spectra - RB/FB Node 108X -

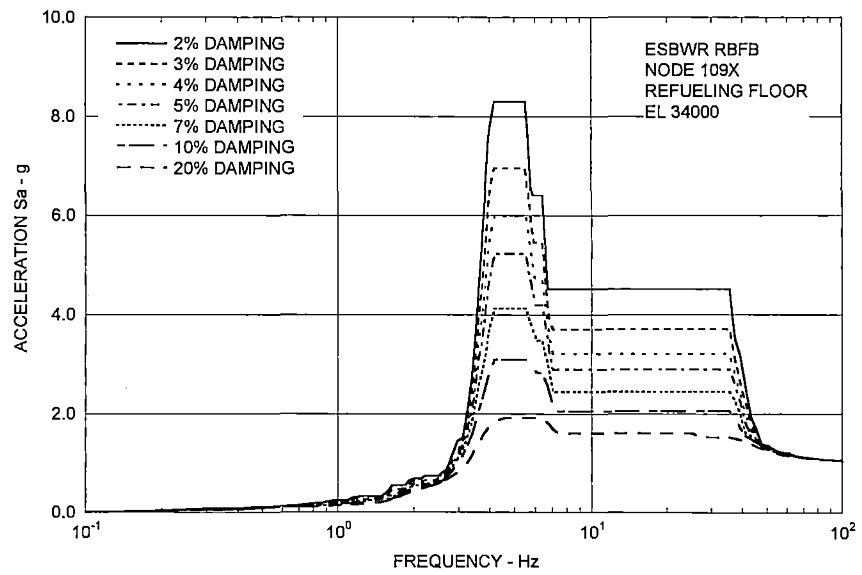

Figure E-10 Site-Specific In-Structure Response Spectra - RB/FB Node 109X -

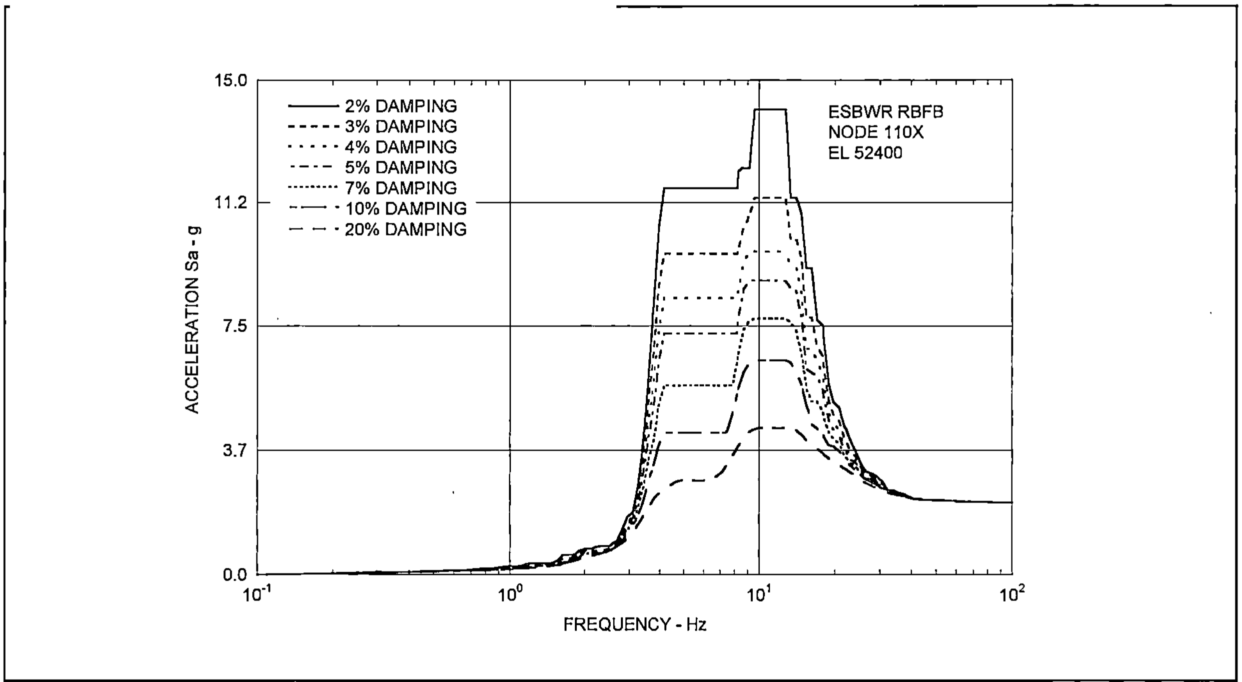

Figure E-11 Site-Specific In-Structure Response Spectra - RB/FB Node 110X -

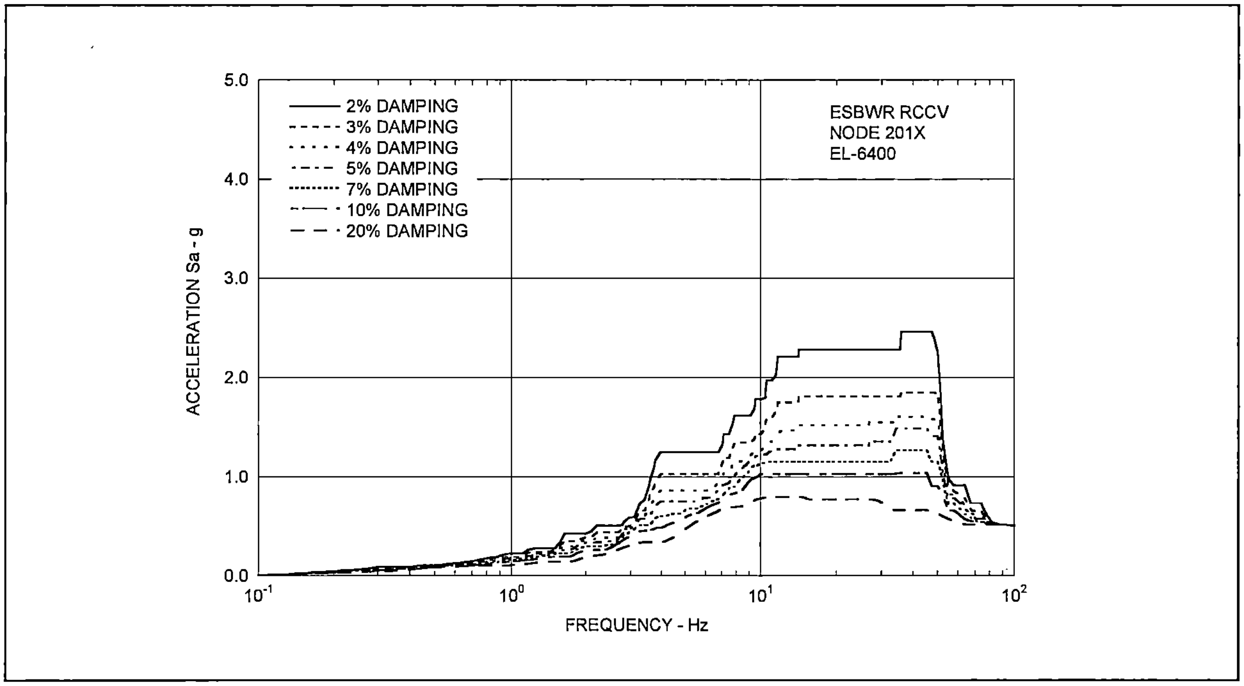

Figure E-12 Site-Specific In-Structure Response Spectra - RCCV Node 201X -

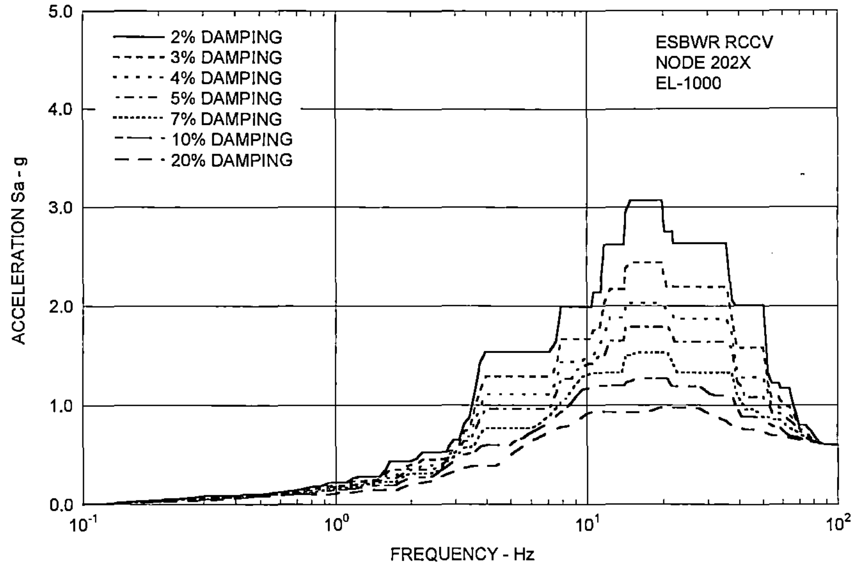

Figure E-13 Site-Specific In-Structure Response Spectra - RCCV Node 202X -

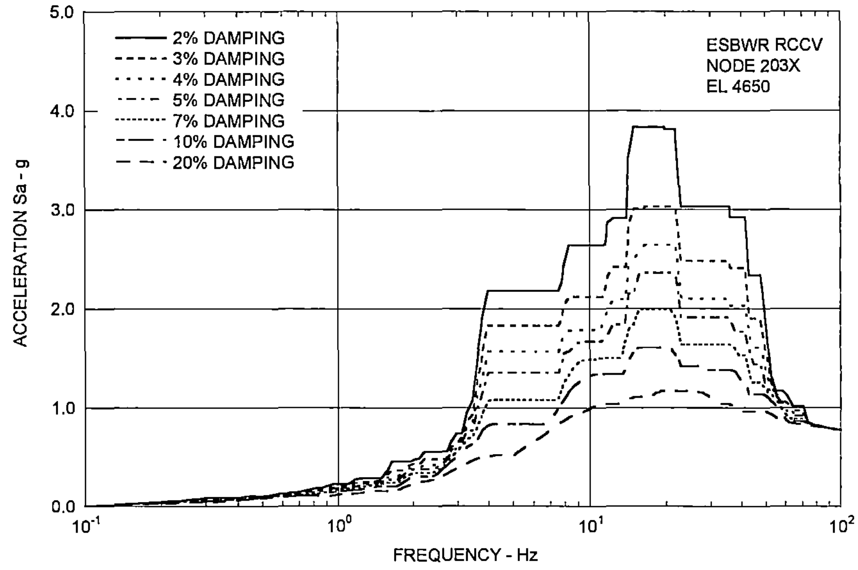

Figure E-14 Site-Specific In-Structure Response Spectra - RCCV Node 203X -

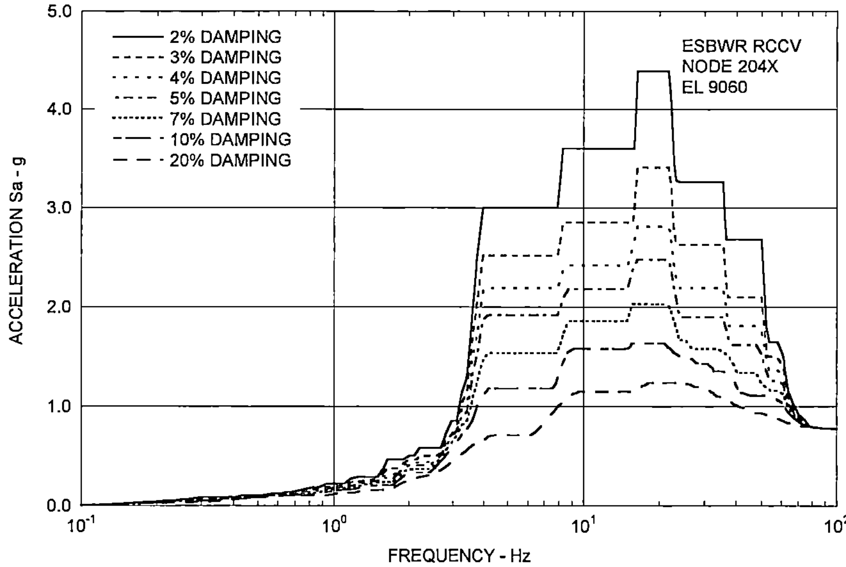

Figure E-15 Site-Specific In-Structure Response Spectra - RCCV Node 204X -

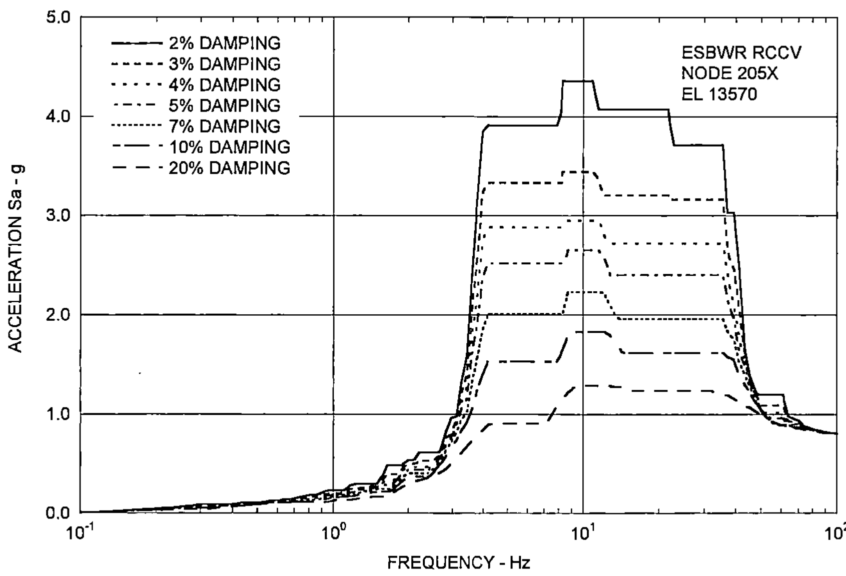

Figure E-16 Site-Specific In-Structure Response Spectra - RCCV Node 205X -

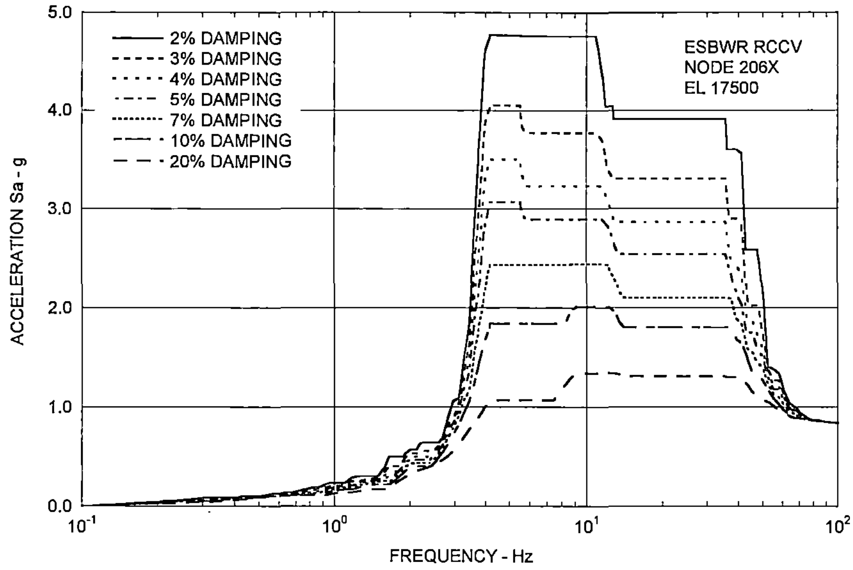

Figure E-17 Site-Specific In-Structure Response Spectra - RCCV Node 206X -

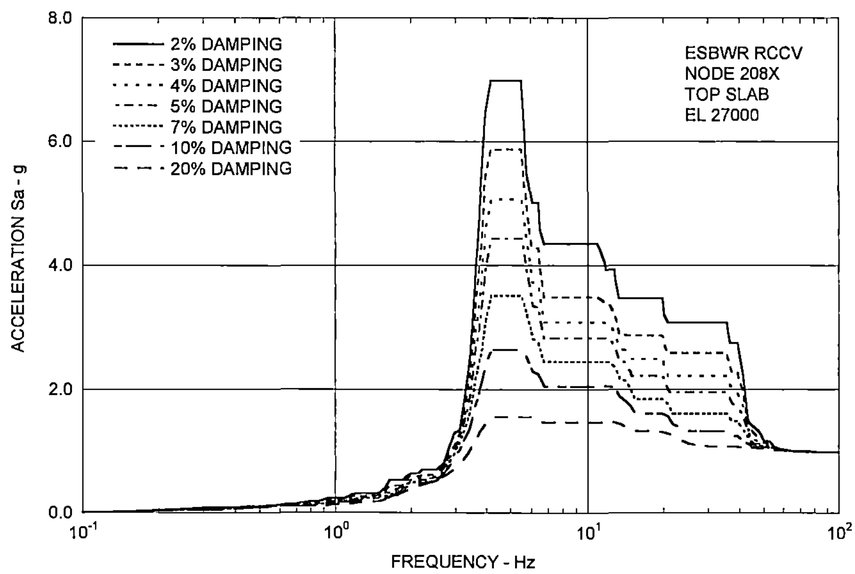

Figure E-18 Site-Specific In-Structure Response Spectra - RCCV Node 208X -

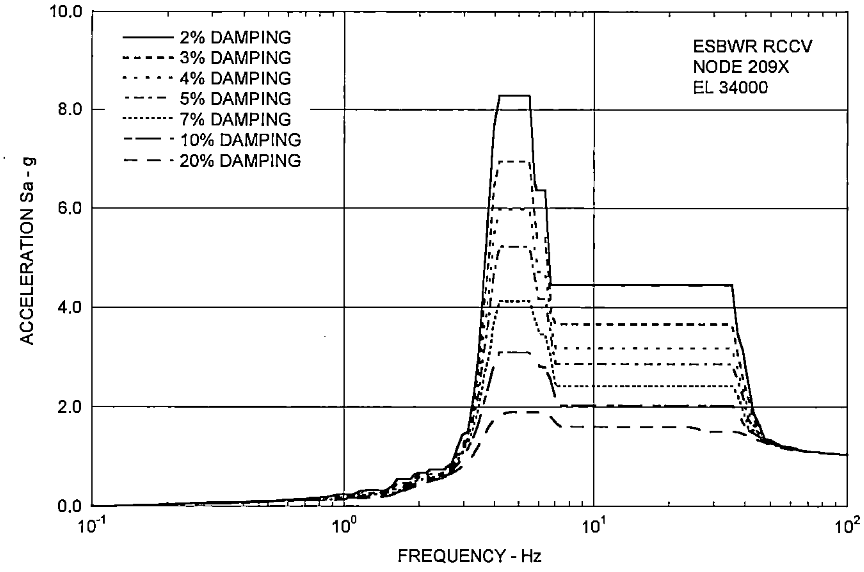

Figure E-19 Site-Specific In-Structure Response Spectra - RCCV Node 209X -

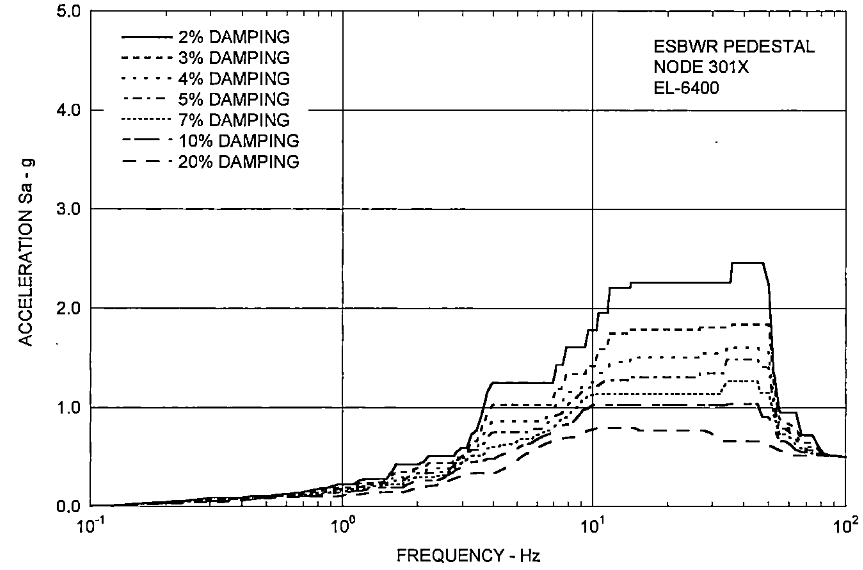

Figure E-20 Site-Specific In-Structure Response Spectra - Pedestal Node 301X -

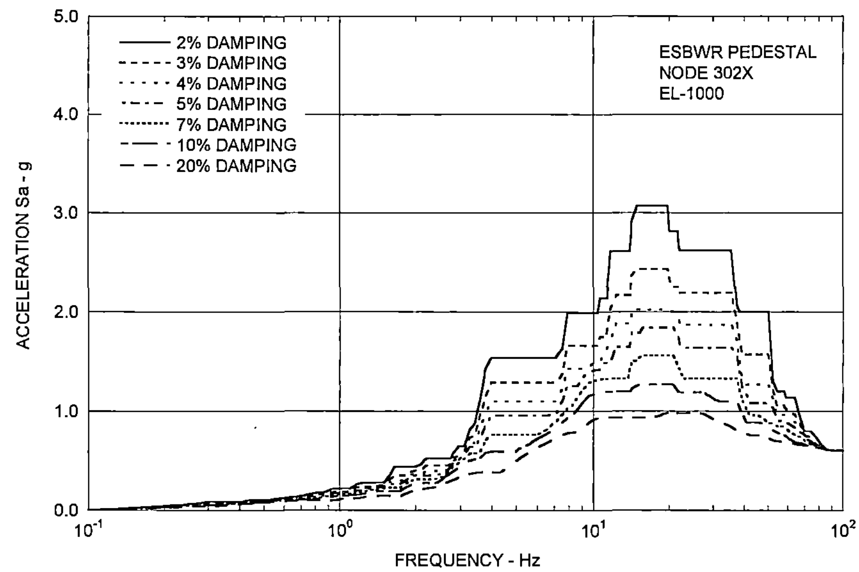

Figure E-21 Site-Specific In-Structure Response Spectra - Pedestal Node 302X -

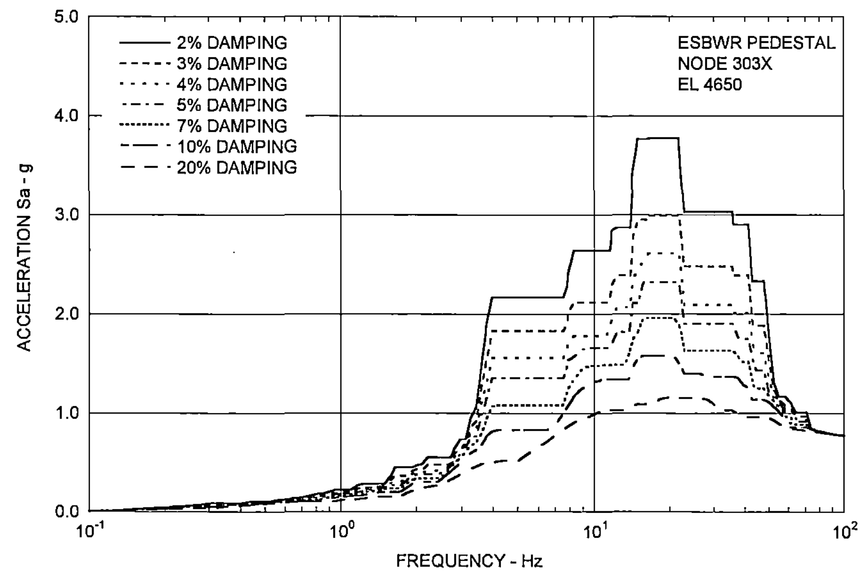

Figure E-22 Site-Specific In-Structure Response Spectra - Pedestal Node 303X -

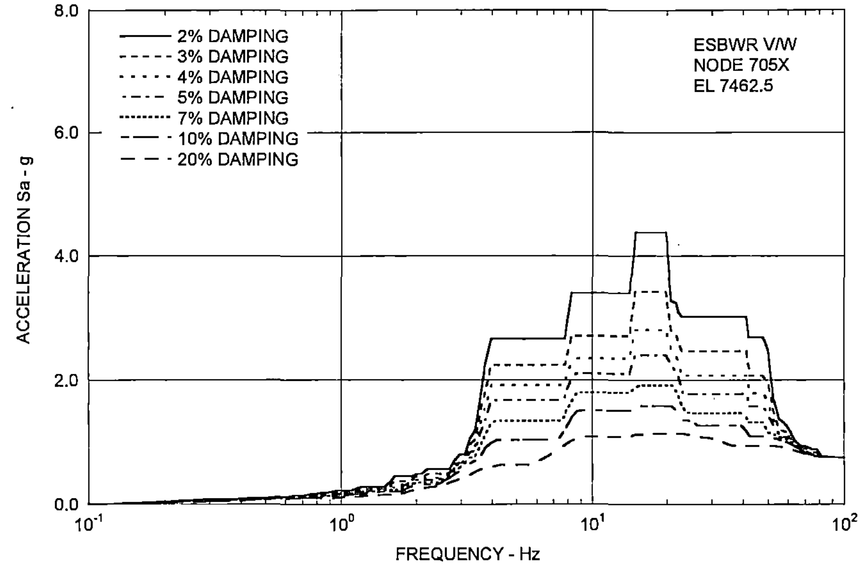

Figure E-23 Site-Specific In-Structure Response Spectra - Vent Wall Node 705X -

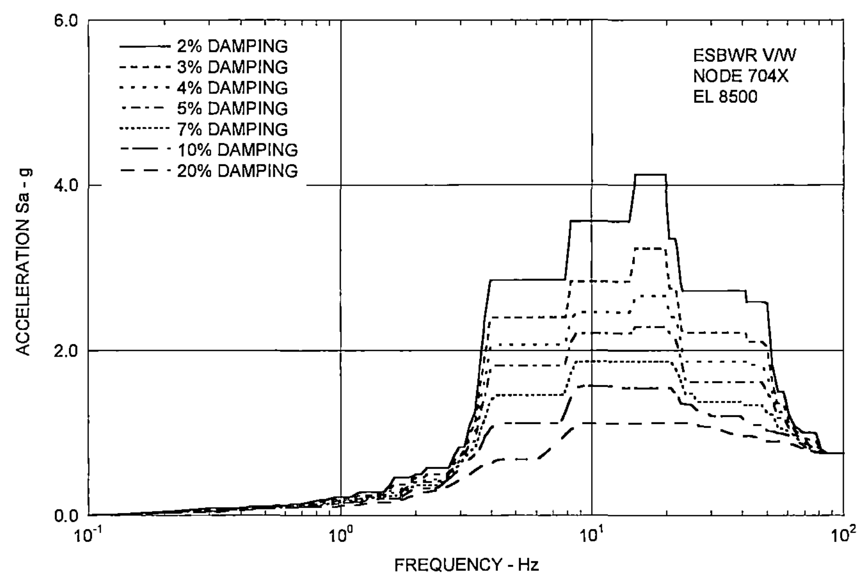

Figure E-24 Site-Specific In-Structure Response Spectra - Vent Wall Node 704X -

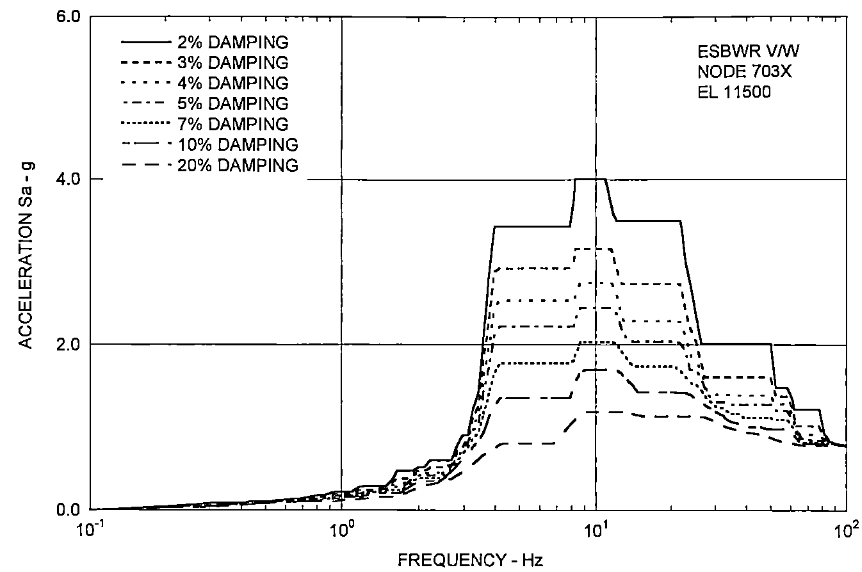

Figure E-25 Site-Specific In-Structure Response Spectra - Vent Wall Node 703X -

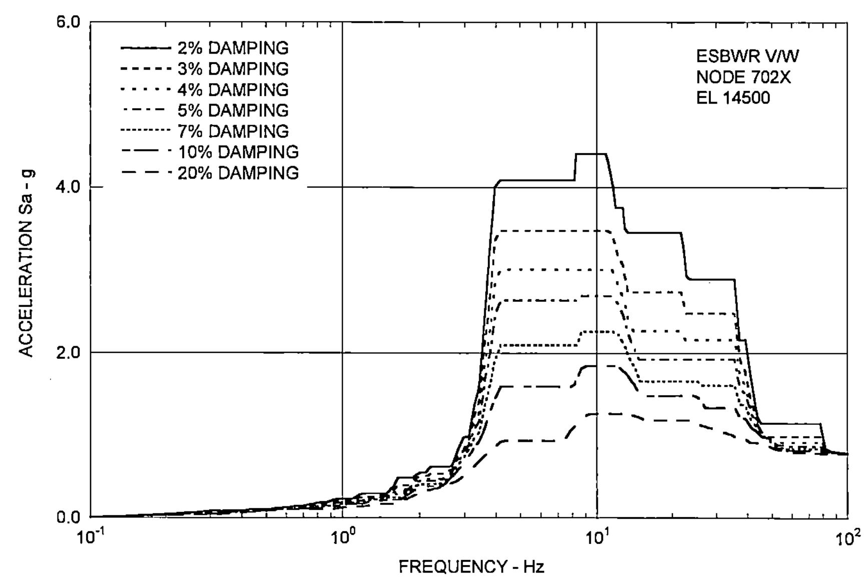

Figure E-26 Site-Specific In-Structure Response Spectra - Vent Wall Node 702X -

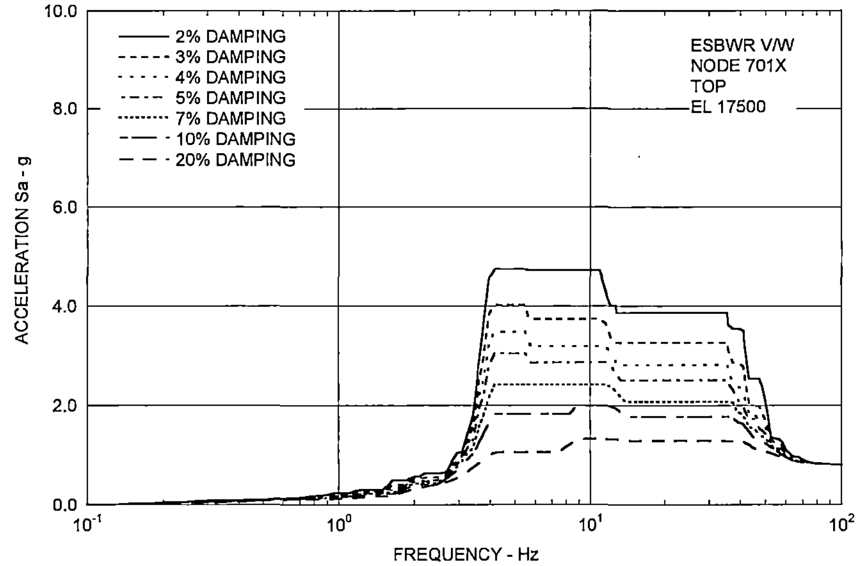

Figure E-27 Site-Specific In-Structure Response Spectra - Vent Wall Node 701X -

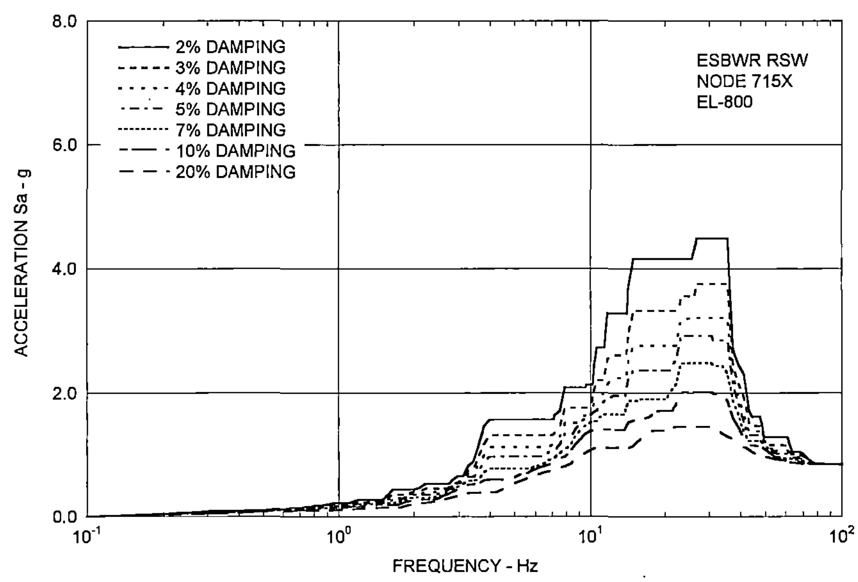

Figure E-28 Site-Specific In-Structure Response Spectra - RSW Node 715X -

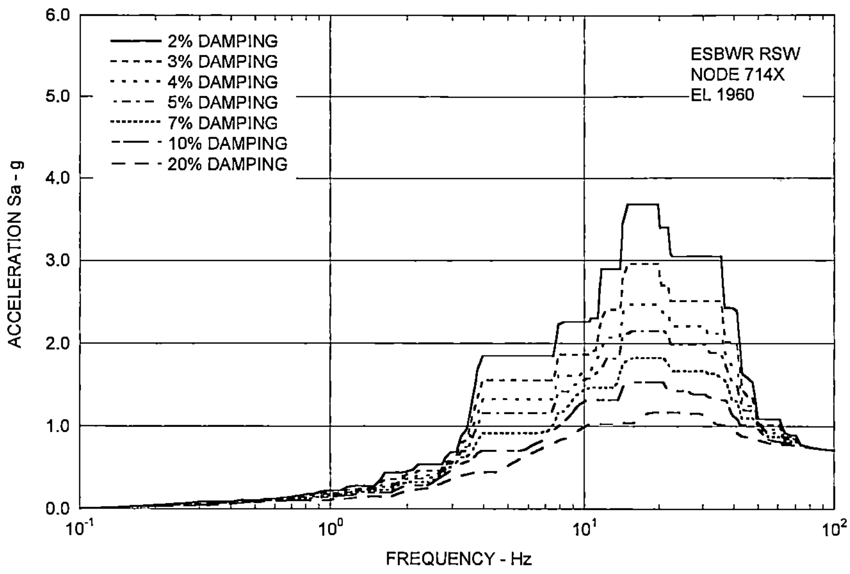

Figure E-29 Site-Specific In-Structure Response Spectra - RSW Node 714X -

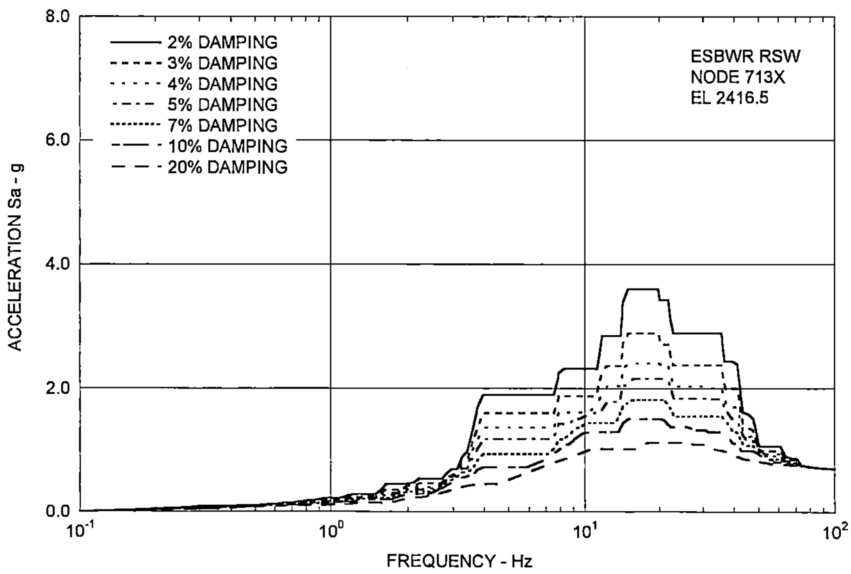

Figure E-30 Site-Specific In-Structure Response Spectra - RSW Node 713X -

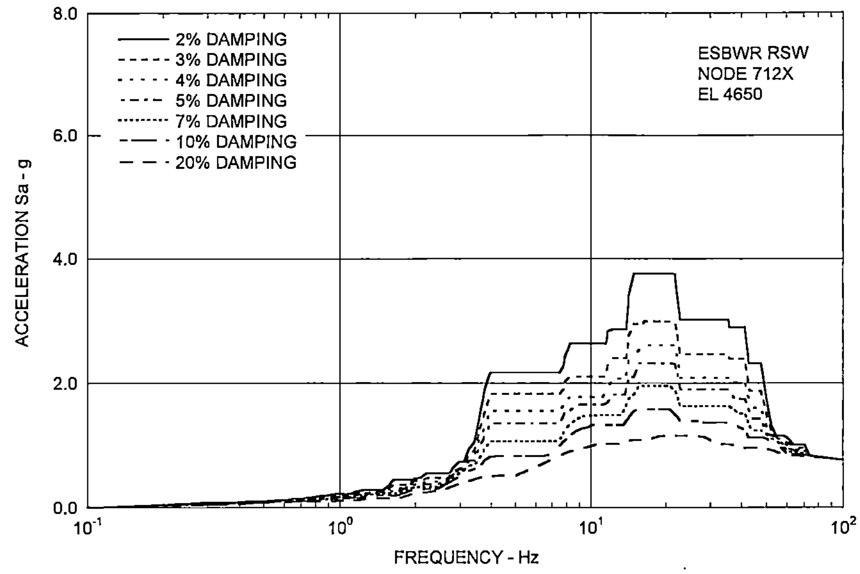

Figure E-31 Site-Specific In-Structure Response Spectra - RSW Node 712X -

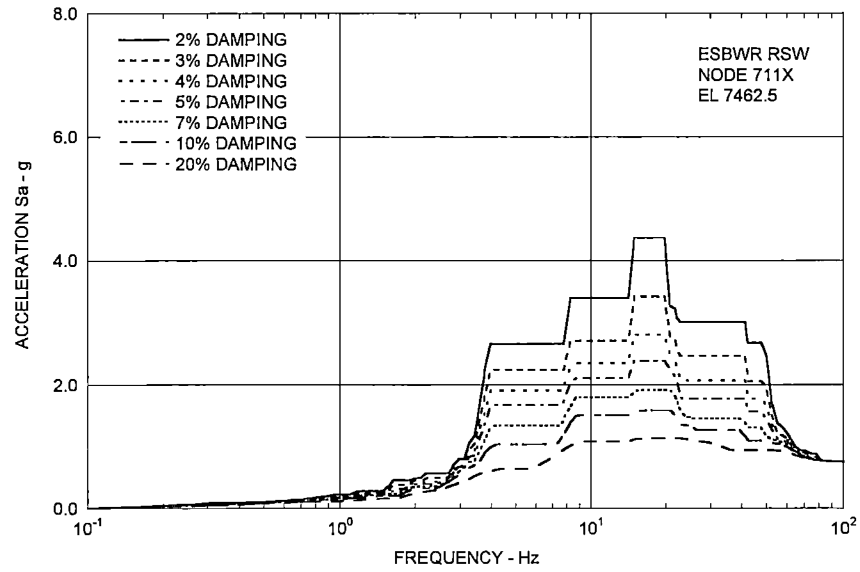

Figure E-32 Site-Specific In-Structure Response Spectra - RSW Node 711X -

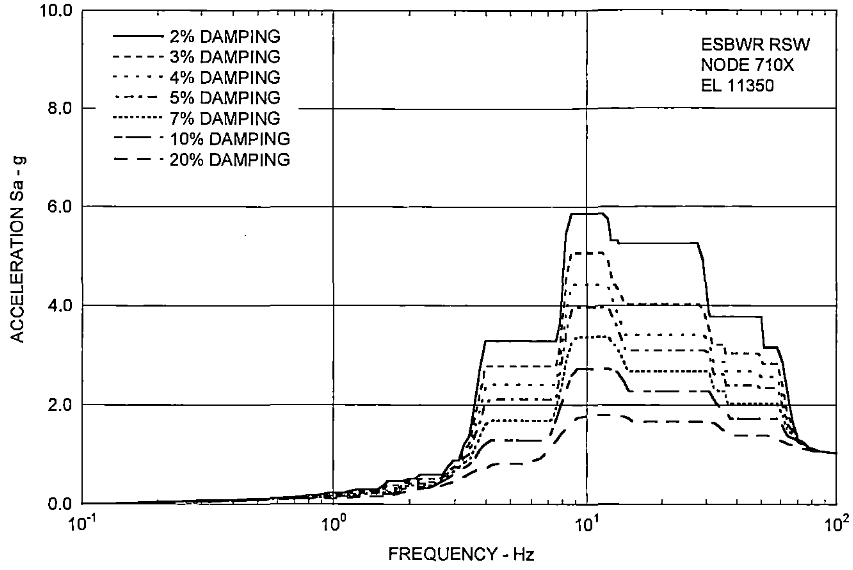

Figure E-33 Site-Specific In-Structure Response Spectra - RSW Node 710X -

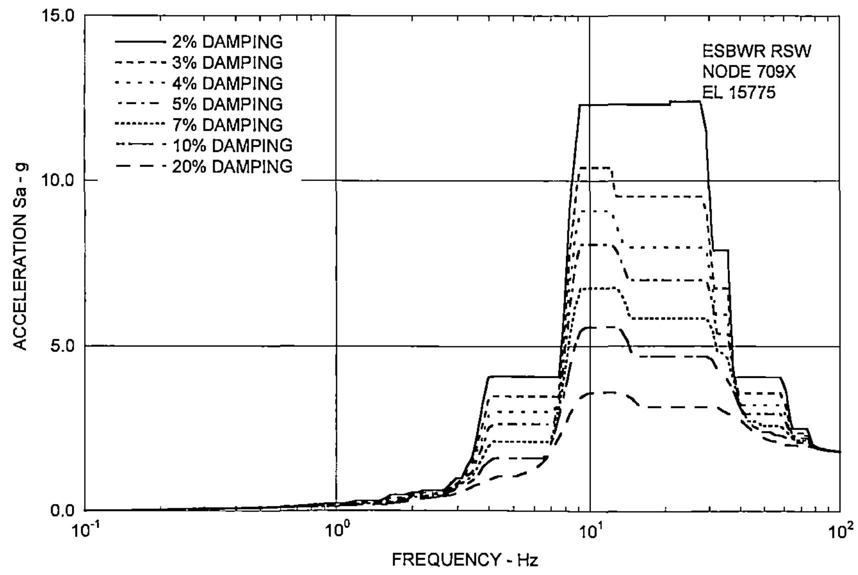

Figure E-34 Site-Specific In-Structure Response Spectra - RSW Node 709X -

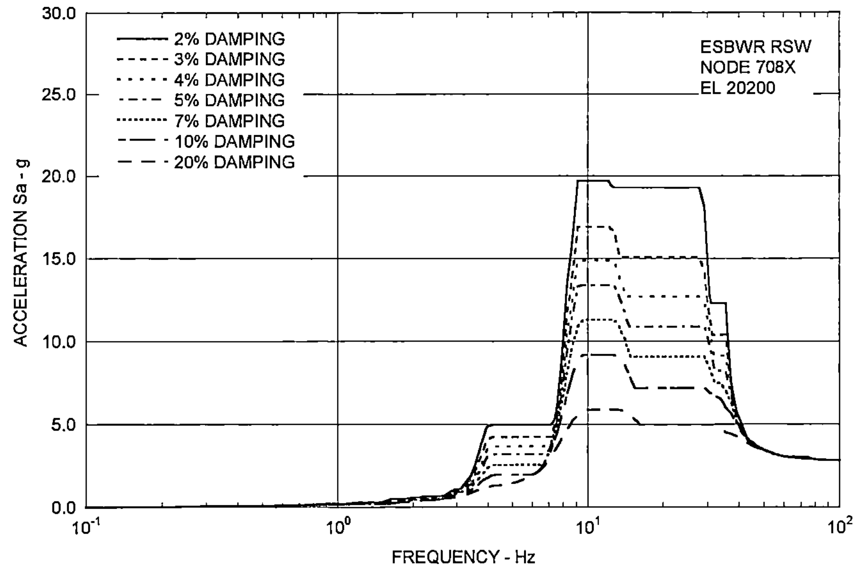

Figure E-35 Site-Specific In-Structure Response Spectra - RSW Node 708X -

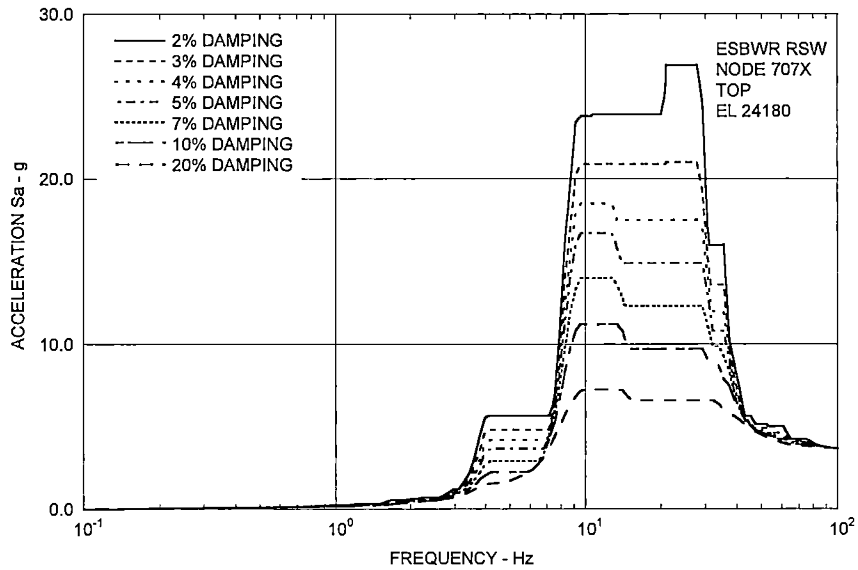

Figure E-36 Site-Specific In-Structure Response Spectra - RSW Node 707X -

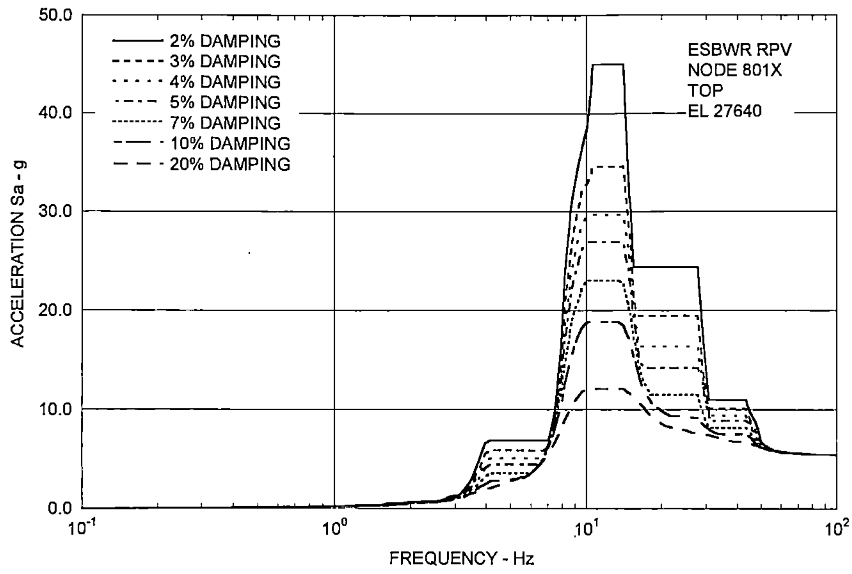

Figure E-37 Site-Specific In-Structure Response Spectra - RPV Node 801X -

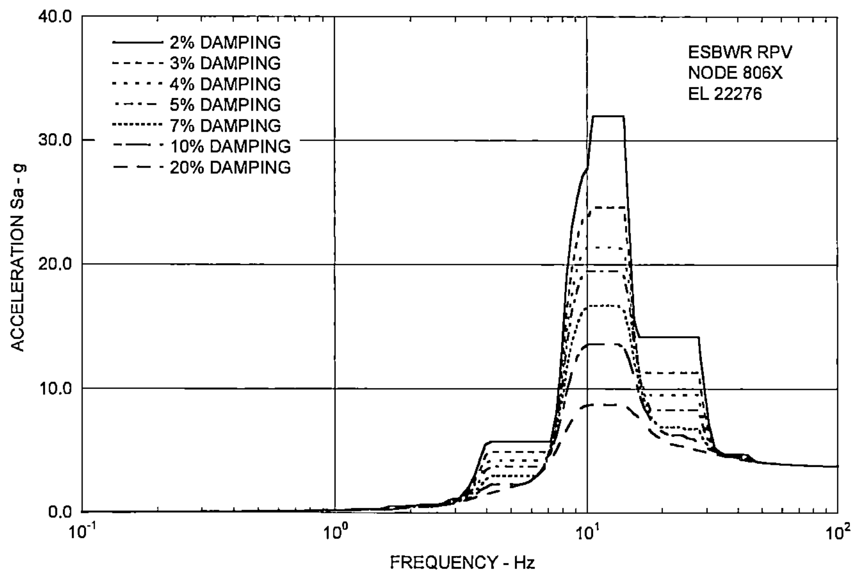

Figure E-38 Site-Specific In-Structure Response Spectra - RPV Node 806X -

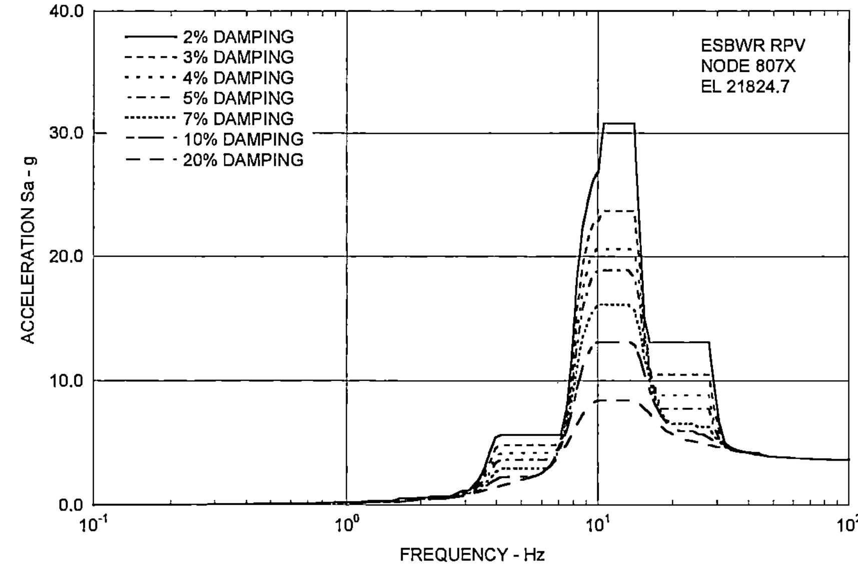

Figure E-39 Site-Specific In-Structure Response Spectra - RPV Node 807X -

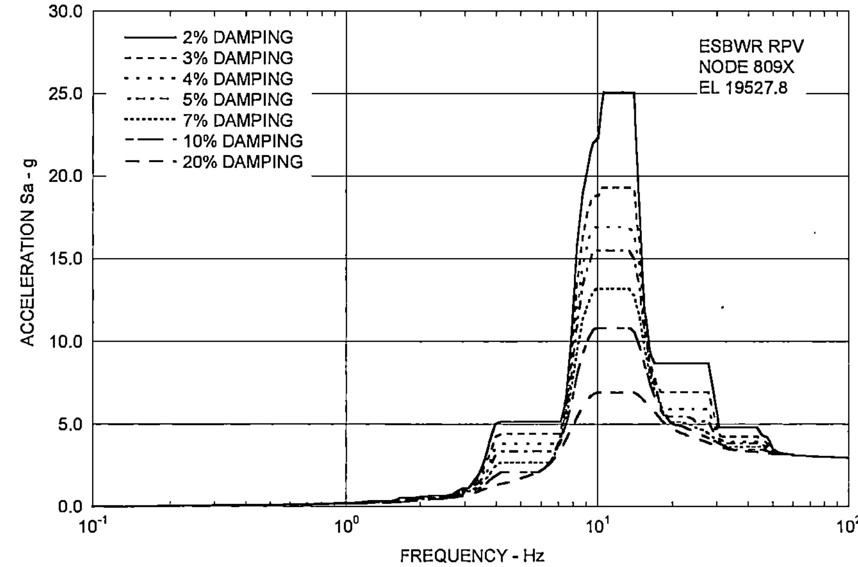

Figure E-40 Site-Specific In-Structure Response Spectra - RPV Node 809X -

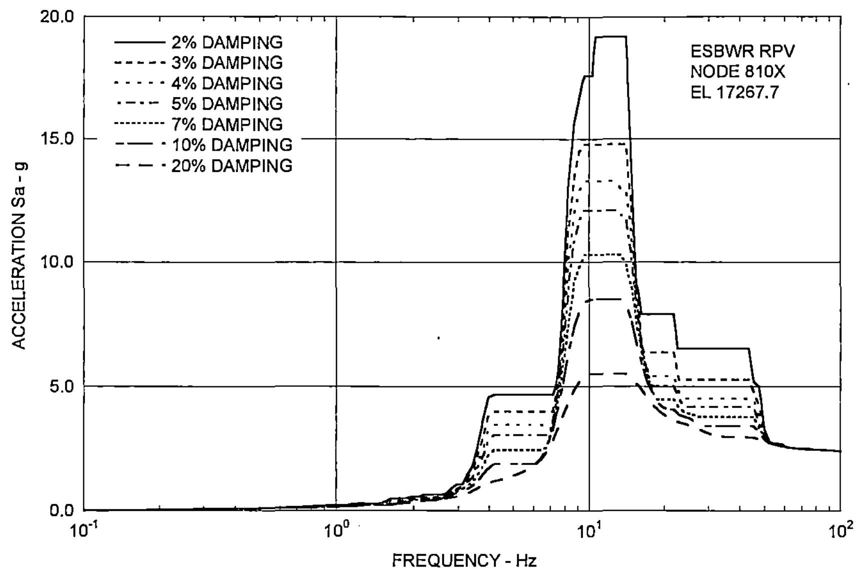

Figure E-41 Site-Specific In-Structure Response Spectra - RPV Node 810X -

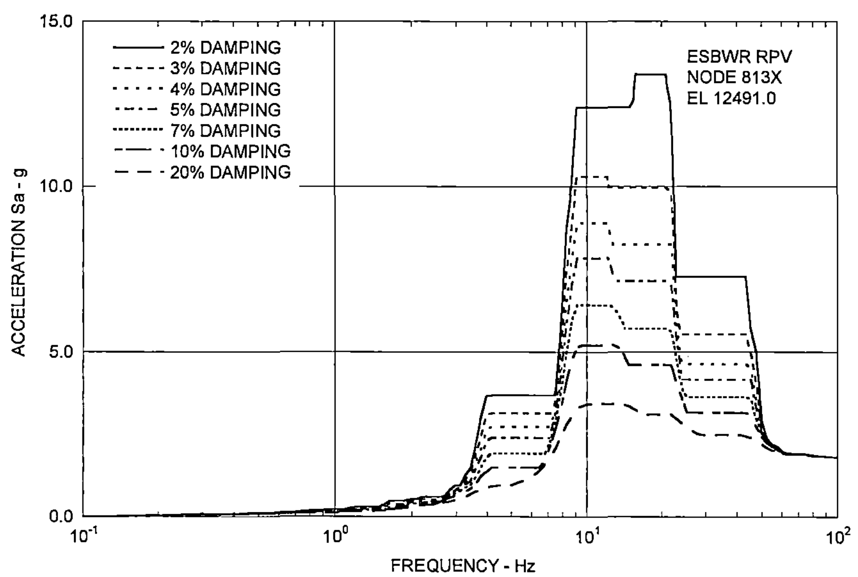

Figure E-42 Site-Specific In-Structure Response Spectra - RPV Node 813X -

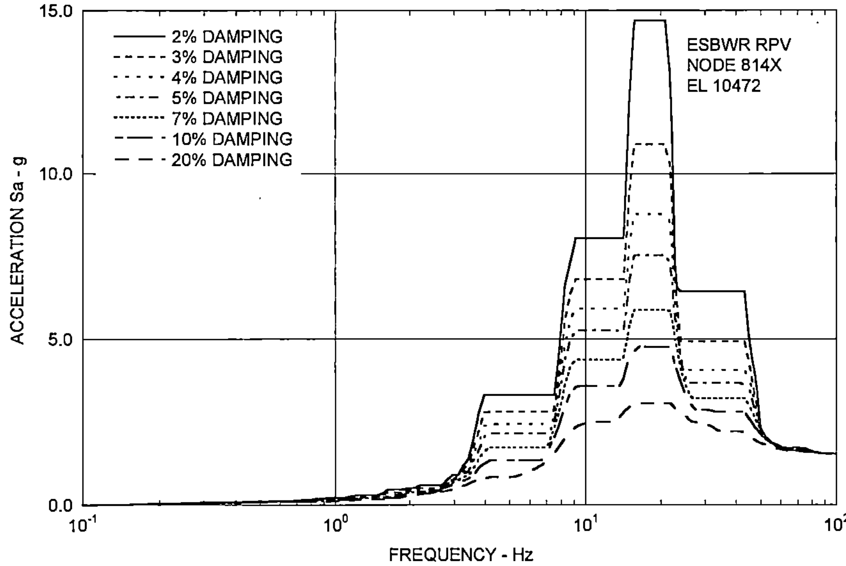

Figure E-43 Site-Specific In-Structure Response Spectra - RPV Node 814X -

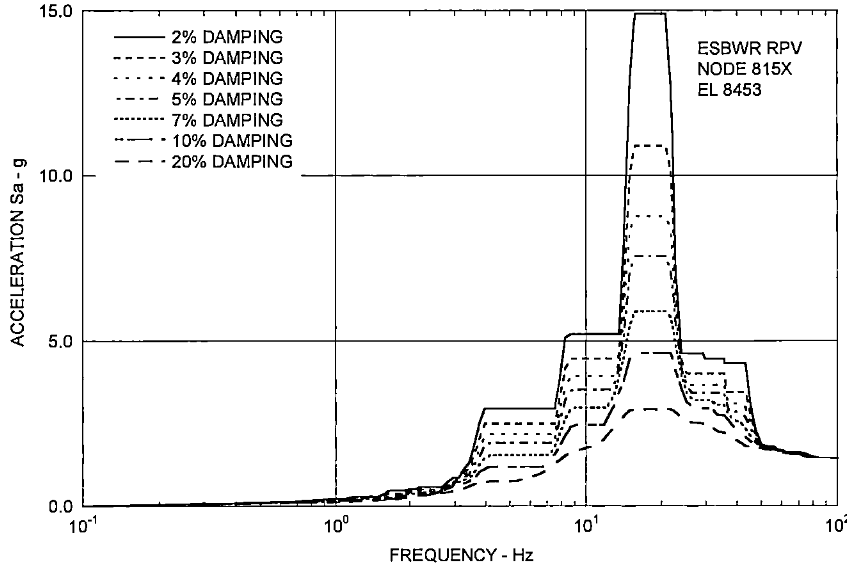

Figure E-44 Site-Specific In-Structure Response Spectra - RPV Node 815X -

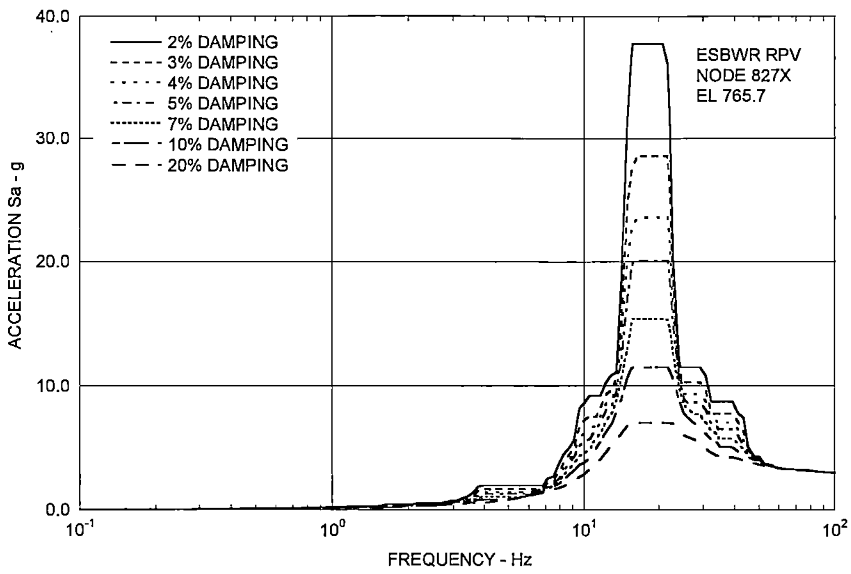

Figure E-45 Site-Specific In-Structure Response Spectra - RPV Node 827X -

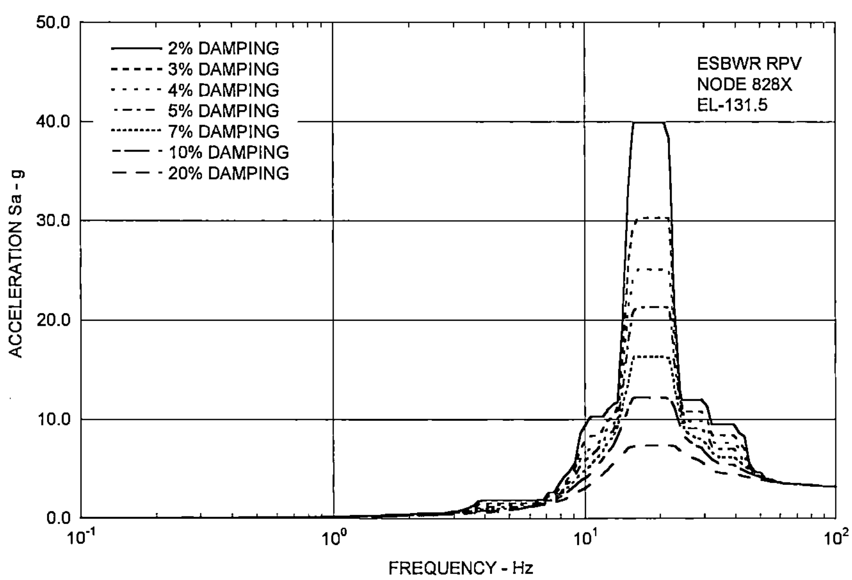

Figure E-46 Site-Specific In-Structure Response Spectra - RPV Node 828X -

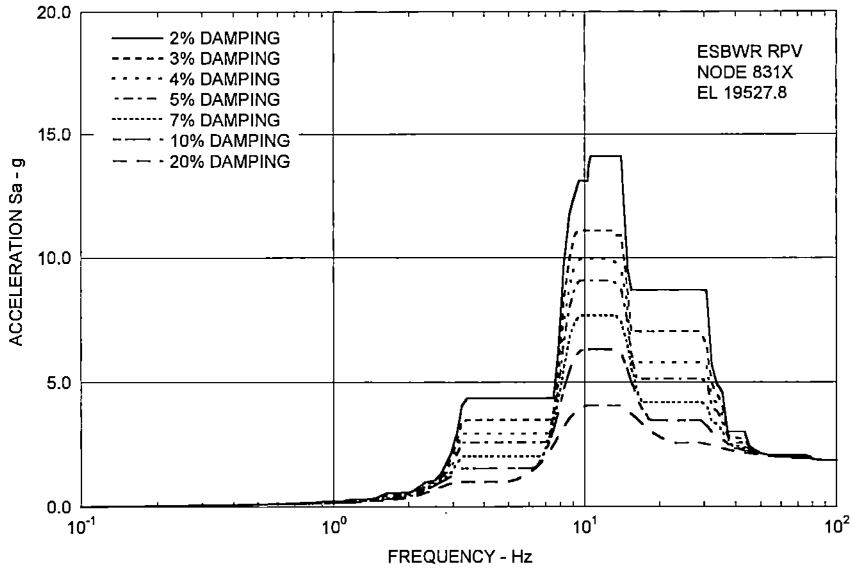

Figure E-47 Site-Specific In-Structure Response Spectra - RPV Node 831X -

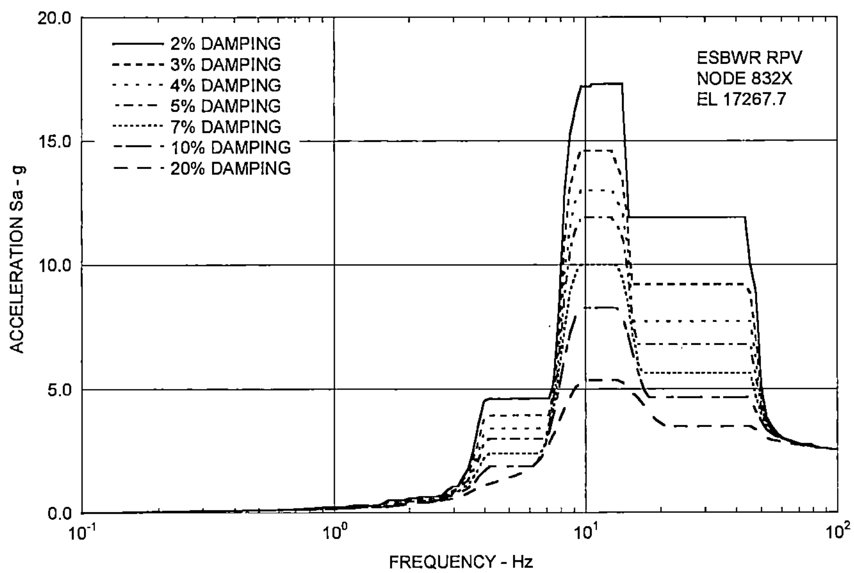

Figure E-48 Site-Specific In-Structure Response Spectra - RPV Node 832X -

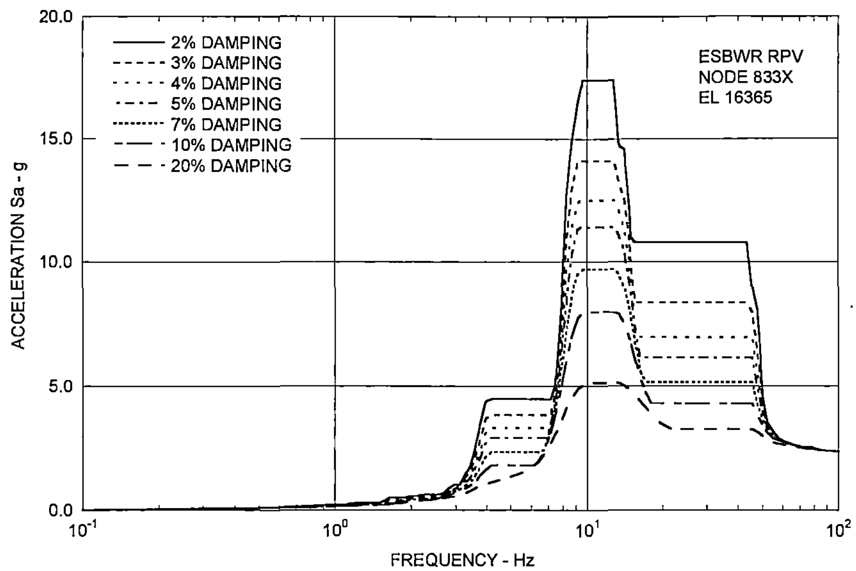

Figure E-49 Site-Specific In-Structure Response Spectra - RPV Node 833X -

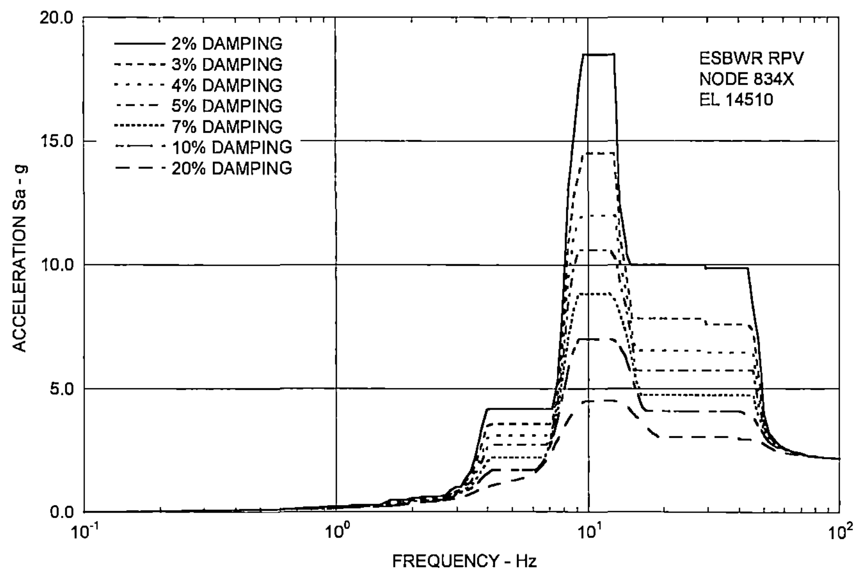

Figure E-50 Site-Specific In-Structure Response Spectra - RPV Node 834X -

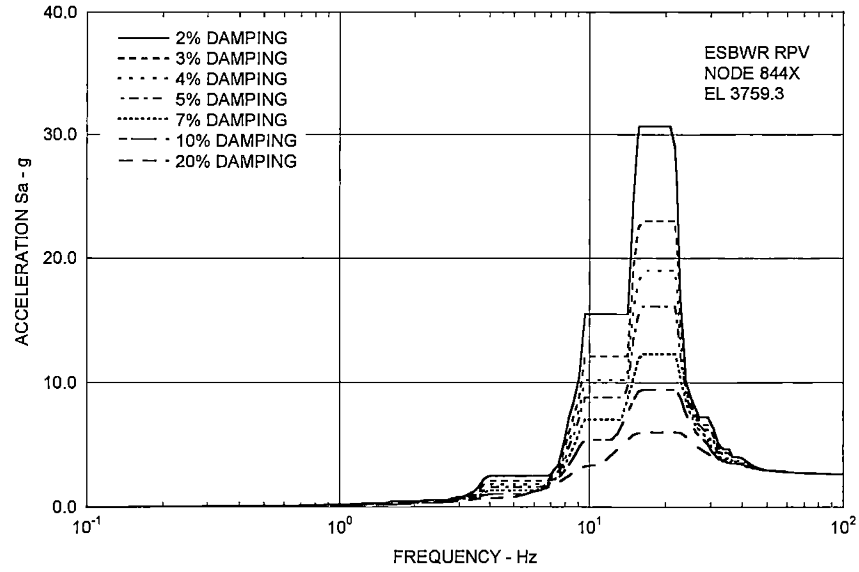

Figure E-51 Site-Specific In-Structure Response Spectra - RPV Node 844X -

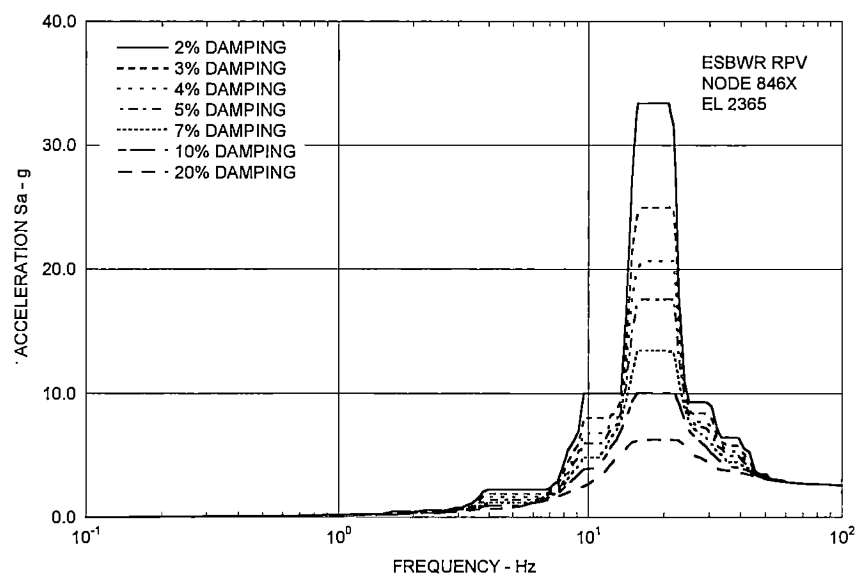

Figure E-52 Site-Specific In-Structure Response Spectra - RPV Node 846X -

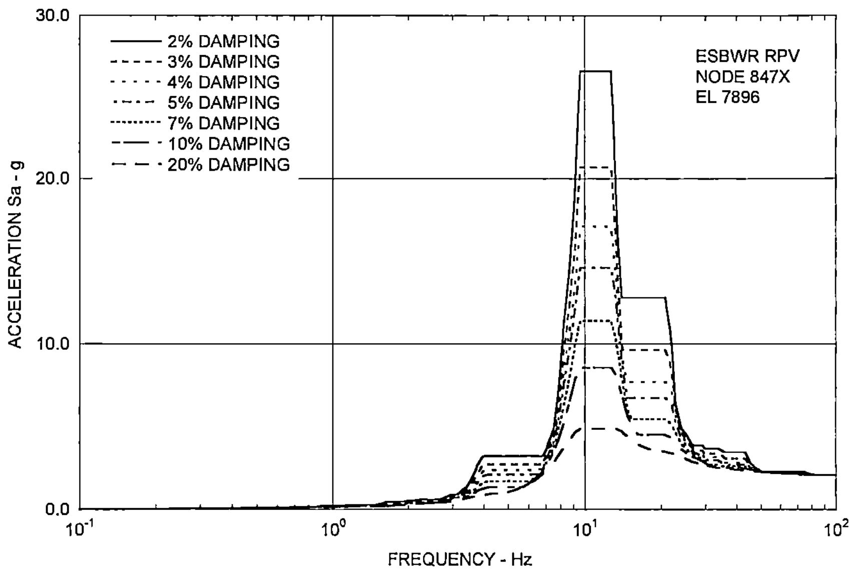

Figure E-53 Site-Specific In-Structure Response Spectra - RPV Node 847X -

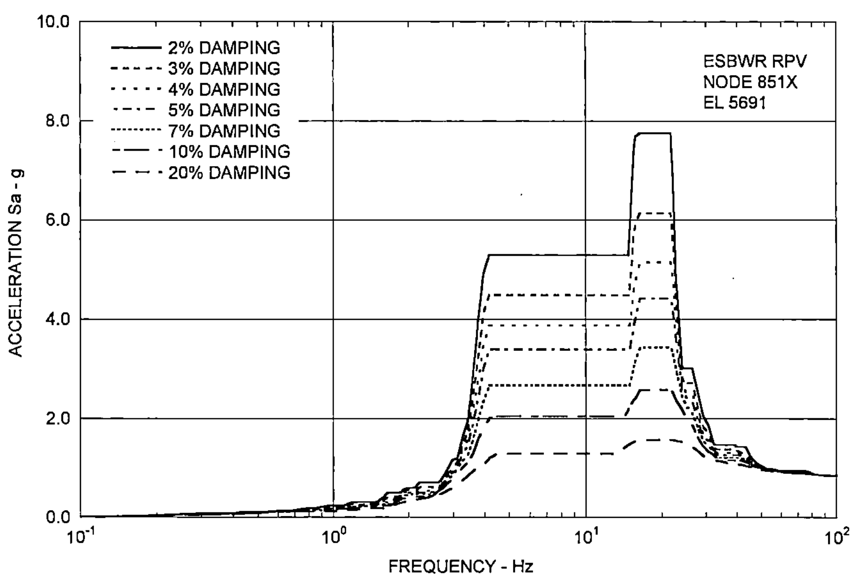

Figure E-54 Site-Specific In-Structure Response Spectra - RPV Node 851X -

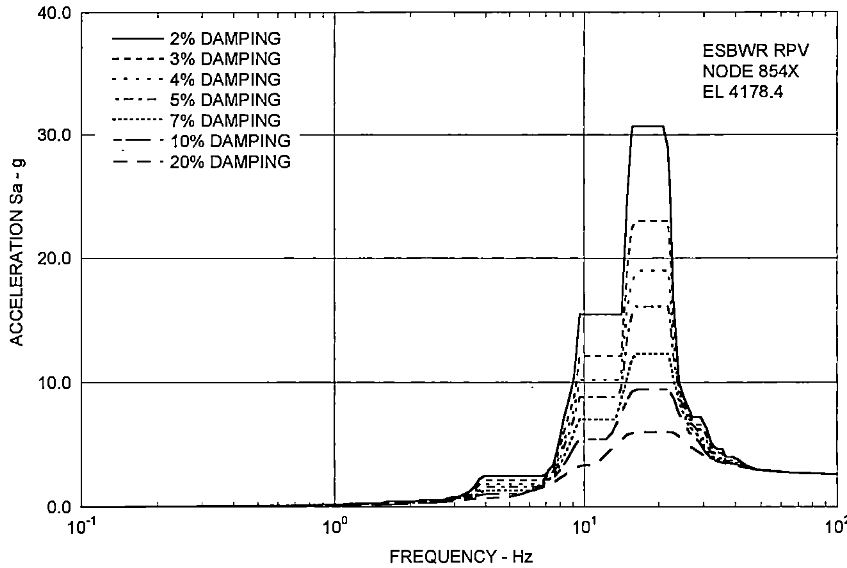

Figure E-55 Site-Specific In-Structure Response Spectra - RPV Node 854X -

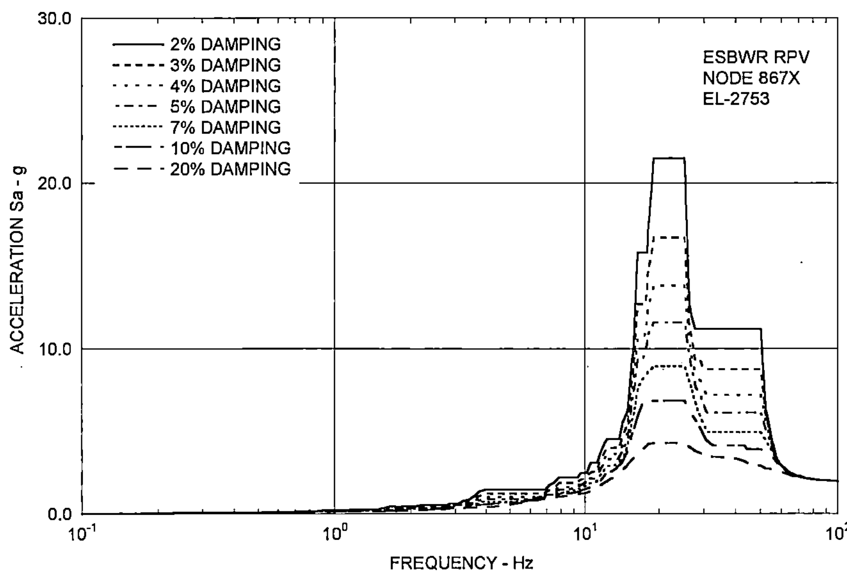

Figure E-56 Site-Specific In-Structure Response Spectra - RPV Node 867X -

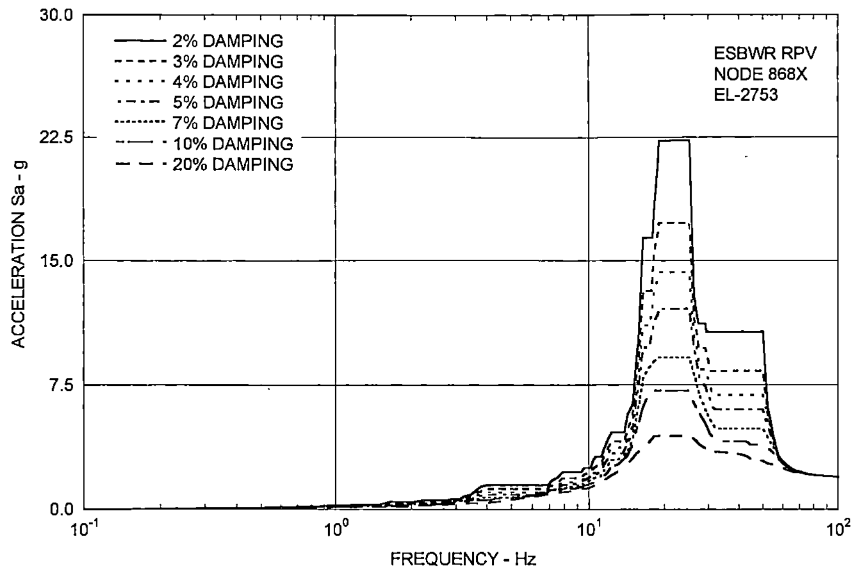

Figure E-57 Site-Specific In-Structure Response Spectra - RPV Node 868X -

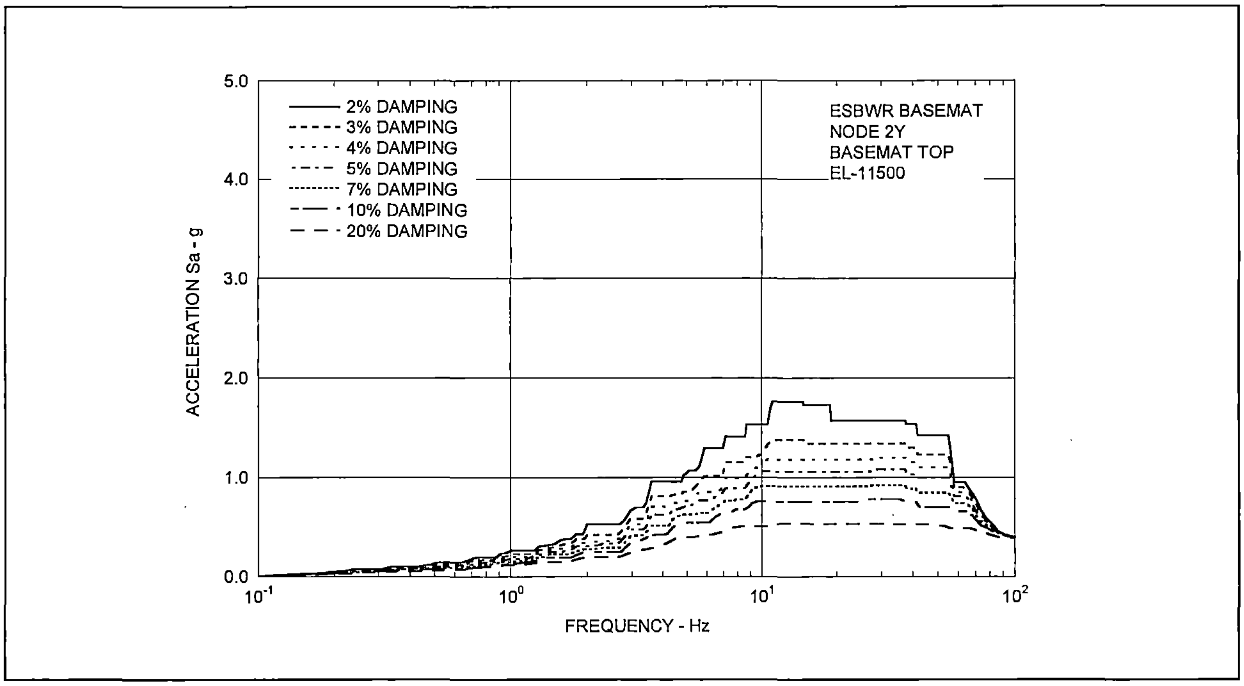

Figure E-58 Site-Specific In-Structure Response Spectra - RB/FB Basemat Node 2Y -

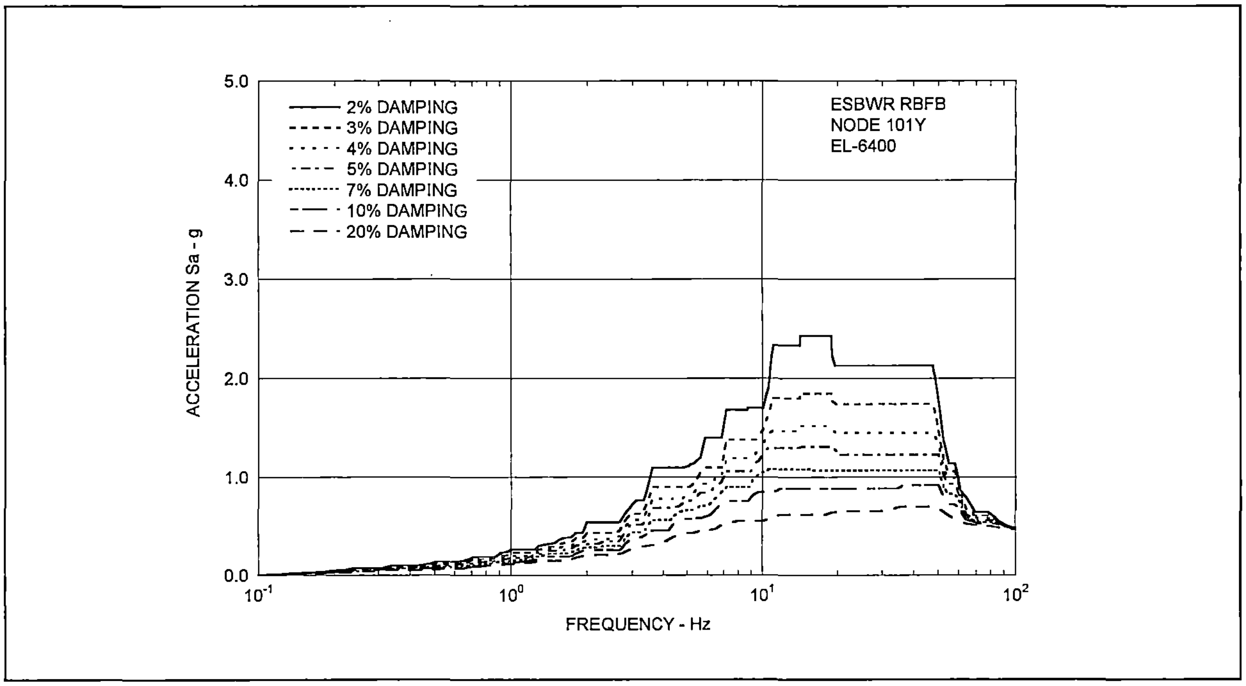

Figure E-59 Site-Specific In-Structure Response Spectra - RB/FB Node 101Y –

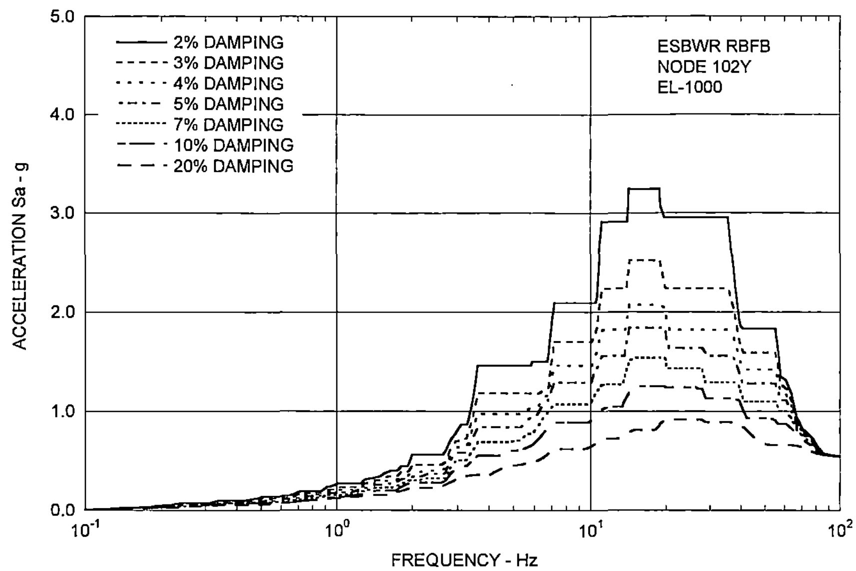

Figure E-60 Site-Specific In-Structure Response Spectra - RB/FB Node 102Y -

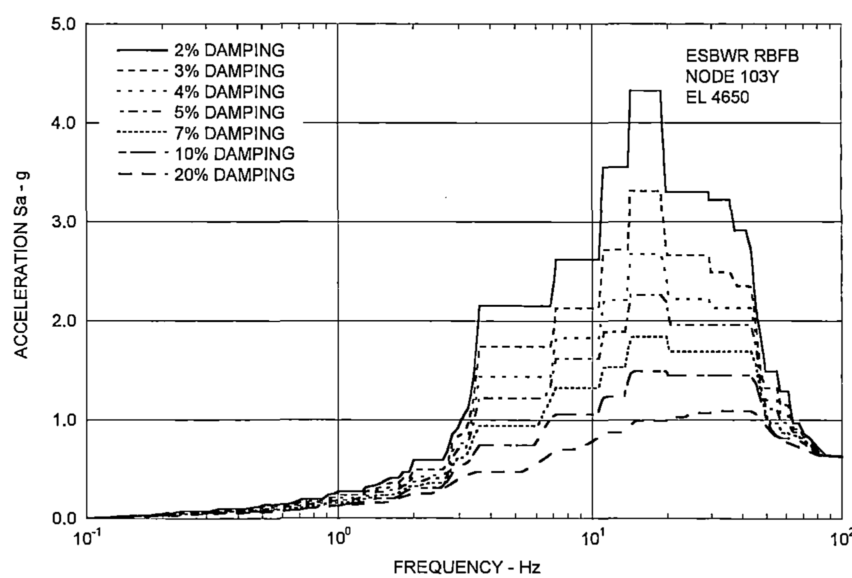

Figure E-61 Site-Specific In-Structure Response Spectra - RB/FB Node 103Y -

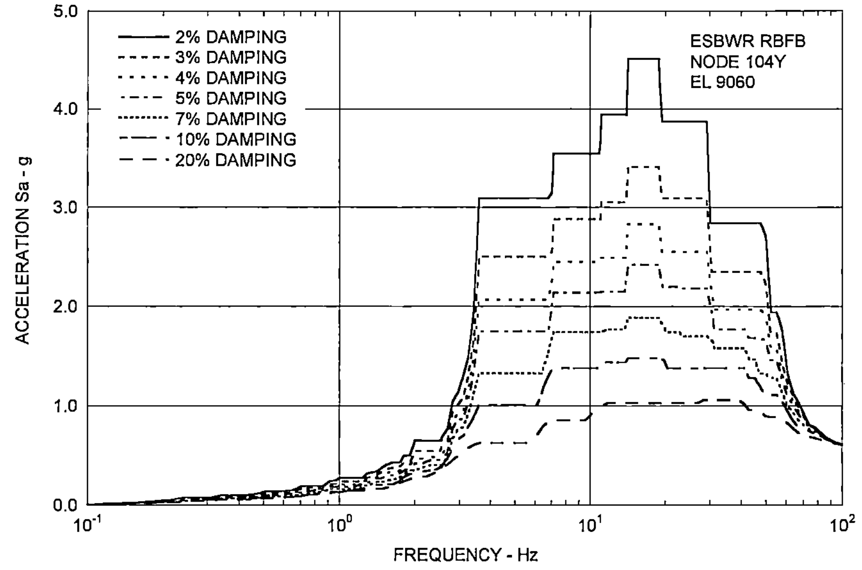

Figure E-62 Site-Specific In-Structure Response Spectra - RB/FB Node 104Y -

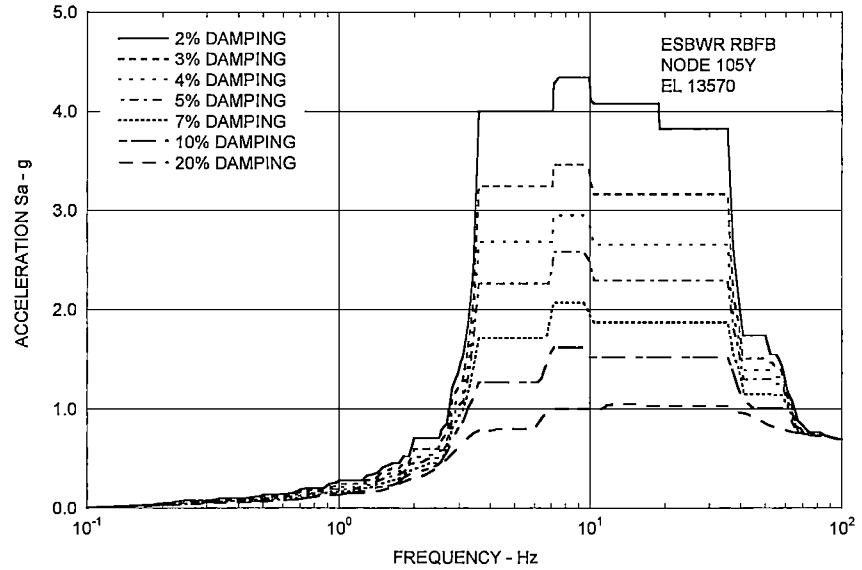

Figure E-63 Site-Specific In-Structure Response Spectra - RB/FB Node 105Y -

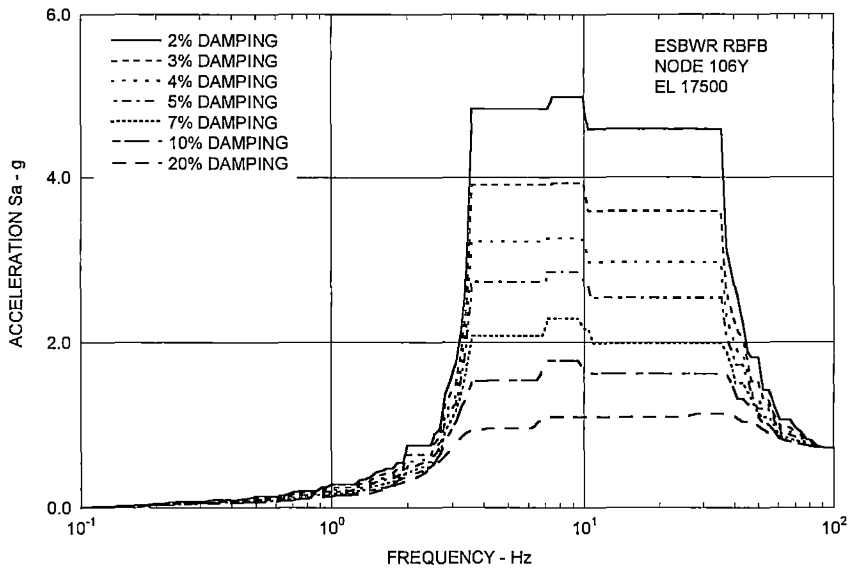

Figure E-64 Site-Specific In-Structure Response Spectra - RB/FB Node 106Y -

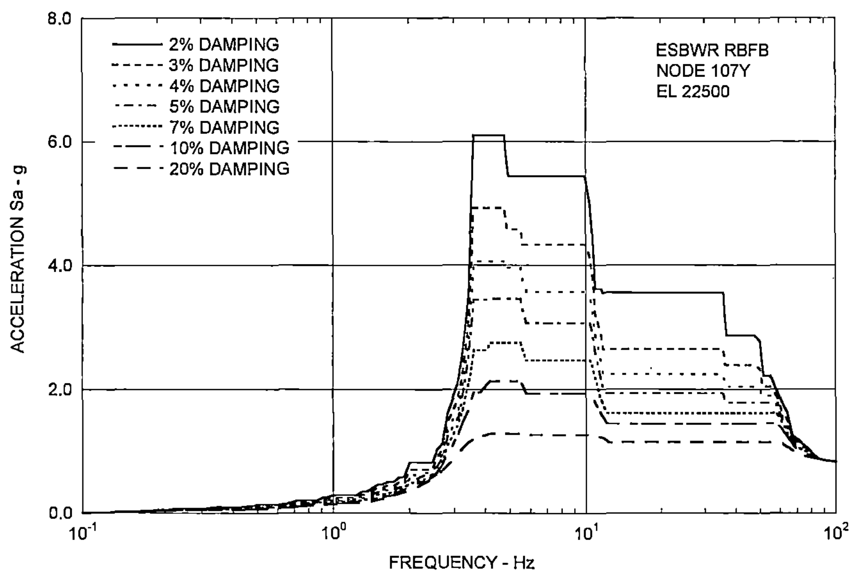

Figure E-65 Site-Specific In-Structure Response Spectra - RB/FB Node 107Y -

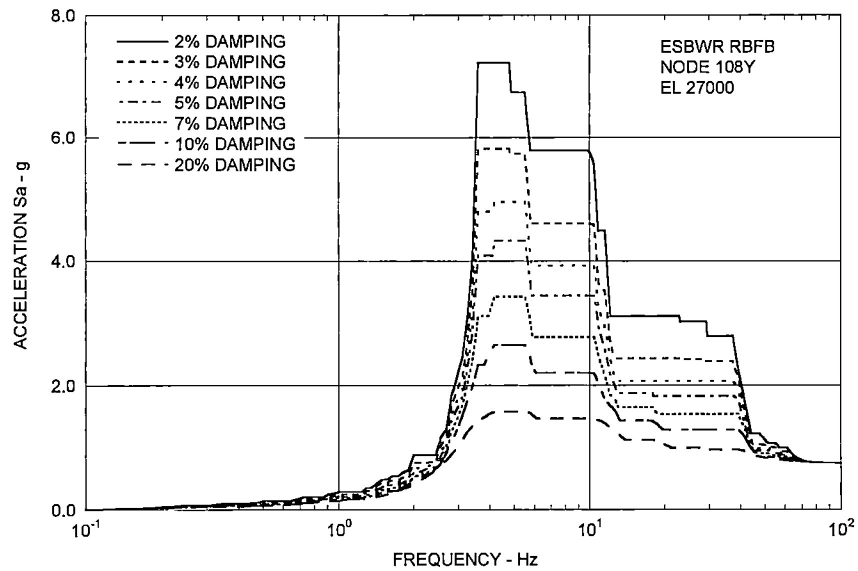

Figure E-66 Site-Specific In-Structure Response Spectra - RB/FB Node 108Y -

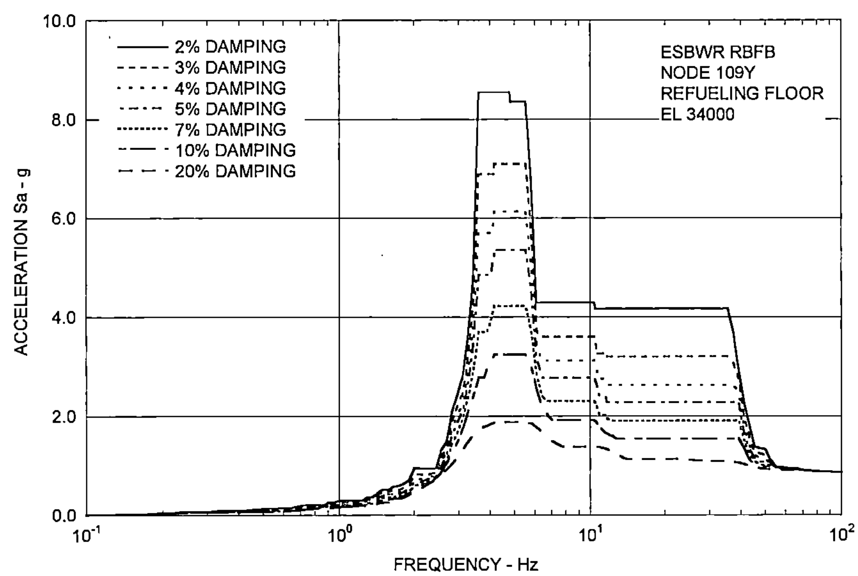

Figure E-67 Site-Specific In-Structure Response Spectra - RB/FB Node 109Y -

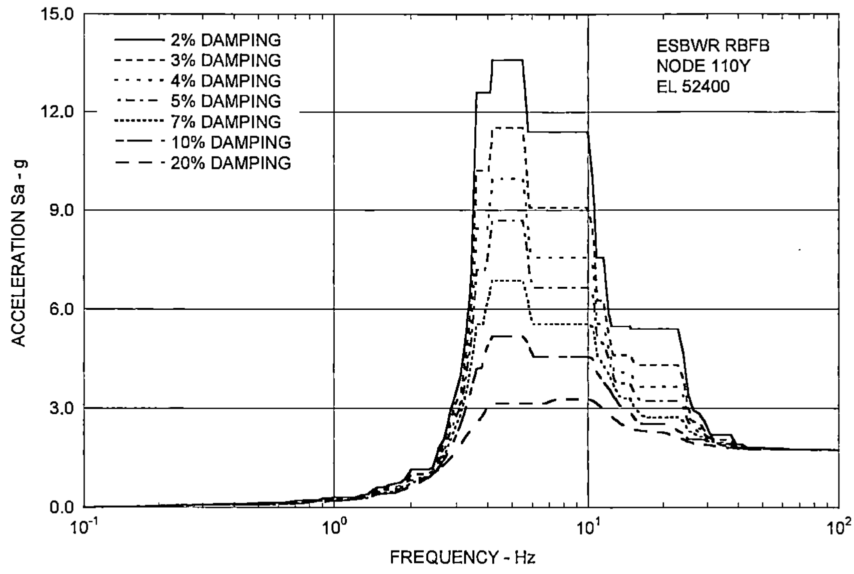

Figure E-68 Site-Specific In-Structure Response Spectra - RB/FB Node 110Y -

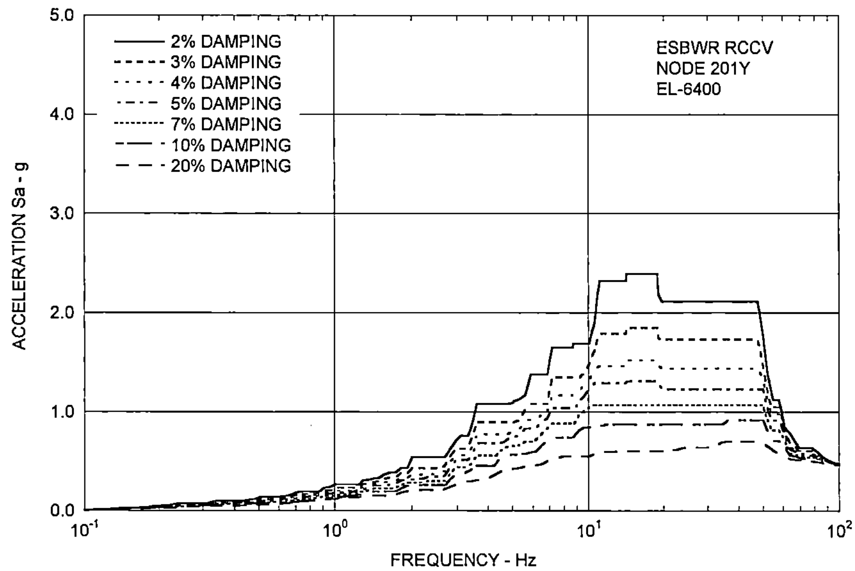

Figure E-69 Site-Specific In-Structure Response Spectra - RCCV Node 201Y -

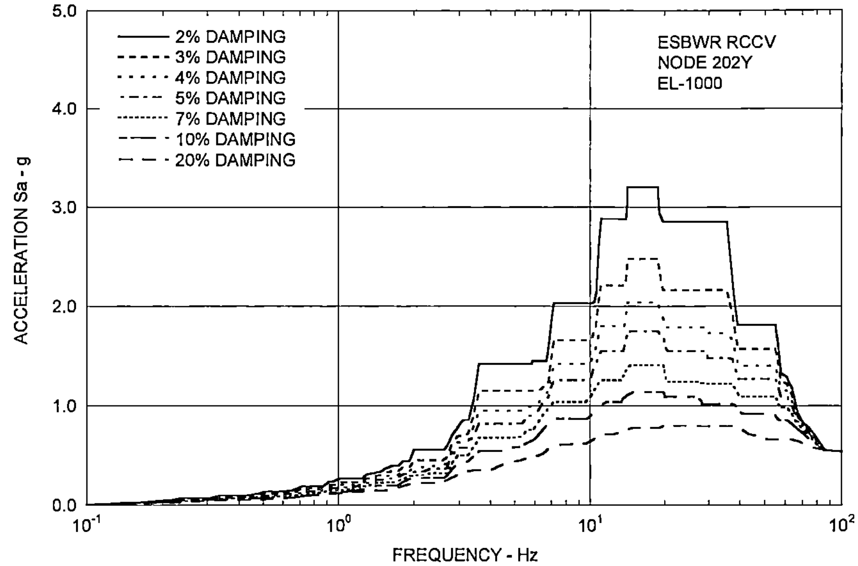

Figure E-70 Site-Specific In-Structure Response Spectra - RCCV Node 202Y -

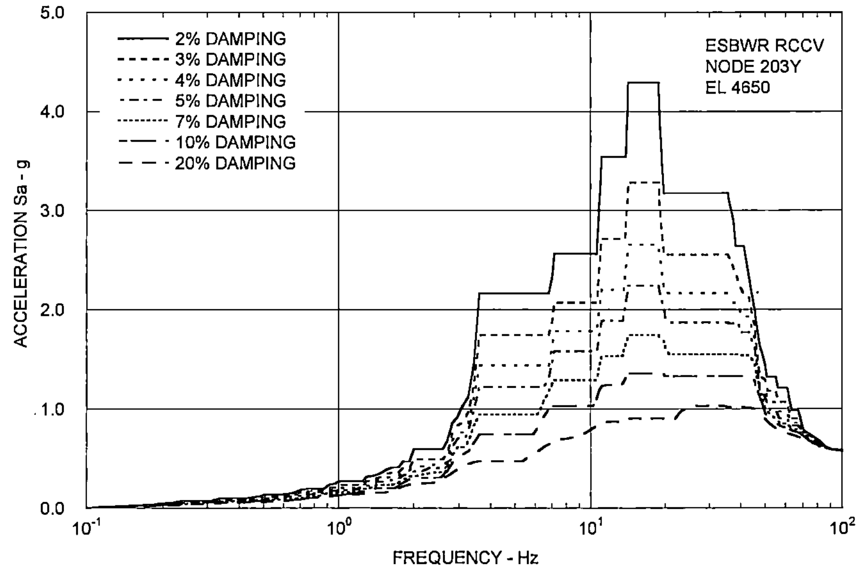

Figure E-71 Site-Specific In-Structure Response Spectra - RCCV Node 203Y -

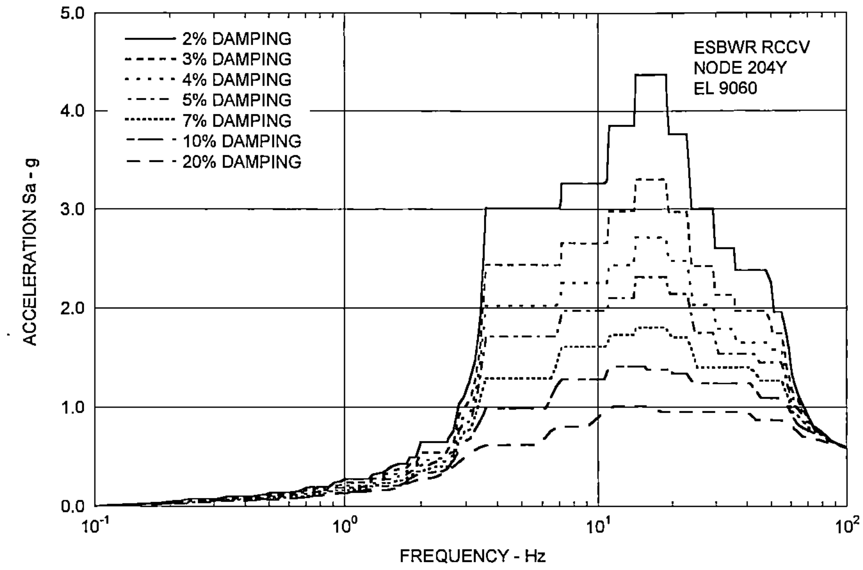

Figure E-72 Site-Specific In-Structure Response Spectra - RCCV Node 204Y -

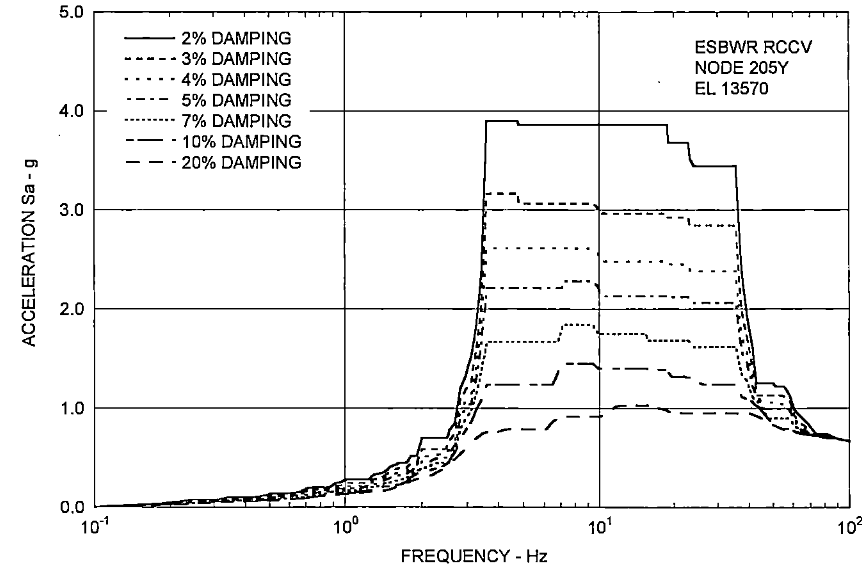

Figure E-73 Site-Specific In-Structure Response Spectra - RCCV Node 205Y -

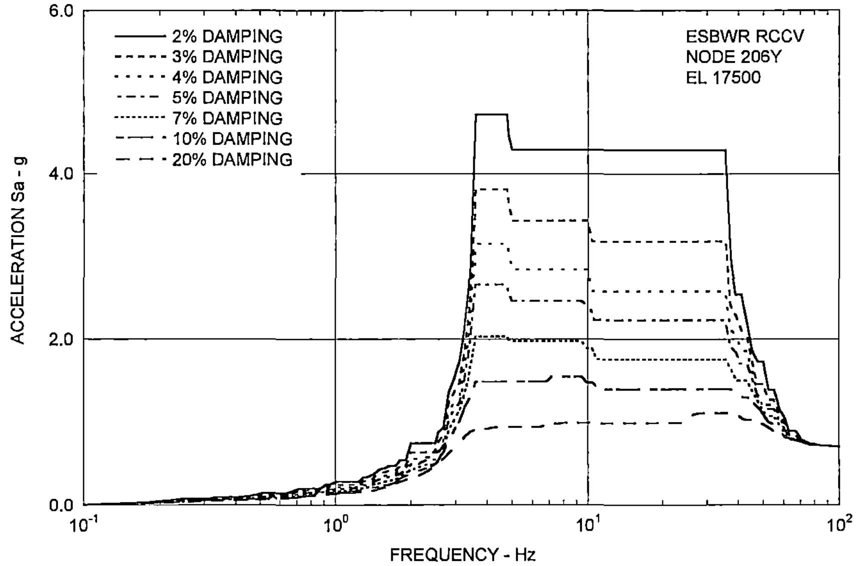

Figure E-74 Site-Specific In-Structure Response Spectra - RCCV Node 206Y –

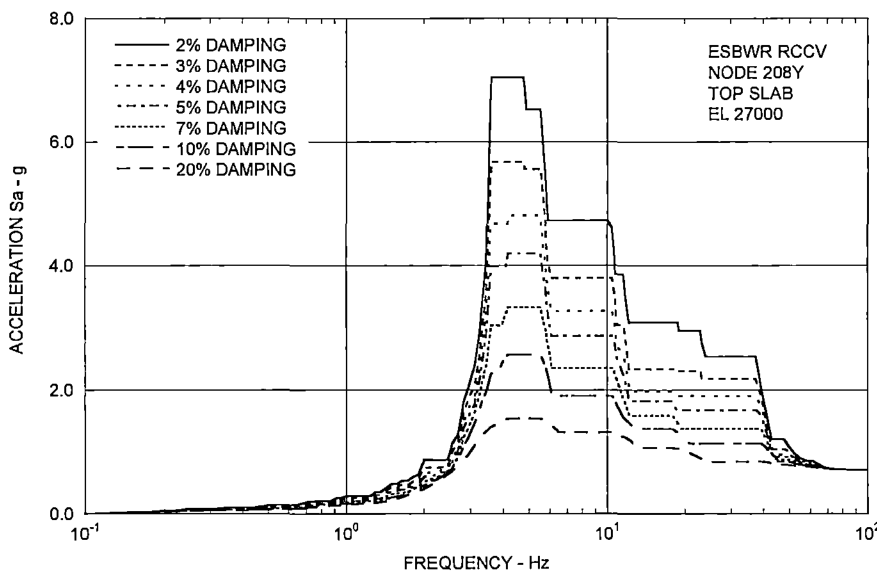

Figure E-75 Site-Specific In-Structure Response Spectra - RCCV Node 208Y -

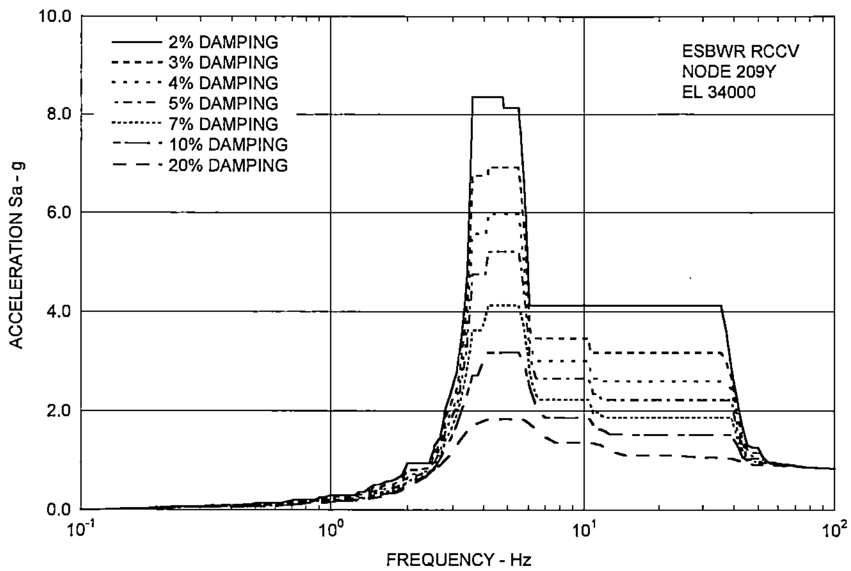

Figure E-76 Site-Specific In-Structure Response Spectra - RCCV Node 209Y -

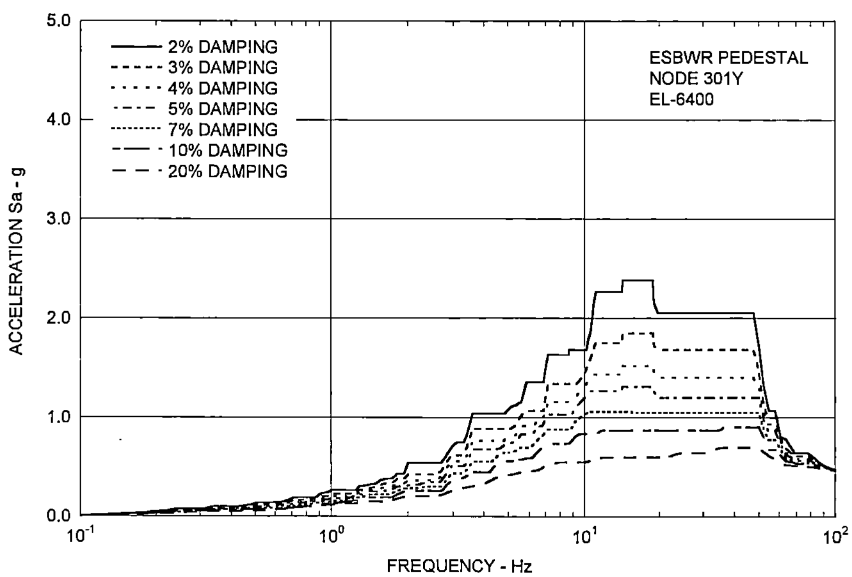

Figure E-77 Site-Specific In-Structure Response Spectra - Pedestal Node 301Y -

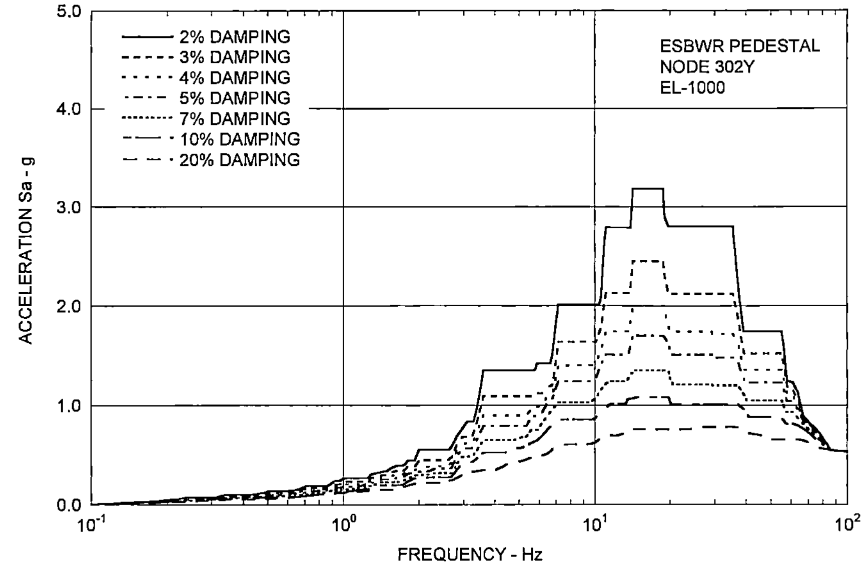

Figure E-78 Site-Specific In-Structure Response Spectra - Pedestal Node 302Y -

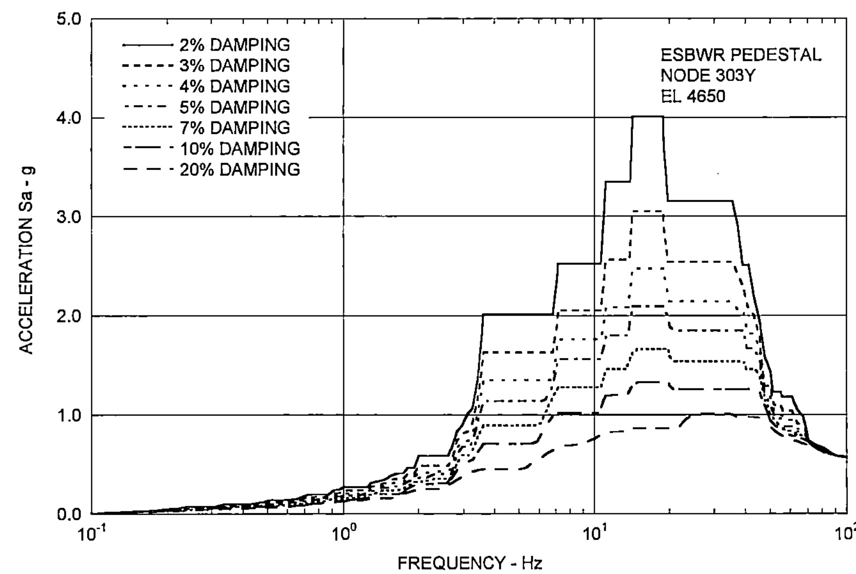

Figure E-79 Site-Specific In-Structure Response Spectra - Pedestal Node 303Y -

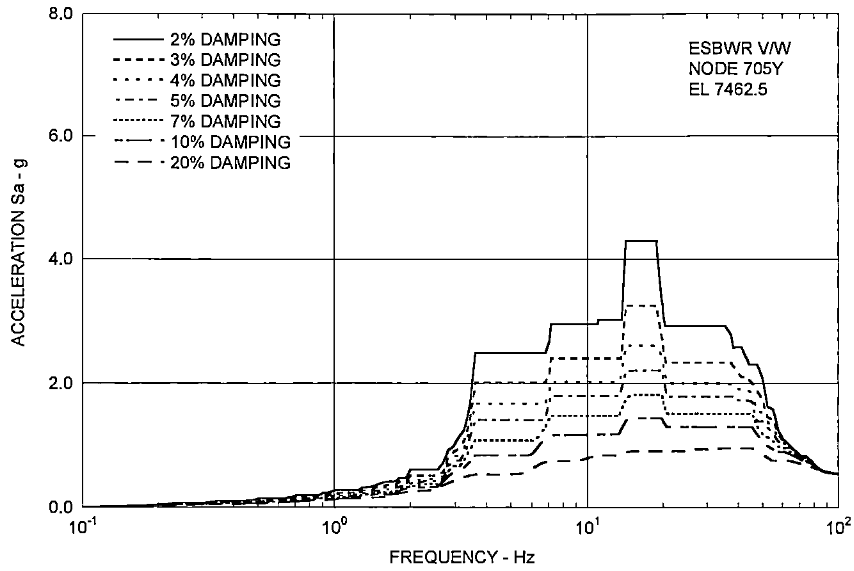

Figure E-80 Site-Specific In-Structure Response Spectra - Vent Wall Node 705Y -

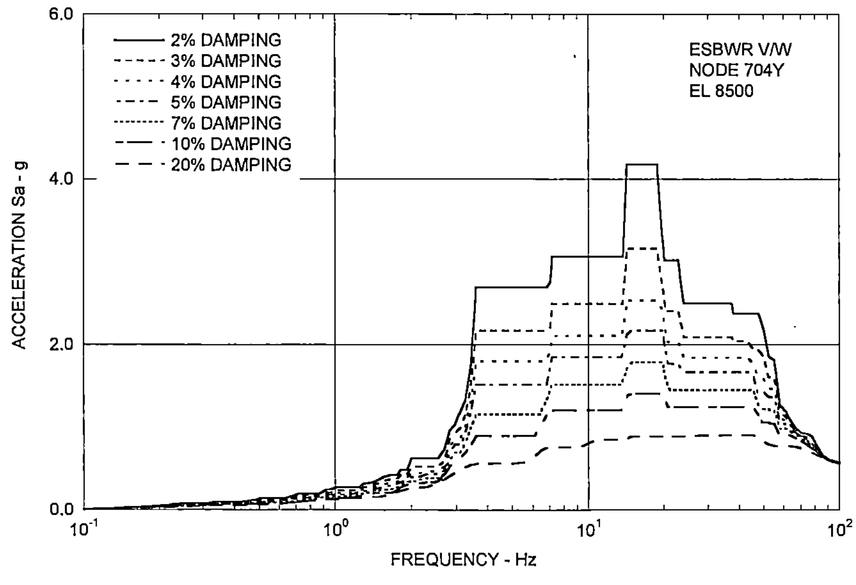

Figure E-81 Site-Specific In-Structure Response Spectra - Vent Wall Node 704Y -

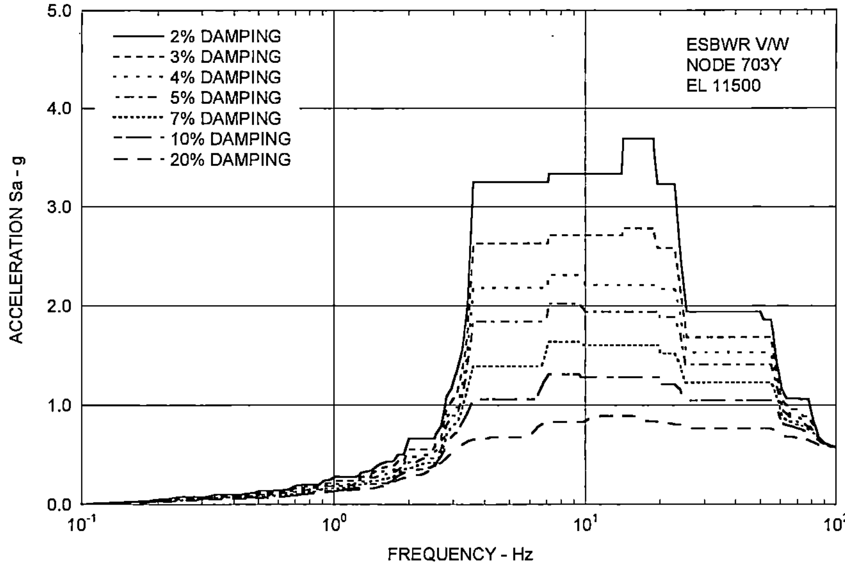

Figure E-82 Site-Specific In-Structure Response Spectra - Vent Wall Node 703Y -

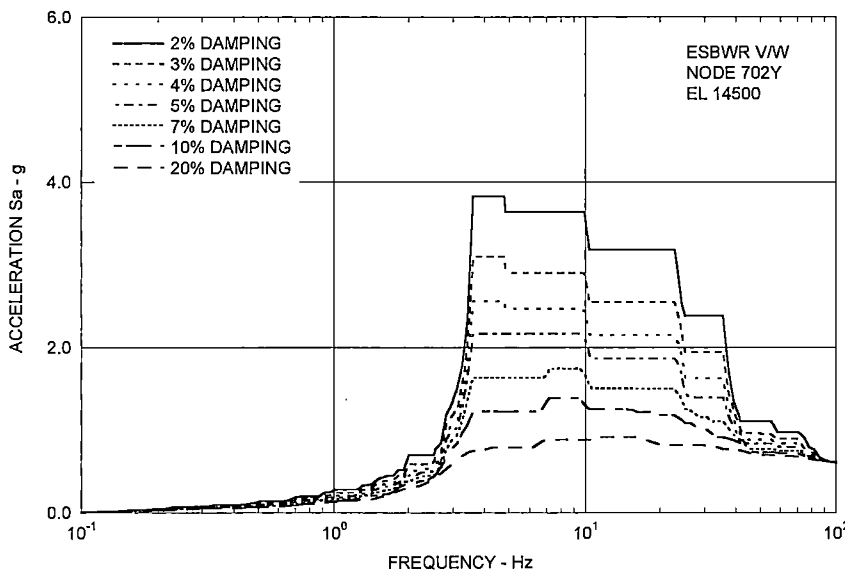

Figure E-83 Site-Specific In-Structure Response Spectra - Vent Wall Node 702Y –

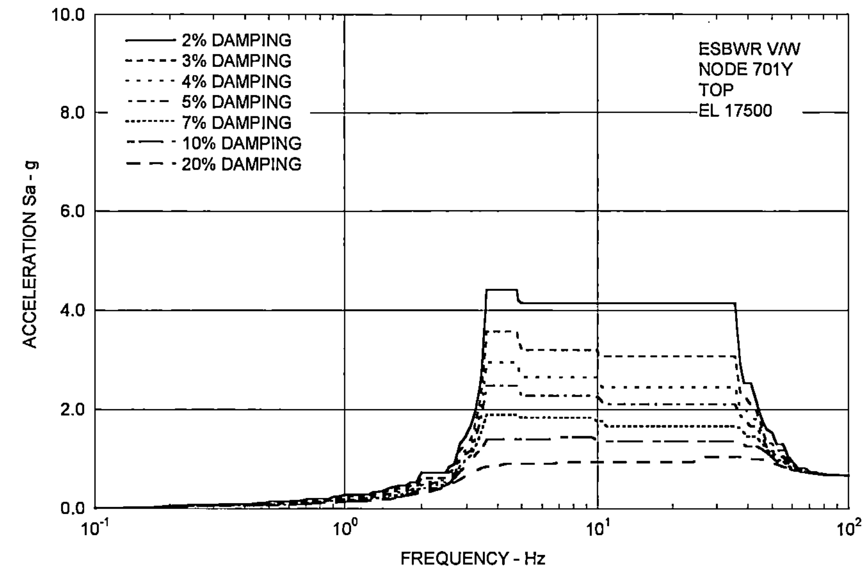

Figure E-84 Site-Specific In-Structure Response Spectra - Vent Wall Node 701Y -

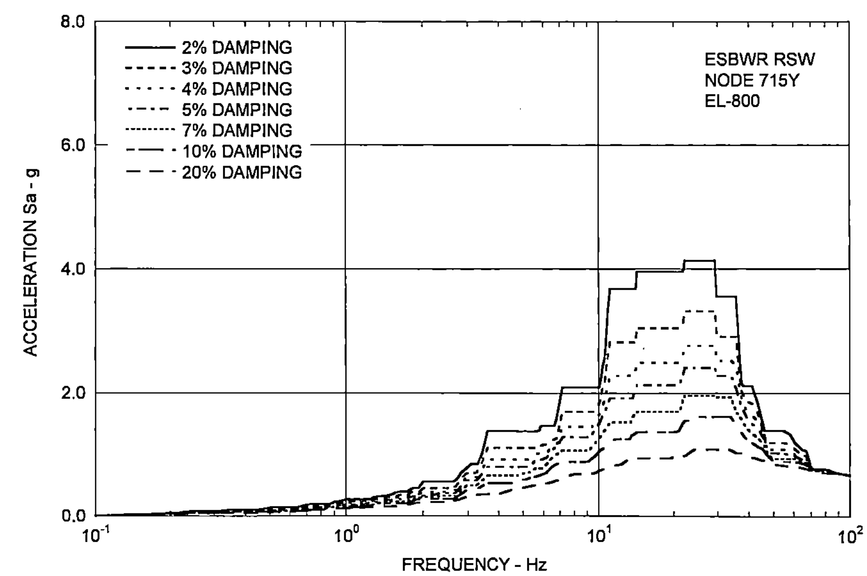

Figure E-85 Site-Specific In-Structure Response Spectra - RSW Node 715Y –

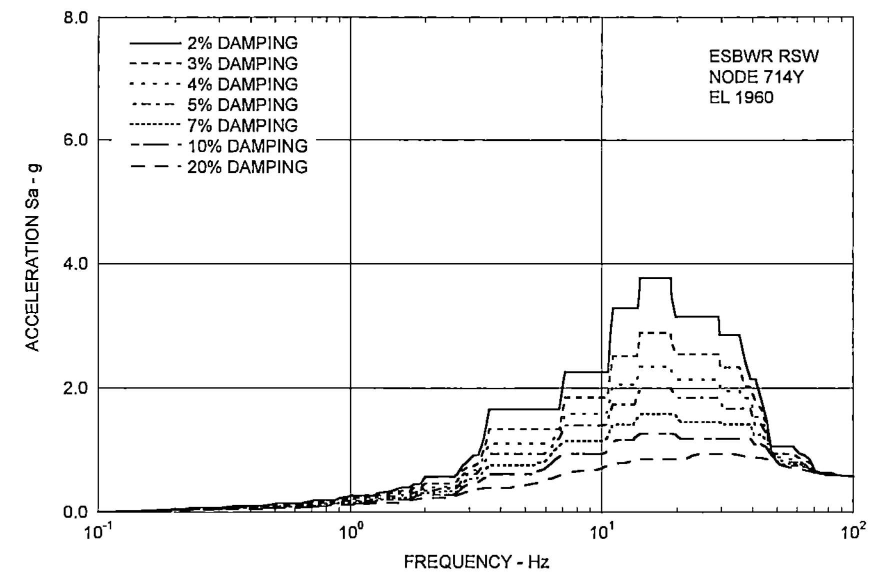

Figure E-86 Site-Specific In-Structure Response Spectra - RSW Node 714Y -

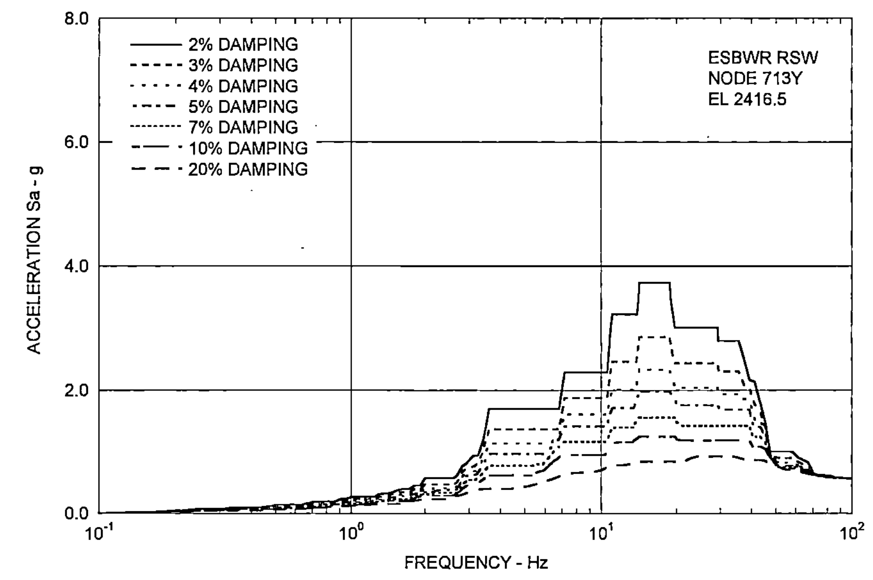

Figure E-87 Site-Specific In-Structure Response Spectra - RSW Node 713Y -

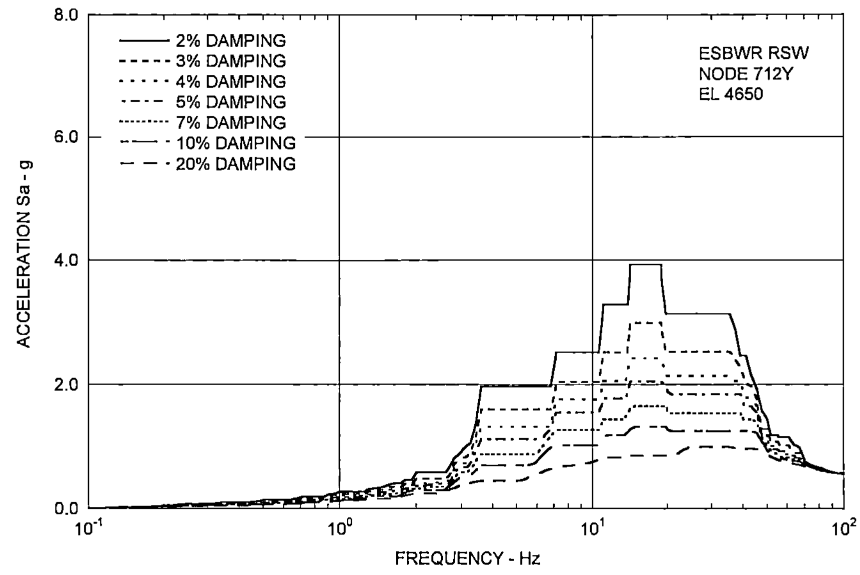

Figure E-88 Site-Specific In-Structure Response Spectra - RSW Node 712Y -

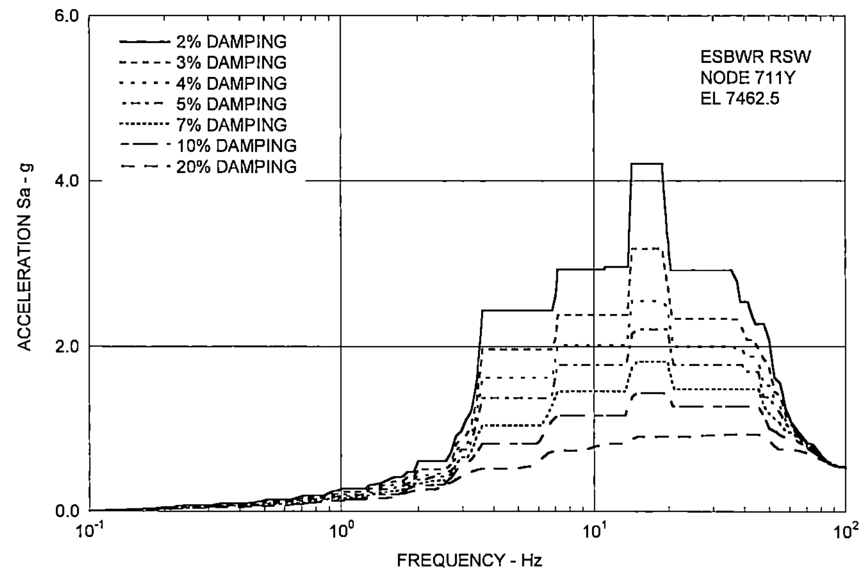

Figure E-89 Site-Specific In-Structure Response Spectra - RSW Node 711Y -

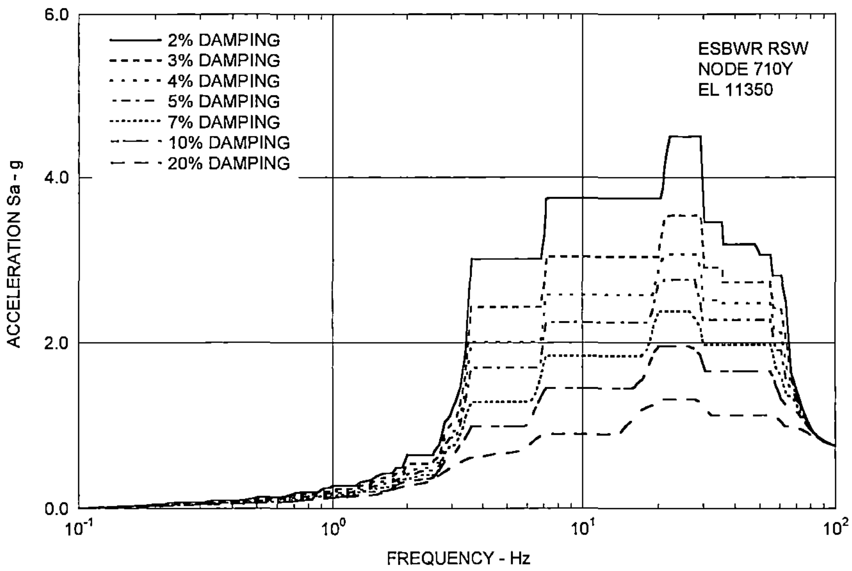

Figure E-90 Site-Specific In-Structure Response Spectra - RSW Node 710Y -

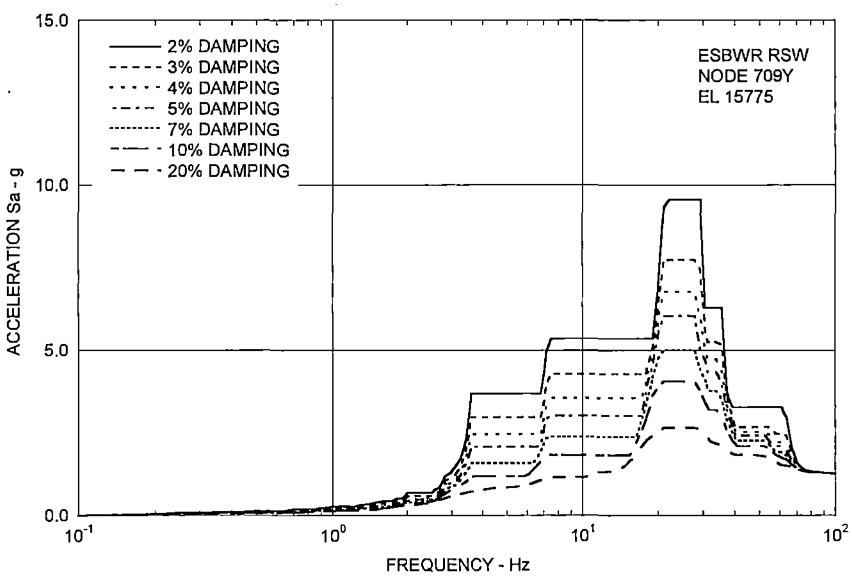

Figure E-91 Site-Specific In-Structure Response Spectra - RSW Node 709Y -

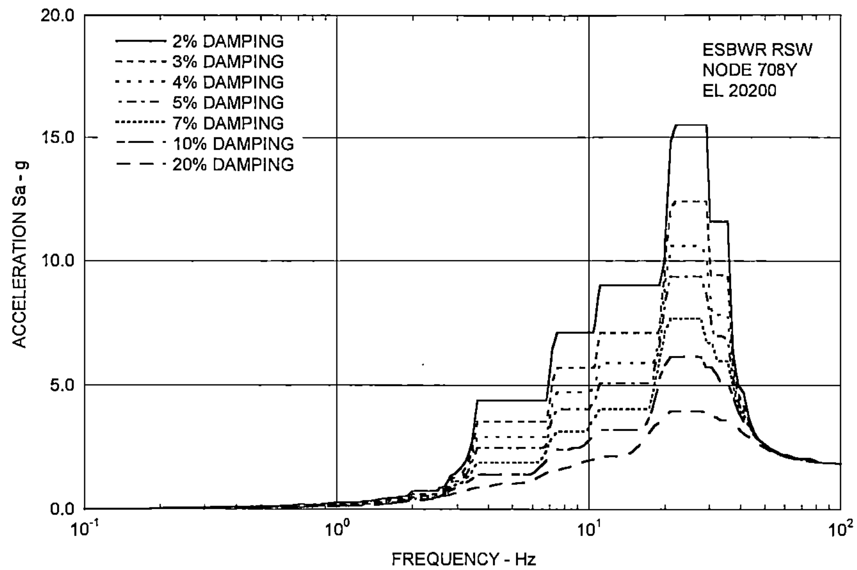

Figure E-92 Site-Specific In-Structure Response Spectra - RSW Node 708Y -

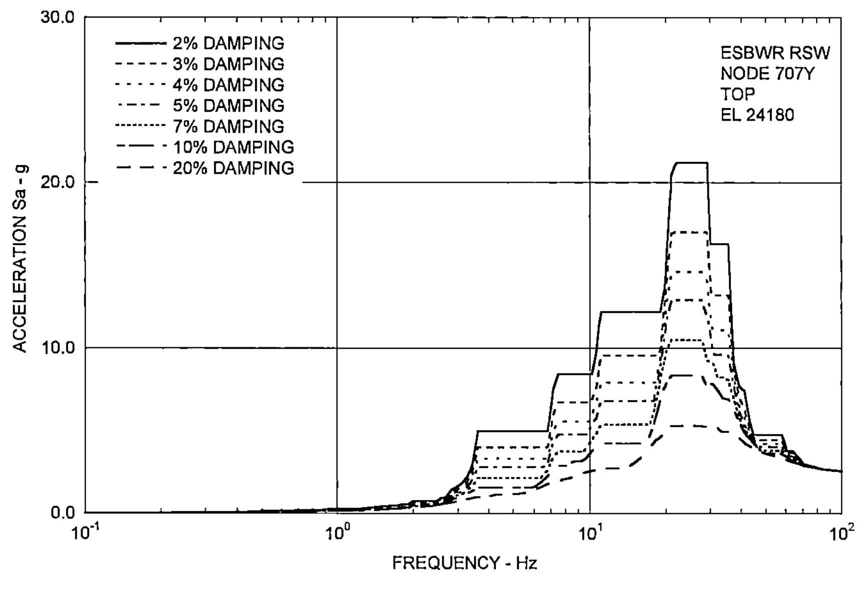

Figure E-93 Site-Specific In-Structure Response Spectra - RSW Node 707Y -

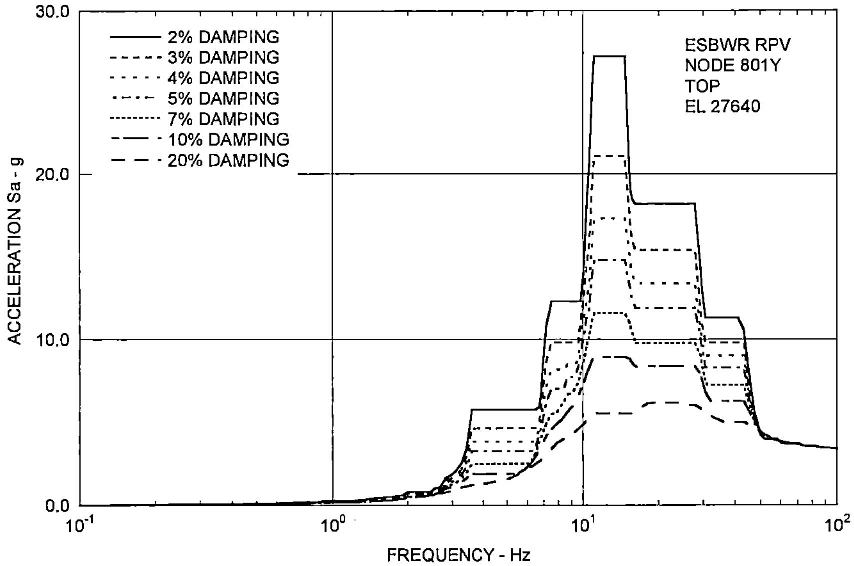

Figure E-94 Site-Specific In-Structure Response Spectra - RPV Node 801Y -

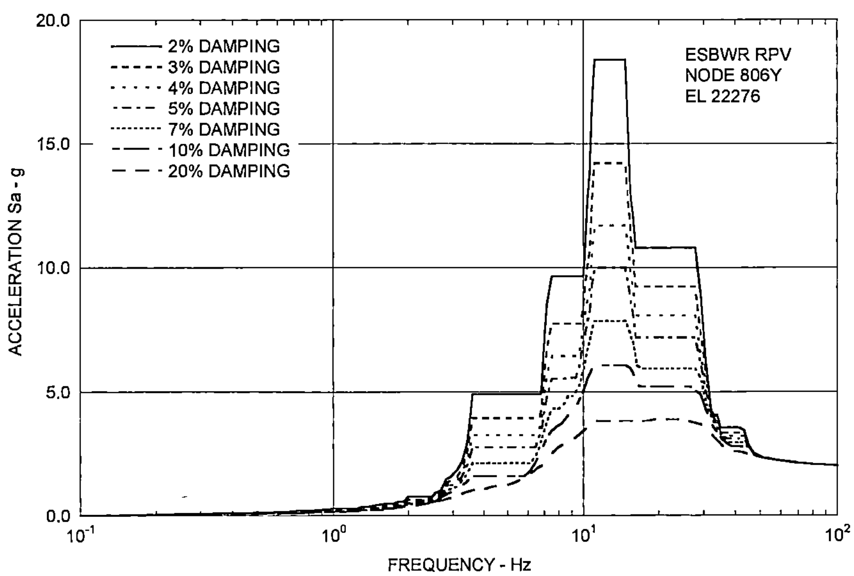

Figure E-95 Site-Specific In-Structure Response Spectra - RPV Node 806Y -

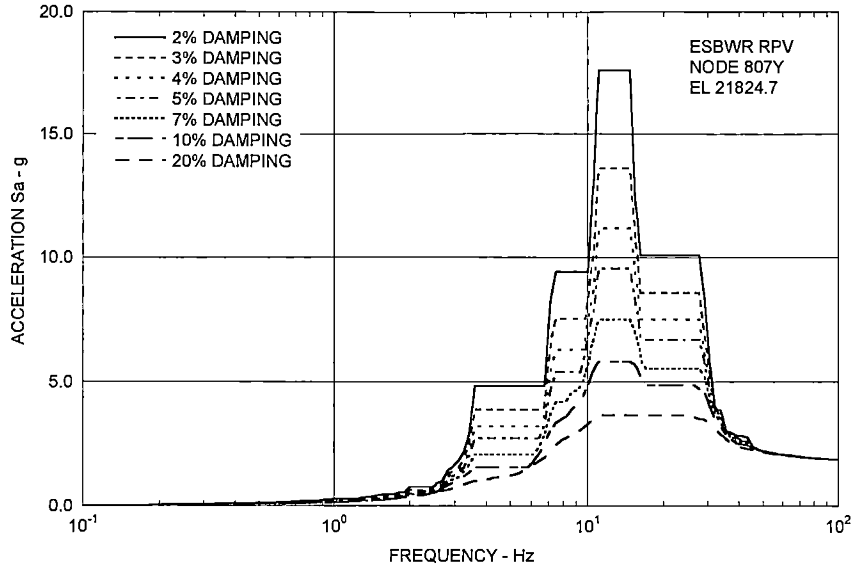

Figure E-96 Site-Specific In-Structure Response Spectra - RPV Node 807Y -

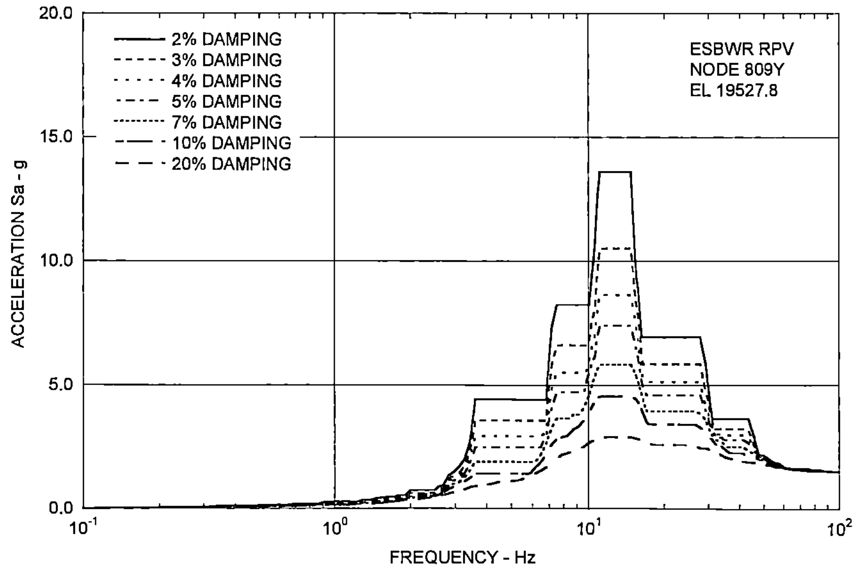

Figure E-97 Site-Specific In-Structure Response Spectra - RPV Node 809Y -

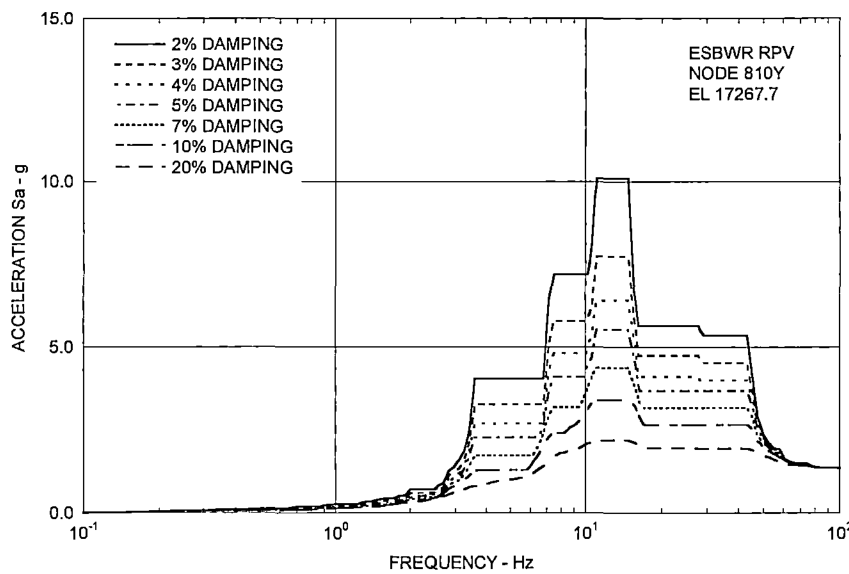

Figure E-98 Site-Specific In-Structure Response Spectra - RPV Node 810Y -

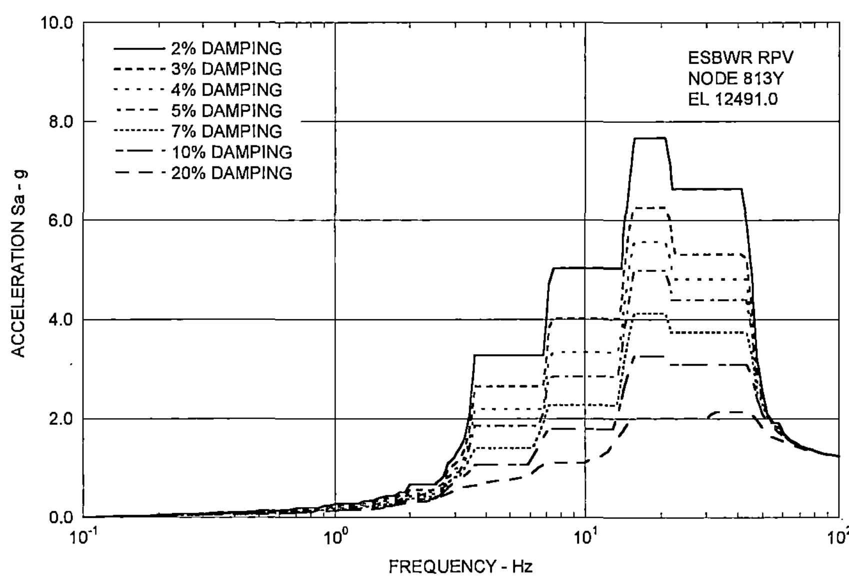

Figure E-99 Site-Specific In-Structure Response Spectra - RPV Node 813Y -

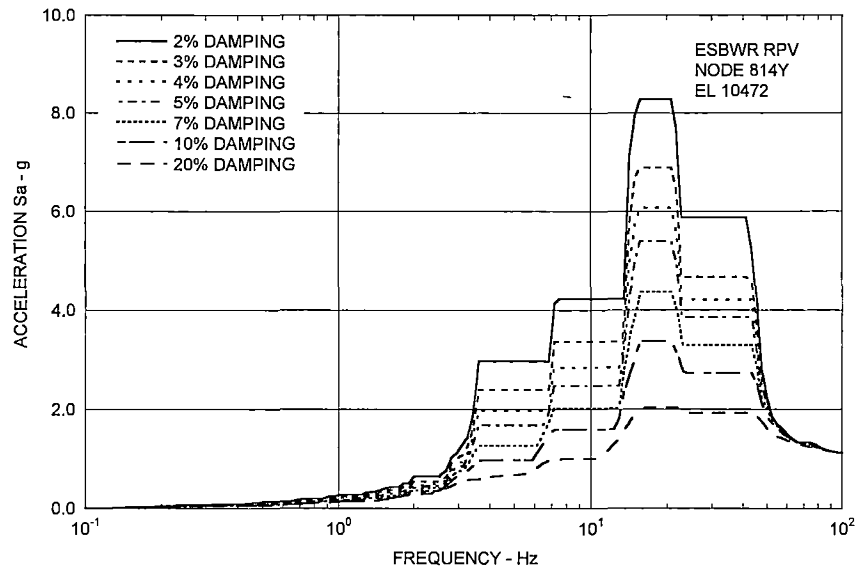

Figure E-100 Site-Specific In-Structure Response Spectra - RPV Node 814Y -

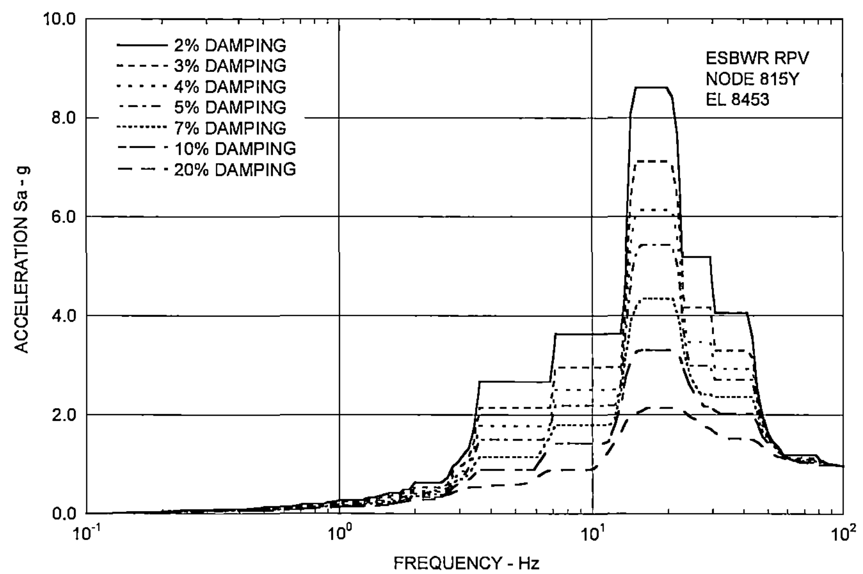

Figure E-101 Site-Specific In-Structure Response Spectra - RPV Node 815Y -

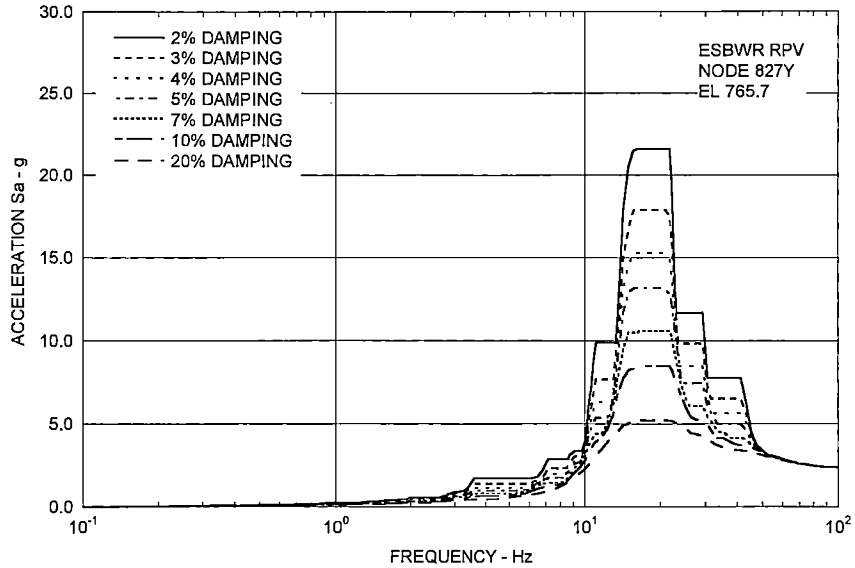

Figure E-102 Site-Specific In-Structure Response Spectra - RPV Node 827Y -

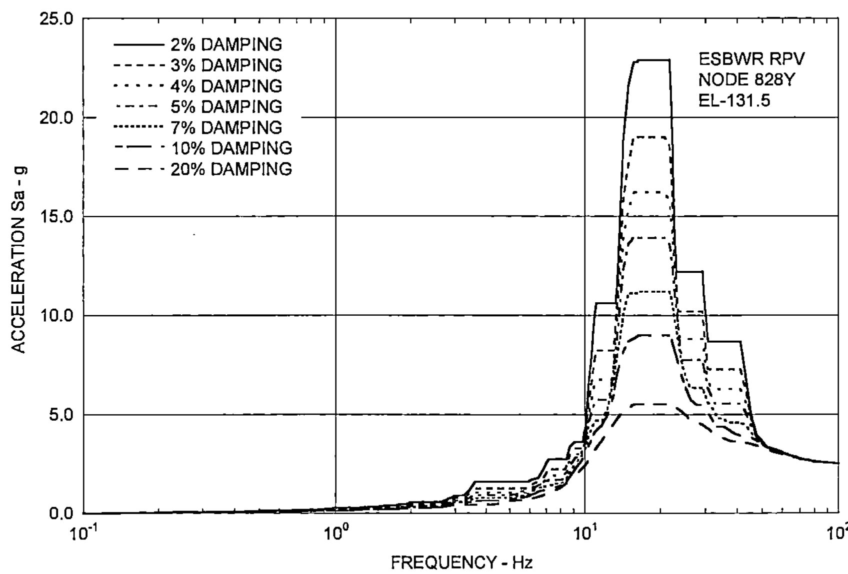

Figure E-103 Site-Specific In-Structure Response Spectra - RPV Node 828Y -

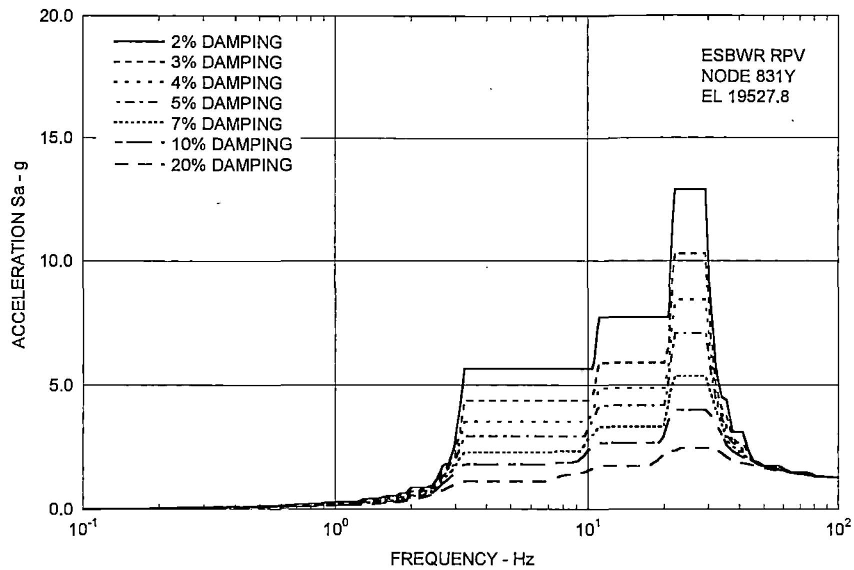

Figure E-104 Site-Specific In-Structure Response Spectra - RPV Node 831Y -

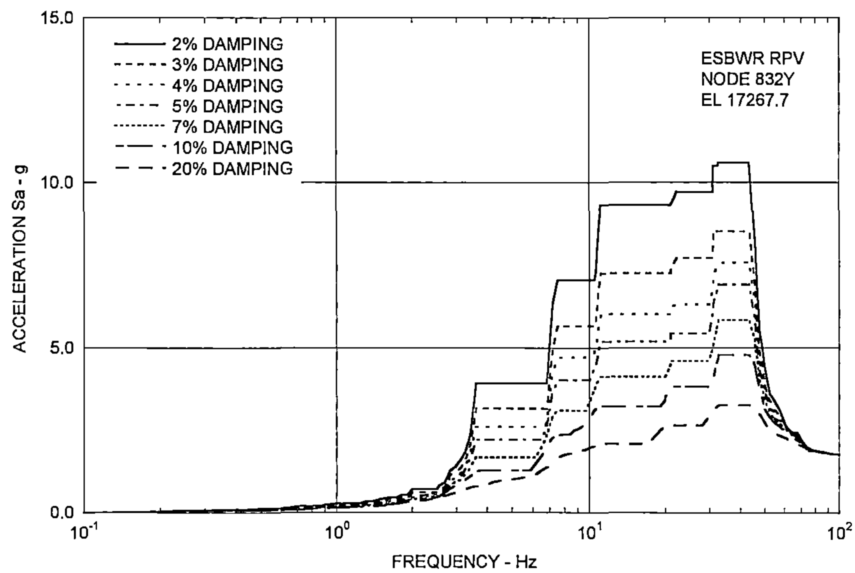

Figure E-105 Site-Specific In-Structure Response Spectra - RPV Node 832Y -

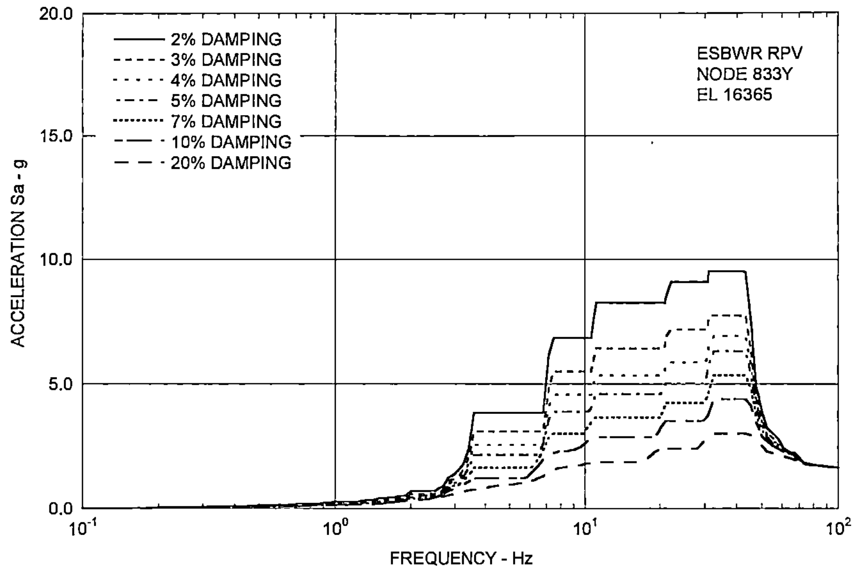

Figure E-106 Site-Specific In-Structure Response Spectra - RPV Node 833Y -

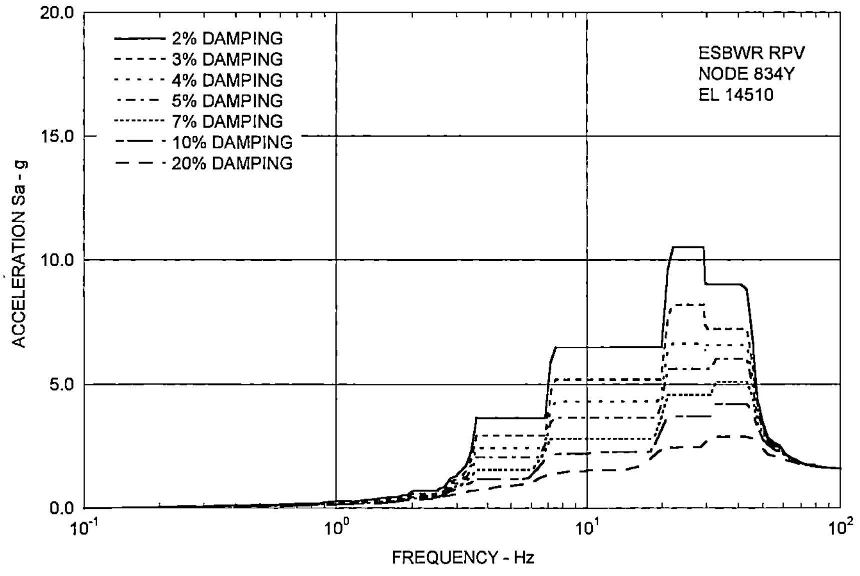

Figure E-107 Site-Specific In-Structure Response Spectra - RPV Node 834Y -

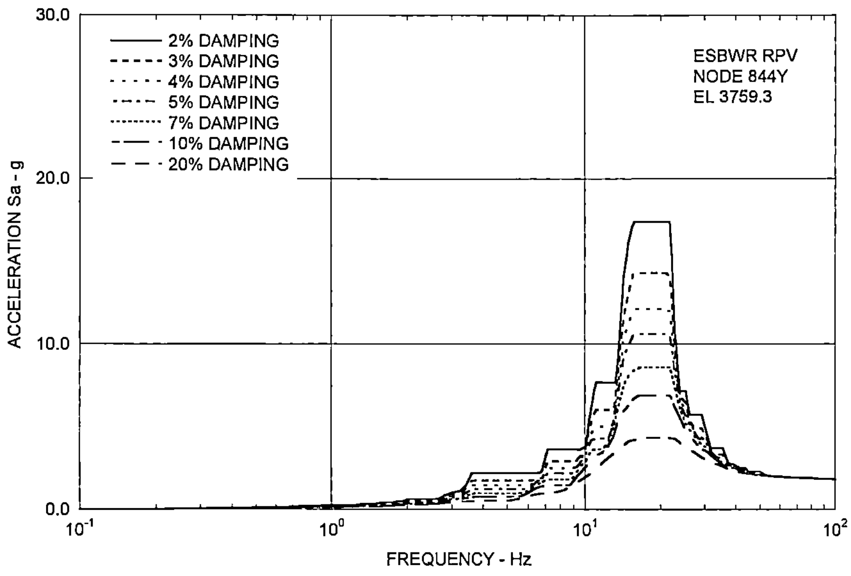

Figure E-108 Site-Specific In-Structure Response Spectra - RPV Node 844Y -

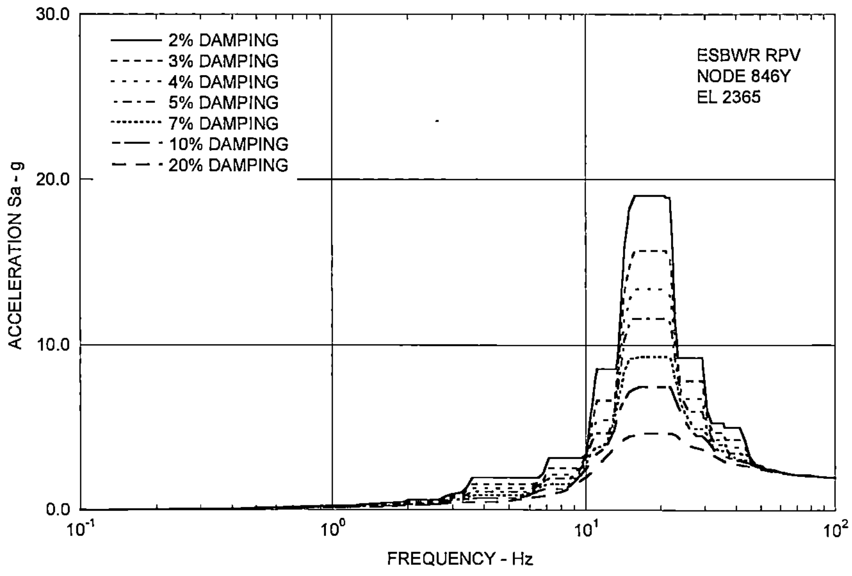

Figure E-109 Site-Specific In-Structure Response Spectra - RPV Node 846Y -

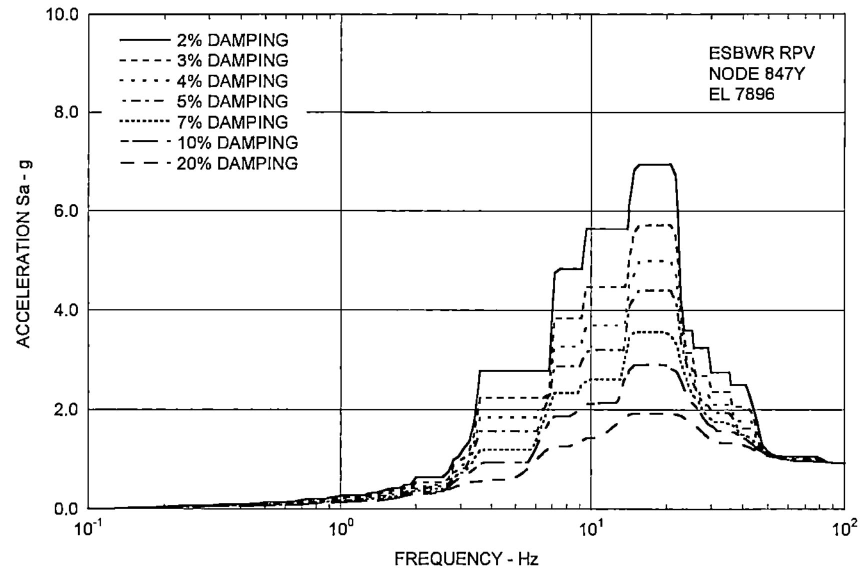

Figure E-110 Site-Specific In-Structure Response Spectra - RPV Node 847Y -

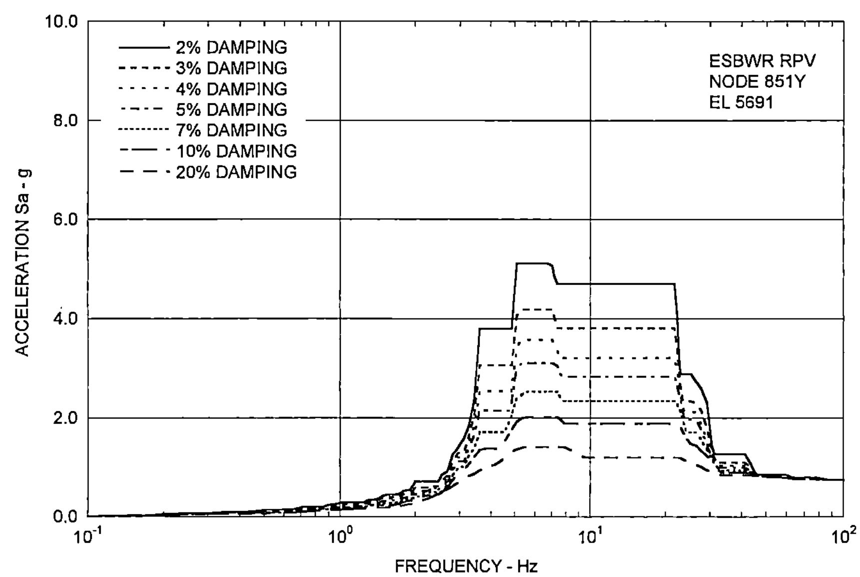

Figure E-111 Site-Specific In-Structure Response Spectra - RPV Node 851Y -

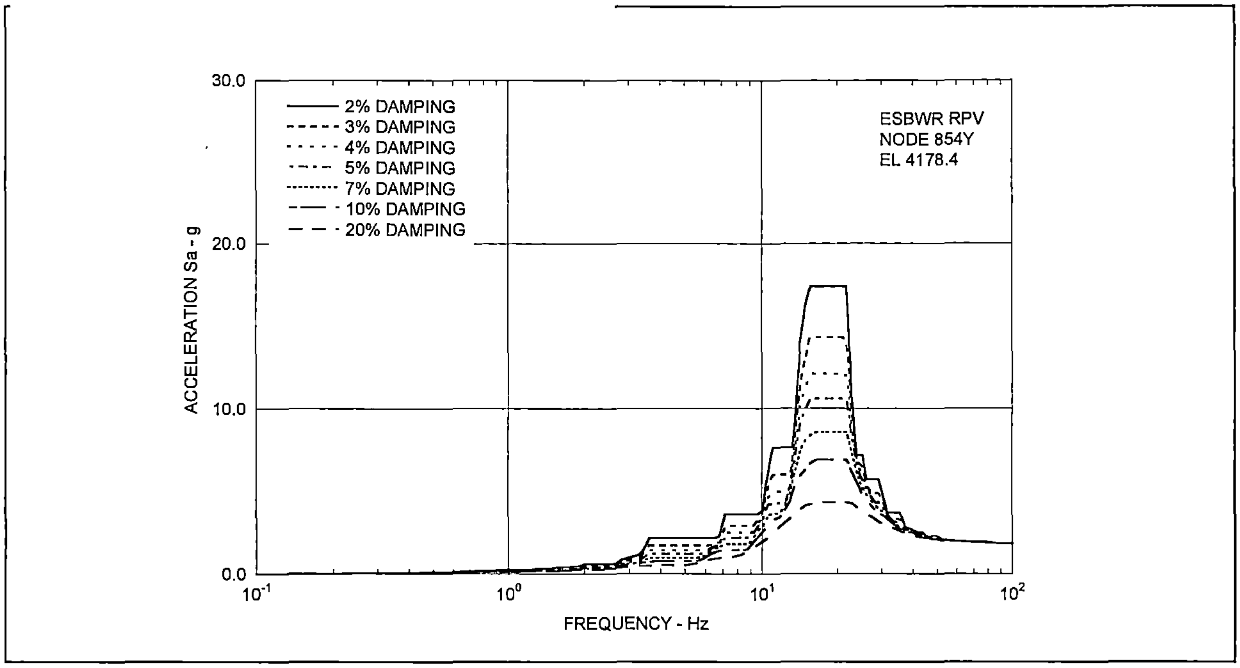

Figure E-112 Site-Specific In-Structure Response Spectra - RPV Node 854Y -

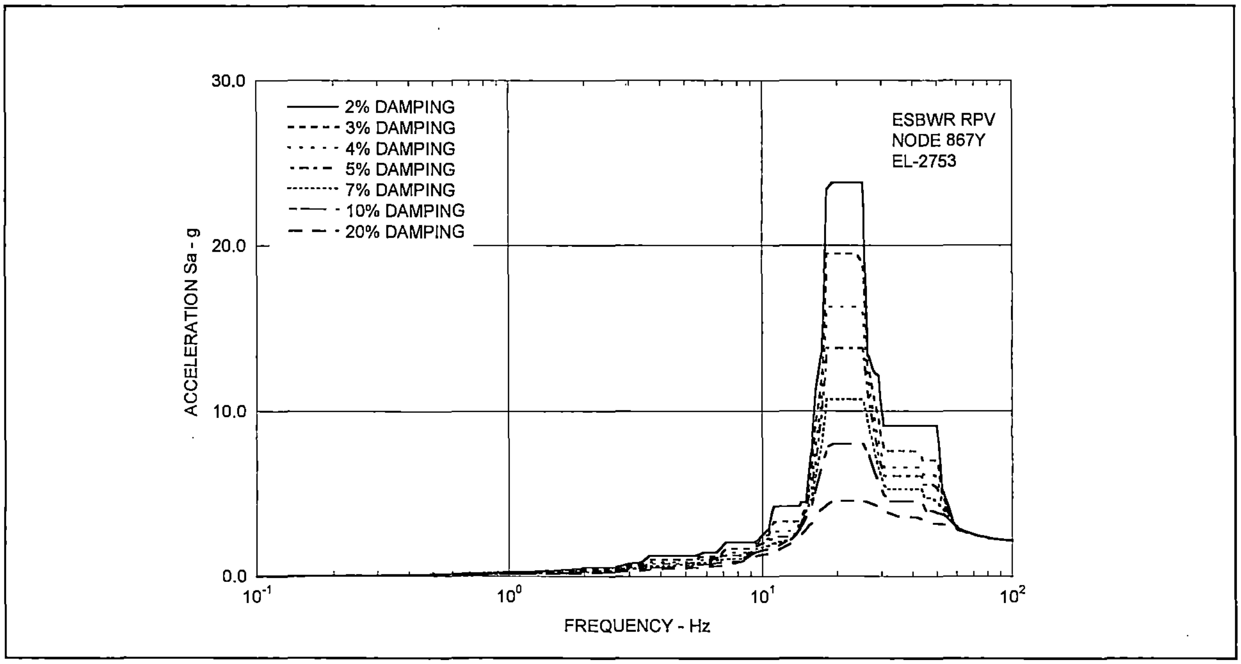

Figure E-113 Site-Specific In-Structure Response Spectra - RPV Node 867Y –

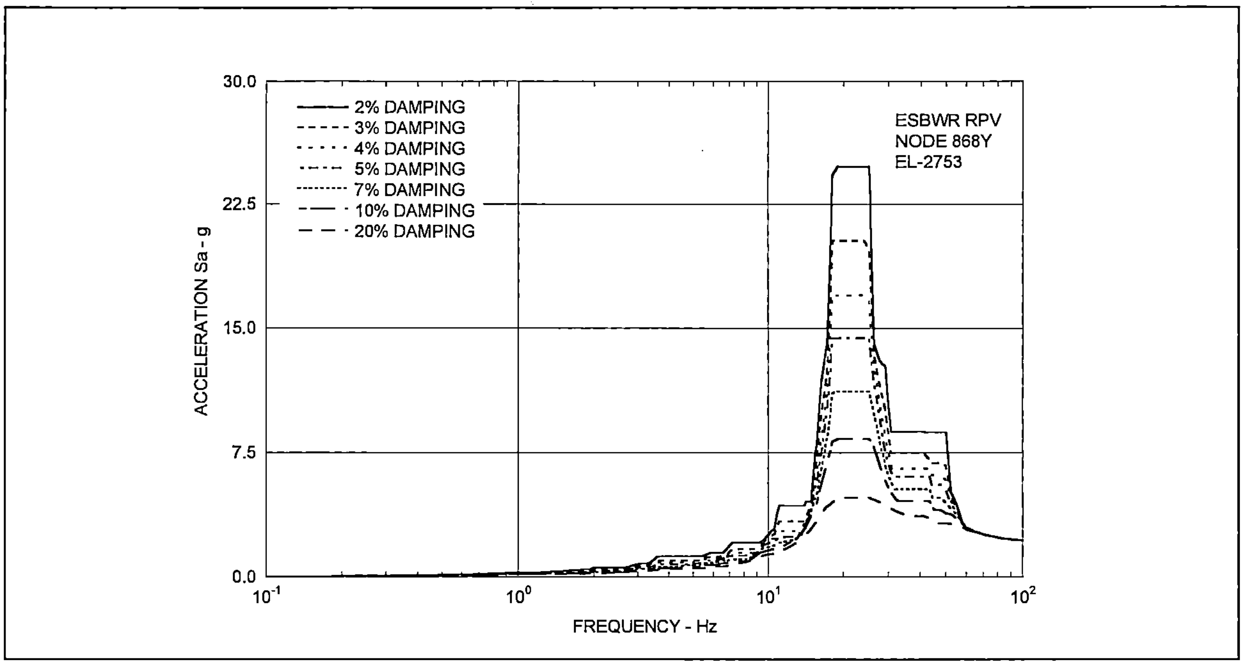

Figure E-114 Site-Specific In-Structure Response Spectra - RPV Node 868Y -

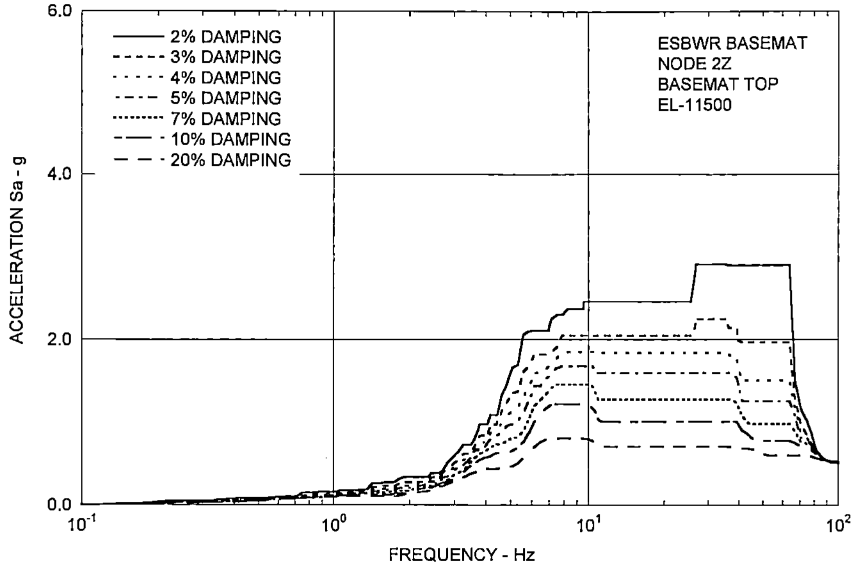

Figure E-115 Site-Specific In-Structure Response Spectra - RB/FB Basemat Node 2Z -

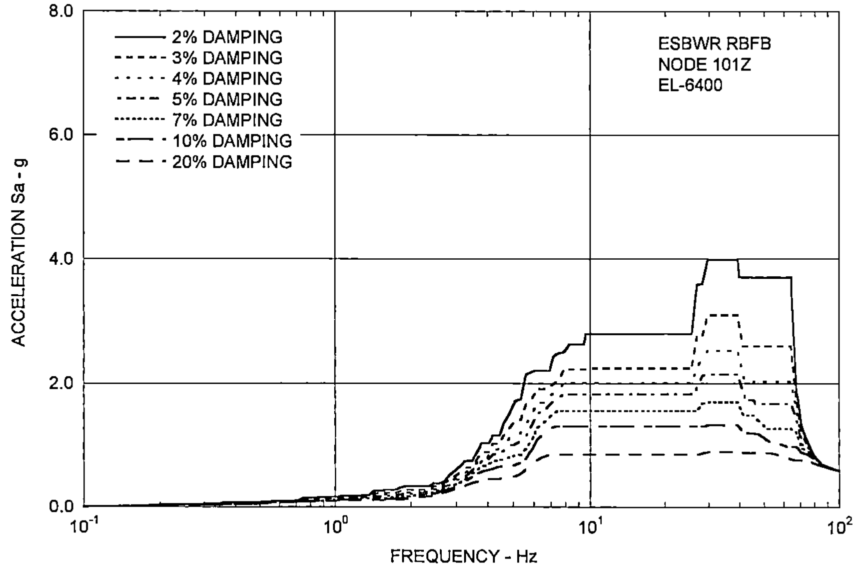

Figure E-116 Site-Specific In-Structure Response Spectra - RB/FB Node 101Z -

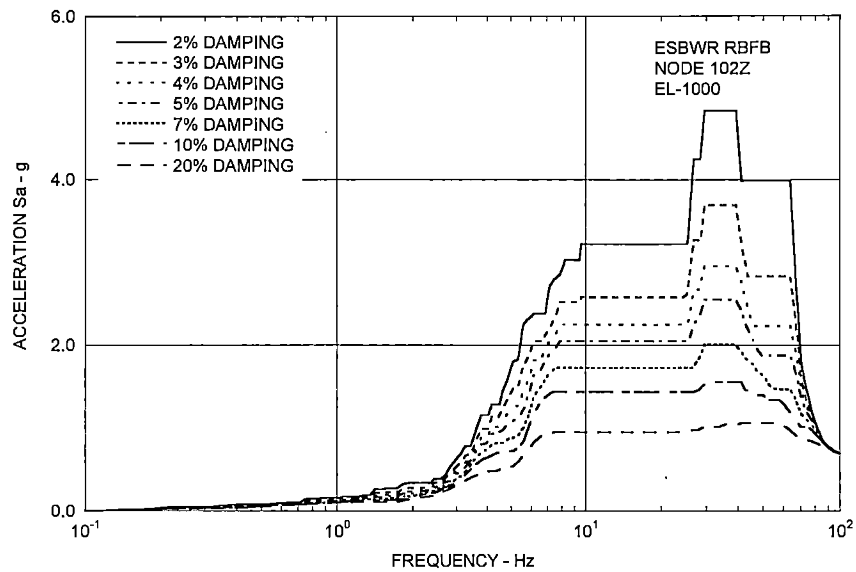

Figure E-117 Site-Specific In-Structure Response Spectra - RB/FB Node 102Z -

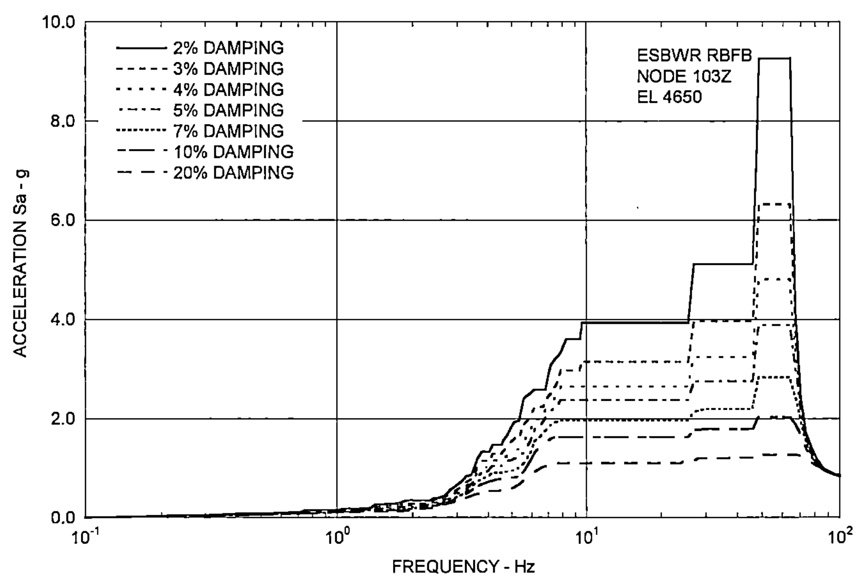

Figure E-118 Site-Specific In-Structure Response Spectra - RB/FB Node 103Z -

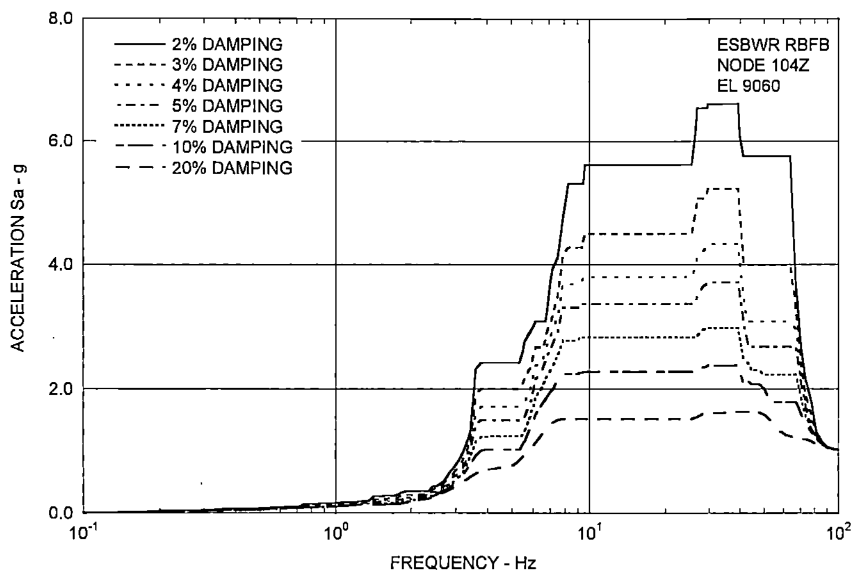

Figure E-119 Site-Specific In-Structure Response Spectra - RB/FB Node 104Z -

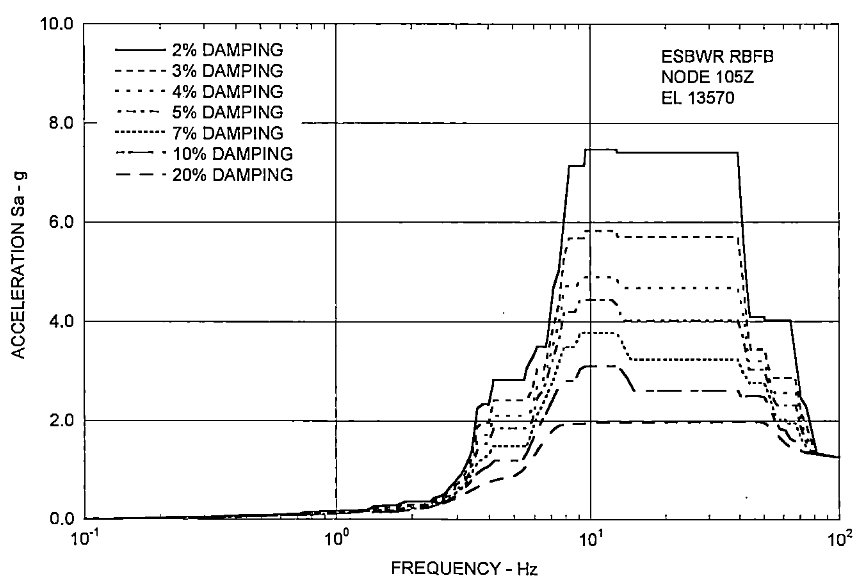

Figure E-120 Site-Specific In-Structure Response Spectra - RB/FB Node 105Z -

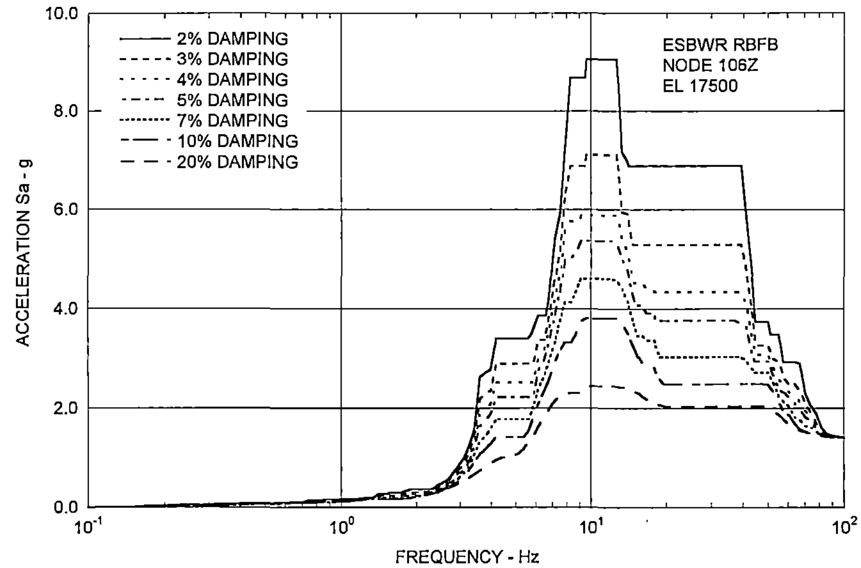

Figure E-121 Site-Specific In-Structure Response Spectra - RB/FB Node 106Z -

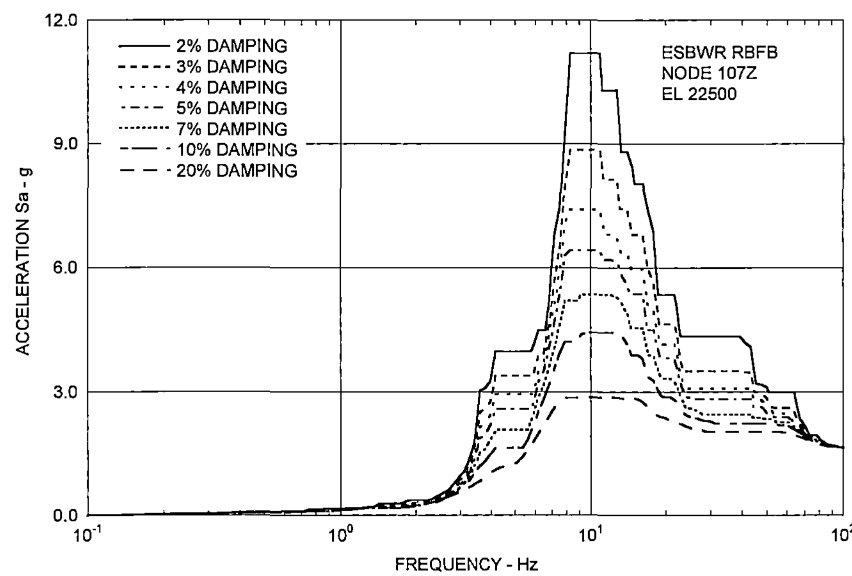

Figure E-122 Site-Specific In-Structure Response Spectra - RB/FB Node 107Z -

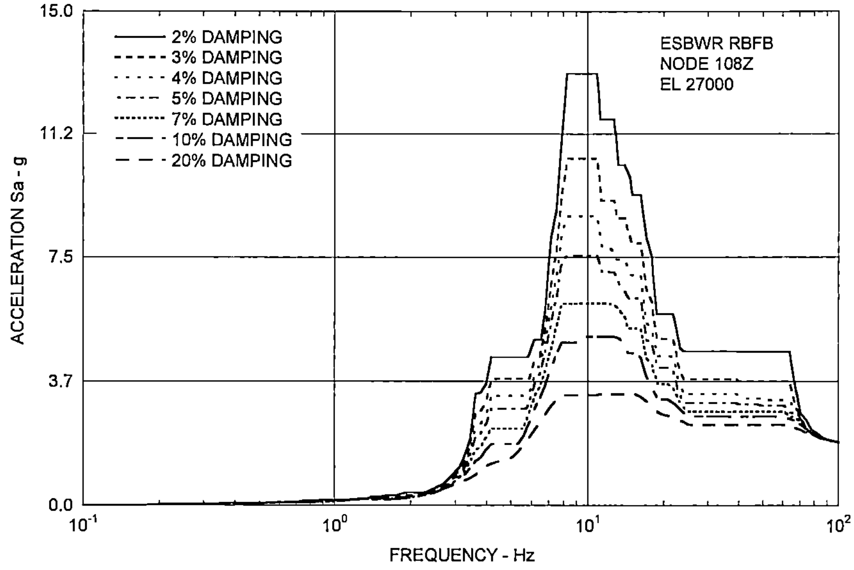

Figure E-123 Site-Specific In-Structure Response Spectra - RB/FB Node 108Z -

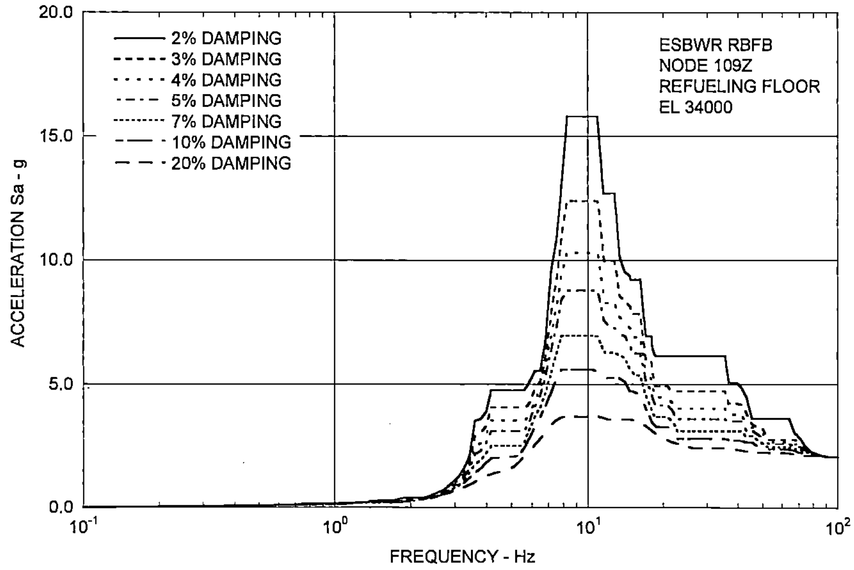

Figure E-124 Site-Specific In-Structure Response Spectra - RB/FB Node 109Z -

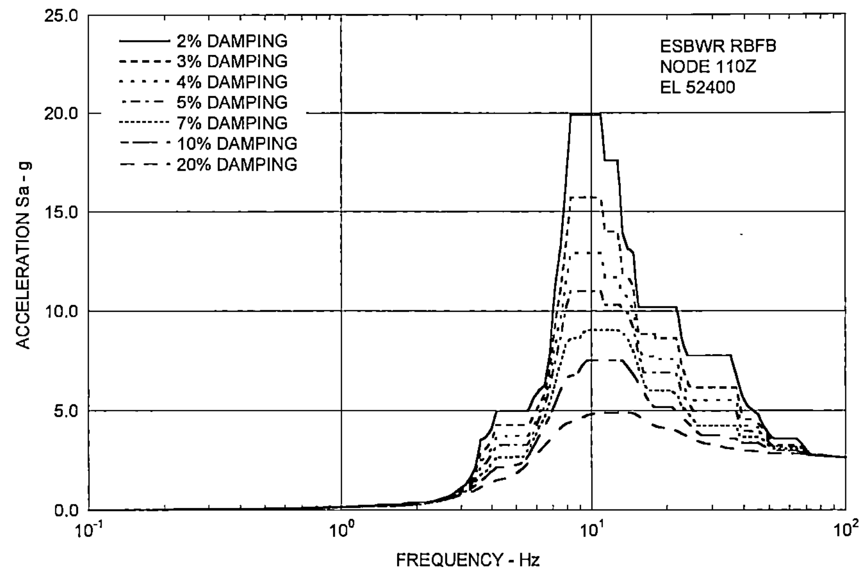

Figure E-125 Site-Specific In-Structure Response Spectra - RB/FB Node 110Z -

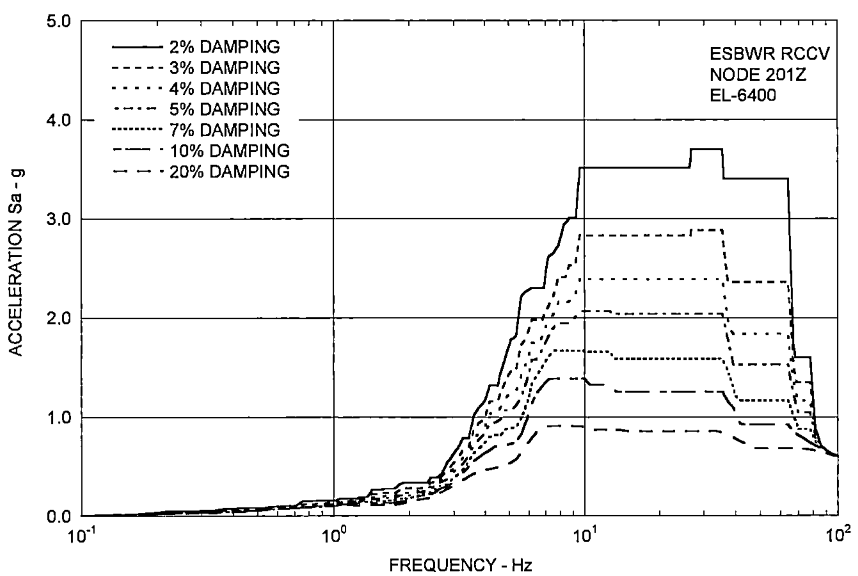

Figure E-126 Site-Specific In-Structure Response Spectra - RCCV Node 201Z -

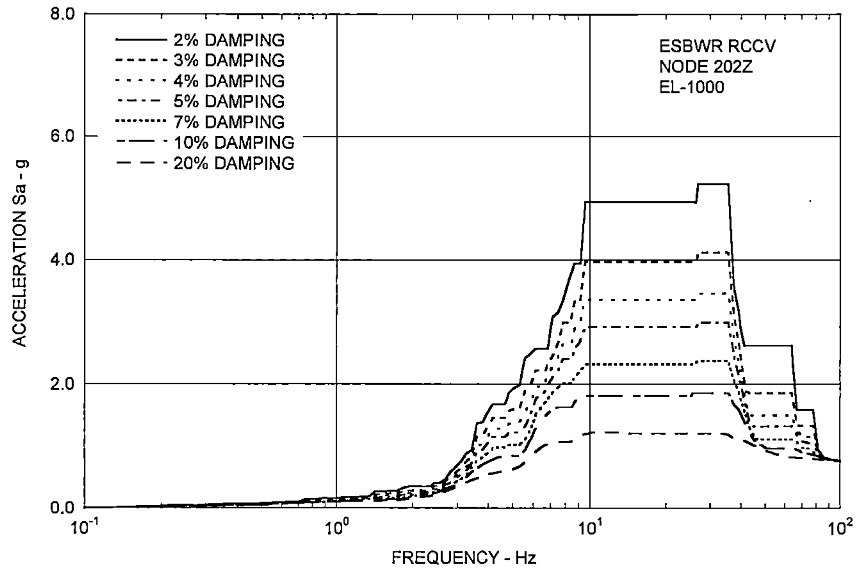

Figure E-127 Site-Specific In-Structure Response Spectra - RCCV Node 202Z -

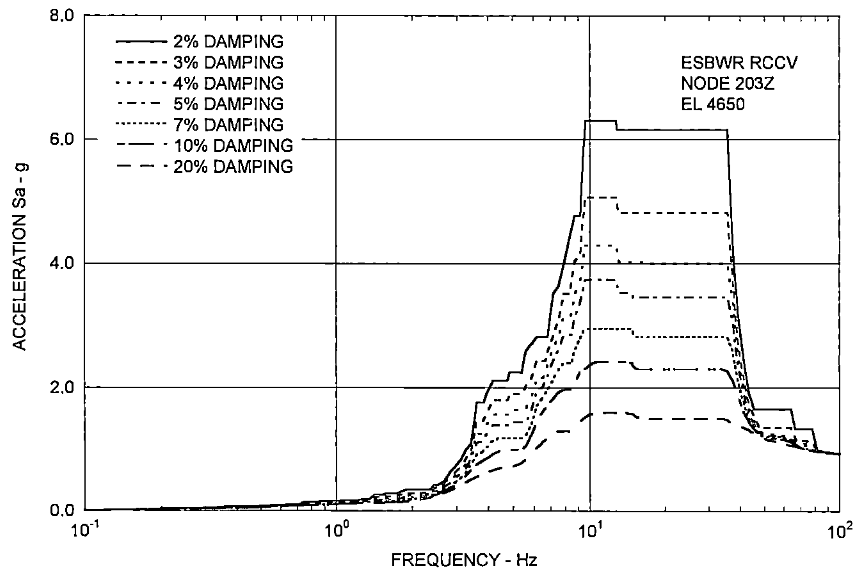

Figure E-128 Site-Specific In-Structure Response Spectra - RCCV Node 203Z -

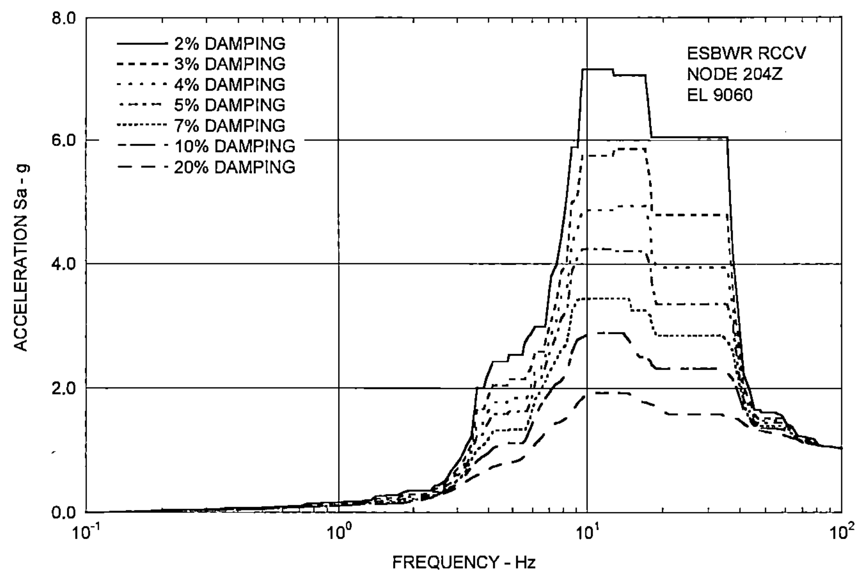

Figure E-129 Site-Specific In-Structure Response Spectra - RCCV Node 204Z -

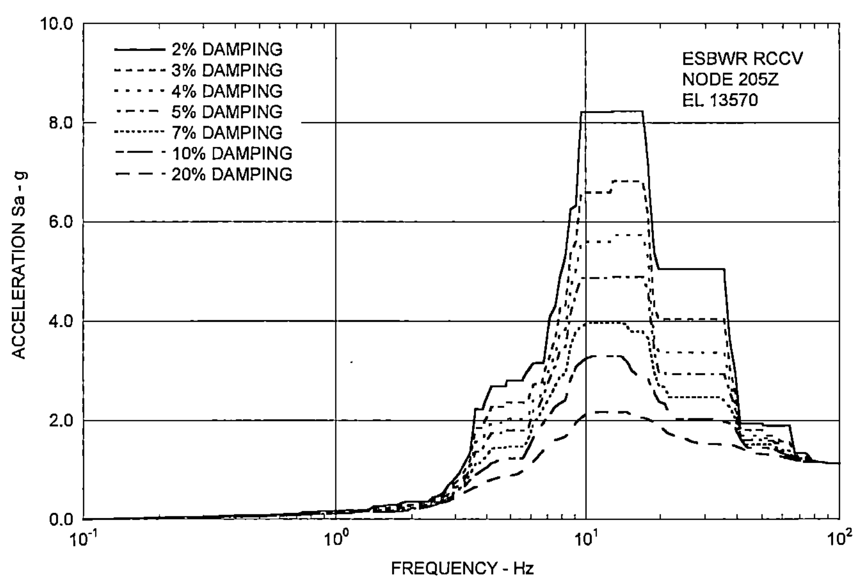

Figure E-130 Site-Specific In-Structure Response Spectra - RCCV Node 205Z -

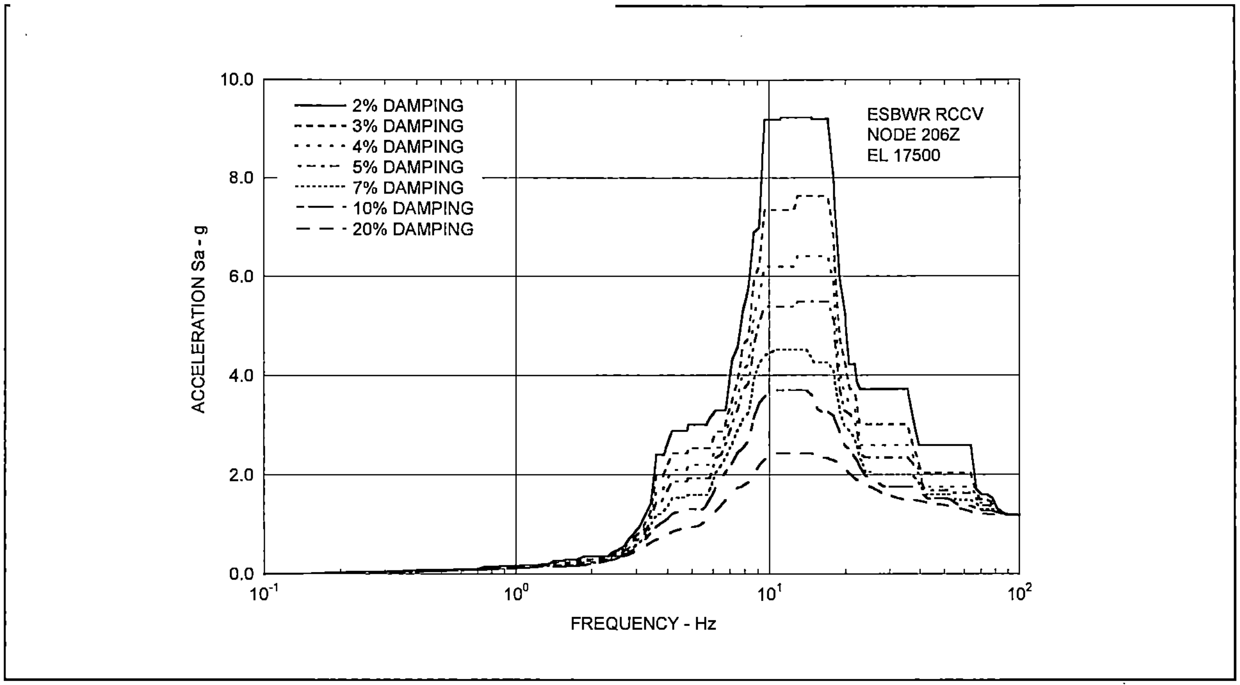

Figure E-131 Site-Specific In-Structure Response Spectra - RCCV Node 206Z -

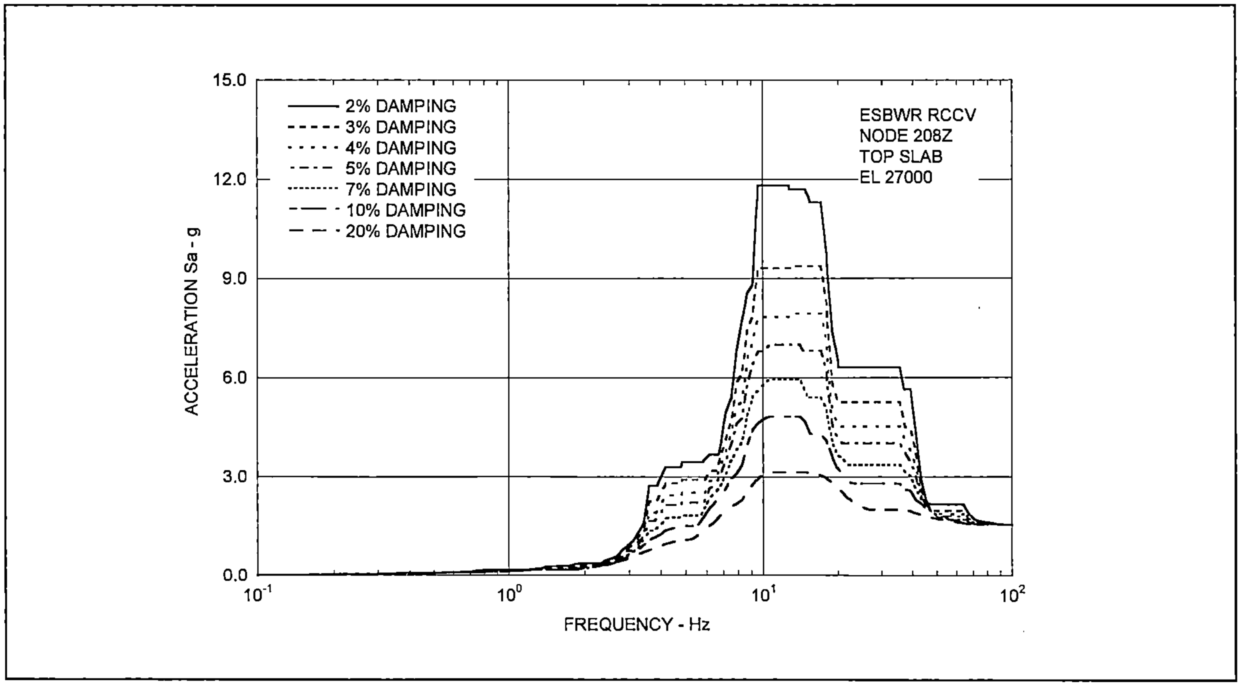

Figure E-132 Site-Specific In-Structure Response Spectra - RCCV Node 208Z -

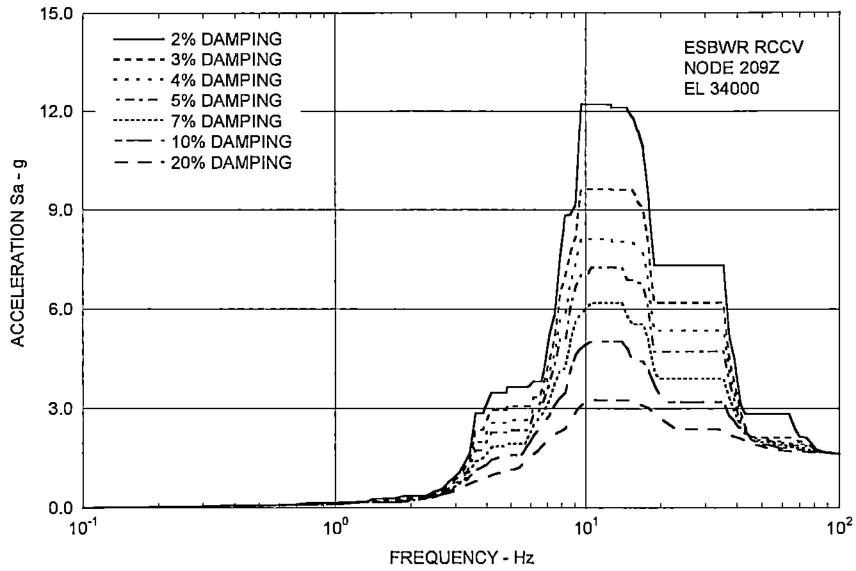

Figure E-133 Site-Specific In-Structure Response Spectra - RCCV Node 209Z -

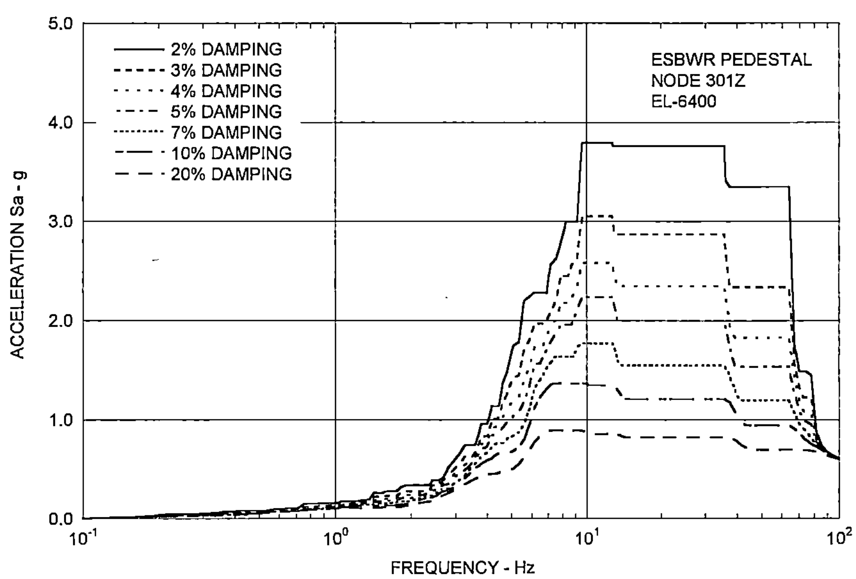

Figure E-134 Site-Specific In-Structure Response Spectra - Pedestal Node 301Z -

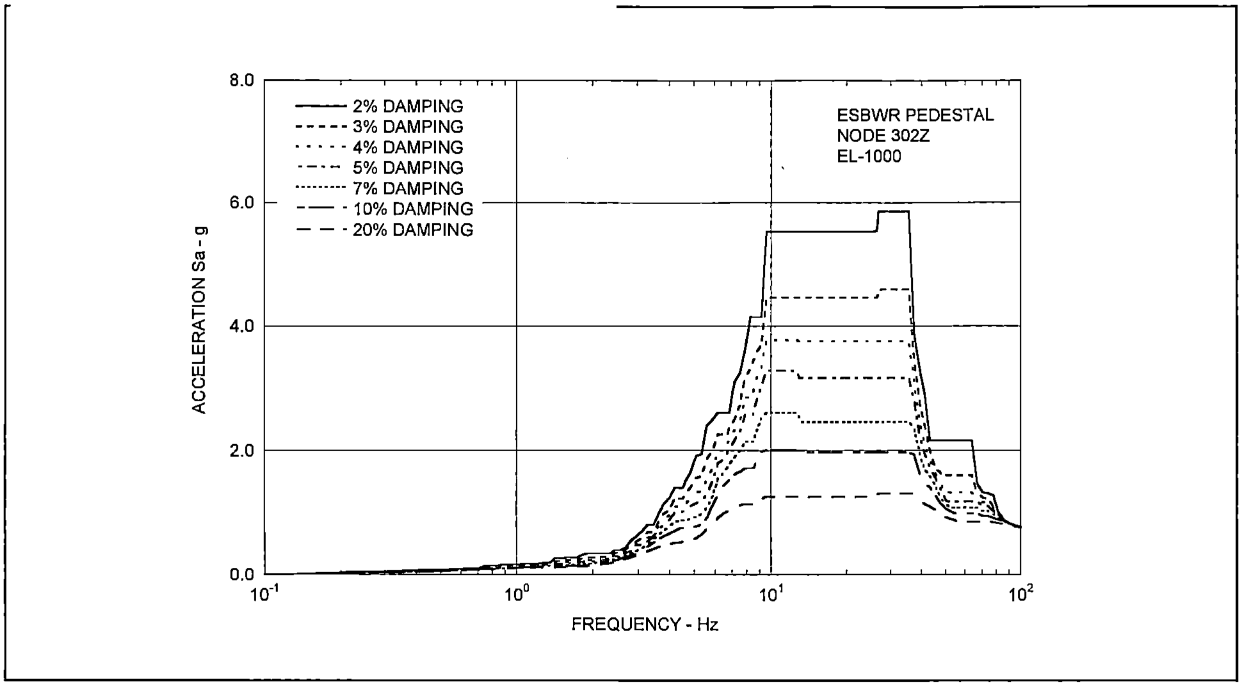

Figure E-135 Site-Specific In-Structure Response Spectra - Pedestal Node 302Z -

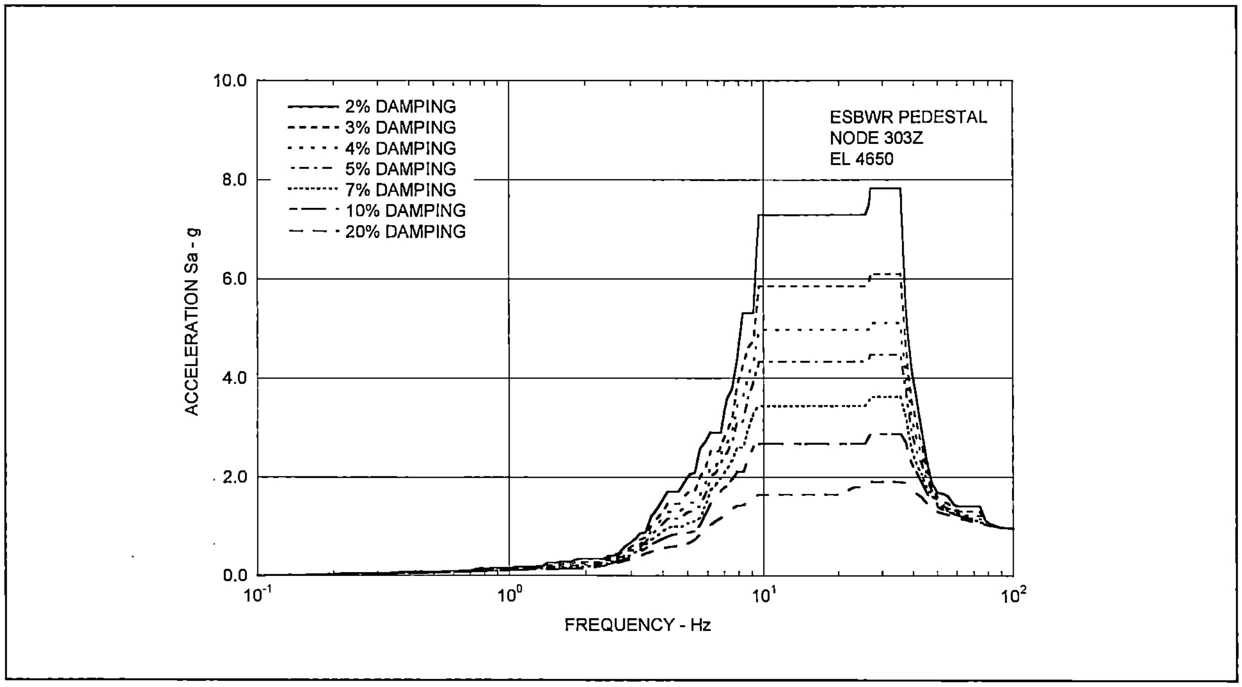

Figure E-136 Site-Specific In-Structure Response Spectra - Pedestal Node 303Z -

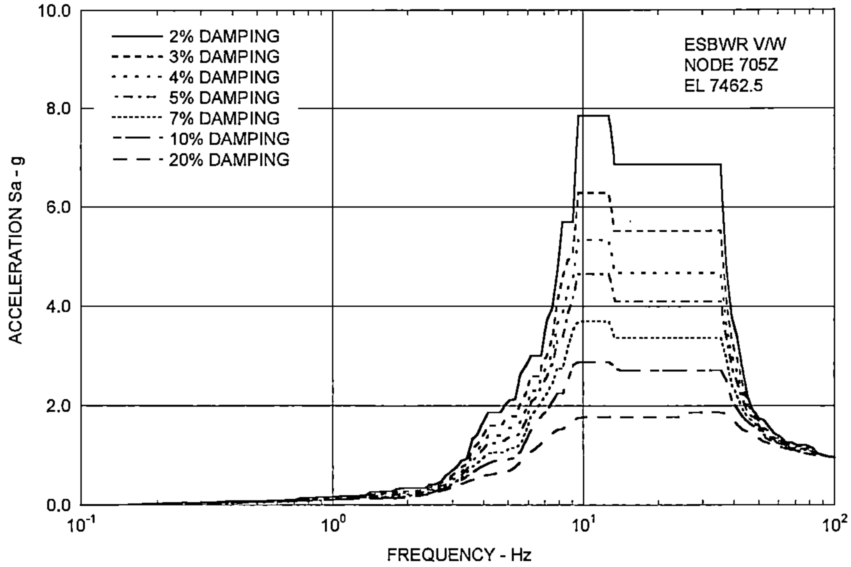

Figure E-137 Site-Specific In-Structure Response Spectra - Vent Wall Node 705Z -

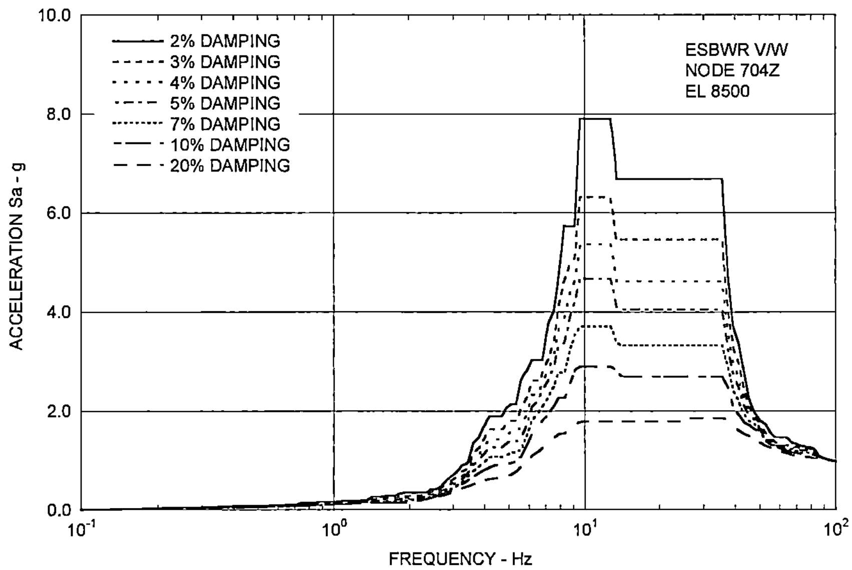

Figure E-138 Site-Specific In-Structure Response Spectra - Vent Wall Node 704Z -

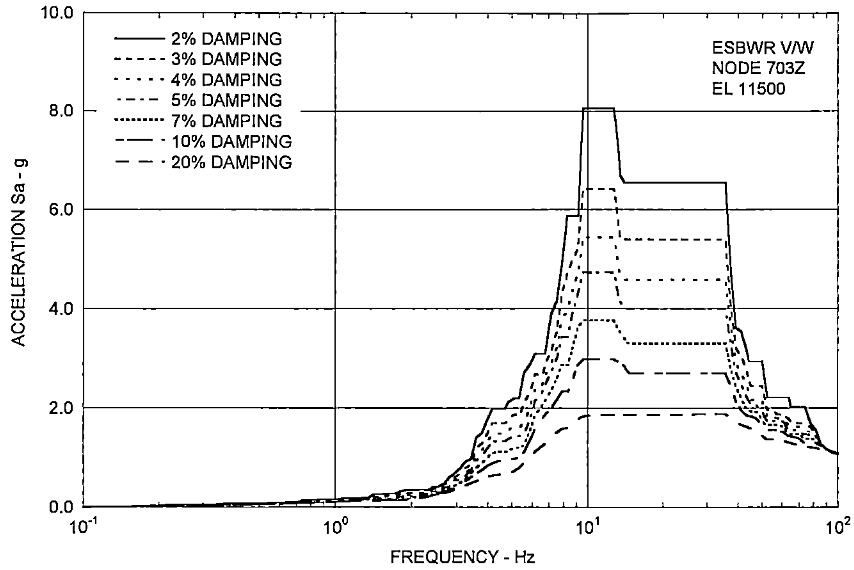

Figure E-139 Site-Specific In-Structure Response Spectra - Vent Wall Node 703Z -

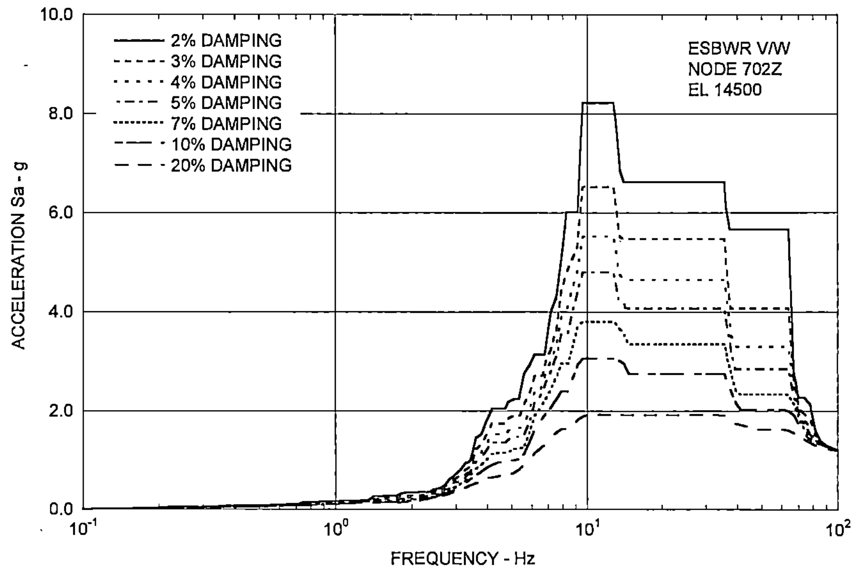

Figure E-140 Site-Specific In-Structure Response Spectra - Vent Wall Node 702Z -

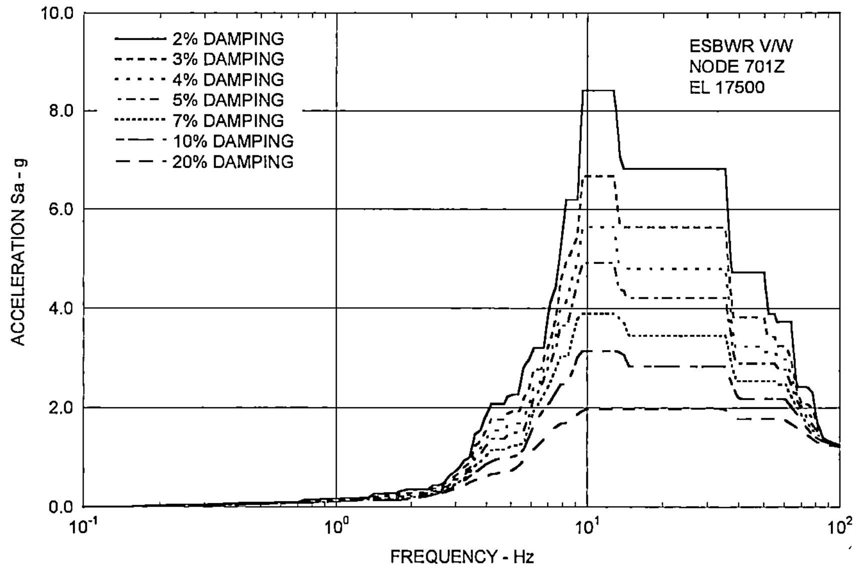

Figure E-141 Site-Specific In-Structure Response Spectra - Vent Wall Node 701Z -

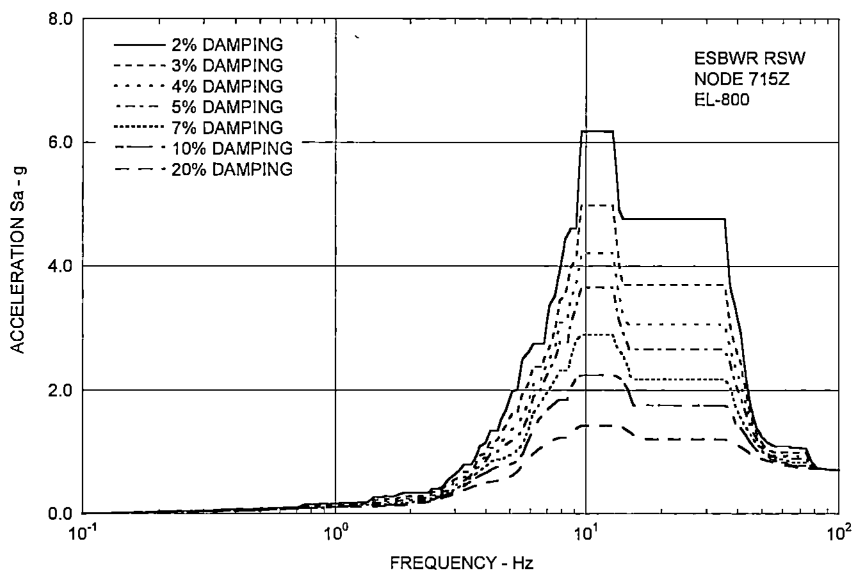

Figure E-142 Site-Specific In-Structure Response Spectra - RSW Node 715Z -

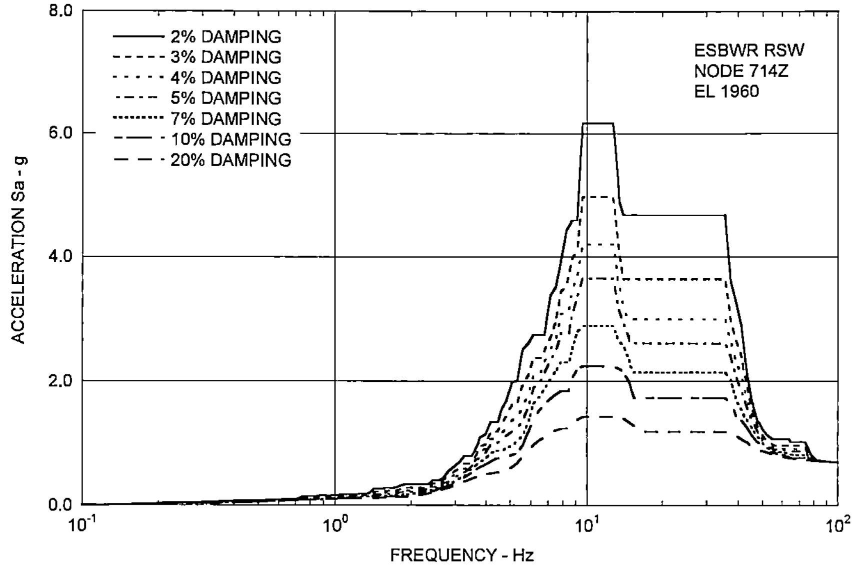

Figure E-143 Site-Specific In-Structure Response Spectra - RSW Node 714Z -

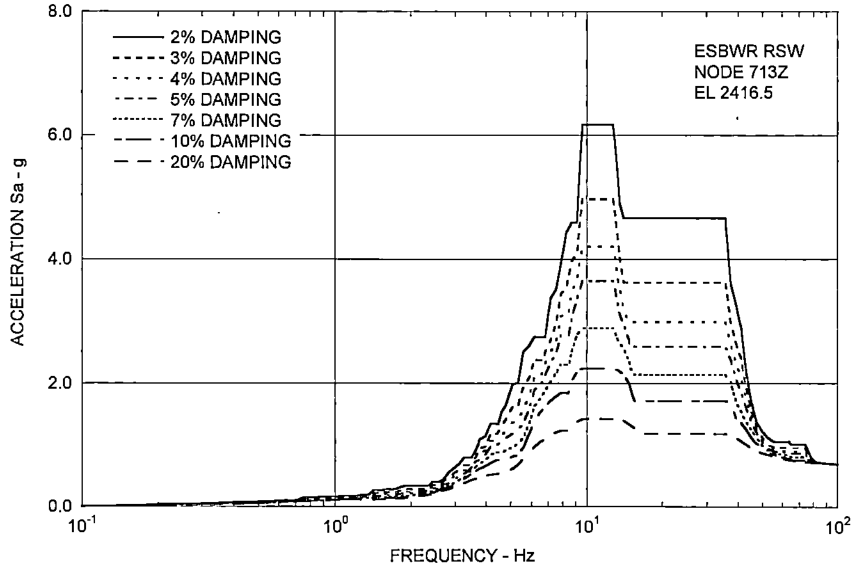

Figure E-144 Site-Specific In-Structure Response Spectra - RSW Node 713Z -

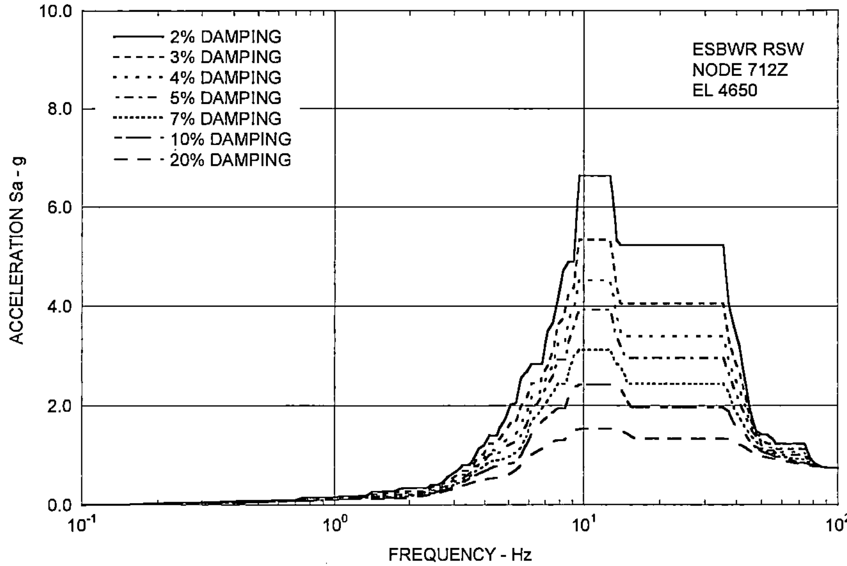

Figure E-145 Site-Specific In-Structure Response Spectra - RSW Node 712Z -

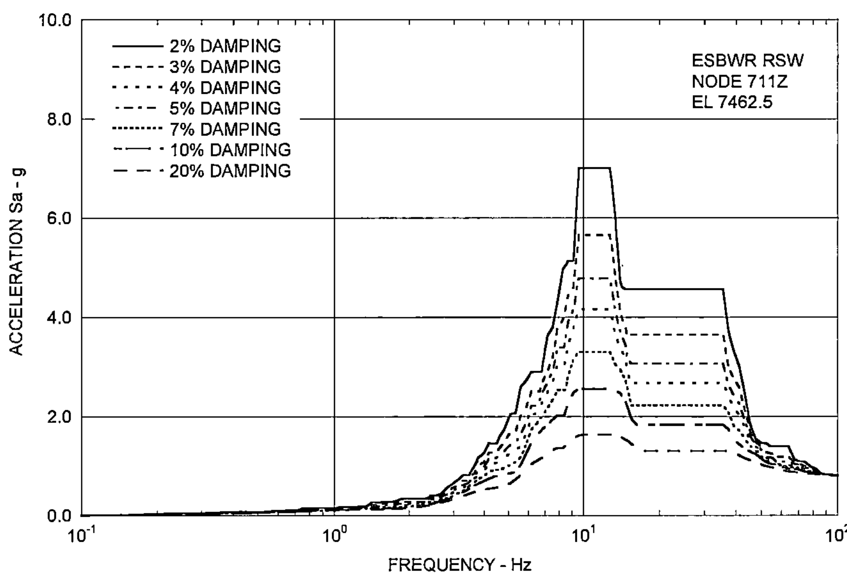

Figure E-146 Site-Specific In-Structure Response Spectra - RSW Node 711Z -

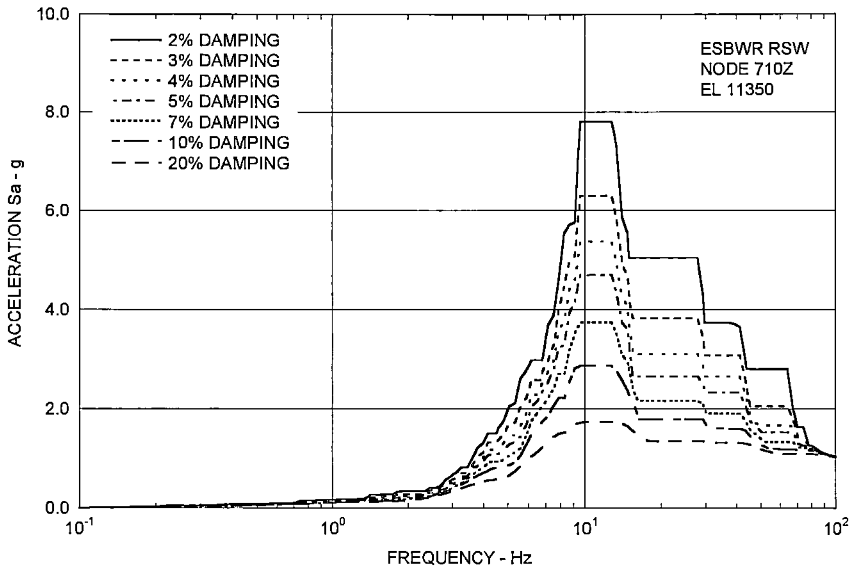

Figure E-147 Site-Specific In-Structure Response Spectra - RSW Node 710Z -

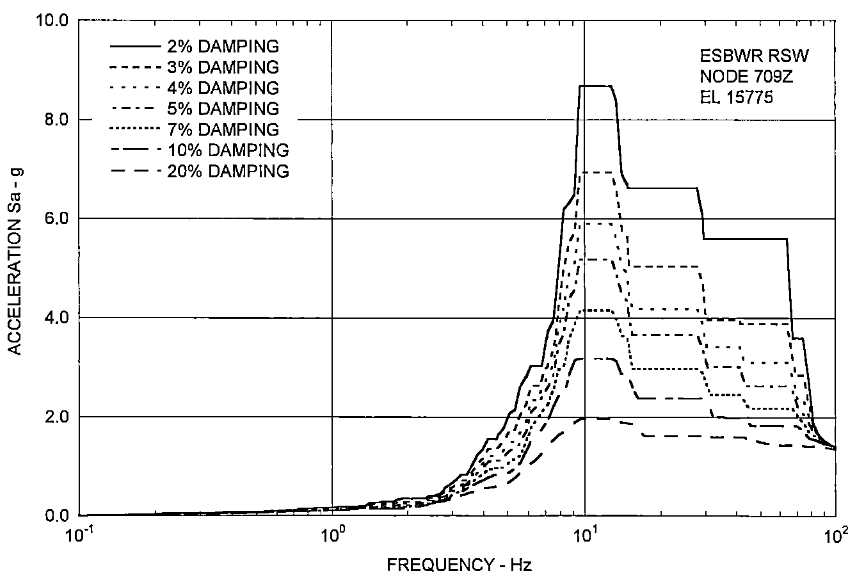

Figure E-148 Site-Specific In-Structure Response Spectra - RSW Node 709Z -

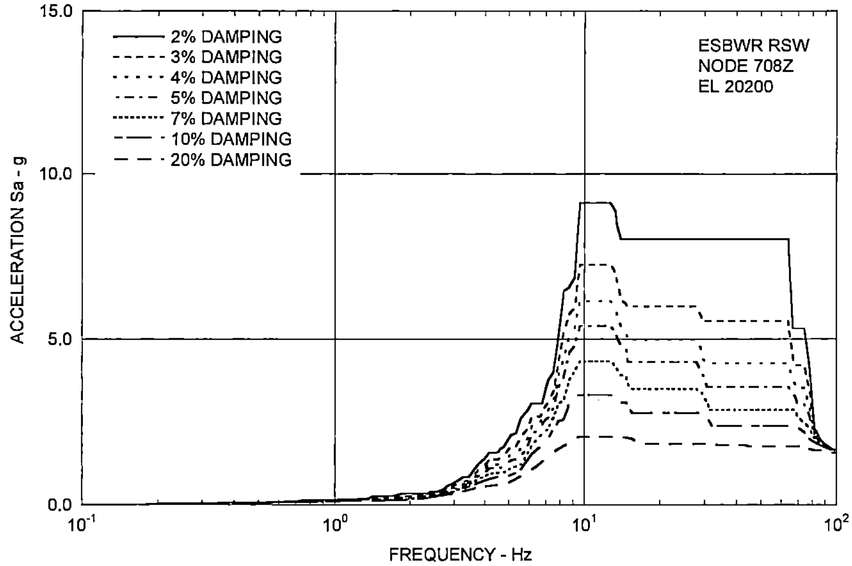

Figure E-149 Site-Specific In-Structure Response Spectra - RSW Node 708Z -

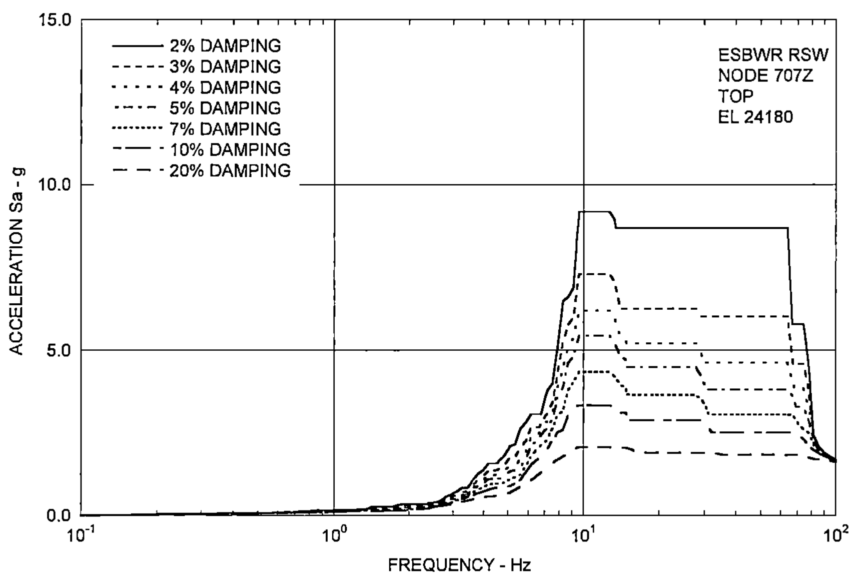

Figure E-150 Site-Specific In-Structure Response Spectra - RSW Node 707Z -

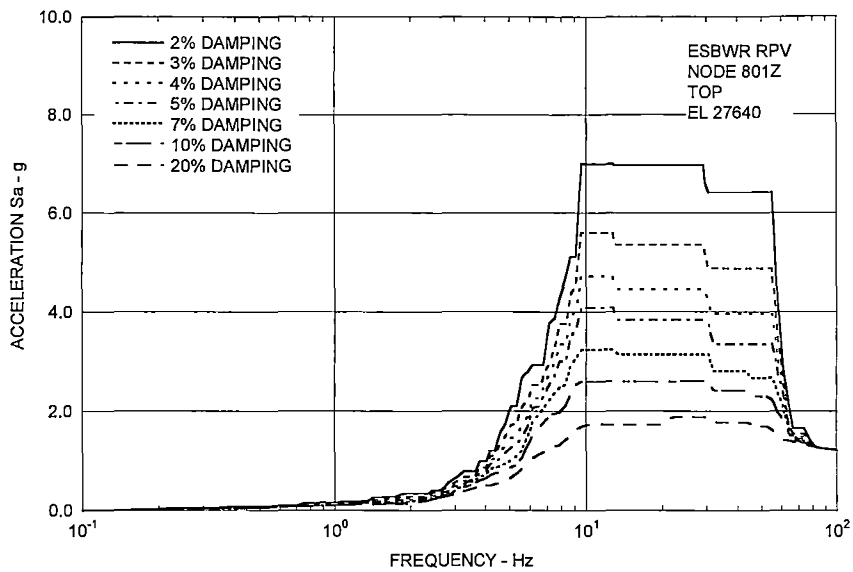

Figure E-151 Site-Specific In-Structure Response Spectra - RPV Node 801Z -

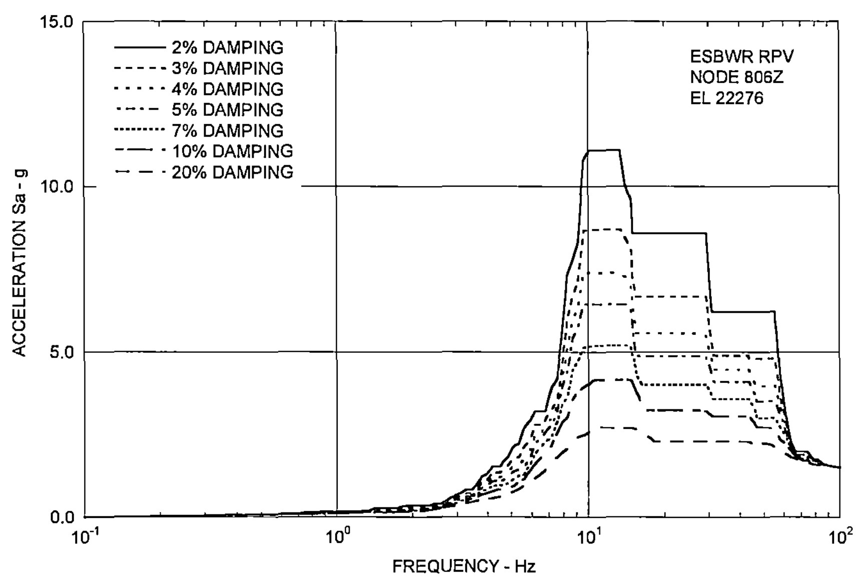

Figure E-152 Site-Specific In-Structure Response Spectra - RPV Node 806Z -

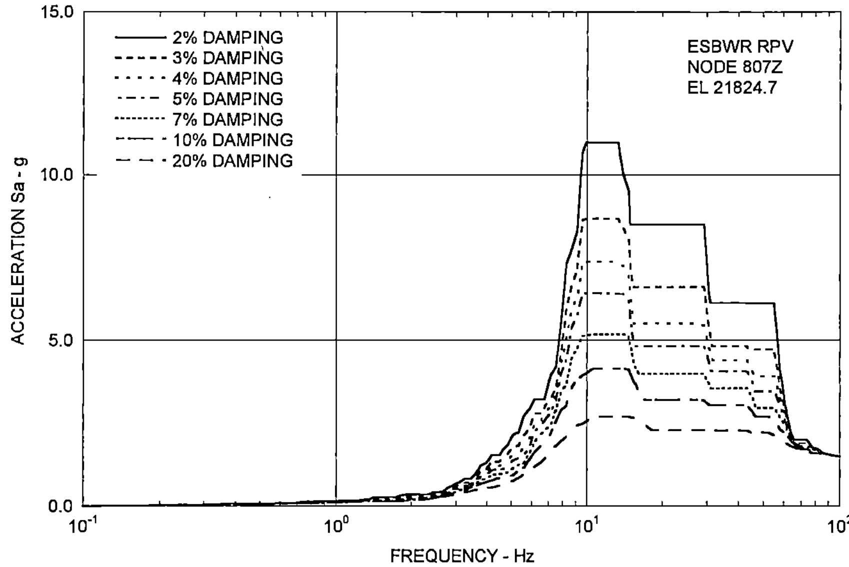

Figure E-153 Site-Specific In-Structure Response Spectra - RPV Node 807Z -

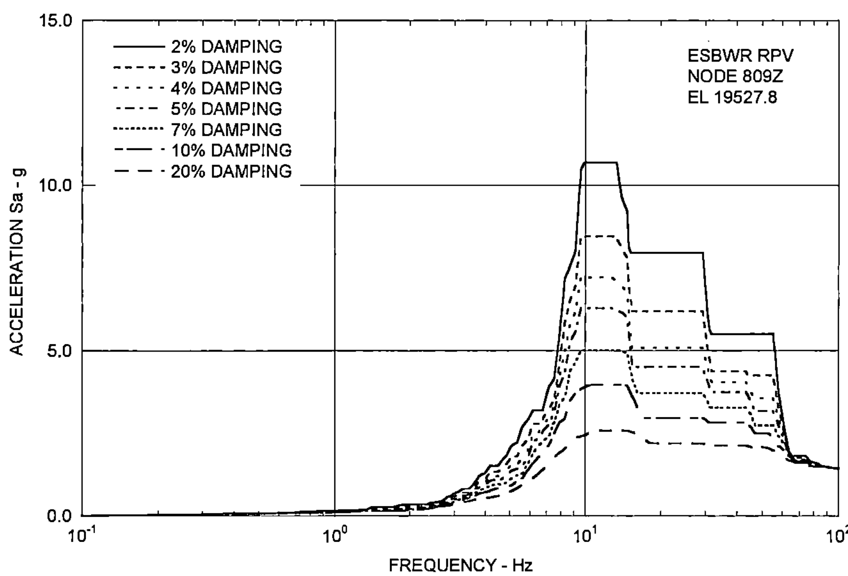

Figure E-154 Site-Specific In-Structure Response Spectra - RPV Node 809Z -

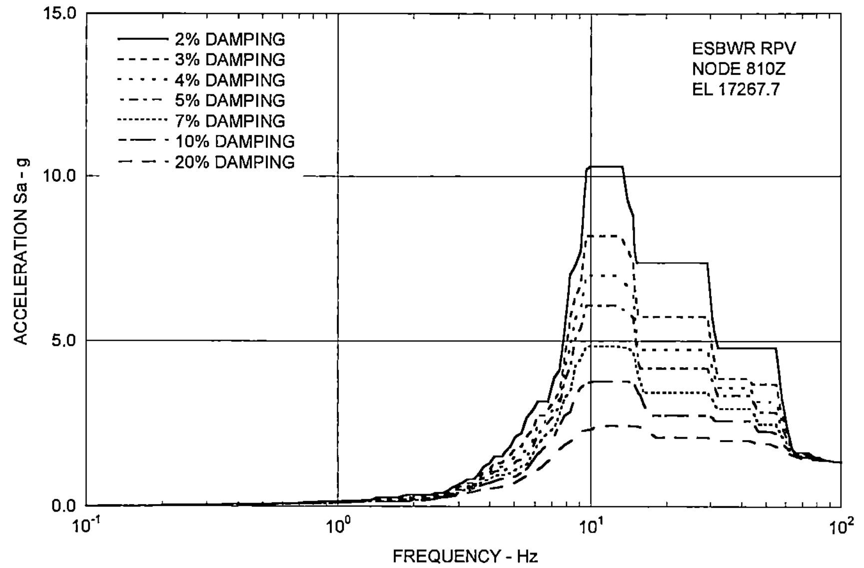

Figure E-155 Site-Specific In-Structure Response Spectra - RPV Node 810Z -

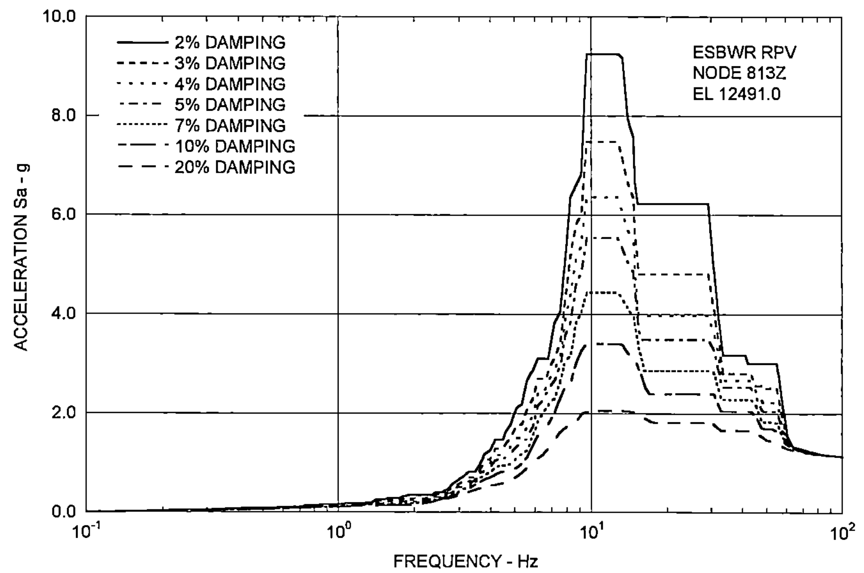

Figure E-156 Site-Specific In-Structure Response Spectra - RPV Node 813Z -

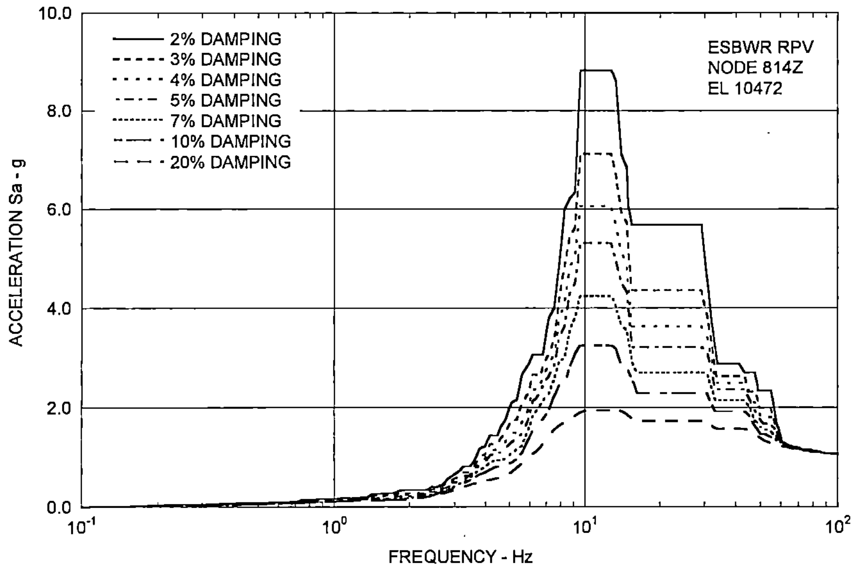

Figure E-157 Site-Specific In-Structure Response Spectra - RPV Node 814Z -

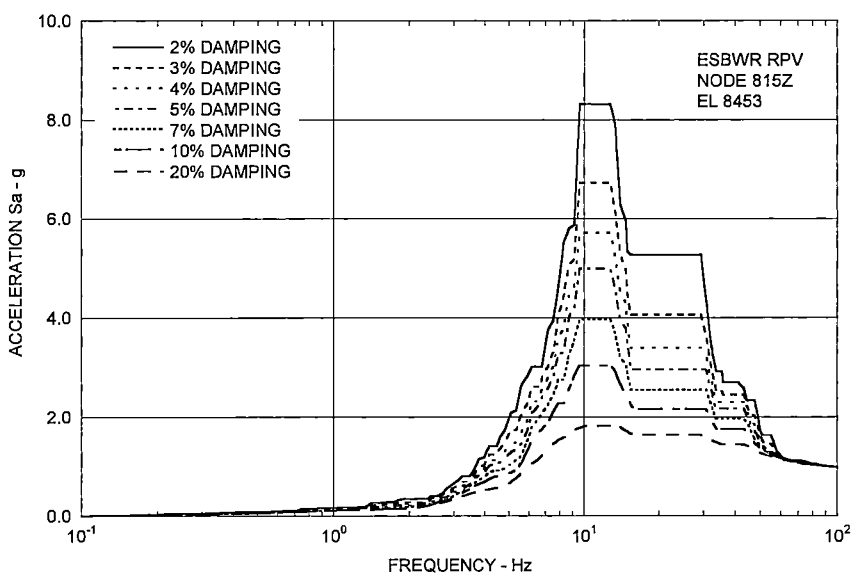

Figure E-158 Site-Specific In-Structure Response Spectra - RPV Node 815Z -

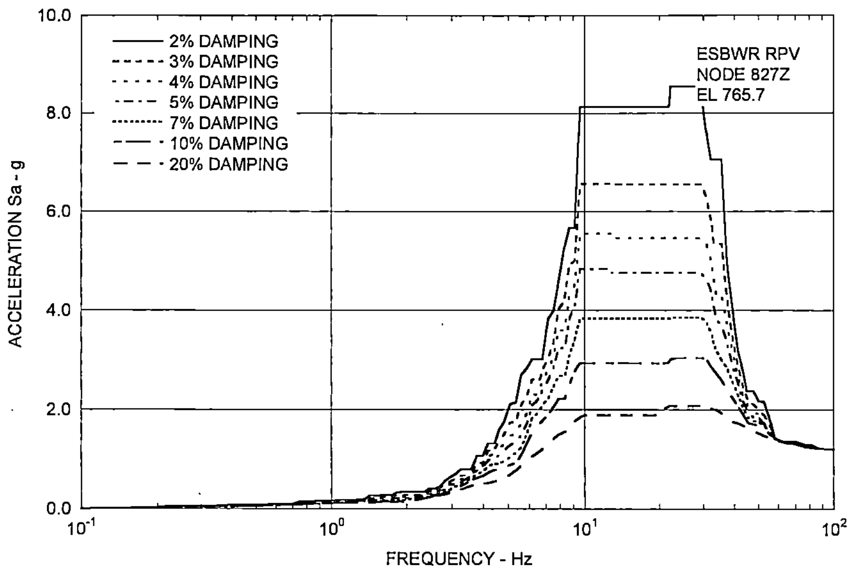

Figure E-159 Site-Specific In-Structure Response Spectra - RPV Node 827Z -

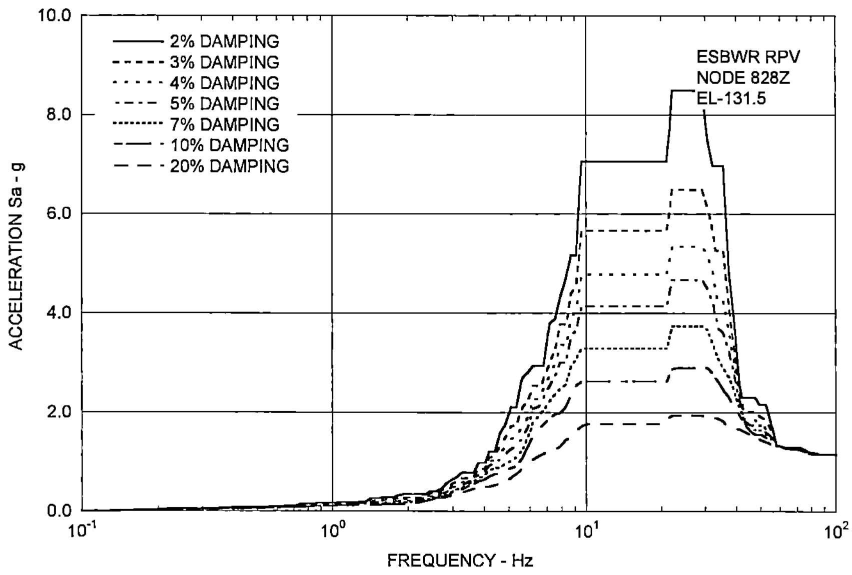

Figure E-160 Site-Specific In-Structure Response Spectra - RPV Node 828Z -

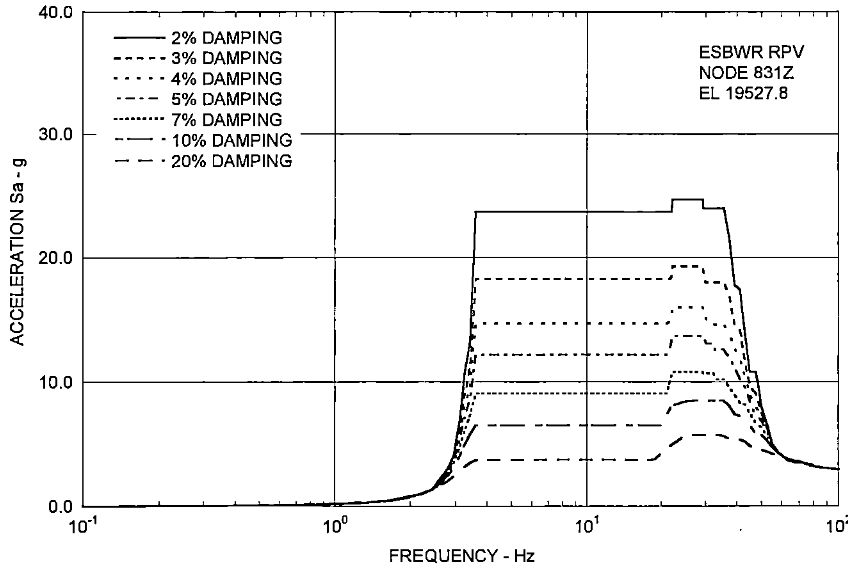

Figure E-161 Site-Specific In-Structure Response Spectra - RPV Node 831Z -

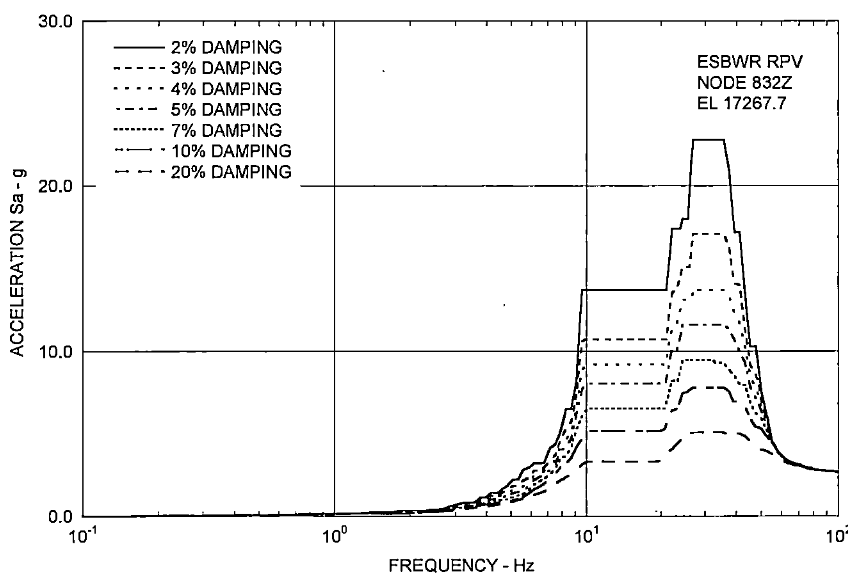

Figure E-162 Site-Specific In-Structure Response Spectra - RPV Node 832Z -

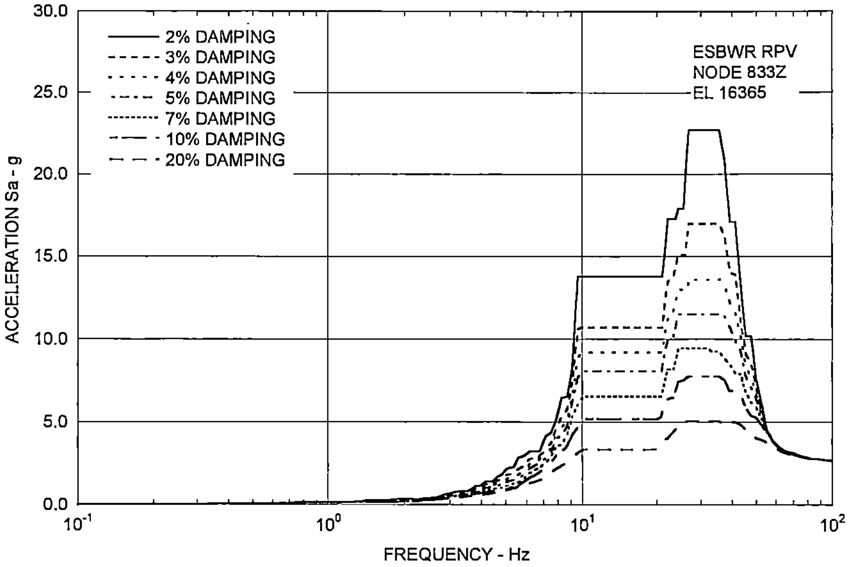

Figure E-163 Site-Specific In-Structure Response Spectra - RPV Node 833Z -

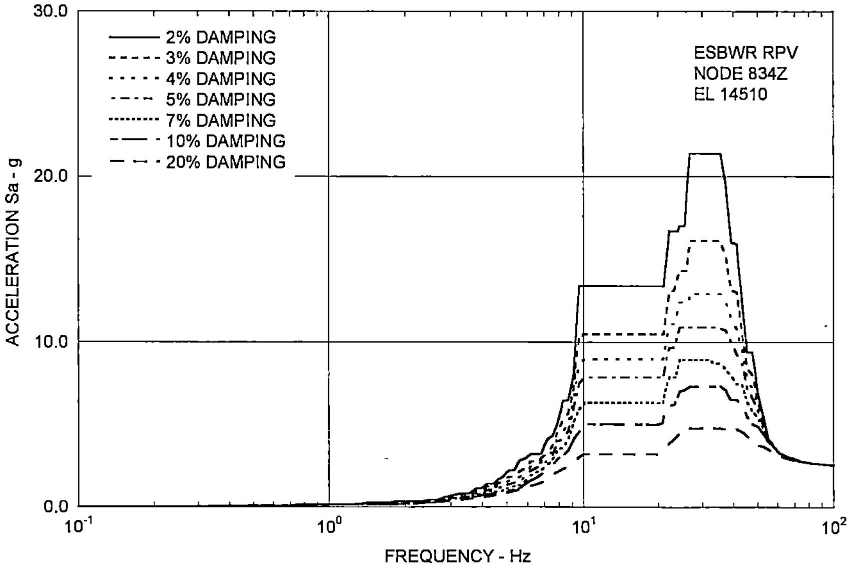

Figure E-164 Site-Specific In-Structure Response Spectra - RPV Node 834Z -

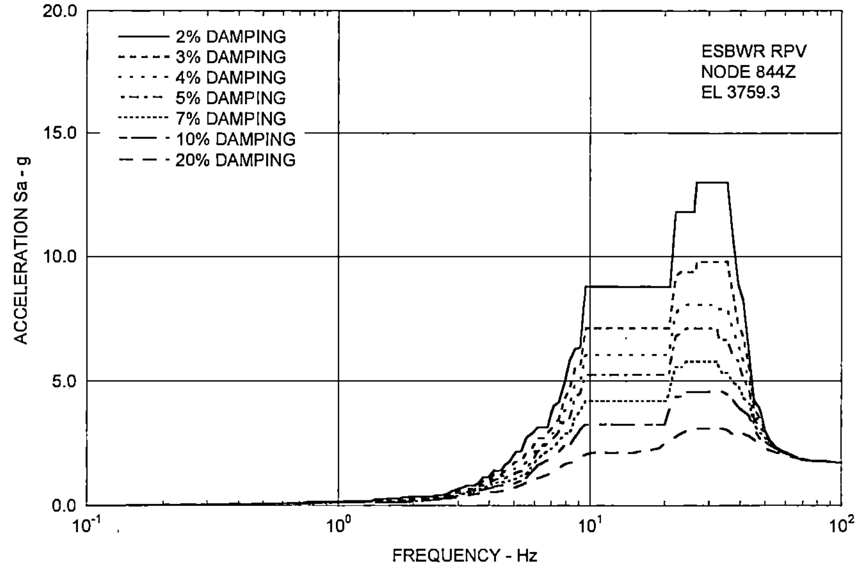

Figure E-165 Site-Specific In-Structure Response Spectra - RPV Node 844Z -

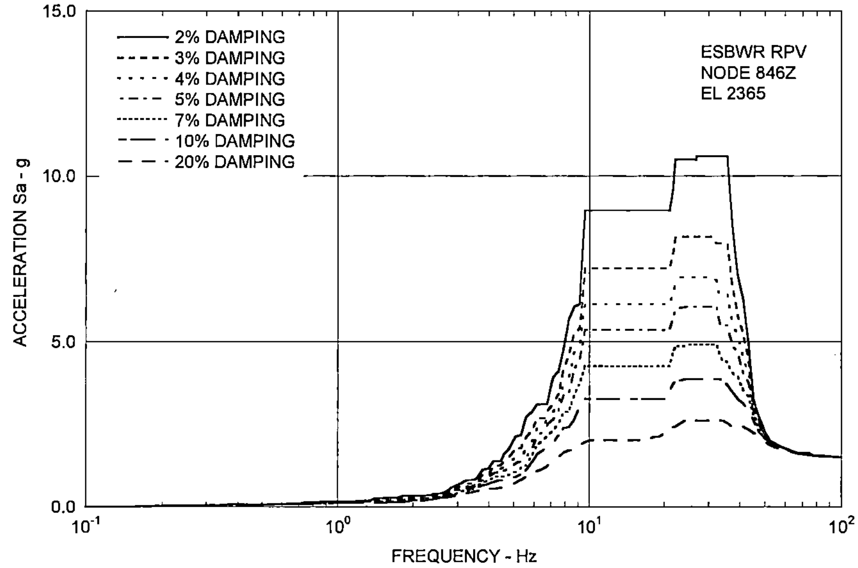

Figure E-166 Site-Specific In-Structure Response Spectra - RPV Node 846Z -

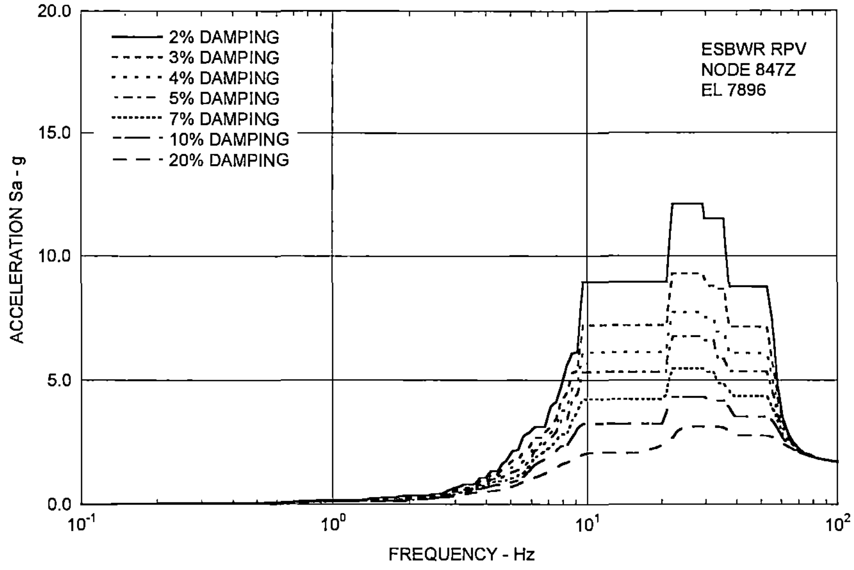

Figure E-167 Site-Specific In-Structure Response Spectra - RPV Node 847Z -

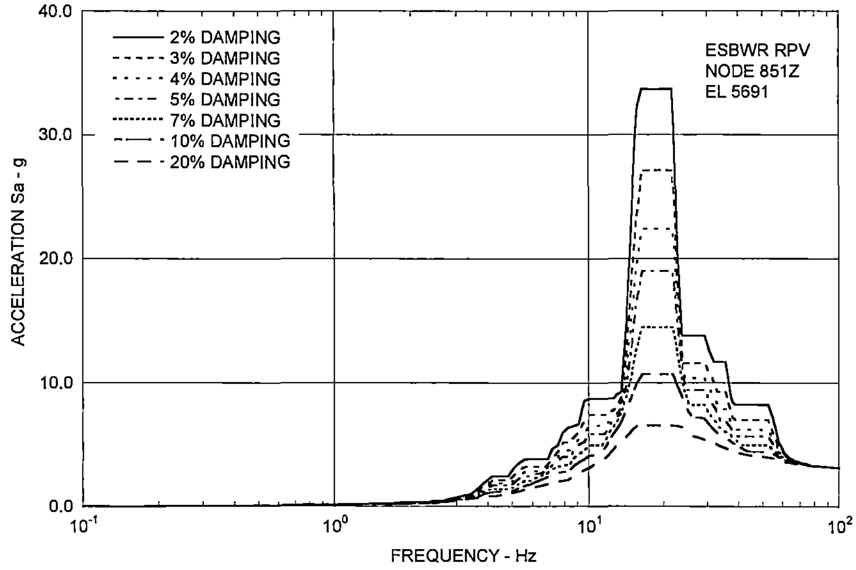

Figure E-168 Site-Specific In-Structure Response Spectra - RPV Node 851Z -

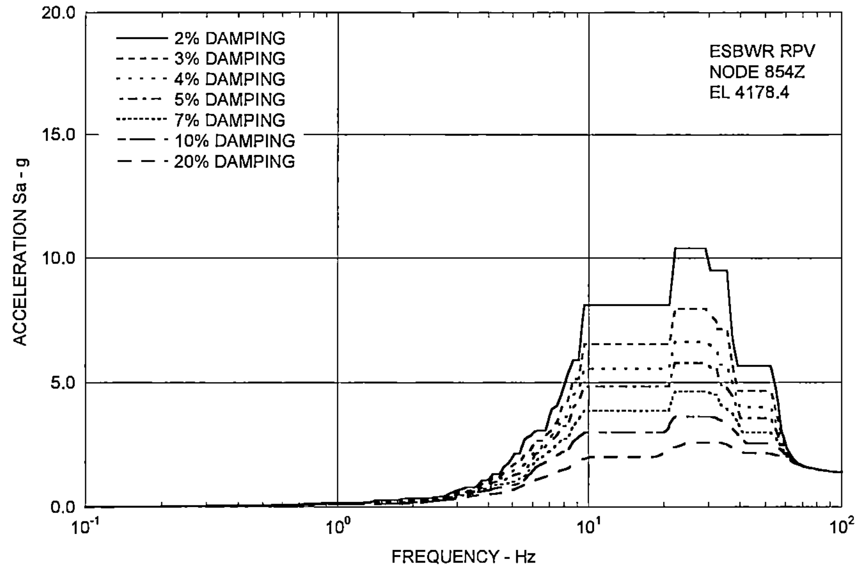

Figure E-169 Site-Specific In-Structure Response Spectra - RPV Node 854Z –

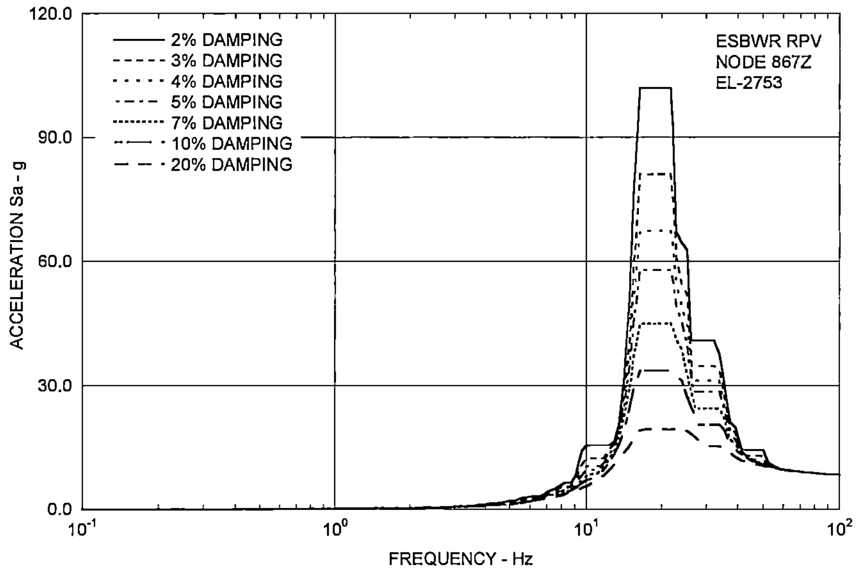

Figure E-170 Site-Specific In-Structure Response Spectra - RPV Node 867Z –

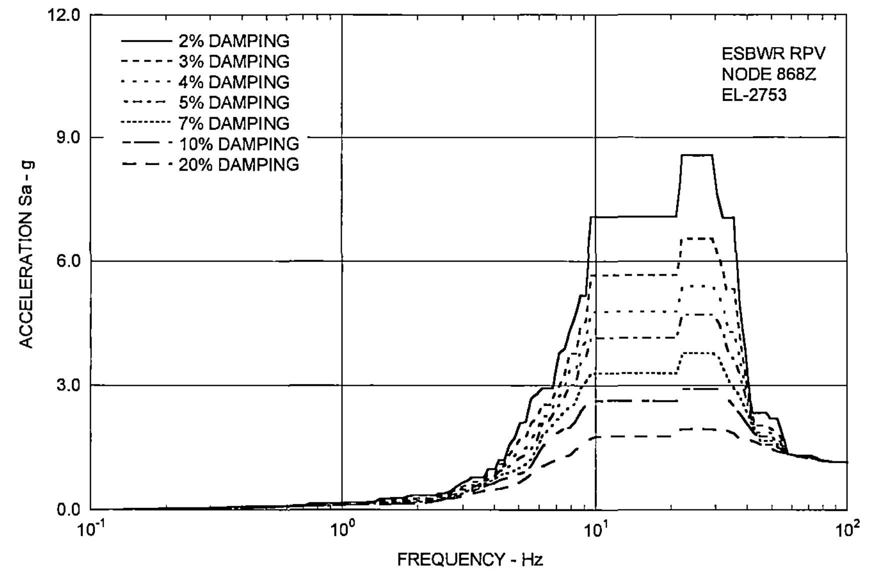

Figure E-171 Site-Specific In-Structure Response Spectra - RPV Node 868Z -

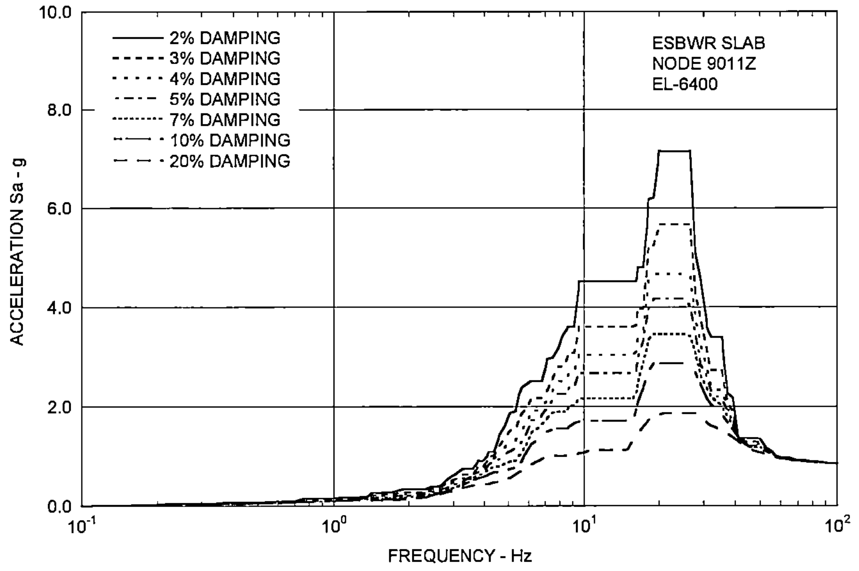

Figure E-172 Site-Specific In-Structure Response Spectra - Oscillator Node 9011Z -

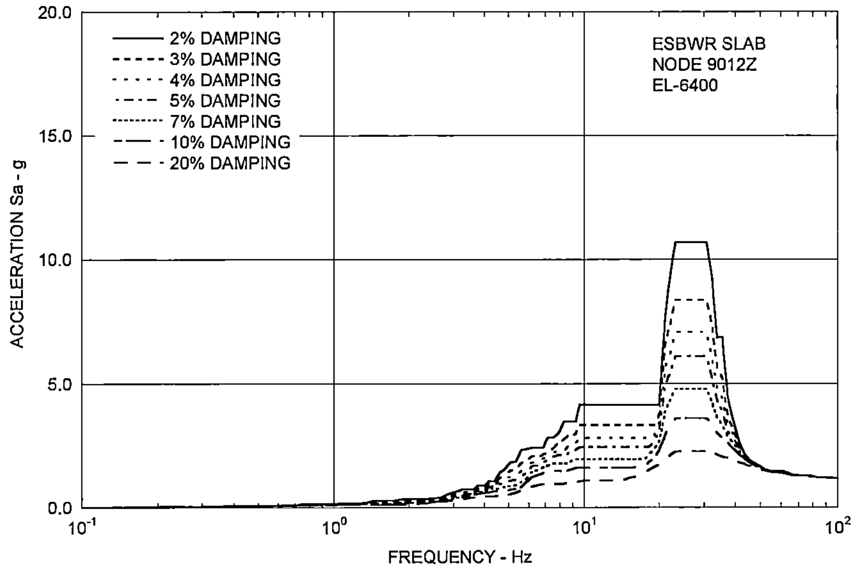

Figure E-173 Site-Specific In-Structure Response Spectra - Oscillator Node 9012Z -

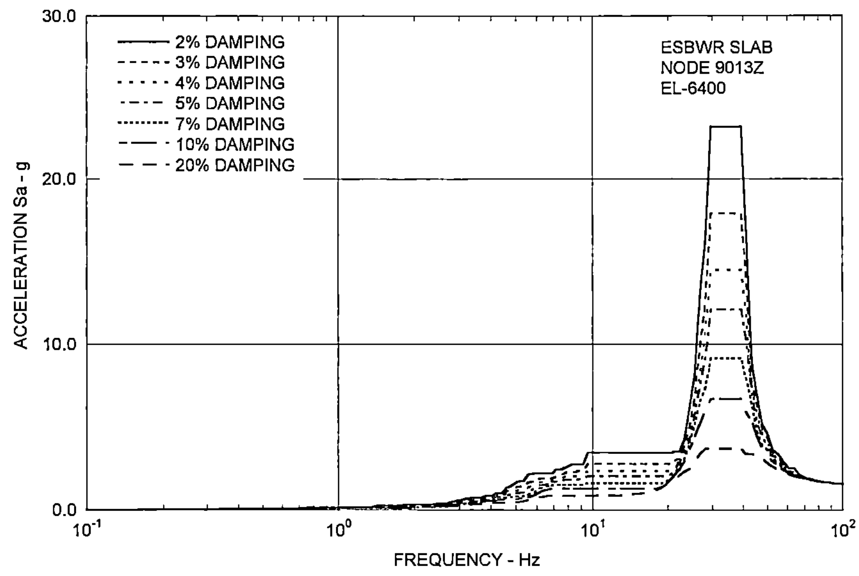

Figure E-174 Site-Specific In-Structure Response Spectra - Oscillator Node 9013Z -

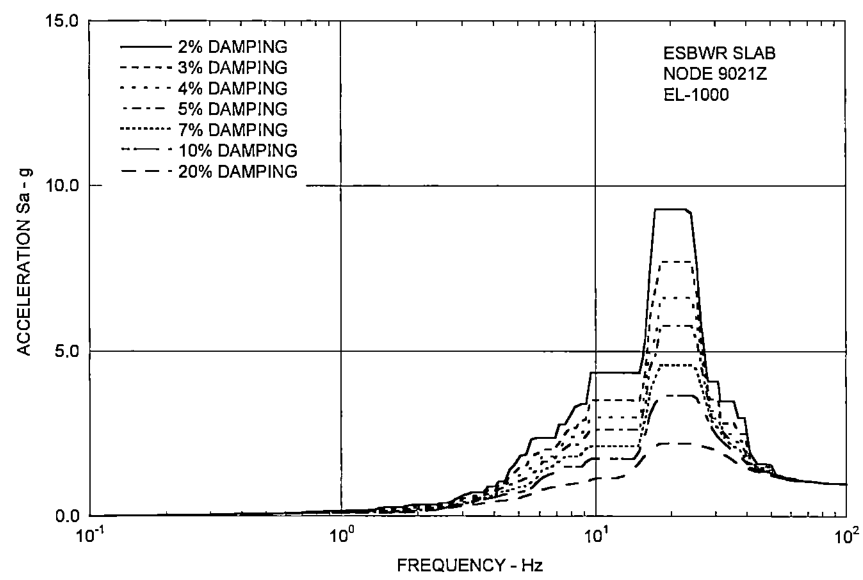

Figure E-175 Site-Specific In-Structure Response Spectra - Oscillator Node 9021Z -

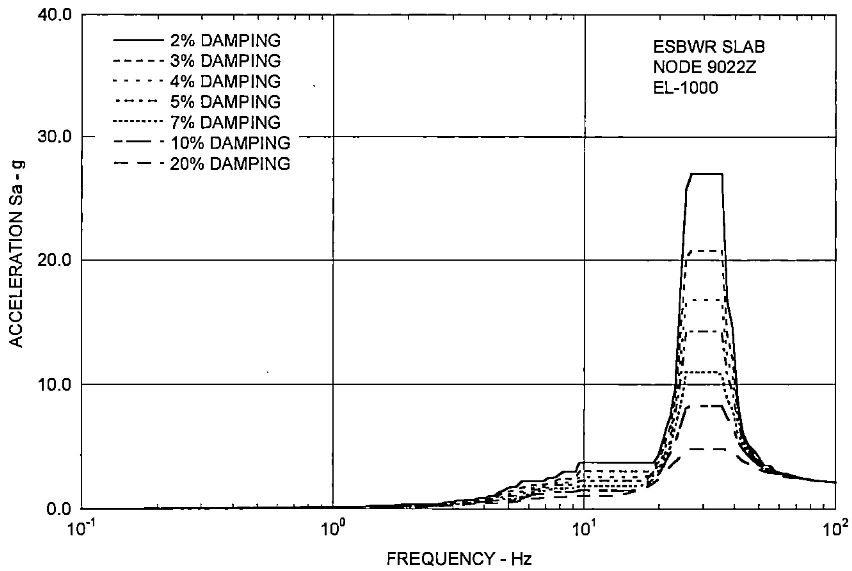

Figure E-176 Site-Specific In-Structure Response Spectra - Oscillator Node 9022Z -

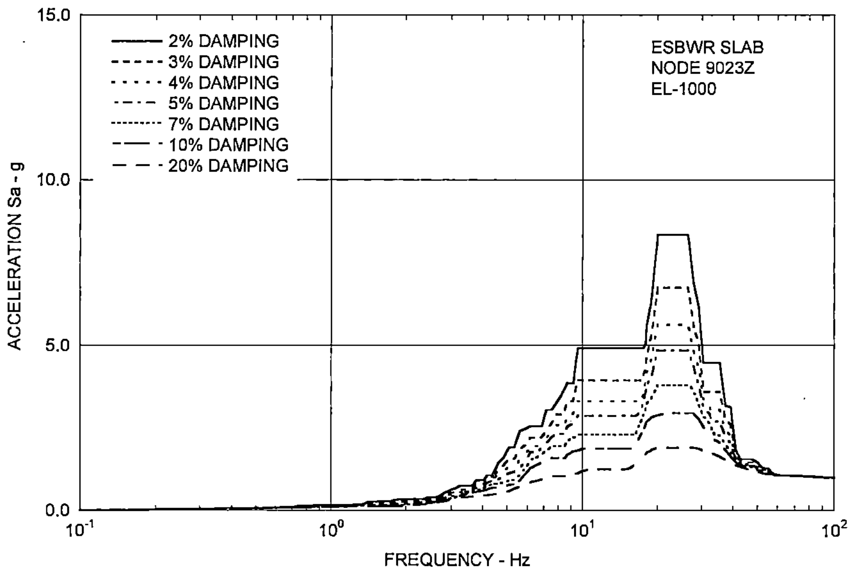

Figure E-177 Site-Specific In-Structure Response Spectra - Oscillator Node 9023Z -

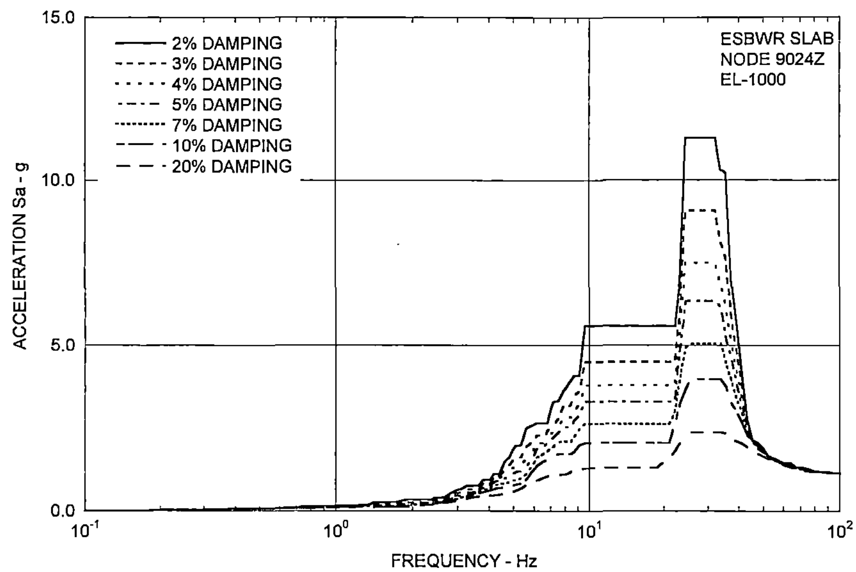

Figure E-178 Site-Specific In-Structure Response Spectra - Oscillator Node 9024Z -

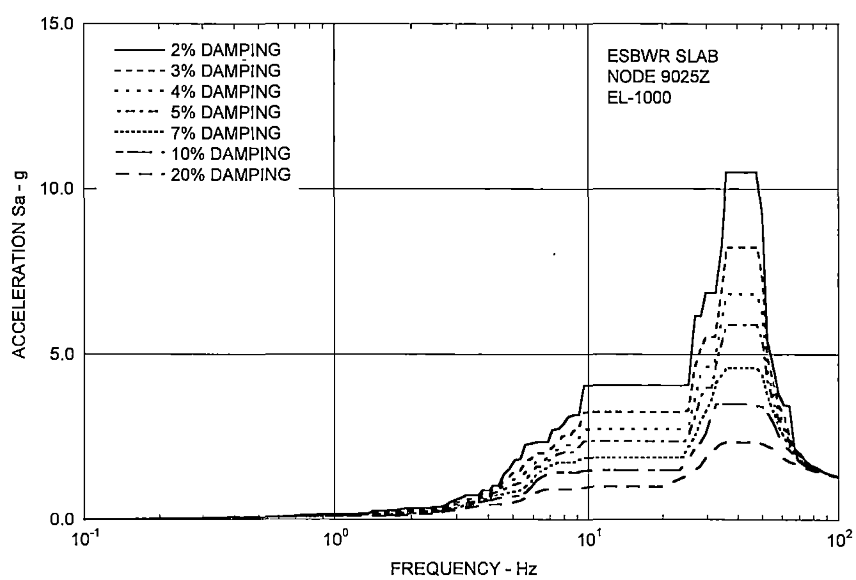

Figure E-179 Site-Specific In-Structure Response Spectra - Oscillator Node 9025Z -

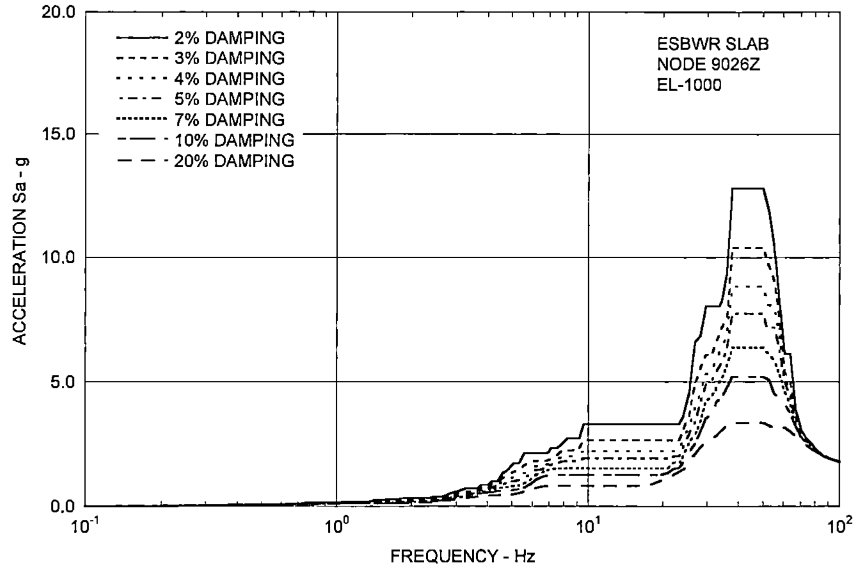

Figure E-180 Site-Specific In-Structure Response Spectra - Oscillator Node 9026Z -

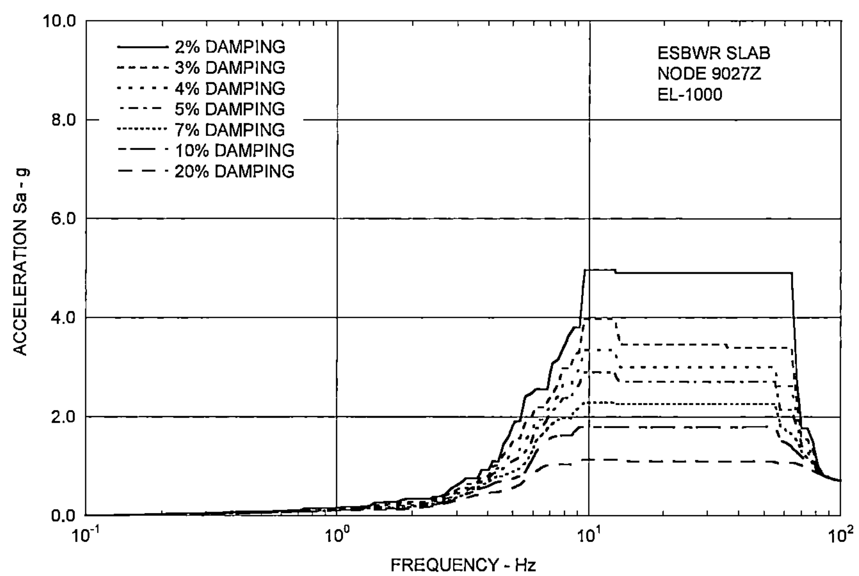

Figure E-181 Site-Specific In-Structure Response Spectra - Oscillator Node 9027Z -

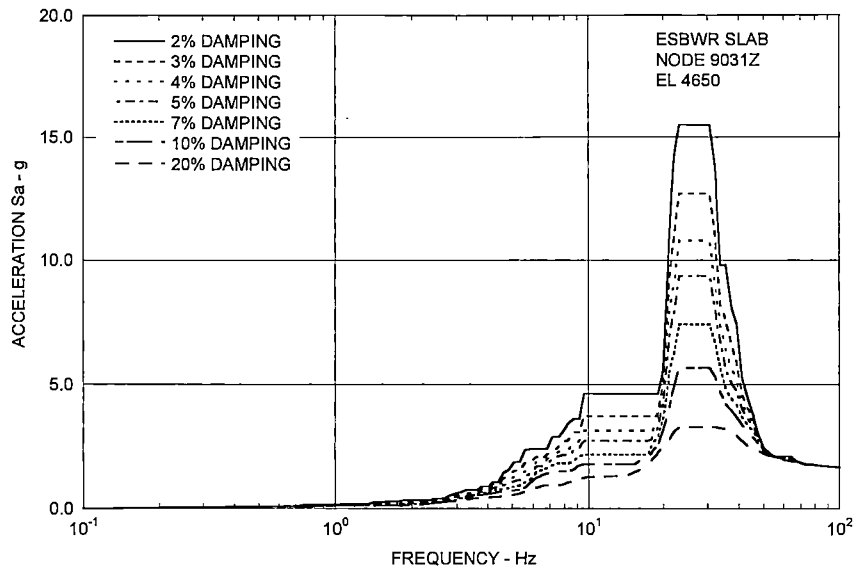

Figure E-182 Site-Specific In-Structure Response Spectra - Oscillator Node 9031Z -

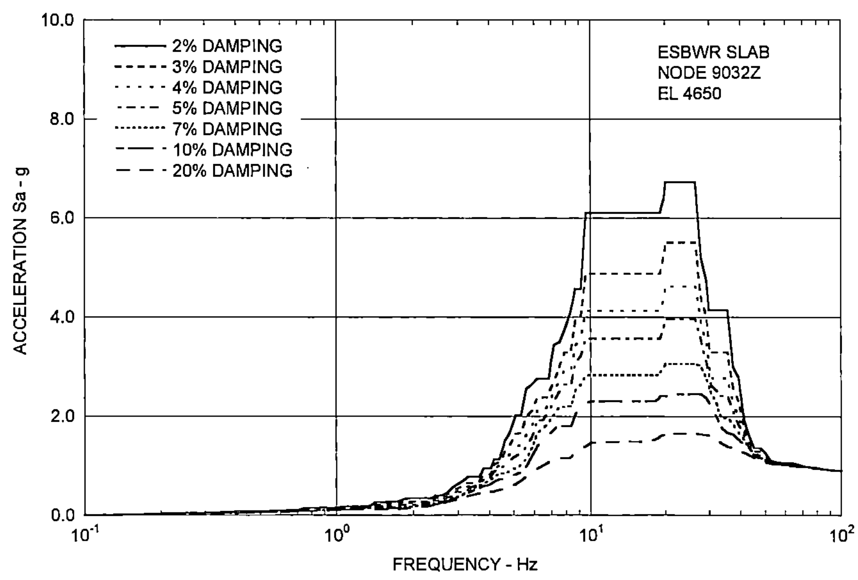

Figure E-183 Site-Specific In-Structure Response Spectra - Oscillator Node 9032Z -

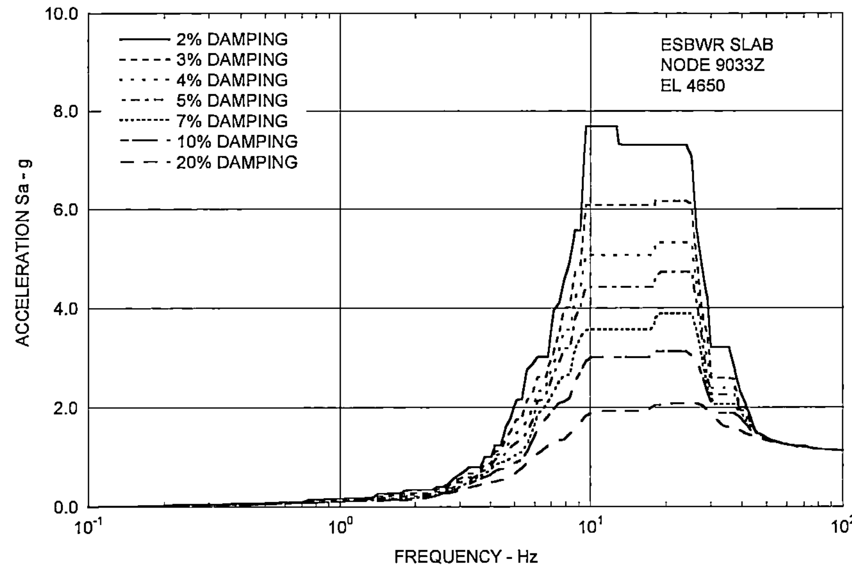

Figure E-184 Site-Specific In-Structure Response Spectra - Oscillator Node 9033Z -

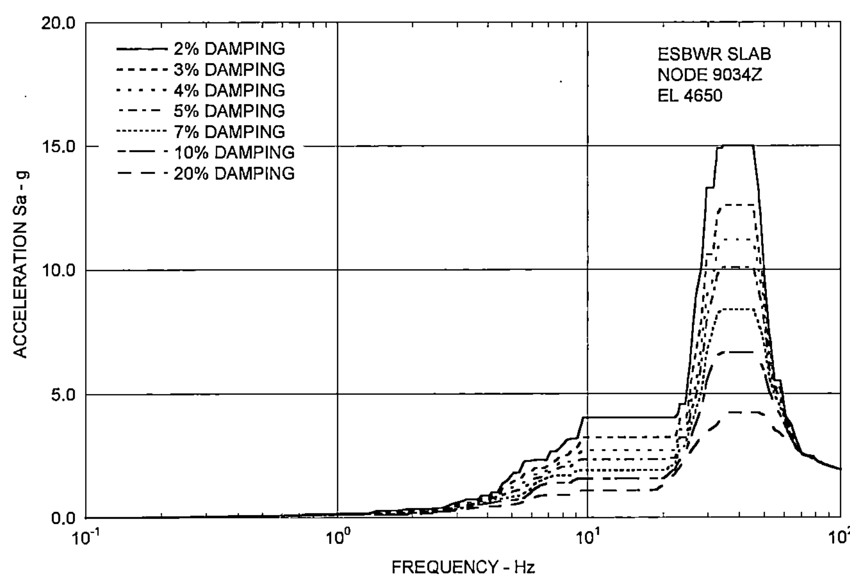

Figure E-185 Site-Specific In-Structure Response Spectra - Oscillator Node 9034Z -

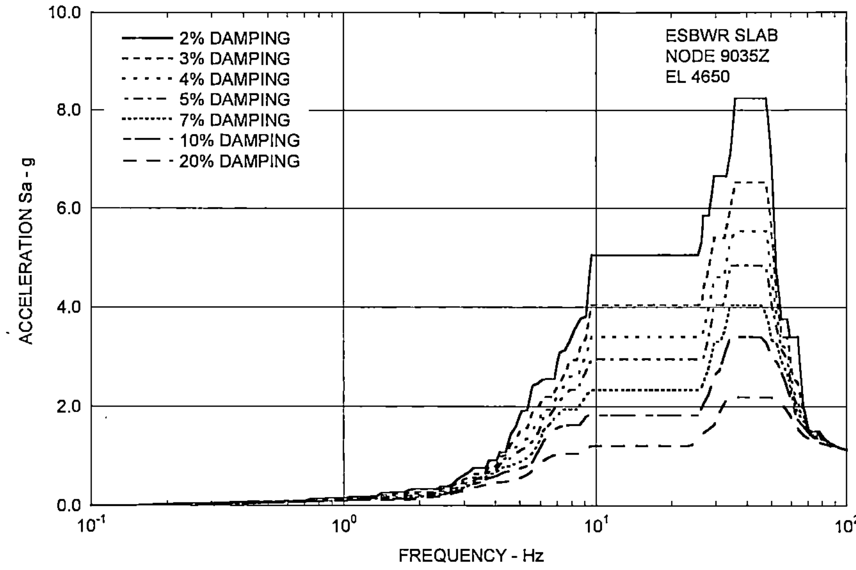

Figure E-186 Site-Specific In-Structure Response Spectra - Oscillator Node 9035Z -

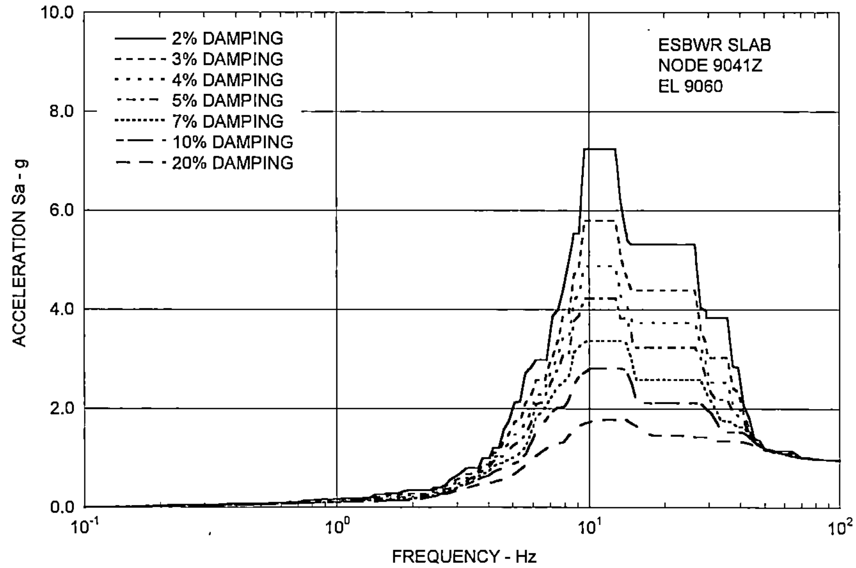

Figure E-187 Site-Specific In-Structure Response Spectra - Oscillator Node 9041Z -

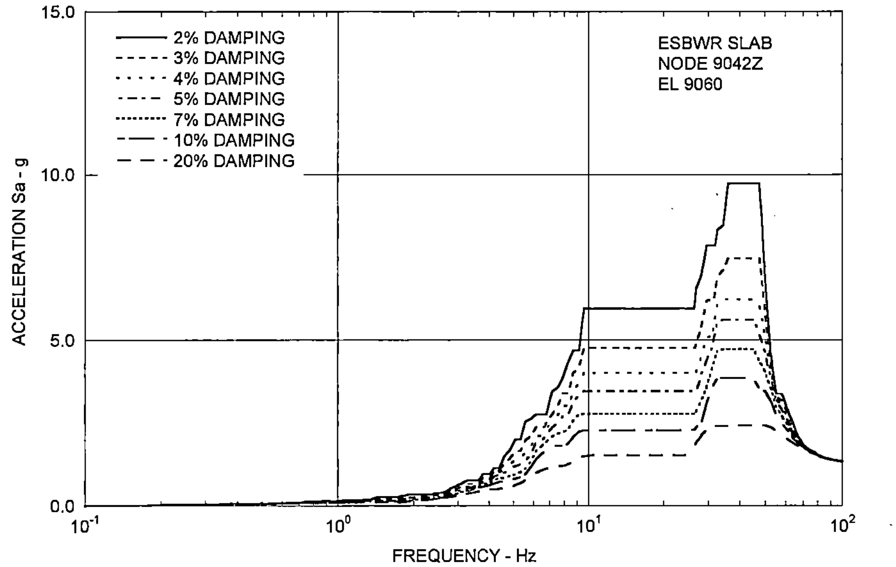

Figure E-188 Site-Specific In-Structure Response Spectra - Oscillator Node 9042Z -

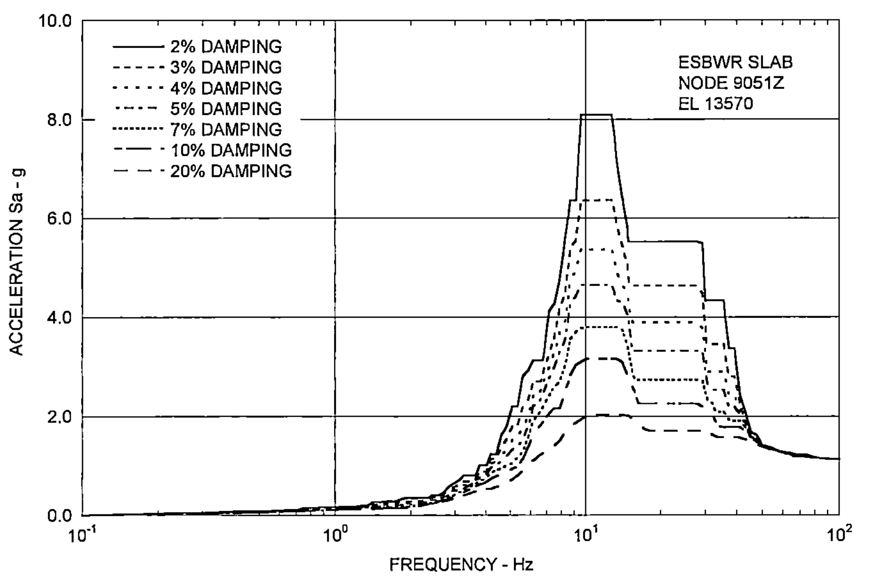

Figure E-189 Site-Specific In-Structure Response Spectra - Oscillator Node 9051Z -

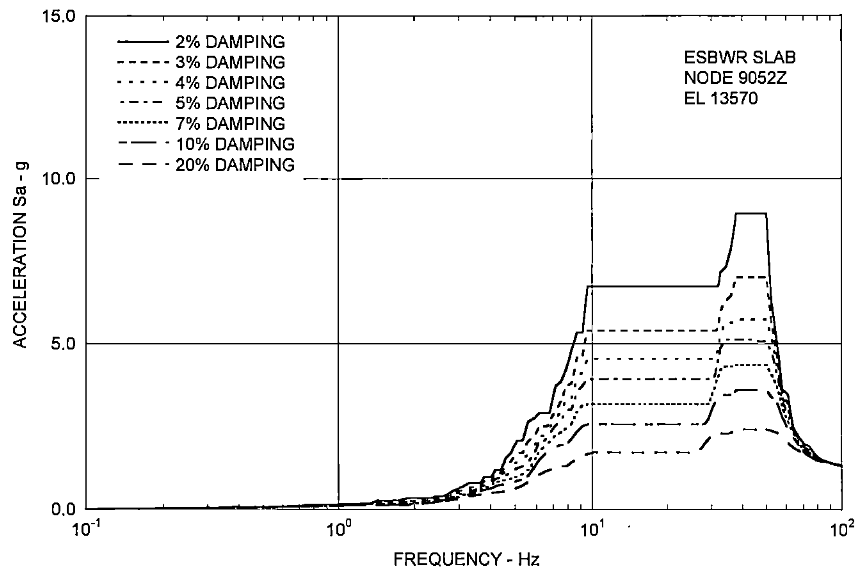

Figure E-190 Site-Specific In-Structure Response Spectra - Oscillator Node 9052Z -

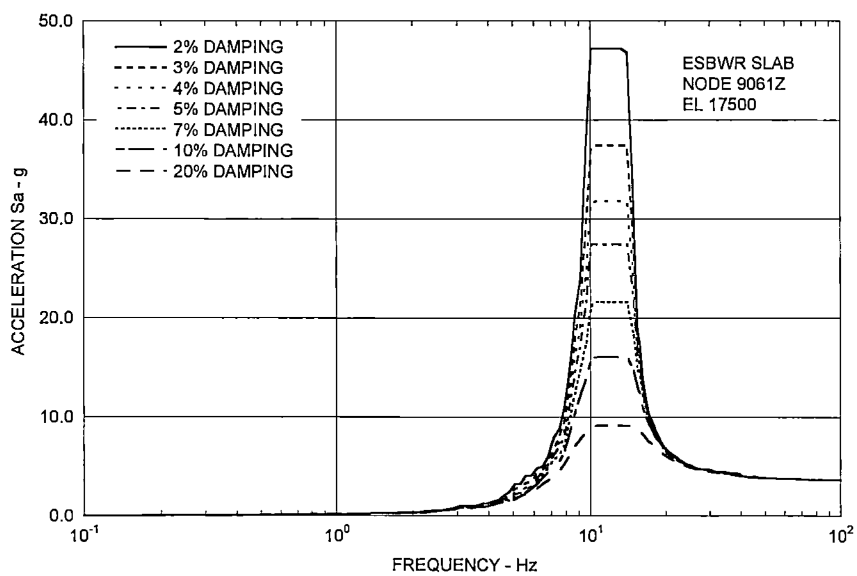

Figure E-191 Site-Specific In-Structure Response Spectra - Oscillator Node 9061Z -

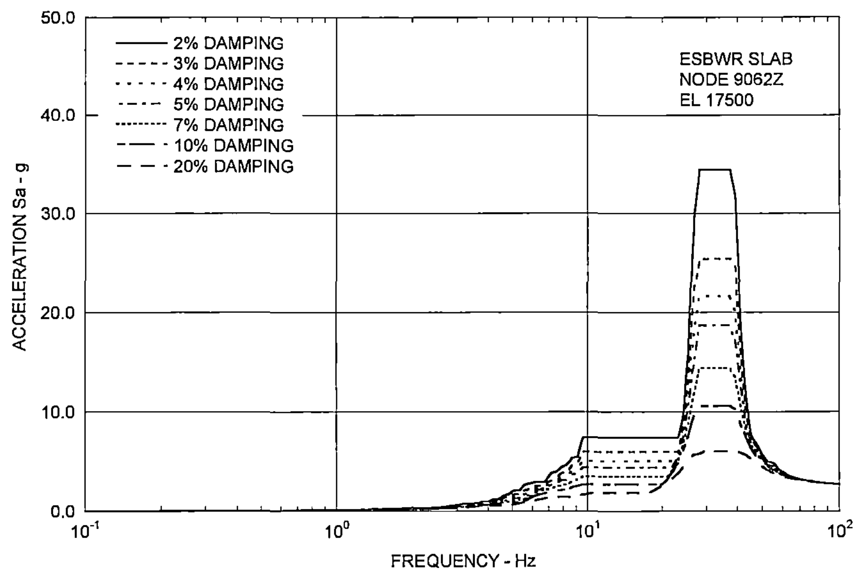

Figure E-192 Site-Specific In-Structure Response Spectra - Oscillator Node 9062Z -

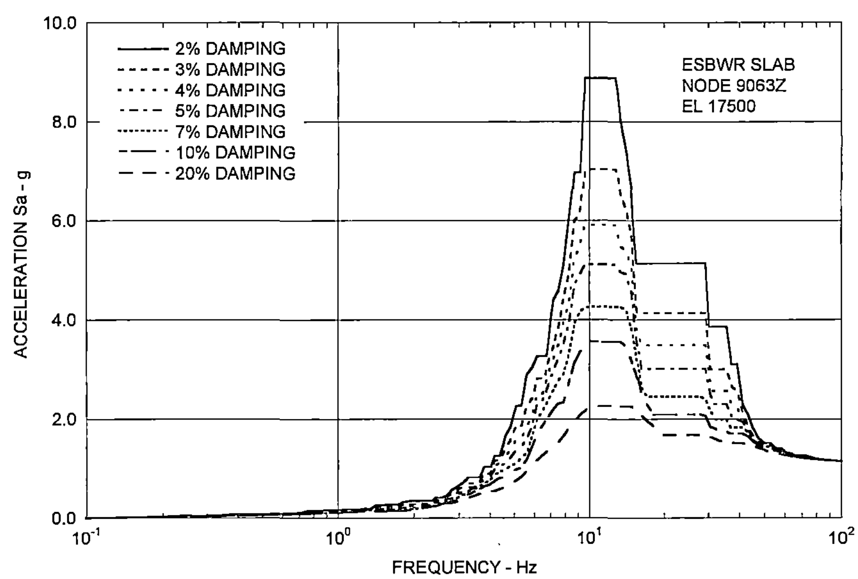

Figure E-193 Site-Specific In-Structure Response Spectra - Oscillator Node 9063Z -

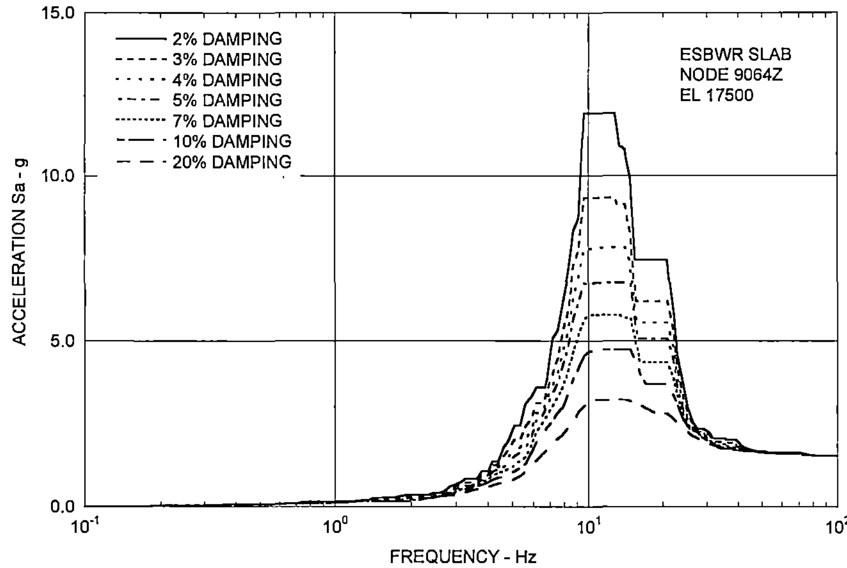

Figure E-194 Site-Specific In-Structure Response Spectra - Oscillator Node 9064Z -

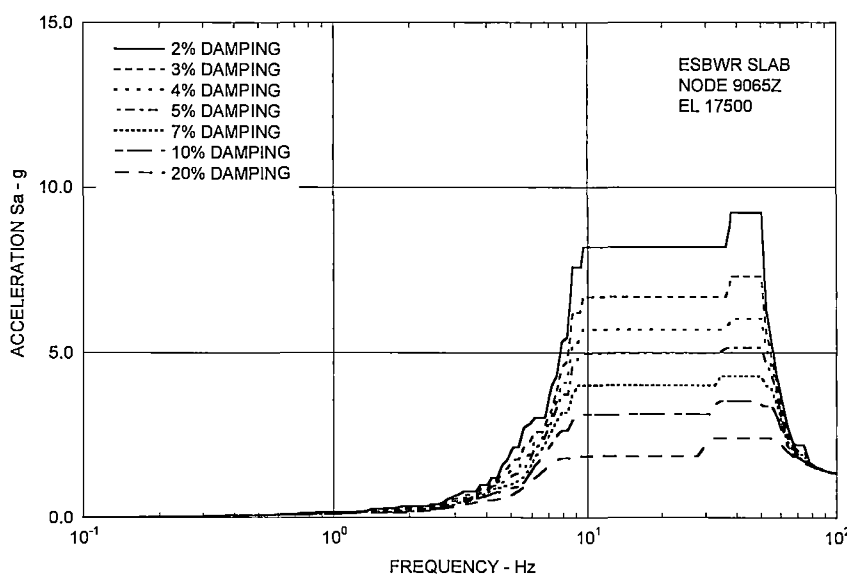

Figure E-195 Site-Specific In-Structure Response Spectra - Oscillator Node 9065Z -

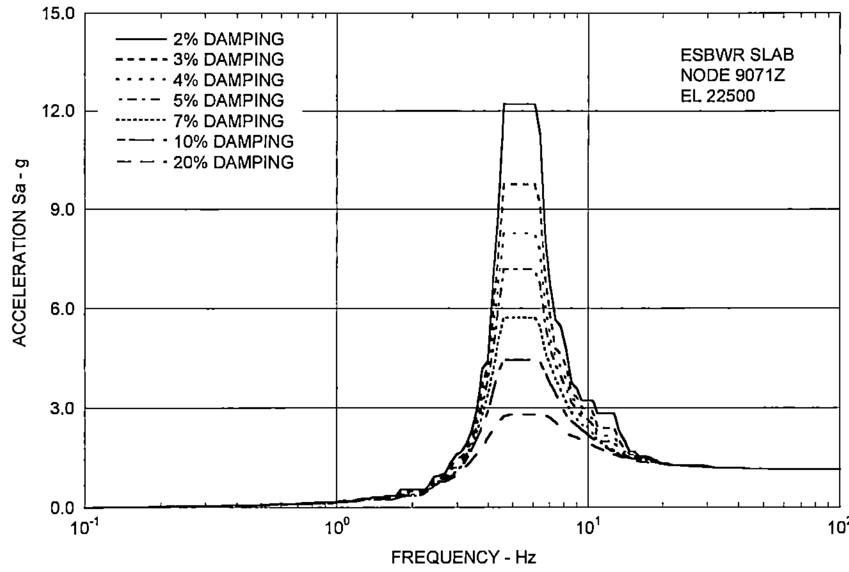

Figure E-196 Site-Specific In-Structure Response Spectra - Oscillator Node 9071Z -

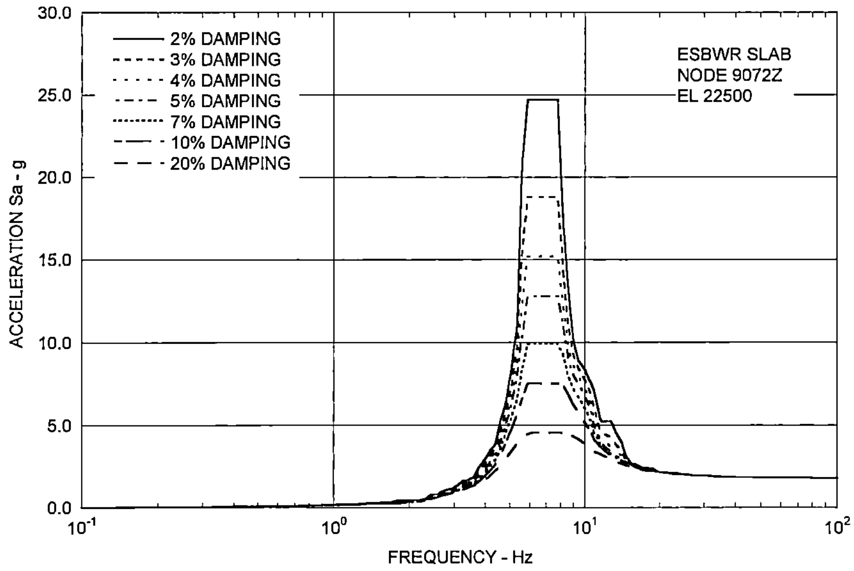

Figure E-197 Site-Specific In-Structure Response Spectra - Oscillator Node 9072Z -

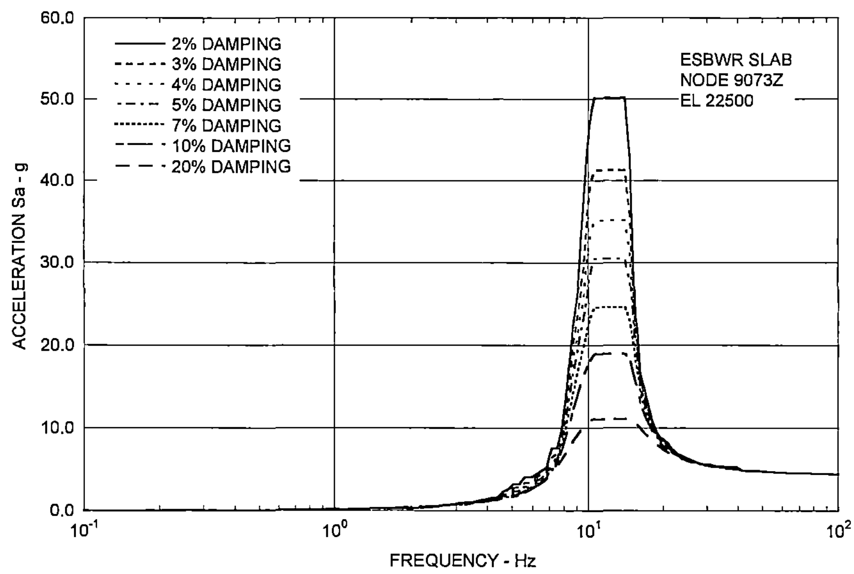

Figure E-198 Site-Specific In-Structure Response Spectra - Oscillator Node 9073Z -

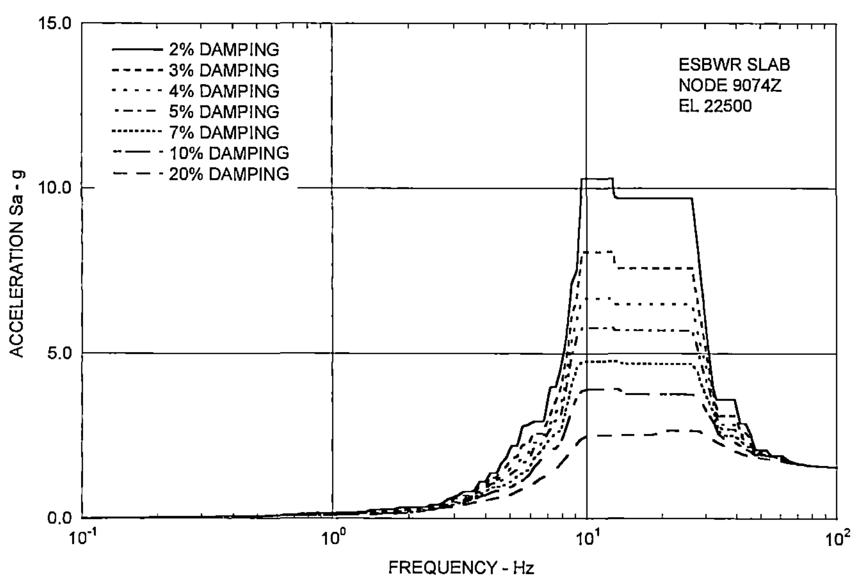

Figure E-199 Site-Specific In-Structure Response Spectra - Oscillator Node 9074Z -

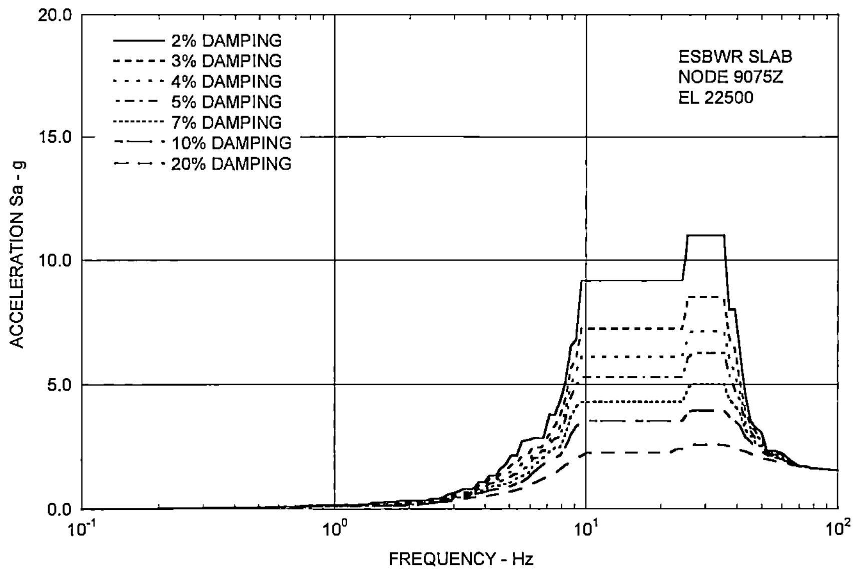

Figure E-200 Site-Specific In-Structure Response Spectra - Oscillator Node 9075Z -

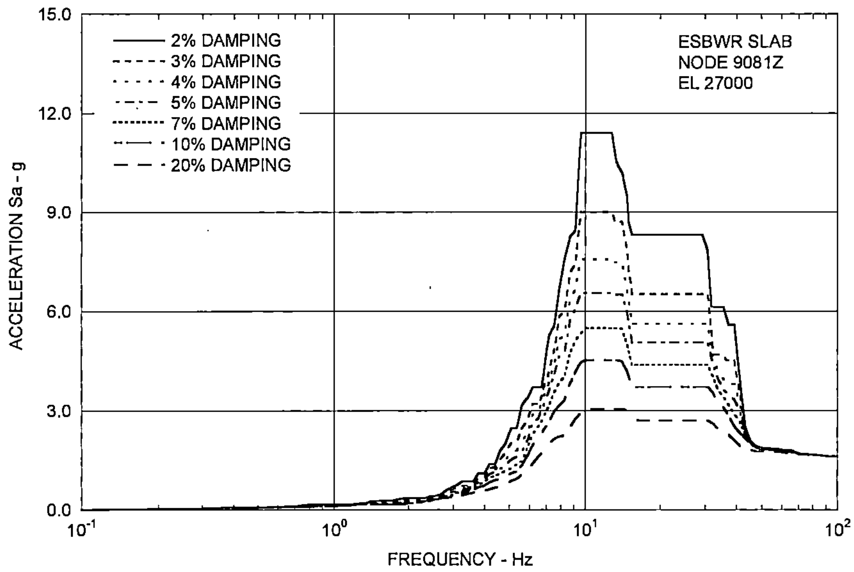

Figure E-201 Site-Specific In-Structure Response Spectra - Oscillator Node 9081Z -

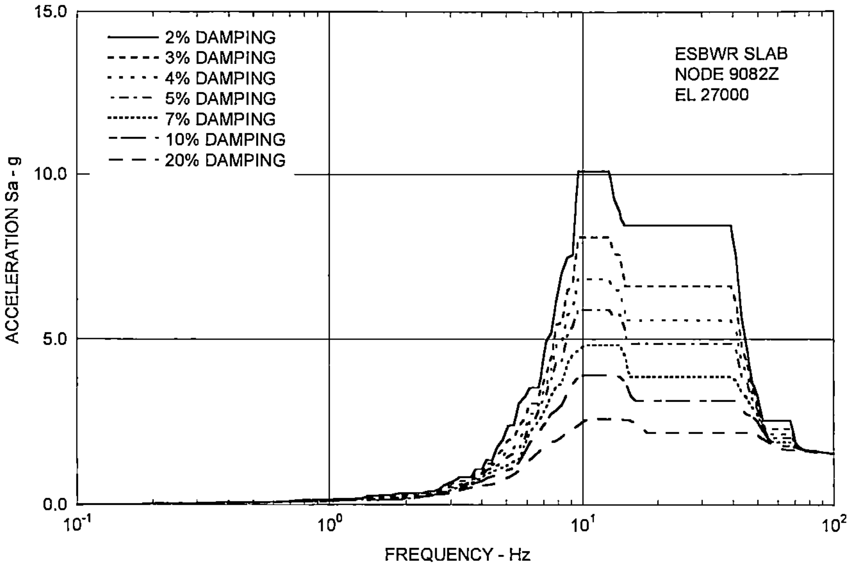

Figure E-202 Site-Specific In-Structure Response Spectra - Oscillator Node 9082Z -

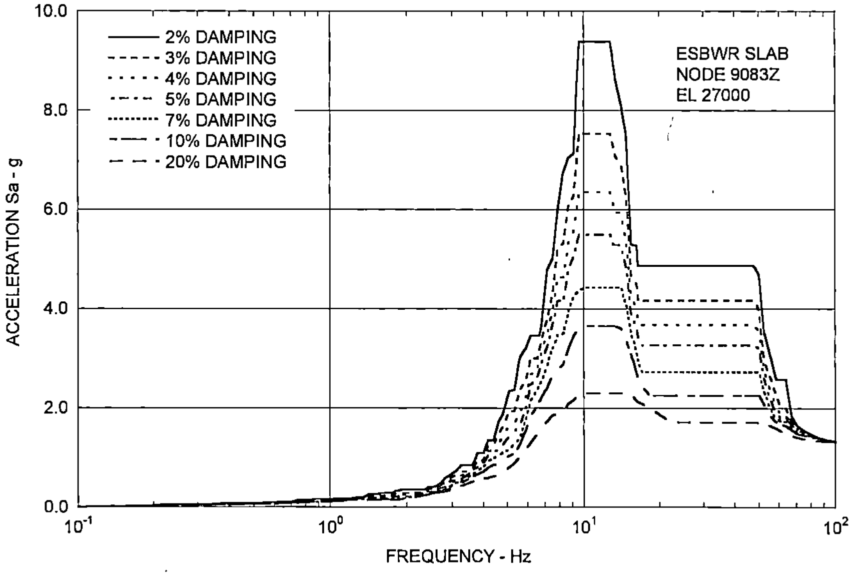

Figure E-203 Site-Specific In-Structure Response Spectra - Oscillator Node 9083Z -

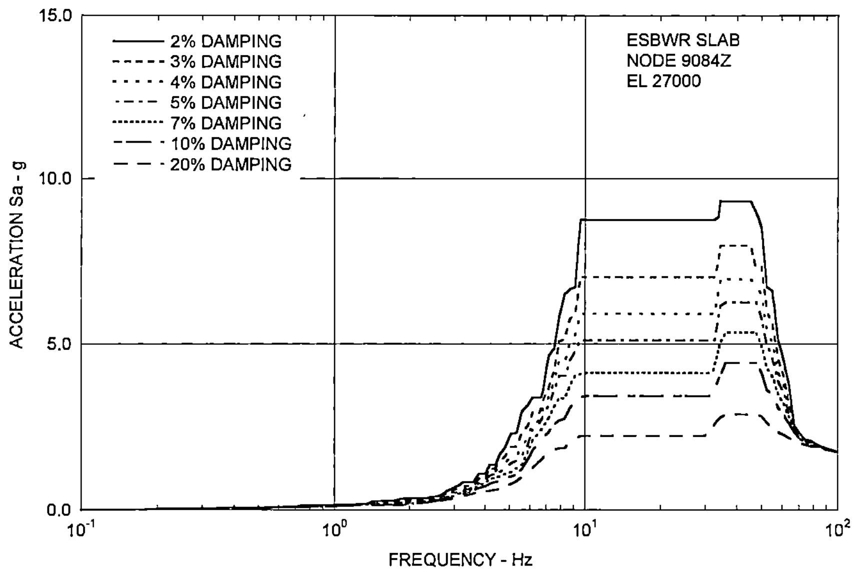

Figure E-204 Site-Specific In-Structure Response Spectra - Oscillator Node 9084Z -

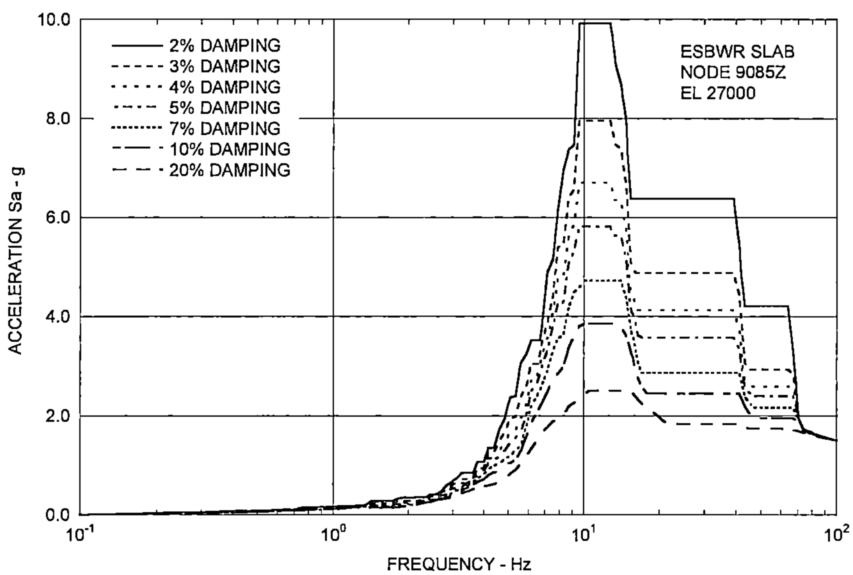

Figure E-205 Site-Specific In-Structure Response Spectra - Oscillator Node 9085Z -

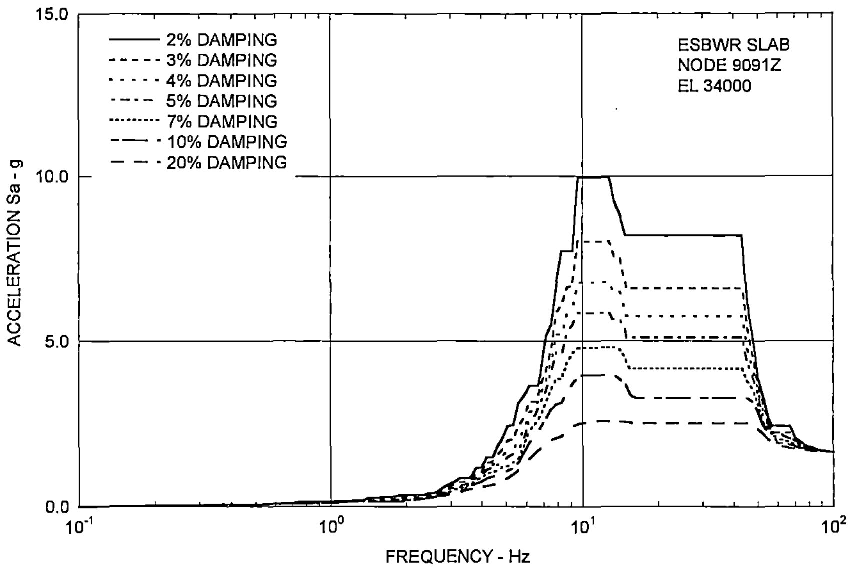

Figure E-206 Site-Specific In-Structure Response Spectra - Oscillator Node 9091Z -

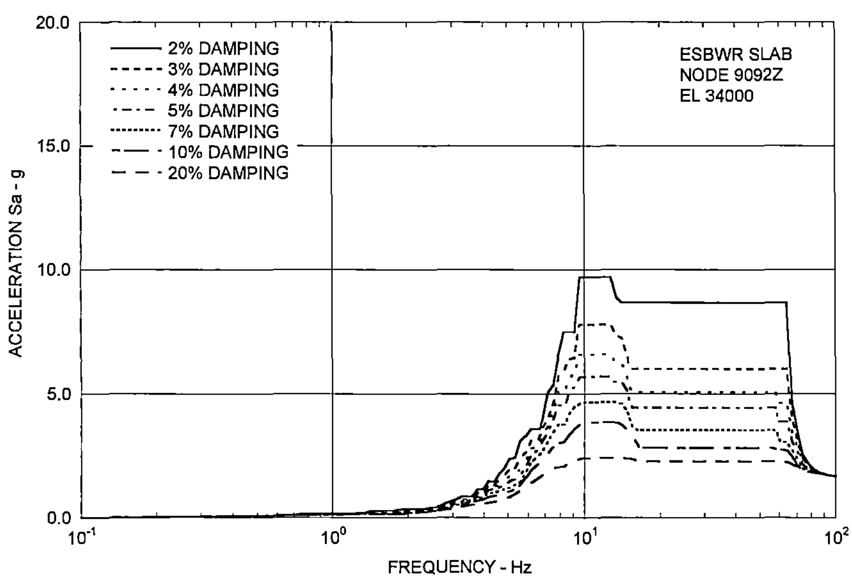

Figure E-207 Site-Specific In-Structure Response Spectra - Oscillator Node 9092Z -

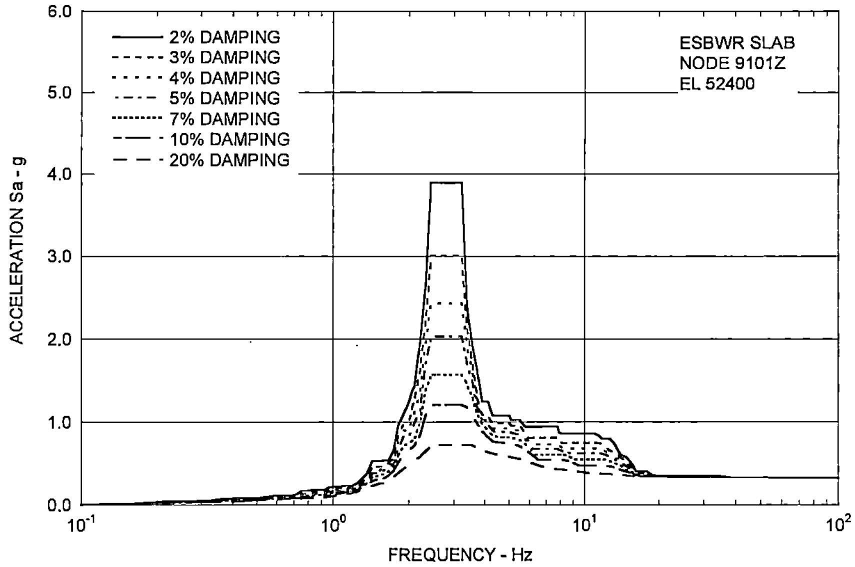

Figure E-208 Site-Specific In-Structure Response Spectra - Oscillator Node 9101Z -

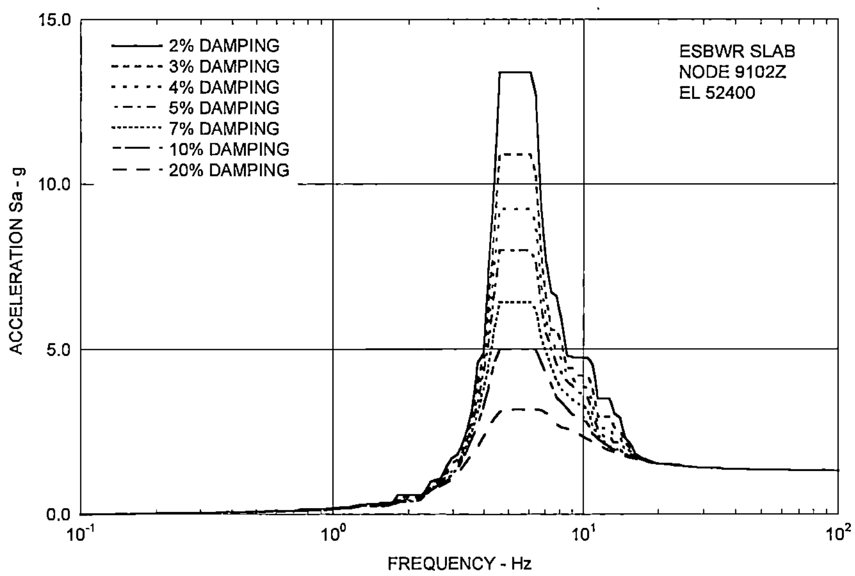

Figure E-209 Site-Specific In-Structure Response Spectra - Oscillator Node 9102Z -

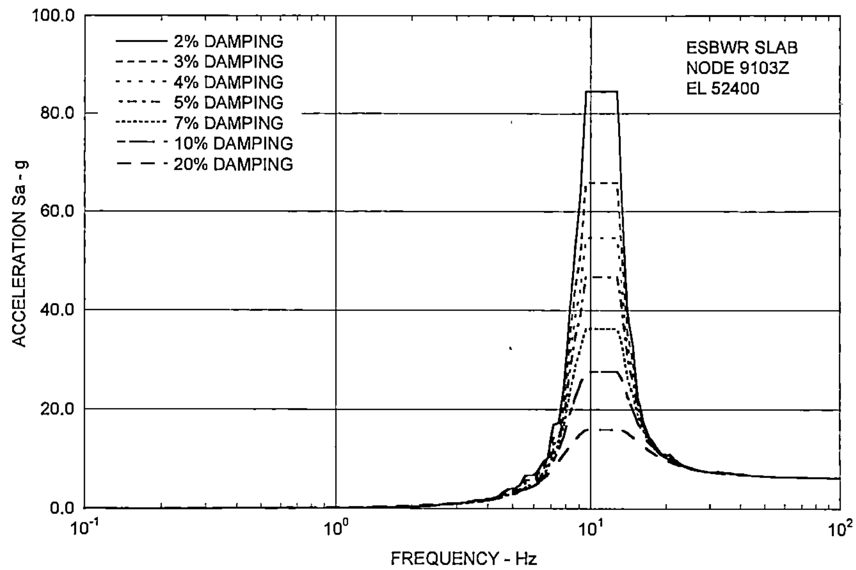

Figure E-210 Site-Specific In-Structure Response Spectra - Oscillator Node 9103Z -

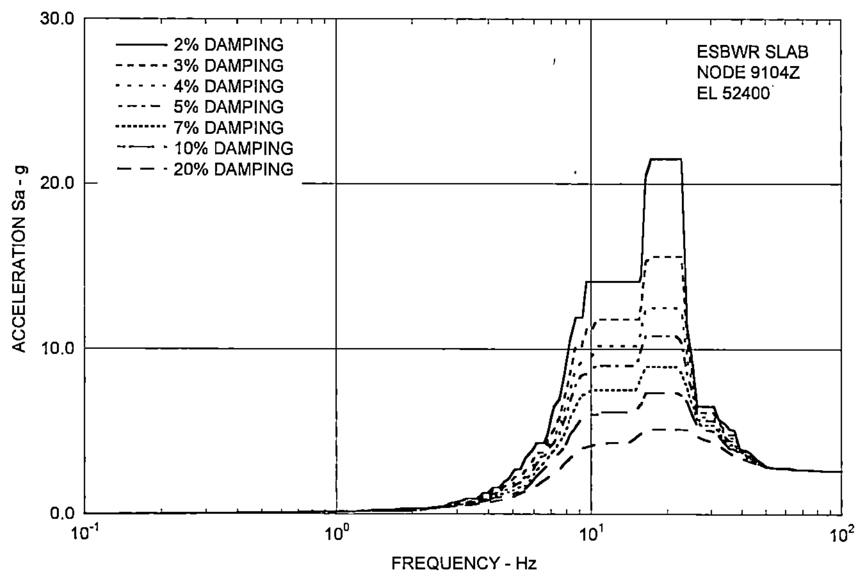

Figure E-211 Site-Specific In-Structure Response Spectra - Oscillator Node 9104Z -

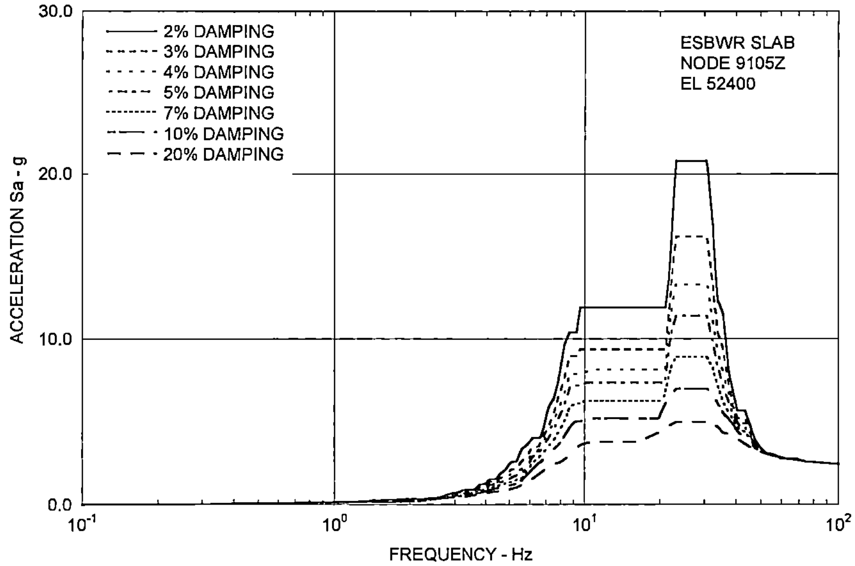

Figure E-212 Site-Specific In-Structure Response Spectra - Oscillator Node 9105Z -

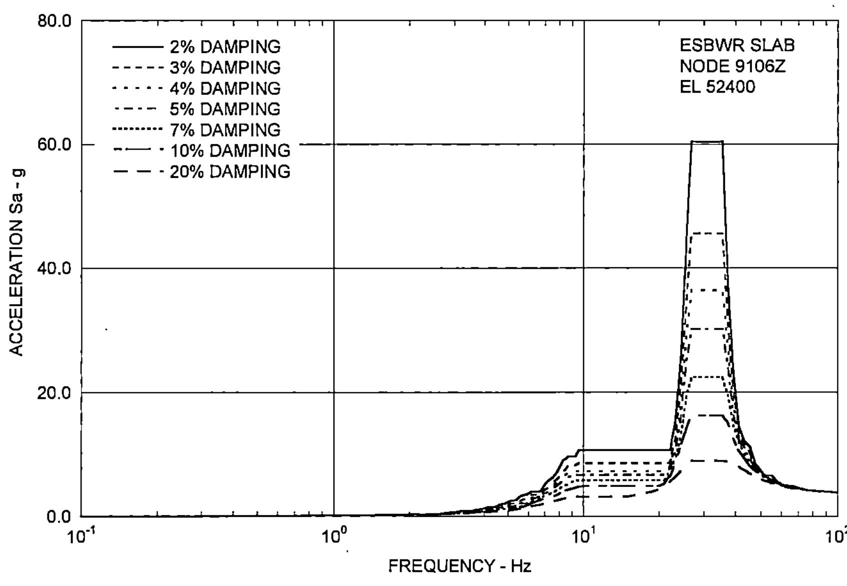

Figure E-213 Site-Specific In-Structure Response Spectra - Oscillator Node 9106Z -

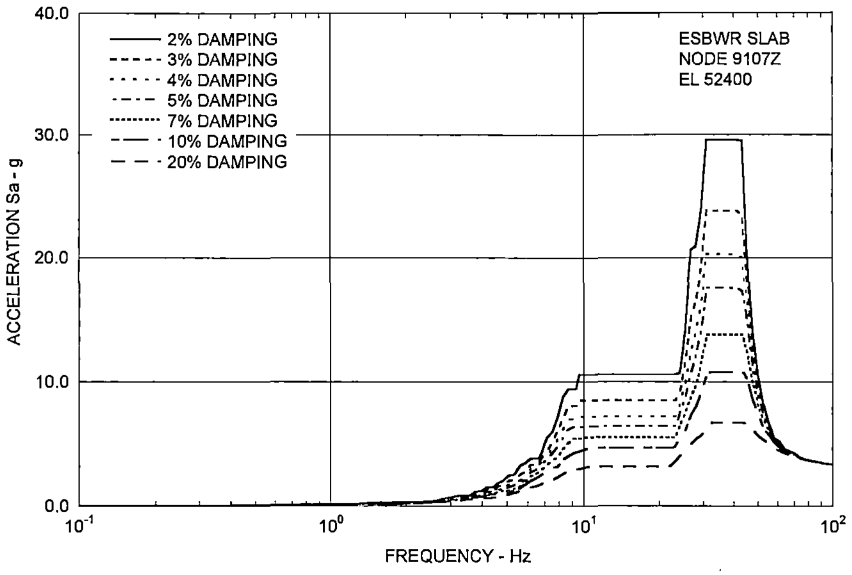

Figure E-214 Site-Specific In-Structure Response Spectra - Oscillator Node 9107Z -

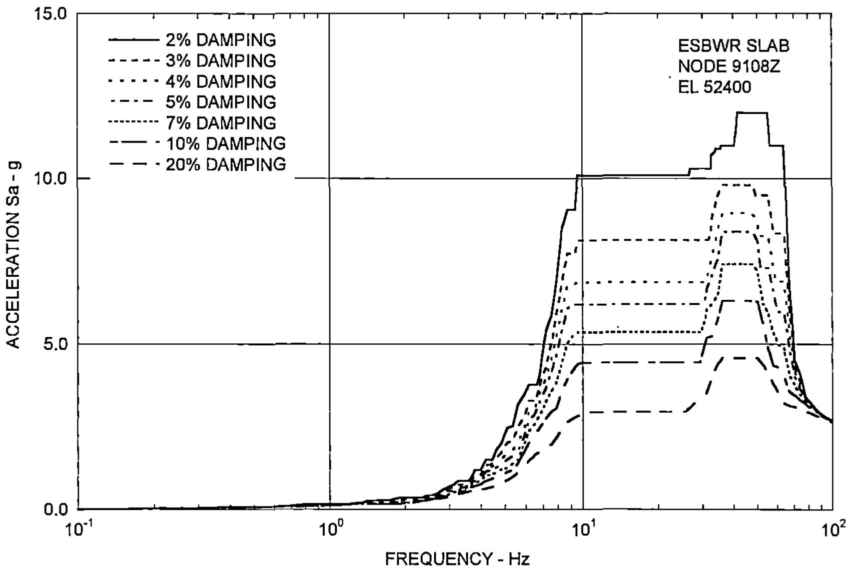

Figure E-215 Site-Specific In-Structure Response Spectra - Oscillator Node 9108Z -

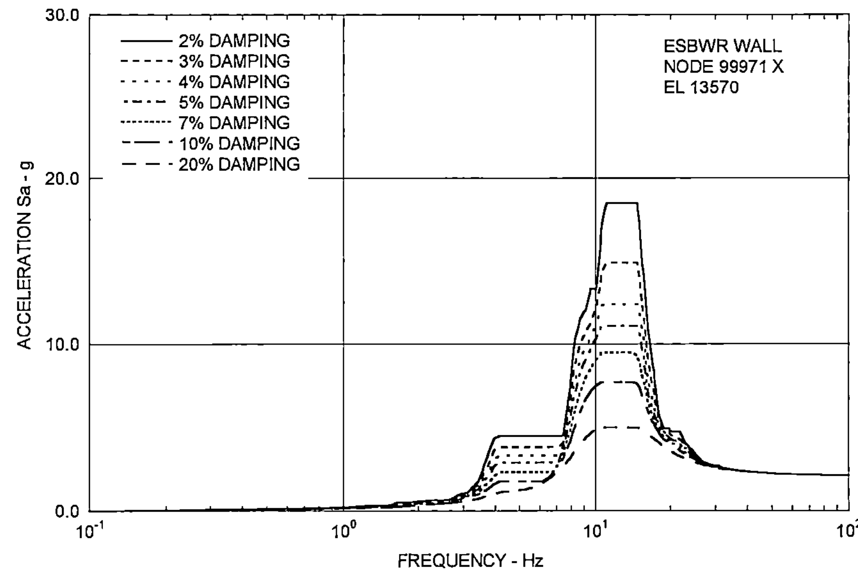

Figure E-216 Site-Specific ISRS - Wall Oscillator Node 99971X, F3 Wall -

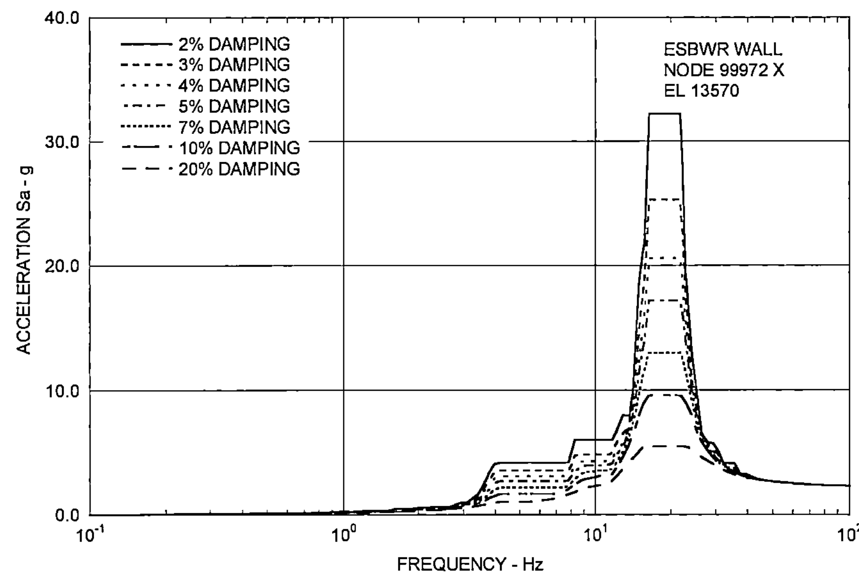

Figure E-217 Site-Specific ISRS - Wall Oscillator Node 99972X, F3 Wall -

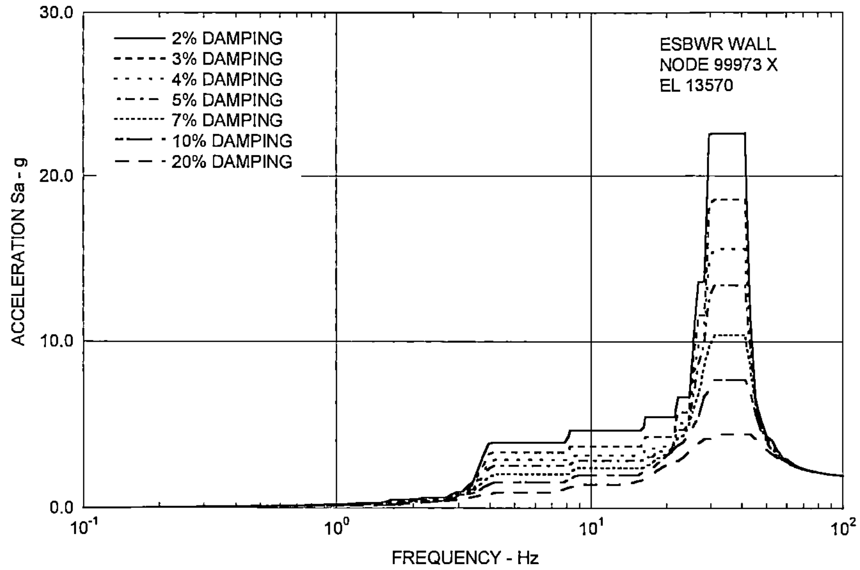

Figure E-218 Site-Specific ISRS - Wall Oscillator Node 99973X, F3 Wall -

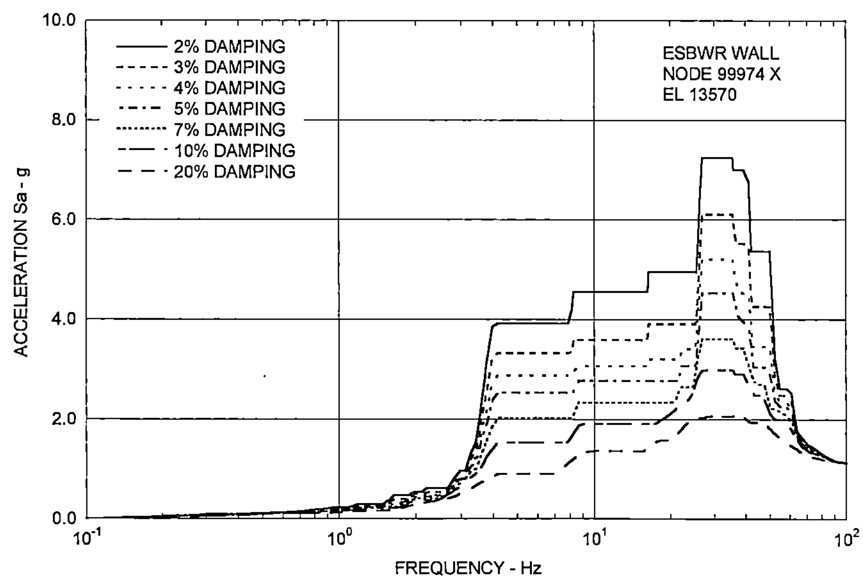

Figure E-219 Site-Specific ISRS - Wall Oscillator Node 99974X, F3 Wall -

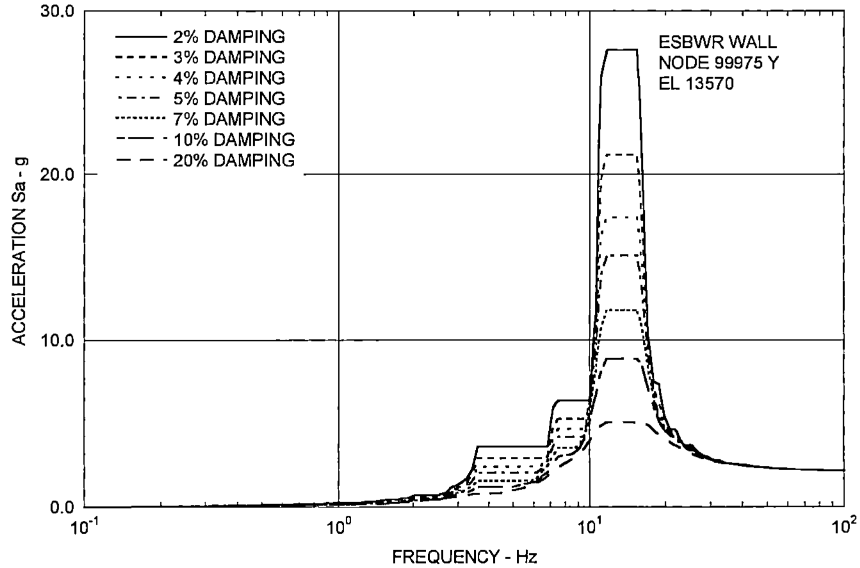

Figure E-220 Site-Specific ISRS - Wall Oscillator Node 99975Y, FA and FF Wall -

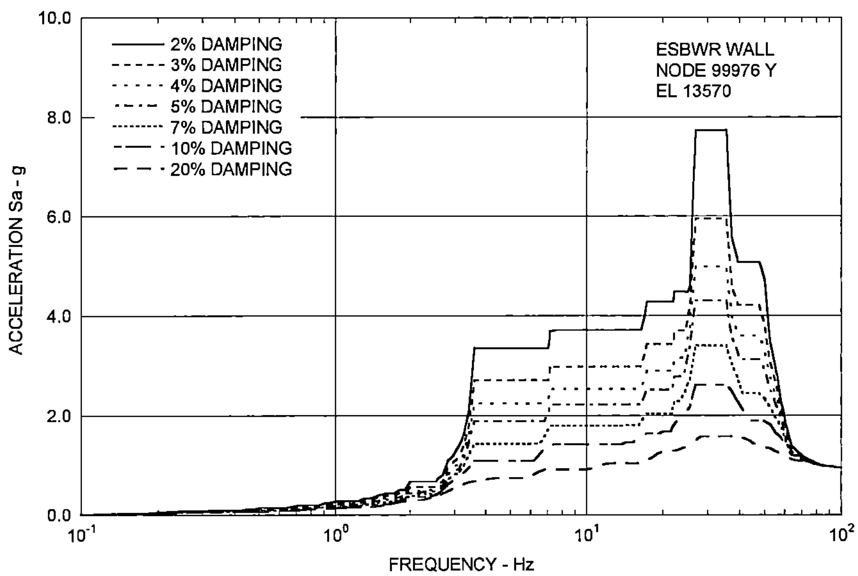

Figure E-221 Site-Specific ISRS - Wall Oscillator Node 99976Y, FA and FF Wall -

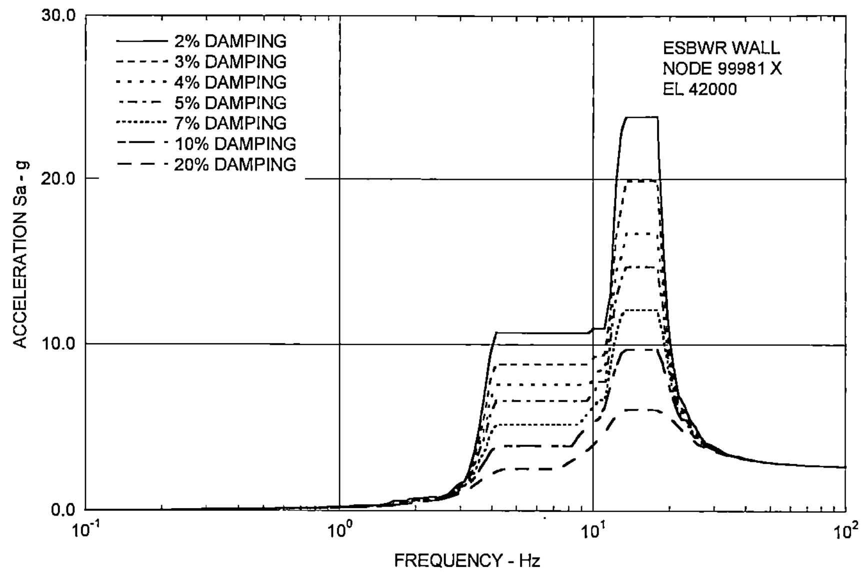

Figure E-222 Site-Specific ISRS - Wall Oscillator Node 99981X, R1 and R7 Wall -

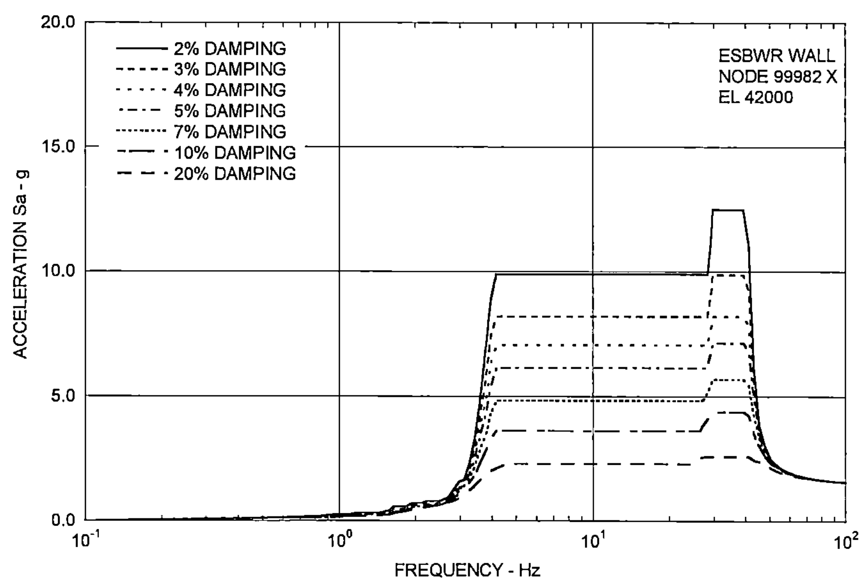

Figure E-223 Site-Specific ISRS - Wall Oscillator Node 99982X, R1 and R7 Wall -

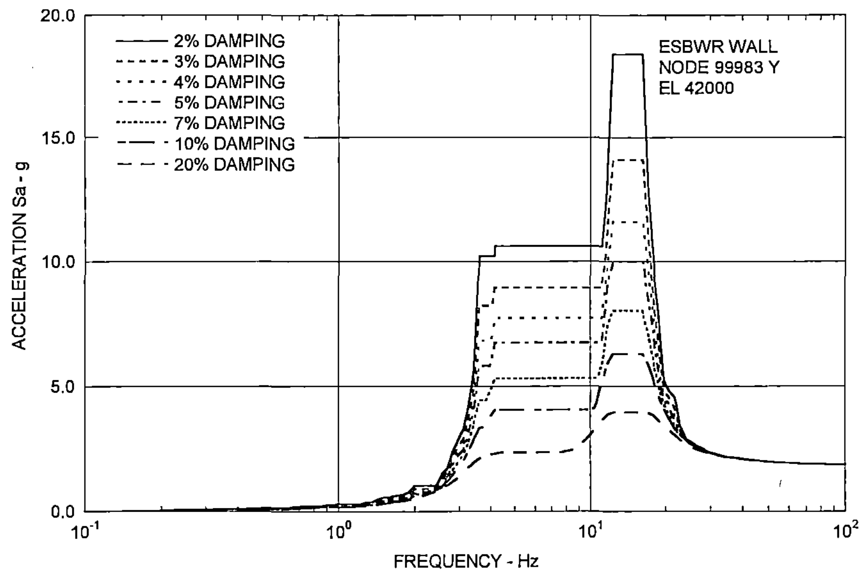

Figure E-224 Site-Specific ISRS - Wall Oscillator Node 99983Y, RB and RF Wall -

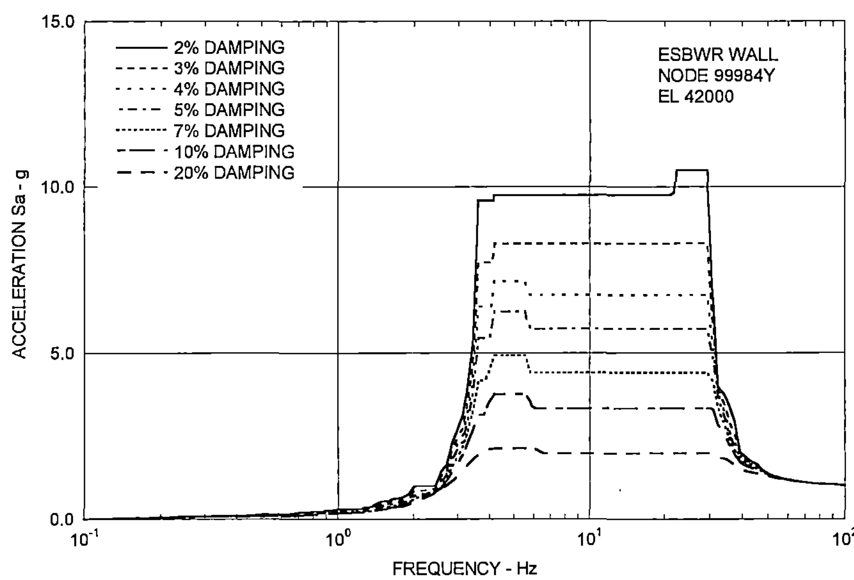

Figure E-225 Site-Specific ISRS - Wall Oscillator Node 99984Y, RB and RF Wall -

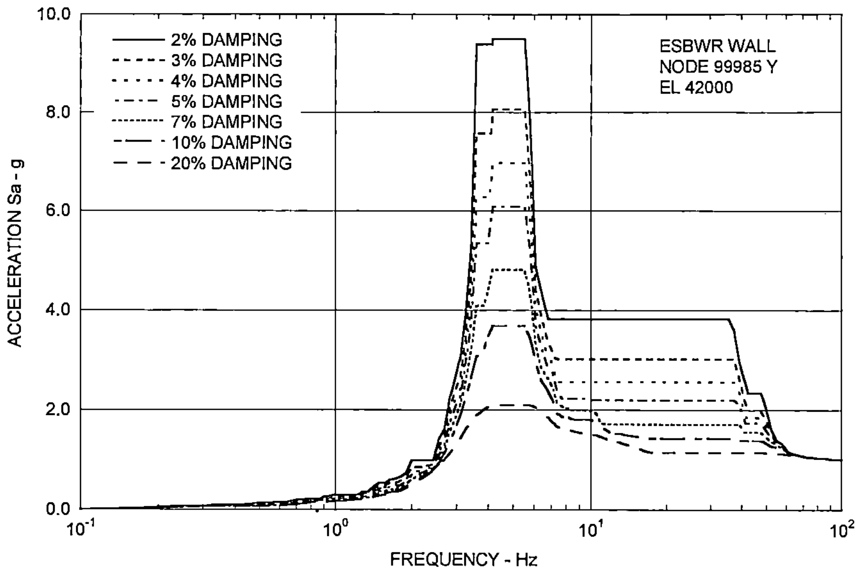

Figure E-226 Site-Specific ISRS - Wall Oscillator Node 99985Y, RB and RF Wall -

APPENDIX F

SDOF Oscillators 5% Damped Site-Specific ISRS

LIST OF TABLES

LIST OF FIGURES

Table F-1 Figure Numbers for Comparison of ISRS

Structure	Elevation (m)	Node number	Figure number of Floor Response Spectra		
			X	Y	Z
Slab Oscillator	-6.40	9011	-	-	F-1
	-6.40	9012	-	-	F-2
	-6.40	9013	-	-	F-3
	-1.00	9014	-	-	F-4
	-1.00	9022	-	-	F-5
	-1.00	9023	-	-	F-6
	-1.00	9024	-	-	F-7
	-1.00	9025	-	-	F-8
	-1.00	9026	-	-	F-9
	-1.00	9027	-	-	F-10
	4.65	9031	-	-	F-11
	4.65	9032	-	-	F-12
	4.65	9033	-	-	F-13
	4.65	9034	-	-	F-14
	4.65	9035	-	-	F-15
	9.06	9041	-	-	F-16
	9.06	9042	-	-	F-17
	13.57	9051	-	-	F-18
	13.57	9052	-	-	F-19
	17.50	9061	-	-	F-20
	17.50	9062	-	-	F-21
	17.50	9063	-	-	F-22
	17.50	9064	-	-	F-23
	17.50	9065	-	-	F-24
	22.50	9071	-	-	F-25
	22.50	9072	-	-	F-26
	22.50	9073	-	-	F-27
	22.50	9074	-	-	F-28
	22.50	9075	-	-	F-29

Table F-1 Figure Numbers for Comparison of ISRS(Continued)

Structure	Elevation (m)	Node number	Figure number of Floor Response Spectra		
			X	Y	Z
Slab Oscillator	27.00	9081	-	-	F-30
	27.00	9082	-	-	F-31
	27.00	9083	-	-	F-32
	27.00	9084	-	-	F-33
	27.00	9085	-	-	F-34
	34.00	9091	-	-	F-35
	34.00	9092	-	-	F-36
	52.40	9101	-	-	F-37
	52.40	9102	-	-	F-38
	52.40	9103	-	-	F-39
	52.40	9104	-	-	F-40
	52.40	9105	-	-	F-41
	52.40	9106	-	-	F-42
	52.40	9107	-	-	F-43
	52.40	9108	-	-	F-44
Wall Oscillator	13.57	99971	F-45	-	-
	13.57	99972	F-46	-	-
	13.57	99973	F-47	-	-
	13.57	99974	F-48	-	-
	13.57	99975	-	F-49	-
	13.57	99976	-	F-50	-
	42.00	99981	F-51	-	-
	42.00	99982	F-52	-	-
	42.00	99983	-	F-53	-
	42.00	99984	-	F-54	-
	42.00	99985	-	F-55	-

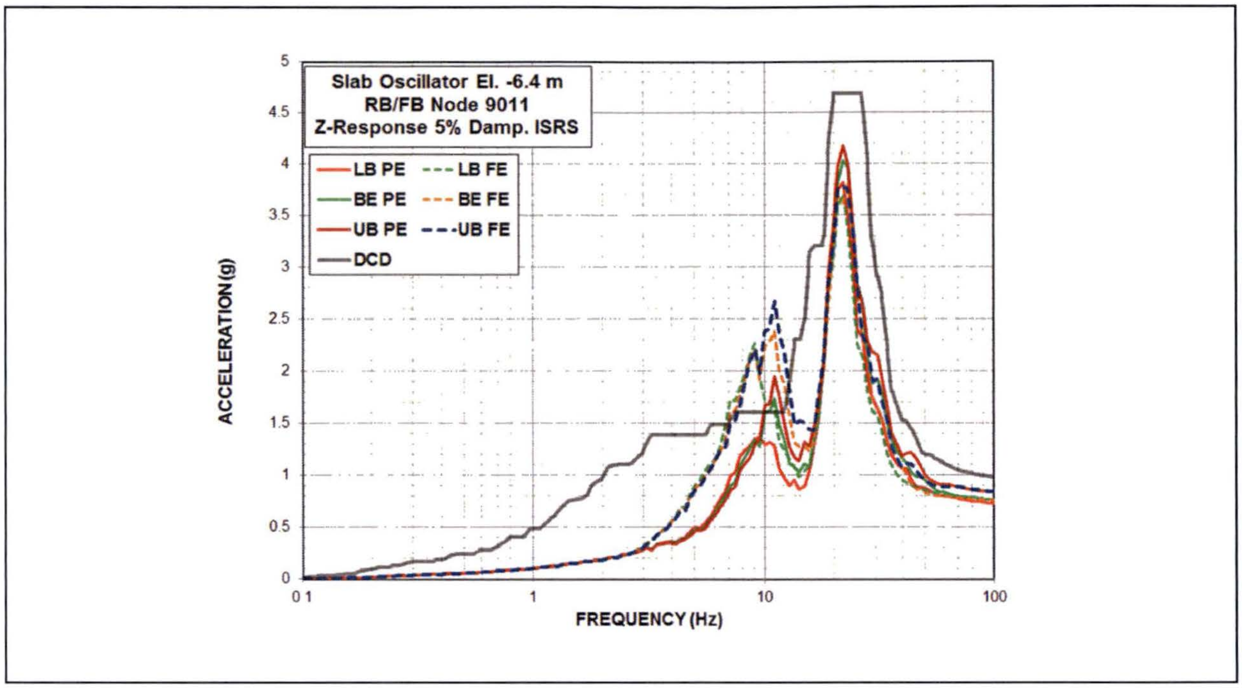

Figure F-1 Comparison of ISRS - Oscillator Node 9011Z

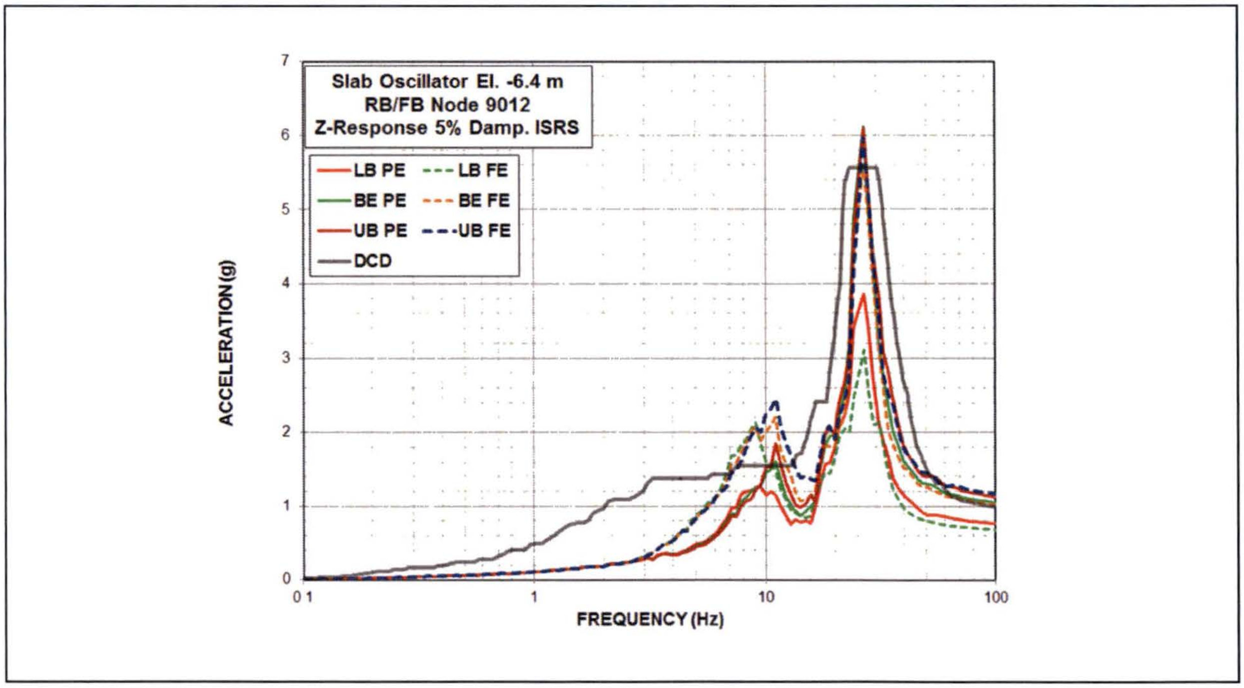

Figure F-2 Comparison of ISRS - Oscillator Node 9012Z

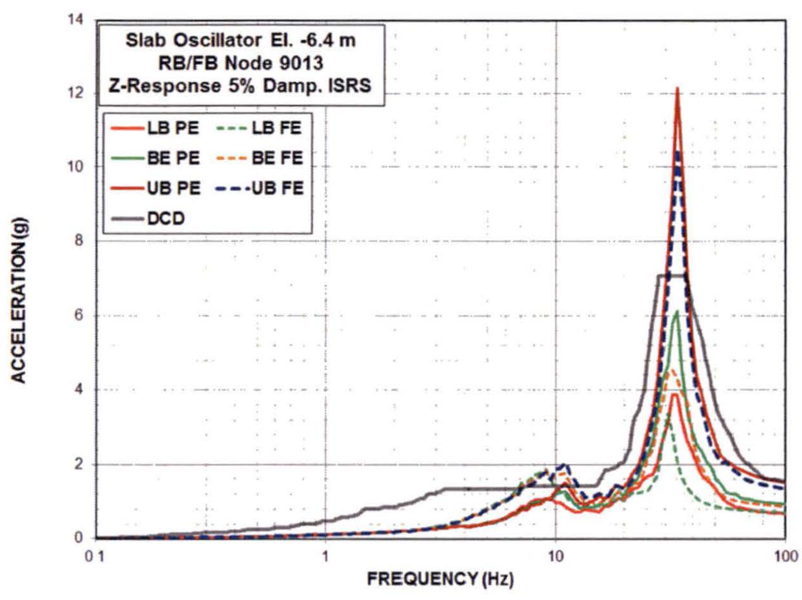

Figure F-3 Comparison of ISRS - Oscillator Node 9013Z

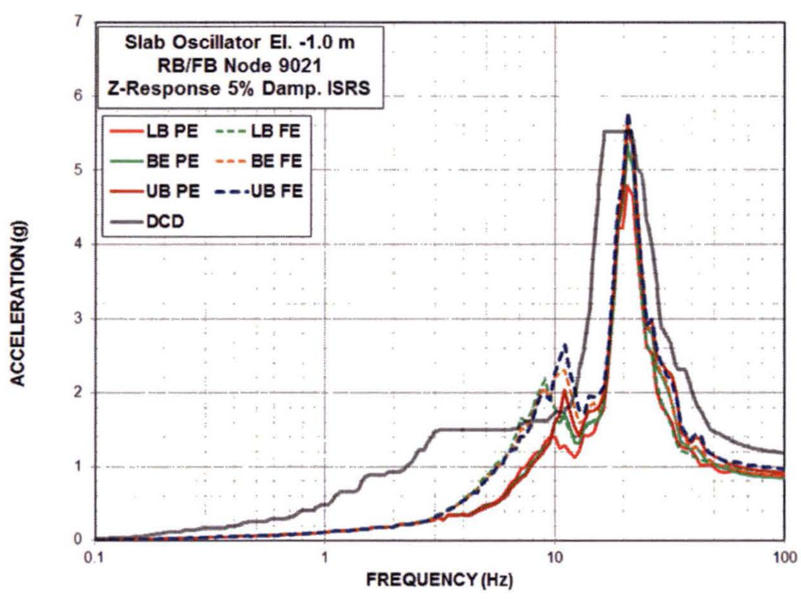

Figure F-4 Comparison of ISRS - Oscillator Node 9021Z

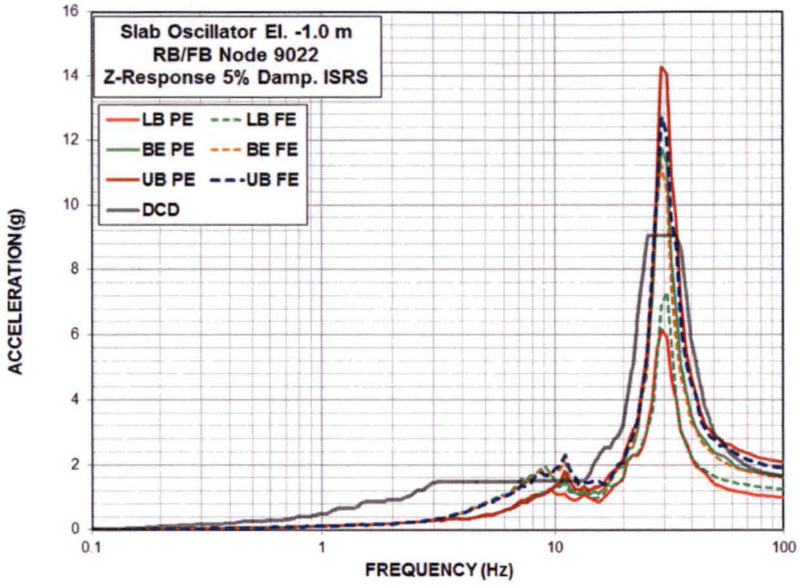

Figure F-5 Comparison of ISRS - Oscillator Node 9022Z

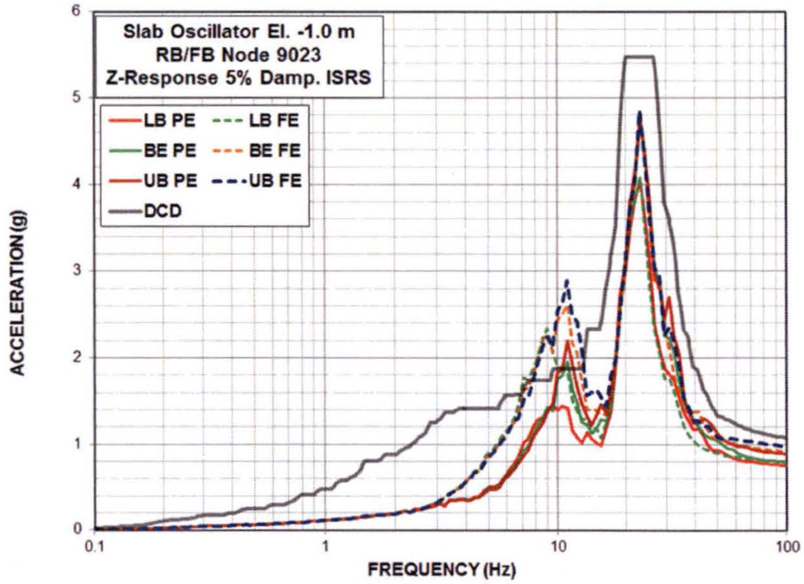

Figure F-6 Comparison of ISRS - Oscillator Node 9023Z

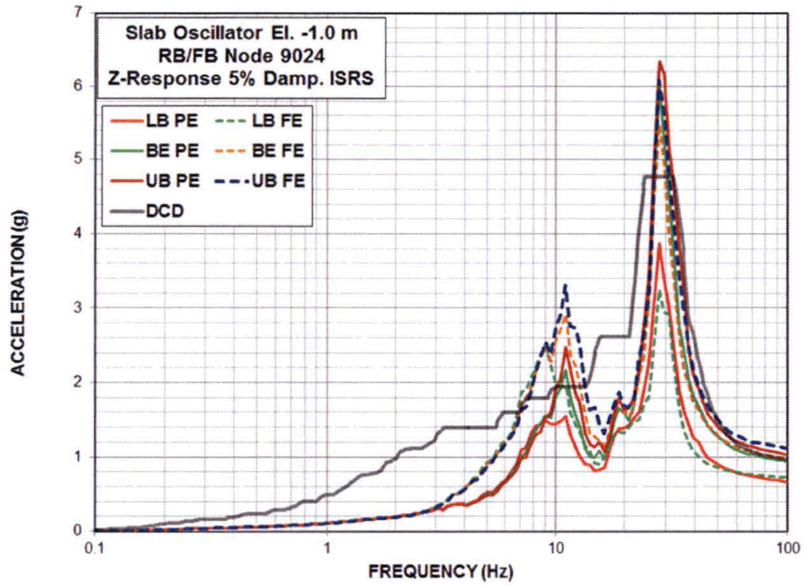

Figure F-7 Comparison of ISRS - Oscillator Node 9024Z

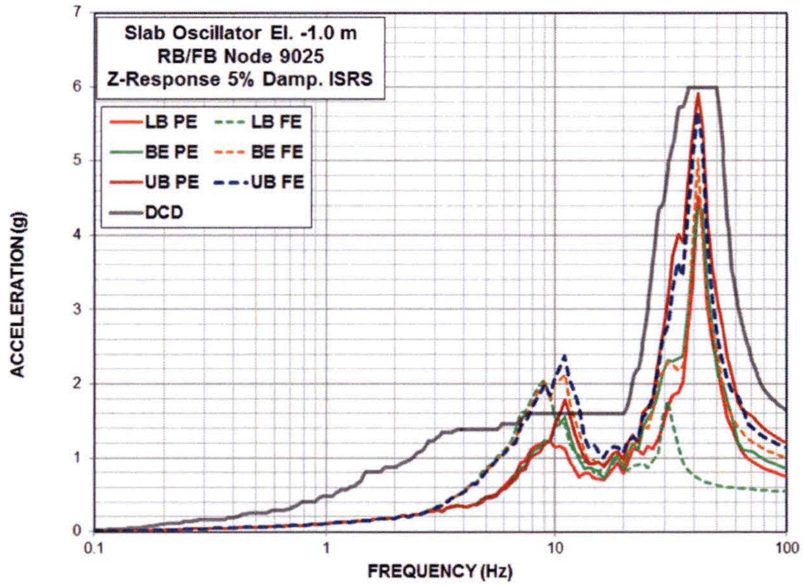

Figure F-8 Comparison of ISRS - Oscillator Node 9025Z

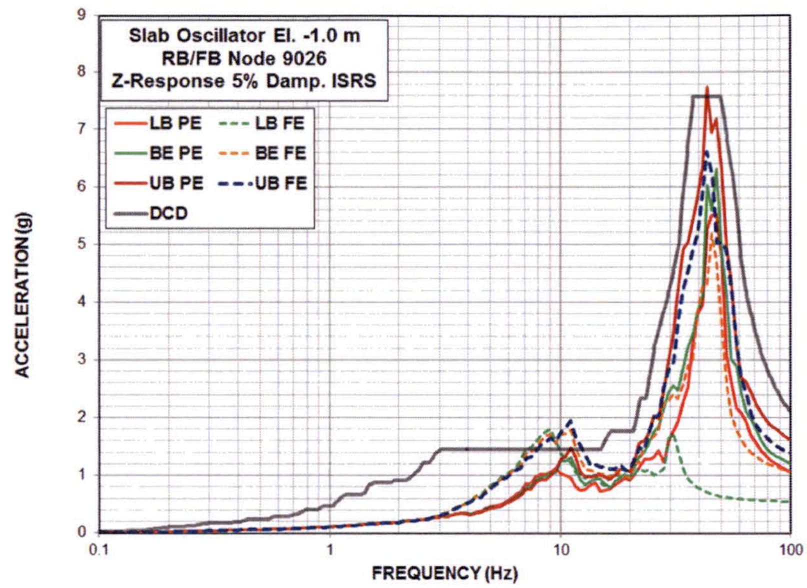

Figure F-9 Comparison of ISRS - Oscillator Node 9026Z

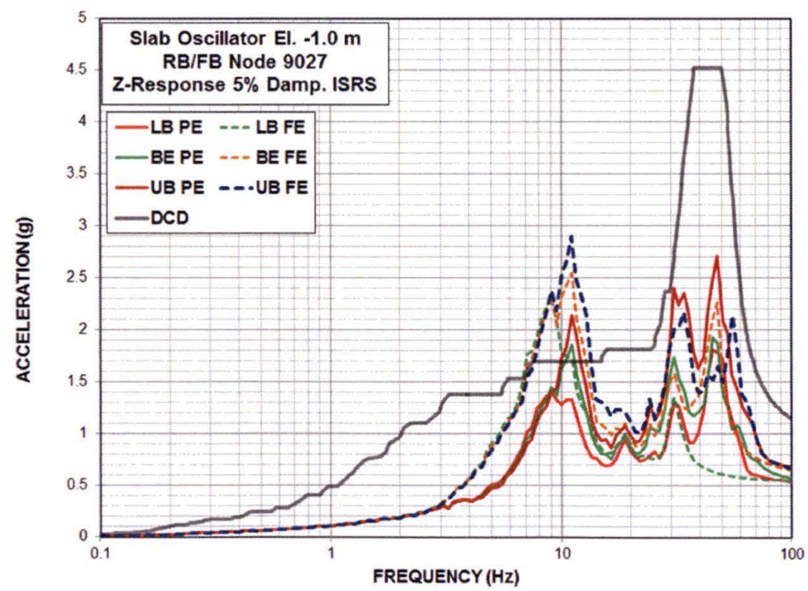

Figure F-10 Comparison of ISRS - Oscillator Node 9027Z

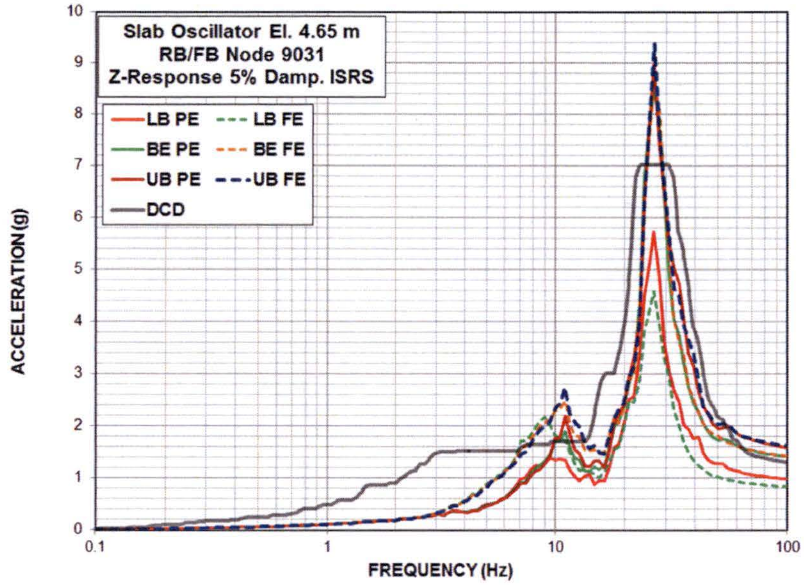

Figure F-11 Comparison of ISRS - Oscillator Node 9031Z

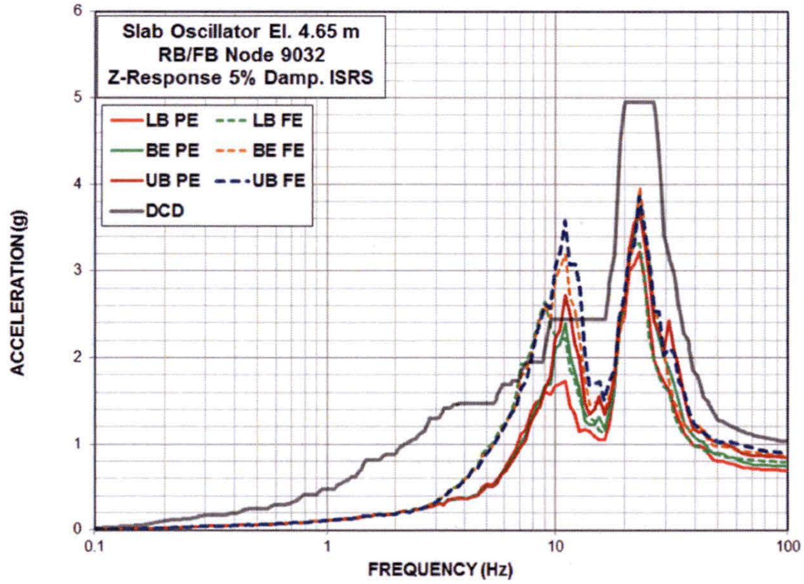

Figure F-12 Comparison of ISRS - Oscillator Node 9032Z

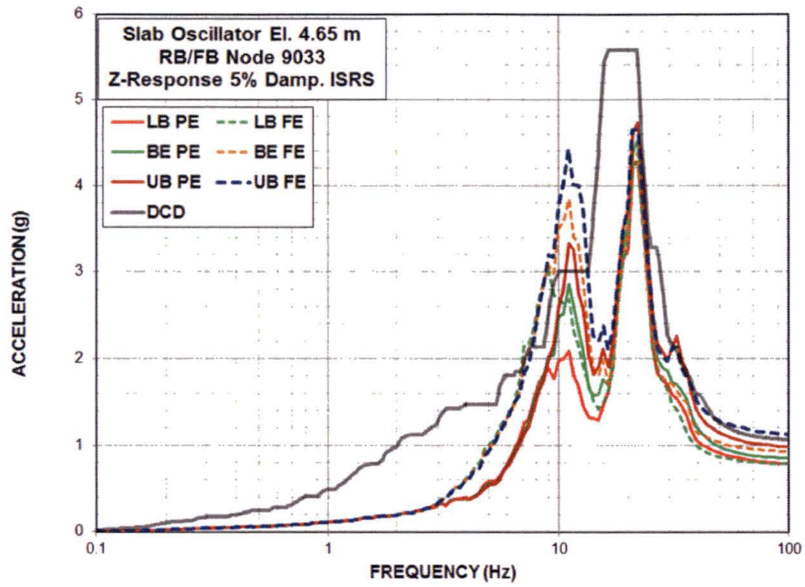

Figure F-13 Comparison of ISRS - Oscillator Node 9033Z

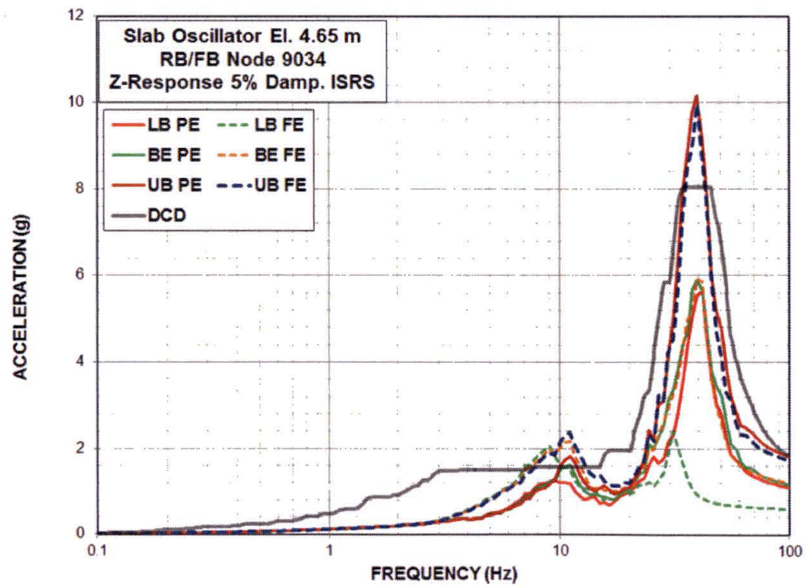

Figure F-14 Comparison of ISRS - Oscillator Node 9034Z

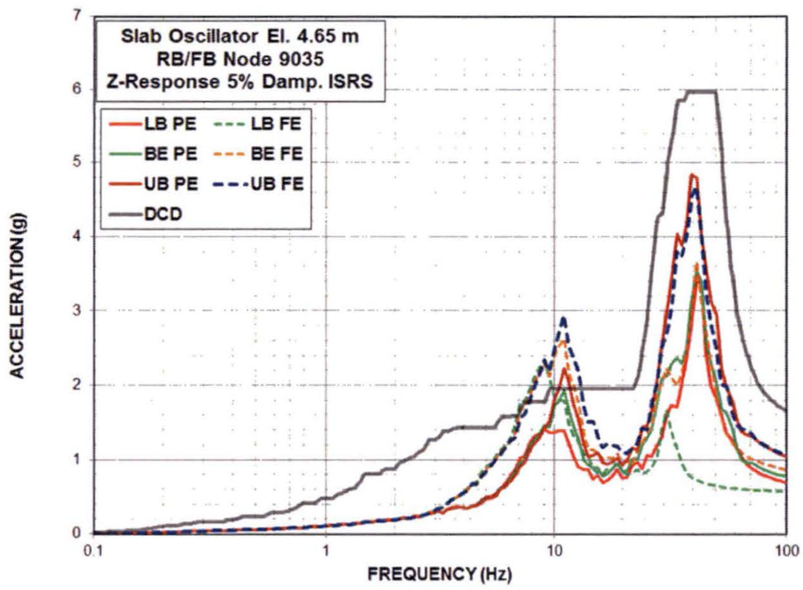

Figure F-15 Comparison of ISRS - Oscillator Node 9035Z

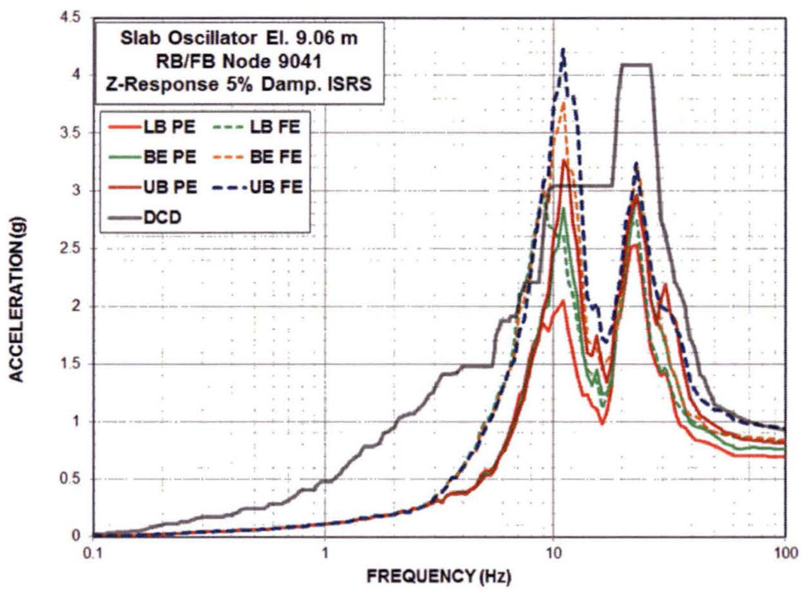

Figure F-16 Comparison of ISRS - Oscillator Node 9041Z

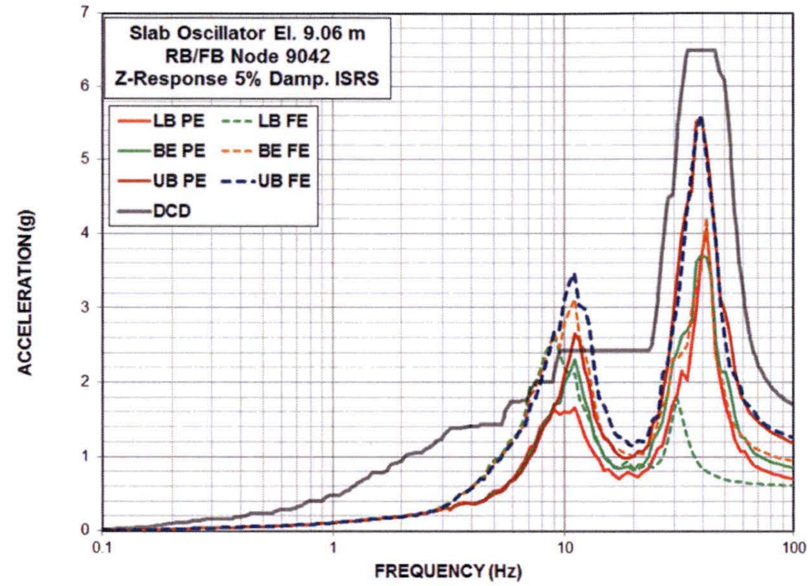

Figure F-17 Comparison of ISRS - Oscillator Node 9042Z

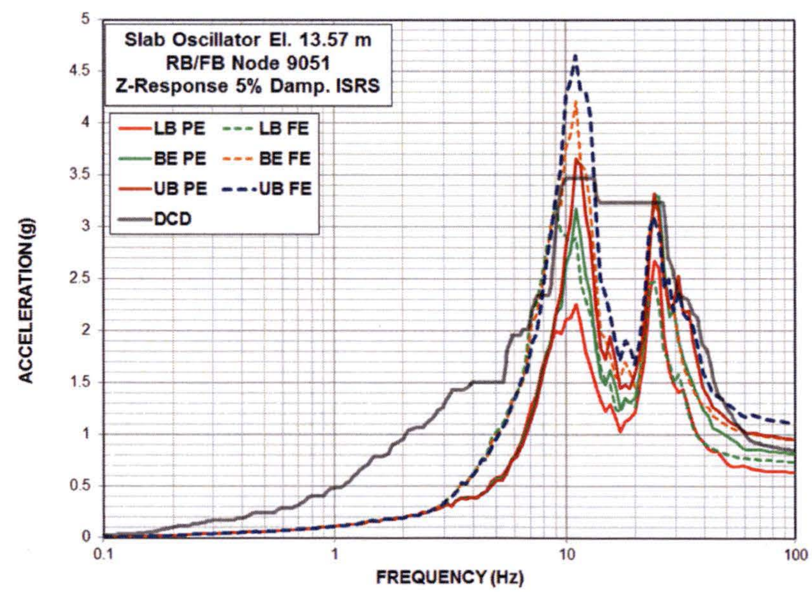

Figure F-18 Comparison of ISRS - Oscillator Node 9051Z

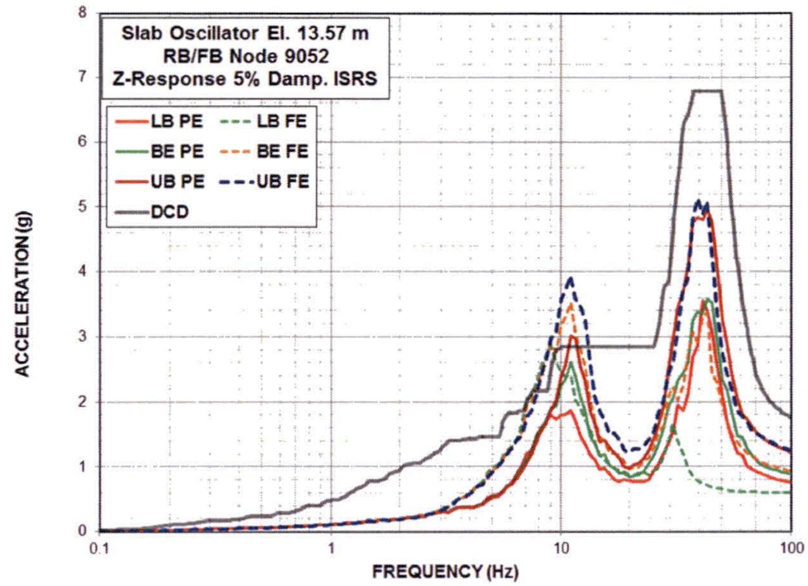

Figure F-19 Comparison of ISRS - Oscillator Node 9052Z

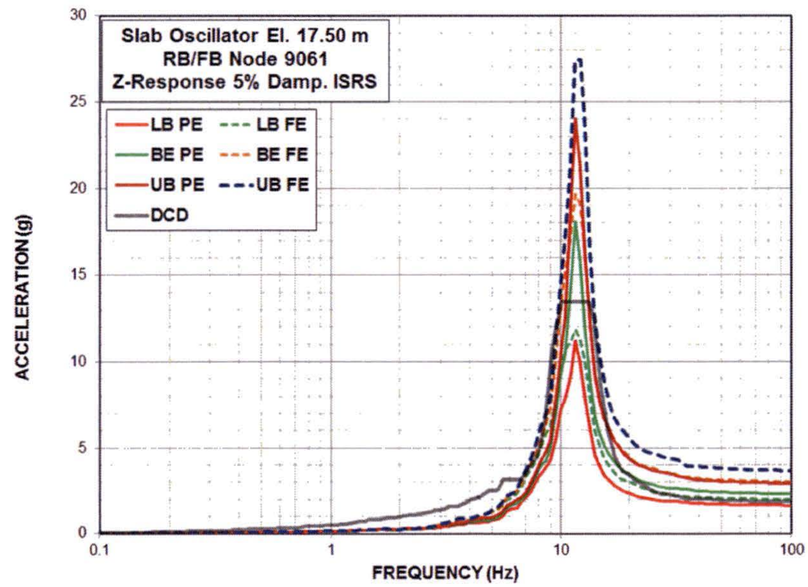

Figure F-20 Comparison of ISRS - Oscillator Node 9061Z

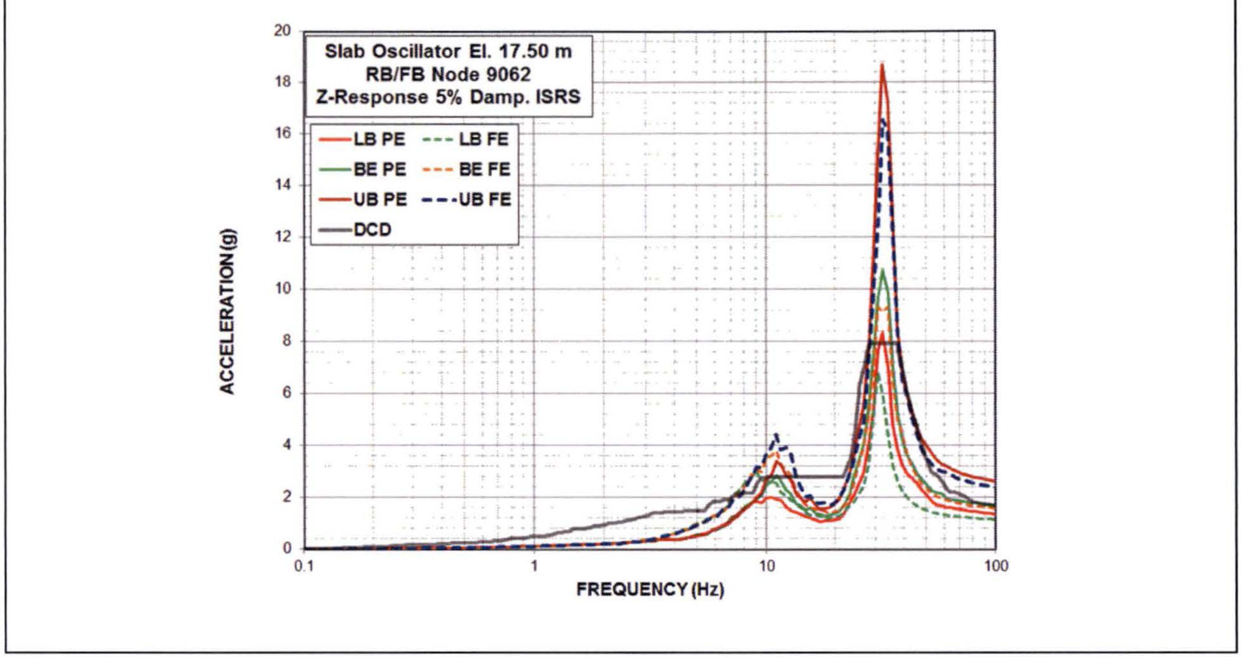

Figure F-21 Comparison of ISRS - Oscillator Node 9062Z

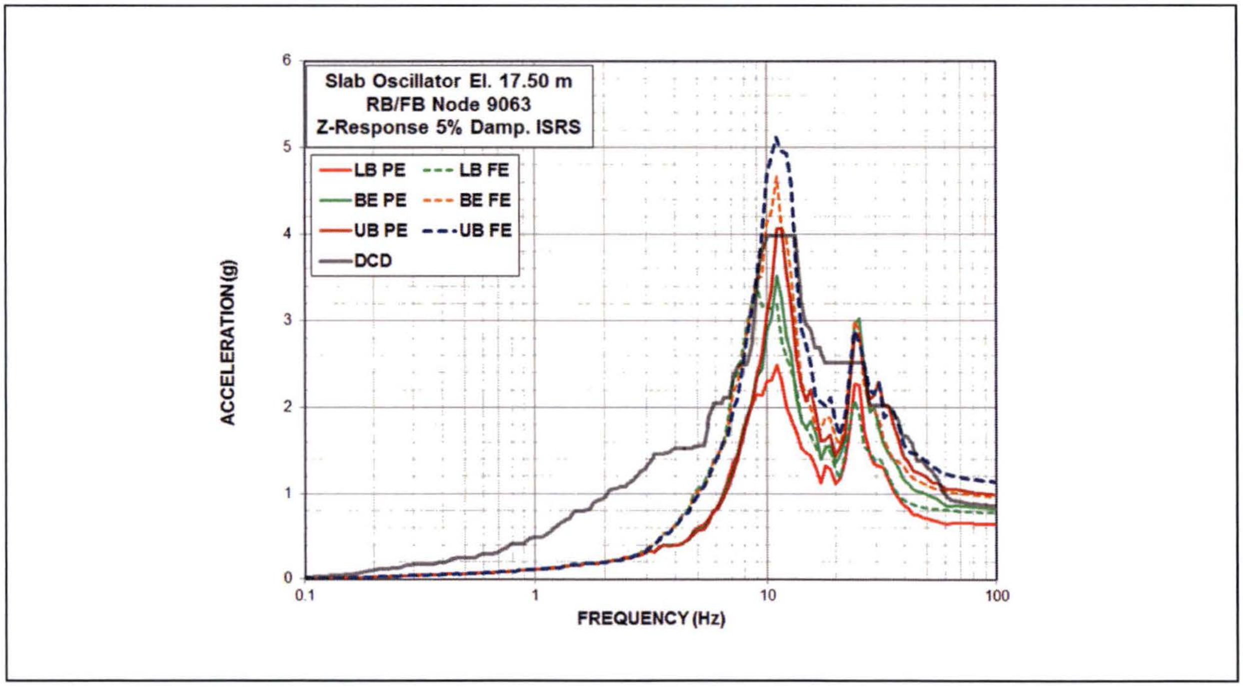

Figure F-22 Comparison of ISRS - Oscillator Node 9063Z

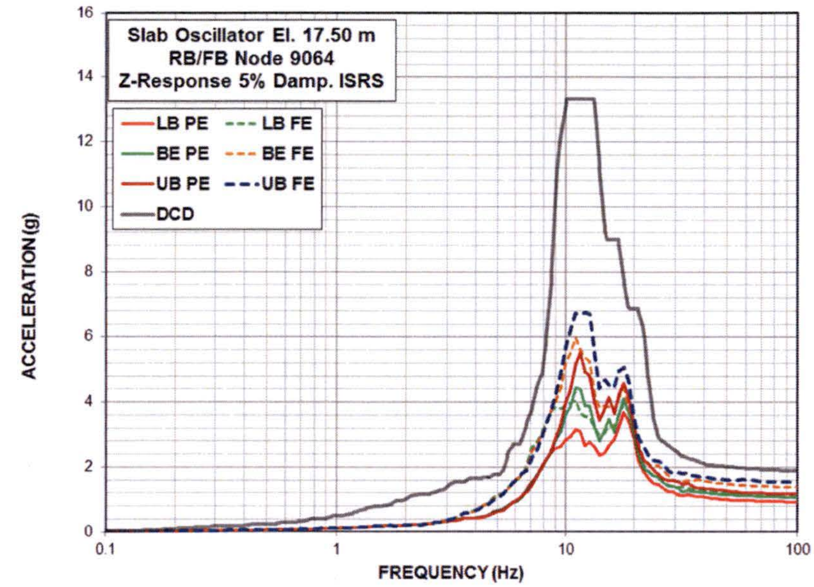

Figure F-23 Comparison of ISRS - Oscillator Node 9064Z

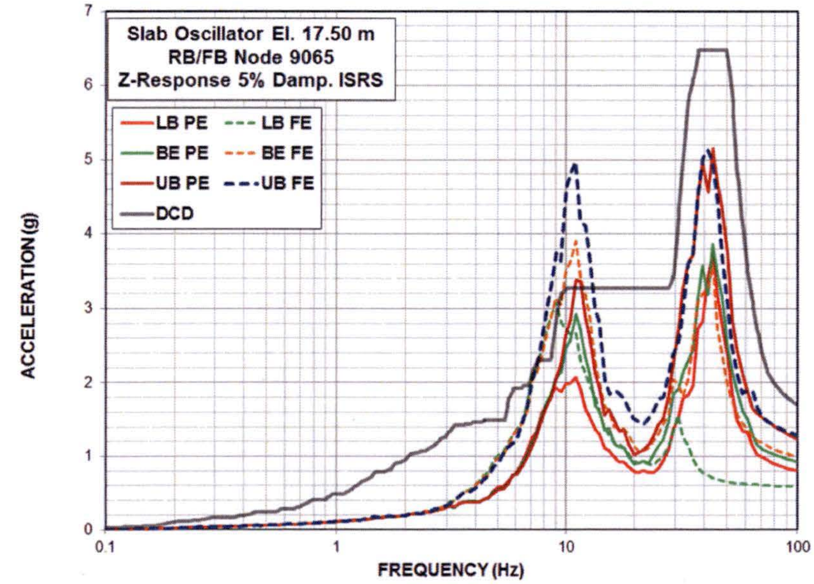

Figure F-24 Comparison of ISRS - Oscillator Node 9065Z

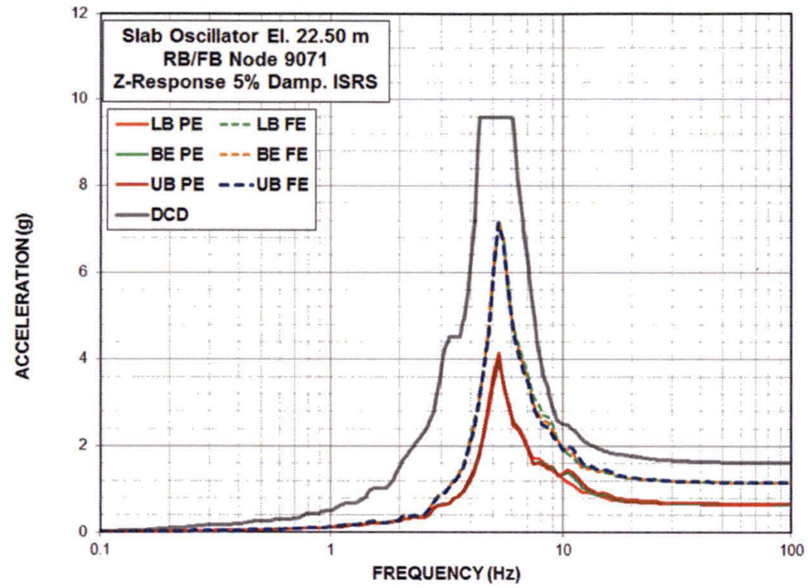

Figure F-25 Comparison of ISRS - Oscillator Node 9071Z

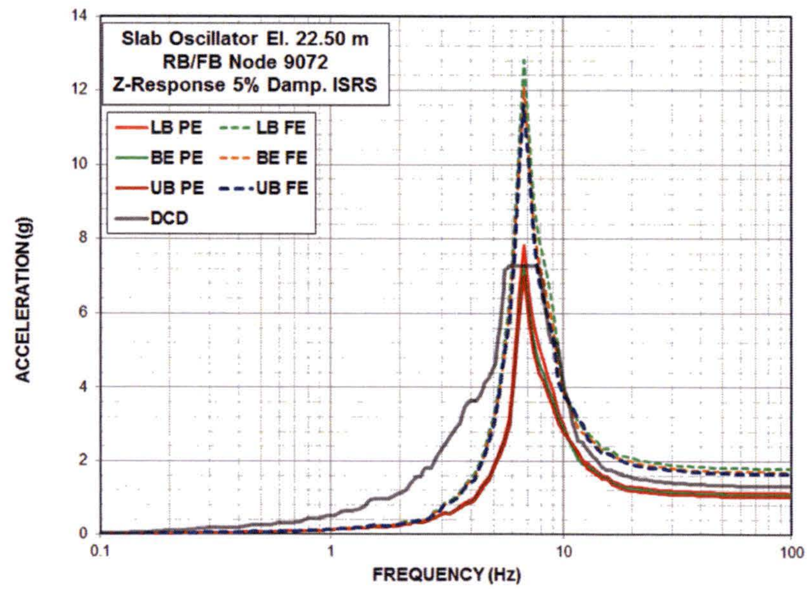

Figure F-26 Comparison of ISRS - Oscillator Node 9072Z

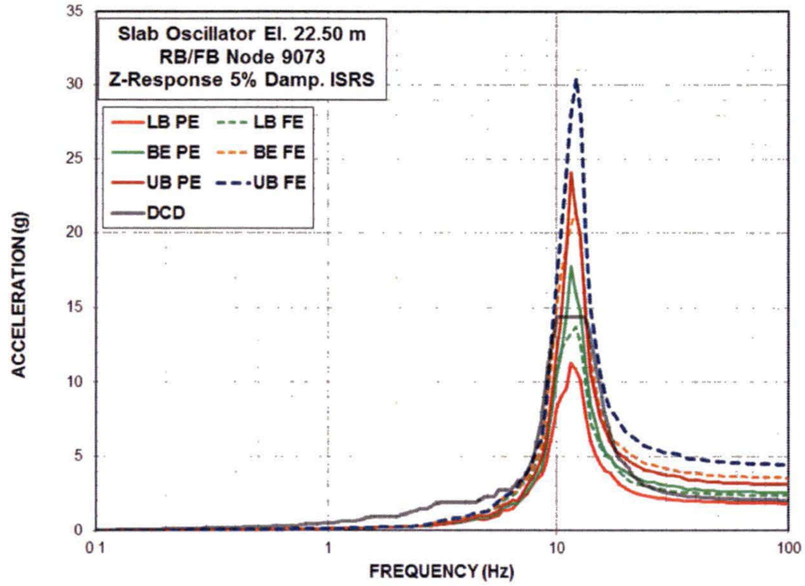

Figure F-27 Comparison of ISRS - Oscillator Node 9073Z

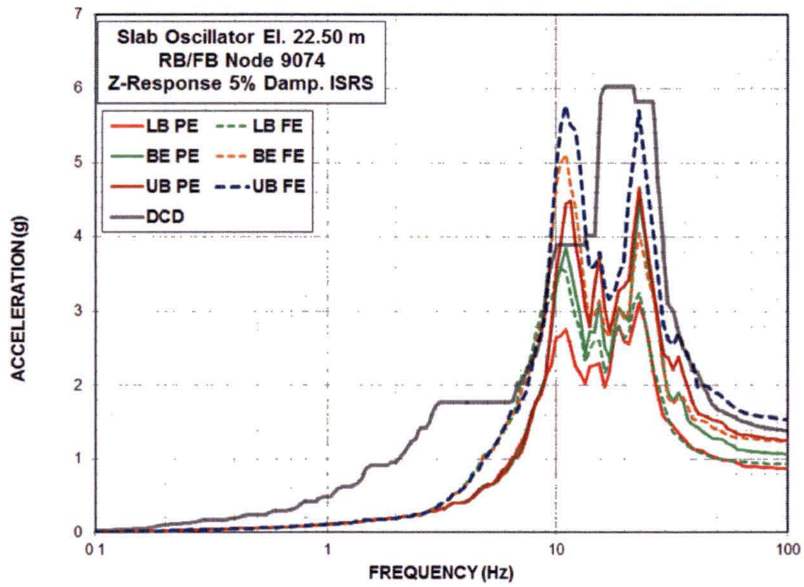

Figure F-28 Comparison of ISRS - Oscillator Node 9074Z

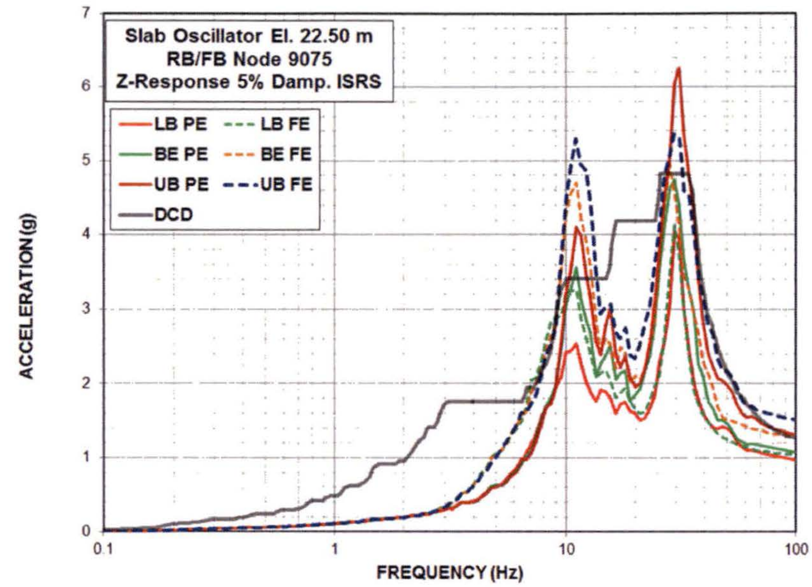

Figure F-29 Comparison of ISRS - Oscillator Node 9075Z

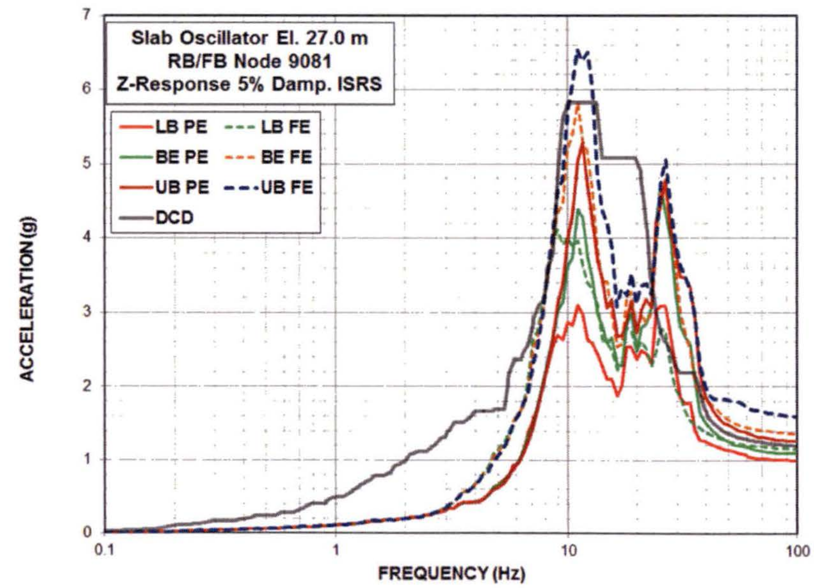

Figure F-30 Comparison of ISRS - Oscillator Node 9081Z

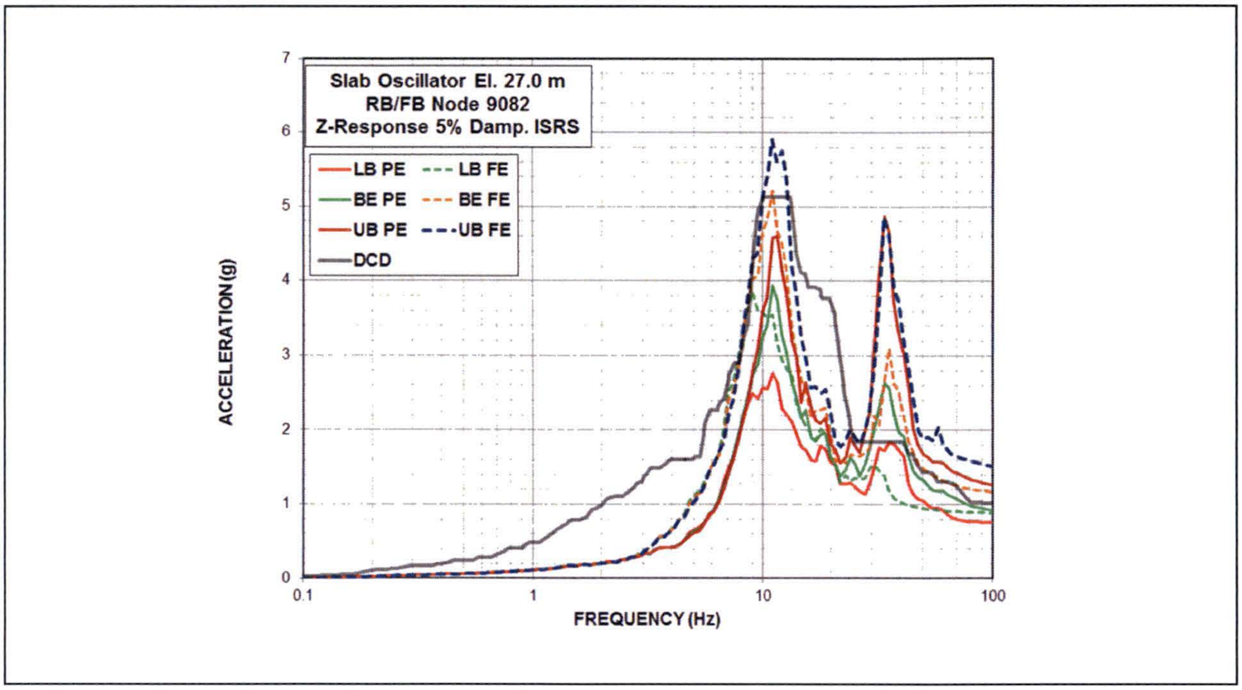

Figure F-31 Comparison of ISRS - Oscillator Node 9082Z

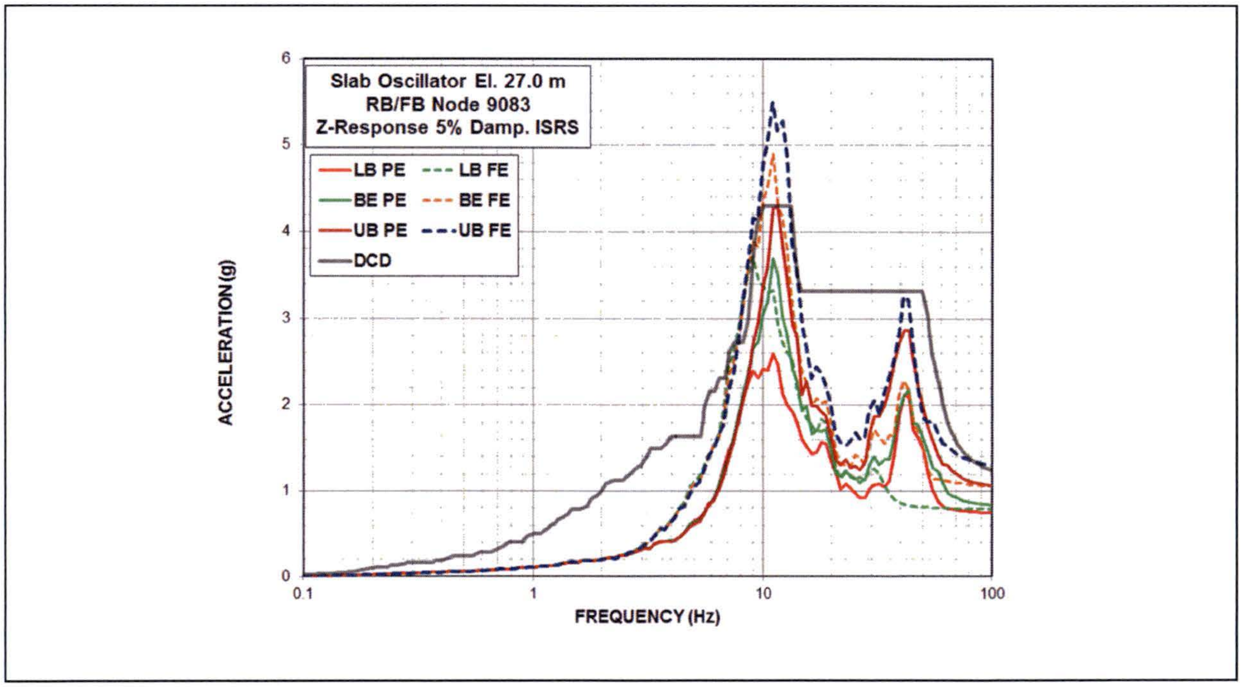

Figure F-32 Comparison of ISRS - Oscillator Node 9083Z

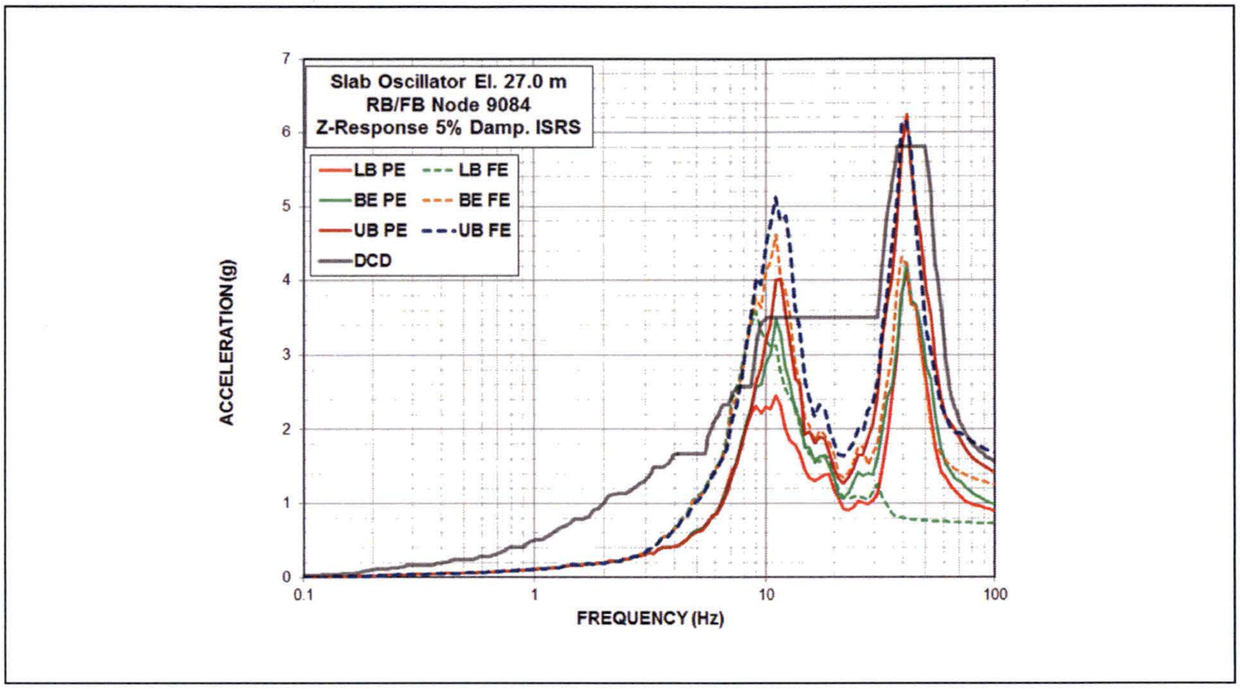

Figure F-33 Comparison of ISRS - Oscillator Node 9084Z

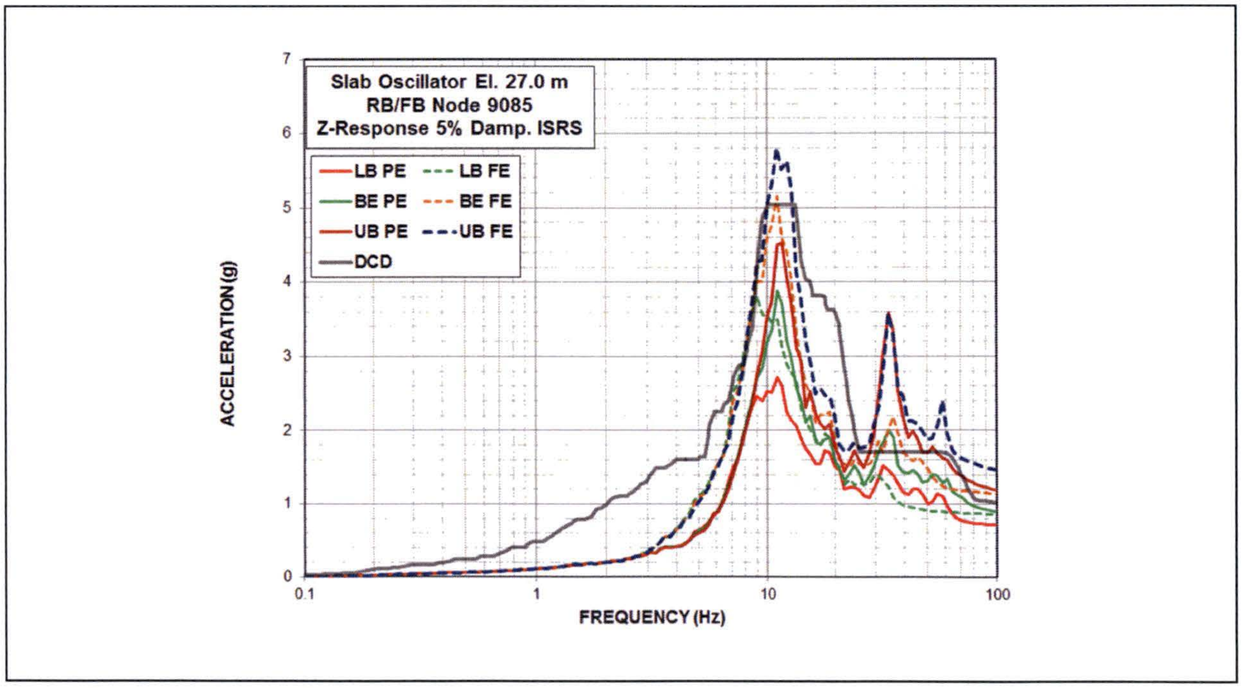

Figure F-34 Comparison of ISRS - Oscillator Node 9085Z

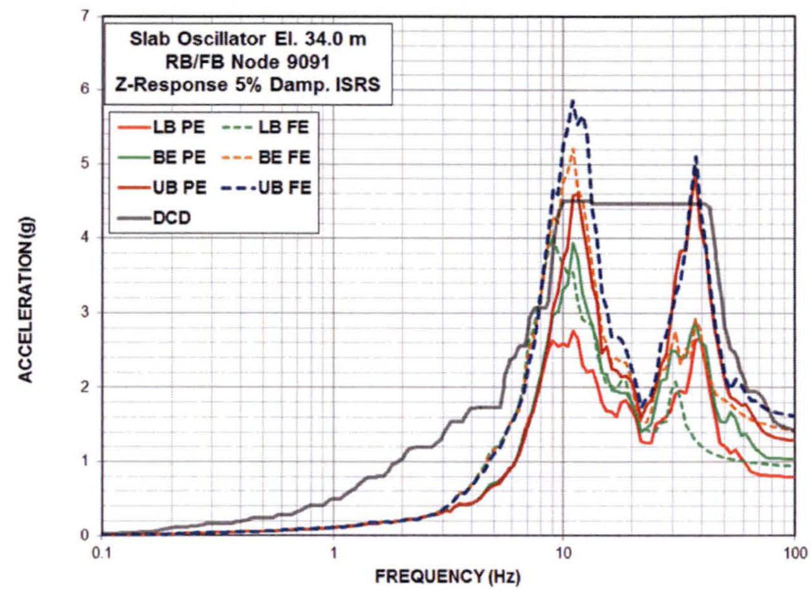

Figure F-35 Comparison of ISRS - Oscillator Node 9091Z

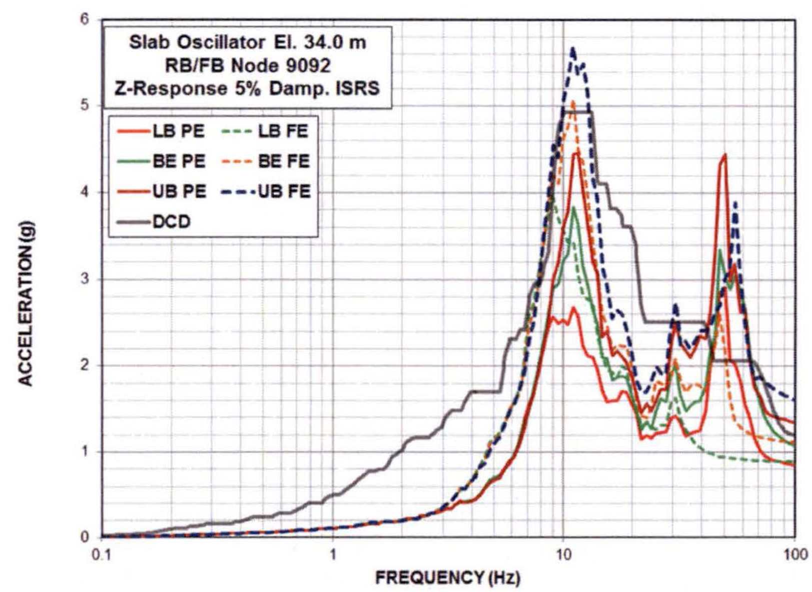

Figure F-36 Comparison of ISRS - Oscillator Node 9092Z

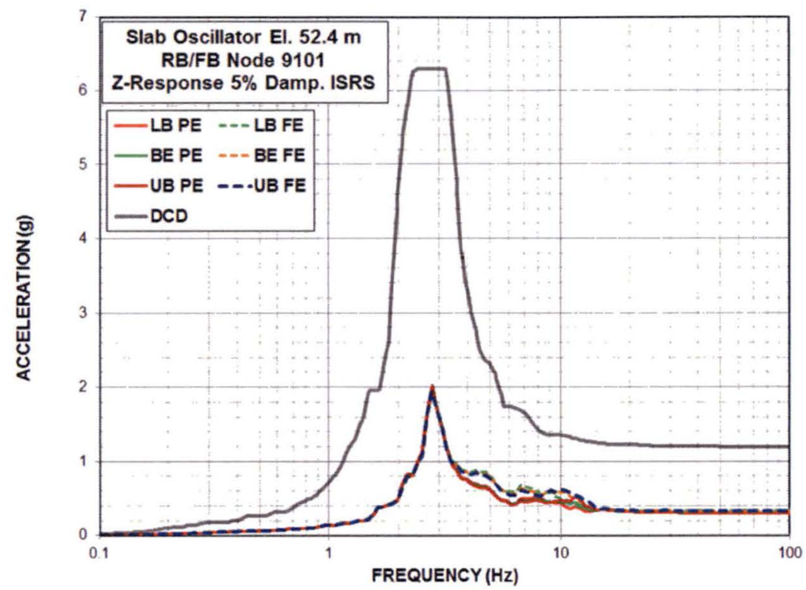

Figure F-37 Comparison of ISRS - Oscillator Node 9101Z

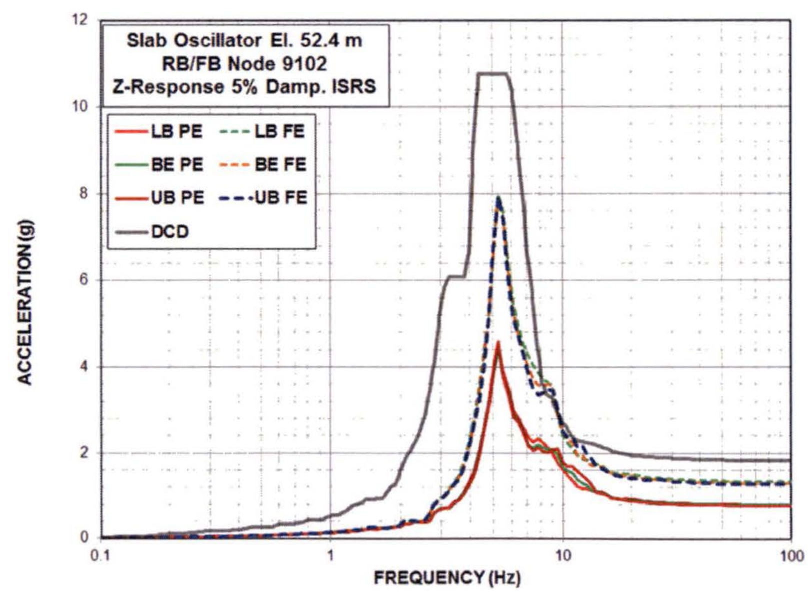

Figure F-38 Comparison of ISRS - Oscillator Node 9102Z

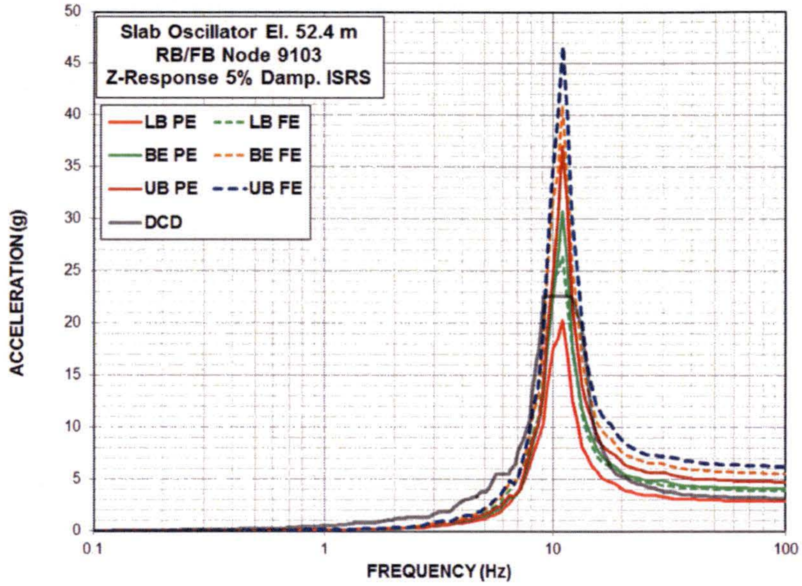

Figure F-39 Comparison of ISRS - Oscillator Node 9103Z

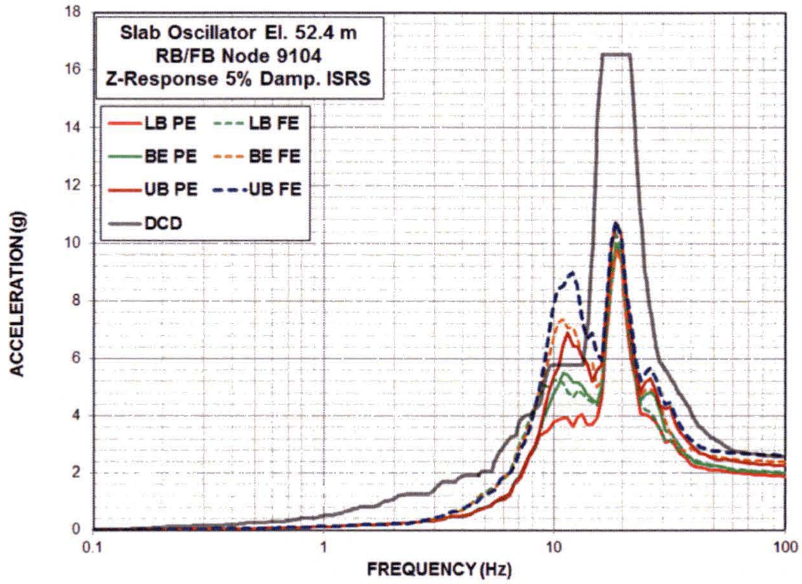

Figure F-40 Comparison of ISRS - Oscillator Node 9104Z

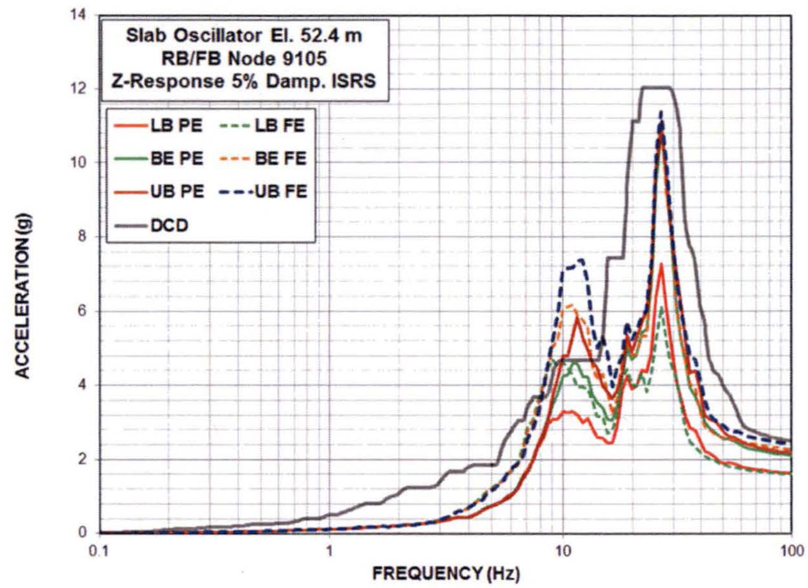

Figure F-41 Comparison of ISRS - Oscillator Node 9105Z

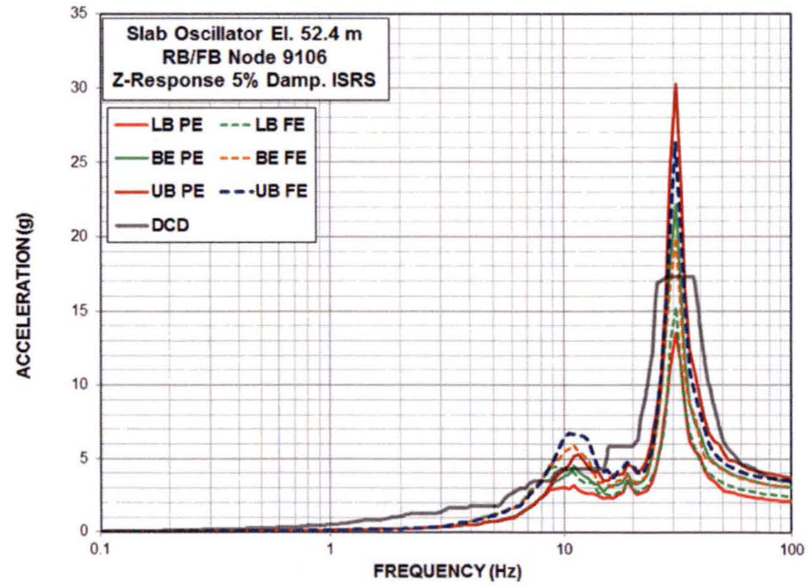

Figure F-42 Comparison of ISRS - Oscillator Node 9106Z

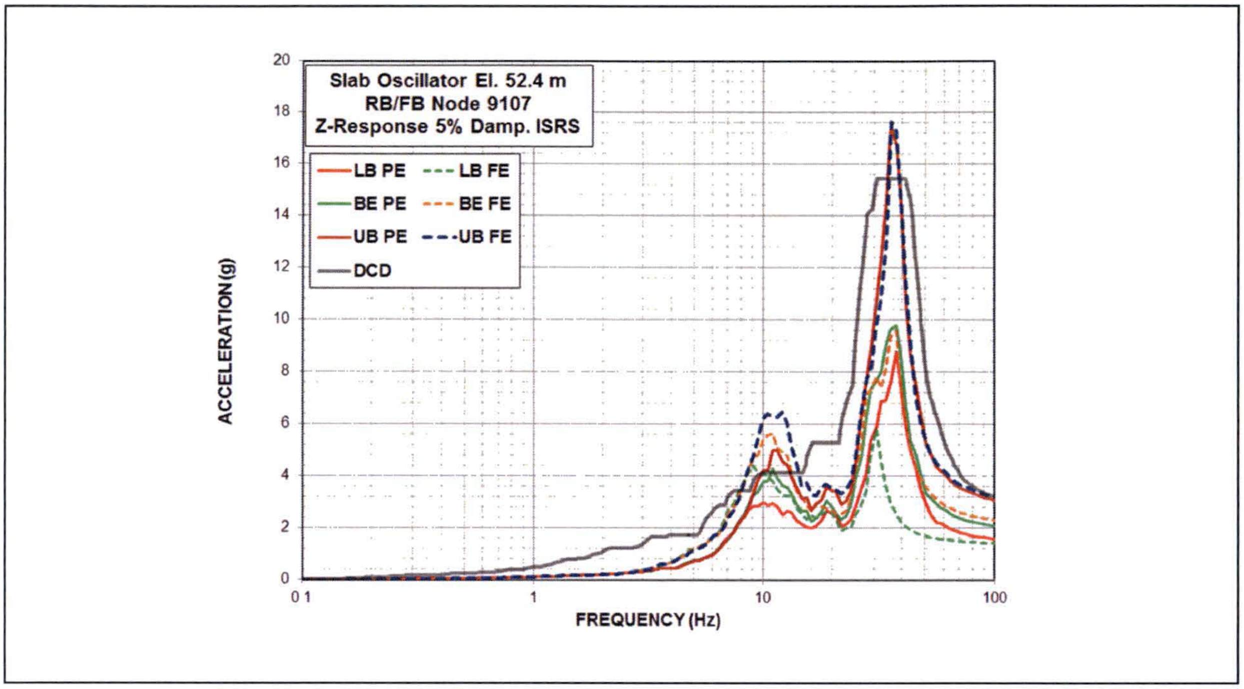

Figure F-43 Comparison of ISRS - Oscillator Node 9107Z

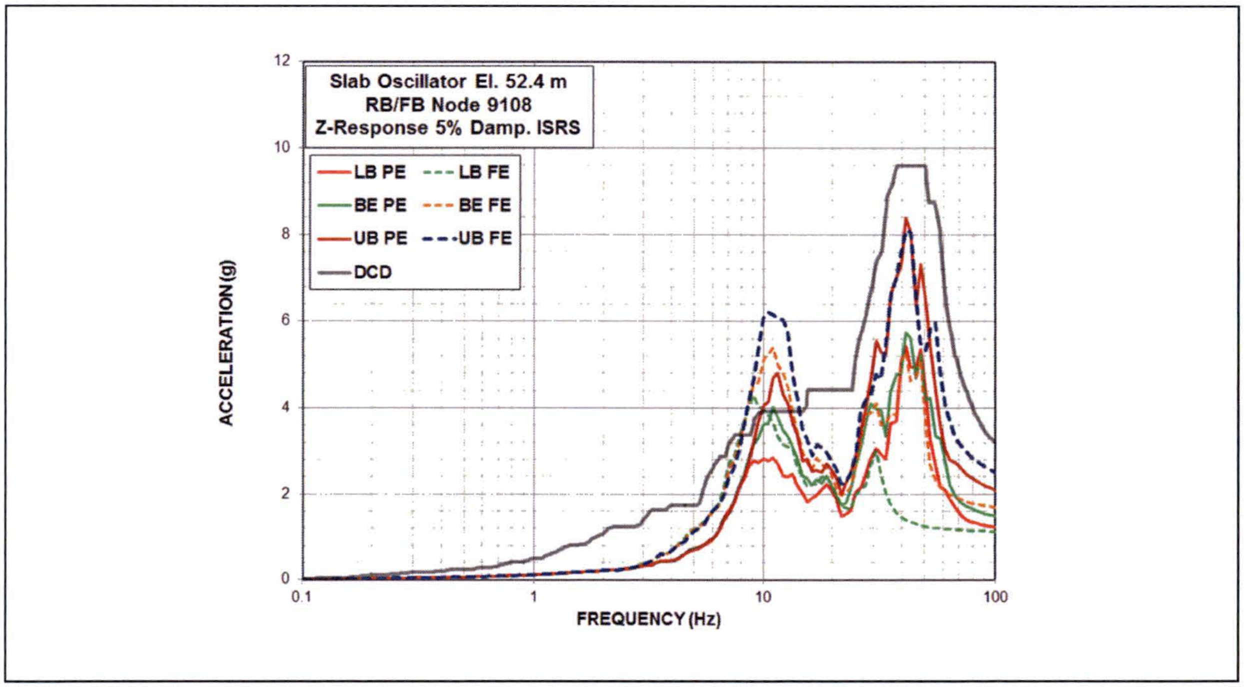

Figure F-44 Comparison of ISRS - Oscillator Node 9108Z

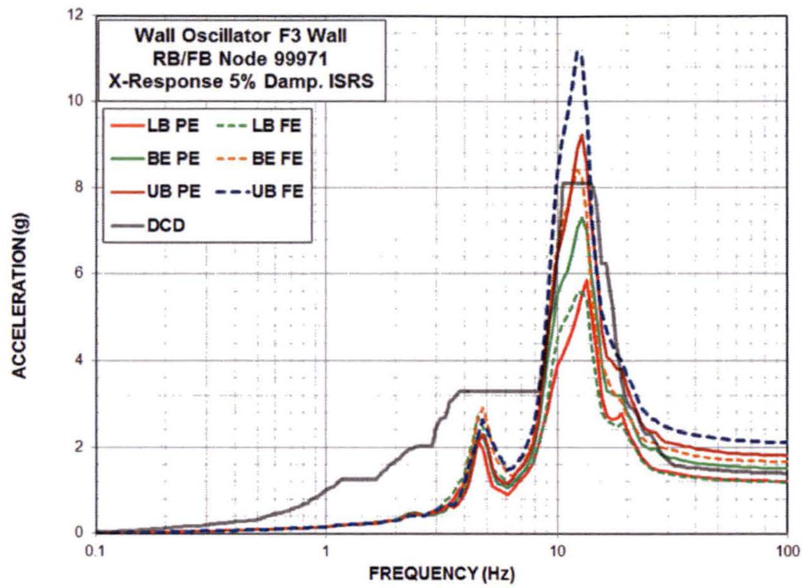

Figure F-45 Comparison of ISRS - Oscillator Node 99971 X

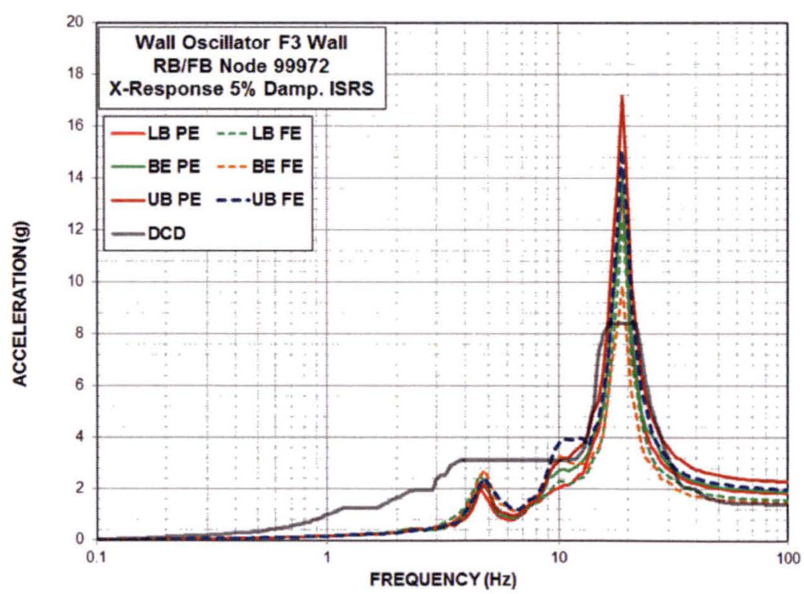

Figure F-46 Comparison of ISRS - Oscillator Node 99972 X

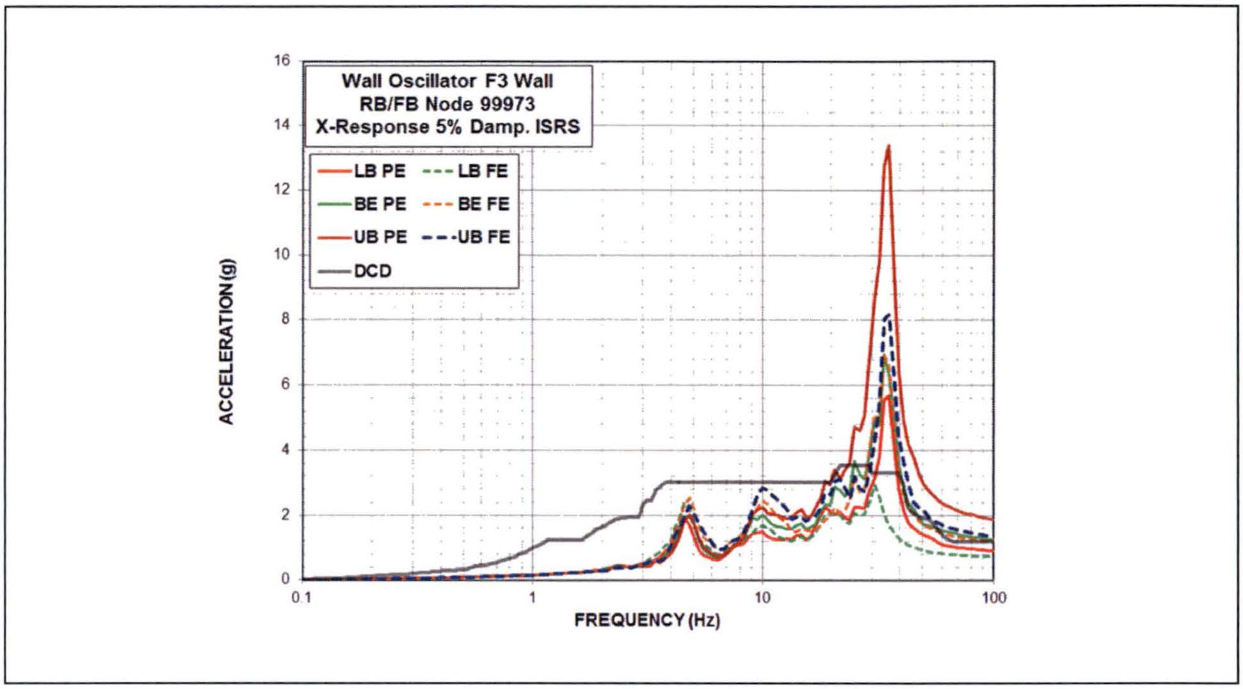

Figure F-47 Comparison of ISRS - Oscillator Node 99973 X

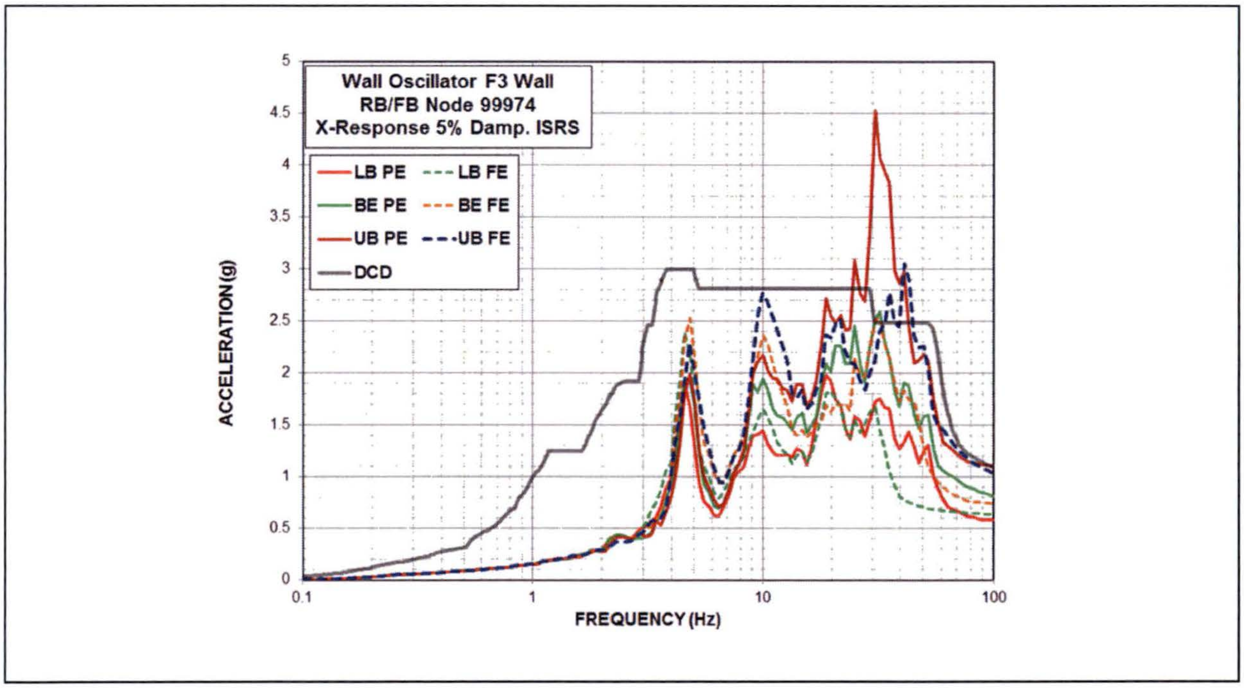

Figure F-48 Comparison of ISRS - Oscillator Node 99974 X

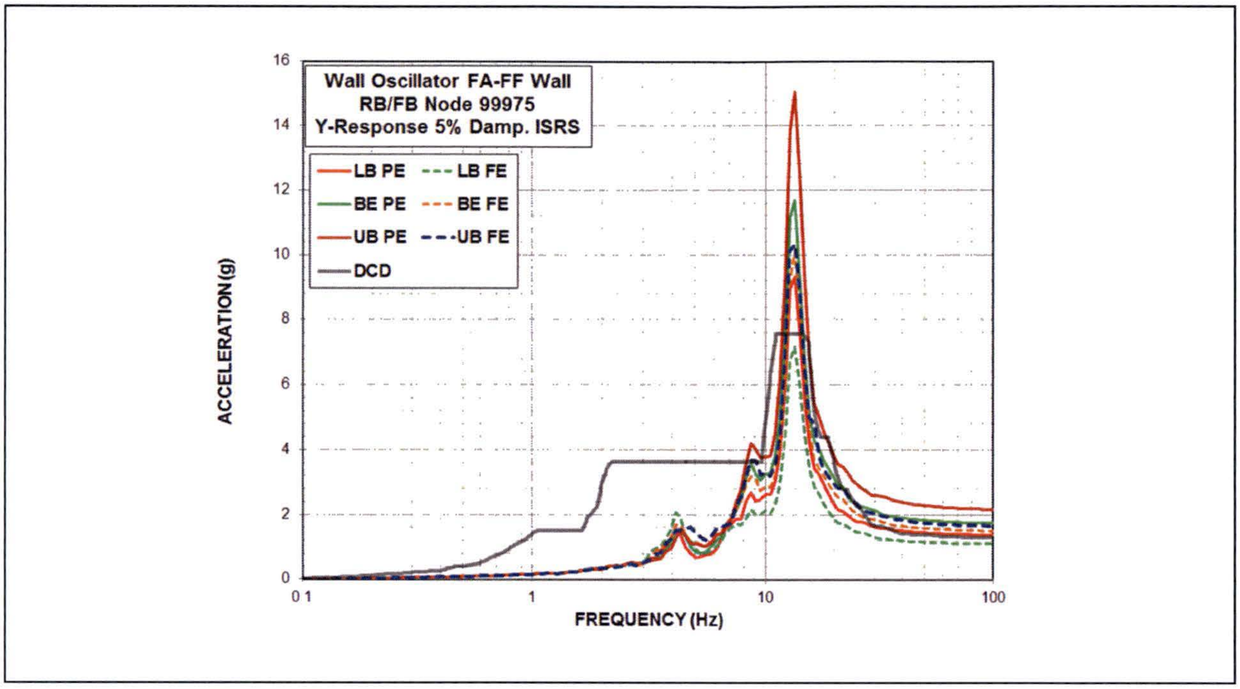

Figure F-49 Comparison of ISRS - Oscillator Node 99975 Y

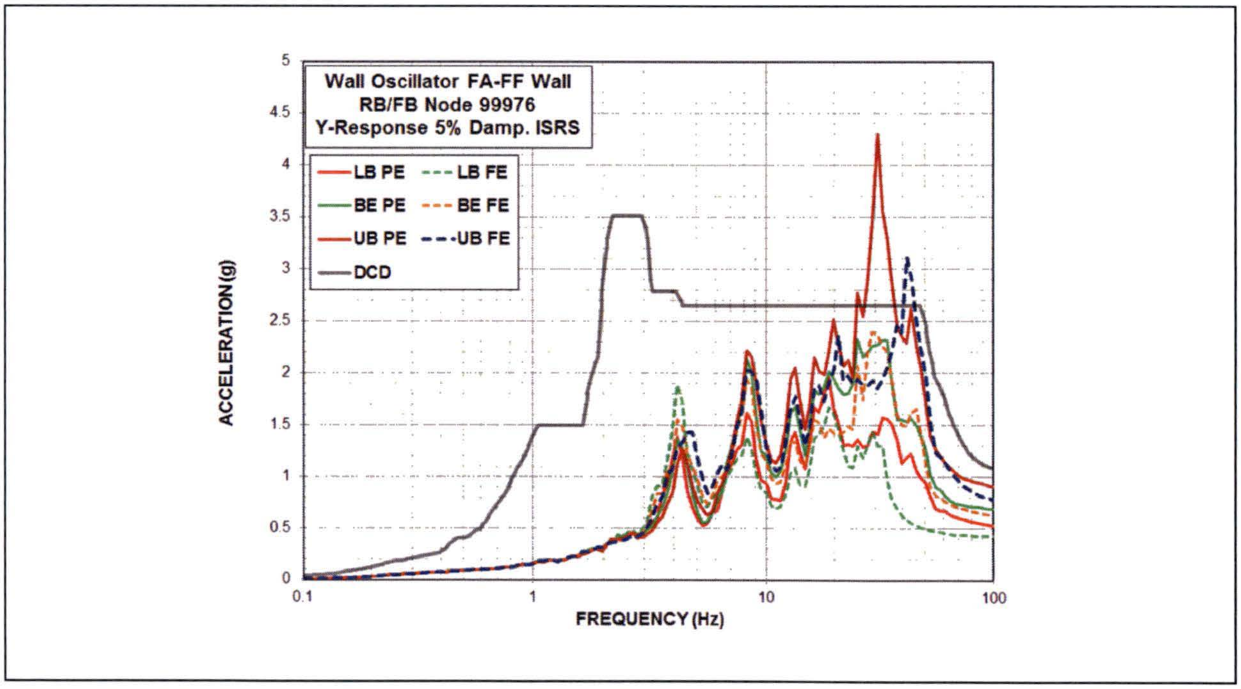

Figure F-50 Comparison of ISRS - Oscillator Node 99976 Y

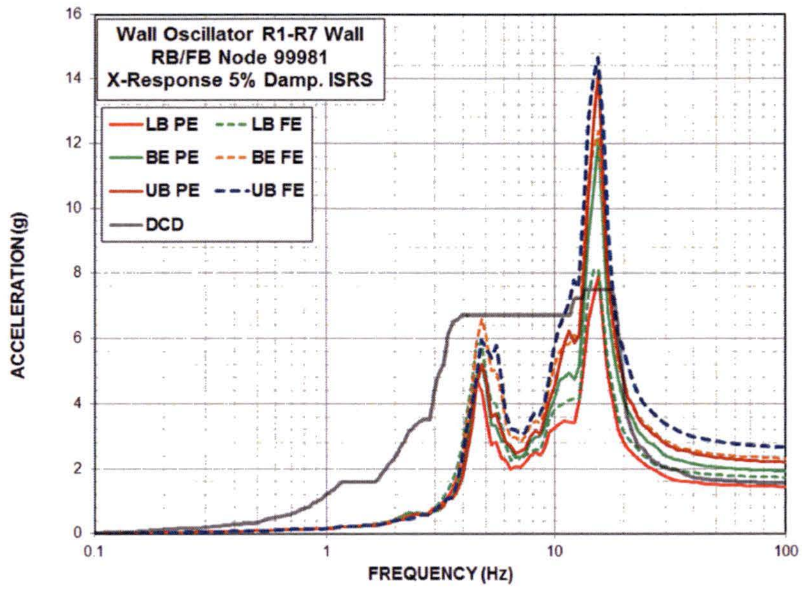

Figure F-51 Comparison of ISRS - Oscillator Node 99981 X

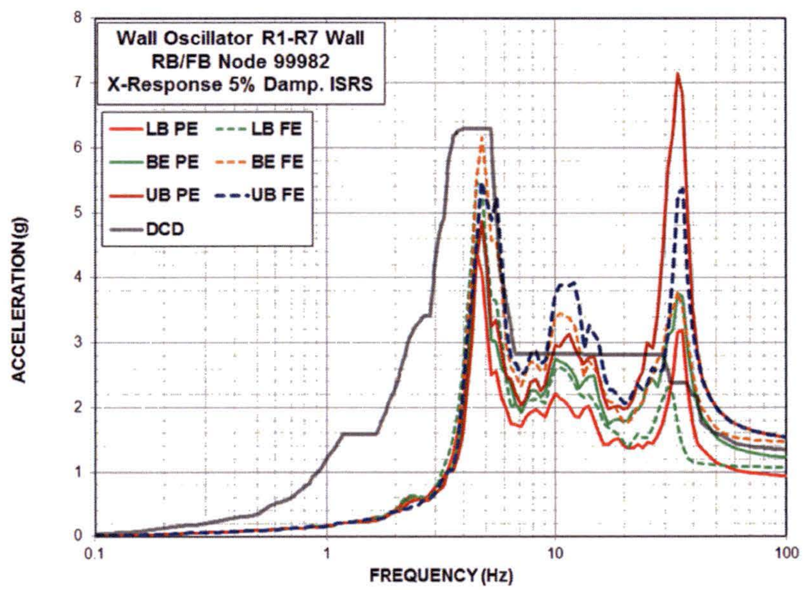

Figure F-52 Comparison of ISRS - Oscillator Node 99982 X

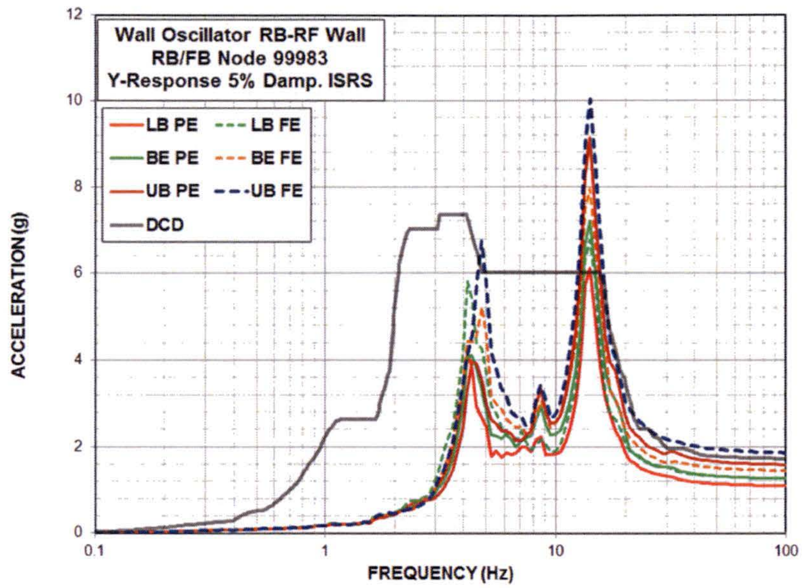

Figure F-53 Comparison of ISRS - Oscillator Node 99983 Y

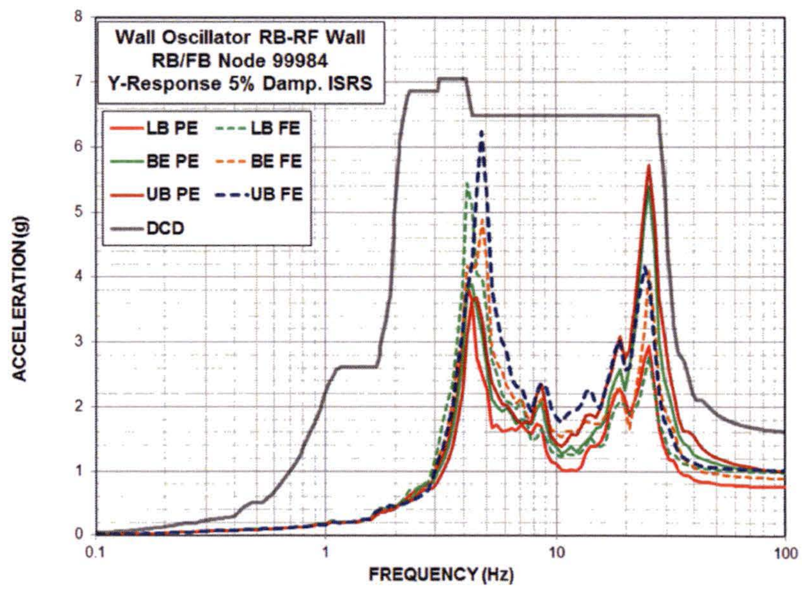

Figure F-54 Comparison of ISRS - Oscillator Node 99984 Y

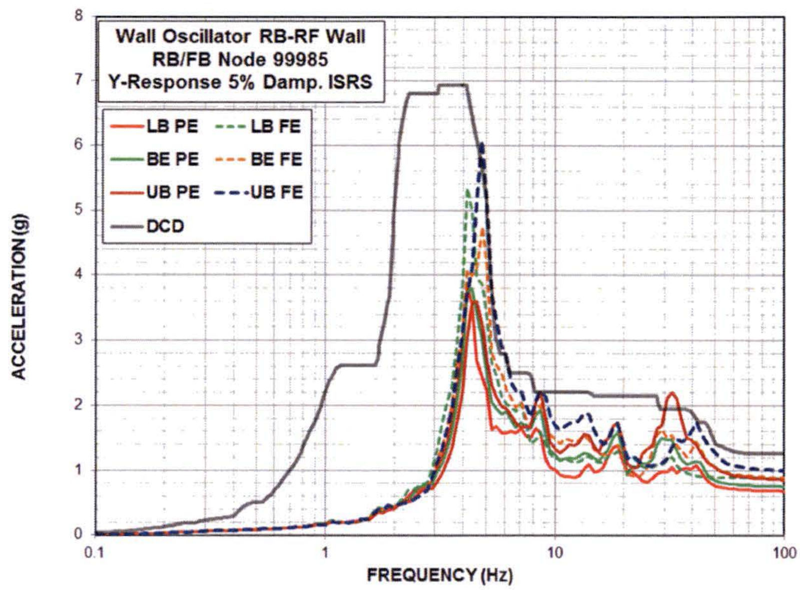

Figure F-55 Comparison of ISRS - Oscillator Node 99985 Y

APPENDIX G

Site-Specific SSI Models Node Mapping

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G.1 SCOPE

This Appendix describes the lists of the correlation of node numbers between DCD stick model shown on Fig. 4.3-2 and actually used SASSI model.

Table G-1 Correlation of Node Numbers between DCD and SASSI Stick Model

DCD	SASSI	
1	10	Mat
2	20	
101	110	RB/FB
102	120	
103	130	
104	140	
105	150	
106	160	
107	170	
108	180	
109	190	
110	200	
201	210	RCCV
202	220	
203	230	
204	240	
205	250	
206	260	
208	280	
209	290	
301	310	Pedestal
376	320	
302	330	
377	340	
303	350	
701	701	
702	702	
703	703	
704	704	
705	705	
706	706	
707	707	RSW
708	708	
709	709	
710	710	
711	711	
712	712	
713	713	
714	714	
715	715	

DCD	SASSI	
801	801	RPV
802	802	
803	803	
804	804	
805	805	
806	806	
807	807	
808	808	
809	809	
810	810	
811	811	
812	812	
813	813	
814	814	
815	815	
816	816	
817	817	
818	818	
819	819	
820	820	
821	821	
822	822	
823	823	
824	824	
825	825	
826	826	
827	827	
828	828	
829	829	
830	830	
831	831	
832	832	
833	833	
834	834	
835	835	
836	836	

DCD	SASSI	
837	837	RPV
838	838	
839	839	
840	840	
841	841	
842	842	
843	843	
844	844	
845	845	
846	846	
847	847	
848	848	
849	849	
850	850	
851	851	
852	852	
853	853	
854	854	
855	855	
856	856	
857	857	
858	858	
859	859	
860	860	
861	861	
862	862	
863	863	
864	864	
865	865	
866	866	
867	867	
868	868	
869	869	
870	870	
871	871	
872	872	

Table G-1 Correlation of Node Numbers between DCD and SASSI Stick Model (Continued)

DCD	SASSI	
9101	901	Slab Oscillator
9102	902	
9103	903	
9104	904	
9105	905	
9106	906	
9107	907	
9108	908	
9011	911	
9012	912	
9013	913	
9021	921	
9022	922	
9023	923	
9024	924	
9025	925	
9026	926	
9027	927	
9031	931	
9032	932	
9033	933	
9034	934	
9035	935	

DCD	SASSI	
9041	941	Slab Oscillator
9042	942	
9051	951	
9052	952	
9061	961	
9062	962	
9063	963	
9064	964	
9065	965	
9071	971	
9072	972	
9073	973	
9074	974	
9075	975	
9081	981	
9082	982	
9083	983	
9084	984	
9085	985	
9091	991	
9092	992	

DCD	SASSI	
99971	771	Wall Oscillator
99972	772	
99973	773	
99974	774	
99975	775	
99976	776	
99981	781	
99982	782	
99983	783	
99984	784	
99985	785	

APPENDIX H

Site Model Depth Sensitivity Study

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H.1 SCOPE

This appendix presents the results of sensitivity study performed on the RB/FB model for the BE partial column subgrade profile to demonstrate that the selected total depths of the site models used for the site-specific SSI analyses are appropriate and achieve sufficient accuracy of the site-specific SSI analysis results.

H.2 ANALYSES AND RESULTS

The effects of the model lower boundary are evaluated by comparing transfer function and 5% damped ISRS results obtained from the analyses of the RB/FB models that differ only in the location of the lower boundary. An additional 20 layers are inserted in the RB/FB model with BE partial column properties (analysis Case 2) between the bottom of the profile to the top of the half-space. This is done to increase the depth of the model lower boundary selected for the site specific SSI analysis by 100 m by lowering the depth of the half-space top surface from 167.3 m to 267.6 m. The properties assigned to the additional layers are the same as those of the half-space. Identical to the models used for the site-specific SSI analysis, 10 additional layers are used in the site model to simulate the half-space. The thickness of these layers varies with frequency as explained in Reference 2-x.

Figures H-1 through H-9 shown comparisons of transfer function results obtained from the analyses of two models with different lower boundary depths for the responses of the RB/FB at lower elevations which will be the most affected by the different lower boundary locations. The comparisons of 5% damped ISRS results for the responses at the same locations are presented in Figures H-10 through H-12. These comparisons show that the two models yield virtually identical results thus demonstrating that the lower boundary locations of the models used for the site-specific SSI analyses are adequate and do not affect the accuracy of the calculated SSI responses.

H.3 CONCLUSIONS

It is concluded that the selected depths of the model lower boundary in the site models used for the site-specific SSI analyses are appropriate and adequate.

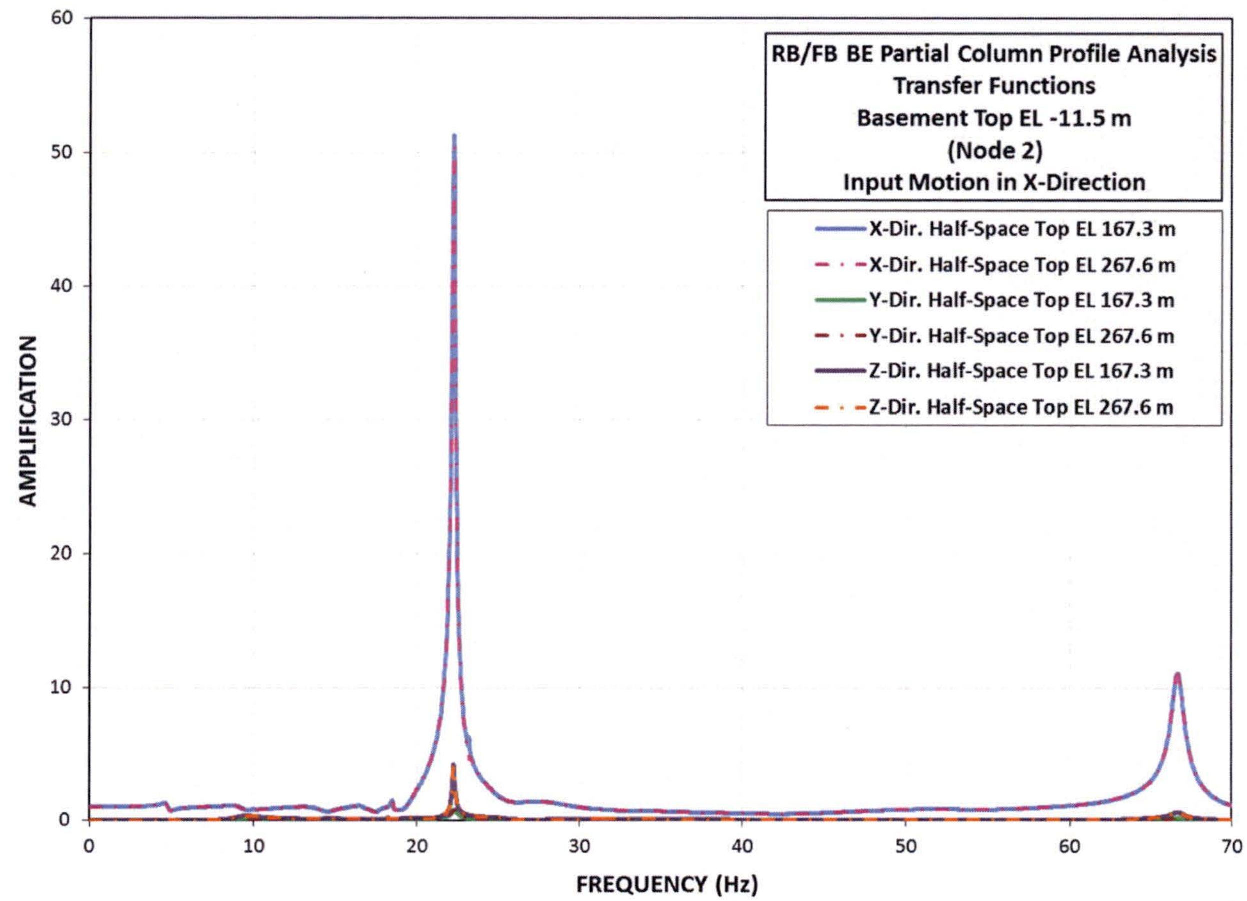

Figure H-1 Transfer Functions for RB/FB Basemat Response due to X-Direction Input

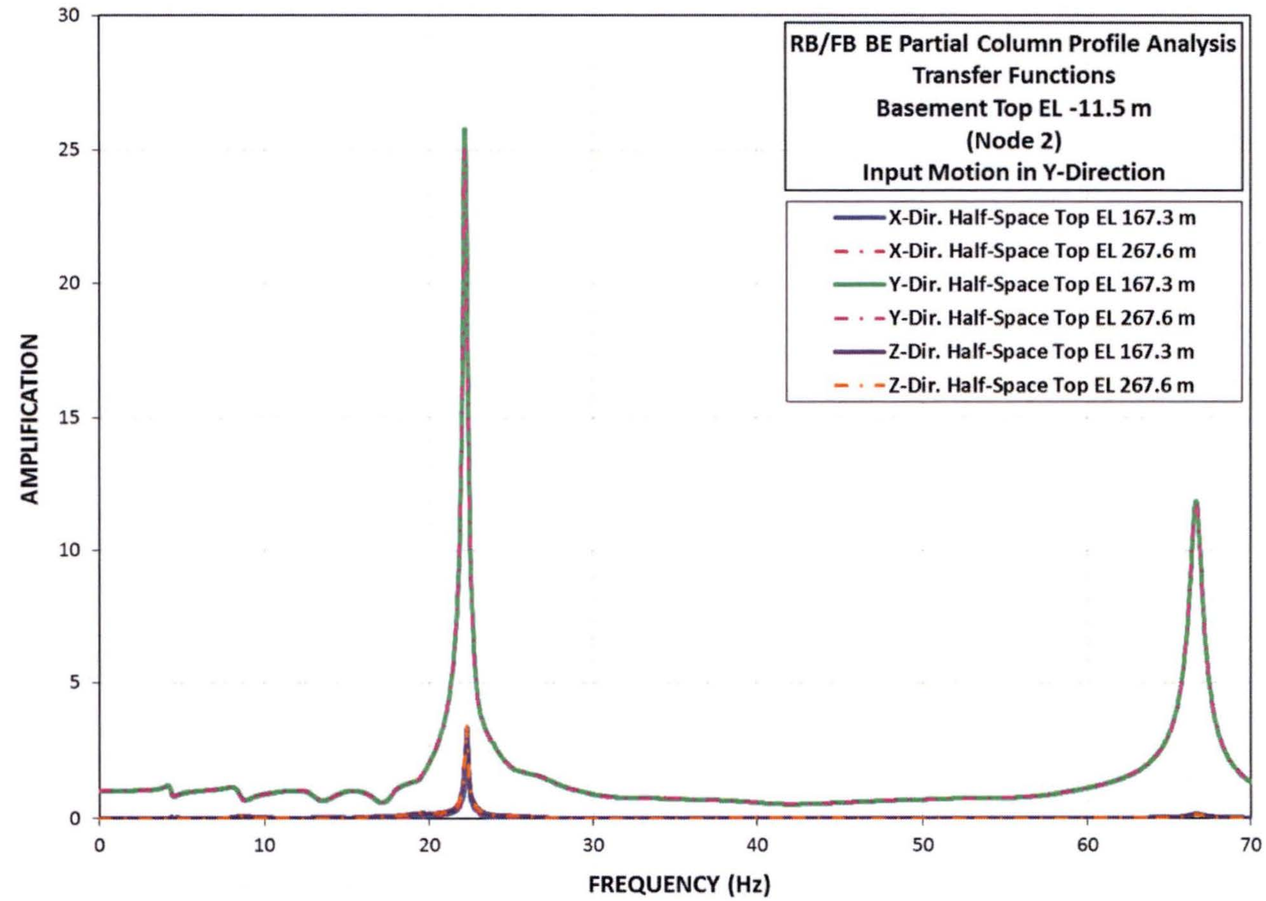

Figure H-2 Transfer Functions for RB/FB Basemat Response due to Y-Direction Input

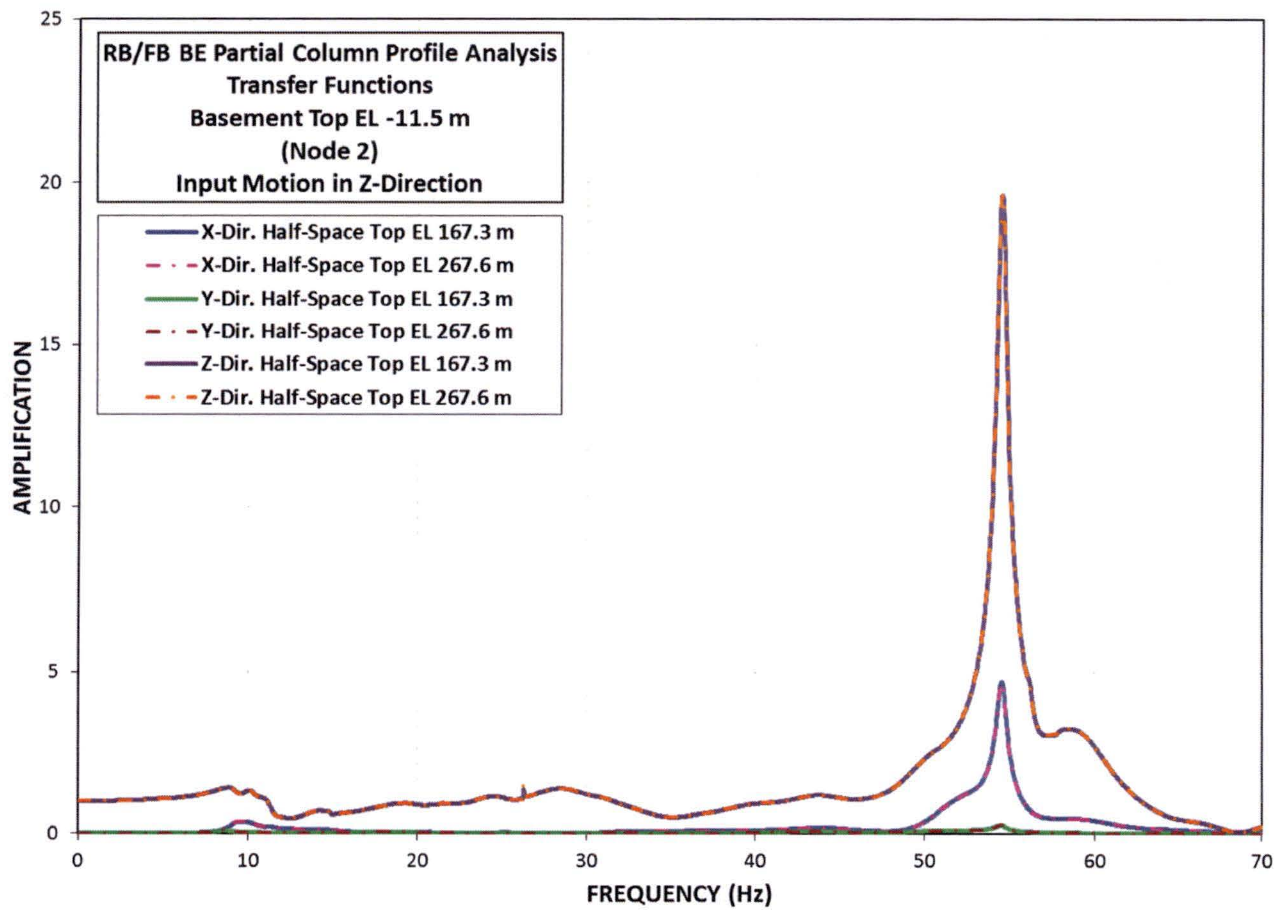

Figure H-3 Transfer Functions for RB/FB Basemat Response due to Z-Direction Input

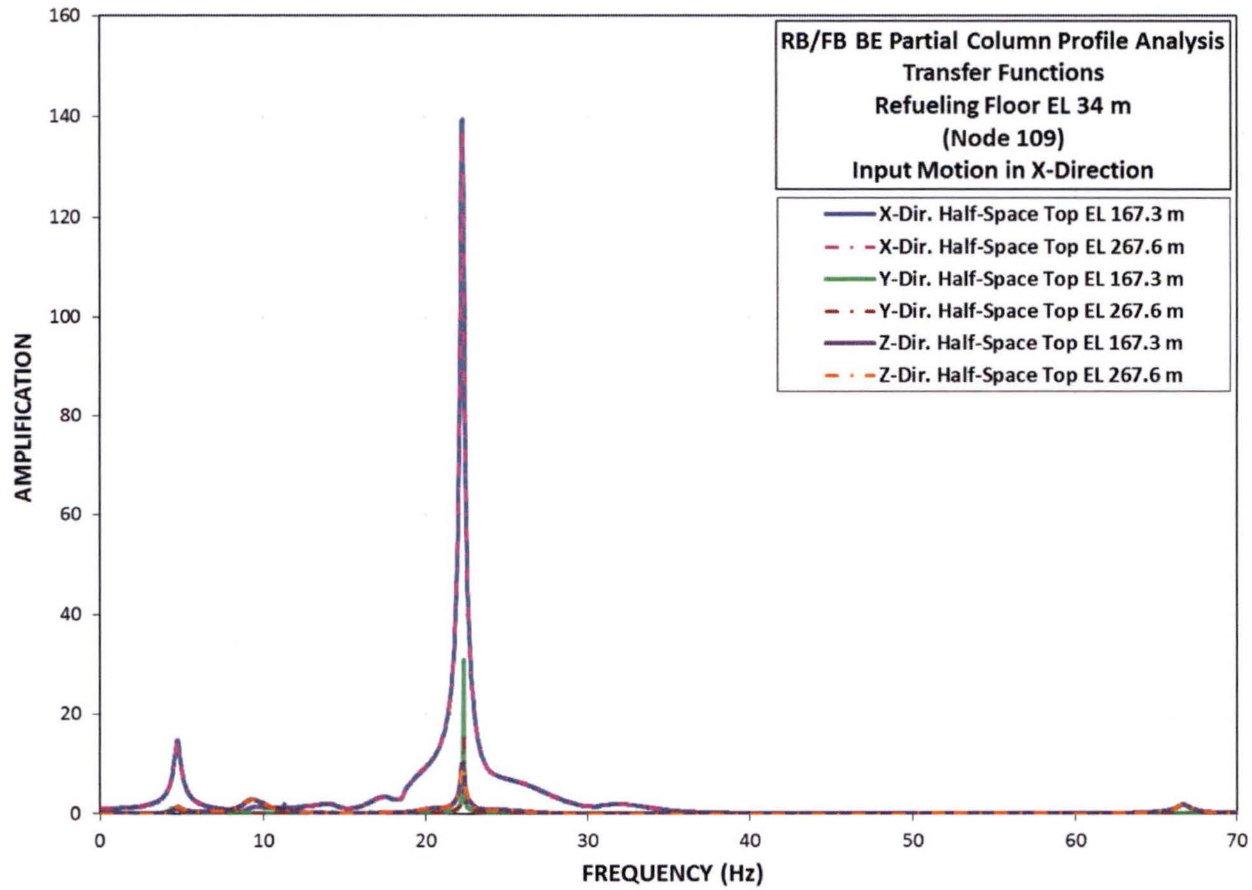

Figure H-4 Transfer Functions for RB/FB Refueling Floor Response due to X-Direction Input

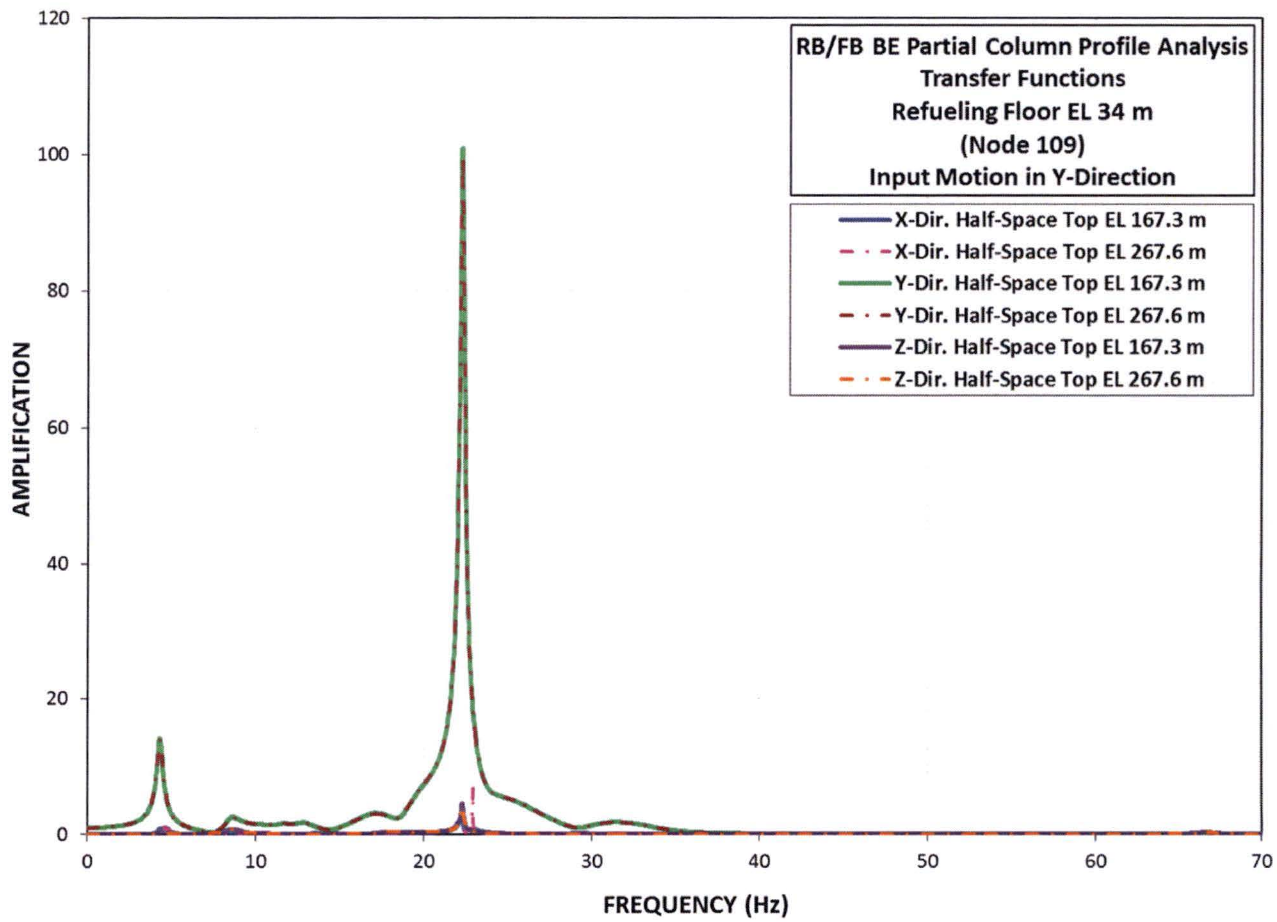

Figure H-5 Transfer Functions for RB/FB Refueling Floor Response due to Y-Direction Input

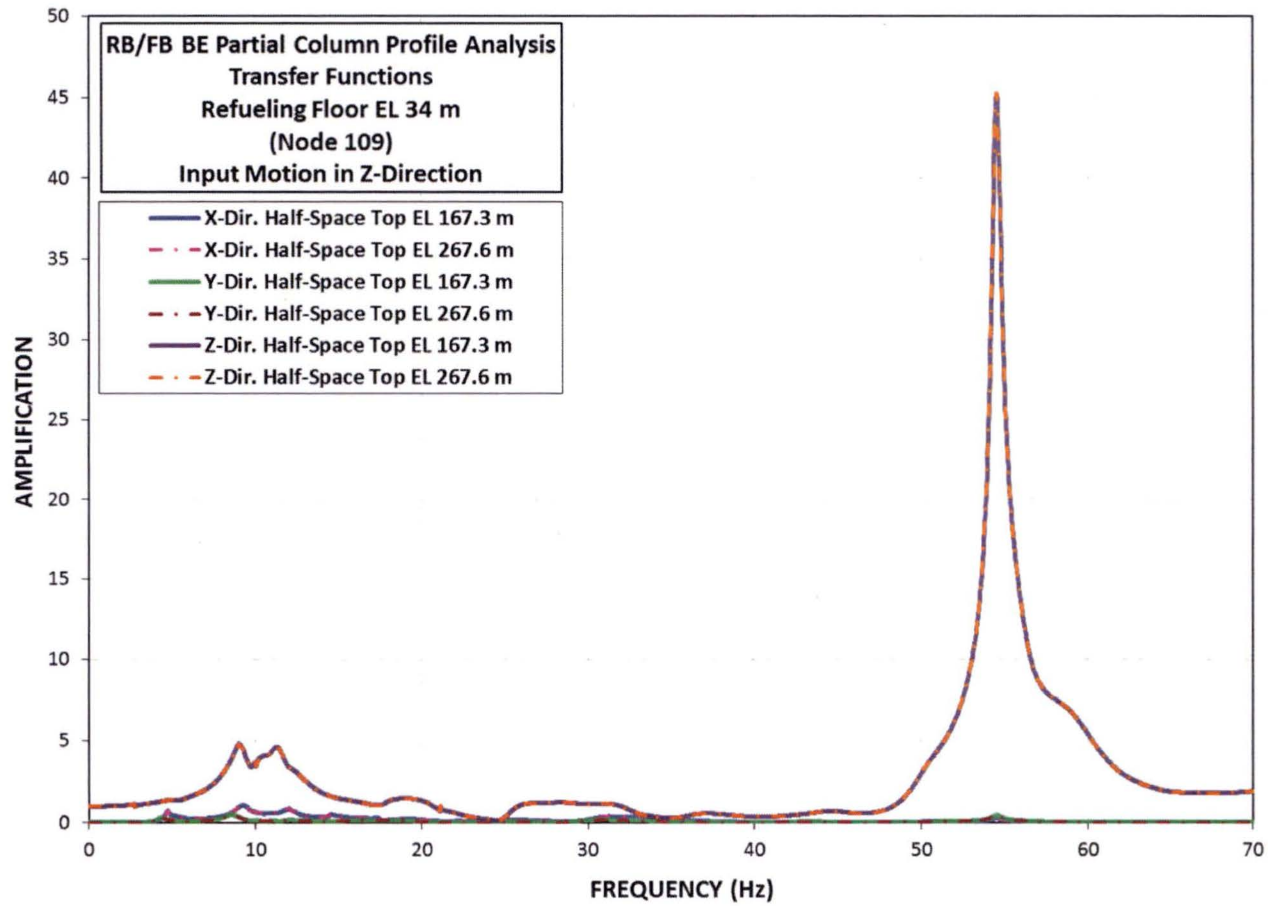

Figure H-6 Transfer Functions for RB/FB Refueling Floor Response due to Z-Direction Input

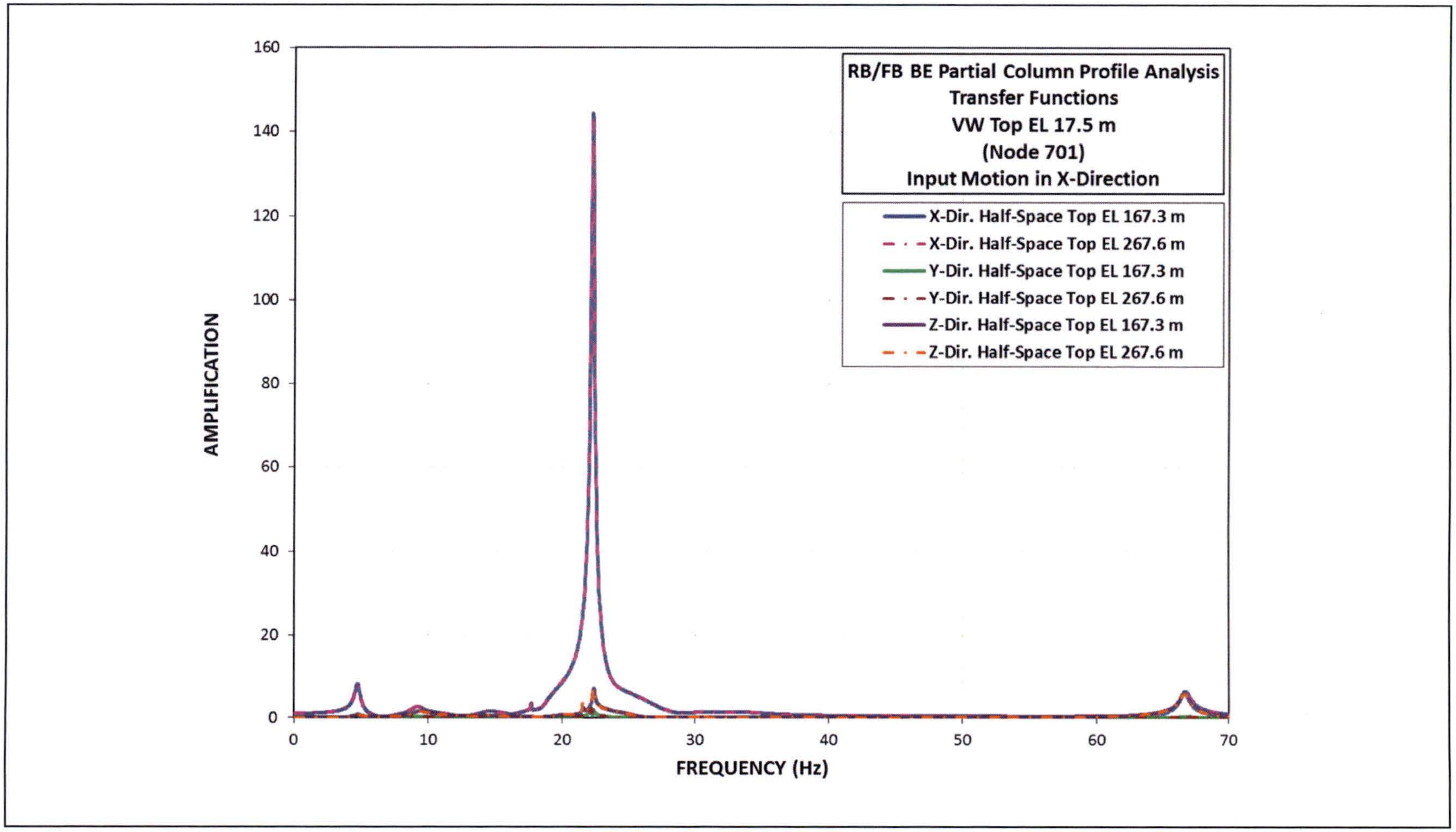

Figure H-7 Transfer Functions for RB/FB V/W Top Response due to X-Direction Input

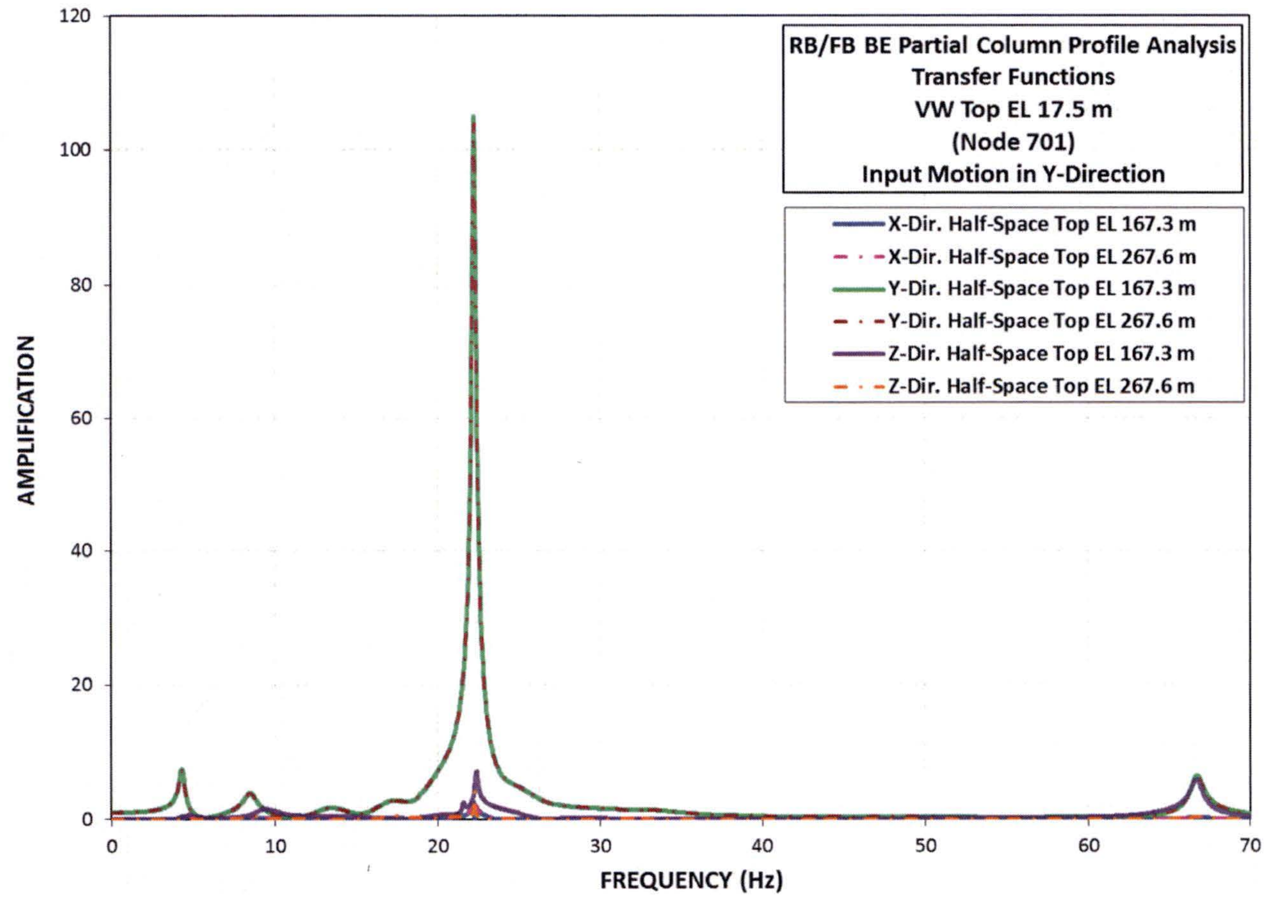

Figure H-8 Transfer Functions for RB/FB V/W Top Response due to Y-Direction Input

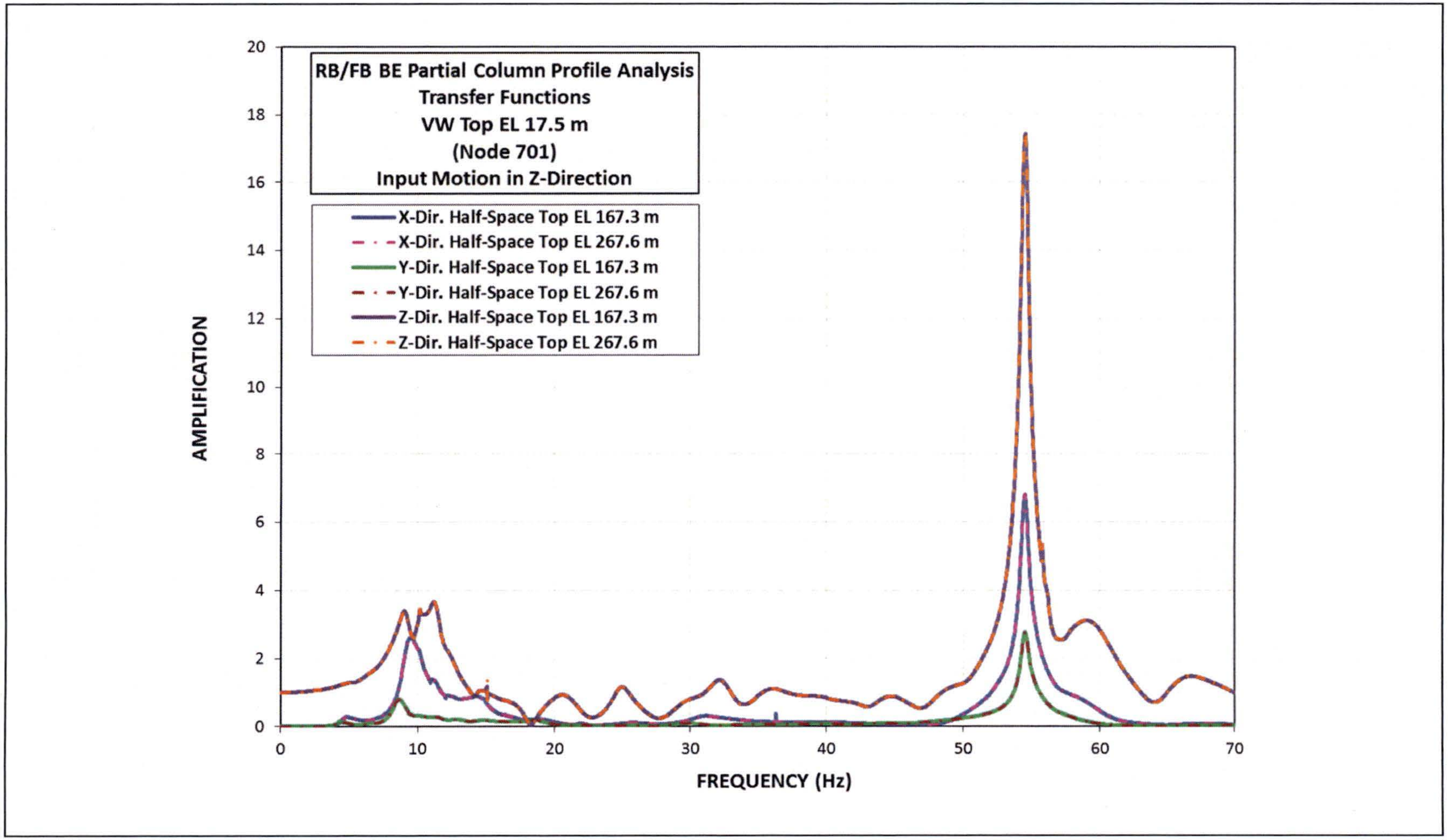

Figure H-9 Transfer Functions for RB/FB V/W Top Response due to Z-Direction Input

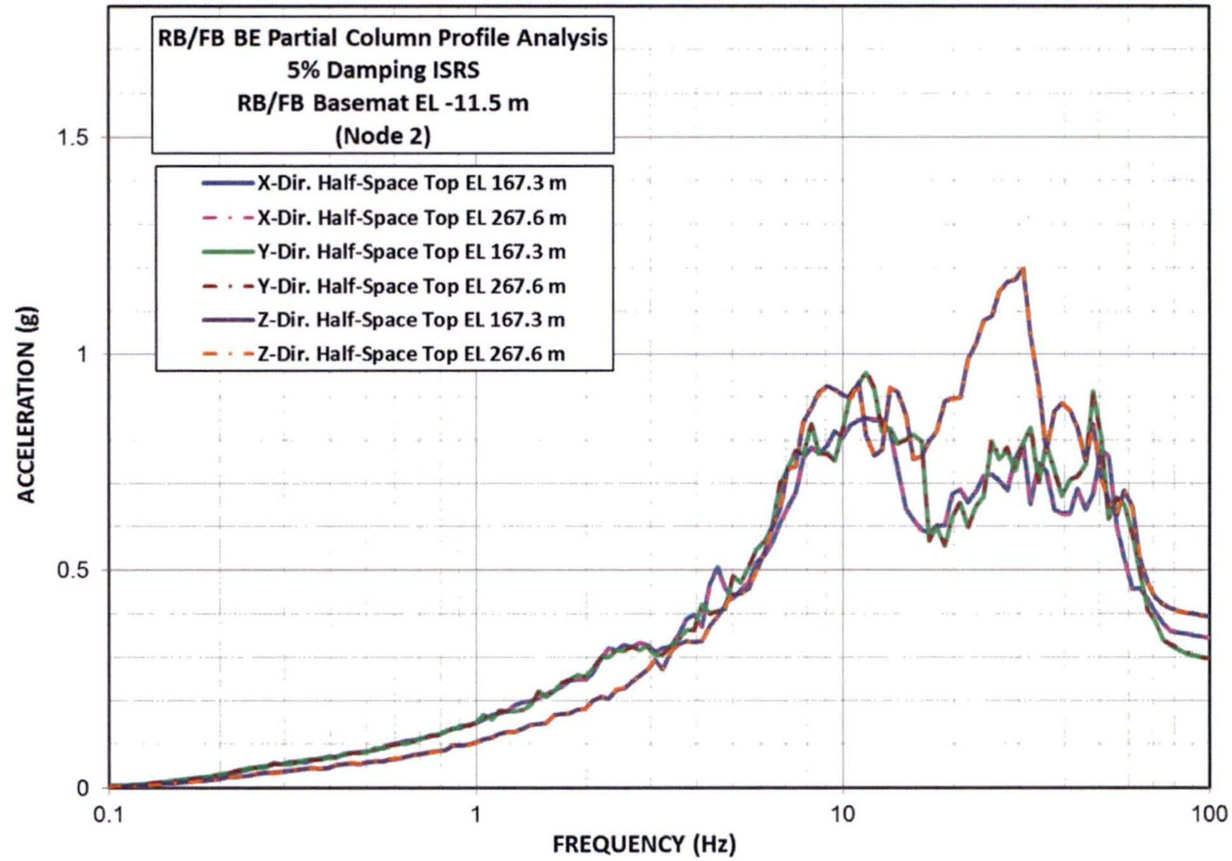

Figure H-10 5% Damped ISRS for RB/FB Basemat Response

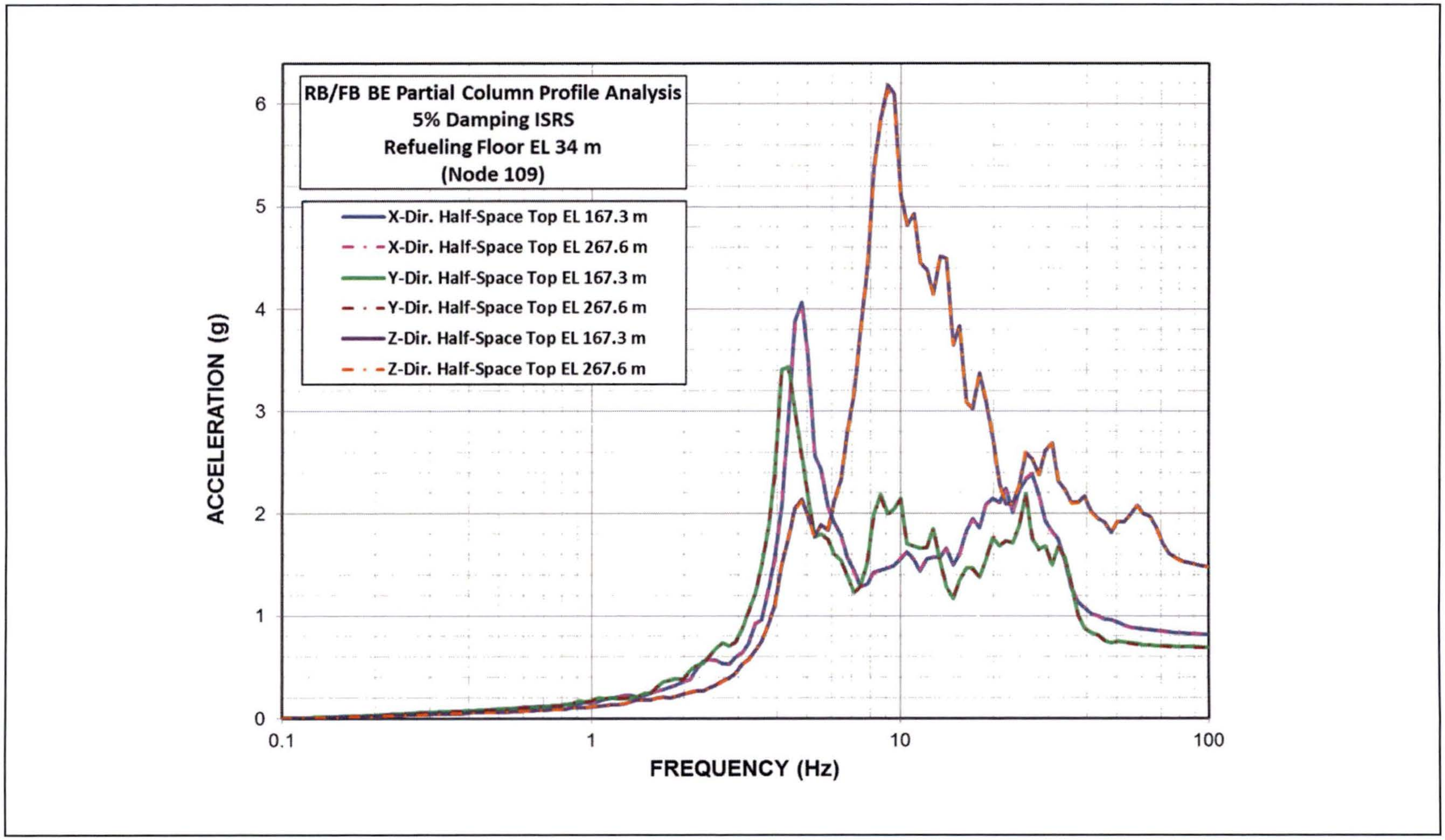

Figure H-11 5% Damped ISRS for RB/FB Refueling Floor Response

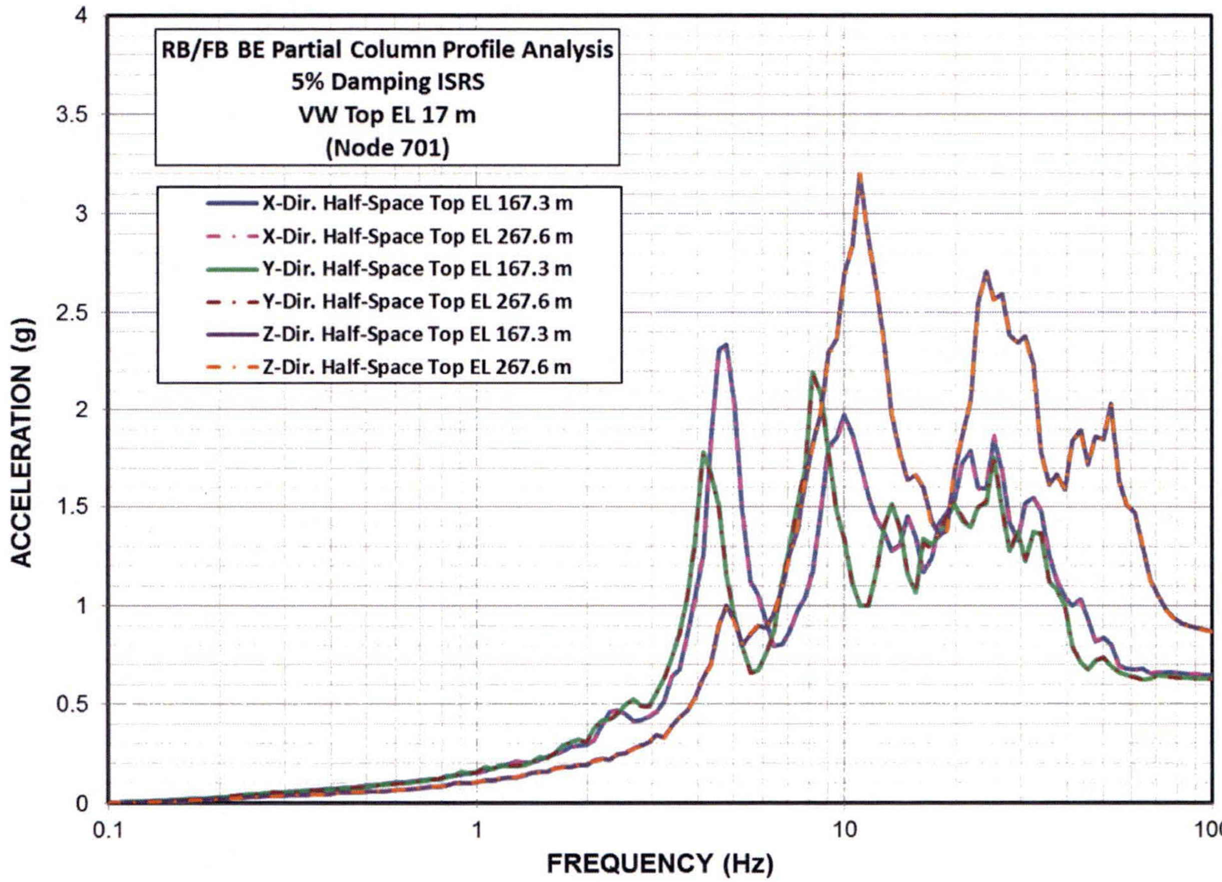

Figure H-12 5% Damped ISRS for RB/FB V/W Top Response

APPENDIX I

ACS SASSI Verification

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I.1 SCOPE

This appendix presents the verification of the results obtained from the site-specific SSI analyses of the RB/FB using the ACS SASSI computer program. Part of the results presented in Appendix B is from RB/FB SSI analyses that utilize the ACS SASSI computer program.

I.2 VERIFICATION ANALYSIS

A verification SSI analysis case V1 in Table 4.2-1 is performed using the ACS SASSI computer program utilizing the RB/FB model with upper bound structural stiffness properties and OBE damping values for the UB full column profile. This ACS SASSI model consists of all the 3-D elements by which SASSI family programs utilize to model the SSI system including brick elements, beam elements, shell elements, soft and rigid spring elements, mass/stiffness matrix, and mass elements. The analysis of this case uses the same inputs and the same set of frequencies of analyses as the ones used for the SASSI2010 computer program runs performed for analysis Case 6 in Table 4.2-1. The results of the verification analysis case obtained using MOTION, STRESS and RelDISP modules of the ACS SASSI program are compared to the corresponding results obtained using SASSI 2010 and its post-processing modules to verify the functionality and accuracy of the ACS SASSI modules.

I.3 RESULTS AND DISCUSSIONS

The results from the ACS SASSI computer program verification analysis case V1 are used to calculate:

a) Acceleration Transfer Functions (ATF) at selected key lumped mass floor locations
b) Maximum accelerations at lumped mass locations listed in Section 5.1
c) Maximum forces and moments for the stick members
d) Maximum floor displacements relative to the free-field motion following the methodology described in Section 5.4
e) 5% damped ISRS for the responses at the key floor locations listed in Section 5.1 following the methodology described in Section 5.3

Items a), b), e) are obtained from the ACS SASSI MOTION module. Items c) and d) are obtained from the ACS SASSI STRESS and RelDISP modules, respectively. ACS SASSI module PREP and or Excel are also used to combine the results due to three directional input and envelop the nodal responses. These results are compared with the corresponding results obtained from the SASSI2010 computer program analyses of the RB/FB model with upper bound structural stiffness properties and OBE damping values for the UB full column profile (analysis case 6 in Table 4.2-1) presented in Section 5.0 and Appendix A. The close agreement of the ACS SASSI computer program results with those obtained from the reference run performed using the SASSI2010 computer program demonstrate the adequacy of the ACS SASSI computer program solutions for the seismic response of the RB/FB at the NA3 site. The observations and justifications from the comparisons are presented as follows:

1) Transfer Function Comparison

   Figures I-1 through I-5 present the comparisons of the ATF results for the responses of the RB/FB structures at the key locations. In the figures, the dots represent the ATFs at the frequency points analyzed and the continuous lines are the ATFs at all the frequency points (steps) that are interpolated from the ATFs at analyzed frequencies. The ATFs at frequencies analyzed are direct output of the analysis. The figures show the dots that represented the ATFs from the two programs are overlapped. This indicates that the two programs produce almost identical ATFs or analysis results. The figures also show very good agreement for the interpolated ATFs. Minor deviations are only shown in the vertical response of the Figures I-3 and I-5 at frequencies around 54 Hz. These deviations have negligible impact on the calculation of the dynamic responses of the structures as shown next.

2) Maximum Acceleration Comparison

   The comparisons of the ACS SASSI and SASSI2010 results for maximum accelerations of the floor lumped masses are presented in Tables I-1 through I-5. Tables I-6 and I-7 present the comparisons of the maximum accelerations calculated for the slab and wall SDOF oscillators, respectively. As expected from ATF comparisons, the two programs produce nearly identical, usually to the third decimals, maximum nodal accelerations.

3) Force and Bending Moment Comparison

   Tables I-8 through I-12 compare the results obtained from the two computer programs for maximum forces, bending moments, and torsion in the different RB/FB LMSMs. The differences from the two programs are generally well below 5% with few exceptions. The maximum differences are less than 9% and are observed in the bending moment results presented in Table I-12 for the top portion of the at RSW stick that experiences small bending moments. These larger differences are mainly in the comparison of small numbers and have no impact on the conclusions of the structural stiffness variation effects study presented in Appendix B since the design is governed by higher loads at lower elevations where the results are in good agreement.

4) Relative Displacement Comparison

   The comparisons of the results for maximum displacements relative to the free-field ground motion are presented in Tables I-13 through I-19. The comparisons show that the ACS SASSI computer program provides results that are very close to those calculated by the SASSI2010 computer program. The differences of the results from the two programs are well below 5% as shown on the tables. The observed differences are mainly due to the different algorithm used by the ACS SASSI RelDISP module for calculation of the relative displacement.

5) ISRS Comparison

   Figures I-6 through I-11 present comparisons of the 5% damped ISRS for responses at the key floor locations listed in Section 5.1. The figures also show the exceedance ratios,

calculated as the difference of the spectral acceleration value from ACS SASSI MOTION and SASSI 2010 MOTION over SASSI 2010 spectral acceleration value, as secondary vertical axis at the right side. Generally, there is a very good agreement between the ISRS results with some deviations at frequencies higher than 30 Hz. The discussion of the comparisons is presented as follows:

- For frequencies that are below 10 Hz, the two curves, ISRS from ACS SASSI and SASSI 2010 are overlapped. For frequencies up to 30 Hz, all the figures show that the ACS SASSI calculated spectral accelerations are larger than the ones from SASSI 2010 and the exceedance ratios are around or below 5%.
- Except for the ISRS for the response at the top of the basemat (Node 2), the ACS SASSI ISRS exceedance ratios at frequencies above 30 Hz are generally below 5%. The occasional occurrences of exceedance ratio being greater than 5% are usually due to very small peak frequency shift and have negligible impact on the conclusions made from the structural stiffness variation study presented in Appendix B.
- The largest deviations between the ACS SASSI and SASSI2010 ISRS results can be observed in the ISRS for the response of the basemat top (Node 2) in high frequency range. These exceedances are manifested by: 1) peak exceedances, 2) peak frequency shifts and 3) the exceedances in zero period acceleration (ZPA) values at frequencies above the SSI analysis cut-off frequency of 70 Hz. The peak exceedance ratios are usually below 10% and the peak shifts are of a very narrow band nature. The ISRS ZPA values exceedances are below 12%.

The nodal acceleration time histories were generated from the SASSI 2010 and used by ACS SASSI MOTION to generate response spectra. Figure I-12 shows a comparison of three ISRS results for the response of one of the nodes in group Node-2 at the basemat top location in the X direction:

1. SASSI2010 MOTION module calculated ARS using the SASSI2010 calculated nodal acceleration time history (denoted as 2010_RS).
2. ACS SASSI MOTION generated ARS using the ACS SASSI calculated nodal acceleration time history (denoted as ACS_RS).
3. ACS SASSI MOTION generated ARS using the SASSI2010 calculated nodal acceleration time history (denoted as ACS-2010_RS).

The comparisons show that the "ACS_RS" and "ACS-2010_RS" curves are overlapped. Differences are observed between curve "2010_RS" and the other two curves. These indicate that the two programs produce identical acceleration responses but use different numerical algorithms to generate the ARS from the output nodal time histories. The comparisons show that the ACS SASSI MOTION module algorithm provides slightly higher ISRS results at higher frequencies than the SASSI2010. The range of differences between SASSI2010 and ACS-SASSI generated spectra are consistent with those in the EPRI TR 1015111 report and as

such the differences do not affect the conclusions made from the structural stiffness variation study presented in Appendix B.

I.4 CONCLUSIONS

The comparisons presented in this appendix show very good agreement between the results obtained from the ACS SASSI computer program verification analysis and those presented in Section 5 and Appendix A that are calculated using the SASSI2010 computer program. This demonstrates that the ACS SASSI computer program results for the seismic response of the RB/FB at the NA3 site are acceptable.

Table I-1: Maximum Accelerations Comparison – RBFB Stick

Elev. (m)	Node No.	SASSI 2010			ACS SASSI			Difference ((ACS)- (2010))/(2010)		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
52.40	200	2.13097	1.54555	1.55620	2.13097	1.54555	1.55670	0.000%	0.000%	-0.032%
34.00	190	0.95429	0.80638	1.19623	0.95429	0.80639	1.19633	0.000%	-0.001%	-0.008%
27.00	180	0.96071	0.68819	1.02328	0.96080	0.68824	1.02308	-0.009%	-0.008%	0.019%
22.50	170	0.82785	0.73246	0.91766	0.83009	0.73248	0.91756	-0.270%	-0.003%	0.011%
17.50	160	0.79751	0.58661	0.79892	0.79751	0.58661	0.79951	0.000%	0.000%	-0.074%
13.57	150	0.78698	0.52523	0.72001	0.78715	0.52622	0.72937	-0.021%	-0.189%	-1.301%
9.06	140	0.75589	0.50757	0.61939	0.75594	0.51910	0.61969	-0.006%	-2.272%	-0.049%
4.65	130	0.75639	0.49295	0.56113	0.75668	0.49295	0.56146	-0.037%	0.000%	-0.059%
-1.00	120	0.58534	0.41360	0.57429	0.58515	0.41360	0.57449	0.032%	0.000%	-0.034%
-6.40	110	0.47278	0.43428	0.49633	0.47296	0.43432	0.49663	-0.038%	-0.009%	-0.060%
-11.50	20	0.43206	0.37033	0.47140	0.43204	0.37023	0.47200	0.003%	0.026%	-0.127%
-15.50	10	0.43961	0.36830	0.45816	0.43944	0.36830	0.45916	0.038%	-0.001%	-0.218%

Table I-2: Maximum Accelerations Comparison – RCCV

Elev. (m)	Node No.	SASSI 2010			ACS SASSI			Difference ((ACS)- (2010))/(2010)		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
34.00	290	0.95465	0.80630	1.20240	0.95465	0.80630	1.20269	0.000%	0.000%	-0.024%
27.00	280	0.96015	0.68794	1.12431	0.96025	0.68794	1.12450	-0.009%	0.000%	-0.017%
17.50	260	0.79753	0.59351	0.90691	0.79753	0.59351	0.90691	0.000%	0.000%	0.000%
13.57	250	0.78678	0.52771	0.82212	0.78708	0.52787	0.82231	-0.039%	-0.030%	-0.024%
9.06	240	0.75594	0.52615	0.71954	0.75603	0.52834	0.71964	-0.012%	-0.417%	-0.014%
4.65	230	0.75631	0.48654	0.64822	0.75663	0.48648	0.64831	-0.043%	0.012%	-0.015%
-1.00	220	0.58585	0.39503	0.58081	0.58585	0.39504	0.58061	0.000%	-0.001%	0.035%
-6.40	210	0.47257	0.43817	0.49516	0.47265	0.43816	0.49606	-0.017%	0.002%	-0.180%

Table I-3: Maximum Accelerations Comparison – VW/Pedestal

Elev. (m)	Node No.	SASSI 2010			ACS SASSI			Difference ((ACS)- (2010))/(2010)		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
17.50	701	0.79753	0.59587	0.82286	0.79753	0.59589	0.82375	0.000%	-0.003%	-0.108%
14.50	702	0.77377	0.53877	0.76757	0.77399	0.53877	0.76757	-0.028%	0.000%	0.000%
11.50	703	0.77092	0.48755	0.70809	0.77194	0.48758	0.70838	-0.133%	-0.005%	-0.041%
8.50	704	0.73908	0.49011	0.68232	0.73908	0.49011	0.68232	0.000%	0.000%	0.000%
7.46	705	0.74663	0.47675	0.67133	0.74676	0.47675	0.67133	-0.017%	0.000%	0.000%
4.65	350	0.75720	0.48714	0.65357	0.75743	0.48709	0.65357	-0.030%	0.009%	0.000%
-1.00	330	0.58587	0.39523	0.58861	0.58587	0.39523	0.58841	0.000%	0.000%	0.033%
-6.40	310	0.47257	0.43816	0.49467	0.47267	0.43815	0.49568	-0.020%	0.002%	-0.203%

Table I-4: Maximum Accelerations Comparison – RSW

Elev. (m)	Node No.	SASSI 2010			ACS SASSI			Difference ((ACS)- (2010))/(2010)		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
24.18	707	3.61313	2.11854	1.18558	3.60980	2.12284	1.18558	0.092%	-0.203%	0.000%
20.20	708	2.80890	1.49875	1.13830	2.80867	1.49919	1.13830	0.008%	-0.029%	0.000%
15.78	709	1.76982	1.03832	0.98621	1.76915	1.04259	0.98620	0.038%	-0.411%	0.000%
11.35	710	1.00327	0.68715	0.78298	1.00120	0.68523	0.78306	0.207%	0.280%	-0.010%
7.46	711	0.74663	0.47675	0.67150	0.74671	0.47675	0.67150	-0.011%	0.000%	0.000%
4.65	712	0.75764	0.48695	0.65328	0.75778	0.48689	0.65328	-0.019%	0.012%	0.000%
2.42	713	0.68589	0.44547	0.63804	0.68584	0.44546	0.63785	0.007%	0.002%	0.031%
1.96	714	0.69602	0.45968	0.63885	0.69602	0.45968	0.63866	0.000%	0.000%	0.031%
-0.80	715	0.78723	0.54025	0.64246	0.78745	0.54014	0.64236	-0.028%	0.019%	0.015%

Table I-5: Maximum Accelerations Comparison – Fuel

Elev. (m)	Node No.	SASSI 2010			ACS SASSI			Difference ((ACS)- (2010))/(2010)		
		X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	Z-Dir. (g)
7.8071	848	1.90947	0.85779	1.48350	1.90964	0.85779	1.48330	-0.009%	0.000%	0.013%
7.1110	849	0.99709	0.48897	1.47466	0.99717	0.48897	1.47417	-0.008%	0.000%	0.033%
6.4010	850	0.61669	0.63656	1.45121	0.61673	0.63656	1.45053	-0.005%	0.000%	0.047%
5.6910	851	0.78700	0.74337	1.41379	0.78717	0.74337	1.41379	-0.021%	0.000%	0.000%
4.9810	852	1.41678	1.08113	1.36300	1.41683	1.08113	1.36309	-0.004%	0.000%	-0.007%
4.2713	853	2.38156	1.65322	1.30942	2.38156	1.65322	1.30942	0.000%	0.000%	0.000%

Table I-6: Maximum Accelerations Comparison – Slab Oscillators

Elev. (m)	Node No.	Vert. Acceleration (g)		Difference ((ACS)-(2010))/(2010)
		SASSI 2010	ACS SASSI	
52.40	9101	0.32460	0.32460	0.0000%
	9102	1.27707	1.27707	0.0000%
	9103	6.26780	6.26770	0.0015%
	9104	2.61788	2.61788	0.0000%
	9105	2.41545	2.41545	0.0000%
	9106	3.52249	3.52249	0.0000%
	9107	3.21656	3.21676	-0.0062%
	9108	2.50154	2.50095	0.0237%
34.00	9091	1.61391	1.61431	-0.0244%
	9092	1.60725	1.60892	-0.1040%
27.00	9081	1.59645	1.59636	0.0061%
	9082	1.51740	1.51750	-0.0065%
	9083	1.29924	1.29914	0.0075%
	9084	1.67359	1.67408	-0.0294%
	9085	1.46133	1.46153	-0.0134%
22.50	9071	1.14814	1.14814	0.0000%
	9072	1.64397	1.64397	0.0000%
	9073	4.46591	4.46591	0.0000%
	9074	1.53494	1.53494	0.0000%
	9075	1.51255	1.51255	0.0000%
17.50	9061	3.65052	3.65052	0.0000%
	9062	2.40441	2.40610	-0.0704%
	9063	1.13492	1.13492	0.0000%
	9064	1.52948	1.52968	-0.0128%
	9065	1.28324	1.28296	0.0218%
13.57	9051	1.11201	1.11201	0.0000%
	9052	1.25082	1.25073	0.0067%
9.06	9041	0.94962	0.94972	-0.0103%
	9042	1.25714	1.25704	0.0079%
4.65	9031	1.62367	1.62377	-0.0061%
	9032	0.89313	0.89313	0.0000%
	9033	1.12302	1.12302	0.0000%
	9034	1.72853	1.72874	-0.0120%
	9035	1.06933	1.06963	-0.0279%
-1.00	9021	0.96599	0.96589	0.0102%
	9022	1.90170	1.90180	-0.0052%
	9023	0.97602	0.97612	-0.0102%
	9024	1.11928	1.11928	0.0000%
	9025	1.14008	1.13948	0.0525%
	9026	1.37665	1.37789	-0.0900%
	9027	0.67050	0.67030	0.0292%
-6.40	9011	0.84168	0.84168	0.0000%
	9012	1.16694	1.16694	0.0000%
	9013	1.34731	1.34781	-0.0370%

Table I-7: Maximum Accelerations Comparison – Wall Oscillators

Elev. (m)	Node No.	SASSI 2010		ACS SASSI		Difference ((ACS)-(2010))/(2010)
		X-Dir. (g)	Y-Dir. (g)	X-Dir. (g)	Y-Dir. (g)	
42.00	99981	2.65938		2.65938		0.0001%
	99982	1.53720		1.53720		0.0000%
13.57	99971	2.10715		2.10715		0.0000%
	99972	1.99667		1.99667		0.0000%
	99973	1.34879		1.34890		-0.0085%
	99974	1.03785		1.03763		0.0211%
42.00	99983		1.86051		1.86051	0.0000%
	99984		1.01770		1.01770	0.0000%
	99985		0.99626		0.99626	0.0000%
13.57	99975		1.66418		1.66426	-0.0047%
	99976		0.77900		0.78034	-0.1712%

Table I-8: Maximum Forces and Moments Comparison – RBFB Stick

Element		SASSI 2010					ACS SASSI					Difference ((ACS)- (2010))/(2010)				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
52.40	110	192.2	140.0	2724	2083	1126	192.4	141.1	2724	2100	1168	-0.1%	-0.8%	0.0%	-0.8%	-3.8%
	109			5838	4488				5783	4493				0.9%	-0.1%	
34.00	109	171.1	113.9	8196	5821	1938	173.0	115.1	8148	5841	2003	-1.1%	-1.0%	0.6%	-0.3%	-3.3%
	108			8719	6389				8679	6393				0.5%	-0.1%	
27.00	108	396.0	251.3	9400	7162	2799	402.3	253.5	9303	7160	2792	-1.6%	-0.9%	1.0%	0.0%	0.2%
	107			9599	7958				9559	7957				0.4%	0.0%	
22.50	107	436.4	291.8	11216	8328	4678	439.8	293.2	11278	8326	4671	-0.8%	-0.5%	-0.5%	0.0%	0.1%
	106			11424	9227				11477	9227				-0.5%	0.0%	
17.50	106	438.4	343.5	12105	9408	4023	440.2	346.5	12184	9398	4017	-0.4%	-0.9%	-0.7%	0.1%	0.1%
	105			12349	10195				12570	10205				-1.8%	-0.1%	
13.57	105	450.7	363.7	12839	10255	4211	449.5	364.4	13029	10254	4203	0.3%	-0.2%	-1.5%	0.0%	0.2%
	104			13397	11216				13655	11222				-1.9%	-0.1%	
9.06	104	454.6	383.4	13803	11338	4694	453.4	384.4	13990	11363	4676	0.3%	-0.3%	-1.4%	-0.2%	0.4%
	103			15047	12506				15076	12521				-0.2%	-0.1%	
4.65	103	447.4	346.8	8869	6302	5248	465.0	350.1	8899	6284	5259	-3.9%	-0.9%	-0.3%	0.3%	-0.2%
	102			10381	7550				10395	7566				-0.1%	-0.2%	
-1.00	102	197.5	156.5	5474	4053	2150	204.3	155.0	5541	4029	2151	-3.5%	0.9%	-1.2%	0.6%	0.0%
	101			5764	4257				5780	4242				-0.3%	0.4%	
-6.40	101	207.2	153.2	3768	2732	1376	213.0	153.9	3828	2684	1381	-2.8%	-0.5%	-1.6%	1.8%	-0.3%
-11.50	2			3572	2543				3611	2518				-1.1%	1.0%	

Table I-9: Maximum Forces and Moments Comparison – RCCV Stick

Element		SASSI 2010					ACS SASSI					Difference ((ACS)- (2010))/(2010)				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
34.00	110	130.9	133.2	221	442	29	132.9	134.2	224	442	30	-1.5%	-0.7%	-1.5%	0.0%	-3.3%
	109			1029	1160				1037	1174				-0.8%	-1.3%	
27.00	109	141.1	151.9	2006	2303	1489	142.8	152.5	2020	2322	1485	-1.2%	-0.4%	-0.7%	-0.8%	0.3%
	108			2713	3071				2704	3080				0.3%	-0.3%	
17.50	108	184.1	158.4	3119	3667	1591	182.1	158.9	3135	3667	1590	1.1%	-0.3%	-0.5%	0.0%	0.1%
	107			3456	3904				3469	3907				-0.4%	-0.1%	
13.57	107	207.9	173.4	3672	4203	1762	208.4	174.4	3686	4202	1759	-0.3%	-0.5%	-0.4%	0.0%	0.2%
	106			4182	4491				4201	4494				-0.5%	-0.1%	
9.06	106	225.4	186.7	4481	4853	2062	225.3	187.3	4495	4851	2054	0.0%	-0.3%	-0.3%	0.1%	0.4%
	105			5190	5203				5235	5224				-0.9%	-0.4%	
4.65	105	109.2	102.3	5523	5470	1439	111.1	102.5	5560	5497	1442	-1.7%	-0.2%	-0.7%	-0.5%	-0.2%
	104			5740	5824				5772	5851				-0.5%	-0.5%	
-1.00	104	67.6	56.9	6008	6066	546	66.3	57.3	6066	6086	546	1.9%	-0.8%	-1.0%	-0.3%	0.0%
	103			5924	6035				5987	6084				-1.1%	-0.8%	
-6.40	101	65.3	46.4	6053	6141	231	65.9	46.3	6123	6187	231	-0.9%	0.3%	-1.2%	-0.7%	-0.1%
-11.50	2			5961	6127				6064	6148				-1.7%	-0.3%	

Table I-10: Maximum Forces and Moments Comparison – VW Stick

Element		SASSI 2010					ACS SASSI					Difference ((ACS)- (2010))/(2010)				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
17.50	701	47.9	32.4	74	56	107	47.2	32.5	75	56	107	1.6%	-0.2%	-1.4%	0.0%	0.1%
	702			139	107				136	108				2.1%	-0.2%	
14.50	702	47.1	32.4	139	113	108	46.9	32.9	137	113	108	0.4%	-1.5%	1.2%	-0.2%	0.7%
	703			279	204				270	202				3.4%	0.9%	
11.50	703	45.8	35.1	280	207	111	45.7	35.2	273	206	111	0.3%	-0.4%	2.5%	0.6%	0.2%
	704			411	301				404	303				1.8%	-0.6%	
8.50	704	44.7	36.5	411	302	112	44.9	36.6	405	304	111	-0.5%	-0.1%	1.4%	-0.5%	0.4%
	705			458	338				450	340				1.9%	-0.6%	
7.46	705	36.8	29.4	440	352	92	36.9	29.1	437	354	92	-0.3%	1.0%	0.7%	-0.6%	0.4%
	706, 303			513	427				506	424				1.4%	0.7%	

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Table I-11: Maximum Forces and Moments Comparison – Pedestal

Element		SASSI 2010					ACS SASSI					Difference ((ACS)- (2010))/(2010)				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
4.65	303	18.5	13.1	667	486	71	18.8	12.7	668	489	71	-1.8%	3.0%	-0.1%	-0.7%	-0.2%
	377			651	495				650	496				0.1%	-0.1%	
2.4165	377	28.6	20.2	793	605	86	29.0	19.8	793	606	86	-1.3%	1.8%	0.1%	-0.2%	-0.2%
	302			754	623				755	627				-0.1%	-0.6%	
-1.00	302	22.1	15.3	691	567	27	22.1	15.2	692	565	27	-0.2%	0.2%	-0.1%	0.4%	0.0%
	376			658	545				658	546				-0.1%	-0.2%	
-2.75	376	21.8	16.1	658	544	27	21.9	16.0	658	546	27	-0.8%	0.4%	0.0%	-0.2%	0.0%
	301			594	505				594	505				0.0%	-0.1%	
-6.40	301	27.6	17.9	555	502	14	27.6	18.0	555	503	14	0.1%	-0.5%	0.0%	-0.2%	-0.2%
-11.50	2			508	512				509	511				-0.3%	0.2%	

Table I-12: Maximum Forces and Moments Comparison – RSW Stick

Element		SASSI 2010					ACS SASSI					Difference ((ACS)- (2010))/(2010)				
Elev. (m)	Node No.	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)	Shear (MN)		Bending (MN-m)		Torsion (MN-m)
		NS	EW	NS	EW		NS	EW	NS	EW		NS	EW	NS	EW	
24.18	707	4.1	2.4	2.5	1.7	0.5	4.0	2.5	2.6	1.9	0.5	1.3%	-3.8%	-1.5%	-8.9%	-4.0%
	708			18.7	11.3				18.5	11.9				0.7%	-5.5%	
20.20	708	20.8	8.6	25.8	15.7	1.7	20.9	8.6	25.9	17.0	1.8	-0.5%	-0.2%	-0.3%	-7.9%	-4.0%
	709			113.5	49.3				113.5	50.9				0.0%	-3.2%	
15.78	709	24.4	10.2	116.7	51.2	2.4	24.4	10.4	116.6	53.3	2.5	-0.2%	-2.0%	0.0%	-4.0%	-4.0%
	710			224.1	94.2				224.2	93.7				-0.1%	0.5%	
11.35	710	27.1	11.1	227.6	95.9	3.0	27.1	11.2	228.0	95.1	3.1	0.1%	-1.0%	-0.2%	0.8%	-4.1%
	711			331.9	140.2				332.0	141.3				0.0%	-0.8%	
7.46	711	21.0	16.8	99.3	77.7	21.4	21.1	16.6	98.6	80.0	21.3	-0.3%	1.0%	0.8%	-2.9%	0.4%
	712			141.3	119.0				139.5	118.7				1.3%	0.3%	
4.65	712	8.0	5.7	147.6	105.2	15.2	8.2	5.5	147.5	106.0	15.2	-1.9%	3.1%	0.1%	-0.7%	-0.2%
	713			139.8	109.0				139.8	109.9				0.0%	-0.8%	
2.42	713	1.4	1.0	3.4	2.4	0.1	1.6	0.9	3.4	2.5	0.1	-9.4%	1.6%	1.0%	-0.2%	-6.9%
	714			2.8	2.0				2.7	2.1				1.2%	-0.6%	
1.96	714	0.8	0.6	2.5	1.8	0.1	0.8	0.6	2.5	1.8	0.1	-0.9%	1.5%	0.2%	-0.6%	-6.2%
-0.80	715			0.5	0.4				0.5	0.4				-0.9%	-1.7%	

Table I-13: Maximum Displacements Comparison – RB/FB

Elev. (m)	Node No.	Displacement (cm)								
		SASSI 2010			ACS SASSI			Difference ((2010)-(ACS))/(2010)		
		NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.
52.4	110	1.20	1.57	0.80	1.21	1.53	0.79	-0.80%	2.30%	0.75%
34.0	109	0.83	0.90	0.69	0.84	0.88	0.68	-0.26%	2.18%	0.55%
27.0	108	0.70	0.74	0.58	0.70	0.73	0.58	-0.11%	1.87%	0.47%
22.5	107	0.57	0.61	0.49	0.57	0.60	0.49	-0.06%	1.74%	0.64%
17.5	106	0.44	0.46	0.41	0.44	0.46	0.41	0.24%	1.82%	0.85%
13.6	105	0.34	0.37	0.33	0.34	0.36	0.33	0.48%	1.80%	1.06%
9.06	104	0.23	0.26	0.23	0.23	0.25	0.23	-1.01%	1.96%	-0.49%
4.65	103	0.13	0.15	0.12	0.13	0.15	0.12	-0.50%	2.47%	-0.24%
-1.00	102	0.06	0.07	0.08	0.06	0.07	0.08	-0.46%	2.78%	-0.35%
-6.40	101	0.03	0.03	0.05	0.03	0.03	0.05	-0.45%	2.67%	-0.15%
-11.5	2	0.02	0.02	0.04	0.02	0.02	0.04	0.16%	2.16%	-0.20%
-15.5	1	0.02	0.01	0.04	0.02	0.01	0.04	0.64%	0.10%	-0.22%

Table I-14: Maximum Displacements Comparison – RCCV

Elev. (m)	Node No.	Displacement (cm)								
		SASSI 2010			ACS SASSI			Difference ((2010)-(ACS))/(2010)		
		NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.
34.0	209	0.83	0.88	0.43	0.83	0.86	0.43	-0.29%	2.23%	0.84%
27.0	208	0.69	0.72	0.40	0.69	0.71	0.40	-0.14%	1.74%	0.97%
17.5	206	0.43	0.45	0.32	0.43	0.44	0.33	0.17%	1.83%	-0.80%
13.6	205	0.34	0.36	0.30	0.33	0.35	0.30	0.51%	1.84%	-0.76%
9.06	204	0.23	0.25	0.26	0.23	0.24	0.26	-1.06%	1.96%	-0.76%
4.65	203	0.13	0.15	0.22	0.13	0.15	0.22	-0.49%	2.46%	-0.50%
-1.00	202	0.06	0.07	0.16	0.06	0.06	0.16	-0.45%	2.67%	0.10%
-6.40	201	0.03	0.03	0.09	0.03	0.03	0.09	-0.53%	2.81%	-0.64%

Table I-15: Maximum Displacements Comparison – VW/Pedestal

Elev. (m)	Node No.	Displacement (cm)								
		SASSI 2010			ACS SASSI			Difference ((2010)-(ACS))/(2010)		
		NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.
17.5	701	0.42	0.41	0.24	0.42	0.40	0.24	0.36%	2.48%	-0.29%
14.5	702	0.35	0.35	0.23	0.35	0.34	0.23	0.30%	2.83%	-0.35%
11.5	703	0.28	0.28	0.22	0.27	0.28	0.22	0.59%	2.65%	-0.22%
8.50	704	0.21	0.22	0.21	0.21	0.21	0.21	-1.21%	2.43%	-0.44%
7.46	705	0.19	0.20	0.20	0.19	0.19	0.21	-1.30%	2.23%	-0.39%
4.65	706, 303	0.13	0.14	0.18	0.13	0.14	0.18	-0.83%	2.30%	-0.45%
1.00	302	0.06	0.06	0.13	0.06	0.06	0.13	-0.48%	2.56%	-0.14%
-6.40	301	0.03	0.03	0.07	0.03	0.03	0.07	-0.74%	2.51%	-0.06%

Table I-16: Maximum Displacements Comparison – RSW

Elev. (m)	Node No.	Displacement (cm)								
		SASSI 2010			ACS SASSI			Difference ((2010)-(ACS))/(2010)		
		NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.
24.2	707	0.82	0.55	0.21	0.81	0.53	0.20	1.44%	2.83%	0.10%
20.2	708	0.67	0.46	0.20	0.66	0.45	0.20	2.13%	2.88%	-0.10%
15.8	709	0.47	0.36	0.20	0.46	0.35	0.20	2.00%	3.06%	-0.27%
11.3	710	0.29	0.27	0.18	0.29	0.26	0.18	1.12%	2.58%	-0.27%
7.46	711	0.18	0.19	0.16	0.19	0.19	0.16	-1.35%	2.35%	-0.17%
4.65	712	0.13	0.14	0.15	0.13	0.13	0.15	-0.87%	2.26%	-0.09%
2.46	713	0.10	0.11	0.14	0.10	0.10	0.14	-0.71%	2.08%	-0.04%
1.96	714	0.09	0.10	0.14	0.09	0.10	0.14	-0.95%	2.17%	-0.07%
-0.80	715	0.07	0.07	0.14	0.07	0.07	0.14	-0.81%	2.07%	-0.03%

Table I-17: Maximum Displacements Comparison – RPV

Node No.	Displacement (cm)								
	SASSI 2010			ACS SASSI			Difference ((2010)-(ACS))/(2010)		
	NS	EW	Vert.	NS	EW	Vert.	NS	EW	Vert.
801	1.21	0.73	0.14	1.22	0.71	0.14	-0.41%	2.78%	0.68%
806	0.91	0.58	0.24	0.91	0.56	0.24	-0.26%	2.96%	-0.17%
807	0.88	0.57	0.23	0.88	0.55	0.23	-0.20%	2.98%	-0.18%
809	0.74	0.50	0.23	0.75	0.48	0.23	-0.72%	3.09%	-0.17%
810	0.62	0.44	0.22	0.63	0.42	0.22	-1.19%	3.07%	-0.13%
813	0.42	0.31	0.20	0.42	0.30	0.20	1.73%	3.25%	-0.45%
814	0.33	0.26	0.18	0.33	0.26	0.18	-0.09%	2.65%	-0.49%
815	0.26	0.22	0.17	0.26	0.22	0.17	-1.13%	2.60%	-0.08%
827	0.26	0.19	0.16	0.26	0.19	0.16	-0.72%	0.04%	-0.21%
828	0.27	0.19	0.15	0.27	0.19	0.15	0.28%	-0.06%	0.69%
831	0.76	0.70	1.12	0.76	0.68	1.14	0.90%	1.72%	-2.18%
832	0.61	0.43	0.28	0.61	0.41	0.28	-0.36%	3.05%	0.11%
833	0.59	0.41	0.28	0.59	0.40	0.28	-0.13%	3.17%	0.11%
834	0.56	0.37	0.27	0.56	0.35	0.27	0.05%	3.30%	0.09%
844	0.34	0.19	0.19	0.34	0.19	0.19	0.10%	-0.37%	-0.51%
846	0.28	0.18	0.18	0.28	0.18	0.18	-1.03%	0.41%	-0.87%
847	0.48	0.26	0.18	0.48	0.25	0.18	-0.13%	1.86%	-0.57%
851	0.45	0.56	0.39	0.46	0.55	0.40	-2.49%	1.70%	-0.39%
854	0.34	0.19	0.17	0.34	0.19	0.17	0.11%	-0.07%	0.01%
867	0.11	0.11	0.58	0.12	0.11	0.57	-4.36%	-0.90%	1.30%

Table I-18: Maximum Vertical Displacements Comparison – Slab Oscillators

Elev. (m)	Node No.	Displacement (cm)		Difference ((2010)-(ACS))/(2010)
		SASSI 2010	ACS SASSI	
52.40	9101	1.02	0.98	4.19%
	9102	1.10	1.08	1.97%
	9103	1.38	1.36	1.52%
	9104	0.43	0.43	0.05%
	9105	0.32	0.32	0.00%
	9106	0.34	0.34	-0.10%
	9107	0.31	0.31	0.50%
	9108	0.30	0.30	-0.02%
34.00	9091	0.27	0.27	0.38%
	9092	0.26	0.26	0.31%
27.00	9081	0.27	0.27	0.00%
	9082	0.25	0.24	0.29%
	9083	0.23	0.23	0.50%
	9084	0.22	0.22	0.48%
	9085	0.24	0.24	0.26%
22.50	9071	1.01	0.99	1.48%
	9072	0.89	0.88	0.47%
	9073	0.84	0.83	0.45%
	9074	0.23	0.23	-0.09%
	9075	0.20	0.20	-0.37%
17.50	9061	0.69	0.68	0.54%
	9062	0.17	0.17	-0.05%
	9063	0.20	0.20	1.01%
	9064	0.28	0.27	0.50%
	9065	0.19	0.20	-2.63%
13.57	9051	0.18	0.18	0.74%
	9052	0.15	0.15	0.39%
9.06	9041	0.15	0.15	-0.11%
	9042	0.12	0.12	0.68%
4.65	9031	0.10	0.10	0.27%
	9032	0.11	0.11	1.17%
	9033	0.15	0.15	0.33%
	9034	0.08	0.08	0.01%
	9035	0.09	0.09	-0.27%
-1.00	9021	0.08	0.08	0.20%
	9022	0.08	0.08	-0.13%
	9023	0.09	0.09	0.08%
	9024	0.12	0.12	0.39%
	9025	0.07	0.07	0.59%
	9026	0.05	0.05	-0.51%
	9027	0.09	0.09	0.96%
-6.40	9011	0.08	0.08	2.64%
	9012	0.09	0.09	0.71%
	9013	0.06	0.06	0.23%

Table I-19: Maximum Horizontal Displacements Comparison – Wall Oscillators

Elev. (m)	Node No.	Dir.	Displacement (cm)		
			SASSI 2010	ACS SASSI	Difference ((2010)-(ACS))/(2010)
42	99981	NS	1.09	1.10	-0.83%
	99982		0.97	0.98	-0.82%
13.6	99971		0.55	0.55	-0.63%
	99972		0.39	0.39	-1.22%
	99973		0.33	0.33	0.54%
	99974		0.33	0.33	0.43%
42	99983	EW	1.16	1.13	2.61%
	99984		1.07	1.05	2.30%
	99985		1.04	1.02	2.31%
13.6	99975		0.45	0.45	1.47%
	99976		0.31	0.30	2.67%

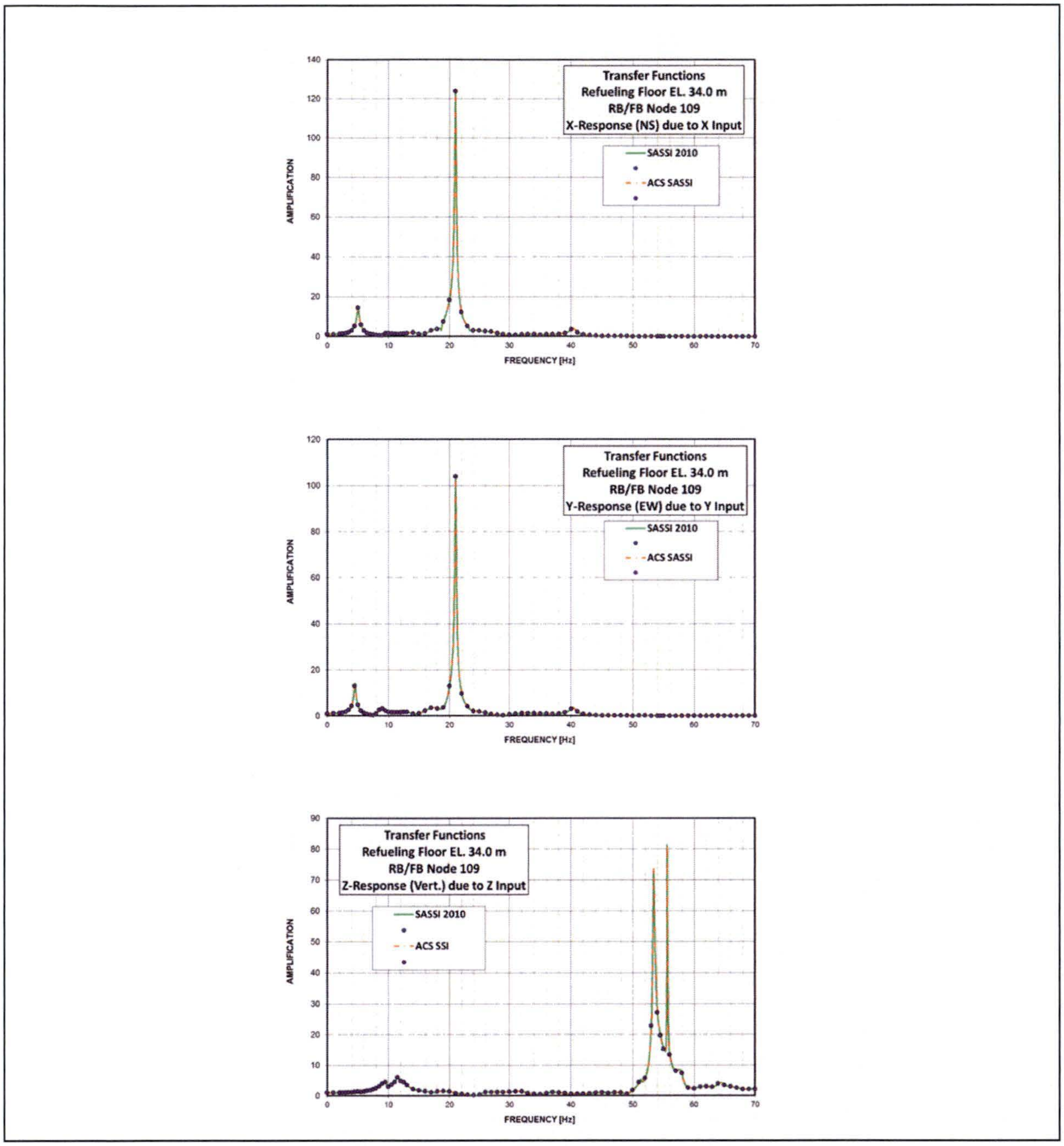

Figure I-1: Comparison of ATF – RB/FB Refueling Floor

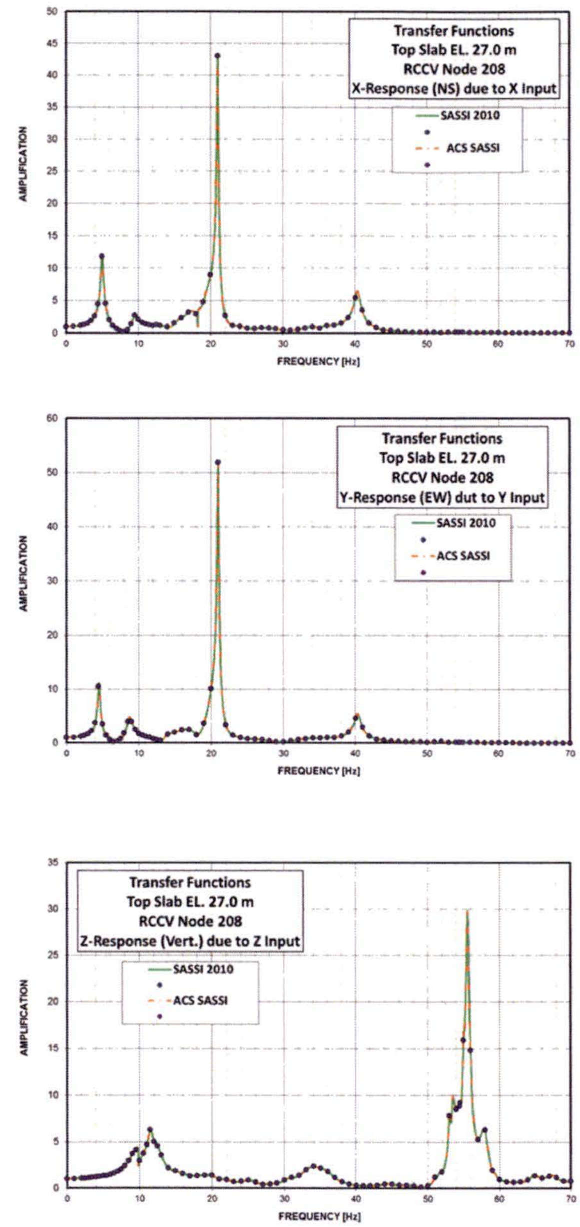

Figure I-2: Comparison of ATF – RCCV Top Slab

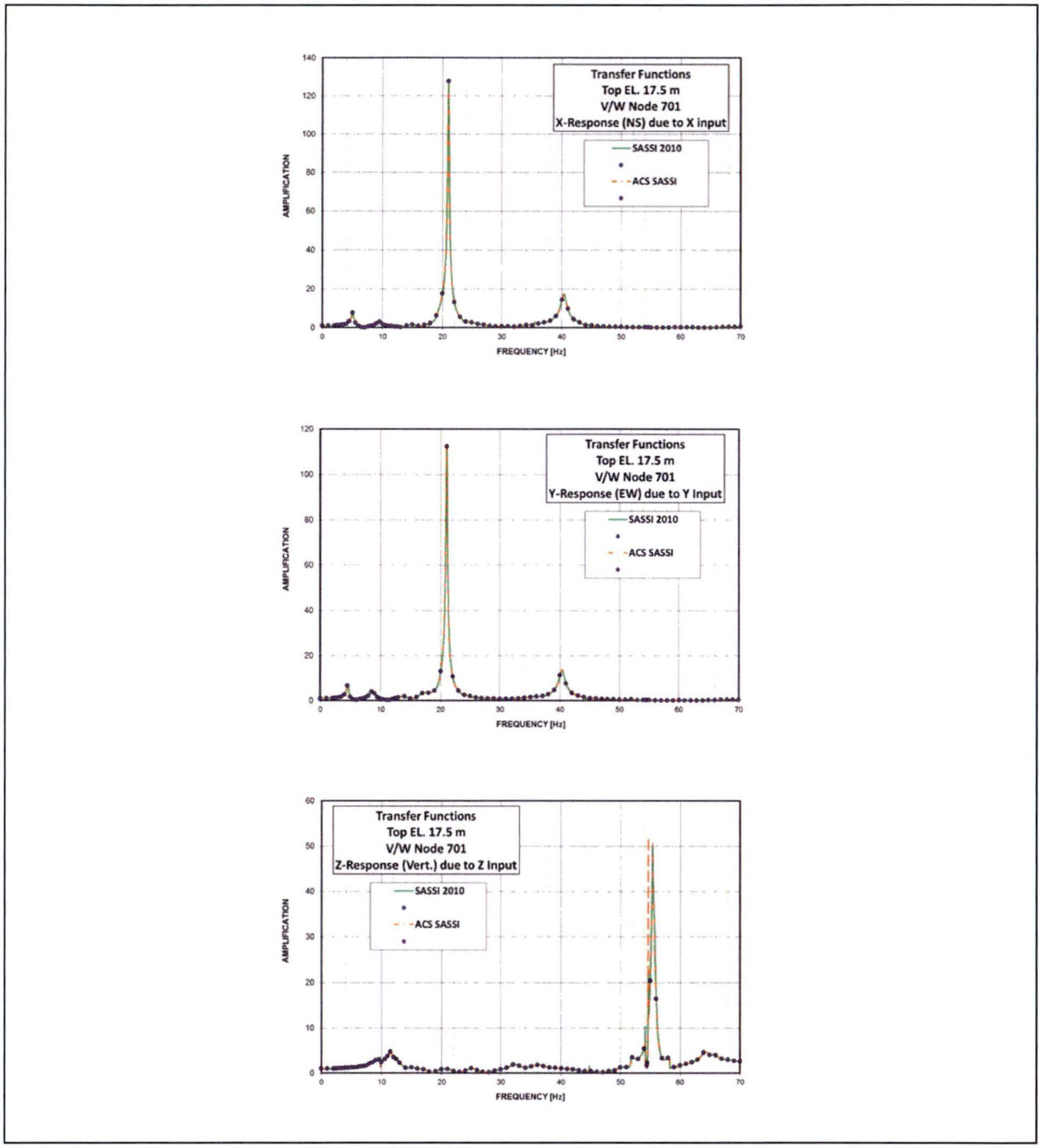

Figure I-3: Comparison of ATF – Vent Wall Top

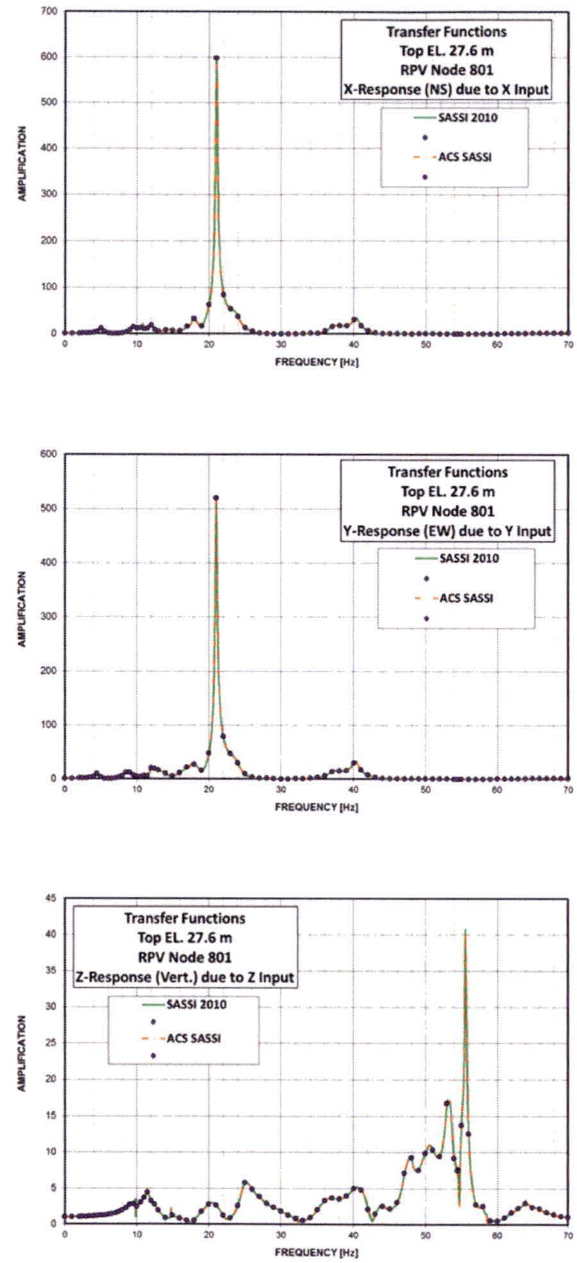

Figure I-4: Comparison of ARS – RPV Top

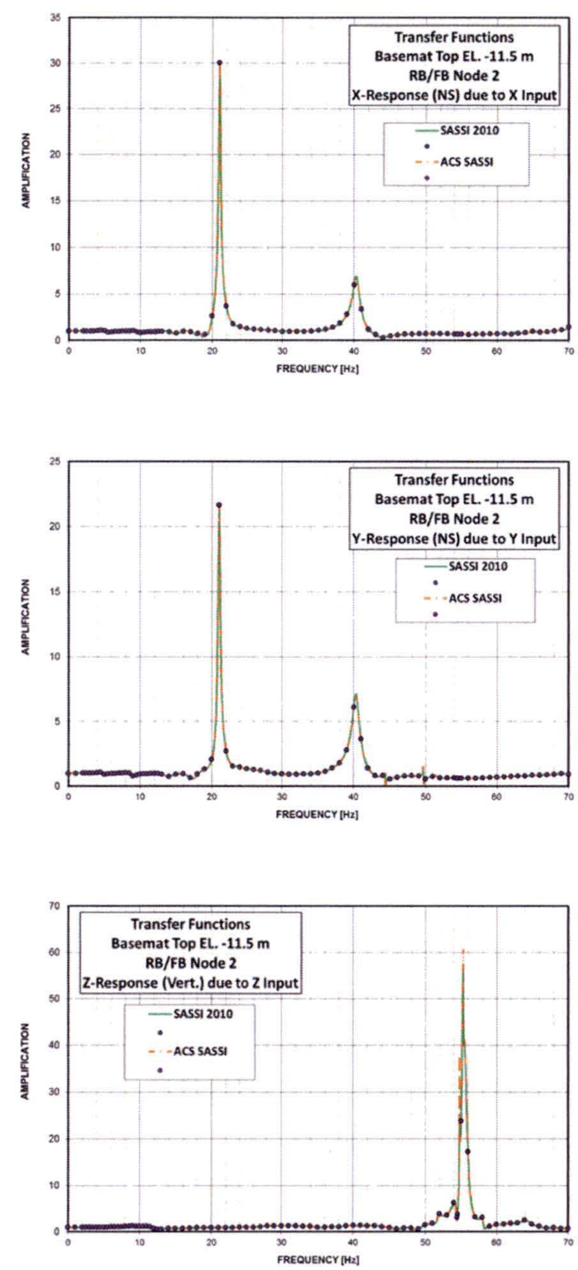

Figure I-5: Comparison of ATF – RB/FB Basemat

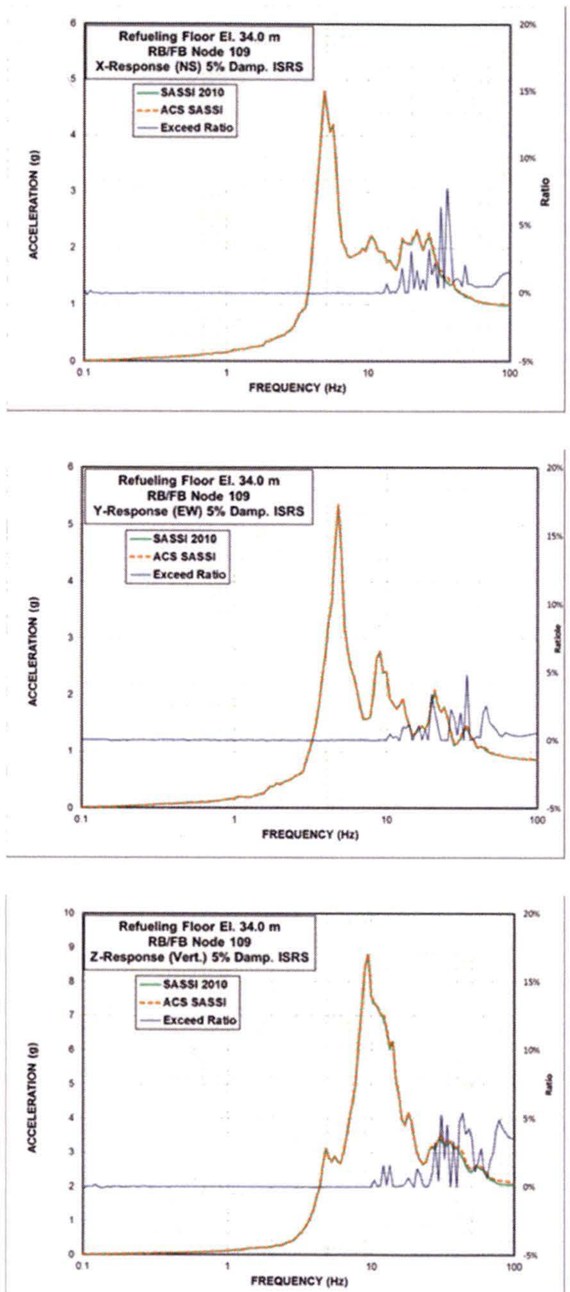

Figure I-6: Comparison of ISRS – RB/FB Refueling Floor

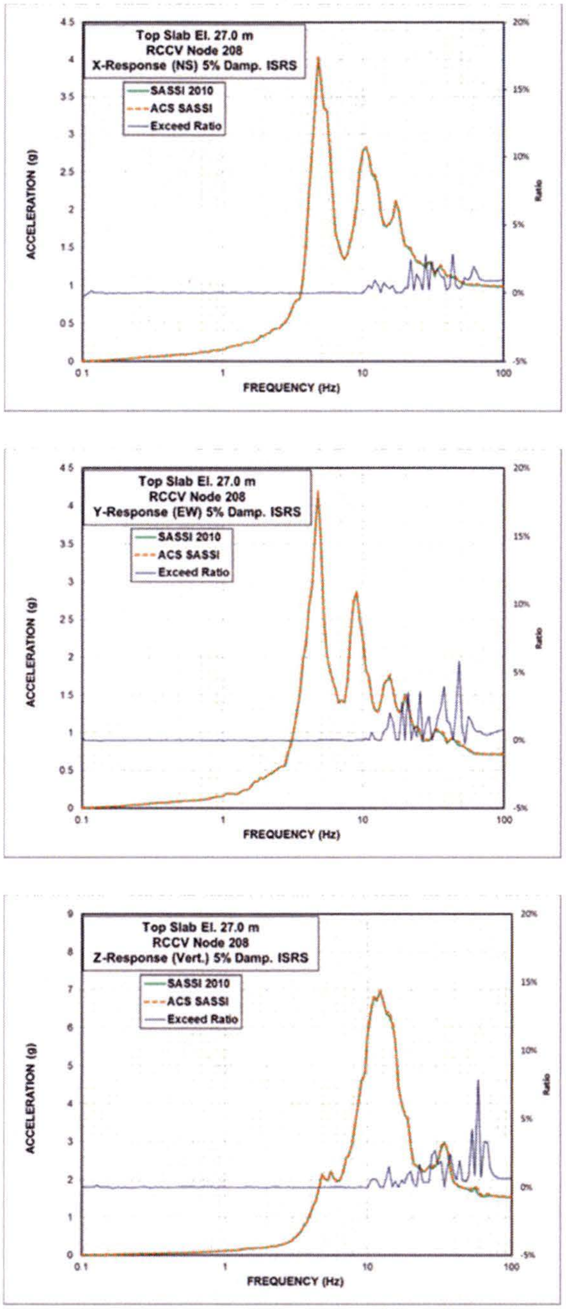

Figure I-7: Comparison of ISRS – RCCV Top Slab

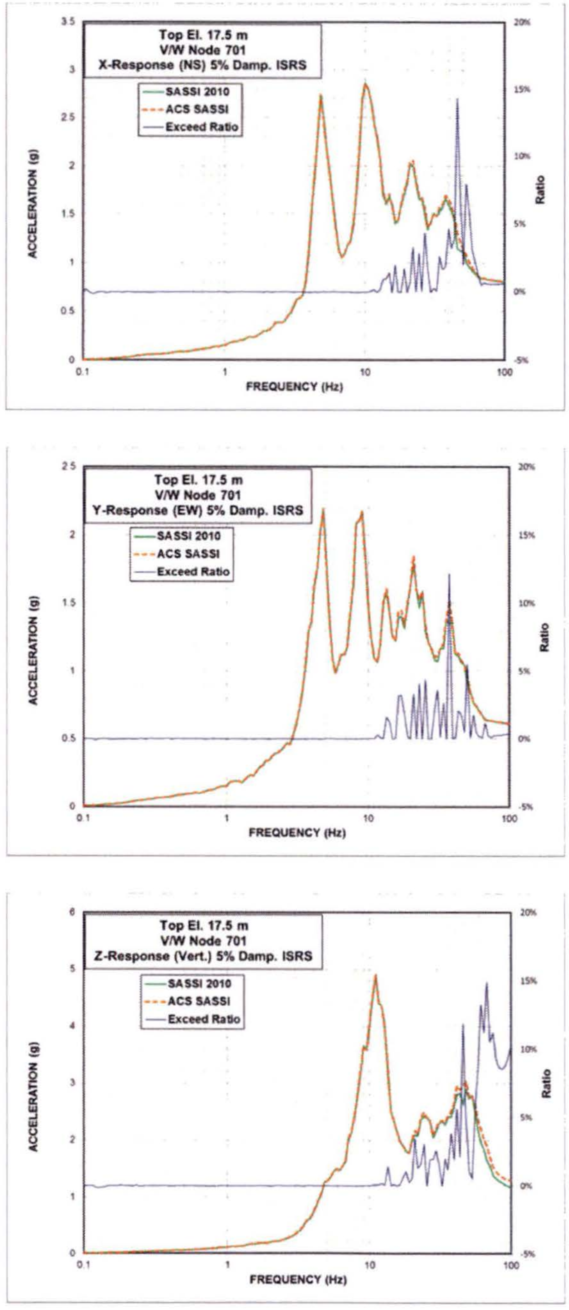

Figure I-8: Comparison of ISRS – Vent Wall Top

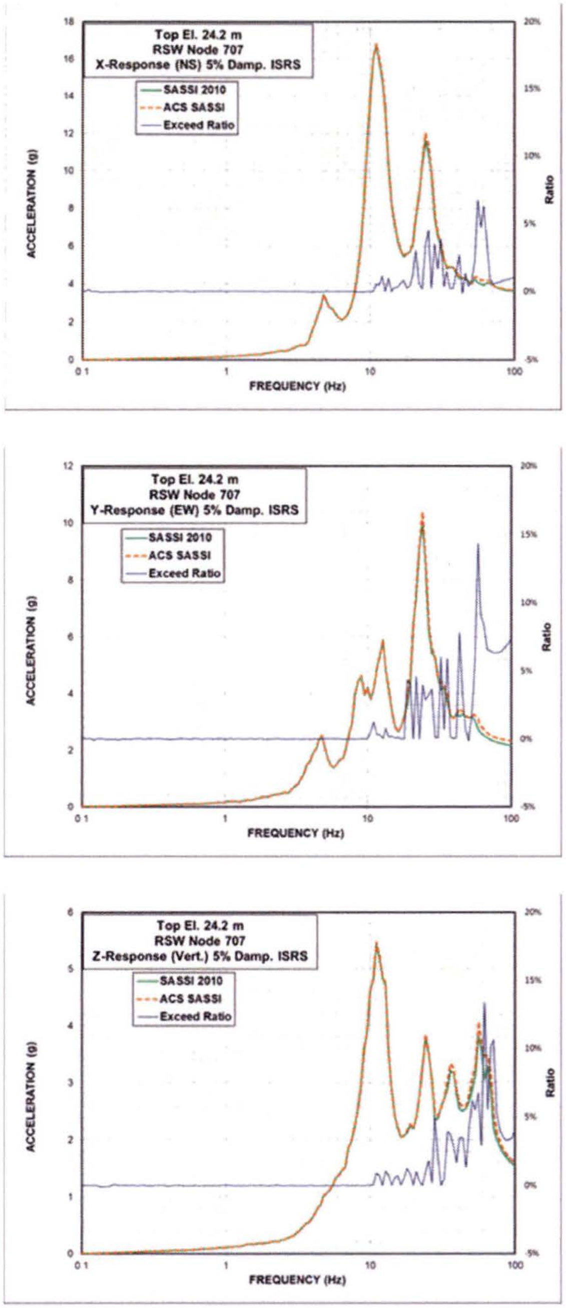

Figure I-9: Comparison of ISRS – RSW Top

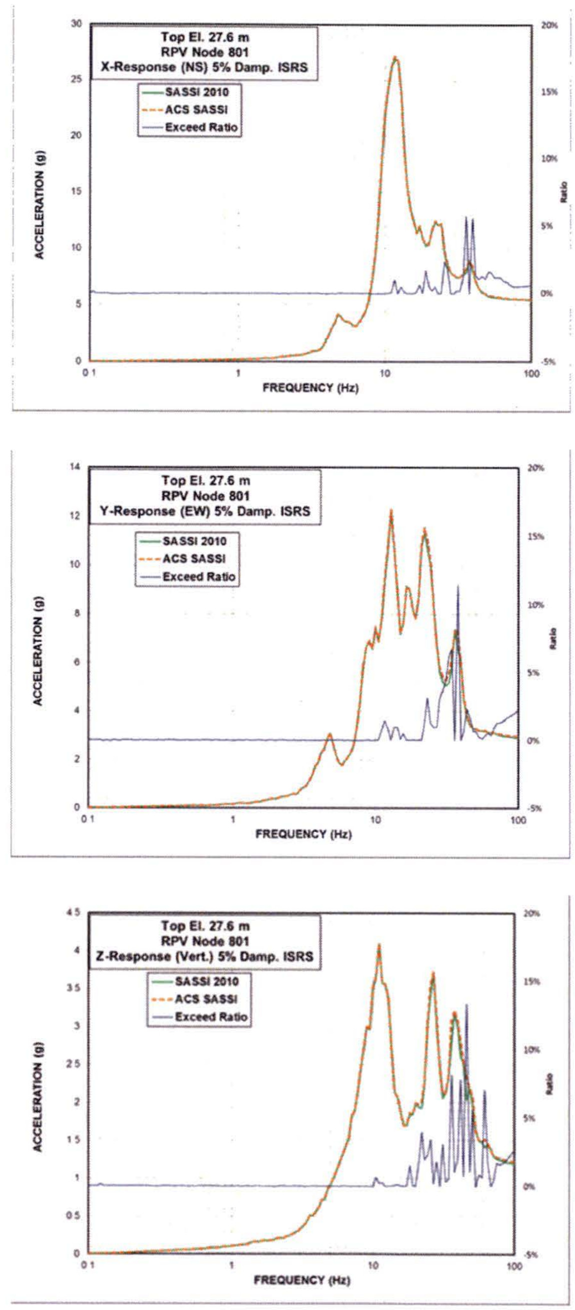

Figure I-10: Comparison of ISRS – RPV Top

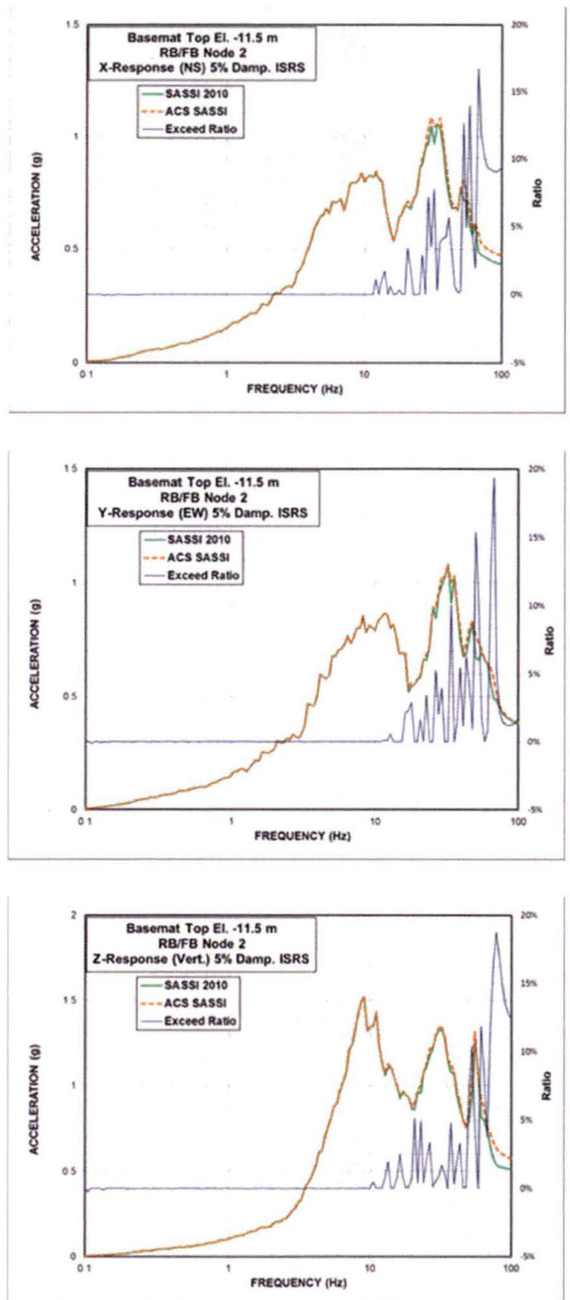

Figure I-11: Comparison of ISRS – RB/FB Basemat

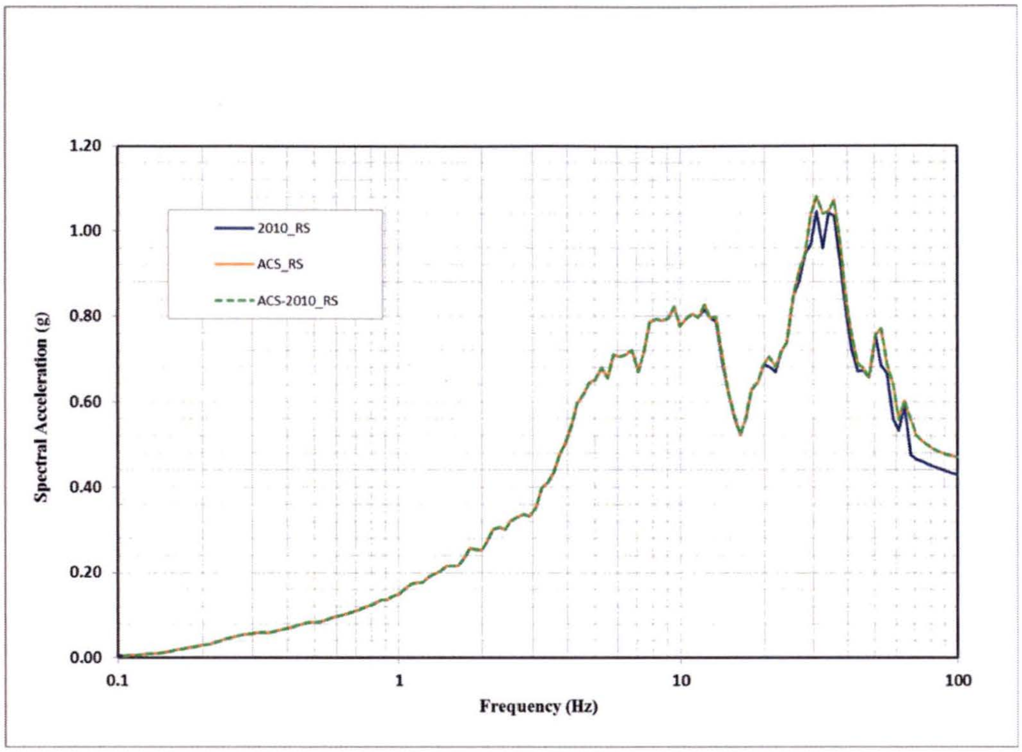

Figure I-12: Comparison of Node_2 Response Spectra

APPENDIX J

Alternative RB/FB Foundation Uplift Evaluations

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J.1 SCOPE

This appendix presents the alternative uplift calculations for the foundation that provide the minimum contact area between the rigid RB/FB complex basemat and the supporting subgrade. The objective of these calculations is to address uncertainties related to the modelling of the basemat stiffness in the RB/FB dynamic model used for the SSI analyses.

The RB/FB dynamic model described in Section 4.3 does not include the effect of the inner walls and pedestal on the overall stiffness of the RB/FB complex foundation. This modelling simplification significantly underestimates the stiffness of the RB/FB complex basemat, which in turn affects the distribution of base pressures used in Section 5.6 for calculations of the minimum foundation contact area. In order to address uncertainties related to the effects of the RB/FB foundation overall stiffness on the foundation uplift, alternative calculations are performed in this appendix that consider the bounding case of an absolutely rigid foundation. The results of these alternative calculations demonstrate that the uncertainties related to the stiffness of the RB/FB complex basemat do not affect the conclusions of the SASSI2010 uplift analyses presented in Section 5.6.

J.2 ALTERNATIVE CALCULATIONS

Under the assumption of an absolutely rigid foundation, the contact pressures below the RB/FB basemat can be calculated using the following equation from the theory of elasticity:

$$\sigma_Z(x,y) = \frac{D - B - S_z(t)}{A} - 12\frac{M_{NS}(t)}{L_{EW}L_{NS}^3}x - 12\frac{M_{EW}(t)}{L_{NS}L_{EW}^3}y$$

where:

x and y are the NS and EW directional coordinates with the coordinate origin in the center of the foundation;

D = 2360 MN is the RB/FB seismic weight (total weight of the RB/FB dynamic model), B = 597 MN is the groundwater buoyancy force and $S_z(t)$ is the vertical seismic base reaction at time t;

L_{NS} = 70 m and L_{EW} = 49 m are the foot print dimensions of the RB/FB complex basemat in NS and EW direction, respectively;

$A = L_{NS}\, L_{EW}$ is the basemat contact area;

$M_{NS}(t)$ and $M_{EW}(t)$ are the overturning moments of the RB/FB complex basemat towards NS and EW direction, respectively.

As described in Section 5.6 (Steps 1 and 3), the vertical seismic force ($S_z(t)$) and the overturning moments ($M_{NS}(t)$ and $M_{EW}(t)$) are calculated using the SASSI2010 results for the contact springs vertical forces.

Alternative calculations are performed in this appendix for the two cases identified in Table 5.6-1 as critical for the uplift of the RB/FB foundation:

a. UB partial column analysis case 3 in Table 4.2-1 for the combination of earthquake input direction +Ex-Ey-Ez and the critical instance of time t = 3.225 sec

b. UB full column analysis case 6 in Table 4.2-1 for the combination of earthquake input direction +Ex-Ey-Ez and the critical instance of time t = 3.225 sec

Table J-1 provides the SASSI2010 calculated magnitudes of the base reactions and overturning moments for these two critical cases.

J.3 RESULTS

Figures J-1 and J-2 present the results of the alternative calculations of the RB/FB rigid foundation uplift, which are performed using the base reaction results provided in Table J-1. The uplifted area of the foundation is shaded in the figures. Figure J-1 shows that based on the results from the RB/FB SSI analyses of the UB partial column profile (analysis case 3 in Table 4.2-1) for the combination of earthquake input direction +Ex-Ey-Ez, 97.2% of the rigid foundation is in contact with soil at the critical instance of time, t = 3.225 sec. Figure J-2 shows that based on the results from the RB/FB SSI analyses of the UB full column profile (analysis case 6 in Table 4.2-1) for the combination of earthquake input direction +Ex-Ey-Ez, the portion of the rigid foundation that is uplifted at the critical instance of time, t = 3.225 sec, is very small (< 1%).

J.4 CONCLUSIONS

The comparisons in Table J-2 show that the alternative rigid foundation uplift calculations presented in this appendix yielded base contact ratio results that are larger than those presented in Section 5.6, which are obtained directly from the SASSI2010 analyses of RB/FB partially and fully embedded dynamic models. Therefore, the results of the alternative rigid foundation uplift calculations confirm the conclusion in Section 5.6, which is the contact area between the RB/FB basemat and the underlying subgrade remains larger than 80%, which per guidance of SRP 3.7.2 (Reference 2-p), ensures that the possible uplift of the RB/FB basemat has negligible effect on the RB/FB seismic response and results of site-specific RB/FB SSI analyses documented in this report.

Table J-1 Magnitudes of Base Reactions and Overturning Moments

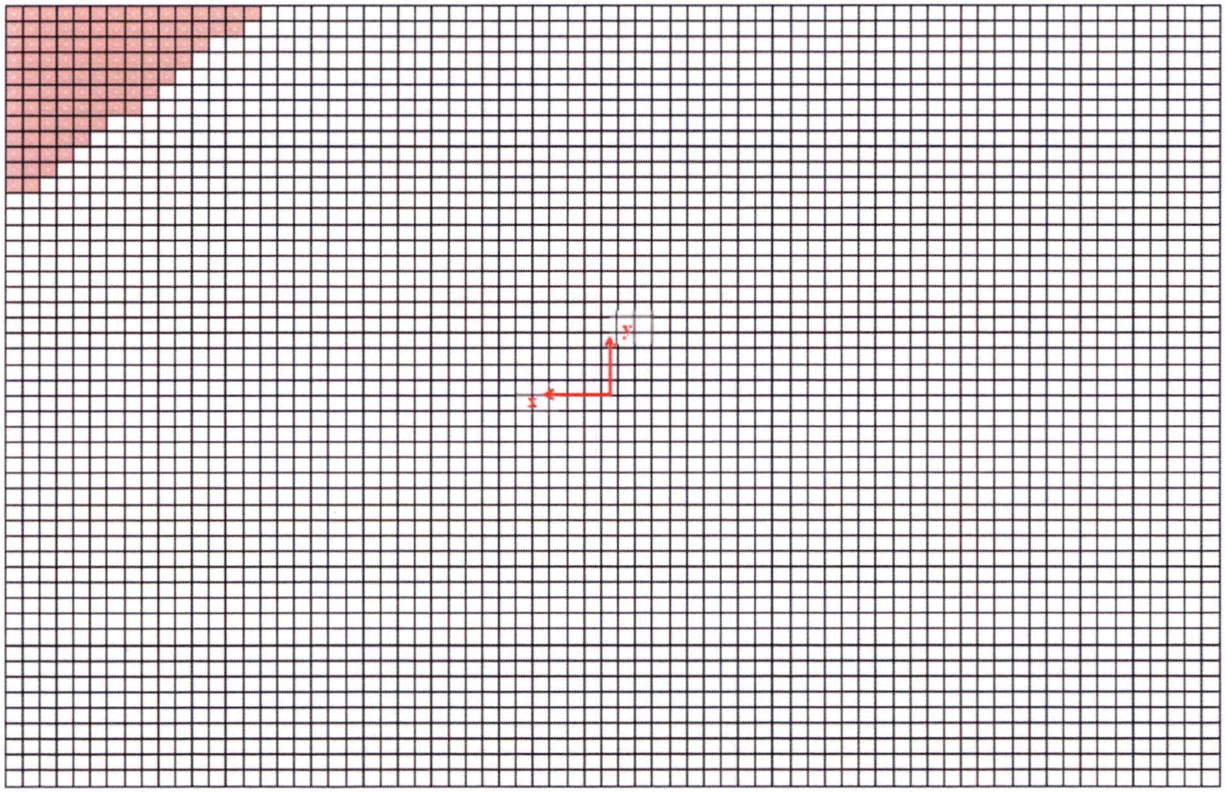
SSI Analysis Case	Input Motion Combination	Time (sec)	Vertical Base Reaction S_z (MN)	Overturning Moments (MN-m)	
				M_{NS}	M_{EW}
UB Partial Column (Case 3)	+Ex-Ey-Ez	3.225	640	9140	5384
UB Full Column (Case 6)	+Ex-Ey-Ez	3.225	739	8140	3107

Table J-2 Base Contact Area

SSI Analysis Case	Input Motion Combination	Time (sec)	Base Contact Area	
			Flexible Foundation*)	Rigid Foundation**)
UB Partial Column (Case 3)	+Ex-Ey-Ez	3.225	90.4%	97.2%
UB Full Column (Case 6)	+Ex-Ey-Ez	3.225	89.2%	99.7%

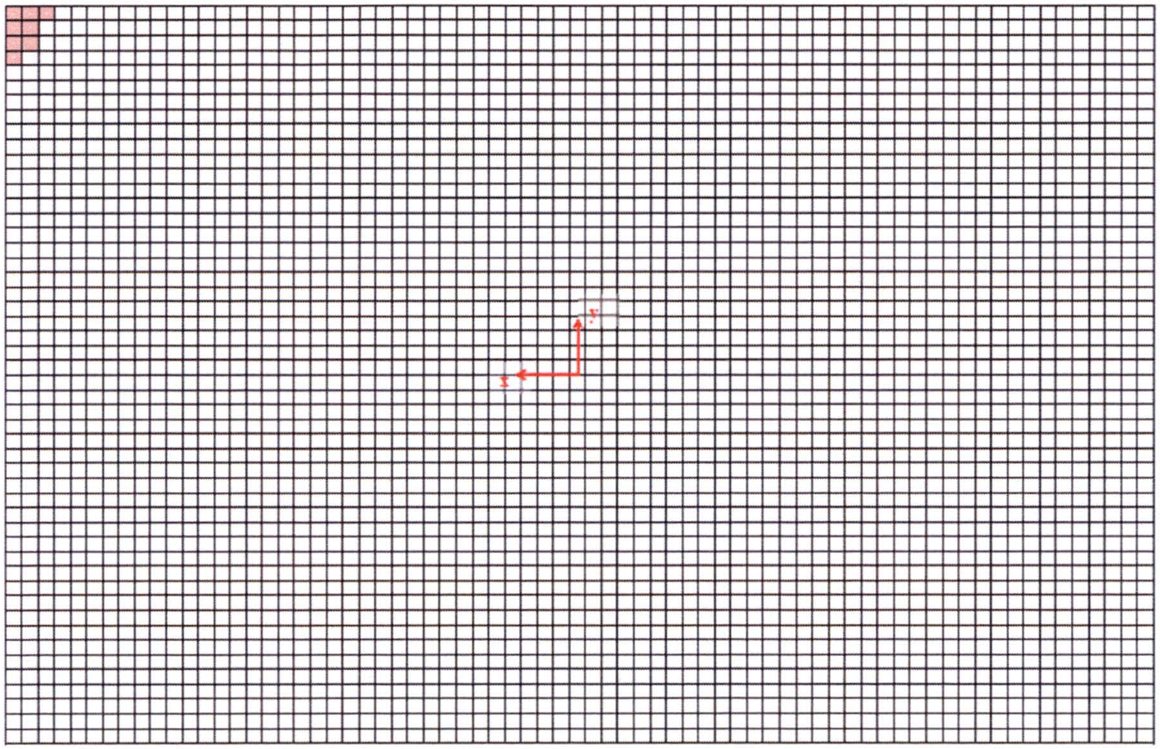
*) SASSI2010 results (Section 5.6, reproduced from Table 5.6-1)

**) Alternative rigid foundation calculations results (Appendix J)



Minimum Contact Area of 97.2% at critical time t = 3.225 sec

Figure J-1 RB/FB Base Contact Area – Alternative Rigid Foundation Calculations for UB Partial Column Analysis Case 3 with Combination of Input Direction +Ex-Ey-Ez



Minimum Contact Area of 99.7% at critical time t = 3.225 sec

Figure J-2 RB/FB Base Contact Area – Alternative Rigid Foundation Calculations for UB Full Column Analysis Case 6 with Combination of Input Direction +Ex-Ey-Ez