Attachment 3

LNG-1000-S2R-804-NP

Revision 0

Levy Nuclear Island and RCC Bridging Mat - 3D SASSI SSI Evaluation Report

[115 pages attached]

BNGF-3.4.1-1 Rev 5

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	SIGNATURE / DATE	
	SIGNATURE / DATE	
VERIFIER(S) WEC 6.1.pdf Dali Li	SIGNATURE / DATE Dali Li 2/9/2011	Verification Method: Independent Review

Plant Applicability: ☐ All AP1000 plants except:
☒ Only the following plants: LN1, LN2

APPLICABILITY REVIEWER WEC 6.1.pdf N/A	SIGNATURE / DATE
RESPONSIBLE MANAGER* WEC 6.1.pdf L.J. Tunon-Sanjur	SIGNATURE / DATE L. Tunon-Sanjur 2/9/11

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LNG-1000-S2R-804-NP
Revision 0

February 2011

AP1000
Levy Nuclear Island and RCC Bridging Mat – 3D SASSI SSI Evaluation Report

Westinghouse Electric Company LLC
Nuclear Power Plants
Post Office Box 355
Pittsburgh, PA 15230-0355

Record of Revisions

Rev	Date	Revision Description[1]
0	02/09/11	Original Issue

Note (1) Significant changes are briefly described in this table. In the rest of the report, each row that has changed is marked using a revision bar in the margin of the page. This approach satisfies the change identification requirements in WP 4.5 Section 7.4.

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List of Figures (cont.)

List of Figures (cont.)

1.0 Introduction

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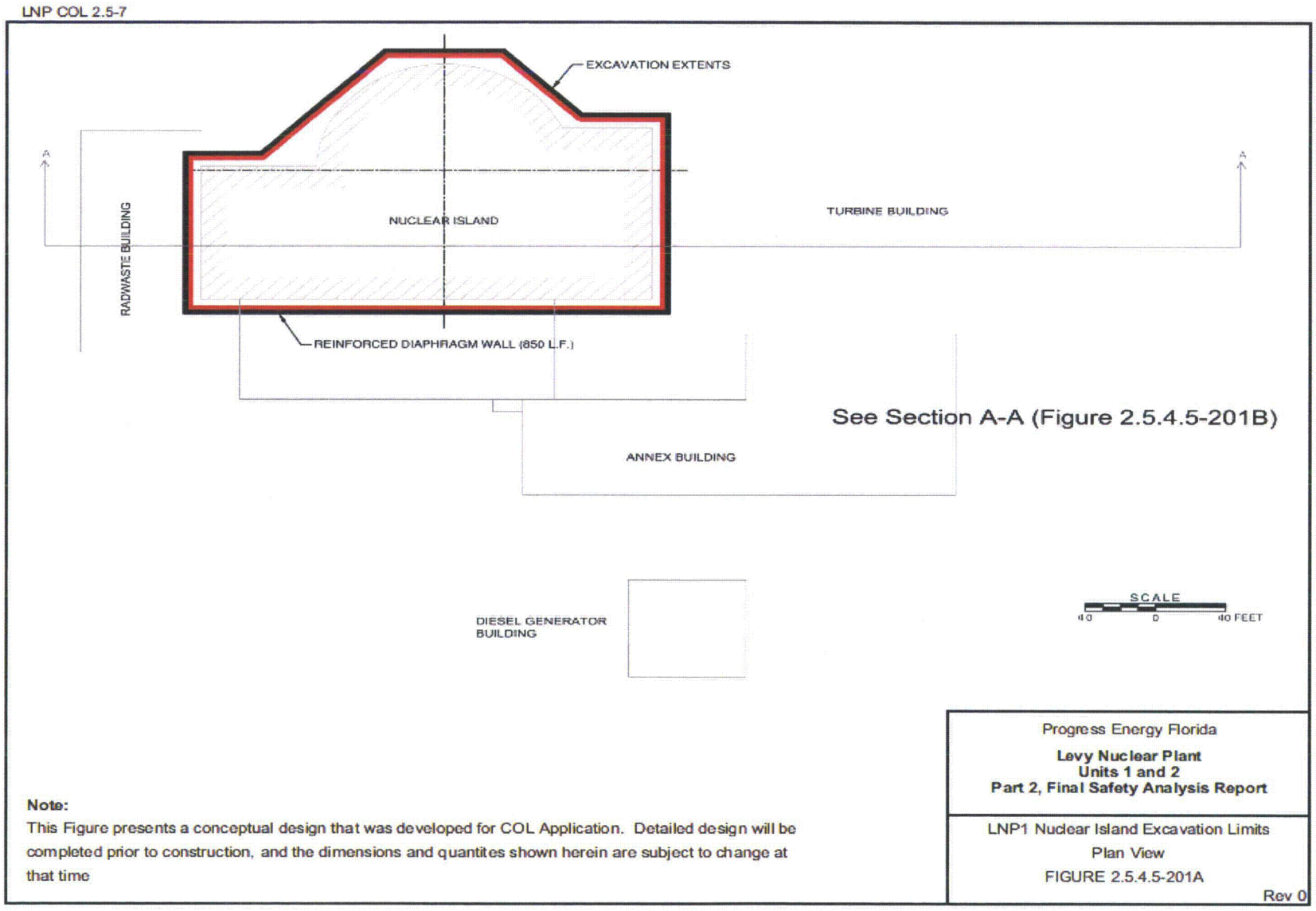
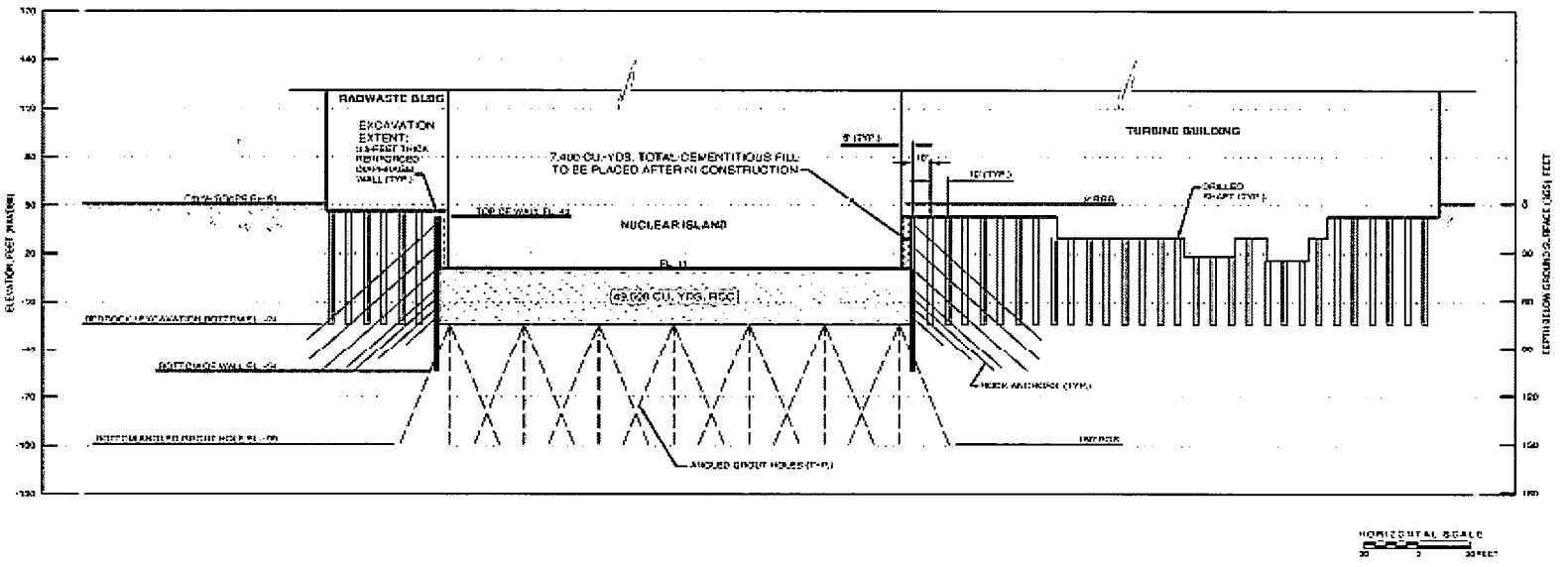


Figure 1.1-1: LNP Unit 1 Plan View

LNP COL 2.5-7

SECTION A-A (FROM FIGURE 2.5.4.5-201A)



Note:

This Figure presents a conceptual design that was developed for COL Application. Detailed design will be completed prior to construction, and the dimensions and quantities shown herein are subject to change at that time.

Progress Energy Florida

Levy Nuclear Plant
Units 1 and 2
Part 2, Final Safety Analysis Report

LNP 1 Nuclear Island Excavation Limits
Plant South to Plant North Cross Section
FIGURE 2.5.4.5-201B
Rev 0

Figure 1.1-2: LNP Unit 1 Cross-Section

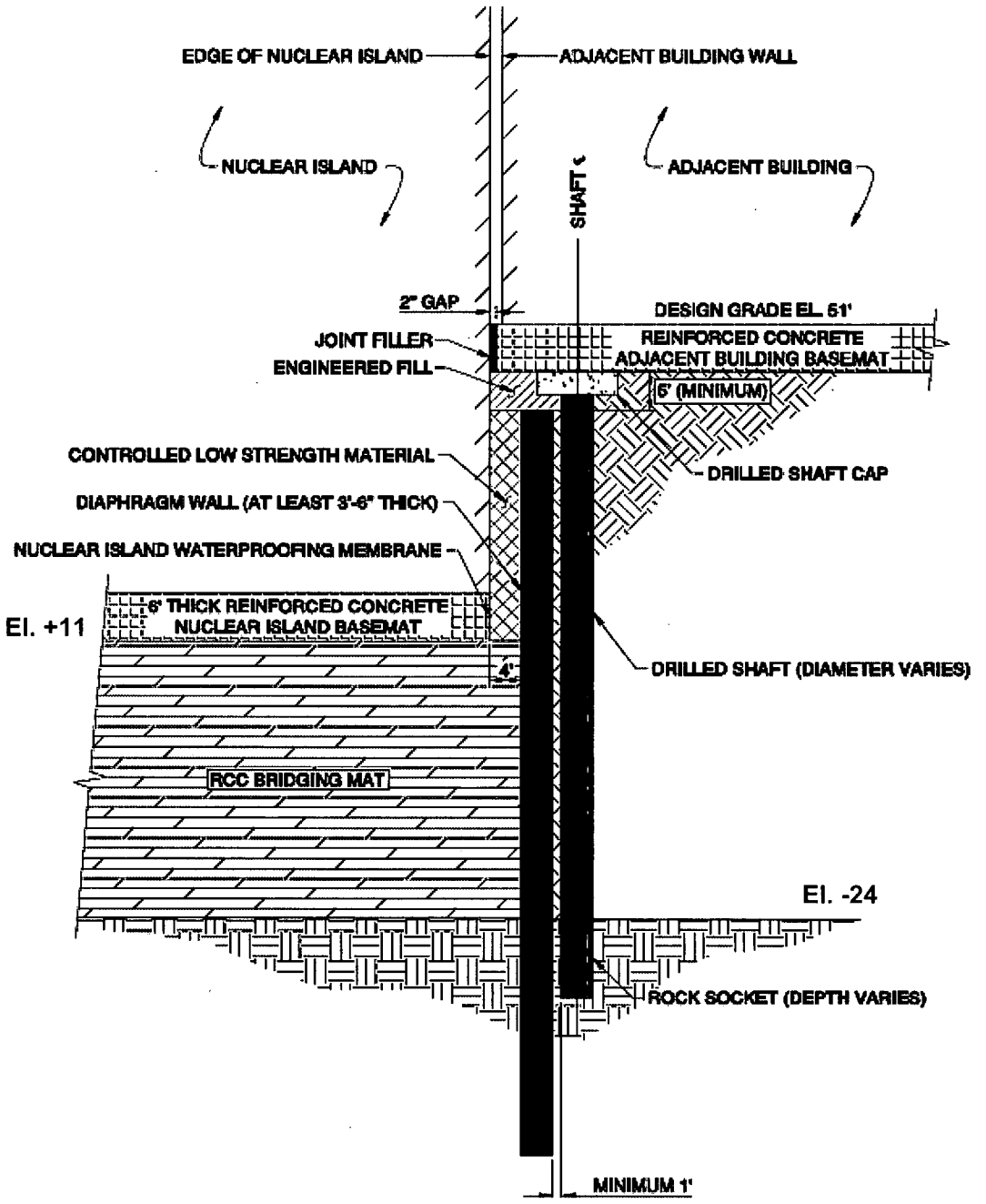


Figure 1.1-3: Conceptual Design Detail – Diaphragm Wall
(Progress Figure RAI 03.07.02-01-1)

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2.0 LNP Site Specific Conditions

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2.1 LNP NI SASSI 8-Layer Embedded Model

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Table 2.1-1: [ ] a,c

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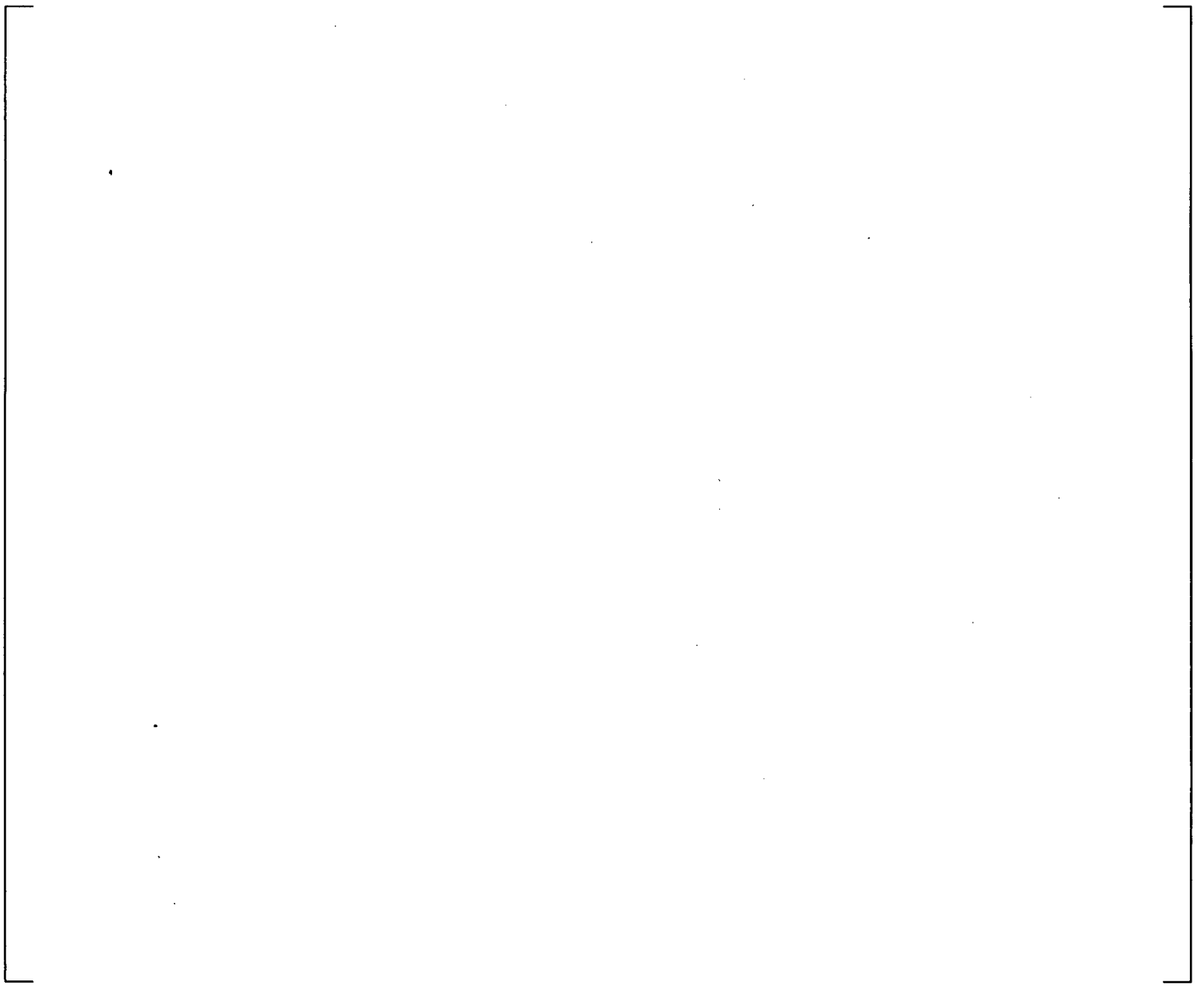

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Table 2.2-1: [ ]^{a,c} a,c

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Figure 2.2-1: [ ]a,c

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Table 3.1-1: [ ]a,c

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Table 3.2-1: LNP Best Estimate (BE) Strain Compatible Soil Profile

Layer Thickness (ft)	Soil Unit Wt. (kcf)	Vs (ft/s)	Vp (ft/s)	Damping
2.50	0.110	836	1590	0.013
2.50	0.110	824	1590	0.016
2.50	0.110	796	1590	0.020
3.50	0.110	788	1590	0.023
2.00	0.110	796	5000	0.024
2.00	0.110	786	5000	0.026
3.50	0.120	1503	5600	0.024
2.50	0.120	1500	5600	0.025
1.00	0.120	1500	5600	0.025
3.50	0.120	1501	5600	0.020
3.50	0.120	1496	5600	0.021
6.90	0.120	1482	5600	0.021
4.10	0.120	1476	5600	0.021
2.80	0.120	1476	5600	0.021
8.40	0.130	2267	7550	0.021
8.40	0.130	2266	7550	0.021
7.10	0.130	2254	7550	0.022
7.10	0.130	2251	7550	0.022
1.20	0.138	2772	8700	0.014
24.60	0.138	2772	8700	0.014
47.40	0.138	2694	8550	0.014
61.30	0.138	3374	10600	0.014
17.90	0.138	3315	9450	0.014
24.10	0.120	3243	7250	0.019
24.60	0.120	3210	7250	0.019
40.00	0.120	3539	7900	0.013

Table 3.2-1: LNP Best Estimate (BE) Strain Compatible Soil Profile (cont.)

Layer Thickness (ft)	Soil Unit Wt. (kcf)	Vs (ft/s)	Vp (ft/s)	Damping
42.00	0.120	3358	7900	0.013
38.40	0.140	4144	8900	0.009
59.40	0.140	3369	8100	0.009
59.40	0.140	3721	9000	0.009
242.70	0.140	4541	11000	0.009
355.80	0.140	5934	14400	0.009
249.40	0.150	7294	17850	0.007
252.90	0.150	5101	12350	0.007
148.30	0.150	7279	17400	0.007
106.10	0.150	6259	14900	0.007
199.00	0.150	7168	17500	0.007
601.20	0.150	5429	13000	0.008
149.20	0.150	5955	14200	0.008
192.70	0.150	6200	14950	0.008
652.30	0.150	5168	12600	0.008
603.70	0.150	5555	13450	0.008
96.60	0.150	4800	11500	0.008
Halfspace	0.169	9396	16100	0.001

Table 3.2-2: LNP Upper Bound (UB) Strain Compatible Soil Profile

Layer Thickness (ft)	Soil Unit Wt. (kcf)	Vs (ft/s)	Vp (ft/s)	Damping
2.50	0.110	1280	1948	0.009
2.50	0.110	1275	1948	0.011
2.50	0.110	1291	1948	0.012
3.50	0.110	1287	1948	0.013
2.00	0.110	1273	5000	0.014
2.00	0.110	1266	5000	0.015
3.50	0.120	1982	7226	0.011
2.50	0.120	1980	7226	0.012
1.00	0.120	1980	7226	0.012
3.50	0.120	1931	7226	0.006
3.50	0.120	1931	7226	0.006
6.90	0.120	1906	7226	0.006

Table 3.2-2: LNP Upper Bound (UB) Strain Compatible Soil Profile (cont.)

Layer Thickness (ft)	Soil Unit Wt. (kcf)	Vs (ft/s)	Vp (ft/s)	Damping
4.10	0.120	1902	7226	0.059
2.80	0.120	1902	7226	0.006
8.40	0.130	2993	9737	0.005
8.40	0.130	2991	9737	0.005
7.10	0.130	2887	9737	0.005
7.10	0.130	2887	9737	0.005
1.20	0.130	2887	9737	0.005
24.60	0.138	4731	10655	0.006
47.40	0.138	3984	10472	0.006
61.30	0.138	5157	12982	0.006
17.90	0.138	4356	11574	0.006
24.10	0.120	3972	9308	0.005
24.60	0.120	3975	9308	0.006
40.00	0.120	4335	9798	0.007
42.00	0.120	4112	9798	0.007
38.40	0.140	5075	11329	0.005
59.40	0.140	4126	10043	0.005
59.40	0.140	4620	11023	0.005
242.70	0.140	5562	13472	0.005
355.80	0.140	7267	17636	0.005
249.40	0.150	8934	21862	0.004
252.90	0.150	6247	15126	0.004
148.30	0.150	8915	21311	0.004
106.10	0.150	7666	18249	0.004
199.00	0.150	8779	21433	0.004
601.20	0.150	6649	15922	0.004
149.20	0.150	7294	17391	0.004
192.70	0.150	7593	18310	0.004
652.30	0.150	6330	15432	0.004
603.70	0.150	6803	16473	0.004
96.60	0.150	5879	14085	0.004
Halfspace	0.169	11507	19718	0.001

Table 3.2-3: LNP Lower Bound (LB) Strain Compatible Soil Profile

Layer Thickness (ft)	Soil Unit Wt. (kcf)	Vs (ft/s)	Vp (ft/s)	Damping
2.50	0.110	373	935	0.026
2.50	0.110	342	935	0.044
2.50	0.110	315	935	0.058
3.50	0.110	300	935	0.068
2.00	0.110	301	5000	0.073
2.00	0.110	294	5000	0.079
3.50	0.120	1123	5000	0.054
2.50	0.120	1115	5000	0.055
1.00	0.120	1115	5000	0.055
3.50	0.120	1074	5000	0.053
3.50	0.120	1070	5000	0.055
6.90	0.120	1111	5000	0.056
4.10	0.120	1100	5000	0.059
2.80	0.120	1100	5000	0.048
8.40	0.130	1851	6165	0.049
8.40	0.130	1850	6165	0.050
7.10	0.130	1841	6165	0.051
7.10	0.130	1838	6165	0.024
1.20	0.138	2264	7022	0.024
24.60	0.138	2264	7022	0.024
47.40	0.138	2199	6532	0.024
61.30	0.138	2755	7634	0.024
17.90	0.138	2707	6654	0.024
24.10	0.120	2145	5920	0.047
24.60	0.120	2148	5920	0.047
40.00	0.120	2890	6450	0.019
42.00	0.120	2742	6450	0.019
38.40	0.140	3384	7267	0.013
59.40	0.140	2750	6614	0.013
59.40	0.140	3038	7348	0.013
242.70	0.140	3708	8981	0.013
355.80	0.140	4845	11758	0.013
249.40	0.150	5956	14574	0.010
252.90	0.150	4165	10084	0.010
148.30	0.150	5943	14207	0.010

Table 3.2-3: LNP Lower Bound (LB) Strain Compatible Soil Profile (cont.)

Layer Thickness (ft)	Soil Unit Wt. (kcf)	Vs (ft/s)	Vp (ft/s)	Damping
106.10	0.150	5111	12166	0.010
199.00	0.150	5853	14289	0.010
601.20	0.150	4432	10614	0.012
149.20	0.150	4863	11594	0.012
192.70	0.150	5062	12207	0.012
652.30	0.150	4220	10288	0.012
603.70	0.150	4535	10982	0.012
96.60	0.150	3919	9390	0.012
Halfspace	0.169	7672	13146	0.001

Table 3.2-4: LNP Lower Lower Bound (LLB) Strain Compatible Soil Profile

Layer Thickness (ft)	Soil Unit Wt. (kcf)	Vs (ft/s)	Vp (ft/s)	Damping
2.50	0.110	373	935	0.026
2.50	0.110	342	935	0.044
2.50	0.110	315	935	0.058
3.50	0.110	300	935	0.068
2.00	0.110	301	5000	0.073
2.00	0.110	294	5000	0.079
3.50	0.120	1066	5000	0.054
2.50	0.120	1058	5000	0.055
1.00	0.120	1058	5000	0.055
3.50	0.120	1019	5000	0.053
3.50	0.120	1015	5000	0.055
6.90	0.120	1054	5000	0.056
4.10	0.120	1043	5000	0.059
2.80	0.120	1043	5000	0.048
8.40	0.130	1756	5848	0.049
8.40	0.130	1755	5848	0.050
7.10	0.130	1746	5848	0.051
7.10	0.130	1744	5848	0.024
1.20	0.138	2147	6661	0.024

Table 3.2-4: LNP Lower Lower Bound (LLB) Strain Compatible Soil Profile (cont.)

Layer Thickness (ft)	Soil Unit Wt. (kcf)	Vs (ft/s)	Vp (ft/s)	Damping
24.60	0.138	2264	7022	0.024
47.40	0.138	2199	6532	0.024
61.30	0.138	2755	7634	0.024
17.90	0.138	2707	6654	0.024
24.10	0.120	2145	5920	0.047
24.60	0.120	2148	5920	0.047
40.00	0.120	2890	6450	0.019
42.00	0.120	2742	6450	0.019
38.40	0.140	3384	7267	0.013
59.40	0.140	2750	6614	0.013
59.40	0.140	3038	7348	0.013
242.70	0.140	3708	8981	0.013
355.80	0.140	4845	11758	0.013
249.40	0.150	5956	14574	0.010
252.90	0.150	4165	10084	0.010
148.30	0.150	5943	14207	0.010
106.10	0.150	5111	12166	0.010
199.00	0.150	5853	14289	0.010
601.20	0.150	4432	10614	0.012
149.20	0.150	4863	11594	0.012
192.70	0.150	5062	12207	0.012
652.30	0.150	4220	10288	0.012
603.70	0.150	4535	10982	0.012
96.60	0.150	3919	9390	0.012
Halfspace	0.169	7672	13146	0.001

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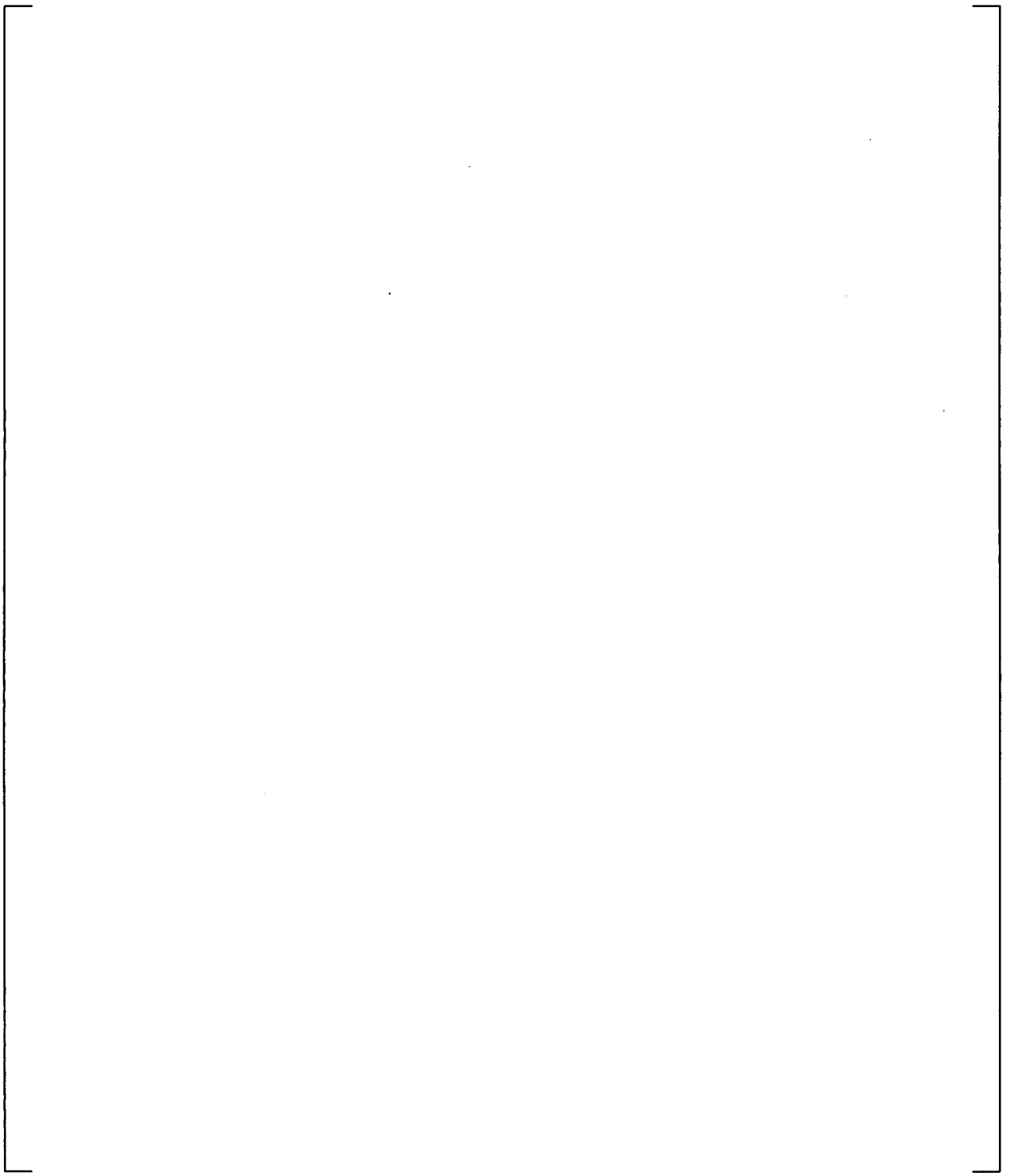

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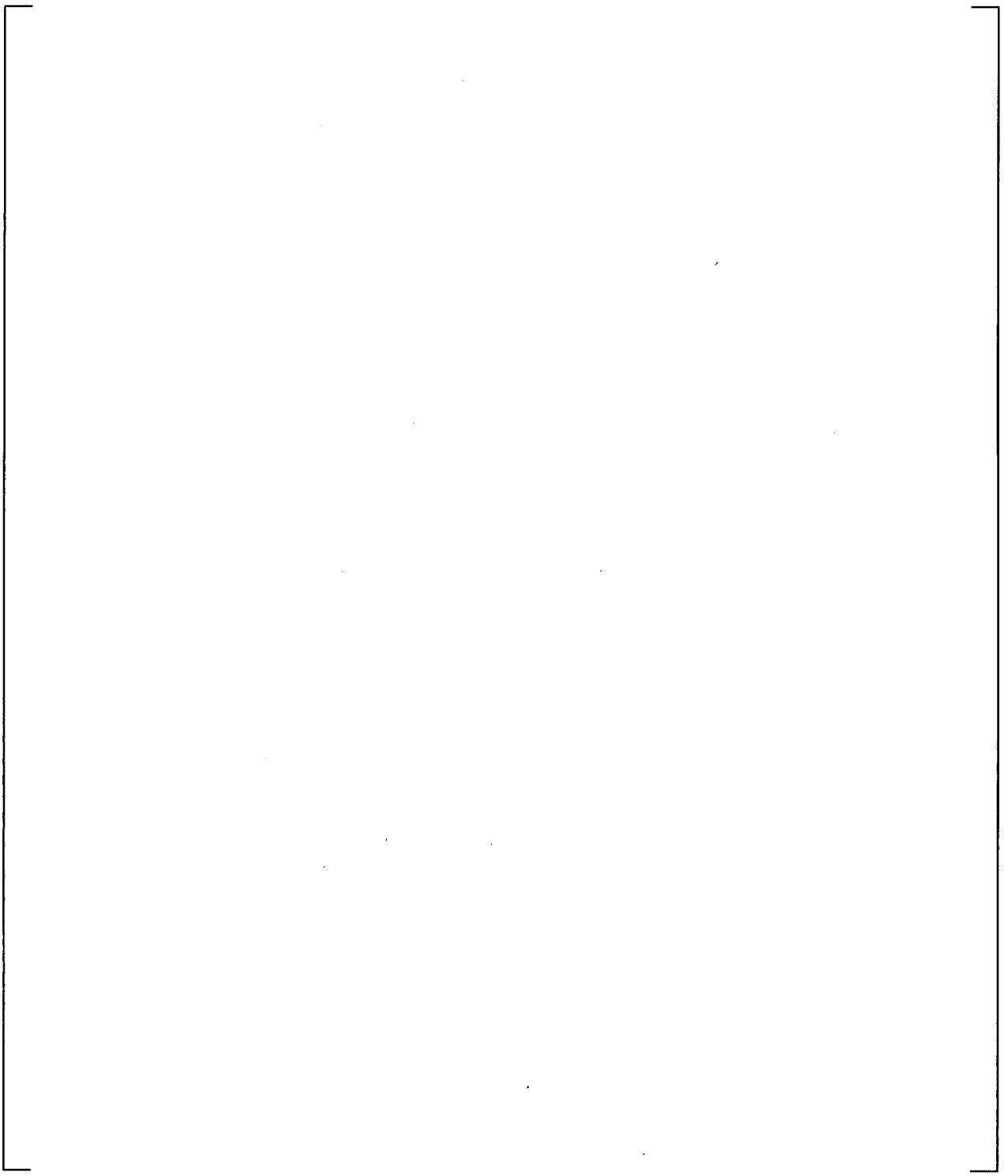

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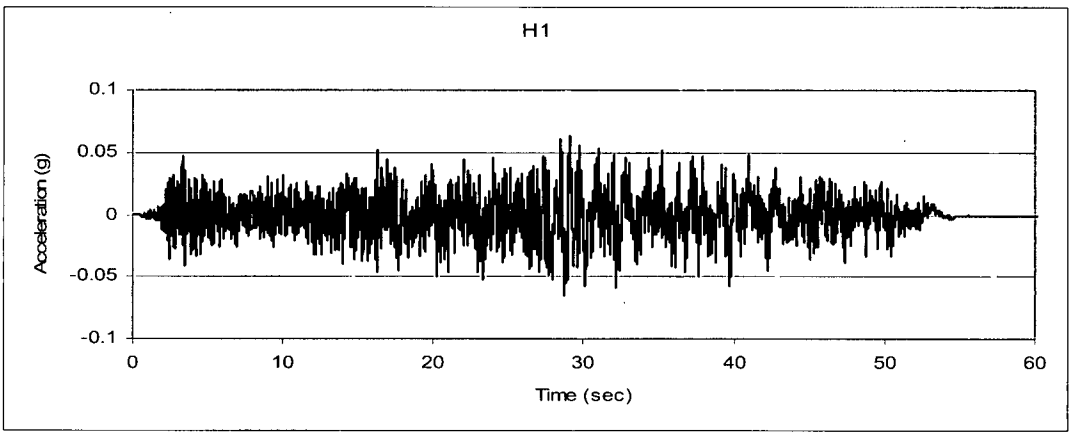

Figure 3.6-1: LNP BE Seismic Input in X-Direction – El. -24

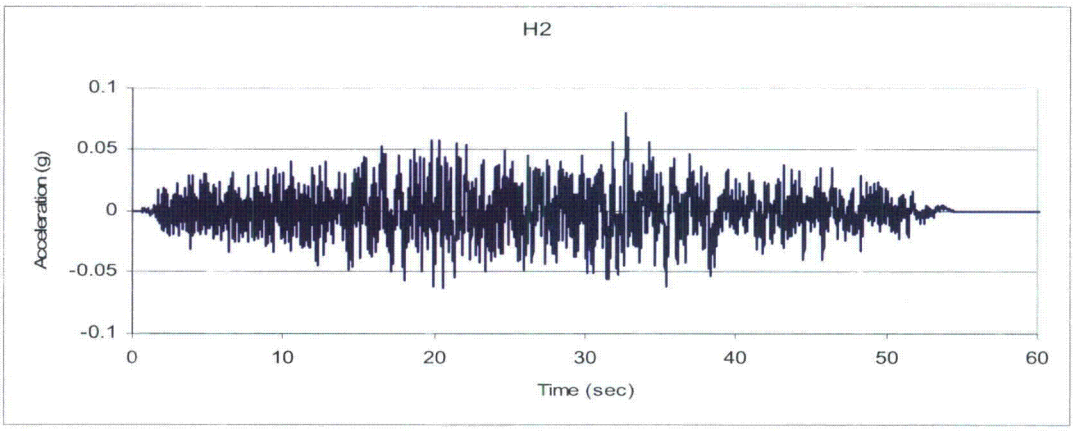

Figure 3.6-2: LNP BE Seismic Input in Y-Direction – El. -24

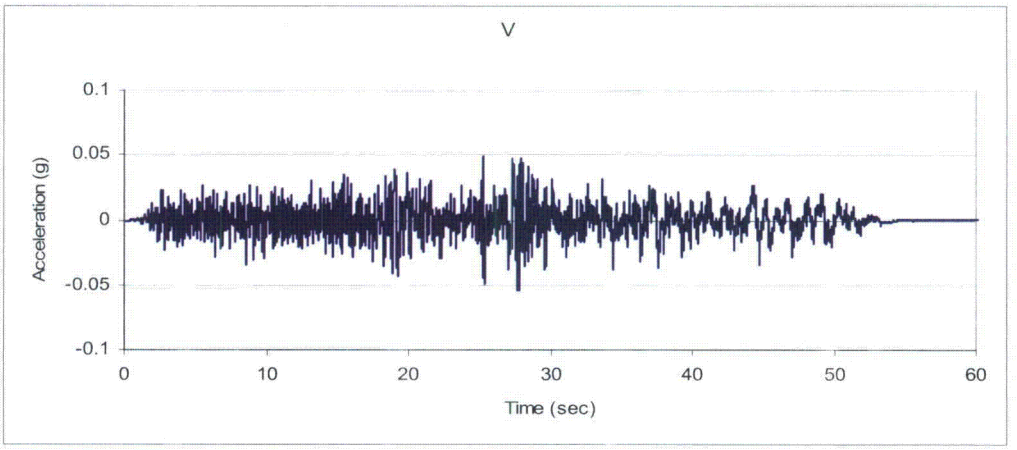

Figure 3.6-3: LNP BE Seismic Input in Z-Direction – El. -24

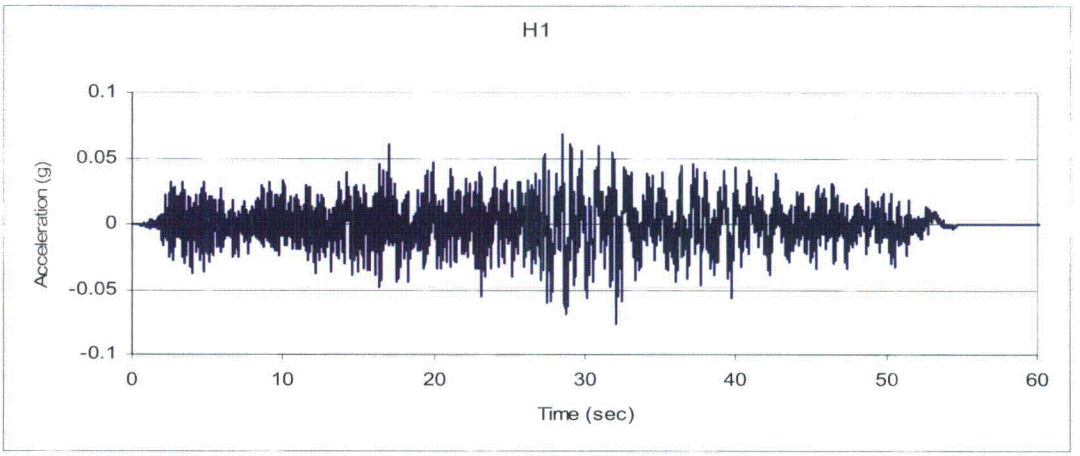

Figure 3.6-4: LNP UB Seismic Input in X-Direction – El. -24

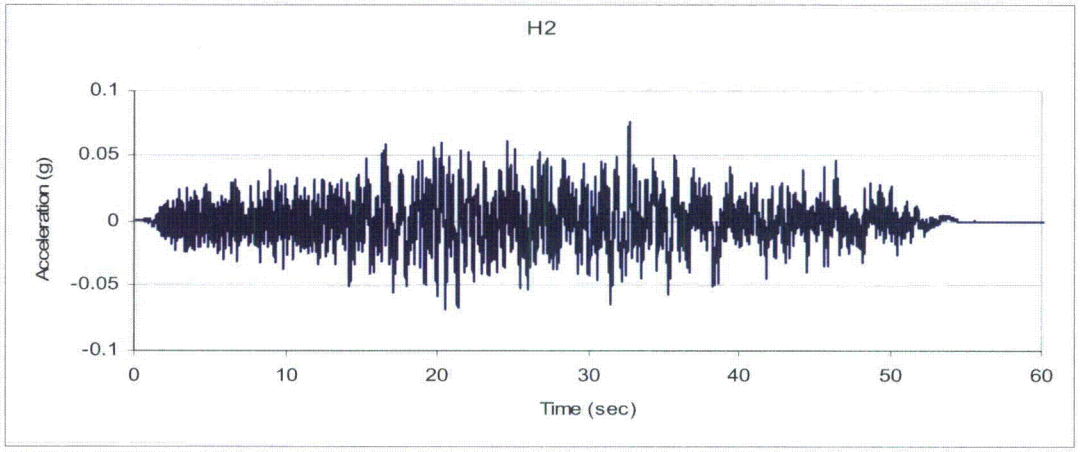

Figure 3.6-5: LNP UB Seismic Input in Y-Direction – El. -24

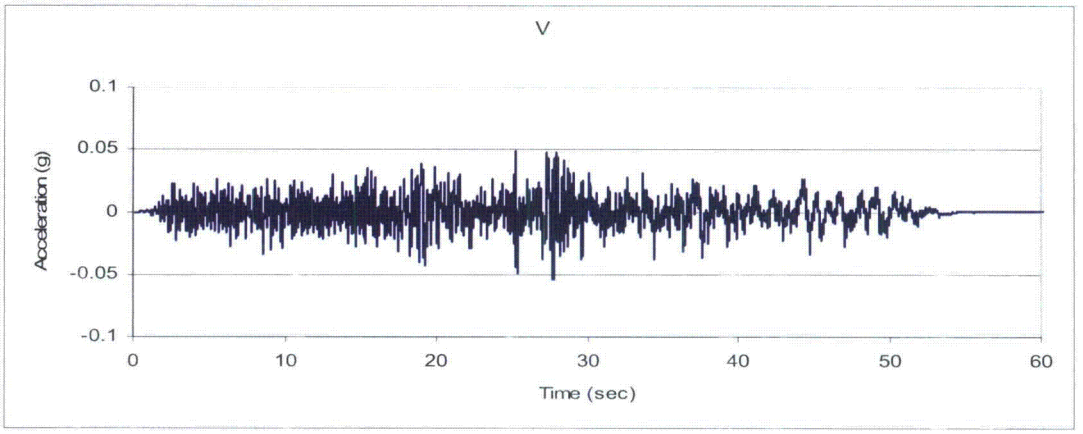

Figure 3.6-6: LNP UB Seismic Input in Z-Direction – El. -24

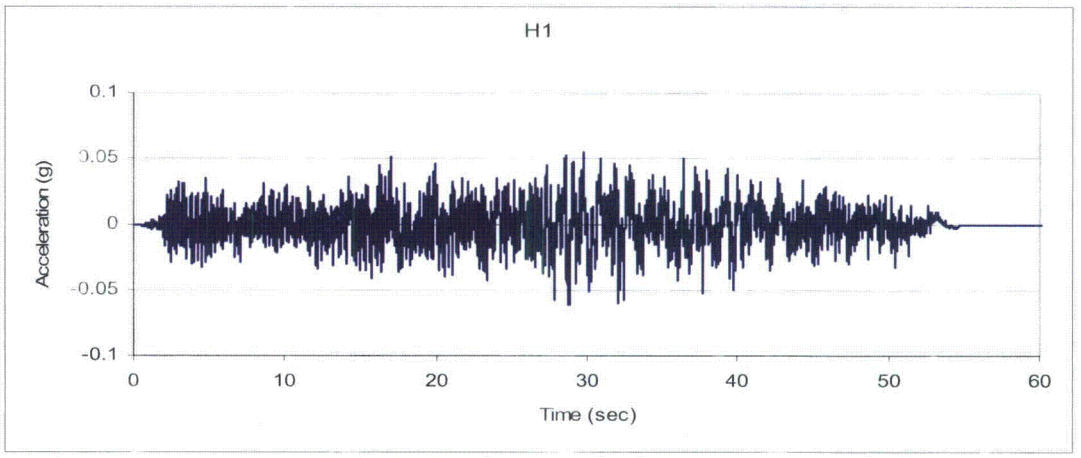

Figure 3.6-7: LNP LB Seismic Input in X-Direction – El. -24

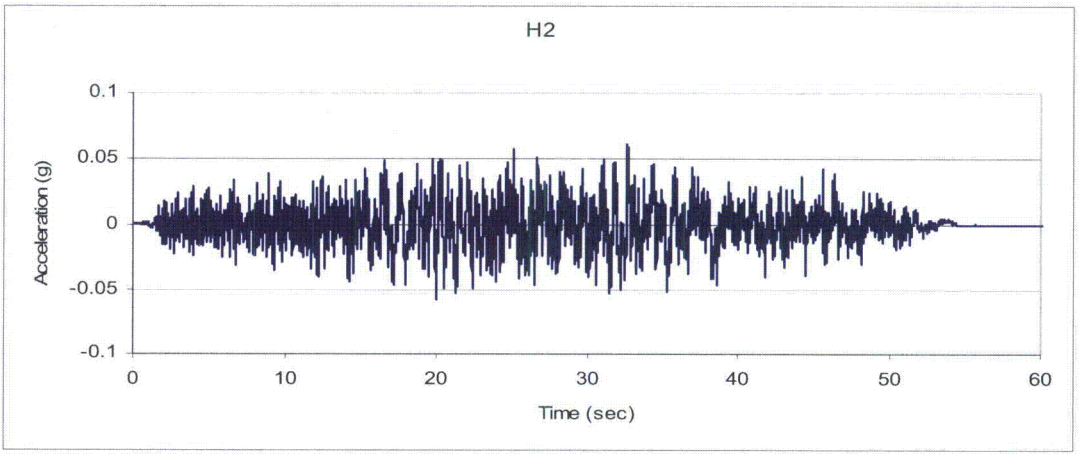

Figure 3.6-8: LNP LB Seismic Input in Y-Direction – El. -24

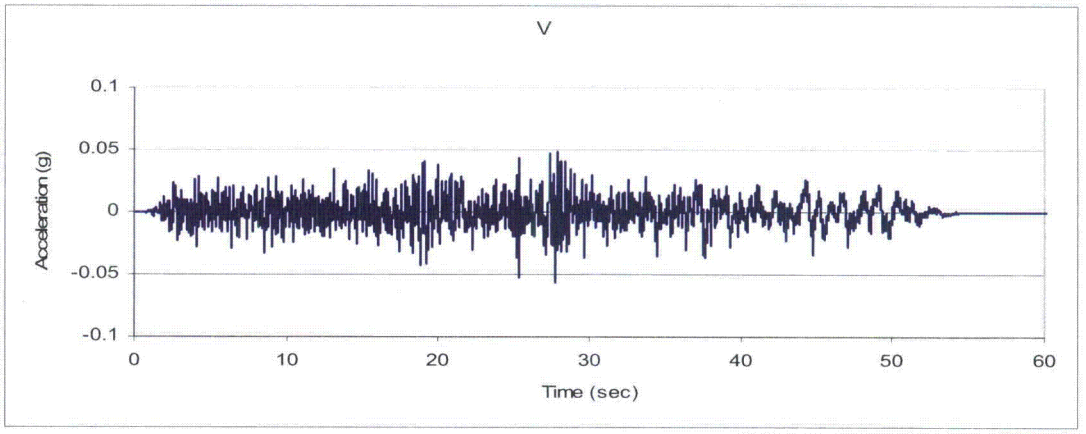

Figure 3.6-9: LNP LB Seismic Input in Z-Direction – El. -24

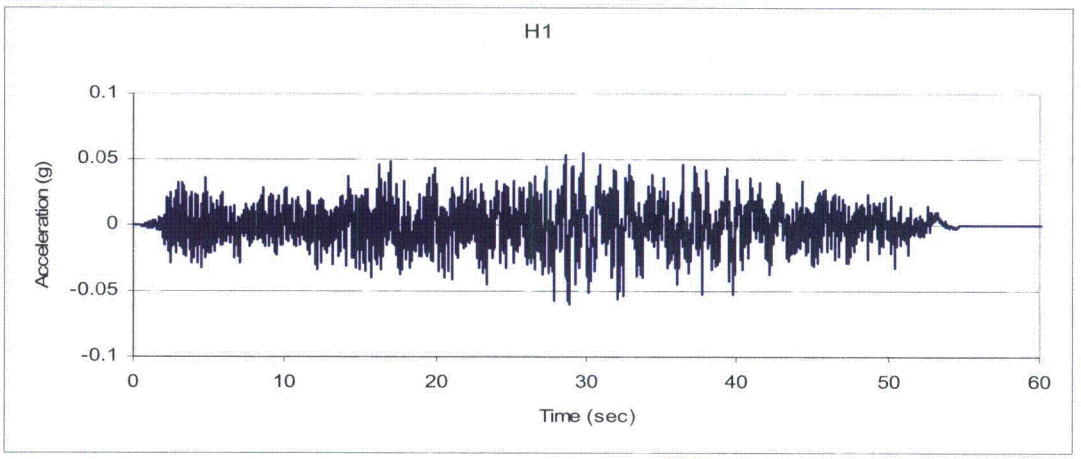

Figure 3.6-10: LNP LLB Seismic Input in X-Direction – El. -24

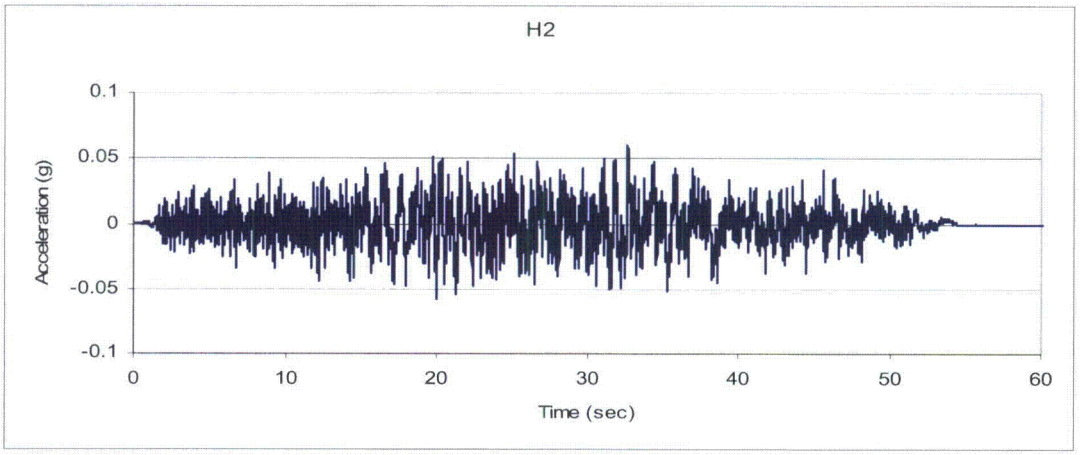

Figure 3.6-11: LNP LLB Seismic Input in Y-Direction – El. -24

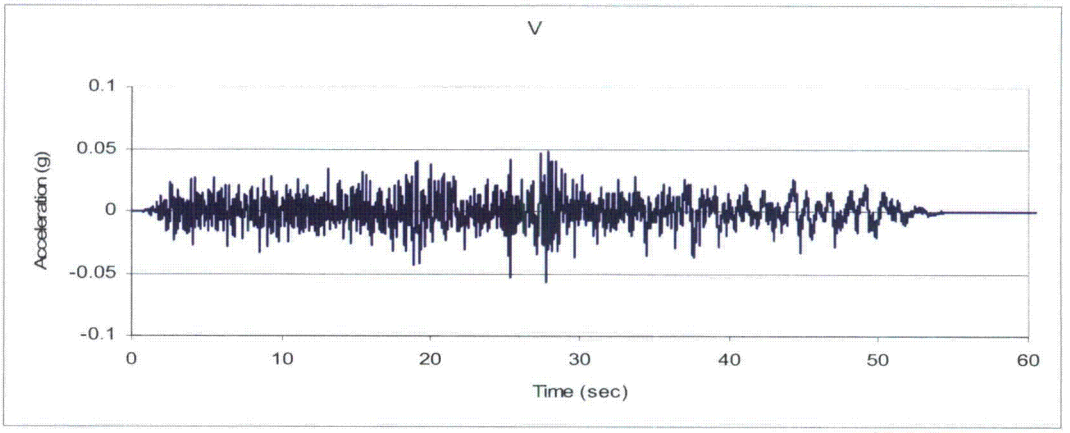

Figure 3.6-12: LNP LLB Seismic Input in Z-Direction – El. -24

3.7 [**]^{a,c}**

[

]^{a,c}

[

]a,c

Table 3.7-1: [ ]^{a,c} a,c

Table 3.7-1: [ ] a,c

Table 3.7-2: [ ][a,c] a,c

Table 3.7-3: [ ][a,c] a,c

4.0 LNP Site Specific SSI Analyses

4.1 [

]^{a,c}

[

]^{a,c}

4.2 [

]^{a,c}

[

]^{a,c}

4.3 [ ]^{a,c}

[

]^{a,c}

5.0 LNP Site Specific 3D SSI Analyses Results

5.1 [ ]a,c

[

]a,c

a,c

Figure 5.1-1: [**]a,c**

a,c

Figure 5.1-2: [**]a,c**

a,c

Figure 5.1-3: [ ]a,c

a,c

Figure 5.1-4: [ ]a,c

a,c

Figure 5.1-5: [ ][a,c]

a,c

Figure 5.1-6: [ ][a,c]

a,c

Figure 5.1-7: [**]**[a,c]**

a,c

Figure 5.1-8: [**]**[a,c]**

a,c

Figure 5.1-9: [**]**[a,c]**

a,c

Figure 5.1-10: [**]**[a,c]**

a,c

Figure 5.1-11: [**]a,c**

a,c

Figure 5.1-12: [**]a,c**

a,c

Figure 5.1-13: [ ][a,c]

a,c

Figure 5.1-14: [ ][a,c]

a,c

Figure 5.1-15: [**]a,c**

a,c

Figure 5.1-16: [**]a,c**

a,c

Figure 5.1-17: [ ][a,c]

a,c

Figure 5.1-18: [ ][a,c]

5.2 [

]a,c

[

]a,c

a,c

Figure 5.2-1: [ ][a,c]

a,c

Figure 5.2-2: [ ][a,c]

a,c

Figure 5.2-3: [ ][a,c]

a,c

Figure 5.2-4: [ ][a,c]

a,c

Figure 5.2-5: [ ][a,c]

a,c

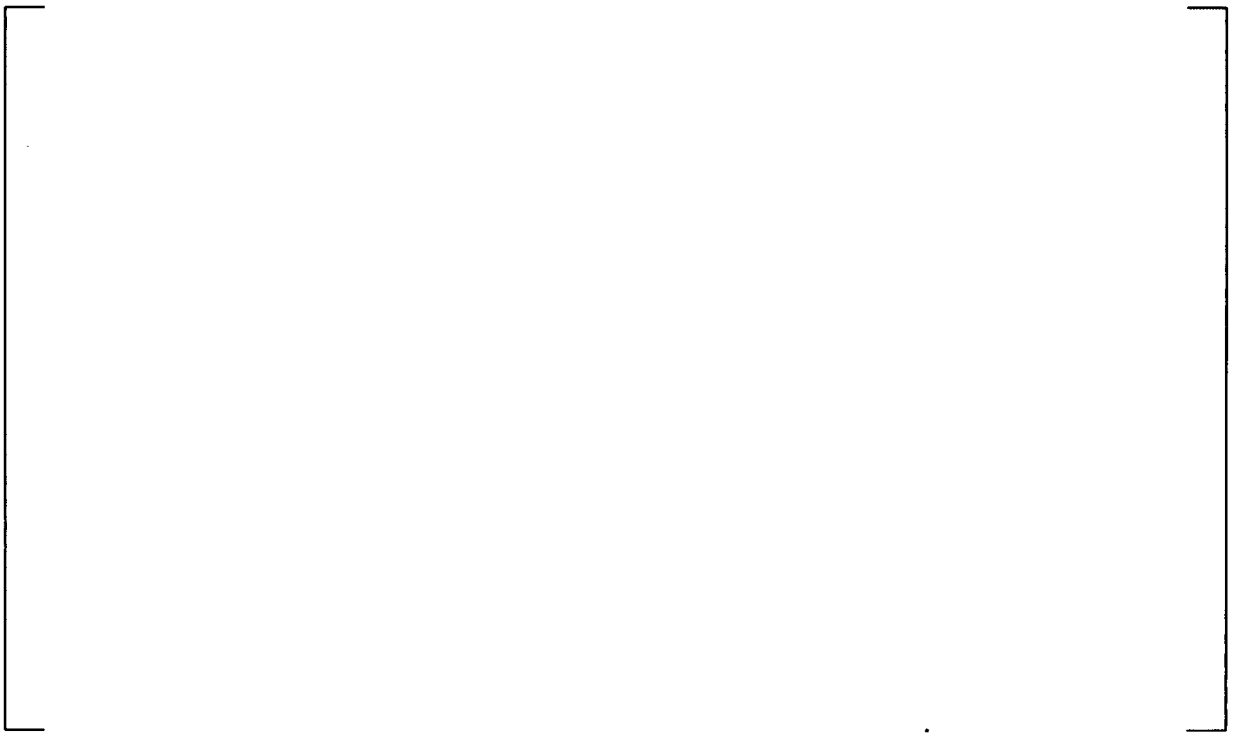

Figure 5.2-6: [ ][a,c]

a,c

[ ]

Figure 5.2-7: [ ][a,c]

a,c

[ ]

Figure 5.2-8: [ ][a,c]

a,c

Figure 5.2-9: [ ][a,c]

a,c

Figure 5.2-10: [ ][a,c]

a,c

[ ]

Figure 5.2-11: [ ]a,c

a,c

[ ]

Figure 5.2-12: [ ]a,c

a,c

Figure 5.2-13: [**]**[a,c]**

a,c

Figure 5.2-14: [**]**[a,c]**

a,c

[ ]

Figure 5.2-15: [ ][a,c]

a,c

[ ]

Figure 5.2-16: [ ][a,c]

a,c

Figure 5.2-17: [ ]a,c

a,c

Figure 5.2-18: [ ]a,c

5.3 [

]a,c

[

]a,c

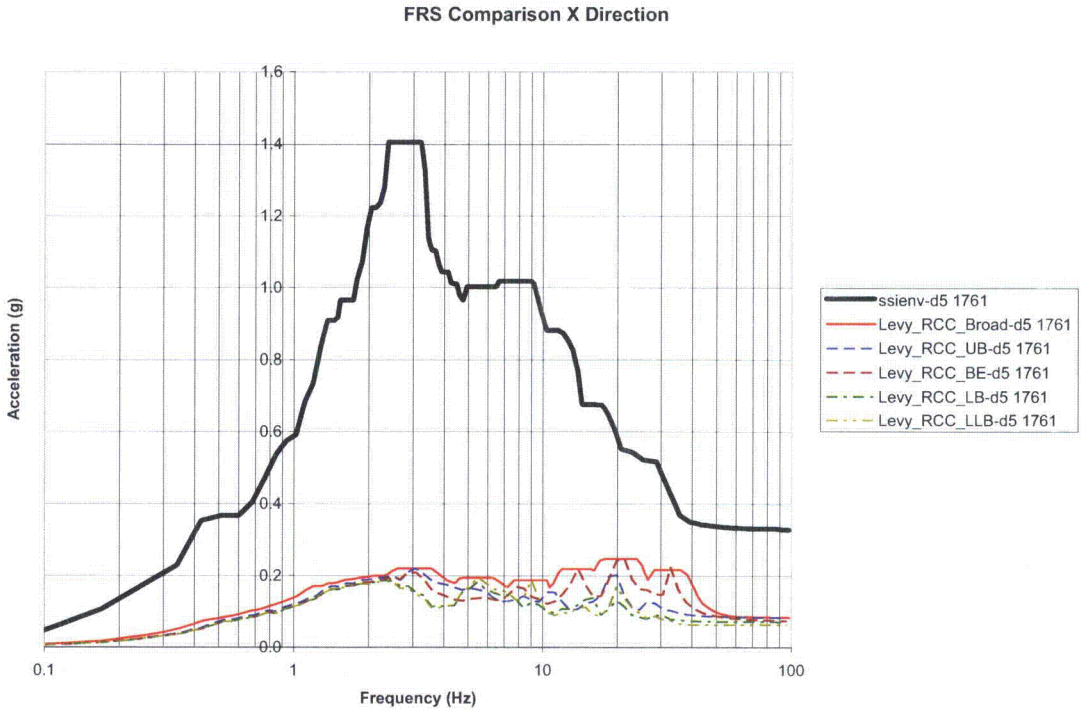

Figure 5.3-1: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in X-Direction – Node 1761

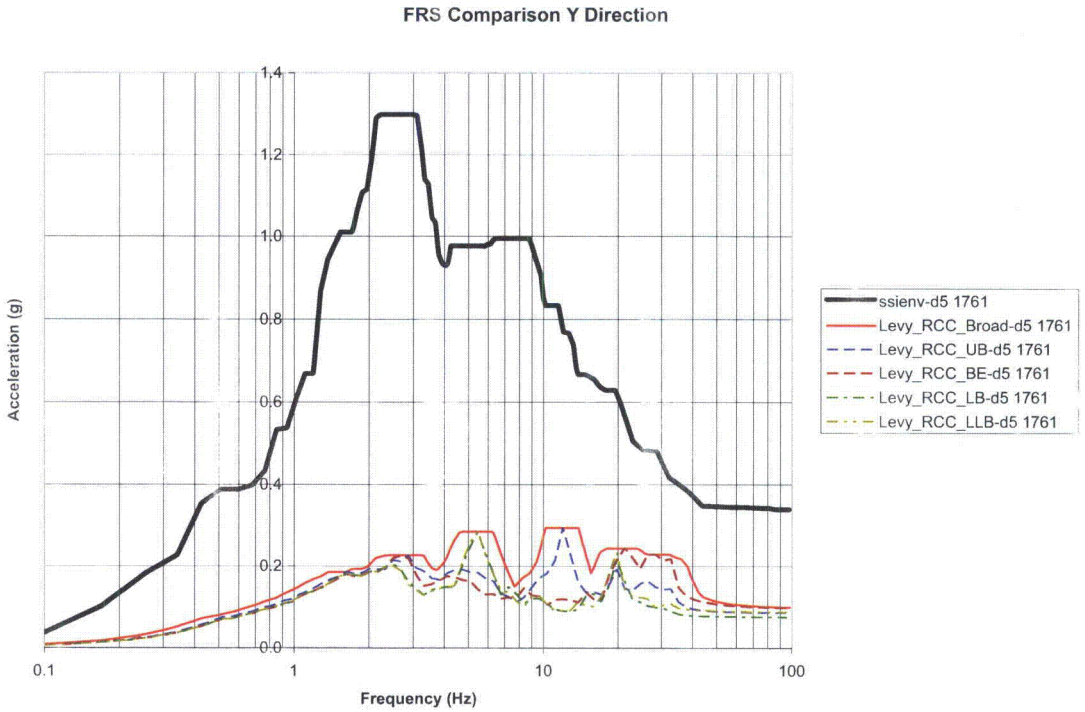

Figure 5.3-2: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in Y-Direction – Node 1761

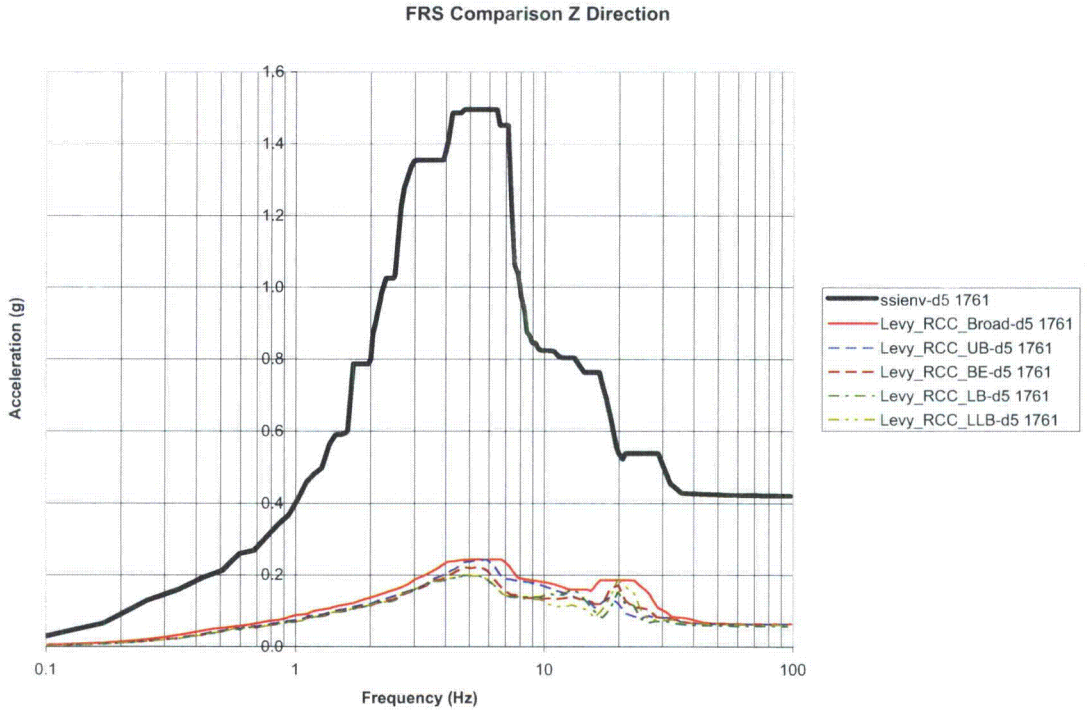

Figure 5.3-3: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in Z-Direction – Node 1761

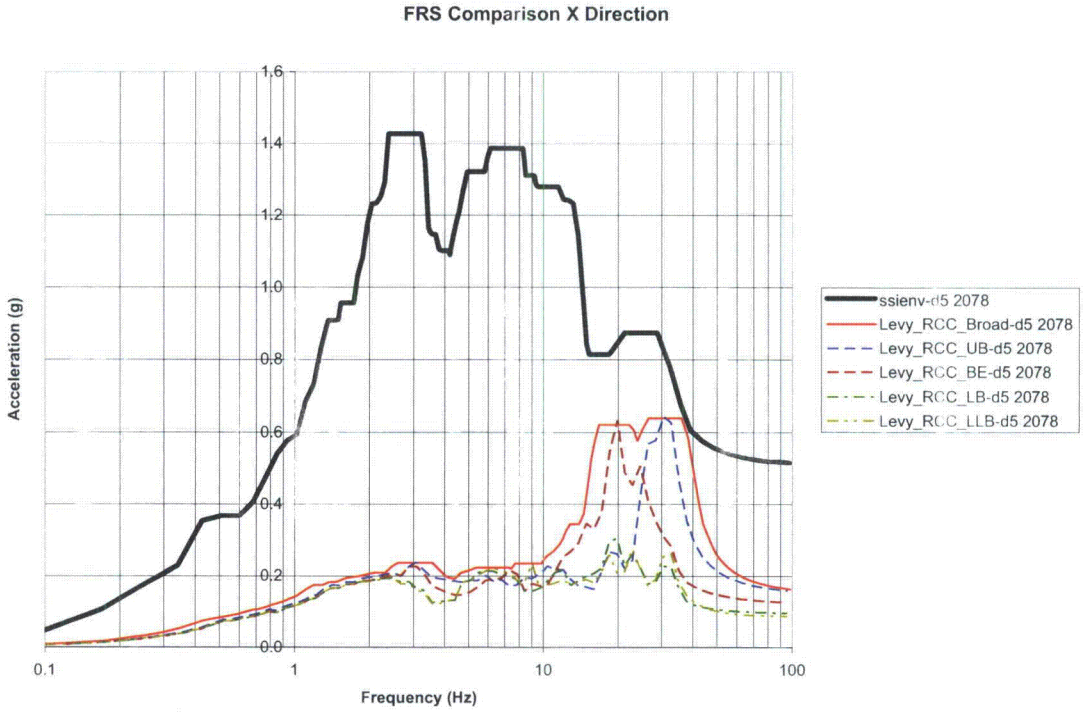

Figure 5.3-4: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in X-Direction – Node 2078

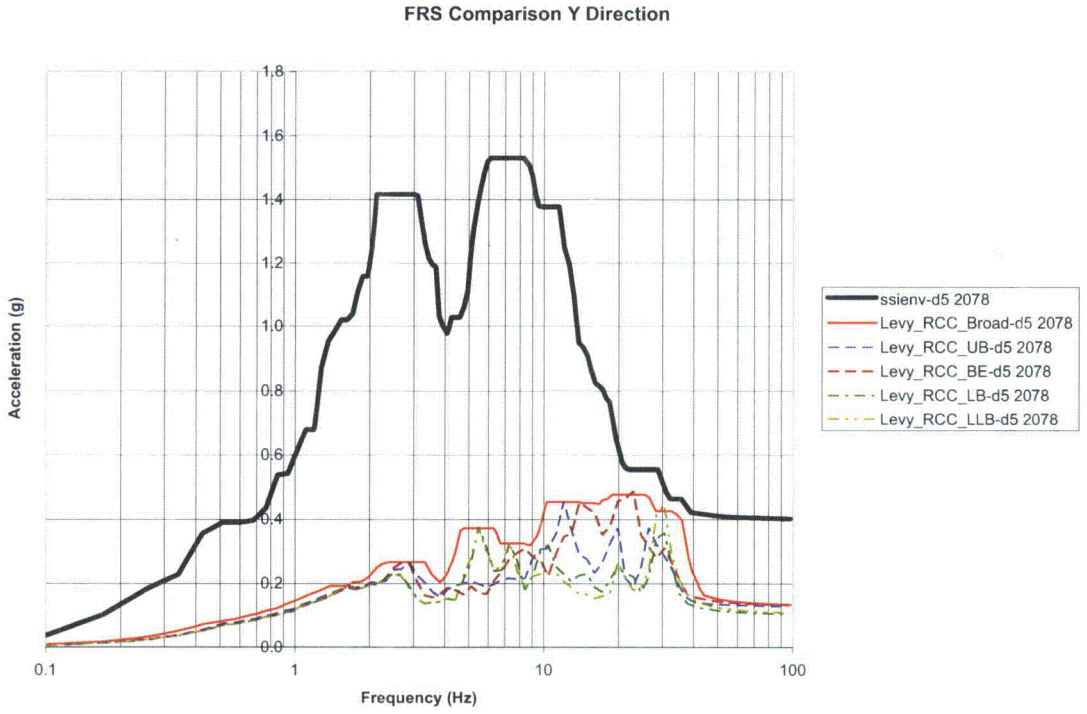

Figure 5.3-5: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in Y-Direction – Node 2078

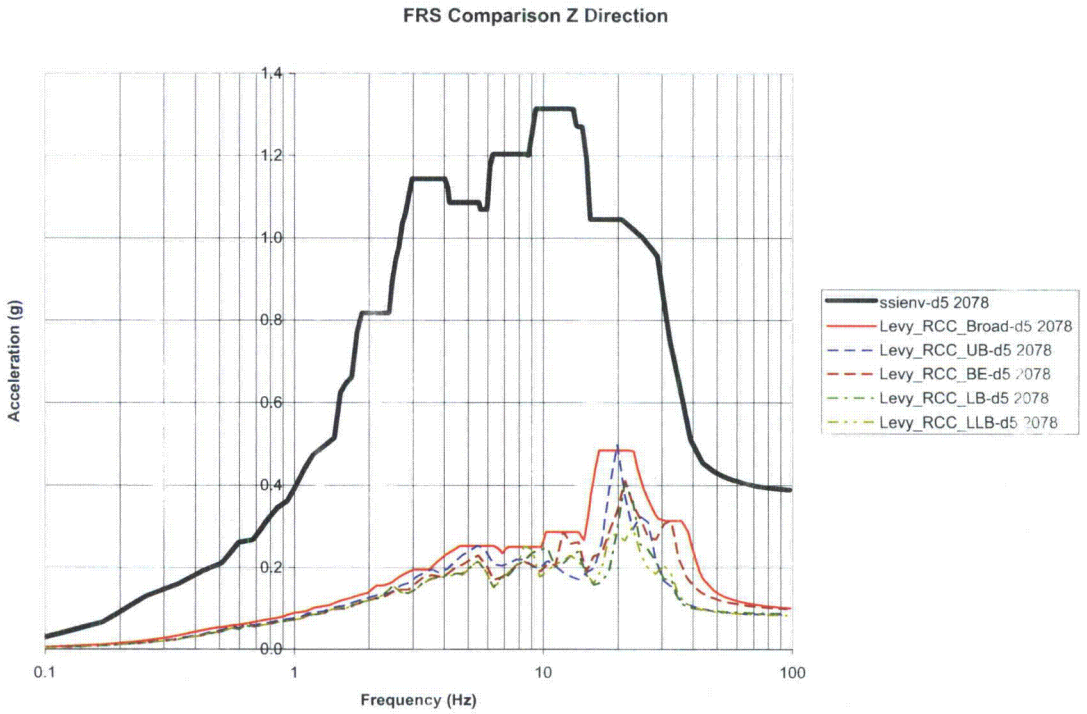

Figure 5.3-6: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in Z-Direction – Node 2078

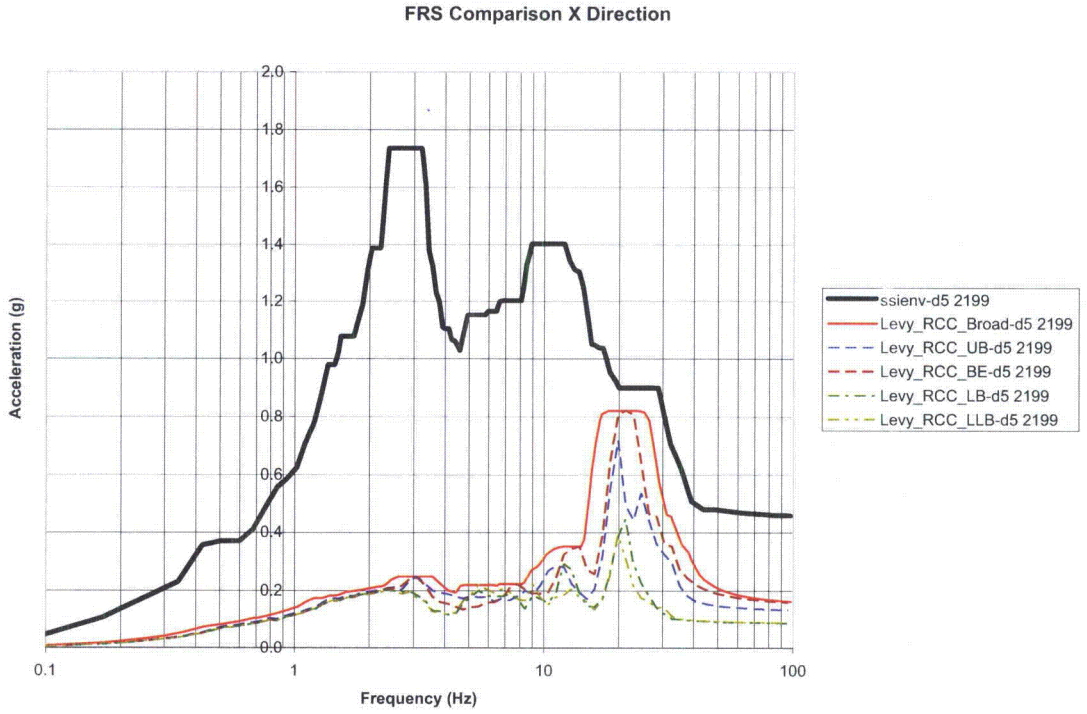

Figure 5.3-7: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in X-Direction – Node 2199

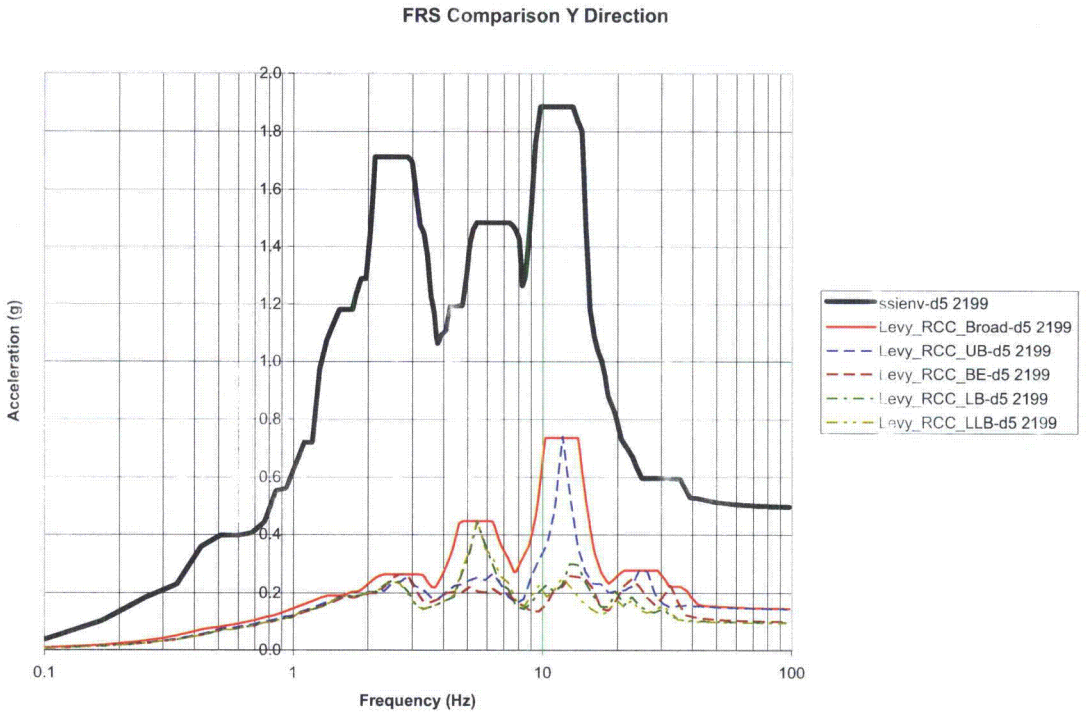

Figure 5.3-8: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in Y-Direction – Node 2199

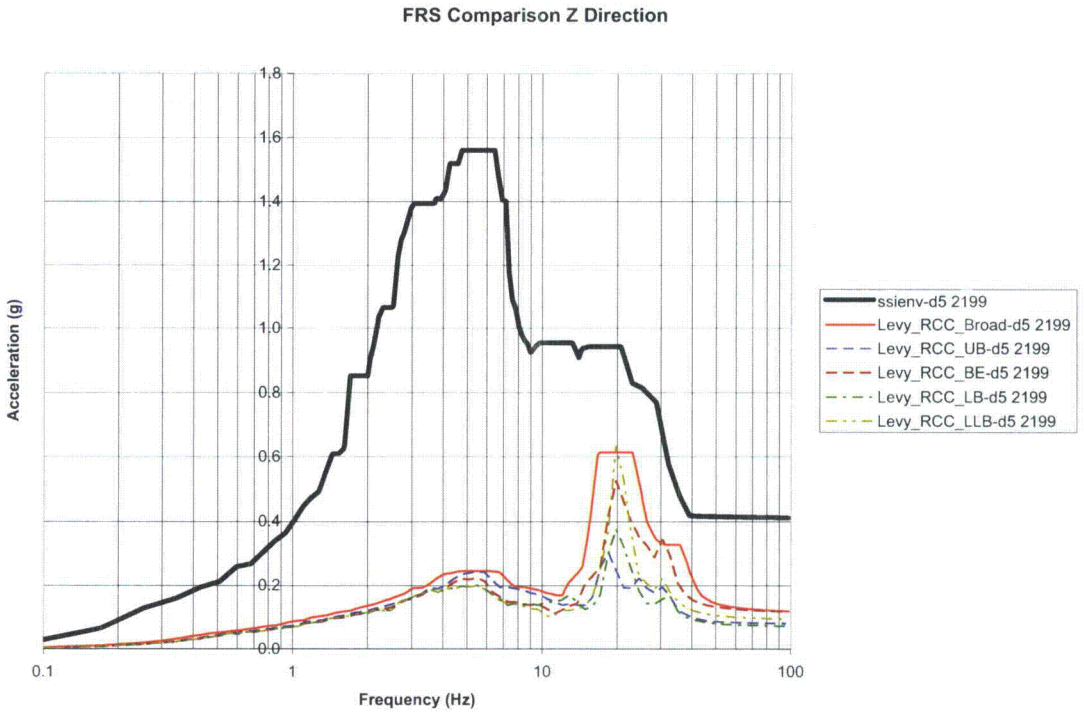

Figure 5.3-9: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in Z-Direction – Node 2199

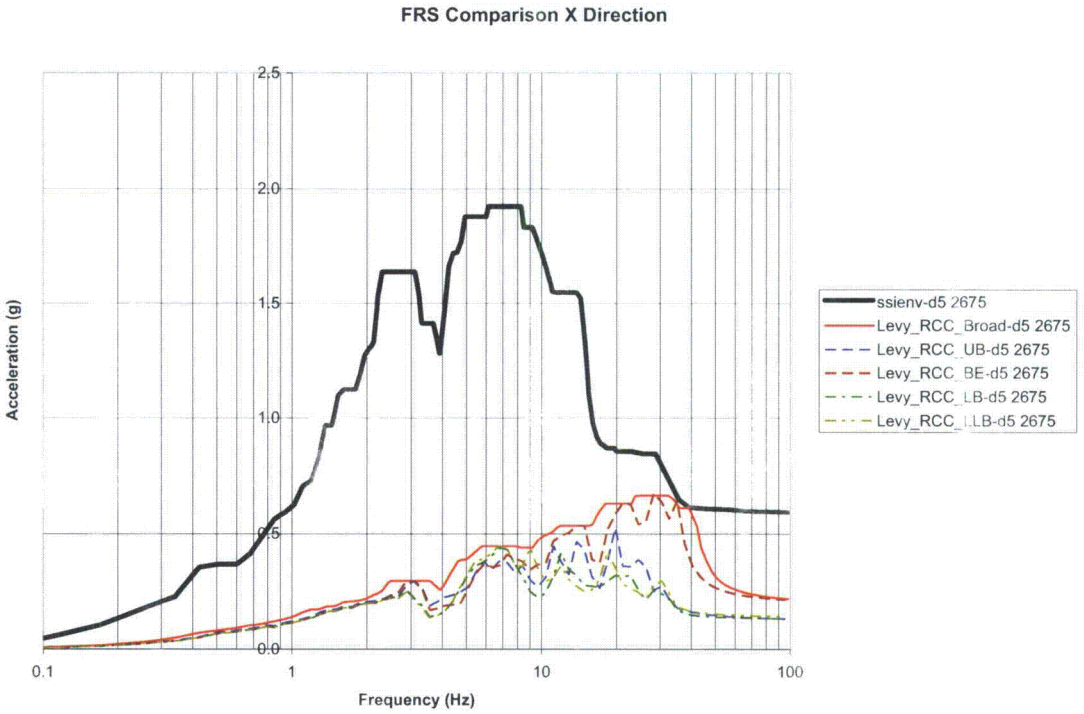

Figure 5.3-10: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in X-Direction – Node 2675

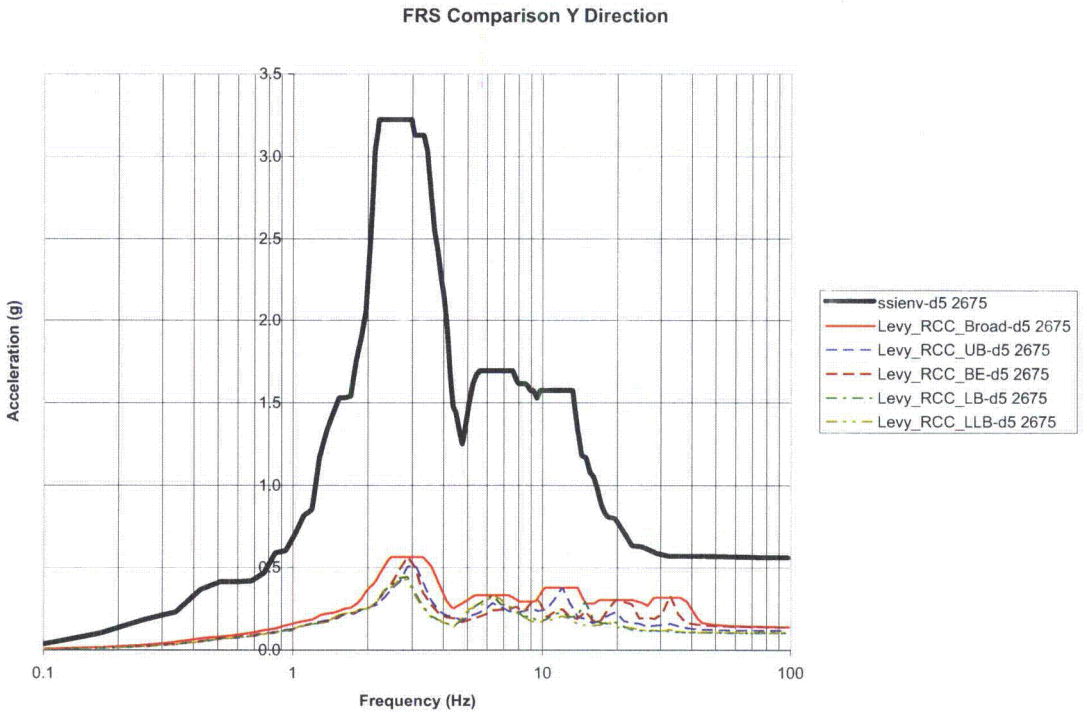

Figure 5.3-11: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in Y-Direction – Node 2675

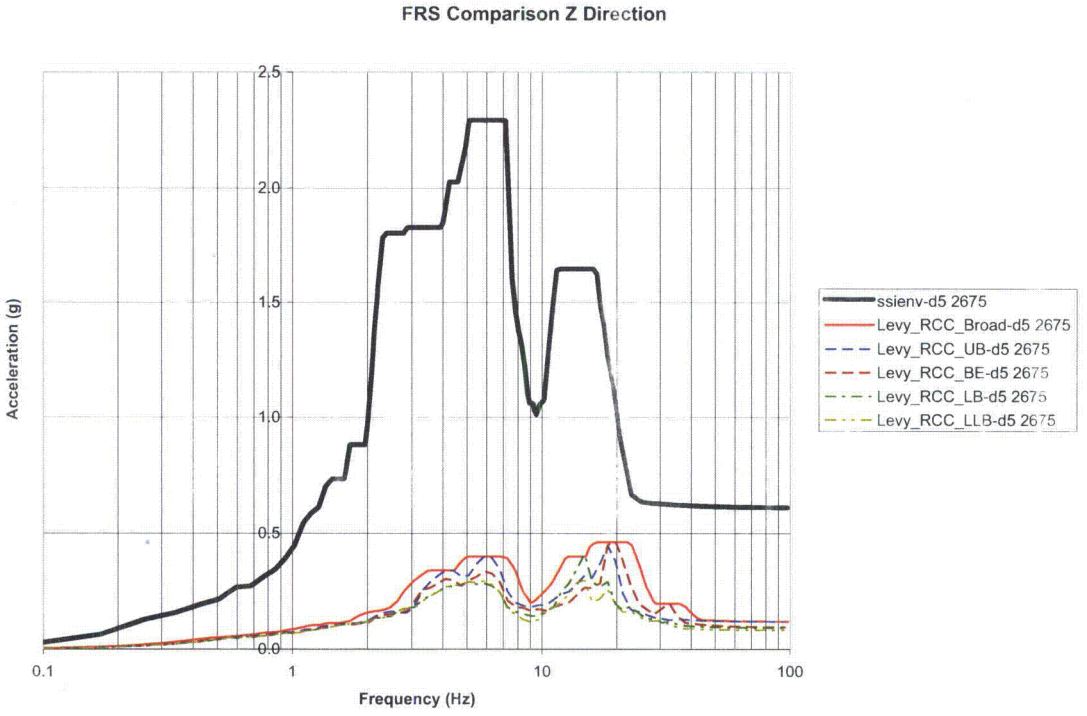

Figure 5.3-12: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in Z-Direction – Node 2675

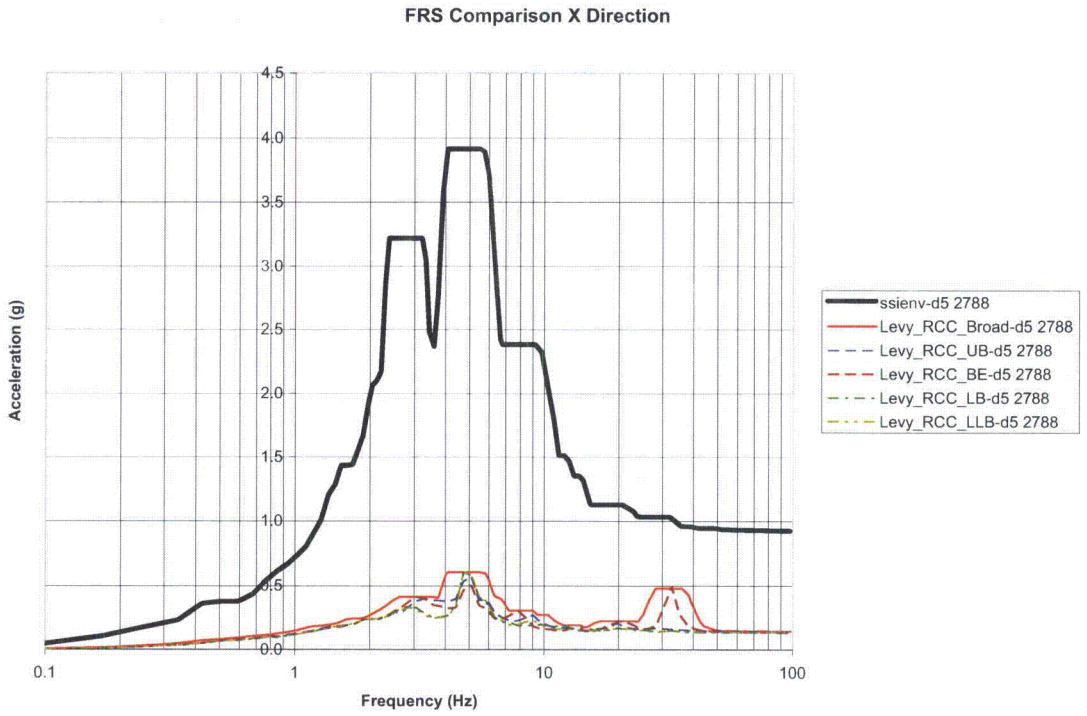

Figure 5.3-13: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in X-Direction – Node 2788

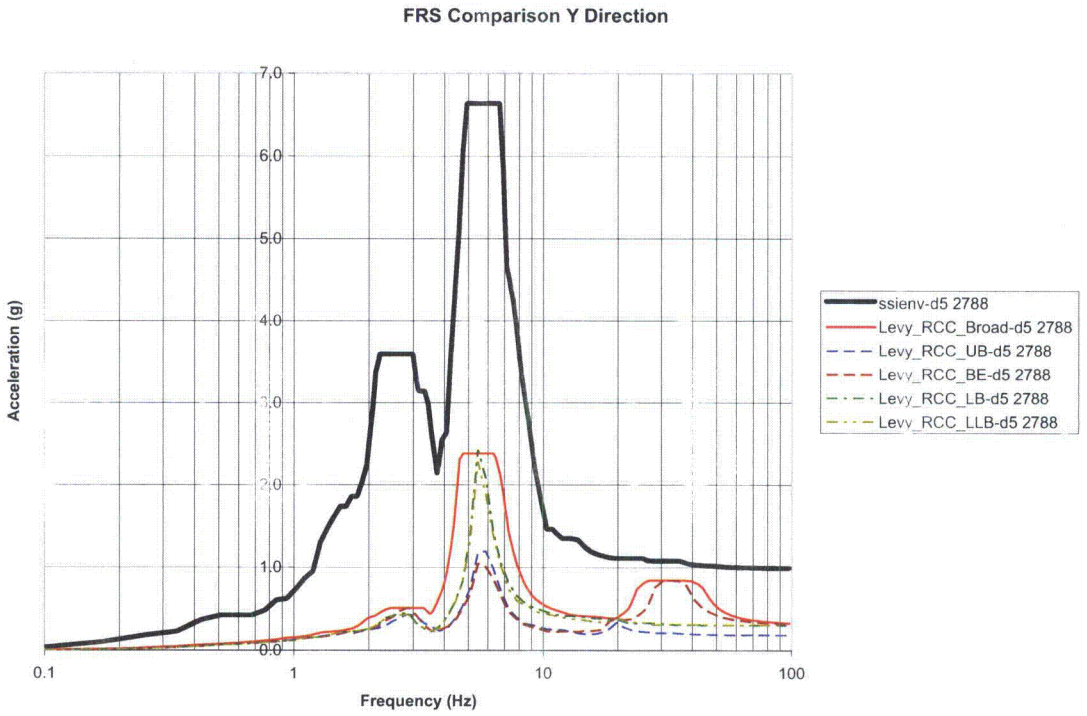

Figure 5.3-14: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in Y-Direction – Node 2788

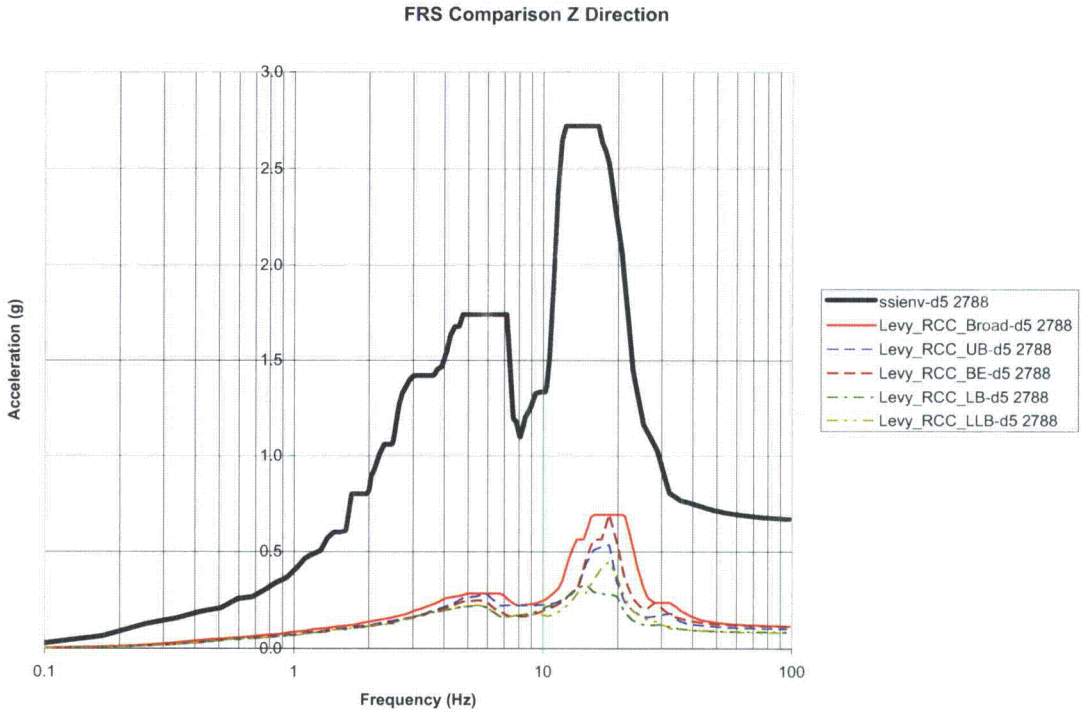

Figure 5.3-15: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in Z-Direction – Node 2788

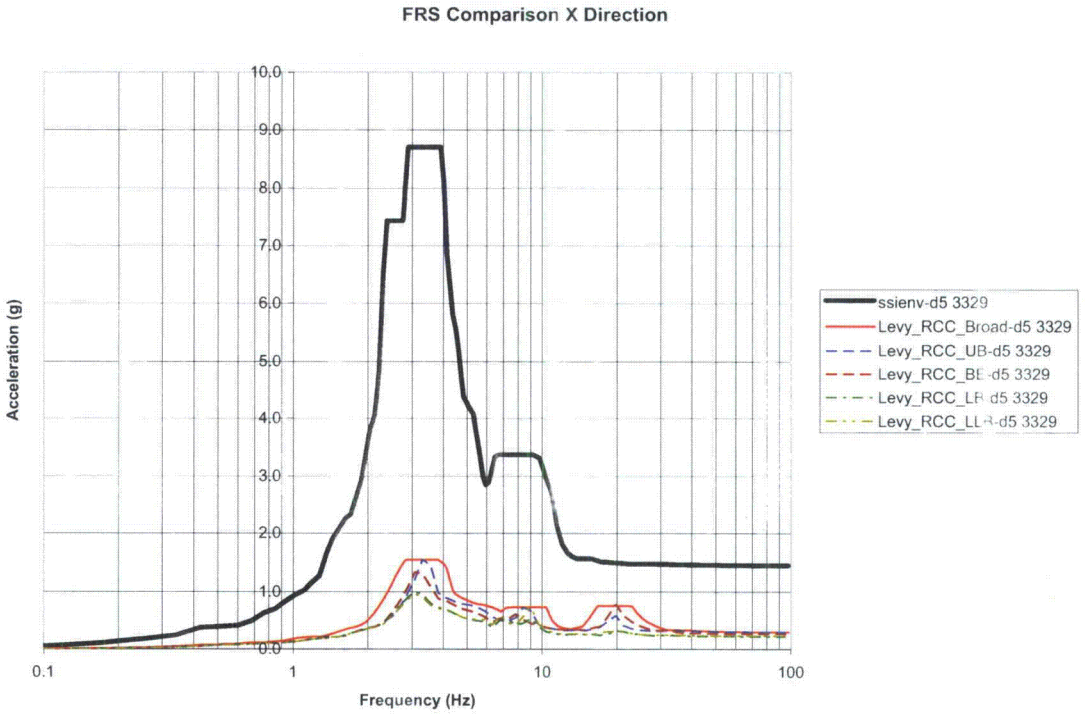

Figure 5.3-16: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in X-Direction – Node 3329

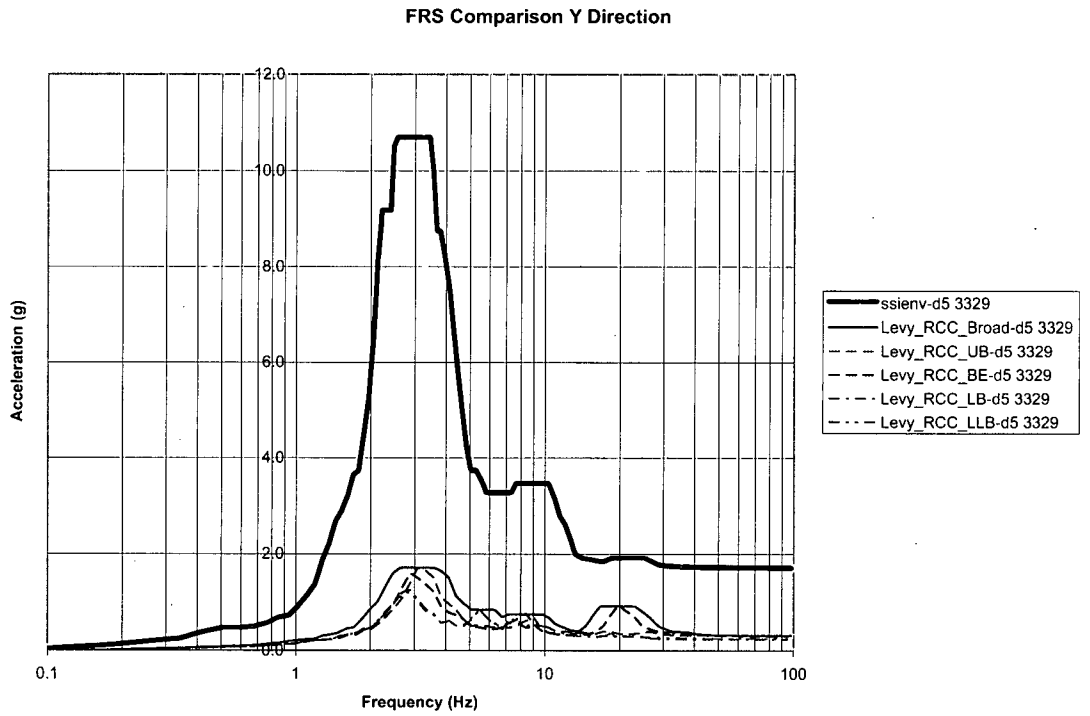

Figure 5.3-17: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope Y-Direction – Node 3329

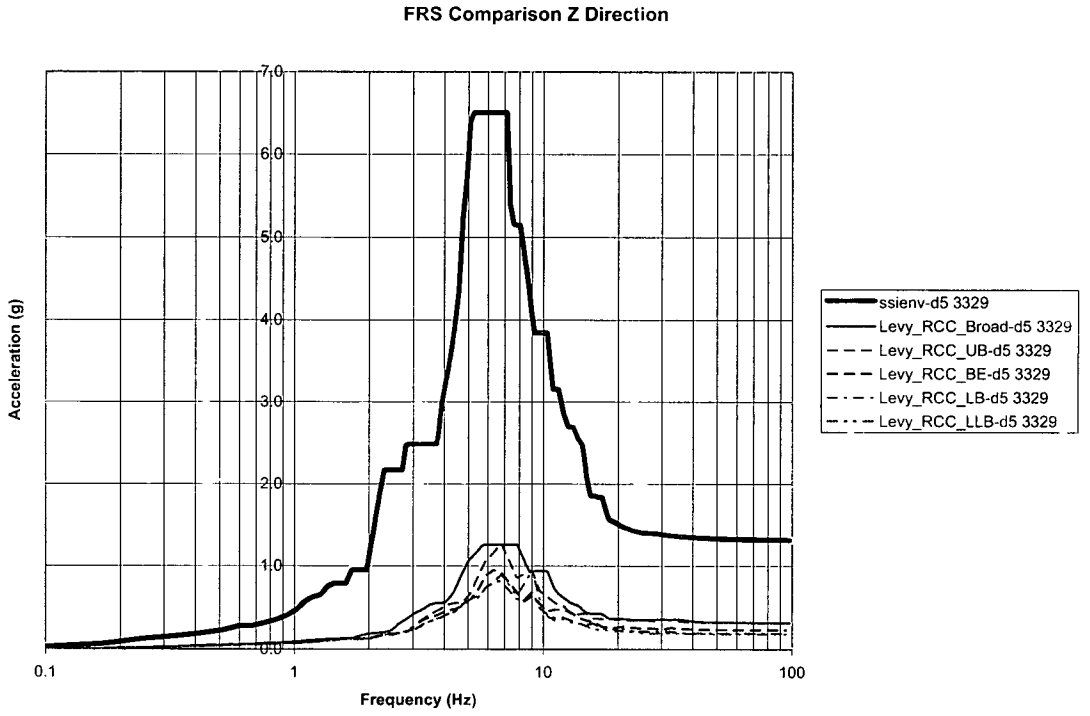

Figure 5.3-18: LNP BE, UB, LB and LLB FRS and AP1000 FRS Envelope in Z-Direction – Node 3329

5.4 [

]a,c

[

]a,c

a,c

Figure 5.4-1: [ ]a,c

a,c

Figure 5.4-2: [ ]a,c

a,c

Figure 5.4-3: [ ]a,c

a,c

Figure 5.4-4: [ ]a,c

a,c

Figure 5.4-5: [ ][a,c]

a,c

Figure 5.4-6: [ ][a,c]

a,c

Figure 5.4-7: [ ][a,c]

a,c

Figure 5.4-8: [ ][a,c]

a,c

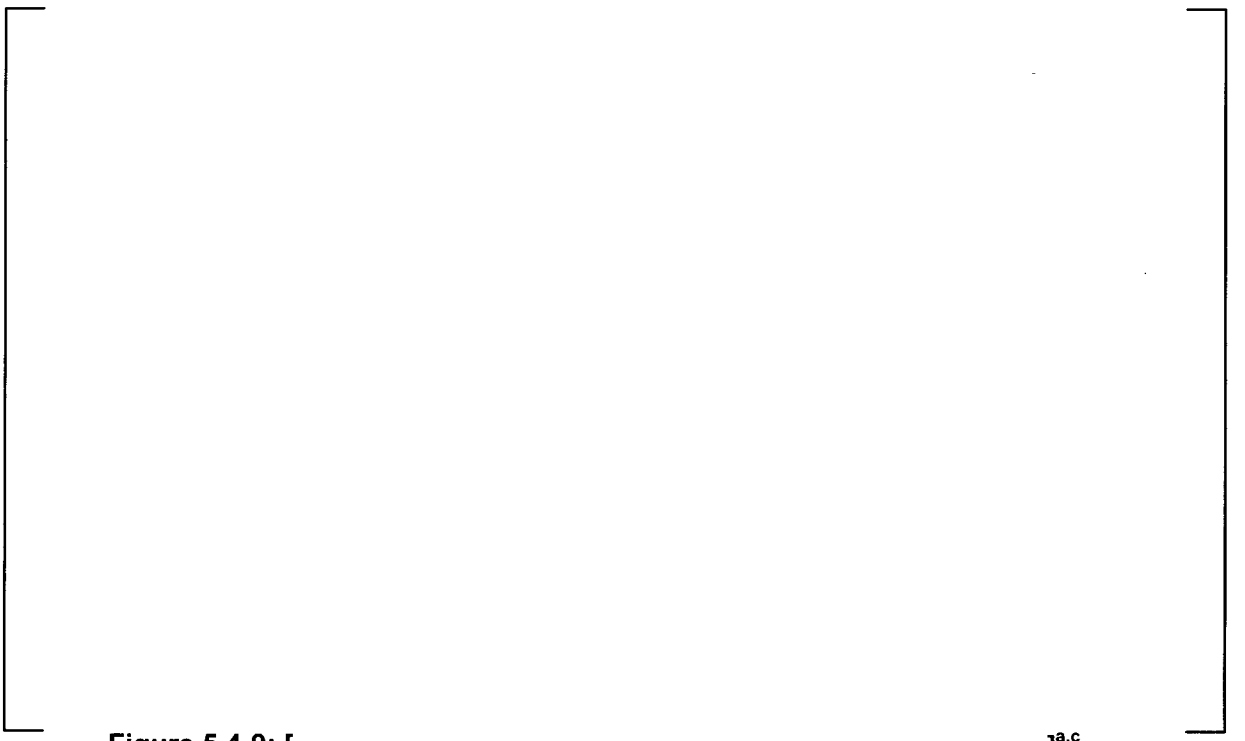

Figure 5.4-9: [ ][a,c]

a,c

Figure 5.4-10: [ ][a,c]

a,c

Figure 5.4-11: [ ][a,c]

a,c

Figure 5.4-12: [ ][a,c]

a,c

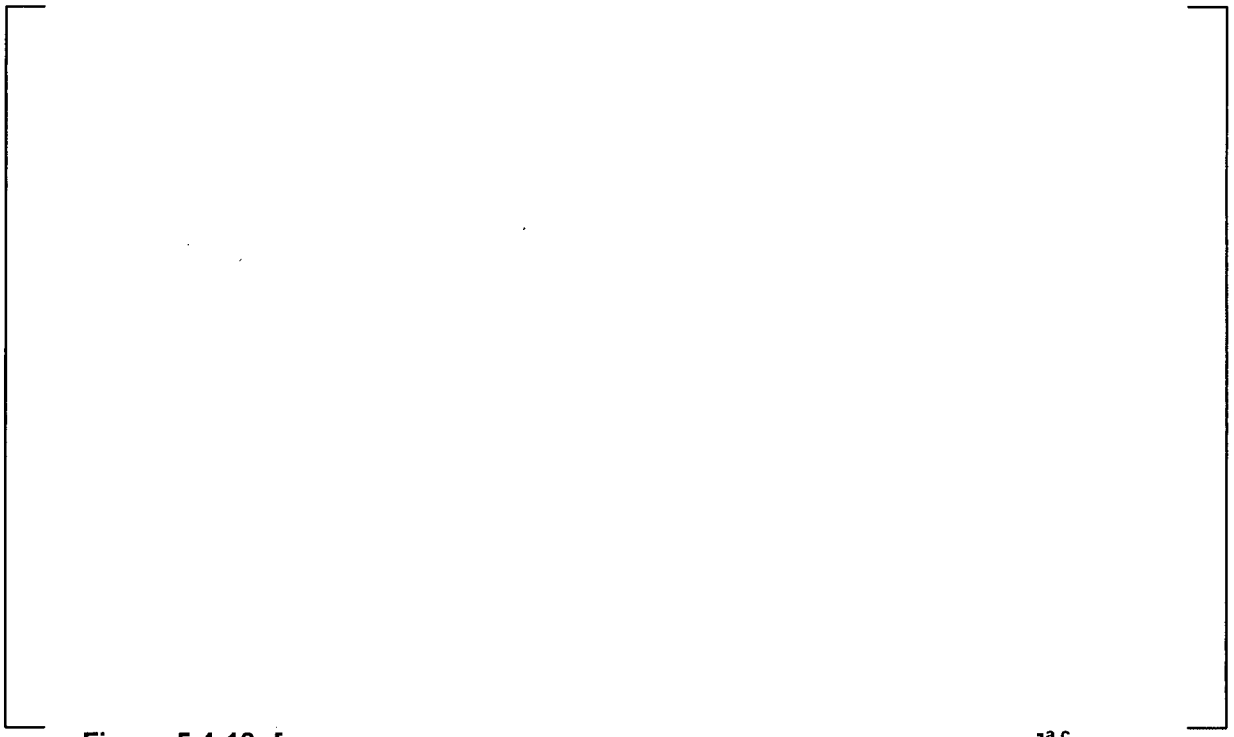

Figure 5.4-13: [ ][a,c]

a,c

Figure 5.4-14: [ ][a,c]

a,c

Figure 5.4-15: [ ]a,c

a,c

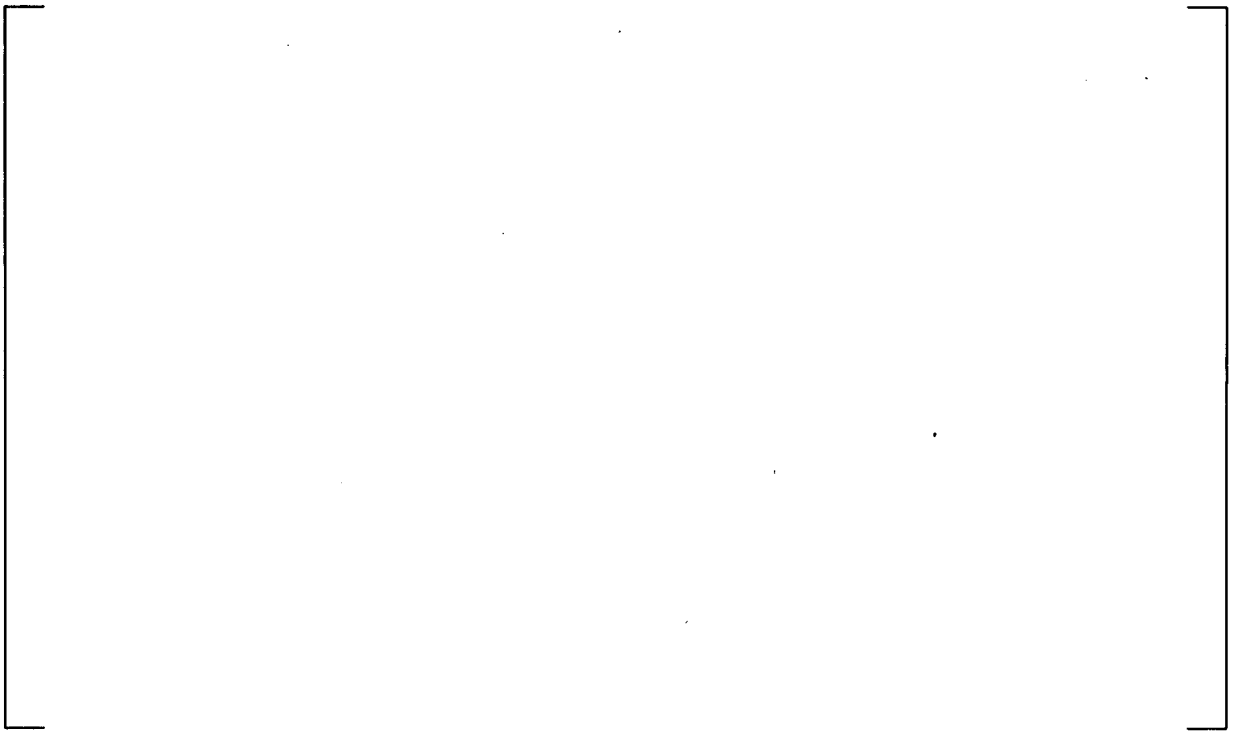

Figure 5.4-16: [ ]a,c

a,c

Figure 5.4-17: [ ][a,c]

a,c

Figure 5.4-18: [ ][a,c]

5.5 [ ]a,c

[

]a,c

Table 5.5-1: [ ]a,c

a,c

5.6 [ ]^{a,c}

[

]^{a,c}

Table 5.6-1: [ ]^{a,c} a,c

5.7 [ ]^{a,c}

[

]^{a,c}

6.0 Conclusions

[,

]a,c

7.0 References

[

]a,c

Appendix A: [ ]^{a,c}

[

]^{a,c}

a,c

Figure A-1: [

][a,c]

a,c

Figure A-2: [

][a,c]

a,c

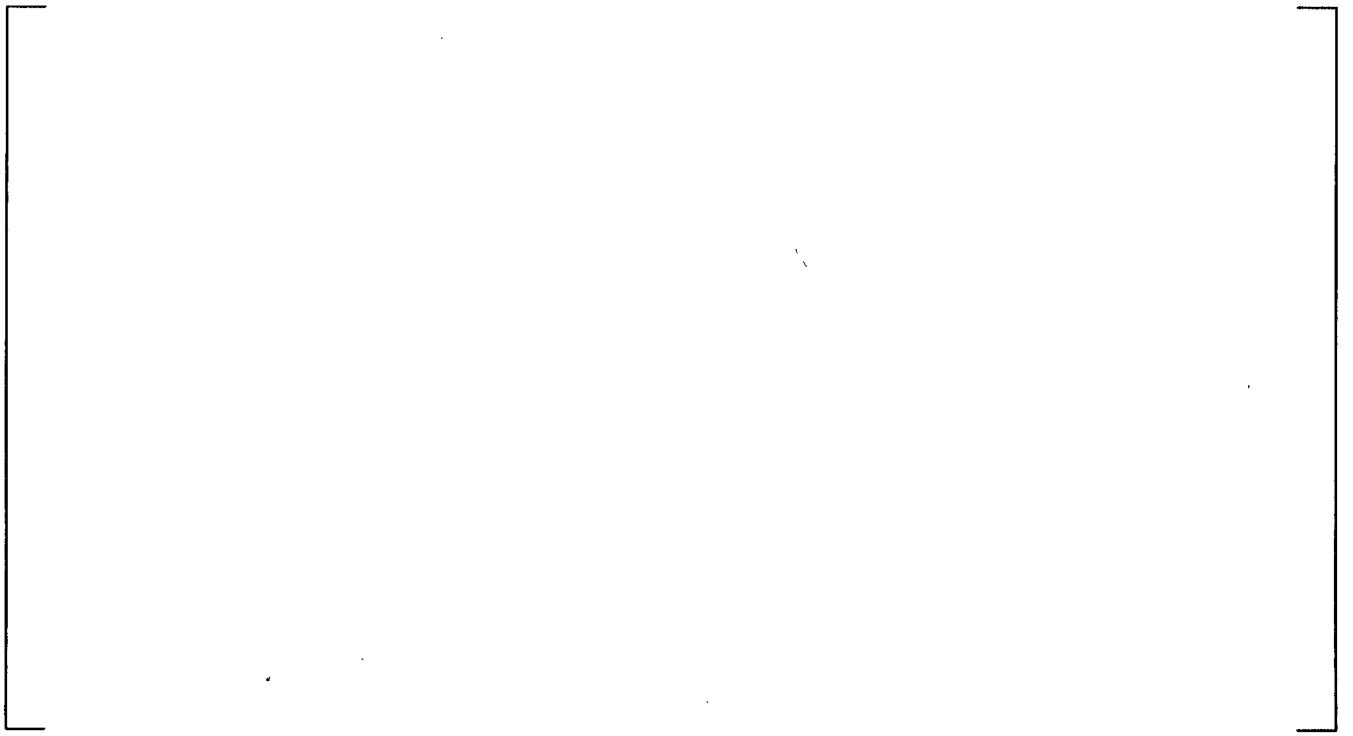

Figure A-3: [

]a,c

a,c

Figure A-4: [

]a,c

a,c

Figure A-5: [ ][a,c]

a,c

Figure A-6: [ ][a,c]

a,c

Figure A-7: [

]^{a,c}

a,c

Figure A-8: [

]^{a,c}

Appendix B: [ ]^{a,c}

[

]^{a,c}

a,c

Figure B-1: [ ][a,c]

a,c

Figure B-2: [ ][a,c]

a,c

Figure B-3: [ ]a,c

a,c

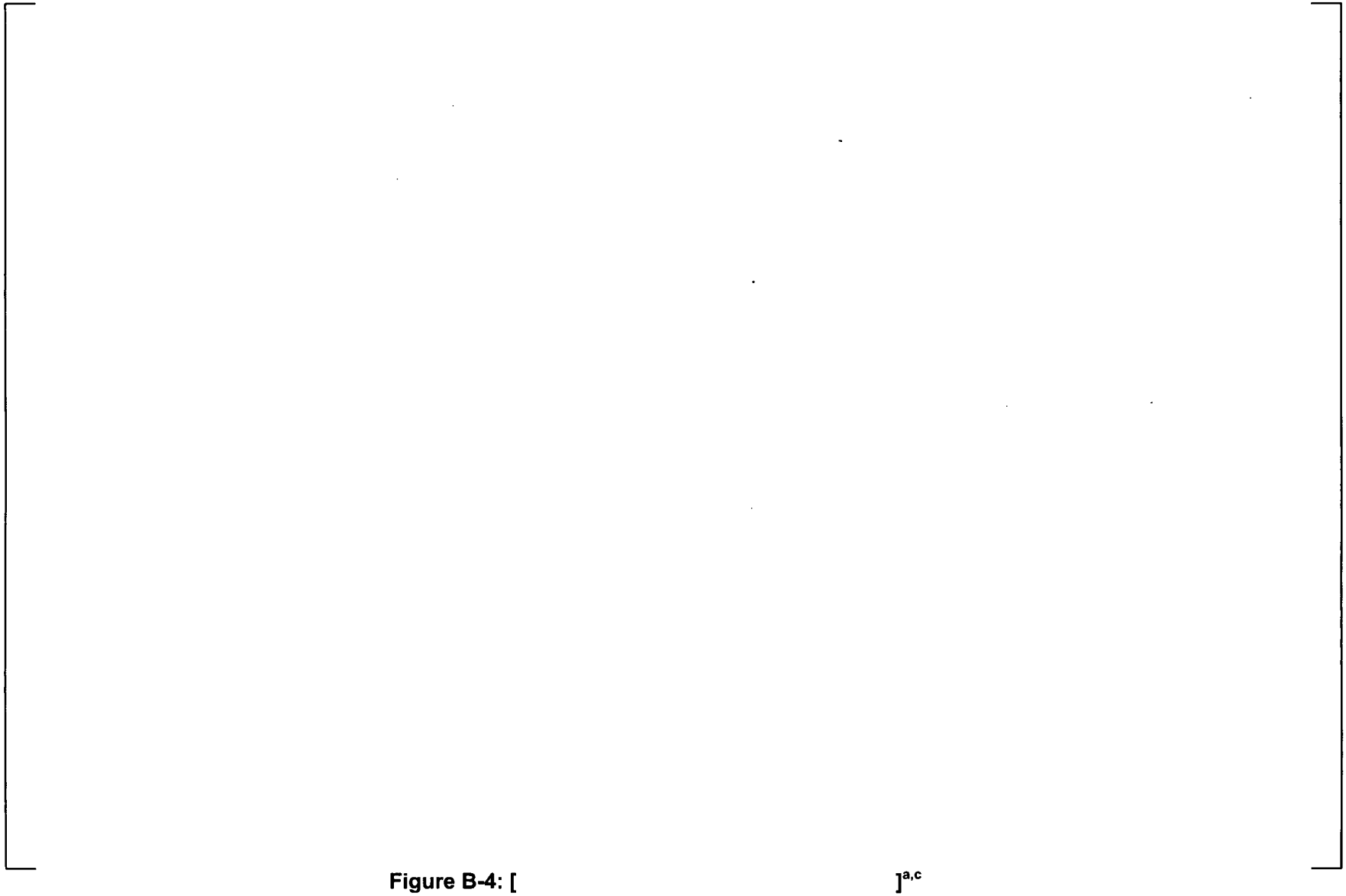

Figure B-4: [ ][a,c]

a,c

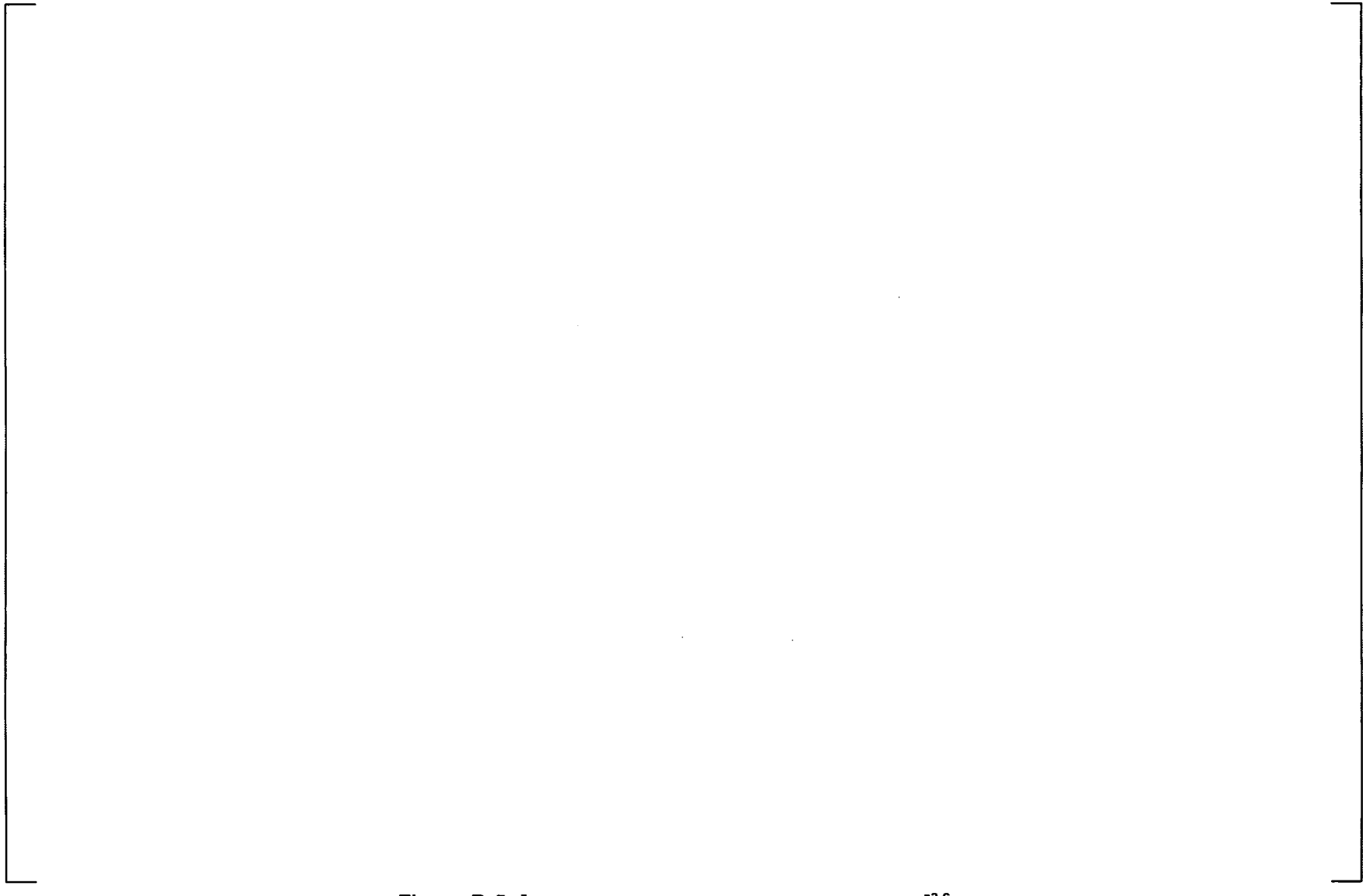

Figure B-5: [ ][a,c]

Appendix C: [ ]^{a,c}

[

]^{a,c}

a,c

Figure C-1: [ ][a,c]

a,c

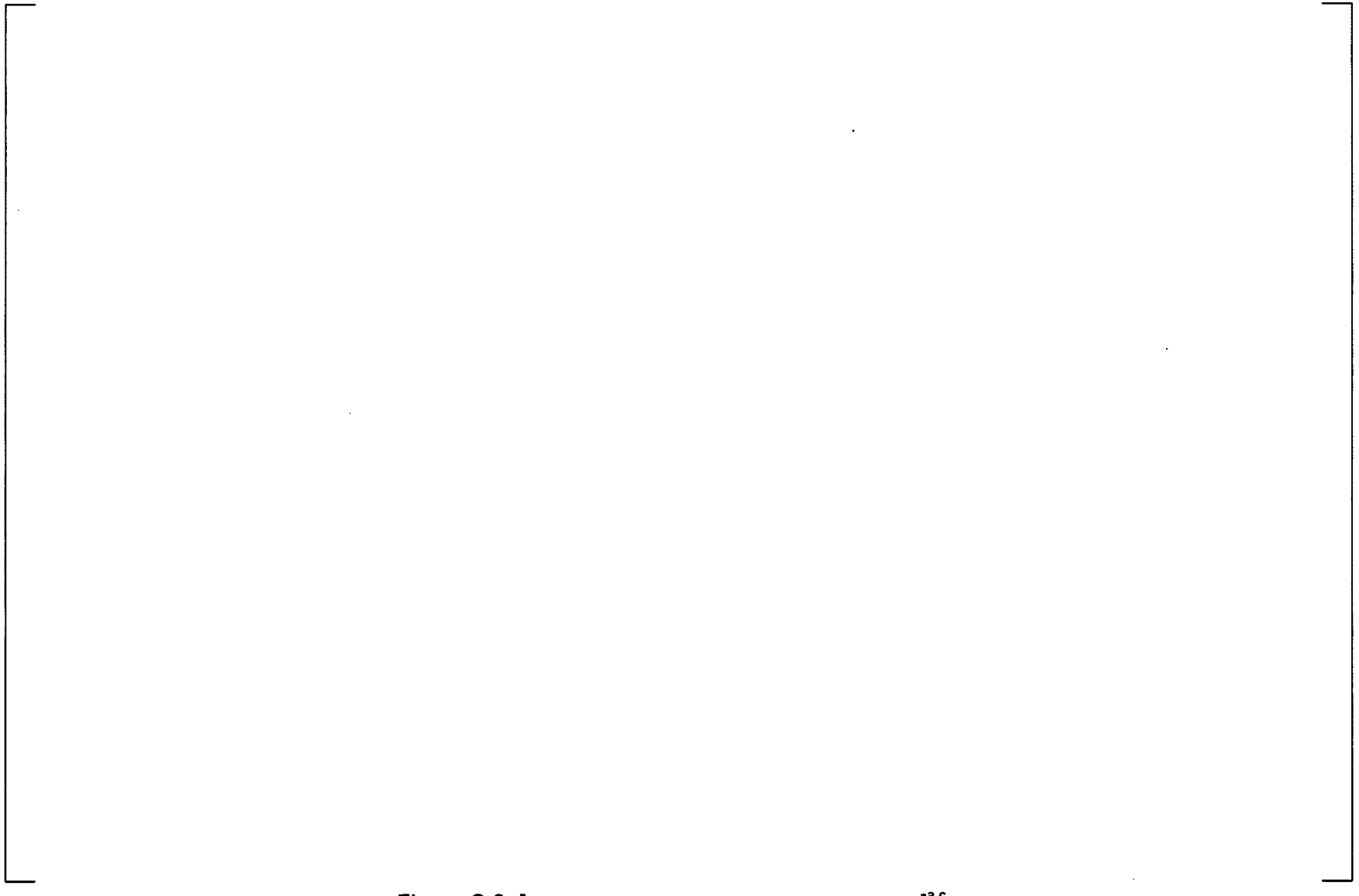

Figure C-2: [ ][a,c]

a,c

Figure C-3: [ ][a,c]

a,c

Figure C-4: [ ][a,c]

Appendix D: [ ]a,c

[

]a,c

a,c

Figure D-1: [ ]a,c

a,c

Figure D-2: [ ][a,c]

a,c

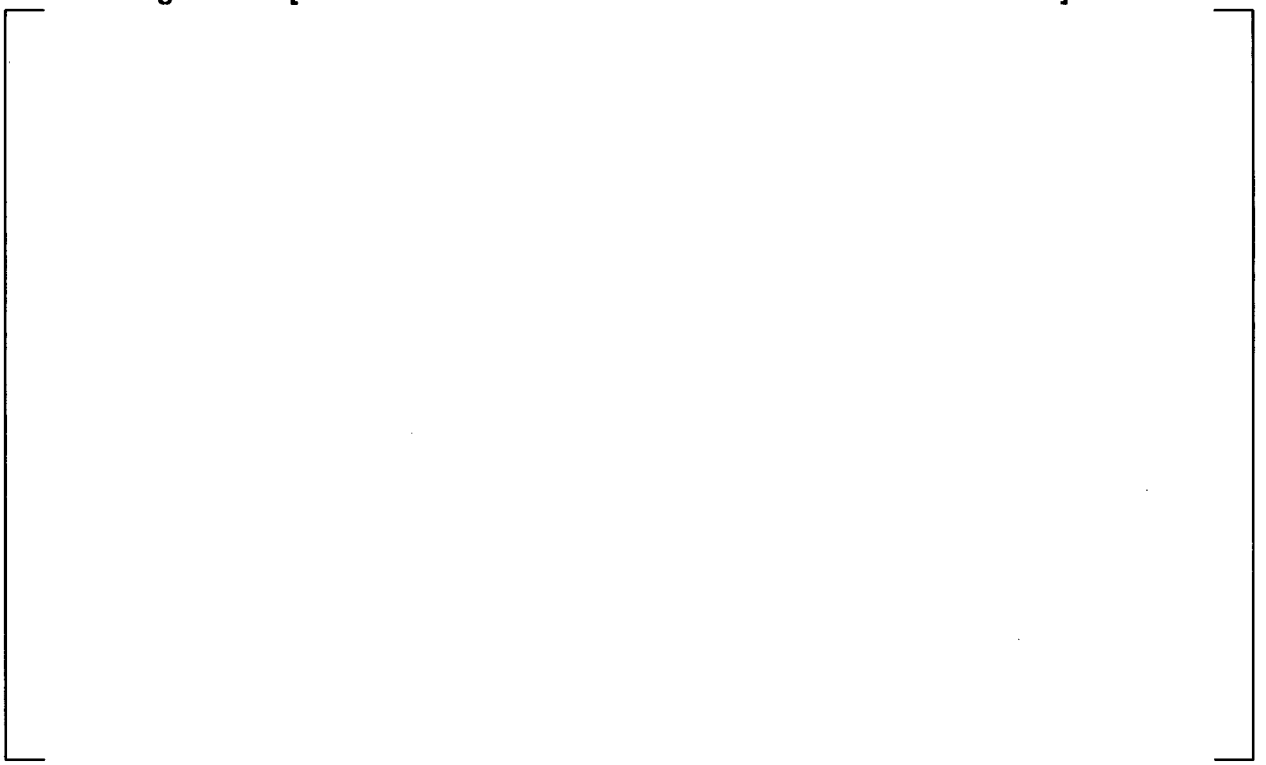

Figure D-3: [ ][a,c]

a,c

Figure D-4: [ ]a,c

a,c

Figure D-5: [ ]a,c

a,c

Figure D-6: [**]**[a,c]**

a,c

Figure D-7: [**]**[a,c]**

a,c

Figure D-8: [ ][a,c]

a,c

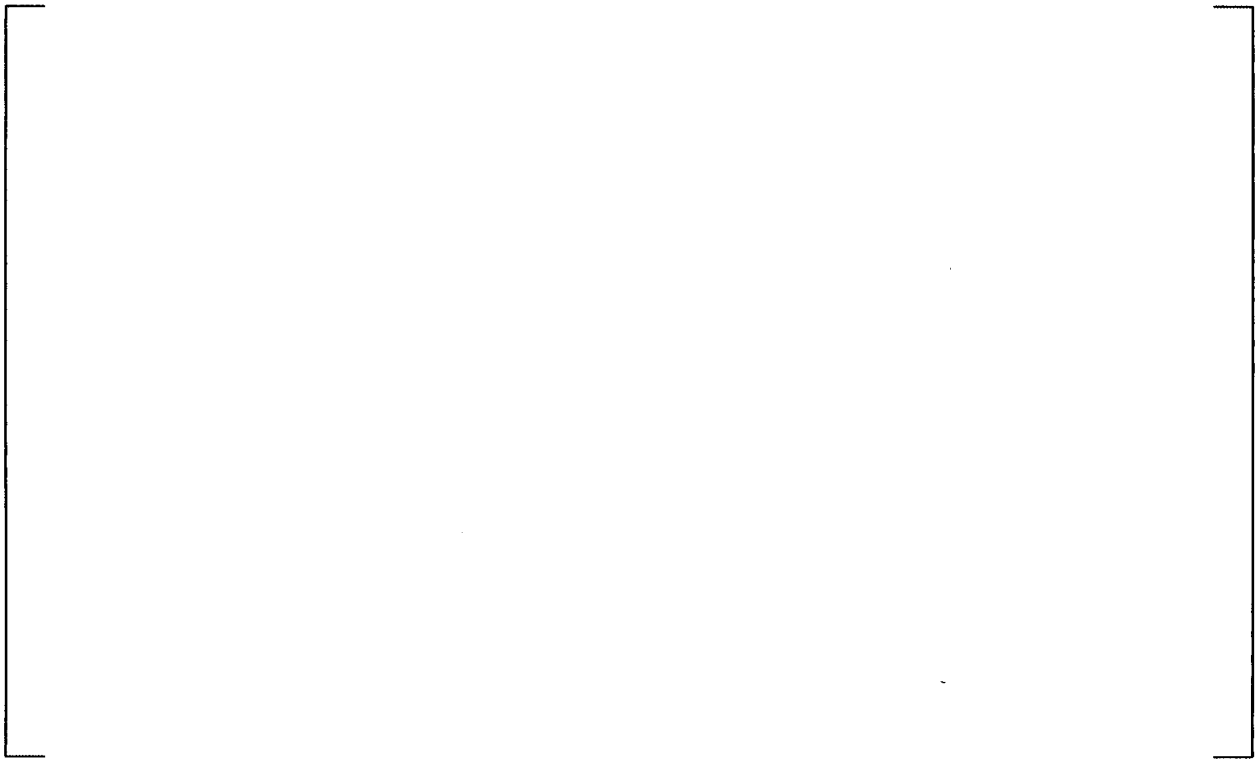

Figure D-9: [ ][a,c]

a,c

Figure D-10: [ ][a,c]

a,c

Figure D-11: [ ][a,c]

a,c

Figure D-12: [ ][a,c]