Ministry of Transportation and Infrastructure

APPENDICES TO SCHEDULE 4

Appendix M
SITE-SPECIFIC FIRM-GROUND (CLASS C) RESPONSE SPECTRA AND ASSOCIATED GROUND MOTION TIME-HISTORIES

partnerships British Columbia

TECHNICAL MEMORANDUM

DATE December 2, 2011 **PROJECT No.** 08-1411-0115/5500A

TO Mr. Rob Ahola, P.Eng.
CH2MHILL

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SITE-SPECIFIC FIRM-GROUND (CLASS C) RESPONSE SPECTRA AND ASSOCIATED ACCELERATION TIME-HISTORIES, EVERGREEN LINE RAPID TRANSIT (ELRT) PROJECT, GREATER VANCOUVER, BC

This revised Technical Memorandum presents the site-specific response spectra and ground motions developed for the Evergreen Line Rapid Transit (ELRT) Project and replaces the Memorandum dated October 24, 2011. The project extends from the Lougheed Town Centre in Burnaby, BC, to Douglas College in Coquitlam, BC.

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has undertaken analyses to develop site-specific ground motion parameters as input to the seismic design and analysis of the structures comprising the proposed Evergreen Line Rapid Transit (ELRT) project in Greater Vancouver, BC. This Technical Memorandum presents the results of analyses completed and includes the following:

1) Uniform Hazard Response Spectra (UHRS) developed for 100-year, 475-year, 975-year, and 2,475-year ground motions applicable for firm-ground (Site Class C Soils) conditions; and

2) Spectrally-matched input acceleration time-histories that correspond to the firm-ground UHRS noted above.

In addition to the probabilistic ground motions, a deterministic subduction earthquake scenario has also been considered since the long duration of shaking and the large number of cycles of effective dynamic loading from a subduction earthquake are expected to have an impact on the geotechnical performance of the foundation soils.

The input firm-ground UHRS are based on the seismogenic zones and seismic hazard models developed for the 4th Generation Seismic Hazard Maps and incorporated in the seismic design provisions of the 2005 National Building Code of Canada. The spectra have been extrapolated for periods extending from 2 seconds to a maximum period of 6 seconds.

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2.0 SITE GEOLOGY AND SOIL CONDITIONS

The Evergreen Line Rapid Transit (ELRT) alignment corridor extends from an upland area between Lougheed Mall and Barnet Highway through a low-lying area in Port Moody and Coquitlam Town Centre. The upland area is underlain by a thick sequence of glacial and interglacial soils (Vashon Drift and Pre-Vashon Deposits). These soils have been glacially overridden and are generally dense to very dense. The low-lying area has been in-filled with geologically recent soft and loose to compact Salish Sediments of marine shoreline and fluvial origin, as well as localized Capilano Sediments. These sediments overlie the Vashon Drift and Pre-Vashon deposits in the area.

The surficial geology illustrated in the Surficial Geology Map (GSC No. 1484 A, 1980) along with the ELRT alignment is shown on Figure 2-1.

Several areas along the alignment are underlain by soils that are likely to experience liquefaction, lateral spreading and movements when subjected to strong ground shaking from an earthquake. These areas are as follows;

- Port Moody Segment east of Barnet Highway and west of Ioco Road (519+000 m to 521+500 m);
- Ioco Segment east of Ioco Road and west of Pinetree Way (521+800 m to 523+700 m); and
- North Coquitlam Segment along Pinetree Way North of Lougheed Highway to Guilford Way (523+700 to 525+300 m).

The remaining areas of the alignment are generally underlain by competent ground conditions that have a low risk of liquefaction, lateral spreading, and movements when subjected to strong ground shaking.

3.0 SITE SEISMICITY

The seismicity at the site results from the thrusting (subducting) of the offshore Juan de Fuca Plate beneath the continental North American Plate (see Figure 3-1). There are three basic sources of earthquakes:

- Relatively shallow crustal earthquakes (depths in the order of 20 km);
- Deeper earthquakes (depths in the order of 60 km) within the subducted plate; and
- Very large inter-plate earthquakes often referred to as the “mega-thrust” or “subduction” earthquakes occurring in the Cascadia Subduction Zone.

Earthquakes of the first two categories (intra-plate) have been recorded at regular intervals during the last several decades. The largest are those near Campbell River in 1946 (M7.3), near Olympia in 1949 (M7.1), near Seattle/Tacoma on 1965 (M6.5), and in Nisqually, Washington, USA in 2001 (M6.8). The duration of strong shaking of these two categories of earthquakes is expected to be 10 to 15 seconds. A very large earthquake is also reported to have occurred in the vicinity of the USA/Canada border in 1872, near Lake Chelan, WA.

The most recent major subduction event is reported to have occurred in 1700, some 311 years ago. The seismologists assign an approximate return period varying from 500 years to 600 years for subduction earthquakes affecting this region. The magnitude of a large subduction earthquake that could affect Vancouver is expected to occur in the Cascadia Subduction Zone and will be in the order of M8.2+ with the centre of energy

release located some 140 km from the site. Because of the greater epicentral distance to the site, the median firm ground acceleration at the site under the M8.2 subduction event is not expected to be larger than 0.16 g. The duration of strong shaking, however, is expected to be close to 30 to 60 seconds.

A site-specific seismic hazard analysis completed by the Geological Survey of Canada (GSC) has established the following ground motion parameters corresponding to the return periods of 100-year, 475-year, 975-year, and 2,475-year at various sites along the Project Alignment (see Tables 3-1a and 3-1b). The ground motion parameters have been obtained form the interactive website maintained by GSC and are applicable for Class C ground conditions or for soil profiles where the average shear wave velocity of soils within the upper 30 m varies between 360 m/s and 760 m/s.

Table 3-1a: Site-Specific Ground Motion Parameters

Return Period	100-Year			475-Year			975-Year		
Probability of Exceedance	63% in 100 Years			19% in 100 Years			10% in 100 Years		
Location	PGA	Sa(0.2)	Sa(2.0)	PGA	Sa(0.2)	Sa(2.0)	PGA	Sa(0.2)	Sa(2.0)
Lougheed Town Centre	0.116g	0.224g	0.039g	0.254g	0.502g	0.086g	0.343g	0.688g	0.119g
Barnet Hwy & St. Johns St.	0.113g	0.217g	0.039g	0.246g	0.487g	0.085g	0.334g	0.669g	0.118g
Douglas College	0.112g	0.215g	0.039g	0.244g	0.484g	0.085g	0.331g	0.664g	0.117g
Difference* (%)	4%	4%	0%	4%	4%	1%	4%	4%	2%

Note: * Difference in the ground motions parameters has been computed with respect to Lougheed Town Centre

Table 3-1b: Site-Specific Ground Motion Parameters

Return Period	2,475-Year		
Probability of Exceedance	4% in 100 Years		
Location	PGA	Sa(0.2)	Sa(2.0)
Lougheed Town Centre	0.478g	0.965g	0.170g
Barnet Hwy & St. Johns St.	0.465g	0.938g	0.169g
Douglas College	0.461g	0.931g	0.168g
Difference* (%)	4%	4%	1%

Note: * Difference in the ground motions parameters has been computed with respect to Lougheed Town Centre

The variation in the peak ground acceleration and short and long-period spectral accelerations is minimal (4 percent or less) at the other locations compared to those at the Lougheed Town Centre. Therefore, the Lougheed Town Centre has been taken as the reference site in the development of site-specific seismic hazard parameters for the use along the entire ELRT alignment.

The firm-ground response spectra (5% damped) that correspond to return periods of 100-year, 475-year, 975-year, 2,475-year and the subduction earthquake for the Lougheed Town Centre, which are applicable for Class C ground conditions, are summarized in Table 3-2.

Table 3-2: Site-Specific Spectral Accelerations (5% Damped) – Lougheed Town Centre

Scenario	Spectral Period (Seconds)								
	0.0 (PGA)	0.10	0.15	0.20	0.30	0.40	0.50	1.0	2.0
100-Year Spectral Accelerations (g)	0.116	0.188	0.224	0.224	0.196	0.171	0.150	0.078	0.039
475-Year Spectral Accelerations (g)	0.254	0.433	0.505	0.502	0.431	0.371	0.331	0.168	0.086
975-Year Spectral Accelerations (g)	0.343	0.593	0.693	0.688	0.590	0.510	0.456	0.230	0.119
2,475-Year Spectral Accelerations (g)	0.478	0.832	0.972	0.965	0.827	0.721	0.645	0.325	0.170
Subduction Spectral Accelerations (g)	0.160	0.260	0.340	0.370	0.350	0.330	0.310	0.170	0.077

4.0 FIRM-GROUND UNIFORM HAZARD SPECTRA

In order to cover the anticipated range of periods, the response spectra presented in Table 3-2 for periods up to 2 seconds have been extrapolated to include spectral accelerations at periods up to 6 seconds. The extrapolation was carried out using a spectral decay curve defined by the spectral acceleration at a period of 1 second (Sa_1) divided by the corresponding period (T); *i.e.,* Sa = Sa_1/T, for T > 1 seconds. The response spectra developed in this manner are summarized in Table 4-1 and graphically shown on Figure 4-1:

Table 4-1: Firm-Ground (Class C) Motions for 475-Year, 975-Year, and Subduction Events (5% damped)

Period (Seconds)	100-Year Motions	475-Year Motions	975-Year Motions	2,475-Year Motions	Subduction Event Motions
PGA	0.116 g	0.254 g	0.343 g	0.478 g	0.160 g
0.10	0.188 g	0.433 g	0.593 g	0.832 g	0.260 g
0.15	0.224 g	0.505 g	0.693 g	0.965 g	0.340 g
0.20	0.224 g	0.502 g	0.688 g	0.827 g	0.370 g
0.30	0.196 g	0.431 g	0.590 g	0.840 g	0.350 g
0.40	0.171 g	0.371 g	0.510 g	0.721 g	0.330 g
0.50	0.150 g	0.331 g	0.456 g	0.645 g	0.310 g
1.0	0.078 g	0.168 g	0.230 g	0.325 g	0.170 g
2.0	0.039 g	0.086 g	0.119 g	0.170 g	0.077 g
3.0	0.026 g	0.056 g	0.077 g	0.108 g	0.057 g
4.0	0.020 g	0.042 g	0.058 g	0.081 g	0.043 g
5.0	0.016 g	0.034 g	0.046 g	0.065 g	0.034 g
6.0	0.013 g	0.028 g	0.038 g	0.054 g	0.028 g

5.0 FIRM-GROUND ACCELERATION TIME-HISTORIES

Spectrally-matched input acceleration time-histories were developed for the 475-year, 975-year, 2,475-year and subduction ground motions. Considering the close proximity of the ELRT alignment to the New Port Mann Bridge site, the acceleration time-histories spectrally-matched to the site-specific spectra at the Port Mann Bridge site have been scaled uniformly with respect to the peak ground acceleration at the Lougheed Town Centre to obtain the time-histories for use in ELRT project. A comparison of firm-ground UHRS at the Port Mann Bridge site and Lougheed Town Centre is shown on Figure 5-1, where minimal differences (less than 4%) in the peak ground acceleration and spectral accelerations can be noted between the two sites.

The spectral matching of acceleration time histories for the Port Mann Bridge site was carried out in the time-domain using the computer program EZ-FRISK (Risk Engineering Inc., Version 7.23) and the details of the acceleration time histories used in the spectral matching are provided in the following sections.

All acceleration time-histories have been base-line corrected.

5.1 Acceleration Time-Histories for the 475-Year Return Period Ground Motions

Records from the 1971 San Fernando, 1989 Loma Prieta, and 1949 Western Washington earthquakes have been selected as representative time-histories for the 475-year ground motions based on distance, magnitude, and peak horizontal ground acceleration (PHGA). The duration of strong shaking for the selected earthquake records varies between 7 and 25 seconds.

All six horizontal components of the records have been matched to the target 475-year Class C Spectrum that correspond to the Port Mann Bridge site as shown on Figure 5-1. The bracketed duration of strong shaking of the spectrally matched time-histories varies between 14 and 25 seconds. In order to derive vertical motions consistent with the modified horizontal motions, the vertical components of the selected *unmodified* earthquake records were scaled to 2/3 of the target horizontal PHGA. Details of the earthquake records selected for spectral matching are summarized in Table 5-1.

Table 5-1: Details of Input Earthquakes Used for Spectral Matching for 475-Year Motions

Event	Date	Magnitude & [Bracketed Duration]	Epicentral Distance	Peak Horizontal Ground Motions		Station
				a (g)	v	
475-Year Motions						
San Fernando (EW)	Feb. 9, 1971	M6.6 [~7 s]	36.0 km	0.20	0.11	Seismological Laboratory
San Fernando (NS)	Feb. 9, 1971	M6.6 [~7 s]	36.0 km	0.09	0.05	Seismological Laboratory
Loma Prieta (EW)	Oct. 18, 1989	M7.0 [~20 s]	9.7 km	0.44	0.29	Capitola
Loma Prieta (NS)	Oct. 18, 1989	M7.0 [~25 s]	9.7 km	0.53	0.35	Capitola
Western Washington (EW)	Apr. 13, 1949	M7.1 [~21 s]	26.0 km	0.28	0.18	Olympia Highway Test Laboratory
Western Washington (NS)	Apr. 13, 1949	M7.1 [~22 s]	26.0 km	0.17	0.18	Olympia Highway Test Laboratory

The original records of the earthquakes listed in Table 5-1 were obtained from the PEER and COSMOS strong motion data bases. The one-page headers of the original records are presented in Attachment 1.

The acceleration time-histories of the modified records scaled uniformly with respect to the PGA of the Lougheed Town Centre are shown on Figures 5-2 through 5-4 and the corresponding response spectra along with the target response spectrum of Lougheed Town Centre are shown on Figure 5-5.

5.2 Acceleration Time-Histories for the 975-Year Return Period Ground Motions

Records from the 1992 Landers, 1989 Loma Prieta, and 1999 Chi Chi earthquakes were selected as representative time-histories for the 975 year ground motions based on distance, magnitude, and peak horizontal ground acceleration (PHGA). The duration of strong shaking for the selected earthquake records varies between 20 and 36 seconds.

All six horizontal components of the records were matched to the target 975-year Class C Spectrum that correspond to the Port Mann site as shown on Figure 5-1. The bracketed duration of strong shaking of the spectrally-matched time-histories varies between 35 and 42 seconds. In order to derive vertical motions consistent with the modified horizontal motions, the vertical components of the selected *unmodified* earthquake records were scaled to 2/3 of the target horizontal PHGA. Details of the earthquake records selected for spectral matching are summarized in Table 5-2.

Table 5-2: Details of Input Earthquakes Used for Spectral Matching for 975-Year Ground Motions

Event	Date	Magnitude & [Bracketed Duration]	Epicentral Distance	Peak Horizontal Ground Motions		Station
				a (g)	v (m/s)	
975 Year Motions						
Landers (EW)	Jun. 28, 1992	M7.3 [~31 s]	13.7 km	0.28	0.43	Joshua Tree
Landers (NS)	Jun. 28, 1992	M7.3 [~35 s]	13.7 km	0.27	0.28	Joshua Tree
Loma Prieta (EW)	Oct. 18, 1989	M7.0 [~20 s]	9.7 km	0.44	0.29	Capitola
Loma Prieta (NS)	Oct. 18, 1989	M7.0 [~25 s]	9.7 km	0.53	0.35	Capitola
Chi Chi (EW)	Sept. 20, 1999	M7.6 [~32 s]	7.1 km	0.45	0.44	Taichung
Chi Chi (NS)	Sept. 20, 1999	M7.6 [~36 s]	7.1 km	0.31	0.33	Taichung

The original records of the earthquakes listed in Table 5-2 were obtained from the PEER and COSMOS strong motion data bases. The one-page headers of the original records are presented in Attachment 1.

The acceleration time-histories of the modified records scaled uniformly with respect to the PGA of the Lougheed Town Centre are shown on Figures 5-6 through 5-8 and the corresponding response spectra along with the target response spectrum for the Lougheed Town Centre are shown on Figure 5-9.

5.3 Acceleration Time-Histories for the 2,475-Year Return Period Ground Motions

The acceleration time histories selected for the 975-year grand motions were also considered as representive time histories for the 2,475-year ground motions based on distance, magnitude, and peak horizontal ground acceleration (PHGA).

All six horizontal components of the records as noted in the previous section were matched to the target 2,475-year Class C Spectrum that correspond to the Port Mann site as shown on Figure 5-1. The bracketed duration of strong shaking of the spectrally-matched time-histories varies between 35 and 42 seconds. In order to derive vertical motions consistent with the modified horizontal motions, the vertical components of the selected *unmodified* earthquake records were scaled to 2/3 of the target horizontal PHGA.

The acceleration time-histories of the modified records scaled uniformly with respect to the PGA of the Lougheed Town Centre are shown on Figures 5-10 through 5-12 and the corresponding response spectra along with the target response spectrum for the Lougheed Town Centre are shown on Figure 5-13.

5.4 Acceleration Time-Histories for the 100-Year Motions

Acceleration time-histories for the 100-year motions were derived by uniformly scaling the acceleration time histories derived for the 475-year motions with respect to the peak horizontal ground acceleration. This approximation is valid in light of the similarities in the spectral shapes between the site-specific 100-year response spectrum and the uniformly scaled acceleration response spectrum.

The acceleration time-histories of the modified records are shown on Figures 5-14 through 5-16 and the corresponding response spectra are shown on Figure 5-17.

5.5 Acceleration Time-Histories for the Subduction Event

Long-duration ground motions recorded from a subduction event are included herein. It should be noted that the spectral accelerations that correspond to the subduction event are smaller than the spectral accelerations that correspond to the 475-year, 975-year, and 2,475-year ground motions (Figure 4-1)

Consistent with the characteristics of the subduction event (*i.e.,* M8.2 at about 140 km and with PGA=0.16 g) considered by the 2005 NBCC for Vancouver, BC, acceleration time-histories that correspond to M_w 8+ subduction earthquakes were searched to obtain a representative acceleration time-history of a long-duration event. Other search parameters included the following:

- Records with a PHGA varying between 0.15 and 0.20 g; and
- An epicentral distance varying between 100 and 170 km.

Based on these criteria, the acceleration time-histories recorded at La Union Station from the 1985 Mexico City earthquake were selected to represent the level of shaking associated with a subduction event. The duration of strong shaking of the selected earthquake records is about 32 seconds.

The two horizontal components of the recorded time-histories were matched to the target subduction event Class C Spectrum presented in Table 4-1 and on Figure 4-1. The bracketed duration of strong shaking of the spectrally matched time-histories varies between 27 and 33 seconds. In order to derive vertical motions consistent with the modified horizontal motions, the vertical components of the selected *unmodified* earthquake records were scaled to 2/3 of the target horizontal PHGA. Details of the earthquake records selected for spectral matching are summarized in Table 5-3.

Table 5-3: Details of Input Earthquakes Used for Spectral Matching – Subduction Earthquake Ground Motions

Event	Date	Magnitude & [Bracketed Duration]	Epicentral Distance	Peak Horizontal Ground Motions		Station
				a (g)	v (m/s)	
Subduction Event						
Mexico City (EW)	Sept. 19, 1985	M8.1 [~32 s]	107 km	0.15	0.13	La Union
Mexico City (NS)	Sept. 19, 1985	M8.1 [~32 s]	107 km	0.17	0.22	La Union

The original records of the earthquakes listed in Table 5-3 were obtained from the COSMOS Strong Motion Data Base. The one-page headers of the original records are presented in Attachment 1.

The acceleration time-histories of the modified records are shown on Figure 5-18 and the corresponding response spectra are shown on Figure 5-19.

6.0 CLOSURE

We trust that the contents of this Technical Memorandum meet with your immediate requirements. If you have any questions or need further information, please do not hesitate to contact the undersigned.

GOLDER ASSOCIATES LTD.

ORIGINAL SIGNED

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VJF/UDA/nnv

Attachments: Figures 2-1, 3-1, 4-1, and 5-1 to 5-19
Attachment 1 – Headers of Original Earthquake Records Used for Spectral Matching

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7.0 REFERENCES

Adams, J. and Halchuk, S. (2003), Fourth Generation Seismic Hazard Maps of Canada: Values for over 650 Canadian localities intended for the 2005 National Building Code of Canada, Geological Survey of Canada, Open File 4459.

Geological Survey of Canada (1980), Surficial Geology Map, GSC No. 1484 A.

EZ-FRISK (Version 7.23), Risk Engineering Inc.

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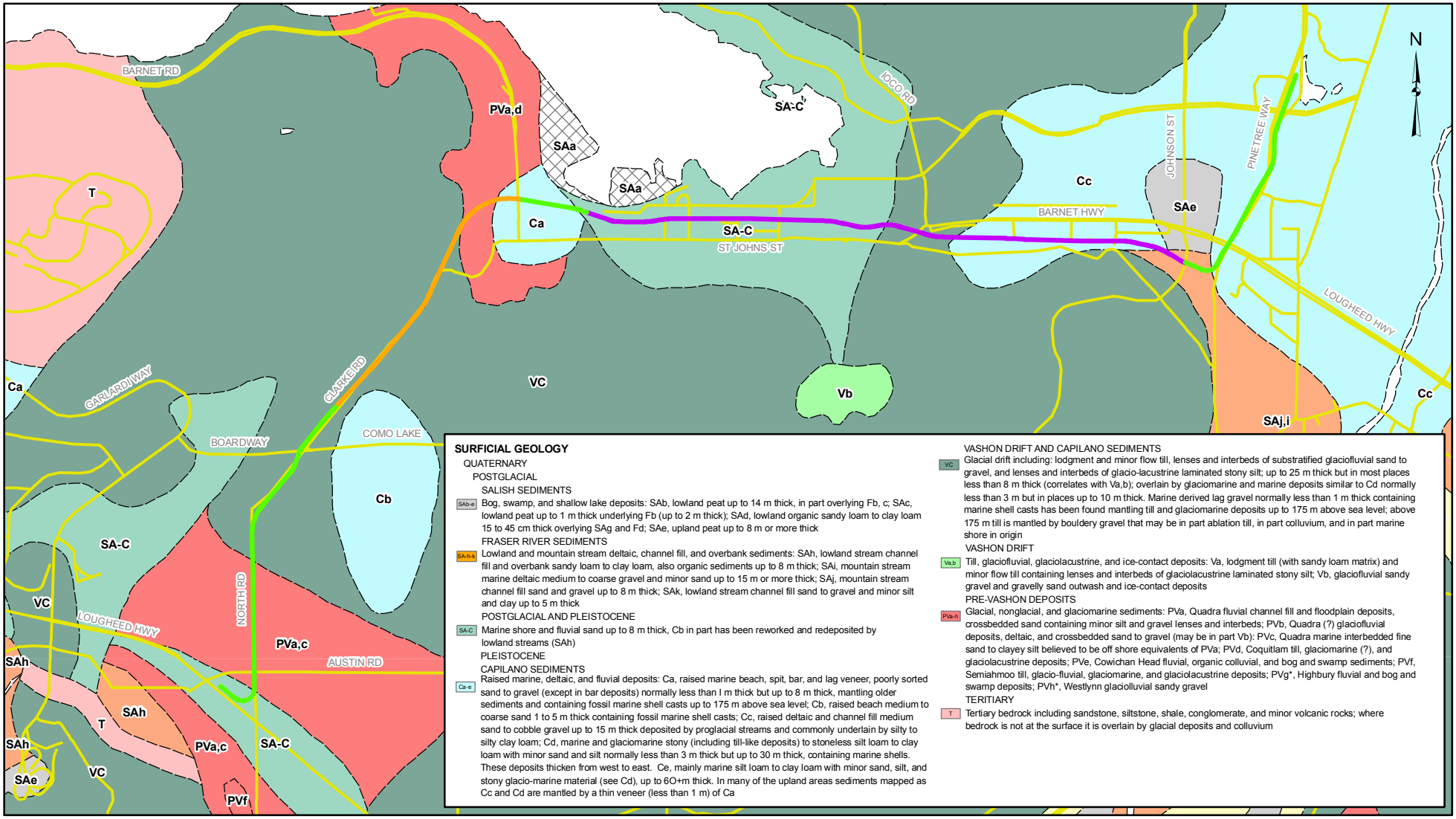


SURFICIAL GEOLOGY

QUATERNARY

POSTGLACIAL

SALISH SEDIMENTS

SAb-e — Bog, swamp, and shallow lake deposits: SAb, lowland peat up to 14 m thick, in part overlying Fb, c; SAc, lowland peat up to 1 m thick underlying Fb (up to 2 m thick); SAd, lowland organic sandy loam to clay loam 15 to 45 cm thick overlying SAg and Fd; SAe, upland peat up to 8 m or more thick

FRASER RIVER SEDIMENTS

SA-h-k — Lowland and mountain stream deltaic, channel fill, and overbank sediments: SAh, lowland stream channel fill and overbank sandy loam to clay loam, also organic sediments up to 8 m thick; SAi, mountain stream marine deltaic medium to coarse gravel and minor sand up to 15 m or more thick; SAj, mountain stream channel fill sand and gravel up to 8 m thick; SAk, lowland stream channel fill sand to gravel and minor silt and clay up to 5 m thick

POSTGLACIAL AND PLEISTOCENE

SA-C — Marine shore and fluvial sand up to 8 m thick, Cb in part has been reworked and redeposited by lowland streams (SAh)

PLEISTOCENE

CAPILANO SEDIMENTS

Ca-e — Raised marine, deltaic, and fluvial deposits: Ca, raised marine beach, spit, bar, and lag veneer, poorly sorted sand to gravel (except in bar deposits) normally less than l m thick but up to 8 m thick, mantling older sediments and containing fossil marine shell casts up to 175 m above sea level; Cb, raised beach medium to coarse sand 1 to 5 m thick containing fossil marine shell casts; Cc, raised deltaic and channel fill medium sand to cobble gravel up to 15 m thick deposited by proglacial streams and commonly underlain by silty to silty clay loam; Cd, marine and glaciomarine stony (including till-like deposits) to stoneless silt loam to clay loam with minor sand and silt normally less than 3 m thick but up to 30 m thick, containing marine shells. These deposits thicken from west to east. Ce, mainly marine silt loam to clay loam with minor sand, silt, and stony glacio-marine material (see Cd), up to 6O+m thick. In many of the upland areas sediments mapped as Cc and Cd are mantled by a thin veneer (less than 1 m) of Ca

VASHON DRIFT AND CAPILANO SEDIMENTS

VC — Glacial drift including: lodgment and minor flow till, lenses and interbeds of substratified glaciofluvial sand to gravel, and lenses and interbeds of glacio-lacustrine laminated stony silt; up to 25 m thick but in most places less than 8 m thick (correlates with Va,b); overlain by glaciomarine and marine deposits similar to Cd normally less than 3 m but in places up to 10 m thick. Marine derived lag gravel normally less than 1 m thick containing marine shell casts has been found mantling till and glaciomarine deposits up to 175 m above sea level; above 175 m till is mantled by bouldery gravel that may be in part ablation till, in part colluvium, and in part marine shore in origin

VASHON DRIFT

Va,b — Till, glaciofluvial, glaciolacustrine, and ice-contact deposits: Va, lodgment till (with sandy loam matrix) and minor flow till containing lenses and interbeds of glaciolacustrine laminated stony silt; Vb, glaciofluvial sandy gravel and gravelly sand outwash and ice-contact deposits

PRE-VASHON DEPOSITS

PVa-h — Glacial, nonglacial, and glaciomarine sediments: PVa, Quadra fluvial channel fill and floodplain deposits, crossbedded sand containing minor silt and gravel lenses and interbeds; PVb, Quadra (?) glaciofluvial deposits, deltaic, and crossbedded sand to gravel (may be in part Vb): PVc, Quadra marine interbedded fine sand to clayey silt believed to be off shore equivalents of PVa; PVd, Coquitlam till, glaciomarine (?), and glaciolacustrine deposits; PVe, Cowichan Head fluvial, organic colluvial, and bog and swamp sediments; PVf, Semiahmoo till, glacio-fluvial, glaciomarine, and glaciolacustrine deposits; PVg*, Highbury fluvial and bog and swamp deposits; PVh*, Westlynn glaciolluvial sandy gravel

TERITIARY

T — Tertiary bedrock including sandstone, siltstone, shale, conglomerate, and minor volcanic rocks; where bedrock is not at the surface it is overlain by glacial deposits and colluvium

LEGEND

- At Grade / Low Elevated Guideway
- Elevated Guideway
- Tunnel
- Major Road

NOTE

Rapid Transit Alignment shown is for illustrative purposes only.

REFERENCE

Surficial Geology Maps digitized from Geological Survey of Canada Map 1484 A (New Westminster), 1980.

800 0 800

SCALE 1:40,000 METRES

PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM, PORT MOODY, B.C.

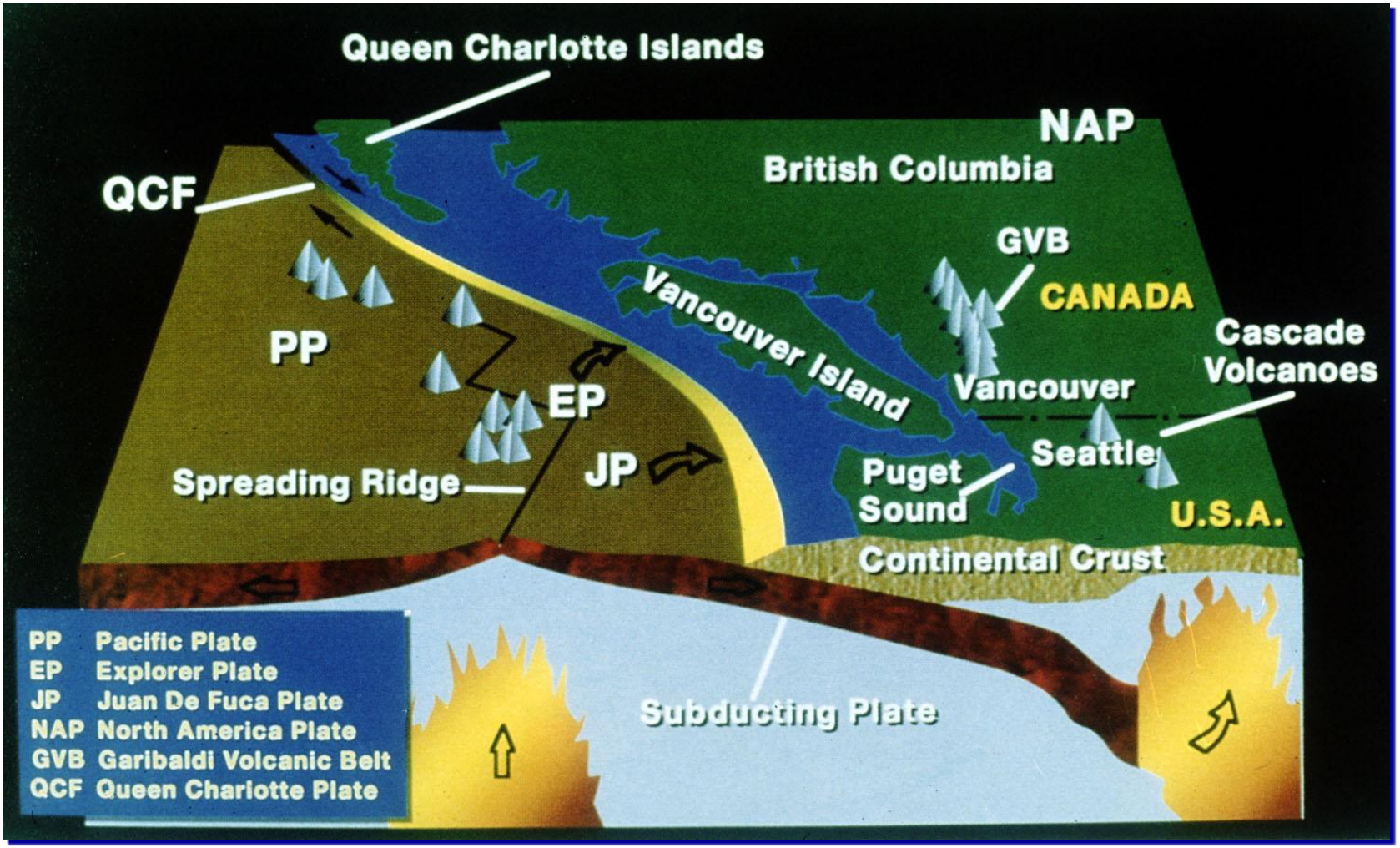
TITLE

SURFICIAL GEOLOGY ALONG THE PROPOSED ELRT ALIGNMENT

PROJECT No. 08-1411-0115			PHASE No. 4000/4020	
DESIGN	VF	04OCT10	SCALE AS SHOWN	REV. 0
GIS	MH	04OCT10		
CHECK	UDA	21JUL11		
REVIEW	TPF	21JUL11		

FIGURE 2-1

REVISION DATE:

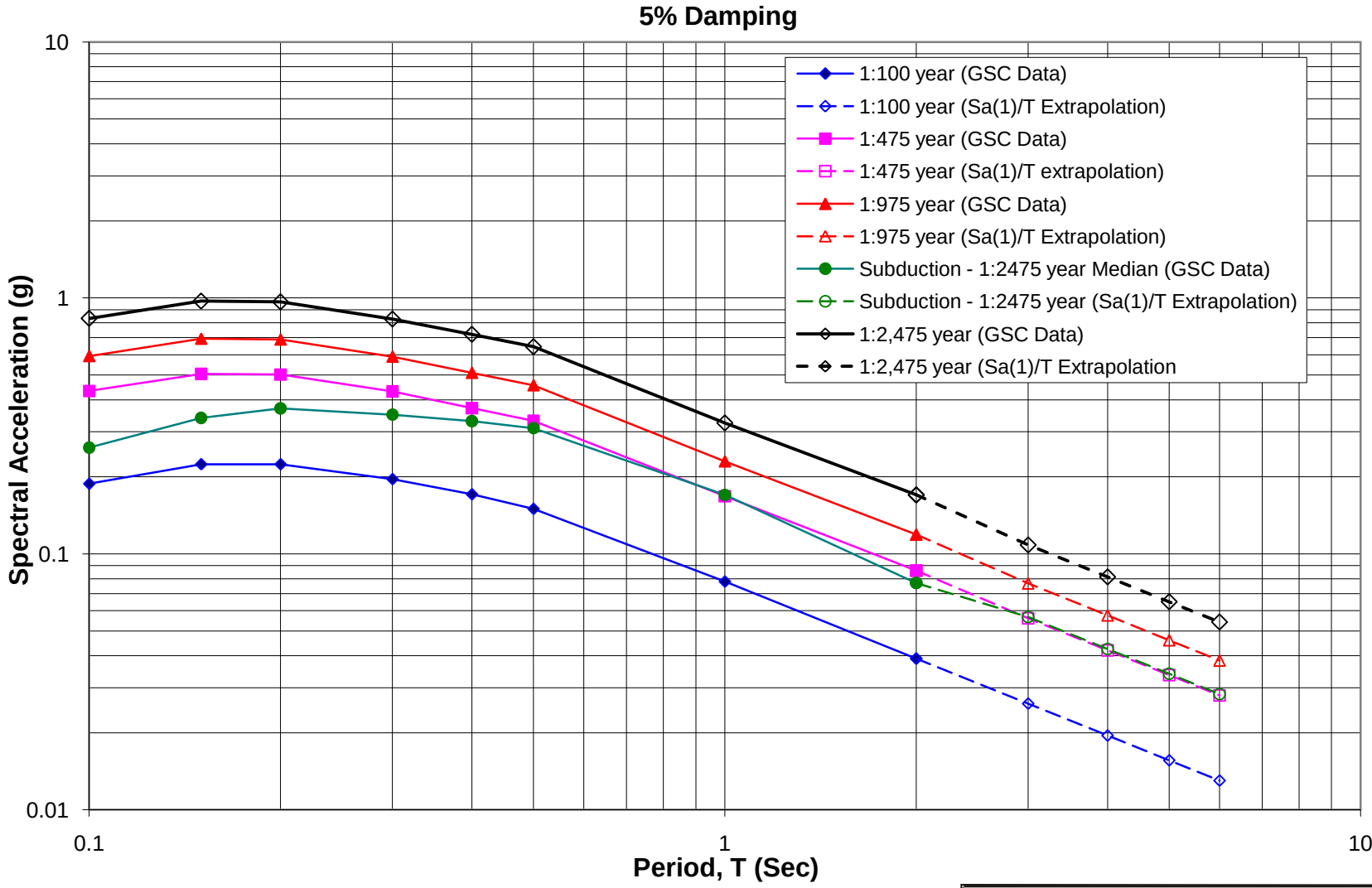


PROJECT	CH2M HILL CANADA LIMITED EVERGREEN LINE RAPID TRANSIT PROJECT COQUITLAM, PORT MOODY, BC
TITLE	TECTONIC SETTING FOR THE AREA

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4250	
DESIGN	VF	OCT 21, 2011	SCALE NTS	REV.
CADD	--		FIGURE 3-1	
CHECK	UDA	OCT 21, 2011		
REVIEW				

REVISION DATE:



PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM, PORT MOODY, BC

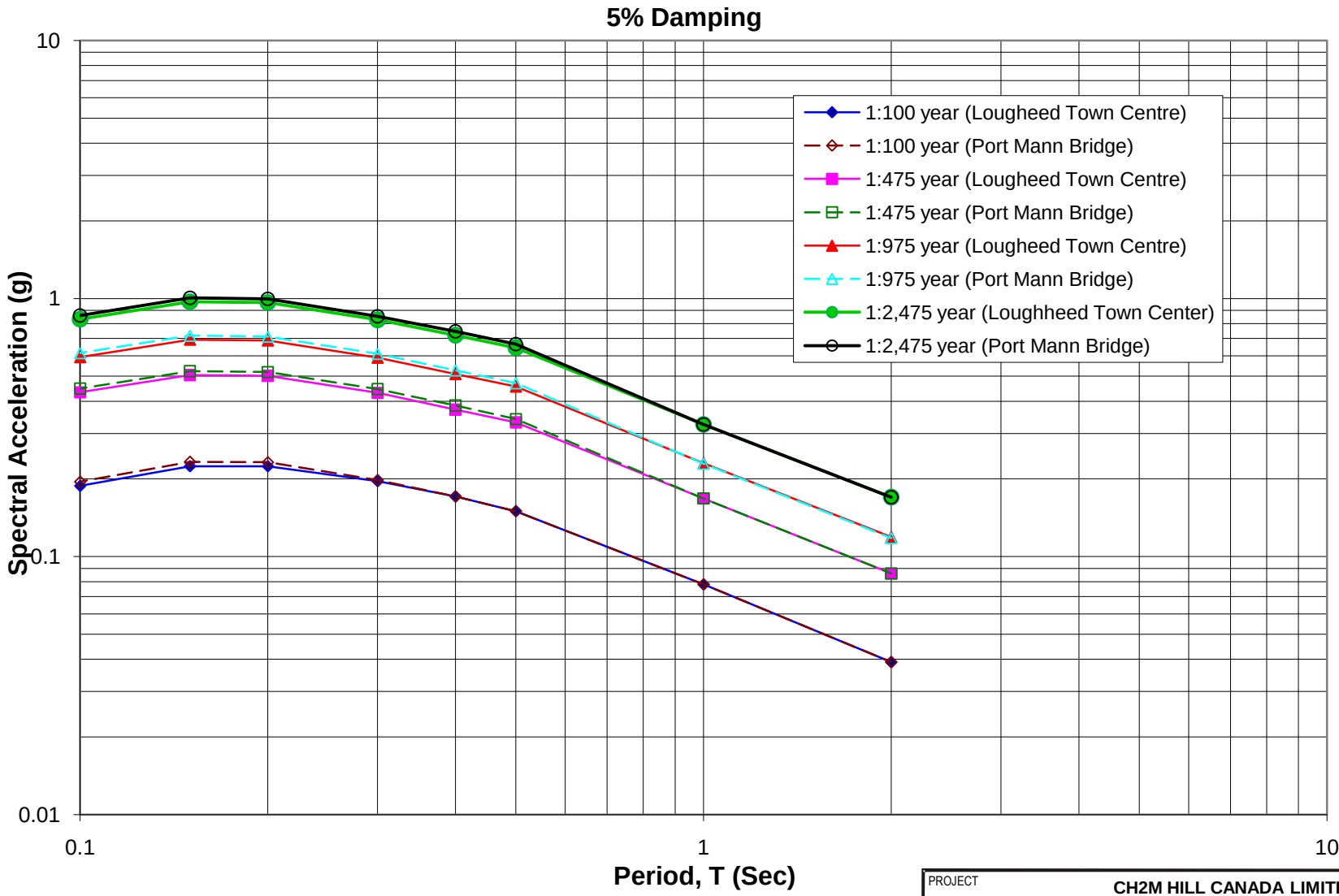
TITLE

CLASS C UNIFORM HAZARD RESPONSE SPECTRA

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4250	
DESIGN	VF	OCT 21, 2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21, 2011	**FIGURE 4-1**	
REVIEW				

REVISION DATE:



PROJECT

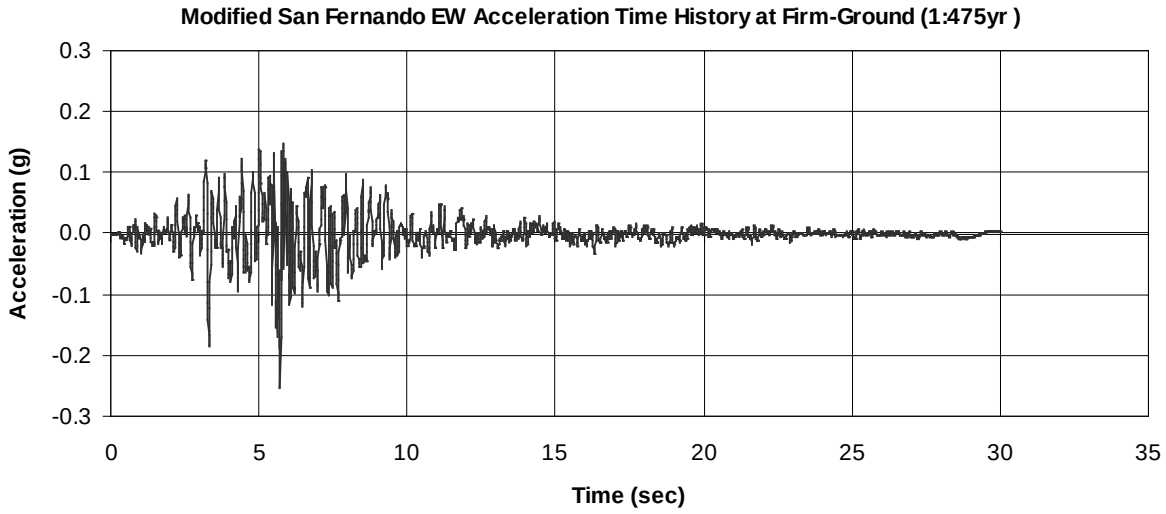
CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM, PORT MOODY, BC

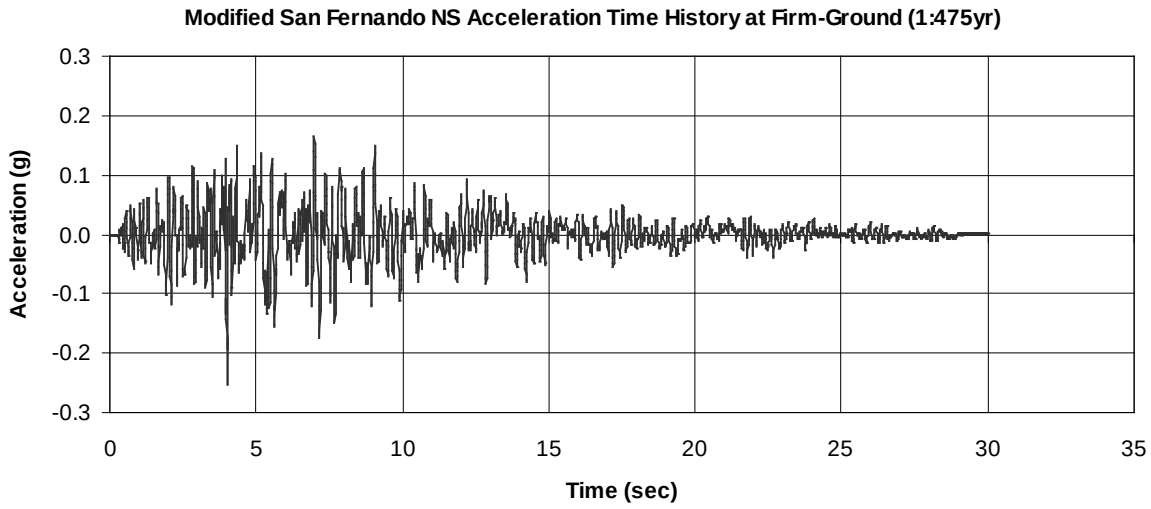
TITLE

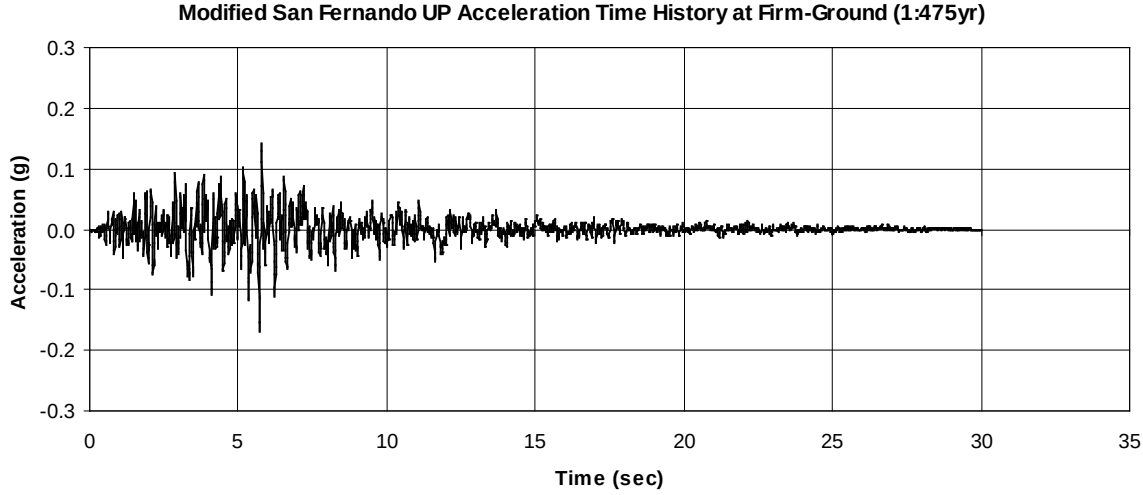
CLASS C UNIFORM HAZARD RESPONSE SPECTRA
(Port Mann Bridge Vs. Lougheed Town Centre)

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4250	
DESIGN	VF	OCT 21, 2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21, 2011	**FIGURE 5-1**	
REVIEW				







PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM , PORT MOODY, BC

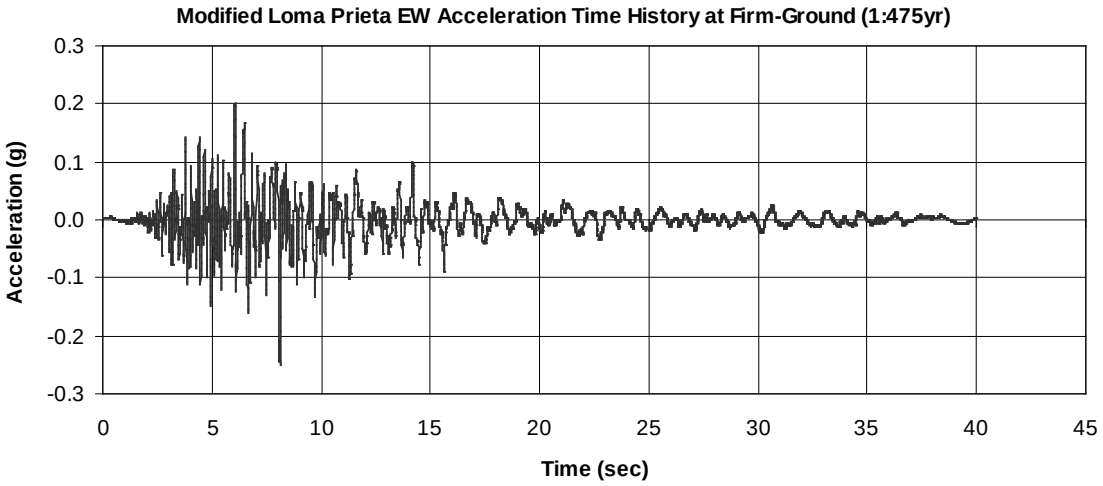
TITLE

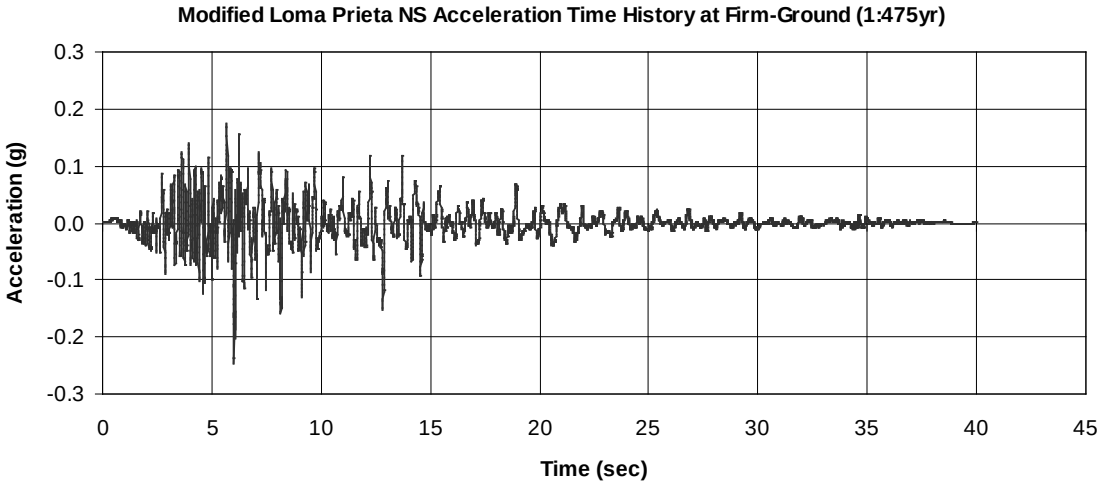
MODIFIED SAN FERNANDO EQ ACCELERATION TIME-HISTORIES (475-YEAR GROUND MOTIONS)

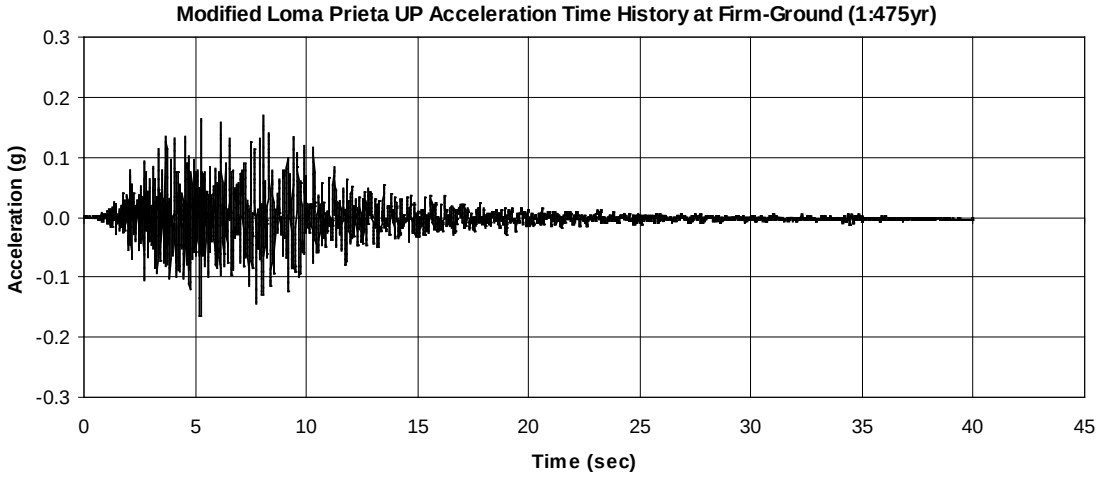
Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4240	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21,2011	**FIGURE 5-2**	
REVIEW				

REVISION DATE: BY: FILE:







PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM , PORT MOODY, BC

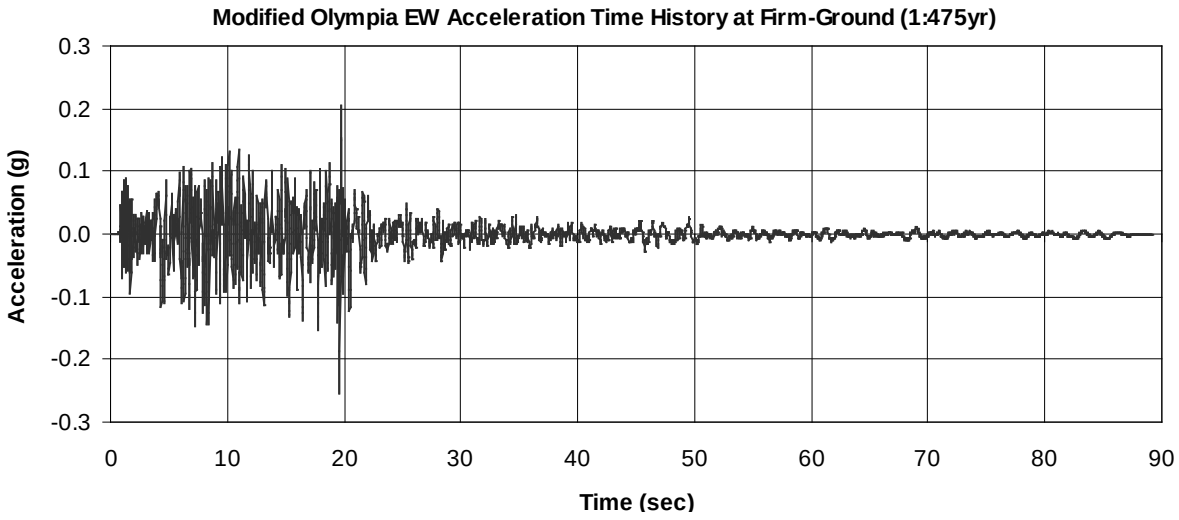
TITLE

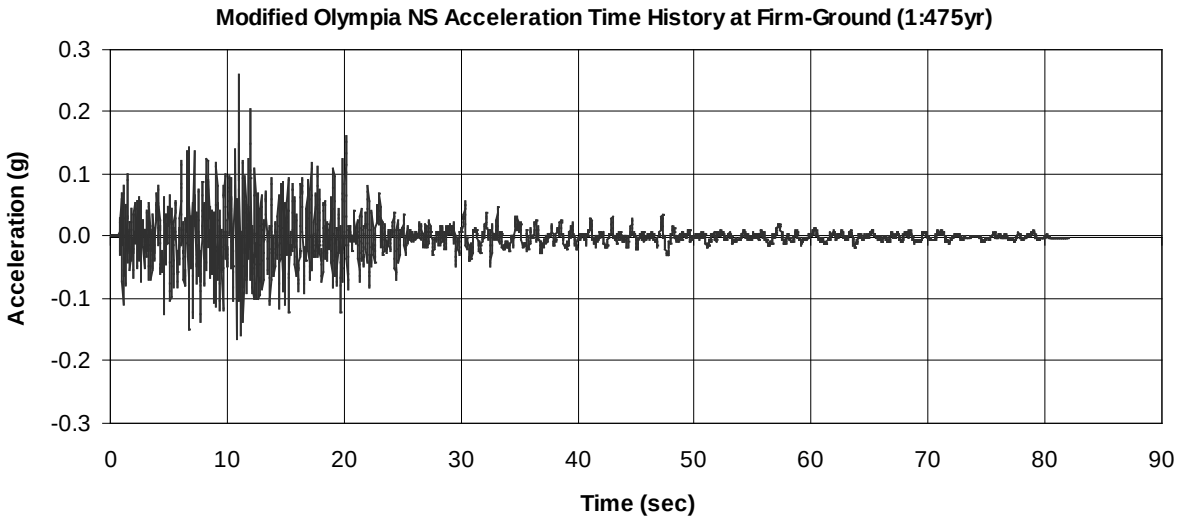
MODIFIED LOMA PRIETA EQ ACCELERATION TIME-HISTORIES (475-YEAR GROUND MOTIONS)

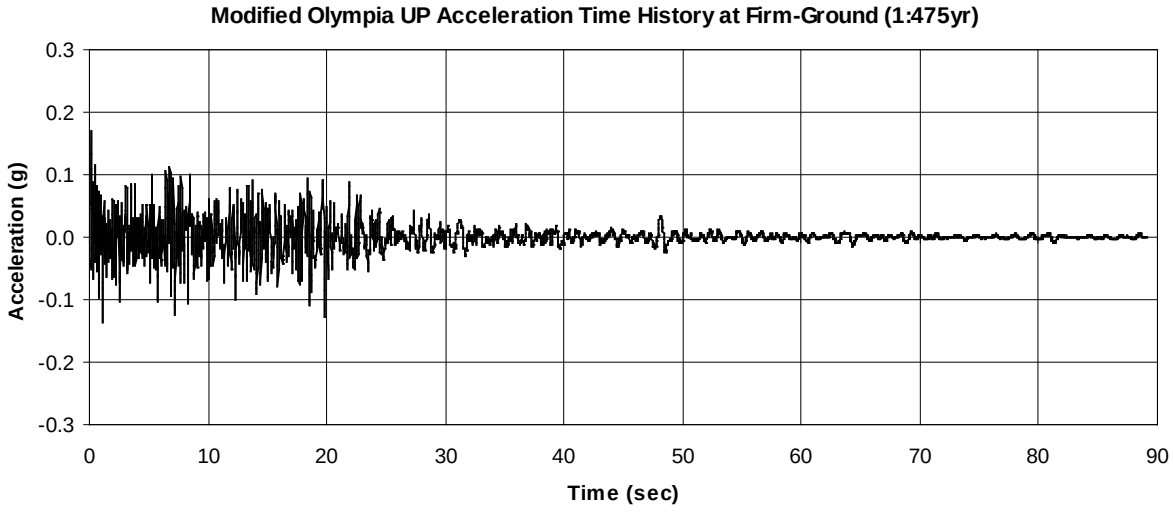
Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4240	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21,2011	**FIGURE 5-3**	
REVIEW				

REVISION DATE: BY: FILE:







PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM , PORT MOODY, BC

TITLE

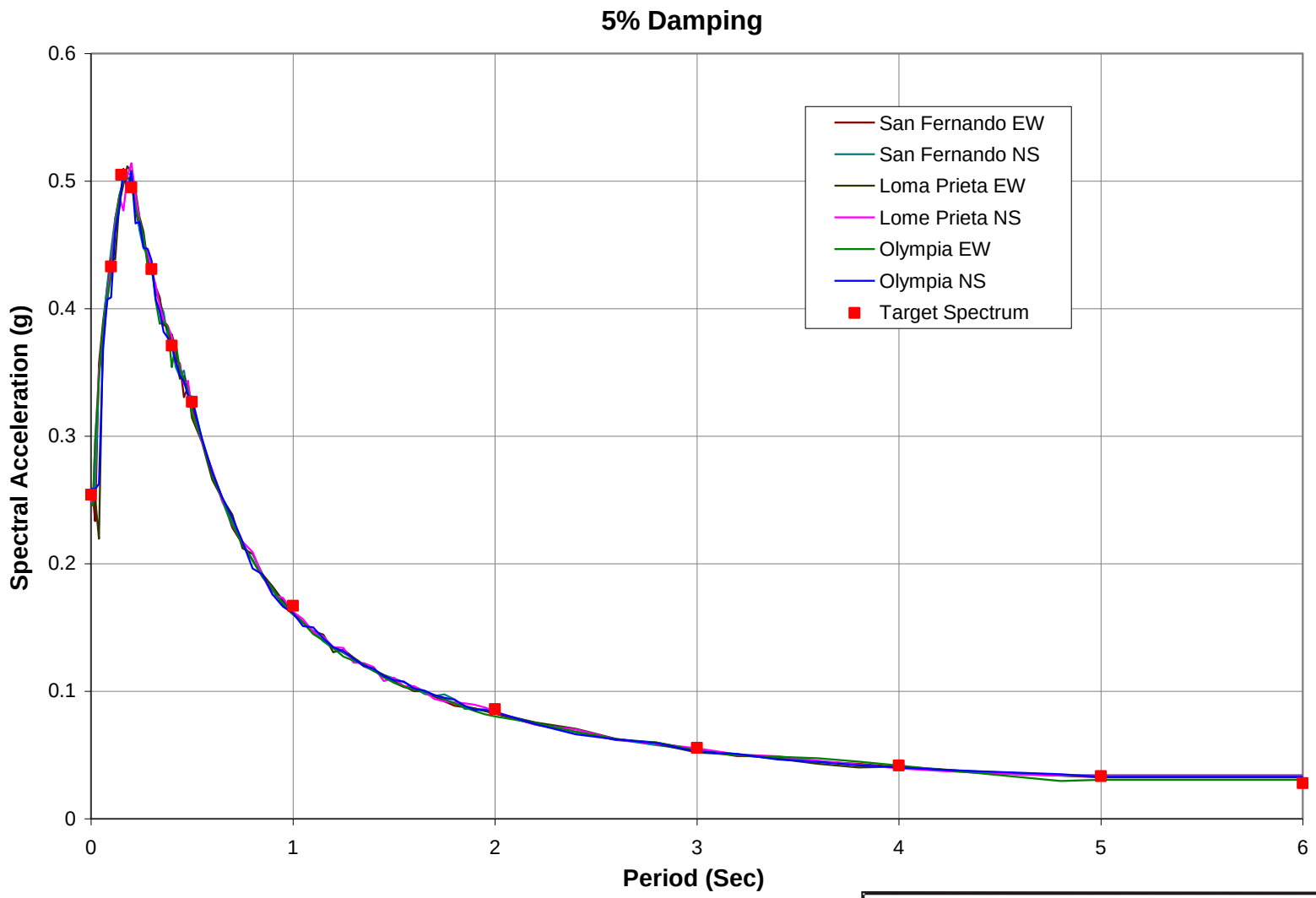
MODIFIED OLYMPIA EQ ACCELERATION TIME-HISTORIES (475-YEAR GROUND MOTIONS)

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4240	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21,2011	**FIGURE 5-4**	
REVIEW				

REVISION DATE: BY: FILE:

REVISION DATE:



PROJECT

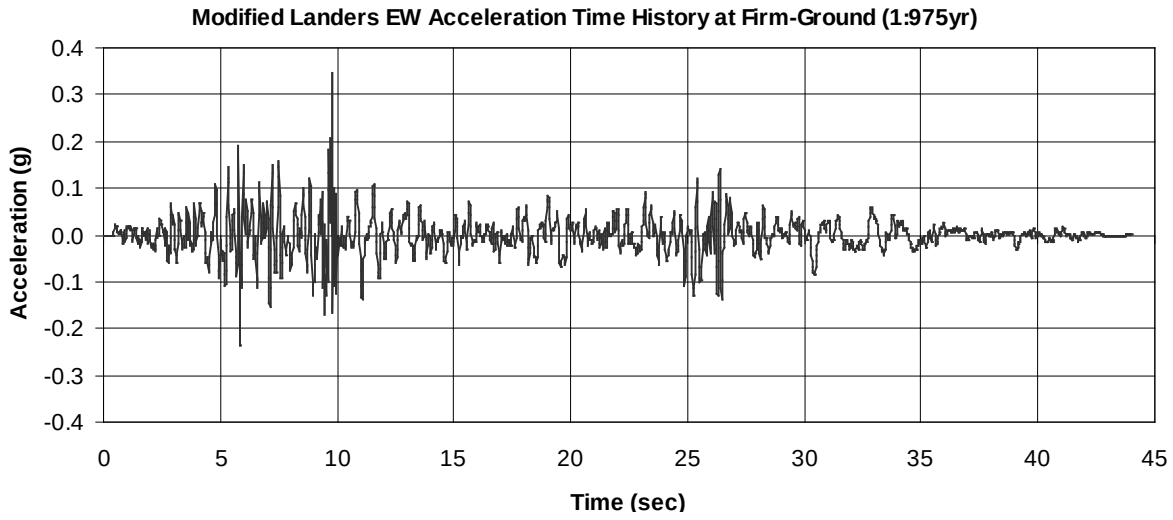
CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM, PORT MOODY, BC

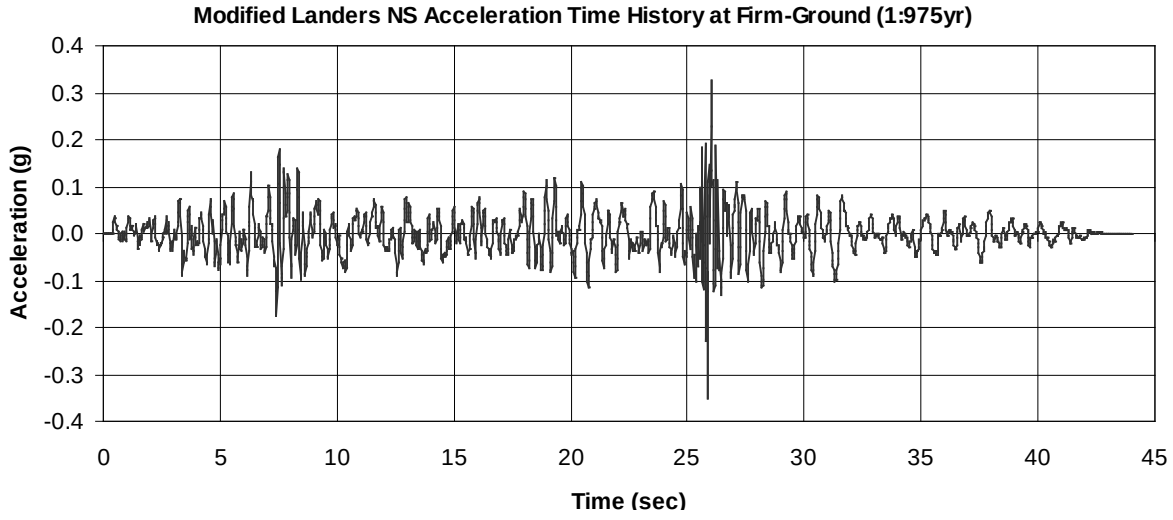
TITLE

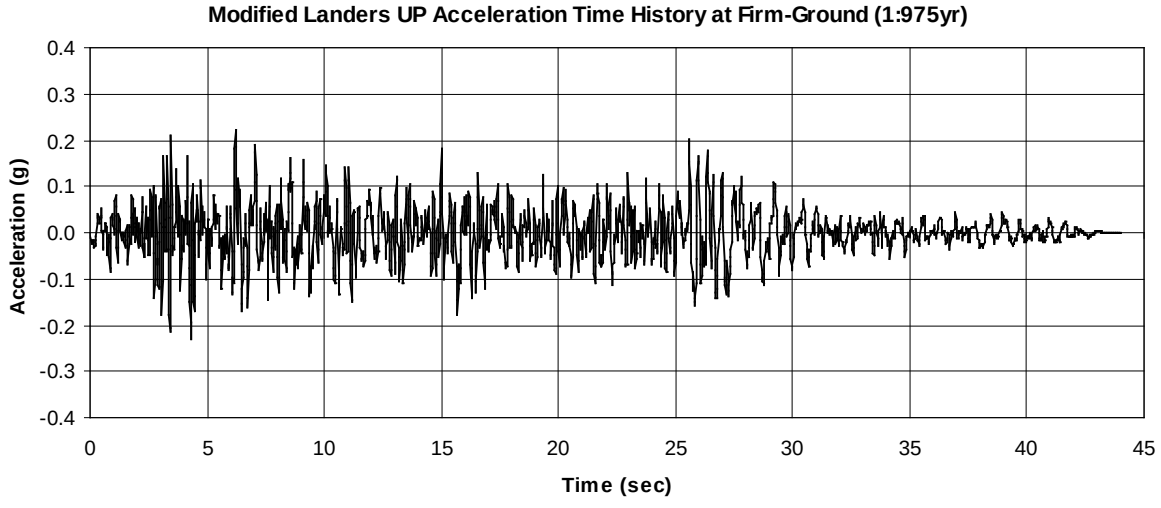
FIRM GROUND TARGET SPECTRUM AND SPECTRA OF MODIFIED RECORDS (475-YEAR GROUND MOTIONS)

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4250	
DESIGN	VF	OCT 21, 2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21, 2011	**FIGURE 5-5**	
REVIEW				







PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM , PORT MOODY, BC

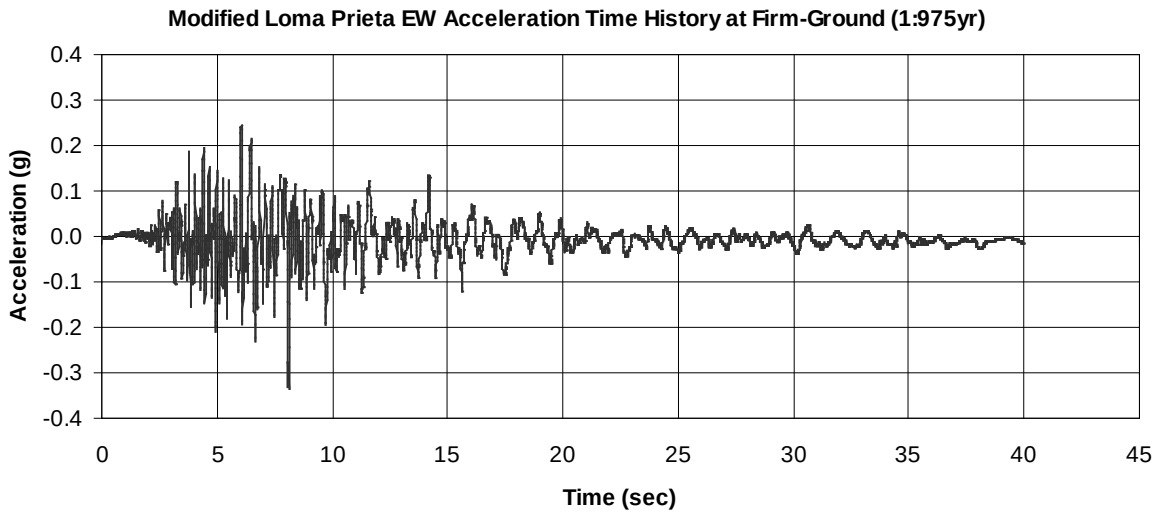
TITLE

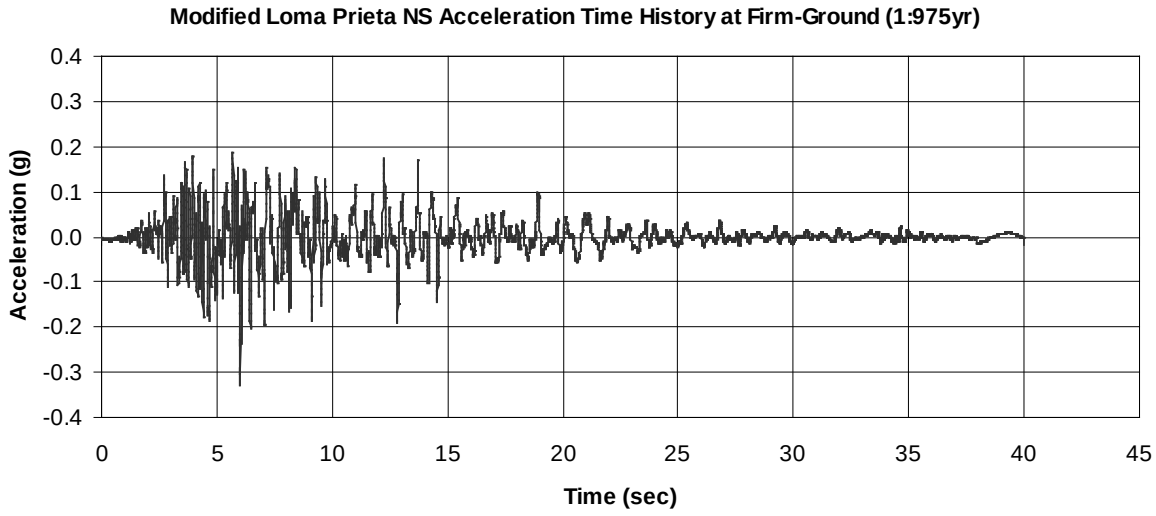
MODIFIED LANDERS EQ ACCELERATION TIME-HISTORIES (975-YEAR GROUND MOTIONS)

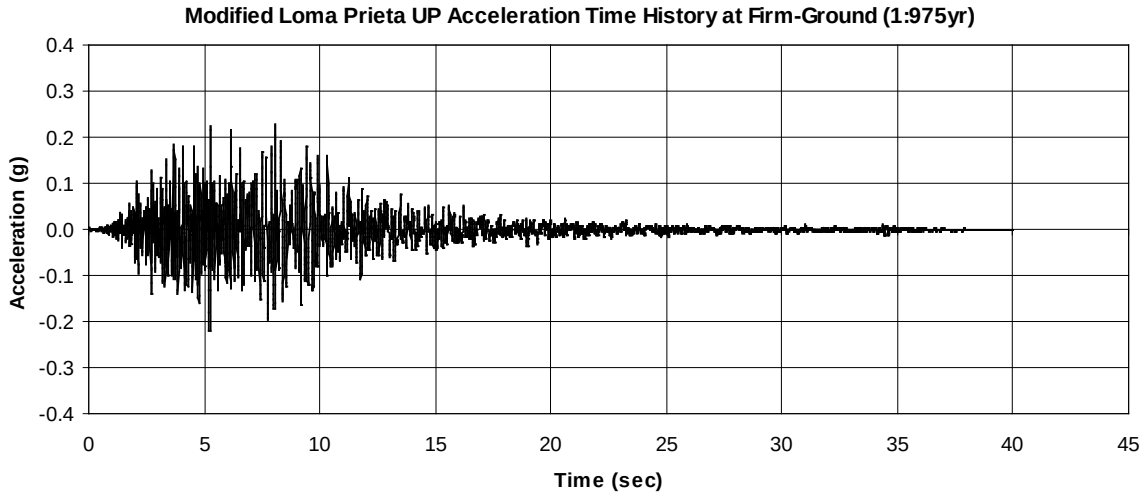
Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4240	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21,2011	**FIGURE 5-6**	
REVIEW				

REVISION DATE: BY: FILE:







PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM , PORT MOODY, BC

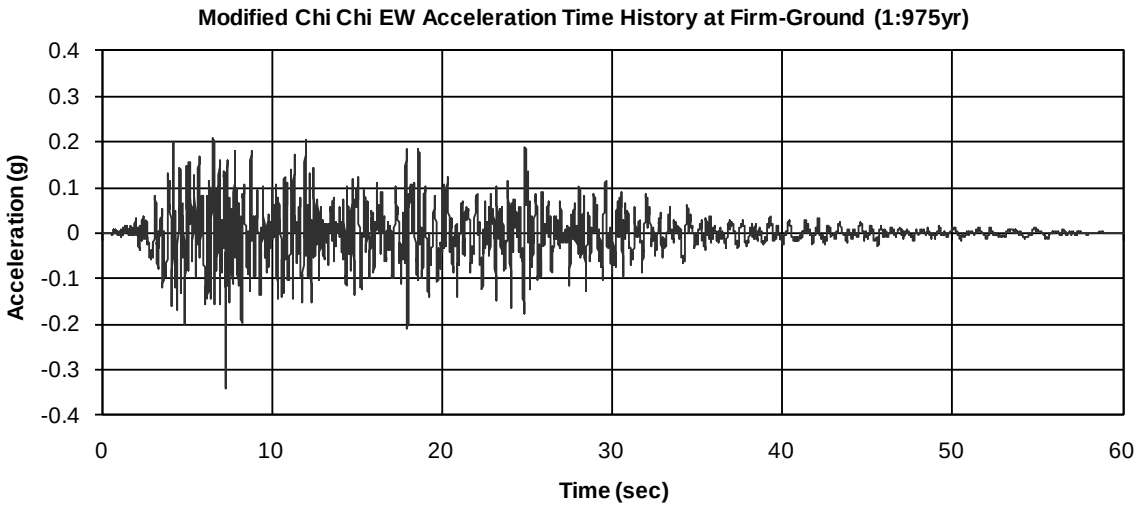
TITLE

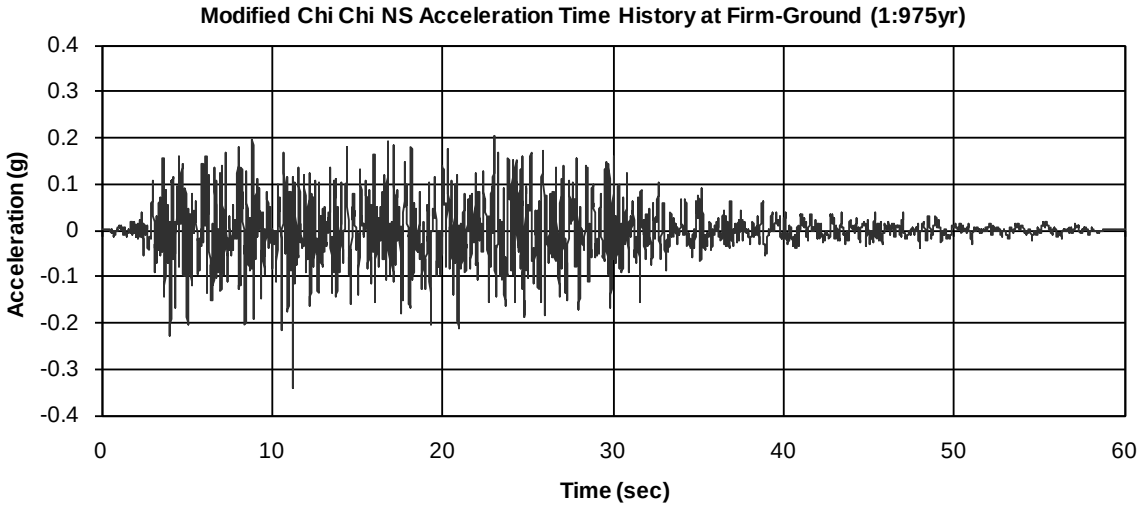
MODIFIED LOMA PRIETA EQ ACCELERATION TIME-HISTORIES (975-YEAR GROUND MOTIONS)

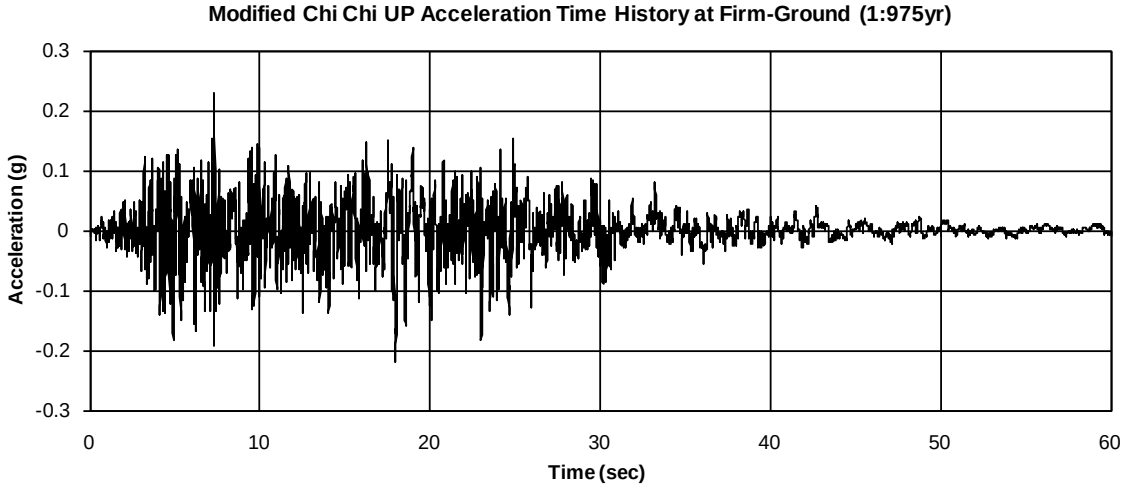
Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4240	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21,2011	**FIGURE 5-7**	
REVIEW				

REVISION DATE: BY: FILE:







PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM , PORT MOODY, BC

TITLE

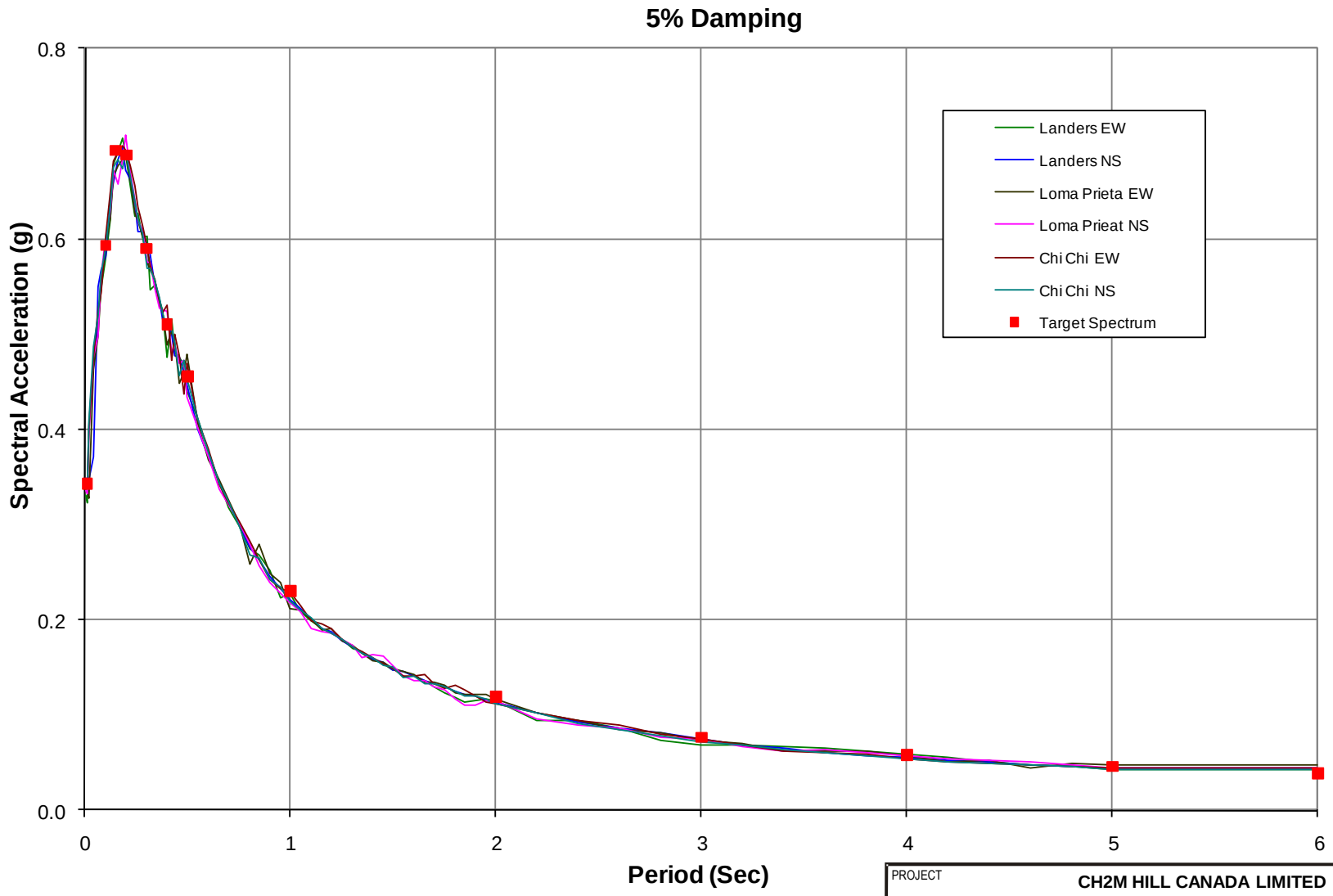
MODIFIED CHI CHI EQ ACCELERATION TIME-HISTORIES (975-YEAR GROUND MOTIONS)

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4240	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21,2011	**FIGURE 5-8**	
REVIEW				

REVISION DATE: BY: FILE:

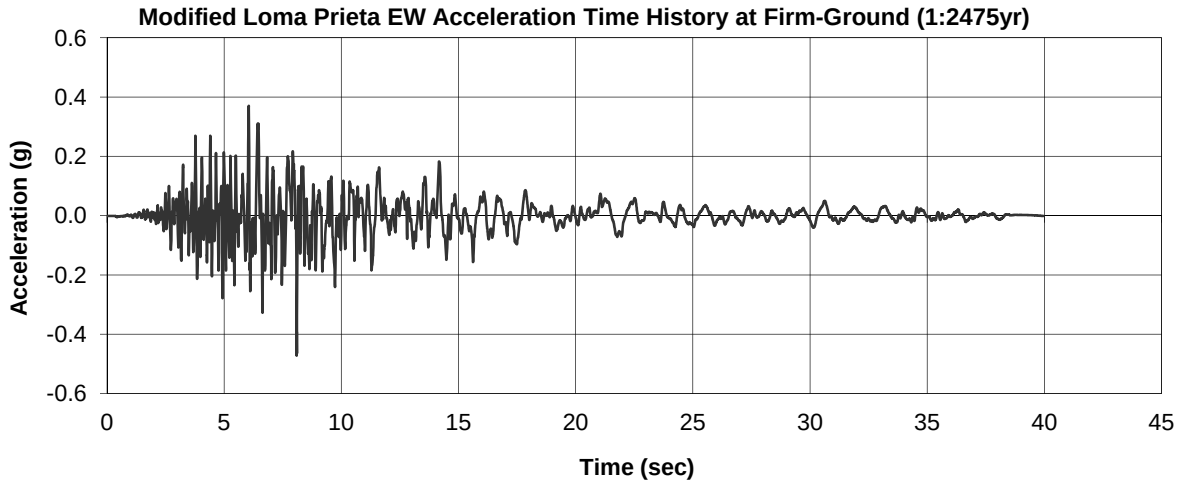
REVISION DATE:

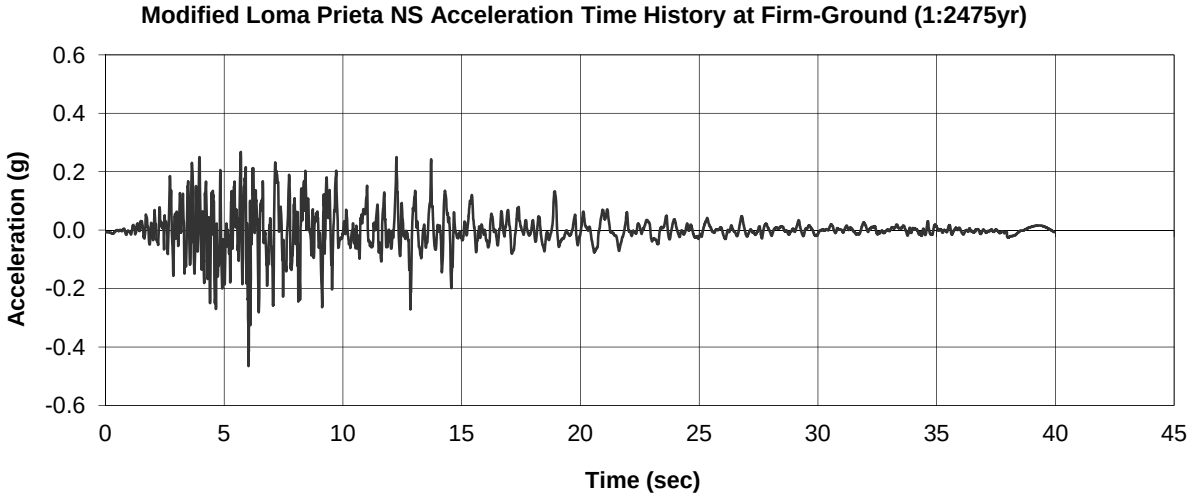


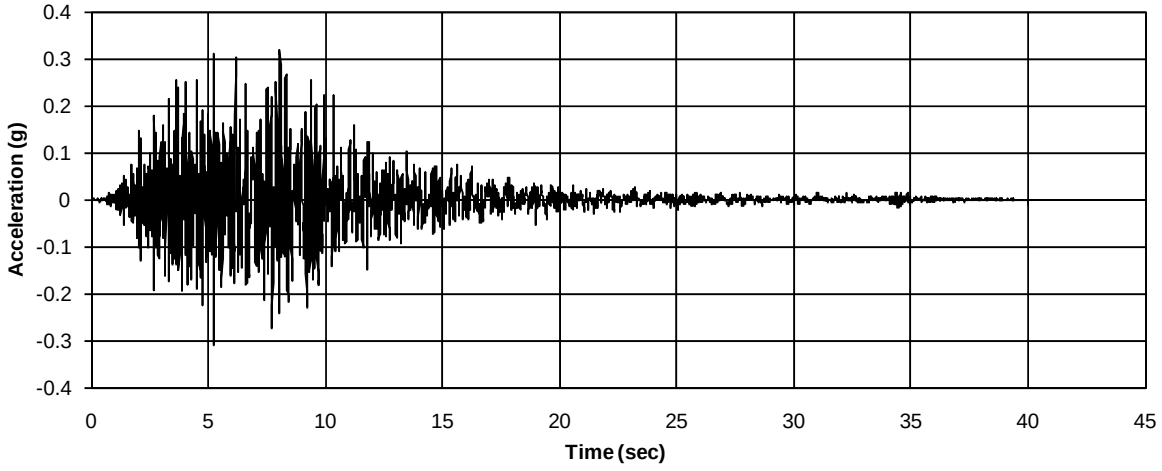
PROJECT	CH2M HILL CANADA LIMITED EVERGREEN LINE RAPID TRANSIT PROJECT COQUITLAM, PORT MOODY, BC
TITLE	FIRM GROUND TARGET SPECTRUM AND SPECTRA OF MODIFIED RECORDS (975-YEAR GROUND MOTIONS)

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4250	
DESIGN	VF	OCT 21, 2011	SCALE NTS	REV.
CADD	--		FIGURE 5-9	
CHECK	UDA	OCT 21, 2011		
REVIEW				







PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM , PORT MOODY, BC

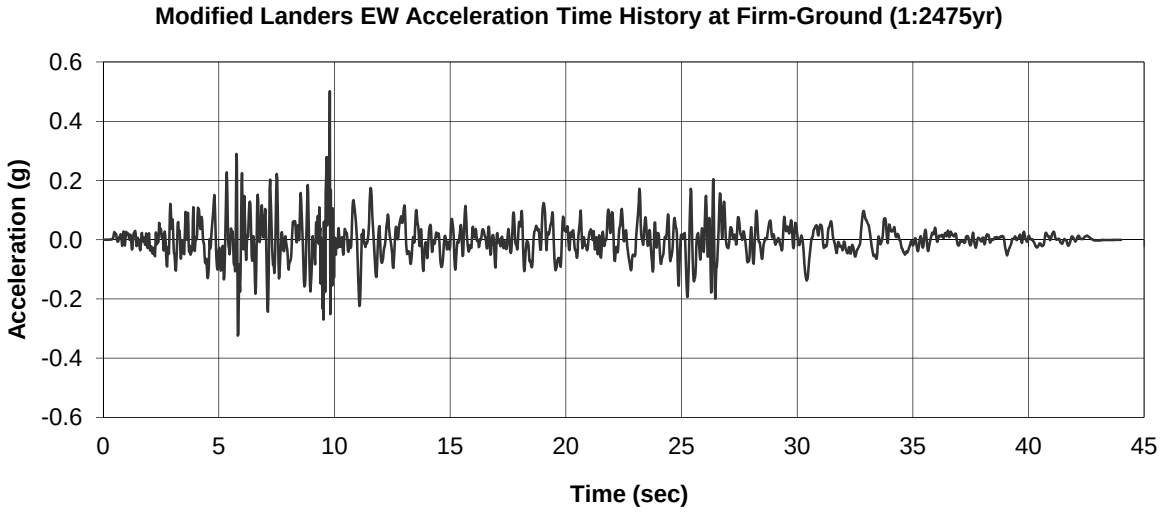
TITLE

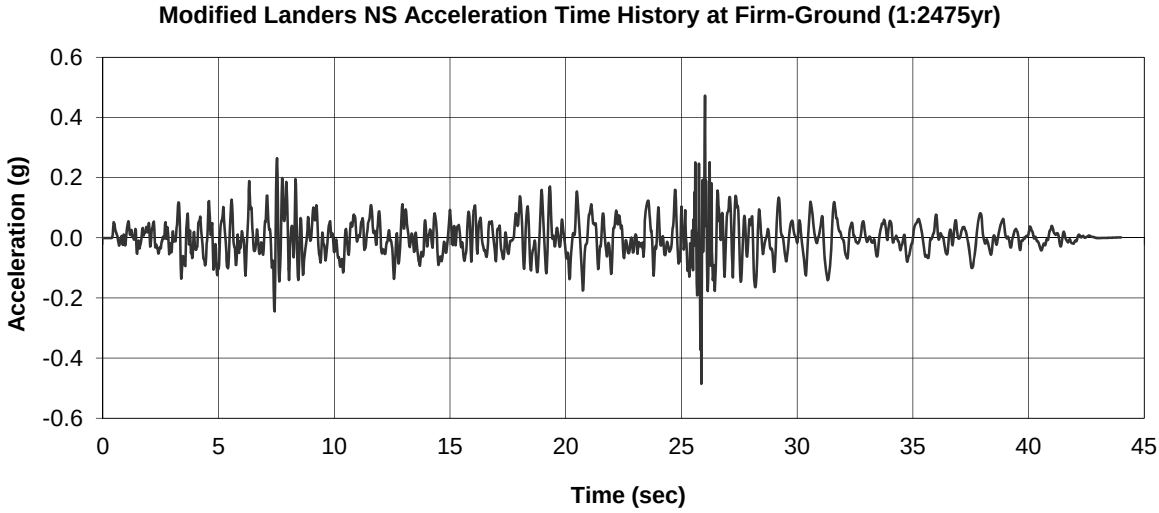
MODIFIED LOMA PRIETA EQ ACCELERATION TIME-HISTORIES (2,475-YEAR GROUND MOTIONS)

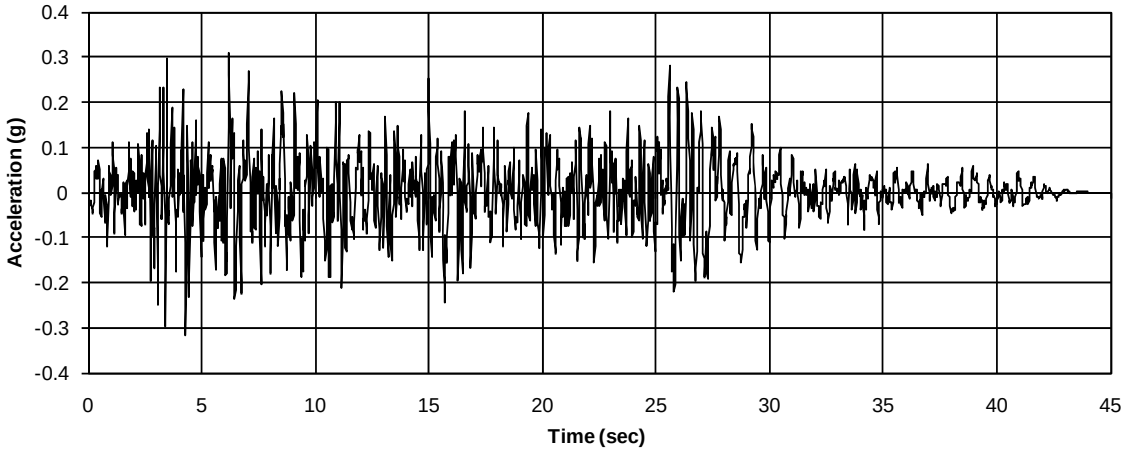
Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 5500A	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	DEC 2,2011	**FIGURE 5-10**	
REVIEW				

FILE: \\Bur1-s-filesrv2\final\2008\1411\08-1411-0115\5500A\TM 1202_11 FINAL\Components\Figure 5-10 Dec 2_11.PPT







PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM , PORT MOODY, BC

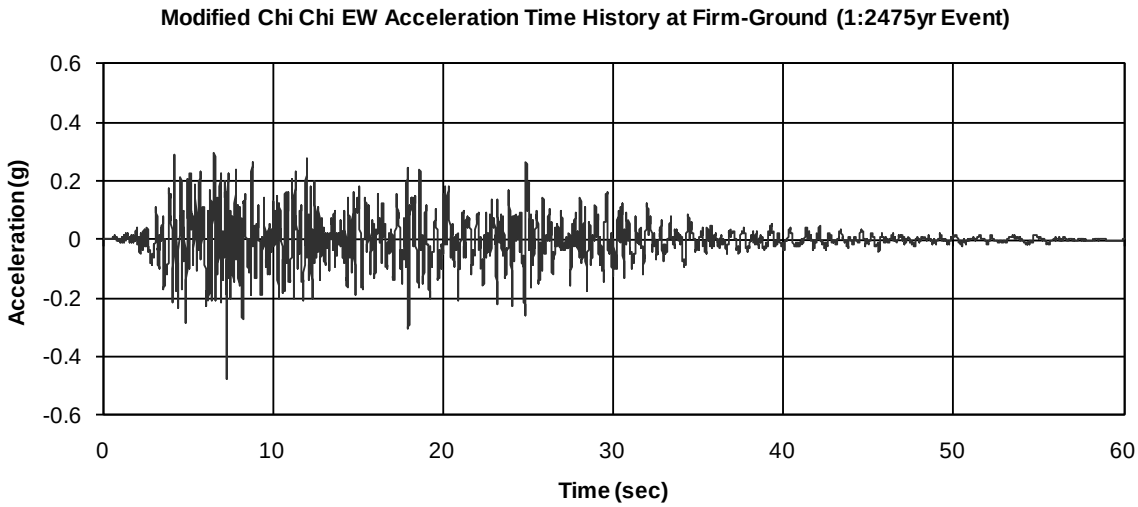
TITLE

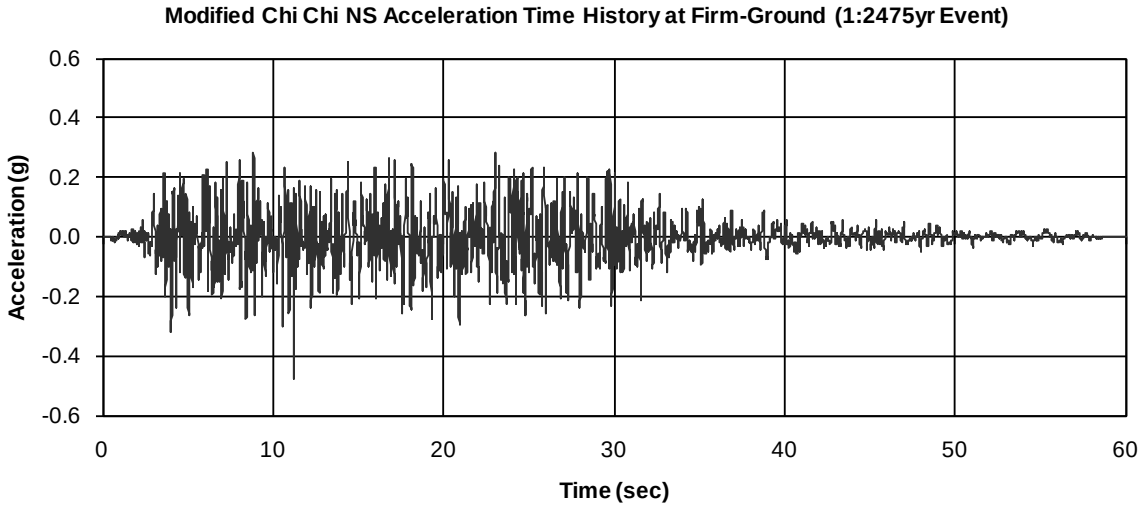
MODIFIED LANDERS EQ ACCELERATION TIME-HISTORIES (2,475-YEAR GROUND MOTIONS)

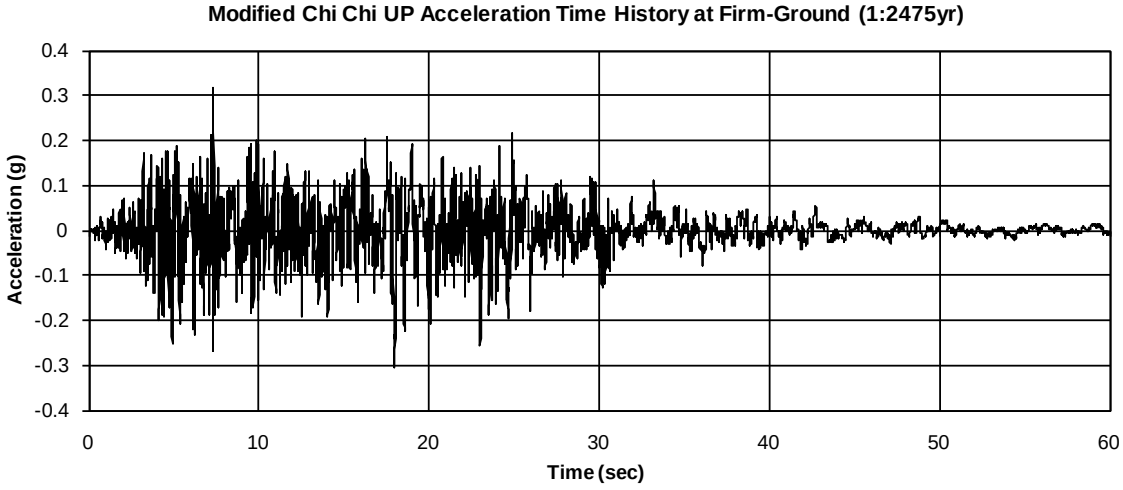
Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 5500A	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	DEC 2,2011	**FIGURE 5-11**	
REVIEW				

FILE: \\Bur1-s-filesrv2\final\2008\1411\08-1411-0115\5500A\TM 1202_11 FINAL\Components\Figure 5-11 Dec 2_11 .PPT







PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM , PORT MOODY, BC

TITLE

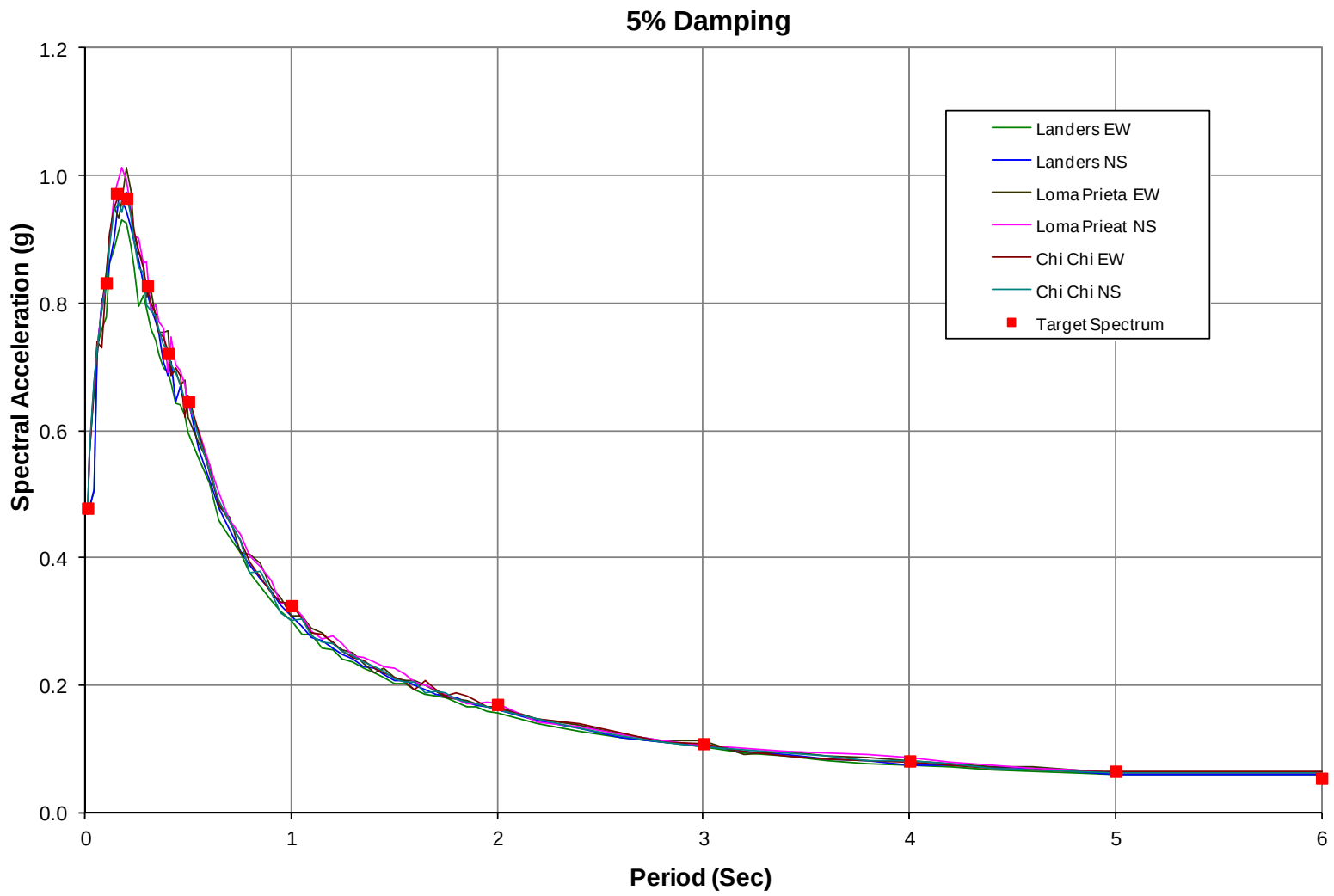
MODIFIED CHI CHI EQ ACCELERATION TIME-HISTORIES (2,475-YEAR GROUND MOTIONS)

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4240	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21,2011	**FIGURE 5-12**	
REVIEW				

REVISION DATE: BY: FILE:

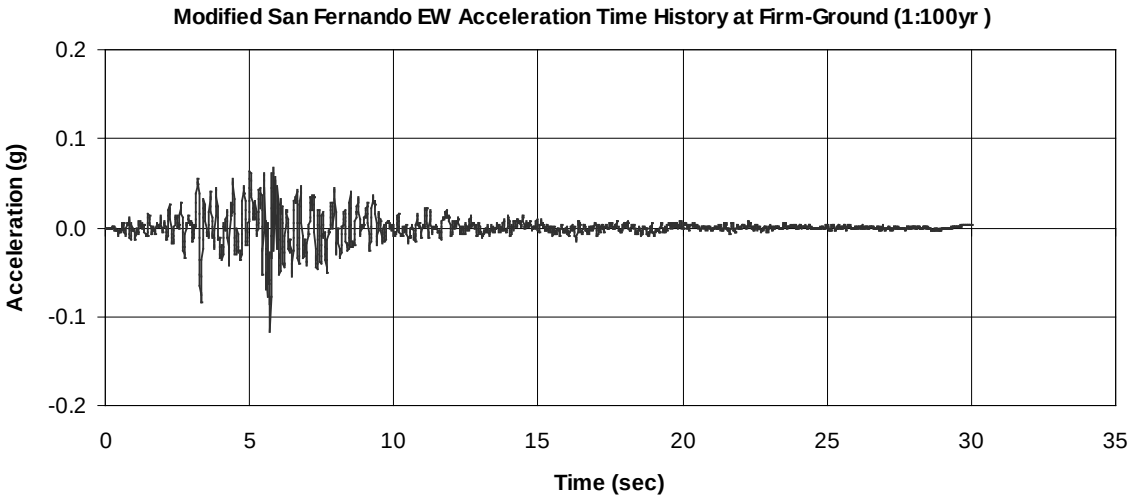
File:\Bur1-s-filesrv2\final\2008\1411\08-1411-0115\5500A\TM 1202_11 FINAL\Components\Figure 5-13 Dec 2_11 .PPT

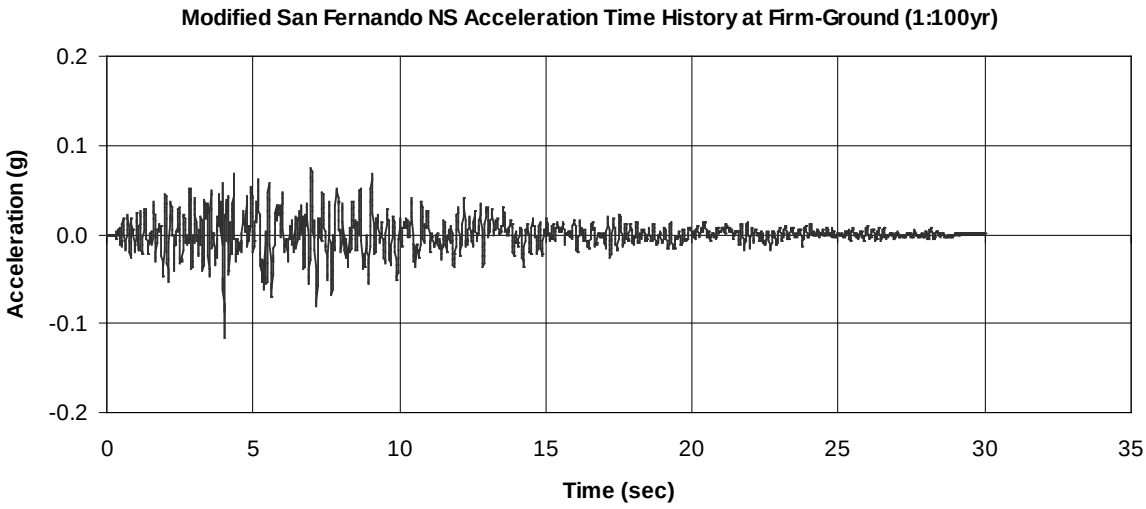


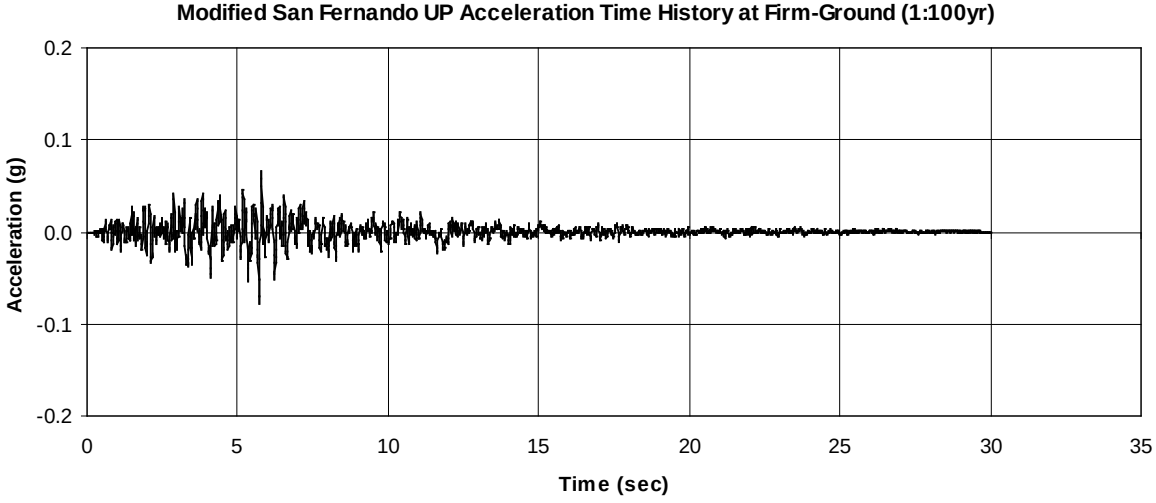
PROJECT	CH2M HILL CANADA LIMITED EVERGREEN LINE RAPID TRANSIT PROJECT COQUITLAM, PORT MOODY, BC
TITLE	FIRM GROUND TARGET SPECTRUM AND SPECTRA OF MODIFIED RECORDS (2,475-YEAR GROUND MOTIONS)

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4250	
DESIGN	VF	OCT 21, 2011	SCALE NTS	REV.
CADD	--		FIGURE 5-13	
CHECK	UDA	DEC 2, 2011		
REVIEW				







PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM , PORT MOODY, BC

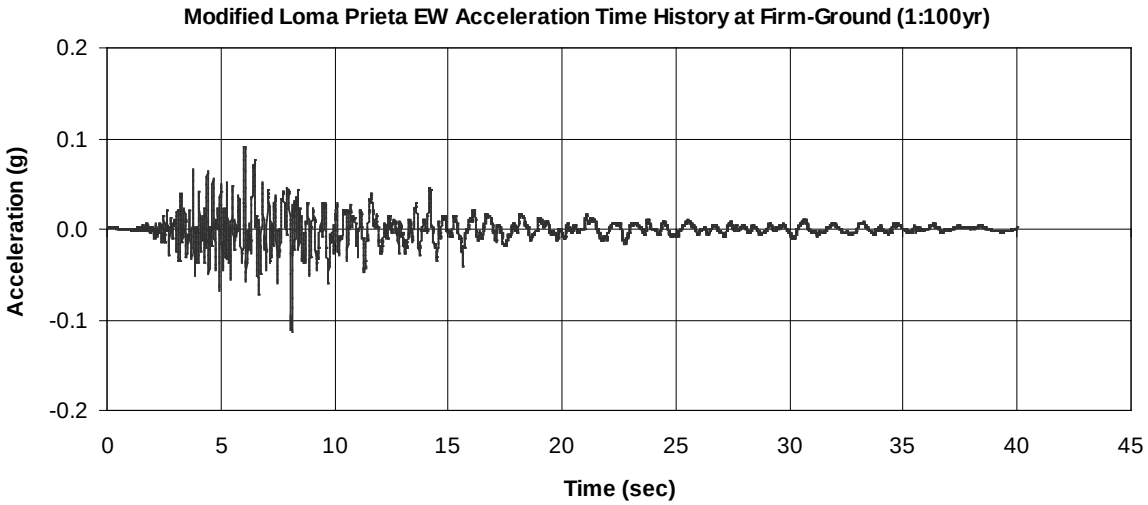
TITLE

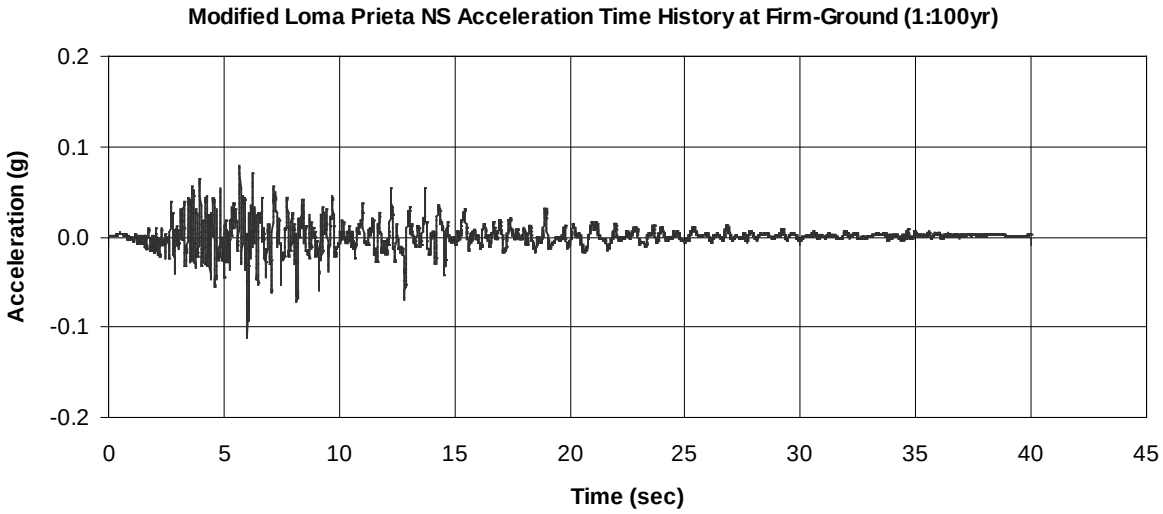
MODIFIED SAN FERNANDO EQ ACCELERATION TIME-HISTORIES (100-YEAR GROUND MOTIONS)

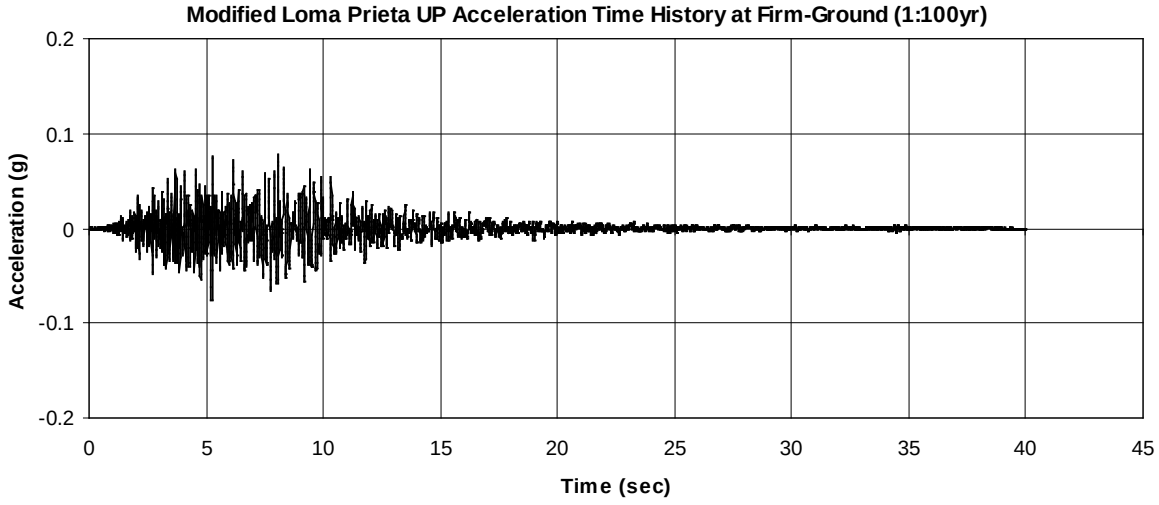
Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4240	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21,2011	**FIGURE 5-14**	
REVIEW				

REVISION DATE: BY: FILE:







PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM , PORT MOODY, BC

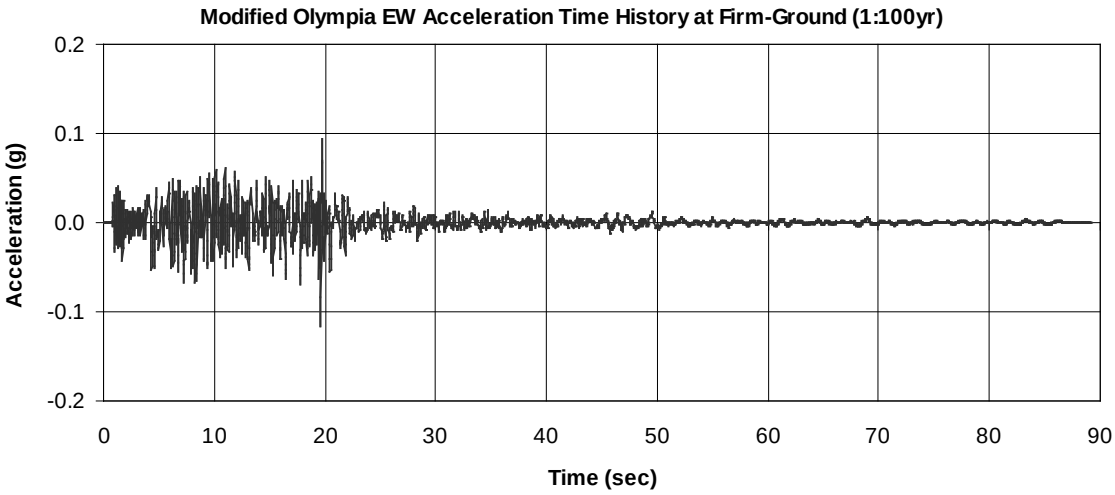
TITLE

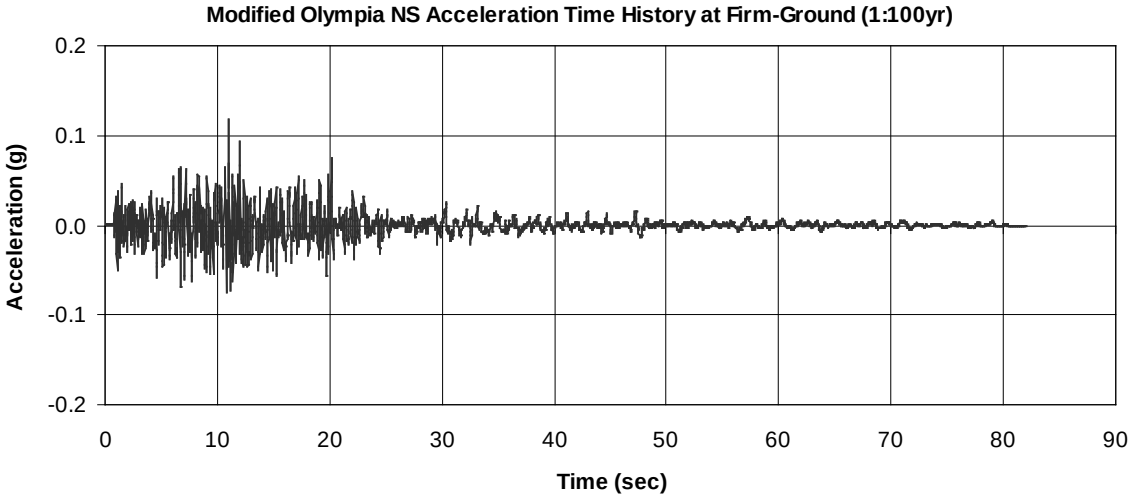
MODIFIED LOMA PRIETA EQ ACCELERATION TIME-HISTORIES (100-YEAR GROUND MOTIONS)

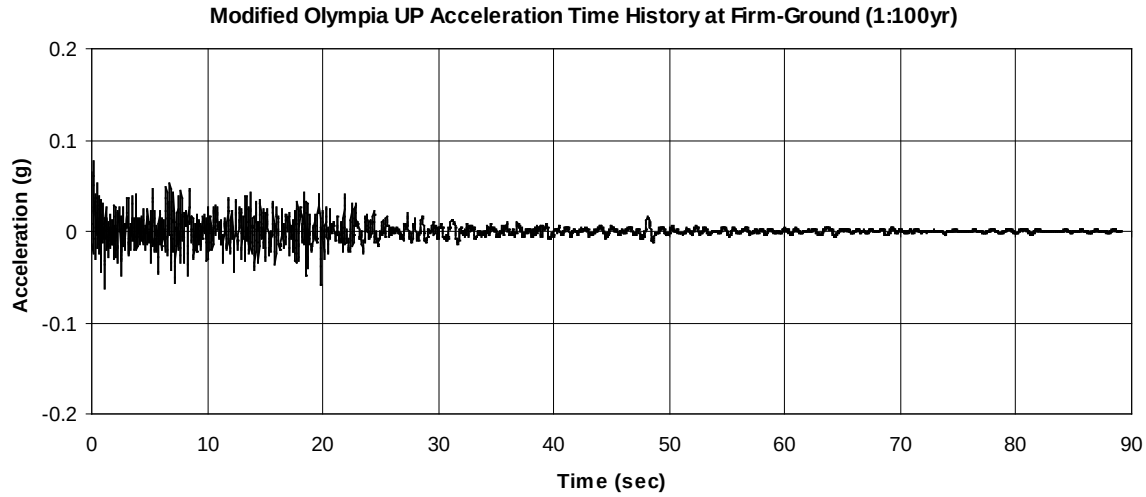
Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4240	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21,2011	**FIGURE 5-15**	
REVIEW				

REVISION DATE: BY: FILE:







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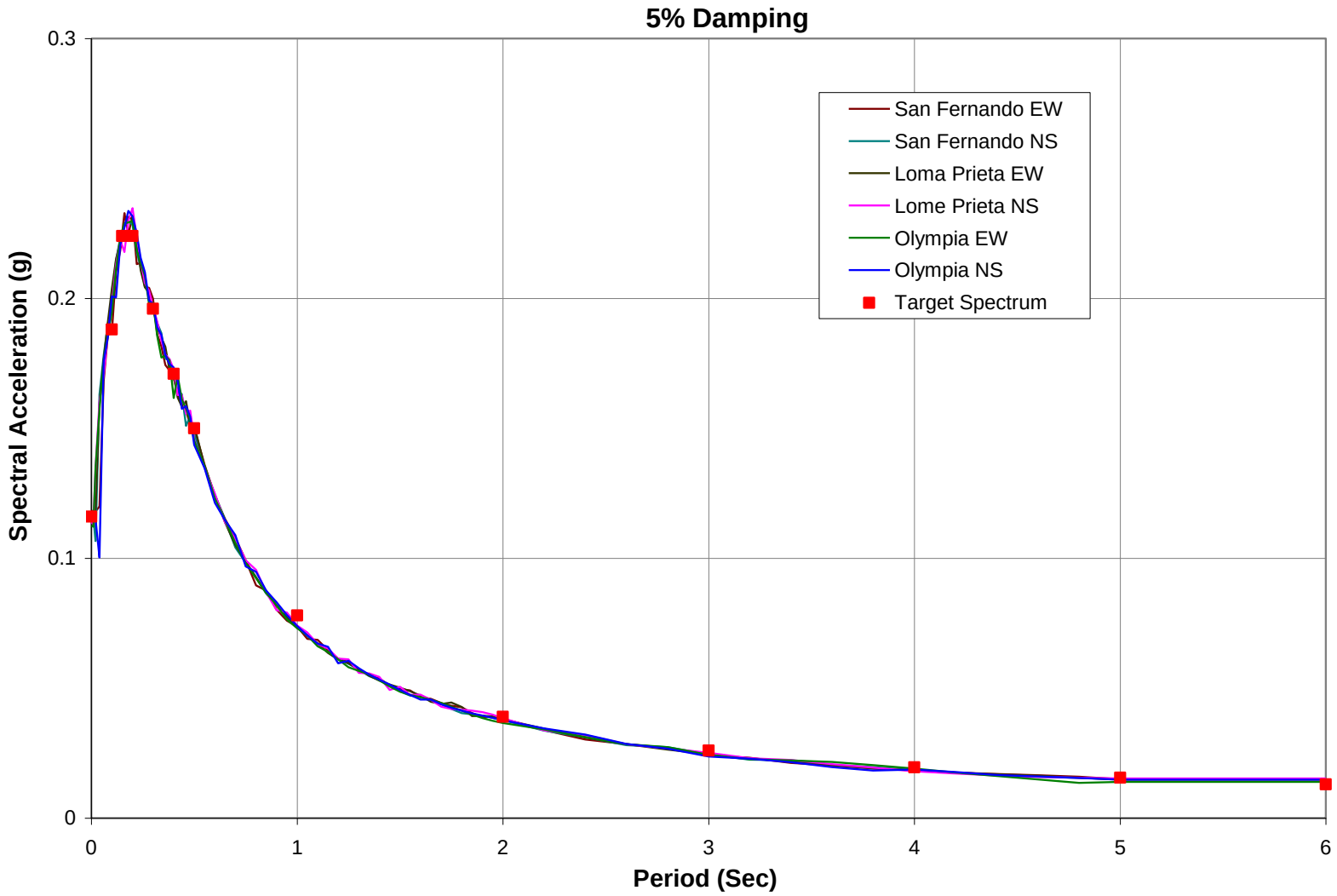
PROJECT	CH2M HILL CANADA LIMITED EVERGREEN LINE RAPID TRANSIT PROJECT COQUITLAM , PORT MOODY, BC
TITLE	MODIFIED OLYMPIA EQ ACCELERATION TIME-HISTORIES (100-YEAR GROUND MOTIONS)

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4240	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--		FIGURE 5-16	
CHECK	UDA	OCT 21,2011		
REVIEW				

REVISION DATE:



PROJECT

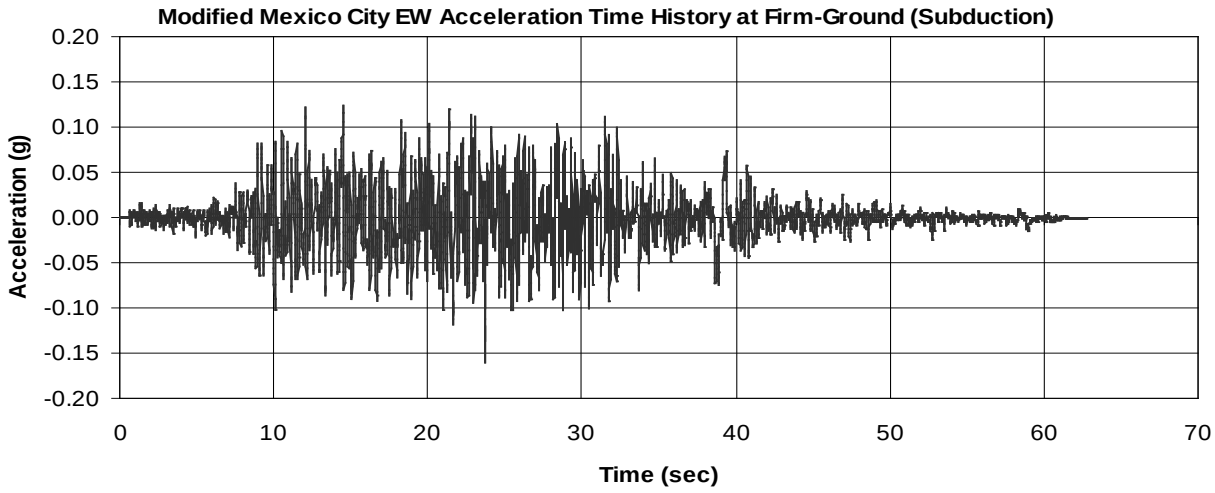
CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM, PORT MOODY, BC

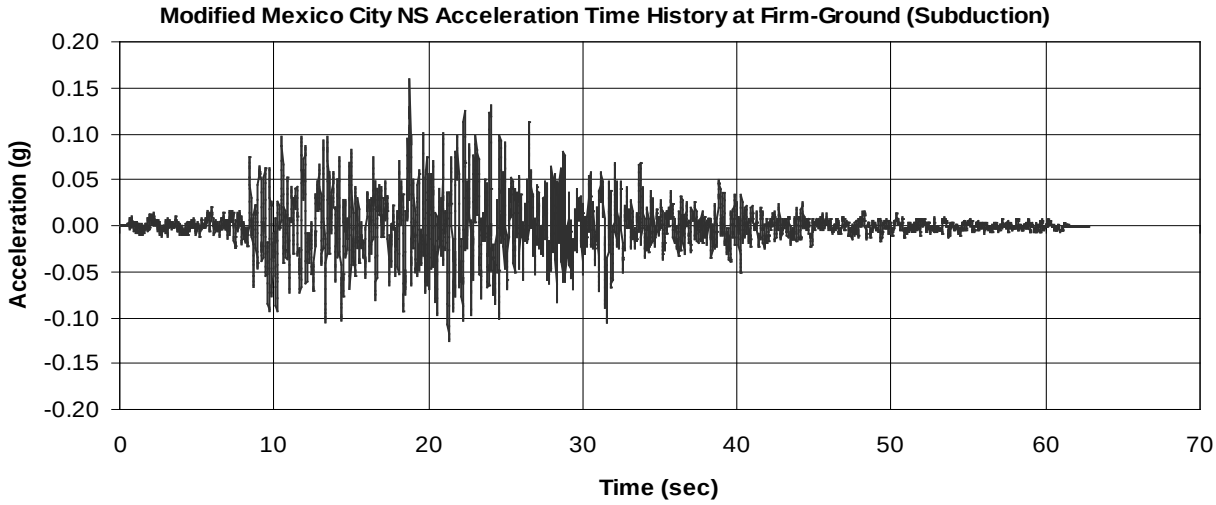
TITLE

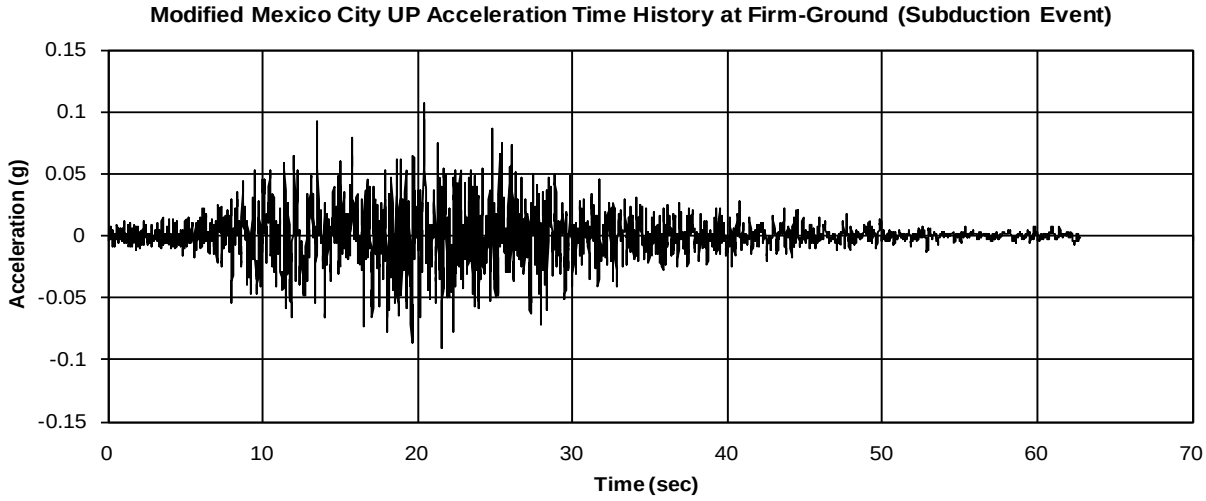
FIRM GROUND TARGET SPECTRUM AND SPECTRA OF MODIFIED RECORDS (100-YEAR GROUND MOTIONS)

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4250	
DESIGN	VF	OCT 21, 2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21, 2011	**FIGURE 5-17**	
REVIEW				







PROJECT

CH2M HILL CANADA LIMITED
EVERGREEN LINE RAPID TRANSIT PROJECT
COQUITLAM , PORT MOODY, BC

TITLE

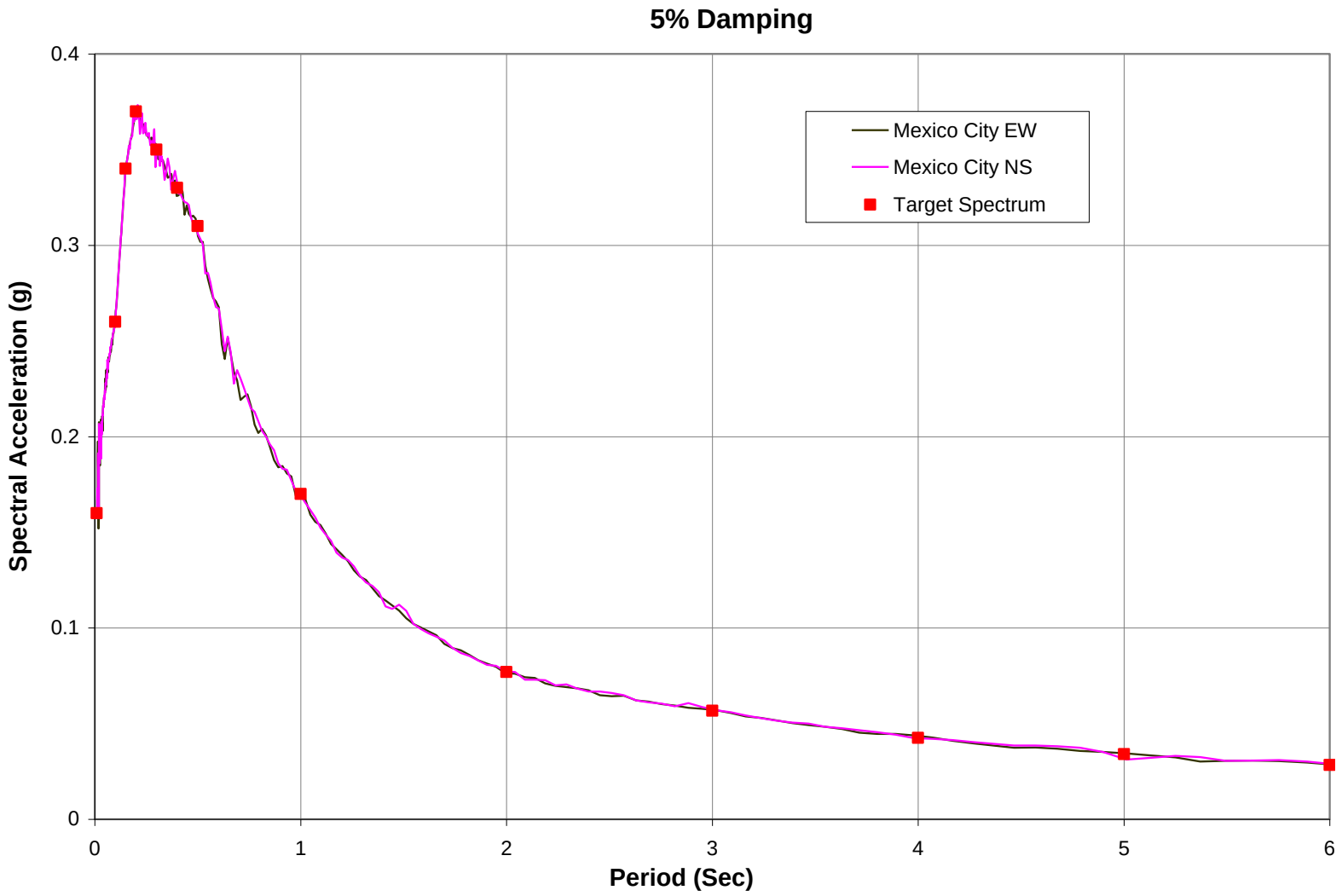
MODIFIED MEXICO CITY EQ ACCELERATION TIME-HISTORIES (SUBDUCTION GROUND MOTIONS)

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4240	
DESIGN	VF	OCT 21,2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21,2011	**FIGURE 5-18**	
REVIEW				

REVISION DATE: BY: FILE:

REVISION DATE:



PROJECT	CH2M HILL CANADA LIMITED EVERGREEN LINE RAPID TRANSIT PROJECT COQUITLAM, PORT MOODY, BC
TITLE	FIRM GROUND TARGET SPECTRUM AND SPECTRA OF MODIFIED RECORDS (SUBDUCTION GROUND MOTIONS)

Golder Associates

PROJECT No. 08-1411-0115			PHASE / TASK No. 4000/4250	
DESIGN	VF	OCT 21, 2011	SCALE NTS	REV.
CADD	--			
CHECK	UDA	OCT 21, 2011	FIGURE 5-19	
REVIEW				

ATTACHMENT 1
Headers of Original Earthquake Records Used for Spectral Matching

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<!-- saved from url=(0056)http://peer.berkeley.edu/smcat/data/ath/SFERN/PSL270.AT2
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<HTML><HEAD>
<META http-equiv=Content-Type content="text/html; charset=iso-8859-1">
<META content="MSHTML 6.00.2800.1458" name=GENERATOR></HEAD>
<BODY><PRE>PEER STRONG MOTION DATABASE RECORD. PROCESSING BY PACIFIC ENGINEERING.
SAN FERNANDO 02/09/71 14:00, PASADENA OLD SEISMO LAB, 270 (USGS STATION 266)
ACCELERATION TIME HISTORY IN UNITS OF G. FILTER POINTS: HP=0.5 Hz LP=35.0 Hz
NPTS= 3000, DT= .01000 SEC

-.3379386E-04	-.2423763E-03	-.6323161E-03	-.6295359E-03	-.3202323E-03
-.9311963E-05	.2945921E-03	.5673417E-03	.8392212E-03	.1128044E-02
.1279219E-02	.1148317E-02	.7708589E-03	.2863514E-03	-.1475880E-04
-.4497441E-04	-.8735792E-04	-.2285221E-03	-.4125091E-03	-.8223742E-03
-.1503562E-02	-.2163280E-02	-.2244519E-02	-.1705727E-02	-.1062948E-02
-.8405794E-04	.7742754E-03	.5690176E-03	.1564075E-03	.3927864E-03
.9845141E-03	.1185650E-02	.5000701E-03	-.3792854E-03	-.8900821E-03
-.7811832E-03	.2461459E-03	.1485006E-02	.2544819E-02	.3557832E-02
.4101843E-02	.3563912E-02	.1410492E-02	-.1905312E-02	-.5283362E-02
-.6292838E-02	-.3503062E-02	-.2700417E-03	.1984186E-03	-.1630189E-02
-.3408788E-02	-.4665379E-02	-.5796564E-02	-.5491982E-02	-.3867436E-02
-.1705455E-02	.1760899E-03	.2150484E-02	.5844007E-02	.9449475E-02
.1096566E-01	.1022402E-01	.7083423E-02	.2971373E-02	-.8052393E-04
-.1072370E-02	-.2840704E-02	-.8233160E-02	-.1147596E-01	-.8659682E-02
-.5396062E-02	-.3293772E-02	.6567028E-04	.3355415E-02	.5769235E-02
.7163321E-02	.5678121E-02	.2262811E-02	.1755246E-02	.5741520E-02
.1092562E-01	.1323921E-01	.7681585E-02	-.3865228E-02	-.1336874E-01
-.2034257E-01	-.2215168E-01	-.1382430E-01	-.1974304E-02	.6911139E-02
.1259085E-01	.1216069E-01	.6828809E-02	.3454410E-02	.2824812E-02
.3880461E-02	.5858493E-02	.7250353E-02	.7790427E-02	.5004804E-02
-.3042061E-03	-.4263103E-02	-.8218595E-02	-.1171770E-01	-.9062623E-02
-.2669688E-02	.1480012E-02	.3580339E-02	.3322206E-02	.6649185E-03
-.3768643E-02	-.9695066E-02	-.1380529E-01	-.1212967E-01	-.6659860E-02
-.2007354E-02	.2238916E-02	.4893685E-02	.3024529E-02	-.8961410E-03
-.4570099E-02	-.6546519E-02	-.3963723E-02	.2504024E-03	.2730518E-02
.3491667E-02	.1725251E-02	-.7580788E-03	-.2219309E-02	-.1153730E-02
.2990376E-02	.6783323E-02	.9217692E-02	.8085022E-02	.1993170E-02
-.3206036E-02	-.6762660E-02	-.1059912E-01	-.1261108E-01	-.1346481E-01
-.1222464E-01	-.8817919E-02	-.8795767E-02	-.1191670E-01	-.1302000E-01
-.8950134E-02	-.4996195E-03	.9211407E-02	.1914878E-01	.2412524E-01
.2177334E-01	.1909767E-01	.1699511E-01	.1159470E-01	.5218116E-02
.2591891E-04	-.2940884E-02	-.2193197E-02	-.2095008E-02	-.6362587E-02
-.1243627E-01	-.1589645E-01	-.1320403E-01	-.7374906E-02	-.2937821E-02
.1334299E-02	.3517467E-02	.2019608E-02	.8272968E-03	.3101519E-03
-.1356229E-02	-.4026144E-02	-.4524270E-02	.1868934E-03	.6521270E-02
.1153583E-01	.1278181E-01	.8456651E-02	.5049909E-02	.3845851E-02
-.3548289E-03	-.5632106E-02	-.8353848E-02	-.8532135E-02	-.8558162E-02
-.1066087E-01	-.1296961E-01	-.1221290E-01	-.7098421E-02	-.6457300E-03
.6047803E-02	.1125006E-01	.9086731E-02	.4612273E-02	.2804214E-02
-.4442271E-03	-.4416595E-02	-.5496077E-02	-.3785245E-02	-.4984856E-03
.4903153E-02	.1075727E-01	.1420672E-01	.1691989E-01	.1851807E-01
.1532748E-01	.9438425E-02	.4726363E-02	-.2744023E-03	-.7885961E-02
-.1484388E-01	-.1901508E-01	-.2357907E-01	-.2597150E-01	-.2239423E-01
-.1664331E-01	-.9582191E-02	-.1637975E-03	.9185537E-02	.1924177E-01
.2566099E-01	.2251397E-01	.1663329E-01	.1240501E-01	.8082666E-02
.3410801E-02	-.5201268E-02	-.1762486E-01	-.2656748E-01	-.2929959E-01

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<META http-equiv=Content-Type content="text/html; charset=iso-8859-1">
<META content="MSHTML 6.00.2800.1458" name=GENERATOR></HEAD>
<BODY><PRE>PEER STRONG MOTION DATABASE RECORD. PROCESSING BY PACIFIC ENGINEERING.
SAN FERNANDO 02/09/71 14:00, PASADENA OLD SEISMO LAB, 180 (USGS STATION 266)
ACCELERATION TIME HISTORY IN UNITS OF G. FILTER POINTS: HP=0.5 Hz LP=35.0 Hz
NPTS=  3000, DT= .01000 SEC
   .3565188E-03   .8065582E-03   .1802837E-02   .2228652E-02   .2131381E-02
   .2101916E-02   .1952793E-02   .1721972E-02   .1466693E-02   .1295714E-02
   .1302838E-02   .1395068E-02   .1259198E-02   .8654559E-03   .6078917E-03
   .5752250E-03   .6844891E-03   .1089871E-02   .1584835E-02   .1697392E-02
   .1313738E-02   .5991548E-03  -.5487824E-04  -.1806115E-03   .1985850E-03
   .4436776E-03  -.6667949E-04  -.1541494E-02  -.3194246E-02  -.3571079E-02
  -.2541477E-02  -.1002327E-02   .8950262E-03   .2734727E-02   .3302834E-02
   .2569150E-02   .9817669E-03  -.1181029E-02  -.2127884E-02  -.8562566E-03
   .1192286E-02   .2707394E-02   .3021728E-02   .1101110E-02  -.3624255E-02
  -.7953578E-02  -.7341771E-02  -.3783540E-02  -.2782291E-02  -.5383231E-02
  -.7366304E-02  -.3723319E-02   .4171089E-02   .1094141E-01   .1422166E-01
   .1376254E-01   .1032256E-01   .5373922E-02   .3242204E-03  -.5244957E-02
  -.1130691E-01  -.1553385E-01  -.1747114E-01  -.1755843E-01  -.1608886E-01
  -.1268684E-01  -.7559156E-02  -.2310057E-02   .3253829E-02   .1005705E-01
   .1662933E-01   .1924594E-01   .1676095E-01   .1018440E-01   .3332502E-02
   .8979325E-03  -.7435645E-04  -.5726156E-02  -.1601847E-01  -.2261224E-01
  -.2048014E-01  -.1256139E-01  -.1702710E-02   .7270300E-02   .8690514E-02
   .3931461E-02   .1561552E-02   .3078015E-02   .3106047E-02   .3340003E-02
   .5466235E-02   .4030798E-02  -.1373428E-02  -.3488791E-02  -.4060867E-02
  -.8681829E-02  -.1098535E-01  -.6645481E-02  -.1694277E-02   .3036610E-02
   .9386731E-02   .1370213E-01   .1398831E-01   .7420442E-02  -.4508315E-02
  -.1129554E-01  -.1212251E-01  -.1245115E-01  -.8338504E-02   .1783804E-02
   .8734068E-02   .1094560E-01   .1611303E-01   .2074109E-01   .1675417E-01
   .6639353E-02  -.4253070E-02  -.1264169E-01  -.1554305E-01  -.1625129E-01
  -.1731123E-01  -.1502845E-01  -.8938989E-02  -.2157736E-02   .2699706E-02
   .8200173E-02   .1523458E-01   .1770400E-01   .1760038E-01   .1948857E-01
   .1850736E-01   .1264043E-01   .5470134E-02  -.4421426E-03  -.4338153E-02
  -.7020269E-02  -.7961482E-02  -.7595088E-02  -.8771223E-02  -.1161313E-01
  -.1380313E-01  -.1151287E-01  -.4629045E-02  -.3097127E-03   .2604218E-03
   .7464206E-03   .4040117E-03  -.2755996E-03  -.5992113E-03  -.1263449E-02
  -.1463554E-02  -.3124233E-02  -.8495439E-02  -.1390993E-01  -.1611818E-01
  -.1567931E-01  -.8987086E-02   .8558850E-02   .2422445E-01   .2530540E-01
   .2224302E-01   .2317186E-01   .2329965E-01   .1860535E-01   .9630179E-02
  -.2963165E-02  -.1711546E-01  -.2357557E-01  -.1953222E-01  -.1425524E-01
  -.1226051E-01  -.1054405E-01  -.7735070E-02  -.6376954E-02  -.5315947E-02
   .4704995E-03   .7186450E-02   .9748348E-02   .1322774E-01   .1901974E-01
   .2044073E-01   .1784378E-01   .1766228E-01   .2027231E-01   .1745693E-01
   .3256125E-02  -.1180279E-01  -.1913506E-01  -.2790024E-01  -.3860980E-01
  -.4308352E-01  -.4324021E-01  -.4097394E-01  -.3329321E-01  -.1573924E-01
   .7568642E-02   .2354770E-01   .3111269E-01   .3682573E-01   .4194113E-01
   .4445500E-01   .4218293E-01   .3270776E-01   .1593937E-01  -.3518190E-02
  -.2178618E-01  -.3424748E-01  -.4136939E-01  -.4969245E-01  -.5256148E-01
  -.4181442E-01  -.2569177E-01  -.5929062E-02   .1615805E-01   .2693337E-01
   .3007242E-01   .3741829E-01   .4613027E-01   .4972663E-01   .4556657E-01
   .3729726E-01   .2887759E-01   .1617462E-01   .1677221E-03  -.1090123E-01
  -.1599134E-01  -.1968209E-01  -.2855647E-01  -.4220311E-01  -.4334042E-01
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<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
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<META http-equiv=Content-Type content="text/html; charset=iso-8859-1">
<META content="MSHTML 6.00.2800.1458" name=GENERATOR></HEAD>
<BODY><PRE>PEER STRONG MOTION DATABASE RECORD. PROCESSING BY PACIFIC ENGINEERING.
SAN FERNANDO 02/09/71 14:00, PASADENA OLD SEISMO LAB, DWN (USGS STATION 266)
ACCELERATION TIME HISTORY IN UNITS OF G. FILTER POINTS: HP=0.5 Hz LP=35.0 Hz
NPTS= 3000, DT= .01000 SEC

-.2450065E-03	-.6910135E-03	-.1546358E-02	-.1820007E-02	-.1585225E-02
-.1290110E-02	-.1085288E-02	-.9877803E-03	-.9083485E-03	-.1016736E-02
-.1316623E-02	-.1435664E-02	-.1187900E-02	-.9140257E-03	-.1102002E-02
-.1713180E-02	-.2133805E-02	-.1961547E-02	-.1442958E-02	-.6738320E-03
-.8889448E-04	-.6007470E-03	-.1871226E-02	-.2577888E-02	-.1751814E-02
-.2118463E-04	.1409005E-02	.1823145E-02	.1211780E-02	.9384261E-03
.3174025E-03	-.2322619E-02	-.5392163E-02	-.6557284E-02	-.5281703E-02
-.2317567E-02	.1105535E-02	.2179851E-02	-.2207300E-03	-.1811111E-02
-.2754511E-03	.2242807E-02	.3882601E-02	.2322303E-02	-.1307124E-02
-.1855246E-02	.1610637E-03	.1427518E-02	.3056742E-02	.3589313E-02
-.1502539E-02	-.9694793E-02	-.1393315E-01	-.1112302E-01	-.5349419E-02
-.1166674E-02	.1013447E-02	.9958540E-03	.2967120E-02	.9641640E-02
.1525900E-01	.1355614E-01	.6595901E-02	.2992649E-02	.2250610E-02
-.1957736E-02	-.8507388E-02	-.1227874E-01	-.1034964E-01	-.6000449E-02
-.9916721E-03	.5778651E-02	.9339109E-02	.7435413E-02	.4289987E-02
.3901463E-02	.9345943E-02	.1600514E-01	.1239918E-01	-.1004336E-03
-.1107578E-01	-.1917286E-01	-.2153004E-01	-.1469183E-01	-.6104028E-02
-.4633308E-03	.4658401E-02	.8637938E-02	.6524940E-02	-.9587268E-03
-.3952967E-02	.1182267E-02	.6915363E-02	.8749595E-02	.9769381E-02
.1266870E-01	.1446237E-01	.1016654E-01	.5431645E-03	-.8807743E-02
-.1390965E-01	-.1469806E-01	-.9708651E-02	.1804940E-02	.9456306E-02
.9000366E-02	.1184690E-01	.1484043E-01	.6238280E-02	-.8917033E-02
-.2148074E-01	-.2485935E-01	-.1758592E-01	-.8246104E-02	-.3454463E-02
.1871387E-03	.6735004E-02	.1032994E-01	.8353407E-02	.9339081E-02
.1034024E-01	.1580544E-02	-.8656512E-02	-.1055911E-01	-.9691031E-02
-.1199944E-01	-.1331621E-01	-.1254699E-01	-.1343327E-01	-.1120218E-01
-.4667101E-02	.9235378E-03	.5385822E-02	.6837494E-02	.3894059E-02
.1563199E-02	.3022022E-02	.1141584E-02	-.7715681E-02	-.1039780E-01
-.4472537E-02	-.3662473E-02	-.8945728E-02	-.1067108E-01	-.3369533E-02
.9699057E-02	.2297599E-01	.3245303E-01	.2766719E-01	.7239841E-02
-.4213025E-02	.9439238E-02	.2570340E-01	.2040990E-01	.3315973E-02
-.7714981E-02	-.9844041E-02	-.3327781E-02	.6284286E-02	.5824809E-02
-.6813003E-02	-.1815957E-01	-.1412439E-01	.2014272E-02	.1458632E-01
.1729439E-01	.1015113E-01	-.3207634E-02	-.1064932E-01	-.6946311E-02
-.3805287E-02	-.6072568E-02	-.1865719E-02	.6678749E-02	.5074446E-02
-.3275859E-02	-.7159688E-02	-.5167766E-02	-.2798615E-02	-.7410437E-02
-.1643366E-01	-.2308127E-01	-.2162245E-01	-.7246203E-02	.1345711E-01
.2842548E-01	.3223297E-01	.2980586E-01	.2706322E-01	.2866875E-01
.3277530E-01	.2716419E-01	.1150029E-01	-.5329683E-02	-.2085048E-01
-.2998554E-01	-.2522851E-01	-.1434896E-01	-.1342649E-01	-.1795277E-01
-.1201937E-01	.9762477E-03	.1124763E-01	.2021314E-01	.2840661E-01
.3315771E-01	.3516509E-01	.3379554E-01	.2361671E-01	.4822596E-02
-.1589882E-01	-.3187395E-01	-.3921554E-01	-.3786144E-01	-.3142186E-01
-.2853960E-01	-.3111954E-01	-.2722044E-01	-.1183362E-01	.6500868E-02
.2059675E-01	.1828980E-01	.1624890E-02	-.5888044E-02	-.1006192E-02
.3874500E-02	.5114537E-02	.4472780E-02	-.1832147E-03	-.1123813E-01

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<META content="MSHTML 5.00.2314.1000" name=GENERATOR></HEAD>
<BODY><XMP>CORRECTED ACCELEROGRAM  IIB029  49.003.0    COMP N86E   FILE 26
CORRESPONDING TO
FILE  26  OF UNCORRECTED ACCELEROGRAM DATA OF VOL. I-B, EERL 70-21
WESTERN WASHINGTON EARTHQUAKE
APR 13, 1949 - 1156 PST
IB029   49.003.0 T                                                      18
STATION NO. 325   47 02 00N,122 54 00W                                 38
OLYMPIA, WASHINGTON HWY TEST LAB                                        32
COMP N86E                                                               9
WESTERN WASHINGTON EARTHQUAKE   APR 13, 1949 - 1156 PST                 55
EPICENTER  47 06 00N,122 42 00W                                         31
INSTR PERIOD   0.0800 SEC  DAMPING   0.574                             42
NO. OF POINTS   1282  DURATION   89.15 SEC                             42
UNITS ARE SEC AND G/10.                                                 23
RMS ACCLN OF COMPLETE RECORD   0.2981 G/10.                             43
ACCELEROGRAM IS BAND-PASS FILTERED BETWEEN   0.070  AND  25.000  CYC/SEC
  4453  INSTRUMENT AND BASELINE CORRECTED DATA
AT EQUALLY-SPACED INTERVALS OF   0.02   SEC.
PEAK ACCELERATION    -274.62964  CMS/SEC/SEC AT  19.6200 SEC
PEAK VELOCITY         -17.08972  CMS/SEC     AT   8.4600 SEC
PEAK DISPLACEMENT      10.37631  CMS         AT   7.3000 SEC
INITIAL VELOCITY        0.82482  CMS/SEC        INITIAL DISP.      -0.76681 CMS
WESTERN WASHINGTON EARTHQUAKE   APR 13, 1949 - 1156 PST

IIB029  49.003.0   OLYMPIA, WASHINGTON HWY TEST LAB   COMP N86E

        26          1          2         29         49          3          0          3
325         47
         2          0       -122         54          0         47          6          0
-122         42
         0          4         13       1949       1156          0         86       1282
29          32
         0          0          0          0          0          0          0          0
0           0
         0          0          0          0          0          0          0          0
0           0
      1282       1284       4453          2         10         10          1          0
55          63
        10         10          2       2227          5        891          0          0
0           0
         0          0          0          0          0          0          0          0
0           0
         0          0          0          0          0          0          0          0
0           0
         0          0          0          0          0          0          0          0
0           0
   0.08000   0.57400  89.14999   0.29810   0.10000   0.0        0.0        0.0
0.0        0.0
   0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
0.0        0.0
```

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<!-- saved from url=(0052)ftp://smdb.crustal.ucsb.edu/smdb/1949/c/103l56ol.y0a -->
<HTML><HEAD>
<META content="text/html; charset=windows-1252" http-equiv=Content-Type>
<META content="MSHTML 5.00.2314.1000" name=GENERATOR></HEAD>
<BODY><XMP>CORRECTED ACCELEROGRAM  IIB029  49.003.0    COMP N04W   FILE 25
CORRESPONDING TO
FILE  25  OF UNCORRECTED ACCELEROGRAM DATA OF VOL. I-B, EERL 70-21
WESTERN WASHINGTON EARTHQUAKE
APR 13, 1949 - 1156 PST
IB029   49.003.0 T                                                    18
STATION NO. 325   47 02 00N,122 54 00W                               38
OLYMPIA, WASHINGTON HWY TEST LAB                                      32
COMP N04W                                                             9
WESTERN WASHINGTON EARTHQUAKE   APR 13, 1949 - 1156 PST               55
EPICENTER  47 06 00N,122 42 00W                                       31
INSTR PERIOD   0.0770 SEC  DAMPING   0.574                           42
NO. OF POINTS   1094  DURATION   89.16 SEC                           42
UNITS ARE SEC AND G/10.                                               23
RMS ACCLN OF COMPLETE RECORD   0.2455 G/10.                           43
ACCELEROGRAM IS BAND-PASS FILTERED BETWEEN   0.070  AND  25.000  CYC/SEC
  4454  INSTRUMENT AND BASELINE CORRECTED DATA
AT EQUALLY-SPACED INTERVALS OF   0.02   SEC.
PEAK ACCELERATION     161.63023  CMS/SEC/SEC AT  10.9400 SEC
PEAK VELOCITY          21.39984  CMS/SEC     AT  11.0400 SEC
PEAK DISPLACEMENT      -8.57898  CMS         AT  10.6800 SEC
INITIAL VELOCITY        3.23732  CMS/SEC        INITIAL DISP.      -0.99615 CMS
WESTERN WASHINGTON EARTHQUAKE   APR 13, 1949 - 1156 PST

IIB029  49.003.0   OLYMPIA, WASHINGTON HWY TEST LAB   COMP N04W

        25          1          2         29         49          3          0          3
325         47
         2          0       -122         54          0         47          6          0
-122          42
         0          4         13       1949       1156          0        356       1094
29          32
         0          0          0          0          0          0          0          0
0           0
         0          0          0          0          0          0          0          0
0           0
      1094       1096       4454          2         10         10          1          0
55          63
        10         10          2       2227          5        891          0          0
0           0
         0          0          0          0          0          0          0          0
0           0
         0          0          0          0          0          0          0          0
0           0
         0          0          0          0          0          0          0          0
0           0
   0.07700   0.57400  89.15999   0.24550   0.10000   0.0        0.0        0.0
0.0         0.0
   0.0         0.0        0.0        0.0        0.0        0.0        0.0        0.0
0.0         0.0
```

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<!-- saved from url=(0052)ftp://smdb.crustal.ucsb.edu/smdb/1949/c/103l56ol.y0c -->
<HTML><HEAD>
<META content="text/html; charset=windows-1252" http-equiv=Content-Type>
<META content="MSHTML 5.00.2314.1000" name=GENERATOR></HEAD>
<BODY><XMP>CORRECTED ACCELEROGRAM  IIB029  49.003.0    COMP DOWN   FILE 27
CORRESPONDING TO
FILE  27  OF UNCORRECTED ACCELEROGRAM DATA OF VOL. I-B, EERL 70-21
WESTERN WASHINGTON EARTHQUAKE
APR 13, 1949 - 1156 PST
IB029   49.003.0 T                                                    18
STATION NO. 325   47 02 00N,122 54 00W                               38
OLYMPIA, WASHINGTON HWY TEST LAB                                      32
COMP DOWN                                                             9
WESTERN WASHINGTON EARTHQUAKE   APR 13, 1949 - 1156 PST               55
EPICENTER  47 06 00N,122 42 00W                                       31
INSTR PERIOD   0.0790 SEC  DAMPING   0.592                           42
NO. OF POINTS   2464  DURATION   89.00 SEC                           42
UNITS ARE SEC AND G/10.                                               23
RMS ACCLN OF COMPLETE RECORD   0.1233 G/10.                           43
ACCELEROGRAM IS BAND-PASS FILTERED BETWEEN   0.070  AND  25.000  CYC/SEC
  4445  INSTRUMENT AND BASELINE CORRECTED DATA
AT EQUALLY-SPACED INTERVALS OF   0.02   SEC.
PEAK ACCELERATION      90.62807  CMS/SEC/SEC AT   0.1400 SEC
PEAK VELOCITY           7.02949  CMS/SEC     AT   0.7400 SEC
PEAK DISPLACEMENT       4.03140  CMS         AT   2.5800 SEC
INITIAL VELOCITY       -6.73264  CMS/SEC        INITIAL DISP.      -2.41549 CMS
WESTERN WASHINGTON EARTHQUAKE   APR 13, 1949 - 1156 PST

IIB029  49.003.0   OLYMPIA, WASHINGTON HWY TEST LAB   COMP DOWN

        27          1          2         29         49          3          0          3
325         47
         2          0       -122         54          0         47          6          0
-122          42
         0          4         13       1949       1156          0        600       2464
29          32
         0          0          0          0          0          0          0          0
0           0
         0          0          0          0          0          0          0          0
0           0
      2464       2466       4445          2         10         10          1          0
55          63
        10         10          2       2223          5        889          0          0
0           0
         0          0          0          0          0          0          0          0
0           0
         0          0          0          0          0          0          0          0
0           0
         0          0          0          0          0          0          0          0
0           0
   0.07900   0.59200  89.00000   0.12330   0.10000   0.0        0.0        0.0
0.0        0.0
   0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
0.0        0.0
```

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<!-- saved from
url=(0058)http://peer.berkeley.edu/smcat/data/ath/LANDERS/JOS090.AT2 -->
<HTML><HEAD>
<META http-equiv=Content-Type content="text/html; charset=windows-1252">
<META content="MSHTML 6.00.2800.1400" name=GENERATOR></HEAD>
<BODY><PRE>PEER STRONG MOTION DATABASE RECORD. PROCESSING BY CDMG.
LANDERS 06/28/92 1158, JOSHUA TREE, 090 (CDMG STATION 22170)
ACCELERATION TIME HISTORY IN UNITS OF G. FILTER POINTS: HP=0.07 Hz LP=23.0 Hz

NPTS= 2200, DT= .02000 SEC

.4512580E-02	-.8925021E-02	-.1363959E-01	-.4519901E-02	.4631398E-02
.4279351E-02	-.1543740E-01	-.2262040E-01	-.1062027E-01	-.1003880E-02
-.7345398E-02	-.1888076E-01	-.2201235E-01	-.1815899E-01	-.1298576E-01
-.5580768E-02	.1008215E-02	.3913971E-02	.1138014E-01	.1082197E-01
.6521404E-02	.4752475E-02	.1187692E-01	.2008256E-01	.1782197E-01
.1837658E-01	.1876594E-01	.1586681E-01	.6128582E-02	-.2988476E-02
-.7374780E-02	-.8721491E-02	-.7346847E-02	-.1267970E-02	.1834541E-02
.9998459E-03	.1777765E-02	.4704818E-02	-.3690155E-03	-.1893439E-01
-.3408890E-01	-.3223491E-01	-.7580869E-02	.1124897E-01	-.1309662E-02
-.2126840E-01	-.2726538E-01	-.1029503E-01	.1138670E-01	.2081006E-01
.1927658E-01	.1634262E-01	.2159927E-01	.2199254E-01	.1832214E-01
.9872001E-02	.5740540E-02	.1405511E-01	.2048982E-01	.8499244E-02
-.1058442E-01	-.2889901E-01	-.2771019E-01	-.7211747E-02	.5787645E-02
.1351057E-01	.1446783E-01	.1629617E-01	.1751454E-01	.9470283E-02
-.1278870E-01	-.3001399E-01	-.2613140E-01	-.9634478E-02	-.2089083E-02
-.6379773E-02	-.1310215E-01	-.1791305E-01	-.2771890E-01	-.3180765E-01
-.1780773E-01	.5077407E-02	.2757800E-01	.2949600E-01	.1310806E-01
.5751196E-02	.1019878E-01	.1843465E-01	.1531892E-01	-.1848324E-02
-.4435698E-02	.1915624E-01	.3140578E-01	.1694865E-01	-.4091568E-02
-.1383019E-01	-.4535759E-03	.2394107E-01	.3286945E-01	.6993391E-02
-.1858994E-01	-.2030629E-01	-.1202257E-01	-.6761113E-02	-.1172312E-01
-.2316520E-01	-.2758866E-01	-.2154896E-01	-.9215876E-02	-.1320075E-01
-.3090055E-01	-.3822594E-01	-.3637492E-02	.3170371E-01	.1055323E-01
-.7917720E-02	-.3491713E-02	.6068684E-03	-.3391315E-02	.2069926E-01
.5398920E-01	.4586816E-01	.2959222E-01	.3230255E-01	.3011585E-01
.1248738E-01	.6310431E-02	.1956346E-01	.1829985E-01	-.1240811E-01
-.2347394E-01	.1442227E-01	.3661455E-01	.2402789E-01	.3435250E-02
-.4127326E-01	-.6658443E-01	-.7013595E-01	-.4196854E-01	-.5078092E-02
-.8599027E-02	-.2473125E-01	.2154829E-01	.9456507E-01	.1247745E+00
.1056220E+00	.6381129E-01	.3925385E-01	.4528823E-01	.6419501E-01
.3490883E-01	-.1393076E-01	-.4035177E-01	-.4033133E-01	-.6275702E-01
-.8863948E-01	-.9247874E-01	-.7555386E-01	-.4475902E-01	-.5940292E-03
.4758160E-01	.5688094E-01	.3700318E-01	.3741423E-01	.4111172E-01
.1425306E-01	-.2714060E-01	-.5014978E-01	-.4125031E-01	-.2272409E-01
-.1411941E-01	-.2209381E-01	-.3601584E-01	-.5638529E-01	-.5196059E-01
-.7117376E-02	.3871218E-01	.8689079E-01	.6701704E-01	-.6959573E-02
-.3734444E-01	-.1126619E-01	.3663087E-01	.9650756E-02	-.3800681E-01
-.3000400E-01	.8162250E-02	.1256343E-01	-.8702669E-02	-.1104879E-01
-.2544317E-01	-.3951828E-01	-.2822294E-01	.3583087E-01	.7773538E-01
.3828775E-01	-.2243125E-02	-.6392646E-02	.2524759E-01	.4433978E-01
.3105716E-01	.2273602E-02	-.6583241E-02	.2200513E-01	.3829944E-01
.3792898E-01	.5245562E-01	.5506253E-01	.4398818E-01	.4431131E-01
.5561677E-01	.6006171E-01	.5411998E-01	.3810983E-01	.6113218E-02
-.1678296E-01	-.2202294E-01	-.3313303E-01	-.6625982E-01	-.7557880E-01
-.5139078E-01	-.2006582E-01	-.2767913E-02	-.3683721E-01	-.9278347E-01
-.1225035E+00	-.1225221E+00	-.1012340E+00	-.4393069E-01	.5165690E-02

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<!-- saved from
url=(0058)http://peer.berkeley.edu/smcat/data/ath/LANDERS/JOS000.AT2 -->
<HTML><HEAD>
<META http-equiv=Content-Type content="text/html; charset=windows-1252">
<META content="MSHTML 6.00.2800.1400" name=GENERATOR></HEAD>
<BODY><PRE>PEER STRONG MOTION DATABASE RECORD. PROCESSING BY CDMG.
LANDERS 06/28/92 1158, JOSHUA TREE, 000 (CDMG STATION 22170)
ACCELERATION TIME HISTORY IN UNITS OF G. FILTER POINTS: HP=0.07 Hz LP=23.0 Hz

NPTS= 2200, DT= .02000 SEC

-.3190527E-02	-.3100527E-02	-.2921781E-02	-.4958467E-02	-.4150367E-02
-.4771281E-02	-.7454627E-02	-.1111105E-01	-.1232456E-01	-.3035127E-02
.2091693E-02	-.1366820E-02	-.4436707E-02	-.3681587E-02	.3671195E-03
.7299372E-02	.1191929E-01	.1520302E-01	.1667115E-01	.1815561E-01
.2189836E-01	.2513519E-01	.2654011E-01	.2437707E-01	.2111754E-01
.1423192E-01	.8191887E-02	.5183298E-02	.2044155E-02	-.1127621E-02
-.2978490E-02	-.9870194E-02	-.1533491E-01	-.2066600E-01	-.2319515E-01
-.1809366E-01	-.1251482E-01	-.9117743E-02	-.4037661E-02	-.1268895E-02
-.7914721E-02	-.1708504E-01	-.1925306E-01	-.8827125E-02	.3178793E-02
-.2594903E-02	-.1559121E-01	-.1888630E-01	-.1390305E-01	-.3609851E-03
.1120637E-01	.1984633E-01	.2510602E-01	.2927737E-01	.3272453E-01
.2830953E-01	.1481655E-01	.5042482E-02	.3744626E-02	.1038441E-01
.1470167E-01	.1188709E-01	.5721817E-02	-.2965695E-03	-.1146611E-02
-.2398526E-02	-.5806715E-02	-.8202991E-03	.8447064E-02	.1702185E-01
.1354228E-01	-.1155005E-01	-.3440961E-01	-.3583284E-01	-.1999766E-01
-.9205358E-02	-.7888849E-02	-.2025461E-01	-.2427167E-01	-.1813361E-01
-.1527076E-01	-.1123898E-01	-.5285516E-02	.6666572E-02	-.1739365E-01
.1885301E-01	.6943232E-02	.2225483E-02	.7550660E-02	.8274622E-02
.6953490E-02	.8861683E-02	.1580868E-01	.1834113E-01	.1365096E-01
.6014013E-02	.6957314E-02	.1732338E-01	.2485793E-01	.1919879E-01
-.4678566E-02	-.2569788E-01	-.2435164E-01	-.8960005E-02	.5696220E-02
.1251579E-01	.1547874E-01	.2178935E-01	.2515827E-01	.2765816E-01
.1365650E-01	-.1279528E-01	-.2656641E-01	-.2633804E-01	-.2017530E-01
-.2572318E-01	-.2710027E-01	-.2701365E-01	-.3379673E-01	-.3717709E-01
-.3410186E-01	-.2489643E-01	-.2167635E-01	-.2241488E-01	-.2369299E-01
-.1360422E-01	-.7518938E-02	-.8121793E-02	-.1749883E-02	.1380473E-02
.1638513E-02	-.2564921E-02	.5548149E-02	.2754240E-01	.3178050E-01
.1246885E-01	-.3928658E-02	.6512078E-02	.2094612E-01	.1519130E-01
.4224295E-02	-.1989153E-01	-.3738143E-01	-.3205494E-01	-.2076043E-01
-.1435988E-01	-.2234336E-01	-.3344497E-01	-.2460048E-01	.1689070E-02
.1138629E-01	.1737174E-02	-.9782617E-02	-.8468764E-02	-.2193625E-02
-.3201281E-02	-.7439273E-02	.5555639E-02	.2226030E-01	.2974722E-01
.5074200E-01	.7314542E-01	.7929309E-01	.7856495E-01	.6824882E-01
.4069877E-01	.2288786E-02	-.5728517E-01	-.8311039E-01	-.7417910E-01
-.5637585E-01	-.3424269E-01	-.3376821E-01	-.4581728E-01	-.4721041E-01
-.4750907E-01	-.5262213E-01	-.5344201E-01	-.1417078E-01	.2848991E-01
.4113609E-01	.5691776E-01	.6296046E-01	.5040347E-01	.1835531E-01
-.1977127E-02	.5742478E-02	.2609581E-01	.2915541E-02	-.2408258E-01
-.2086422E-01	-.2967879E-01	-.3630546E-01	-.3186104E-01	-.7821403E-02
.1827456E-01	.2050457E-01	.1294181E-02	-.1388210E-01	-.7056981E-02
-.1259528E-01	-.8708766E-02	-.3054592E-02	-.1785394E-02	.2587835E-01
.4970383E-01	.5354140E-01	.5298278E-01	.5812800E-01	.6357004E-01
.4853355E-01	.3243218E-01	.2146039E-01	.3683175E-02	-.7742502E-02
-.2766069E-01	-.4387832E-01	-.4663093E-01	-.4699061E-01	-.5749418E-01
-.5761415E-01	-.5320940E-01	-.3547631E-01	-.6263109E-02	.3017255E-02
.2246396E-01	.5717089E-01	.9011527E-01	.9559820E-01	.8141041E-01

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<!-- saved from url=(0058)http://peer.berkeley.edu/smcat/data/ath/LANDERS/JOS-
UP.AT2 -->
<HTML><HEAD>
<META http-equiv=Content-Type content="text/html; charset=windows-1252">
<META content="MSHTML 6.00.2800.1400" name=GENERATOR></HEAD>
<BODY><PRE>PEER STRONG MOTION DATABASE RECORD. PROCESSING BY CDMG.
LANDERS 06/28/92 1158, JOSHUA TREE,  UP (CDMG STATION 22170)
ACCELERATION TIME HISTORY IN UNITS OF G. FILTER POINTS: HP=0.07 Hz LP=23.0 Hz

NPTS=  2200, DT= .02000 SEC
  -.4924549E-02  -.1827176E-01  -.1576919E-01  -.1359711E-01  -.1502869E-01
  -.1148166E-01  -.1608239E-01  -.2112785E-01  -.2617841E-01  -.2388089E-01
  -.1997382E-01  -.1323217E-01  -.4975827E-02   .1737385E-01   .2539865E-01
   .2947808E-01   .3291593E-01   .2710033E-01   .1716189E-01   .1698484E-01
   .2317871E-01   .2529870E-01   .4114176E-01   .2954682E-01   .4437895E-02
  -.4719255E-02  -.2567577E-01  -.3038471E-01   .2420930E-02   .3588203E-02
   .2225873E-02   .1692242E-01   .1646278E-01   .1073790E-01  -.8130709E-02
  -.3485842E-01  -.3795069E-01  -.1484529E-01  -.4489896E-02  -.1628890E-01
  -.4247399E-01  -.6840205E-01  -.6004689E-01  -.9849291E-02   .2605402E-01
   .3239977E-01   .2606590E-01   .2231466E-01   .1352155E-01   .6006508E-02
  -.3532222E-02   .7930843E-02   .5517754E-01   .6294718E-01   .4605117E-01
   .2909090E-01  -.2603981E-01  -.5085613E-01  -.2542623E-01   .2480224E-02
   .3124959E-01   .2217492E-01   .2071964E-01   .2209996E-01   .2925235E-02
  -.1402793E-01  -.1259867E-01  -.3410844E-03  -.2974536E-04  -.4903070E-02
  -.5143559E-02  -.4492912E-03  -.1455363E-01  -.2539397E-01  -.2203489E-01
  -.1308418E-01   .2925949E-02   .1251721E-01  -.2272358E-01  -.5365285E-01
  -.4844555E-01  -.1788617E-01   .9835581E-02   .1401674E-01  -.7054240E-02
  -.1872694E-01   .8381766E-02   .2586473E-01   .6319077E-01   .5902933E-01
   .2429543E-01  -.4763197E-02   .3157853E-01   .4166953E-01   .1475188E-01
   .1045271E-01  -.1650779E-01   .3330317E-02   .2582858E-01   .2310122E-01
  -.5624915E-02  -.2455498E-01  -.2030209E-02   .1555266E-01  -.1128446E-01
  -.2193826E-01   .1895160E-02   .6838173E-02   .9202232E-03   .3604401E-01
   .6068525E-01   .3561475E-01  -.2596563E-01  -.4022312E-01  -.2076655E-01
  -.4230991E-01  -.8379549E-02   .4621193E-01   .2514898E-01  -.8175389E-02
  -.8994402E-02   .2474010E-01   .2323666E-01  -.1219504E-01  -.3755017E-01
  -.3989002E-01   .2129878E-01   .3874284E-01   .7497326E-01   .5975080E-01
   .2026253E-01   .6706737E-02  -.6801118E-02   .7621871E-01   .7942968E-01
  -.3376177E-01  -.1123263E+00  -.7981683E-01  -.5570026E-02   .6526793E-01
   .6072789E-01  -.1958388E-01  -.5428940E-01  -.4553784E-01  -.9113290E-01
  -.9626558E-01  -.1532046E-01   .4483909E-01   .4028372E-01   .5870486E-01
   .1604637E-01  -.9152391E-01  -.1405074E+00  -.8205640E-01   .8847965E-02
   .7998065E-01   .1323086E+00   .5148067E-01   .2284409E-01   .9168858E-02
  -.3318877E-01  -.2919863E-01  -.3272486E-01   .5804891E-01   .1324374E+00
   .4601882E-01   .2647347E-01  -.2842814E-01  -.1419369E+00  -.1697086E+00
  -.1620526E+00   .2473989E-01   .1679090E+00   .4919718E-01  -.3343316E-01
  -.3908818E-01  -.2299272E-01  -.2825709E-01  -.8670179E-02   .8619688E-02
   .9287632E-02   .2042179E-01   .6060555E-01   .1077426E+00   .3606299E-01
   .4301399E-03  -.5670656E-02   .1973124E-01   .8070565E-01   .4404462E-01
  -.4303572E-02  -.4364516E-01  -.1008653E+00  -.4467270E-01  -.2114456E-01
  -.2751058E-01   .2759981E-01   .1767602E-01  -.3156979E-01   .1798261E-01
   .2333739E-01  -.2501476E-02   .1716084E-01   .2908284E-03   .5378449E-01
   .1557608E-01   .6040586E-01   .1303511E+00  -.2039290E-01  -.2394989E-01
   .2075747E-01  -.6220142E-01  -.1179304E+00  -.1551984E+00  -.1813147E+00
  -.9081142E-01   .5185468E-01   .8107436E-01   .8304165E-01  -.1305384E-01
  -.1169768E+00  -.1331839E+00  -.1105055E+00  -.3728202E-01   .1729788E-01
   .3817800E-01   .3938742E-01   .1774170E-01   .6377298E-01   .1955363E-01
```

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<!-- saved from url=(0056)http://peer.berkeley.edu/smcat/data/ath/LOMAP/CAP090.AT2
-->
<HTML><HEAD>
<META http-equiv=Content-Type content="text/html; charset=windows-1252">
<META content="MSHTML 6.00.2800.1400" name=GENERATOR></HEAD>
<BODY><PRE>PEER STRONG MOTION DATABASE RECORD. PROCESSING BY PACIFIC ENGINEERING.
LOMA PRIETA 10/18/89 00:05, CAPITOLA, 090 (CDMG STATION 47125)
ACCELERATION TIME HISTORY IN UNITS OF G. FILTER POINTS: HP=0.2 Hz LP=40.0 Hz
NPTS= 7991, DT= .00500 SEC

-.4810804E-02	-.4990053E-02	-.1313251E-02	.3169603E-02	.2322619E-02
.2221711E-02	.2183147E-02	.2209518E-02	.2267251E-02	.2337543E-02
.2422262E-02	.2544537E-02	.2694633E-02	.2834048E-02	.2912210E-02
.2894176E-02	.2780296E-02	.2630191E-02	.2502537E-02	.2407349E-02
.2333365E-02	.2346743E-02	.2615119E-02	.3246449E-02	.4059301E-02
.4640195E-02	.4674050E-02	.4229844E-02	.3642624E-02	.3150811E-02
.2793976E-02	.2572633E-02	.2474776E-02	.2433117E-02	.2376201E-02
.2278330E-02	.2130221E-02	.1947230E-02	.1763700E-02	.1607399E-02
.1500038E-02	.1444572E-02	.1414343E-02	.1384726E-02	.1344368E-02
.1305352E-02	.1282360E-02	.1275773E-02	.1322309E-02	.1474335E-02
.1698429E-02	.1917709E-02	.2091773E-02	.2198318E-02	.2210188E-02
.2130772E-02	.1984380E-02	.1789619E-02	.1571925E-02	.1346493E-02
.1126221E-02	.9563870E-03	.8408281E-03	.7187246E-03	.5399976E-03
.3294154E-03	.1603368E-03	.5693783E-04	-.3481606E-04	-.1712715E-03
-.3294201E-03	-.4410847E-03	-.4983872E-03	-.5487502E-03	-.6304049E-03
-.7682246E-03	-.9811042E-03	-.1245430E-02	-.1505315E-02	-.1699462E-02
-.1798136E-02	-.1840099E-02	-.1885914E-02	-.1928143E-02	-.1900526E-02
-.1792428E-02	-.1676883E-02	-.1557421E-02	-.1316888E-02	-.9284177E-03
-.5568809E-03	-.3722233E-03	-.3858687E-03	-.4743625E-03	-.4954362E-03
-.3833706E-03	-.2702012E-03	-.3777064E-03	-.6595722E-03	-.8533443E-03
-.9006530E-03	-.9852483E-03	-.1141475E-02	-.1212812E-02	-.1215172E-02
-.1222307E-02	-.1153960E-02	-.1007903E-02	-.8716669E-03	-.7330583E-03
-.5355941E-03	-.3090044E-03	-.1468281E-03	-.3222489E-04	.1295315E-03
.3333855E-03	.5711232E-03	.8680264E-03	.1126464E-02	.1264912E-02
.1373440E-02	.1466008E-02	.1379864E-02	.1090135E-02	.8289804E-03
.7891491E-03	.8422158E-03	.7769083E-03	.6472978E-03	.5911990E-03
.6037075E-03	.6170482E-03	.5896529E-03	.4573990E-03	.1482283E-03
-.2760107E-03	-.7197108E-03	-.1194719E-02	-.1604601E-02	-.1700267E-02
-.1483107E-02	-.1286552E-02	-.1278841E-02	-.1219173E-02	-.9676774E-03
-.8070370E-03	-.9438112E-03	-.1139155E-02	-.1086354E-02	-.9024058E-03
-.8108481E-03	-.6489620E-03	-.2567697E-03	.1969156E-03	.5542044E-03
.9463594E-03	.1437818E-02	.1731699E-02	.1597207E-02	.1176139E-02
.8576723E-03	.8795185E-03	.1054759E-02	.1222005E-02	.1553177E-02
.2078172E-02	.2558551E-02	.2751811E-02	.2415278E-02	.1587284E-02
.6765619E-03	.7060267E-04	.2566514E-04	.6074892E-03	.1370851E-02
.1679773E-02	.1483746E-02	.1216021E-02	.1199354E-02	.1374295E-02
.1340528E-02	.8731687E-03	.3400306E-03	.2314297E-03	.4990388E-03
.7012596E-03	.5230400E-03	.5450082E-04	-.3182958E-03	-.4297090E-03
-.4954142E-03	-.6619391E-03	-.6898312E-03	-.1837586E-03	.7542480E-03
.1335027E-02	.8762665E-03	-.3185984E-03	-.1233752E-02	-.1288875E-02
-.6774964E-03	.9305460E-04	.6309584E-03	.8836087E-03	.9622702E-03
.7751966E-03	.2000995E-03	-.5381356E-03	-.1211924E-02	-.1862094E-02
-.2635038E-02	-.3624979E-02	-.4566652E-02	-.5035319E-02	-.5159229E-02
-.5371105E-02	-.5847773E-02	-.6404262E-02	-.6708151E-02	-.6771734E-02
-.6634240E-02	-.6169457E-02	-.5566537E-02	-.5057919E-02	-.4638197E-02
-.4160769E-02	-.3234772E-02	-.1618933E-02	.3281295E-03	.1867368E-02

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<!-- saved from url=(0056)http://peer.berkeley.edu/smcat/data/ath/LOMAP/CAP000.AT2
-->
<HTML><HEAD>
<META http-equiv=Content-Type content="text/html; charset=windows-1252">
<META content="MSHTML 6.00.2800.1400" name=GENERATOR></HEAD>
<BODY><PRE>PEER STRONG MOTION DATABASE RECORD. PROCESSING BY PACIFIC ENGINEERING.
LOMA PRIETA 10/18/89 00:05, CAPITOLA, 000 (CDMG STATION 47125)
ACCELERATION TIME HISTORY IN UNITS OF G. FILTER POINTS: HP=0.2 Hz LP=48.0 Hz
NPTS= 7991, DT= .00500 SEC

-.2034737E-02	-.1899185E-02	.3645107E-03	.2977220E-02	.2831513E-02
.2884587E-02	.2853097E-02	.2803388E-02	.2736653E-02	.2643013E-02
.2536830E-02	.2448610E-02	.2375981E-02	.2300371E-02	.2227396E-02
.2195724E-02	.2248720E-02	.2397560E-02	.2581156E-02	.2744917E-02
.2916104E-02	.3093601E-02	.3205390E-02	.3221117E-02	.3053297E-02
.2603519E-02	.2196878E-02	.2388388E-02	.3118683E-02	.3717036E-02
.3709952E-02	.3256040E-02	.2878153E-02	.2868040E-02	.3079409E-02
.3293886E-02	.3486805E-02	.3677544E-02	.3790329E-02	.3780568E-02
.3712571E-02	.3668809E-02	.3655369E-02	.3645633E-02	.3649597E-02
.3645906E-02	.3529042E-02	.3238348E-02	.2856667E-02	.2497101E-02
.2188614E-02	.1913579E-02	.1646288E-02	.1382437E-02	.1135076E-02
.8825753E-03	.6403947E-03	.4838597E-03	.4272109E-03	.4344367E-03
.4636801E-03	.4121623E-03	.2119696E-03	.5168590E-05	-.7905103E-04
-.1375621E-03	-.2311118E-03	-.2697189E-03	-.2395351E-03	-.2395717E-03
-.3171916E-03	-.4050757E-03	-.4126061E-03	-.4350147E-03	-.6438159E-03
-.8604122E-03	-.8277692E-03	-.6593771E-03	-.4951517E-03	-.3313756E-03
-.1901333E-03	-.7541190E-04	-.1048875E-04	-.1224987E-04	.1336355E-04
.5810235E-04	-.1614662E-04	-.2011656E-03	-.4406285E-03	-.6312736E-03
-.5656978E-03	-.2887491E-03	-.4216513E-04	.1523474E-03	.3516169E-03
.4803453E-03	.4626595E-03	.2638204E-03	-.6606778E-04	-.3958680E-03
-.5992815E-03	-.7137392E-03	-.1037281E-02	-.1643171E-02	-.2149458E-02
-.2483949E-02	-.2945077E-02	-.3439395E-02	-.3746678E-02	-.4001851E-02
-.4246825E-02	-.4153135E-02	-.3611957E-02	-.2998105E-02	-.2675968E-02
-.2512782E-02	-.2064185E-02	-.1445621E-02	-.1078682E-02	-.8135127E-03
-.4533188E-03	-.1670185E-03	.1102783E-04	.1285779E-03	.6199062E-04
-.2270477E-03	-.4747955E-03	-.4698780E-03	-.5348325E-03	-.1188780E-02
-.2423585E-02	-.3716719E-02	-.4750588E-02	-.5558115E-02	-.6041184E-02
-.6061767E-02	-.5899734E-02	-.5928898E-02	-.6032305E-02	-.5781689E-02
-.5042551E-02	-.4135474E-02	-.3265252E-02	-.2361226E-02	-.1543411E-02
-.9852708E-03	-.2033824E-03	.1203972E-02	.2577189E-02	.3366493E-02
.3811788E-02	.4309677E-02	.5172626E-02	.6512211E-02	.7676975E-02
.7823894E-02	.7475418E-02	.7358986E-02	.7205174E-02	.7048700E-02
.6962573E-02	.6209637E-02	.4492242E-02	.2602679E-02	.9169564E-03
-.1038353E-02	-.3061760E-02	-.4385527E-02	-.5223357E-02	-.6168368E-02
-.7004180E-02	-.7512533E-02	-.8003458E-02	-.8801523E-02	-.9610217E-02
-.9794865E-02	-.9312366E-02	-.7856969E-02	-.4905556E-02	-.1759965E-02
-.1260441E-03	.2015676E-03	.1923827E-03	.5276068E-03	.1136331E-02
.1668407E-02	.2255028E-02	.2922254E-02	.3382217E-02	.3257397E-02
.2624378E-02	.1992408E-02	.1743169E-02	.1392883E-02	.1476055E-03
-.1230694E-02	-.1576468E-02	-.1211949E-02	-.7543153E-03	-.4557157E-03
-.6646389E-03	-.1377575E-02	-.2609653E-02	-.4002165E-02	-.4412022E-02
-.3886226E-02	-.3563414E-02	-.3701175E-02	-.4132123E-02	-.5089577E-02
-.6523585E-02	-.7912808E-02	-.8906036E-02	-.9691637E-02	-.1026159E-01
-.1001056E-01	-.8700531E-02	-.6716248E-02	-.4353619E-02	-.1820367E-02
.2153474E-03	.1628888E-02	.3042404E-02	.4542095E-02	.6402040E-02
.8691380E-02	.1081412E-01	.1309930E-01	.1539874E-01	.1619907E-01

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<!-- saved from url=(0056)http://peer.berkeley.edu/smcat/data/ath/LOMAP/CAP-UP.AT2
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<HTML><HEAD>
<META http-equiv=Content-Type content="text/html; charset=windows-1252">
<META content="MSHTML 6.00.2800.1400" name=GENERATOR></HEAD>
<BODY><PRE>PEER STRONG MOTION DATABASE RECORD. PROCESSING BY PACIFIC ENGINEERING.
LOMA PRIETA 10/18/89 00:05, CAPITOLA,  UP (CDMG STATION 47125)
ACCELERATION TIME HISTORY IN UNITS OF G. FILTER POINTS: HP=0.2 Hz LP=50.0 Hz
NPTS=  7991, DT= .00500 SEC
   .8592815E-02   .9327441E-02   .3948169E-02  -.3347691E-02  -.1928583E-02
  -.1462184E-02  -.8536293E-03  -.2858248E-03   .1329634E-03   .4173252E-03
   .6547141E-03   .8743396E-03   .1054614E-02   .1137308E-02   .9962862E-03
   .4416386E-03  -.5307477E-03  -.1797165E-02  -.3284678E-02  -.4626428E-02
  -.5192052E-02  -.4787038E-02  -.3952346E-02  -.3285581E-02  -.2649878E-02
  -.1767244E-02  -.9043428E-03  -.3927167E-03  -.2186472E-03  -.3405045E-03
  -.8028176E-03  -.1392068E-02  -.1771529E-02  -.2059720E-02  -.2520216E-02
  -.2954031E-02  -.3002118E-02  -.2638767E-02  -.2060978E-02  -.1394327E-02
  -.7143323E-03  -.2824125E-03  -.3729985E-03  -.9039764E-03  -.1449061E-02
  -.1597335E-02  -.1288332E-02  -.7365948E-03  -.6784797E-04   .6566766E-03
   .1030242E-02   .6676084E-03  -.7330389E-04  -.6755535E-03  -.9668889E-03
  -.8607268E-03  -.4747921E-03  -.1826548E-03  -.2818066E-03  -.9699703E-03
  -.2245553E-02  -.3535439E-02  -.4125992E-02  -.3834256E-02  -.2906794E-02
  -.1889362E-02  -.1537430E-02  -.2362322E-02  -.4095250E-02  -.5859873E-02
  -.6875092E-02  -.6668753E-02  -.5285597E-02  -.3393593E-02  -.1656191E-02
  -.4683766E-03  -.2067591E-04  -.8526081E-04  -.2338273E-03  -.1841030E-03
   .2759721E-03   .1060947E-02   .1671891E-02   .1895564E-02   .2235723E-02
   .3225220E-02   .4595217E-02   .5662380E-02   .6012182E-02   .5103369E-02
   .2852630E-02   .6628109E-03  -.7979873E-04   .2323884E-03   .2445092E-03
  -.5018234E-03  -.1459357E-02  -.2291431E-02  -.2845720E-02  -.2673883E-02
  -.1866323E-02  -.1445293E-02  -.2136810E-02  -.3606363E-02  -.5023521E-02
  -.5843793E-02  -.5725406E-02  -.4469883E-02  -.2351362E-02   .3482654E-03
   .3142900E-02   .5002478E-02   .5139511E-02   .3761102E-02   .2346725E-02
   .2134583E-02   .2542819E-02   .2428337E-02   .1817468E-02   .1588725E-02
   .2067041E-02   .2744183E-02   .3061884E-02   .2543587E-02   .8709889E-03
  -.1931484E-02  -.5713316E-02  -.1020444E-01  -.1419998E-01  -.1539454E-01
  -.1262639E-01  -.7265930E-02  -.1745290E-02   .1465622E-02   .3851563E-03
  -.4035560E-02  -.7905378E-02  -.8759397E-02  -.6625341E-02  -.1946353E-02
   .3691198E-02   .7504345E-02   .8698781E-02   .8204072E-02   .5636105E-02
   .8506237E-03  -.4510187E-02  -.8986617E-02  -.1116326E-01  -.8722707E-02
   .2541103E-03   .1345858E-01   .2204731E-01   .1803490E-01   .3713419E-02
  -.1060557E-01  -.1694190E-01  -.1410215E-01  -.4517508E-02   .7137371E-02
   .1481753E-01   .1558770E-01   .1161668E-01   .5508532E-02  -.2948949E-02
  -.1354342E-01  -.2273909E-01  -.2532894E-01  -.1871242E-01  -.5635296E-02
   .7304150E-02   .1413688E-01   .1322715E-01   .6829362E-02  -.8116581E-03
  -.4963000E-02  -.2327128E-02   .5633998E-02   .1282695E-01   .1410978E-01
   .8800870E-02   .7434354E-03  -.5250620E-02  -.7511275E-02  -.7507343E-02
  -.7590922E-02  -.7408633E-02  -.3526947E-02   .4311912E-02   .9708193E-02
   .6398954E-02  -.3049050E-02  -.9419620E-02  -.6993301E-02   .1658668E-02
   .1036922E-01   .1536174E-01   .1590332E-01   .1242778E-01   .5564243E-02
  -.2985319E-02  -.1009926E-01  -.1314338E-01  -.1114262E-01  -.4889722E-02
   .3128052E-02   .9007165E-02   .7606045E-02  -.4172283E-02  -.2244988E-01
  -.3672170E-01  -.3616300E-01  -.1711229E-01   .1135784E-01   .3127438E-01
   .3319069E-01   .2334637E-01   .8371357E-02  -.1069070E-01  -.2762830E-01
  -.3223071E-01  -.2008819E-01   .5147315E-02   .3045806E-01   .3802435E-01
   .2205594E-01  -.3721307E-02  -.2136596E-01  -.2414667E-01  -.1370315E-01
```

```
Uncorrected Acceleration  (Format v01.00 with 13 text lines) Orig: QT020000.ASC
ChiChi,Taiwan Earthquake                September 20, 1999 17:47:15.670 UTC
Hypocenter:23.860300 120.799500 10.33km(CWB)    Mw=7.6(CWB)
Origin: 09/20/1999 17:47:15.670 UTC(CWB)Owner: CWB
Station: TCU078 CWB 23.8120   120.8455  T078
Site Geology: S_D (UBC 1997)
Recorder: A900 S/N 020     ( 3 Chns of  3 at Sta) Sensor:  S/N
Rcrd Start Time:09/20/99 17:46:58.000 UTC(Q=0) Recordid:
Sta Cha: 3     90 deg (Rcrdr Chan  3) Location:Free-field
Raw record length: 160.005 sec  Uncor max= -440.0cm/s/, at 27.290  sec
Rec, filtered below:       Hz (periods over      secs), & above:       Hz
Max:   -440.025 cm/s/s , at 27.290  sec
Values used in headers to denote parameter is unknown/unspecified: -999, -999.0
100 Integer-header values follow on 10 lines, Format  (10I8)
       1       1       3     100       1    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
    -999       1       3    -999     182    -999      20       3       3       3
    -999    -999    -999    -999    -999    -999    1999     263       9      20
      17      47      15      67       0    -999    -999    -999    -999       3
    -999    -999       0      90    -999    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
100 Real-header values follow on 17 lines, Format (6F13.6)
    23.812000   120.845497   272.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000    23.860300   120.799500    10.330000
     7.600000  -999.000000  -999.000000  -999.000000     7.100000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000     0.005000
     0.000000     0.000000  -999.000000  -999.000000  -999.000000  -999.000000
   160.005000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000     2.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -440.024963    27.290000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000
  7  comment line(s) follow, each starting with a '|':
| Station Map:http://scman.cwb.gov.tw/eqv3/accsta-e/acc-sta-e.htm
| Original file, QT020000.ASC, created: January 08, 2001 17:50 UTC
| http://www.cwb.gov.tw/V3.0e/index-e.htm
| Converted to COSMOS format: July 18, 2001 21:49 UTC
| http://www.cosmos-eq.org/cosmos_format_01.pdf
| Retrieved from:
| ftp://smdb.crustal.ucsb.edu/chichi/QT020000_E
32001  acceleration pts a  200 pts/sec, Units=cm/s/s     , Format=(1F14.9  )
  -0.119750977
   0.179626465
   0.299377441
  -0.239501953
   0.000000000
   0.179626465
```

```
Uncorrected Acceleration  (Format v01.00 with 13 text lines) Orig: QT020000.ASC
ChiChi,Taiwan Earthquake                 September 20, 1999 17:47:15.670 UTC
Hypocenter:23.860300 120.799500 10.33km(CWB)    Mw=7.6(CWB)
Origin: 09/20/1999 17:47:15.670 UTC(CWB)Owner: CWB
Station: TCU078 CWB 23.8120   120.8455  T078
Site Geology: S_D (UBC 1997)
Recorder: A900 S/N 020     ( 3 Chns of  3 at Sta) Sensor:  S/N
Rcrd Start Time:09/20/99 17:46:58.000 UTC(Q=0) Recordid:
Sta Cha: 2     0 deg (Rcrdr Chan  2) Location:Free-field
Raw record length: 160.005 sec  Uncor max= -302.7cm/s/, at 31.185  sec
Rec, filtered below:       Hz (periods over      secs), & above:       Hz
Max:   -302.730 cm/s/s , at 31.185  sec
Values used in headers to denote parameter is unknown/unspecified: -999, -999.0
100 Integer-header values follow on 10 lines, Format  (10I8)
       1       1       3     100       1    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
    -999       1       3    -999     182    -999      20       3       3       3
    -999    -999    -999    -999    -999    -999    1999     263       9      20
      17      47      15      67       0    -999    -999    -999    -999       2
    -999    -999       0       0    -999    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
100 Real-header values follow on 17 lines, Format (6F13.6)
    23.812000   120.845497   272.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000    23.860300   120.799500    10.330000
     7.600000  -999.000000  -999.000000  -999.000000     7.100000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000     0.005000
     0.000000     0.000000  -999.000000  -999.000000  -999.000000  -999.000000
   160.005000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000     2.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -302.730469    31.185000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000
  7  comment line(s) follow, each starting with a '|':
| Station Map:http://scman.cwb.gov.tw/eqv3/accsta-e/acc-sta-e.htm
| Original file, QT020000.ASC, created: January 08, 2001 17:50 UTC
| http://www.cwb.gov.tw/V3.0e/index-e.htm
| Converted to COSMOS format: July 18, 2001 21:49 UTC
| http://www.cosmos-eq.org/cosmos_format_01.pdf
| Retrieved from:
| ftp://smdb.crustal.ucsb.edu/chichi/QT020000_N
32001  acceleration pts a  200 pts/sec, Units=cm/s/s     , Format=(1F14.9  )
   0.000000000
   0.000000000
   0.000000000
   0.000000000
   0.059875488
   0.000000000
```

```
Uncorrected Acceleration  (Format v01.00 with 13 text lines) Orig: QT020000.ASC
ChiChi,Taiwan Earthquake                 September 20, 1999 17:47:15.670 UTC
Hypocenter:23.860300 120.799500 10.33km(CWB)    Mw=7.6(CWB)
Origin: 09/20/1999 17:47:15.670 UTC(CWB)Owner: CWB
Station: TCU078 CWB 23.8120   120.8455  T078
Site Geology: S_D (UBC 1997)
Recorder: A900 S/N 020     ( 3 Chns of  3 at Sta) Sensor:  S/N
Rcrd Start Time:09/20/99 17:46:58.000 UTC(Q=0) Recordid:
Sta Cha: 1   UP       (Rcrdr Chan  1) Location:Free-field
Raw record length: 160.005 sec  Uncor max= 171.1cm/s/s, at 27.335  sec
Rec, filtered below:       Hz (periods over      secs), & above:       Hz
Max:    171.124 cm/s/s , at 27.335  sec
Values used in headers to denote parameter is unknown/unspecified: -999, -999.0
100 Integer-header values follow on 10 lines, Format  (10I8)
       1       1       3     100       1    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
    -999       1       3    -999     182    -999      20       3       3       3
    -999    -999    -999    -999    -999    -999    1999     263       9      20
      17      47      15      67       0    -999    -999    -999    -999       1
    -999    -999       0     400    -999    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
    -999    -999    -999    -999    -999    -999    -999    -999    -999    -999
100 Real-header values follow on 17 lines, Format (6F13.6)
    23.812000   120.845497   272.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000    23.860300   120.799500    10.330000
     7.600000  -999.000000  -999.000000  -999.000000     7.100000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000     0.005000
     0.000000     0.000000  -999.000000  -999.000000  -999.000000  -999.000000
   160.005000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000     2.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000   171.124146    27.335000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000  -999.000000
  -999.000000  -999.000000  -999.000000  -999.000000
  7  comment line(s) follow, each starting with a '|':
| Station Map:http://scman.cwb.gov.tw/eqv3/accsta-e/acc-sta-e.htm
| Original file, QT020000.ASC, created: January 08, 2001 17:50 UTC
| http://www.cwb.gov.tw/V3.0e/index-e.htm
| Converted to COSMOS format: July 18, 2001 21:49 UTC
| http://www.cosmos-eq.org/cosmos_format_01.pdf
| Retrieved from:
| ftp://smdb.crustal.ucsb.edu/chichi/QT020000_V
32001  acceleration pts a  200 pts/sec, Units=cm/s/s     , Format=(1F14.9  )
  -0.059875488
  -0.059875488
   0.000000000
   0.059875488
  -0.119750977
   0.059875488
```

```
**********************************************************************
*                    REPORTE DEL ARCHIVO:  UNIO850919AT.T            *
*                                                                    *
* SISMO: 8509190A      FECHA REGISTRO:  850920      ESTACION:    UNIO  *
* DISTANCIA:  107      ACELEROGRAFO:     DS-259     ORIENTACION: N90E  *
* # EVENTO:    0A      HORA:          13:17:49      DURACION:    62.7  *
*++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
* DIGITIZACION:        NXYA=     0   NXYR=     0    NXYT=     0       *
*++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
* DATOS SIN CORREGIR:                NPSC= 6272                      *
*++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
* DATOS CORREGIDOS:    NP=   6274   DT=  0.010     METODO=   CALTECH. *
* PARAMETROS:          F1=  0.180   F2=  0.200     F3=45.00  F4=47.00 *
*                      F5=  0.000   F6=  0.000     F7= 0.00  F8= 0.00 *
*                      TINICIAL=    0.000          TFINAL=   62.709   *
*++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
*             MAXIMO     TMAX       MINIMO     TMIN      INICIAL   CRUCES *
* ACELER:    135.34     25.037    -147.06     23.737      -1.73      662  *
* VELOCI:     11.70     22.937      -9.92     23.837       0.70      245  *
* DESPLA:      4.16     20.907      -3.13     24.507      -0.09       54  *
*                                                                    *
*++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
*                                                                    *
* ESPECTROS PARA 5 AMORTIGUAMIENTOS:                                 *
* AMORTIG:       0          2          5         10         20         0   *
* # PER:        81         81         81         81         81         0   *
* SAMAX:   3952.98     917.15     597.74     390.72     265.58      0.00 *
* PERIODO:     0.15       0.24       0.24       0.24       0.22      0.00 *
* SVMAX:     130.33      62.32      38.43      27.19      20.16      0.00 *
* PERIODO:     0.46       0.54       0.54       2.60       2.80      0.00 *
* SDMAX:      26.80      17.72      13.09       9.61       6.98      0.00 *
* PERIODO:     2.60       2.60       5.00       5.40       5.40      0.00 *
*                                                                    *
**********************************************************************
```

NPSC	TSC	ASC	NPSC	TSC	ASC	NPSC	TSC	ASC	NPSC	TSC	ASC	NPSC	TSC	ASC
1	0.010	-0.941	2	0.020	1.929	3	0.030	4.799	4	0.040	5.759	5	0.050	3.839
6	0.060	1.929	7	0.070	1.929	8	0.080	1.929	9	0.090	0.019	10	0.100	-2.861
11	0.110	-3.811	12	0.120	-0.941	13	0.130	2.889	14	0.140	4.799	15	0.150	4.799
16	0.160	4.799	17	0.170	3.839	18	0.180	2.889	19	0.190	0.019	20	0.200	-0.941
21	0.210	0.969	22	0.220	1.929	23	0.230	2.889	24	0.240	2.889	25	0.250	0.019
26	0.260	-2.861	27	0.270	-2.861	28	0.280	0.019	29	0.290	2.889	30	0.300	0.969
31	0.310	0.019	32	0.320	0.019	33	0.330	0.969	34	0.340	-0.941	35	0.350	-4.771

```
**********************************************************************
```

```
*                    REPORTE DEL ARCHIVO:  UNIO850919AL.T                *
*                                                                        *
* SISMO: 8509190A      FECHA REGISTRO:  850920      ESTACION:    UNIO   *
* DISTANCIA:  107      ACELEROGRAFO:     DS-259     ORIENTACION: N00E   *
* # EVENTO:    0A      HORA:           13:17:49     DURACION:   62.71   *
*+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
* DIGITIZACION:        NXYA=     0   NXYR=     0    NXYT=     0          *
*+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
* DATOS SIN CORREGIR:                NPSC= 6272                          *
*+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
* DATOS CORREGIDOS:    NP=   6274   DT=  0.010     METODO=    CALTECH.  *
* PARAMETROS:          F1=  0.180   F2=  0.200     F3=45.00   F4=47.00  *
*                      F5=  0.000   F6=  0.000     F7= 0.00   F8= 0.00  *
*                      TINICIAL=    0.000          TFINAL=    62.709    *
*+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
*             MAXIMO     TMAX      MINIMO     TMIN      INICIAL   CRUCES *
* ACELER:    162.79    23.997   -155.70    21.287       6.37       659  *
* VELOCI:     20.34    12.059    -17.54    24.577      -0.39       165  *
* DESPLA:      6.95    24.327     -3.76    18.768       0.09        54  *
*                                                                        *
*+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
*                                                                        *
* ESPECTROS PARA 5 AMORTIGUAMIENTOS:                                     *
* AMORTIG:       0          2          5         10         20          0  *
* # PER:        81         81         81         81         81          0  *
* SAMAX:   3178.93     823.71     535.60     379.99     253.90       0.00 *
* PERIODO:     0.17       0.28       0.34       0.34       0.34       0.00 *
* SVMAX:    216.78      83.55      56.48      38.39      28.77       0.00 *
* PERIODO:     0.74       2.40       2.40       2.60       4.80       0.00 *
* SDMAX:      52.15      30.58      19.61      14.04      10.48       0.00 *
* PERIODO:     2.40       2.40       2.60       4.80       4.60       0.00 *
*                                                                        *
**************************************************************************
```

NPSC	TSC	ASC	NPSC	TSC	ASC	NPSC	TSC	ASC	NPSC	TSC	ASC	NPSC	TSC	ASC
1	0.010	6.796	2	0.020	3.926	3	0.030	2.966	4	0.040	0.096	5	0.050	-2.774
6	0.060	-0.854	7	0.070	1.056	8	0.080	0.096	9	0.090	-1.814	10	0.100	-2.774
11	0.110	-1.814	12	0.120	-0.854	13	0.130	-1.814	14	0.140	-1.814	15	0.150	-0.854
16	0.160	0.096	17	0.170	-0.854	18	0.180	-1.814	19	0.190	0.096	20	0.200	1.056
21	0.210	2.966	22	0.220	2.016	23	0.230	0.096	24	0.240	-0.854	25	0.250	2.016
26	0.260	3.926	27	0.270	3.926	28	0.280	2.966	29	0.290	2.966	30	0.300	0.096
31	0.310	-1.814	32	0.320	-2.774	33	0.330	-4.684	34	0.340	-0.854	35	0.350	3.926
36	0.360	7.756	37	0.370	8.716	38	0.380	6.796	39	0.390	-0.854	40	0.400	-2.774

```
*********************************************************************
*                    REPORTE DEL ARCHIVO:  UNIO850919AV.T           *
*                                                                   *
* SISMO: 8509190A     FECHA REGISTRO:  850920     ESTACION:    UNIO  *
* DISTANCIA:  107     ACELEROGRAFO:    DS-259     ORIENTACION: VERT  *
* # EVENTO:    0A     HORA:          13:17:49     DURACION:    62.7  *
*+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
* DIGITIZACION:       NXYA=    0   NXYR=    0    NXYT=    0          *
*+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
* DATOS SIN CORREGIR:              NPSC= 6272                       *
*+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
* DATOS CORREGIDOS:   NP=   6274   DT=  0.010     METODO=   CALTECH. *
* PARAMETROS:         F1=  0.200   F2=  0.230     F3=45.00  F4=47.00 *
*                     F5=  0.000   F6=  0.000     F7= 0.00  F8= 0.00 *
*                     TINICIAL=    0.000          TFINAL=   62.709   *
*+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
*             MAXIMO    TMAX      MINIMO    TMIN     INICIAL   CRUCES *
* ACELER:   120.94    20.358    -95.06    21.587      0.22      751  *
* VELOCI:     8.68    20.578    -11.72    19.678     -1.06      168  *
* DESPLA:     2.56    27.266     -3.89    20.368      0.21       48  *
*                                                                   *
*+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++*
*                                                                   *
* ESPECTROS PARA 5 AMORTIGUAMIENTOS:                                *
* AMORTIG:     0         2         5        10        20         0   *
* # PER:      80        80        80        80        80         0   *
* SAMAX:   2029.19    523.28    331.62    230.52    169.12      0.00 *
* PERIODO:    0.22      0.32      0.30      0.30      0.07      0.00 *
* SVMAX:     86.61     48.59     28.52     19.35     15.36      0.00 *
* PERIODO:    2.60      2.60      2.60      2.60      4.80      0.00 *
* SDMAX:     35.66     19.37     13.09      9.01      5.94      0.00 *
* PERIODO:    2.60      2.60      4.80      4.80      4.80      0.00 *
*                                                                   *
*********************************************************************
```

NPSC	TSC	ASC	NPSC	TSC	ASC	NPSC	TSC	ASC	NPSC	TSC	ASC
1	0.010	-0.920	2	0.020	1.960	3	0.030	6.760	4	0.040	6.760
5	0.050	1.960	6	0.060	-0.920	7	0.070	-3.800	8	0.080	-1.880
9	0.090	1.000	10	0.100	1.960						
11	0.110	0.040	12	0.120	0.040	13	0.130	1.960	14	0.140	1.960
15	0.150	1.960	16	0.160	1.000	17	0.170	-0.920	18	0.180	-2.840
19	0.190	-3.800	20	0.200	-0.920						
21	0.210	3.880	22	0.220	7.720	23	0.230	6.760	24	0.240	4.840
25	0.250	1.960	26	0.260	1.960	27	0.270	1.000	28	0.280	2.920
29	0.290	4.840	30	0.300	0.040						
31	0.310	-4.760	32	0.320	-7.630	33	0.330	-9.550	34	0.340	-6.670
35	0.350	-2.840	36	0.360	1.000	37	0.370	1.960	38	0.380	-2.840
39	0.390	-6.670	40	0.400	-3.800						
41	0.410	-1.880	42	0.420	-4.760	43	0.430	-7.630	44	0.440	-9.550
45	0.450	-7.630	46	0.460	-2.840	47	0.470	0.040	48	0.480	1.000
49	0.490	1.960	50	0.500	1.000						
51	0.510	1.000	52	0.520	1.960	53	0.530	1.960	54		