Table 3.7.1-214 Enhanced Horizontal and Vertical RB/FB SCOR FIRS at Elevation 523.7 (ft) NAVD 88 (Sheet 2 of 2)

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

Period (sec)	Frequency (Hz)	Horizontal Enhanced SCOR FIRS (g)	Vertical Enhanced SCOR FIRS (g)
0.50	2.0000	0.2605	0.2479
0.55	1.8182	0.2409	0.2224
0.60	1.6667	0.2243	0.2014
0.65	1.5385	0.2100	0.1839
0.70	1.4286	0.1976	0.1690
0.75	1.3333	0.1867	0.1562
0.80	1.2500	0.1770	0.1451
0.85	1.1765	0.1684	0.1354
0.90	1.1111	0.1607	0.1290
0.95	1.0526	0.1537	0.1232
1.0	1.0000	0.1473	0.1179
1.1	0.9091	0.1362	0.1087
1.2	0.8333	0.1268	0.1010
1.3	0.7692	0.1187	0.0938
1.4	0.7143	0.1117	0.0875
1.5	0.6667	0.1056	0.0821
1.6	0.6250	0.1001	0.0774
1.7	0.5882	0.0952	0.0731
1.8	0.5556	0.0909	0.0694
1.9	0.5263	0.0869	0.0660
2.0	0.5000	0.0833	0.0629
2.2	0.4545	0.0770	0.0576
2.4	0.4167	0.0717	0.0531
2.6	0.3846	0.0672	0.0493
2.8	0.3571	0.0632	0.0461
3.0	0.3333	0.0597	0.0432
3.2	0.3125	0.0566	0.0407
3.4	0.2941	0.0539	0.0385
3.6	0.2778	0.0514	0.0365
3.8	0.2632	0.0492	0.0347
4.0	0.2500	0.0471	0.0331
4.2	0.2381	0.0450	0.0316
4.4	0.2273	0.0431	0.0303
4.6	0.2174	0.0414	0.0291
4.8	0.2083	0.0397	0.0280
5.0	0.2000	0.0382	0.0269
5.5	0.1818	0.0350	0.0247
6.0	0.1667	0.0323	0.0227
6.5	0.1538	0.0299	0.0211
7.0	0.1429	0.0279	0.0197
7.5	0.1333	0.0262	0.0185
8.0	0.1250	0.0246	0.0174
8.5	0.1176	0.0233	0.0165
9.0	0.1111	0.0221	0.0156
10	0.1000	0.0200	0.0142

Table 3.7.1-215 Enhanced Horizontal and Vertical CB SCOR FIRS at Elevation 540.4 (ft) NAVD 88 (Sheet 1 of 2)

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

Period (sec)	Frequency (Hz)	Horizontal Enhanced SCOR FIRS (g)	Vertical Enhanced SCOR FIRS (g)
0.010	100.00	0.2209	0.2292
0.017	60.241	0.4047	0.4777
0.020	50.000	0.4803	0.5604
0.025	40.000	0.5367	0.5807
0.030	33.333	0.5608	0.5631
0.033	30.303	0.5680	0.5541
0.040	25.000	0.5827	0.5322
0.042	23.810	0.5772	0.5200
0.044	22.727	0.5719	0.5086
0.046	21.739	0.5669	0.4978
0.048	20.833	0.5622	0.4875
0.050	20.000	0.5577	0.4777
0.055	18.182	0.5425	0.4749
0.060	16.667	0.5290	0.4723
0.065	15.385	0.5250	0.4700
0.070	14.286	0.5213	0.4678
0.075	13.333	0.5179	0.4658
0.080	12.500	0.5147	0.4639
0.085	11.765	0.5118	0.4622
0.090	11.111	0.5090	0.4605
0.095	10.526	0.5064	0.4590
0.10	10.000	0.5039	0.4575
0.11	9.0909	0.4994	0.4548
0.12	8.3333	0.4953	0.4523
0.13	7.6923	0.4915	0.4501
0.14	7.1429	0.4881	0.4480
0.15	6.6667	0.4849	0.4461
0.16	6.2500	0.4819	0.4443
0.17	5.8824	0.4792	0.4426
0.18	5.5556	0.4766	0.4410
0.19	5.2632	0.4741	0.4396
0.20	5.0000	0.4718	0.4382
0.22	4.5455	0.4676	0.4356
0.24	4.1667	0.4637	0.4332
0.26	3.8462	0.4363	0.4320
0.28	3.5714	0.4123	0.4309
0.30	3.3333	0.3912	0.4145
0.32	3.1250	0.3724	0.3923
0.34	2.9412	0.3556	0.3726
0.36	2.7778	0.3404	0.3549
0.38	2.6316	0.3184	0.3389
0.40	2.5000	0.3130	0.3197
0.42	2.3810	0.3007	0.3024
0.44	2.2727	0.2894	0.2868
0.46	2.1739	0.2790	0.2726
0.48	2.0833	0.2694	0.2597

Table 3.7.1-215 Enhanced Horizontal and Vertical CB SCOR FIRS at Elevation 540.4 (ft) NAVD 88 (Sheet 2 of 2)

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

Period (sec)	Frequency (Hz)	Horizontal Enhanced SCOR FIRS (g)	Vertical Enhanced SCOR FIRS (g)
0.50	2.0000	0.2605	0.2479
0.55	1.8182	0.2409	0.2224
0.60	1.6667	0.2243	0.2014
0.65	1.5385	0.2100	0.1839
0.70	1.4286	0.1976	0.1690
0.75	1.3333	0.1867	0.1562
0.80	1.2500	0.1770	0.1451
0.85	1.1765	0.1684	0.1354
0.90	1.1111	0.1607	0.1290
0.95	1.0526	0.1537	0.1232
1.0	1.0000	0.1473	0.1179
1.1	0.9091	0.1362	0.1087
1.2	0.8333	0.1268	0.1010
1.3	0.7692	0.1187	0.0938
1.4	0.7143	0.1117	0.0875
1.5	0.6667	0.1056	0.0821
1.6	0.6250	0.1001	0.0774
1.7	0.5882	0.0952	0.0731
1.8	0.5556	0.0909	0.0694
1.9	0.5263	0.0869	0.0660
2.0	0.5000	0.0833	0.0629
2.2	0.4545	0.0770	0.0576
2.4	0.4167	0.0717	0.0531
2.6	0.3846	0.0672	0.0493
2.8	0.3571	0.0632	0.0461
3.0	0.3333	0.0597	0.0432
3.2	0.3125	0.0566	0.0407
3.4	0.2941	0.0539	0.0385
3.6	0.2778	0.0514	0.0365
3.8	0.2632	0.0492	0.0347
4.0	0.2500	0.0471	0.0331
4.2	0.2381	0.0450	0.0316
4.4	0.2273	0.0431	0.0303
4.6	0.2174	0.0414	0.0291
4.8	0.2083	0.0397	0.0280
5.0	0.2000	0.0382	0.0269
5.5	0.1818	0.0350	0.0247
6.0	0.1667	0.0323	0.0227
6.5	0.1538	0.0299	0.0211
7.0	0.1429	0.0279	0.0197
7.5	0.1333	0.0262	0.0185
8.0	0.1250	0.0246	0.0174
8.5	0.1176	0.0233	0.0165
9.0	0.1111	0.0221	0.0156
10	0.1000	0.0200	0.0142

Table 3.7.1-216 Horizontal and Vertical FWSC FIRS at Elevation 581.6 (ft) NAVD 88 with Associated V/H Ratios (Sheet 1 of 2)

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

Period (sec)	Frequency (Hz)	Horizontal FWSC FIRS (g)	V/H Ratio	Vertical FWSC FIRS (g)
0.010	100.00	0.2290	1.0000	0.2290
0.017	60.241	0.4282	1.1374	0.4871
0.020	50.000	0.5789	1.1244	0.6509
0.025	40.000	0.7887	1.0426	0.8224
0.030	33.333	0.9961	0.9675	0.9638
0.033	30.303	1.0524	0.9400	0.9893
0.040	25.000	1.0316	0.8800	0.9078
0.042	23.810	0.9953	0.8681	0.8640
0.044	22.727	0.9559	0.8569	0.8191
0.046	21.739	0.9141	0.8461	0.7735
0.048	20.833	0.8687	0.8355	0.7258
0.050	20.000	0.8429	0.8255	0.6958
0.055	18.182	0.7880	0.8069	0.6358
0.060	16.667	0.7613	0.7984	0.6078
0.065	15.385	0.7395	0.7906	0.5846
0.070	14.286	0.7150	0.7834	0.5602
0.075	13.333	0.6930	0.7769	0.5383
0.080	12.500	0.6729	0.7708	0.5187
0.085	11.765	0.6547	0.7651	0.5009
0.090	11.111	0.6379	0.7597	0.4846
0.095	10.526	0.6224	0.7547	0.4698
0.10	10.000	0.6081	0.7500	0.4561
0.11	9.0910	0.5824	0.7500	0.4368
0.12	8.3330	0.5598	0.7500	0.4199
0.13	7.6920	0.5398	0.7500	0.4049
0.14	7.1430	0.5220	0.7500	0.3915
0.15	6.6670	0.5059	0.7500	0.3794
0.16	6.2500	0.4913	0.7500	0.3685
0.17	5.8820	0.4779	0.7500	0.3584
0.18	5.5560	0.4657	0.7500	0.3493
0.19	5.2630	0.4544	0.7500	0.3408
0.20	5.0000	0.4439	0.7500	0.3330
0.22	4.5450	0.4251	0.7500	0.3189
0.24	4.1670	0.4087	0.7500	0.3065
0.26	3.8460	0.3941	0.7500	0.2956
0.28	3.5710	0.3865	0.7500	0.2899
0.30	3.3330	0.3689	0.7500	0.2767
0.32	3.1250	0.3471	0.7500	0.2603
0.34	2.9410	0.3232	0.7500	0.2424
0.36	2.7780	0.3002	0.7500	0.2251
0.38	2.6320	0.2789	0.7500	0.2092
0.40	2.5000	0.2564	0.7500	0.1923
0.42	2.3810	0.2391	0.7500	0.1793
0.44	2.2730	0.2236	0.7500	0.1677
0.46	2.1740	0.2085	0.7500	0.1564
0.48	2.0830	0.1956	0.7500	0.1467

Table 3.7.1-216 Horizontal and Vertical FWSC FIRS at Elevation 581.6 (ft) NAVD 88 with Associated V/H Ratios (Sheet 2 of 2)

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

Period (sec)	Frequency (Hz)	Horizontal FWSC FIRS (g)	V/H Ratio	Vertical FWSC FIRS (g)
0.50	2.0000	0.1843	0.7500	0.1383
0.55	1.8180	0.1653	0.7500	0.1240
0.60	1.6670	0.1500	0.7500	0.1125
0.65	1.5380	0.1380	0.7500	0.1035
0.70	1.4290	0.1281	0.7500	0.0961
0.75	1.3330	0.1198	0.7500	0.0899
0.80	1.2500	0.1118	0.7500	0.0838
0.85	1.1760	0.1059	0.7500	0.0794
0.90	1.1110	0.1007	0.7500	0.0755
0.95	1.0530	0.0952	0.7500	0.0714
1.0	1.0000	0.0910	0.7500	0.0682
1.1	0.9090	0.0852	0.7500	0.0639
1.2	0.8330	0.0802	0.7500	0.0602
1.3	0.7690	0.0759	0.7500	0.0569
1.4	0.7140	0.0730	0.7500	0.0548
1.5	0.6670	0.0713	0.7500	0.0535
1.6	0.6250	0.0694	0.7500	0.0520
1.7	0.5880	0.0675	0.7500	0.0506
1.8	0.5560	0.0660	0.7500	0.0495
1.9	0.5260	0.0646	0.7500	0.0485
2.0	0.5000	0.0634	0.7500	0.0475
2.2	0.4550	0.0593	0.7500	0.0445
2.4	0.4170	0.0555	0.7500	0.0416
2.6	0.3850	0.0528	0.7500	0.0396
2.8	0.3570	0.0502	0.7500	0.0376
3.0	0.3330	0.0478	0.7500	0.0359
3.2	0.3130	0.0457	0.7500	0.0343
3.4	0.2940	0.0438	0.7500	0.0328
3.6	0.2780	0.0418	0.7500	0.0314
3.8	0.2630	0.0404	0.7500	0.0303
4.0	0.2500	0.0391	0.7500	0.0293
4.2	0.2380	0.0380	0.7500	0.0285
4.4	0.2270	0.0369	0.7500	0.0277
4.6	0.2170	0.0358	0.7500	0.0268
4.8	0.2080	0.0348	0.7500	0.0261
5.0	0.2000	0.0339	0.7500	0.0255
5.5	0.1820	0.0312	0.7500	0.0234
6.0	0.1670	0.0288	0.7500	0.0216
6.5	0.1540	0.0267	0.7500	0.0200
7.0	0.1430	0.0249	0.7500	0.0187
7.5	0.1330	0.0234	0.7500	0.0176
8.0	0.1250	0.0219	0.7500	0.0164
8.5	0.1180	0.0205	0.7500	0.0154
9.0	0.1110	0.0193	0.7500	0.0145
10	0.1000	0.0173	0.7500	0.0130

Table 3.7.1-217 Seed Time History Recording Details [EF3 SUP 3.7-1]

			Filter Corners		Record Parameters			
Earthquake	Station	Component	High-Pass (Hz)	Low-Pass (Hz)	PGA (g)	PGV (cm/sec)	PGD (cm)	Duration* (sec)
1999 Chi-Chi, Taiwan	TAP078 R = 131 km	TAP078-N	0.04	40	0.088	13.0	5.6	25.8
		TAP078-W	0.02	40	0.094	10.7	5.0	30.1
M 7.6		TAP078-V	0.03	33	0.063	8.6	8.3	30.5

Note:

Duration is defined as the time interval between the time history points at which 5 and 75 percent of the normalized Arias intensity (total energy measure) has been recorded.

Table 3.7.1-218 Cross Correlation Coefficients for the Matched Time Histories

[EF3 SUP 3.7-1]

Building	Components	Cross Correlation Coefficient
RB/FB	H1 – H2	-0.01
	H1 – V	0.02
	H2 – V	0.00
CB	H1 – H2	-0.02
	H1 – V	0.02
	H2 – V	0.00

Table 3.7.1-219 Matched Time History (Outcrop Motions) Parameters [EF3 SUP 3.7-1]

Response Spectrum	Component	Record Parameters					
		PGA (g)	PGV (cm/sec)	PGD (cm)	Duration (sec)	PGV/PGA (cm/sec/g)	PGA×PGD /PGV^2
RB/FB Enhanced SCOR FIRS	Horizontal 1	0.24	17.80	12.11	24.65	74.03	9.01
	Horizontal 2	0.24	17.28	12.57	29.21	73.50	9.71
	Vertical	0.24	14.06	9.38	30.89	58.17	11.25
CB Enhanced SCOR FIRS	Horizontal 1	0.24	18.63	12.07	24.52	77.24	8.23
	Horizontal 2	0.23	16.03	12.16	29.15	69.92	10.65
	Vertical	0.24	14.21	8.78	31.05	58.84	10.31

Note:

PGA – Peak ground acceleration (100 Hz)
PGV – Peak ground velocity
PGD – Peak ground displacement
Duration is defined as the time interval between the time history points at which 5 and 75 percent of the normalized Arias intensity (total energy measure) has been recorded.

Table 3.7.1-220 Cumulative Power below 50 Hz for In-Column Acceleration Time Histories with and without Engineered Granular Backfill above the Top of the Bass Islands Group Bedrock [EF3 SUP 3.7-1]

Structure	Engineered Granular Backfill above the Top of the Bass Islands Group Bedrock	In-Column Time History Component	Cumulative Power Below 50 Hz		
			Deterministic Profile		
			BE	LB	UB
RB/FB	Without Backfill	Vertical	92%	94%	91%
		Horizontal – H1	100%	99%	99%
		Horizontal – H2	99%	98%	98%
	With Backfill	Vertical	93%	95%	91%
		Horizontal – H1	100%	99%	99%
		Horizontal – H2	99%	98%	98%
CB	Without Backfill	Vertical	88%	89%	88%
		Horizontal – H1	96%	97%	95%
		Horizontal – H2	93%	94%	92%
	With Backfill	Vertical	90%	91%	92%
		Horizontal – H1	96%	97%	96%
		Horizontal – H2	93%	94%	93%

Figure 3.7.1-201 Shear Wave Velocity Profiles for Site Response Analysis: Intermediate Range, Lower Range, and Upper Range Values [EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

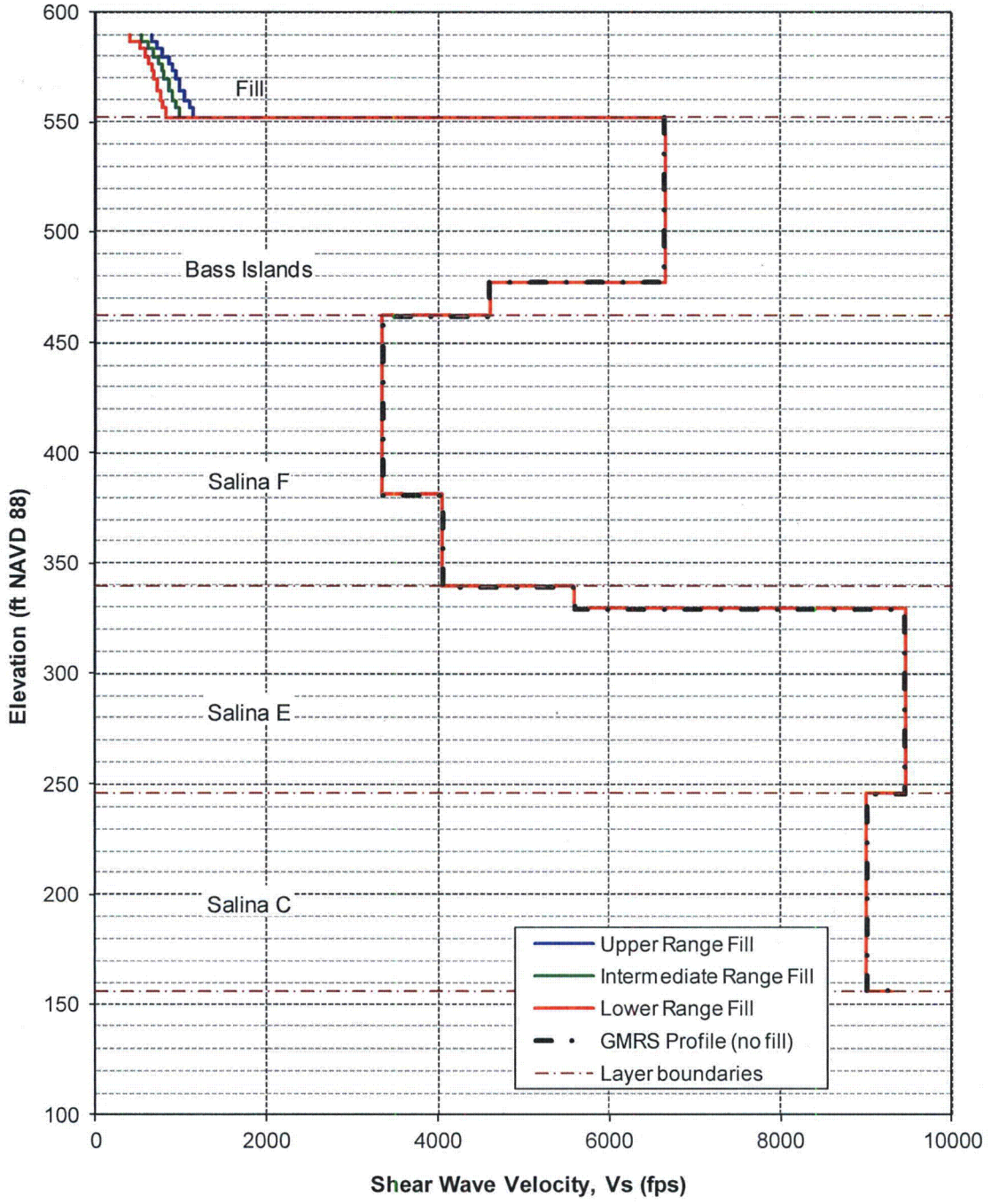

Figure 3.7.1-202 Shear Wave Velocity Profiles for Site Response Analysis: FWSC Shear Wave Velocity Profile

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

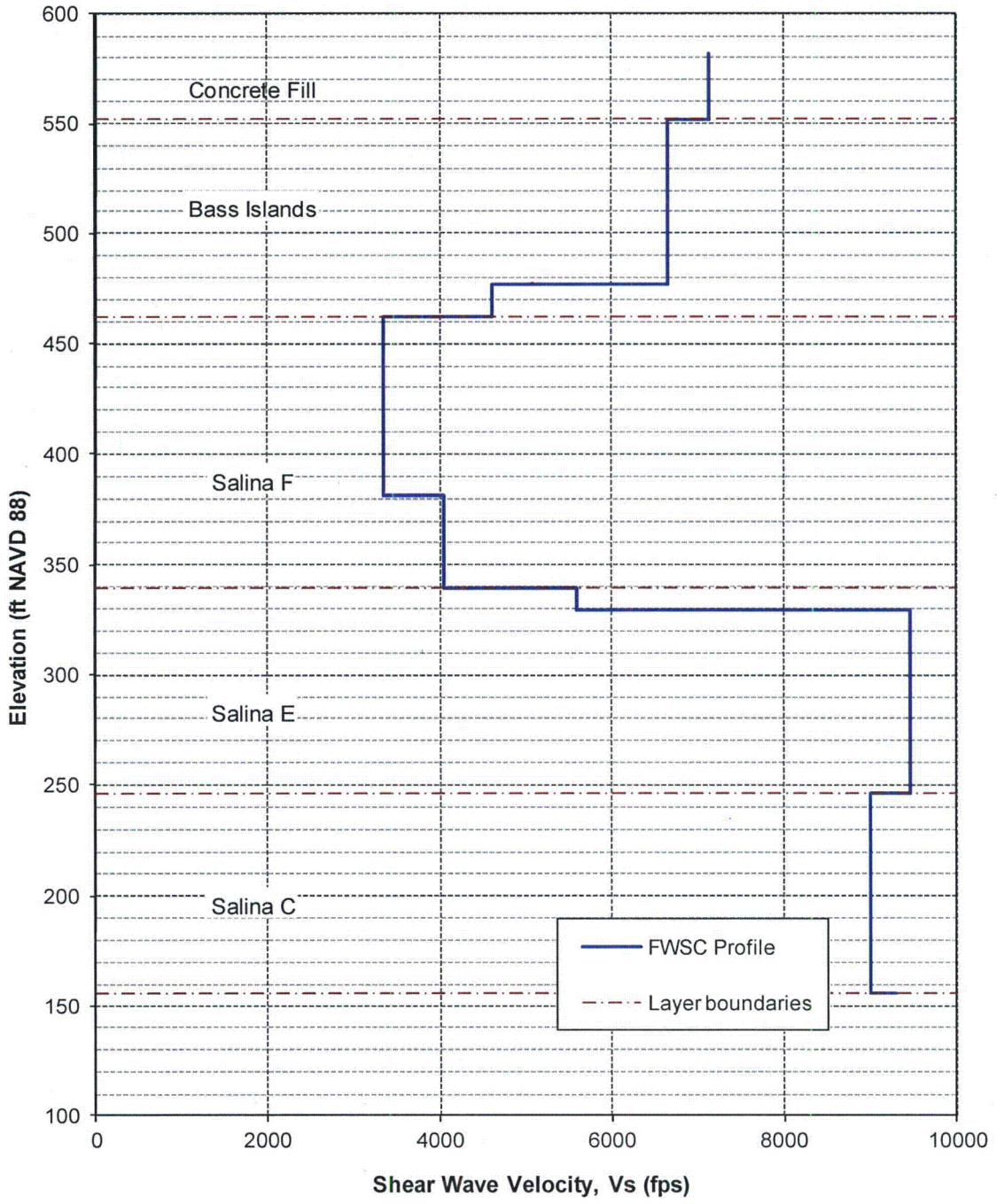

Figure 3.7.1-203 Modulus Reduction and Damping Relationships Used for the Engineered Granular Backfill Material

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

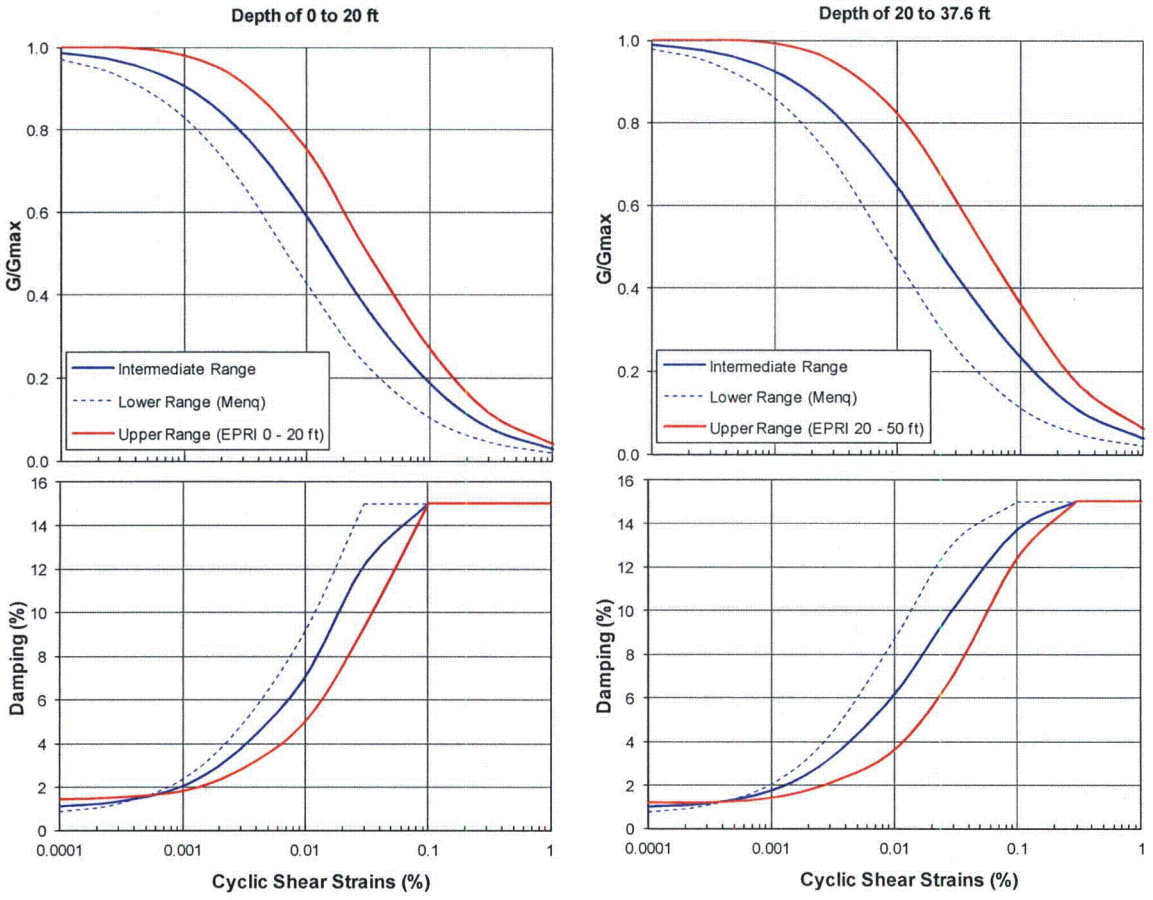

Figure 3.7.1-204 Randomized Shear Wave Velocity Profiles 1-30 for the Intermediate Range Site Response Analysis Profile

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

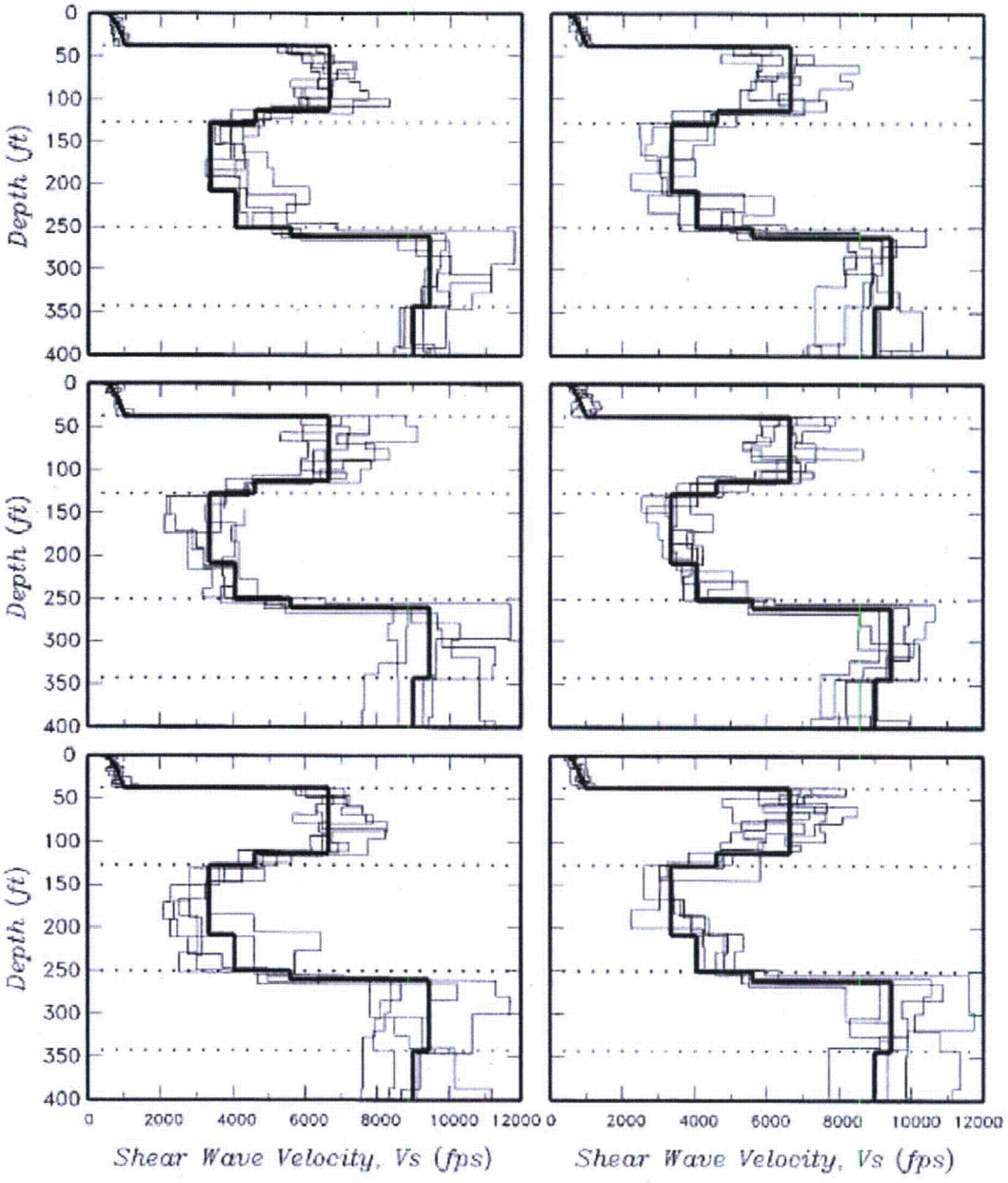

Figure 3.7.1-205 Randomized Shear Wave Velocity Profiles 31-60 for the Intermediate Range Site Response Analysis Profile

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

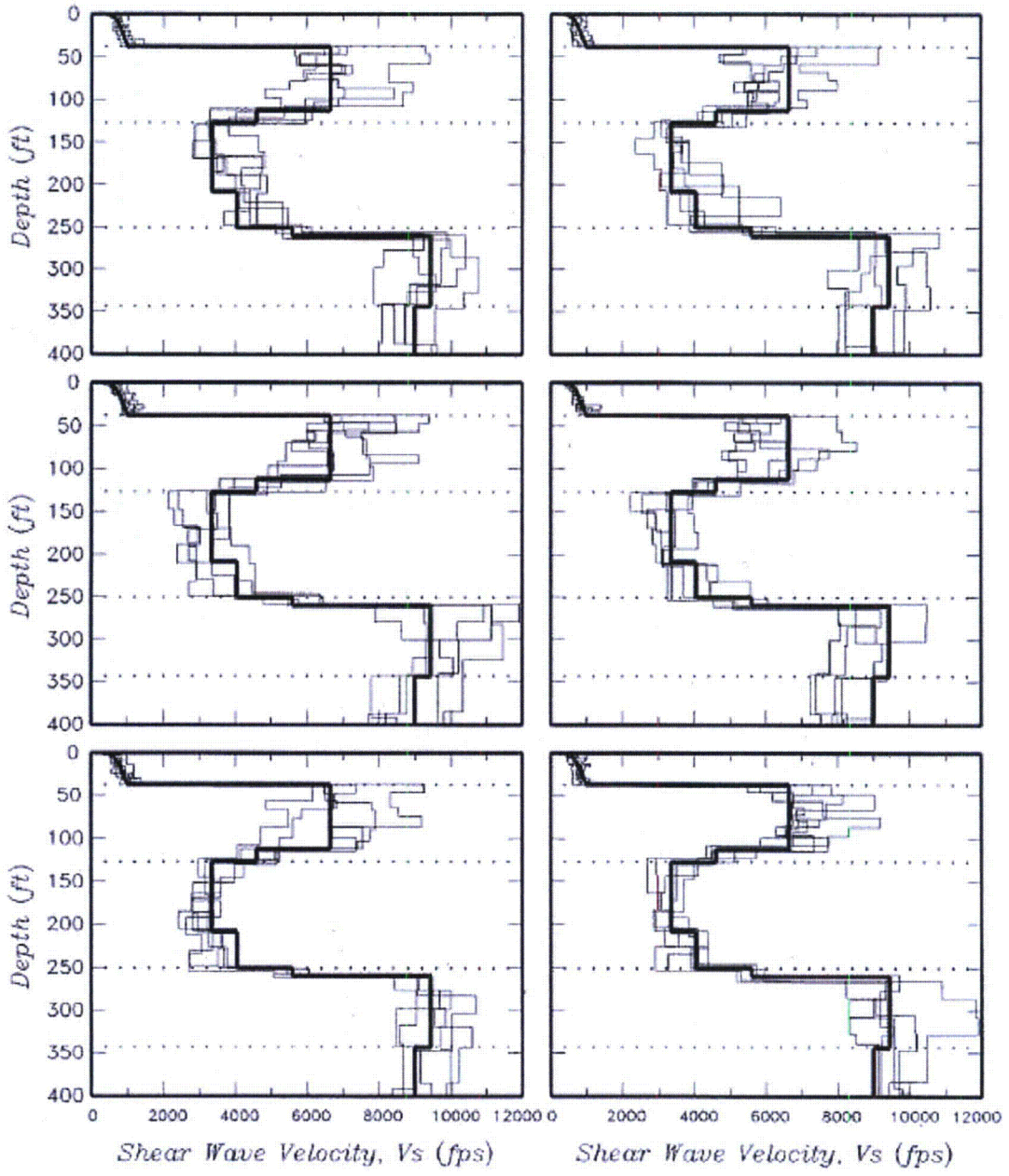

Figure 3.7.1-206 Statistics of Randomized Shear Wave Velocity Profiles for the Intermediate Range Site Response Analysis Profile
[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

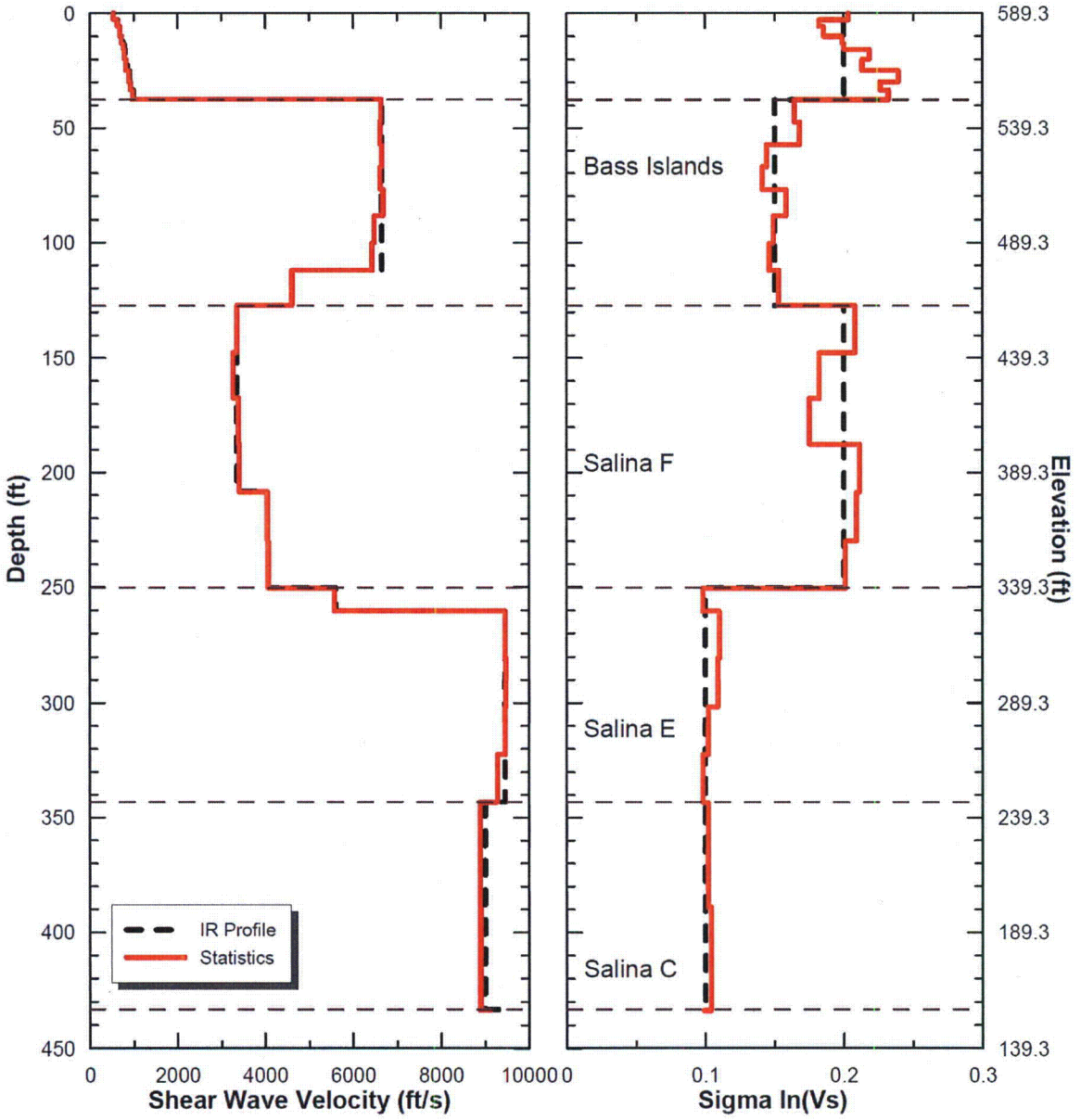

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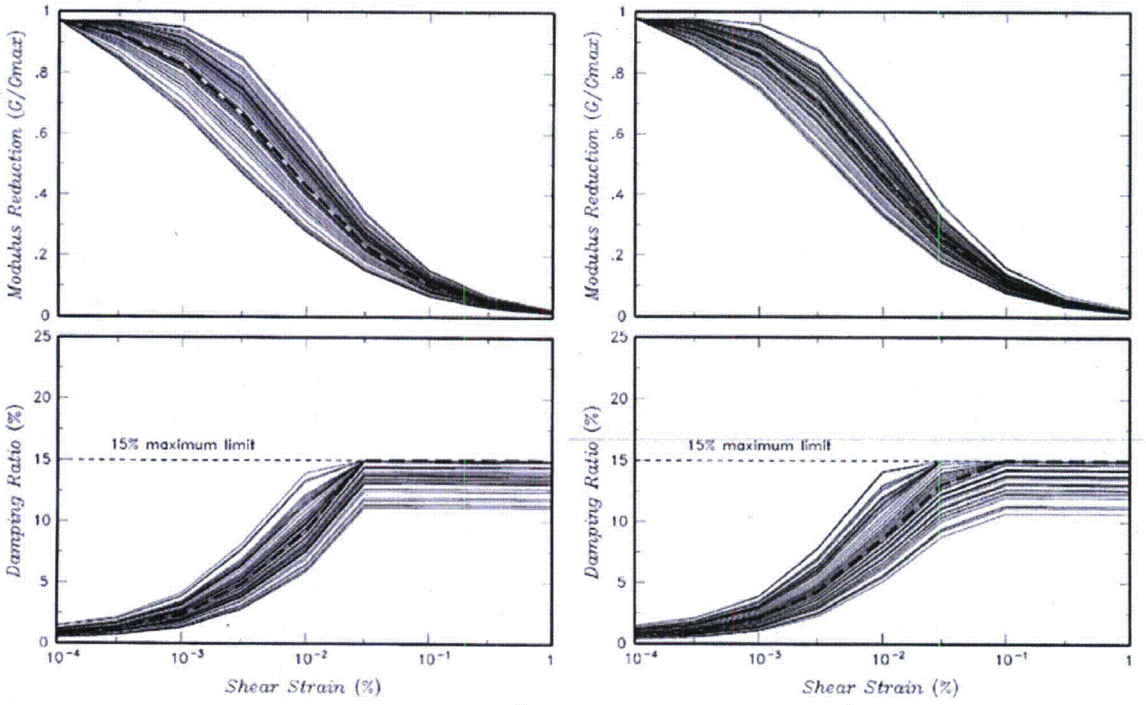
Figure 3.7.1-207 Randomized Shear Modulus Reduction and Damping Relationships Used for LR Engineered Granular Backfill Material

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]



0 to 20 feet depth

20 to 37.6 feet depth

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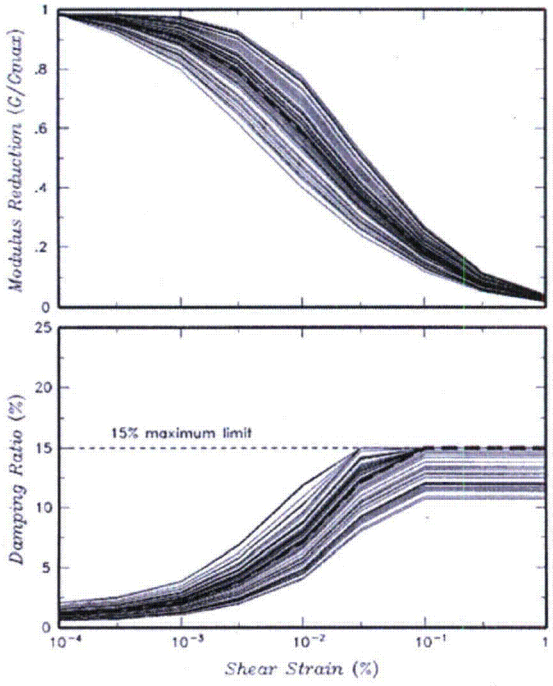
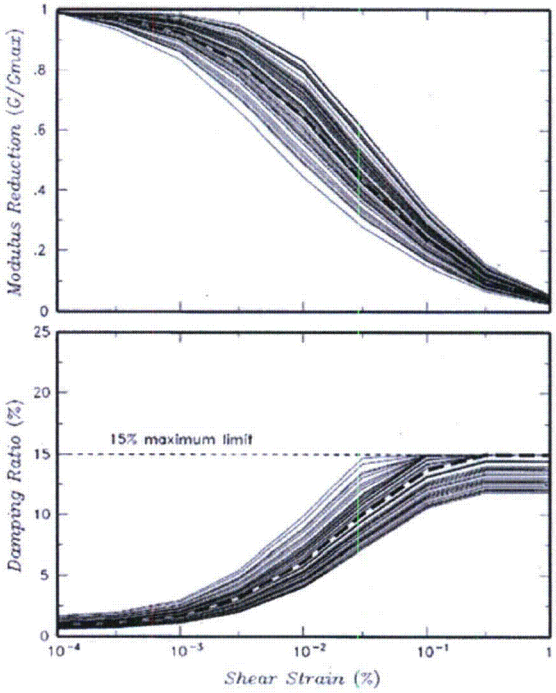
Figure 3.7.1-208 Randomized Shear Modulus Reduction and Damping Relationships Used for IR Engineered Granular Backfill Material

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]



0 to 20 feet depth



20 to 50 feet depth

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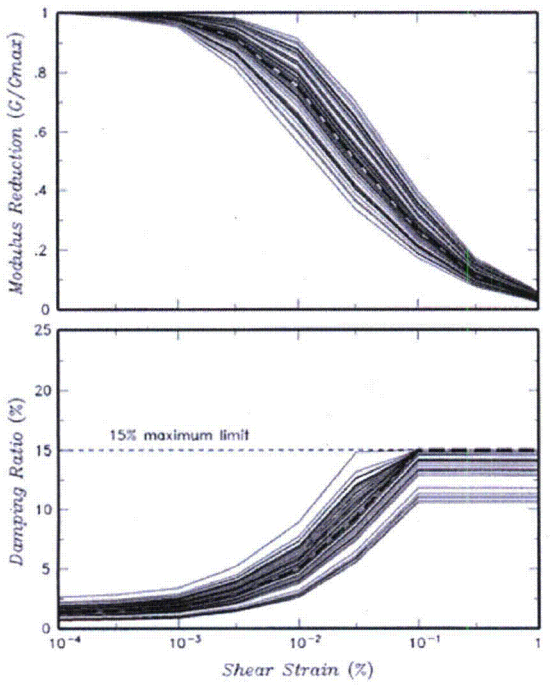
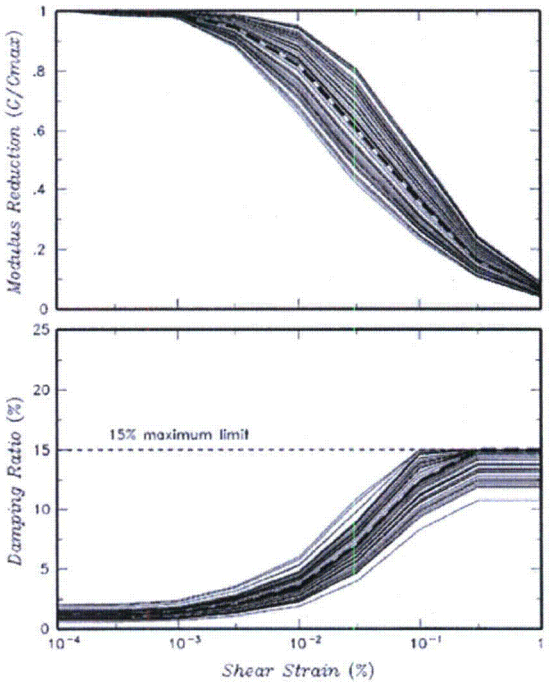
Figure 3.7.1-209 Randomized Shear Modulus Reduction and Damping Relationships Used for UR Engineered Granular Backfill Material

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]



0 to 20 feet depth



20 to 50 feet depth

Figure 3.7.1-210 Site Response Logic Tree for Full Soil Column Profile

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

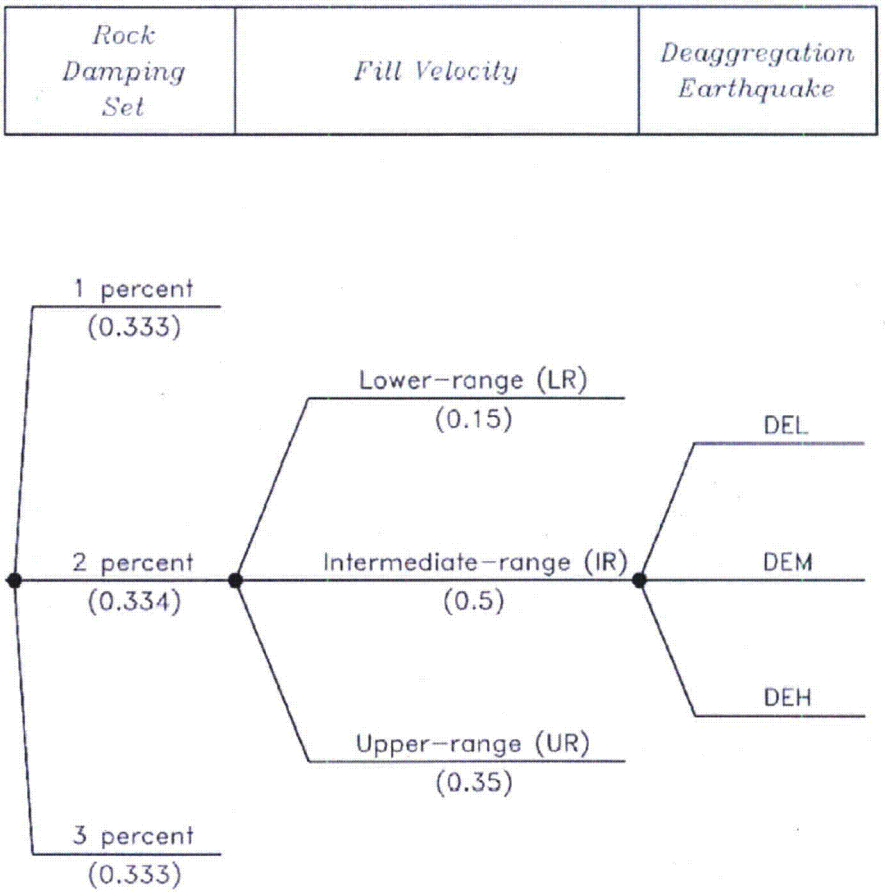
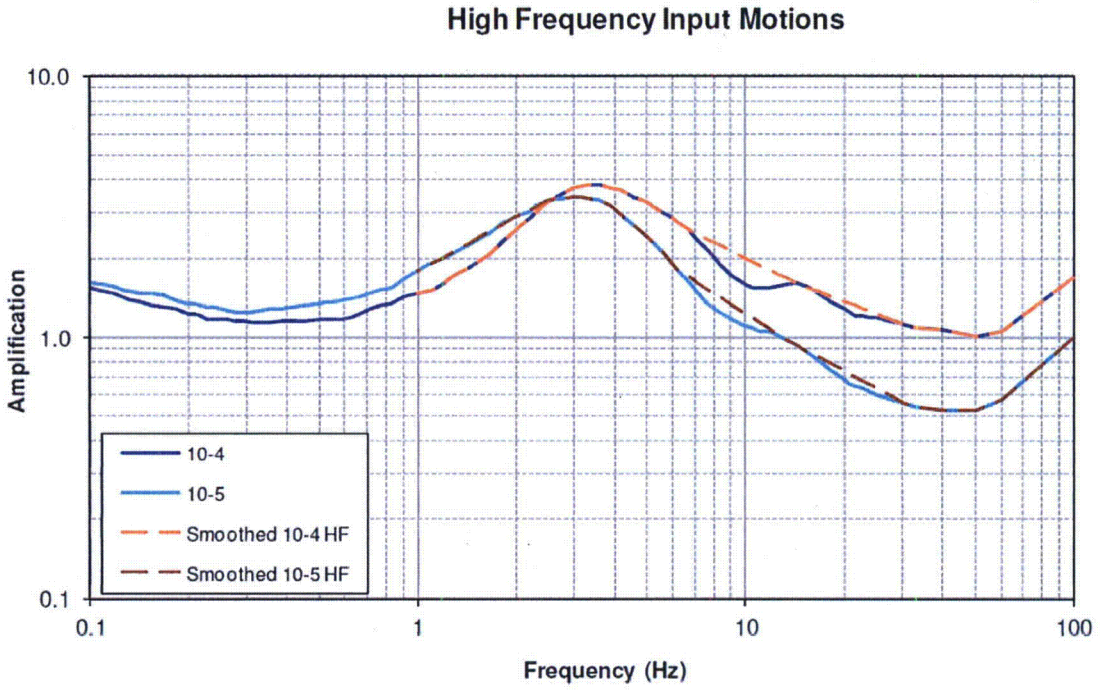


Figure 3.7.1-211 PBSRS Amplification Functions for the Fermi 3 Site [EF3 SUP 3.7-1]



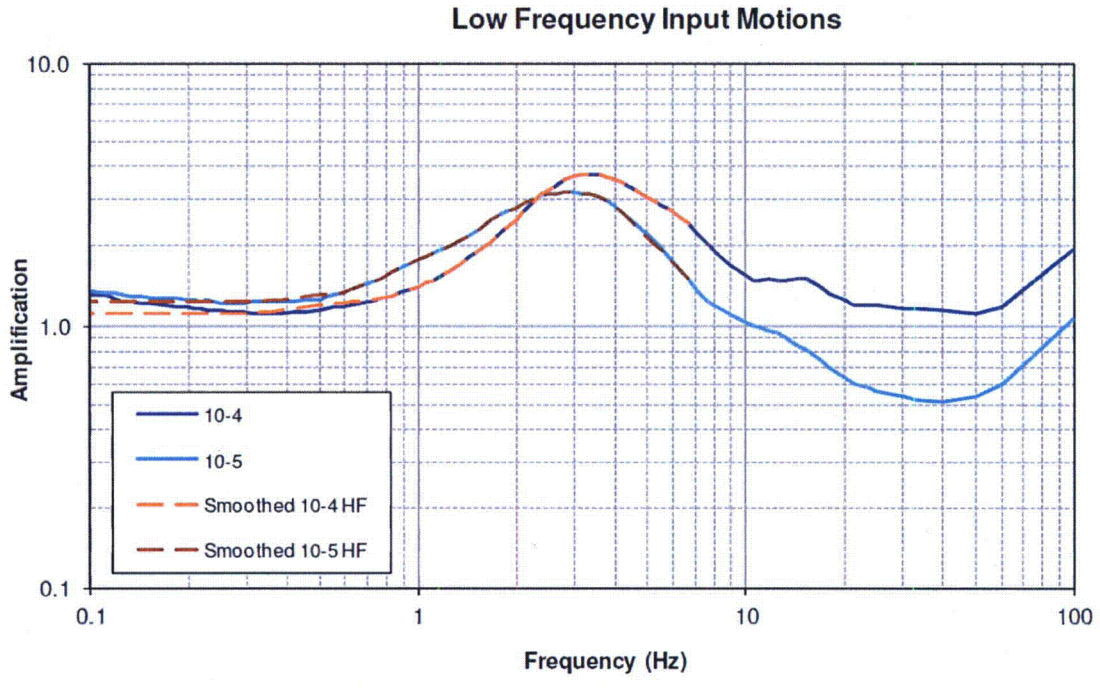
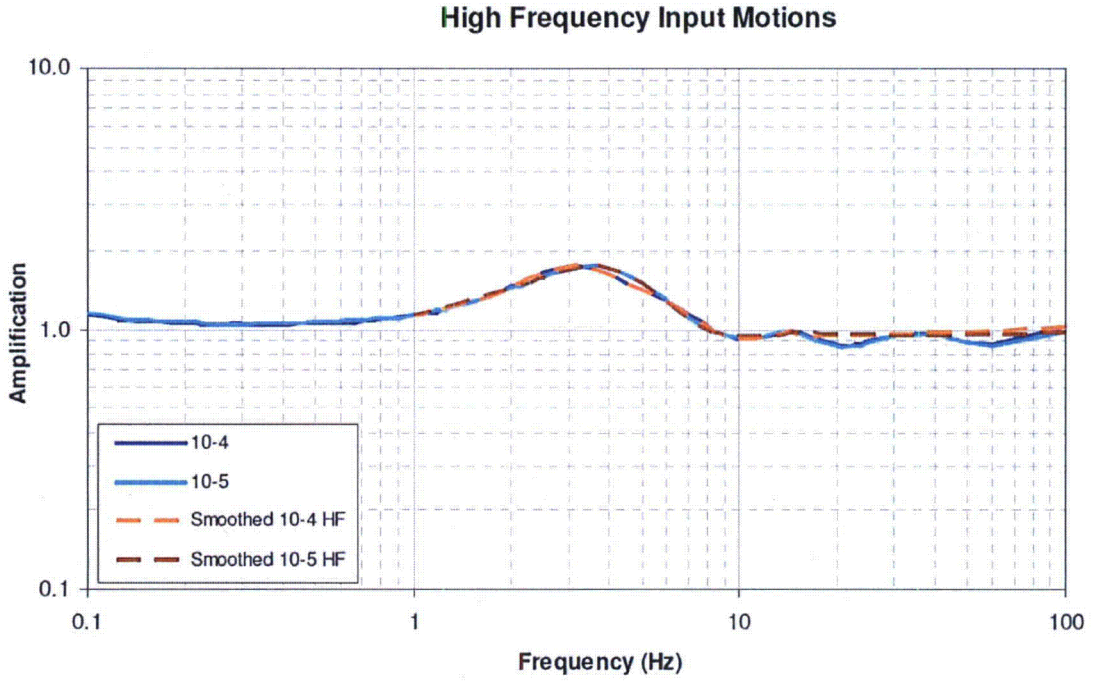


Figure 3.7.1-212 RB/FB SCOR FIRS Amplification Functions for the Fermi 3 Site
[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]



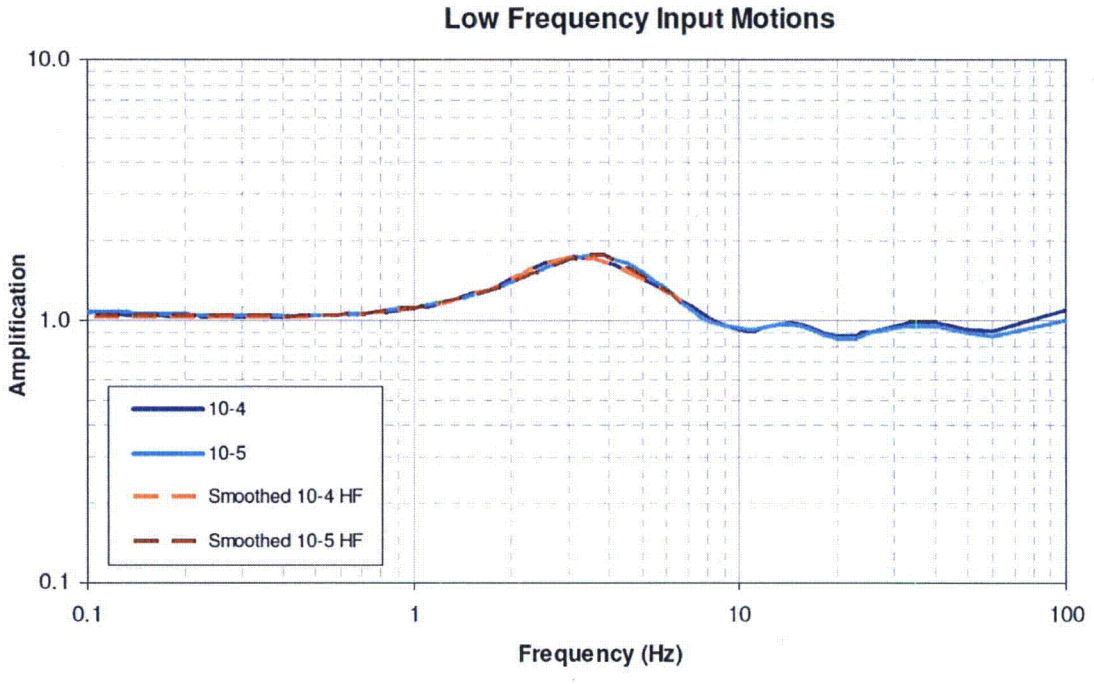
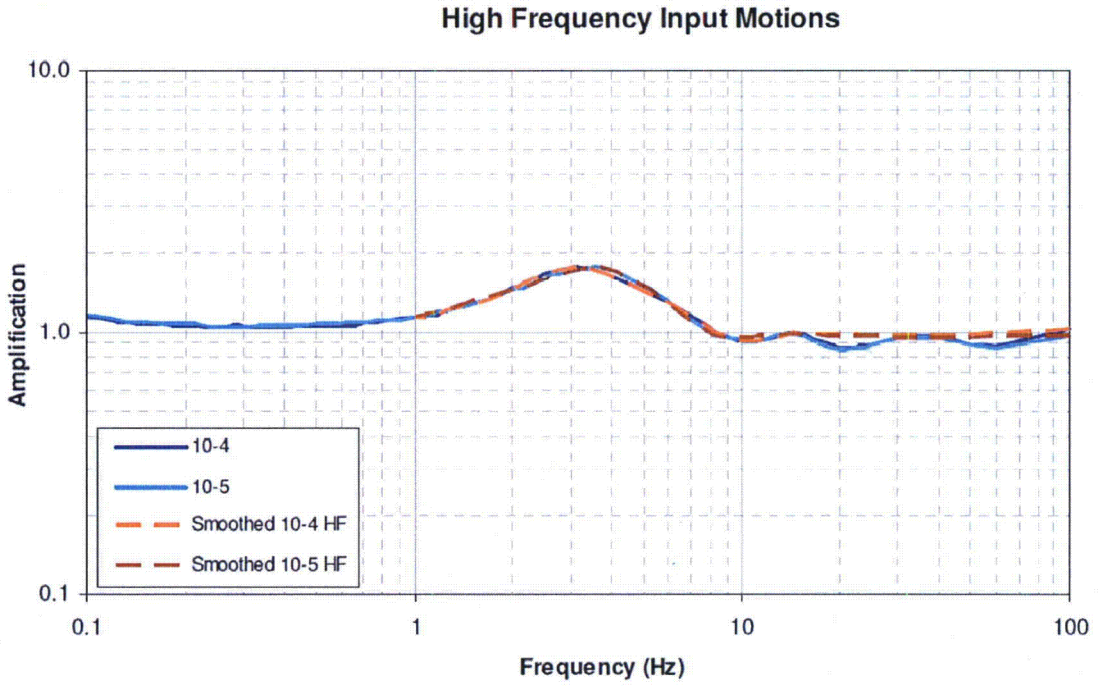


Figure 3.7.1-213 CB SCOR FIRS Amplification Functions for the Fermi 3 Site
[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]



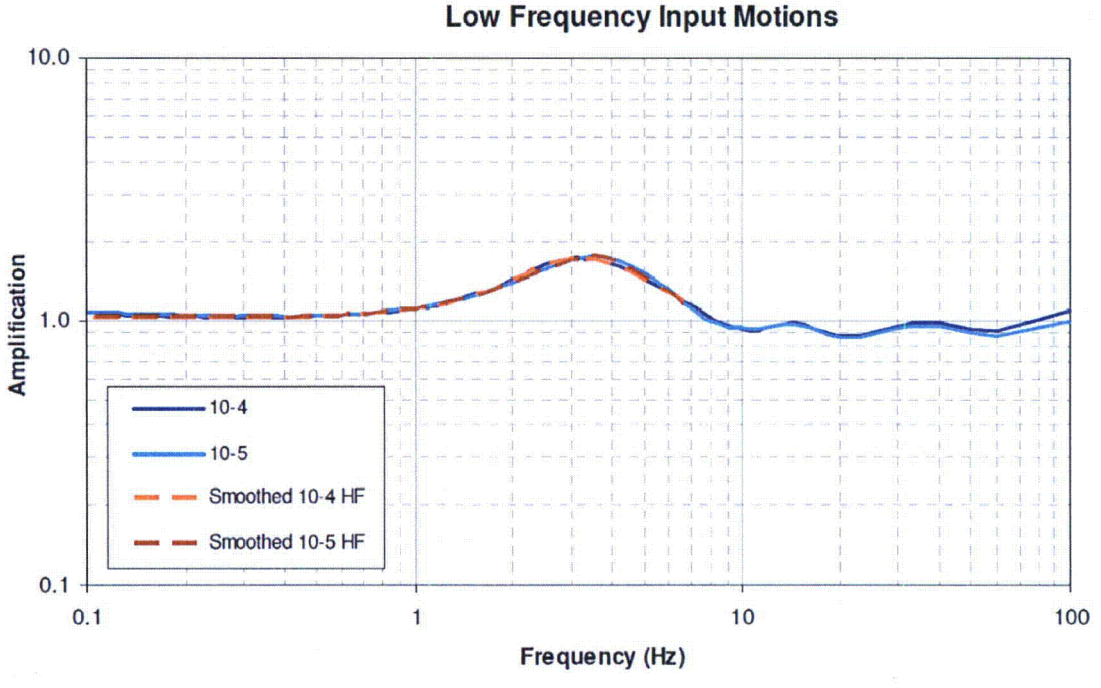
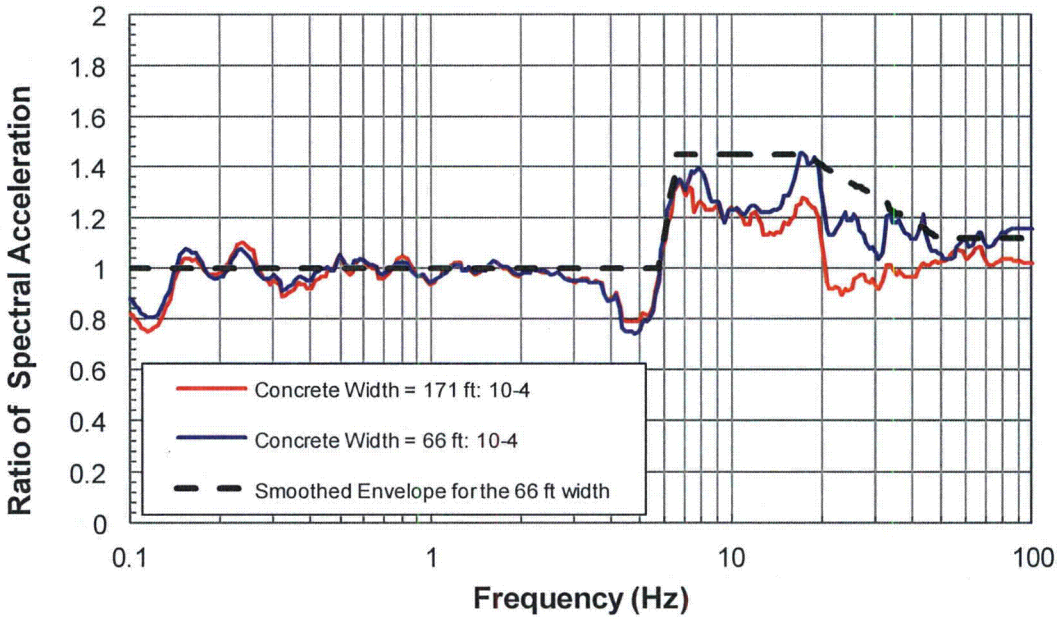
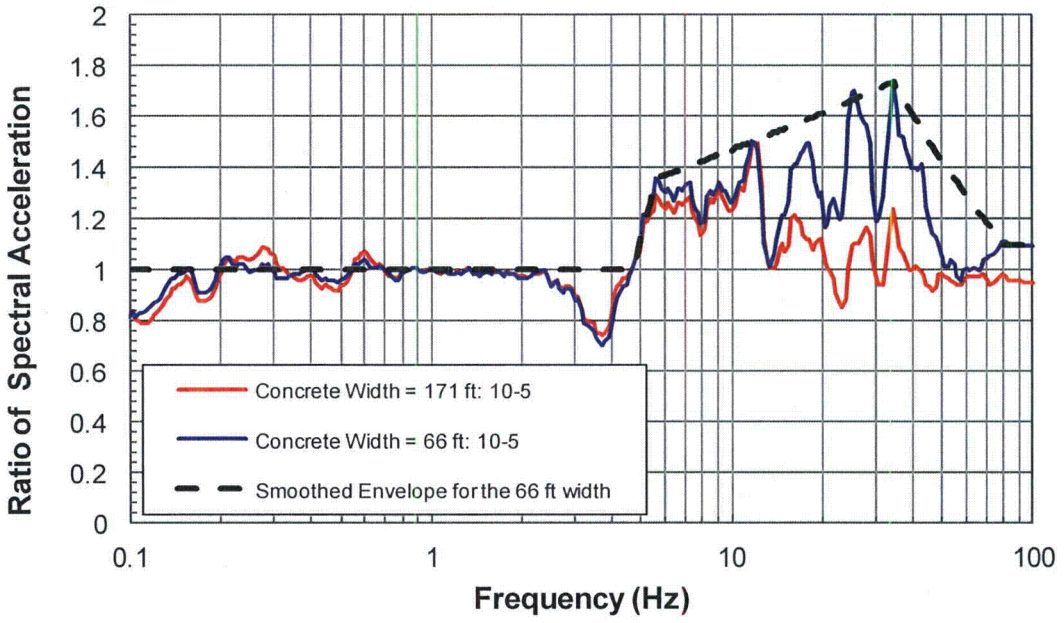


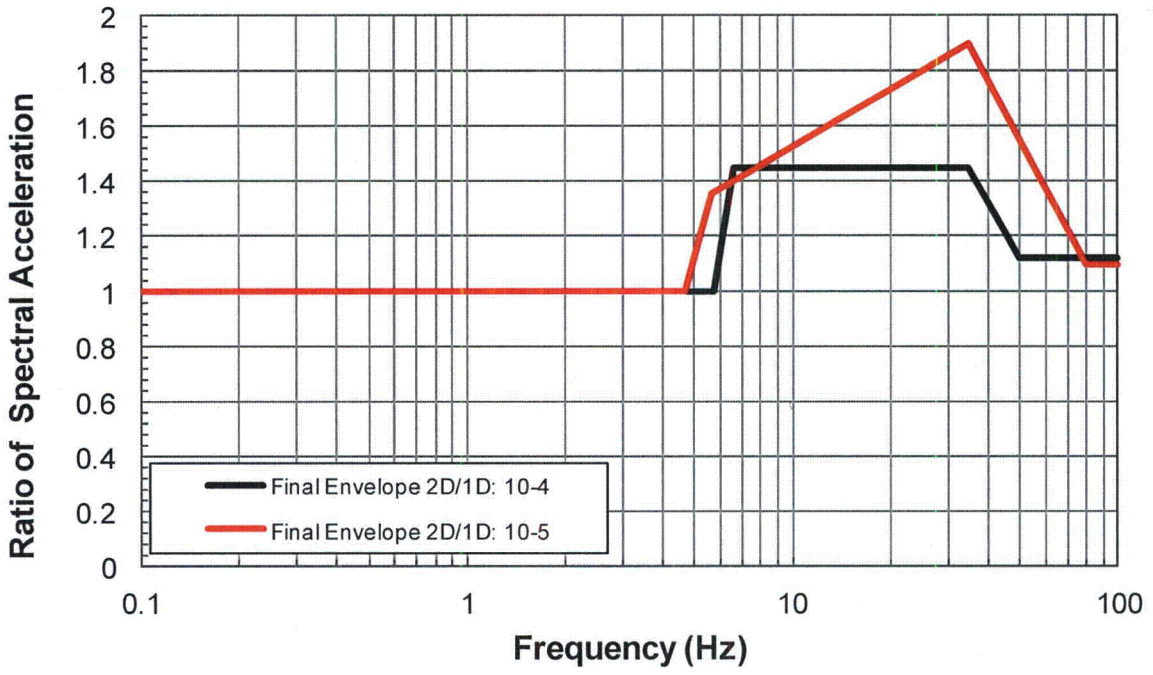
Figure 3.7.1-214 Example of FWSC 2D/1D Response Spectral Ratios for Fill Concrete Based on the 10^{-4} and 10^{-5} Exccedance Levels of Input Ground Motion [EF3 COL 2.0-27-A, EF3 SUP 3.7-1]





Insert 13 - Page 63 of 102

Figure 3.7.1-215 FWSC 2D/1D Response Spectral Ratios for Fill Concrete
[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]



Insert 13 - Page 64 of 102

Figure 3.7.1-216 FWSC FIRS Amplification Functions for the Fermi 3 Site
[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

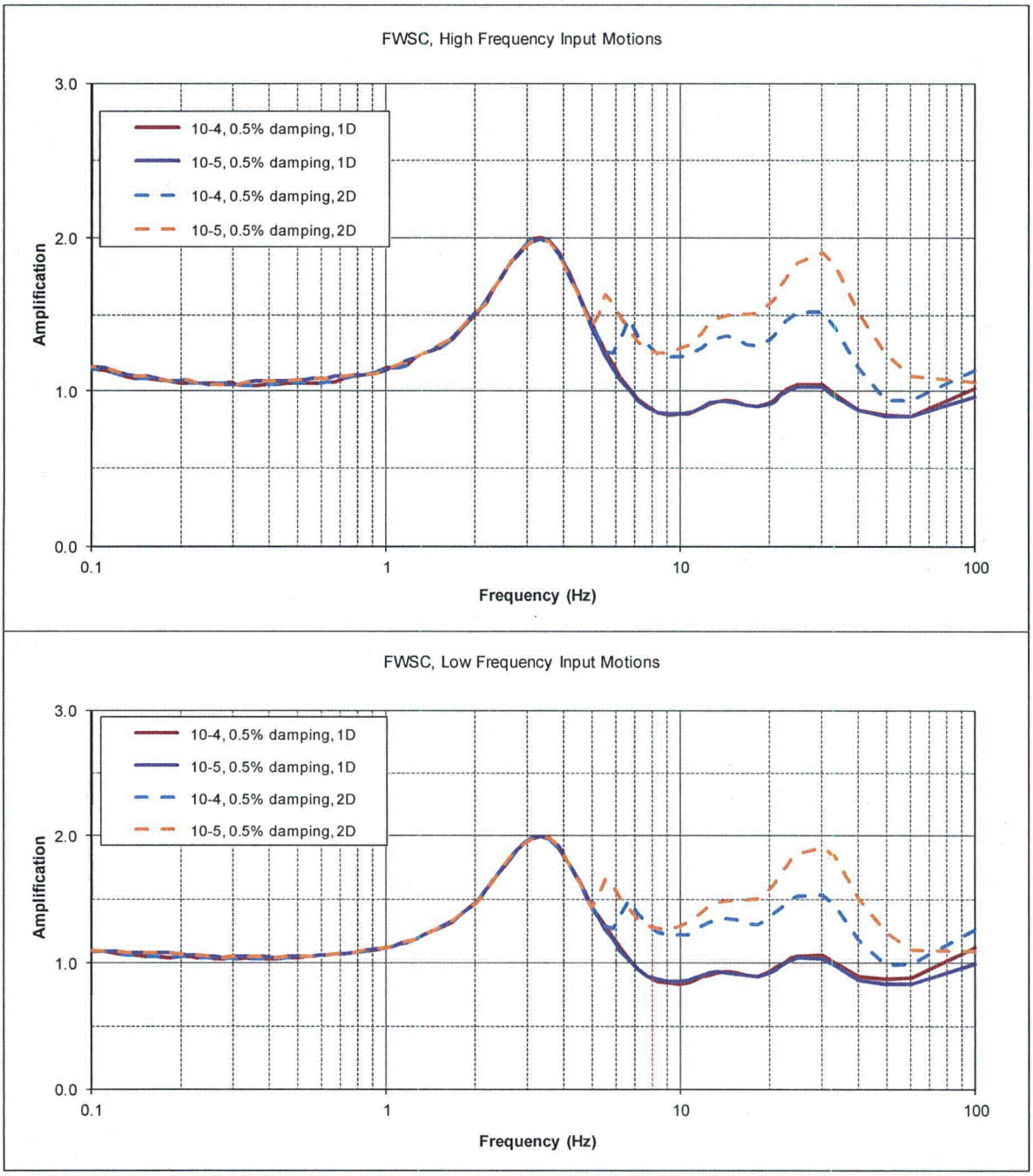


Figure 3.7.1-217 Development of 10^{-4} Surface UHRS at the Finished Ground Level Grade for the Full Soil Column Profile [EF3 SUP 3.7-1]

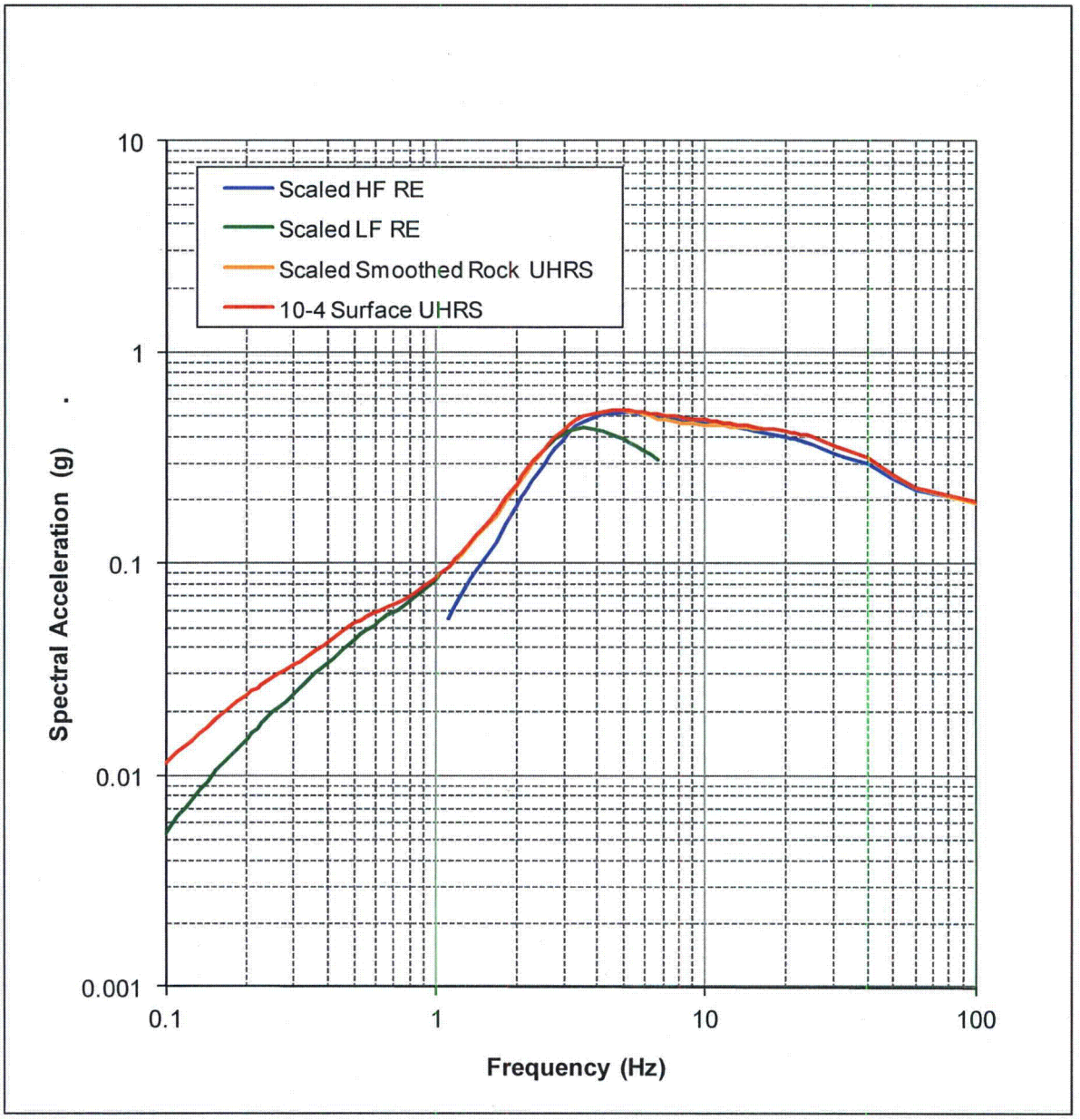


Figure 3.7.1-218 Development of 10^{-4} SCOR UHRS at the RB/FB Foundation Level for the Full Soil Column Profile [EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

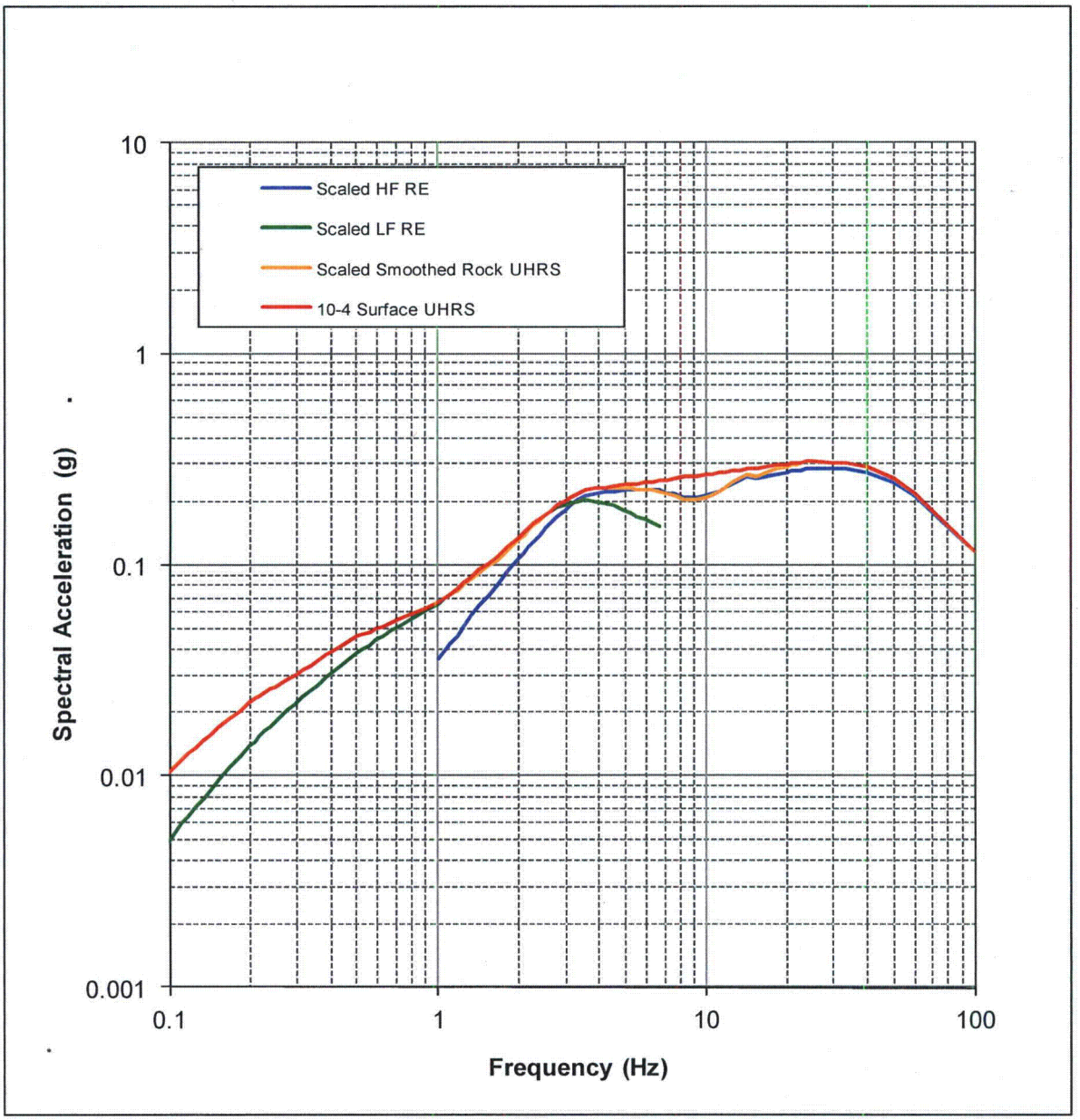


Figure 3.7.1-219 Development of the Horizontal PBSRS for the Fermi 3 Site
[EF3 SUP 3.7-1]

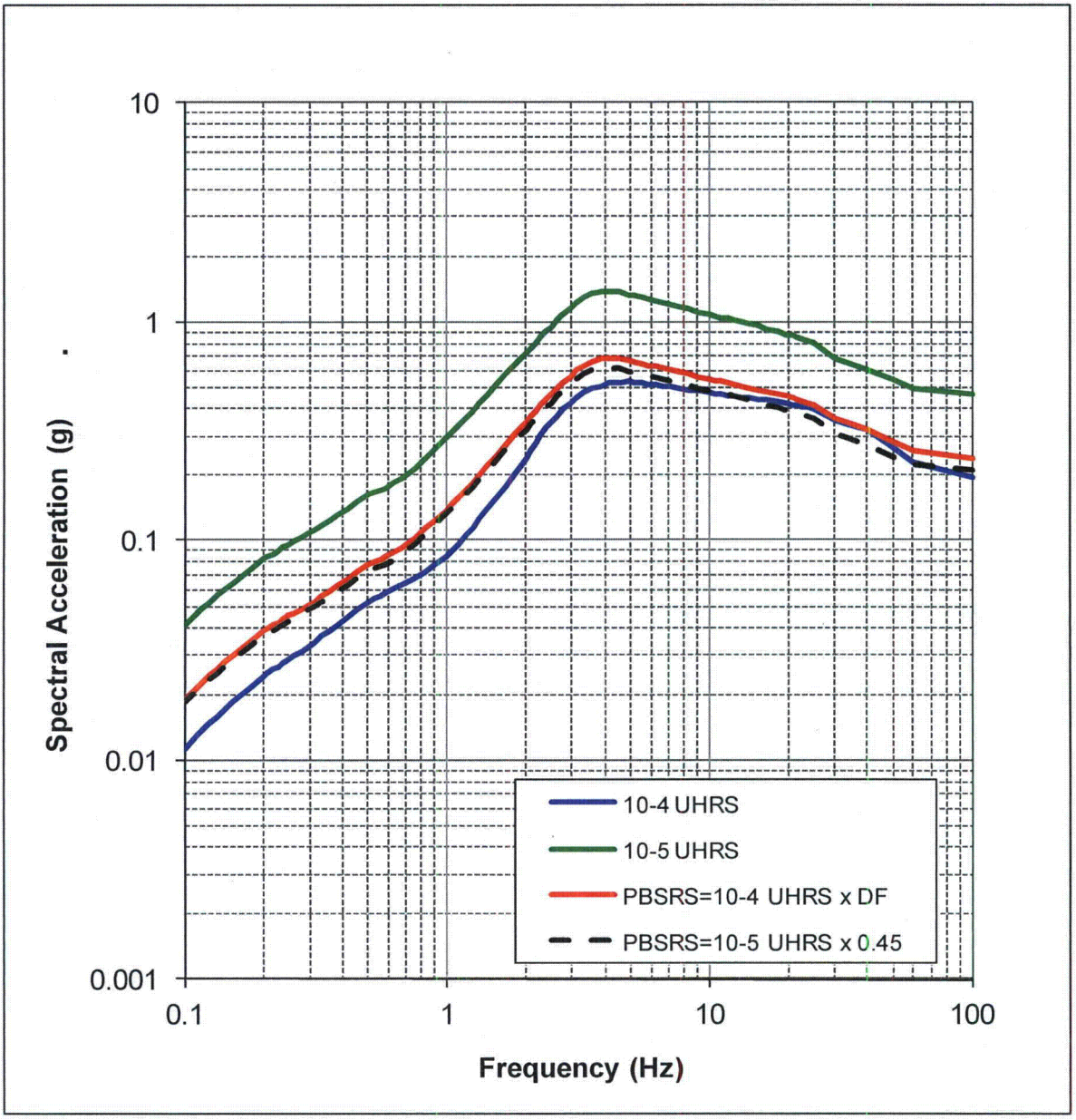


Figure 3.7.1-220 Vertical to Horizontal Spectral ratios Developed for the Fermi 3 Site Full Soil Column Profile [EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

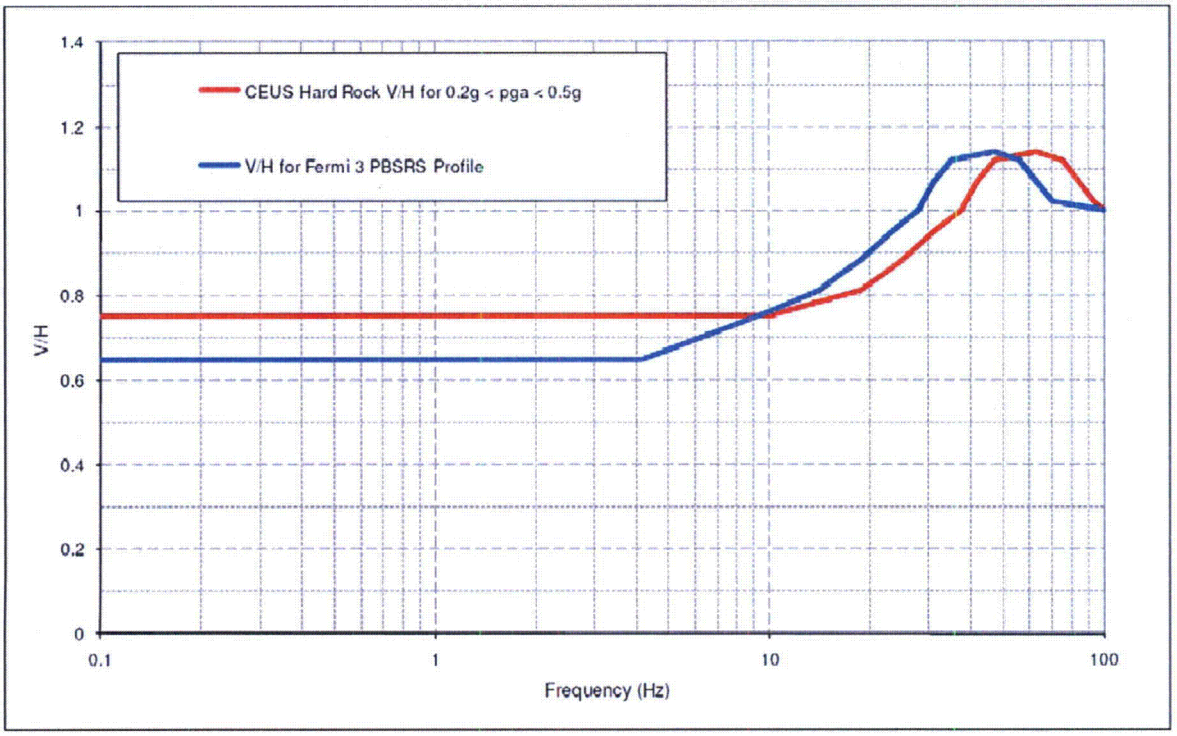


Figure 3.7.1-221 Horizontal and Vertical Fermi 3 PBSRS at Finished Ground Level Grade (5 Percent Damping) [EF3 SUP 3.7-1]

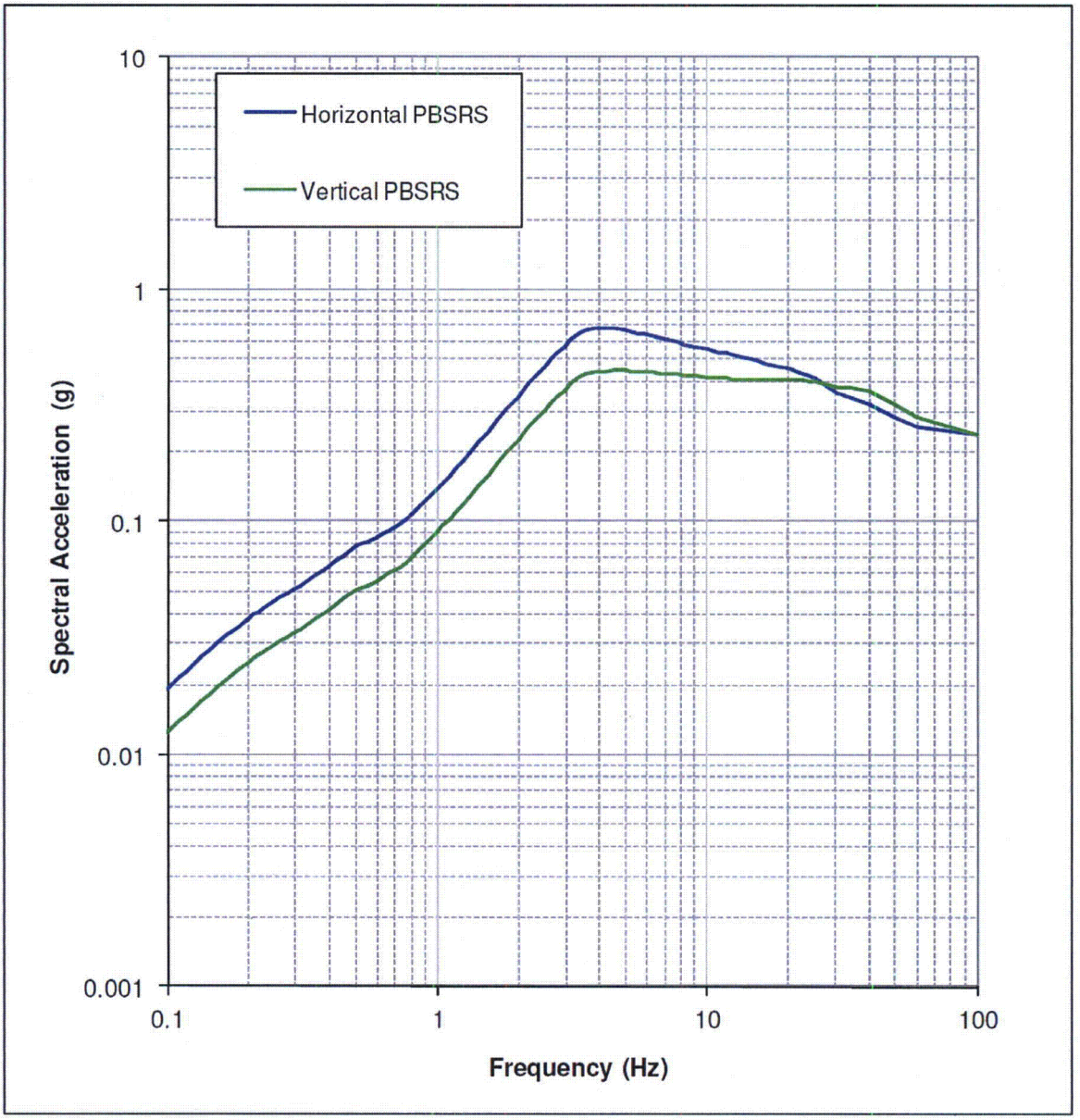


Figure 3.7.1-222 Deterministic Shear Wave Velocity Profiles for the Full Soil Column with Engineered Granular Backfill Above the Top of the Bass Islands Group Bedrock

[EF3 SUP 3.7-1]

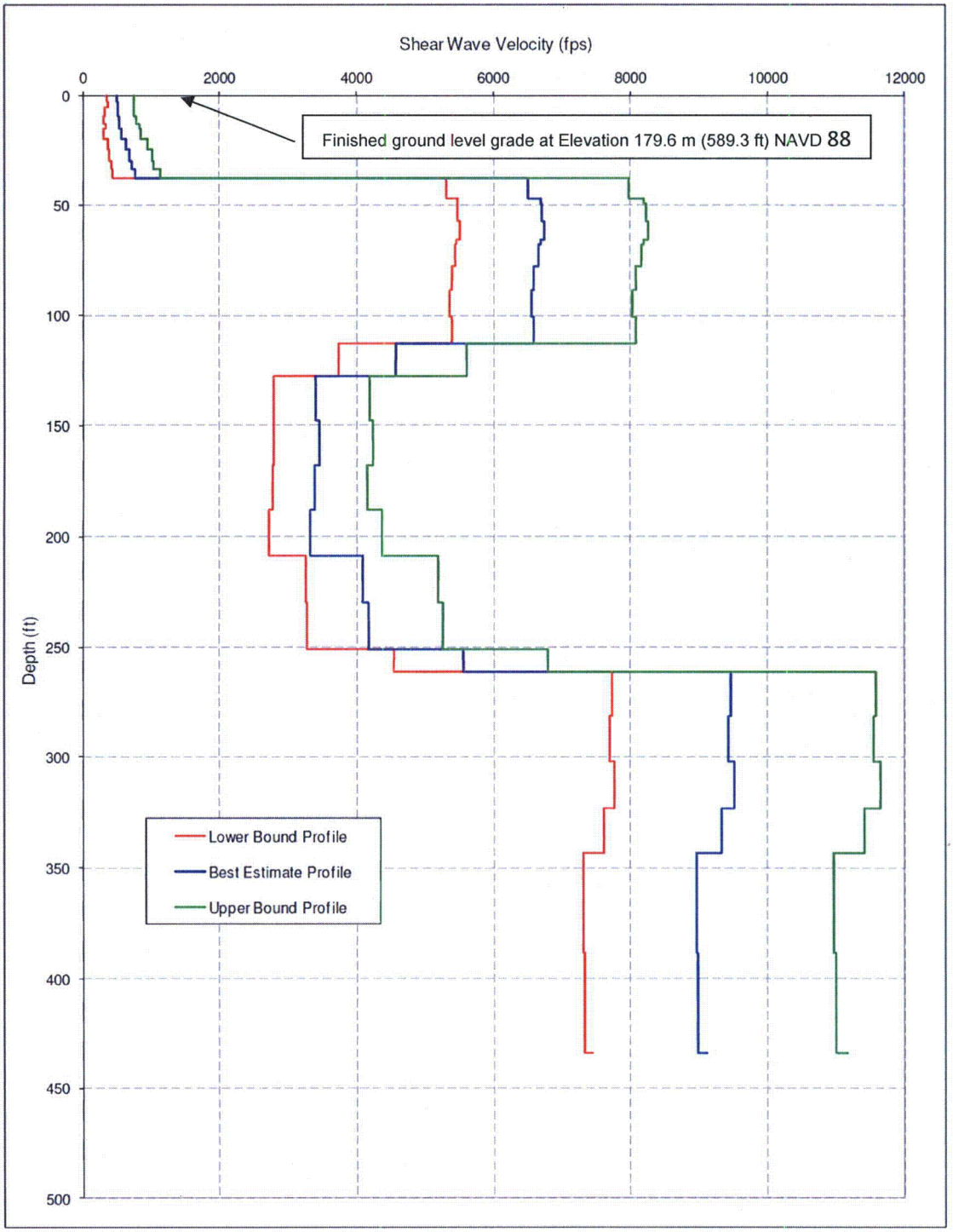


Figure 3.7.1-223 Deterministic Shear Wave Velocity Profiles for the Soil Column without Engineered Granular Backfill Above the Top of the Bass Islands Group Bedrock

[EF3 SUP 3.7-1]

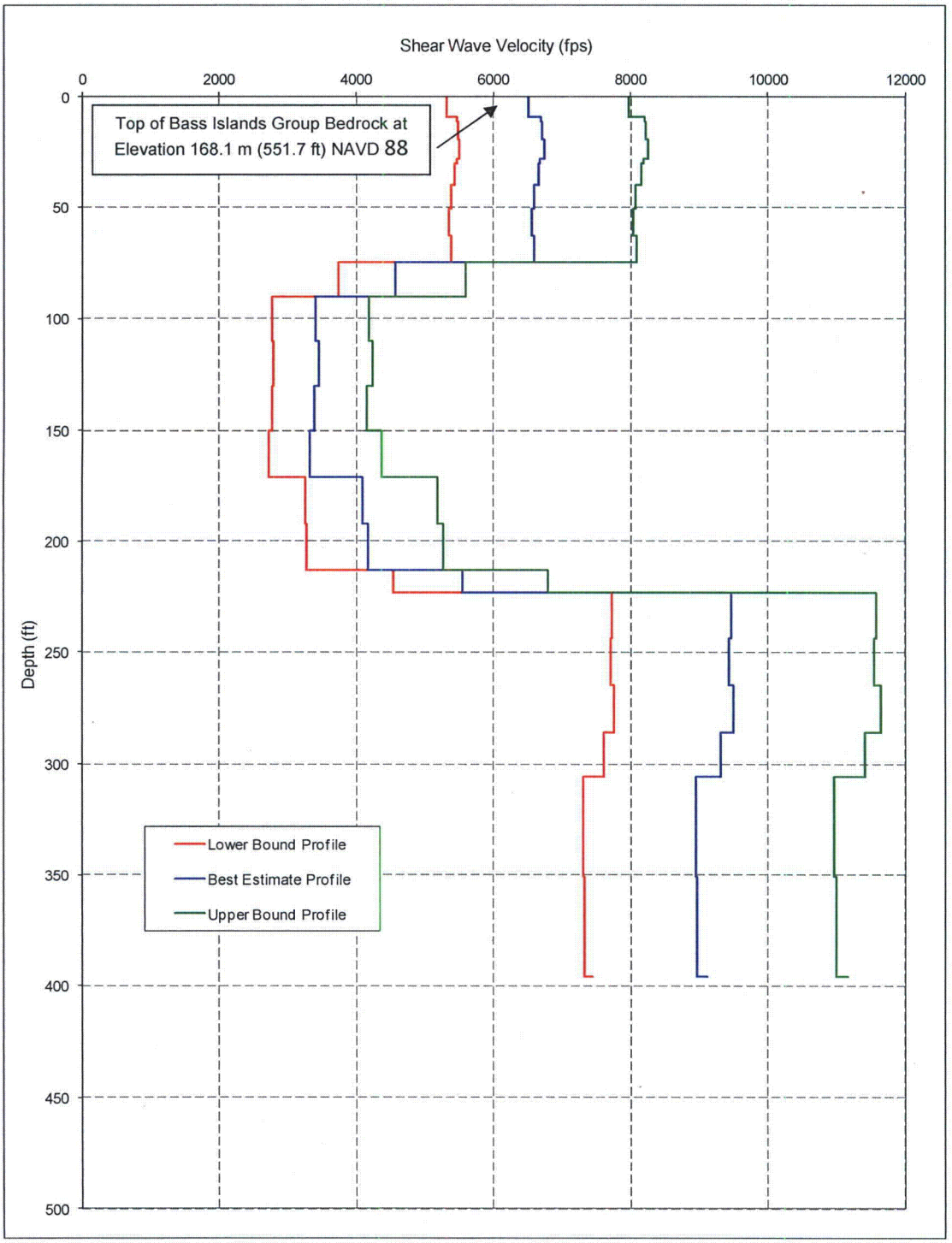


Figure 3.7.1-224 Fermi 3 RB/FB SCOR FIRS (5 Percent Damping)

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

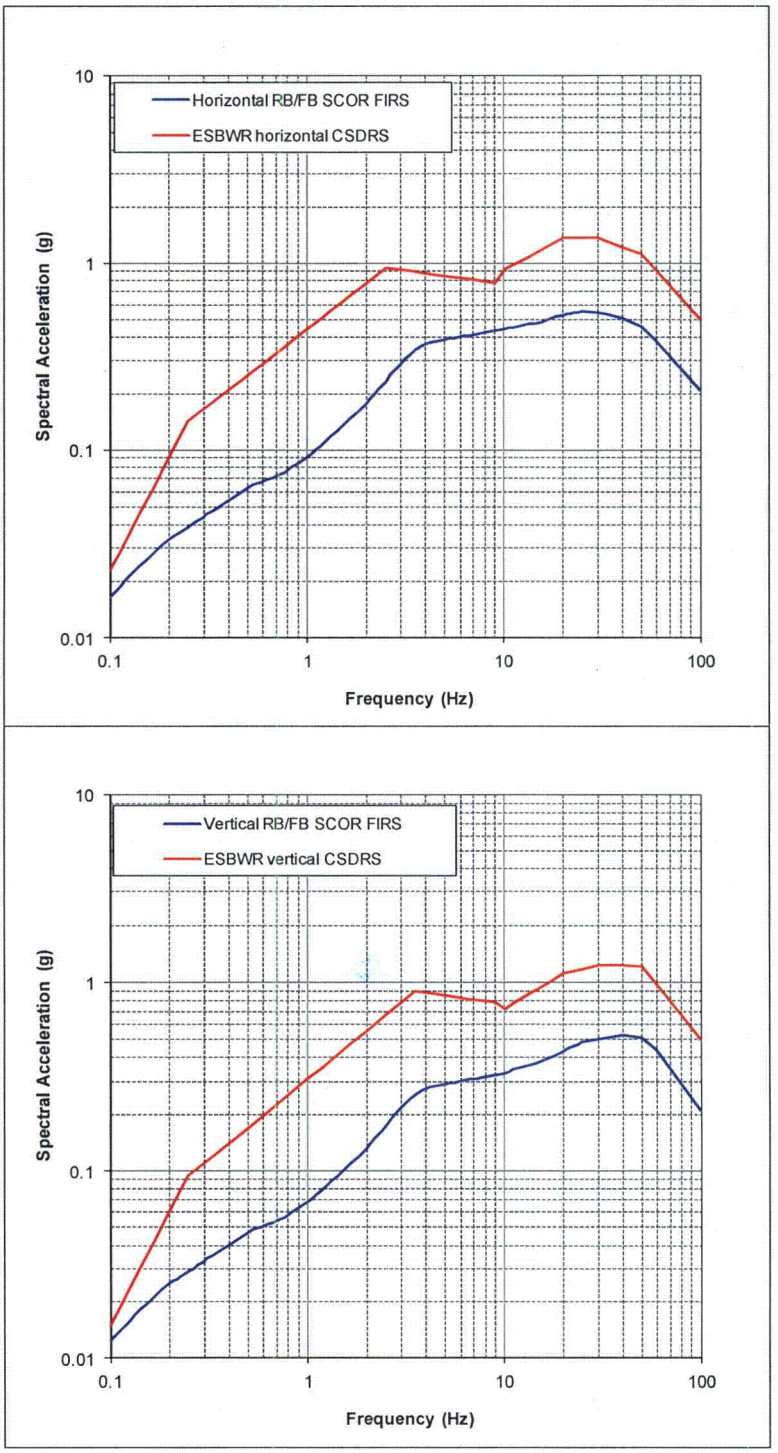


Figure 3.7.1-225 Fermi 3 CB SCOR FIRS (5 Percent Damping)

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]

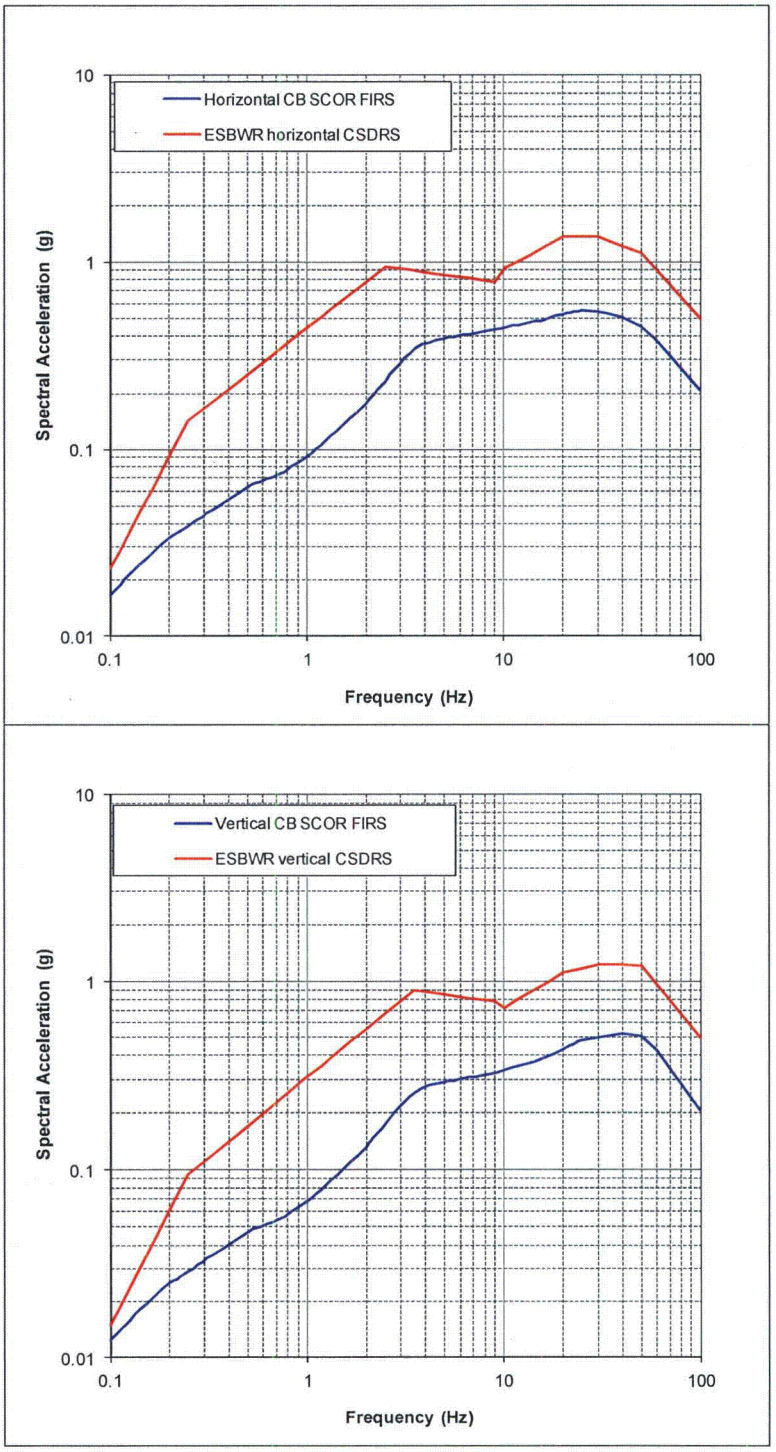


Figure 3.7.1-226 Fermi 3 Horizontal RB/FB SCOR FIRS and Initially Enhanced SCOR FIRS with the NUREG/CR-0098 Median Rock Spectral Shape, Enveloping NUREG/CR-6728 CEUS Spectral Shape, and RG 1.60 Spectral Shape, all Scaled to a Minimum PGA of 0.1 g (5 Percent Damping) [EF3 SUP 3.7-1]

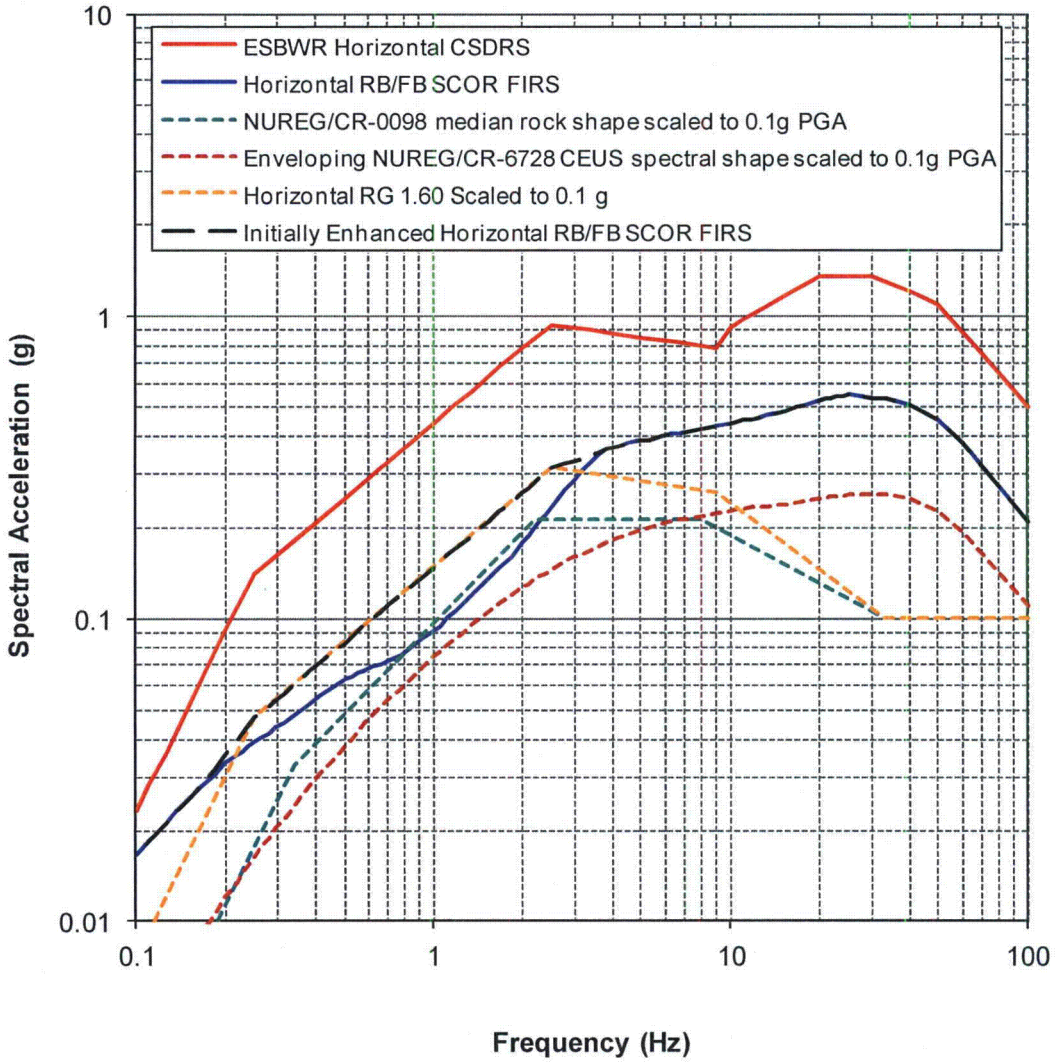


Figure 3.7.1-227 **Fermi 3 Horizontal CB SCOR FIRS and Initially Enhanced SCOR FIRS with the NUREG/CR-0098 Median Rock Spectral Shape, Enveloping NUREG/CR-6728 CEUS Spectral Shape, and RG 1.60 Spectral Shape, all Scaled to a Minimum PGA of 0.1 g (5 Percent Damping)**

[EF3 SUP 3.7-1]

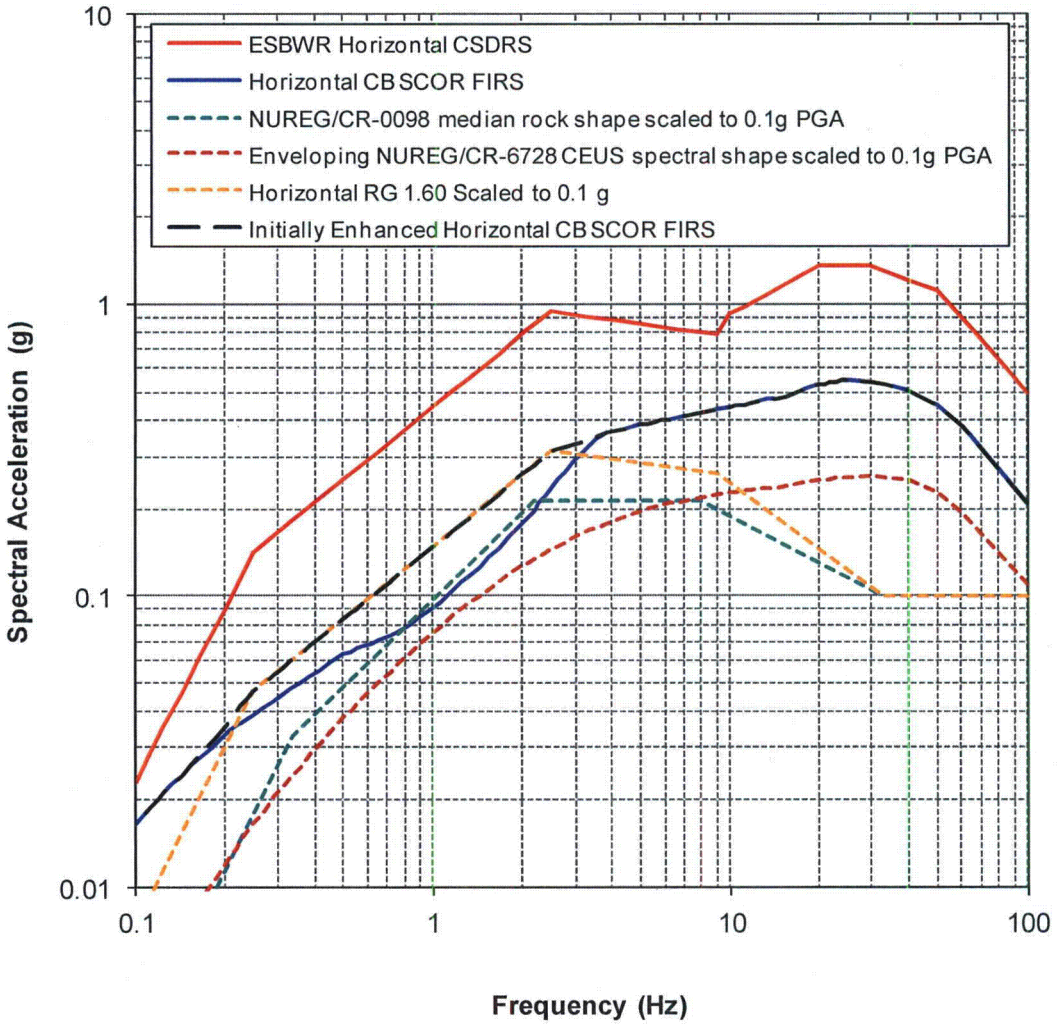
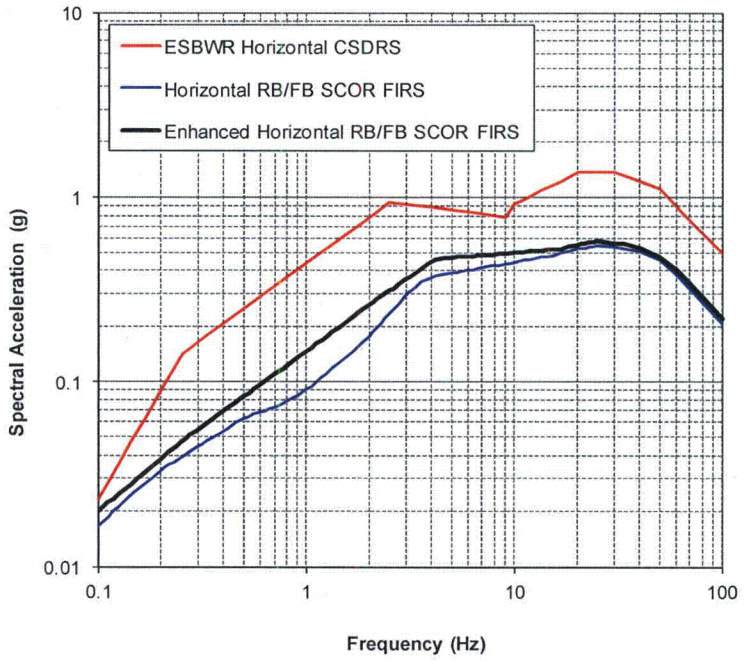


Figure 3.7.1-228 Fermi 3 Horizontal and Vertical RB/FB SCOR FIRS and Enhanced RB/FB SCOR FIRS (5 Percent Damping)

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]



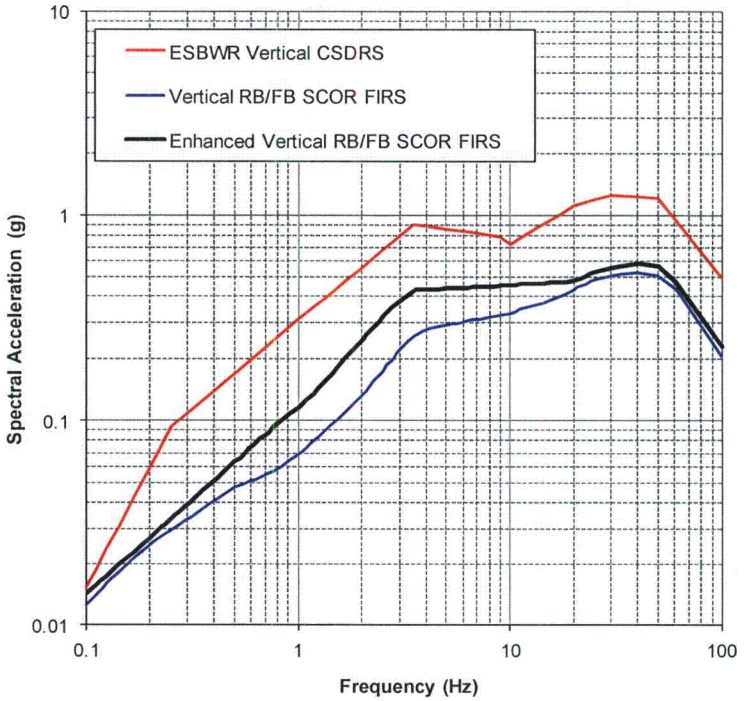
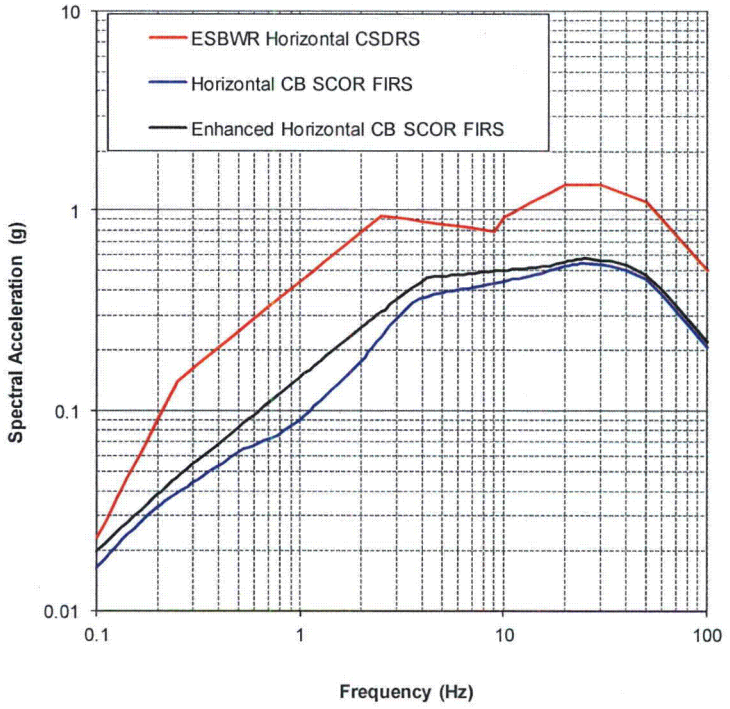


Figure 3.7.1-229 Fermi 3 Horizontal CB SCOR FIRS and Enhanced CB SCOR FIRS (5 Percent Damping) [EF3 COL 2.0-27-A, EF3 SUP 3.7-1]



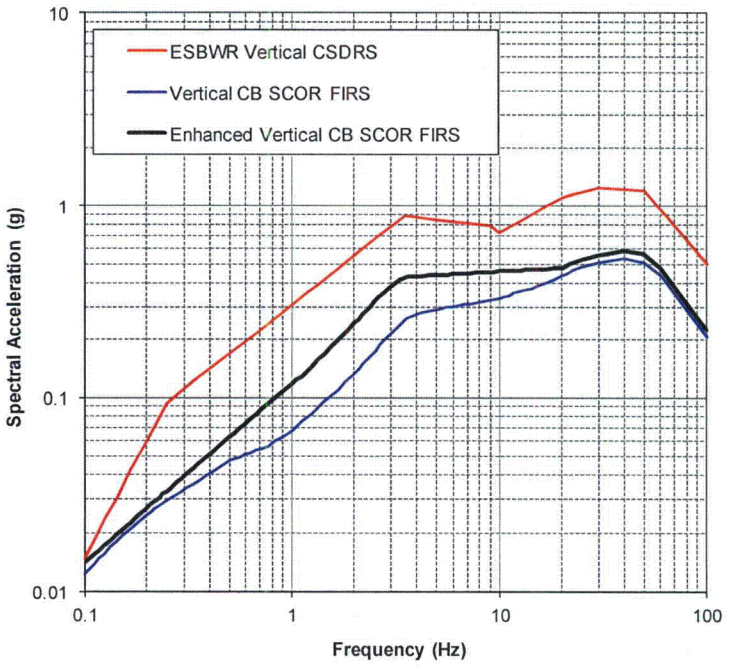


Figure 3.7.1-230 **Comparison of the Envelope of the Response Spectra of Computed Horizontal Component Surface Motions for Deterministic Profiles with Engineered Granular Backfill above the Top of the Bass Islands Group Bedrock Using the RB/FB Enhanced SCOR FIRS Input Motions with the Horizontal PBSRS** **[EF3 SUP 3.7-1]**

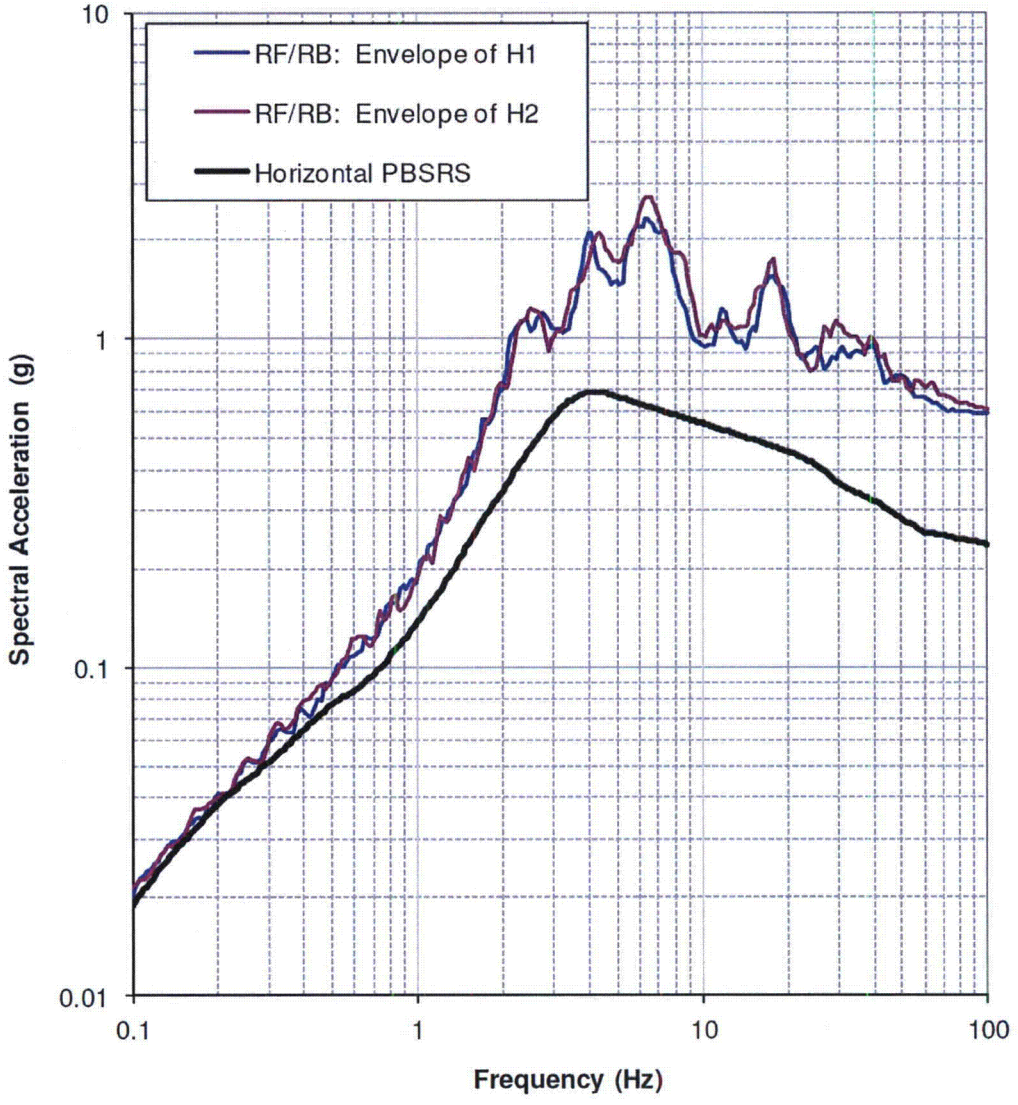


Figure 3.7.1-231 **Comparison of the Envelope of the Response Spectra of Computed Horizontal Component Surface Motions for Deterministic Profiles with Engineered Granular Backfill above the Top of the Bass Islands Group Bedrock Using the CB Enhanced SCOR FIRS Input Motions with the Horizontal PBSRS** **[EF3 SUP 3.7-1]**

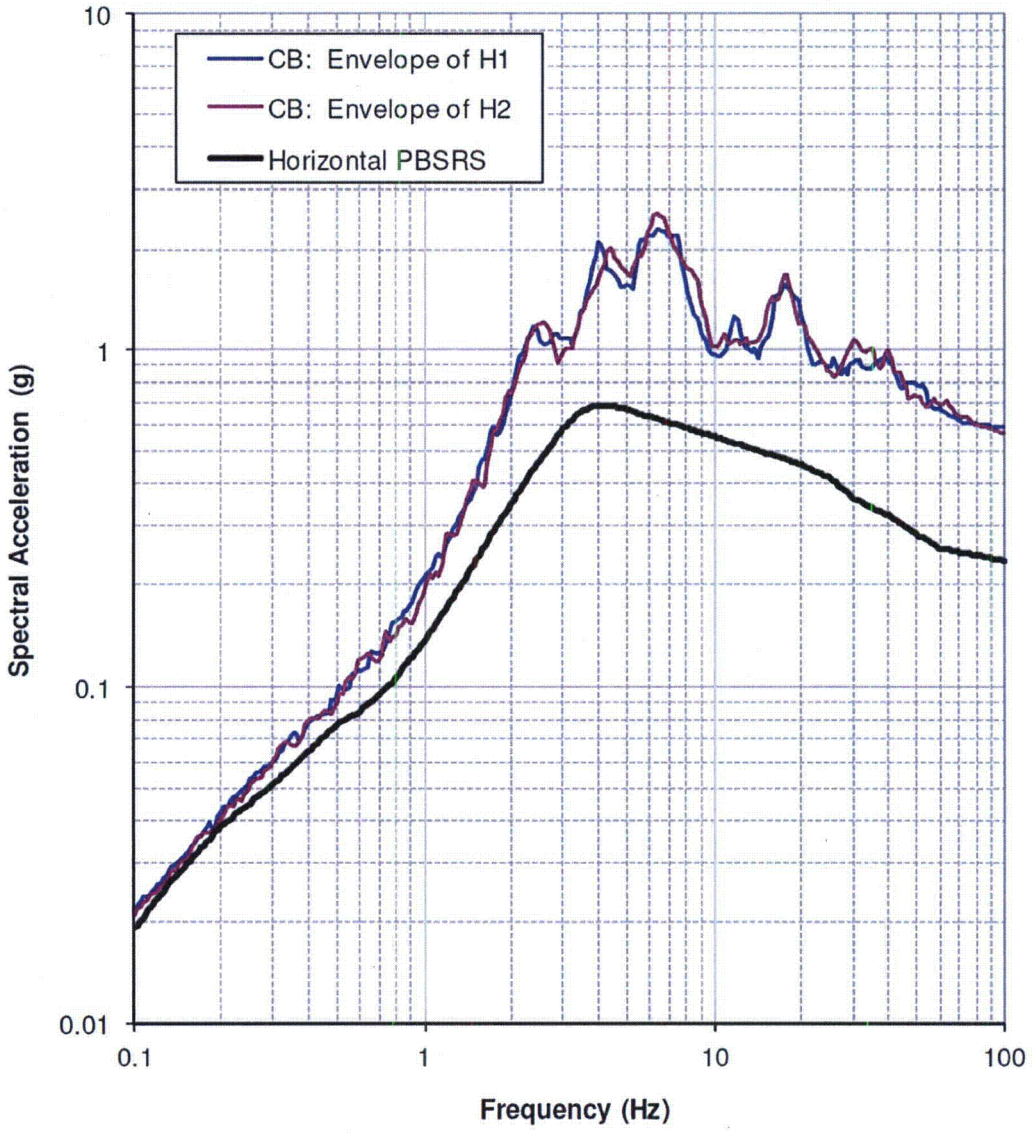


Figure 3.7.1-232 Comparison of the Envelope of the Response Spectra of Computed Horizontal Component Surface Motions for Deterministic Profiles without Engineered Granular Backfill above the Top of the Bass Islands Group Bedrock Using the RB/FB Enhanced SCOR FIRS Input Motions with the Horizontal GMRS [EF3 SUP 3.7-1]

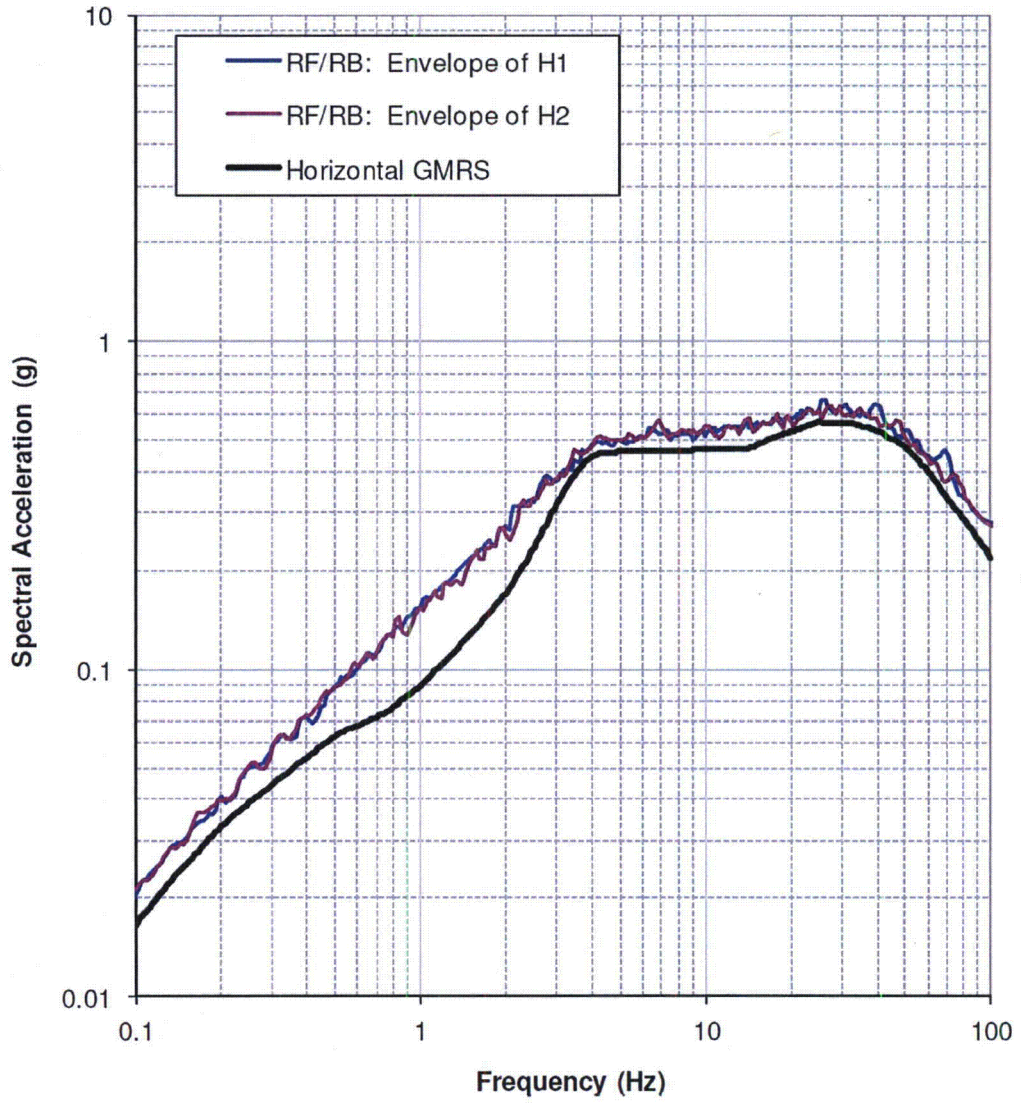


Figure 3.7.1-233 Comparison of the Envelope of the Response Spectra of Computed Horizontal Component Surface Motions for Deterministic Profiles without Engineered Granular Backfill above the Top of the Bass Islands Group Bedrock Using the CB Enhanced SCOR FIRS Input Motions with the Horizontal GMRS [EF3 SUP 3.7-1]

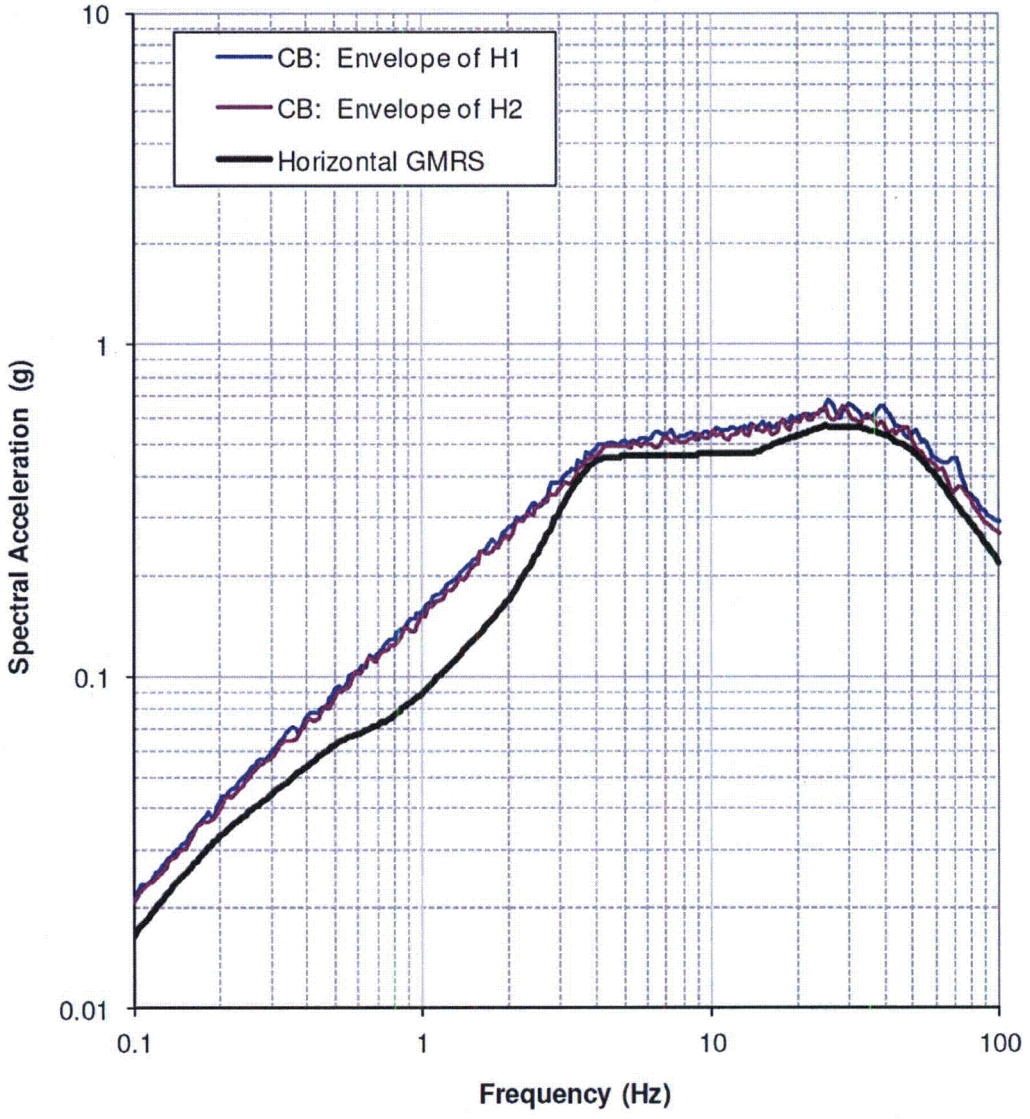


Figure 3.7.1-234 **Comparison of the Envelope of the Response Spectra of Computed Vertical Component Surface Motions for Deterministic Profiles With Engineered Granular Backfill Above the top of the Bass Islands Group Bedrock Using the RB/FB Enhanced SCOR FIRS Input Motions with the Vertical PBSRS** **[EF3 SUP 3.7-1]**

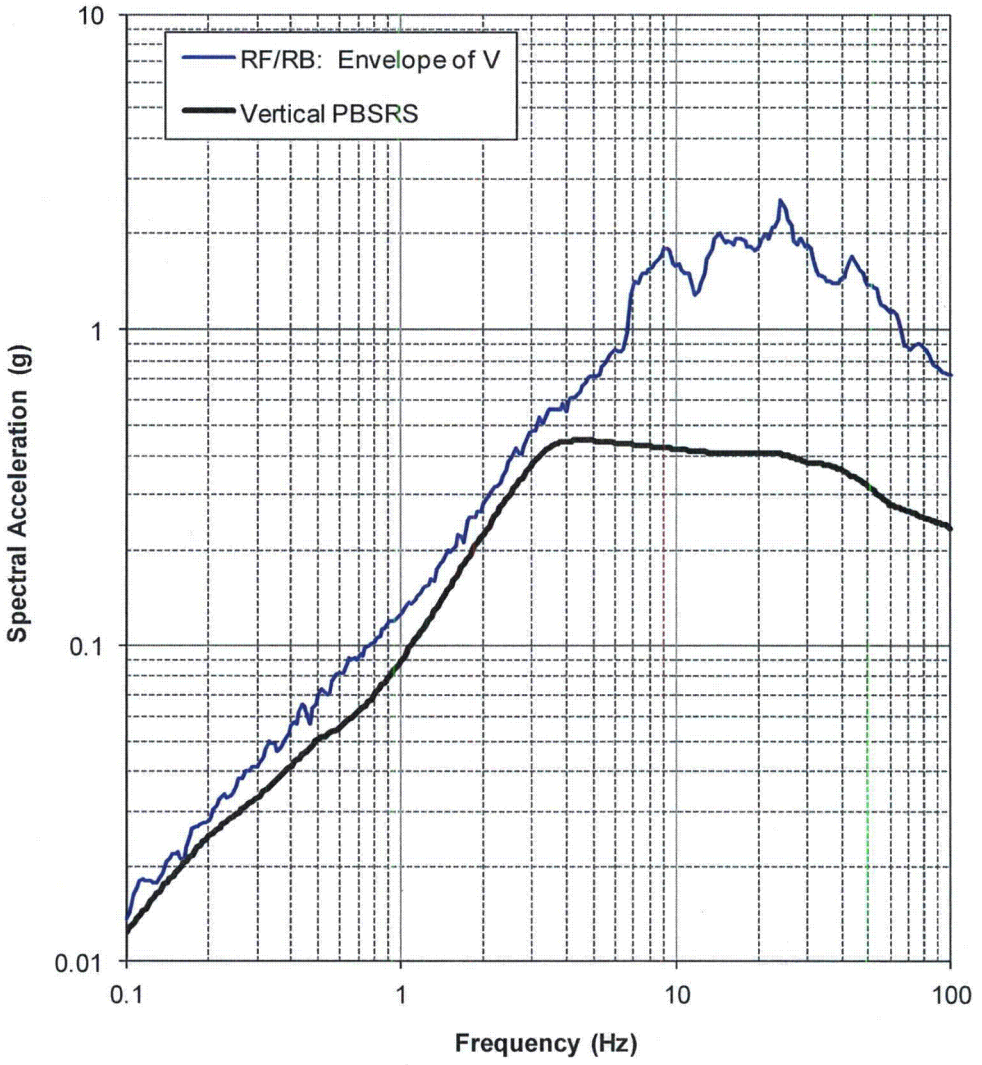


Figure 3.7.1-235 **Comparison of the Envelope of the Response Spectra of Computed Vertical Component Surface Motions for Deterministic Profiles With Engineered Granular Backfill Above the top of the Bass Islands Group Bedrock Using the CB Enhanced SCOR FIRS Input Motions with the Vertical PBSRS** **[EF3 SUP 3.7-1]**

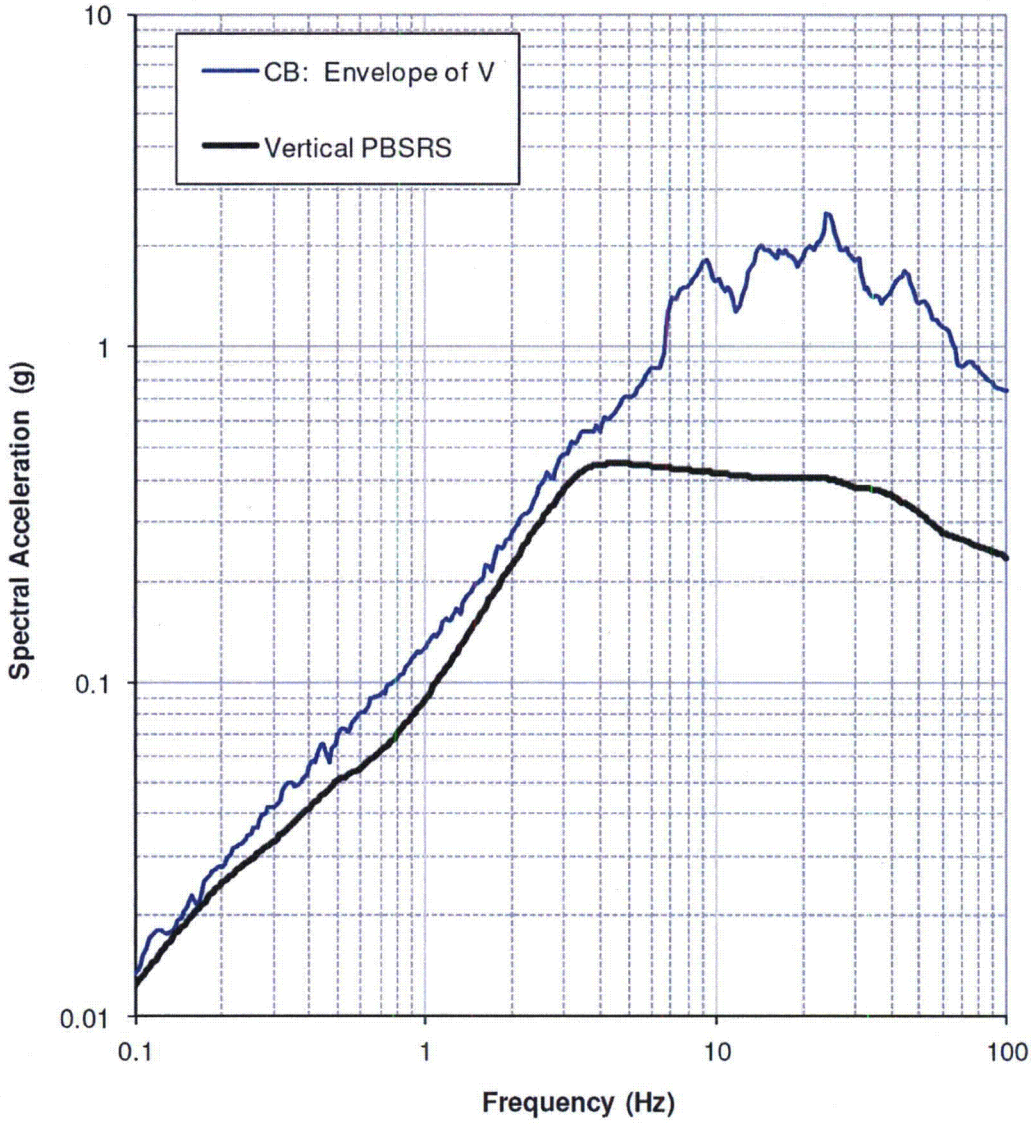


Figure 3.7.1-236 Comparison of the Envelope of the Response Spectra of Computed Vertical Component Surface Motions for Deterministic Profiles without Engineered Granular Backfill above the Top of the Bass Islands Group Bedrock Using the RB/FB Enhanced SCOR FIRS Input Motions with the Vertical GMRS [EF3 SUP 3.7-1]

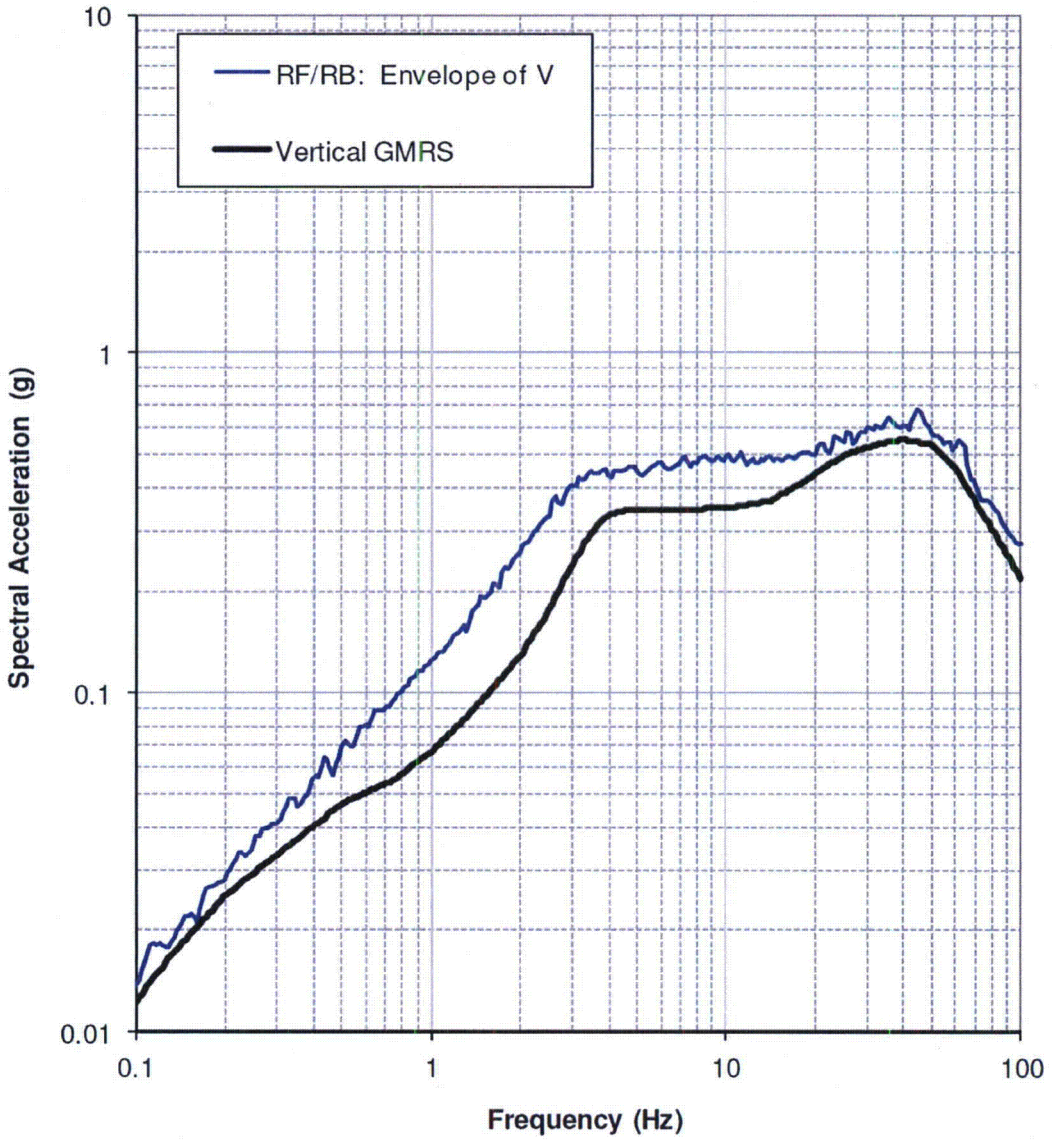


Figure 3.7.1-237 Comparison of the Envelope of the Response Spectra of Computed Vertical Component Surface Motions for Deterministic Profiles without Engineered Granular Backfill above the Top of the Bass Islands Group Bedrock Using the CB Enhanced SCOR FIRS Input Motions with the Vertical GMRS [EF3 SUP 3.7-1]

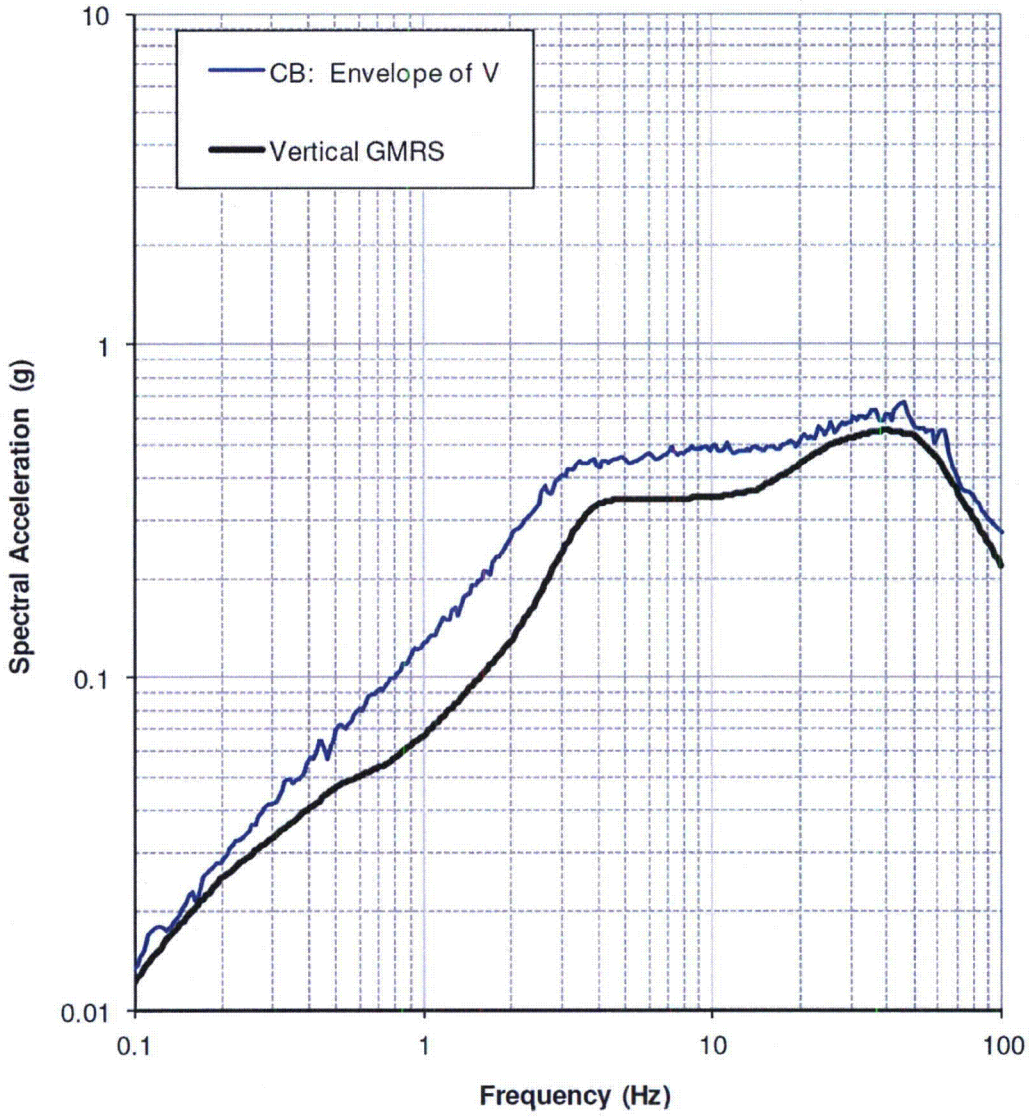
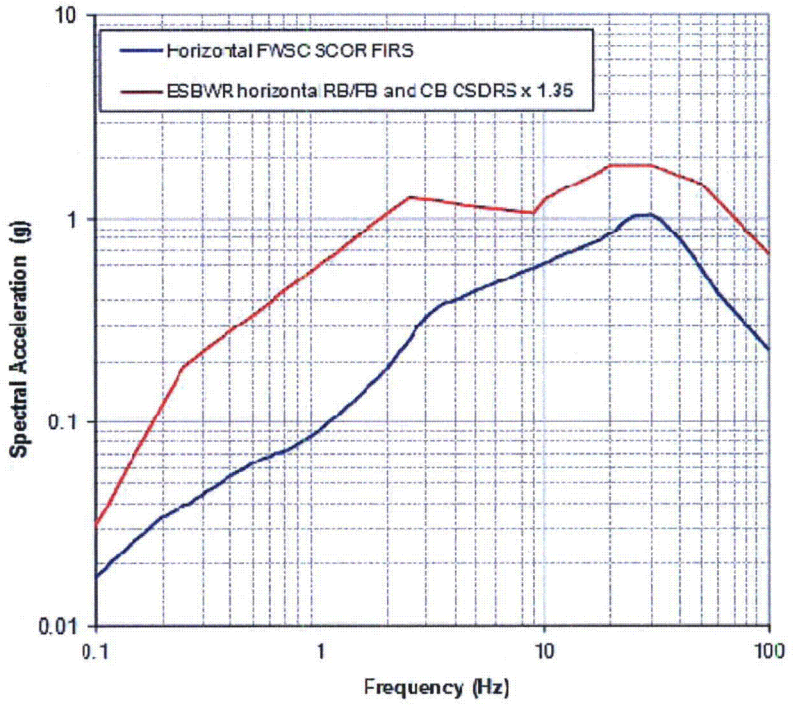


Figure 3.7.1-238 Fermi 3 FWSC FIRS (5 Percent Damping)

[EF3 COL 2.0-27-A, EF3 SUP 3.7-1]



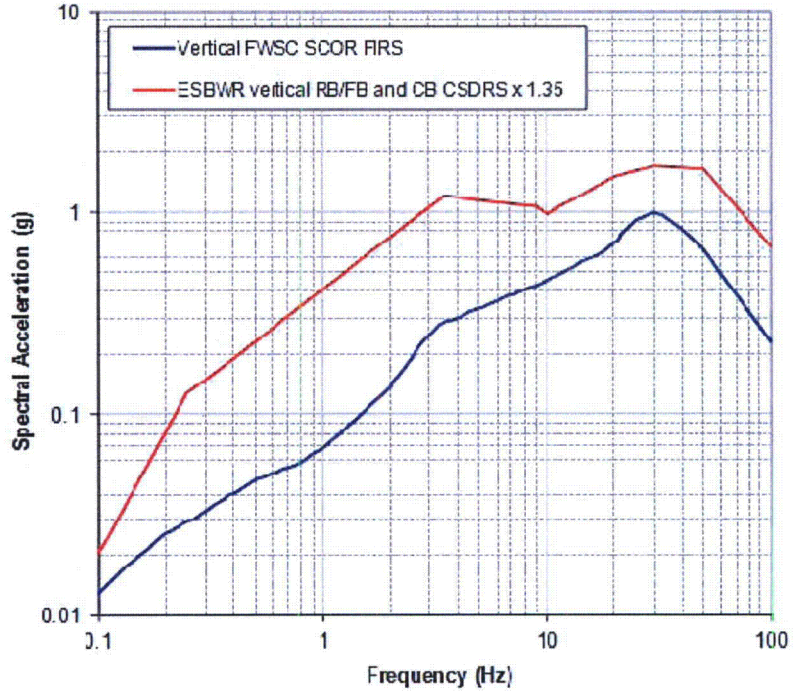


Figure 3.7.1-239 Response Spectrum for Spectrally Matched Horizontal (H1) Component for the Fermi 3 RB/FB Enhanced SCOR FIRS

[EF3 SUP 3.7-1]

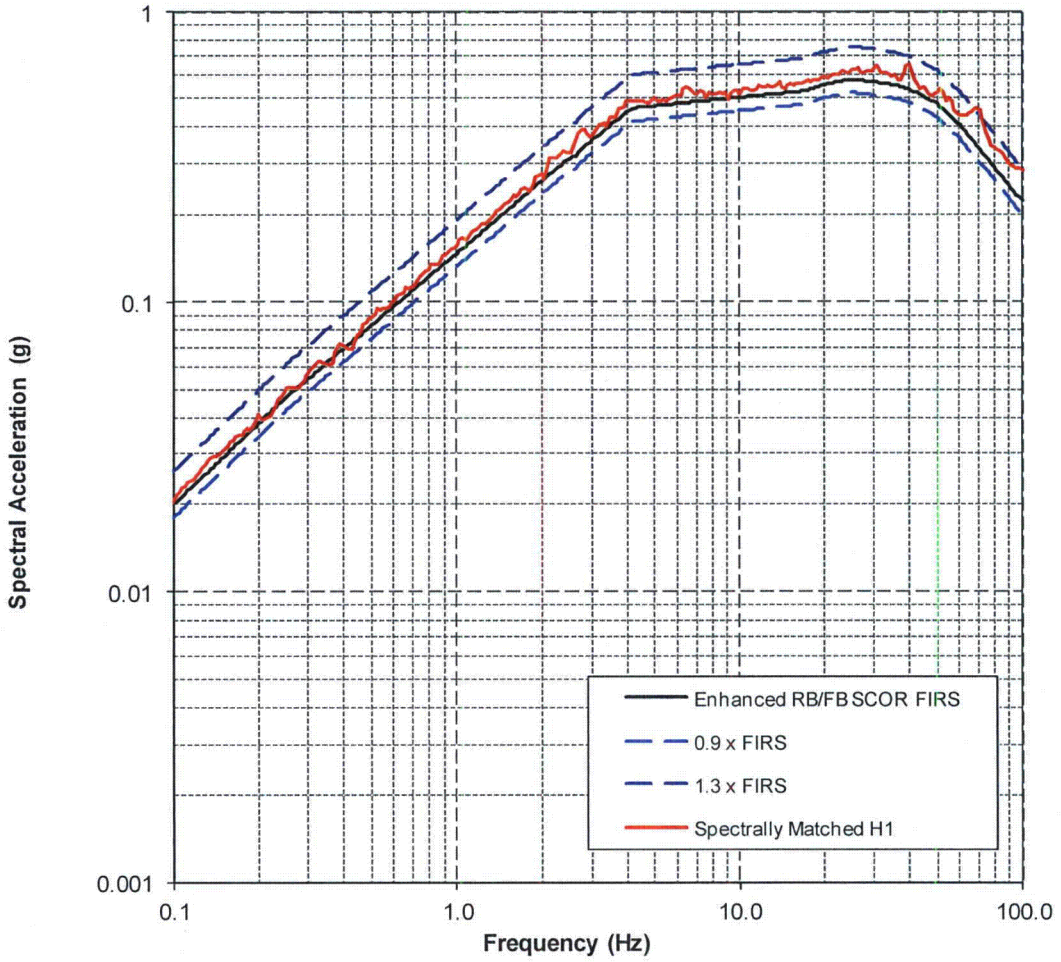


Figure 3.7.1-240 Response Spectrum for Spectrally Matched Horizontal (H2) Component for the Fermi 3 RB/FB Enhanced SCOR FIRS

[EF3 SUP 3.7-1]

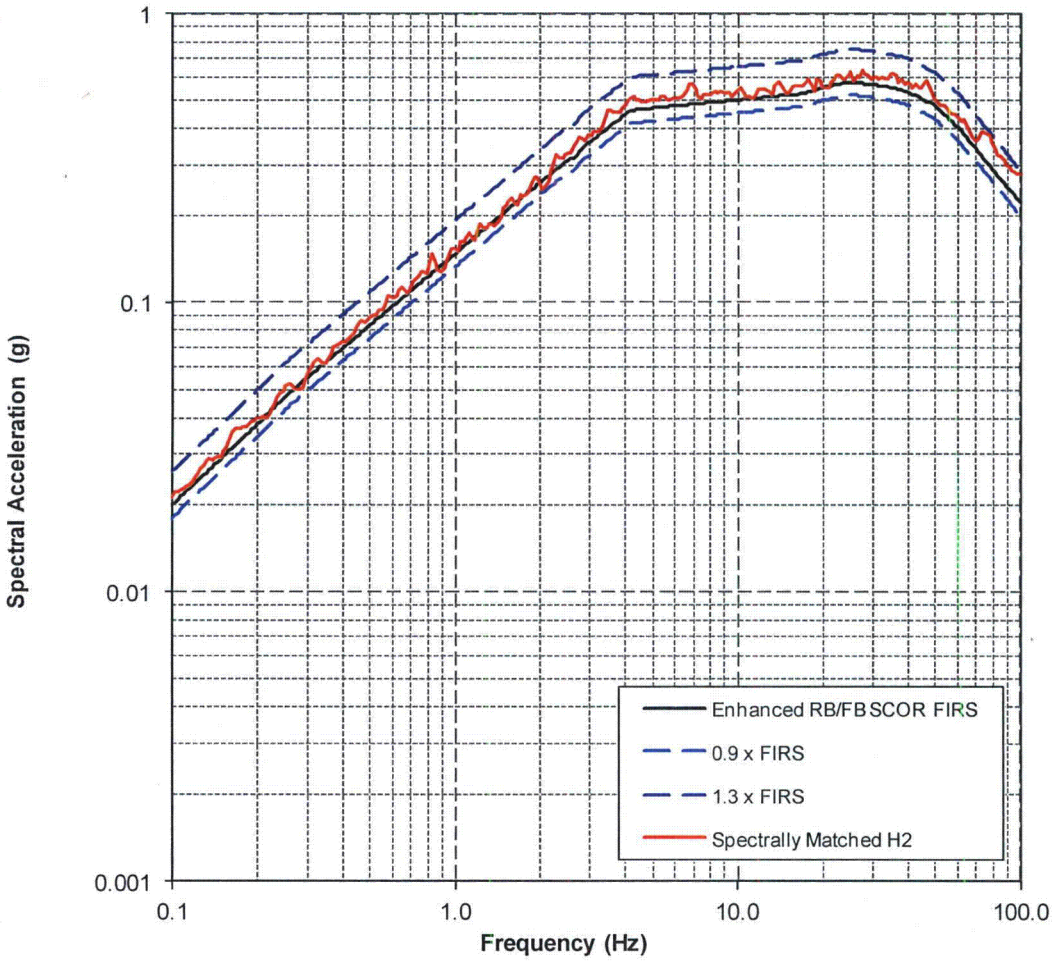


Figure 3.7.1-241 Response Spectrum for Spectrally Matched Vertical (V) Component for the Fermi 3 RB/FB Enhanced SCOR FIRS [EF3 SUP 3.7-1]

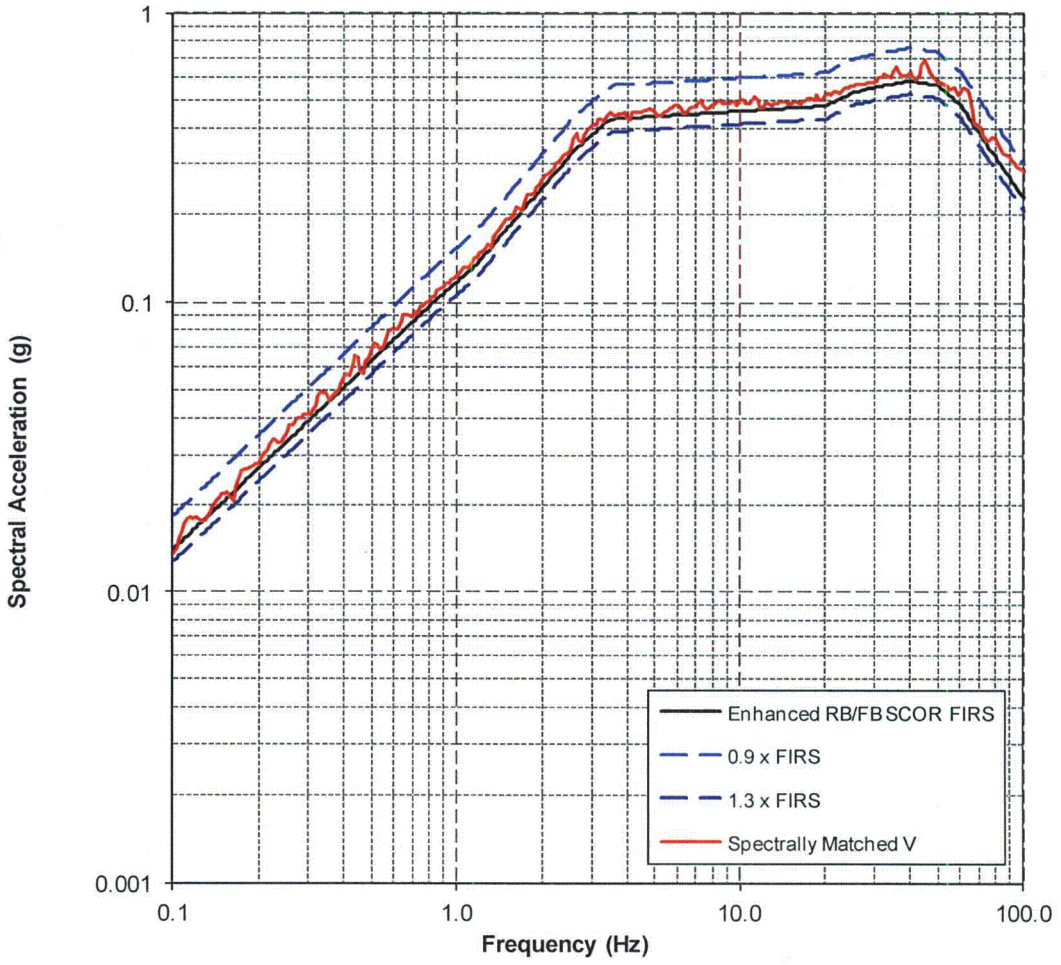


Figure 3.7.1-242 Response Spectrum for Spectrally Matched Horizontal (H1) Component for the Fermi 3 CB Enhanced SCOR FIRS

[EF3 SUP 3.7-1]

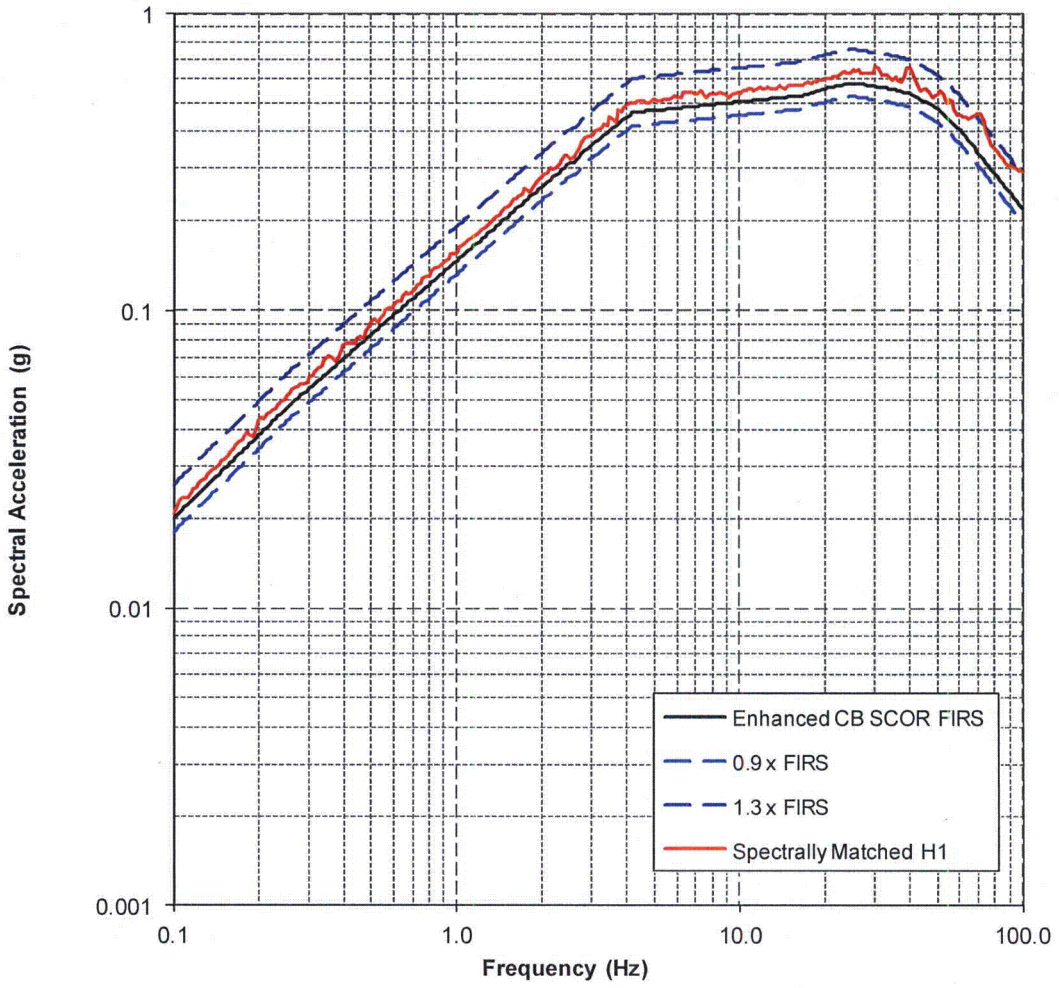


Figure 3.7.1-243 Response Spectrum for Spectrally Matched Horizontal (H2) Component for the Fermi 3 CB Enhanced SCOR FIRS

[EF3 SUP 3.7-1]

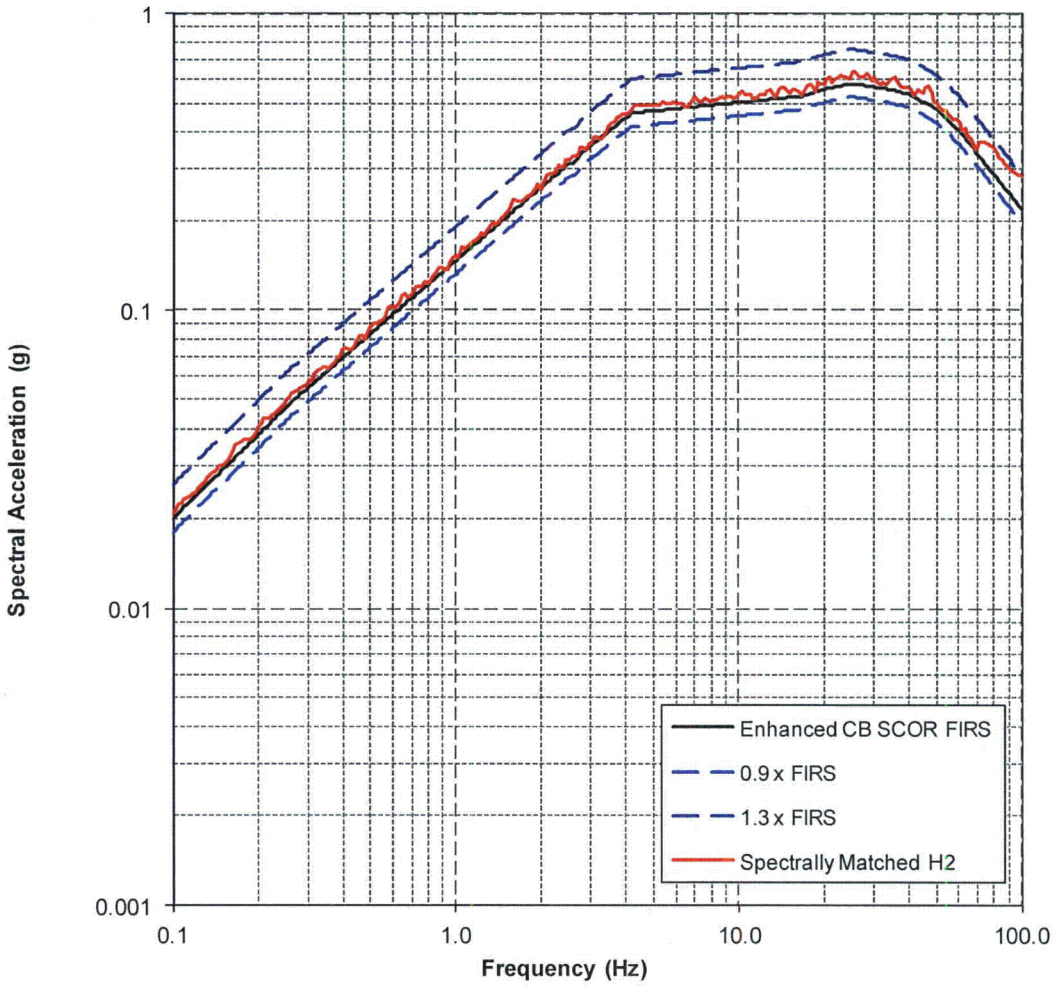


Figure 3.7.1-244 Response Spectrum for Spectrally Matched Vertical (V) Component for the Fermi 3 CB Enhanced SCOR FIRS [EF3 SUP 3.7-1]

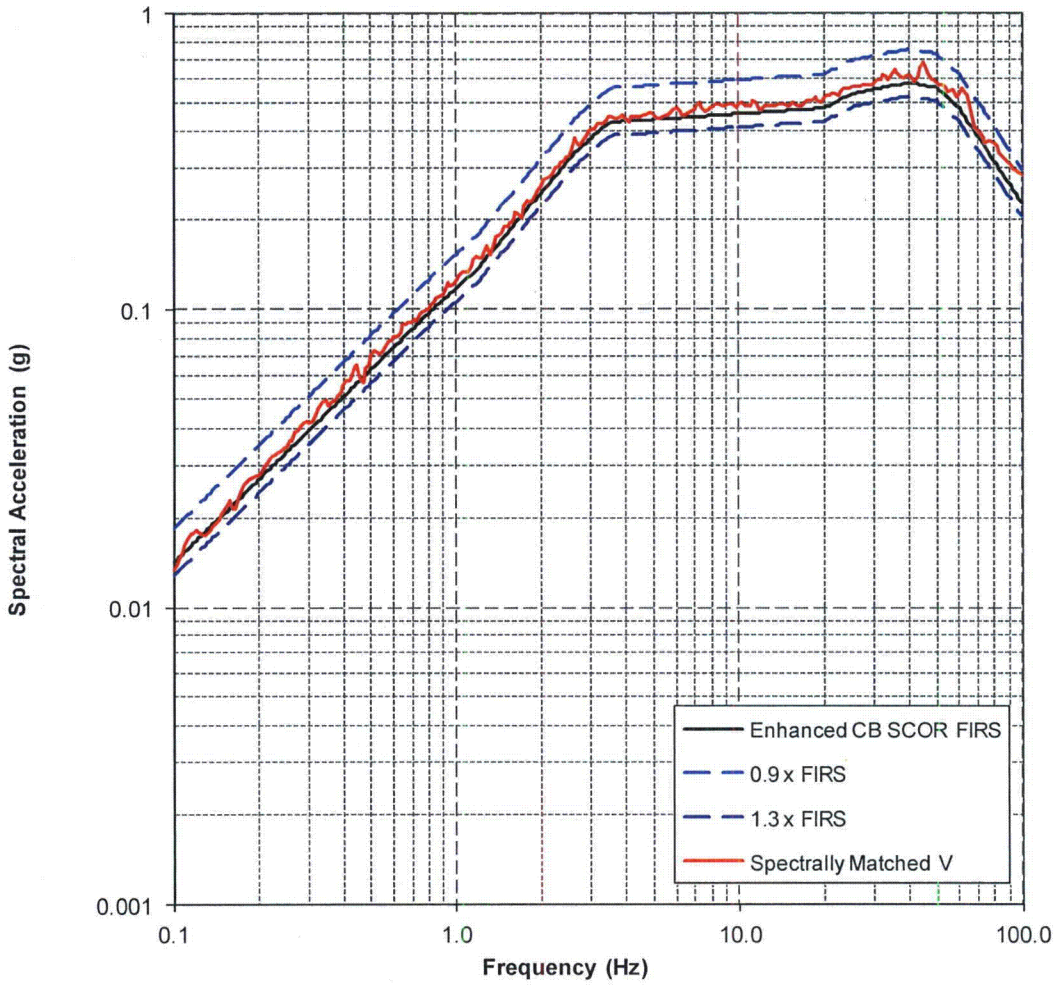
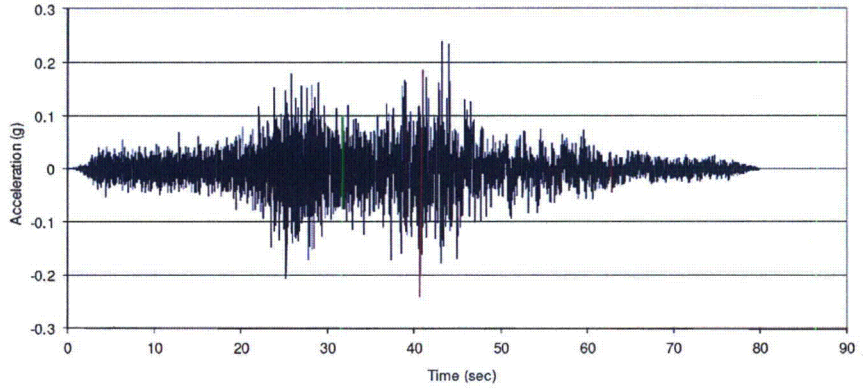
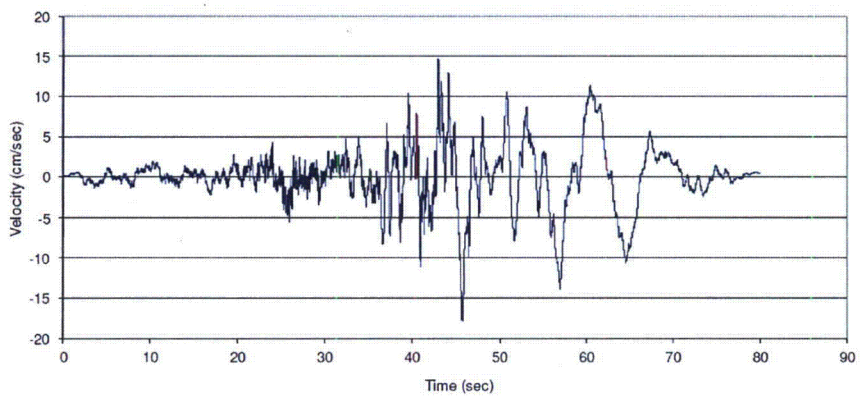


Figure 3.7.1-245 Acceleration, Velocity, and Displacement Time Histories for the Spectrally Matched Horizontal (H1) Component Compatible with the Fermi 3 RB/FB Enhanced SCOR FIRS [EF3 SUP 3.7-1]



H1



H1

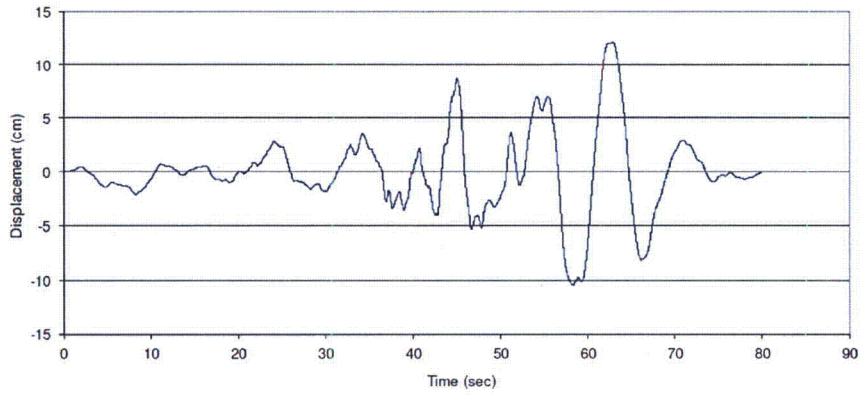
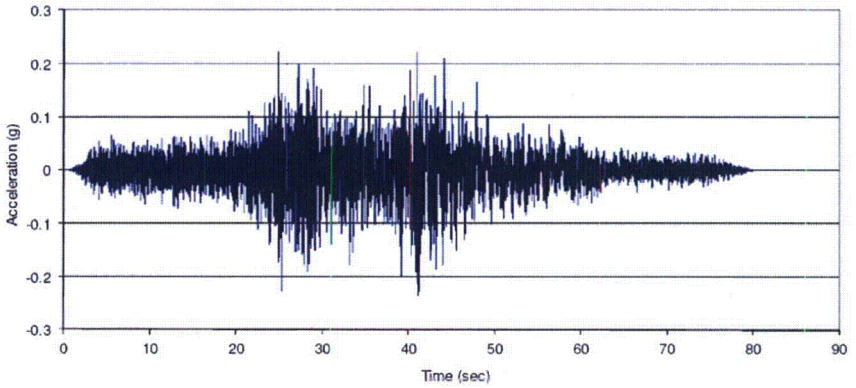
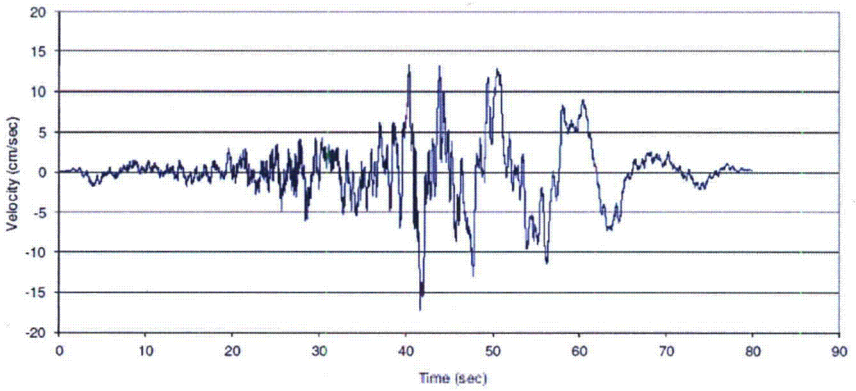


Figure 3.7.1-246 Acceleration, Velocity, and Displacement Time Histories for the Spectrally Matched Horizontal (H2) Component Compatible with the Fermi 3 RB/FB Enhanced SCOR FIRS [EF3 SUP 3.7-1]



H2



H2

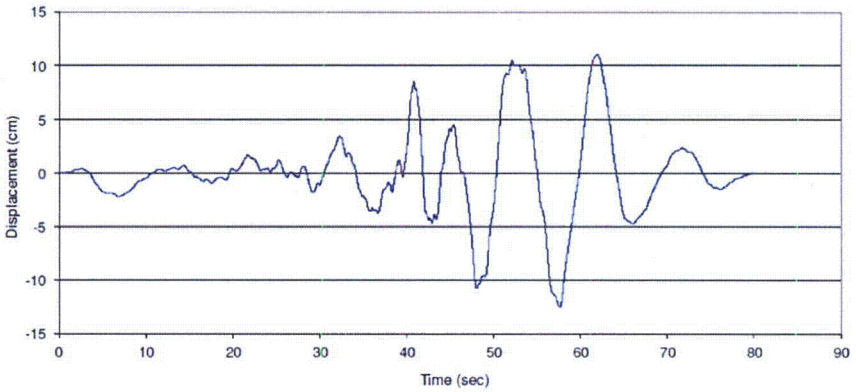
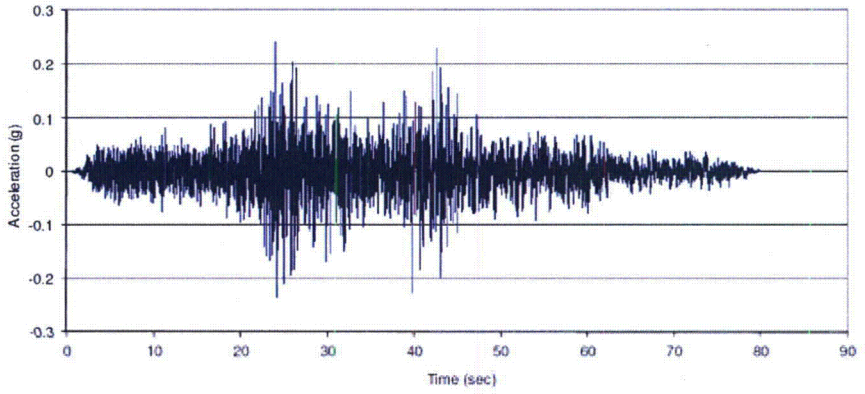
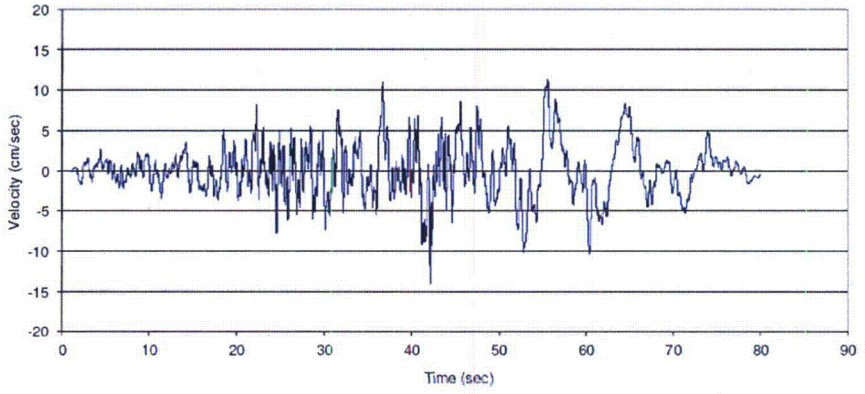


Figure 3.7.1-247 Acceleration, Velocity, and Displacement Time Histories for the Spectrally Matched Vertical (V) Component Compatible with the Fermi 3 RB/FB Enhanced SCOR FIRS [EF3 SUP 3.7-1]



V



V

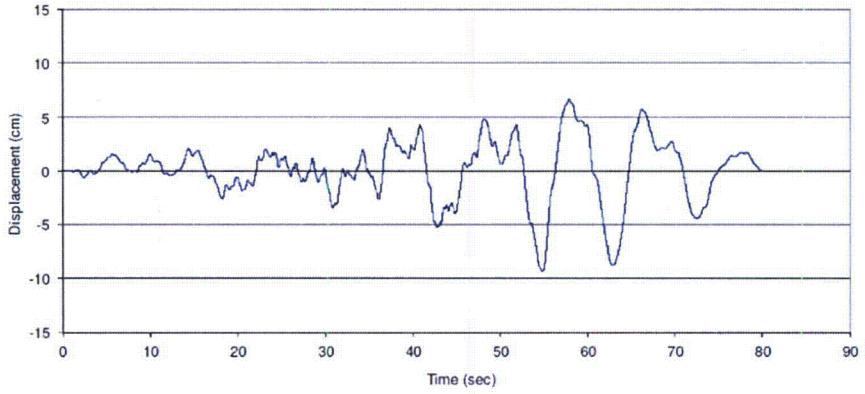
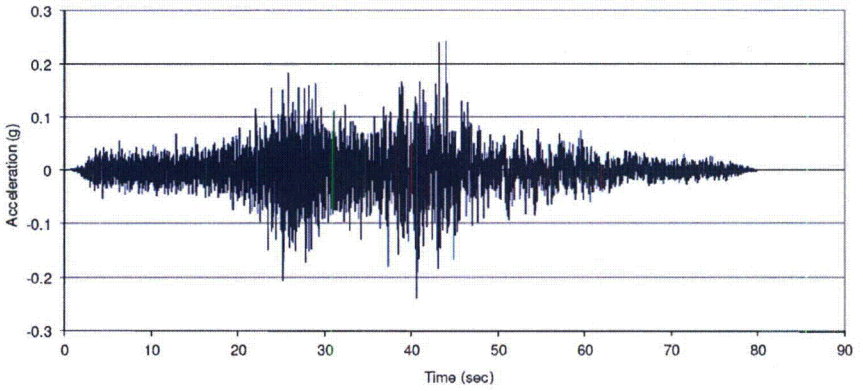
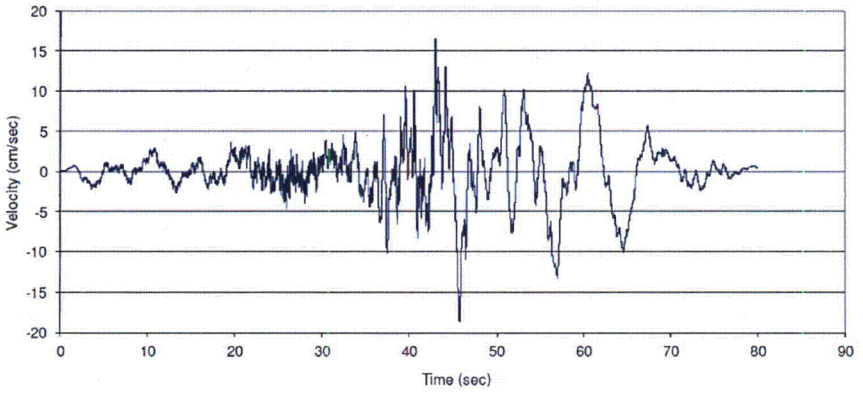


Figure 3.7.1-248 Acceleration, Velocity, and Displacement Time Histories for the Spectrally Matched Horizontal (H1) Component Compatible with the Fermi 3 CB Enhanced SCOR FIRS [EF3 SUP 3.7-1]



H1



H1

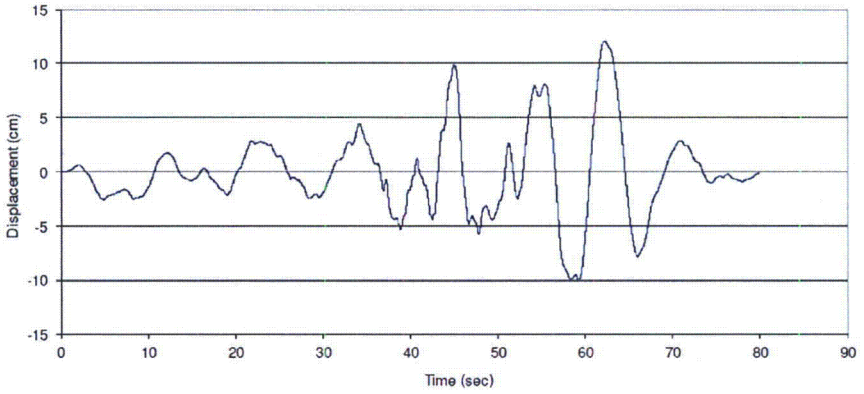
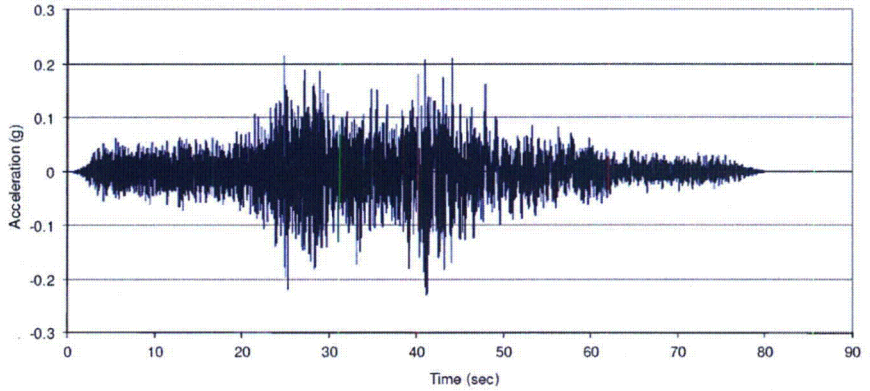
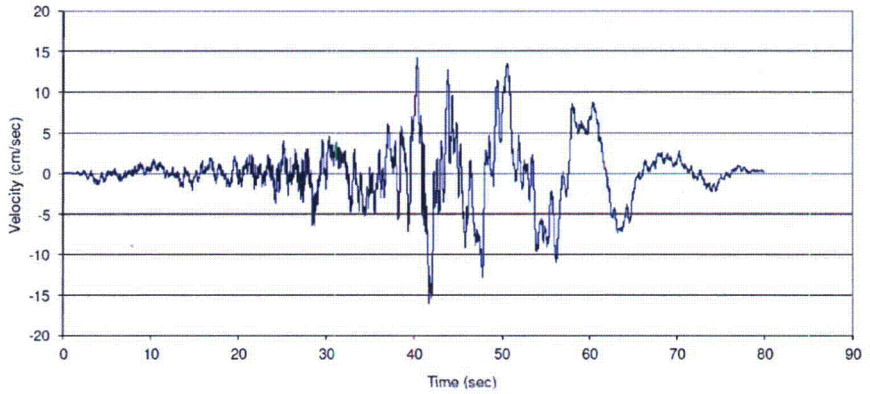


Figure 3.7.1-249 Acceleration, Velocity, and Displacement Time Histories for the Spectrally Matched Horizontal (H2) Component Compatible with the Fermi 3 CB Enhanced SCOR FIRS [EF3 SUP 3.7-1]



H2



H2

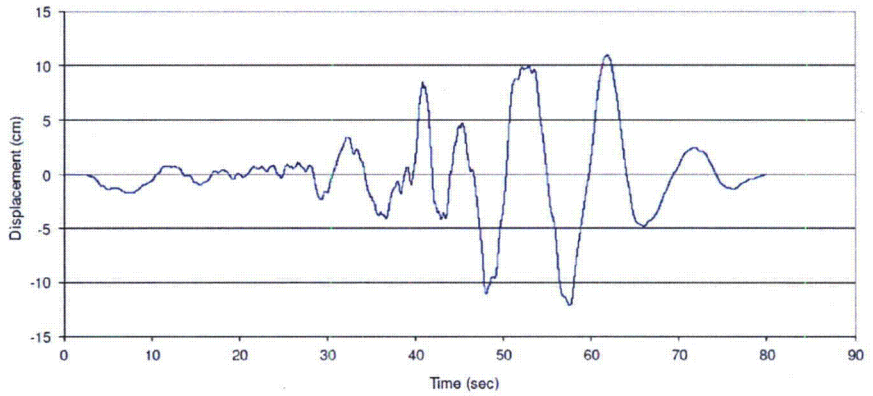
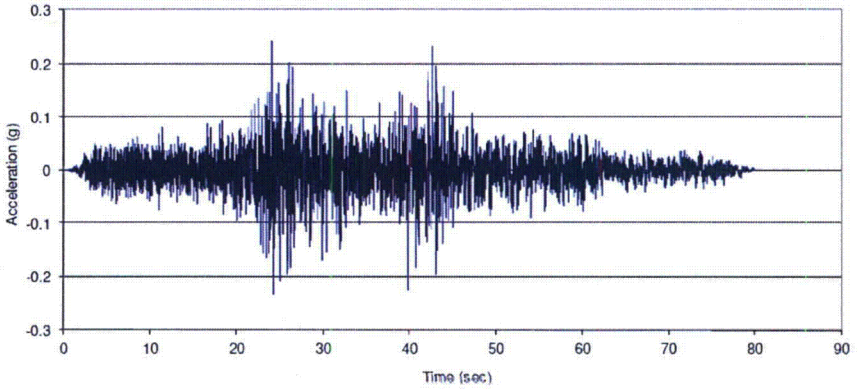
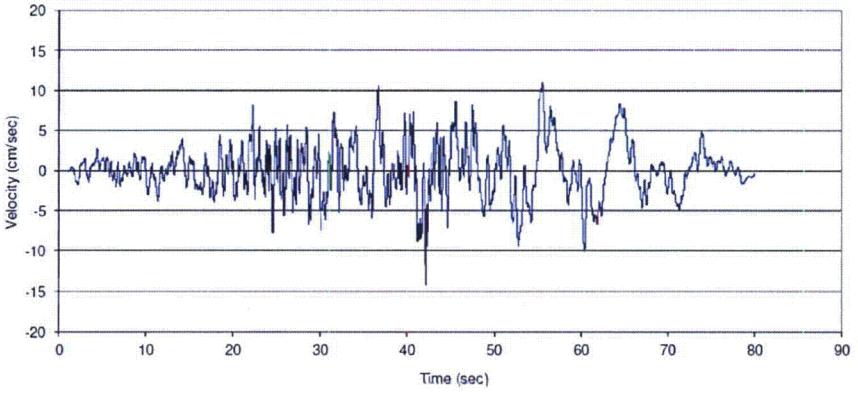


Figure 3.7.1-250 Acceleration, Velocity, and Displacement Time Histories for the Spectrally Matched Vertical (V) Component Compatible with the Fermi 3 CB Enhanced SCOR FIRS [EF3 SUP 3.7-1]



V



V

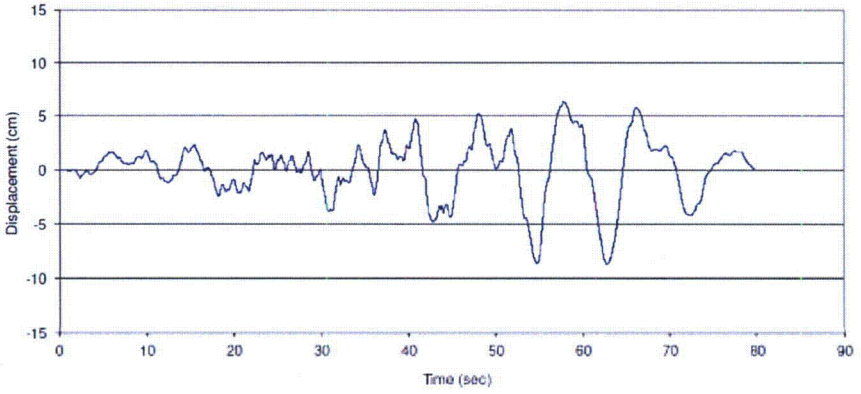
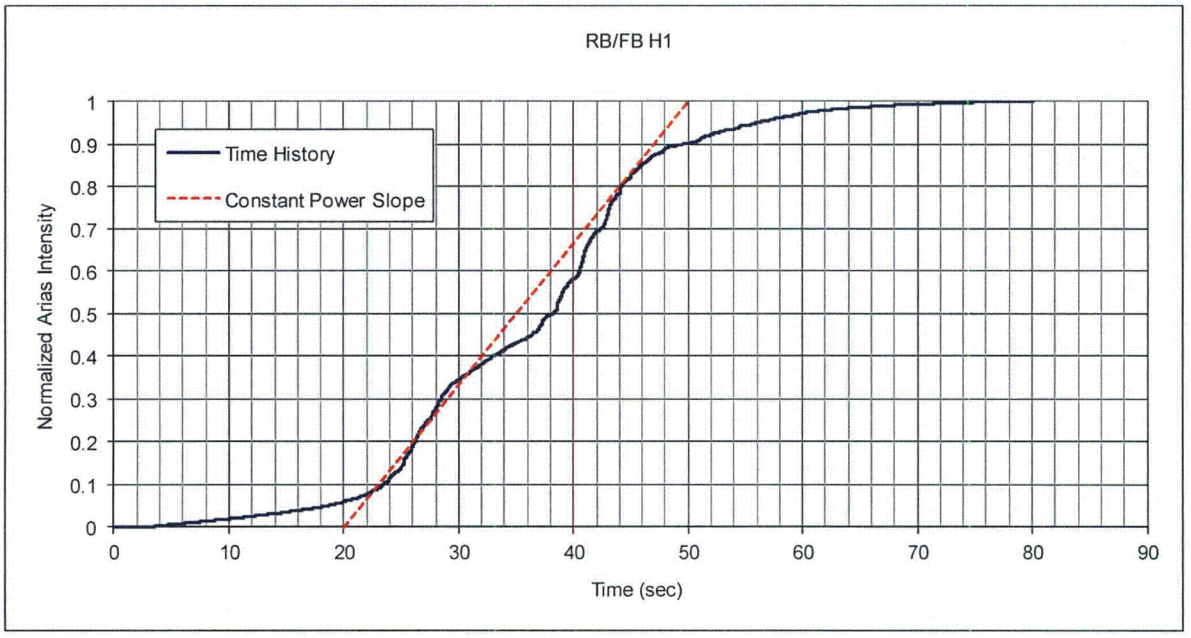


Figure 3.7.1-251 Slope of Near Constant Power used to Estimate Durations of 30 and 31.5 Seconds for Calculating the PSD for the Spectrally Matched Horizontal (H1 and H2) Components Compatible with the Fermi 3 RB/FB Enhanced SCOR FIRS [EF3 SUP 3.7-1]



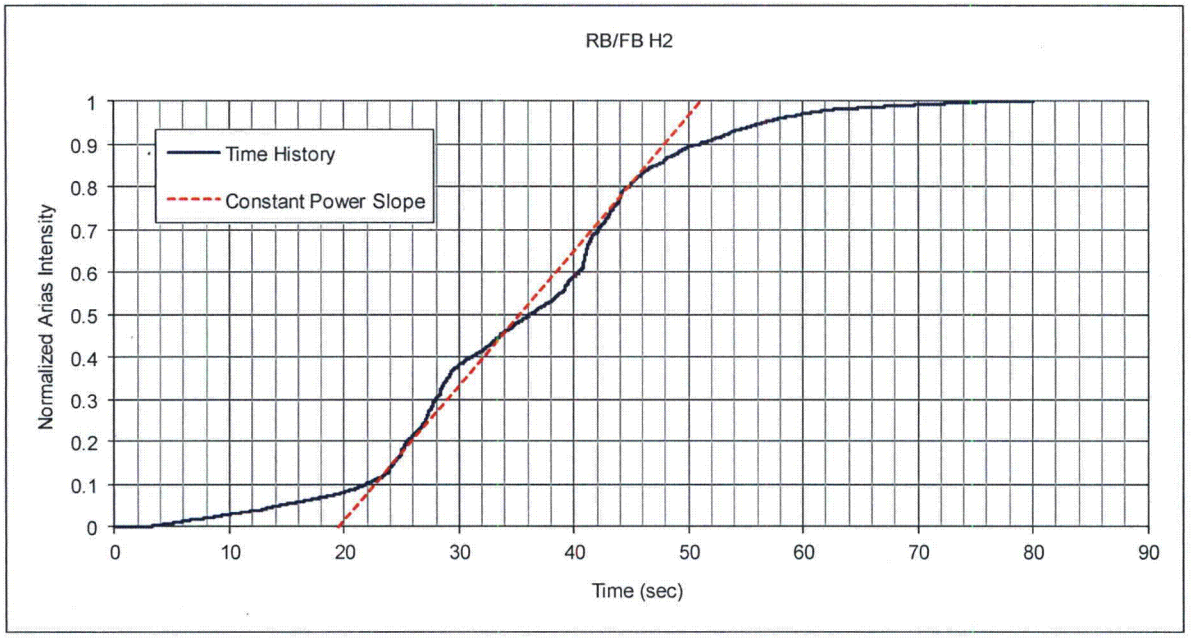


Figure 3.7.1-252 PSD for Spectrally Matched Time History Components (H1 and H2) Compatible with the Fermi 3 RB/FB Enhanced SCOR FIRS and Target PSD Based on Appendix B of SRP 3.7.1 [EF3 SUP 3.7-1]

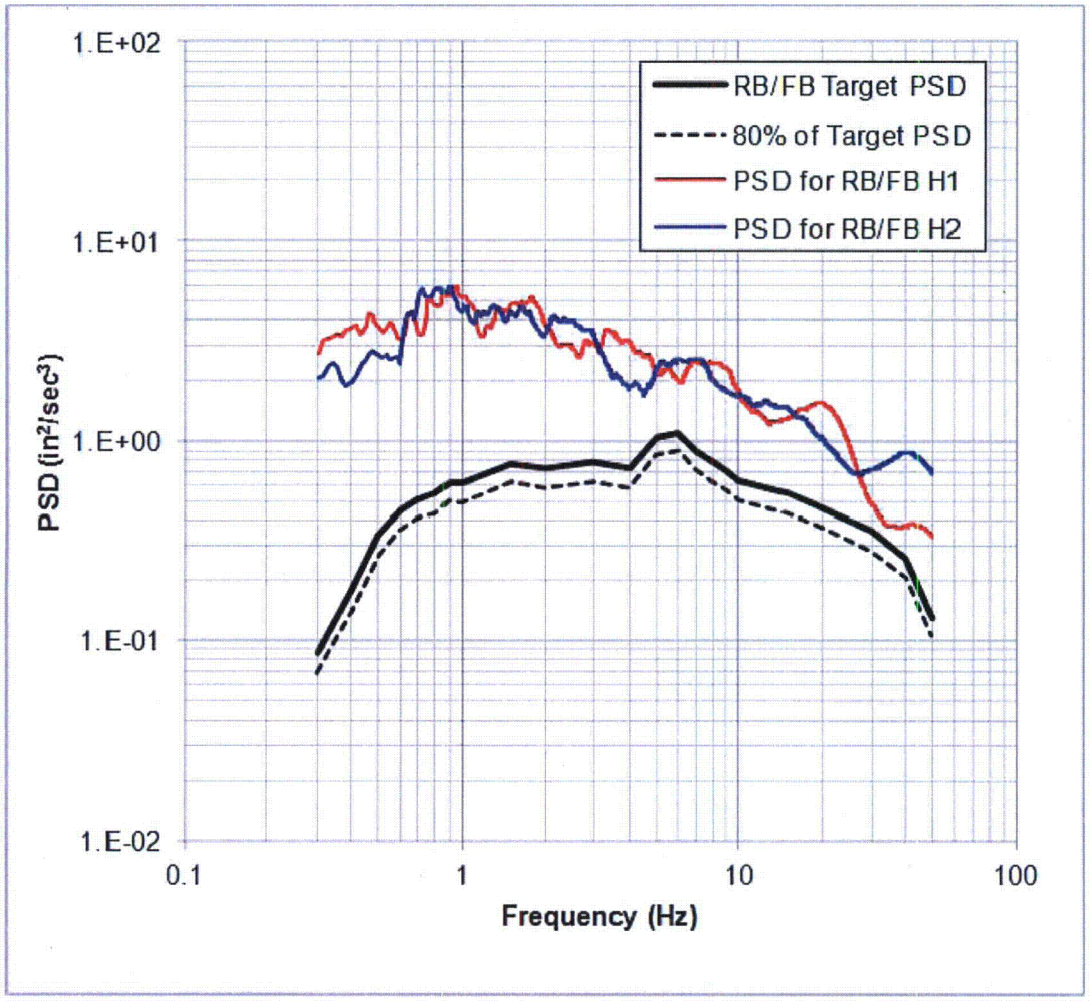


Figure 3.7.1-253 PSD for Spectrally Matched Time History Components (H1 and H2) Compatible with the Fermi 3 CB Final Enhanced SCOR FIRS and Target PSD Based on Appendix B of SRP 3.7.1 [EF3 SUP 3.7-1]

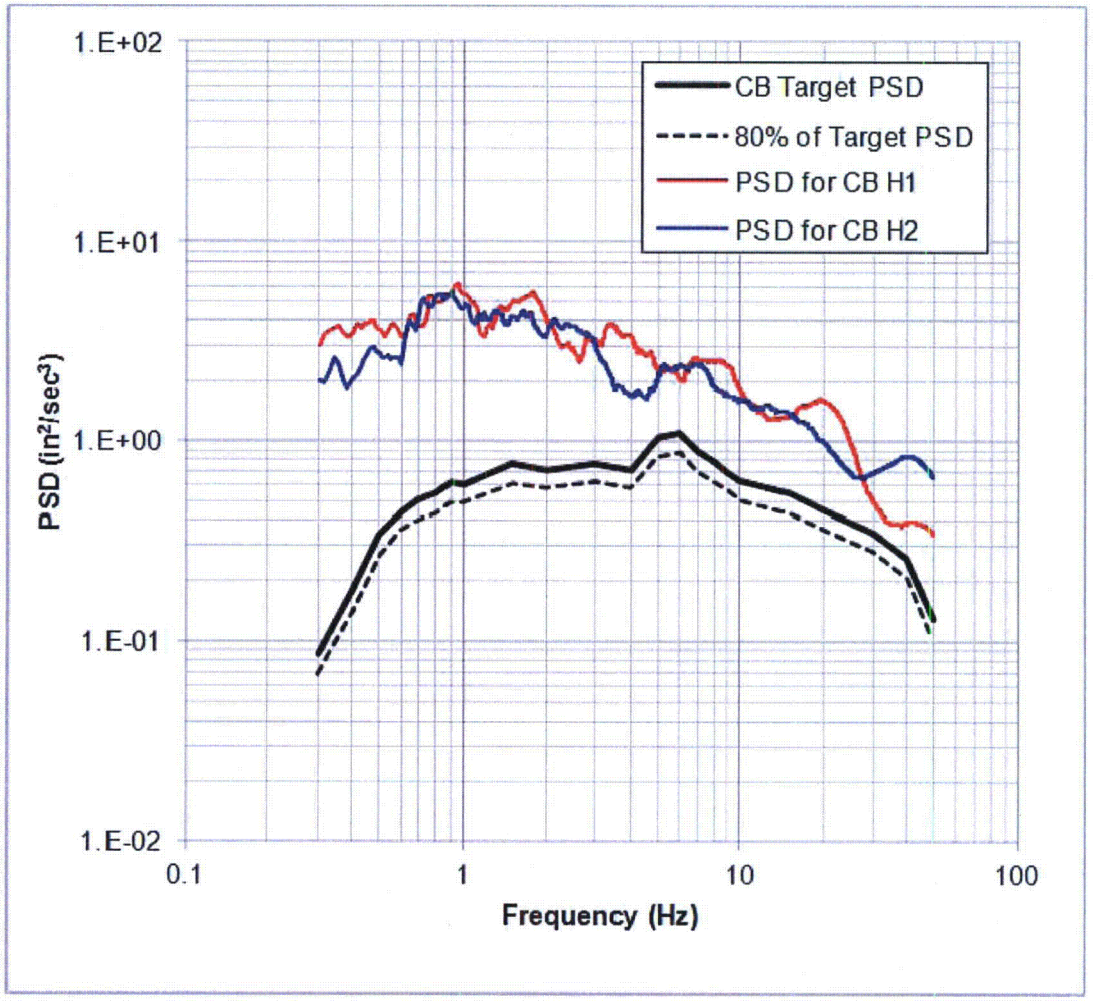
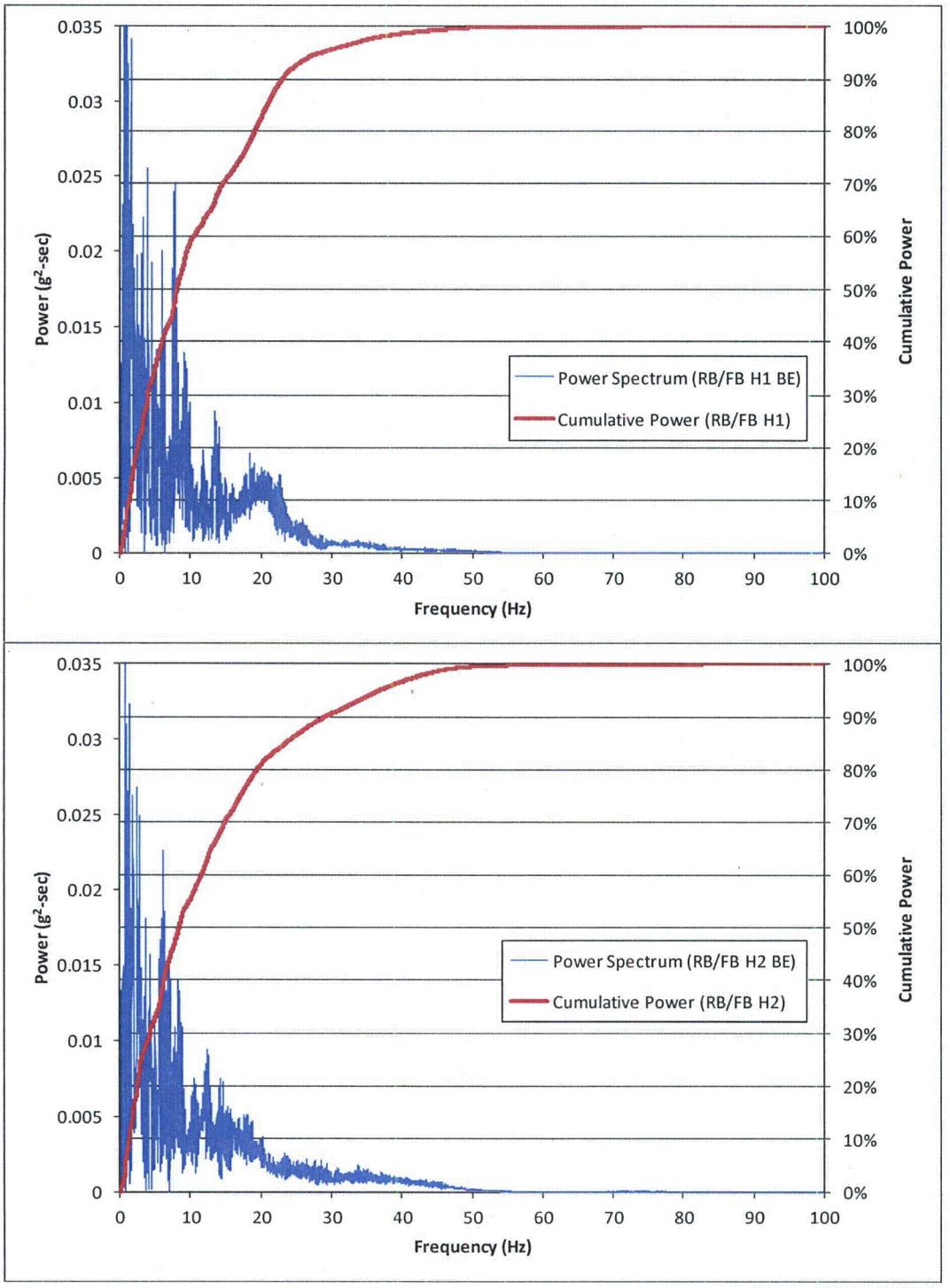


Figure 3.7.1-254 **Power Spectra and Cumulative Power Plots for the Horizontal In-Column Acceleration Time Histories (H1 and H2) Compatible with the BE Deterministic Profile without Engineered Granular Backfill above the Top of the Bass Islands Group Bedrock [EF3 SUP 3.7-1]**



Attachment 2
NRC3-13-0015
(2 pages)

Supplemental Response to RAI Letter No. 82
(eRAI Tracking No. 6975)

RAI Question No. 03.07.02-10

NRC RAI 03.07.02-10

Fermi 3 FSAR Tier 2 Rev. 4 Section 3.7.1.1.4.4.3 describes the deterministic strain-iterated lower-bound (LB), best-estimate (BE), and upper-bound (UB) shear wave velocity profiles for the full soil column, which are used as input to the SSI analysis in accordance with SRP 3.7.2. These profiles are listed in FSAR Tables 3.7.1-205, 3.7.1-206, and 3.7.1-207, and shown in FSAR Figure 3.7.1-225. The FSAR indicates that UB and LB profiles were modified where necessary to maintain the minimum variation relative to the BE profile, such that GUB≥1.5 x GBE or GLB≤GBE / 1.5 is satisfied as required by SRP 3.7.2. The staff notes that the value 1.5 (corresponding to COV=50%) is applicable to subsurface site conditions that have been "well investigated" by the geotechnical investigation. Since the engineered granular backfill above the bedrock has not yet been built, the applicant is requested to provide the technical basis for using COV=50% and not considering a minimum COV=100% for the backfill portion of the LB and UB profiles.

Supplemental Response

The initial response to this RAI was provided in DTE Electric Company letter NRC3-13-0007, dated February 8, 2013 (ML13043A012). As discussed in the initial response, a minimum coefficient of variation (COV) of 100 percent is applied to the engineered granular backfill in the lower bound (LB) and upper bound (UB) subsurface profiles. A minimum COV of 50 percent is used for the well investigated in-situ bedrock units beneath the engineered granular backfill. The use of these minimum COV values satisfies the requirements of Standard Review Plan (SRP) 3.7.2.

Subsection 3.7.1.1.4.3.3 of the markup for Fermi 3 FSAR Subsection 3.7.1 describes the development of the best estimate (BE), LB, and UB deterministic profiles for soil-structure interaction (SSI) analysis. Table 3.7.1-206, Table 3.7.1-207, and Table 3.7.1-208 of the markup for Fermi 3 FSAR Subsection 3.7.1 provide the BE, LB, and UB deterministic profiles for the Fermi 3 site with engineered granular backfill above the top of the Bass Islands Group bedrock.

Proposed COLA Revision

FSAR Subsection 3.7.1 is revised as shown in Attachment 1.

Attachment 3
NRC3-13-0015
(3 pages)

Supplemental Response to RAI Letter No. 82
(eRAI Tracking No. 6976)

RAI Question No. 02.05.02-20

NRC RAI 02.05.02-20

10 CFR Part 100, Appendix A requires the determination of the static and dynamic engineering properties of the materials underlying the site, which should include properties needed to determine the behavior of the underlying material during earthquakes and the characteristics of the underlying material in transmitting earthquake-induced motions to the foundations of the plant. FSAR Section 3.7.1.1.4.1.1 describes the dynamic properties of the engineered granular backfill above the bedrock; however, in order to satisfy the requirements of 10 CFR Part 100, Appendix A, please provide the information described below.

a) *FSAR Section 3.7.1.1.4.1.1 states that the shear-wave velocity for the granular backfill is estimated based on empirical relationships for angular-grained material from Richart et al. (1970). Please provide the range of parameters (i.e., void ratio and average effective confining pressure) that were used to define the lower range (LR), intermediate range (IR) and upper range (UR) shear-wave velocity profiles and explain why they are appropriate for the backfill material to be used at the site. Furthermore, please justify the use of Richart et al. (1970) in light of more recently published empirical relationships, e.g. Menq (2003), and include a discussion of the potential applicability of the more recent relationships.*

b) *FSAR Section 3.7.1.1.4.1.1.2 states that the shear modulus reduction and damping relationships selected for the granular backfill correspond to generic sand curves from EPRI (1993). Please justify the use of the EPRI (1993) generic sand curves rather than more recently published shear modulus reduction and damping relationships, e.g. Darendeli (2001) and Menq (2003), which may be more representative of the proposed backfill material. In addition, include a discussion of the potential applicability of the more recent relationships.*

References

Darendeli, M. B. (2001), "Development of a New Family of Normalized Modulus Reduction and Material Damping Curves", Ph. D. Dissertation, University of Texas at Austin.

EPRI (1993), "Guidelines for Determining Design Basis Ground Motions," Early Site Permit Demonstration Program, Project RP3302.

Menq, F. Y. (2003), "Dynamic Properties of Sandy and Gravelly Soils", School of Civil Engineering, Ph.D. Dissertation, University of Texas at Austin.

Richart, F.E., Woods, R.D., and Hall J.R. (1970), "Vibration of Soils and Foundations," Prentice-Hall.

Supplemental Response

The initial response to this RAI was provided in DTE Electric Company letter NRC3-13-0007, dated February 8, 2013 (ML13043A012).

a) *FSAR Section 3.7.1.1.4.1.1 states that the shear-wave velocity for the granular backfill is estimated based on empirical relationships for angular-grained material from Richart et al. (1970). Please provide the range of parameters (i.e., void ratio and average effective*

confining pressure) that were used to define the lower range (LR), intermediate range (IR) and upper range (UR) shear-wave velocity profiles and explain why they are appropriate for the backfill material to be used at the site. Furthermore, please justify the use of Richart et al. (1970) in light of more recently published empirical relationships, e.g. Menq (2003), and include a discussion of the potential applicability of the more recent relationships.

The range of parameters used to define the engineered granular backfill lower range (LR), intermediate range (IR), and upper range (UR) shear wave velocity profiles are selected to represent the possible range of properties based on the anticipated engineered granular backfill types described in Fermi 3 FSAR Subsection 2.5.4.5.1. Subsection 3.7.1.1.4.1.1 of the markup for Fermi 3 FSAR Subsection 3.7.1 provides the detailed supplemental response regarding the range of parameters considered in the development of the LR, IR, and UR shear wave velocity profiles.

b) *FSAR Section 3.7.1.1.4.1.1.2 states that the shear modulus reduction and damping relationships selected for the granular backfill correspond to generic sand curves from EPRI (1993). Please justify the use of the EPRI (1993) generic sand curves rather than more recently published shear modulus reduction and damping relationships, e.g. Darendeli (2001) and Menq (2003), which may be more representative of the proposed backfill material. In addition, include a discussion of the potential applicability of the more recent relationships.*

Subsection 3.7.1.1.4.1.1.2 of the markup for Fermi 3 FSAR Subsection 3.7.1 provides the detailed supplemental response regarding the development of the shear modulus reduction and damping relationships used in conjunction with the LR, IR, and UR shear wave velocity profiles.

Proposed COLA Revision

FSAR Subsection 3.7.1 is revised as shown in Attachment 1.

Attachment 4
NRC3-13-0015
(7 pages)

Revised Responses to NRC Data Requests 7 and 8
(CD inventory and summary of data
requests included on the following pages)

As stated in the response to RAI 01.05-1 in DTE Electric letter NRC3-13-0004, dated January 25, 2013 (ML13032A378):

> *Plots in this response and the electronic files containing data and analysis results for the GMRS are only provided for the results using the Updated CEUS SSC model.*
>
> *Similarly, the plots and the electronic files containing data and analysis results for the PBSRS and FIRS that will be provided with the markup for FSAR Subsection 3.7.1 on April 26, 2013, will present the results using the Updated CEUS SSC model. Comparison of the FIRS to the CSDRS will be provided.*

Responses to NRC Data Requests 7 and 8 are provided to support NRC review of the response to RAI 01.05-1. NRC Data Requests 7 and 8 are being submitted with the markup to FSAR Subsection 3.7.1 and include the Performance-Based Surface Response Spectra (PBSRS) and Foundation Input Response Spectra (FIRS) developed using the Updated CEUS SSC model. Comparison of the FIRS to the Certified Seismic Design Response Spectra (CSDRS) is provided in the markup to FSAR Subsection 3.7.1, and the CSDRS values are provided in NRC Data Request 8.

The information provided in this submittal for NRC Data Request 7 and 8 includes the information provided earlier with the response to RAI 01.05-1 and new information associated with the submittal of the markup to FSAR Subsection 3.7.1. This is done to provide the complete information associated with each data request.

NRC Data Request 7

If amplification functions are recalculated for the CEUS SSC results, an excel spreadsheet containing target response spectra values, amplification functions, and resulting soil UHRS.

DTE Electric Company Response

The development of amplification functions for the Updated CEUS SSC model for the ground motion response spectra (GMRS) is provided in the response to RAI 01.05-1. Excel file "FERMI3_CEUS_SSC_NRC_Data_Request_7.xlsx" is provided containing the requested digital data. Tabs "10-3 RE&DE", "10-4 RE&DE", "10-5 RE&DE", and "10-6 RE&DE" contain the Reference Earthquake (RE) and Deaggregation Earthquake (DE) horizontal response spectra for exceedance levels of 10^{-3}, 10^{-4}, 10^{-5}, and 10^{-6}, respectively. Column A on each tab contains spectral frequency. Column B contains the high frequency (HF) RE spectrum. Columns C, D, and E contain the HF DE spectra for low magnitude (DEL), medium magnitude (DEM), and high magnitude (DEH). The HF DEL, DEM, and DEH are the target spectra used in the development of the HF amplification functions. Column F contains the low frequency (LF) RE spectrum. Columns G, H, and I contain the LF DEL, DEM, and DEH spectra. The LF DEL, DEM, and DEH are the target spectra used in the development of the LF amplification functions. Column J contains the low frequency extension of the hard rock UHRS from 0.5 to 0.1 Hz.

Tab "CEUS SSC GMRS Amps" contains the computed mean amplification functions for the GMRS elevation. Rows 5 through 95 contain the HF amplification functions and rows 105 through 195 contain the LF amplification functions. Columns A and B contain spectral period and spectral frequency, respectively. Columns C, D, E, and F contain the mean 10^{-3}, 10^{-4}, 10^{-5}, and 10^{-6} amplification functions, respectively. Columns G, H, I, and J contain the smoothed amplification functions. Note: the smoothed HF amplification functions are presented for the

frequency range of 1 to 100 Hz and the smoothed LF amplification functions are presented for the frequency range of 0.1 to 6.67 Hz as these are the frequency ranges for which the HF and LF amplification functions are used to develop the surface Uniform Hazard Response Spectra (UHRS) at the GMRS elevation.

Tab "UHRS" contains the resulting UHRS at the GMRS elevation (top of Bass Islands Group bedrock). Columns A and B contain spectral period and spectral frequency, respectively. Columns C, D, and E contain the horizontal (5 percent damping) UHRS for 10^{-4}, 10^{-5}, and 10^{-6}, respectively.

Tab "PBSRS Amps" contains the smoothed mean amplification functions for the PBSRS elevation at finished ground level grade. Rows 5 through 61 contain the weighted average HF amplification functions and rows 68 through 132 contain the weighted average LF amplification functions. Columns A and B contain spectral periods and spectral frequencies, respectively. Columns C and D contain the smoothed mean 10^{-4} and 10^{-5} amplification functions, respectively. Note: the smoothed HF amplification functions are presented for the frequency range of 1 to 100 Hz and the smoothed LF amplification functions are presented for the frequency range of 0.1 to 6.67 Hz as these are the frequency ranges for which the HF and LF amplification functions are used to develop the surface UHRS at the PBSRS elevation.

Tab "PBSRS UHRS" contains the resulting UHRS at the PBSRS elevation (finished ground level grade). Columns A and B contain spectral periods and spectral frequencies, respectively. Columns C and D contain the horizontal (5 percent damping) UHRS for 10^{-4} and 10^{-5} exceedance levels, respectively.

Tab "RB_FB Amp" contains the smoothed mean amplification functions for the Reactor Building/Fuel Building (RB/FB) foundation elevation. Rows 5 through 61 contain the HF amplification functions and rows 68 through 132 contain the LF amplification functions. Columns A and B contain spectral period and spectral frequency, respectively. Columns C and D contain the smoothed mean 10^{-4} and 10^{-5} amplification functions, respectively. Note: the smoothed HF amplification functions are presented for the frequency range of 1 to 100 Hz and the smoothed LF amplification functions are presented for the frequency range of 0.1 to 6.67 Hz as these are the frequency ranges for which the HF and LF amplification functions are used to develop the surface UHRS.

Tab "RB_FB UHRS" contains the resulting UHRS at the RB/FB foundation elevation. Columns A and B contain spectral period and spectral frequency, respectively. Columns C and D contain the horizontal (5 percent damping) UHRS for 10^{-4} and 10^{-5} exceedance levels, respectively.

Tab "CB Amp" contains the smoothed mean amplification functions for the Control Building (CB) foundation elevation. Rows 5 through 61 contain the HF amplification functions and rows 68 through 132 contain the LF amplification functions. Columns A and B contain spectral period and spectral frequency, respectively. Columns C and D contain the smoothed mean 10^{-4} and 10^{-5} amplification functions, respectively. Note: the smoothed HF amplification functions are presented for the frequency range of 1 to 100 Hz and the smoothed LF amplification functions are presented for the frequency range of 0.1 to 6.67 Hz as these are the frequency ranges for which the HF and LF amplification functions are used to develop the surface UHRS.

Tab "CB UHRS" contains the resulting UHRS at the CB foundation elevation. Columns A and B contain spectral period and spectral frequency, respectively. Columns C and D contain the horizontal (5 percent damping) UHRS for 10^{-4} and 10^{-5} exceedance levels, respectively.

Tab "FWSC 1D Amp" contains the smoothed mean amplification functions for the Fire Water Service Complex (FWSC) foundation elevation from the one-dimensional (1D) site response analysis with fill concrete between the base of the FWSC and the top of the Bass Islands Group bedrock. Rows 5 through 61 contain the HF amplification functions and rows 68 through 132 contain the LF amplification functions. Columns A and B contain spectral period and spectral frequency, respectively. Columns C and D contain the smoothed mean 10^{-4} and 10^{-5} amplification functions, respectively. Note: the smoothed HF amplification functions are presented for the frequency range of 1 to 100 Hz and the smoothed LF amplification functions are presented for the frequency range of 0.1 to 6.67 Hz as these are the frequency ranges for which the HF and LF amplification functions are used to develop the surface UHRS.

Tab "FWSC 1D UHRS" contains the resulting UHRS at the FWSC foundation elevation based on the 1D site response analysis. Columns A and B contain spectral period and spectral frequency, respectively. Columns C and D contain the horizontal (5 percent damping) UHRS for 10^{-4} and 10^{-5} exceedance levels, respectively.

Tab "FWSC 2D Amp" contains the smoothed mean amplification functions for the FWSC foundation elevation that includes the two-dimensional (2D) site response analysis effect. The 2D site response analysis is described in FSAR Subsection 3.7.1.1.4.1.2 and is incorporated using the 2D-to-1D spectral ratio envelopes in FSAR Figure 3.7.1-215. Rows 5 through 61 contain the HF amplification functions and rows 68 through 132 contain the LF amplification functions. Columns A and B contain spectral period and spectral frequency, respectively. Columns C and D contain the smoothed mean 10^{-4} and 10^{-5} amplification functions, respectively, with the 2D effects. Note: the smoothed HF amplification functions are presented for the frequency range of 1 to 100 Hz and the smoothed LF amplification functions are presented for the frequency range of 0.1 to 6.67 Hz as these are the frequency ranges for which the HF and LF amplification functions are used to develop the surface UHRS.

Tab "FWSC 2D UHRS" contains the resulting UHRS at the FWSC foundation elevation that includes the 2D site response analysis effects. Columns A and B contain spectral period and spectral frequency, respectively. Columns C and D contain the horizontal (5 percent damping) UHRS for 10^{-4} and 10^{-5} exceedance levels, respectively.

NRC Data Request 8

Excel spreadsheet containing GMRS, FIRS, and PBSRS values (both original and updated curves), as well as the CSDRS.

DTE Electric Company Response

The development of the GMRS for the Updated CEUS SSC model is provided in the response to RAI 01.05-1. As stated in the response to RAI 01.05-1, only the values using the Updated CEUS SSC model for the Fermi 3 seismic hazard analysis in FSAR Subsection 2.5.2 and Subsection 3.7.1 are presented in this response.

Excel file "FERMI3_CEUS_SSC_NRC_Data_Request_8.xlsx" is provided containing the requested digital data. Tab "GMRS Table" contains the horizontal and vertical GMRS at the GMRS elevation (top of Bass Islands Group bedrock). Column A contains the spectral frequency. Columns B and C contain the 10^{-4} and 10^{-5} UHRS spectra at the GMRS elevation, respectively. Column D contains the horizontal GMRS. Column E contains the vertical to horizontal (V/H) spectral ratios. Column F contains the vertical GMRS.

Tab "PBSRS Table" contains the horizontal and vertical PBSRS at the finished ground level grade. Column A contains the spectral frequency. Columns B and C contain the 10^{-4} and 10^{-5} UHRS spectra at the PBSRS elevation, respectively. Column D contains the horizontal PBSRS. Column E contains the V/H spectral ratios. Column F contains the vertical PBSRS.

Tab "RB_FB SCOR FIRS Table" contains the horizontal and vertical RB/FB SCOR FIRS at the RB/FB foundation elevation. Column A contains the spectral frequency. Columns B and C contain the 10^{-4} and 10^{-5} UHRS spectra at the RB/FB foundation elevation, respectively. Column D contains the horizontal RB/FB SCOR FIRS. Column E contains the V/H spectral ratios. Column F contains the vertical RB/FB SCOR FIRS.

Tab "Enhanced RB_FB SCOR FIRS" Table contains the enhanced horizontal and vertical RB/FB SCOR FIRS at the RB/FB foundation elevation. The enhanced SCOR FIRS meet the requirements of DC/COL-ISG-017. Column B contains the spectral period. Column C contains the spectral frequency. Columns D and E contain the horizontal and vertical enhanced RB/FB SCOR FIRS, respectively. The horizontal and vertical enhanced RB/FB SCOR FIRS were used to develop the input time histories for use in Soil Structure Interaction (SSI) analyses.

Tab "CB SCOR FIRS Table" contains the horizontal and vertical CB SCOR FIRS at the CB foundation elevation. Column A contains the spectral frequency. Columns B and C contain the 10^{-4} and 10^{-5} UHRS spectra at the CB foundation elevation, respectively. Column D contains the horizontal CB SCOR FIRS. Column E contains the V/H spectral ratios. Column F contains the vertical CB SCOR FIRS.

Tab "Enhanced CB SCOR FIRS Table" contains the enhanced horizontal and vertical CB SCOR FIRS at the CB foundation elevation. The enhanced SCOR FIRS meet the requirements of DC/COL-ISG-017. Column B contains the spectral period. Column C contains the spectral frequency. Columns D and E contain the horizontal and vertical enhanced CB SCOR FIRS, respectively. The horizontal and vertical enhanced CB SCOR FIRS were used to develop the input time histories for use in SSI analyses.

Tab "ESBWR CSDRS" contains the horizontal and vertical CSDRS at the RB/FB and CB foundation elevations. Column A contains the spectral period. Column B contains the spectral frequency. Columns C and D contain the horizontal and vertical CSDRS, respectively.

Tab "FWSC 1D FIRS Table" contains the horizontal and vertical 1D FWSC FIRS at the FWSC foundation elevation. Column A contains the spectral frequency. Columns B and C contain the 1D 10^{-4} and 10^{-5} UHRS spectra at the FWSC foundation elevation, respectively. Column D contains the horizontal 1D FWSC FIRS. Column E contains the V/H spectral ratios. Column F contains the vertical 1D FWSC FIRS.

Tab "FWSC 2D FIRS Table" contains the horizontal and vertical 2D FWSC FIRS at the FWSC foundation elevation. The 2D site response analysis is described in FSAR Subsection 3.7.1.1.4.1.2 and the 2D effects are incorporated by using the 2D amplification functions. Column A contains the spectral frequency. Columns B and C contain the 2D 10^{-4} and 10^{-5} UHRS spectra at the FWSC foundation elevation, respectively. Column D contains the horizontal 2D FWSC FIRS. Column E contains the V/H spectral ratios. Column F contains the vertical 2D FWSC FIRS.

Tab "1.35 x ESBWR CSDRS" contains the horizontal and vertical CSDRS at the FWSC foundation elevation. Column A contains the spectral period. Column B contains the spectral

frequency. Columns C and D contain the horizontal and vertical CSDRS, respectively. Columns E and F contain the CSDRS times 1.35 for comparison to the FWSC FIRS at the FWSC foundation elevation.

Revised Responses to NRC Data Requests 7 and 8

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04/26/2013	08:31 AM	267,474	FERMI3_CEUS_SSC_NRC_Data_Request_7.xlsx
04/26/2013	08:31 AM	98,586	FERMI3_CEUS_SSC_NRC_Data_Request_8.xlsx

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