California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16
Book 3, Part E: Data and Drawings

Attachments:

1. Directive Drawings
2. Preliminary Ground Motions
3. Record of Survey and Control Monument Data
4. Right-of-Way Acquisition Plan
5. CHSTP Certifiable Elements and Hazards Log
6. CHSTP Preliminary Hazard Analysis for Infrastructure, Right-of-Way Generally
7. CHSTP Preliminary Hazard Analysis for Infrastructure, Right-of-Way Structures

California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16

Directive Drawings

Revision No.	Date	Description
0	01 Mar 12	Initial Release, R0

GENERAL

TYPE	DRAWING NO.	DRAWING TITLE
DD	DD-GE-001	GENERAL DIRECTIVE NOTES, CIVIL
DD	DD-GE-002	GENERAL DIRECTIVE NOTES, TRACK
DD	DD-GE-003	GENERAL DIRECTIVE NOTES, STRUCTURAL
DD	DD-GE-100	ACRONYMS AND ABBREVIATIONS 1
DD	DD-GE-101	ACRONYMS AND ABBREVIATIONS 2
DD	DD-GE-102	ACRONYMS AND ABBREVIATIONS 3
DD	DD-GE-103	ACRONYMS AND ABBREVIATIONS 4
DD	DD-GE-104	ACRONYMS AND ABBREVIATIONS 5
DD	DD-GE-110	SYMBOLS 1
DD	DD-GE-111	SYMBOLS 2

CIVIL

TYPE	DRAWING NO.	DRAWING TITLE
DD	DD-CV-001	TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT
DD	DD-CV-002	TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, OPEN CUT
DD	DD-CV-003	TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, RETAINED FILL
DD	DD-CV-004	TYPICAL CROSS SECTION, ONE TRACK NON-BALLASTED, EMBANKMENT AND OPEN CUT
DD	DD-CV-005	TYPICAL CROSS SECTION, FOUR TRACK NON-BALLASTED, EMBANKMENT
DD	DD-CV-006	FENCE AND GATE DETAILS
DD	DD-CV-007	FENCE AND GATE LOCATIONS
DD	DD-CV-008	FENCING ON GRADE SEPARATED STRUCTURES
DD	DD-CV-009	FENCE AT CULVERT CROSSINGS
DD	DD-CV-010	MINIMUM CLEARANCE, GRADE SEPARATED STRUCTURES
DD	DD-CV-011	ACCESS ROADS AND DRIVEWAYS

DRAINAGE

TYPE	DRAWING NO.	DRAWING TITLE
DD	DD-CD-001	NON-BALLASTED AERIAL STRUCTURE, BRIDGE DECK DRAINAGE SYSTEM
DD	DD-CD-002	AERIAL STRUCTURE, BEGIN AND END BRIDGE DRAINAGE SYSTEM
DD	DD-CD-003	AT-GRADE TRACK, DRAINAGE SYSTEM
DD	DD-CD-004	AT-GRADE STATION PLATFORM, DRAINAGE SYSTEM
DD	DD-CD-005	AERIAL STRUCTURE BRIDGE DECK, DRAINAGE INLET DETAIL

UTILITY

TYPE	DRAWING NO.	DRAWING TITLE
DD	DD-UT-001	UTILITY CROSSING CLEARANCES, AT GRADE
DD	DD-UT-002	UTILITY CROSSING CLEARANCES, RETAINED CUT TRENCH
DD	DD-UT-004	UTILITY CROSSING CLEARANCES, TRENCH
DD	DD-UT-004	UTILITY CROSSING CLEARANCES, CUT AND COVER TUNNELS

INTRUSION PROTECTION

TYPE	DRAWING NO.	DRAWING TITLE
DD	DD-IP-001	EARTHWORK BERM, RAILROAD ADJACENT TO HST
DD	DD-IP-002	BARRIERS IN SHARED CORRIDOR
DD	DD-IP-003	HST PIER PROTECTION, IN RAILROAD RIGHT-OF-WAY
DD	DD-IP-004	IN SHARED AND ADJACENT CORRIDOR, AT-GRADE
DD	DD-IP-005	AT-GRADE BERM OR DITCH ON HST GUIDEWAY, RAILROAD ADJACENT TO HST
DD	DD-IP-006	HST PIER PROTECTION, IN HIGHWAY/ROADWAY RIGHT-OF-WAY
DD	DD-IP-007	HST TRENCH AND RETAINING WALL PROTECTION
DD	DD-IP-008	ADJACENT TO HIGHWAY/ROADWAY

STRUCTURE

TYPE	DRAWING NO.	DRAWING TITLE
DD	DD-ST-001	AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK
DD	DD-ST-002	AERIAL STRUCTURE, ONE TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK
DD	DD-ST-003	AERIAL STRUCTURE, TYPICAL CABLE TROUGH DETAILS
DD	DD-ST-004	AERIAL STRUCTURE, CABLE TROUGH DETAILS, AT OCS POLE
DD	DD-ST-005	AERIAL STRUCTURE, CONCRETE PARAPET
DD	DD-ST-006	AERIAL STRUCTURE, TYPICAL SPAN, SHEAR KEY DETAILS
DD	DD-ST-007	AERIAL STRUCTURE,TYPICAL SPAN, EXPANSION JOINT DETAILS
DD	DD-ST-008	AERIAL STRUCTURE, EMERGENCY EXIT STAIRWAY DETAILS 1
DD	DD-ST-009	AERIAL STRUCTURE, EMERGENCY EXIT STAIRWAY DETAILS 2
DD	DD-ST-010	TYPICAL CROSS SECTION, TWO TRACK TRENCH, OUTSIDE WALKWAY
DD	DD-ST-011	CABLE TROUGH DETAILS, TRENCH / CUT AND COVER TUNNEL
DD	DD-ST-012	CABLE TROUGH LAYOUT TRANSITION AREAS
DD	DD-ST-013	TYPICAL CABLE TROUGH DETAILS, EMBANKMENT/CUT
DD	DD-ST-014	RETAINING WALL, LAYOUT AND DETAILS

SYSTEM OVERALL

TYPE	DRAWING NO.	DRAWING TITLE
DD	DD-SY-010	TYPICAL CIVIL ACCOMMODATIONS, SYSTEM SITES

TRACTION POWER

TYPE	DRAWING NO.	DRAWING TITLE
DD	DD-TP-N101	TYPICAL 25KV DUCT BANK DETAILS
DD	DD-TP-N111	TYPICAL 25KV MANHOLE DETAILS

OVERHEAD CONTACT SYSTEM

TYPE	DRAWING NO.	DRAWING TITLE
DD	DD-OC-2046	TYPICAL GROUNDING AND BONDING ARRANGEMENT, GRADE SEPARATED STRUCTURE, 220 MPH SEGMENT
DD	DD-OC-2047	TYPICAL GROUNDING AND BONDING ARRANGEMENT, AERIAL STRUCTURE, 220 MPH SEGMENT
DD	DD-OC-2048	TYPICAL GROUNDING AND BONDING ARRANGEMENT, CUT AND COVER TUNNEL, 220 MPH SEGMENT
DD	DD-OC-2049	GROUNDING AND BONDING ARRANGEMENT, OPEN TRENCH, 220 MPH SEGMENT

COMMUNICATIONS

DRAWING TYPE	DRAWING NO.	DRAWING TITLE
DD	DD-CO-G021	TYPICAL CROSS SECTION, SYSTEMS LOW-VOLTAGE, CONDUIT DUCT BANK,
DD	DD-CO-G022	TYPICAL CROSS SECTION, SYSTEMS LOW-VOLTAGE, UNDER TRACK CONDUCT DUCT BANK, AT-GRADE
DD	DD-CO-G023	TYPICAL SYSTEMS LOW-VOLTAGE, UNDERGROUND CONDUIT DUCT BANK INSTALLATIONS, AT TRENCH SECTIONS
DD	DD-CO-G024	TYPICAL SYSTEMS LOW-VOLTAGE, UNDERGROUND CONDUIT DUCT BANK INSTALLATIONS, AT TRENCH SECTIONS

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY R. MINCIO
DRAWN BY V. HUANTE
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
SIERRA SUBDIVISION

DIRECTIVE DRAWINGS
CONTRACT PACKAGE 1
SHEET INDEX

CONTRACT NO.
DRAWING NO. INDEX-1 CP1
SCALE NO SCALE
SHEET NO.

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California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16

Directive Drawings

General

03/08/2012 RFP HSR 11-16

CIVIL DIRECTIVE NOTES

A. GENERAL SITE NOTES

1. FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO THE COMMENCEMENT OF WORK AND REPORT ANY DISCREPANCIES TO THE ATHORITY'S REPRESENTATIVE.
2. ALL CONSTRUCTION ACTIVITIES AFFECTING THIRD PARTY FACILITIES SHALL BE COORDINATED WITH THE PROPER JURISDICTION AUTHORITY.
3. FOR ABBREVIATIONS, SEE GENERAL DIRECTIVE DRAWINGS.
4. FOR SYMBOLS, SEE GENERAL DIRECTIVE DRAWINGS.
5. "ORIGINAL GROUND" SHOWN ON CROSS SECTIONS REFERS TO THE APPROXIMATE EXISTING GROUND LINE AT THE DESIGNATED CENTERLINE, BASELINE, LAYOUT LINE OR SECTION LINE.
6. ALL WORK SHALL CONFORM TO ALL LOCAL, STATE AND FEDERAL CODES AND ORDINANCES IN EFFECT.
7. PROVIDE AND MAINTAIN PROPER BARRICADES, RAILINGS, GUARDS, FLAGGING, LIGHTING, OR OTHER DEVICES NECESSARY FOR THE PROTECTION OF LIFE AND PROPERTY.
8. VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING MATERIALS.

B. GRADING

1. DO NOT PERFORM ANY GRADING OPERATION SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES. SHOULD SUCH VIOLATION OCCUR THE CONTRACTOR MAY BE CITED AND THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY.
2. KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE.
3. PROVISIONS SHALL BE MADE TO PREVENT SURFACE WATERS FROM DAMAGING THE CUT FACE OF AN EXCAVATION OR THE SLOPED SURFACES OF A FILL. FURTHERMORE, PROVISIONS SHALL BE MADE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE.
4. THE LIMITS OF THE AREA TO BE GRADED SHALL BE FLAGGED BEFORE THE COMMENCEMENT OF THE GRADING WORK.
5. ALL GRADING OPERATIONS SHALL BE PERFORMED IN CONFORMANCE WITH THE APPLICABLE PROVISIONS OF THE WATER POLLUTION CONTROL AND WATER QUALITY STANDARDS CONTAINED IN THE LATEST CALTRANS STORM WATER QUALITY HANDBOOKS.

03/08/2012 RFP HSR 11-16

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DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY S. MILITELLO
DRAWN BY R. MINCIO
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
GENERAL DIRECTIVE

GENERAL DIRECTIVE NOTES
CIVIL

CONTRACT NO.
DRAWING NO. DD-GE-001
SCALE NO SCALE
SHEET NO.

TRACK DIRECTIVE NOTES

1. THE GENERAL BASIS FOR TRACK STANDARDS AND MATERIALS SHALL BE THE AREMA MANUAL.

2. TRACK AND TRACK COMPONENTS SHALL BE DESIGNED AND FABIRICATED TO PERFORM UNDER THE PREVAILING AND EXTREME CLIMATIC AND ENVIRONMENTAL CONDITIONS OCCURING WITHIN THE GEOGRAPHIC EXTENT OF THE SYSTEM.

3. THE PROFILE GRADE LINE IS CARRIED ON THE TOP OF LOW RAIL THROUGH HORIZONTAL CURVES AND SPIRALS FOR THE DESIGNATED TRACK.

4. THE LENGTHS OF TRACK IS BASED ON CENTER OF TRACK ALIGNMENT.

5. UNLESS SEPARATE TRACK PROFILES ARE GIVEN, TRACK PARALLEL TO THE DESIGNATED TRACK ARE AT THE SAME TOP OF RAIL ELEVATIONS PROJECTED ON EITHER PERPENDICULAR OR RADIAL LINES FROM THE DESIGNATED TRACK CENTERLINES.

6. BALLASTED TRACKS ARE GENERALLY PREFERRED FOR YARD TRACKS. DESIGNERS SHALL FOLLOW THE REQUIREMENTS ASSOCIATED WITH CONSTRUCTION OF BALLASTED TRACK IN THE CALIFORNIA HIGH SPEED TRAIN DESIGN MANUAL.

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DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY S. MILITELLO
DRAWN BY R. MINCIO
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
GENERAL DIRECTIVE

GENERAL DIRECTIVE NOTES
TRACK

CONTRACT NO.
DRAWING NO. DD-GE-002
SCALE NO SCALE
SHEET NO.

STRUCTURAL DIRECTIVE NOTES:

A. SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

1. CONSTRUCTION SPECIFICATION SHALL BE THE DESIGN-BUILD STANDARD SPECIFICATION, CALIFORNIA HIGH SPEED TRAIN.

2. THE STRUCTURAL DESIGN OF STRUCTURES SUPPORTING HIGH SPEED TRAINS SHALL BE BASED ON THE REQUIREMENTS OF THE CALIFORNIA HIGH SPEED TRAIN AUTHORITY.

3. DESIGN CRITERIA FOR HIGHWAY BRIDGES SHALL BE THE CALIFORNIA BRIDGE DESIGN SPECIFICATION. FOR HIGHWAY BRIDGES PASSING OVER THE HIGH SPEED TRAIN THE BRIDGE DESIGN SPECIFICATION SHALL BE SUPPLEMENTED BY THE CALIFORNIA HIGH SPEED TRAIN REQUIREMENTS FOR SEISMIC DESIGN.

4. DESIGN CRITERIA FOR RAILROAD STRUCTURES NOT SUPPORTING HIGH SPEED TRAINS SHALL BE THE AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA) MANUAL FOR RAILWAY ENGINEERING (APRIL 2008). FOR RAILROAD BRIDGES PASSING OVER THE HIGH SPEED TRAIN THE BRIDGE DESIGN SPECIFICATION SHALL BE SUPPLEMENTED BY THE CALIFORNIA HIGH SPEED TRAIN REQUIREMENTS FOR SEISMIC DESIGN.

B. DESIGN METHOD

1. DESIGN SHALL BE PERFORMED TO THE LOAD AND RESISTANCE FACTOR (LRFD) DESIGN METHOD.

2. THE DESIGN OF PRESTRESSING AND PARTIAL PRESTRESSING SHALL CONFORM TO THE REQUIREMENTS OF SUBSECTION 5.9 OF AASHTO LRFD WITH CALTRANS AMENDMENTS WITH THE FOLLOWING EXCEPTION: NET TENSION STRESSES ARE NOT ALLOWED IN THE PRECOMPRESSED TENSILE ZONE AFTER ALL LOSSES HAVE OCCURRED.

C. GENERAL

1. FOR ACRONYMS AND ABBREVIATIONS SEE DRAWING DD-GE-100 THROUGH DD-GE-104.

2. ALL STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND ALL OTHER DRAWINGS RELATED TO THE WORK.

3. EMBEDDED ITEMS SUCH AS PIPES, INSERTS, SLEEVES AND CONDUITS, AND ANY RECESSES, NICHES OR OPENINGS REQUIRED FOR UTILITY, ARCHITECTURAL, MECHANICAL AND ELECTRICAL INSTALLATIONS ARE NOT SHOWN ON THE STRUCTURAL DRAWINGS. CONTRACTOR SHALL REFER TO THE UTILITY, ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR THE LOCATIONS AND DETAILS OF THESE ITEMS. CONTRACTOR SHALL REVIEW AND APPROVE ALL PENETRATIONS PRIOR TO CONSTRUCTION. PENETRATIONS WHICH LOCAL THICKENING OF CONCRETE OR STEEL MEMBERS AND /OR SUPPLEMENTAL REINFORCING SHALL BE SHOWN ON THE STRUCTURAL DRAWINGS.

4. THE VERTICAL CONTROL OF ALL TRACK STRUCTURES IS BASED ON THE TOP OF LOW RAIL ELEVATION IN SUPERELEVATED STRUCTURES.

5. CONTRACTORS ATTENTION IS DIRECTED TO THE AREAS OF SAG VERTICAL CURVES. IN SUCH AREAS CAUTION SHOULD BE EXERCISED THAT THE DIMENSION TO THE INVERT OF CONCRETE OF GUIDEWAY IS NEVER LESS THAN THAT SHOWN FOR INVERT DETAILS.

7. ALL CONSTRUCTION JOINTS IN EARTH RETAINING STRUCTURES AND IN STRUCTURES BELOW THE FINISH GRADE SHALL CONTAIN CONTINUOUS WATERSTOPS, AND SHALL HAVE REINFORCEMENT CONTINUOUS ACROSS ALL JOINTS. HYDROSWELLING STRIPS SHALL BE INSTALLED ON ALL JOINT SURFACES WHICH WILL BE EXPOSED TO EARTH.

8. ALL WATERSTOPS SHALL BE INSTALLED SECURELY IN ACCORDANCE WITH THE SPECIFICATIONS. THE WATERSTOPS SHALL BE PLACED CONTINUOUSLY THROUGHOUT THE LENGTH OF THE CONSTRUCTION JOINT. LAPPING OF WATERSTOPS SHALL NOT BE PERMITTED. SPLICING SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.

9. UNLESS INDICATED OTHERWISE, CONCRETE SURFACES LEADING TO DRAINS SHALL BE SLOPED A MINIMUM OF 1/8 INCH PER FOOT TOWARD THE DRAIN AND THE ADJACENT SURFACES WARPED AS REQUIRED TO SATISFY AN ADEQUATE DRAINAGE FLOW.

D. MATERIAL PROPERTIES

1. CONCRETE 28 DAY COMPRESSIVE STRENGTH (MINIMUM)

a) DRILLED SHAFTS: f'c=4,000 PSI

b) PRECAST-PRESTRESSED PILES: f'c=6,000 PSI

c) FORMED CAST-IN-PLACE STRUCTURAL CONCRETE: f'c=5,000 PSI

d) PRECAST GIRDERS OR SEGMENTS OF GIRDERS: f'c=6,000 PSI

e) UNLESS NOTED OTHERWISE ON THE DRAWINGS, OR SPECIFIED, MINIMUM STRUCTURAL CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,000 PSI.

f) ALL EXPOSED CONCRETE EDGES AND CORNERS SHALL BE CHAMFERED WITH A 3/4 INCH, 45 DEGREE CHAMFER UNLESS NOTED OTHERWISE.

2. REINFORCING STEEL SHALL CONFORM TO THE SPECIFICATIONS OF ASTM A 706 GRADE 60.

3. PRESTRESSING STEEL

a) STRAND:
ASTM A416/AASHTO M203, GRADE 270, LOW RELAXATION
FRICTION COEFFICIENT: 0.25
WOBBLE COEFFICIENT: 0.0002 PER FT
ANCHOR SET: 0.375"
APPARENT MODULUS: 28,500 KSI
MINIMUM JACKING STRESS: 216 KSI (80% ULTIMATE)
MAXIMUM ANCHORING STRESS: 189 KSI (70% ULTIMATE)
MAXIMUM STRESS AFTER ANCHOR SET: 202 KSI (75% ULTIMATE)
STRAND DIAMETER: 0.6" (AREA=0.216 SQ IN)

b) POST TENSIONING BARS:
ASTM A722/AASHTO M275, GRADE 150, TYPE II
ANCHOR SET: 0.0625"
APPARENT MODULUS: 30,000 KSI
MAXIMUM JACKING STRESS: 113 KSI
MAXIMUM ANCHORING STRESS: 105 KSI
MAXIMUM STRESS AFTER LOSSES: 96 KSI

4. STRUCTURAL STEEL SHAPES SHALL CONFORM TO ASTM A6 WITH A YIELD STRENGTH OF FY = 50 KSI UNLESS NOTED OTHERWISE. THE FOLLOWING MATERIAL PROPERTIES SHALL APPLY:

a) WIDE FLANGE SHAPES: ASTM A992

b) M-SHAPES, S-SHAPES, HP SHAPES: ASTM A572

c) ANGLES, CHANNELS: ASTM A572

d) RECTANGULAR AND SQUARE HSS: ASTM A500 GR B (46 KSI)

e) ROUND HSS: ASTM A500 GR B (42 KSI)

f) STEEL PIPE: ASTM A53 GR B (35 KSI)

g) PLATES, BARS: ASTM A36 (36 KSI)

h) BOLTS: ASTM A325

i) NUTS: ASTM A563

j) WASHERS: ASTM F436

5. STEEL FABRICATIONS

a) WELDING OF BUILT UP MEMBERS AND STEEL FABRICATIONS SHALL COMPLY WITH AASHTO/AWS D 1.5

b) WELDING OF HSS SECTIONS AND PIPES SHALL COMPLY WITH AWS D 1.1

c) MISCELLANEOUS STEEL ITEMS SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION UNLESS COMPLETELY EMBEDDED IN CONCRETE AND UNLESS NOTED OTHERWISE.

6. FASTENERS

a) ALL HIGH STRENGTH BOLTS NUTS AND WASHERS SHALL BE ZINC COATED

b) ALL BOLTED CONNECTIONS SHALL COMPLY WITH RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS (RCSC) "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS".

c) ALL BOLTS ARE ASTM A325 HIGH STRENGTH SLIP CRITICAL WITH THREADS EXCLUDED FROM THE SHEAR PLANE

E. CONCRETE COVER

UNLESS OTHERWISE NOTED, MINIMUM CONCRETE COVER SHALL BE:

a) DRILLED SHAFTS: 6"

b) PIERS, COLUMNS, WALLS, BENT CAPS: 2"

c) FOOTINGS AND CONCRETE CAST AGAINST EARTH: 3"

d) SUPERSTRUCTURE (CAST-IN-PLACE, PRECAST) TOP OF DECK: 2.5"

e) SUPERSTRUCTURE (CAST-IN-PLACE, PRECAST) EXTERIOR SURFACES: 2"

f) SUPERSTRUCTURE (CAST-IN-PLACE, PRECAST) INTERIOR SURFACES: 1.5"

g) CONCRETE SURFACES NOT EXPOSED TO WEATHER, SOIL OR WATER:
PRINCIPAL REINFORCEMENT: 2"
STIRRUPS, TIES AND SPIRALS: 1.5"

F. SEISMIC LOADING AND DESIGN

THERE ARE TWO LEVELS OF DESIGN EARTHQUAKES:

1. MAXIMUM CONSIDERED EARTHQUAKE (MCE): GROUND MOTIONS CORRESPONDING TO GREATER OF (1) A PROBABILISTIC SPECTRUM BASED UPON A 10% PROBABILITY OF EXCEEDANCE IN 100 YEARS (i.e., A RETURN PERIOD OF 950 YEARS) AND (2) A DETERMINISTIC SPECTRUM BASED UPON THE LARGEST MEDIAN RESPONSE RESULTING FROM THE MAXIMUM RUPTURE (CORRESPONDING TO M_w) OF ANY FAULT IN THE VICINITY OF THE STRUCTURE.

2. OPERATING BASIS EARTHQUAKE (OBE): GROUND MOTIONS CORRESPONDING TO A PROBABILISTIC SPECTRUM BASED UPON AN 86% PROBABILITY OF EXCEEDANCE IN 100 YEARS (i.e., A RETURN PERIOD OF 50 YEARS).

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DESIGNED BY S. MILITELLO
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PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
GENERAL DIRECTIVE

GENERAL DIRECTIVE NOTES
STRUCTURAL

CONTRACT NO.
DRAWING NO. DD-GE-003
SCALE NO SCALE
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A

@	AT
A&E	ARCHITECTURAL AND ENGINEERING
A/G	AT-GRADE
AADT	AVERAGE ANNUAL DAILY TRAFFIC
AB	AGGREGATE BASE,
	ANCHOR BOLT
ABBC	ASBESTOS BONDED BITUMINOUS COATED
ABM	AIR-BLOWN MORTAR
ABN	ABANDON
ABUT	ABUTMENT
ABV	ABOVE
AC	ALTERNATING CURRENT,
	ASPHALT CONCRETE
ACB	ASPHALT CONCRETE BASE
ACMB	AD DISTRIBUTION PANEL MAIN BREAKER
ACS	ACCESS CONTROL ROOM
ACOUS	ACOUSTICAL
ACP	ASBESTOS CEMENT PIPE
ACSR	ALUMINUM CONDUCTOR STEEL REINFORCED
AD	AREA DRAIN
ADJ	ADJACENT,
	ADJUST,
	ADJUSTABLE
ADL	ADDED DEAD LOAD
ADP	AC DISTRIBUTION PANEL
ADT	AVERAGE DAILY TRAFFIC
AEC	AERIAL EARTH (GROUND) CONDUCTOR
AED	AUTOMATED EXTERNAL DEFIBRILLATOR
AFC	AUTOMATIC FARE COLLECTION
AFES	ALTERNATIVE FLARED END SECTION
AGW	AERIAL GROUND WIRE
AHD	AHEAD
AL	ALUMINUM
ALIGN	ALIGNMENT
ALT	ALTERNATE
AM	TIME FROM MIDNIGHT TO NOON
ANC	ANCHOR
ANN	ANNUNCIATOR
ANS	AMBIENT NOISE SENSOR
AP	ALTERNATIVE PIPE
APC	ALTERNATIVE PIPE CULVERT
APE	AREA OF POTENTIAL EFFECTS
APEFZ	ALQUIST-PRIOLO EARTHQUAKE FAULT ZONE
API	APPLICATION PROGRAMMING INTERFACE
APPROX	APPROXIMATE
APU	ALTERNATIVE PIPE UNDERDRAIN
AR	ACCESS RESTRICTION
ARCH	ARCHITECTURAL
ARS	ACCELERATION RESPONSE SPECTRUM
AS	AGGREGATE SUBBASE
ASPH	ASPHALT
ASRP	ALUMINUM SPIRAL RIB PIPE
ASSY	ASSEMBLY
AT	AUTOTRANSFORMER,
	AUTOMATIC TENSION
ATC	AUTOMATIC TRAIN CONTROL
ATEL	ADMINISTRATIVE TELEPHONE
ATM	ALONG TRACK MOVEMENT
ATO	AUTOMATIC TRAIN OPERATION
ATP	AUTOMATIC TRAIN PROTECTION
ATPB	ASPHALT TREATED PERMEABLE BASE
ATPM	ASPHALT TREATED PERMEABLE MATERIAL
ATR	ABOVE TOP OF RAIL
ATS	AUTOMATIC TRAIN SUPERVISION,
	AUTOTENSIONED SYSTEM
AUX	AUXILARY
AVE	AVENUE
AVG	AVERAGE
AVL	AUTOMATIC VEHICLE LOCATION
AWG	AMERICAN WIRE GAUGE
AWS	AMERICAN WELDING SOCIETY

B

B/SPAN	BODY SPAN
BAGR	BRIDGE APPROACH GUARD RAILING
BAR	BARRIER
BAT	BATTERY
BB	BEGINNING OF BRIDGE
B-B	BACK-TO-BACK
BC	BOLT CIRCLE

B CONTINUED

BCR	BEGIN CURB RETURN
BD	BOARD
BDA	BI-DIRECTIONAL AMPLIFIER,
	BRIDGE DESIGN AIDS (CALTRANS)
BDD	BRIDGE DESIGN DETAILS (CALTRANS)
BDP	BRIDGE DESIGN PRACTICE (CALTRANS)
BDS	BRIDGE DESIGN SPECIFICATIONS (CALTRANS)
BEC	BURIED EARTH (GROUND) CONDUCTOR
BEG	BEGIN
BFA	BY PASS FEEDER ANCHOR
BIL	BASIC IMPULSE INSULATION LEVEL
BITUM	BITUMINOUS
BK	BACK
BKF	BACKFILL
BKR	BREAKER
BL	BASE LINE
BLDG	BUILDING
BLKG	BLOCKING
BLM	BRIDGE-LOG MILE
BLST	BALLAST
BLVD	BOULEVARD
BM	BEAM,
	BENCH MARK
BN	BACKBONE NETWORK
BND	BOUND
BOC	BOTTOM OF CURB
BOCC	BACK-UP OPERATIONAL CONTROL CENTER
BOS	BOTTOM OF SLOPE
BOT	BOTTOM
BOW	BOTTOM OF WALL
BR	BRIDGE
BRG	BEARING
BRKT	BRACKET
BRS	BROADBAND RADIO SYSTEM
BRT	BUS RAPID TRANSIT
BS	BODY SPAN WIRE
BSC	BASE STATION CONTROLLER
BT	BUS TIE
BTM	BOTTOM
BTS	BASE TRANSCEIVER STATION
BTU	BRITISH THERMAL UNIT
BTWN	BETWEEN
BW	BARBED WIRE,
	BALANCE WEIGHT
BWA	BALANCE WEIGHT ANCHOR
BWLAN	BROADBAND WIRELESS LOCAL AREA NETWORK
BZ	BRONZE

C

C	CLOSE,
	CONTACT,
	CONTROL
CA	CERTIFICATION ACCEPTANCE
CAA	CABLE ANCHOR ASSEMBLY
CAB	CABINET
CADD	COMPUTER-AIDED DESIGN AND DRAFTING
CAH	CONTROLLED ACCESS HIGHWAY
CAI	CUSTOMER ASSISTANCE INTERCOM
CALP	CORRUGATED ALUMINUM PIPE
CANT	CANTILEVER
CAP	CAPACITY,
	CAPACITOR,
	CORRUGATED ALUMINUM PIPE
CAPA	CORRUGATED ALUMINUM PIPE ARCH
CAS	CONSTRUCTION AREA SIGN
CAT	CATEGORY,
	CATEGORY SPECIFICATION FOR
	TWISTED PAIR CABLING,
	CATENARY
CATF	CANTENARY FOUNDATION
CATP	CATENARY POLE
CB	CATCH BASIN,
	CIRCUIT BREAKER
	CONCRETE BARRIER
CBC	CALIFORNIA BUILDING CODE
CBDM	CALIFORNIA DEPARTMENT OF TRANSPORTATION -
	BRIDGE DESIGN MANUAL
CBTC	COMMUNICATIONS BASED TRAIN CONTROL
CBW	CONCRETE BLOCK WALL

C CONTINUED

C-C	CENTER LINE TO CENTER LINE
CCF	CENTRAL CONTROL FACILITY
CCO	CONTRACT CHANGE ORDER
CCR	CALIFORNIA CODE OF REGULATIONS
CCS	CALIFORNIA COORDINATE SYSTEM
CCTV	CLOSED CIRCUIT TELEVISION
CCVT	COUPLING CAPACITOR VOLTAGE TRANSFORMER
CDC	CALIFORNIA HIGH-SPEED TRAIN DESIGN CRITERIA
CEC	CALIFORNIA ELECTRIC CODE
CEG	CERTIFIED ENGINEERING GEOLOGIST
CEM	CEMENT
CER	COMMUNICATIONS EQUIPMENT ROOM
CFR	CODE OF FEDERAL REGULATIONS
C&G	CURB & GUTTER
CG	CENTER OF GRAVITY
CGS	CALIFORNIA GEOLOGICAL SURVEY
CHNL	CHANNEL
CI	CAST IRON
CIC	COMMUNICATIONS INTERFACE CABINET
CIDH	CAST-IN-DRILLED-HOLE
CIF	COMMON INTERMEDIATE FORMAT
CIP	CAST IRON PIPE
C-I-P	CAST-IN-PLACE
CIPCP	CAST-IN-PLACE CONCRETE PIPE
CIS	CUSTOMER INFORMATION SIGN
CISS	CAST-IN-STEEL-SHELL
CJ	CONSTRUCTION JOINT
CJP	COMPLETE JOINT PENETRATION
CKT	CIRCUIT
CL	CLASS
CL2	CLASS 2
CL-6	CHAIN LINK FENCE (6 FT)
CLG	CEILING
CLK	CHAIN LINK
CLKG	CAULKING
CLO	CLOSET
CLR	CLEAR,
	CLEARANCE
CM	CONTROL MODULE,
	CORRUGATED METAL
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CNTR	COUNTER
CO	CLEANOUT,
	COUNTY
COL	COLUMN
COMM	COMMUNICATIONS
CONC	CONCRETE
COND	CONDUIT
CONN	CONNECTOR,
	CONNECTION
CONST	CONSTRUCT,
	CONSTRUCTION
CONT	CONTINUOUS,
	CONTINUATION
CONTR	CONTRACTOR
COORD	COORDINATE
CORR	CORRIDOR
CP	CONTROL POINT
CPH	CALIFORNIA PERMIT HANDBOOK
CPT	CONE PENETRATION TEST,
	CONTROL POWER TRANSFORMER
CPU	CENTRAL PROCESSING UNIT
CR	CREEK,
	CONDUIT RISER
CRC	COMBINED RELAY AND CONTROL PANEL
CRCP	CONTINUOUS REINFORCED CONCRETE PAVEMENT
CRSP	CONCRETED ROCK SLOPE PROTECTION
CRZ	CLEAR RECOVERY ZONE
CS	CONTROL SWITCH
CSA	CONSTRUCTION STAGING AREA
CSP	CORRUGATED STEEL PIPE
CSPA	CORRUGATED STEEL PIPE ARCH
CT	CERAMIC TILE,
	COURT,
	CURRENT TRANSFORMER/TRANSDUCER
CTB	CEMENT TREATED BASE
CTD	COATED
CTPB	CEMENT TREATED PERMEABLE BASE
CTPM	CEMENT TREATED PERMEABLE MATERIAL
CTR	CENTER
CTS	COMMUNICATIONS TRANSMISSION SYSTEM
CTSK	COUNTERSUNK
CTVT	COMBINED CURRENT TRANSFORMER AND
	VOLTAGE TRANSFORMER

C CONTINUED

CTW	COUNTERWEIGHT TAIL WIRE
CU	COPPER
CULV	CULVERT
CV	CURVE
CVR	COVER
CW	CONTACT WIRE,
	CATENARY WIRE
CWA	CONTACT WIRE ANCHOR
CWH	CONTACT WIRE HEIGHT
CWR	CONTINUOUSLY WELDED RAIL
CWT	COUNTER WEIGHT

D

D	DEPTH
DB	DESIGN-BUILD
DBE	DESIGN BASIS EARTHQUAKE
DBL	DOUBLE
DC	DIRECT CURRENT
DCMB	Dc DISTRIBUTION PANEL MAIN BREAKER
DCP	Dc DISTRIBUTION PANEL
DD	DOWNDRAIN,
	DEVICE DRIVER
DE	DEAD END
DEL	DELINEATOR
DEMO	DEMOLISH
DEPT	DEPARTMENT
DET	DETOUR
DF	DIRECT FIXATION,
	DRINKING FOUNTAIN
DGA	DOWN GUY ANCHOR
DHV	DESIGN HOURLY VOLUME
DI	DRAINAGE INLET
DIAG	DIAGONAL
DIAPH	DIAPHRAGM
DIFF	DIFFERENTIAL
DIM	DIMENSION
DIN	DROP INLET
DIR	DIRECTION
DISC	DISCONNECT
DISP	DISPENSER
DIST	DISTANCE
DISTR	DISTRIBUTION
DST	DISTRICT
DMBB	DOUBLE METAL BEAM BARRIER
DN	DOWN
DNS	DOMAIN NAME SYSTEM
DO	DOOR OPENING
DPDT	DOUBLE-POLE DOUBLE-THROW
DR	DRIVE
DS	DOWNSPOUT,
	DISCONNECT SWITCH
DSC	DIFFERING SITE CONDITIONS
DSCW	DIRECT SUSPENSION CONTACT WIRE
DSG	DISCONNECT SWITCH GROUP
DSHA	DETERMINISTIC SEISMIC HAZARD ANALYSIS
DST	DISTRICT
DTBB	DOUBLE THRIE BEAM BARRIER
DTM	DIGITAL TERRAIN MODEL
DTX	DOWNTOWN EXTENSION (CALTRAIN)
DVR	DIGITAL VIDEO RECORDERS
DWG	DRAWING
DWY	DRIVEWAY
DXO	DOUBLE CROSSOVER

E

E	EAST
EA	EACH
EB	EASTBOUND,
	END OF BRIDGE
EC	END HORIZONTAL CURVE,
	ELECTRICAL CONDUCTOR
ECR	END CURB RETURN
EE	EACH END
EF	EACH FACE
EGS	EMERGENCY GROUND SWITCH
EHS	EXTRA HIGH STRENGTH
EI	EMERGENCY INTERCOM

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY R. MINCIO
DRAWN BY V. HUANTE
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT DIRECTIVE DRAWING

ACRONYMS AND ABBREVIATIONS 1

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E CONTINUED

EIRENE	EUROPEAN INTEGRATED RADIO ENHANCED NETWORK
EJ	EXPANSION JOINT
E-LAN	ETHERNET LAN
ELAST	ELASTOMERIC
ELEC	ELECTRICAL, ELECTRIC
ELECT	ELECTROLIER
ELEV	ELEVATION
ELOCK	ELECTRONIC LOCK
EMB	EMBANKMENT
EMC	ELECTROMAGNETIC COMPATIBILITY
EMER	EMERGENCY
EMF	ELECTROMAGNETIC FIELD
EMI	ELECTRO MAGNETIC INTERFERENCE
EMS	ELEMENT MANAGEMENT SYSTEM
EMU	ELECTRIC MULTIPLE UNIT
ENCL	ENCLOSURE
ENGR	ENGINEER, ENGINEERING
EOB	END OF BRIDGE
EOD	EDGE OF DECK
EOS	ELECTRICAL OPERATED SWITCH
EOW	END OF WALL
EP	EDGE OF PAVEMENT
EPBM	EARTH PRESSURE BALANCING MACHINE
EPR	ETHYLENE PROPYLENE RUBBER
EQ	EQUAL, EQUILATERAL
EQN	EQUATION
EQUIP	EQUIPMENT
ERTMS	EUROPEAN RAIL TRAFFIC MANAGEMENT SYSTEM
ES	EDGE OF SHOULDER, EXTRA STRENGTH, ELECTRICAL SECTION
ESA	ENVIRONMENTALLY SENSITIVE AREA
ESC	ESCALATOR
ESEW	EMERGENCY SHOWER / EYE WASH
ESMT	EASEMENT
ETCS	EUROPEAN TRAIN CONTROL SYSTEM
ETEL	EMERGENCY TELEPHONE
ETS	EMERGENCY TRIP SYSTEM
ETW	EDGE OF TRAVELED WAY
EU	UNBALANCED SUPERELEVATION
EW	EACH WAY, ENDWALL
EXC	EXCAVATION
EXIST	EXISTING
EXP	EXPANSION
EXWY	EXPRESSWAY
EXPO	EXPOSED
EXT	EXTERIOR

F

F/F	FACE TO FACE
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FAS	FIRE ALARM SYSTEM
FB	FLAT BAR, FLOOR BEAM, FEEDER BREAKER
FBO	FURNISHED BY OTHERS
FC	FARE COLLECTION
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FDN	FOUNDATION
FDP	FIBER DISTRIBUTION PANEL
FDU	FIBER DISTRIBUTION UNIT
FDR	FEEDER
FE	FIRE EXTINGUISHER
FES	FLARED END SECTION
FF	FILTER FABRIC
FFJ	FULL FEEDING JUMPER
FG	FINISHED GRADE
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FID	FIRE INITIATING DEVICE
FIG	FIGURE
FIN	FINISH
FIRM	FLOOD INSURANCE RATE MAPS
FJ	FEEDER JUMPER
FL	FLOW LINE

F CONTINUED

FLB	FLOOR BEAM
FLH	FLAT HEAD
FLR	FLOOR
FNA	FIRE NOTIFICATION APPLIANCE
FO	FIBER OPTIC
FOC	FIBER OPTIC CABLE, FACE OF CURB
FOCN	FIBER OPTIC CABLING NETWORK
FOE	FACE OF CONCRETE
FOF	FACE OF FINISH
FOP	FACE OF POLE
FOS	FACE OF STUDS, FACTOR OF SAFETY
FP	FULL PENETRATION
FPLM	FULL SPAN PRECAST LAUNCHING
FPRF	FIREPROOF
FPS	FRAMES PER SECOND
FR	FRAME
FS	FINISHED SURFACE
FTEL	FIRE TELEPHONE
FTG	FOOTING
FTP	FILE TRANSFER PROTOCOL
FTW	FIXED END TAIL WIRE
FUT	FUTURE
FW	FEEDER WIRE
FWY	FREEWAY

G

G1	ENTRANCE GRADE
G2	EXIT GRADE
G/L	GROUND LINE
GALV	GALVANIZED
GBR	GEOTECHNICAL BASELINE REPORT
GBR-B	GEOTECHNICAL BASELINE REPORT FOR BIDDING
GBR-C	GEOTECHNICAL BASELINE REPORT FOR CONSTRUCTION
GCL	GRADING CONTROL LINE
GD	GRADE
GDR	GEOTECHNICAL DATA REPORT
GHS	GALVANIZED HIGH STRENGTH
GIGE	GIGABIT ETHERNET
GIS	GAS INSULATED SWITCH, GEOGRAPHIC INFORMATION SYSTEM
GL	GLASS
GMA	GROUND MOTION ANALYSIS
GND	GROUND
GO-95	PUC GENERAL ORDER 95
GP	GRADING PLANE
GPS	GLOBAL POSITIONING SYSTEM
GR	GUARDRAIL, GROUND ROD
GRP	GLASS REINFORCED PLASTIC ROD
GRS	GALVANIZED RIGID STEEL
GRX	GRADE CROSSING
GSHA	GEOLOGIC AND SEISMIC HAZARDS ANALYSIS
GSP	GALVANIZED STEEL PIPE
GT	GENERAL INFORMATION
GTGM	GEOTECHNICAL TECHNICAL GUIDANCE MANUAL (FHWA)
GTR	GUTTER
GW	GUY WIRE
GYP	GYPSUM
GYPBD	GYPSUM BOARD

H

H/SPAN	HEADSPAN
HAZ	HAZARDOUS
HB	HARDNESS BRINELL, HOSE BIBB
HC	HANDICAP
HD	HARD DRAWN, HORIZONTAL DRAIN
HDG	HOT DIP GALVANIZED
HDPE	HIGH DENSITY POLYETHYLENE
HDWE	HARDWARE
HDWL	HEADWALL
HEX	HEXAGONAL
HH	HANDHOLE, HEAD HARDENED
HI	HIGH

H CONTINUED

HI-RAIL	HIGHWAY TO RAILROAD VEHICLE
HM	HOLLOW METAL
HMA	HOT MIXED ASPHALT
HMI	HUMAN MACHINE INTERFACE
HOR	HORIZONTAL
HO	HAND OPERATED
HOV	HIGH-OCCUPANCY VEHICLE
HP	HIGH POINT, HINGE POINT
HP&R	HIGHWAY PLANTING AND RESTORATION
HPS	HIGH PERFORMANCE STEEL
HR	HANDRAIL,
HRL	HIGH RAIL LEVEL
HS	HIGH STRENGTH
HSR	HIGH-SPEED RAIL
HST	HIGH-SPEED TRAIN
HT	HIGH TEMPERATURE
HTR	HEATER
HV	HIGH VOLTAGE
HVAC	HEATING VENTILATION AND AIR CONDITIONING
HW	HIGH WATER
HWM	HIGH WATER MARK
HWY	HIGHWAY

I

I/O	INPUT/OUTPUT
IB	IMPEDANCE BOND
IBC	INTERNATIONAL BUILDING CODE
IF	INSIDE FACE
IIMP	INTEGRATED INFORMATION MANAGEMENT PLATFORM
IJ	INSULATED JOINT
IJP	INSULATED JOINT PLUG
INSUL	INSULATION
INSR	INSULATOR
INST	INSTANTANEOUS
INT	INTERIOR
Inter-LATA	INTER-LOCAL ACCESS AND TRANSPORT AREA
INV	INVERT
IR	INSIDE RADIUS, IN-RUNNING
IRR	IRRIGATION
I&S	IRON AND STEEL
I/S	IN-SPAN
I/SJ	IN-SPAN JUMPER

H

J	JUMPER
JAN	JANITOR
JB	JUNCTION BOX
JCT	JUNCTION
JP	JOINT POLE
JT(S)	JOINT(S)

L

LA	LANDSCAPE ARCHITECT, LIGHTNING ARRESTER
LAM	LAMINATE
LAN	LOCAL AREA NETWORK
LAT	LATITUDE
LAUS	LOS ANGELES UNION STATION
LAV	LAVATORY
LC	LANDSCAPE CONTRACTOR
LCB	LEAN CONCRETE BASE
LCX	LOWER-LEVEL DESIGN BASIS EARTHQUAKE
LDBE	LEAKY COAXIAL RADIO CABLE
LED	LIGHT EMITTING DIODE
LF	LINEAR FEET
LG	LONG
LGT	LIGHT, LIGHTING
LH	LEFT-HAND
LKR	LOCKER
LL	LIGHT LOADING
LLT	LAST LONG TIE
LN	LANE
LO	LOCKOUT

L CONTINUED

LOC	LOCATION
LOL	LAYOUT LINE
LONG	LONGITUDE, LONGITUDINAL
LOS	LEVEL OF SERVICE
LOTB	LOGS OF TEST BORINGS
LP	LOW POINT, LOW PROFILE
LPL	LIGHT POLE
LR	LOW RAIL
LRFD	LOAD AND RESISTANCE FACTOR DESIGN
LRT	LIGHT RAIL TRANSIT
LRV	LIGHT RAIL VEHICLE
LS	LANDSCAPING, LUMP SUM
LT	LEFT
LV	LOW VOLTAGE
LVL	LEVEL
LWP	LOWER WORKING POINT
LVT	LOW VIBRATION TRACK

M

M	MEDIUM LOADING
M.DET	MOTION DETECTION
MAINT	MAINTENANCE
MAT	MATERIAL
MAX	MAXIMUM
MB	METAL BEAM
MBB	METAL BEAM BARRIER
MBGR	METAL BEAM GUARD RAILING
MCC	MAINTENANCE CONTROL CENTER
MCE	MAXIMUM CONSIDERED EARTHQUAKE
MCR	MASTER CONTROL ROOM
MDS	MOBILE DATA SYSTEM
MECH	MECHANICAL
MED	MEDIAN
MEM	MEMBRANE
MESSGR	MESSENGER WIRE
MET	METAL
MFR	MANUFACTURER
MH	MANHOLE
MHHW	MEAN HIGHEST HIGH WATER
MI	MILD IRON
MIN	MINIMUM
MISC	MISCELLANEOUS
MKR	MARKER
ML	MAIN LINE
MLLW	MEAN LOWER LOW WATER
MMIS	MAINTENANCE MANAGEMENT INFORMATION SYSTEM
MO	MASONRY OPENING
MOC	MOTOR OPERATED CONTRACTOR
MOD	MODIFIED, MODIFY
MODC	MOTOR OPERATED DISCONNECT SWITCH
MOE	MAINTENANCE OF EQUIPMENT
MOI	MAINTENANCE OF INFRASTRUCTURE
MON	MONUMENT
MOP	MOTOR OPERATED
MOS	MANUALLY OPERATED SWITCH
MOV	METAL-OXIDE VARISTOR
MOW	MAINTENANCE OF WAY
MP	MILEPOST
MPA	MIDPOINT ANCHOR
MPLS	MULTI-PROTOCOL LABEL SWITCHING
MR	MOVEMENT RATING
MSE	MECHANICALLY STABILIZED EMBANKMENT
MSF	MAINTENANCE AND STORAGE FACILITY
MSL	MEAN SEA LEVEL
MT-1	CALTRAIN MAINLINE TRACK
MT-2	CALTRAIN MAINLINE TRACK
MTD	MEMO TO DESIGNERS (CALTRANS), MOUNTED
MUL	MULLION
MUTCD	MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES
MVC	MINIMUM VERTICLE CLEARANCE
MW	MESSENGER WIRE

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY R. MINCIO
DRAWN BY V. HUANTE
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
DIRECTIVE DRAWING

ACRONYMS AND ABBREVIATIONS 2

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N

N	NORTH,
	NEW
N/A	NOT APPLICABLE
NAAQS	NATIONAL AMBIENT AIR QUALITY STANDARDS
NAC	NOISE ABATEMENT CRITERIA
NAVD	NORTH AMERICAN VERTICAL DATUM
NB	NORTHBOUND
NBR	NONBRIDGING
NBSSR	NOISE BARRIER SCOPE SUMMARY REPORT
NC	NORMALLY CLOSED
NCL	NO COLLAPSE PERFORMANCE LEVEL
NDP	NONLINEAR DYNAMIC PROCEDURE
NEC	NATIONAL ELECTRICAL CODE
NEG	NEGATIVE
NESC	NATIONAL ELECTRICAL SAFETY CODE
NEUT	NEUTRAL
NF	NEGATIVE FEEDER,
	NEAR FACE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NGVD	NATIONAL GEODETIC VERTICAL DATUM
NIC	NOT IN CONTRACT
NMS	NETWORK MANAGEMENT SYSTEM
NO.	NUMBER
NO	NORMALLY OPEN
NOM	NOMINAL
NP	NETWORK PORT
NPRM	NOTICE OF PROPOSED RULE MAKING
NPS	NOMINAL PIPE SIZE
NR	NOT REGISTERED
NS	NOT SUPPORTED
NSR	NOT SUPPORTED OR REGISTERED
NT	NETWORK
NTP	NETWORK TIME PROTOCOL,
	NOTICE TO PROCEED
NTS	NETWORK TIME SERVER,
	NOT TO SCALE

O

O&M	OPERATIONS AND MAINTENANCE
OA	OVERALL
OBLR	OBLITERATE
OC	ON CENTER,
	OVERCROSSING
OCC	OPERATIONS CONTROL CENTER
OCS	OVERHEAD CONTACT SYSTEM
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
OFF	OFFSET
OG	ORIGINAL GROUND
OH	OVERHEAD
OL	OVERLAP
O-O	OUT TO OUT
OOR	OUT-OF-RUNNING (NONRIDING CONTACT WIRE)
OP	OVERPASS
OPL	OPERABILITY PERFORMANCE LEVEL
OPNG	OPENING
OPP	OPPOSITE
ORS	OPERATIONS RADIO SYSTEM
OSP	OUTSIDE PLANT
OVERTEMP	OVERTEMPERATURE

P

P/L	PROPERTY LINE
PA	PUBLIC ADDRESS
PACIS	PUBIC ADDDRESS / CUSTOMER INFORMATION SYSTEM
PAN	PANTOGRAPH
PAP	PERFORATED ALUMINUM PIPE
PB	PULL BOX
PBX	PRIVATE BRANCH EXCHANGE
PC	PRECAST CONCRETE
PCC	PORTLAND CEMENT CONCRETE
PCP	PERFORATED CONCRETE PIPE,
	PRESTRESSED CONCRETE PIPE
PCPT	PIEZOCONE PENETROMETER TEST
PE	PORCELAIN ENAMEL
PED	PEDESTRIAN
PEER	PACIFIC EARTHQUAKE ENGINEER RESEARCH
PERF	PERFORATED
PERM	PERMEABLE
PET	POTENTIAL EQUALIZING JUMPER

P CONTINUED

PF	POWER FACTOR
PFDHA	PROBABILISTIC FAULT DISPLACEMENT
	HAZARD ANALYSIS
PG	PROFILE GRADE
PH	PHASE
PHF	POTHOLE
PID	PASSENGER INFORMATION DISPLAY
PJP	POINT OF INTERSECTION TURNOUT
PL	PARTIAL JOINT PENETRATION
PLAM	PLATE
PLAS	PLASTIC LAMINATE
PLC	PLASTER
PLYWD	PROGRAMMABLE LOGIC CONTROLLER
PM	PLYWOOD
	POST MILE,
PMS	TIME FROM NOON TO MIDNIGHT
PN	PAVEMENT MANAGEMENT SYSTEM
PNL	PAVING NOTCH
PNT	PANEL
PO	POINT
POC	PULL OFF
POE	POINT OF CONNECTION
POS	POSITIVE
POTS	PLAIN ORDINARY TELEPHONE SERVICE
PP	PLASTIC PIPE,
	POWER POLE
PPL	PREFORMED PERMEABLE LINER
PPP	PERFORATED PLASTIC PIPE
PR	PAIR
PRI	PRIMARY RATE INTERFACE (ISDN SERVICE)
PROP	PROPOSED
PS	PARALLELING STATION,
P/S	PRESTRESSED
	PERFORATED STEEL PIPE,
PSP	PRODUCT SAFETY PLAN
PSTN	PUBLIC SWITCHING TELEPHONE NETWORK
PSTTWS	PUBLIC SAFETY TRENCH AND
	TUNNEL WIRELESS SYSTEM
PSU	POWER SUPPLY UNIT
	POTENTIAL TRANSFORMER
PTC	POSITIVE TRAIN CONTROL
PTD/R	PAPER TOWEL DISPENSER & RECEPTACLE
PTEL	PASSENGER ASSISTANCE TELEPHONE
PTM	PARKING TICKET MACHINE
PTT	PUSH TO TALK
PTZ	PAN-TILT-ZOOM
PUE	PUBLIC UTILITY EASEMENT
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER

Q

QOS	QUALITY OF SERVICE
QT	QUARRY TILE
QTY	QUANTITY

R

R	RADIUS,
	RED
R/A	ROCK ANCHOR
R/W, ROW	RIGHT OF WAY
R&D	REMOVE AND DISPOSE
R&S	REMOVE AND SALVAGE
RA	REMOTE ANNUNCIATOR
RAID	REDUNDANT ARRAY OF INDEPENDENT DISKS
RB	RESILIENT BASE
RBM	RAILBOUND MANGANESE FROG
RC	REGIONAL CONSULTANT,
	REINFORCED CONCRETE
RCA	REINFORCED CONCRETE ARCH
RCB	REINFORCED CONCRETE BOX
RCC	REGIONAL CONTROL CENTER
RCE	REGISTERED CIVIL ENGINEER
RCP	REINFORCED CONCRETE PIPE
RCPA	REINFORCED CONCRETE PIPE ARCH
RD	ROAD,
	ROOF DRAIN
RDWY	ROADWAY
REBAR	CONCRETE REINFORCING BAR

R CONTINUED

RECT	RECTANGULAR
RE	RUNNING EDGE OF RAIL
REF	REFERENCE
REINF	REINFORCED,
	REINFORCEMENT,
	REINFORCING
REL	RELOCATE,
	RELOCATED
REPL	REPLACEMENT
REQD	REQUIRED
RESIL	RESILIENT
RET	RETAINING
REV	REVISED,
	REVISION
RF	RADIO FREQUENCY
RFI	REQUEST FOR INFORMATION
RGS	RIGID GALVANIZED STEEL
RH	RIGHT-HAND
R-M	ROAD-MIXED
RM	RESTRICTED MANUAL,
	ROOM
RO	ROUGH OPENING
RP	RADIUS POINT,
	REFERENCE POINT
RR	RAILROAD,
RRR	RUNNING RAIL
	RESURFACING,
RRRR	RESTORATION,
	REHABILITATION (3R)
	RESURFACING,
	RESTORATION,
	REHABILITATION,
	RECONSTRUCTION (4R)
RRX	RAILROAD GRADE CROSSING
RSIA	RAIL SAFETY IMPROVEMENT ACT (2008)
RSP	ROCK SLOPE PROTECTION
RT	RESILIENT TILE,
	RIGHT
RTE	ROUTE
RTU	REMOTE TERMINAL UNIT
RW	RETAINING WALL
RWL	RAIN WATER LEADER
RWY	RAILWAY

S

S	SOUTH,
	SLOPE
SAE	STRUCTURE APPROACH EMBANKMENT
SALV	SALVAGE
SAPP	STRUCTURAL ALUMINUM PLATE PIPE
SB	SOUTHBOUND
SC	SWITCH CABLE
SCADA	SUPERVISORY CONTROL AND DATA
	ACQUISITION
SCAT	SIMPLE CATENARY-AUTO TENSION
SCB	SUBSTATION CONTROL BUILDING
SCC	STATION CONTROL CENTER
SCD	SEAT COVER DISPENSER
SCFT	SIMPLE CATENARY-FIXED TENSION
SCHD	SCHEDULE
SCN	SECURITY CLASSIFICATION NUMBERS
SCPE	SEISMIC CAPACITY AND PERFORMANCE
	EVALUATION
SCSP	SLOTTED CORRUGATED STEEL PIPE
SD	SOAP DISPENSER,
	STORM DRAIN
SDB	SYSTEM DUCT BANK
SDC	SEISMIC DESIGN CRITERIA
SDOF	SINGLE DEGREE OF FREEDOM
SE	SUPER ELEVATED
SECTLEG	SECTIONALIZING
SECT	SECTION
SEP	SEPARATION
SERV	SERVICE
SF	SPRING FROG
SG	SUBGRADE
SHA	SEISMIC HAZARDS ANALYSIS
SHLD	SHOULDER
SHS	STATE HIGHWAY SYSTEM
SHT	SHEET
SI	SITE INVESTIGATION,
	SECTION INSULATOR

S

SIG	SIGNAL
SIM	SIMILAR
SLAN	PASSENGER STATION LOCAL AREA NETWORK
SM	SELECTED MATERIAL
SMF	SOLID MANGANESE FROG,
	SINGLE MODE FIBER
SND	SANITARY NAPKIN DISPENSER
SNF	SWING NOSE FROG
SNR	SANITARY NAPKIN RECEPTACLE
SNTP	SIMPLE NETWORK TIME PROTOCOL
SP	SPARE
SPC	SPECIAL
SPEC	SPECIFICATION
SPKR	SPEAKER
SPL	SAFETY PERFORMANCE LEVEL
SPS	SMALL PART STEELWORK
SPST	SINGLE POLE SINGLE THROW
SPT	STANDARD PENETRATION TEST
SOP	SETOUT POINT
SQ	SQUARE
SR	SYSTEM REQUIREMENT,
	STATE ROUTE
SRRA	SAFETY ROADSIDE REST AREA
SRSS	SQUARE ROOT OF SUM OF SQUARES
S/SPAN	STEADY SPAN
SS	SLOPE STAKE,
	SUB STATION
SSK	SERVICE SINK
SSCOM	SEISMIC SAFETY COMMISSION,
SSI	SOIL STRUCTURE INTERACTION
SSPA	STRUCTURAL STEEL PLATE ARCH
SSPP	STRUCTURAL STEEL PLATE PIPE
SSPPA	STRUCTURAL STEEL PLATE PIPE ARCH
SSRP	STEEL SPIRAL RIB PIPE
SST	STAINLESS STEEL
SSW	STEADY SPAN WIRE
SSWR	SANITARY SEWER
S4S	SURFACE 4 SIDES
ST	STREET
STA	STATION,
	STATIONING
STBB	SINGLE THRIE BEAM BARRIER
STD	STANDARD
STC	SINGLE TRACK CANTILEVER
STIFF	STIFFENER
STL	STEEL
STOR	STORAGE
STP	SHIELDED TWISTED PAIR CABLE
STR	STRUCTURAL,
	STRUCTURE
STS	SPIRAL TANGENT SPIRAL
STW	STATIC WIRE
SUB	SUBSTATION
SUPV	SUPERVISORY
SURF	SURFACING
SUSP	SUSPENDED
SWK	SIDEWALK
SW	SOUND WALL,
	SOFTWARE
SWA	SINGLE WIRE ANCHOR
SWAT	SINGLE WIRE AUTO TENSIONED
SWFT	SINGLE WIRE-FIXED TERMINATION
SWGR	SWITCHGEAR
SWT	SWITCH
SWPPP	STORM WATER POLLUTION PREVENTION PLAN
SWR	SEWER
SWS	SWITCHING STATION
SYM	SYMMETRICAL

T

T	TREAD
T&B	TOP AND BOTTOM
TAN	TANGENT
TASAS	TRAFFIC ACCIDENT SURVEILLANCE
	ANALYSIS SYSTEM
TBD	TO BE DETERMINED
TBM	TUNNEL BORING MACHINE
TC	TRACK CENTER,
	TRAIN CONTROL
TCB	TRAFFIC CONTROL BOX
TCC	TRAIN CONTROL AND COMMUNICATIONS
TCCR	TRAIN CONTROL AND COMMUNICATIONS ROOM

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY R. MINCIO
DRAWN BY V. HUANTE
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT DIRECTIVE DRAWING

ACRONYMS AND ABBREVIATIONS 3

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T CONTINUED

TCCT	TRACK CIRCUIT
TCE	TEMPORARY CONSTRUCTION EASEMENT
TCP/IP	TRANSMISSION CONTROL PROTOCOL/ INTERNET PROTOCOL
TCR	TRANSMISSION COMMUNICATIONS ROOM
TD	TRENCH DRAIN, TIME DELAY
TDA	TIRE DERIVED AGGREGATE
TDD	TELECOMMUNICATIONS DEVICE FOR THE DEAF
TDM	TIME DIVISION MULTIPLEXING
TEL	TELEPHONE
TEMP	TEMPORARY
TERM	TERMINATION
TES	TRACTION ELECTRIFICATION SYSTEM
TESC	TEMPORARY EROSION AND SETTLEMENT CONTROL
TETEL	TRAIN EMERGENCY TELEPHONE/SPEAKERPHONE
TFE	TETRAFLOUROETHYLENE
TG	TOP OF GRADE
THK	THICK
TIS	TELEPHONE AND INTERCOM SYSTEM
TL	TENSION LENGTH
TM	TECHNICAL MEMORANDUM
TMP	TEMPERATURE
TO	TURNOUT, TELECOM OUTLET
TOC	TOP OF CURB
TOG	TOP OF GRATE
TOL	TOLERANCE
TOLR	TOP OF LOW RAIL
TOF	TOP OF FOUNDATION
TOFG	TOP OF FINISH GRADE
TOP	TOP OF PAVEMENT
TOR	TOP OF RAIL
TOS	TOP OF SLOPE
TOT	TOP OF TIE, TOTAL
TOW	TOP OF WALL
TP	TELEPHONE POLE, TRACTION POWER
TPB	TREATED PERMEABLE BASE
TPD	TOILET PAPER DISPENSER
TPF	TRACTION POWER FACILITY
TPM	TREATED PERMEABLE MATERIAL
TPS	TRACTION POWER SUPPLY SYSTEM
TPSS	TRACTION POWER SUBSTATION
TRANS	TRANSVERSE
TRSN	TRANSITION
TRK	TRACK
TS	TRAFFIC SIGNAL TUBULAR STEEL
TSI	TECHNICAL SPECIFICATIONS FOR INTEROPERABILITY
TSM	TRAFFIC SYSTEMS MANAGEMENT
TSMP	TRAFFIC SYSTEMS MANAGEMENT PLAN
TTC	TWO TRACK CANTILEVER
TTEL	TRAIN EMERGENCY SPEAKERPHONE
TV	TELEVISION
TVM(S)	TICKET VENDING MACHINE(S)
TW	TIE WIRE
TYP	TYPICAL

U

U/S	UNDERSIDE
UB	UTILITY BOX
UC	UNDERCROSSING
UD	UNDERDRAIN
UG	UNDERGROUND, UNDER GRADE
UGB	UNDERGRADE BRIDGE
UI	USER INTERFACE
UNF	UNFINISHED
UNINS	UNINSULATED
UON	UNLESS OTHERWISE NOTED
UP	UNDERPASS
UPS	UNINTERRUPTIBLE POWER SUPPLY
UR	URINAL
UrEDAS	URGENT EARTHQUAKE DETECTION AND ALARM SYSTEM
USCS	UNITED SOIL CLASSIFICATION SYSTEM
UTIL	UTILITY
UTP	UNSHIELDED TWISTED PAIR
UWP	UPPER WORKING POINT

V

V	DESIGN SPEED, VALVE
VAC	VOLTS ALTERNATING CURRENT
VAR	VARIABLE, VARIES, VOLT-AMPERE REACTIVE
VCAT	VIRTUAL CONCATENATION
VCP	VITRIFIED CLAY PIPE
VCT	VINYL COMPOSITION TILE
VDC	VOLT DC
VE	VALUE ENGINEERING
VERT	VERTICAL
VEST	VESTIBULE
VIA	VIADUCT
VLAN	VIRTUAL LOCAL AREA NETWORK
VMS	VARIABLE MESSAGE SIGN, VARIABLE MESSAGE SYSTEM,
VOL	VOLTIMETER, VOLUME
VOIP	VOICE OVER INTERNET PROTOCOL
VPN	VIRTUAL PRIVATE NETWORK
VRCS	VOICE RADIO COMMUNICATIONS SYSTEM
VS	VOLTAGE SWITCH
VT	VOLTAGE TRANSFORER/TRANSDUCER

W

W	WEST, WIDTH
W/	WITH
W/O	WITHOUT
WA	WORK AREA
WB	WESTBOUND
WC	WATER CLOSET
WCS	WIRELESS COMMUNICATIONS SYSTEM
WD	WOOD
WLAN	WIRELESS LOCAL AREA NETWORK
WM	WIRE MESH
WP	WORK POINT, WOOD POLE
WPF	WATERPROOF
WPC	WAYSIDE POWER CUBICLES
WR	WIRE RUN
WRT	WITH RESPECT TO
WS	WATER SURFACE, WORK STATION
WSP	WELDED STEEL PIPE
WT	WEIGHT
WV	WATER VALVE
WW	WINGWALL, WALKWAY
WWF	WELDED WIRE FABRIC
WWLOL	WINGWALL LAYOUT LINE
WWM	WELDED WIRE MESH

X

X/CAT	CROSS CANTENARY
X/SPAN	CROSS SPAN
XD	TRANSDUCER
XFMR	TRANSFORMER
XO	CROSSOVER
XO ST	CROSSOVER SPRING TENSIONER
XSEC	CROSS SECTION
XING	CROSSING
XMITTER	TRANSMITTER

TRACK GEOMETRY - HORIZONTAL

BC	BEGIN HORIZONTAL CURVE
CC	COMPOUND CURVE
CS	POINT OF CHANGE FROM CIRCULAR CURVE TO SPIRAL
K1	TANGENT DISTANCE PF SHIFT PC REFERENCE TO THE TS
K2	TANGENT DISTANCE PF SHIFT PT REFERENCE TO THE ST
Lc	LENGTH OF CIRCULAR CURVE
Ls1	LENGTH OF SPIRAL
Ls2	LENGTH OF SPIRAL FROM TS TO SC
LSc	LENGTH OF SPIRAL FROM CS TO ST
LVC	LENGTH OF COMPOUND SPIRAL FROM CS TO SC
p1	OFFSET FROM INITIAL TANGENT TO PC OF THE SHIFTED CIRCLE OF SPIRALIZED CURVE
p2	OFFSET FROM INITIAL TANGENT TO PT OF THE SHIFTED CIRCLE OF SPIRALIZED CURVE
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVE
PF	POINT OF FROG
PI	POINT OF INTERSECTION
PITO	POINT OF INTERSECTION TURNOUT
POC	POINT ON HORIZONTAL CURVE
POE	POINT OF ENDING
POS	POINT ON SPIRAL,
POVC	POINT ON VERTICAL CURVE
POVT	POINT ON VERTICAL TANGENT
PRC	POINT OF REVERSE CURVE
PRVC	POINT OF REVERSE VERTICAL CURVE
PS	POINT OF SWITCH
PT	POINT OF TANGENT
SC	POINT OF CHANGE FROM SPIRAL TO CIRCULAR CURVE
SPO	POINT ON ORIGIN OF COMPOUND SPIRAL
SS	POINT OF CHANGE BETWEEN SPIRALS
SSC	SPIRAL TO SPIRAL POINT OF CURVATURE
ST	POINT OF CHANGE FROM SPIRAL TO TANGENT
TC	POINT OF CHANGE FROM TANGENT TO CURVE
TS	POINT OF CHANGE FROM TANGENT TO SPIRAL
Ts1	TANGENT DISTANCE FROM TS TO PI
Ts2	TANGENT DISTANCE FROM ST TO PI
Xs1	TANGENT OFFSET AT THE SC
Xs2	TANGENT OFFSET AT THE CS
Ys1	TANGENT DISTANCE AT THE SC
Ys2	TANGENT DISTANCE AT THE CS
Δ	TOTAL CENTRAL ANGLE OF THE SPIRALIZED CURVE
Δc	CENTRAL ANGLE OF CIRCULAR CURVE (Lc) FROM SC TO CS
Δc1	CENTRAL ANGLE OF FIRST CIRCULAR CURVE OF COMPOUND CURVATURE
Δc2	CENTRAL ANGLE OF SECOND CIRCULAR CURVE OF COMPOUND CURVATURE
θs1	CENTRAL ANGLE OF SPIRAL LENGTH Ls1 OR SPIRAL ANGLE OF FIRST SPIRAL IN SPIRALIZED CURVE
θs2	CENTRAL ANGLE OF SPIRAL LENGTH Ls2 OR SPIRAL ANGLE OF SECOND SPIRAL IN SPIRALIZED CURVE
θsc	CENTRAL ANGLE OF COMPOUND SPIRAL OR COMPOUND SPIRAL ANGLE FROM CS TO SC

TRACK GEOMETRY - VERTICAL

BVC	BEGIN VERTICAL CURVE
Ea	SUPERELEVATION IN INCHES
EVC	END VERTICAL CURVE
PCVC	POINT OF COMPOUND VERTICAL CURVE
POVC	POINT OF VERTICAL INTERSECTION
POVT	POINT ON VERTICAL CURVE
PVI	POINT ON VERTICAL TANGENT
U	UNBALANCED SUPERELEVATION IN INCHES
VC	VERTICAL CURVE
VPI	VERTICAL POINT OF INTERSECTION

UNITS OF MEASUREMENT

Ac	ACRES
AMP	AMPERES
CAL	CALIPER
CF	CUBIC FEET
CP	CANDLE POWER
CY	CUBIC YARD
dB	DECIBEL
DEG	DEGREE
DIA	DIAMETER
Ea	ACTUAL SUPERELEVATION
F	FARENHEIT
FT	FOOT, FEET
g	ACCELERATION DUE TO GRAVITY
GA	GAUGE
GAL	GALLON
GB	GIGABYTE
GBPS	GIGABITS PER SECOND
GHz	GIGAHERTZ
HOUR	HOUR
H	HEIGHT
Hz	HERTZ
ID	INSIDE DIAMETER
IN	INCHES
IR	INSIDE RADIUS
K	KIPS (1000 POUNDS)
KCMIL	THOUSAND CIRCULAR MILS
KHz	KILOHERTZ
KSF	KIPS PER SQAURE FOOT
KSI	KIPS PER SQUARE INCH
kV	KILOVOLTS
KVA	KILOVOLT-AMPERE
KVAR	KILOVOLT-AMPERE REACTIVE
KW	KILOWATT
KWH/D	KILOWATT HOUR / DEMAND
L	LENGTH
LB	POUNDS
LB/FT	POUNDS PER FOOT
LF	LINEAR FEET
m	METER
MBPS	MEGA-BITS PER SECOND
MCM	THOUSAND CIRCULAR MILS
MHz	MEGAHERTZ
mm	MILLIMETER
MPH	MILES PER HOUR
MVA	MEGAVOLT-AMPERE
MW	MEGA WATT
OD	OUTSIDE DIAMETER
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
SEC	SECOND
SF	SQUARE FEET
SY	SQUARE YARD
TF	TRACK FEET
VA	VOLTS
VAC	VOLT-AMPERE
Y	YARDS
YR(S)	YEAR(S)

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REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY R. MINCIO
DRAWN BY V. HUANTE
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT DIRECTIVE DRAWING

ACRONYMS AND ABBREVIATIONS 4

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AGENCIES/ORGANIZATIONS

AAR	ASSOCIATION OF AMERICAN RAILROADS
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS
ACI	AMERICAN CONCRETE INSTITUTE
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AMTRAK	NATIONAL RAILROAD PASSENGER CORPORATION
ANI	AUTOMATIC NUMBER IDENTIFICATION
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ANSS	ADVANCED NATIONAL SEISMIC SYSTEM
APWA	AMERICAN PUBLIC WORKS ASSOCIATION
AREA	AMERICAN RAILWAY ENGINEERING ASSOCIATION
AREMA	AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASTM	ASTM INTERNATIONAL, AMERICAN SOCIETY OF TESTING & MATERIALS
ATC	APPLIED TECHNOLOGY COUNCIL
AWS	AMERICAN WELDING SOCIETY
BART	BAY AREA RAPID TRANSIT DISTRICT
BDA	BRIDGE DESIGN AIDS (CALTRANS)
BDD	BRIDGE DESIGN DETAILS (CALTRANS)
BDP	BRIDGE DESIGN PRACTICE (CALTRANS)
BDS	BRIDGE DESIGN SPECIFICATIONS (CALTRANS)
BNSF	BURLINGTON NORTHERN SANTA FE RAILWAY
CALNET	CALIFORNIA INTEGRATED TELECOMMUNICATIONS NETWORK
CEQA	CALIFORNIA ENVIRONMENTAL QUALITY ACT
CHD	COUNTY HEALTH DEPARTMENT
CHP	CALIFORNIA DEPARTMENT OF HIGHWAY PATROL (STATE)
CHST	CALIFORNIA HIGH-SPEED TRAIN
CHSTP	CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIWMB	CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD (STATE)
CRR	COMMUTER RAIL PROGRAM (STATE)
DOD	DEPARTMENT OF DEFENSE (FEDERAL)
DOT	DEPARTMENT OF TRANSPORTATION (FEDERAL)
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FHWA	FEDERAL HIGHWAY ADMINISTRATION
FMFCD	FRESNO METROPOLITAN FLOOD CONTROL DISTRICT
FRA	FEDERAL RAILROAD ADMINISTRATION
FSTIP	FEDERAL STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM
FTA	FEDERAL TRANSIT ADMINISTRATION
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
ISO	INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
LADWP	LOS ANGELES DEPARTMENT OF WATER AND POWER
LAUS	LOS ANGELES UNION STATION
LTC	LOCAL TRANSPORTATION COMMISSION
MUTCD	MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NENA	NATIONAL EMERGENCY NUMBER ASSOCIATION
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIST	NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
PEER	PACIFIC EARTHQUAKE ENGINEER RESEARCH
PG&E	PACIFIC GAS & ELECTRIC COMPANY
PUC	PUBLIC UTILITIES COMMISSION (STATE)
RWQCB	REGIONAL WATER QUALITY CONTROL BOARD (STATE)
SDG&E	SAN DIEGO GAS & ELECTRIC COMPANY
SDNR	SAN DIEGO NORTHERN RAILWAY
SAVE	SOCIETY OF AMERICAN VALUE ENGINEERS
SHOPP	STATE HIGHWAY OPERATION AND PROTECTION PROGRAM (FORMERLY HSOPP)
SHPO	STATE HISTORIC PRESERVATION OFFICER (STATE)
SJRRA	SAN JOAQUIN REGIONAL RAIL AUTHORITY
SMUD	SACRAMENTO MUNICIPAL UTILITY DISTRICT
SPTC	SOUTHERN PACIFIC TRANSPORTATION COMPANY
SSORC	SAFETY AND SECURITY OVERSIGHT AND REVIEW COMMITTEE
SVBX	SILICON VALLEY BERRYESSA EXTENSION
SVRT	SILICON VALLEY RAPID TRANSIT
UPRR	UNION PACIFIC RAILROAD
US	UNITED STATES
USCE	UNITED STATES (ARMY) CORPS OF ENGINEERS
USCG	UNITED STATES COAST GUARD
USCS	UNITED SOIL CLASSIFICATION SYSTEM
VTA	VALLEY TRANSPORTATION AUTHORITY (OF SANTA CLARA COUNTY)

SEGMENT/COUNTY CODES AND SUBDIVISIONS

A-J	ALTAMONT PASS
B-P	BAKERSFIELD TO PALMDALE
F-B	FRESNO TO BAKERSFIELD
F-J	SAN FRANCISCO TO SAN JOSE
J-M	SAN JOSE TO MERCED
L-D	LOS ANGELES TO SAN DIEGO
L-O	LOS ANGELES TO ANAHEIM
M-F	MERCED TO FRESNO
P-L	PALMDALE TO LOS ANGELES
B	BAY SUBDIVISION
C	CAPITAL SUBDIVISION
D	DESERT SUBDIVISION
J	SAN JACINTO SUBDIVISION
P	PACHECO SUBDIVISION
S	SIERRA SUBDIVISION
T	TONGVA SUBDIVISION
ALA	ALAMEDA
ALP	ALPINE
AMA	AMADOR
BUT	BUTTE
CAL	CALAVERAS
CC	CONTRA COSTA
COL	COLUSA
DN	DEL NORTE
ED	EL DORADO
FRE	FRESNO
GLE	GLENN
HUM	HUMBOLDT
IMP	IMPERIAL
INY	INYO
KER	KERN
KIN	KINGS
LA	LOS ANGELES
LAK	LAKE
LAS	LASSEN
MAD	MADERA
MEN	MENDOCINO
MER	MERCED
MNO	MONO
MOD	MODOC
MON	MONTEREY
MPA	MARIPOSA
MRN	MARIN
NAP	NAPA
NEV	NEVADA
ORA	ORANGE
PLA	PLACER
PLU	PLUMAS
RIV	RIVERSIDE
SAC	SACRAMENTO
SB	SANTA BARBARA
SBD	SAN BERNADINO
SBT	SAN BENITO
SCL	SANTA CLARA
SCR	SANTA CRUZ
SD	SAN DIEGO
SF	SAN FRANCISCO
SHA	SHASTA
SIE	SIERRA
SIS	SISKIYOU
SJ	SAN JOAQUIN
SLO	SAN LUIS OBISPO
SM	SAN MATEO
SOL	SOLANO
SON	SONOMA
STA	STANISLAUS
SUT	SUTTER
TEH	TEHAMA
TRI	TRINITY
TUL	TULARE
TUO	TUOLUMNE
VEN	VENTURA
YOL	YOLO
YUB	YUBA

DIRECTIVE DRAWINGS

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DRAWN BY V. HUANTE
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
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PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
DIRECTIVE DRAWING

ACRONYMS AND ABBREVIATIONS 5

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TRACK

- EXISTING FREIGHT/PASSENGER TRACK
- HST TRACK
- BALLAST
- BUMPER/BUMPING POST
- CONCRETE
- DERAIL-DENOTES DERAIL DIRECTION AND LOCATION OF SWITCH MACHINE (LEFT-HAND SHOWN)
- DOUBLE CROSSOVER
- EARTH
- FRICTION BUFFER
- INSULATED JOINT
- INSULATED JOINT LOCATIONS-BOTH RAIL
- INSULATED JOINT LOCATIONS-LEFT RAIL
- INSULATED JOINT LOCATIONS-RIGHT RAIL
- POINT OF CURVATURE
- POINT OF SWITCH-DENOTES SWITCH MACHINE LOCATION
- PREPARED SUBGRADE
- RAIL LUBRICATOR-DIRECTION OF TRAVEL, (DT), TWO RAIL LUBRICATORS SHOWN — DT
- SINGLE CROSSOVER (LEFT-HAND SHOWN)
- SPECIAL RAIL
- STANDARD BOLTED JOINT
- STANDARD RAIL
- SUB BALLAST
- TURNOUT (RIGHT-HAND SHOWN)
- WELDED JOINT
- CONTROL POINT (CP)
- WALKWAY ENVELOPE

CIVIL

- AGGREGATE BASE
- ASPHALT CONCRETE
- BEGIN OR END PLATFORM — BP OR EP
- BIKE STAND — BS
- BREAK LINE
- BORINGS (EXISTING)
- CENTERLINE
- CENTERLINE TEXT SYMBOL
- CLEAN OUT — CO
- COLUMN, BENT
- CONCRETE
- CONCRETE BARRIER
- CONTOUR LINE — 290
- CONTROL PANEL — CTR
- CONTROL POINT OR STREET INTERSECTION POINT — 4-7-1
- COORDINATE GRID CROSSHAIR — E174000 N87000
- CURB WITH GUTTER (CURB-LIP, FLOW LINE, BACK-TOP OF CURB)
- CURVE NUMBER — ##
- CURVE NUMBER (TRACK GEOMETRY) — ### RADIUS'
- TANGENT NUMBER — ##
- DITCH FLOW LINE
- DOUBLE THRIE BEAM BARRIER
- DROP INLET
- ROUND DROP INLET
- DETENTION BASIN
- EARTHWORK LIMITS

CIVIL CONTINUED

- ELEVATIONS — OG, FG, [2447.9], 2080.3
- ELEVATION (EXISTING) — (175.2)
- ELECTROLIER, ELECTROLIER ON POLE
- EXISTING GUARD RAILING
- EXISTING WALL
- FENCE
- FIRE HYDRANT
- GRADED/LANDSCAPED AREA
- GAS METER — G
- GAS VALVE — G
- GUARD POST
- GUARD RAIL
- GRAVEL OR DIRT ROAD
- GUY WIRE
- HIGH MASS LIGHTING
- HORIZONTAL & VERTICAL CONTROL MONUMENT
- HORIZONTAL CONTROL MONUMENT
- ICV
- MAIL BOX
- MANHOLE
- MATCH LINE — MATCH LINE (DWG NO.)
- NEW ASPHALTIC CONCRETE
- NEW GUARD RAILING
- NEWS STAND — NS
- NORTH ARROW
- ORIGINAL GROUND

CIVIL CONTINUED

- PARKING METER
- POINT OF INTERSECTION
- POINT OF INTERSECTION SYMBOL
- POINT OF VERTICAL INTERSECTION
- POWER POLE
- RETAINING WALL
- RIVER, STREAMS, AND CREEKS
- SECTION DESIGNATION (LETTER) — A
- DRAWING NO. ON WHICH SECTION AND DETAIL APPEARS — DWG NO.
- SECTION OR DETAIL TITLE — SECTION A, SCALE 1"=1'-0"
- SPOT ELEVATION — 290.4
- TILDE (TERMINATOR)
- STATION EQUATION
- STREET LIGHT
- STREET LIGHT POWER POLE
- STREET LIGHT TRAFFIC SIGNAL
- STREET SIGN
- STRUCTURE CLEARANCE ENVELOPE
- SUPER AXIS OF ROTATION
- TELEPHONE BOOTH — T
- TELEPHONE POLE — PT
- TEMPORARY RAILING (TYPE K)
- TIRE DERIVED AGGREGATE
- TRACK ALIGNMENT CENTER LINE — S590+00
- TRAFFIC PANEL — TRF
- TRAFFIC SIGNAL
- TRANSMISSION TOWER
- TREE
- UTILITY POLE

DIRECTIVE DRAWINGS

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					INTERNAL DRAFT

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DRAWN BY V. HUANTE
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 06/30/11

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT STANDARD DRAWING

SYMBOLS 1

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CIVIL CONTINUED

POLE AND WIRES

POLE WITH WIRES AND ANCHOR

VALVE

VENT

VERTICAL CONTROL MONUMENT

WALL

WALL ON BARRIER

WATER EDGE, LAKE, POND, SWAMP

WATER METER

WELL

YARD BOX ELECTRICAL

RIGHT-OF-WAY

PROPOSED RIGHT-OF-WAY — PROP ROW

EXISTING EASEMENT

PROPOSED TEMPORARY CONSTRUCTION EASEMENT — PROP TCE

AERIAL UTILITIES

EXIST ELECTRICAL — e

EXIST FIBER OPTIC — fo (oh)

EXIST TELEMETER CABLE — tc (oh)

EXIST TELEPHONE — t

EXIST TELEVISION — tv

NEW ELECTRICAL — E

NEW FIBER OPTIC — FO (OH)

NEW TELEMETER CABLE — TC (OH)

NEW TELEPHONE — T

NEW TELEVISION — TV

UNDERGROUND UTILITIES

EXIST ELECTRICAL — e

EXIST FIBER OPTIC — fo (oh)

EXIST GASOLINE — g

EXIST NATURAL GAS — g

EXIST OIL — o

EXIST SEWER — s

EXIST STEAM — st

EXIST STORM DRAIN — sd

EXIST TELEMETER CABLE — tc (oh)

EXIST TELEPHONE — t

EXIST TELEVISION — tv

EXIST WATER — w

NEW ELECTRICAL — E

NEW FIBER OPTIC — FO (OH)

NEW GASOLINE — G

NEW NATURAL GAS — G

NEW OIL — O

NEW SEWER — S

NEW STEAM — ST

NEW STORM DRAIN — SD

NEW TELEMETER CABLE — TC (OH)

NEW TELEPHONE — T

NEW TELEVISION — TV

NEW WATER — W

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION
					INTERNAL DRAFT

DESIGNED BY S. MILITELLO
DRAWN BY T. DOUNG
CHECKED BY J. CHIRCO
IN CHARGE K. JONG
DATE 10/28/10

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT STANDARD DRAWING

SYMBOLS 2

CONTRACT NO. 13259
DRAWING NO. DD-GE-111
SCALE NO SCALE
SHEET NO.

mincio 2/3/2012 10:26:10 AM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\General DD\DD-GE-111.dgn

California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16

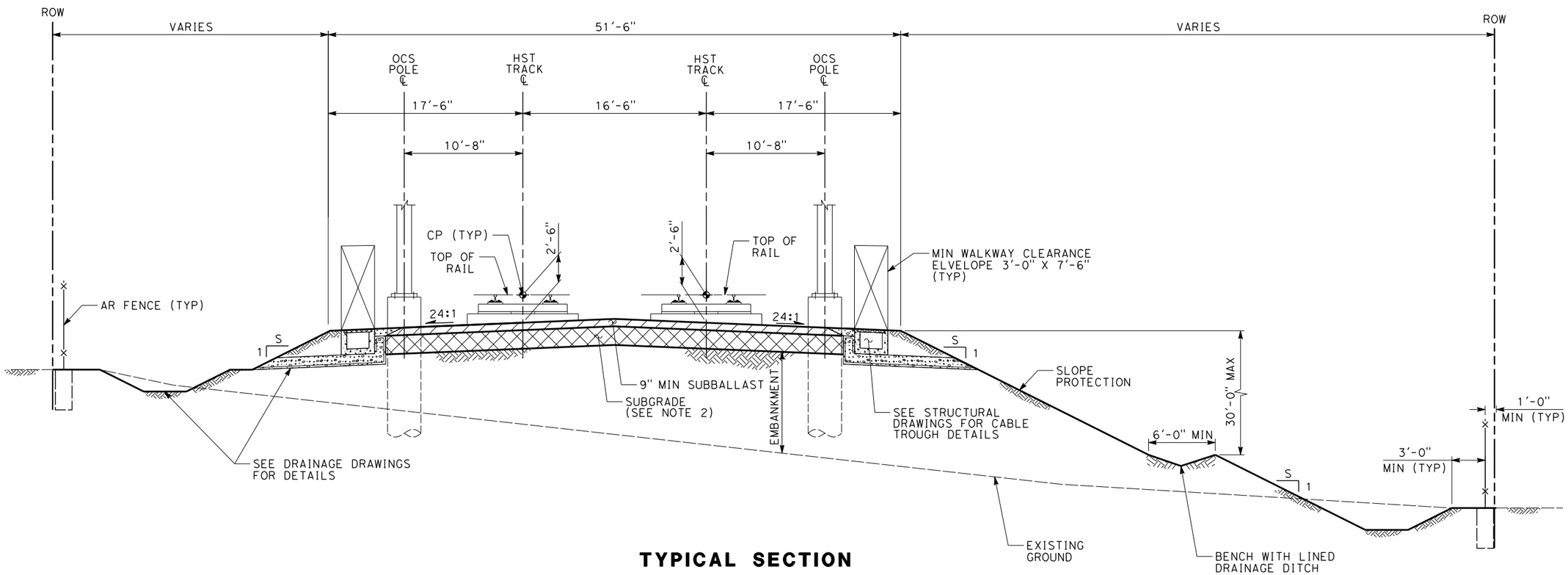
Directive Drawings

Civil

03/08/2012 RFP HSR 11-16

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.



TYPICAL SECTION

TWO TRACK NON-BALLASTED EMBANKMENT

5 0 5 10

1"=5'

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY D. MANITI
DRAWN BY V. HUANTE
CHECKED BY G. HARRIS
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

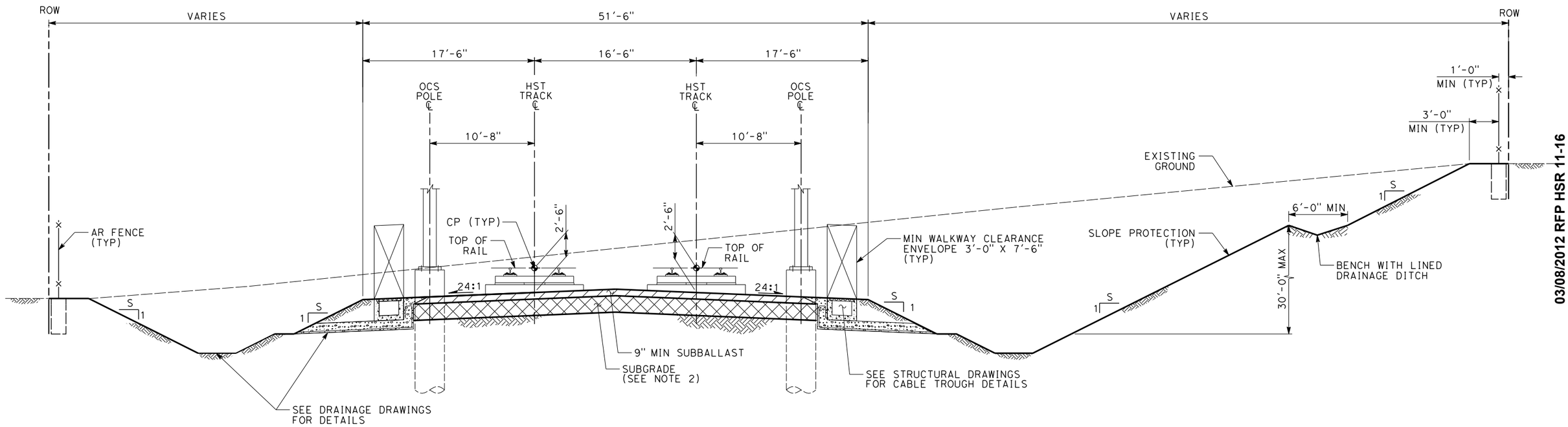
TYPICAL CROSS SECTION
TWO TRACK NON-BALLASTED
EMBANKMENT

CONTRACT NO.
DRAWING NO. DD-CV-001
SCALE AS SHOWN
SHEET NO.

mincio 2/29/2012 5:20:36 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Civil DD\DD-CV-001.dgn

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.



TYPICAL SECTION
TWO TRACK NON-BALLASTED
OPEN CUT

5 0 5 10
1"=5'

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY D. MANITI
DRAWN BY V. HUANTE
CHECKED BY G. HARRIS
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

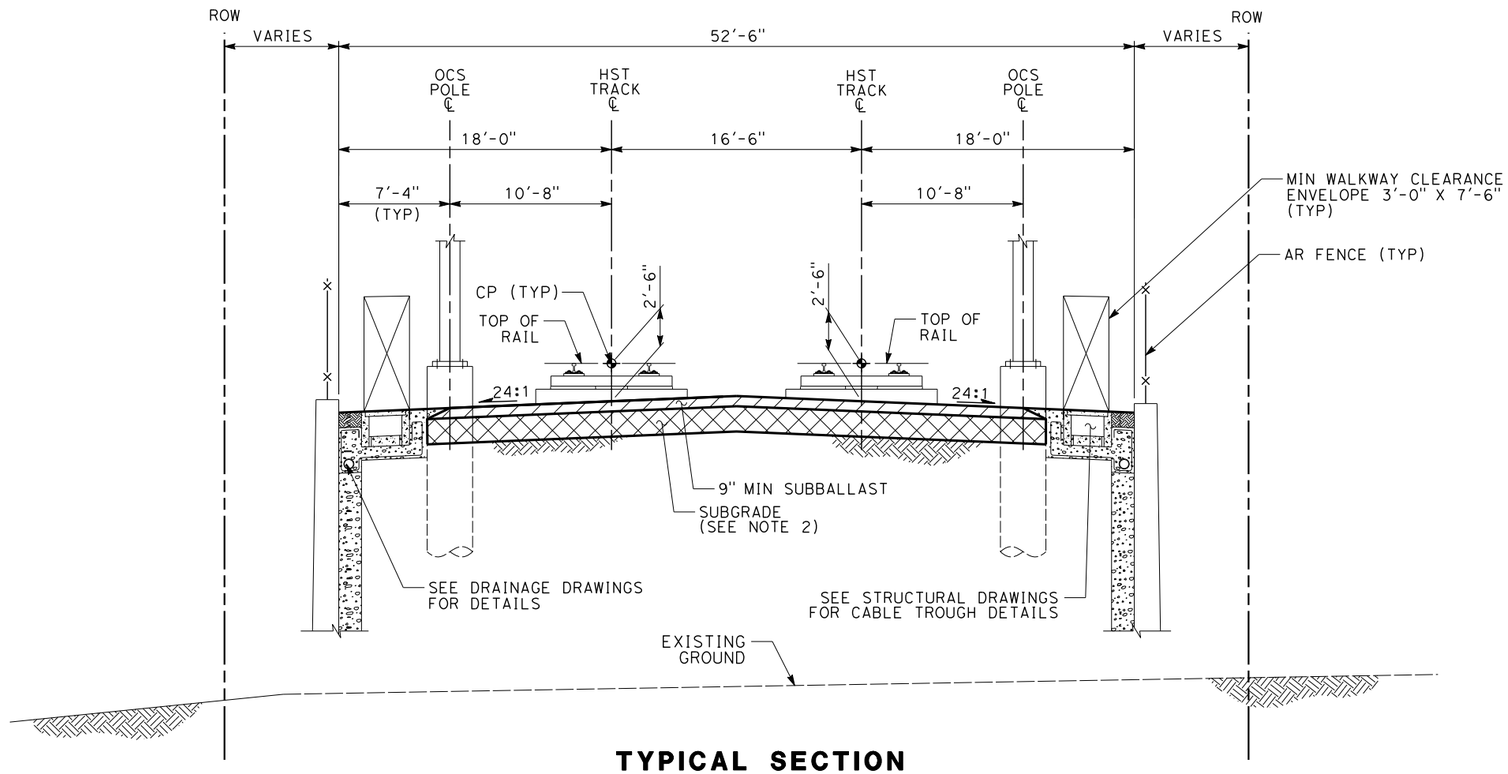
TYPICAL CROSS SECTION
TWO TRACK NON-BALLASTED
OPEN CUT

CONTRACT NO.
DRAWING NO. DD-CV-002
SCALE AS SHOWN
SHEET NO.

mincio 2/29/2012 5:20:37 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Civil DD\DD-CV-002.dgn

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.



TYPICAL SECTION

TWO TRACK NON-BALLASTED RETAINED FILL

5 0 5 10

1"=5'

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY D. MANITI
DRAWN BY V. HUANTE
CHECKED BY G. HARRIS
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

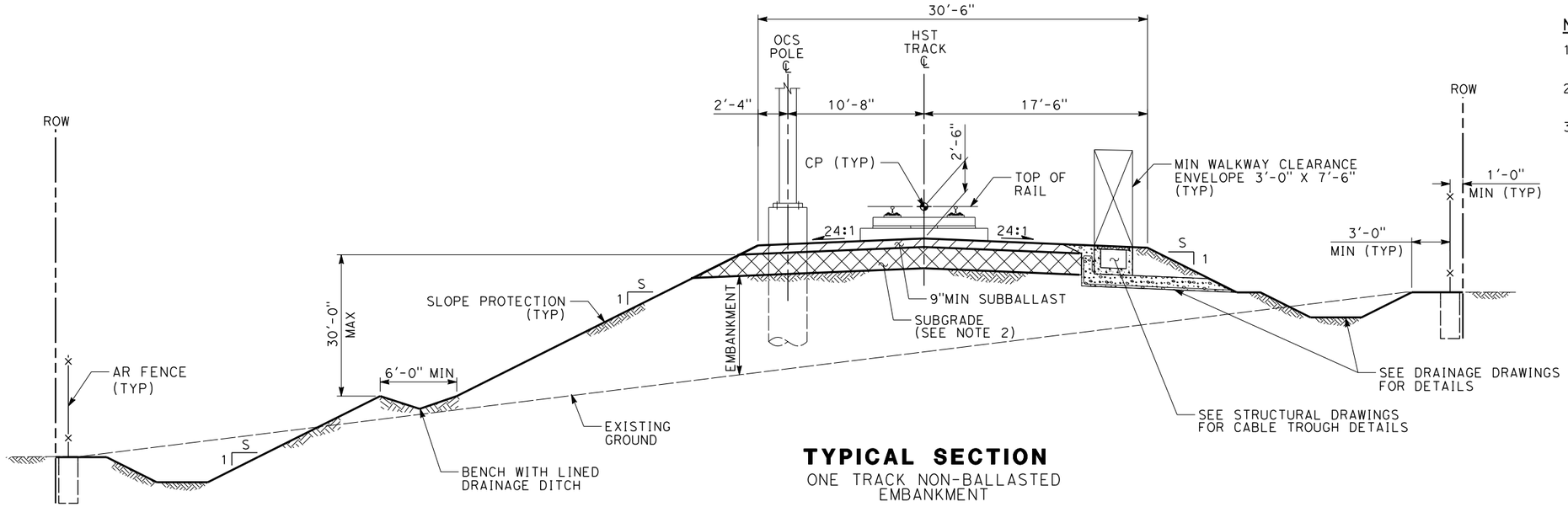
TYPICAL CROSS SECTION
TWO TRACK NON-BALLASTED
RETAINED FILL

CONTRACT NO.
DRAWING NO. DD-CV-003
SCALE AS SHOWN
SHEET NO.

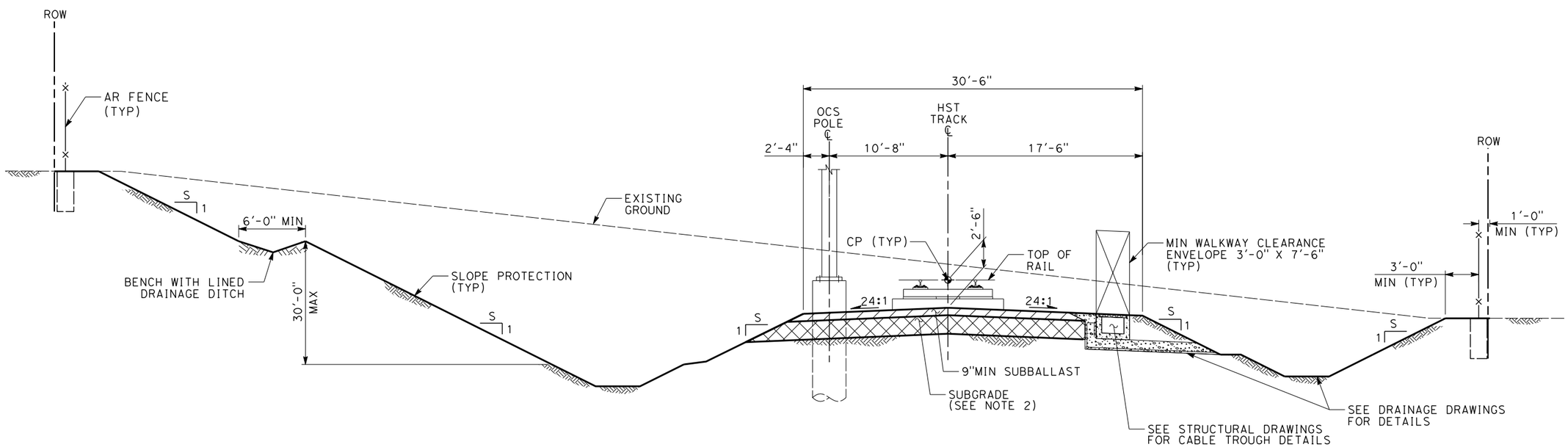
mincio 2/29/2012 5:20:38 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Civil DD\DD-CV-003.dgn

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.



TYPICAL SECTION
ONE TRACK NON-BALLASTED EMBANKMENT



TYPICAL SECTION
ONE TRACK NON-BALLASTED OPEN CUT

5 0 5 10
1"=5'

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY D. MANITI
DRAWN BY V. HUANTE
CHECKED BY G. HARRIS
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

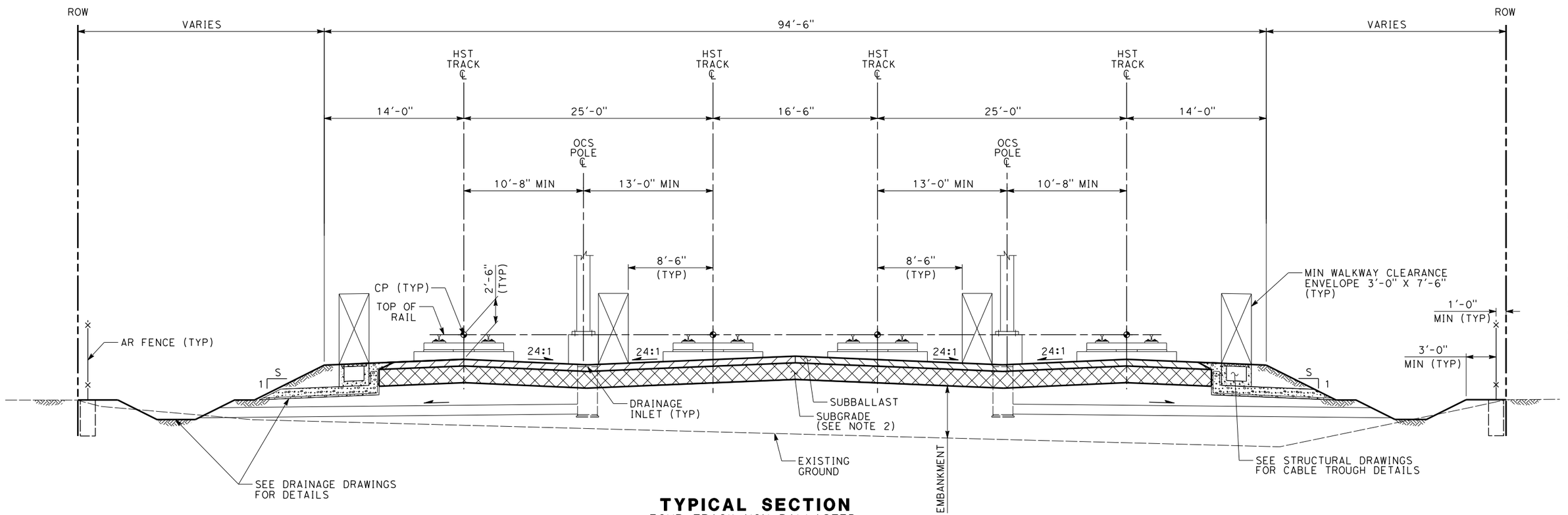
TYPICAL CROSS SECTION
ONE TRACK NON-BALLASTED
EMBANKMENT AND OPEN CUT

CONTRACT NO.
DRAWING NO. DD-CV-004
SCALE AS SHOWN
SHEET NO.

mincio 2/29/2012 5:20:40 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Civil DD\DD-CV-004.dgn

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SUBGRADE THICKNESS SHALL BE DETERMINED BASED ON THE EXISTING GROUND CONDITION.
3. THE CONTROL POINT (CP) SHALL BE 2'-6" ABOVE THE TOP OF SUBBALLAST.



TYPICAL SECTION
FOUR TRACK NON-BALLASTED EMBANKMENT

5 0 5 10
1"=5'

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY D. MANITI
DRAWN BY V. HUANTE
CHECKED BY G. HARRIS
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

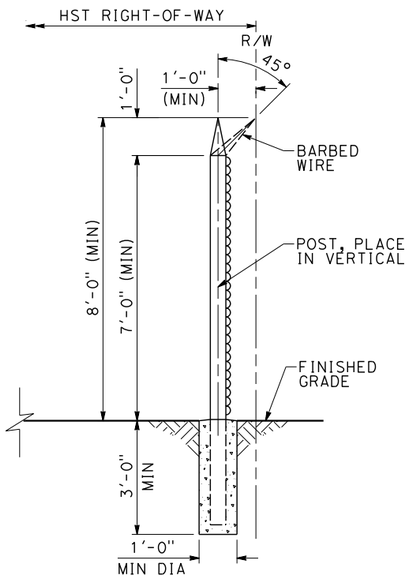
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

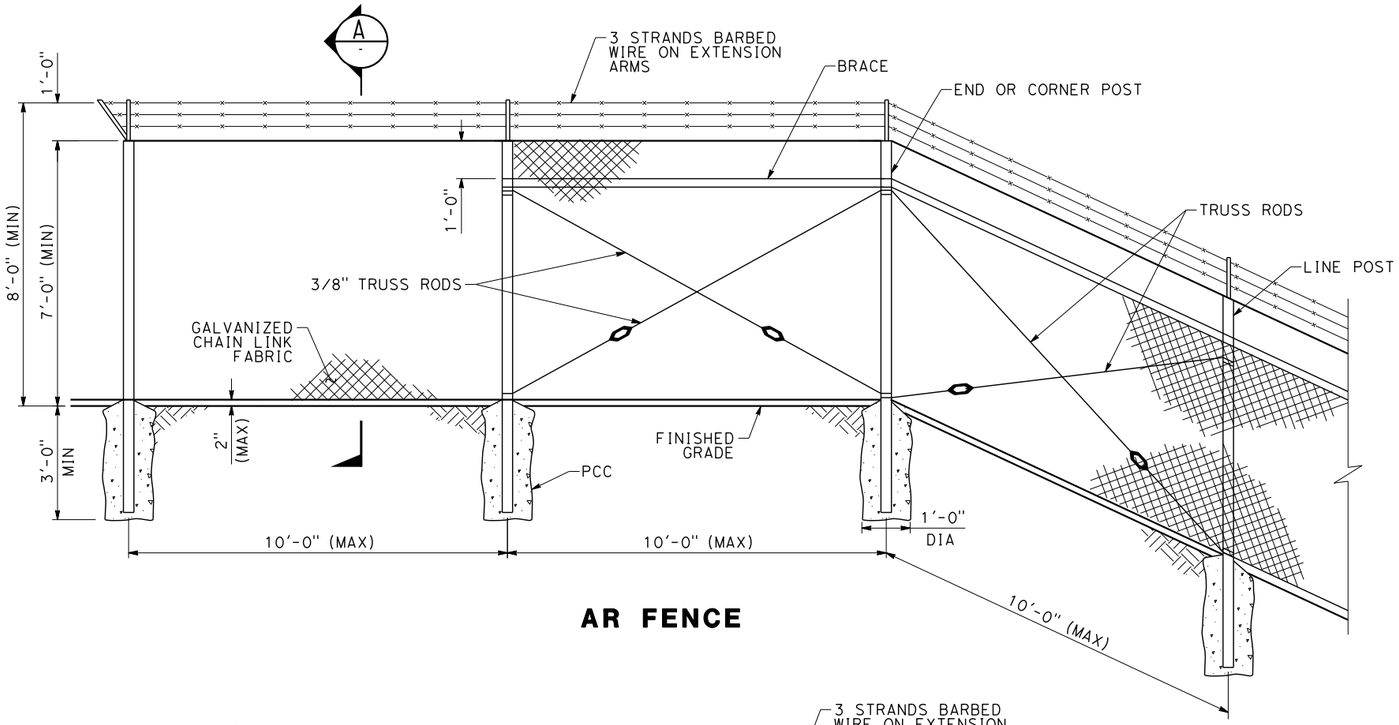
TYPICAL CROSS SECTION
FOUR TRACK NON-BALLASTED
EMBANKMENT

CONTRACT NO.
DRAWING NO. DD-CV-005
SCALE AS SHOWN
SHEET NO.

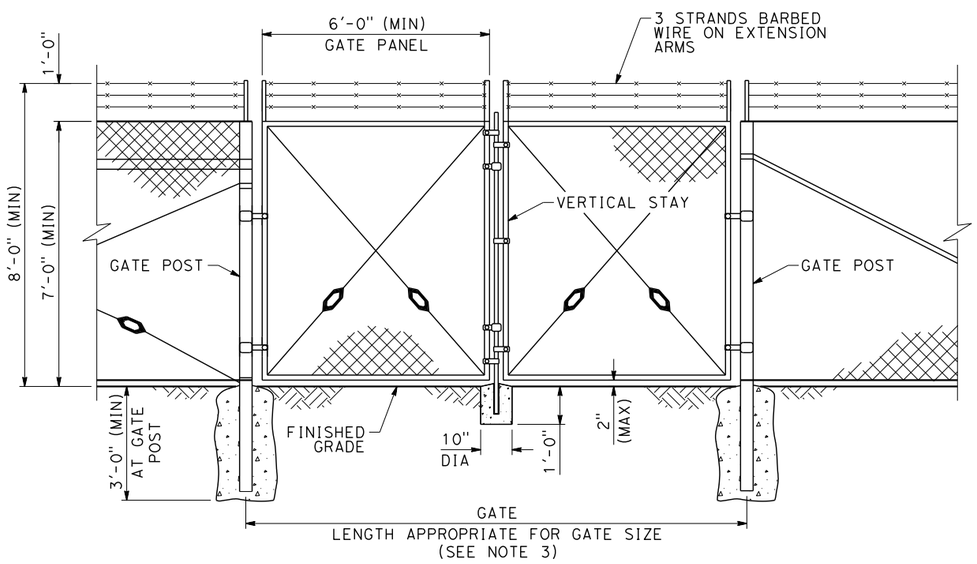
mincio 2/29/2012 5:20:41 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Civil DD\DD-CV-005.dgn



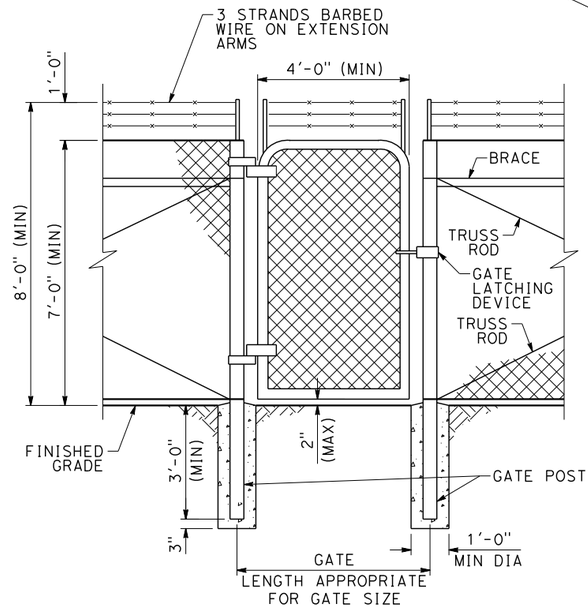
SECTION A



AR FENCE



VEHICLE ACCESS GATE ALONG AR FENCE



PEDESTRIAN ACCESS GATE ALONG AR FENCE

NOTES:

1. ALL PERMANENT FENCING AND GATES SHALL BE BONDED, GROUNDED AND INSULATED TO PREVENT ELECTRIC SHOCK
2. ACCESS RESTRICTIONS (AR) FENCING SHALL BE 8 FEET HIGH MINIMUM (AS SHOWN HERE). ACCESS DETERRING (AD) FENCING (NOT SHOWN) SHALL BE 6 FEET HIGH, WITH NO BARBED WIRE
3. GATES FOR VEHICULAR ACCESS (DRIVING GATES) SHALL BE SIZED IN COORDINATION WITH EMERGENCY RESPONDERS AND MAINTENANCE EQUIPMENT. IF NO OTHER INFORMATION IS AVAILABLE THESE GATES SHOULD HAVE A MINIMUM WIDTH OF TWELVE (12) FEET.
4. GATES CAN EITHER BE SWINGING OR SLIDING TYPE VEHICULAR ACCESS SWINGING GATES SHALL BE A PAIR AND SHALL BE HINGED FROM THE INSIDE. PROVISIONS SHALL BE MADE FOR SWINGING GATES TO SWING NOT LESS THAN 90 DEGREES AWAY FROM THE HST FACILITIES.
5. THIS DRAWING DEPICTS MINIMUM STANDARDS FOR RIGHT-OF-WAY FENCING AND GATE. ALTERNATIVE FENCE TYPE OF EQUIVALENT OR ENHANCED KIND MAY BE ALLOWED UPON APPROVAL OF THE AUTHORITY.

2 0 2 4
1/2"=1'-0"

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. ACOSTA
DRAWN BY D. SO
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

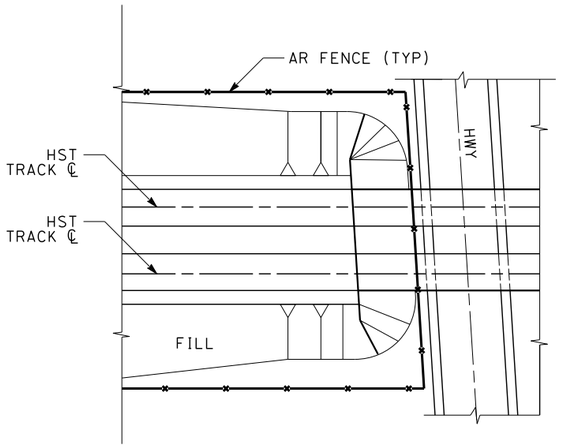
FENCE AND GATE DETAILS

CONTRACT NO.
DRAWING NO. DD-CV-006
SCALE AS SHOWN
SHEET NO.

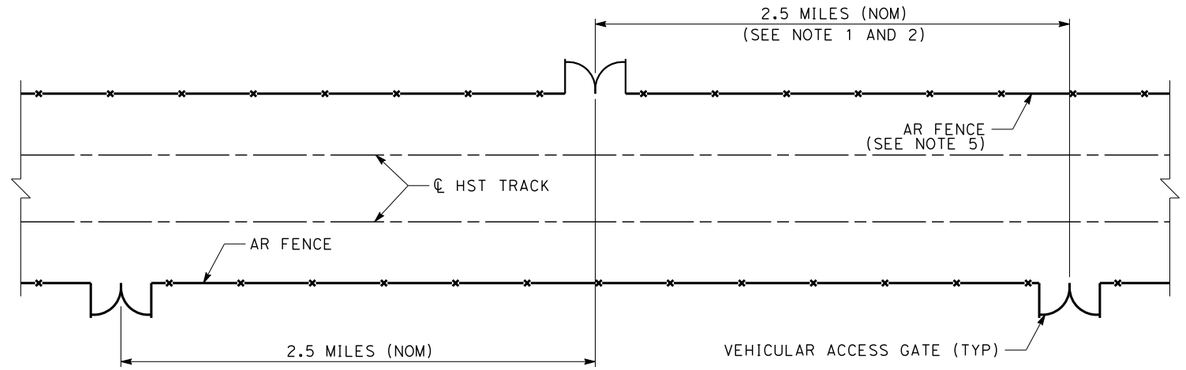
mincio 2/29/2012 5:20:42 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Civil DD\DD-CV-006.dgn

NOTES:

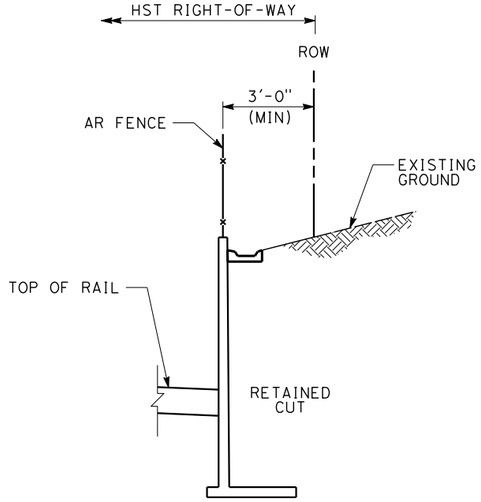
1. LOCATION OF GATES ALONG RIGHT-OF-WAY FENCING MAY REQUIRE COORDINATION WITH THE LOCAL FIRE PROTECTION AGENCY AND EMERGENCY RESPONDERS.
2. IN GENERAL VEHICULAR ACCESS GATE ALONG AT-GRADE TRACKWAY, SHALL BE LOCATED NOMINALLY AT 2.5 MILE INTERVALS AND COORDINATED WITH THE LOCATION OF HST WAYSIDE FACILITIES.
3. GATE LOCATIONS ALONG FENCING WITHIN FREEWAY RIGHT-OF-WAY REQUIRE CALTRANS APPROVAL.
4. VEHICULAR ACCESS GATES SHALL BE PROVIDED IN CONJUNCTION WITH EITHER ACCESS ROADS OR AT LOCATIONS WHERE EXISTING ROADS MAKE IT PRACTICABLE FOR MAINTENANCE AND EMERGENCY VEHICLE TO ACCESS THE TRACKWAY.
5. FOR ADDITIONAL DETAILS SEE CIVIL DRAWING "FENCE AND GATE DETAILS".



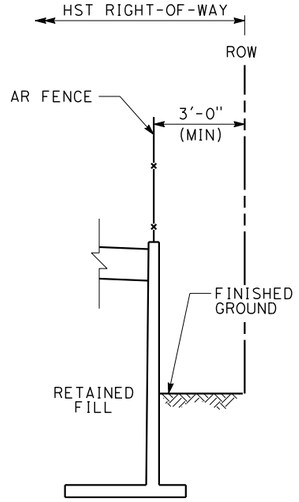
FENCE LOCATION AT HST ABUTMENT



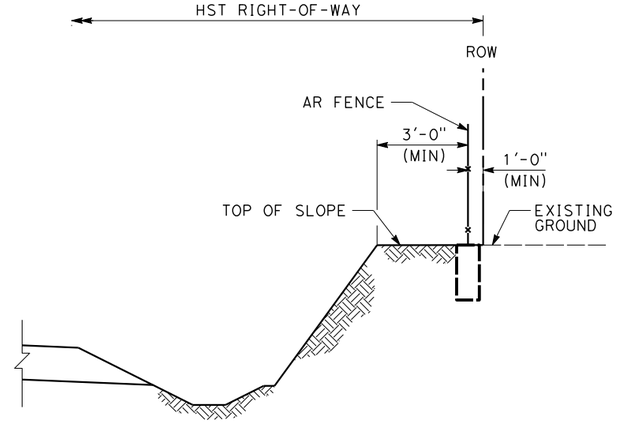
GATE LOCATIONS ALONG HST TRACKWAY
AT GRADE



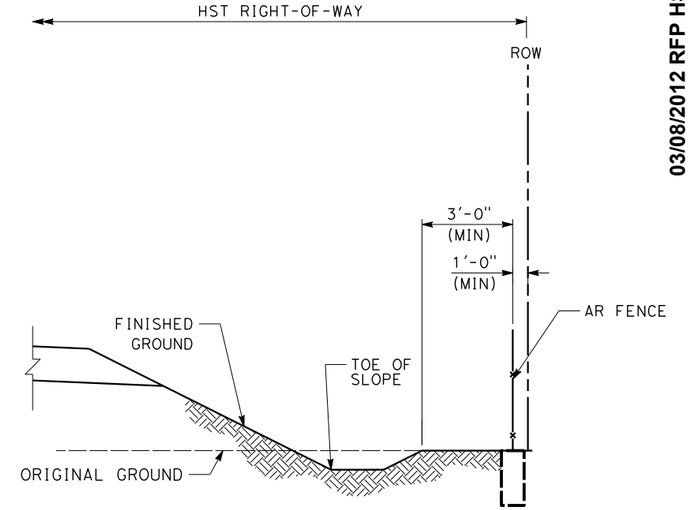
FENCE LOCATION ALONG HST TRACKWAY
RETAINED CUT SECTION



FENCE LOCATION ALONG HST TRACKWAY
RETAINED FILL SECTION



FENCE LOCATION ALONG HST TRACKWAY
OPEN CUT SECTION



FENCE LOCATION ALONG HST TRACKWAY
EMBANKMENT SECTION

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. ACOSTA
DRAWN BY D. SO
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

FENCE AND GATE LOCATIONS

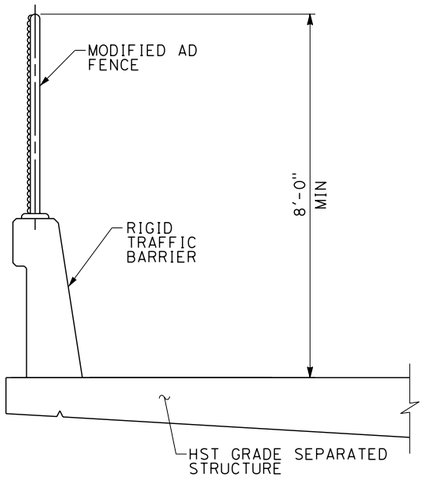
CONTRACT NO.
DRAWING NO. DD-CV-007
SCALE NO SCALE
SHEET NO.

03/08/2012 RFP HSR 11-16

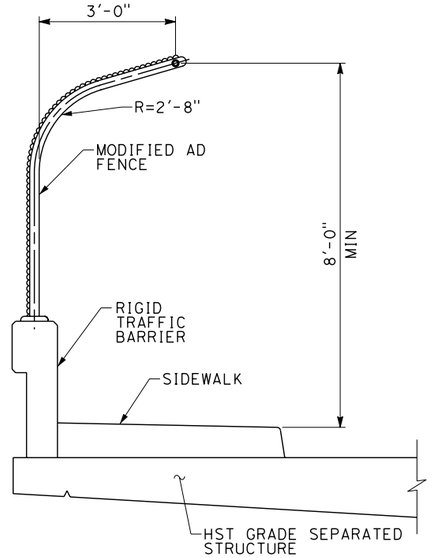
mincio 2/29/2012 5:20:43 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Civil DD\DD-CV-007.dgn

NOTES:

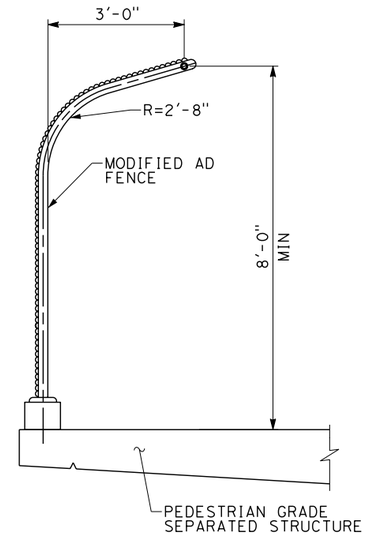
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR SOLID PLATE REQUIREMENT, SEE OVERHEAD CONTACT SYSTEM AND TRACTION POWER RETURN SYSTEM CHAPTER OF THE DESIGN CRITERIA.
3. EXTEND SOLID PLATE 30 FEET FROM CENTERLINE OF OUTERMOST TRACK.



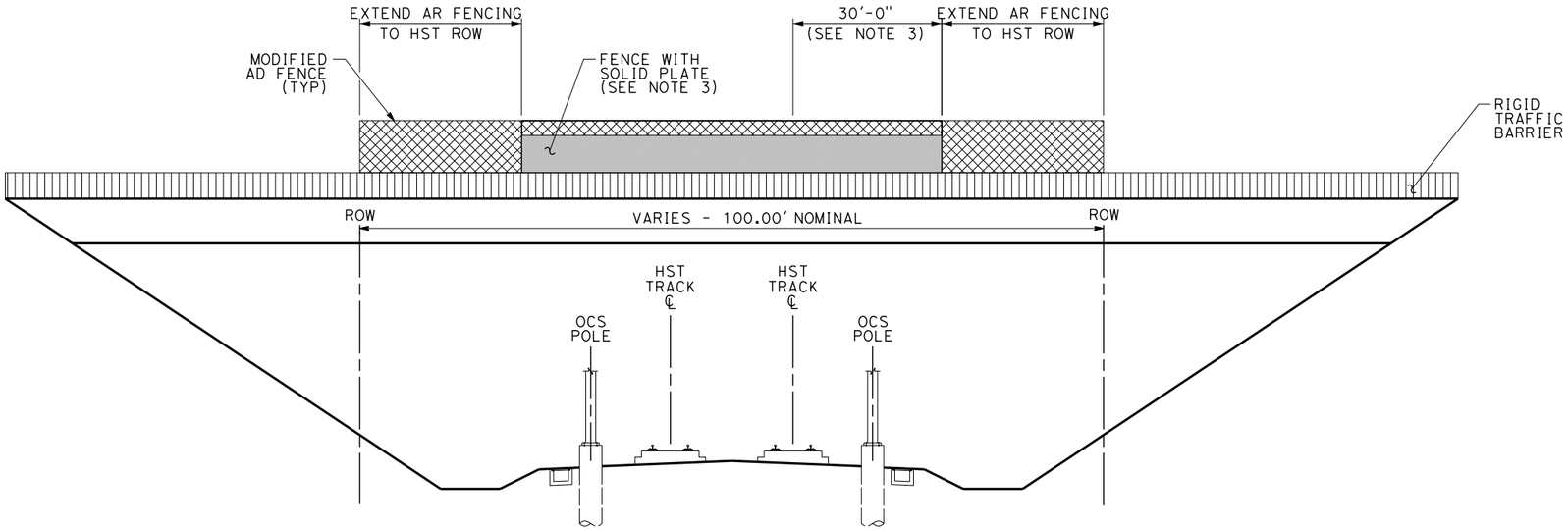
CROSS SECTION
FENCE AT GRADE SEPARATED STRUCTURES WITHOUT SIDEWALK



CROSS SECTION
FENCE AT GRADE SEPARATED STRUCTURES WITH SIDEWALK



CROSS SECTION
FENCE AT PEDESTRIAN GRADE SEPARATED STRUCTURE



UNDERPASS STRUCTURE ELEVATION

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. ACOSTA
DRAWN BY D. SO
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

FENCING ON GRADE SEPARATED STRUCTURES

CONTRACT NO.
DRAWING NO. DD-CV-008
SCALE NO SCALE
SHEET NO.

03/08/2012 RFP HSR 11-16

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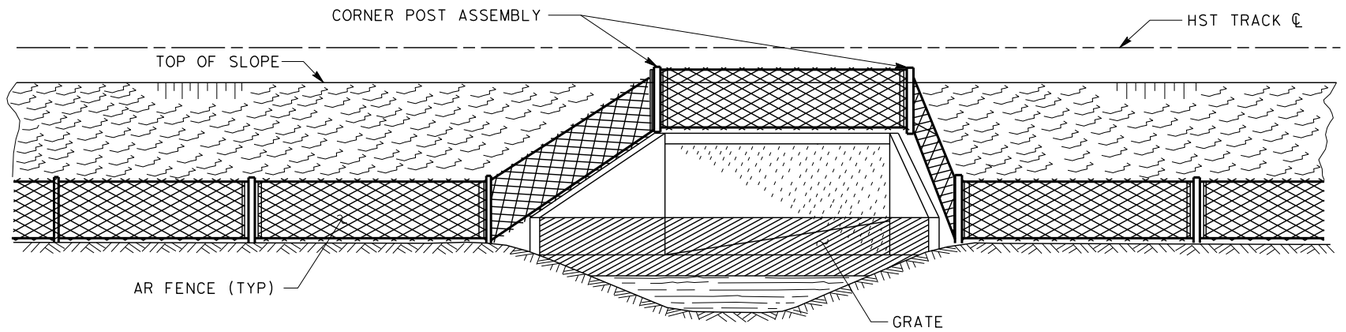
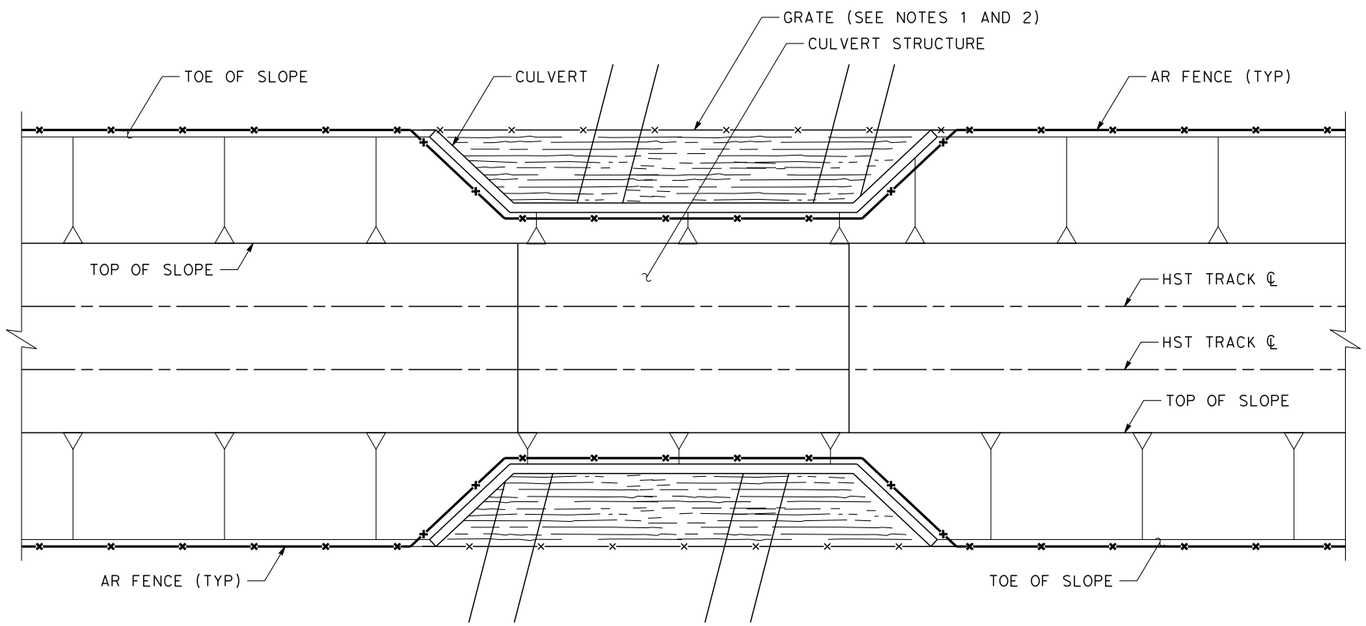
NOTES:

1. GRATES SHALL BE INSTALLED UPSTREAM AND DOWNSTREAM OF CULVERT HEADWALLS.
2. GRATES SHALL HAVE BARS SPACED 6 INCHES APART AND SHALL BE DESIGNED TO WITHSTAND MAXIMUM IMPACT FROM LARGEST EXPECTED FLOATING DEBRIS.
3. GRATE INSTALLATION SHALL BE COORDINATED WITH THE HYDRAULIC ENGINEER TO ENSURE PRESERVATION OF THE CULVERT FLOW CAPACITY.



ELEVATION



PLAN

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. ACOSTA
DRAWN BY D. SO
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

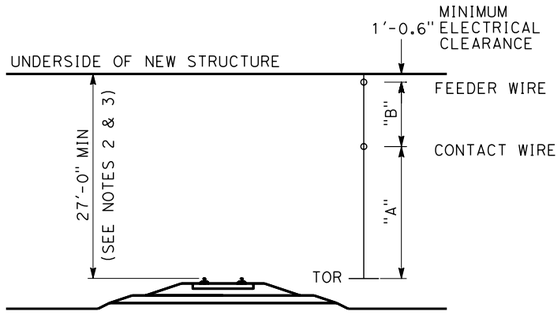
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

FENCE AT CULVERT CROSSINGS

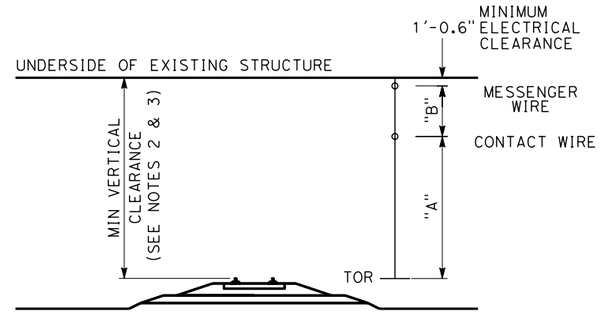
CONTRACT NO.
DRAWING NO. DD-CV-009
SCALE NO SCALE
SHEET NO.

mincio 2/29/2012 5:20:46 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Civil DD\DD-CV-009.dgn



NEW STRUCTURE OVER HST TRACKS

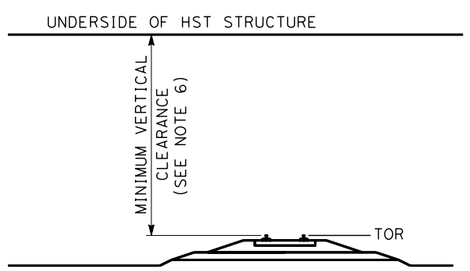
	HEIGHT "A"	HEIGHT "B"	MIN VERTICAL CLEARANCE
DEDICATED HST TRACK	17'-5"	8'-3.5"	27'-0"
SHARED USE TRACK	18'-9"	7'-0.5"	27'-0"



EXISTING STRUCTURE OVER HST TRACKS

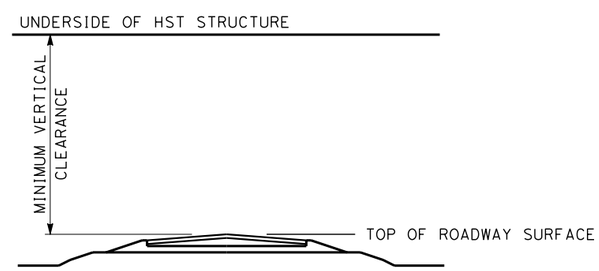
	HEIGHT "A"	HEIGHT "B"	MIN VERTICAL CLEARANCE
DEDICATED HST TRACK	17'-5"	8'-3.5"	27'-0"
DEDICATED HST TRACK (V ≤ 125 MPH)	17'-5"	5'-3"	24'-0"*
SHARED USE TRACK	18'-9"	4'-0"	24'-6"*

* SEE NOTE 2



NEW HST STRUCTURE OVER TRACK

	MIN VERTICAL CLEARANCE
FREIGHT TRACKS	
BNSF	23'-4"
UPRR	23'-0"
NON-FREIGHT TRACKS	
METROLINK	24'-0"
CALTRAIN	24'-6"



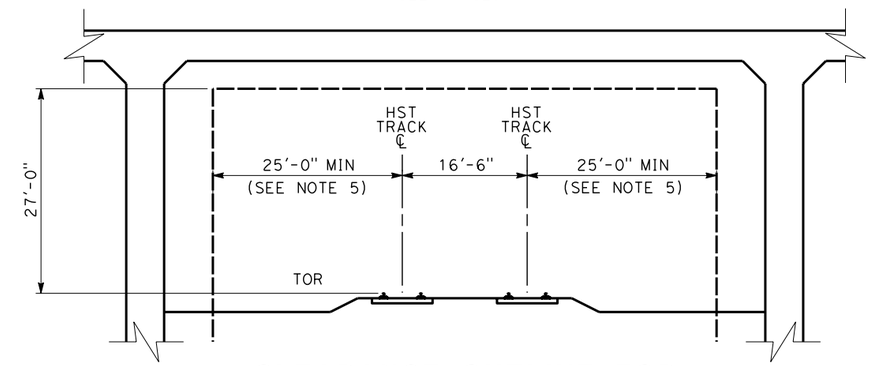
NEW HST STRUCTURE OVER ROADWAY

	MIN VERTICAL CLEARANCE
FREEWAY/EXPRESSWAY	16'-6"
LOCAL ROADWAY	15'-0" *
EXTRA LEGAL LOAD NETWORK(ELLN)	20'-3"

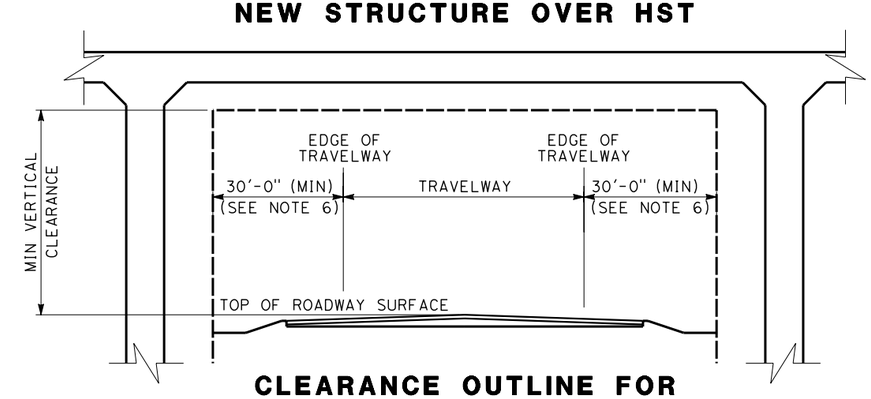
* SEE NOTE 4

NOTES:

1. TOLERANCES ARE NOT ADDITIVE FOR INCREMENTAL DISTANCES.
2. DEFINED CLEARANCES ASSUMES GRADE SEPARATED STRUCTURE LENGTH ALONG TRACK IS NO MORE THAN 160 FEET FOR HST TRACK OVER 125 MPH. THE OCS SHALL BE FREE RUNNING UNDER GRADE SEPARATED STRUCTURES WITH NO SUPPORTS. STRUCTURES WIDER THAN 160' REQUIRE FURTHER ENGINEER APPROVAL.
3. AT LOCATIONS WHERE SUPERELEVATION IS PRESENT, VERTICAL CLEARANCES SHALL BE MEASURED FROM THE HIGH RAIL.
4. AT LOCAL ROADWAYS, 15 FEET MINIMUM VERTICAL CLEARANCE SHOULD BE DISCUSSED WITH LOCAL AGENCY FOR CONCURRENCE.
5. PROTECTIVE STRUCTURE IS REQUIRED IF SIDE CLEARANCE IS LESS THAN 25 FEET.
6. RIGID TRAFFIC BARRIER MAY BE REQUIRED IF SIDE CLEARANCE IS LESS THAN 30 FEET.
7. SEE APPLICABLE LOCAL DESIGN CRITERIA FOR SIDE CLEARANCE.



CLEARANCE OUTLINE FOR NEW STRUCTURE OVER HST



CLEARANCE OUTLINE FOR NEW HST STRUCTURE OVER ROADWAY

	MIN SIDE CLEARANCE
FREEWAY/EXPRESSWAY	30'-0"
OTHER	SEE NOTE 7

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY S. MILITELLO
DRAWN BY V. HUANTE
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CIVIL DIRECTIVE

MINIMUM CLEARANCE
GRADE SEPARATED STRUCTURES

CONTRACT NO.
DRAWING NO. DD-CV-010
SCALE NO SCALE
SHEET NO.

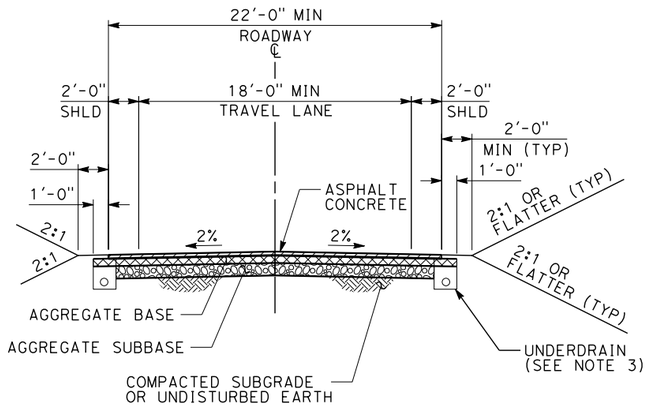
huante 3/7/2012 10:21:48 AM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Civil DD\DD-CV-010.dgn

NOTES:

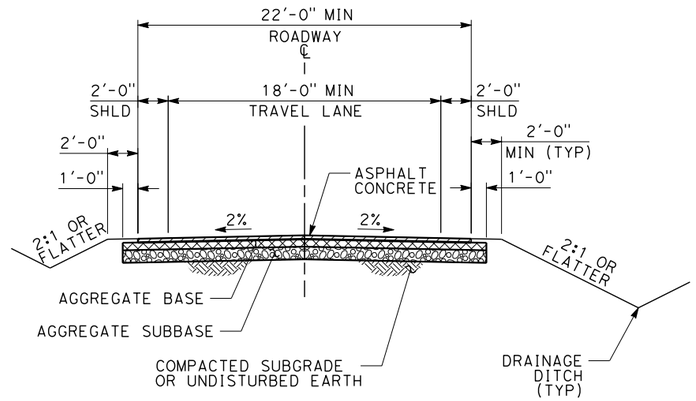
1. AUTHORITY ROADWAYS REFER TO ACCESS ROADS AND SERVICE ROADS.
2. UNPAVED ROADWAYS CAN BE USED AS TEMPORARY ACCESS TO SITES.
3. REFER TO CALTRANS STANDARD PLANS FOR:

   A) CURBS AND DRIVEWAYS (A87A)
   B) UNDERDRAINS (D102)

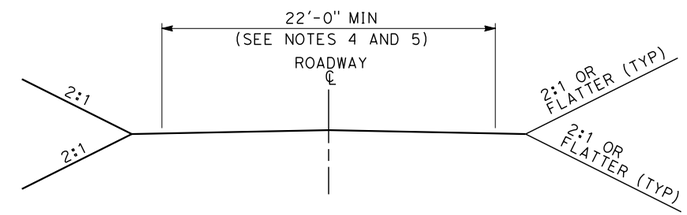
4. IF FIRE HYDRANT IS LOCATED ON ROAD, MINIMUM ROADWAY WIDTH SHALL BE 26 FEET.
5. TWO-WAY SERVICE ROADS SHALL BE 24 FEET WIDE WITH NO SHOULDERS.
6. COMPACT SUBGRADE TO 95% COMPACTION.



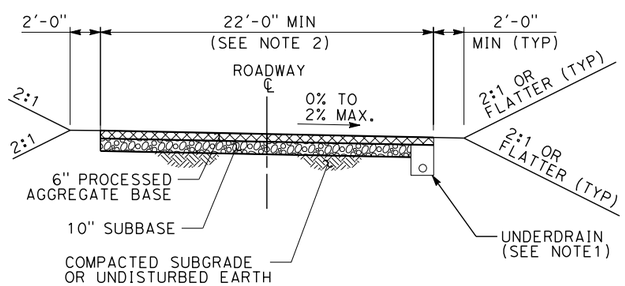
TYPICAL 22 FT ROADWAY SECTION-PAVED
CLOSED DRAINAGE



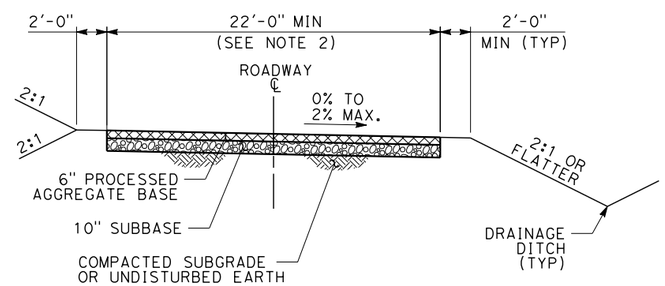
TYPICAL 22 FT ROADWAY SECTION-PAVED
OPEN DRAINAGE



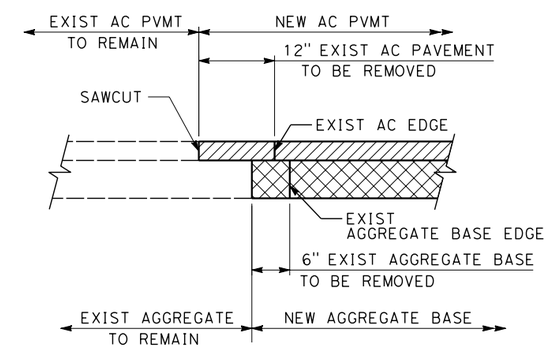
AUTHORITY ROADWAYS WIDTH



TYPICAL 22 FT ROADWAY SECTION-UNPAVED
CLOSED DRAINAGE



TYPICAL 22 FT ROADWAY SECTION-UNPAVED
OPEN DRAINAGE



PAVEMENT CONNECTION DETAIL
SCALE: 1"=1'-0"

5 0 5 10
1"=5'

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY S. MILITELLO
DRAWN BY V. HUANTE
CHECKED BY A. ABTAHI
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT CIVIL DIRECTIVE

AUTHORITY ROADWAYS

CONTRACT NO.
DRAWING NO. DD-CV-011
SCALE AS SHOWN
SHEET NO.

03/08/2012 RFP HSR 11-16

huante 2/29/2012 8:25:19 AM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Civil DD\DD-CV-011.dgn

California High-Speed Train Project

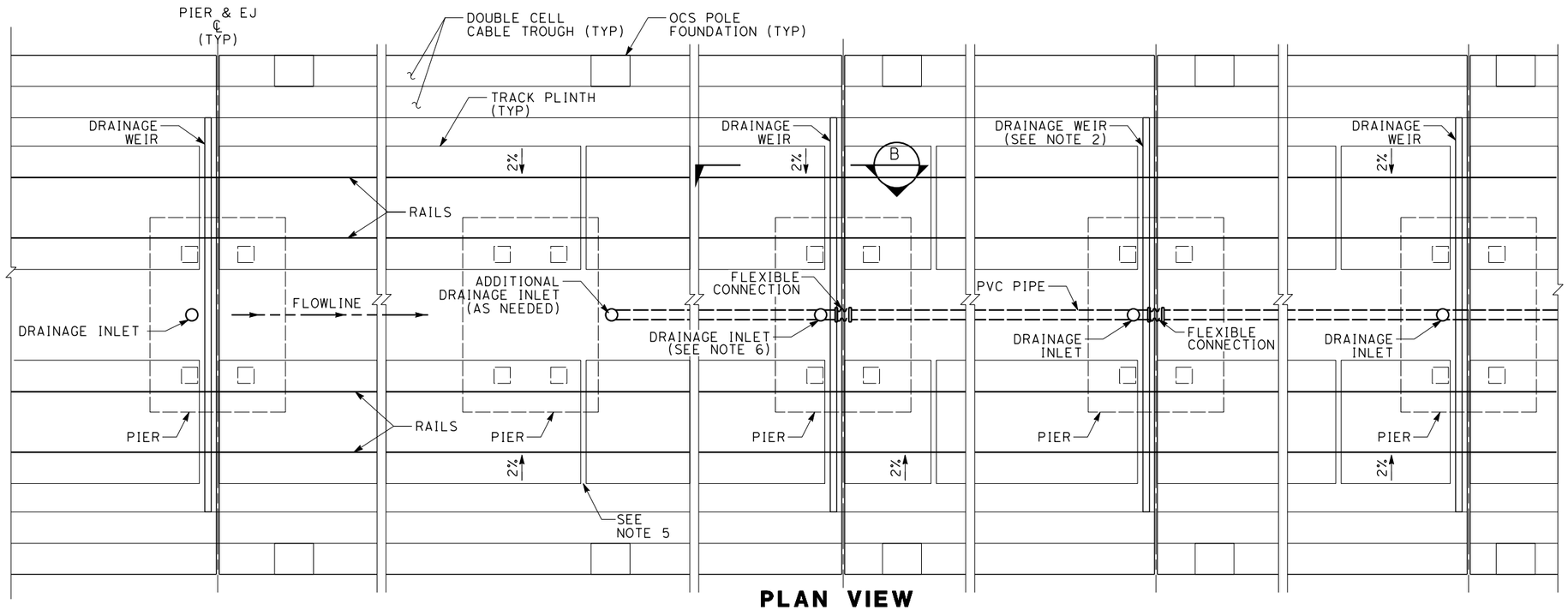
Request for Proposal for Design-Build Services

RFP No.: HSR 11-16

Directive Drawings

Drainage

03/08/2012 RFP HSR 11-16

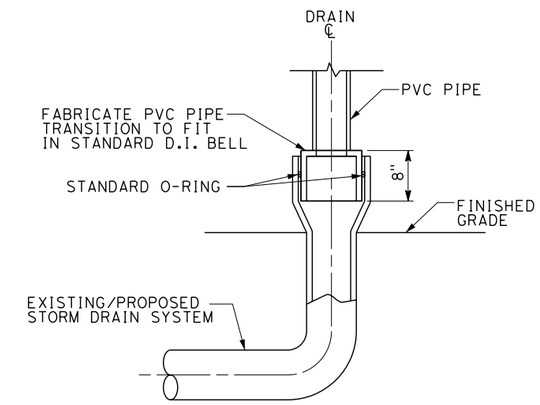


PLAN VIEW

ELEVATION LAYOUT

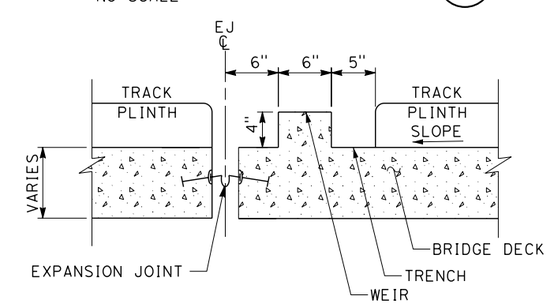
NOTES:

1. TRACK, SYSTEMS AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. WEIR AND INLET SHALL BE PROVIDED UPSTREAM OF EVERY EXPANSION JOINT, SEE "NON-BALLASTED AERIAL STRUCTURE DECK DRAINAGE SYSTEM" FOR EXPANSION JOINT DETAILS.
3. IF DOWNSPOUT IS NOT FEASIBLE AT EXPANSION JOINT, COLUMN CONNECTED STORM WATER MAY BE CONVEYED THROUGH PVC PIPE, USING FLEXIBLE CONNECTIONS AT EXPANSION JOINTS, UNTIL DOWNSPOUT CAN BE CONNECTED TO EXISTING/ PROPOSED STORM DRAIN SYSTEM.
4. PROVIDE MINIMUM 1-6" GAP BETWEEN PVC PIPE AND INTERIOR COLUMN WALL.
5. PROVIDE A 5-INCH WIDE GAP IN TRACK PLINTH, 20 FEET ON CENTER AND ONE JUST UPSTREAM OF THE WEIR, SEE DETAIL.
6. REFER TO DRAINAGE DRAWING "AERIAL STRUCTURE BRIDGE DECK DRAINAGE INLET DETAIL" FOR DRAINAGE INLET DETAIL.
7. CLEANOUTS AND PIPE PENETRATIONS FROM THE COLUMNS SHALL BE OUTSIDE OF THE PLASTIC HINGE



TRANSITION DETAIL (1 / -)

NO SCALE



SECTION (B / -)

NO SCALE

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

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DRAWN BY V. HUANTE
CHECKED BY A. ABTAHI
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT DRAINAGE DIRECTIVE

NON-BALLASTED AERIAL STRUCTURE DECK DRAINAGE SYSTEM

CONTRACT NO.
DRAWING NO. DD-CD-001
SCALE NO SCALE
SHEET NO.

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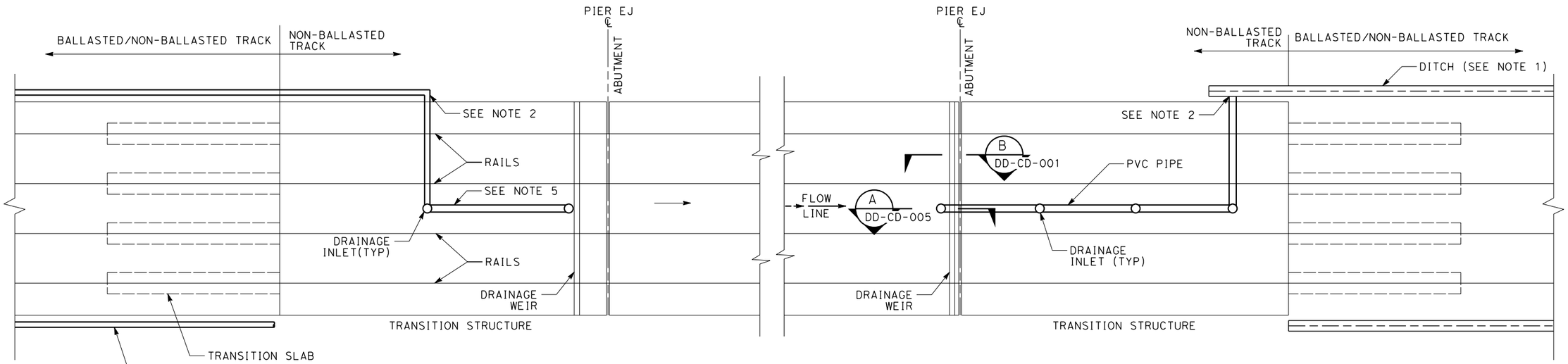
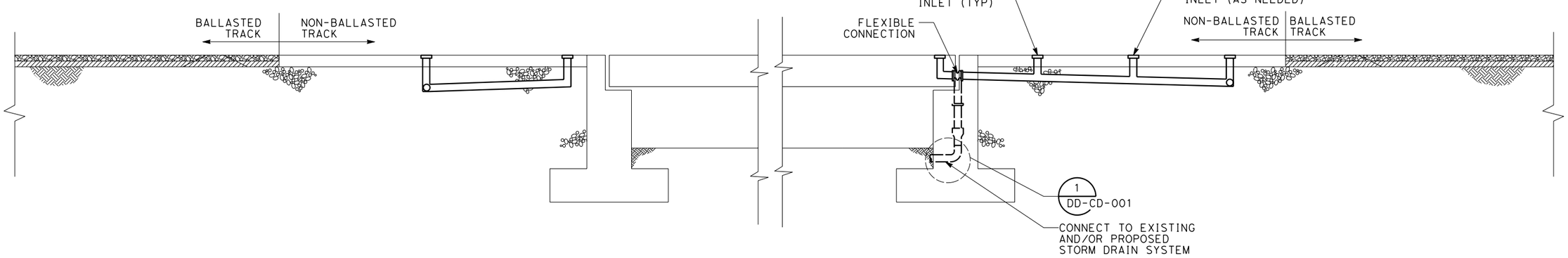
2/29/2012 8:27:20 AM CAHSRP.tbl CHSR_half_black.plt
huante

NOTES:

1. TRACK AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. PERFORATED UNDERDRAIN DRAINAGE SYSTEM OR TRACKSIDE DITCHES. SEE "TRACK DRAIN/UNDERDRAIN CLEANOUT AND RISER DETAILS" AND "DITCH DETAILS" FOR DRAINAGE SYSTEM DETAILS.
3. STORM DRAIN SYSTEM CONNECTS TO AN UNDERGROUND SYSTEM OR TRACKSIDE DITCHES.
4. INLET AND WIER REQUIRED UPSTREAM OF ALL EXPANSION JOINTS. FOR MULTIPLE SPAN BRIDGES WITH INTERMEDIATE EXPANSION JOINTS, SEE "NON-BALLASTED AERIAL STRUCTURE DECK DRAINAGE SYSTEM".
5. STORM DRAIN INLET MAY DISCHARGE TO OVERSIDE DRAIN ON THE EMBANKMENT.



PLAN



ELEVATION

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY K. SISTLA
DRAWN BY V. HUANTE
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IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT DRAINAGE DIRECTIVE

AERIAL STRUCTURE
BEGIN AND END BRIDGE DRAINAGE SYSTEM

CONTRACT NO.
DRAWING NO. DD-CD-002
SCALE NO SCALE
SHEET NO.

03/08/2012 RFP HSR 11-16

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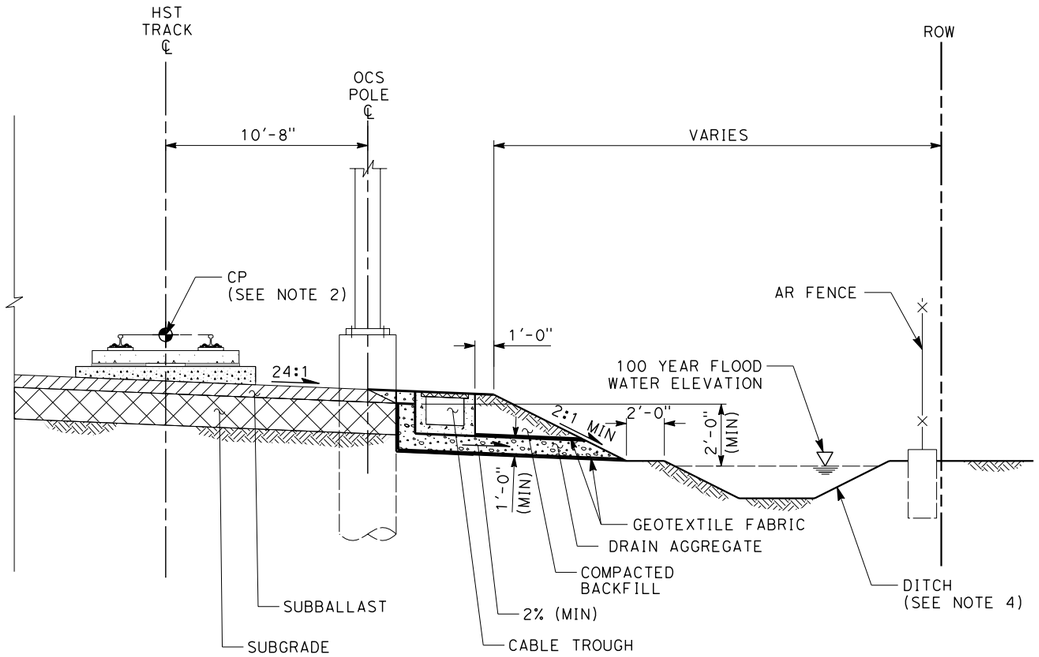
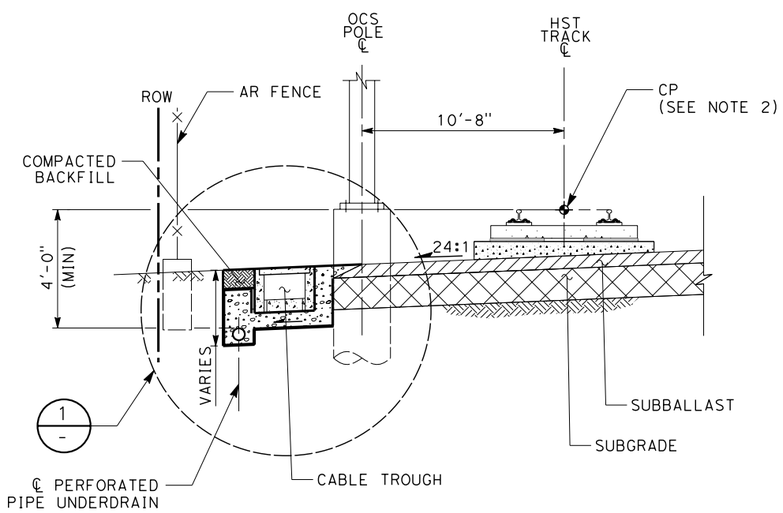


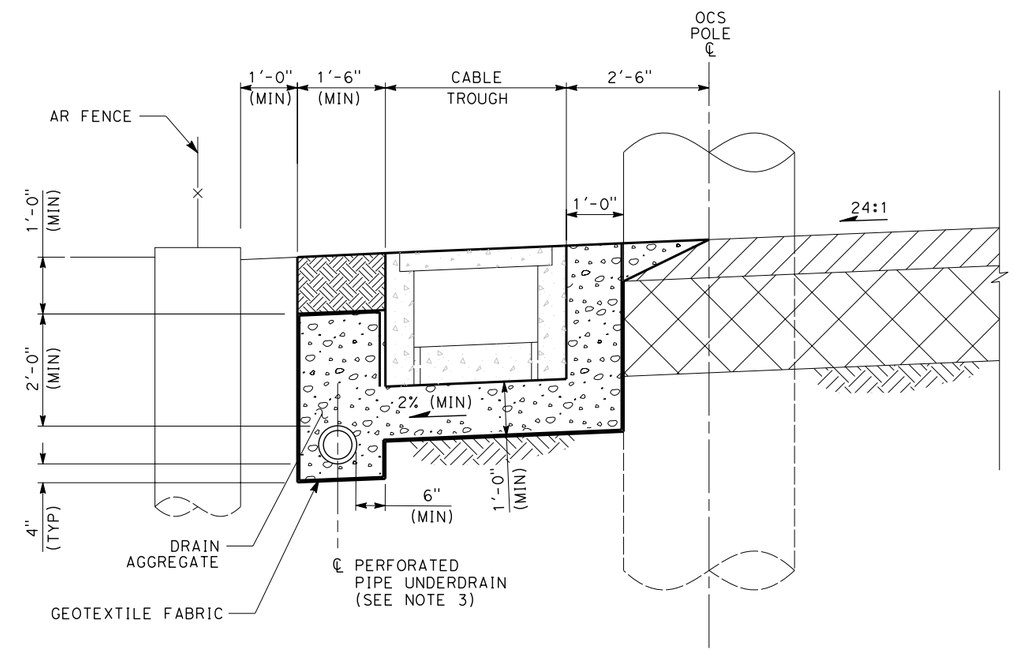
TYPICAL SECTION
AT GRADE TRACK OPEN DRAINAGE SYSTEM



TYPICAL SECTION
AT GRADE TRACK CLOSED DRAINAGE SYSTEM

NOTES:

1. TRACK AND SYSTEMS ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE CONTROL POINT (CP) IS THE INTERSECTION OF THE CENTERLINE OF TRACK AND THE TOP OF THE RAIL, FOR SUPERELEVATED TRACK SECTIONS THE CP IS THE INTERSECTION OF THE CENTERLINE OF THE TRACK AND THE TOP OF THE LOW RAIL.
3. TRACK DRAINAGE SYSTEM SHALL BE CONNECTED AND DISCHARGE TO THE LOCAL STORM DRAIN SYSTEM.
4. REFER TO DRAINAGE DRAWING "DITCH DETAILS".



DETAIL 1/-
NO SCALE

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY K. SISTLA
DRAWN BY V. HUANTE
CHECKED BY A. ABTAHI
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
DRAINAGE DIRECTIVE

AT-GRADE TRACK
DRAINAGE SYSTEM

CONTRACT NO.
DRAWING NO. DD-CD-003
SCALE NO SCALE
SHEET NO.

03/08/2012 RFP HSR 11-16

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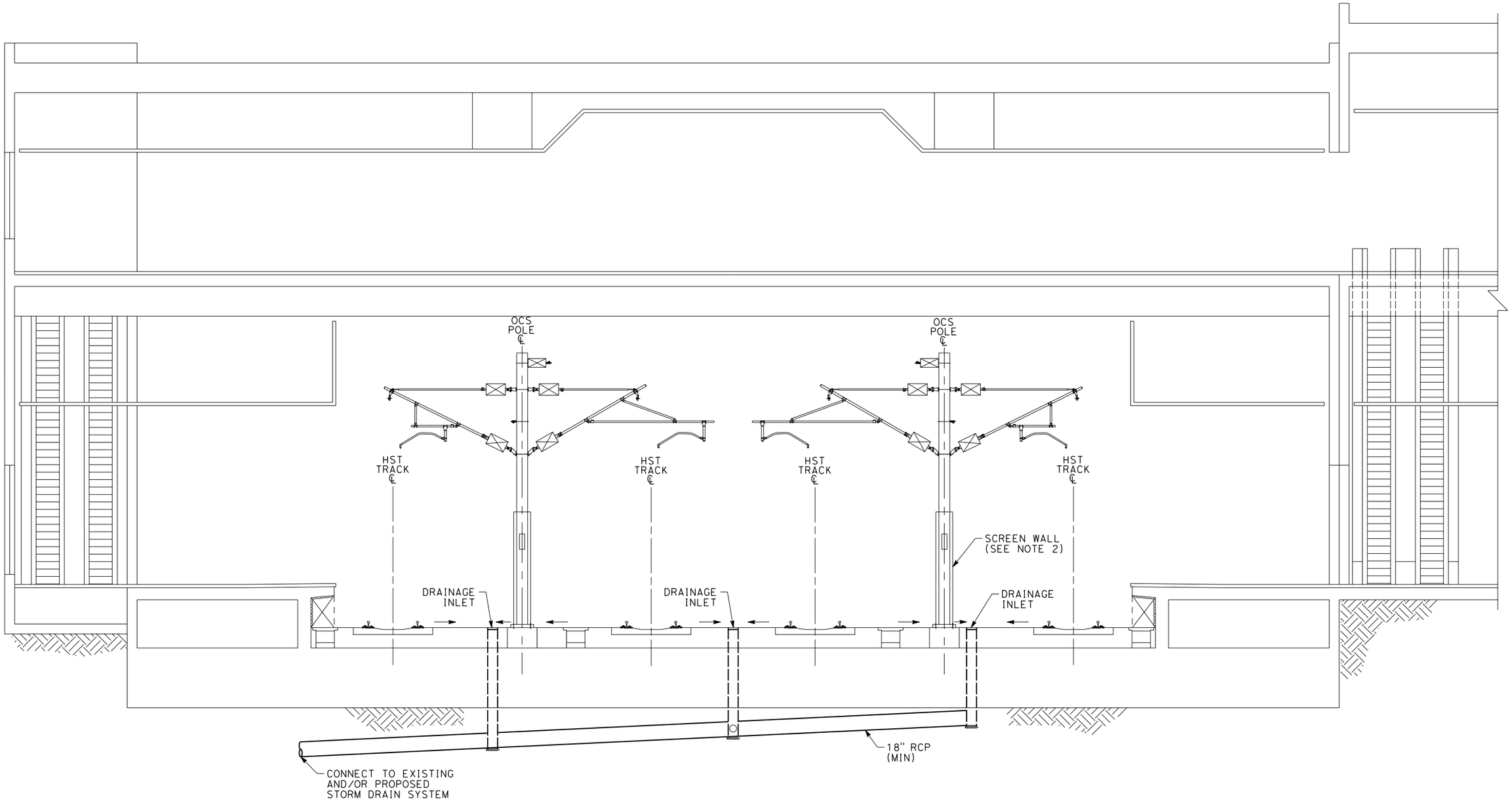
NOTES:

1. TRACK, SYSTEMS AND STRUCTURES ARE SCHEMATIC AN[DO NOT REPRESENT DESIGN.
2. PROVIDE DRAIN SLOTS UNDER SCREEN WALL FOR DRAINAGE. INLETS SHALL BE AT THE LOW POINT AND UNDER THE SCREEN WALL.



DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY K. SISTLA
DRAWN BY V. HUANTE
CHECKED BY A. ABTAHI
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
DRAINAGE DIRECTIVE

AT-GRADE STATION PLATFORM DRAINAGE SYSTEM

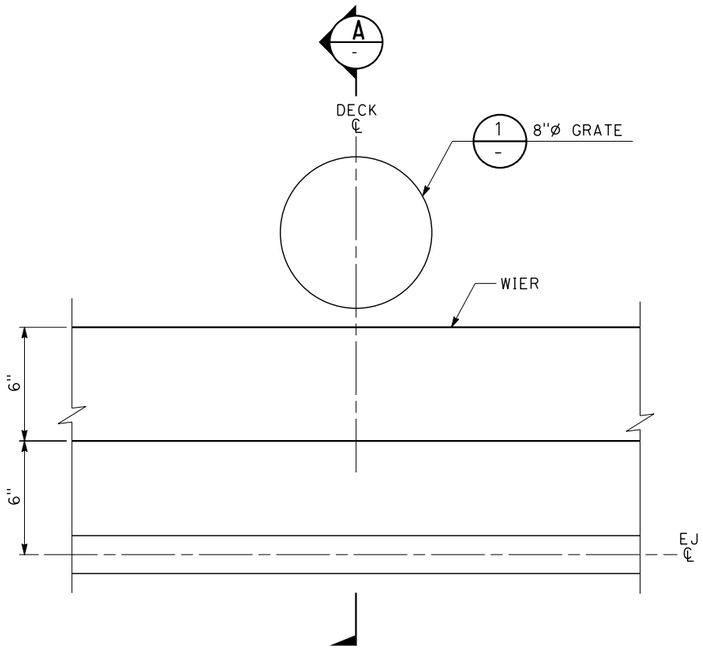
CONTRACT NO.
DRAWING NO. DD-CD-004
SCALE NO SCALE
SHEET NO.

03/08/2012 RFP HSR 11-16

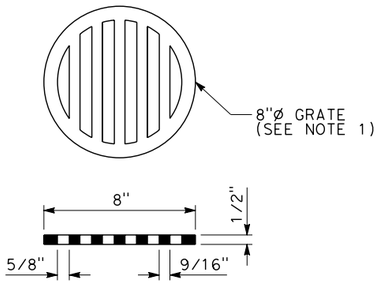
huante 2/29/2012 8:27:29 AM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Drainage DD\DD-CD-004.dgn

NOTES:

1. DRAIN GRATES SHALL BE SECURELY CONNECTED TO THE INLET.



PLAN
DRAINAGE INLET ON AERIAL STRUCTURE DECK
NO SCALE



DETAIL 1 -
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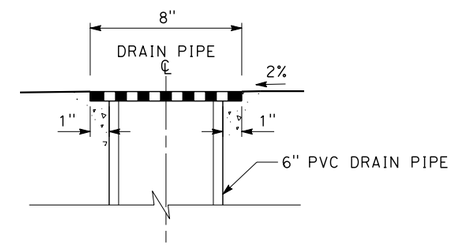
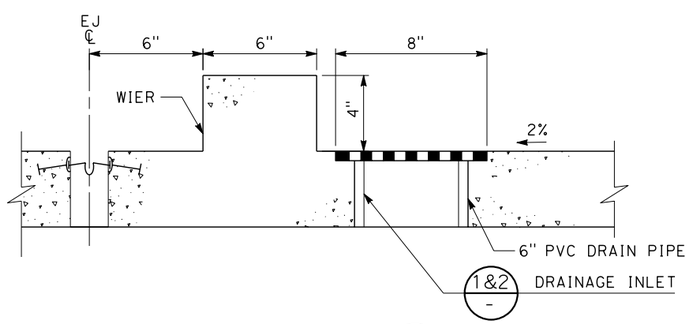
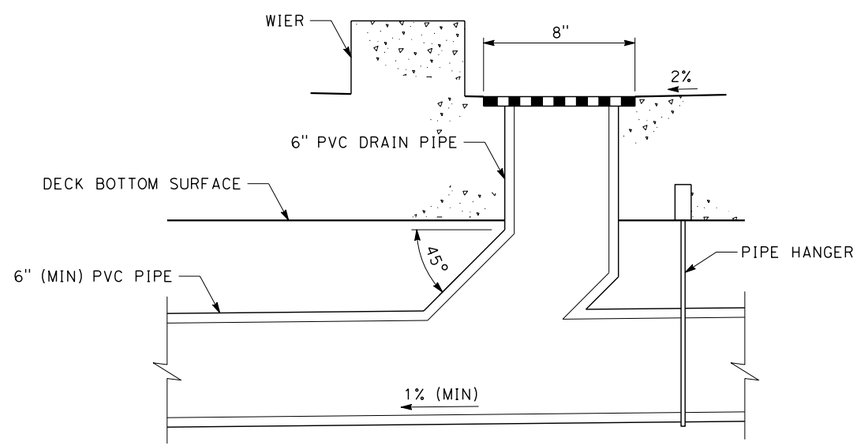


DETAIL 2 -
VERTICAL INLET
NO SCALE



SECTION A -
NO SCALE



DETAIL 3 -
45° ANGLE INLET
NO SCALE

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY K. SISTLA
DRAWN BY T. DOUNG
CHECKED BY A. ABTAHI
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
DRAINAGE DIRECTIVE

AERIAL STRUCTURE BRIDGE DECK
DRAINAGE INLET DETAIL

CONTRACT NO.
DRAWING NO. DD-CD-005
SCALE NO SCALE
SHEET NO.

03/08/2012 RFP HSR 11-16

huante 2/29/2012 8:27:31 AM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Drainage DD\DD-CD-005.dgn

California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16

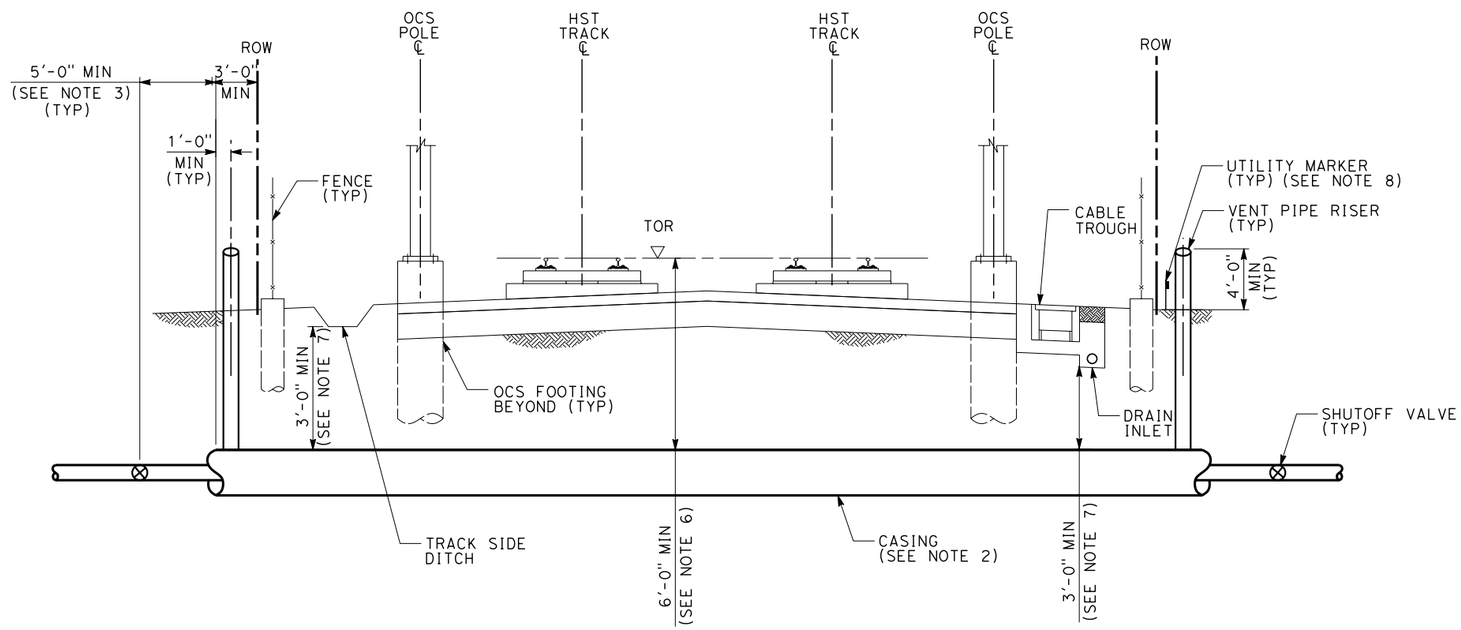
Directive Drawings

Utility

03/08/2012 RFP HSR 11-16

NOTES:

1. TRACK, SYSTEMS, DRAINAGE, AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR ADDITIONAL REQUIREMENTS, SEE AREMA MANUAL.
3. SHUTOFF VALVE MUST BE ACCESSIBLE FROM OUTSIDE THE RIGHT OF WAY. IT MAY NOT BE REQUIRED ON BOTH SIDES.
4. THE CASING SHALL CONTINUE 3 FEET BEYOND THE RIGHT OF WAY.
5. TRANSVERSE UTILITIES SHALL BE LOCATED AWAY FROM MANHOLES, OCS FOOTINGS, AND OTHER HSR SUBSURFACE ELEMENTS.
6. MINIMUM CLEARANCE FOR GAS TRANSMISSION PIPELINE CROSSING SHALL BE 10'-6" BELOW TOP OF RAIL.
7. MINIMUM CLEARANCE FOR UNDERGROUND WIRE LINE CROSSING, OVER 750 VOLTS, SHALL BE 4'-0" AND FOR GAS TRANSMISSION PIPELINE CROSSING SHALL BE 6'-0" BELOW DRAINAGE FACILITIES.
8. UTILITY MARKER TO INDICATE LOCATION OF UTILITY CROSSING AT RIGHT-OF-WAY.



5 0 5 10
1"=5'

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY H. NGUYEN
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE

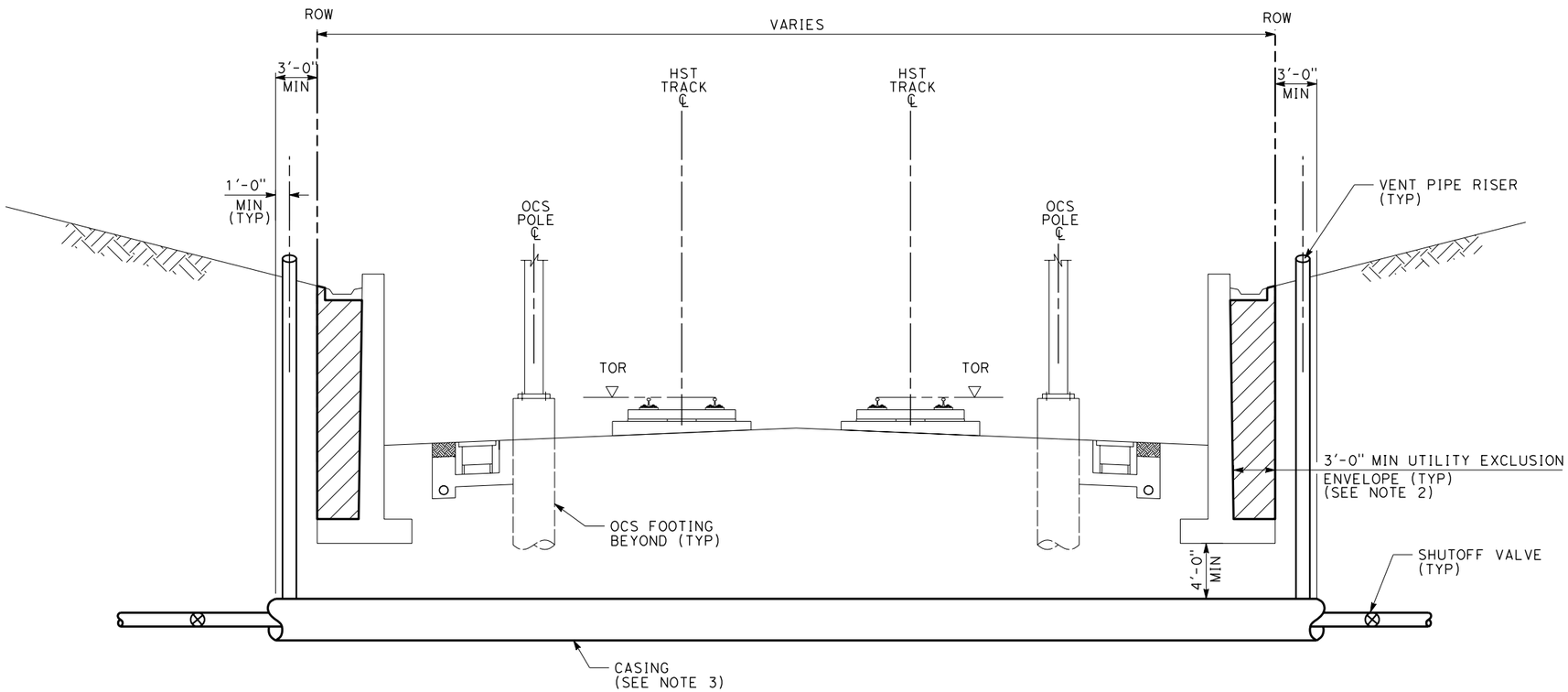
UTILITY CROSSING CLEARANCES AT GRADE

CONTRACT NO.
DRAWING NO. DD-UT-001
SCALE AS SHOWN
SHEET NO.

huante 2/23/2012 8:52:52 AM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Utilities-DD\DD-UT-001.dgn

NOTES:

1. TRACK, SYSTEMS, DRAINAGE, AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. NO UTILITIES ABOVE THE WALL FOOTINGS.
3. FOR ADDITIONAL REQUIREMENTS, SEE AREMA MANUAL.
4. TRANSVERSE UTILITIES SHALL BE LOCATED AWAY FROM MANHOLES, OCS FOOTINGS, AND OTHER HSR SUBSURFACE ELEMENTS.



5 0 5 10
1"=5'

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY D. SO
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE

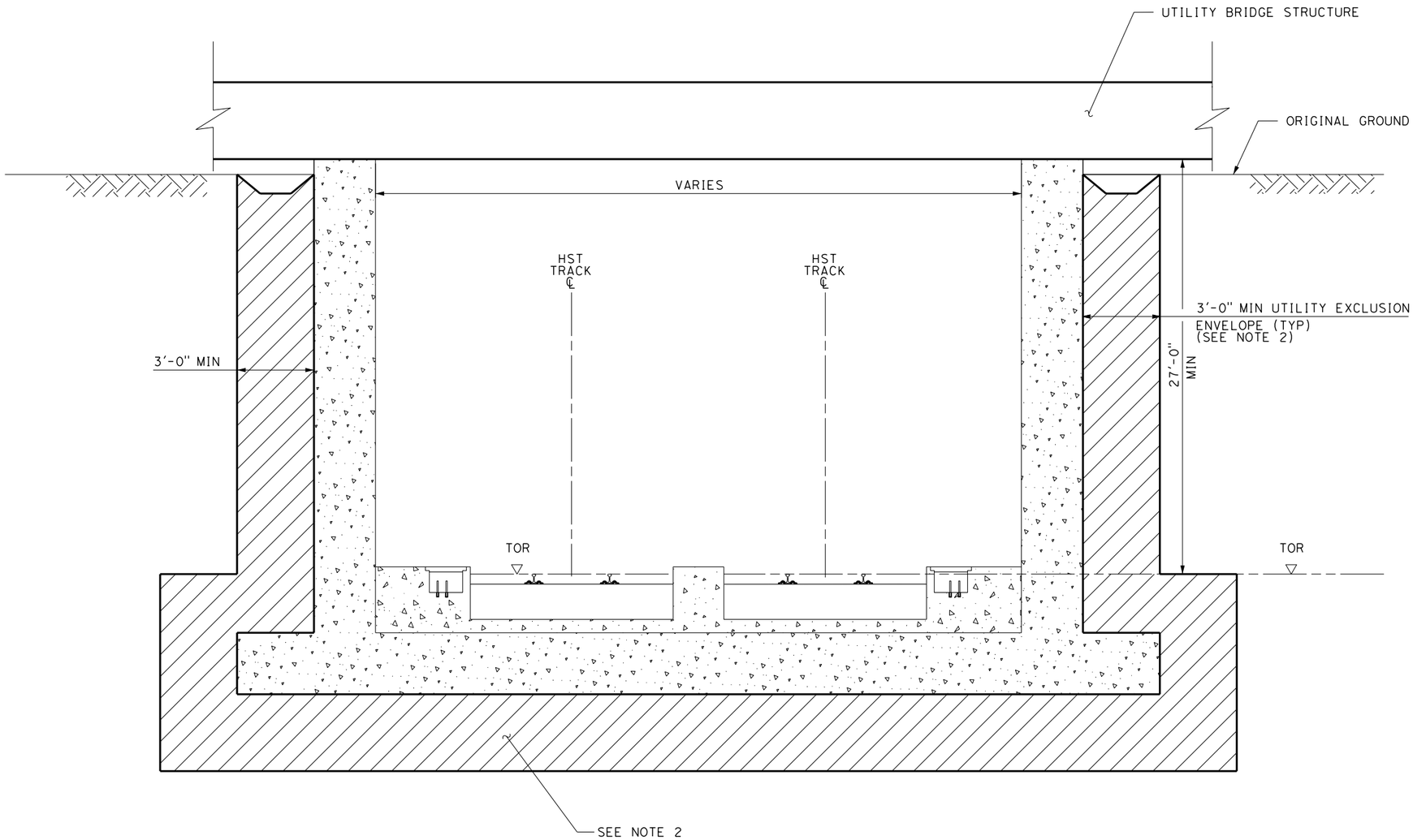
UTILITIES CROSSING CLEARANCES
RETAINED CUT TRENCH

CONTRACT NO.
DRAWING NO. DD-UT-002
SCALE AS SHOWN
SHEET NO.

huante 2/22/2012 10:14:32 AM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Utilities-DD\DD-UT-002.dgn

NOTE:

1. TRACK, SYSTEMS, DRAINAGE, AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. NO UTILITIES ABOVE THE WALL FOOTINGS AND TRENCH DEEPER THAN 8'-0" FROM ORIGINAL GROUND.



4 0 4 8
1/4"=1'-0"

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY V. HUANTE
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE

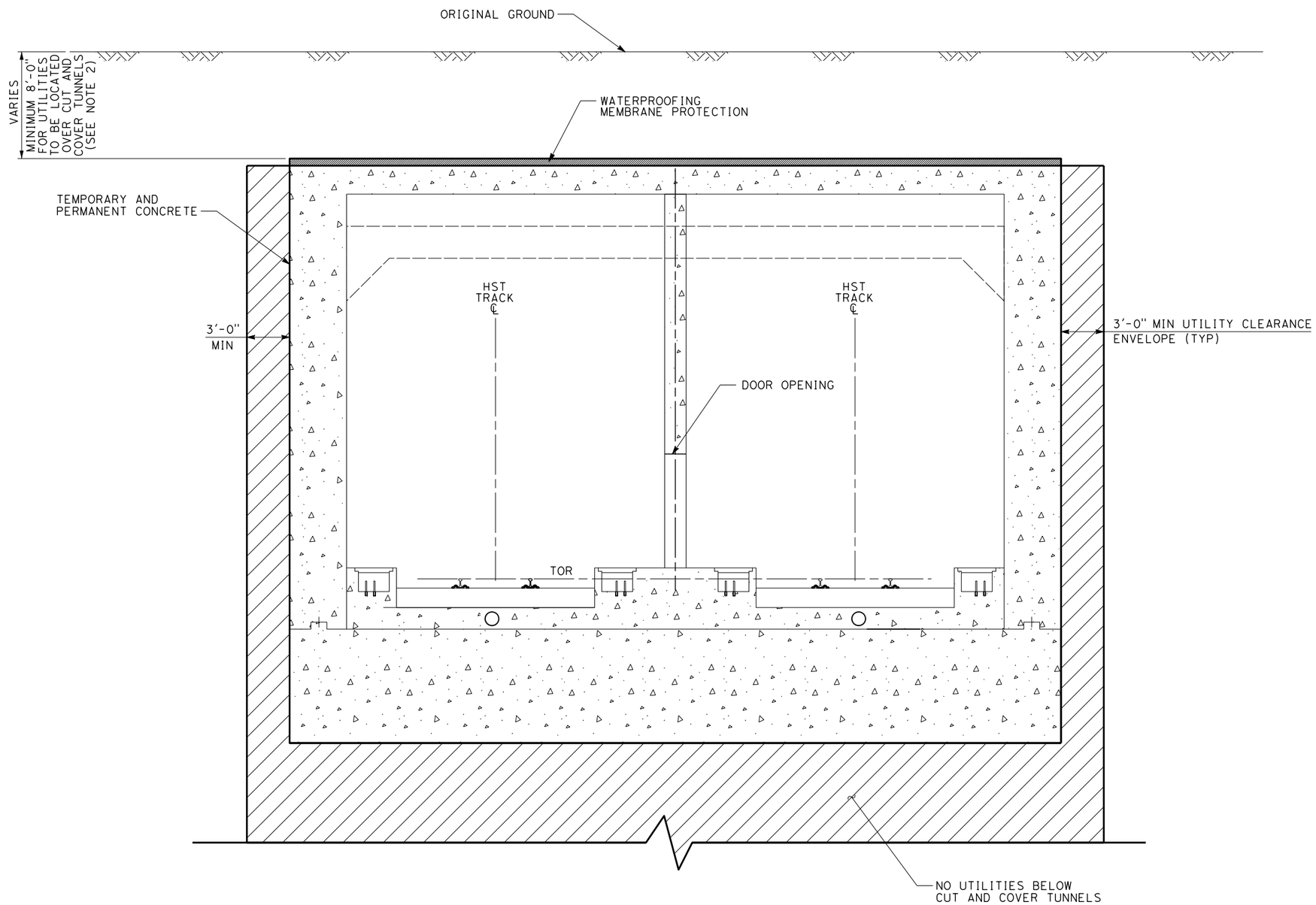
UTILITY CROSSING CLEARANCES
TRENCH

CONTRACT NO.
DRAWING NO. DD-UT-003
SCALE AS SHOWN
SHEET NO.

huante 2/17/2012 1:17:55 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Utilities-DD\DD-UT-003.dgn

NOTES:

1. TRACK, SYSTEMS, DRAINAGE AND STRUCTURES ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. BOTTOM OF UTILITY PIPE OR CASING SHALL BE A MINIMUM OF 12 INCHES ABOVE THE WATERPOOFING MEMBRANE.



4 0 4 8
1/4"=1'-0"

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY T. DOUNG
CHECKED BY S. MILITELLO
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE

UTILITY CROSSING CLEARANCES
CUT AND COVER TUNNELS

CONTRACT NO.
DRAWING NO. DD-UT-004
SCALE AS SHOWN
SHEET NO.

huante 2/17/2012 10:05:37 AM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Utilities-DD\DD-UT-004.dgn

California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16

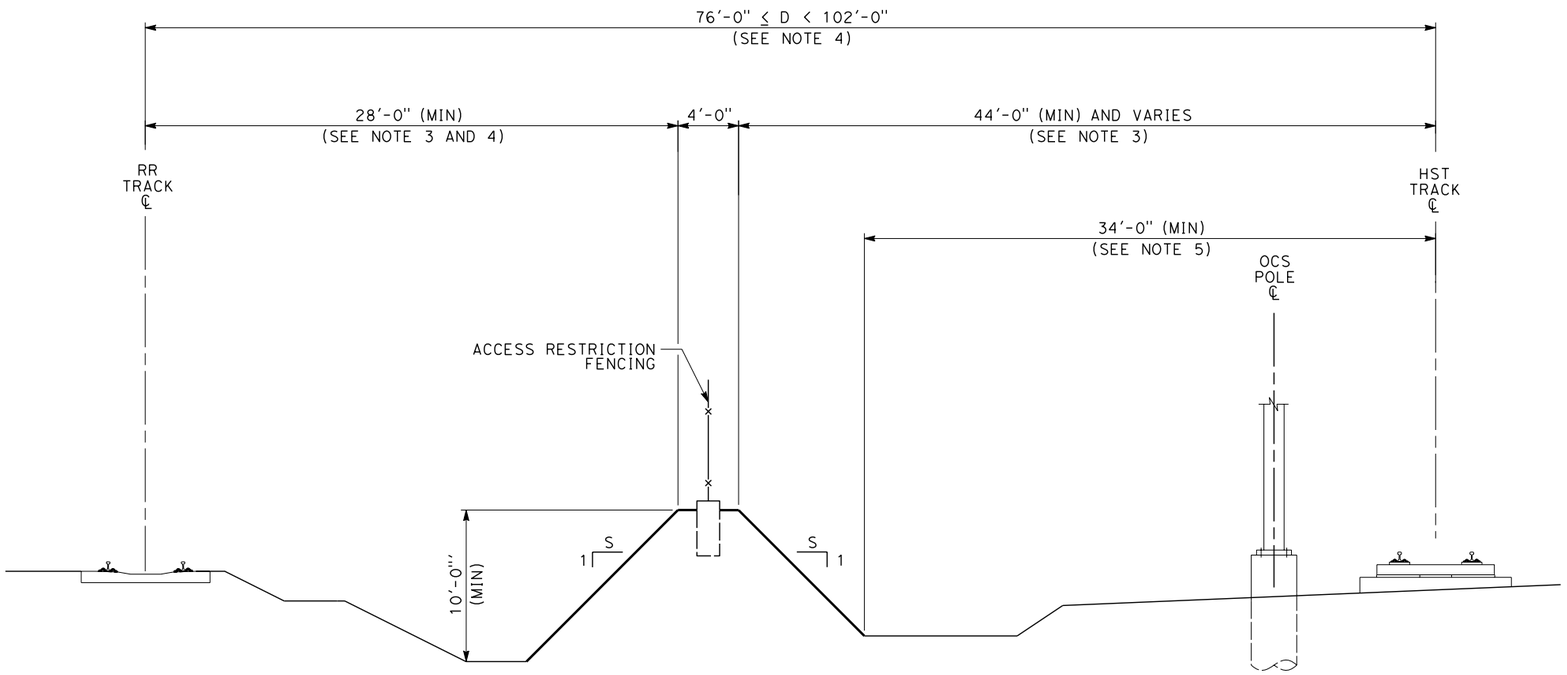
Directive Drawings

Intrusion Protection

03/08/2012 RFP HSR 11-16

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SIDE SLOPES DETERMINED THROUGH SLOPE STABILITY ANALYSIS. FOR COMMON EARTH MATERIAL ONLY, USE 2:1 SIDE SLOPES.
3. MINIMUM DISTANCE IS BASED ON S=1.
4. OFFSET TO TRACK AND LOCATION OF INTRUSION PROTECTION BARRIER WITHIN CONVENTIONAL RAILROAD RIGHT-OF-WAY REQUIRES APPROVAL FROM THE RAILROAD.
5. MINIMUM DISTANCE TO BERM INCLUDES SPACE FOR DRAINAGE DITCH BETWEEN THE BERM AND TRACK BED TOE OF SLOPE.



EARTHWORK BERM

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY T. DOUNG
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

EARTHWORK BERM
RAILROAD ADJACENT TO HST

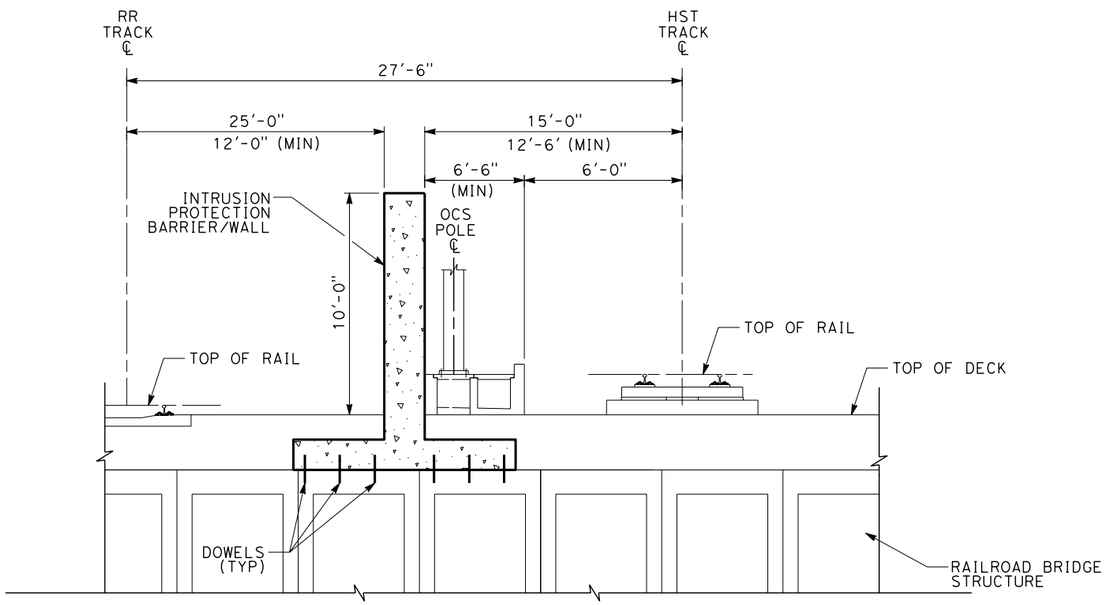
CONTRACT NO.
DRAWING NO. DD-IP-001
SCALE NO SCALE
SHEET NO.

03/08/2012 RFP HSR 11-16

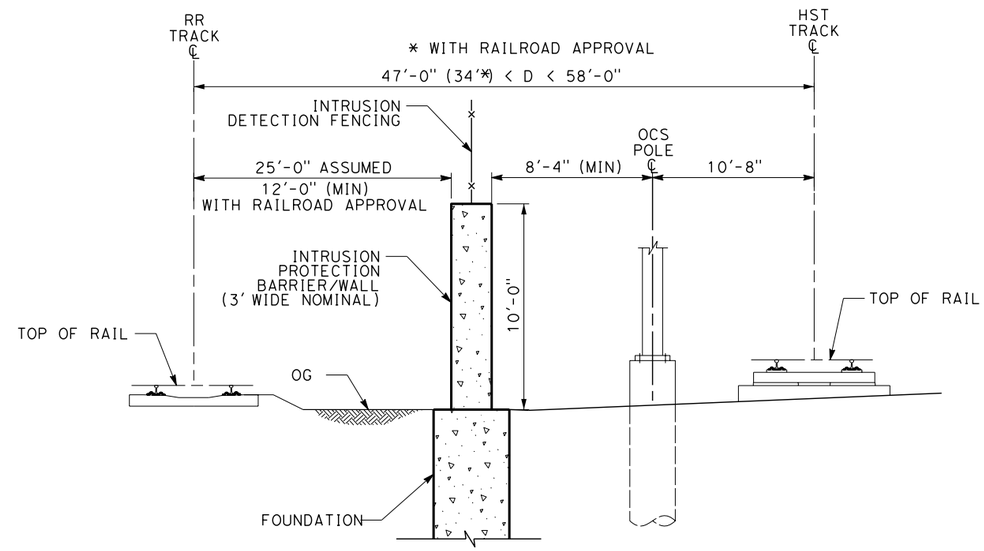
huante 2/29/2012 4:44:56 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Intrusion Protection DD\DD-IP-001.dgn

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.



ELEVATED SHARED CORRIDOR



AT-GRADE SHARED CORRIDOR

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY T. DOUNG
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

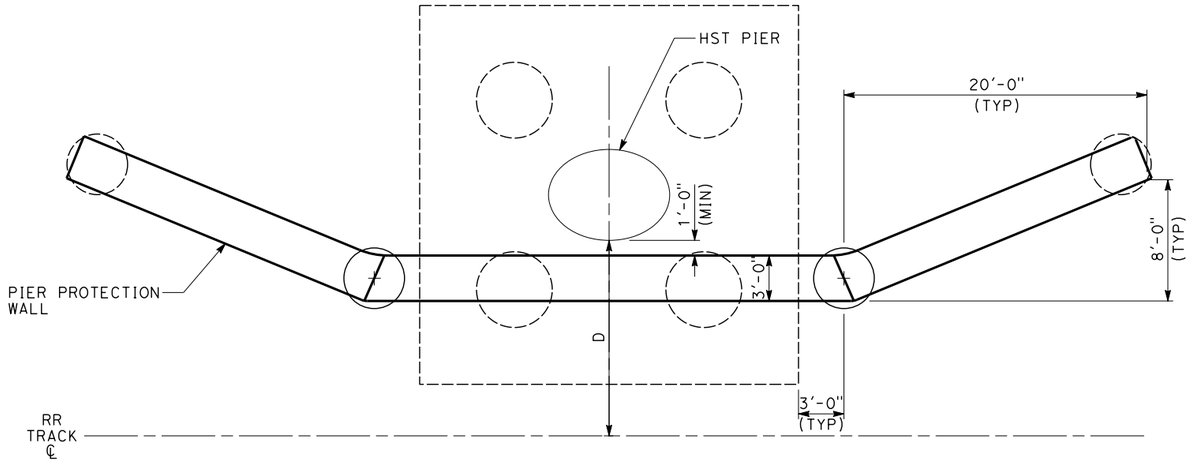
BARRIERS IN SHARED CORRIDOR

CONTRACT NO.
DRAWING NO. DD-IP-002
SCALE NO SCALE
SHEET NO.

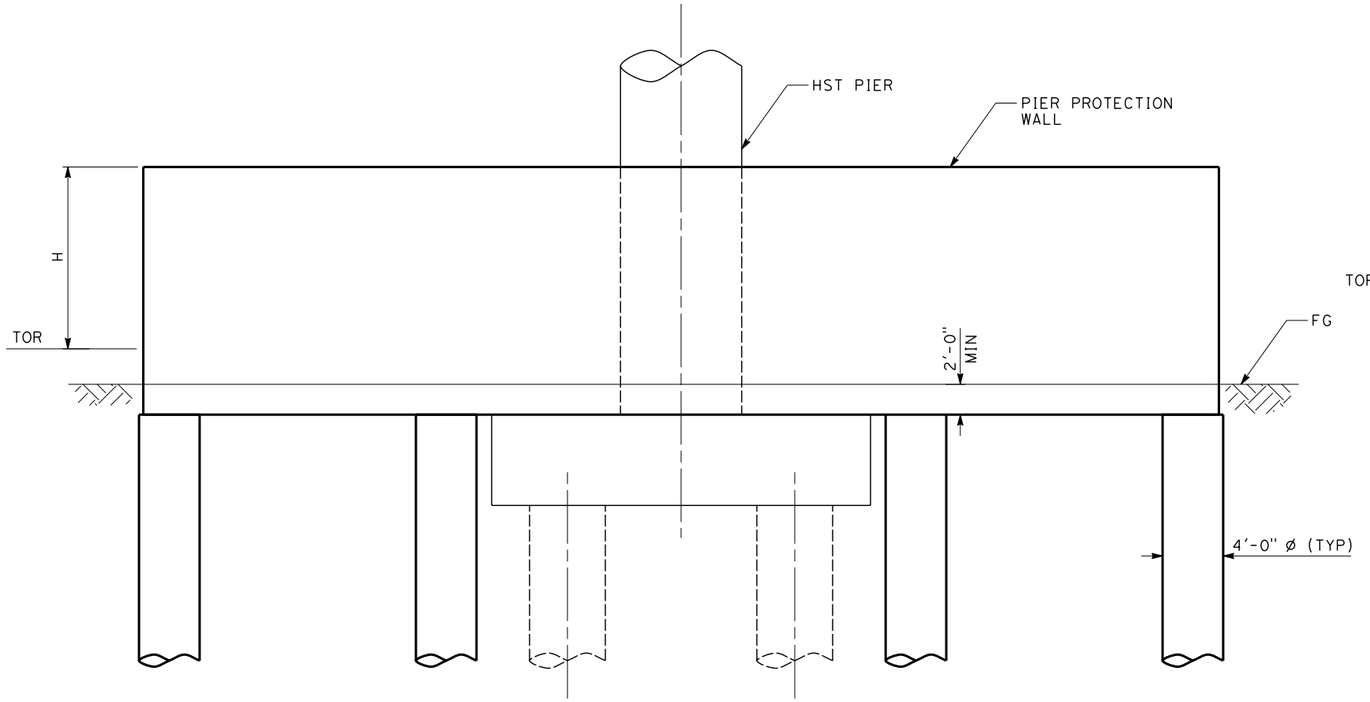
huante 2/29/2012 4:45:26 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Intrusion Protection DD\DD-IP-002.dgn

NOTES:

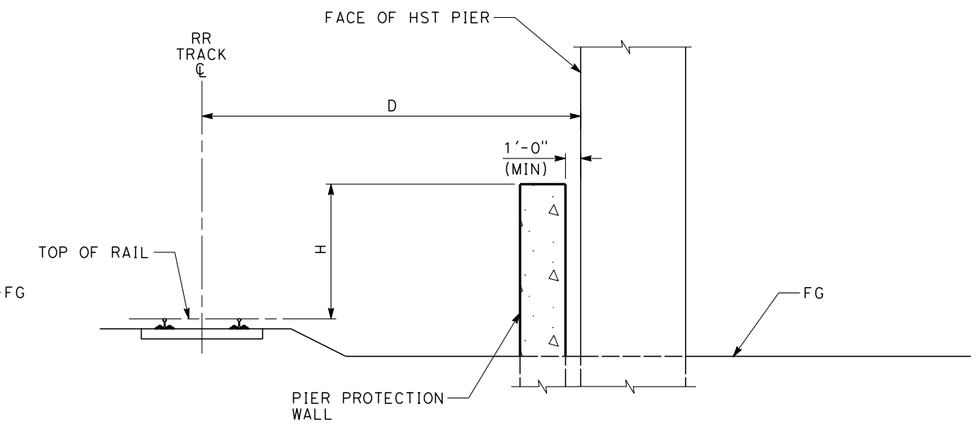
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. PIER PROTECTION WALL MAY BE REQUIRED IF CLEARANCE FROM FACE OF HST STRUCTURE TO NEAREST RR TRACK CENTERLINE IS LESS THAN 25 FEET.
3. LOCATION WHERE BARRIER IS REQUIRED SHALL BE DETERMINED THROUGH SITE SPECIFIC HAZARD ANALYSES.



PLAN



ELEVATION



HST STRUCTURE PIER - PROTECTION WALL

CLEARANCE (D)	WALL HEIGHT ABOVE TOP OF RAIL (H)
≥ 25 FT	N/A
12 FT - 25 FT	6 FT
≤ 12 FT	12 FT

5 0 5 10
1"=5'

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY T. DOUNG
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

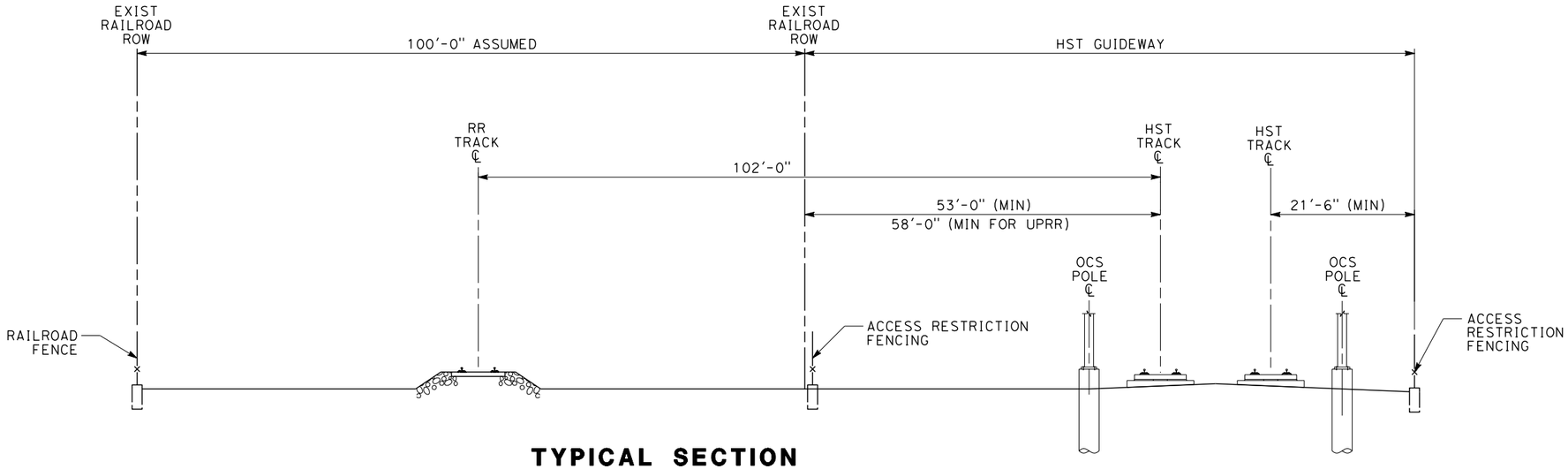
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

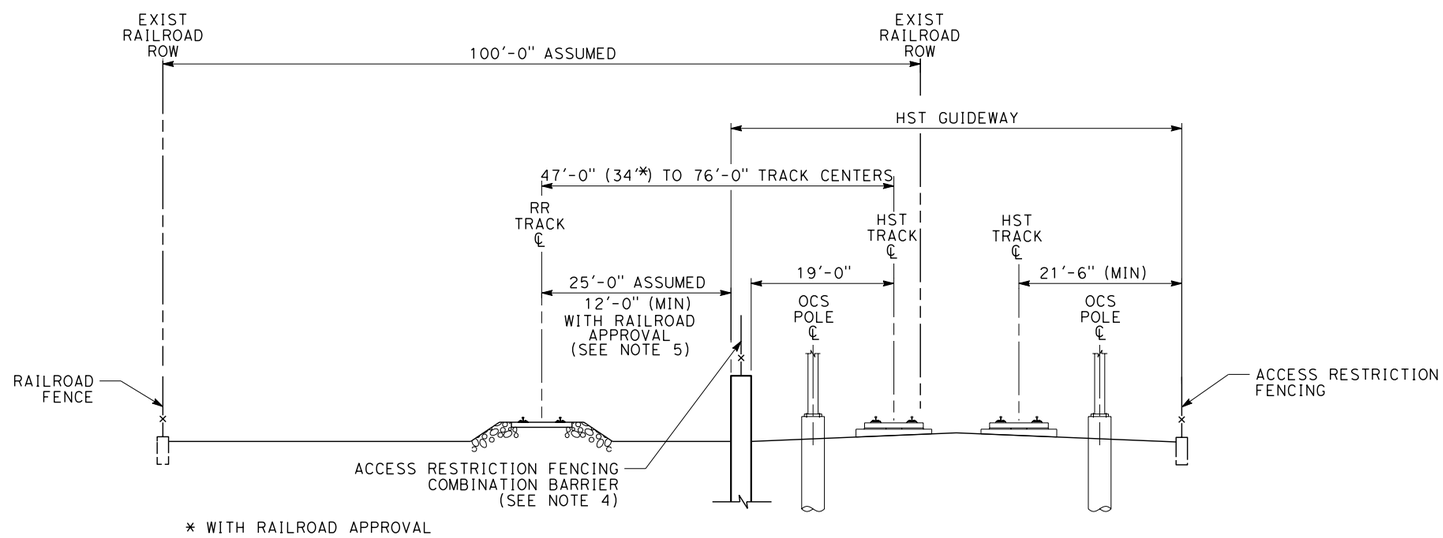
HST PIER PROTECTION
IN RAILROAD RIGHT OF WAY

CONTRACT NO.
DRAWING NO. DD-IP-003
SCALE AS SHOWN
SHEET NO.

huante 2/29/2012 4:46:51 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Intrusion Protection DD\DD-IP-003.dgn



TYPICAL SECTION
ADJACENT CORRIDOR
NO INTRUSION PROTECTION REQUIRED



* WITH RAILROAD APPROVAL

TYPICAL SECTION
IN SHARED CORRIDOR
INTRUSION PROTECTION - CONCRETE BARRIER

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. RIGHT-OF-WAY REQUIRED FOR THE HIGH-SPEED RAIL GUIDEWAY WILL DEPEND UPON CONDITIONS ALONG THE ALIGNMENT, INCLUDING TERRAIN, CUT/FILL SLOPES, RETAINING STRUCTURES, AND REQUIRED ACCESS.
3. ASSUMES RAILROAD CENTERLINE IS 50 FEET FROM EXISTING RAILROAD RIGHT-OF-WAY.
4. AR FENCE COMBINATION BARRIER SHALL BE INSTALLED INSIDE AUTHORITY RIGHT-OF-WAY.
5. OFFSET TO TRACK AND LOCATION OF INTRUSION PROTECTION BARRIER WITHIN CONVENTIONAL RAILROAD RIGHT-OF-WAY REQUIRES APPROVAL FROM THE RAILROAD.

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY T. DOUNG
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

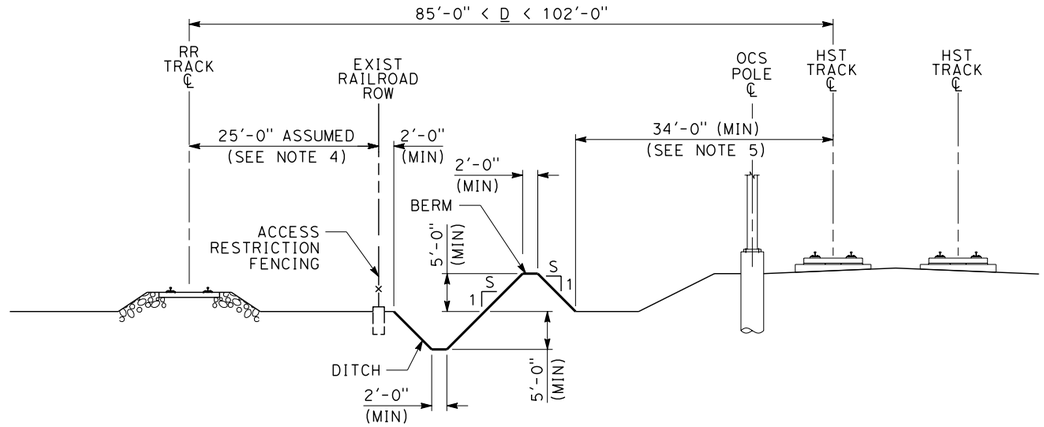
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

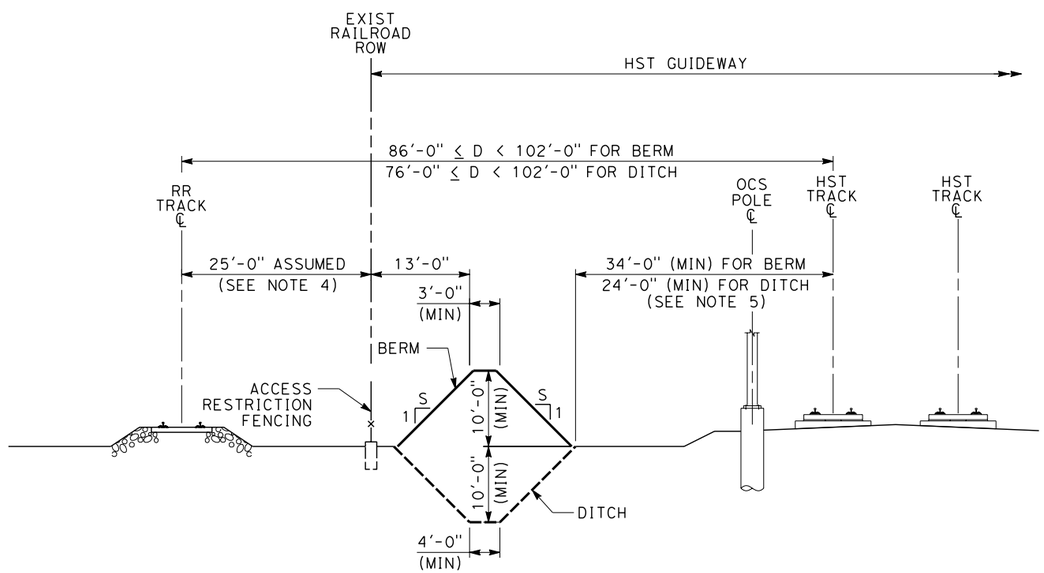
IN SHARED AND ADJACENT CORRIDOR
AT-GRADE

CONTRACT NO.
DRAWING NO. DD-IP-004
SCALE NO SCALE
SHEET NO.

huante 2/29/2012 4:47:40 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Intrusion Protection DD\DD-IP-004.dgn



TYPICAL SECTION
EARTHEN BERM AND DITCH



TYPICAL SECTION
EARTHEN BERM OR DITCH

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SIDE SLOPES (S/1) DETERMINED THROUGH SLOPE STABILITY ANALYSIS. FOR COMMON EARTH MATERIAL ONLY, USE 2:1 SIDE SLOPES.
3. MINIMUM DISTANCE IS BASED ON S=1.
4. OFFSET TO TRACK AND LOCATION OF INTRUSION PROTECTION BARRIER WITHIN CONVENTIONAL RAILROAD RIGHT-OF-WAY REQUIRES APPROVAL FROM THE RAILROAD.
5. MINIMUM DISTANCE TO BERM INCLUDES SPACE FOR DRAINAGE DITCH BETWEEN THE BERM AND TRACK BED TOE OF SLOPE.

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY T. DOUNG
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

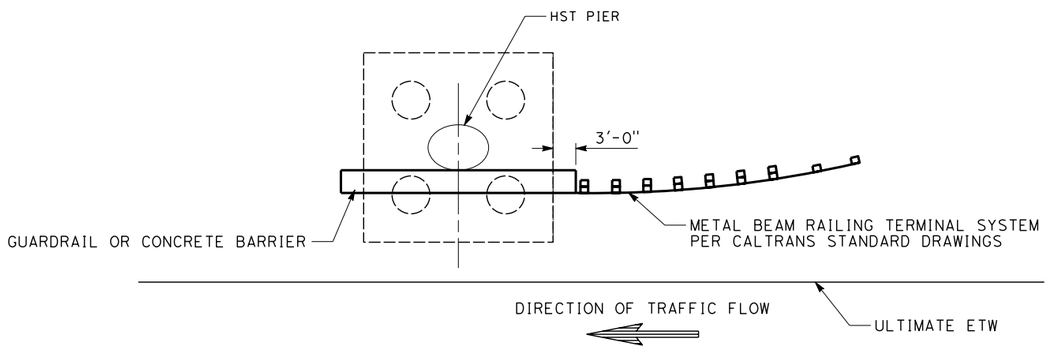
AT-GRADE BERM OR DITCH ON HST GUIDEWAY
RAILROAD ADJACENT TO HST

CONTRACT NO.
DRAWING NO. DD-IP-005
SCALE NO SCALE
SHEET NO.

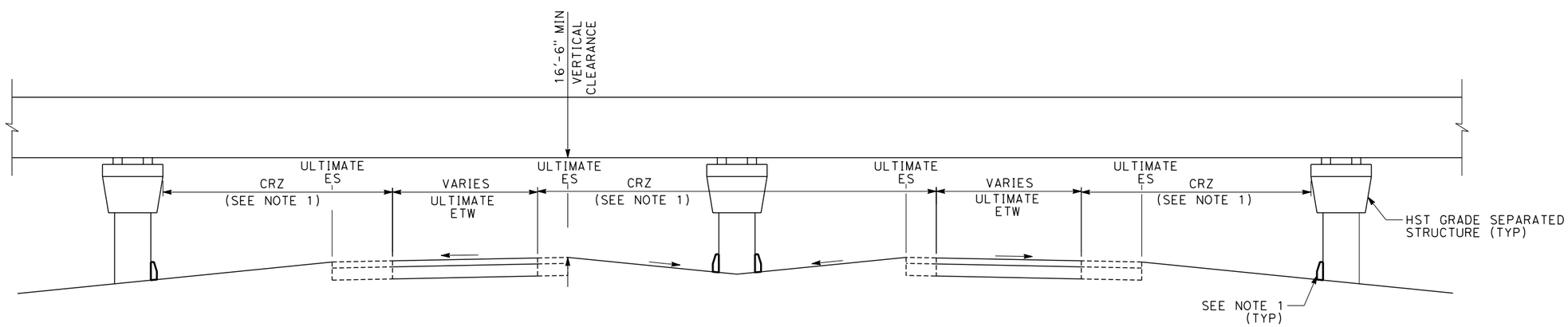
huante 2/29/2012 4:48:31 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Intrusion Protection DD\DD-IP-005.dgn

NOTES:

1. METAL BEAM GUARDRAIL OR CONCRETE BARRIER MAY BE REQUIRED AT HST FIXED OBJECT IF THE DISTANCE FROM ULTIMATE ETW TO HST FIXED OBJECT IS LESS THAN 30 FEET. REFER TO CHAPTER 7 OF CALTRANS TRAFFIC MANUAL. IF METAL BEAM GUARDRAIL IS USED, IT SHALL BE 3 FEET FROM FACE OF PIER. REFER TO CALTRANS STANDARD PLAN NSP A77C5 FOR VEGETATION CONTROL.



PLAN



HST GRADE SEPARATED STRUCTURE OVER HIGHWAY/ROADWAY WITH MEDIAN

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY T. DOUNG
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

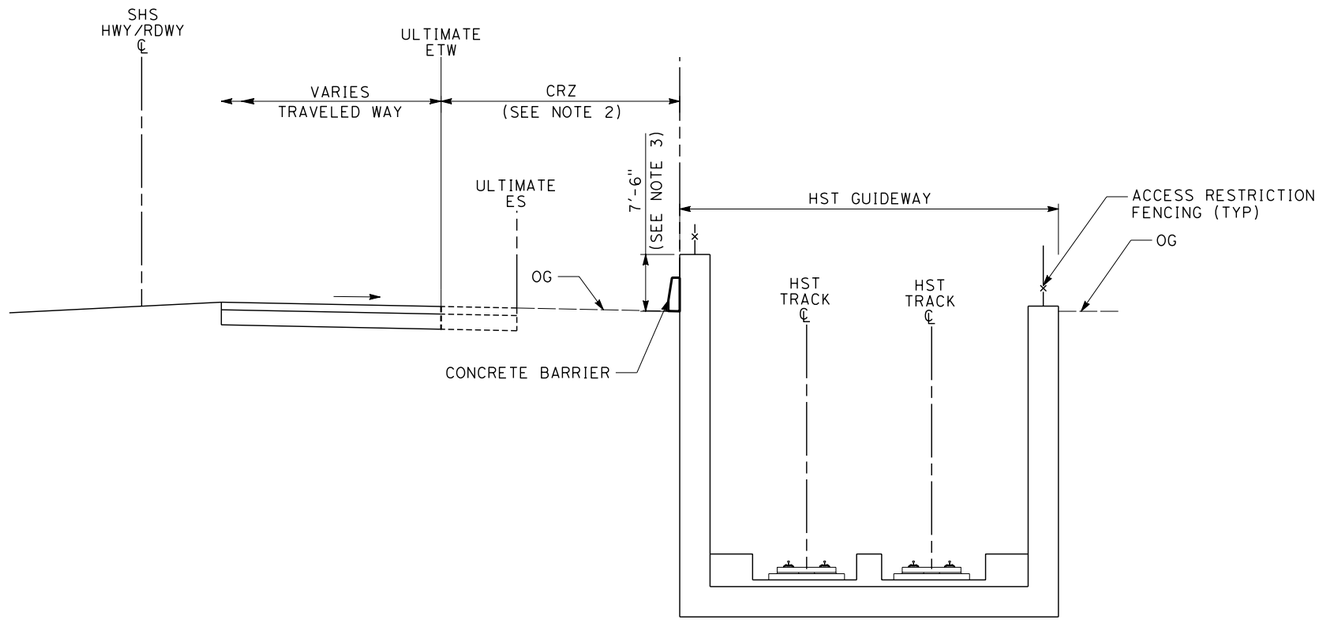
HST PIER PROTECTION
IN HIGHWAY/ROADWAY RIGHT-OF-WAY

CONTRACT NO.
DRAWING NO. DD-IP-006
SCALE NO SCALE
SHEET NO.

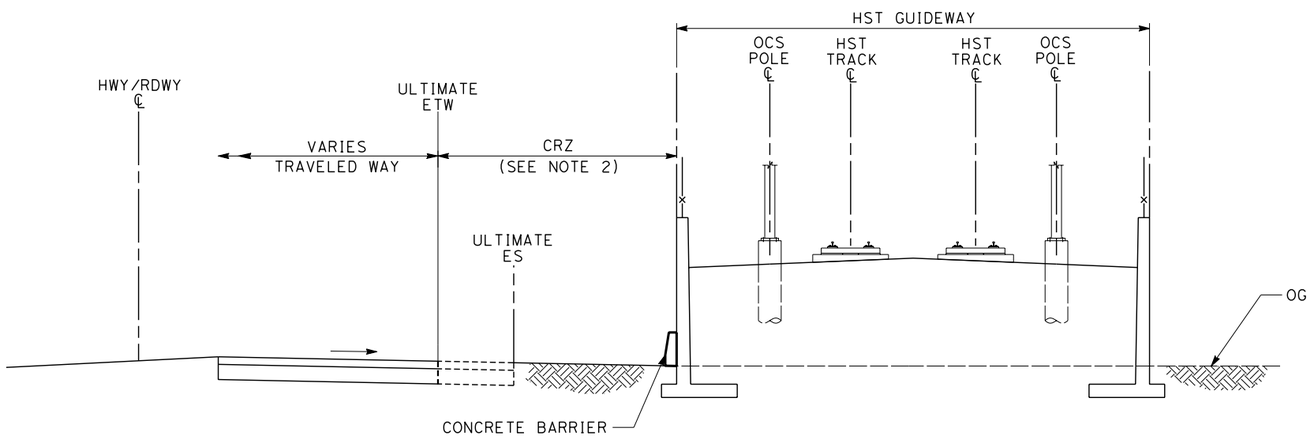
huante 2/29/2012 4:49:08 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Intrusion Protection DD\DD-IP-006.dgn

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SAFETY SHAPE BARRIER SHALL BE INCLUDED IN CONSTRUCTION OF THE WALL IF THE HST WALL IS LESS THAN 52 FEET FROM THE ULTIMATE ETW.
3. FHWA RECOMMENDS 7.5 FEET VERTICAL BARRIER TO CONTAIN HIGH CENTER OF GRAVITY CARGO TRUCKS WITHIN HIGHWAY RIGHT-OF-WAY.



HIGHWAY/ROADWAY AT GRADE ADJACENT TO HST TRENCH



HIGHWAY/ROADWAY AT GRADE ADJACENT TO HST RETAINED FILL

10 0 10 20
1"=10'

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY T. DOUNG
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

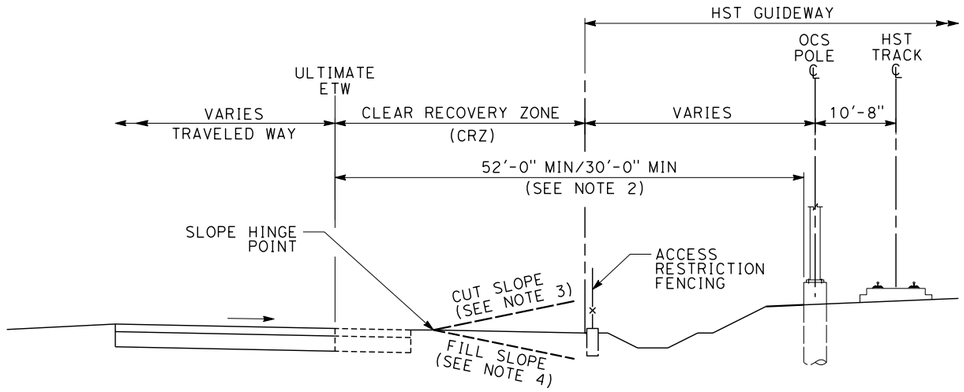
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT INTRUSION PROTECTION DIRECTIVE

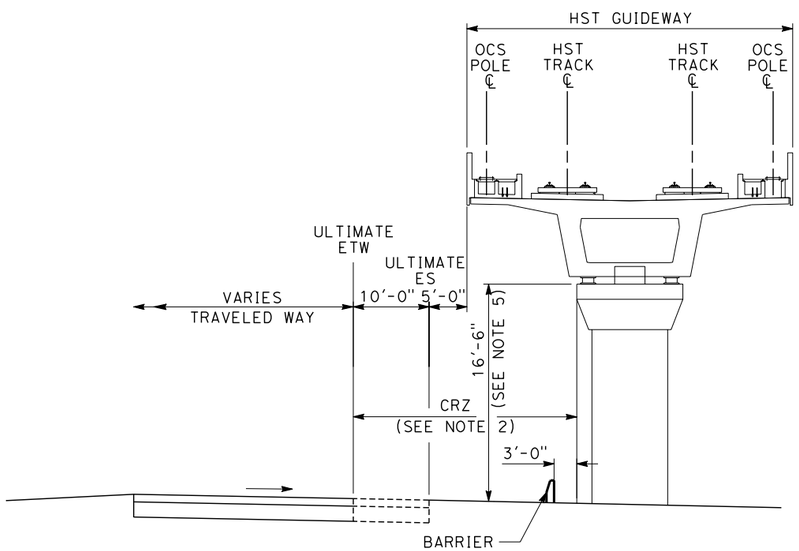
HST TRENCH AND RETAINING WALL PROTECTION

CONTRACT NO.
DRAWING NO. DD-IP-007
SCALE AS SHOWN
SHEET NO.

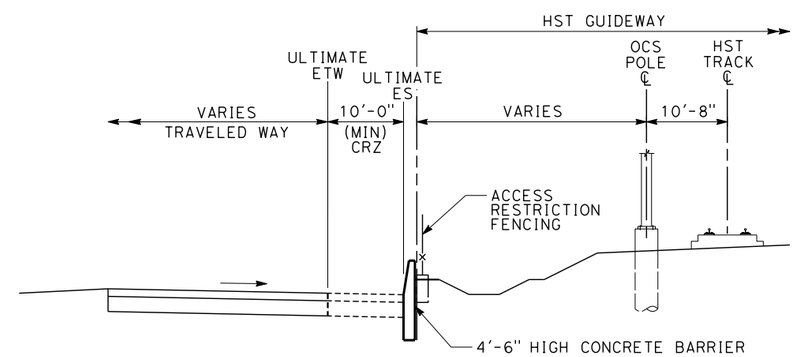
huante 2/24/2012 3:31:04 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Intrusion Protection DD\DD-IP-007.dgn



HST AT GRADE ADJACENT TO HIGHWAY/ROADWAY



HST AERIAL STRUCTURE ADJACENT TO HIGHWAY/ROADWAY



HST AT GRADE ADJACENT TO HIGHWAY/ROADWAY

WITH 10 FEET CLEAR RECOVERY ZONE (CRZ)

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. WHEN HST CORRIDOR IS CONSTRUCTED LONGITUDINALLY TO A FREEWAY, EXPRESSWAY, OR HIGHWAY, METAL BEAM GUARDRAIL OR CONCRETE BARRIER MAY BE REQUIRED AT HST FIXED OBJECT IF THE DISTANCE FROM ULTIMATE ETW TO HST AERIAL STRUCTURE COLUMN, OR ANY HST FIXED OBJECT, IS LESS THAN 52 FEET. IF HST CORRIDOR IS NOT LONGITUDINAL TO A FREEWAY, EXPRESSWAY, OR HIGHWAY, THE CLEARANCE REQUIREMENT TO A HST FIXED OBJECT IS 30 FEET. REFER TO CALTRANS HDM CHAPTER 3 AND CALTRANS TRAFFIC MANUAL CHAPTER 7.
3. IF HEIGHT DIFFERENTIAL AT ROADWAY CUT SLOPE HINGE POINT AND HST ROW FENCE IS GREATER THE 4 FEET, NO GUARDRAIL IS REQUIRED. A 4 FEET HEIGHT DIFFERENTIAL IN A 4:1 CUT SLOPE PROVIDES A GREATER EFFECTIVE SIDE SLOPE THAN A 7.5 FEET VERTICAL BARRIER RECOMMENDED BY THE FHWA.
4. IF THE HEIGHT DIFFERENTIAL AT ROADWAY FILL HINGE POINT AND HSR ROW FENCE WITH A 2:1 SLOPE IS GREATER THAN 10 FT, GUARDRAIL WILL BE REQUIRED AT ROADWAY FILL HINGE POINT (REFER TO CHAPTER 7 OF CALTRANS TRAFFIC MANUAL, FIGURE 7-1 FOR RECOMMENDED PLACEMENT OF GUARDRAIL ALONG EMBANKMENT.
5. IF THE VERTICAL CLEARANCE BETWEEN THE RECOVERY AREA AND THE HST STRUCTURE BENT CAP IS LESS THAN 16.5 FEET, METAL BEAM GUARDRAIL OR CONCRETE BARRIER WILL BE REQUIRED 3 FEET FROM ULTIMATE HIGHWAY EDGE OF SHOULDER.

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ABTAHI
DRAWN BY T. DOUNG
CHECKED BY H. NGUYEN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
INTRUSION PROTECTION DIRECTIVE

ADJACENT TO HIGHWAY/ROADWAY

CONTRACT NO.
DRAWING NO. DD-IP-008
SCALE NO SCALE
SHEET NO.

huante 2/29/2012 4:50:26 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Intrusion Protection DD\DD-IP-008.dgn

California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16

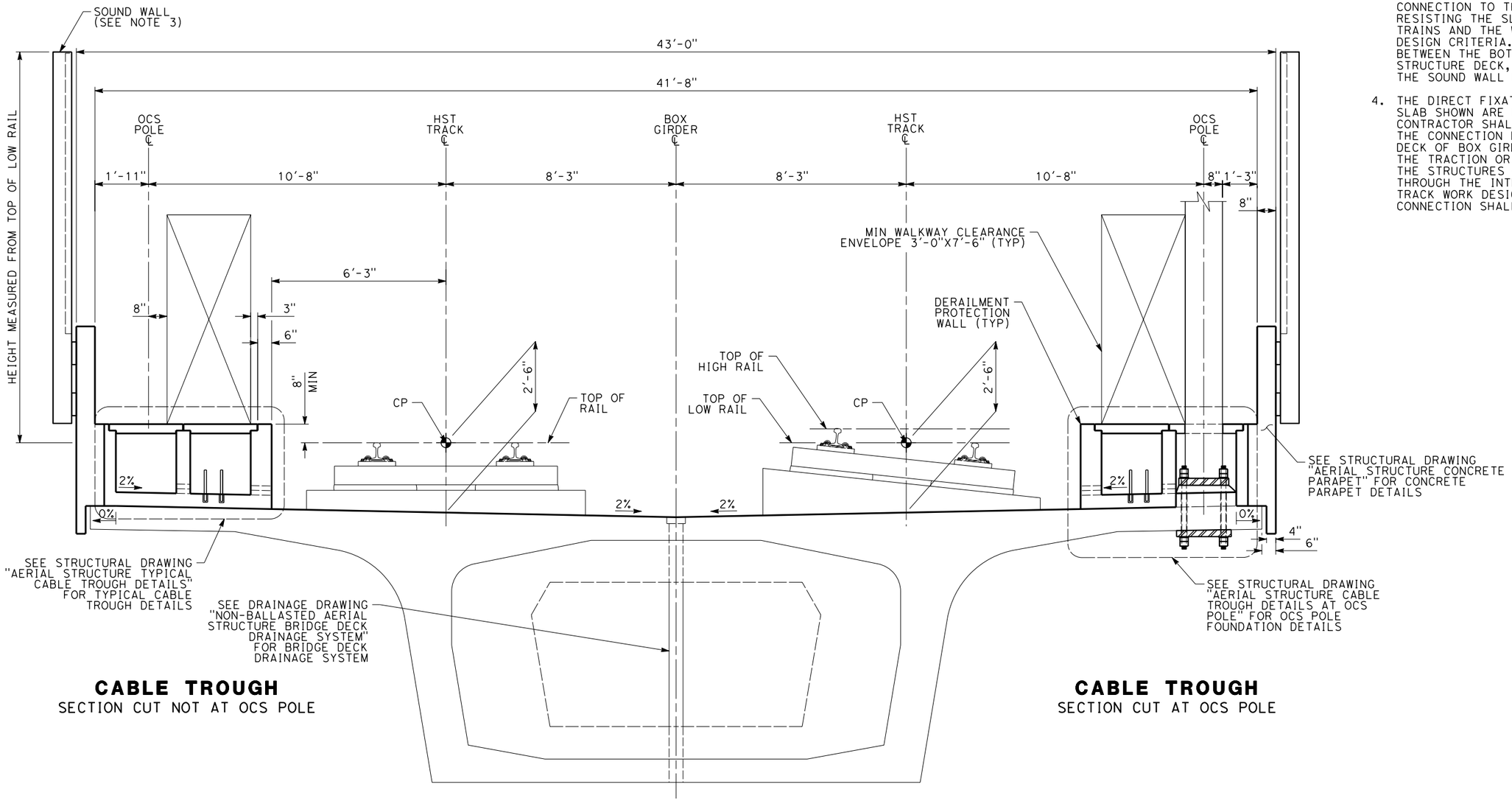
Directive Drawings

Structural

03/08/2012 RFP HSR 11-16

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. ON CURVED ALIGNMENT, THE RELATIVE DIMENSIONS BETWEEN BRIDGE DECK AND BOX GIRDER SHALL BE ADJUSTED PROPERLY. IF A STRAIGHT DECK EDGE IS SELECTED, THE WIDER DECK WIDTH MAY BE REQUIRED.
3. THE HEIGHT OF THE SOUND WALL SHALL BE DETERMINED BASED ON RESULTS FROM THE NOISE ATTENUATION STUDY. THE SOUND WALL ITSELF AND ITS CONNECTION TO THE STRUCTURE SHALL BE CAPABLE OF RESISTING THE SLIPSTREAM EFFECTS FROM PASSING TRAINS AND THE WIND LOADS AS DESCRIBED IN THE DESIGN CRITERIA. NO GAP SHALL BE PERMITTED BETWEEN THE BOTTOM OF SOUND WALL AND THE STRUCTURE DECK, NOR ANY VERTICAL GAPS BETWEEN THE SOUND WALL PANELS.
4. THE DIRECT FIXATION RAIL SYSTEM AND THE TRACK SLAB SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL CONSIDER IN THEIR DESIGN THAT THE CONNECTION BETWEEN THE TRACK SLAB AND TOP DECK OF BOX GIRDER IS CAPABLE OF TRANSFERRING THE TRACTION OR BRAKING FORCES AS DESCRIBED IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA THROUGH THE INTERFACE COORDINATION WITH THE TRACK WORK DESIGNER. ANY EMBEDDED ITEMS OF THIS CONNECTION SHALL BE INSTALLED BY THE CONTRACTOR.



CABLE TROUGH
SECTION CUT NOT AT OCS POLE

CABLE TROUGH
SECTION CUT AT OCS POLE

FOR TANGENT TRACK **FOR SUPERELEVATED TRACK**

2 0 2 4
1/2"=1'-0"

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
DRAWN BY J. GO
CHECKED BY K. PUGASAP
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

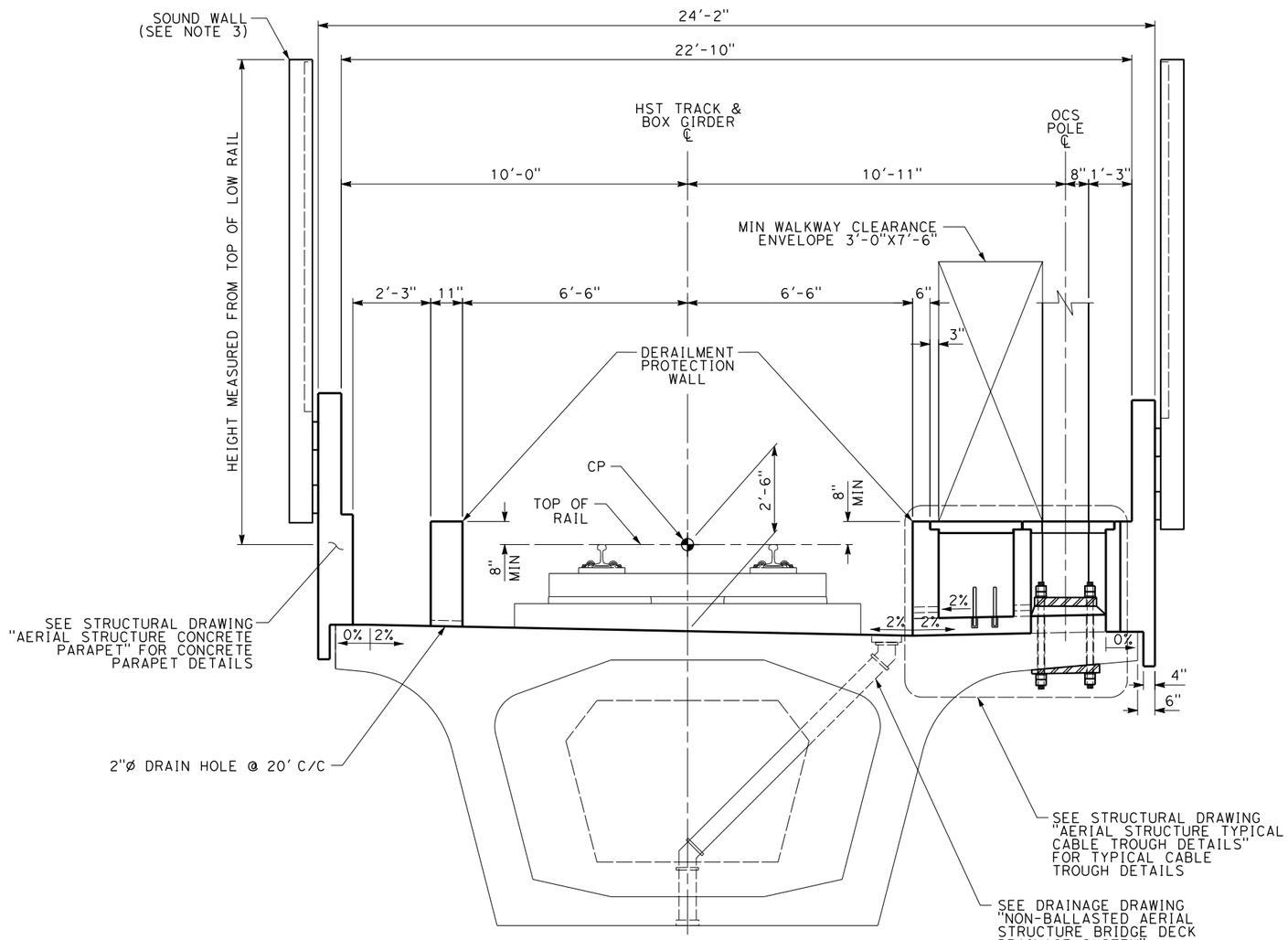
AERIAL STRUCTURE
TWO TRACK NON-BALLASTED
TYPICAL CONFIGURATION ON TOP OF DECK

CONTRACT NO.
DRAWING NO. DD-ST-001
SCALE AS SHOWN
SHEET NO.

huante 3/1/2012 3:17:13 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-001.dgn

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. ON CURVED ALIGNMENT, THE RELATIVE DIMENSIONS BETWEEN BRIDGE DECK AND BOX GIRDER SHALL BE ADJUSTED PROPERLY. IF A STRAIGHT DECK EDGE IS SELECTED, THE WIDER DECK WIDTH MAY BE REQUIRED.
3. THE HEIGHT OF THE SOUND WALL SHALL BE DETERMINED BASED ON RESULTS FROM THE NOISE ATTENUATION STUDY. THE SOUND WALL ITSELF AND ITS CONNECTION TO THE STRUCTURE SHALL BE CAPABLE OF RESISTING THE SLIPSTREAM EFFECTS FROM PASSING TRAINS AND THE WIND LOADS AS DESCRIBED IN THE DESIGN CRITERIA. NO GAP SHALL BE PERMITTED BETWEEN THE BOTTOM OF SOUND WALL AND THE STRUCTURE DECK, NOR ANY VERTICAL GAPS BETWEEN THE SOUND WALL PANELS.
4. THE DIRECT FIXATION RAIL SYSTEM AND THE TRACK SLAB SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL CONSIDER IN THEIR DESIGN THAT THE CONNECTION BETWEEN THE TRACK SLAB AND TOP DECK OF BOX GIRDER IS CAPABLE OF TRANSFERRING THE TRACTION OR BRAKING FORCES AS DESCRIBED IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA THROUGH THE INTERFACE COORDINATION WITH THE TRACK WORK DESIGNER. ANY EMBEDDED ITEMS OF THIS CONNECTION SHALL BE INSTALLED BY THE CONTRACTOR.



TANGENT TRACK
SECTION CUT AT OCS POLE (SHOWN)
SUPERELEVATED TRACK (SIMILAR)

2 0 2 4
1/2"=1'-0"

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
DRAWN BY J. GO
CHECKED BY K. PUGASAP
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

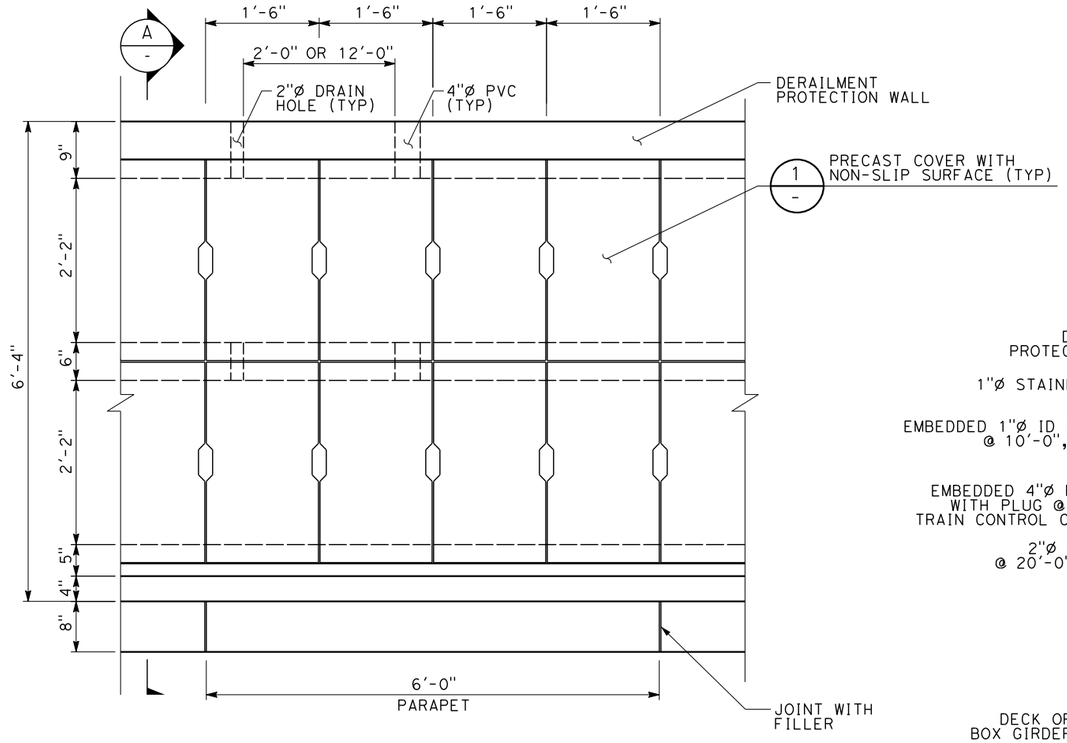
AERIAL STRUCTURE
ONE TRACK NON-BALLASTED
TYPICAL CONFIGURATION ON TOP OF DECK

CONTRACT NO.
DRAWING NO. DD-ST-002
SCALE AS SHOWN
SHEET NO.

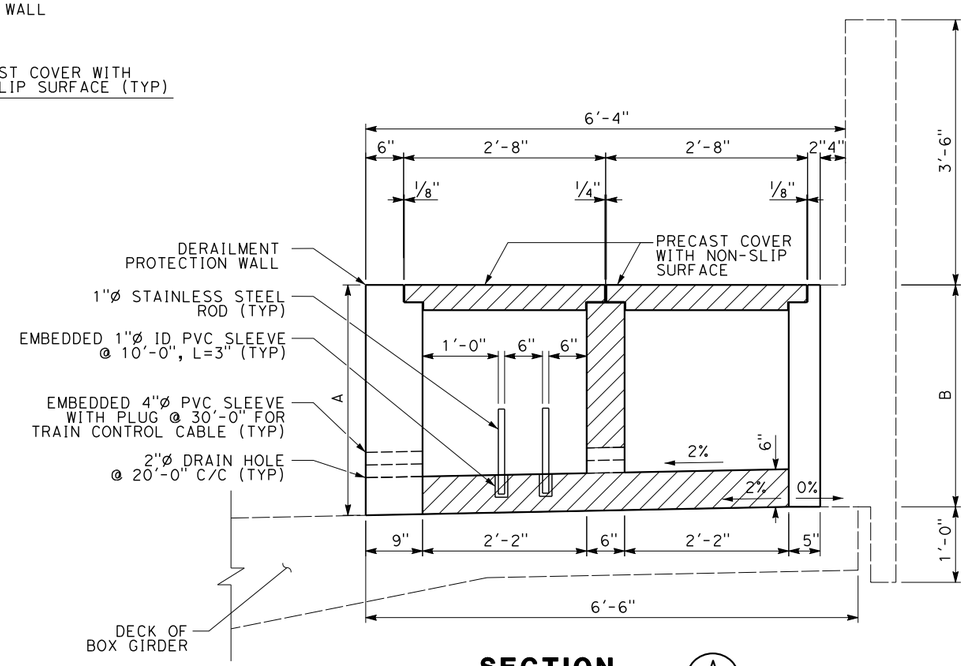
mincio 2/29/2012 5:20:52 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-002.dgn

NOTES:

1. THE CABLE TROUGH DETAIL IS FOR STANDARD TWO TRACK. FOR CABLE TROUGH INFORMATION IN SPECIAL TRACK AREA, THE CONTRACTOR SHALL COORDINATE WITH THE INTERFACED TRACK WORK DESIGNER FOR DETAILED INFORMATION.

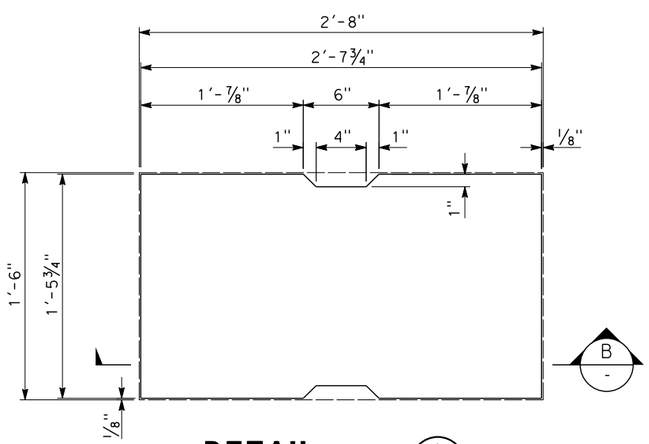


CABLE TROUGH PLAN
SCALE: 1"=1'-0"

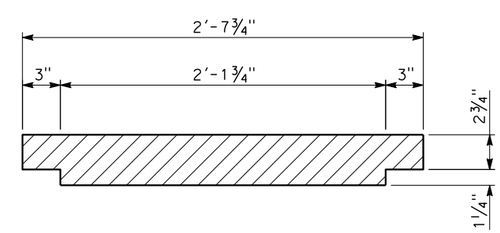


SECTION A
SCALE: 1"=1'-0"

	DOUBLE TRACK	SINGLE TRACK
A	3'-1/2"	3'-3 9/16"
B	2'-11 1/8"	3'-2 1/4"



DETAIL 1
SCALE: 1/2"=1'-0"



SECTION B
SCALE: 1/2"=1'-0"

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
DRAWN BY J. GO
CHECKED BY K. PUGASAP
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

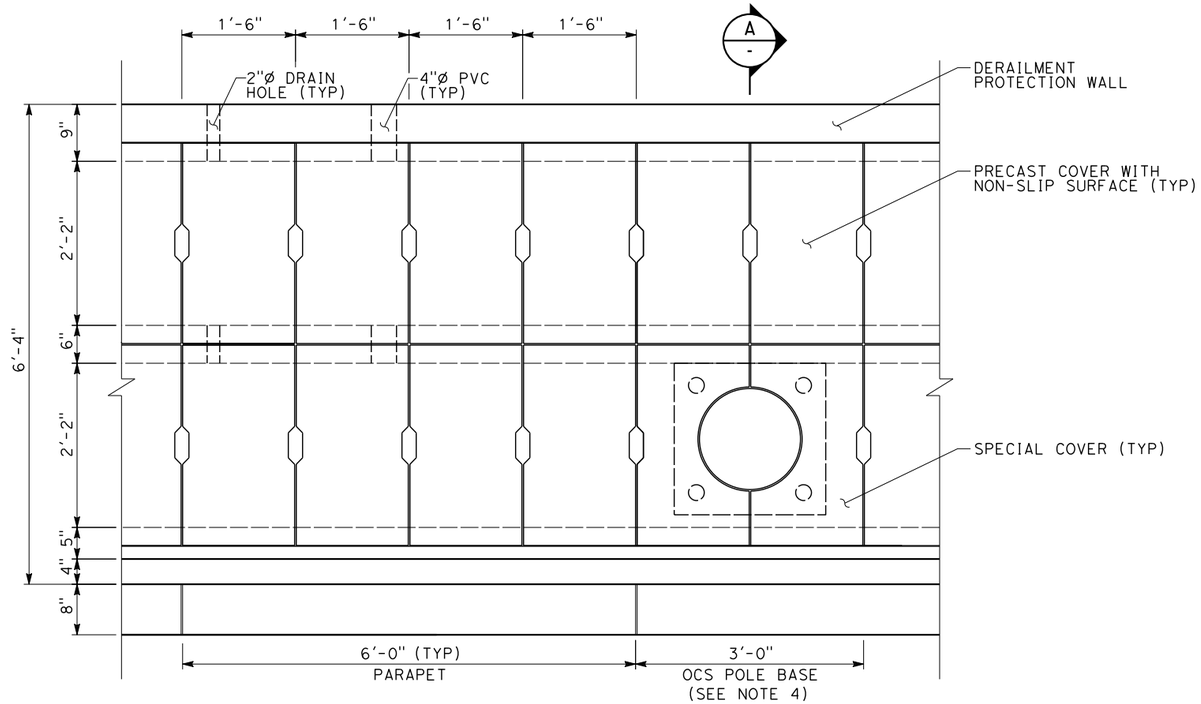
CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

AERIAL STRUCTURE
TYPICAL CABLE TROUGH DETAILS

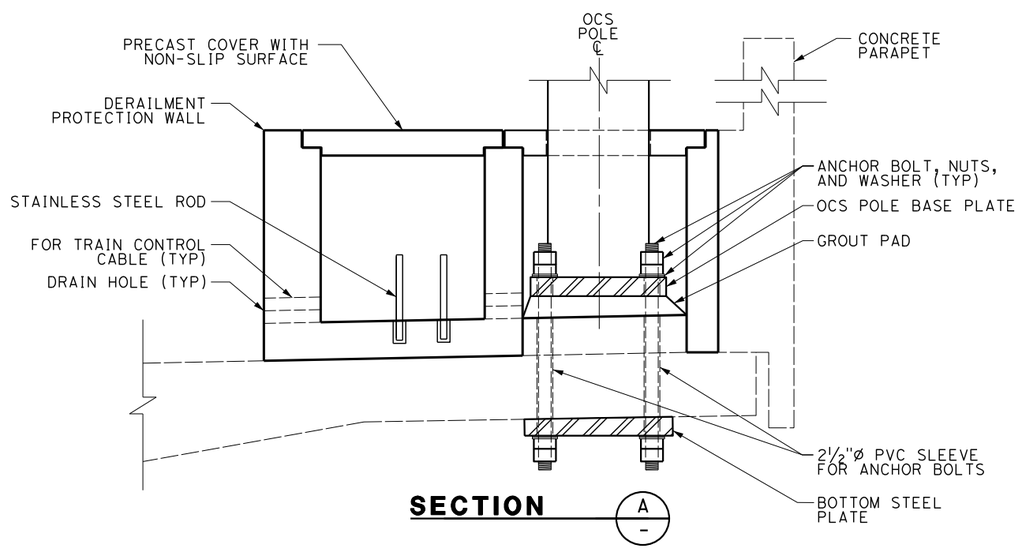
CONTRACT NO.
DRAWING NO. DD-ST-003
SCALE AS SHOWN
SHEET NO.

03/08/2012 RFP HSR 11-16

mincio 2/29/2012 5:20:53 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-003.dgn



CABLE TROUGH AT OCS POLE PLAN



SECTION A -

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. FOR PRECAST COVER DETAIL, SEE DRAWING "AERIAL STRUCTURE TYPICAL CABLE TROUGH DETAILS".
3. SEE STRUCTURAL DRAWING "AERIAL STRUCTURE TYPICAL CABLE TROUGH DETAILS" FOR DIMENSIONS NOT SHOWN.
4. OCS POLE, ANCHOR BOLT ASSEMBLIES, BASE PLATES, AND GROUT PAD FOR OCS POLE FOUNDATION ARE SHOWN FOR ILLUSTRATION ONLY. THE LOCATION OF EMBEDDED PVC SLEEVES AND LOADS FOR DESIGN OF OCS POLE FOUNDATION SHALL CONFORM TO THE REQUIREMENTS IN THE STRUCTURAL CHAPTER OF THE DESIGN CRITERIA.

1 0 1 2
1"=1'-0

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
DRAWN BY J. GO
CHECKED BY K. PUGASAP
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

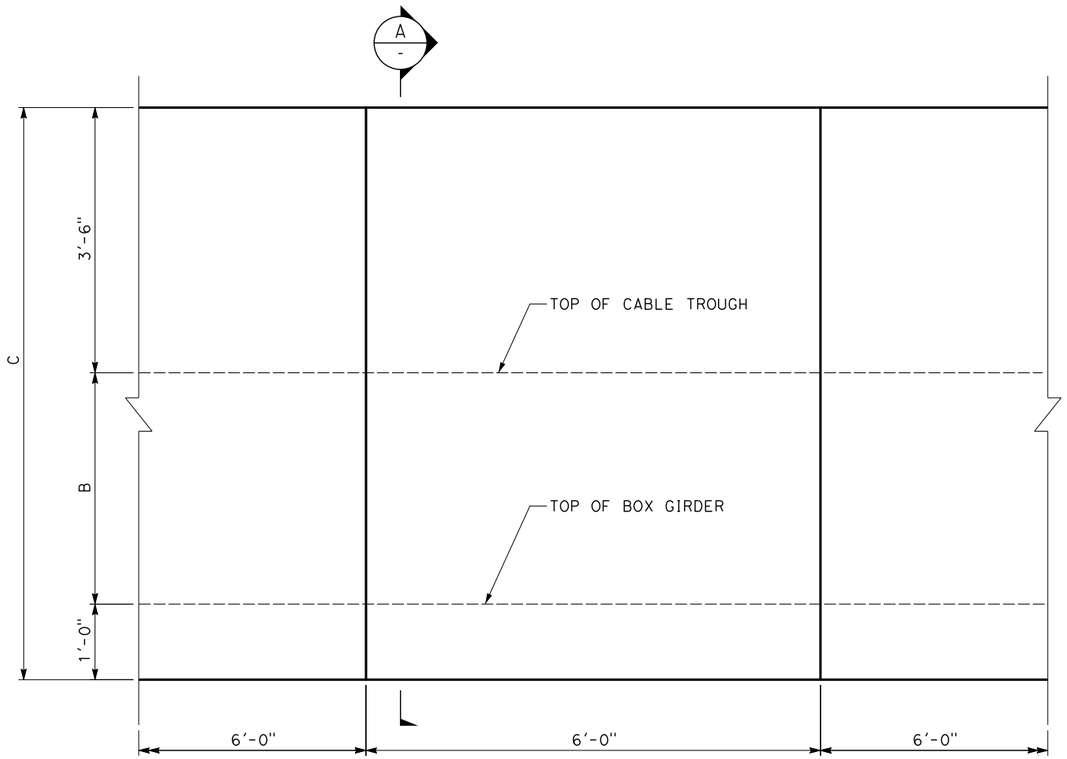
AERIAL STRUCTURE
CABLE TROUGH DETAILS
AT OCS POLE

CONTRACT NO.
DRAWING NO. DD-ST-004
SCALE AS SHOWN
SHEET NO.

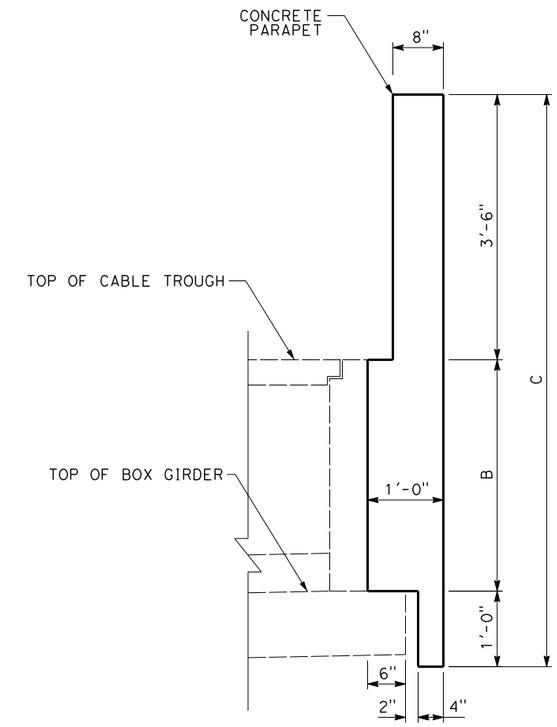
mincio 2/29/2012 5:20:54 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-004.dgn

NOTES:

1. PARAPETS SHALL BE PROVIDED ALONG EDGES OF AERIAL STRUCTURES, BRIDGES, AND HST GRADE SEPARATIONS.
2. PARAPETS SHALL BE DESIGNED FOR WIND LOADS, SLIPSTREAM EFFECTS, AND OTHER LOADS REQUIRED IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA.
3. PARAPETS SHALL BE DESIGNED TO ACCOMMODATE FUTURE INSTALLATION OF SOUND WALLS.



CONCRETE PARAPET
ELEVATION VIEW



SECTION A -

	DOUBLE TRACK	SINGLE TRACK
B	2'-11 1/8"	3'-2 1/4"
C	7'-5 5/8"	7'-8 1/4"

1 0 1 2
1"=1'-0

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
DRAWN BY J. GO
CHECKED BY K. PUGASAP
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

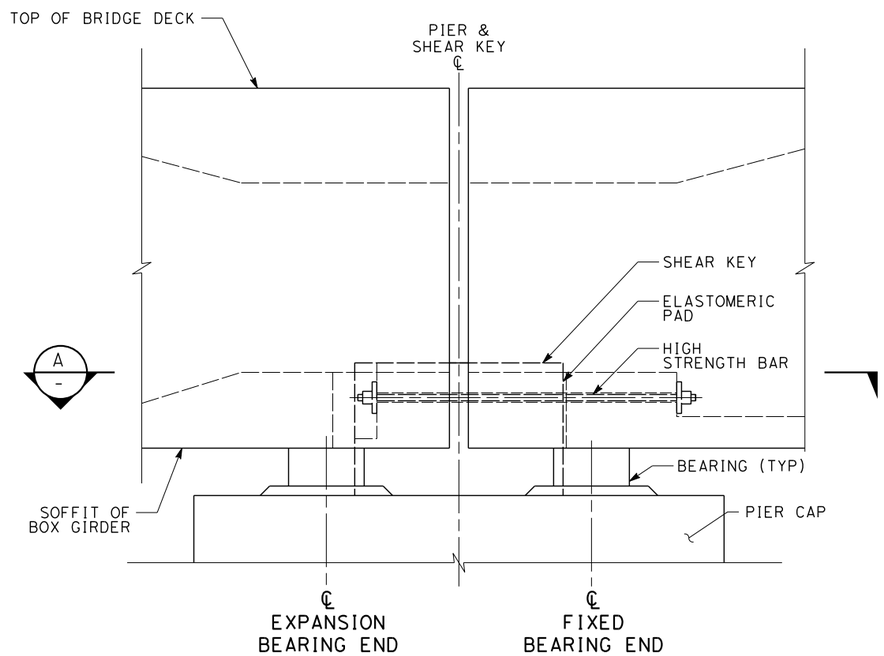
AERIAL STRUCTURE
CONCRETE PARAPET

CONTRACT NO.
DRAWING NO. DD-ST-005
SCALE AS SHOWN
SHEET NO.

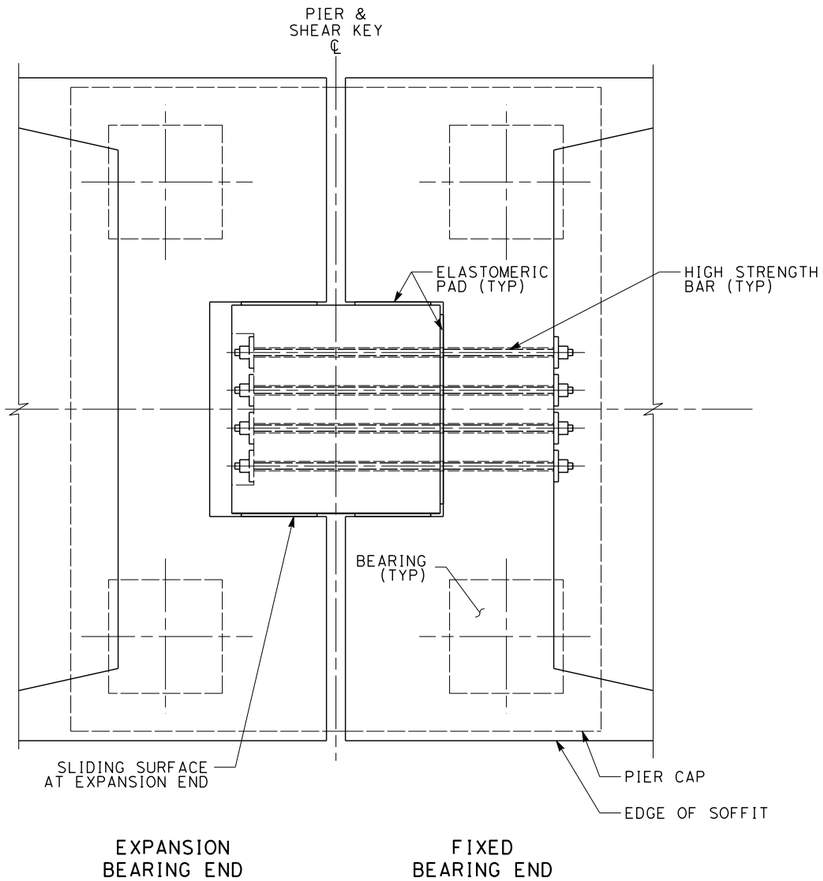
mincio 2/29/2012 5:20:55 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-005.dgn

NOTES:

1. THE SHEAR KEY DETAILS SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DEVELOP A SHEAR KEY SYSTEM THAT CONFORMS TO THE REQUIREMENTS IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA.
2. BEARINGS SHALL BE EASILY ACCESSIBLE FOR INSPECTION AND MAINTENANCE. BEARINGS SHALL BE ADJUSTABLE AND REPLACEABLE AT ANYTIME DURING THE LIFE OF STRUCTURES WITHOUT INTERFERENCE TO NORMAL TRAIN OPERATIONS.
3. THE PROCEDURES FOR BEARING REPLACEMENT, INCLUDING THE LOCATIONS OF JACKS AND THE ALLOWED JACKING FORCES SHALL BE SPECIFIED ON THE DRAWINGS.



ELEVATION
CONCRETE PARAPET NOT SHOWN



SECTION A
1/2" = 1'-0"

2 0 2 4
1/2"=1'-0"

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-006.dgn
CAHSRP.tbl CHSR_half_black.plt 2/29/2012 5:20:56 PM mincio

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
DRAWN BY J. GO
CHECKED BY K. PUGASAP
IN CHARGE J. CHIRCO
DATE 03/01/2012

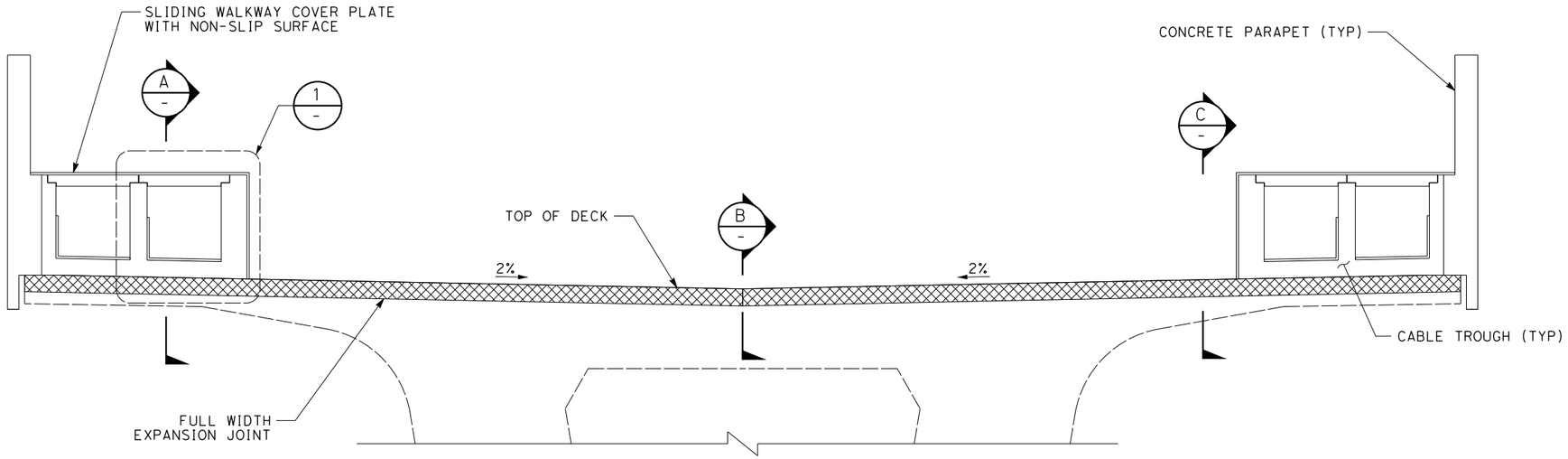
PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

AERIAL STRUCTURE
TYPICAL SPAN
SHEAR KEY DETAILS

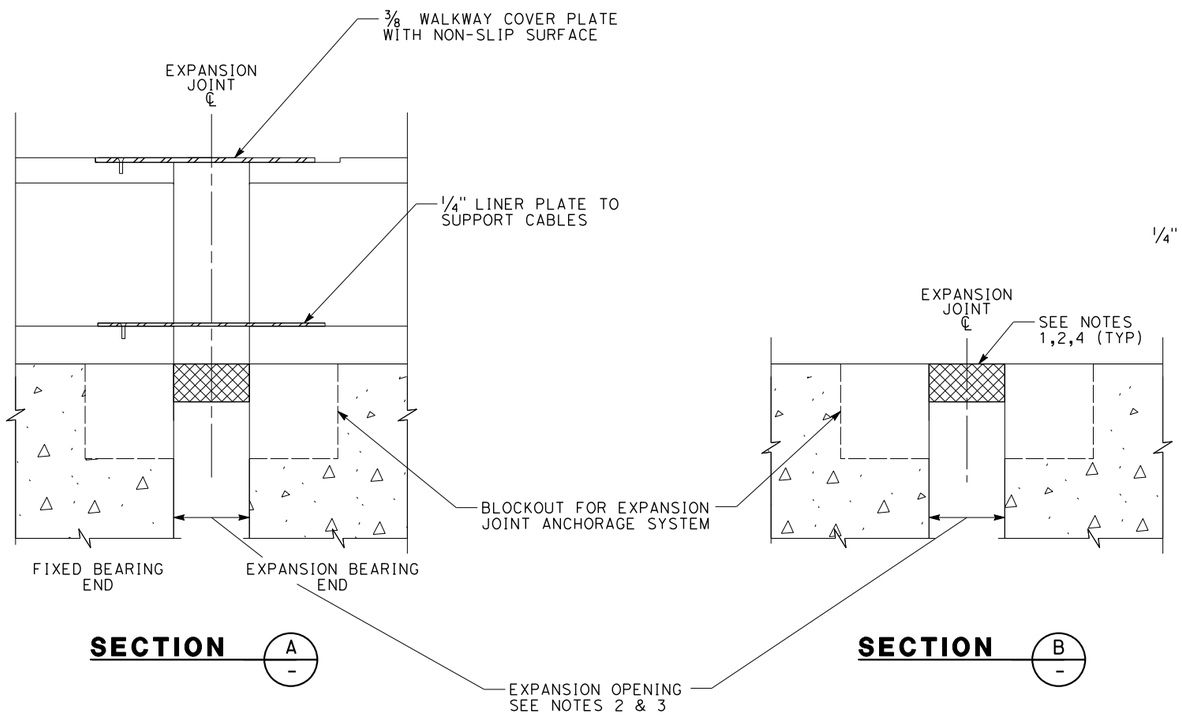
CONTRACT NO.
DRAWING NO. DD-ST-006
SCALE AS SHOWN
SHEET NO.



EXPANSION JOINT SECTION

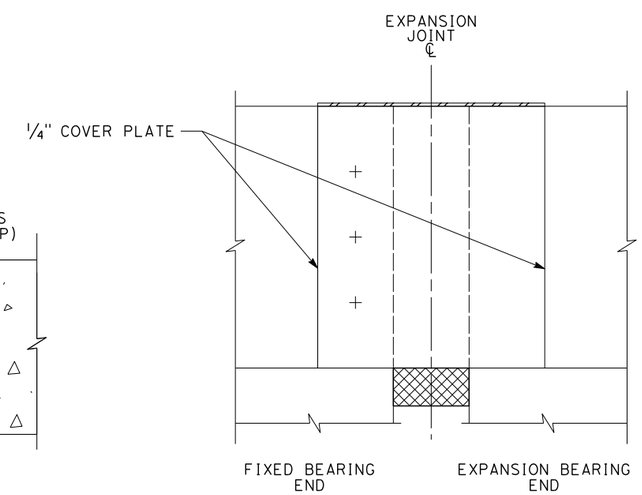
NOTES:

1. THE EXPANSION JOINT DETAILS SHOWN ARE FOR ILLUSTRATION ONLY. THE CONTRACTOR SHALL DEVELOP AN EXPANSION JOINT SYSTEM THAT CONFORMS TO THE REQUIREMENTS IN THE STRUCTURES CHAPTER OF THE DESIGN CRITERIA.
2. THE EXPANSION OPENING BETWEEN THE ENDS OF BRIDGE DECK AND ABUTMENT SHALL ACCOMMODATE THE MOVEMENT RANGE AS SPECIFIED.
3. EXPANSION JOINTS SHALL BE EASILY ACCESSIBLE FOR INSPECTION AND MAINTENANCE. EXPANSION JOINTS SHALL BE REPLACEABLE AT ANYTIME DURING THE LIFE OF STRUCTURES WITHOUT INTERFERENCE TO NORMAL TRAIN OPERATIONS.
4. THE EXPANSION JOINT SHALL BE WATERTIGHT.
5. ALL STRUCTURAL STEEL PLATES SHALL BE GALVANIZED.

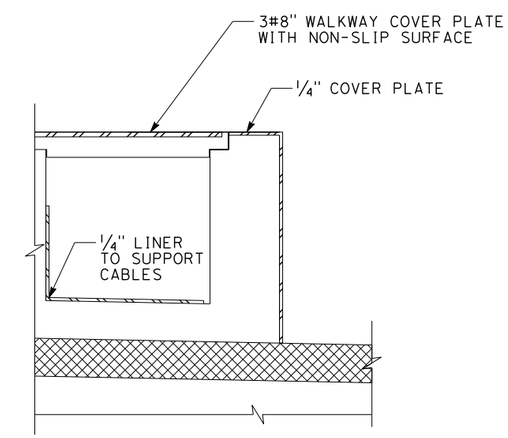


SECTION A -

SECTION B -



SECTION C -



DETAIL 1 -

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
DRAWN BY J. GO
CHECKED BY K. PUGASAP
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

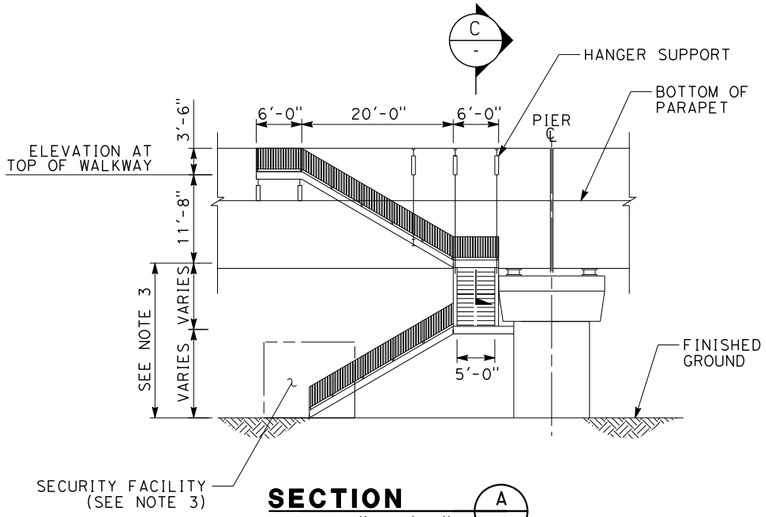
CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

AERIAL STRUCTURE
TYPICAL SPAN
EXPANSION JOINT DETAILS

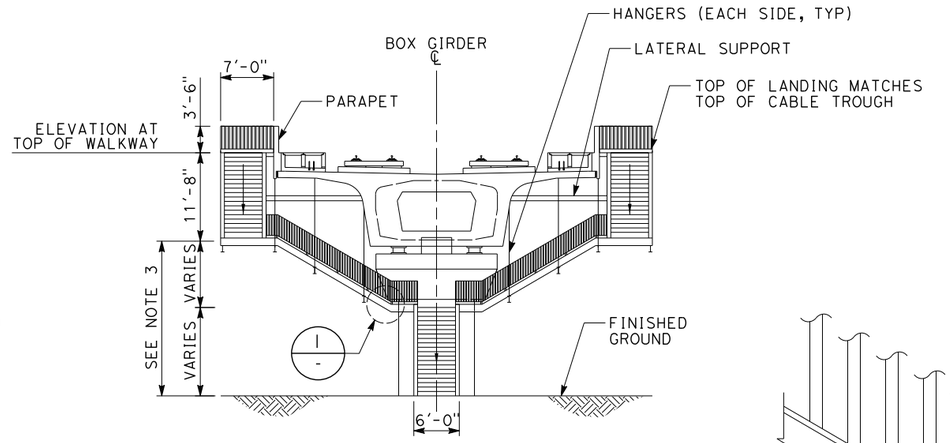
CONTRACT NO.
DRAWING NO. DD-ST-007
SCALE NO SCALE
SHEET NO.

mincio 2/29/2012 5:20:57 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-007.dgn

03/08/2012 RFP HSR 11-16



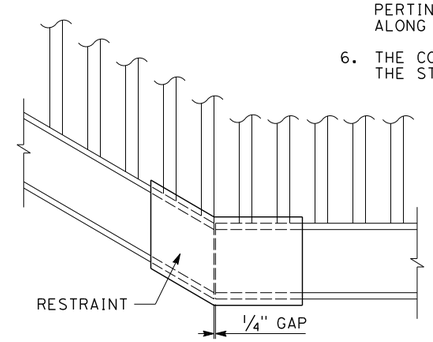
SECTION A
SCALE 1"=40'-0"



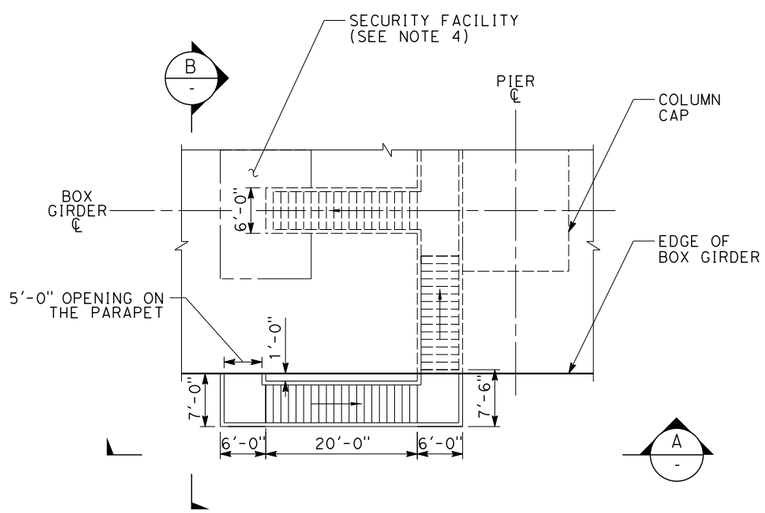
SECTION B
SCALE 1"=40'-0"

NOTES:

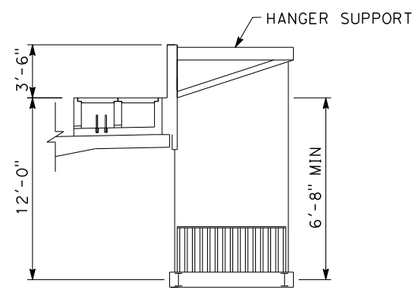
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE STAIRWAY STRUCTURAL SYSTEM SHOWN IS FOR ILLUSTRATION ONLY. THE CONTRACTOR MAY DESIGN AN EQUIVALENT STAIRWAY SYSTEM TO FIT THE SITE CONDITION.
3. WHERE VERTICAL DISTANCE BETWEEN LANDING EXCEEDS 12'-0", INTERMEDIATE LANDINGS MUST BE PROVIDED.
4. THE SECURITY FACILITY SHALL HAVE SOLID WALLS AND A ROOF (AT LEAST 10 FEET HIGH) WITH A GATE AT FINISHED GROUND ELEVATION.
5. THE ACCESS ROAD FROM THE GATE OF SECURITY FACILITY TO THE LOCAL ROAD SHALL BE PROVIDED. THE CONTRACTOR SHALL COORDINATE WITH THE PERTINENT AUTHORITIES FOR REQUIRED EASEMENT ALONG THE AERIAL STRUCTURES.
6. THE CONTRACTOR SHALL CONSIDER THE LOADS DUE TO THE STAIRWAY IN THE DESIGN OF AERIAL STRUCTURES.



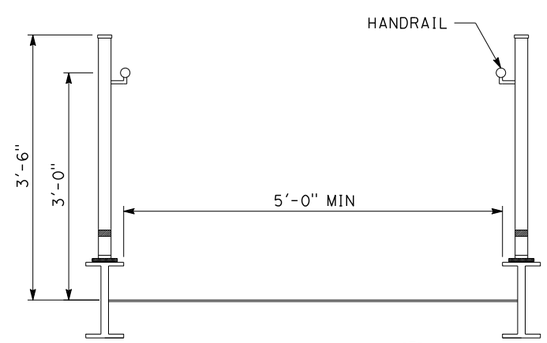
DETAIL 1
SCALE 1"=1'-0"



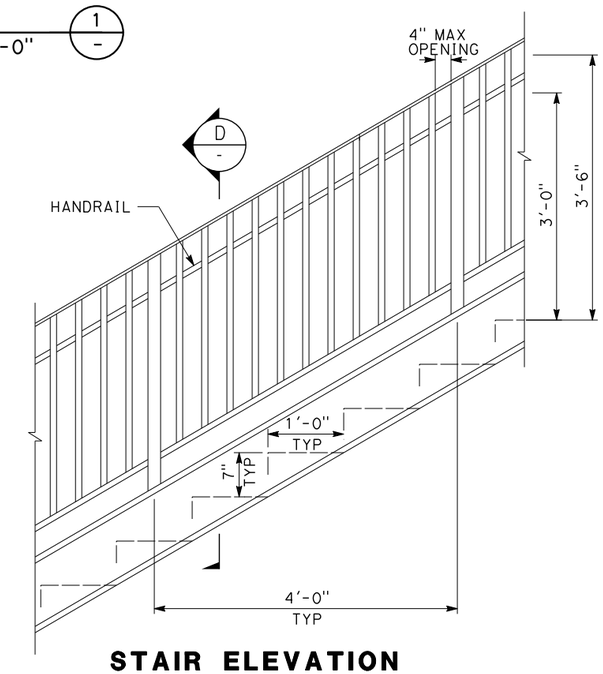
PLAN
SCALE: 1"=40'-0"



SECTION C
SCALE 1"=5'-0"



SECTION D
SCALE 1"=1'-0"



STAIR ELEVATION
SCALE: 1"=1'-0"

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
DRAWN BY J. GO
CHECKED BY K. PUGASAP
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

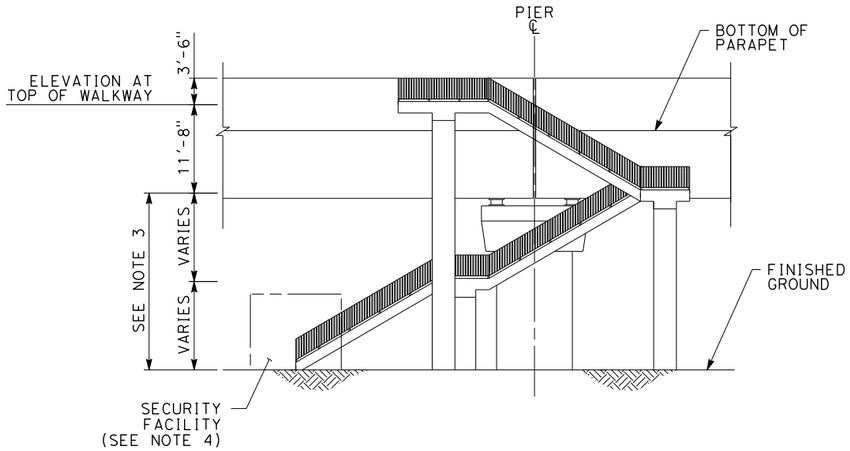
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

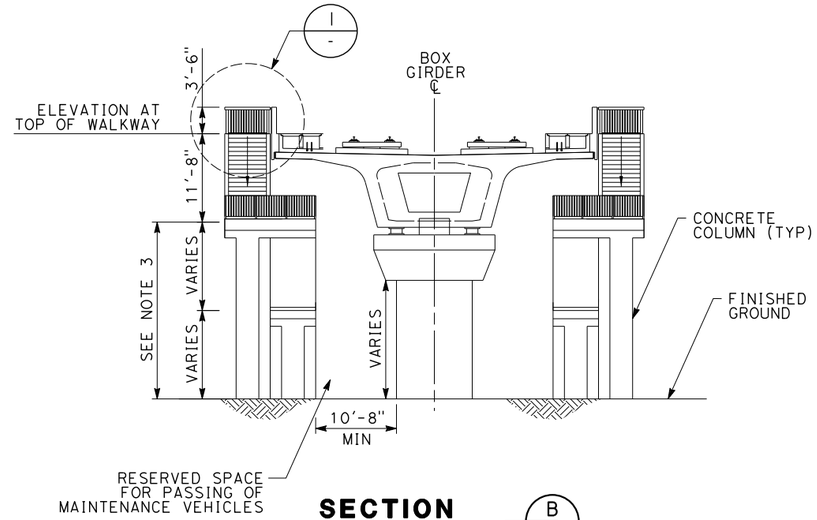
AERIAL STRUCTURE
EMERGENCY EXIT STAIRWAY DETAILS 1

CONTRACT NO.
DRAWING NO. DD-ST-008
SCALE AS SHOWN
SHEET NO.

mincio 2/29/2012 5:20:58 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-008.dgn



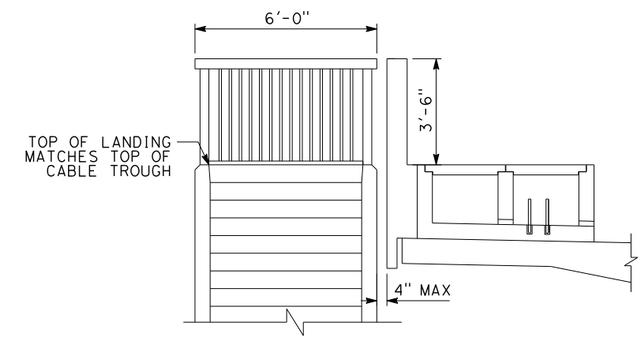
SECTION A
SCALE 1"=40'-0"



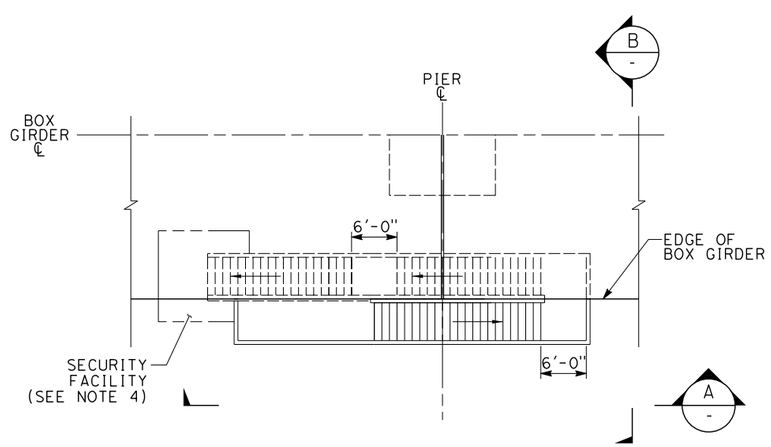
SECTION B
SCALE 1"=40'-0"

NOTES:

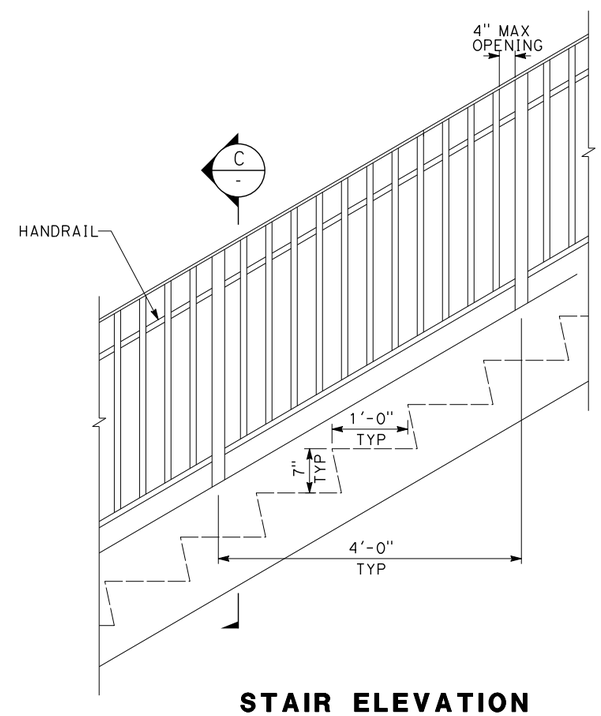
1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE STAIRWAY STRUCTURAL SYSTEM SHOWN IS FOR ILLUSTRATION ONLY. THE CONTRACTOR MAY DESIGN AN EQUIVALENT STAIRWAY SYSTEM TO FIT THE SITE CONDITION.
3. WHERE VERTICAL DISTANCE BETWEEN LANDING EXCEEDS 12'-0", INTERMEDIATE LANDINGS SHALL BE PROVIDED.
4. THE SECURITY FACILITY SHALL HAVE SOLID WALLS AND A ROOF (AT LEAST 10 FEET HIGH) WITH A GATE AT FINISHED GROUND ELEVATION.
5. THE ACCESS ROAD FROM THE GATE OF SECURITY FACILITY TO THE LOCAL ROAD SHALL BE PROVIDED. THE CONTRACTOR SHALL COORDINATE WITH THE PERTINENT AUTHORITIES FOR REQUIRED EASEMENT ALONG THE AERIAL STRUCTURES.
6. THE CONTRACTOR SHALL CONSIDER THE LOADS DUE TO THE STAIRWAY IN THE DESIGN OF AERIAL STRUCTURES.



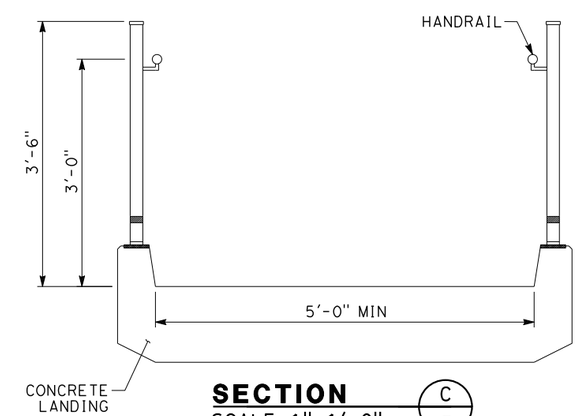
DETAIL 1
SCALE 1"=4'-0"



PLAN
SCALE: 1"=40'-0"



STAIR ELEVATION
SCALE: 1"=1'-0"



SECTION C
SCALE 1"=1'-0"

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
DRAWN BY J. GO
CHECKED BY K. PUGASAP
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

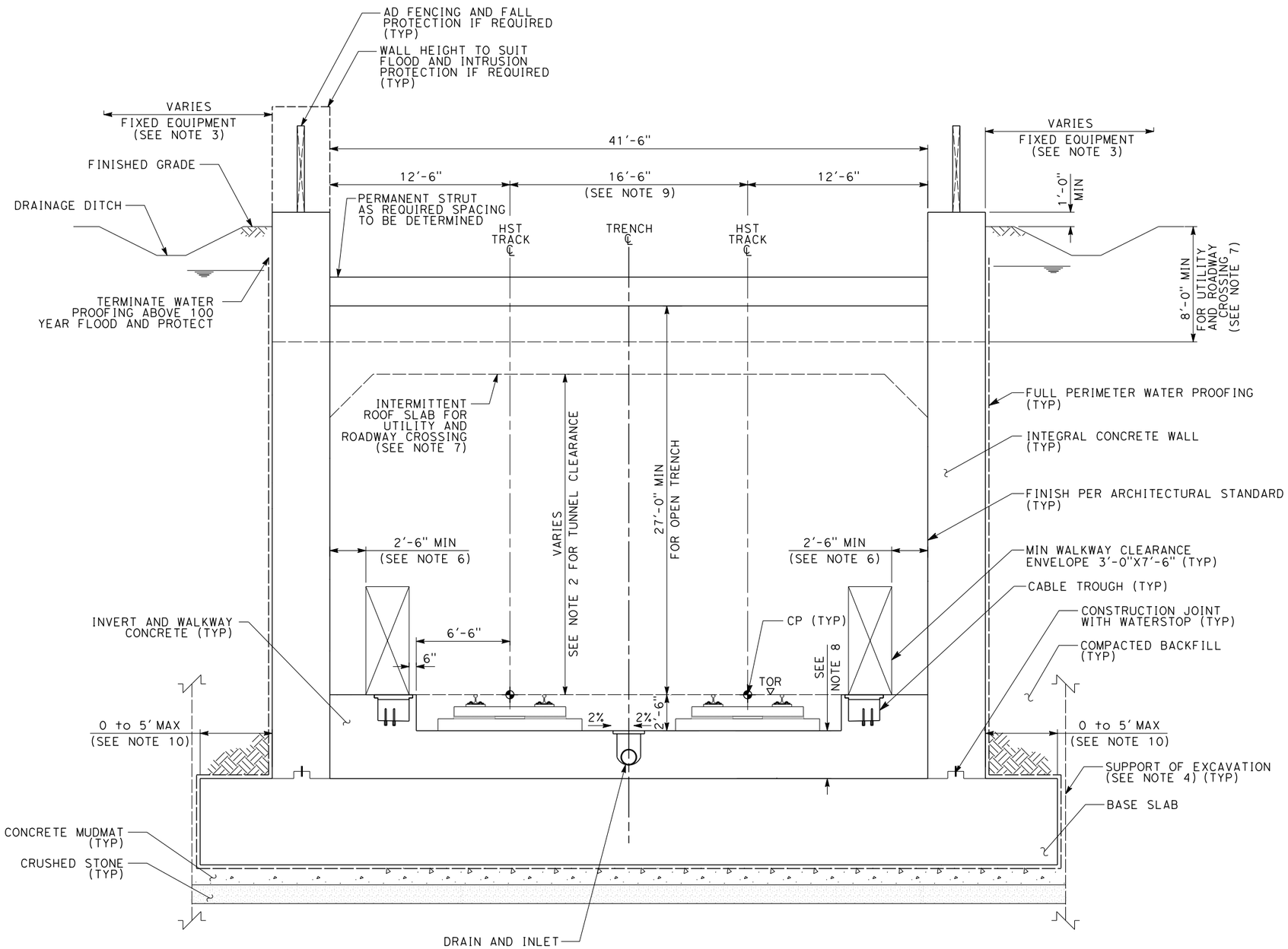
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

AERIAL STRUCTURE
EMERGENCY EXIT STAIRWAY DETAILS 2

CONTRACT NO.
DRAWING NO. DD-ST-009
SCALE AS SHOWN
SHEET NO.

mincio 2/29/2012 5:21:00 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-009.dgn



NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SEE BASIC TUNNEL CONFIGURATION DIRECTIVE DRAWINGS FOR MINIMUM CLEARANCE REQUIREMENTS.
3. TYPES, LOCATIONS AND DIMENSIONS OF NICHES AND/OR ENLARGEMENTS FOR EMERGENCY VENTILATION, IF REQUIRED, NOT DESIGNED.
4. TYPES, LOCATIONS AND DIMENSIONS OF TEMPORARY SUPPORT AND/OR GROUND TREATMENT NOT SHOWN.
5. STRUCTURAL COMPONENTS ARE NOT DESIGNED.
6. PROVIDE A MIN OF 2'-6" AS AN ALLOWANCE FOR FIXED EQUIPMENT.
7. FOR UTILITY AND ROADWAY CROSSINGS, INTERMITTENT ROOF SLAB SHALL BE PROVIDED AND BACKFILLED TO SUIT.
8. DEPTH TO BE DETERMINED BASED ON DRAINAGE DESIGN.
9. DIMENSION SHOWN BASED ON TANGENT TRACK. INCREASE WIDTH AS REQUIRED FOR CURVATURE.
10. WIDTH AS REQUIRED FOR RESISTANCE TO UPLIFT.

4 0 4 8
1/4"=1'-0"

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY B. VALENTI
DRAWN BY J. VILLA
CHECKED BY P. LIN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

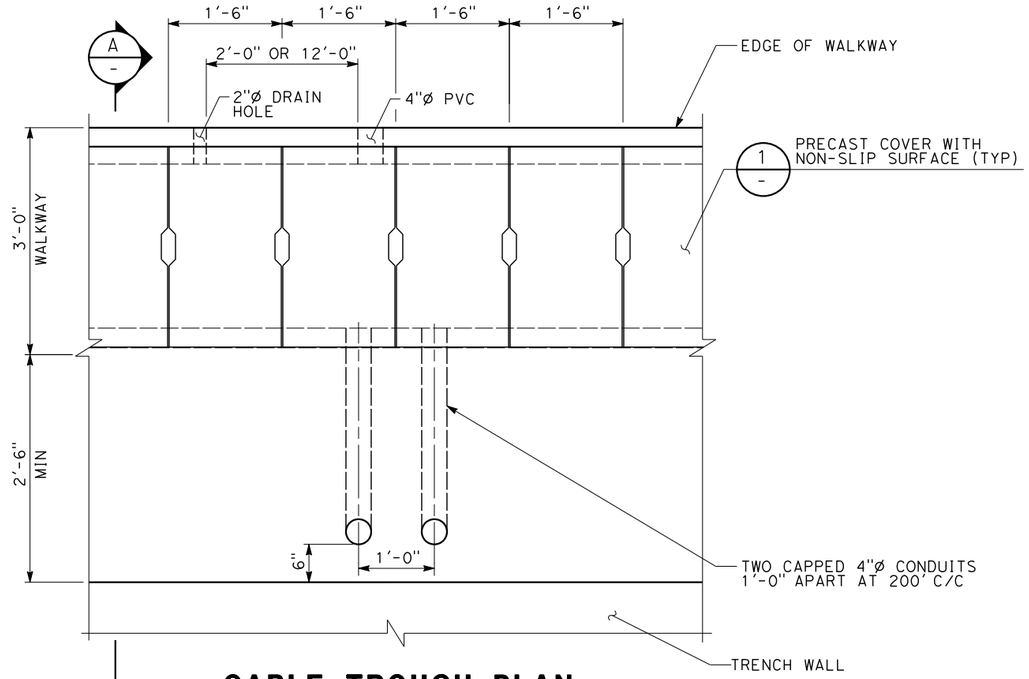
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

TYPICAL CROSS SECTION
TWO TRACK TRENCH
OUTSIDE WALKWAY

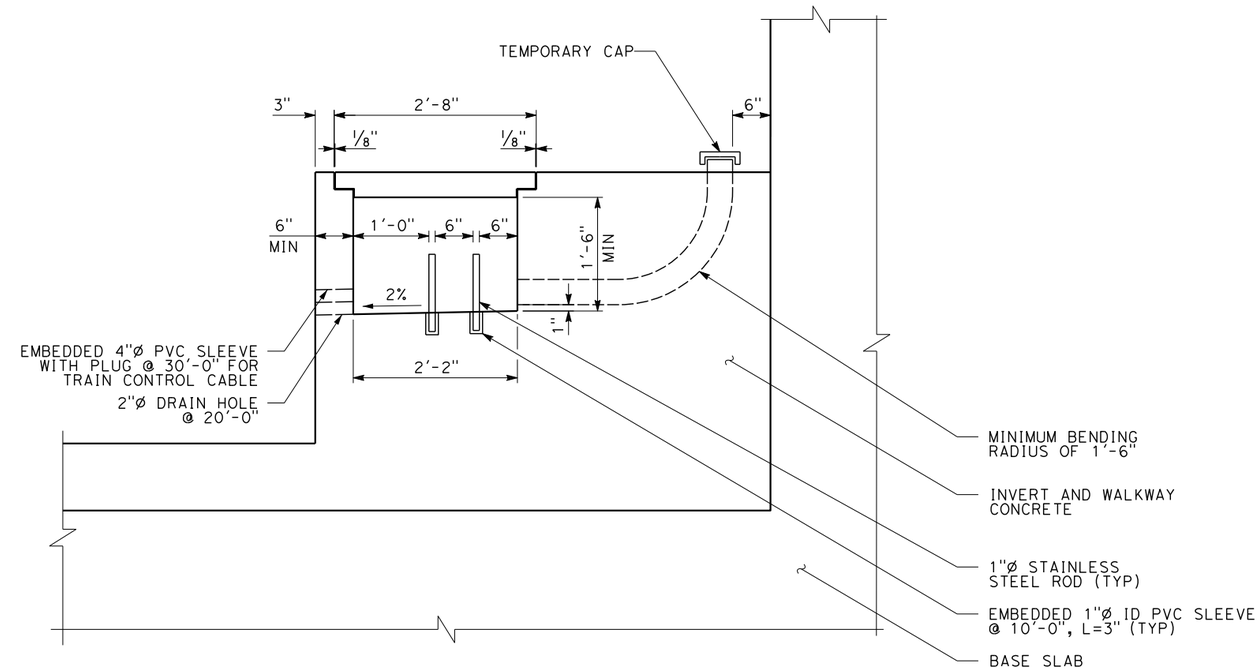
CONTRACT NO.
DRAWING NO. DD-ST-010
SCALE AS SHOWN
SHEET NO.

mincio 2/29/2012 5:21:01 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-010.dgn



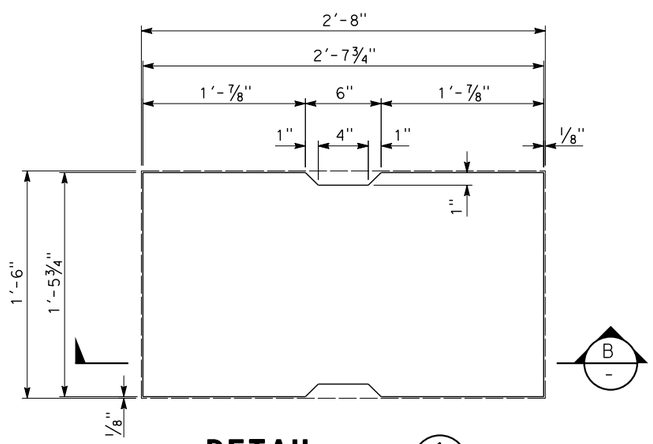
CABLE TROUGH PLAN AND CONDUIT DETAIL

SCALE: 1"=1'-0"



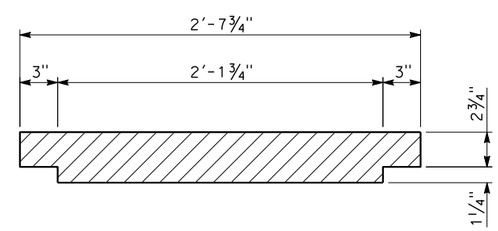
SECTION A

SCALE: 1"=1'-0"



DETAIL 1

SCALE: 1/2"=1'-0"



SECTION B

SCALE: 1/2"=1'-0"

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY B. VALENTI
DRAWN BY T. DOUNG
CHECKED BY P. LIN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

CABLE TROUGH DETAILS
TRENCH/CUT AND COVER TUNNEL

CONTRACT NO.
DRAWING NO. DD-ST-011
SCALE AS SHOWN
SHEET NO.

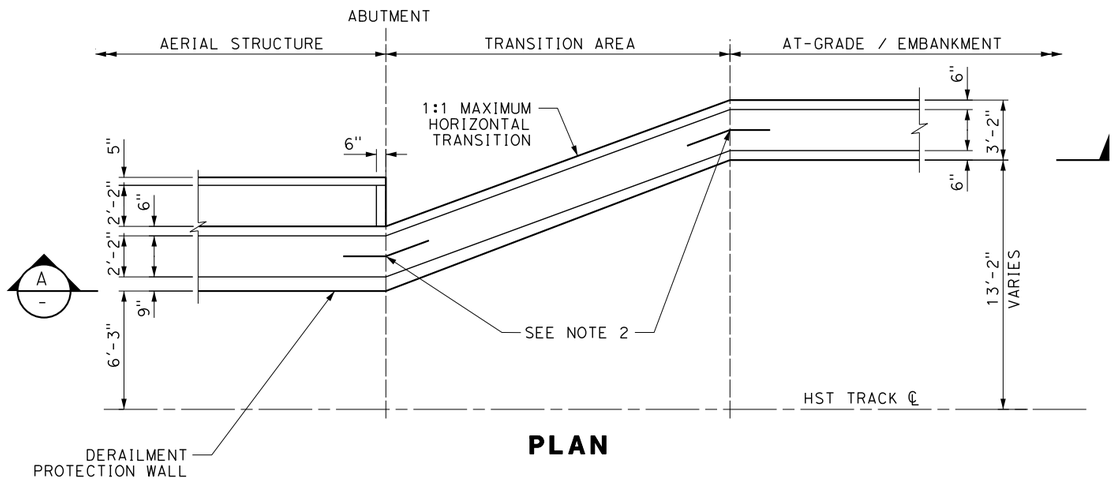
03/08/2012 RFP HSR 11-16

mincio 2/29/2012 5:21:02 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-011.dgn

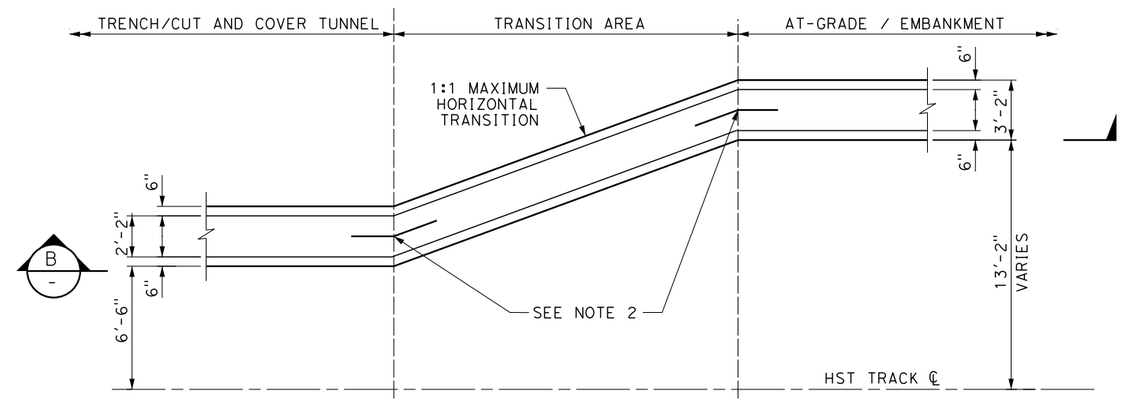
NOTES:

1. BOTH HORIZONTAL AND VERTICAL TRANSITION OF THE CABLE TROUGH SHALL OCCUR WITHIN THE LONGITUDINAL STRUCTURAL TRANSITION ZONE.

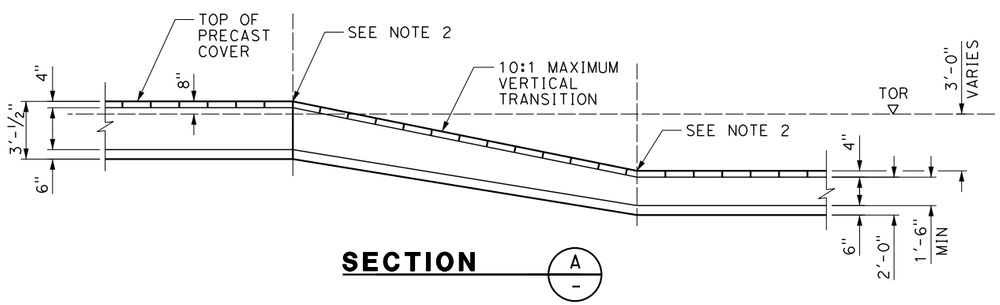
2. SPECIAL TRANSITION TROUGH AND COVER WILL BE REQUIRED AT ANGLE POINTS. MAXIMIZE EXTENT OF STANDARD PIECES.



PLAN

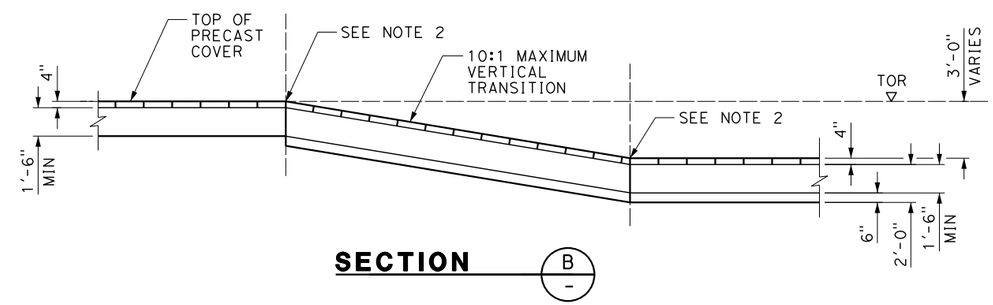


PLAN



SECTION A 1

AERIAL STRUCTURE TO AT-GRADE/EMBANKMENT



SECTION B 1

TRENCH/CUT AND COVER TUNNEL TO AT-GRADE/EMBANKMENT

4 0 4 8
1/4"=1'-0"

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY P. LIN
DRAWN BY J. GO
CHECKED BY B. VALENTI
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

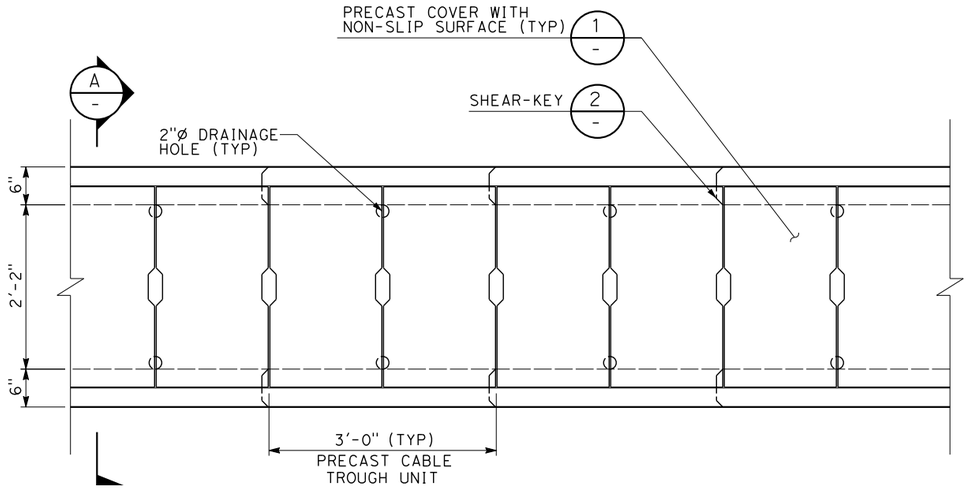
CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

CABLE TROUGH LAYOUT TRANSITION AREAS

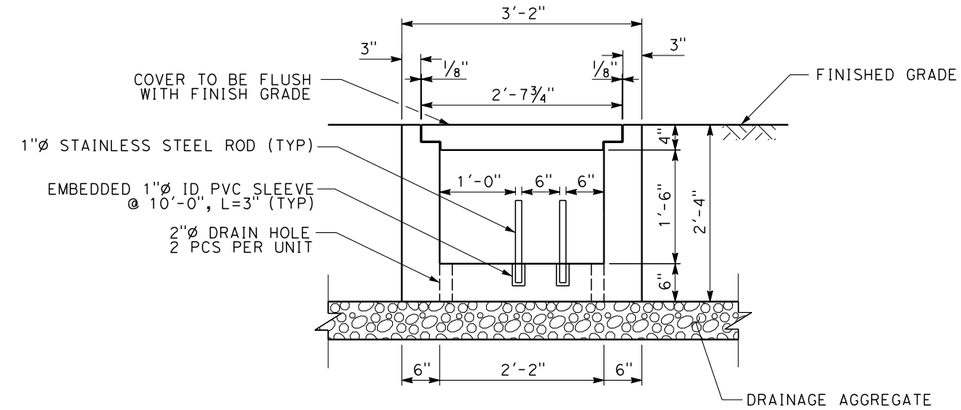
CONTRACT NO.
DRAWING NO. DD-ST-012
SCALE AS SHOWN
SHEET NO.

03/08/2012 RFP HSR 11-16

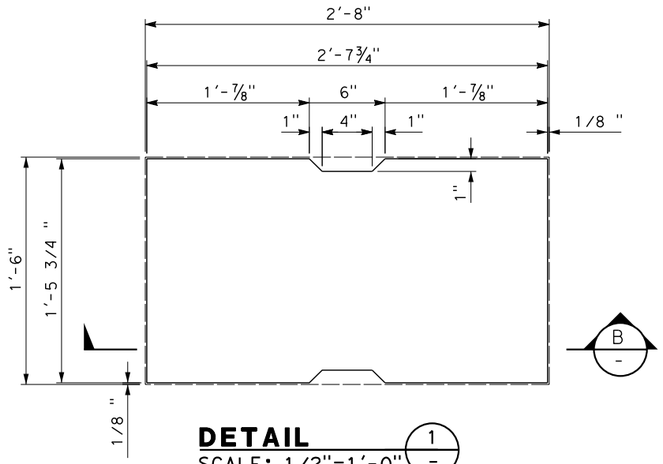
T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-012.dgn CAHSRP.+tbl CHSR_half_black.plt+ 2/29/2012 5:21:03 PM mincio



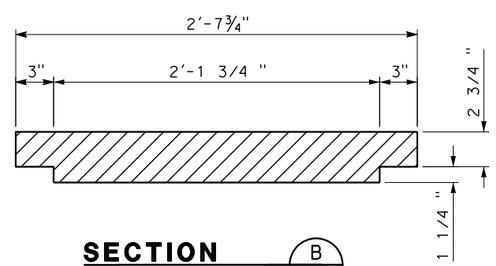
PRECAST CABLE TROUGH PLAN
SCALE: 1"=1'-0"



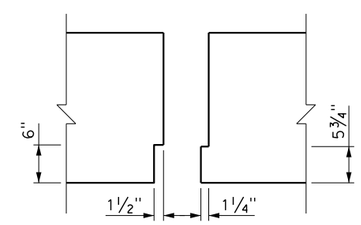
SECTION A
SCALE: 1"=1'-0"



DETAIL 1
SCALE: 1/2"=1'-0"



SECTION B
SCALE: 1/2"=1'-0"



DETAIL 2
SCALE: 1"=1'-0"

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY B. VALENTI
DRAWN BY T. DOUNG
CHECKED BY P. LIN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

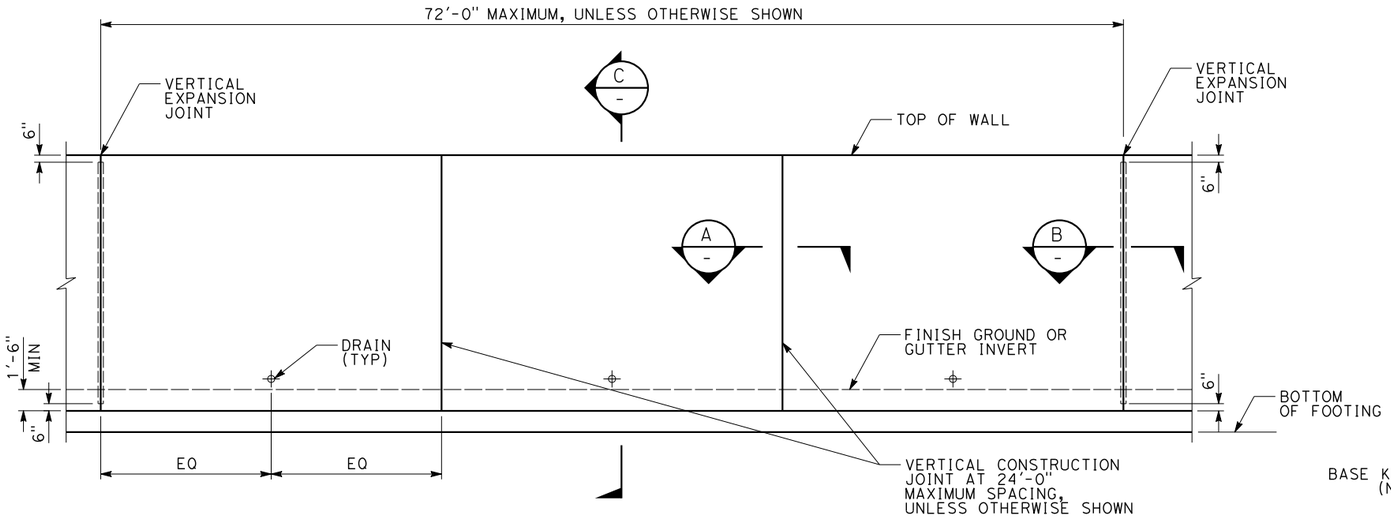
TYPICAL CABLE TROUGH DETAILS
EMBANKMENT/CUT

CONTRACT NO.
DRAWING NO. DD-ST-013
SCALE AS SHOWN
SHEET NO.

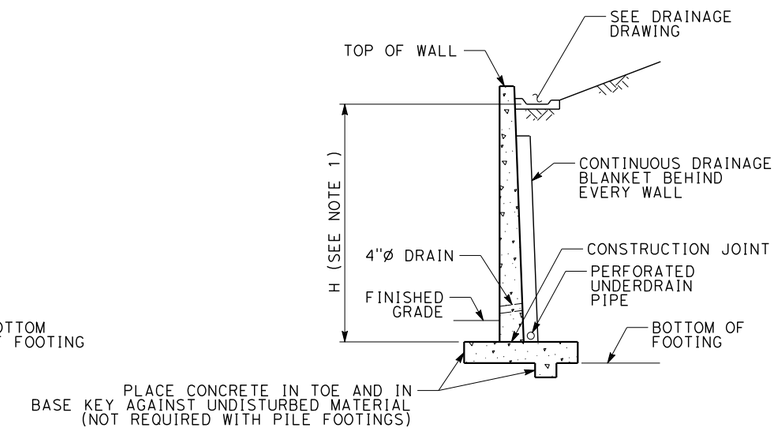
mincio 2/29/2012 5:21:04 PM CAHSRP.tbl CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Directive Drawings\Structures DD\DD-ST-013.dgn

NOTE:

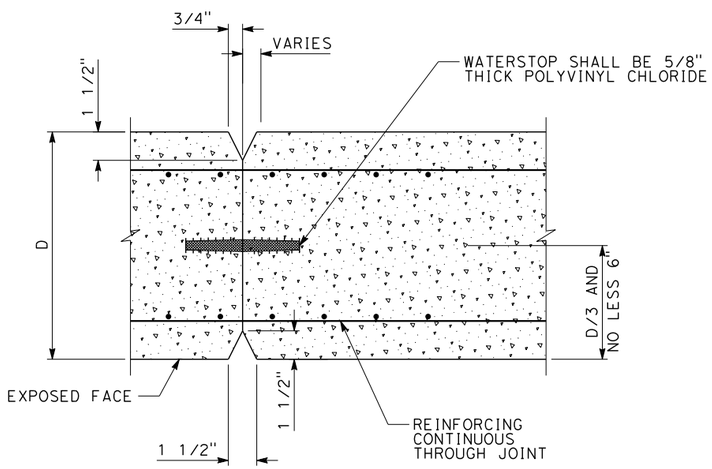
1. ELEVATION OF TOP OF WALL AND BOTTOM OF FOOTING SHALL BE AS SHOWN ON OTHER CONTRACT DRAWINGS, VALUES OF H ARE DESIGN HEIGHTS ONLY.



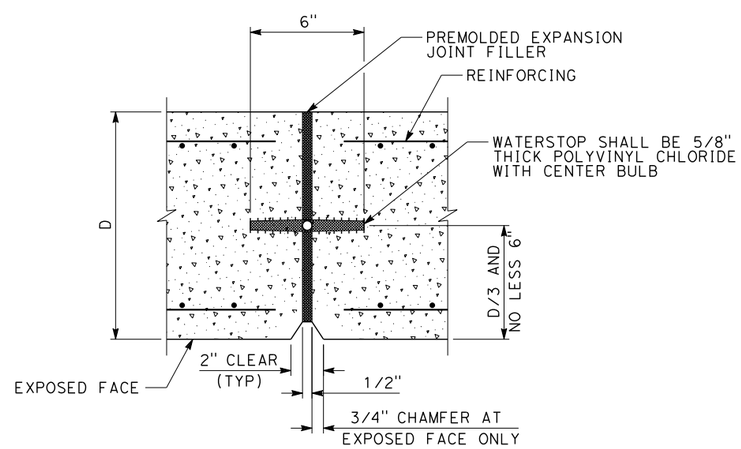
RETAINING WALL ELEVATION (B -)



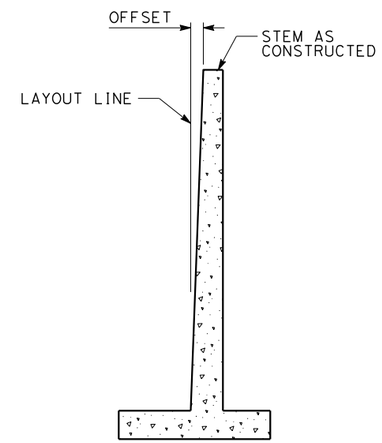
TYPICAL EXPANSION JOINT (C -)



TYPICAL CONSTRUCTION JOINT (A -)



TYPICAL EXPANSION JOINT (B -)



H (FEET)	OFFSET (INCHES)
4	3/8
6	1/2
8	3/4
10	7/8
12	1 1/8
14	1 1/4
16	1 1/2
18	1 5/8
20	1 7/8
22	2
24	2 1/4
26	2 3/8
28	2 5/8

WALL OFFSET VALUES

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY B. VALENTI
DRAWN BY V. HUANTE
CHECKED BY P. LIN
IN CHARGE J. CHIRCO
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
STRUCTURAL DIRECTIVE

RETAINING WALL
LAYOUT AND DETAILS

CONTRACT NO.
DRAWING NO. DD-ST-014
SCALE NO SCALE
SHEET NO.

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California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16

Directive Drawings

Systems

NOTES:

1. SYSTEM SITES INCLUDE TRACTION POWER FACILITIES, TRAIN CONTROL HOUSES, STANDALONE RADIO SITES.
2. SYSTEM SITE ALTERNATIVES MAY BE ACROSS ROW OR ON SAME SIDE. PROVIDE LOW-VOLTAGE AND 25KV DUCT BANK PER REQUIREMENTS FOR EACH SYSTEMS SITE ALTERNATIVE.
3. ACCESS ROADS AND ACCESS GATES ARE SHOWN FOR INFORMATION ONLY. CONSULT CIVIL DESIGN CRITERIA AND PRELIMINARY DESIGN PLANS FOR REQUIREMENTS AND DETAILS.
4. SEE TRACTION POWER AND COMMUNICATIONS DRAWINGS FOR DUCTBANK, MANHOLE CROSS SECTIONS, DETAILS AND ELEVATIONS.
5. FOR NUMBERS OF CONDUITS SEE COMMUNICATION DESIGN CRITERIA AND DRAWING "TYPICAL CROSS SECTION SYSTEMS LOW-VOLTAGE CONDUIT DUCTBANK".
6. INTERMEDIATE MANHOLES TO BE INCLUDED BASED UPON APPLICABLE STANDARDS, REGULATIONS AND CODES.

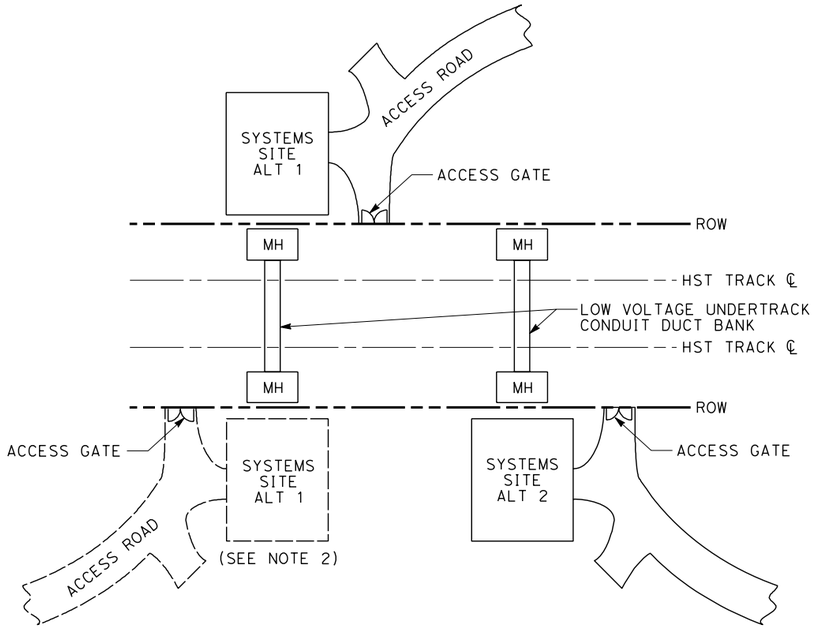


DIAGRAM A

AT-GRADE LOW-VOLTAGE UNDERTRACK CONDUIT DUCTBANK, ACCESS ROADS AND GATES AT ALTERNATIVE SYSTEMS SITES

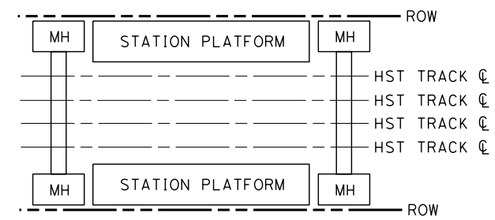


DIAGRAM B

LOW-VOLTAGE UNDERTRACK DUCT BANK AT STATION PLATFORMS

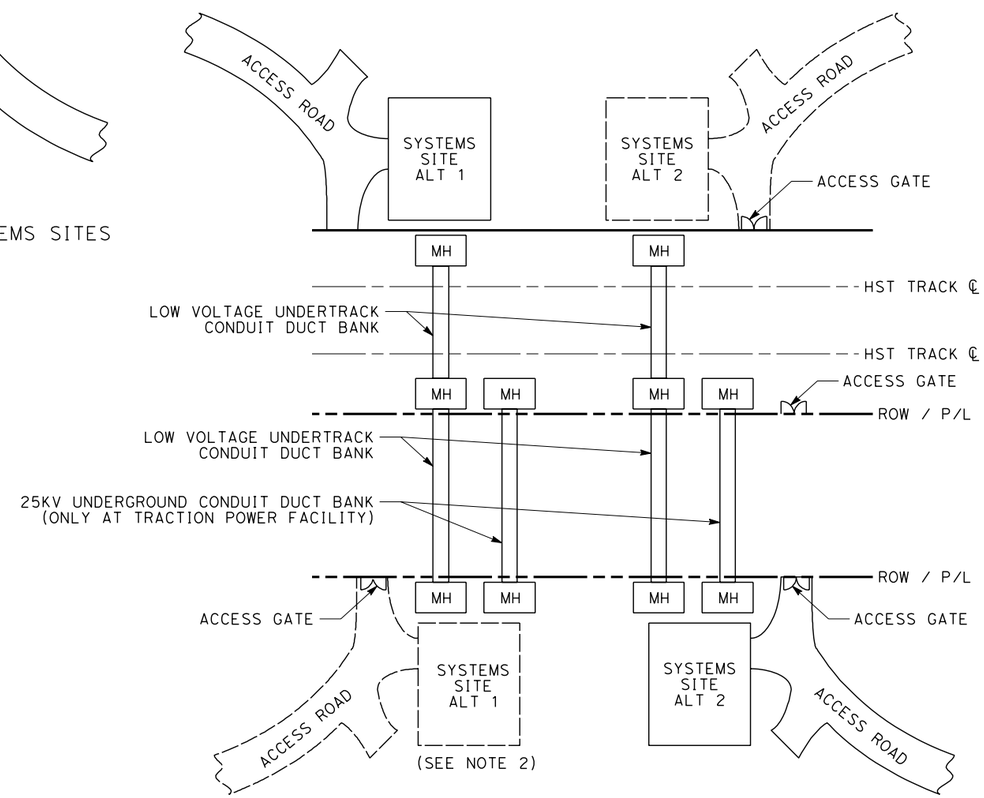


DIAGRAM C

AT-GRADE LOW-VOLTAGE UNDERTRACK AND UNDERGROUND CONDUIT DUCT BANK, 25KV UNDERGROUND CONDUIT DUCT BANK, ACCESS ROADS AND GATES AT ALTERNATIVE SYSTEMS SITES LOCATED AWAY FROM HSR ROW

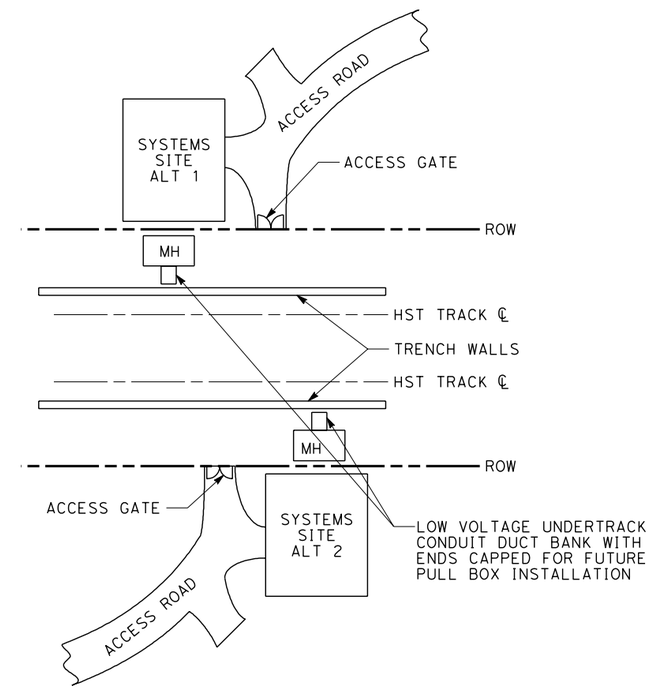


DIAGRAM D

TRENCH LOW-VOLTAGE UNDERTRACK CONDUIT DUCT BANK AND ACCESS ROADS AND GATES AT ALTERNATIVE SYSTEMS SITES

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY B. BANKS
DRAWN BY T. DOUNG
CHECKED BY C. DALOIA
IN CHARGE R. SCHMEDES
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT SYSTEMS DIRECTIVE

TYPICAL CIVIL ACCOMMODATIONS SYSTEM SITES

CONTRACT NO.
DRAWING NO. DD-SY-010
SCALE NO SCALE
SHEET NO.

03/08/2012 RFP HSR 11-16

huante 3/1/2012 3:14:34 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Systems\Systems-Overall\DD-SY-010.dgn

California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16

Directive Drawings

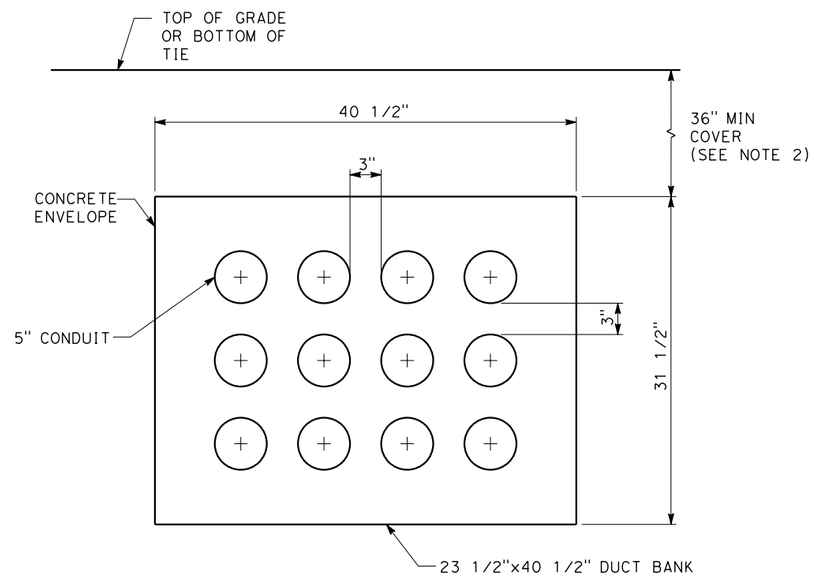
Traction Power

03/08/2012 RFP HSR 11-16

NOTES:

1. THIS DRAWING SHOWS TYPICAL DUCT BANK DETAILS FOR 5" CONDUIT FOR ILLUSTRATION PURPOSES ONLY. DESIGN THE DUCT BANK TO SITE AND EQUIPMENT SPECIFIC REQUIREMENTS CONFORMING TO RELEVANT CODES, SPECIFICATIONS AND DESIGN CRITERIA.

2. A 36" MINIMUM COVER SHALL BE MAINTAINED FROM TOP OF GRADE TO TOP OF DUCT BANK, WHEN NOT GOING UNDER RAILROAD TRACK, AND A MINIMUM 5'-6" UNDER RAILROAD TRACKS FROM THE BOTTOM OF TIE.



3x4-WAY DUCT BANK (1 / -)

NO SCALE

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY V. SIBAL
DRAWN BY V. HUANTE
CHECKED BY M. PAZ
IN CHARGE R. SCHMEDES
DATE 03/01/2012

PARSONS BRINCKERHOFF

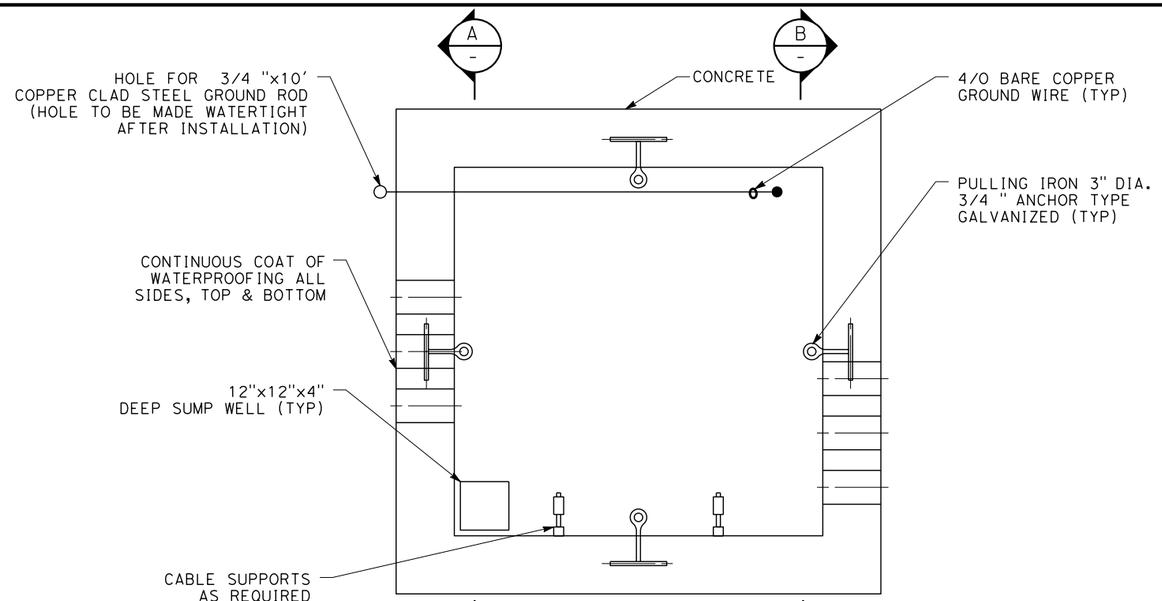
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE

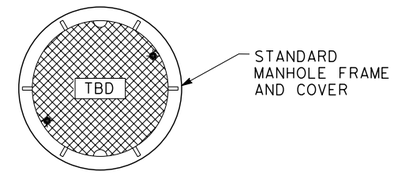
TYPICAL 25KV DUCT BANK DETAIL

CONTRACT NO.
DRAWING NO. DD-TP-N101
SCALE NO SCALE
SHEET NO.

huante 2/28/2012 8:26:15 AM CAHSRP.TBL CHSR_half_black.plt $FILEL$



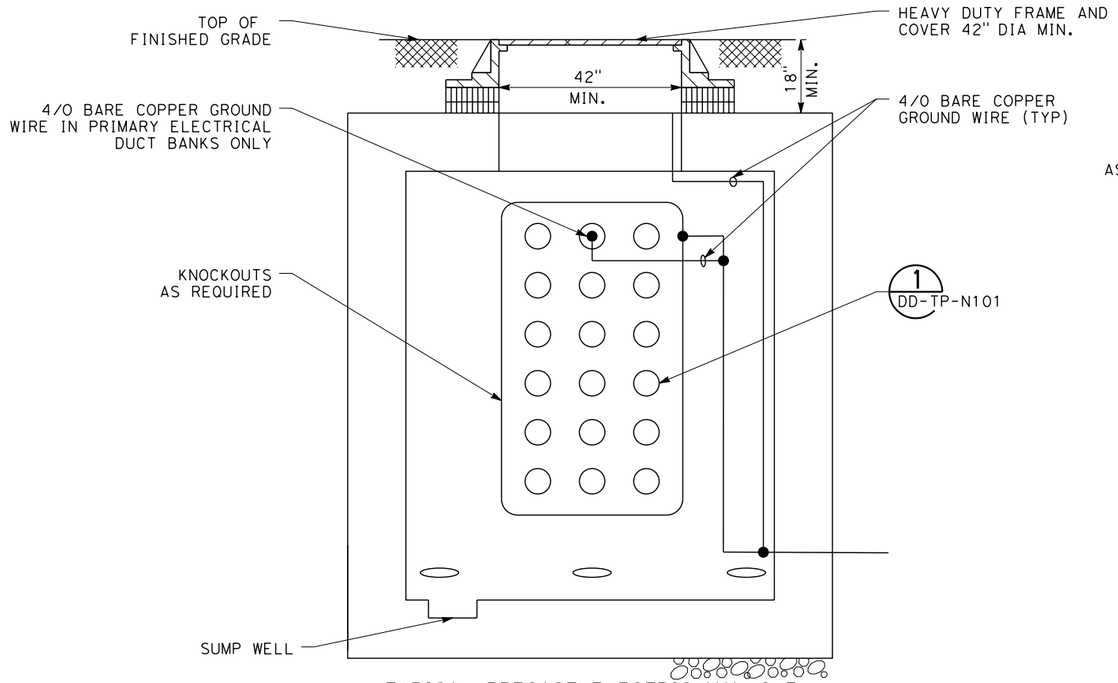
PLAN
TYPICAL PRECAST ELECTRIC MANHOLE



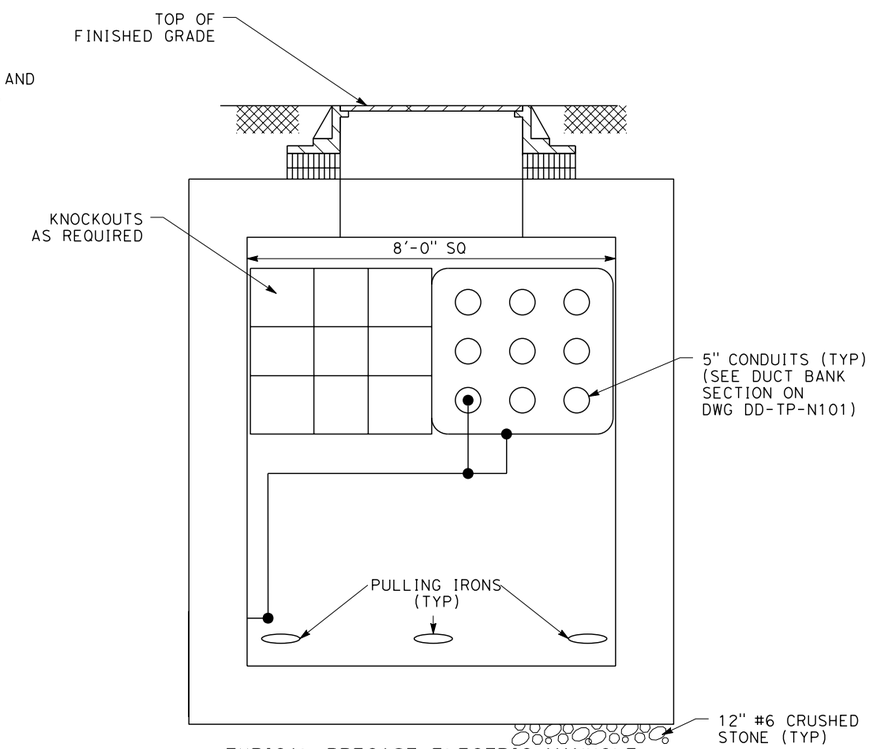
PLAN
ELECTRIC MANHOLE FRAME AND COVER DETAIL

NOTES:

1. THIS DRAWING SHOWS TYPICAL DUCT BANK KNOCKOUTS IN A PRECAST MANHOLE. EXACT DETAILS TO BE WORKED OUT AT DETAILED DESIGN LEVEL.
2. ALL TRACTION POWER MANHOLES SHALL BE TYPICALLY 8'-0"L X 8'-0"W X 9'-0" DEEP (INSIDE DIMENSIONS) AND BE WATERTIGHT WITH SILICON SEALING COMPOUND, OR APPROVED EQUAL.
3. THE MANHOLE FRAME SHALL BE GROUTED TO THE ROOF SLAB.
4. THICKNESS OF MANHOLE WALL SHALL BE 8" MINIMUM.
5. APPROVED CABLE RACK ARMS TO BE INSTALLED TO ACCOMMODATE CABLE, MINIMUM 2 RACKS PER WALL (TYP).
6. PULLING HOOKS TO BE GALVANIZED STEEL, SUPPLIED AND CAST INTO WALLS BY PRECASTER. ANCHORED BEHIND REINFORCEMENT, QUANTITY AND LOCATION TO SUIT.
7. CONNECT ALL METALLIC PARTS, FRAME, PULLING HOOKS, ETC., TO THE TRACTION POWER FACILITY GROUND GRID OR GROUND ROD.
8. PROVIDE FOR CONNECTION TO A PORTABLE PUMP TO REMOVE ACCUMULATED WATER FROM THE MANHOLE OR OTHER SITE SPECIFIC DRAINAGE SYSTEM.



TYPICAL PRECAST ELECTRIC MANHOLE
SECTION A
NO SCALE



TYPICAL PRECAST ELECTRIC MANHOLE
SECTION B
NO SCALE

DIRECTIVE DRAWINGS

03/08/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY V. SIBAL
DRAWN BY V. HUANTE
CHECKED BY M. PAZ
IN CHARGE R. SCHMEDES
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
TRACTION POWER DIRECTIVE

TYPICAL 25KV MANHOLE DETAILS

CONTRACT NO.
DRAWING NO. DD-TP-N111
SCALE NO SCALE
SHEET NO.

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California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16

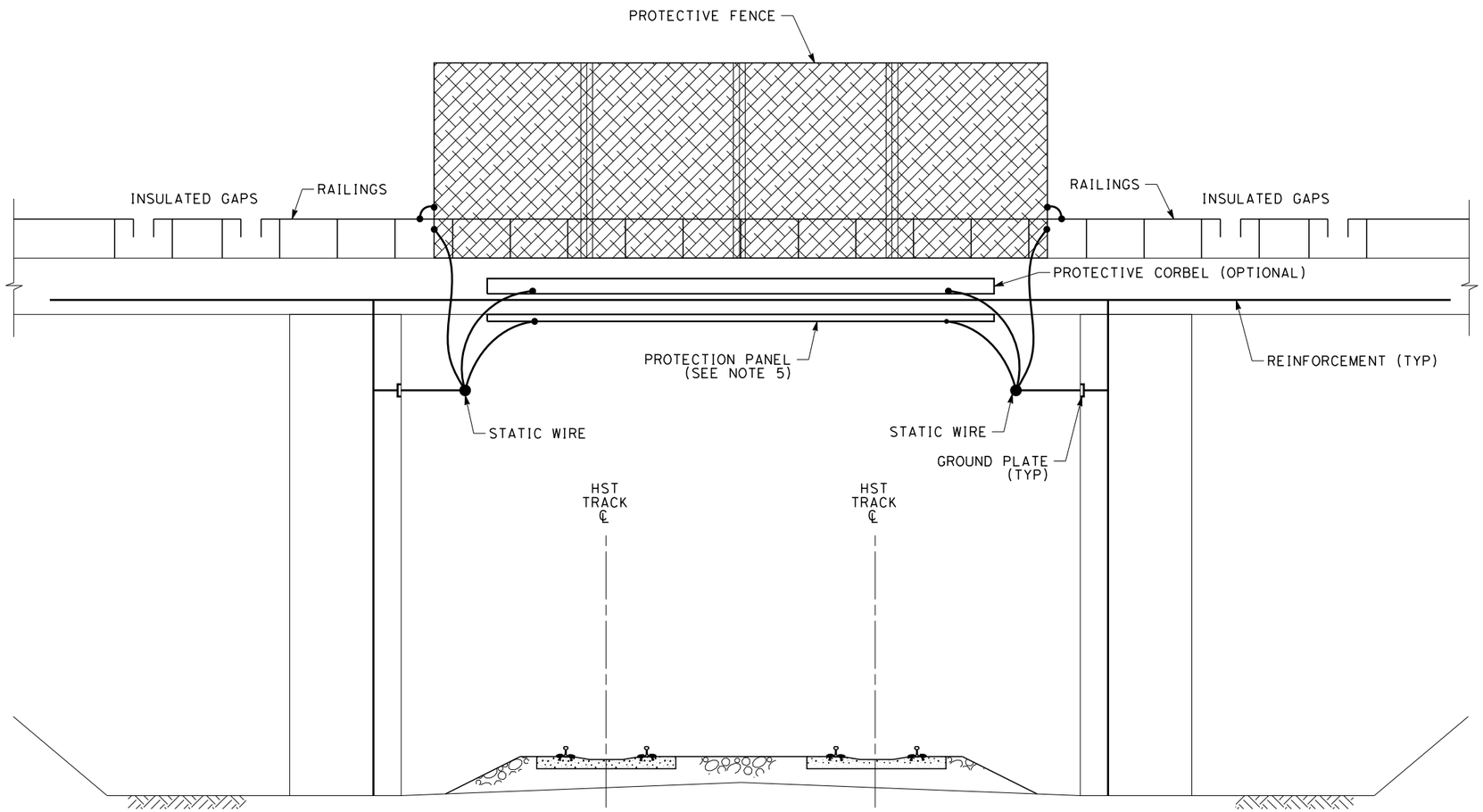
Directive Drawings

Overhead Contact System

03/08/2012 RFP HSR 11-16

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. SMALL METALLIC ITEMS, SUCH AS RAILING, FENCE ETC, BEYOND THE STEP AND TOUCH POTENTIAL LIMIT NEED NOT BE GROUNDED. THE STEP AND TOUCH POTENTIAL EXISTS WITHIN 8' OF A STANDING TRAIN. 8' FROM ANY ELECTRICALLY CONTINUOUS BONDED FENCE, OR 8' FROM ANY METALLIC ITEM BONDED TO STATIC WIRE.
3. GROUNDING DETAILS DESIGN SHALL BE COORDINATED WITH OVERPASS STRUCTURE DESIGNER.
4. OVERHEAD BRIDGE GROUNDING AND BONDING DETAILS SHOWN IN DRAWING ARE GENERIC IN NATURE. THE FINAL DESIGNER SHALL PROVIDE DETAIL ASSEMBLIES AND COMPONENTS THAT MEET THE REQUIREMENT.
5. GALVANIZED STEEL STRIP OR ANGLE SECTION SHALL BE INSTALLED ABOVE THE OVERHEAD LINE AT EACH BRIDGE FACE, IF THE BRIDGE SOFFIT IS WITHIN THE PANTOGRAPH ZONE. WHEN THE VERTICAL CLEARANCE BETWEEN OCS CONDUCTORS AND CONCRETE OVERPASSES IS LESS THAN 3 FEET, PROTECTION PANELS (FLASH PLATES) SHALL BE INSTALLED ABOVE THE OCS, ATTACHED TO THE UNDERSIDE OF THE STRUCTURE, AND INTERCONNECTED TO THE STATIC WIRE AT NOT LESS THAN TWO LOCATIONS.



TYPICAL GRADE SEPARATED STRUCTURE GROUNDING AND BONDING

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY J. LAU
DRAWN BY T. DOUNG
CHECKED BY M. HSIAO
IN CHARGE R. SCHMEDES
DATE 03/01/12

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
OVERHEAD CONTACT SYSTEM DIRECTIVE

TYPICAL GROUNDING AND BONDING ARRANGEMENT
GRADE SEPARATED STRUCTURE
220 MPH SEGMENT

CONTRACT NO.
DRAWING NO. DD-OC-2046
SCALE NO SCALE
SHEET NO.

03/08/2012 RFP HSR 11-16

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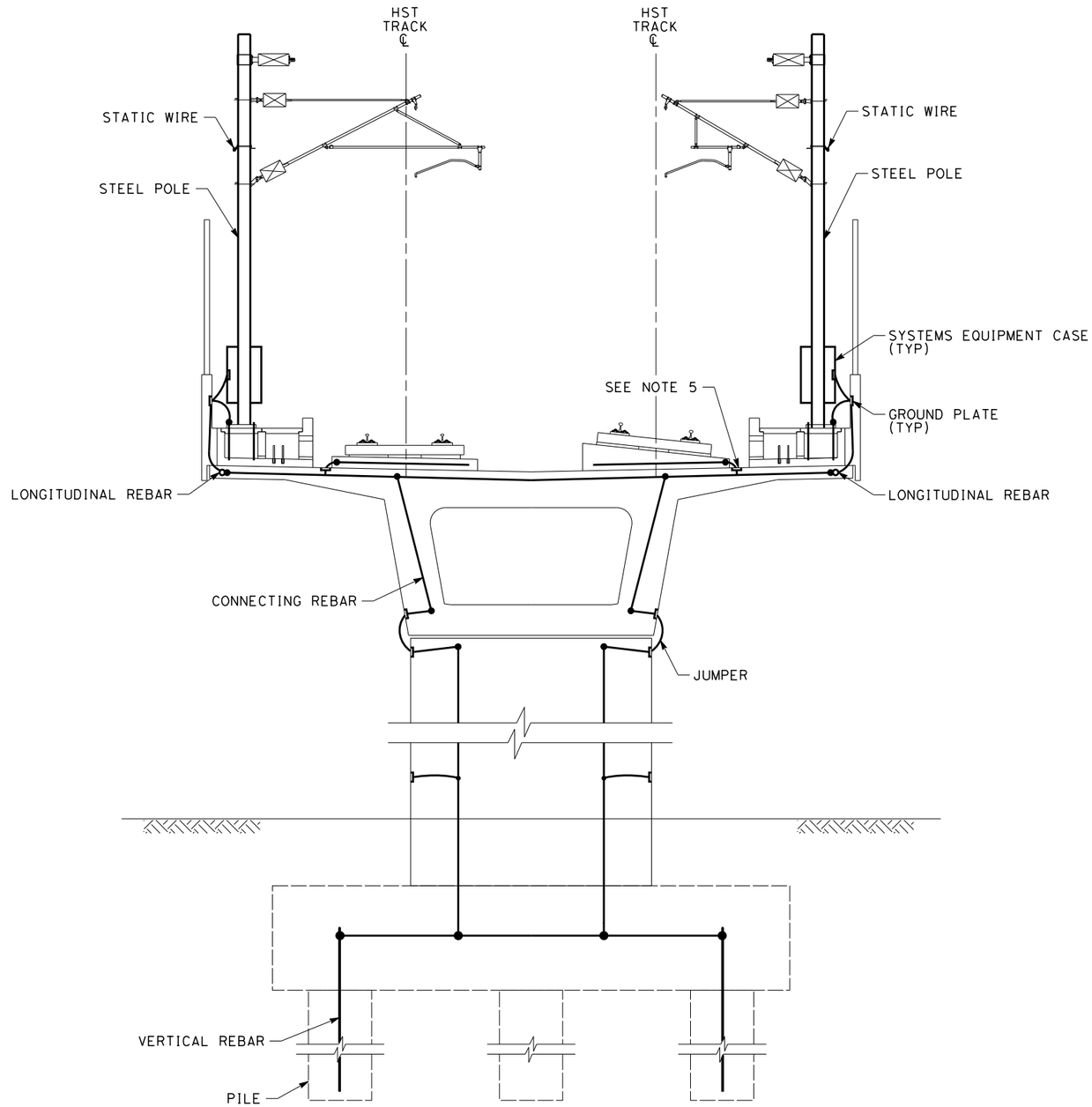


TYPICAL OCS GROUNDING AND BONDING
AT AERIAL STRUCTURE

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. GROUNDING AND BONDING DETAIL DESIGN SHALL BE COORDINATED WITH AERIAL STRUCTURE DESIGNER.
3. THE GROUNDING AND BONDING FOR THE EMERGENCY WALKWAY AREA AND OTHER PUBLICLY ACCESSIBLE AREAS SHALL BE DESIGNED TO AVOID INADMISSIBLE TOUCH AND STEP VOLTAGES AND ALSO MEET THE SIGNALING OPERATION REQUIREMENTS.
4. FOR LOCATIONS OF THE GROUND PLATES, SEE GROUNDING AND BONDING DESIGN CRITERIA FOR DETAIL.
5. THE GROUND PLATES ON THE AERIAL STRUCTURE SLAB SHALL BE PLACED BETWEEN THE EDGE OF THE TRACK SLAB AND DERAILMENT WALL.
6. THE GROUND PLATE SHALL BE NO LESS THAN 6"x6" IN DIMENSION.

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY J. LAU
DRAWN BY T. DOUNG
CHECKED BY M. HSIAO
IN CHARGE R. SCHMEDES
DATE 03/01/12

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
OVERHEAD CONTACT SYSTEM DIRECTIVE

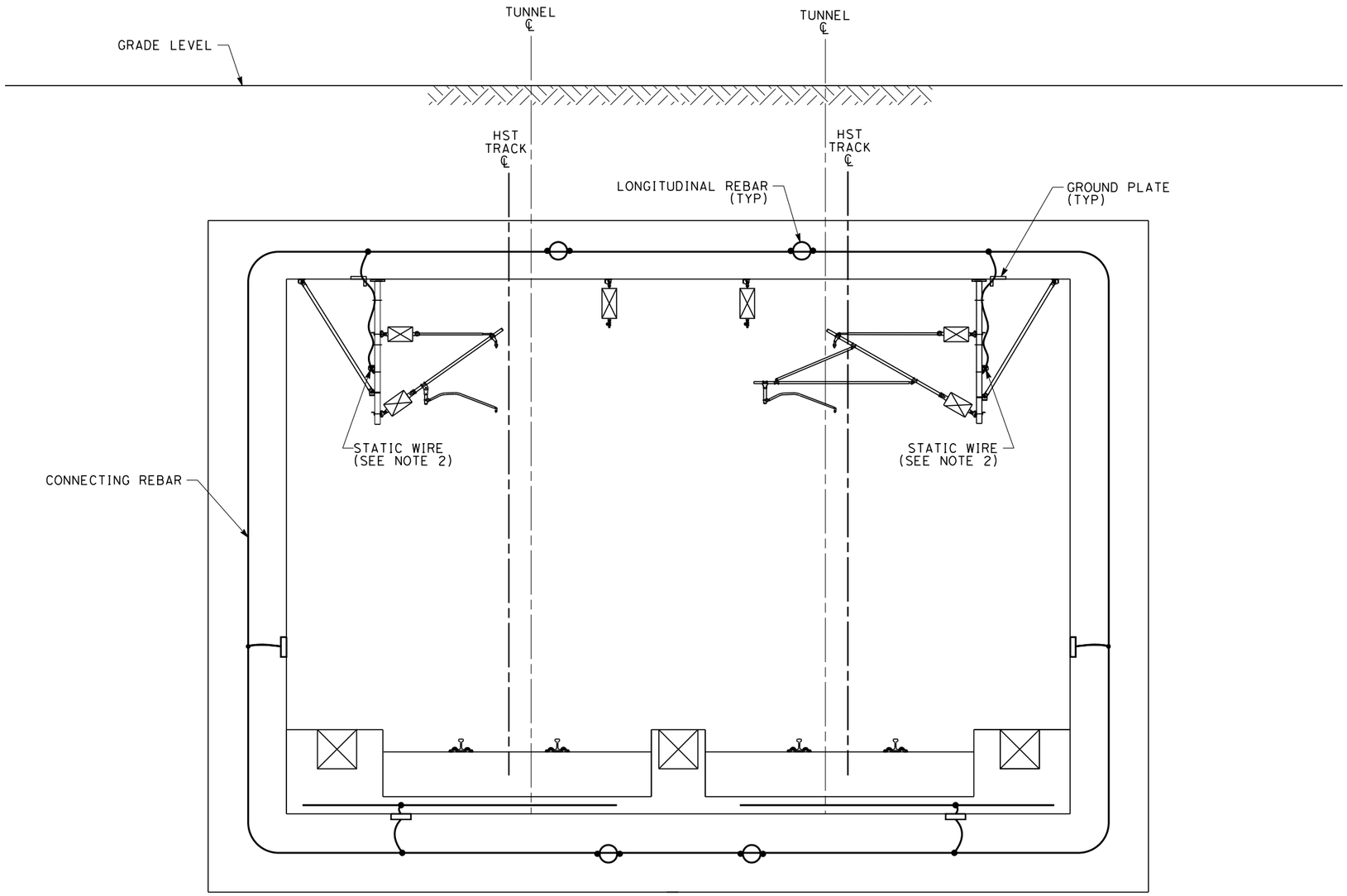
TYPICAL GROUNDING AND BONDING ARRANGEMENT
AERIAL STRUCTURE
220 MPH SEGMENT

CONTRACT NO.
DRAWING NO. DD-OC-2047
SCALE NO SCALE
SHEET NO.

z:\ENG\CHSTP\CADD\PMT\CADD\Directive Drawings\ocs DD\DD-OC-2047.dgn $PLTDRVS$ $PENTBLS$ 2/14/2012 2:23:14 PM CAD4

NOTES:

1. GROUNDING AND BONDING DETAILS DESIGN SHALL BE COORDINATED WITH CIVIL DESIGNER.
2. EACH STATIC WIRE SHALL BE BONDED TO THE TUNNEL REBAR WITH THE ADEQUATE INTERVAL TO MEET THE STEP AND TOUCH POTENTIAL SAFETY REQUIREMENTS, BUT NOT LESS THAN TWO CONNECTIONS PER STRUCTURE.
3. THE GROUND PLATE SHALL BE NO LESS THAN 6"x6" IN DIMENSION.
4. FOR REQUIRED LOCATIONS OF THE GROUND PLATES, SEE GROUNDING AND BONDING DESIGN CRITERIA FOR DETAIL.



TYPICAL GROUNDING AND BONDING ARRANGEMENT
(IN CUT AND COVER TUNNEL)

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY J. LAU
DRAWN BY T. DOUNG
CHECKED BY M. HSIAO
IN CHARGE R. SCHMEDES
DATE 03/01/12

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
OVERHEAD CONTACT SYSTEM DIRECTIVE

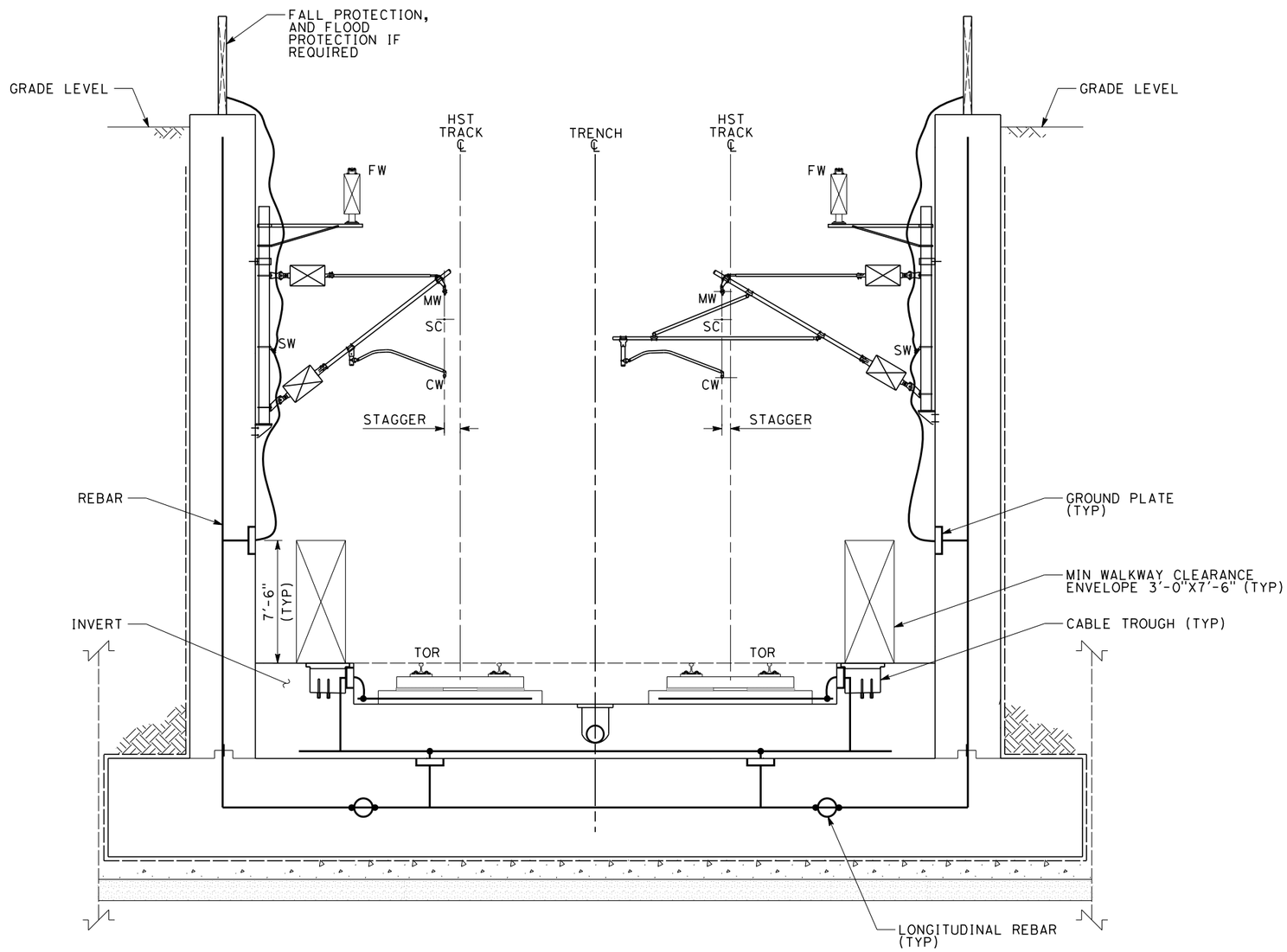
TYPICAL GROUNDING AND BONDING ARRANGEMENT
CUT AND COVER TUNNEL
220 MPH SEGMENT

CONTRACT NO.
DRAWING NO. DD-OC-2048
SCALE NO SCALE
SHEET NO.

CAD4 2/14/2012 2:23:36 PM $PENTBLS$ $PLTDRVS$ z:\ENG\CHSTP\CADD\PMT\CADD\Directive Drawings\ocs DD\DD-OC-2048.dgn

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. THE CROSSOVER OVERLAP CATENARIES HAVE TO BE SEPARATED BY A TYPICAL AIR GAP OF 18", EVEN WHEN OUT OF RUNNING CONTACT WIRE CROSSES THE OTHER CATENARY TO THE ANCHOR.
3. THE DESIGN OF CROSSOVER OVERLAP SHALL ENSURE COMPLIANT TRAINS MOVING SMOOTHLY FROM MAINLINE TRACK CATENARY THROUGH THE CROSSOVER TRACK CATENARY AND BACK TO MAINLINE TRACK CATENARY TO CLEAR OF THE PANTOGRAPH ENVELOPE.
4. THE GROUND PLATE SHALL BE NO LESS THAN 6"x6" IN DIMENSION



TYPICAL OCS SUPPORT STRUCTURES
OPEN TRENCH ON TANGENT TRACKS
WITH CENTER WALKWAY

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY J. LAU
DRAWN BY T. DOUNG
CHECKED BY M. HSIAO
IN CHARGE R. SCHMEDES
DATE 03/01/12

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
OVERHEAD CONTACT SYSTEM DIRECTIVE

GROUNDING AND BONDING ARRANGEMENT
OPEN TRENCH
220 MPH SEGMENT

CONTRACT NO.
DRAWING NO. DD-OC-2049
SCALE NO SCALE
SHEET NO.

03/08/2012 RFP HSR 11-16

CAD4 2/14/2012 2:24:03 PM $PENTBLS$ $PLTDRVS$ z:\ENG\CHSTP\CADD\PMT\CADD\Directive Drawings\ocs DD\DD-OC-2049.dgn

California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16

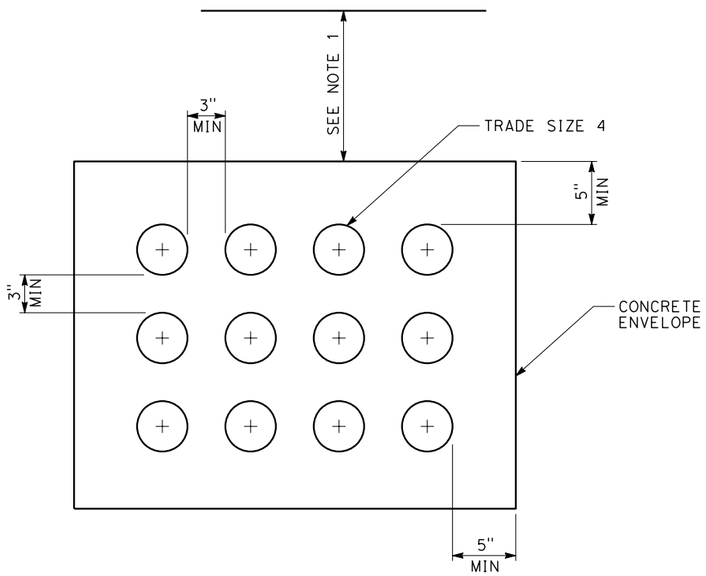
Directive Drawings

Communications

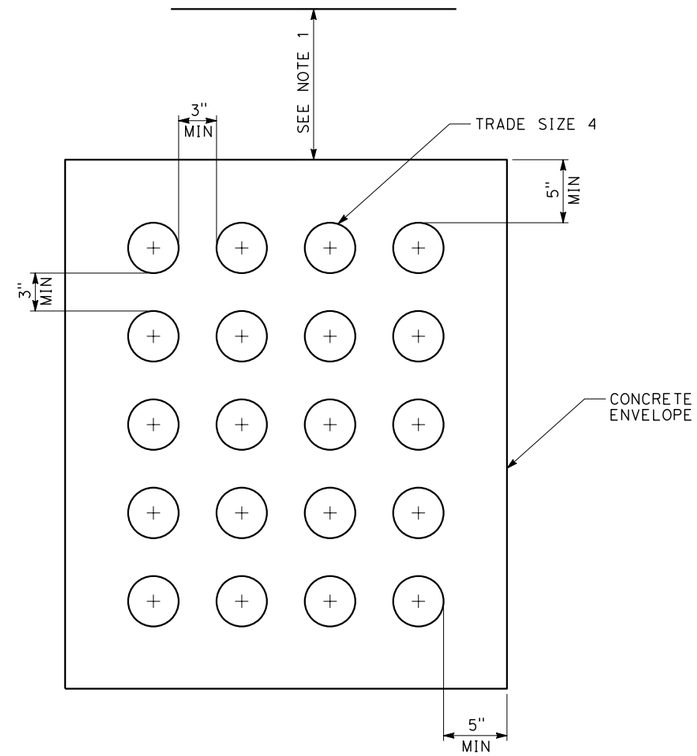
03/08/2012 RFP HSR 11-16

NOTES:

1. CONCRETE ENCASED DUCT BANK TO BE PLACED A MINIMUM 6' BELOW TOP OF RAIL AND MINIMUM 3' BELOW GRADE WHEN NO RAIL IS PRESENT.
2. LOW VOLTAGE DUCT BANK TO BE LOCATED PER THE CRITERIA LISTED IN THE COMMUNICATIONS DESIGN CRITERIA CHAPTER.



12 CONDUIT CONCRETE ENCASED DUCT BANK



20 CONDUIT CONCRETE ENCASED DUCT BANK

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY B. BANKS
DRAWN BY V. HUANTE
CHECKED BY C. DALOIA
IN CHARGE R. SCHMEDES
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE

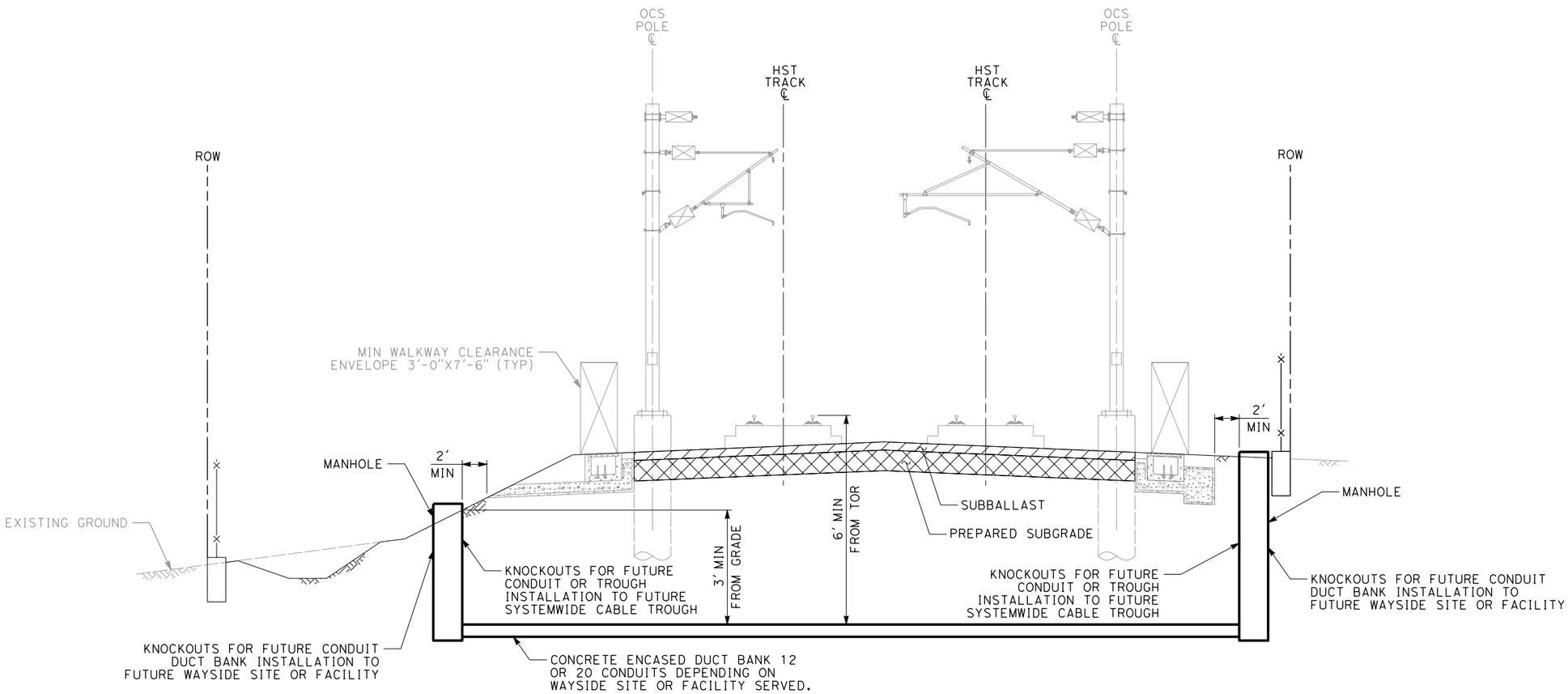
TYPICAL CROSS SECTION
SYSTEMS LOW-VOLTAGE
CONDUIT DUCT BANK

CONTRACT NO.
DRAWING NO. DD-CO-G021
SCALE NO SCALE
SHEET NO.

huante 3/1/2012 3:29:01 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Systems\Comms\Directive\DD-CO-G021.dgn

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. TOP OF MANHOLE STRUCTURE SHALL NOMINALLY BE 2" ABOVE GRADE.



DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY B. BANKS
DRAWN BY V. HUANTE
CHECKED BY C. DALOIA
IN CHARGE R. SCHMEDES
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE
TYPICAL CROSS SECTION
SYSTEMS LOW-VOLTAGE
UNDERTRACK CONDUCT CONDUIT DUCT BANK
AT-GRADE

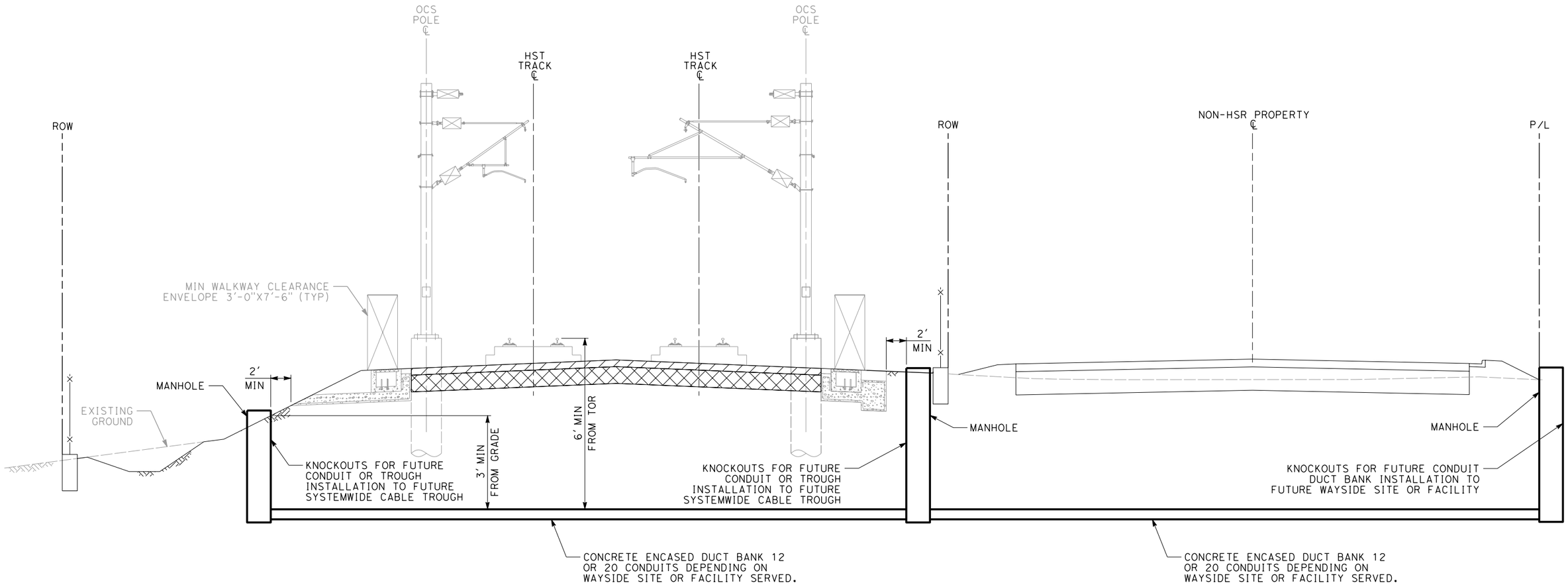
CONTRACT NO.
DRAWING NO. DD-CO-G022
SCALE NO SCALE
SHEET NO.

huante 3/1/2012 3:34:40 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Systems\Comms\Directive\DD-CO-G022.dgn

03/08/2012 RFP HSR 11-16

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. TOP OF MANHOLE STRUCTURE SHALL NOMINALLY BE 2" ABOVE GRADE.



03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY B. BANKS
DRAWN BY V. HUANTE
CHECKED BY C. DALOIA
IN CHARGE R. SCHMEDES
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

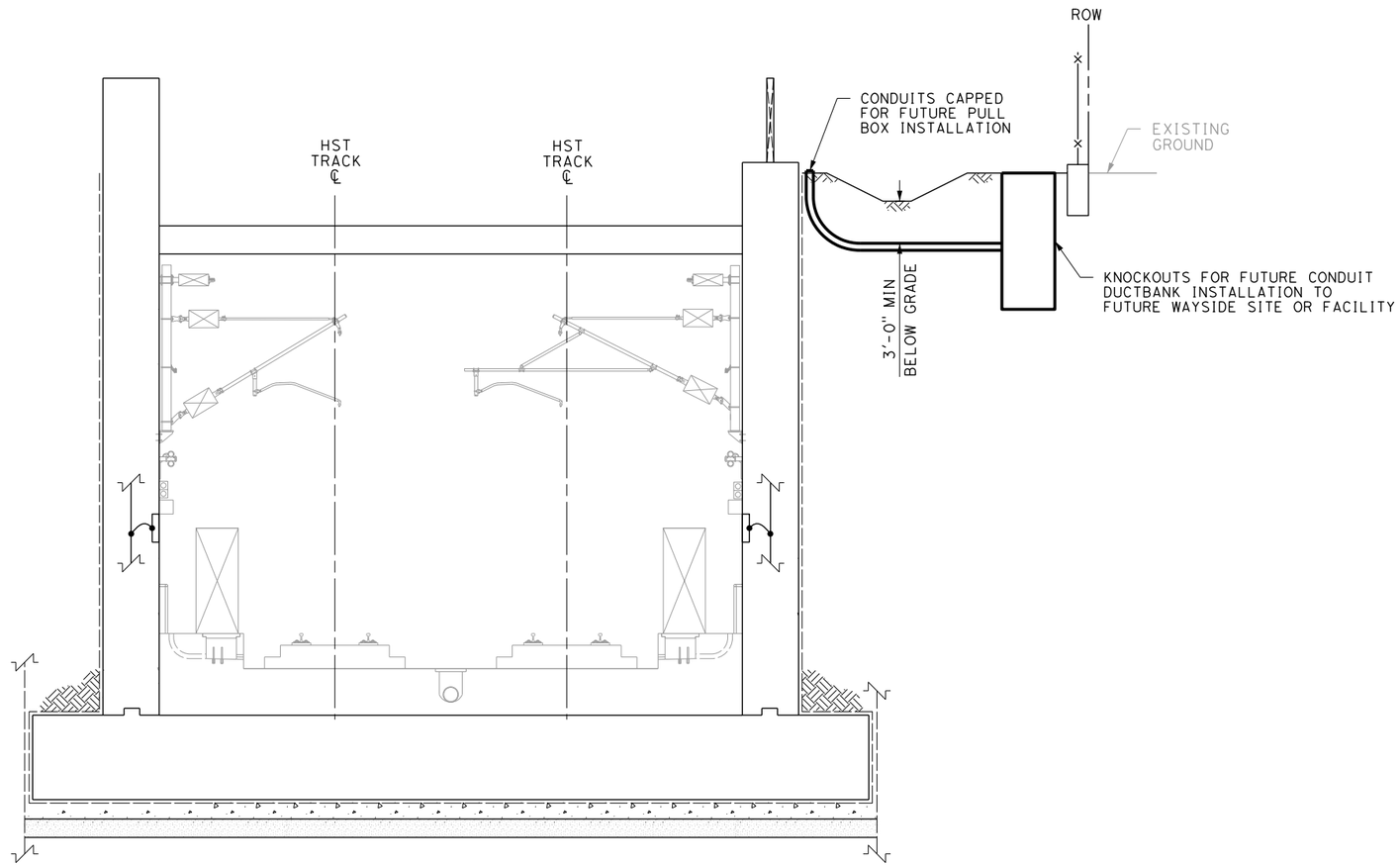
CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE
TYPICAL CROSS SECTION
SYSTEMS LOW-VOLTAGE
UNDER TRACK/UNDERGROUND CONDUCT DUCT BANK
AT-GRADE

CONTRACT NO.
DRAWING NO. DD-CO-G023
SCALE NO SCALE
SHEET NO.

huante 3/1/2012 3:45:22 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Systems\Comms\Directive\DD-CO-G023.dgn

NOTES:

1. TRACK, SYSTEMS AND DRAINAGE ARE SCHEMATIC AND DO NOT REPRESENT DESIGN.
2. MANHOLE AND CONDUIT TO BE PLACED ON SIDE OF WAYSIDE LOCATION.
3. TOP OF MANHOLE STRUCTURE SHALL NOMINALLY BE 2" ABOVE GRADE.



TYPICAL TRENCH SECTION

03/08/2012 RFP HSR 11-16

DIRECTIVE DRAWINGS

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY B. BANKS
DRAWN BY V. HUANTE
CHECKED BY C. DALOIA
IN CHARGE R. SCHMEDES
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
COMMUNICATIONS DIRECTIVE
TYPICAL CROSS SECTIONS
SYSTEMS LOW-VOLTAGE
UNDERGROUND CONDUIT DUCT BANK INSTALLATIONS
TWO TRACK TRENCH

CONTRACT NO.
DRAWING NO. DD-CO-G024
SCALE NO SCALE
SHEET NO.

mincio 3/1/2012 4:47:21 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Systems\Comms\Directive\DD-CO-G024.dgn

California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16
Preliminary Ground Motion Data

03/08/2012 RFP HSR 11-16

Revision No.	Date	Description
0	01 Mar 12	Initial Release, R0

Prepared for

CALIFORNIA High-Speed Rail Authority

Table of Contents

GROUND MOTION DESCRIPTION
GROUND MOTION ZONE MAP
DESIGN SPECTRA ZONES 1 TO 7 – OBE & MCE
TIME HISTORY ZONES 1 TO 7 – OBE (1)
TIME HISTORY ZONES 1 TO 7 – MCE (1)

(1) Data points not plotted, see Attachments for data point files.

03/08/2012 RFP HSR 11-16

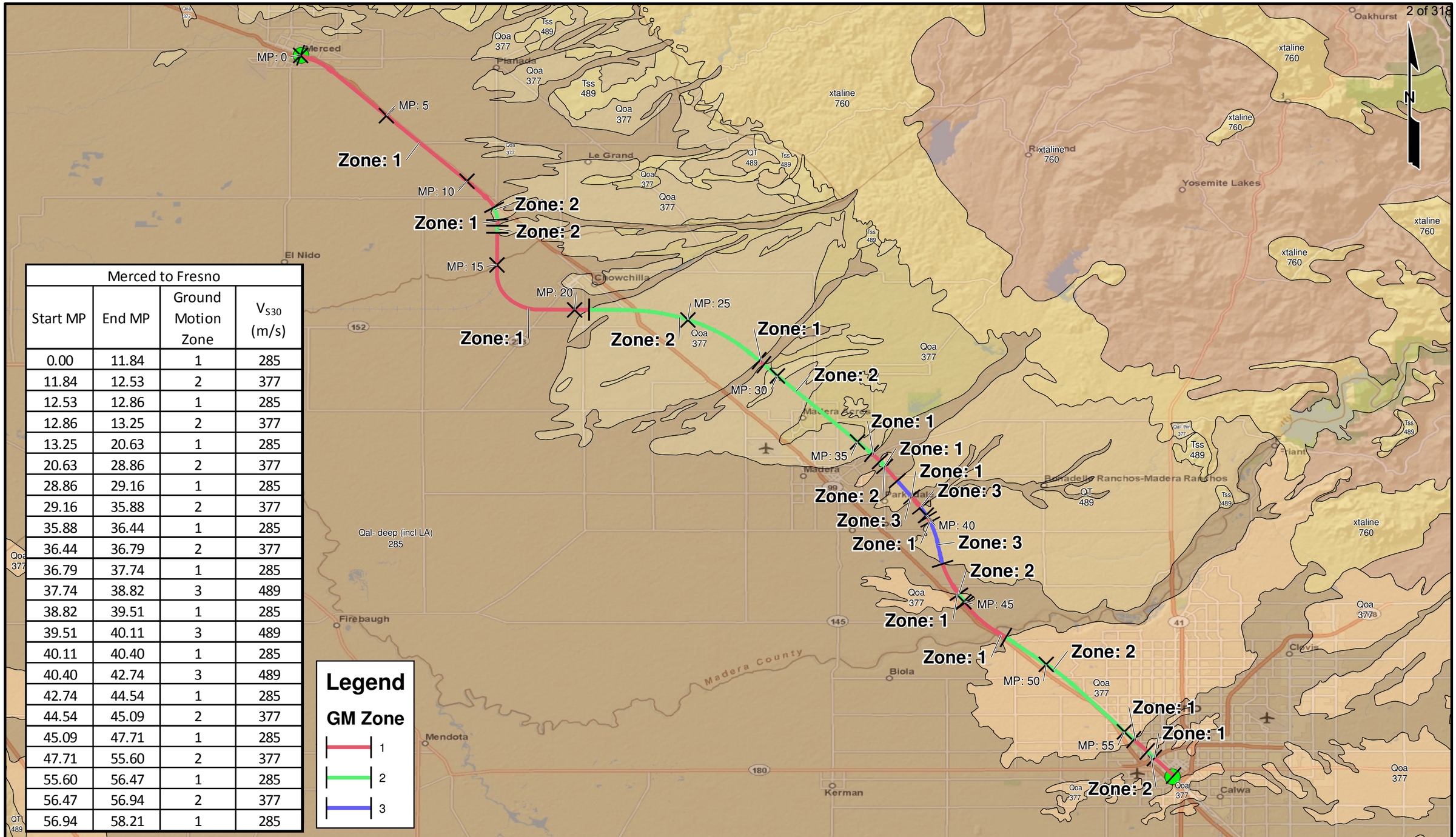
GROUND MOTIONS FOR PRELIMINARY DESIGN OF CALIFORNIA HIGH SPEED RAIL PROJECT

Ground motions are provided for all seven zones in the Merced to Bakersfield segments of the California High Speed Train Project. The Ground Motion Zone Map defines the limits of these zones. This section includes digital formats of the ground motions, developed for preliminary design at Operating Basis Earthquake (OBE) and Maximum Considered Earthquake (MCE) seismic hazard levels, and the documented plots for these motions.

Included are the design spectra and seven digitally formatted files of developed ground motions for the OBE and MCE seismic design events, respectively. Each file includes seven sets of spectrally-matched motions (SMMs). Each SMM set, denoted by a Next Generation Attenuation (NGA) Models number (e.g., NGA_no_1208) leading the filename, includes three files representing for three components in Horizontal 1 (H1-), Horizontal 2 (H2-), and Vertical (V-) directions, respectively. Each of these three files includes the number of data points, time interval, two dummy numbers, and the digital formats for acceleration (denoted by *accel* in units of g), velocity (denoted by *vel* in units of cm/s), and displacement (denoted by *displ* in units of cm) history.

The Word files for documented plots, ground motion metrics for selected seed motions and SMMs are first listed in a table. These metrics are earthquake name, year of the earthquake event, station name, moment magnitude (Mw), and distance (R) for each selected seed motion, and peak ground acceleration (PGA), peak ground velocity (PGV), peak ground displacement (PGD) in H1-, H2-, and V-directions, respectively, for each SMM. This is followed by 21 plates, each of which presents plots of time histories and SMM spectrum plotted against design spectrum for one component of the developed ground motions. The NGA number appeared in the filename of digital formats also services as a reference (appeared as NGA#) to the documented plots of the developed ground motions. In each plate, plots in the left show the time histories of acceleration (A), velocity (V), and displacement (D) of SMM. A signed peak value is shown at the right of each time history plot. Positive peak value for A, V, or D is located above the baseline of the time history, while negative peak value is shown below the baseline. In the right plot of each plate, the computed SMM spectrum is plotted against the target spectrum.

03/08/2012 RFP HSR 11-16



Merced to Fresno			
Start MP	End MP	Ground Motion Zone	V_{S30} (m/s)
0.00	11.84	1	285
11.84	12.53	2	377
12.53	12.86	1	285
12.86	13.25	2	377
13.25	20.63	1	285
20.63	28.86	2	377
28.86	29.16	1	285
29.16	35.88	2	377
35.88	36.44	1	285
36.44	36.79	2	377
36.79	37.74	1	285
37.74	38.82	3	489
38.82	39.51	1	285
39.51	40.11	3	489
40.11	40.40	1	285
40.40	42.74	3	489
42.74	44.54	1	285
44.54	45.09	2	377
45.09	47.71	1	285
47.71	55.60	2	377
55.60	56.47	1	285
56.47	56.94	2	377
56.94	58.21	1	285

Legend

GM Zone

1
2
3

0 2.5 5 10 Miles

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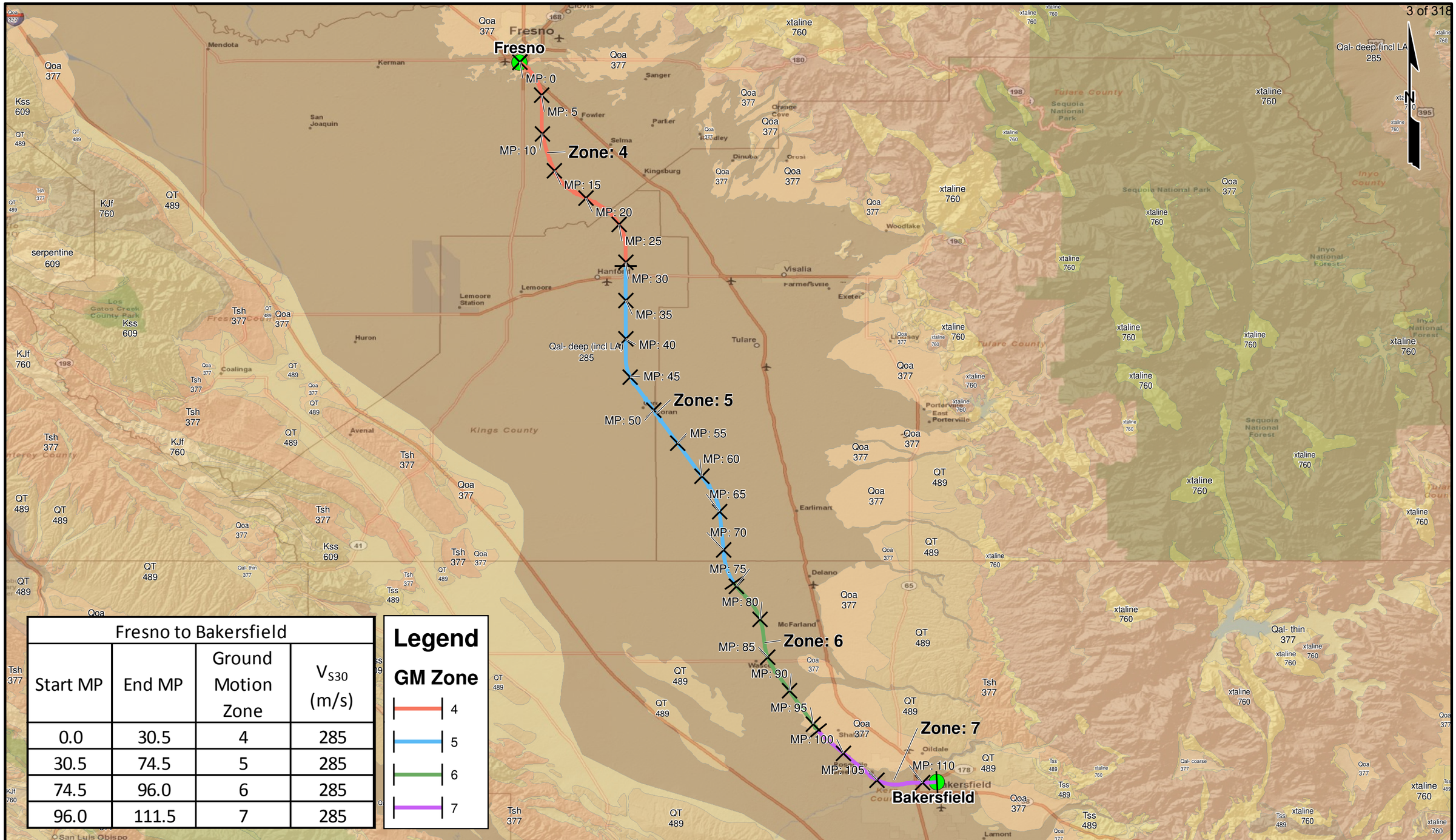
PROJECT NO.	112153
DRAWN:	4/1/11
DRAWN BY:	I.McGovern
CHECKED BY:	Z.Zafir
FILE NAME:	VS30 M-Fre.MXD

GROUND MOTION ZONE MAP
MERCED TO FRESNO

CALIFORNIA HIGHSPEED TRAIN PROJECT
30% DESIGN GROUND MOTIONS

PLATE
3-4

03/08/2012 RFP HSR 11-16



Fresno to Bakersfield			
Start MP	End MP	Ground Motion Zone	V_{S30} (m/s)
0.0	30.5	4	285
30.5	74.5	5	285
74.5	96.0	6	285
96.0	111.5	7	285

Legend

GM Zone

- 4
- 5
- 6
- 7

0 6 12 24 Miles

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PROJECT NO.	112153
DRAWN:	6/24/11
DRAWN BY:	I.McGovern
CHECKED BY:	Z.Zafir
FILE NAME:	VS30 F-B.MXD

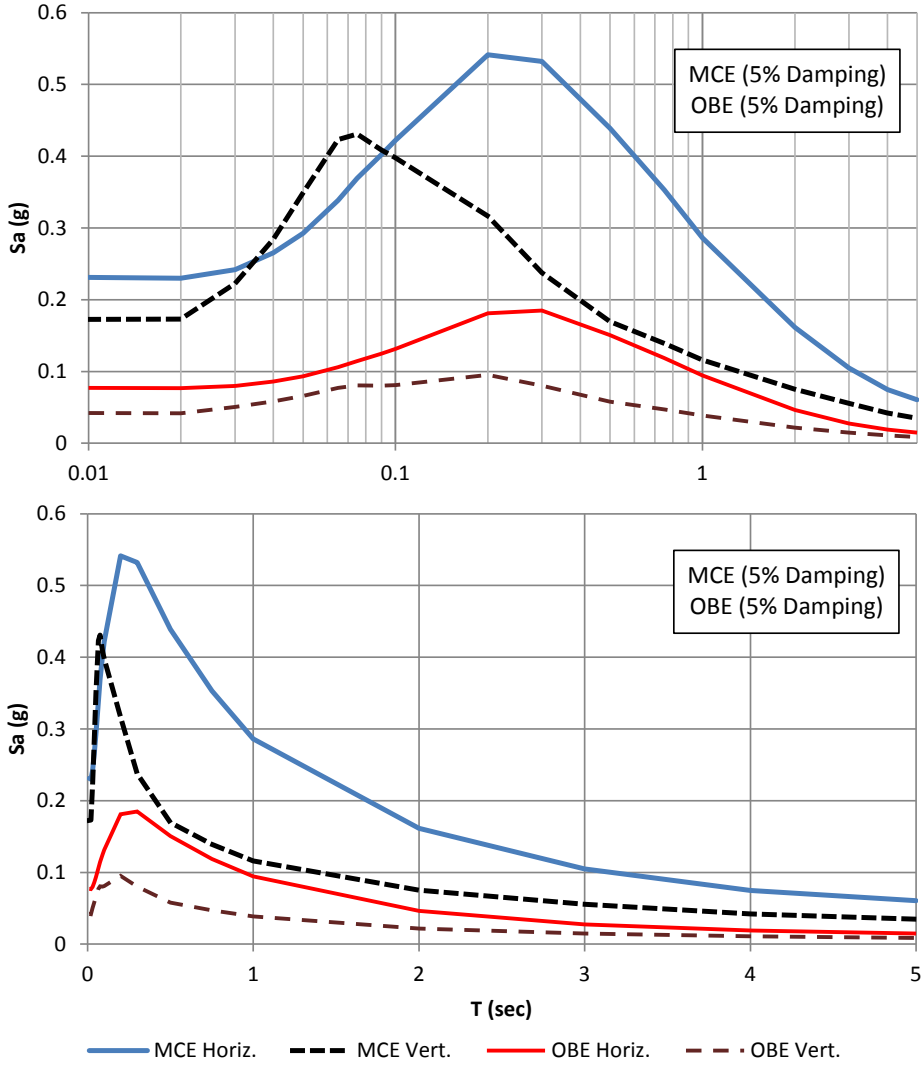
GROUND MOTION ZONE MAP
FRESNO TO BAKERSFIELD

CALIFORNIA HIGHSPEED TRAIN PROJECT
30% DESIGN GROUND MOTIONS

PLATE
3-5

03/08/2012 RFP HSR 11-16

Merced-Fresno Segment, Zone 1



Period, T (sec)	Spectral Acceleration, Sa (g)				Period, T (sec)	Spectral Acceleration, Sa (g)			
	MCE (5%, 950 Years)		OBE (5%, 50 Years)			MCE (5%, 950 Years)		OBE (5%, 50 Years)	
	Horizontal	Vertical	Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical
0.01	0.2309	0.1727	0.0771	0.0419	0.2	0.5413	0.3164	0.1809	0.0951
0.02	0.2300	0.1730	0.0767	0.0417	0.3	0.5319	0.2376	0.1848	0.0800
0.03	0.2417	0.2227	0.0799	0.0504	0.5	0.4389	0.1694	0.1508	0.0580
0.04	0.2654	0.2843	0.0861	0.0581	0.75	0.3531	0.1391	0.1185	0.0469
0.05	0.2925	0.3491	0.0933	0.0659	1	0.2863	0.1161	0.0943	0.0385
0.065	0.3386	0.4231	0.1059	0.0770	2	0.1615	0.0750	0.0462	0.0218
0.075	0.3693	0.4308	0.1145	0.0806	3	0.1050	0.0556	0.0275	0.0148
0.09	0.4024	0.4087	0.1247	0.0803	4	0.0749	0.0422	0.0190	0.0109
0.1	0.4220	0.3977	0.1313	0.0808	5	0.0606	0.0346	0.0147	0.0085

SC SOLUTIONS

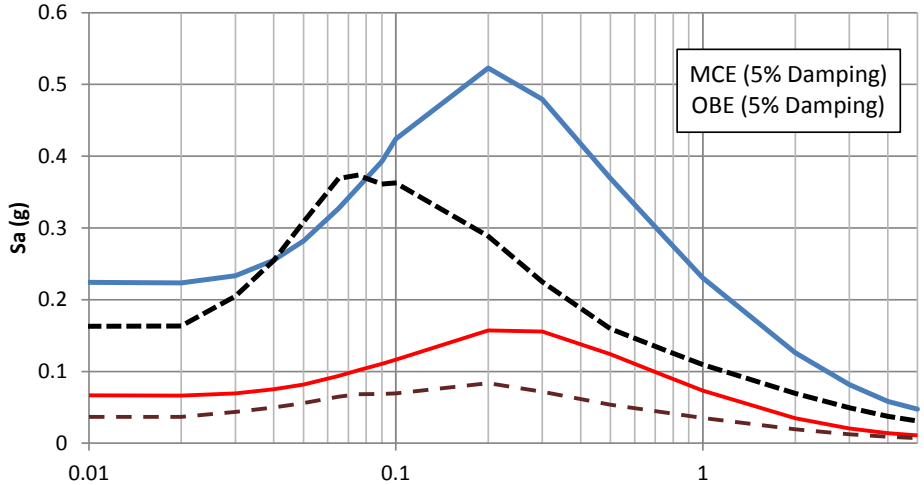
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/27/2012

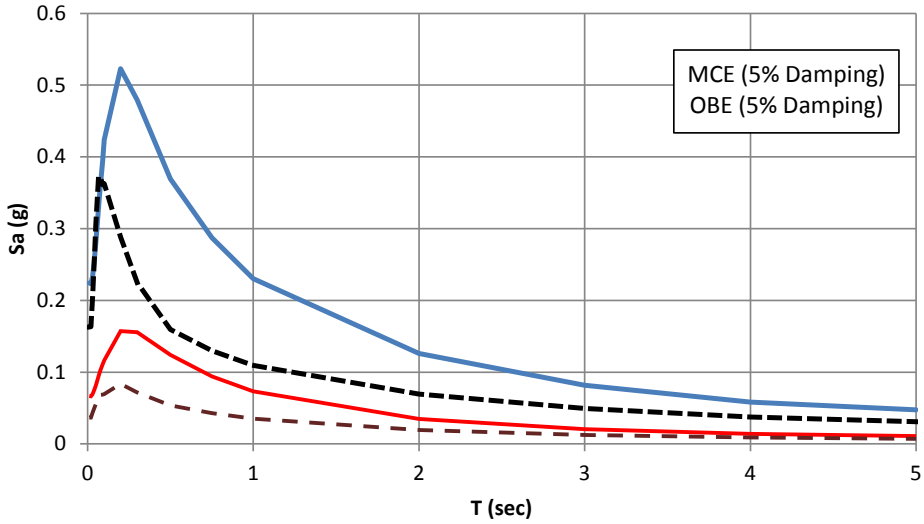
PLATE C-1. ZONE 1 DESIGN SPECTRA: OBE AND MCE

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO BAKERSFILED, CALIFORNIA

03/08/2012 RFP HSR 11-16

Merced-Fresno Segment, Zone 2





MCE Horiz. — MCE Vert. — OBE Horiz. — OBE Vert.

Period, T (sec)	Spectral Acceleration, Sa (g)				Period, T (sec)	Spectral Acceleration, Sa (g)			
	MCE (5%, 950 Years)		OBE (5%, 50 Years)			MCE (5%, 950 Years)		OBE (5%, 50 Years)	
	Horizontal	Vertical	Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical
0.01	0.2241	0.1631	0.0669	0.0367	0.2	0.5230	0.2884	0.1572	0.0836
0.02	0.2234	0.1632	0.0665	0.0366	0.3	0.4792	0.2248	0.1556	0.0719
0.03	0.2333	0.2048	0.0695	0.0436	0.5	0.3694	0.1596	0.1239	0.0537
0.04	0.2548	0.2546	0.0753	0.0496	0.75	0.2874	0.1300	0.0939	0.0429
0.05	0.2817	0.3085	0.0819	0.0558	1	0.2304	0.1094	0.0731	0.0351
0.065	0.3268	0.3688	0.0935	0.0648	2	0.1261	0.0693	0.0348	0.0194
0.075	0.3558	0.3734	0.1014	0.0681	3	0.0818	0.0494	0.0204	0.0125
0.09	0.3929	0.3610	0.1105	0.0686	4	0.0582	0.0374	0.0140	0.0091
0.1	0.4239	0.3628	0.1163	0.0695	5	0.0473	0.0308	0.0108	0.0071

SC SOLUTIONS

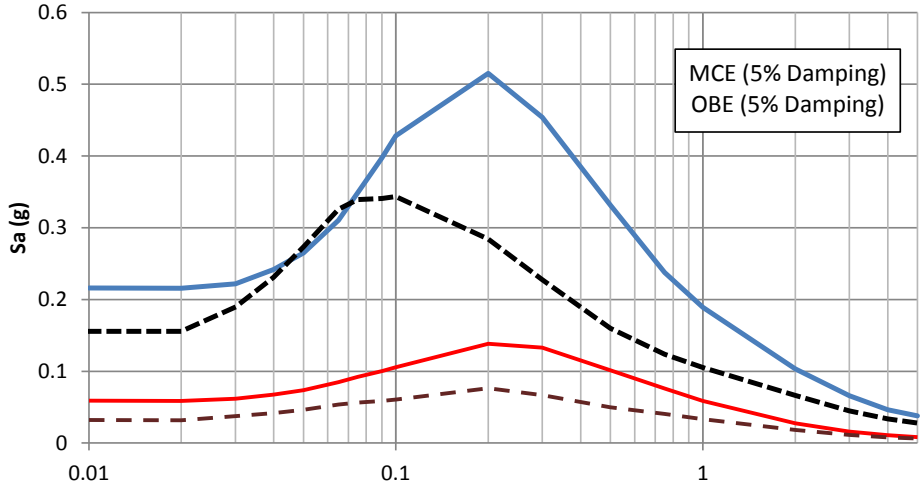
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/27/2012

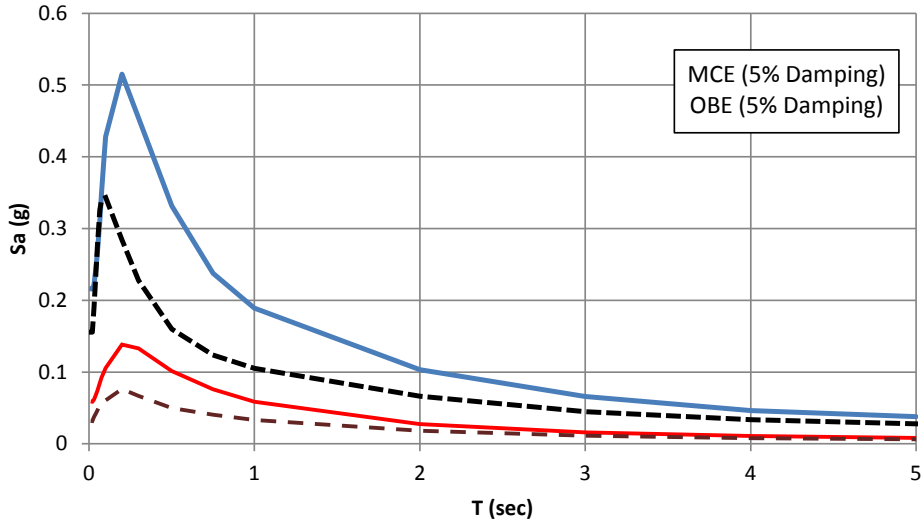
PLATE C-2. ZONE 2 DESIGN SPECTRA: OBE AND MCE

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO BAKERSFILED, CALIFORNIA

03/08/2012 RFP HSR 11-16

Merced-Fresno Segment, Zone 3



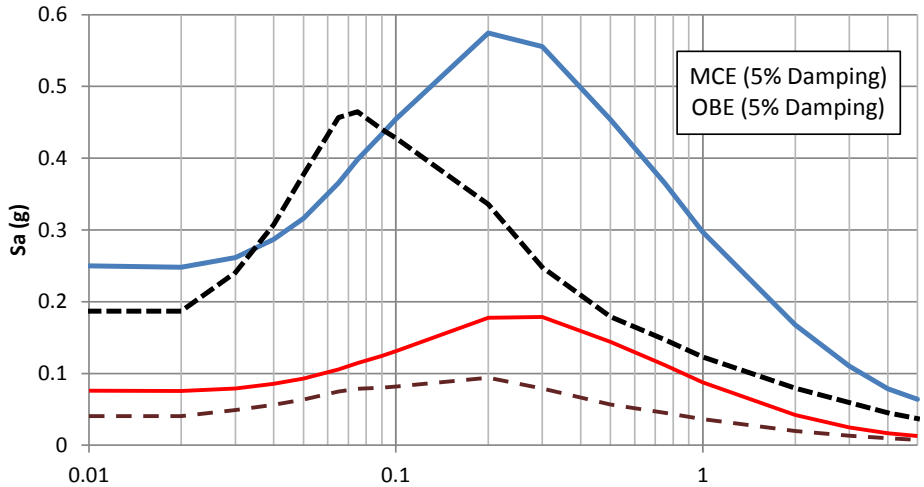


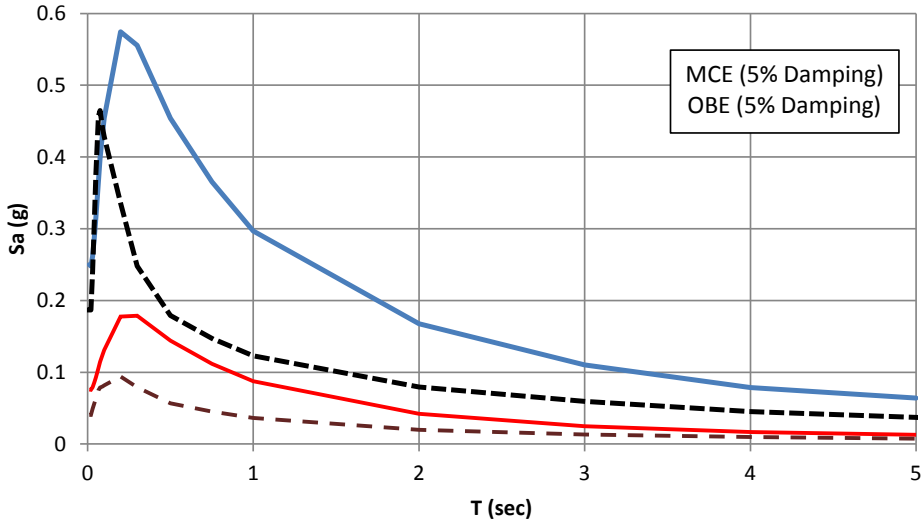
MCE Horiz. — MCE Vert. — OBE Horiz. — OBE Vert.

Period, T (sec)	Spectral Acceleration, Sa (g)				Period, T (sec)	Spectral Acceleration, Sa (g)			
	MCE (5%, 950 Years)		OBE (5%, 50 Years)			MCE (5%, 950 Years)		OBE (5%, 50 Years)	
	Horizontal	Vertical	Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical
0.01	0.2160	0.1558	0.0592	0.0319	0.2	0.5150	0.2842	0.1385	0.0764
0.02	0.2155	0.1558	0.0588	0.0317	0.3	0.4541	0.2275	0.1331	0.0667
0.03	0.2219	0.1896	0.0617	0.0373	0.5	0.3316	0.1597	0.1014	0.0499
0.04	0.2419	0.2311	0.0673	0.0418	0.75	0.2375	0.1235	0.0758	0.0404
0.05	0.2650	0.2736	0.0737	0.0464	1	0.1892	0.1051	0.0586	0.0334
0.065	0.3103	0.3259	0.0847	0.0536	2	0.1031	0.0662	0.0275	0.0181
0.075	0.3484	0.3393	0.0921	0.0565	3	0.0659	0.0448	0.0159	0.0111
0.09	0.3973	0.3408	0.1003	0.0586	4	0.0463	0.0335	0.0108	0.0080
0.1	0.4283	0.3436	0.1055	0.0607	5	0.0379	0.0278	0.0084	0.0063

SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/27/2012	**PLATE C-3. ZONE 3 DESIGN SPECTRA: OBE AND MCE** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO BAKERSFILED, CALIFORNIA

Fresno-Bakersfield Segment, Zone 4





MCE Horiz. — MCE Vert. — OBE Horiz. — OBE Vert.

Period, T (sec)	Spectral Acceleration, Sa (g)				Period, T (sec)	Spectral Acceleration, Sa (g)			
	MCE (5%, 950 Years)		OBE (5%, 50 Years)			MCE (5%, 950 Years)		OBE (5%, 50 Years)	
	Horizontal	Vertical	Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical
0.01	0.2498	0.1868	0.0761	0.0407	0.2	0.5745	0.3358	0.1775	0.0941
0.02	0.2482	0.1867	0.0757	0.0405	0.3	0.5556	0.2482	0.1789	0.0792
0.03	0.2613	0.2408	0.0790	0.0489	0.5	0.4538	0.1790	0.1441	0.0569
0.04	0.2870	0.3074	0.0854	0.0563	0.75	0.3654	0.1471	0.1117	0.0450
0.05	0.3160	0.3772	0.0927	0.0638	1	0.2969	0.1230	0.0875	0.0363
0.065	0.3655	0.4567	0.1056	0.0747	2	0.1677	0.0795	0.0421	0.0199
0.075	0.3982	0.4646	0.1143	0.0785	3	0.1101	0.0595	0.0247	0.0134
0.09	0.4334	0.4402	0.1244	0.0801	4	0.0787	0.0452	0.0168	0.0097
0.1	0.4542	0.4280	0.1310	0.0819	5	0.0639	0.0372	0.0130	0.0076

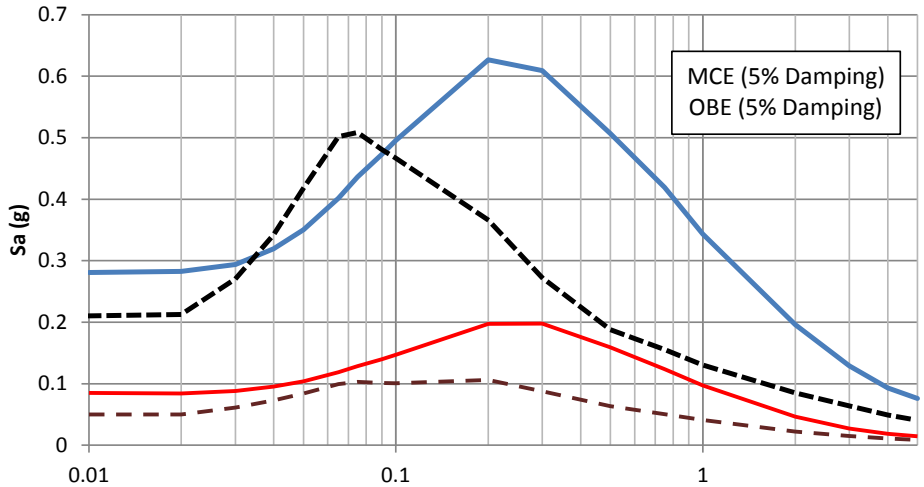
SC SOLUTIONS

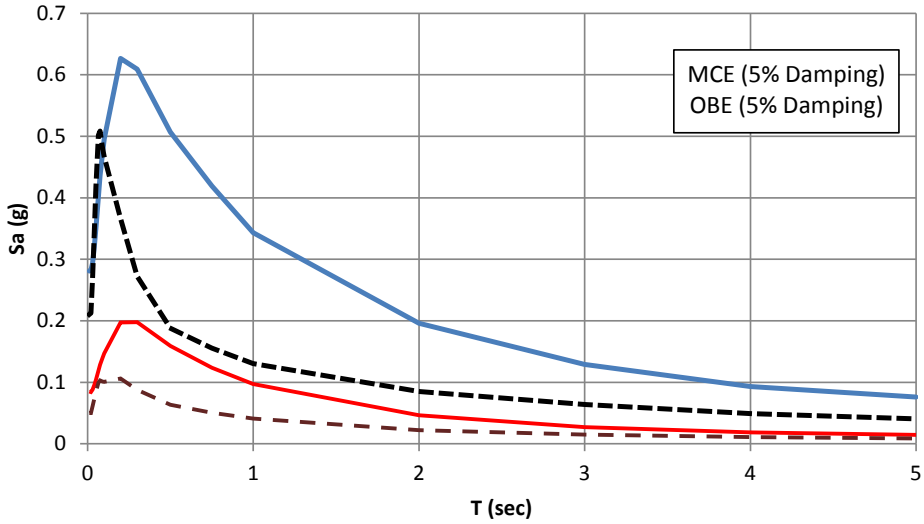
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/27/2012

PLATE C-4. ZONE 4 DESIGN SPECTRA: OBE AND MCE

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO BAKERSFILED, CALIFORNIA

Fresno-Bakersfield Segment, Zone 5





Period, T (sec)	Spectral Acceleration, Sa (g)				Period, T (sec)	Spectral Acceleration, Sa (g)			
	MCE (5%, 950 Years)		OBE (5%, 50 Years)			MCE (5%, 950 Years)		OBE (5%, 50 Years)	
	Horizontal	Vertical	Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical
0.01	0.2810	0.2102	0.0848	0.0500	0.2	0.6267	0.3663	0.1972	0.1061
0.02	0.2824	0.2124	0.0841	0.0498	0.3	0.6091	0.2721	0.1976	0.0875
0.03	0.2937	0.2705	0.0881	0.0614	0.5	0.5067	0.1880	0.1590	0.0633
0.04	0.3195	0.3422	0.0955	0.0727	0.75	0.4190	0.1554	0.1236	0.0504
0.05	0.3505	0.4183	0.1039	0.0843	1	0.3431	0.1305	0.0973	0.0409
0.065	0.4017	0.5019	0.1186	0.0994	2	0.1959	0.0850	0.0463	0.0223
0.075	0.4360	0.5087	0.1286	0.1032	3	0.1290	0.0639	0.0273	0.0150
0.09	0.4731	0.4805	0.1399	0.1012	4	0.0929	0.0489	0.0186	0.0109
0.1	0.4953	0.4667	0.1472	0.1008	5	0.0762	0.0407	0.0145	0.0086

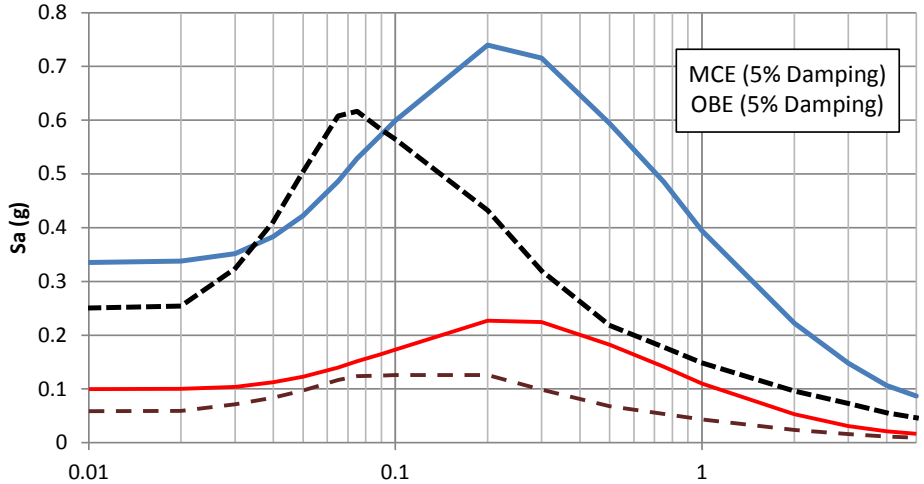
SC SOLUTIONS

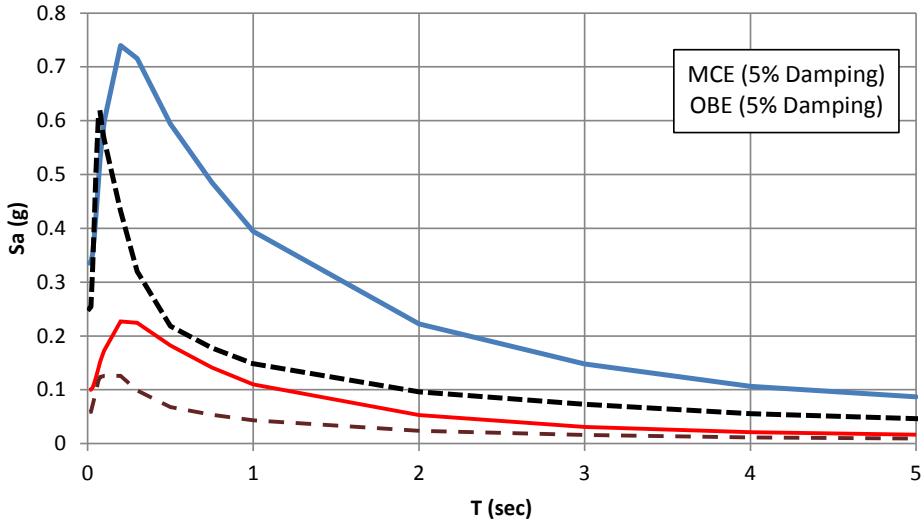
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/27/2012

PLATE C-5. ZONE 5 DESIGN SPECTRA: OBE AND MCE

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO BAKERSFILED, CALIFORNIA

Fresno-Bakersfield Segment, Zone 6





Period, T (sec)	Spectral Acceleration, Sa (g)				Period, T (sec)	Spectral Acceleration, Sa (g)			
	MCE (5%, 950 Years)		OBE (5%, 50 Years)			MCE (5%, 950 Years)		OBE (5%, 50 Years)	
	Horizontal	Vertical	Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical
0.01	0.3354	0.2508	0.0999	0.0587	0.2	0.7398	0.4324	0.2272	0.1259
0.02	0.3379	0.2541	0.1001	0.0590	0.3	0.7158	0.3198	0.2247	0.0987
0.03	0.3515	0.3238	0.1040	0.0717	0.5	0.5940	0.2185	0.1824	0.0678
0.04	0.3837	0.4111	0.1126	0.0838	0.75	0.4852	0.1775	0.1414	0.0536
0.05	0.4227	0.5045	0.1227	0.0974	1	0.3942	0.1485	0.1101	0.0431
0.065	0.4863	0.6076	0.1399	0.1168	2	0.2226	0.0960	0.0530	0.0239
0.075	0.5286	0.6167	0.1516	0.1240	3	0.1479	0.0728	0.0311	0.0160
0.09	0.5733	0.5823	0.1647	0.1250	4	0.1064	0.0557	0.0214	0.0117
0.1	0.5991	0.5646	0.1730	0.1257	5	0.0870	0.0462	0.0166	0.0092

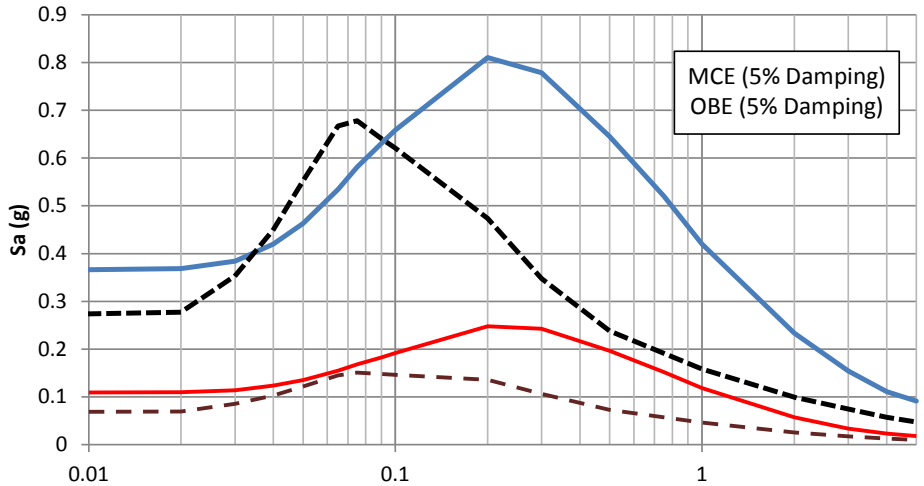
SC SOLUTIONS

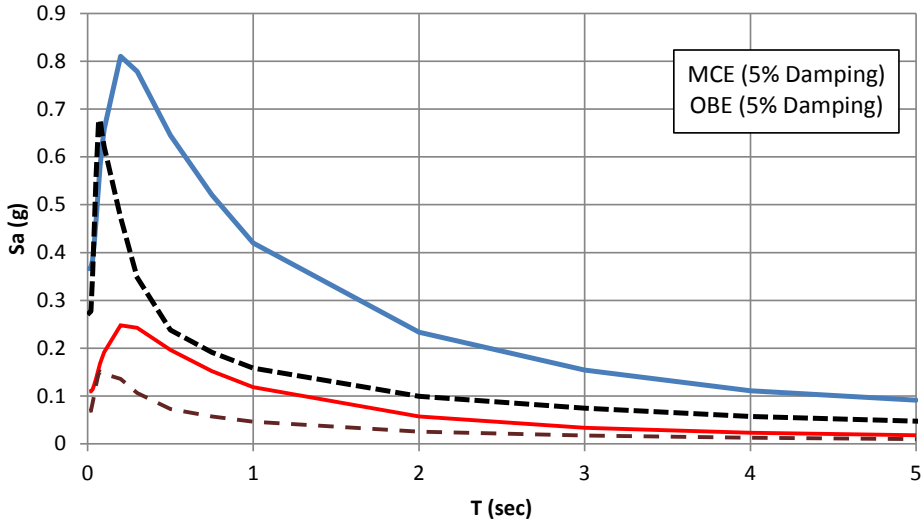
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/27/2012

PLATE C-6. ZONE 6 DESIGN SPECTRA: OBE AND MCE

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO BAKERSFILED, CALIFORNIA

Fresno-Bakersfield Segment, Zone 7





Period, T (sec)	Spectral Acceleration, Sa (g)				Period, T (sec)	Spectral Acceleration, Sa (g)			
	MCE (5%, 950 Years)		OBE (5%, 50 Years)			MCE (5%, 950 Years)		OBE (5%, 50 Years)	
	Horizontal	Vertical	Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical
0.01	0.3662	0.2738	0.1094	0.0688	0.2	0.8105	0.4737	0.2478	0.1361
0.02	0.3685	0.2771	0.1097	0.0693	0.3	0.7786	0.3478	0.2426	0.1062
0.03	0.3840	0.3538	0.1141	0.0856	0.5	0.6451	0.2382	0.1967	0.0727
0.04	0.4201	0.4500	0.1238	0.1029	0.75	0.5202	0.1914	0.1519	0.0572
0.05	0.4633	0.5530	0.1355	0.1218	1	0.4198	0.1582	0.1184	0.0461
0.065	0.5341	0.6673	0.1549	0.1454	2	0.2334	0.0994	0.0571	0.0256
0.075	0.5810	0.6779	0.1681	0.1511	3	0.1543	0.0748	0.0338	0.0173
0.09	0.6304	0.6403	0.1826	0.1478	4	0.1110	0.0572	0.0233	0.0127
0.1	0.6586	0.6207	0.1916	0.1464	5	0.0912	0.0477	0.0182	0.0100

SC SOLUTIONS

PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/27/2012

PLATE C-7. ZONE 7 DESIGN SPECTRA: OBE AND MCE

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO BAKERSFILED, CALIFORNIA

03/08/2012 RFP HSR 11-16

Table A.1: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 1**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	832	Landers	1992	North Palm Springs	7.28	26.84	0.074	10.174	6.024	0.076	8.802	4.246	0.040	3.904	1.969
2	1637	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.072	7.396	2.287	0.072	6.745	2.639	0.041	3.237	1.167
3	907	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.071	6.720	3.767	0.078	10.960	2.639	0.038	4.260	1.482
4	2112	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.077	8.383	6.525	0.067	8.577	6.966	0.037	4.500	3.933
5	882	Imperial Valley-06	1979	Delta	6.53	22.03	0.076	6.250	2.857	0.081	7.278	3.906	0.038	3.447	1.847
6	1776	Manjil, Iran	1990	Rudsar	7.37	64.47	0.070	7.531	4.865	0.085	10.028	2.761	0.039	3.678	2.341
7	2938	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.073	9.017	3.691	0.077	7.934	3.011	0.035	3.751	1.676

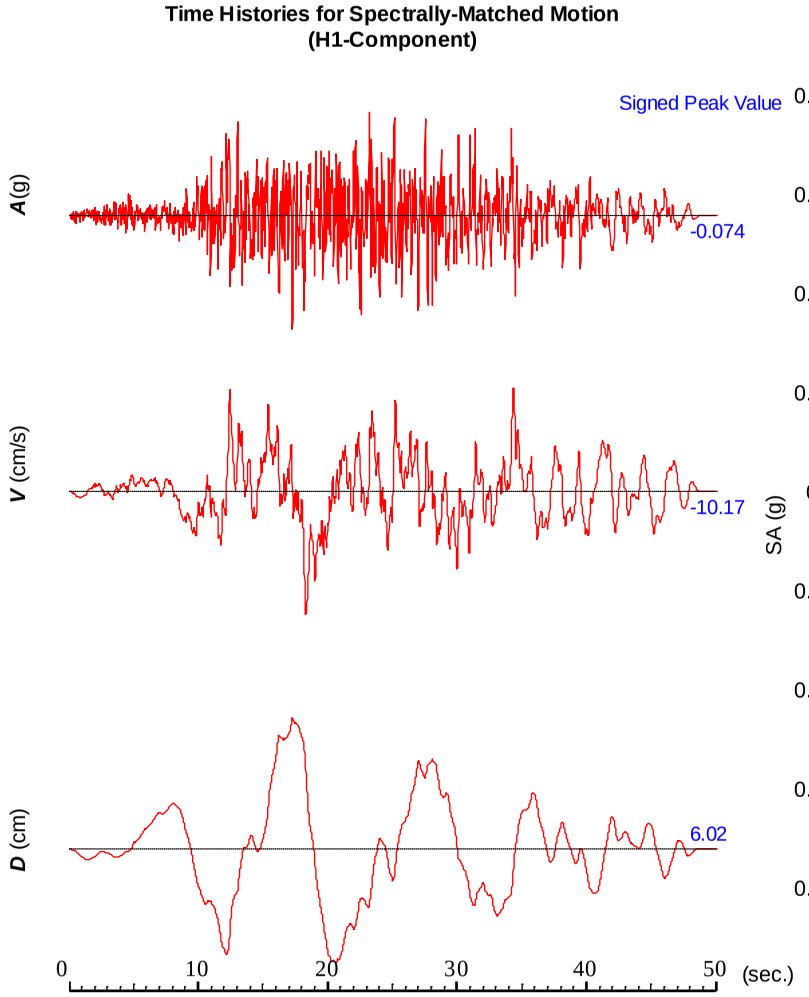
SC SOLUTIONS

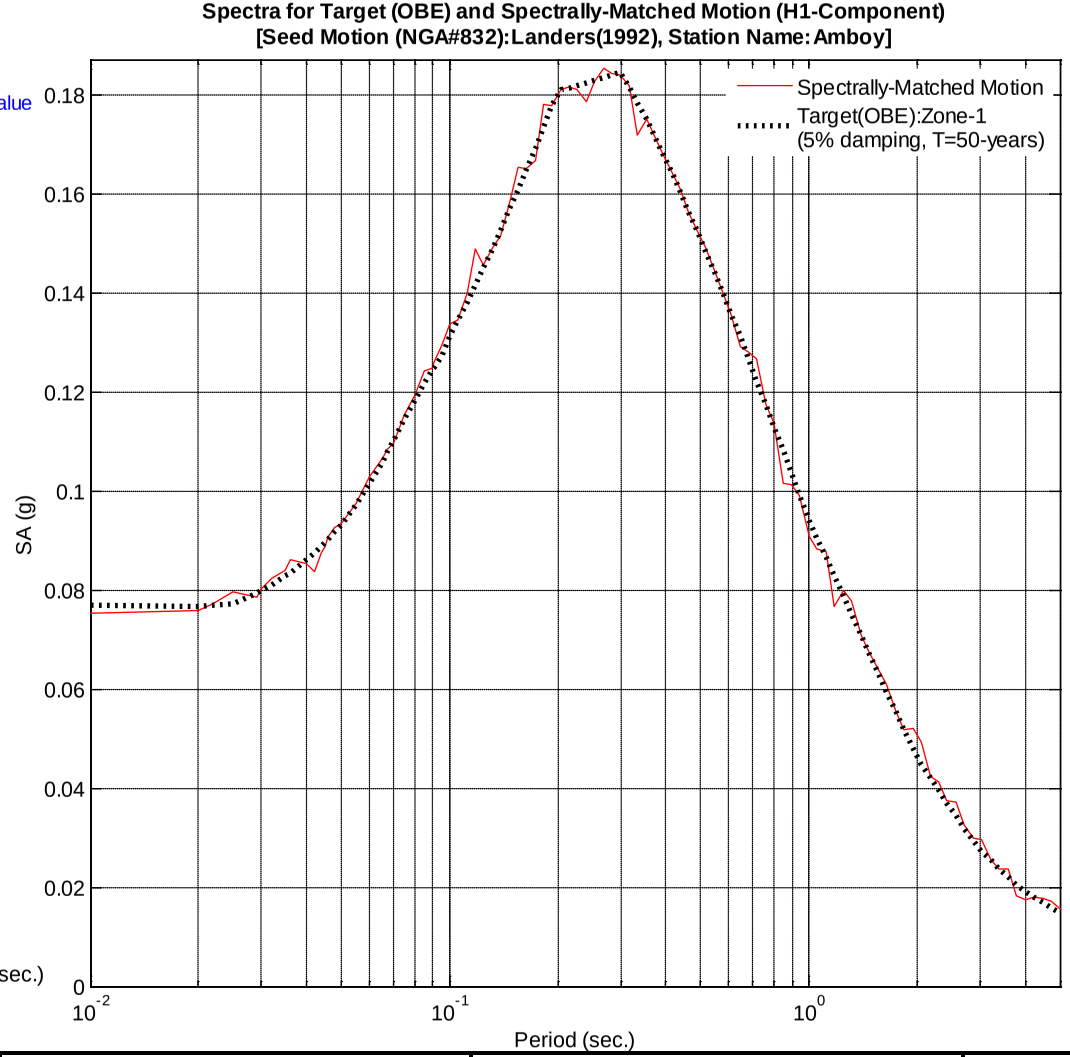
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS OBE – ZONE 1

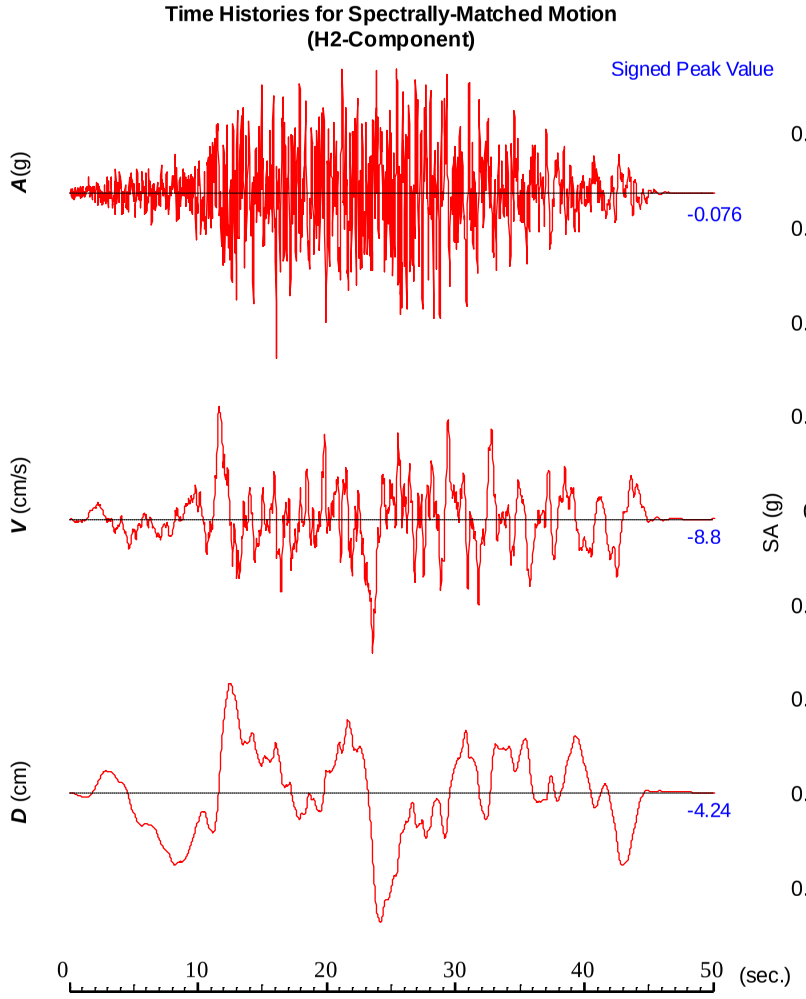
CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

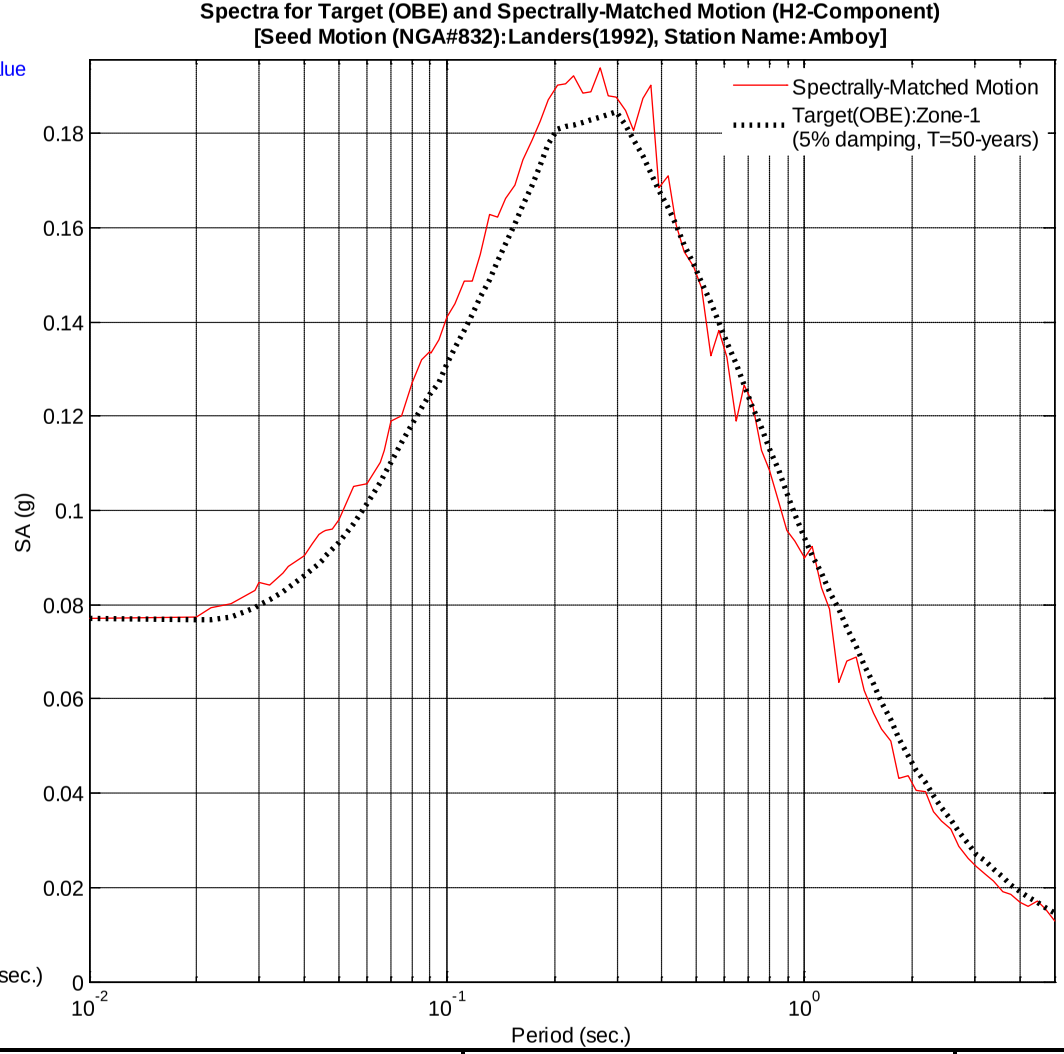
PLATE
A1-0





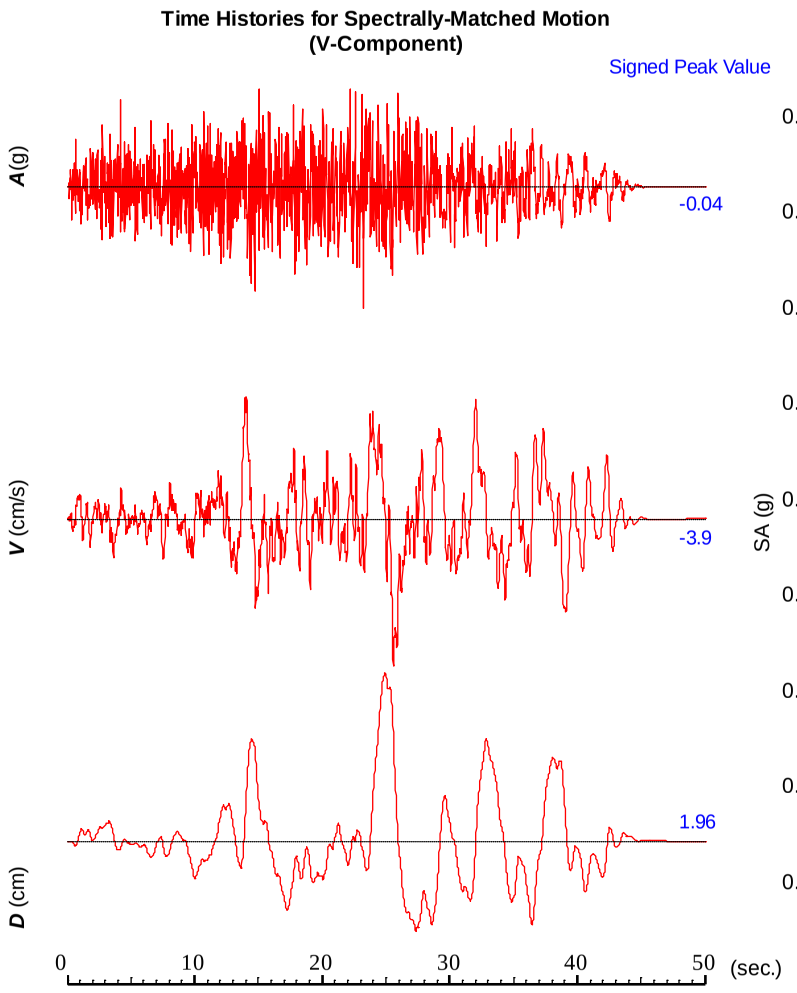
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 1 – SET NO. 1 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A1-1**

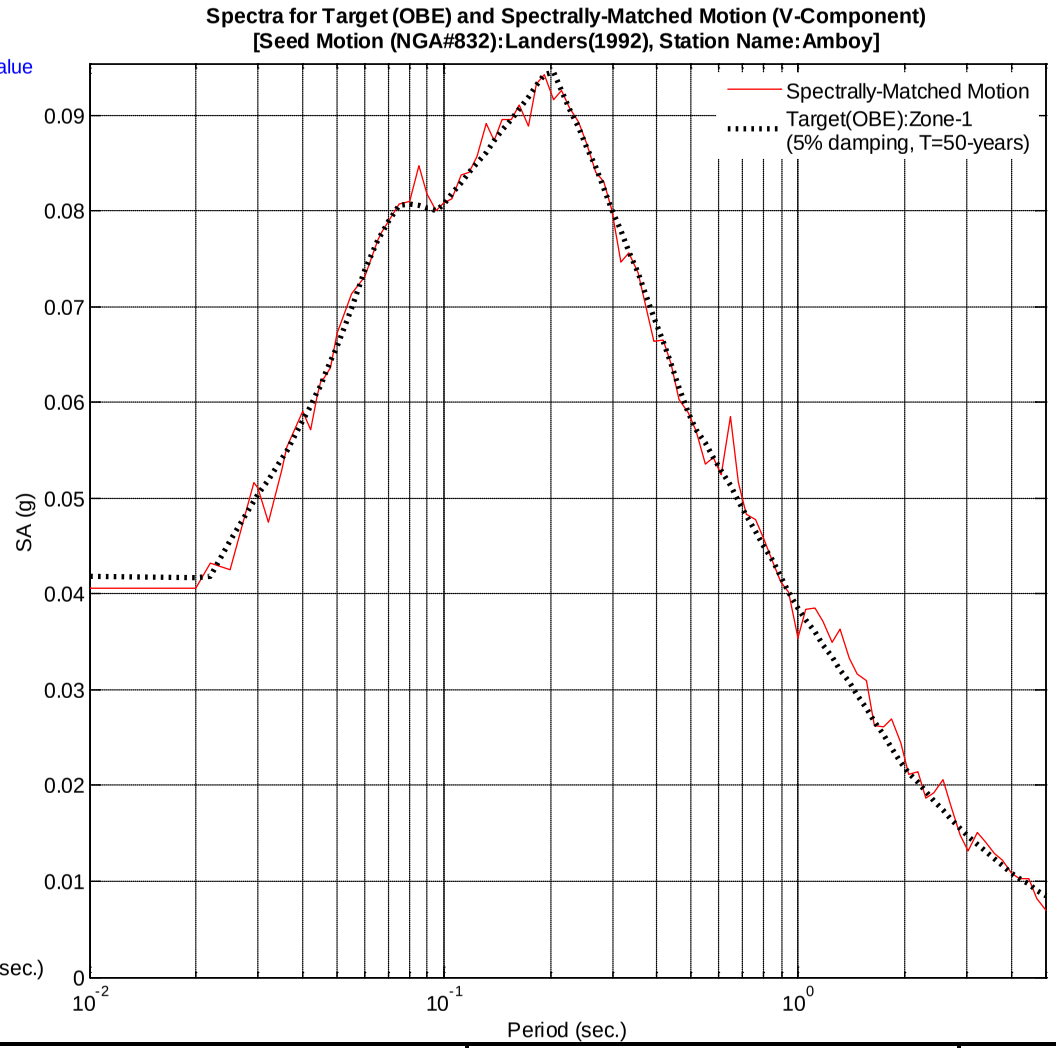




SC SOLUTIONS

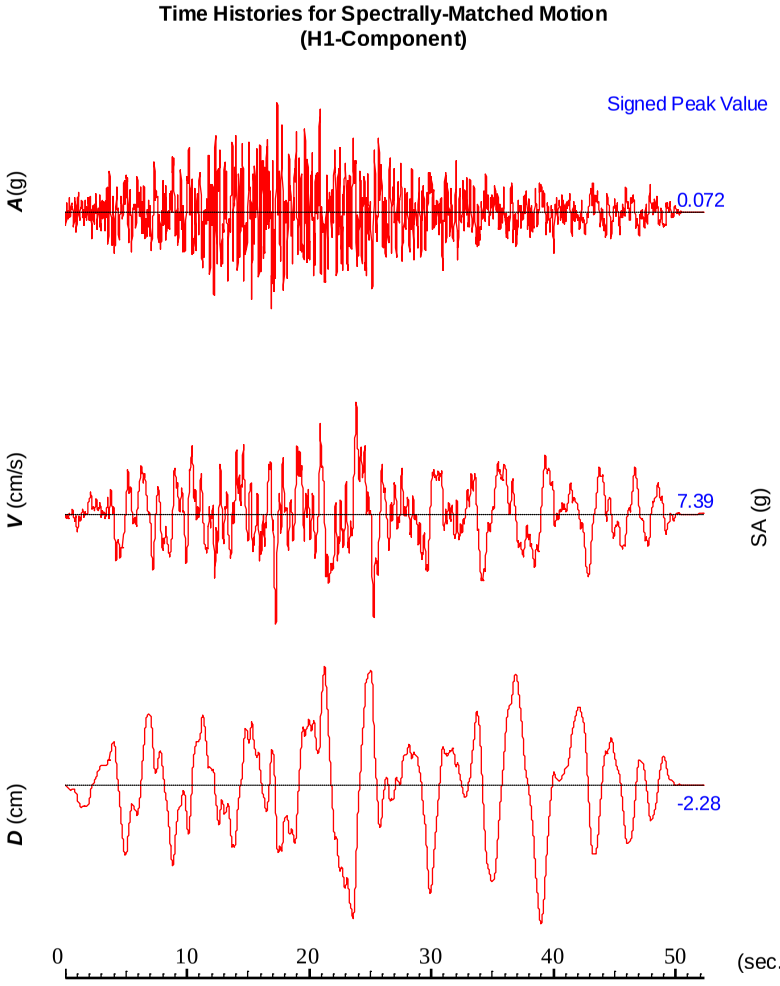
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 1 – SET NO. 1 – HORIZONTAL 2**	PLATE **A1-2**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		

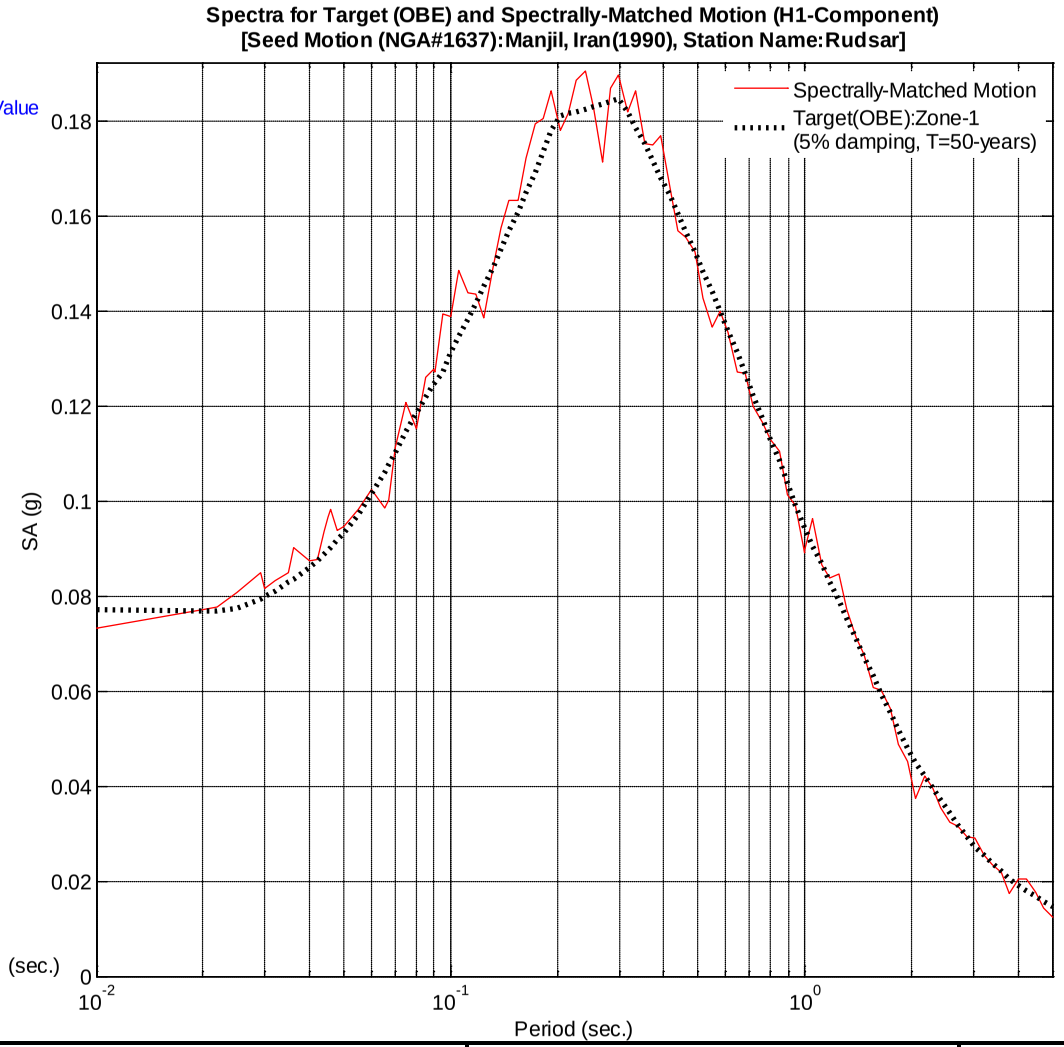




SC SOLUTIONS

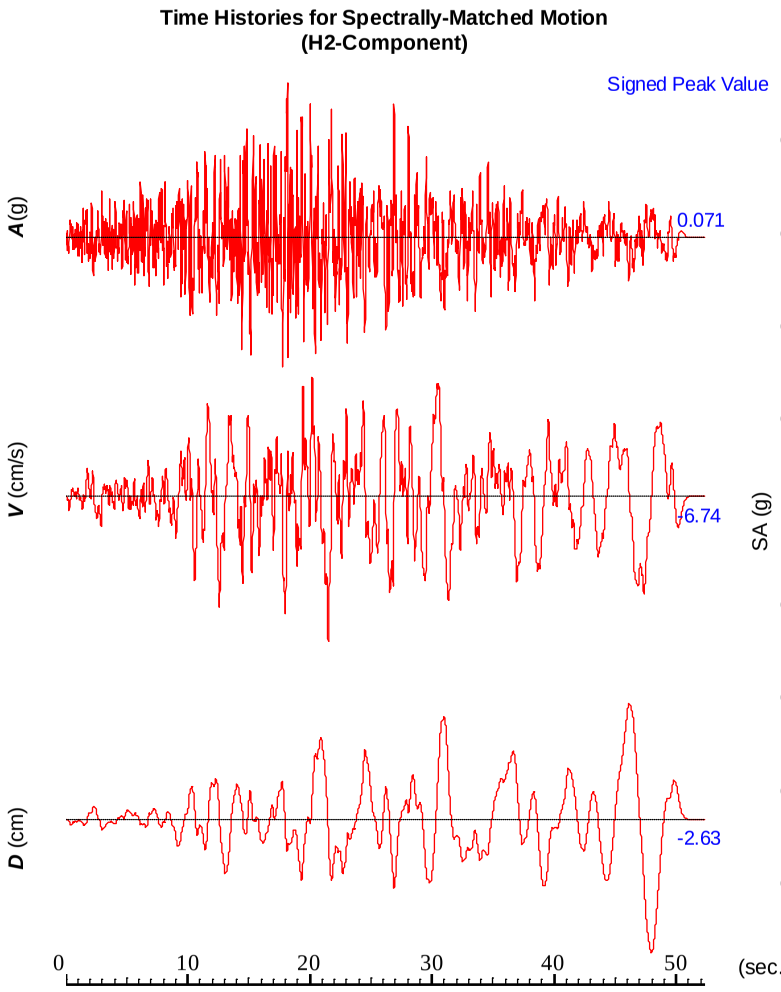
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 1 – SET NO. 1 – VERTICAL**	PLATE
BY:	J. Zhong		**A1-3**
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		

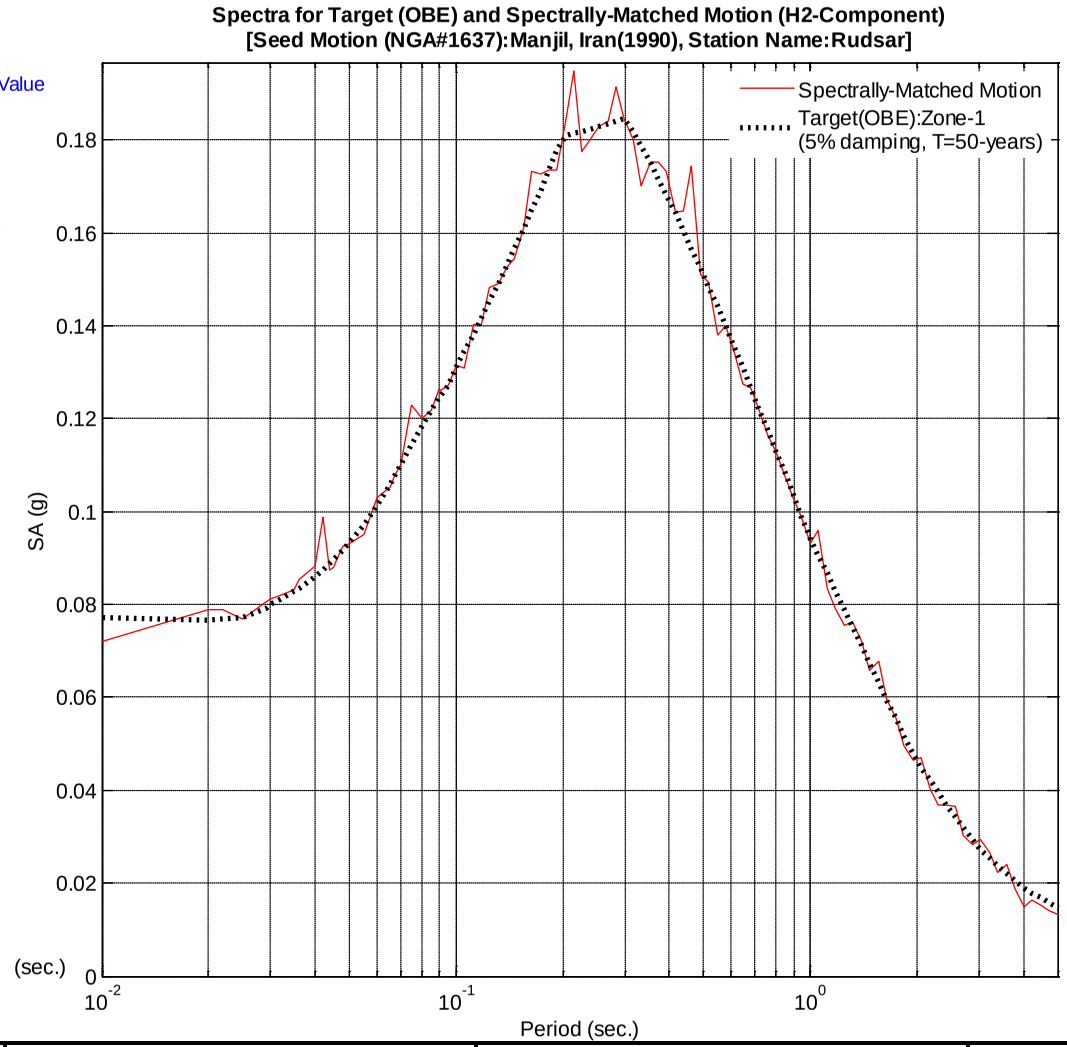




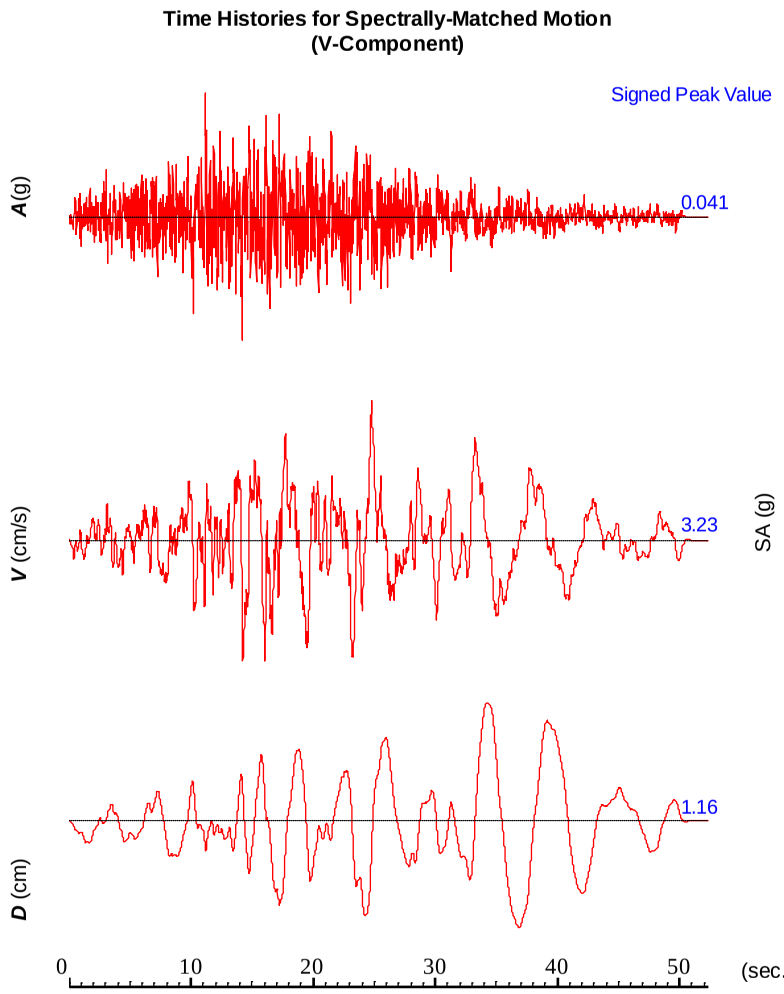
SC SOLUTIONS

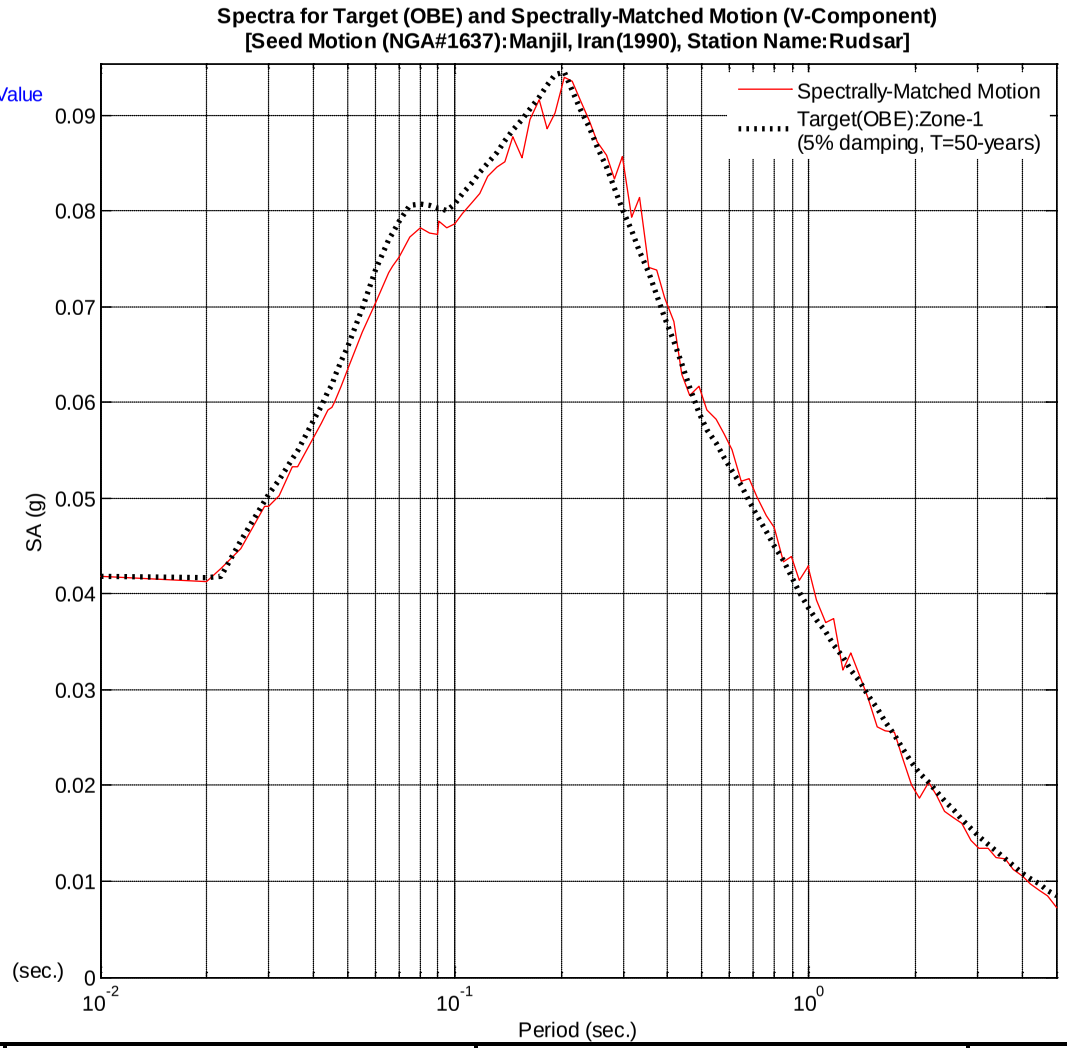
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 1 – SET NO. 2 – HORIZONTAL 1**	PLATE **A1-4**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		



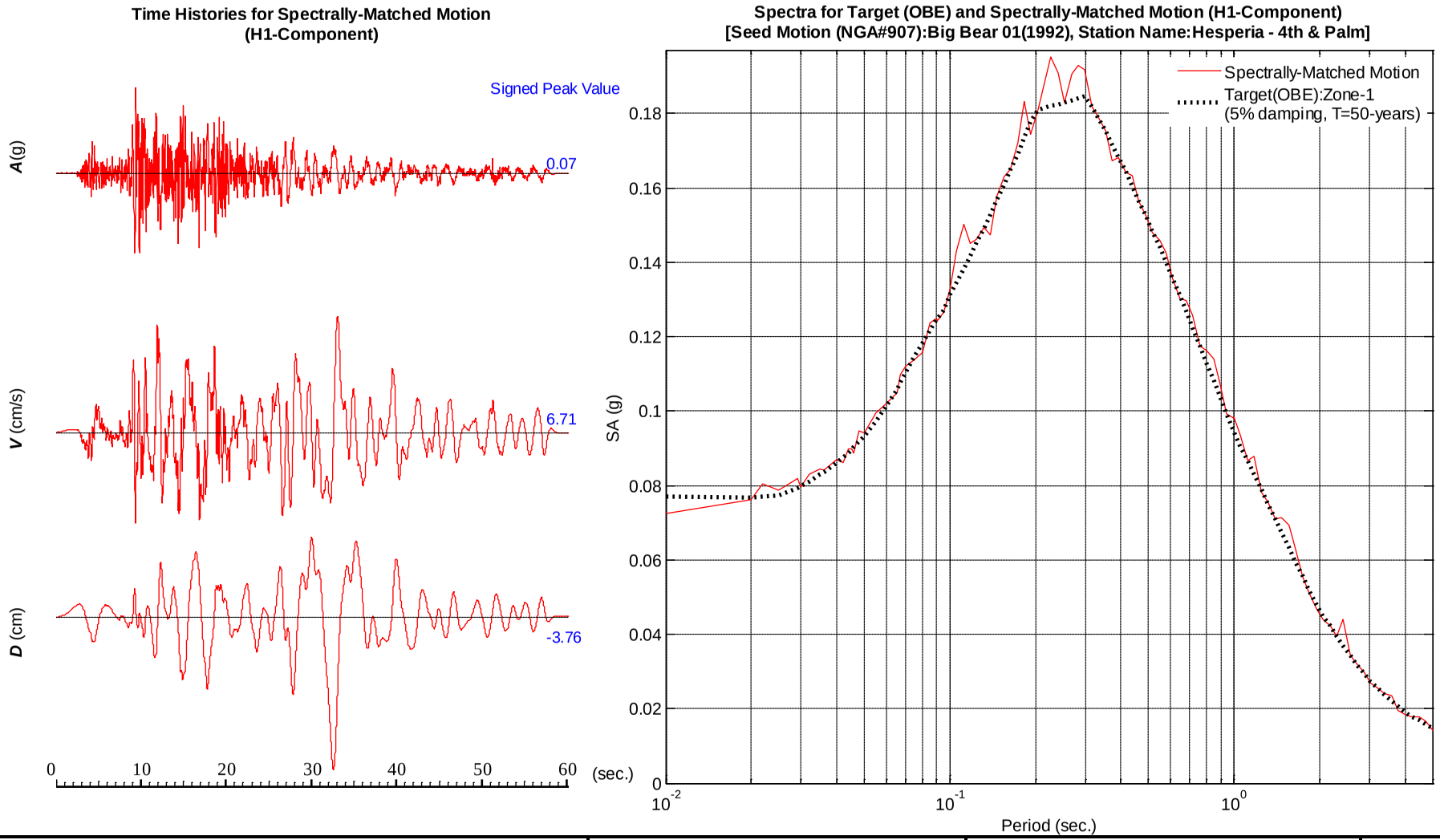


SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 1 – SET NO. 2 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A1-5**

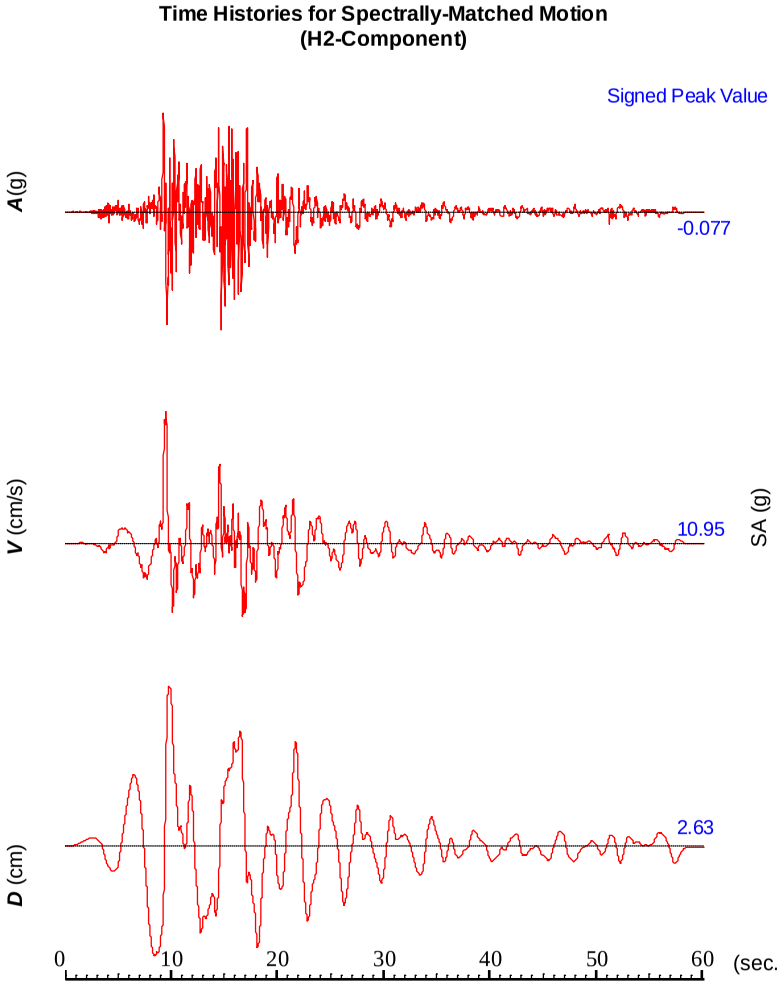


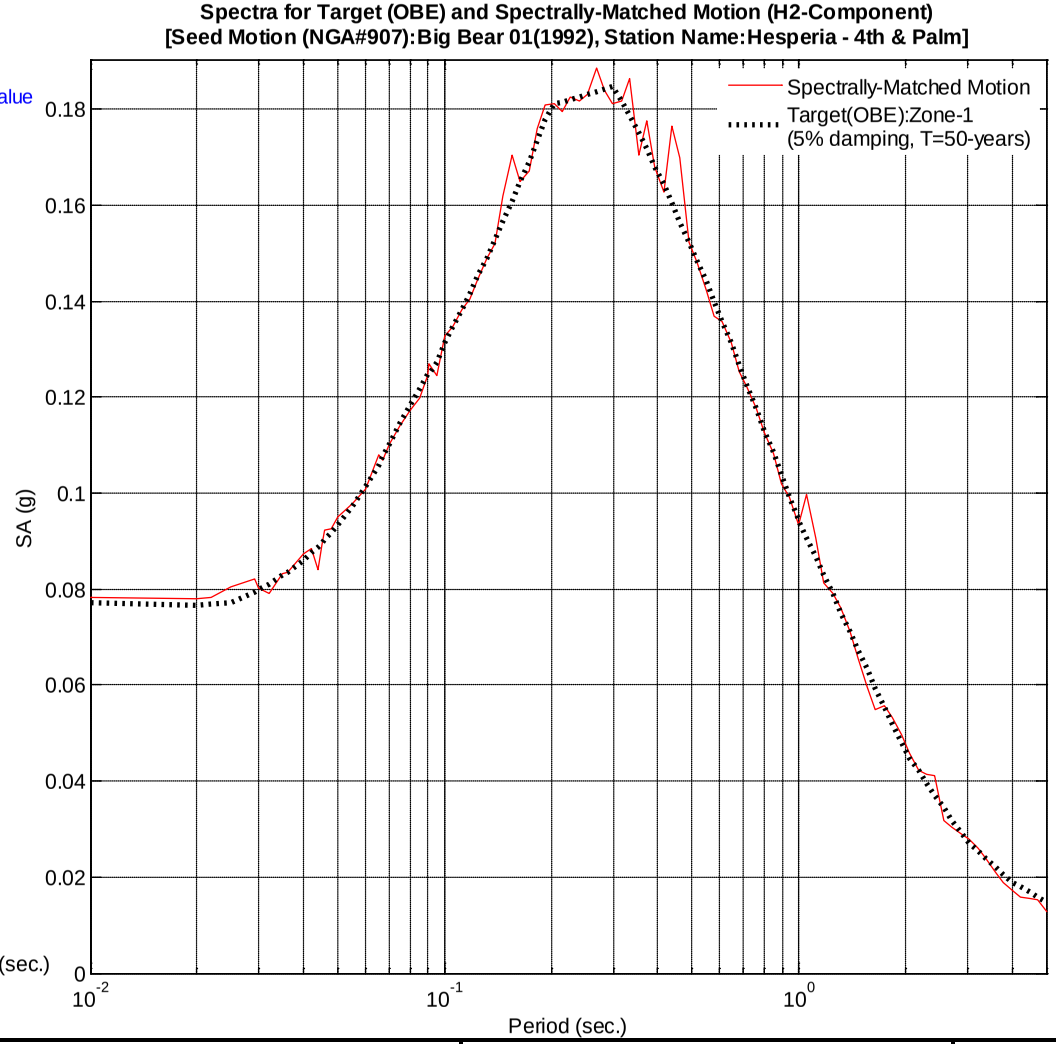


SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 1 – SET NO. 2 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A1-6**

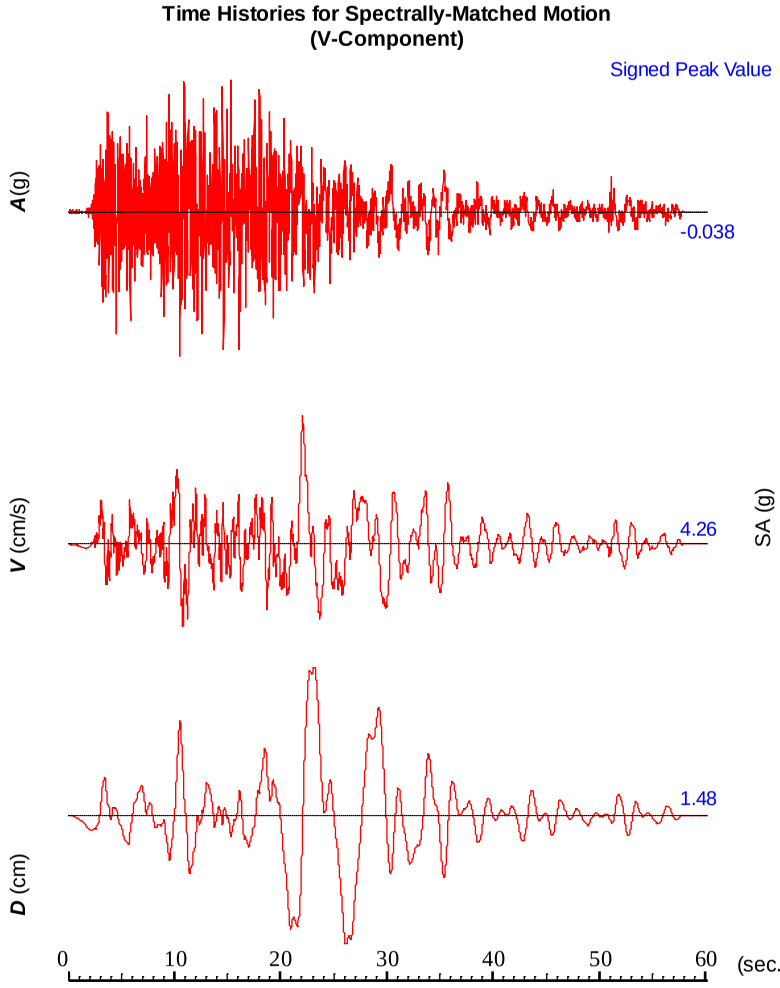


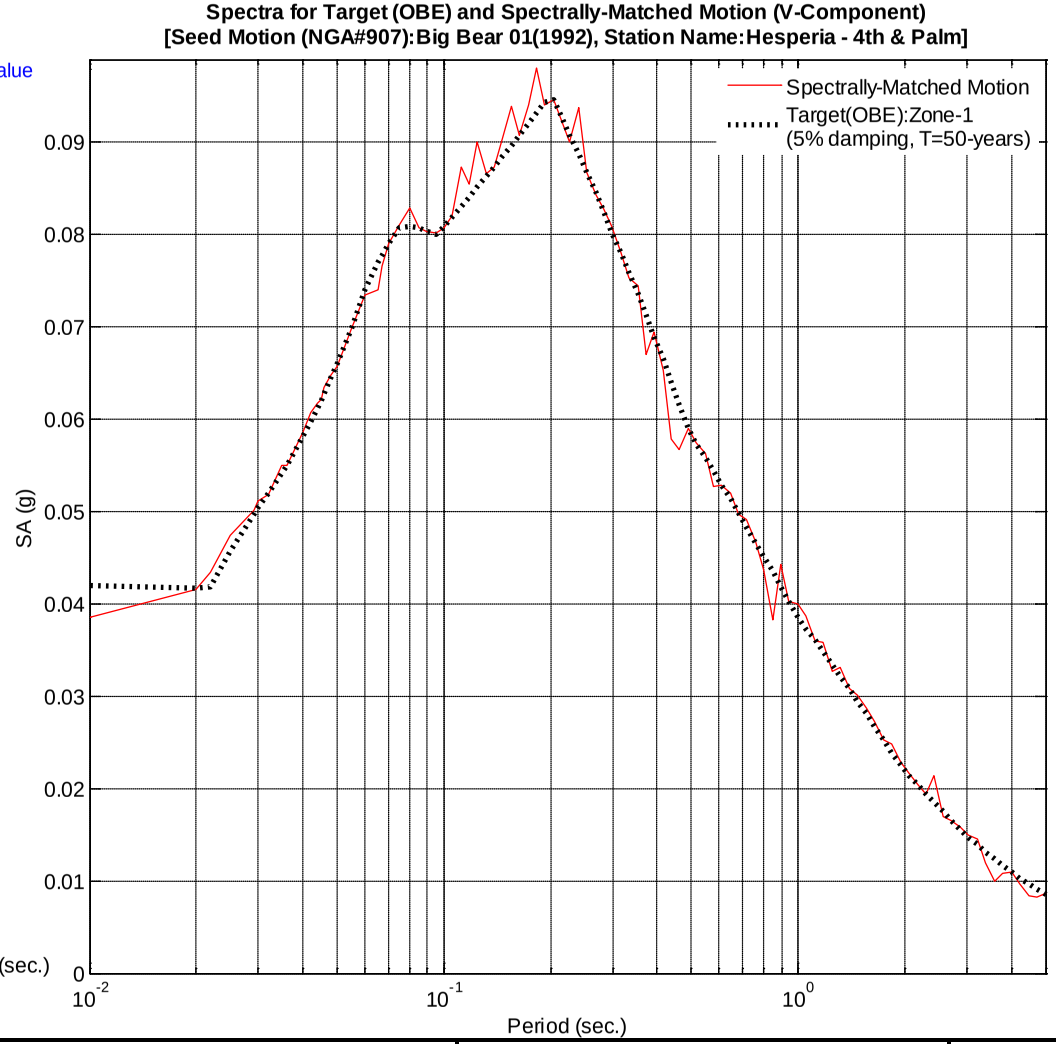
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 1 – SET NO. 3 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A1-7**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 1 – SET NO. 3 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A1-8**





SC SOLUTIONS

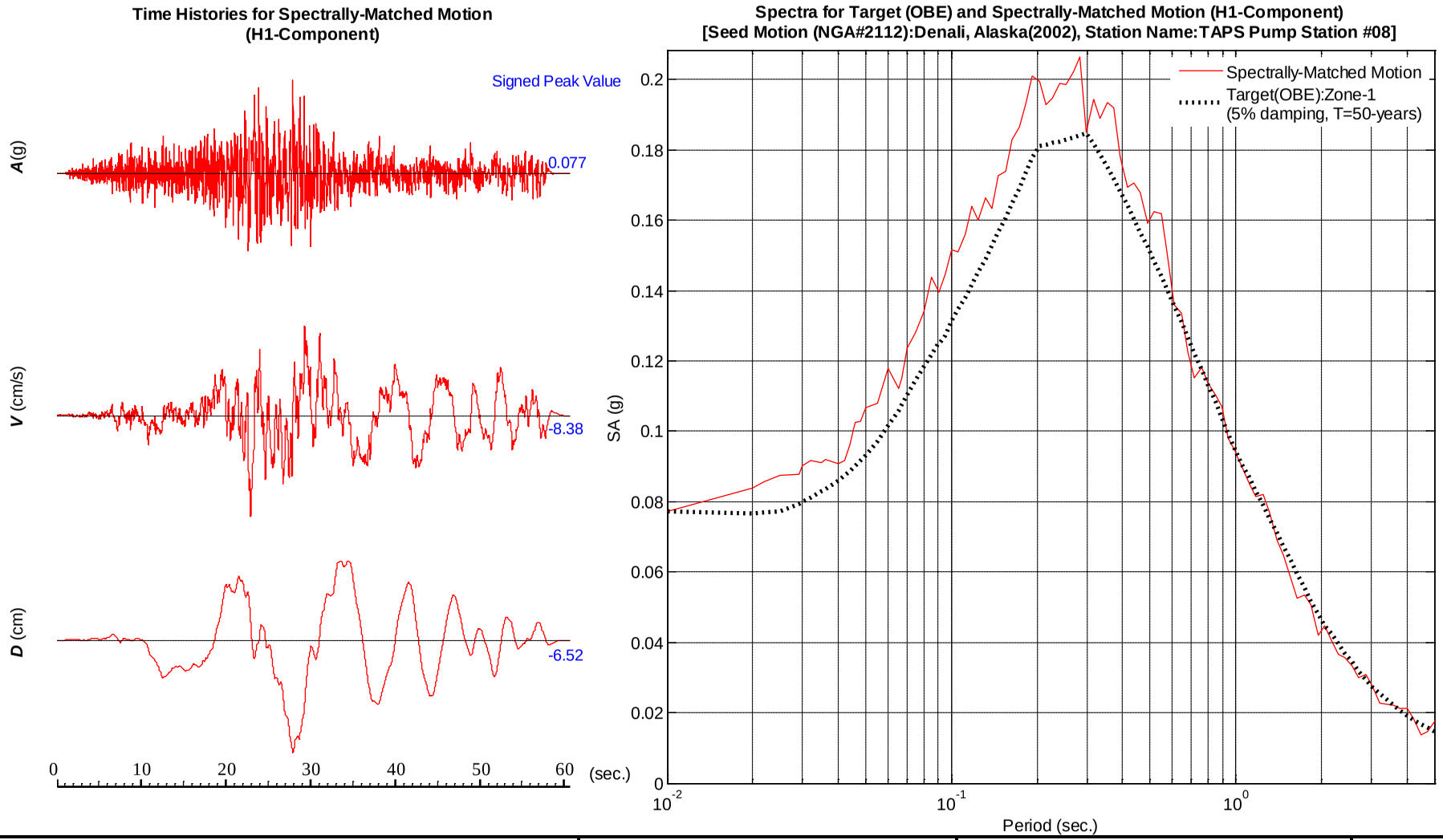
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 1 – SET NO. 3 – VERTICAL

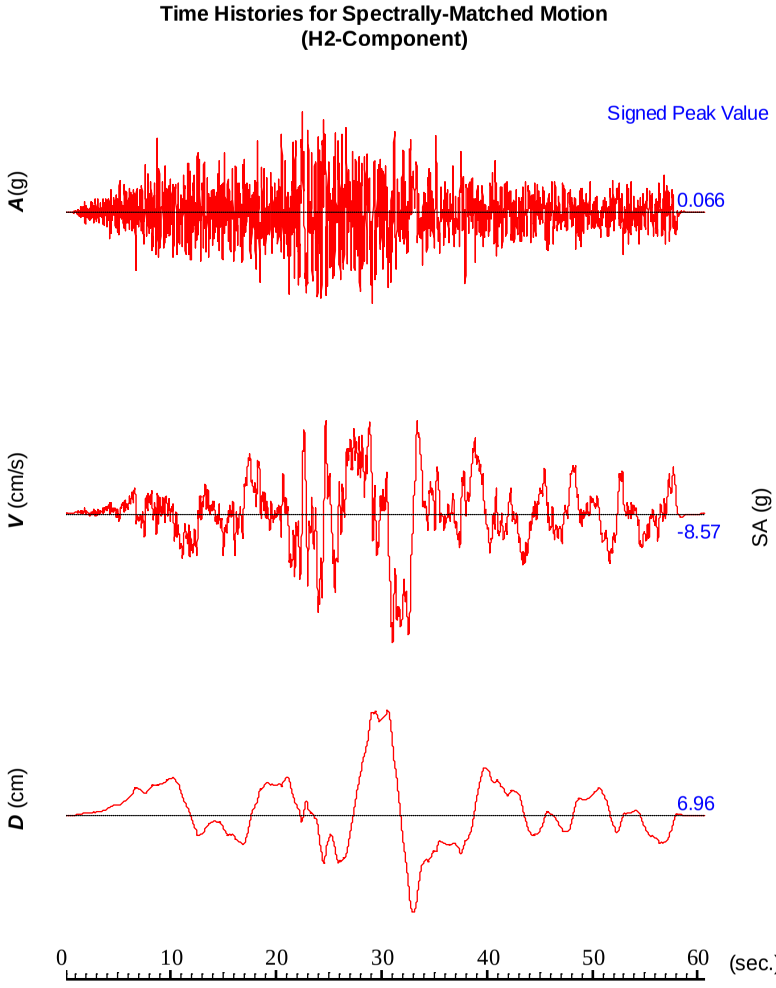
CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

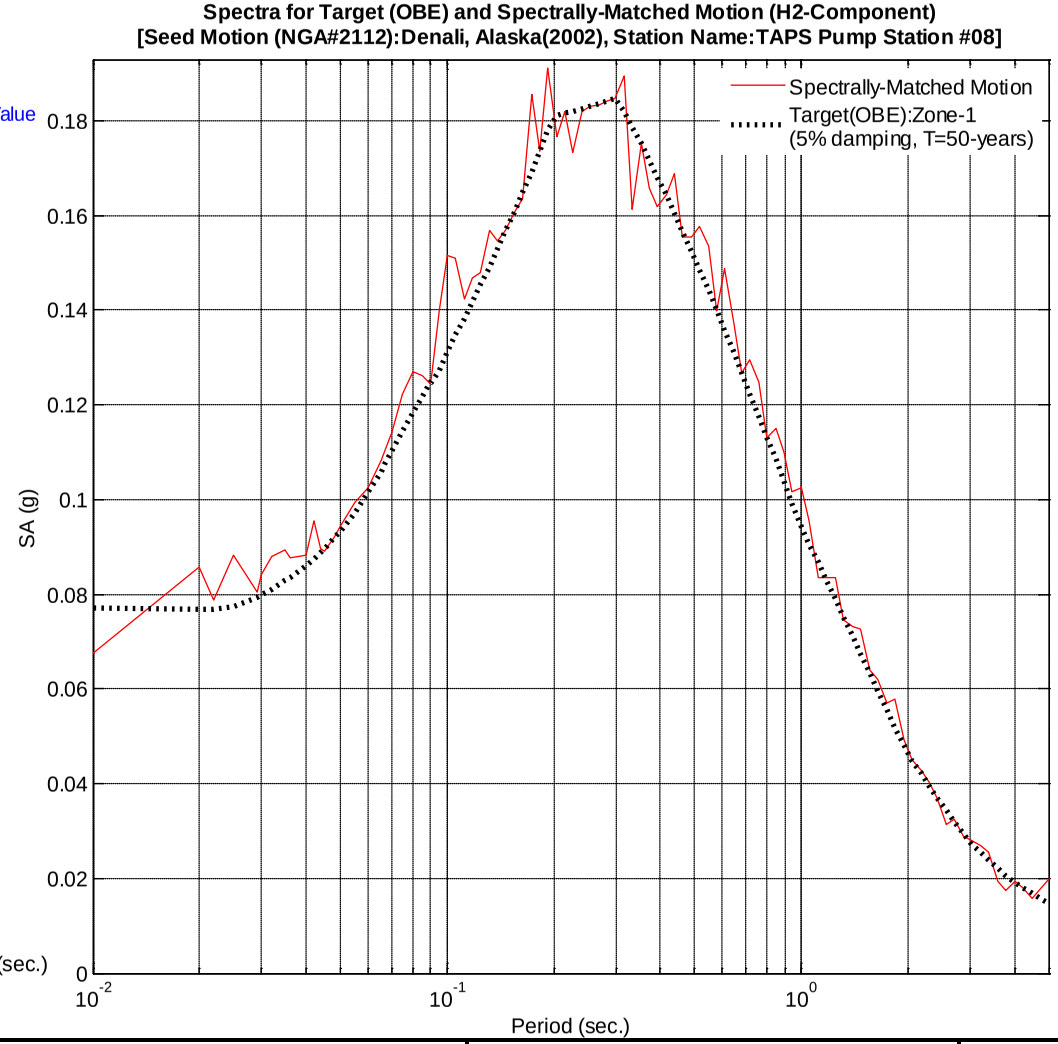
PLATE

A1-9

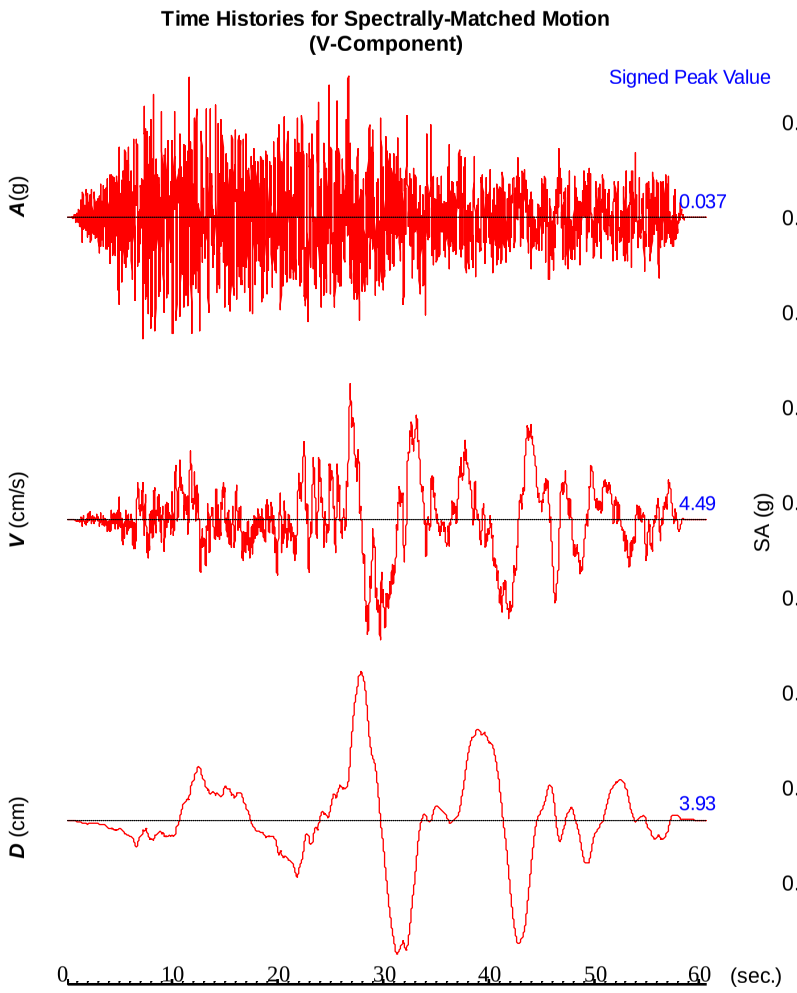


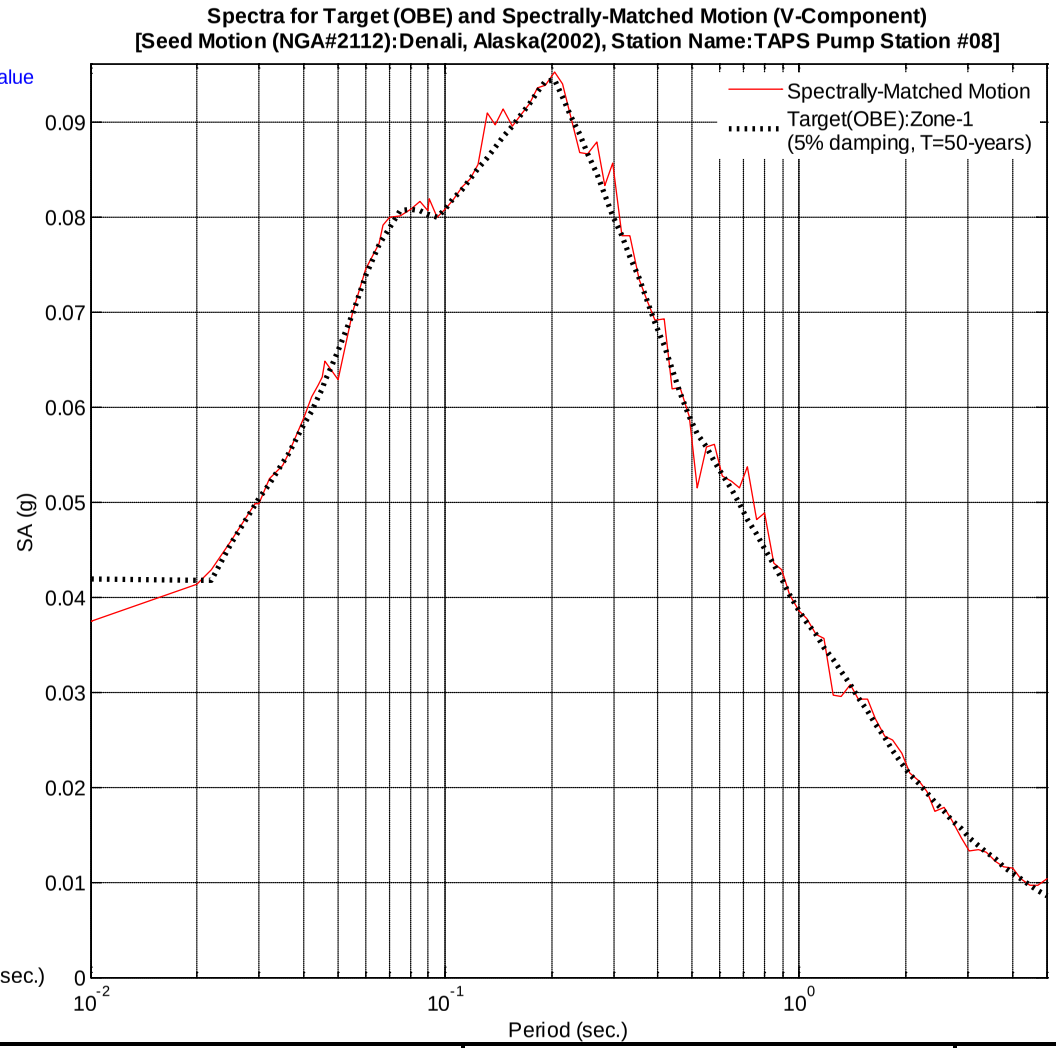
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 1 – SET NO. 4 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A1-10**





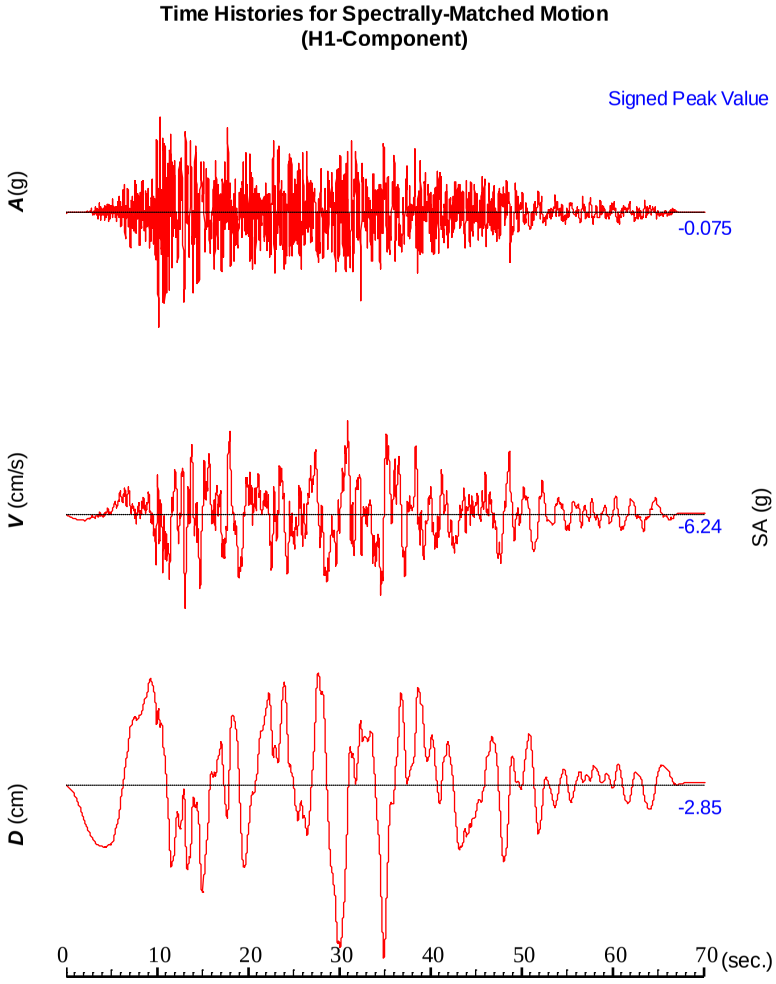
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 1 – SET NO. 4 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A1-11**

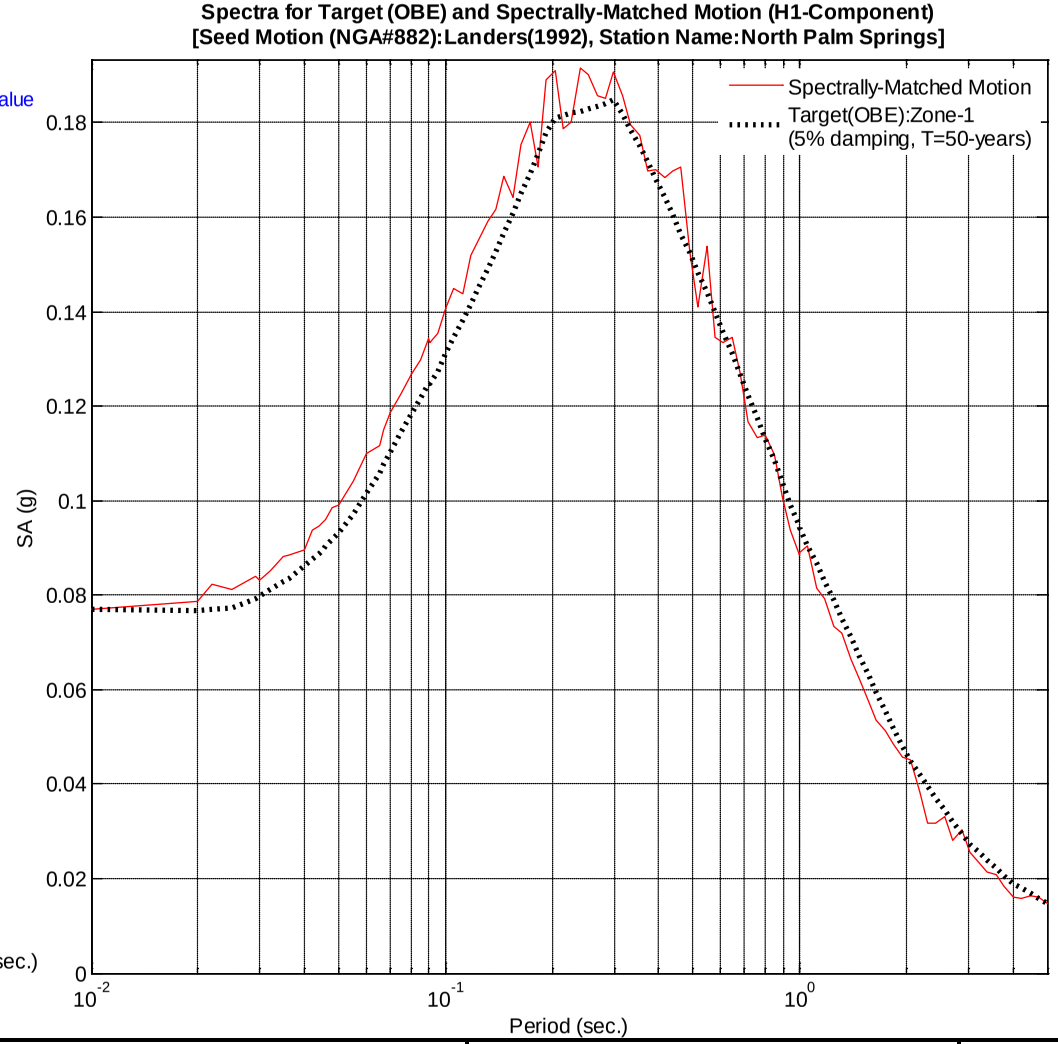




SC SOLUTIONS

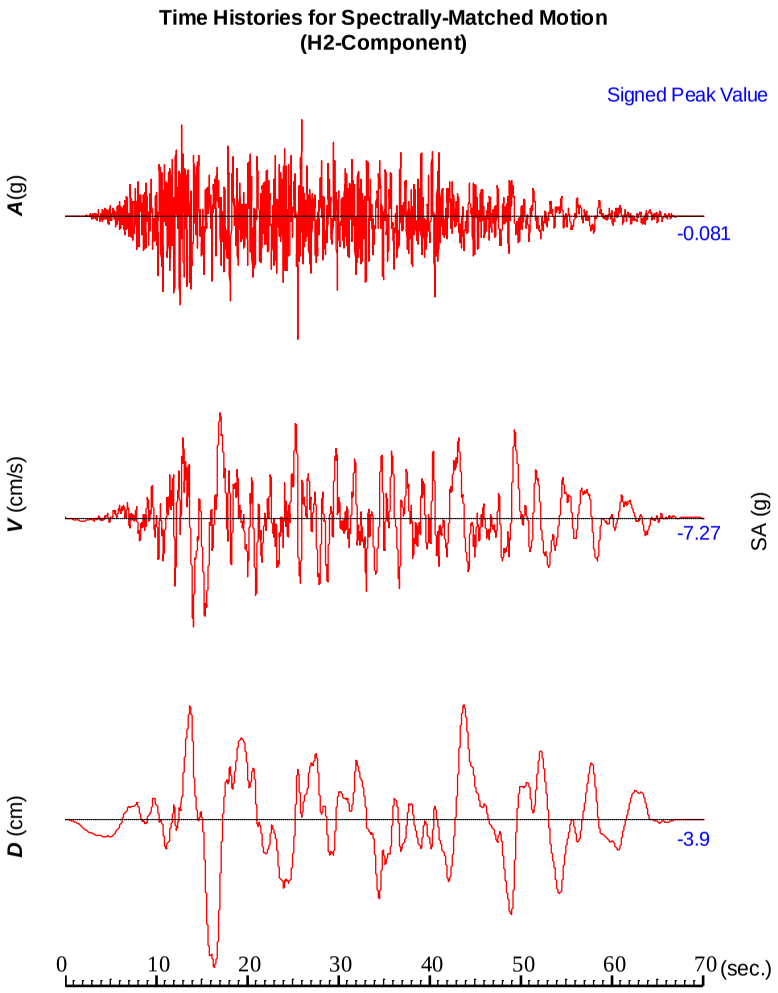
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 1 – SET NO. 4 – VERTICAL**	PLATE **A1-12**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		

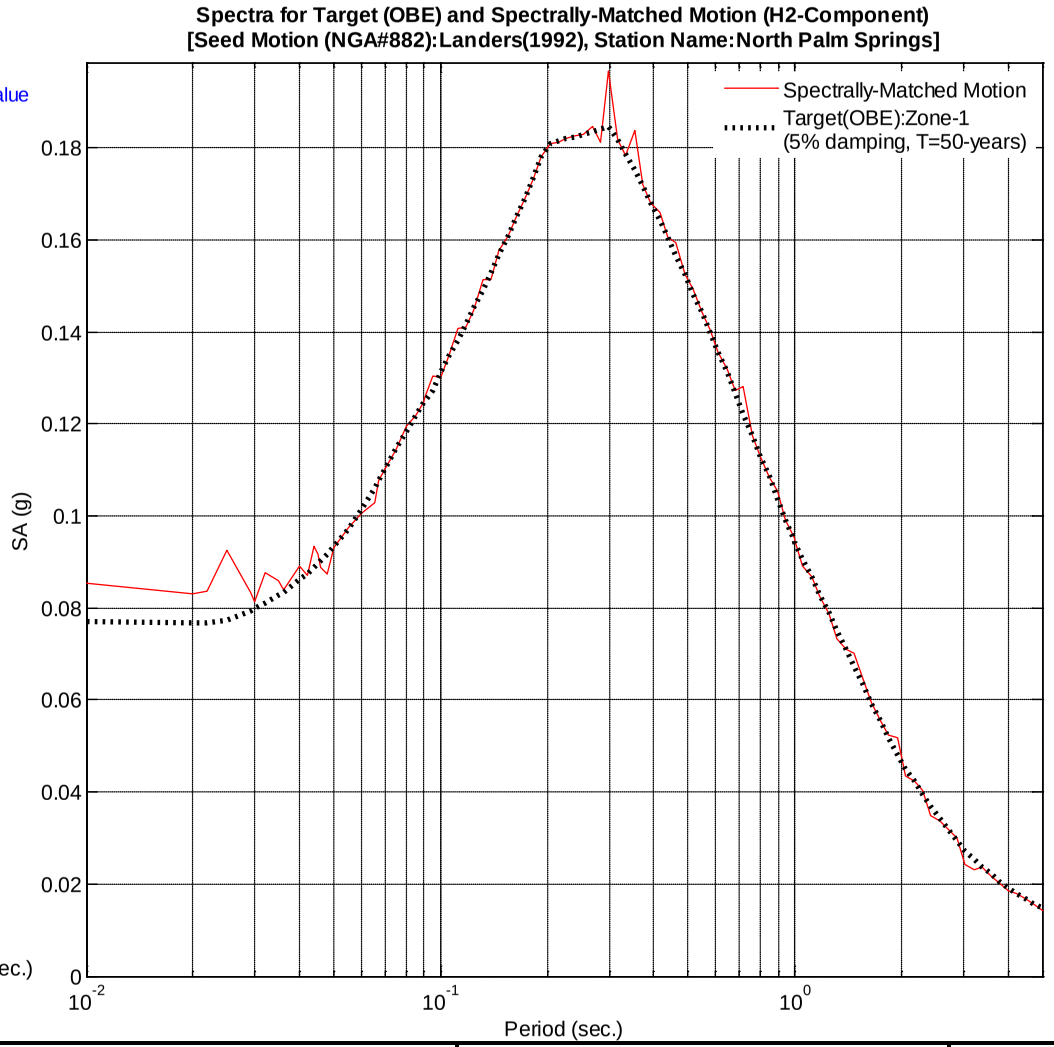




SC SOLUTIONS

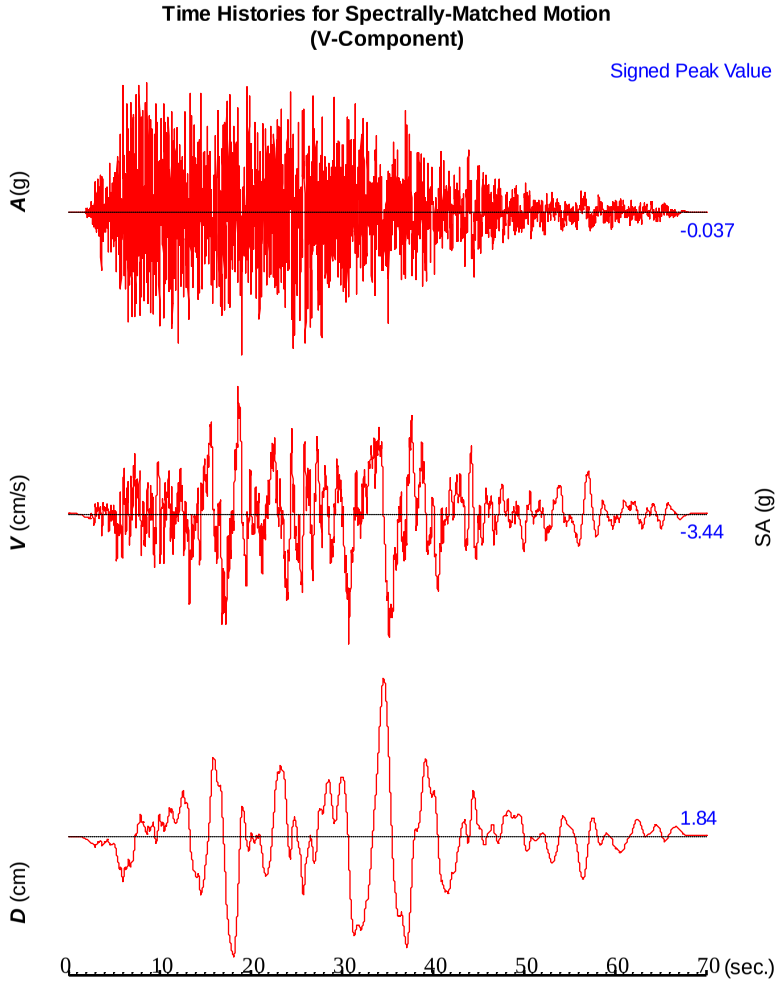
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 1 – SET NO. 5 – HORIZONTAL 1**	PLATE **A1-13**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie		
DATE:	02/24/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	

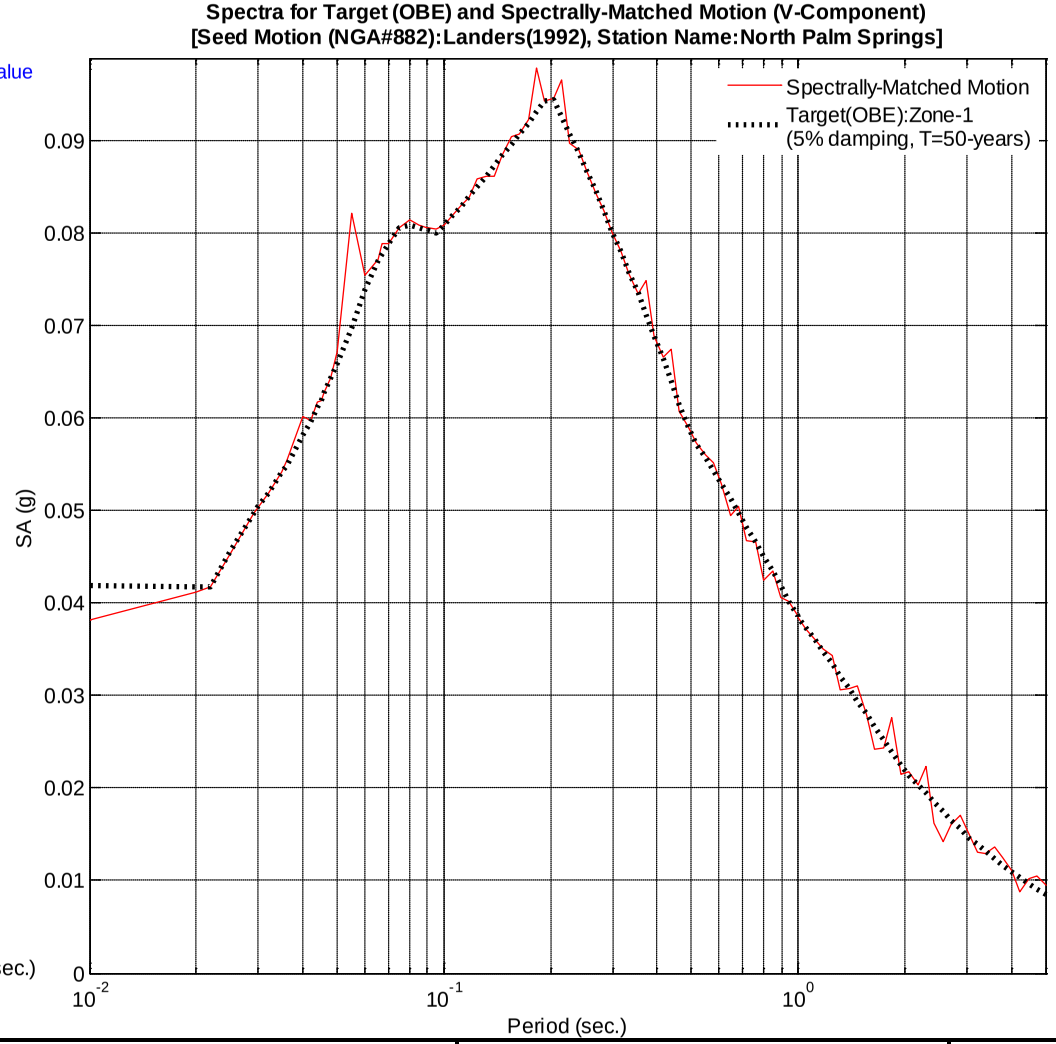




SC SOLUTIONS

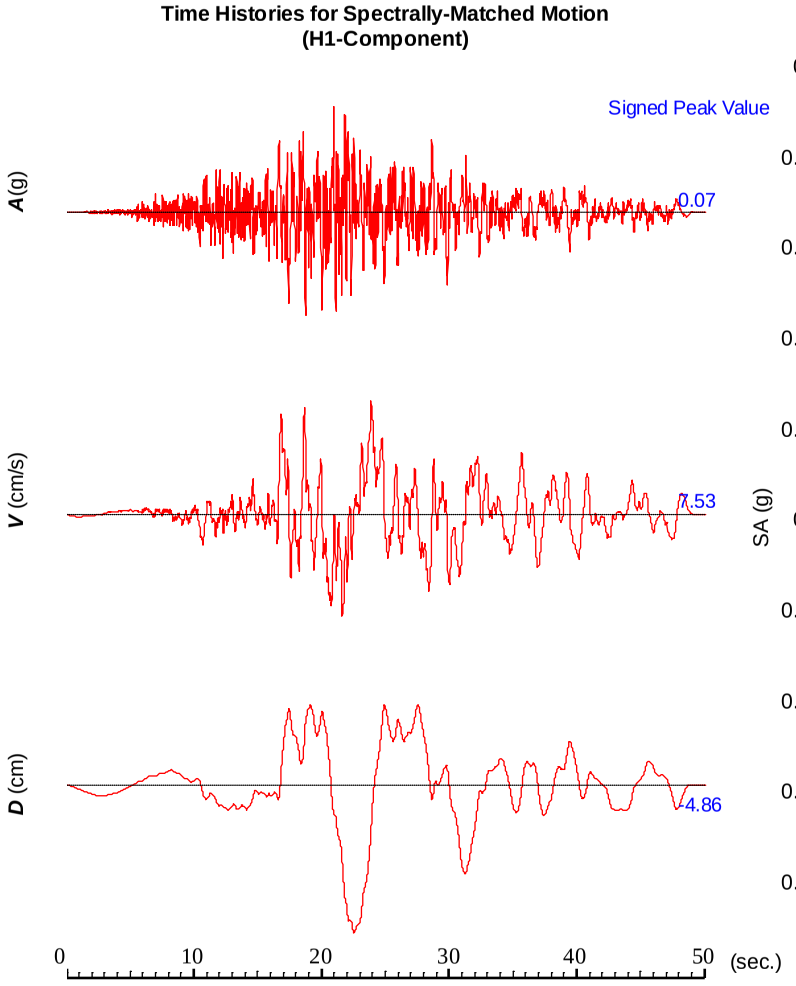
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 1 – SET NO. 5 – HORIZONTAL 2**	PLATE **A1-14**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		

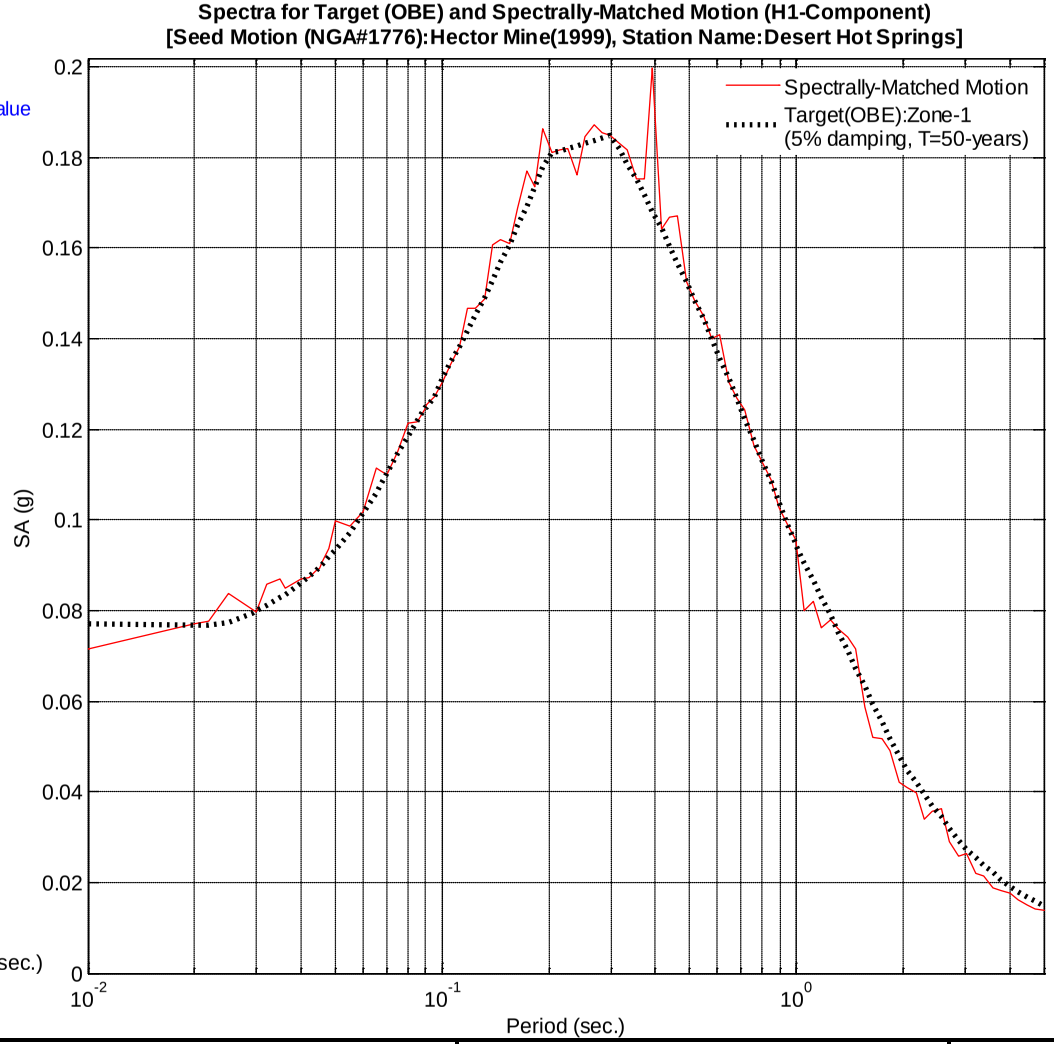




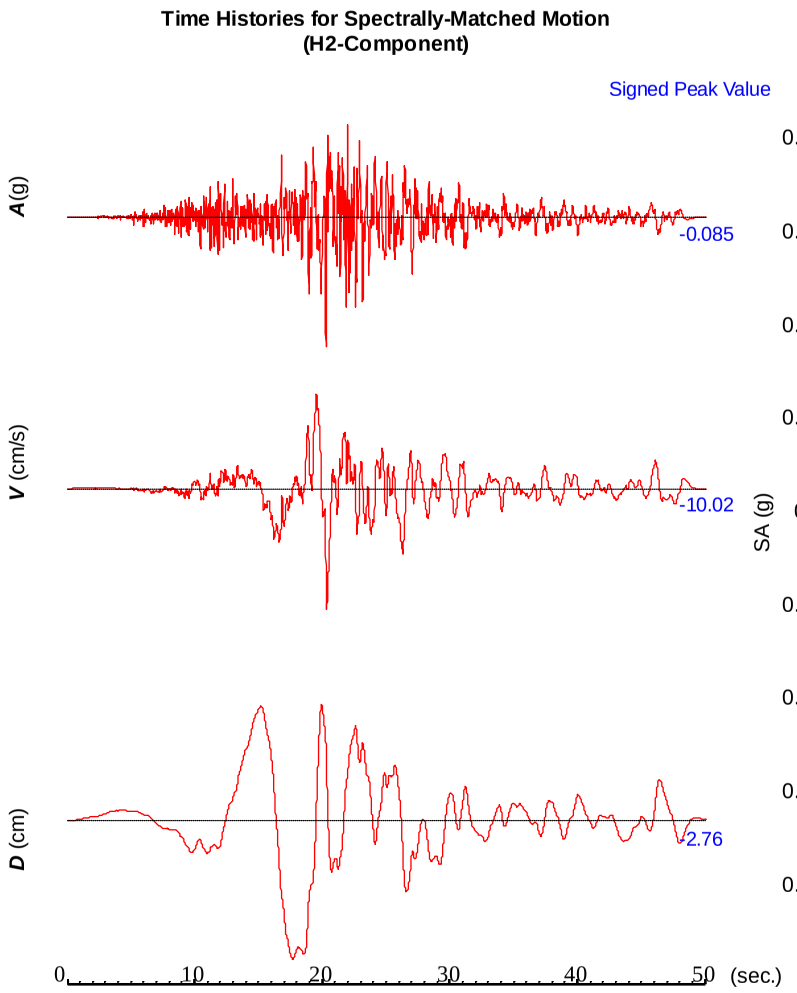
SC SOLUTIONS

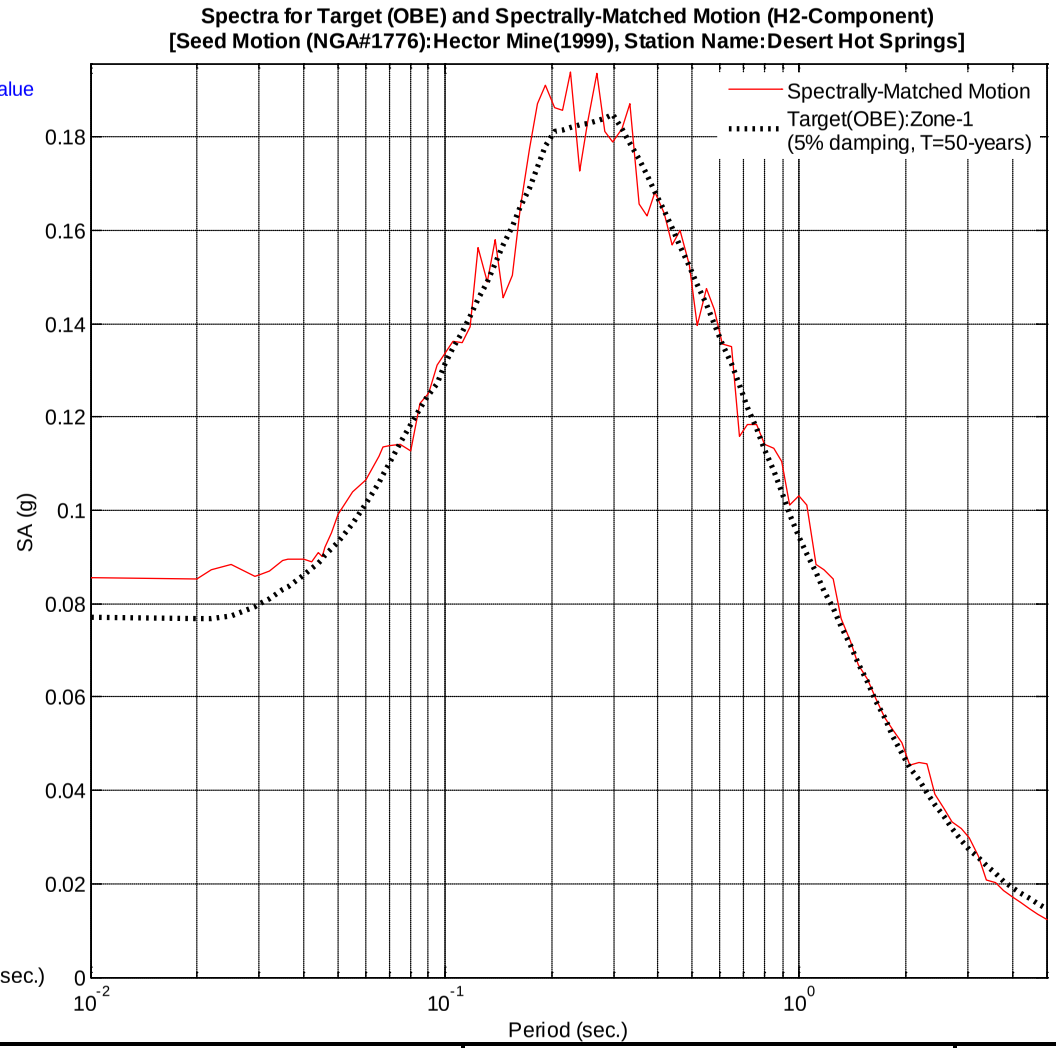
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 1 – SET NO. 5 – VERTICAL**	PLATE
BY:	J. Zhong		**A1-15**
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 1 – SET NO. 6 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A1-16**





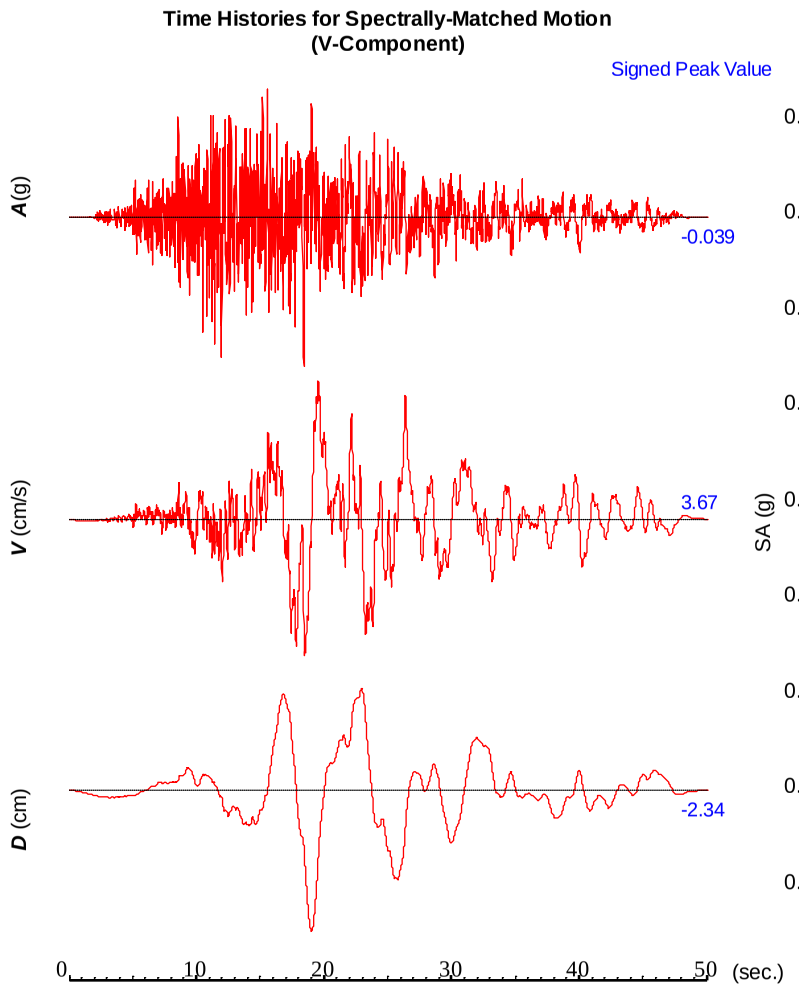
SC SOLUTIONS

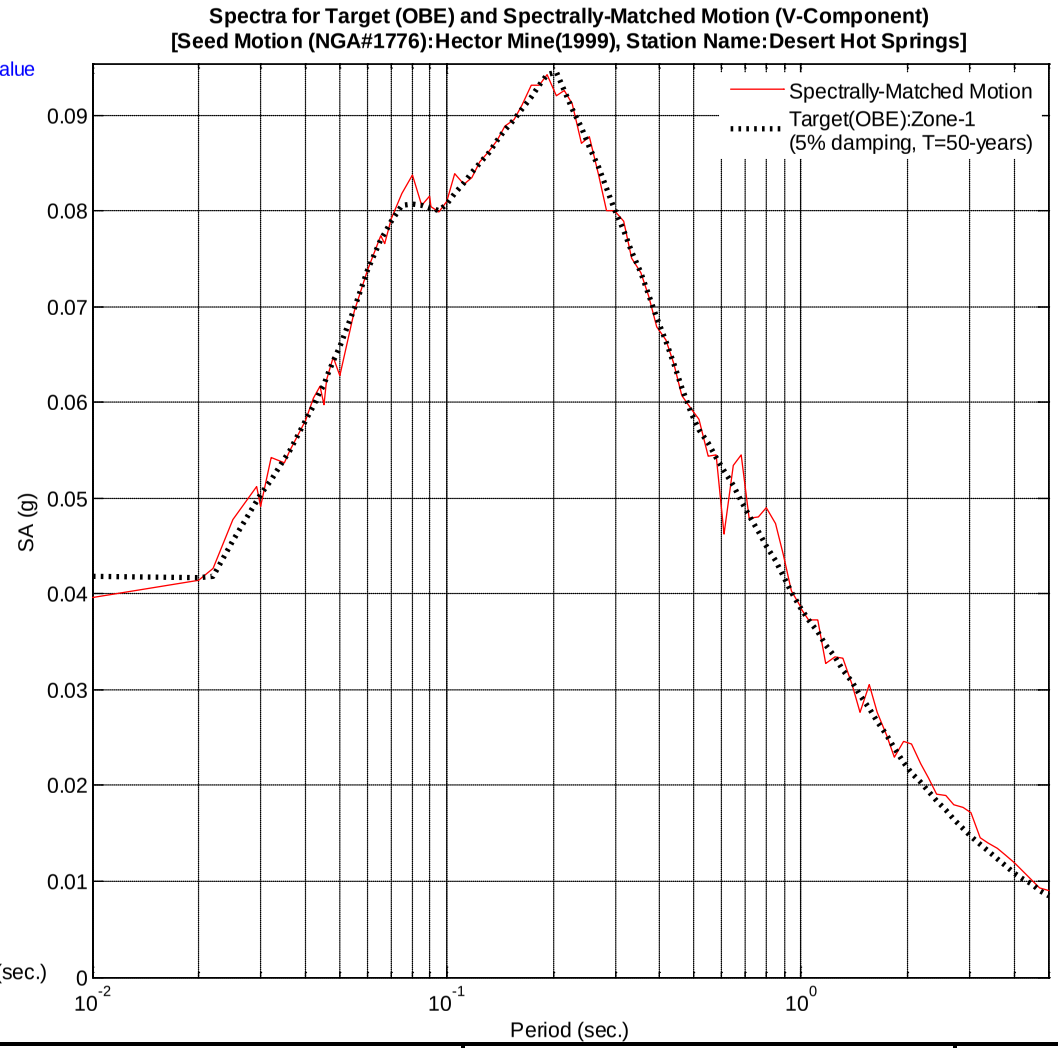
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 1 – SET NO. 6 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

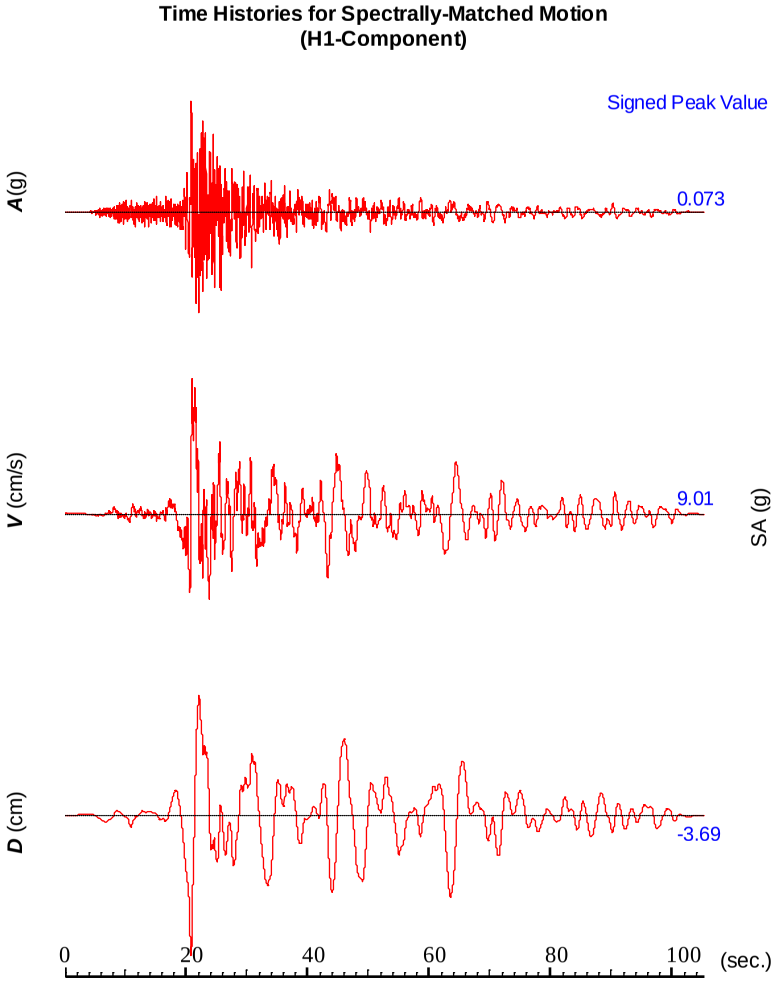
PLATE
A1-17

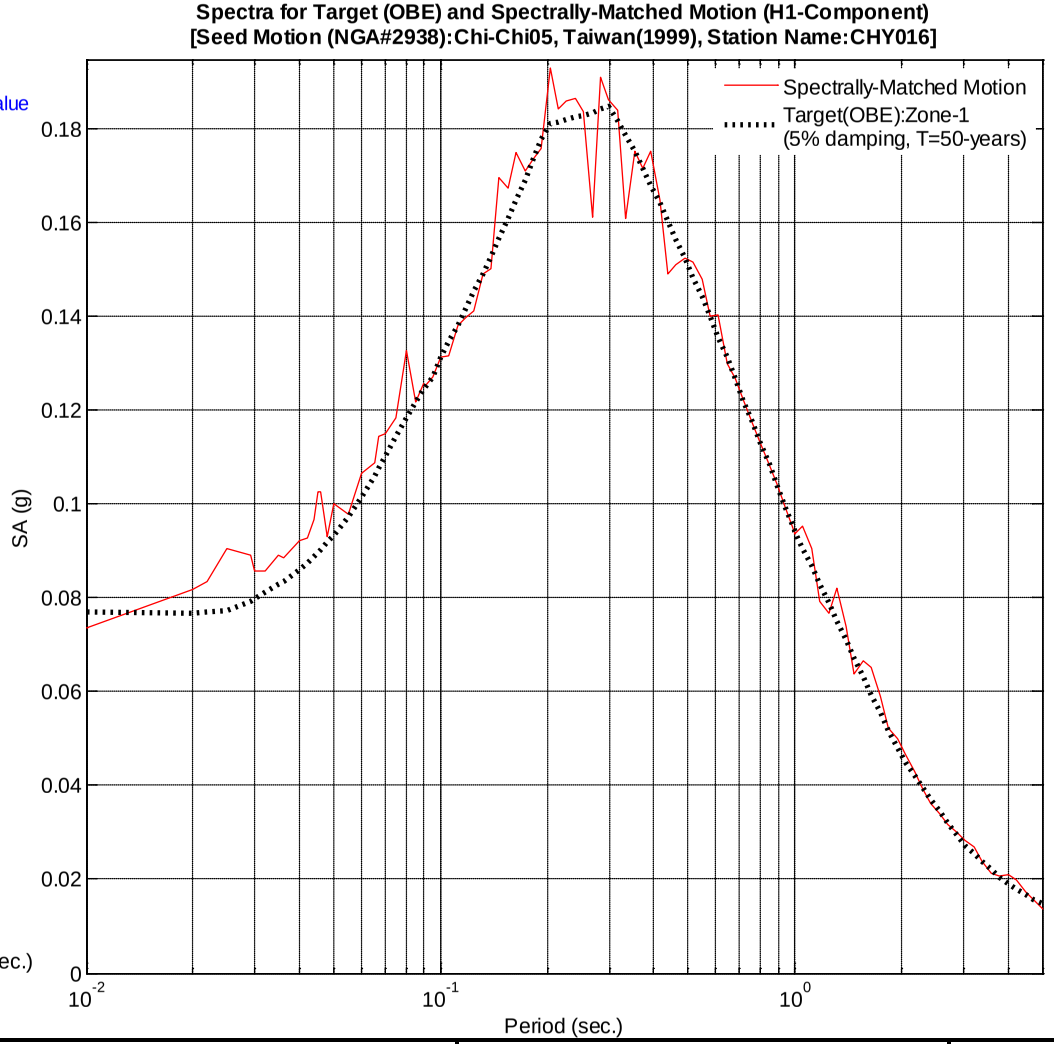




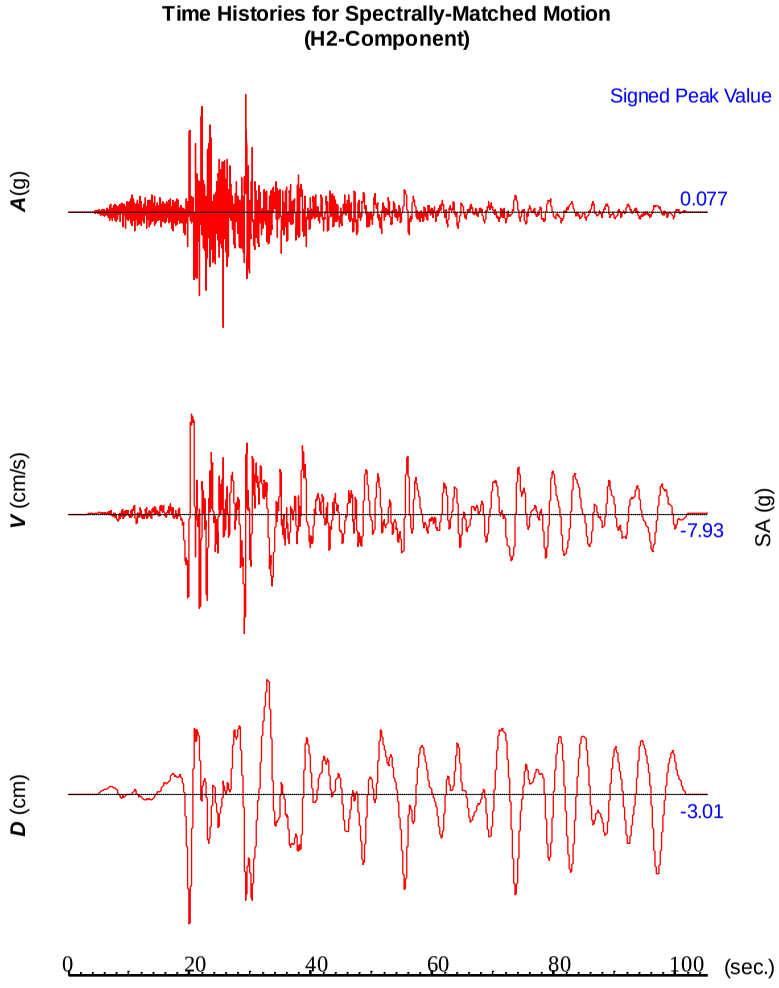
SC SOLUTIONS

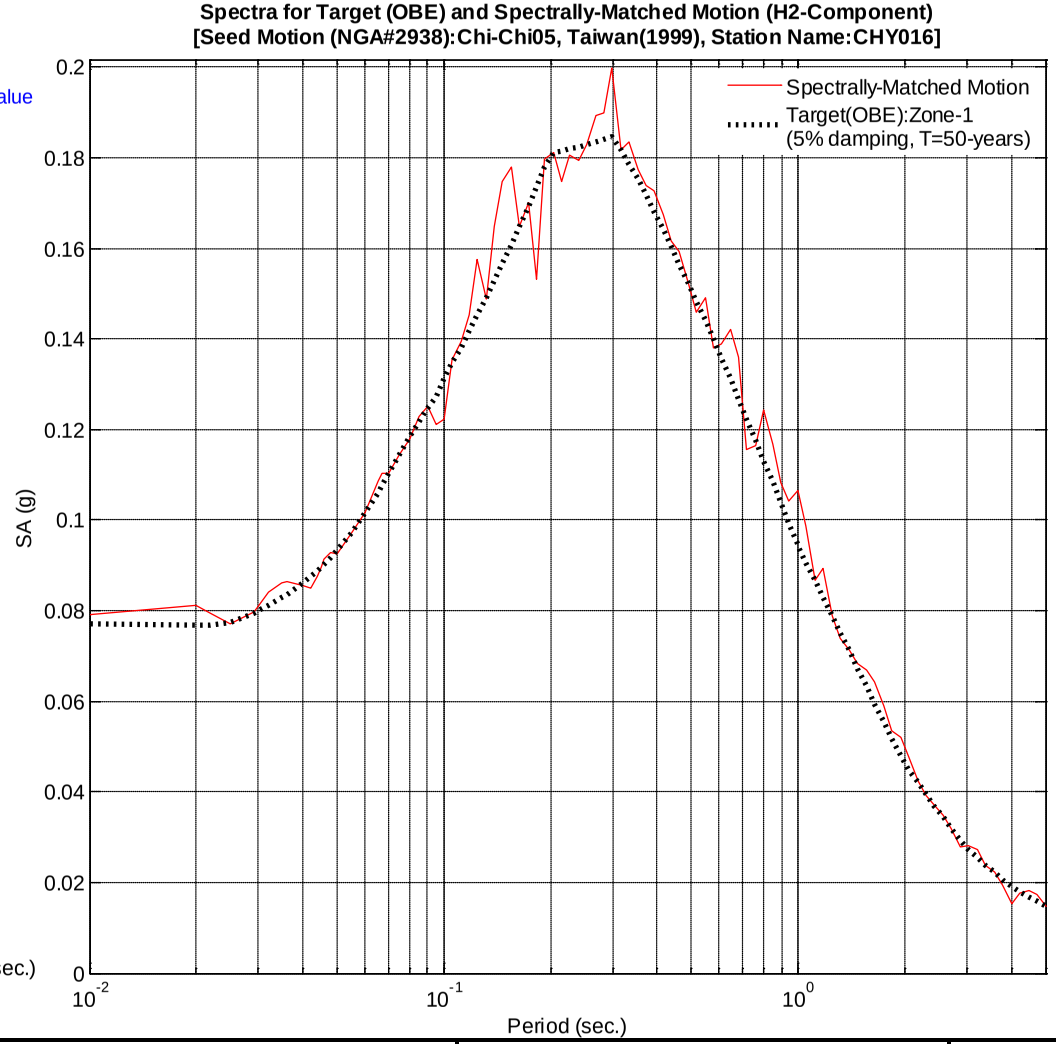
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 1 – SET NO. 6 – VERTICAL**	PLATE **A1-18**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		





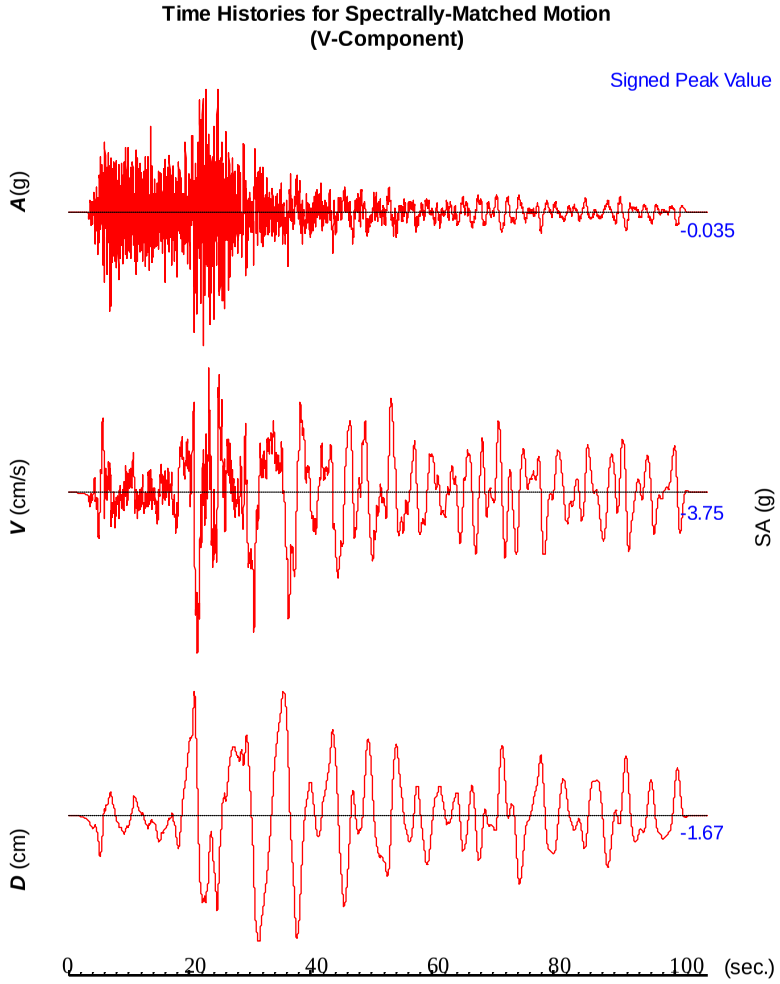
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 1 – SET NO. 7 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A1-19**

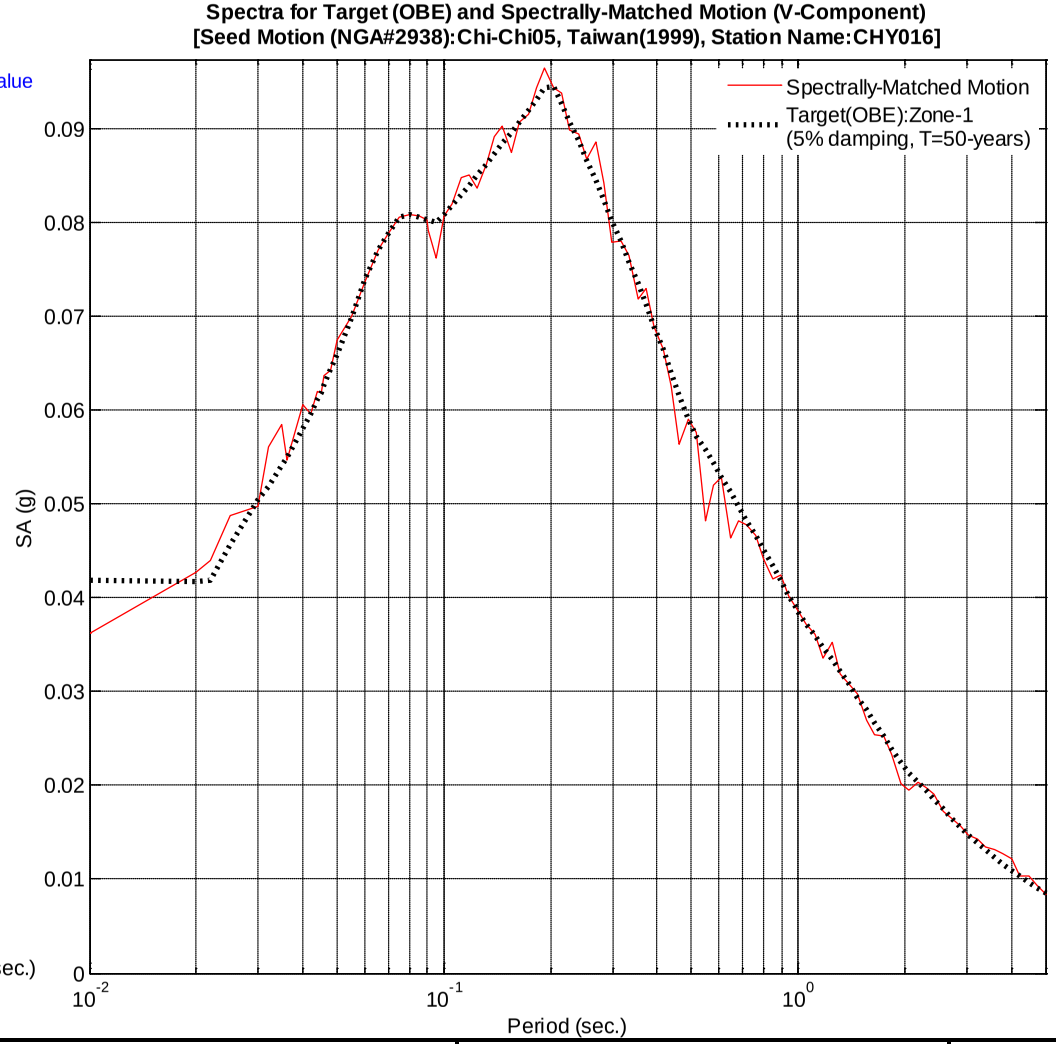




SC SOLUTIONS

PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 1 – SET NO. 7 – HORIZONTAL 2**	PLATE **A1-20**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 1 – SET NO. 7 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE
A1-21

Table A.2: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 2**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	832	Landers	1992	North Palm Springs	7.28	26.84	0.064	7.729	5.269	0.063	7.273	3.508	0.035	3.182	1.664
2	1637	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.058	5.775	1.721	0.060	5.478	2.058	0.036	2.862	1.030
3	907	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.062	4.977	1.969	0.063	8.580	1.695	0.033	3.797	1.310
4	2112	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.061	6.608	5.143	0.056	6.321	5.134	0.031	4.044	3.212
5	882	Imperial Valley-06	1979	Delta	6.53	22.03	0.062	5.140	2.350	0.072	5.751	3.009	0.033	2.955	1.615
6	1776	Manjil, Iran	1990	Rudsar	7.37	64.47	0.062	6.206	3.937	0.071	7.078	2.624	0.032	3.243	1.892
7	2938	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.057	6.905	2.771	0.068	6.284	2.330	0.030	2.908	1.310

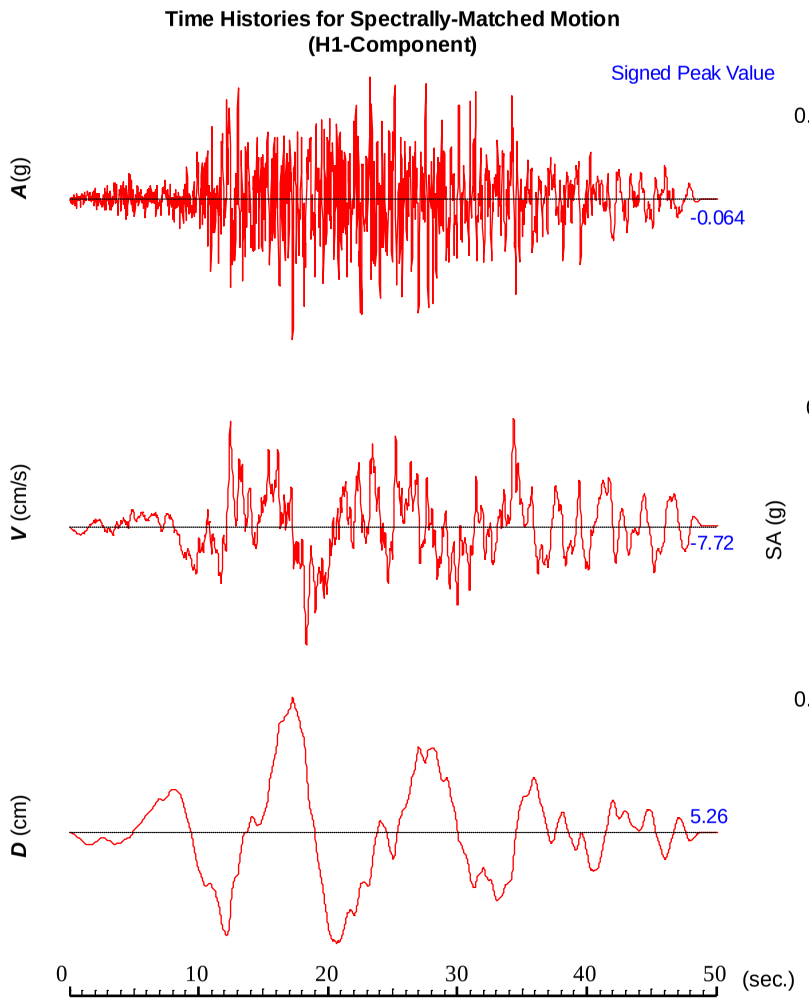
SC SOLUTIONS

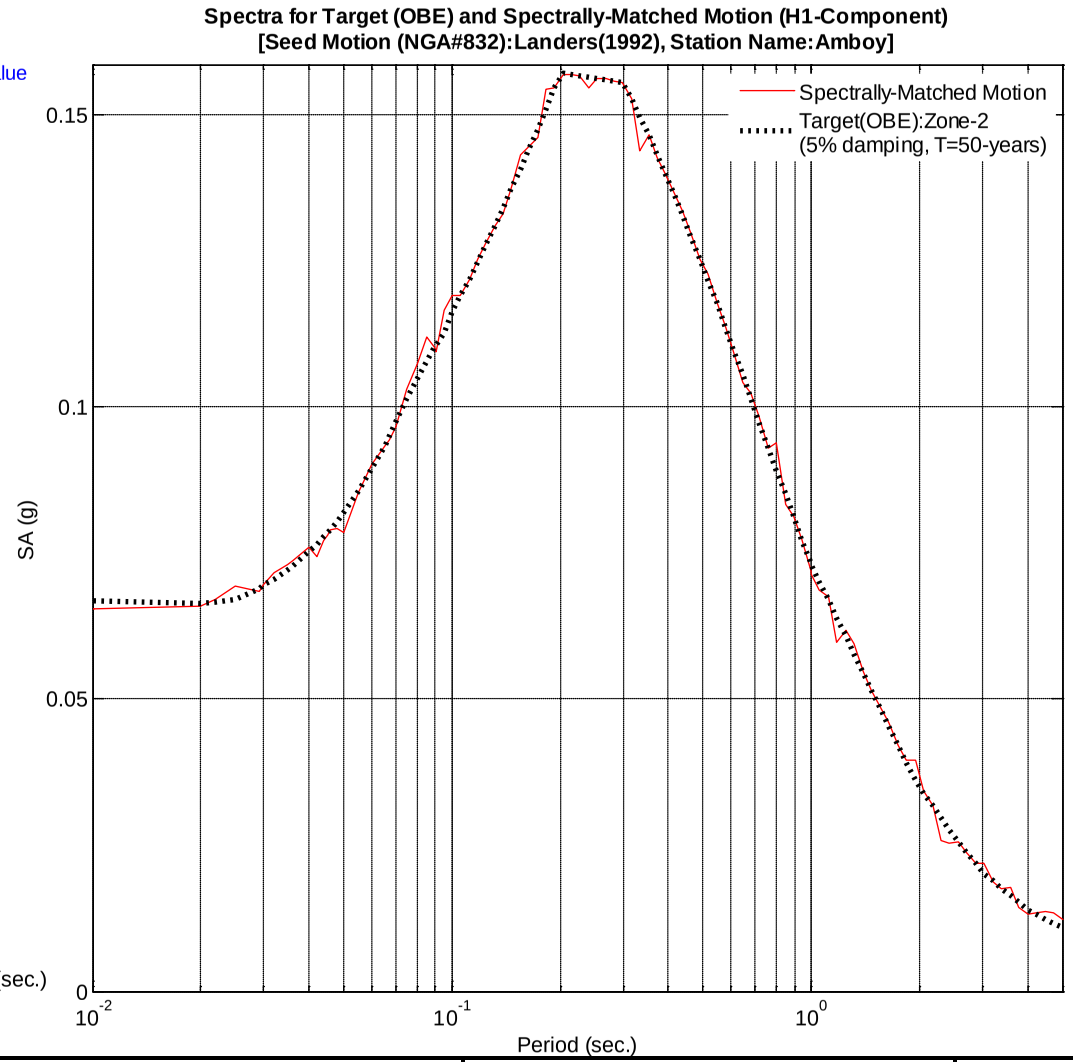
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS OBE – ZONE 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

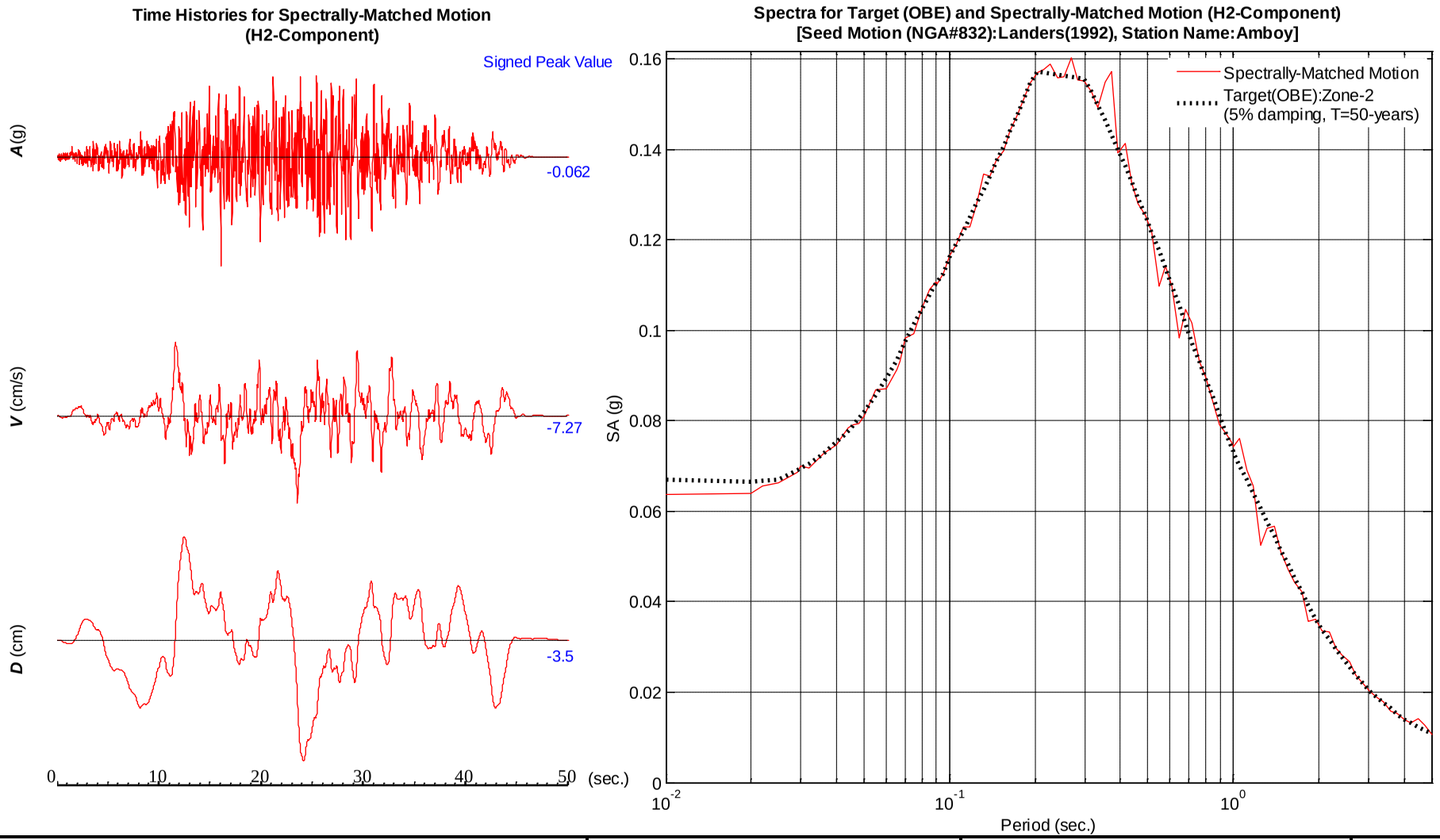
PLATE
A2-0



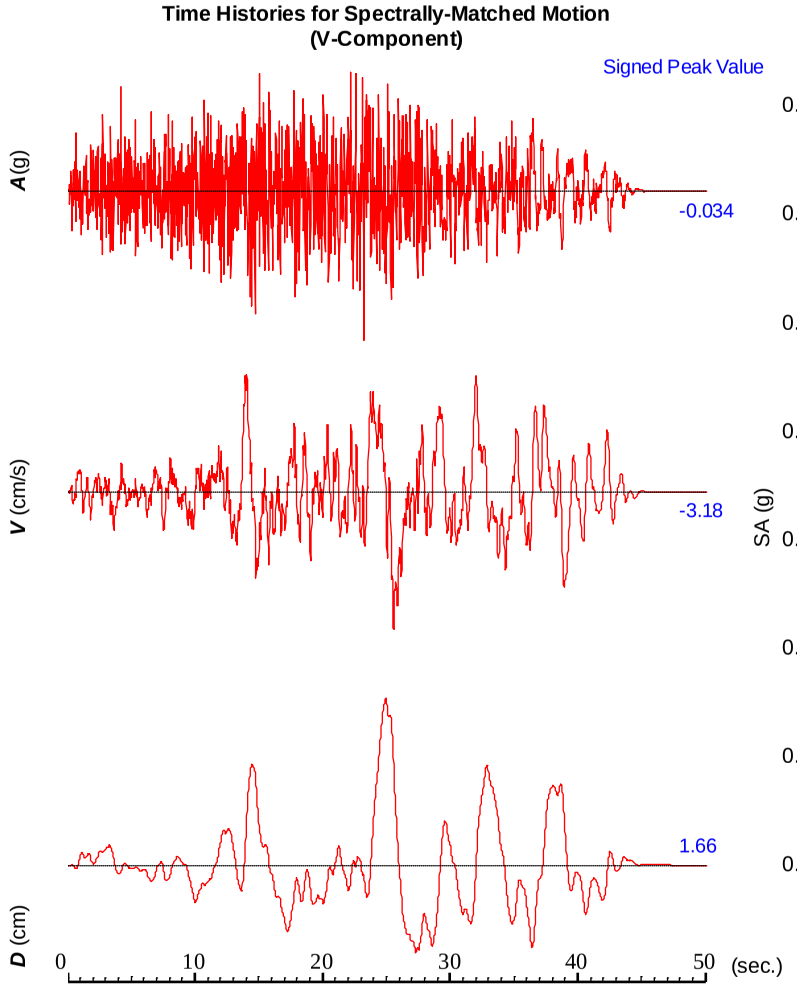


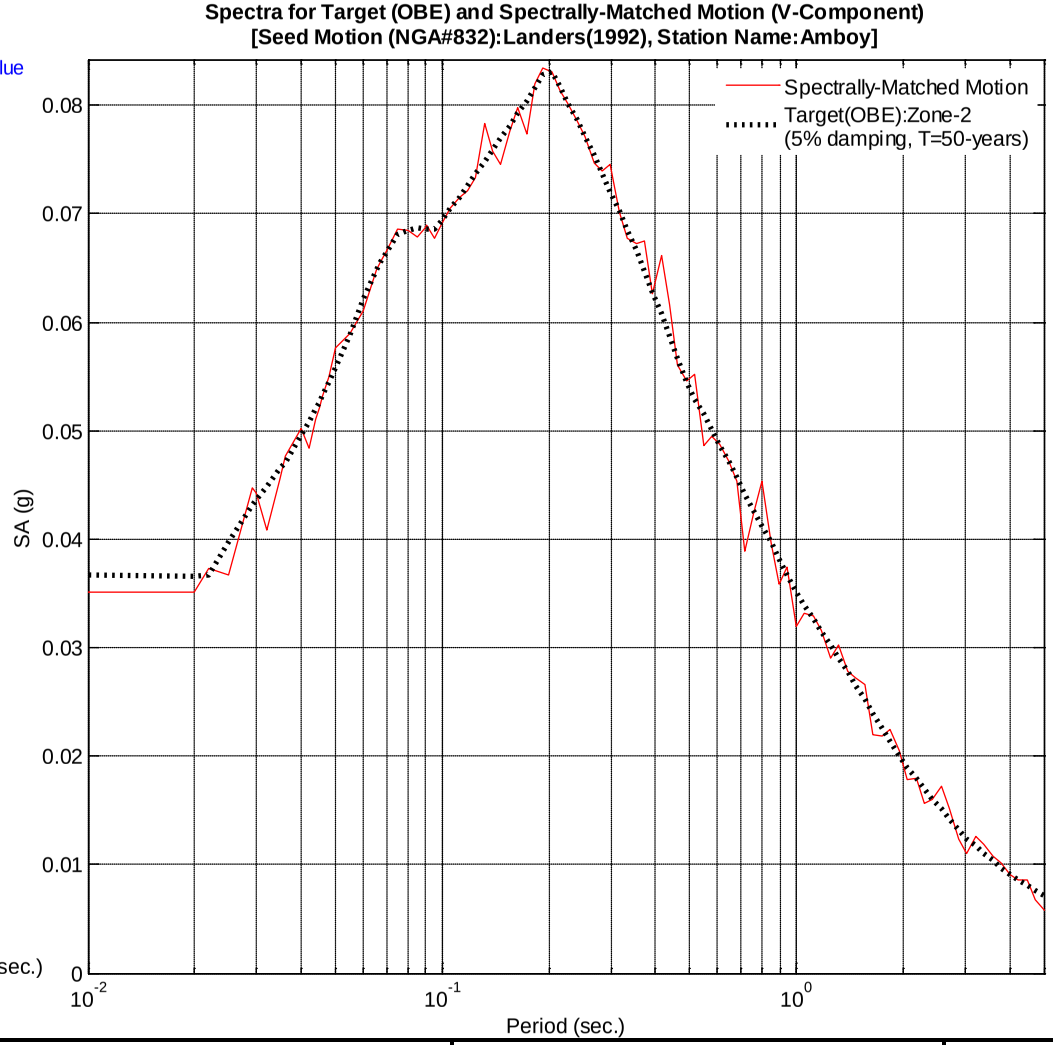
SC SOLUTIONS

PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 2 – SET NO. 1 – HORIZONTAL 1**	PLATE **A2-1**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		



SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 2 – SET NO. 1 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A2-2**





SC SOLUTIONS

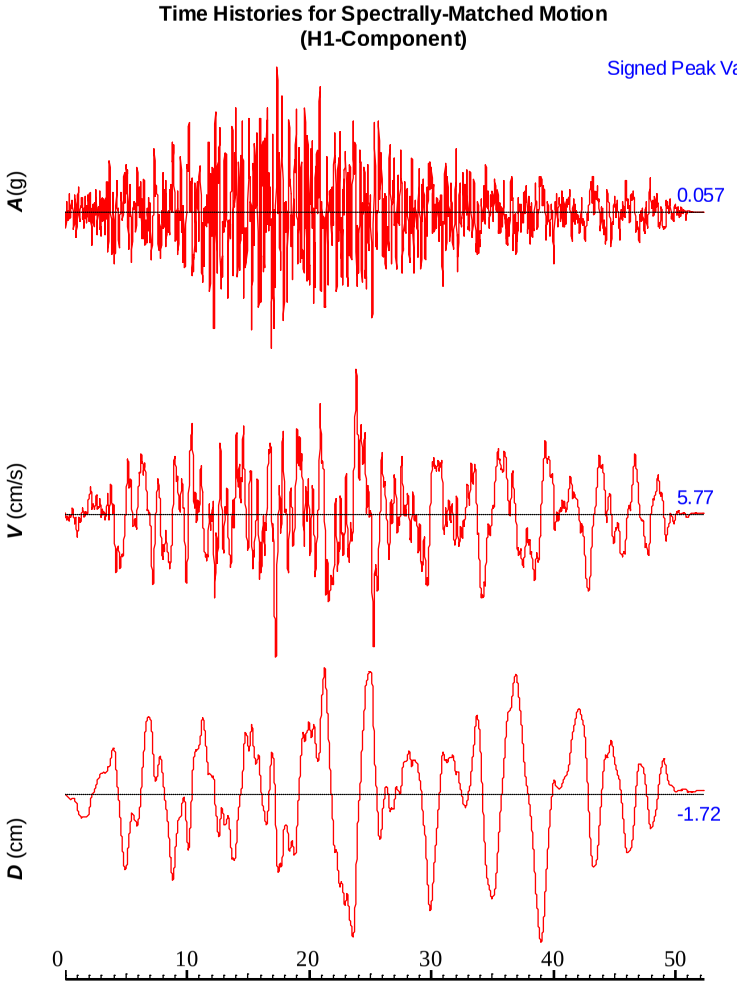
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

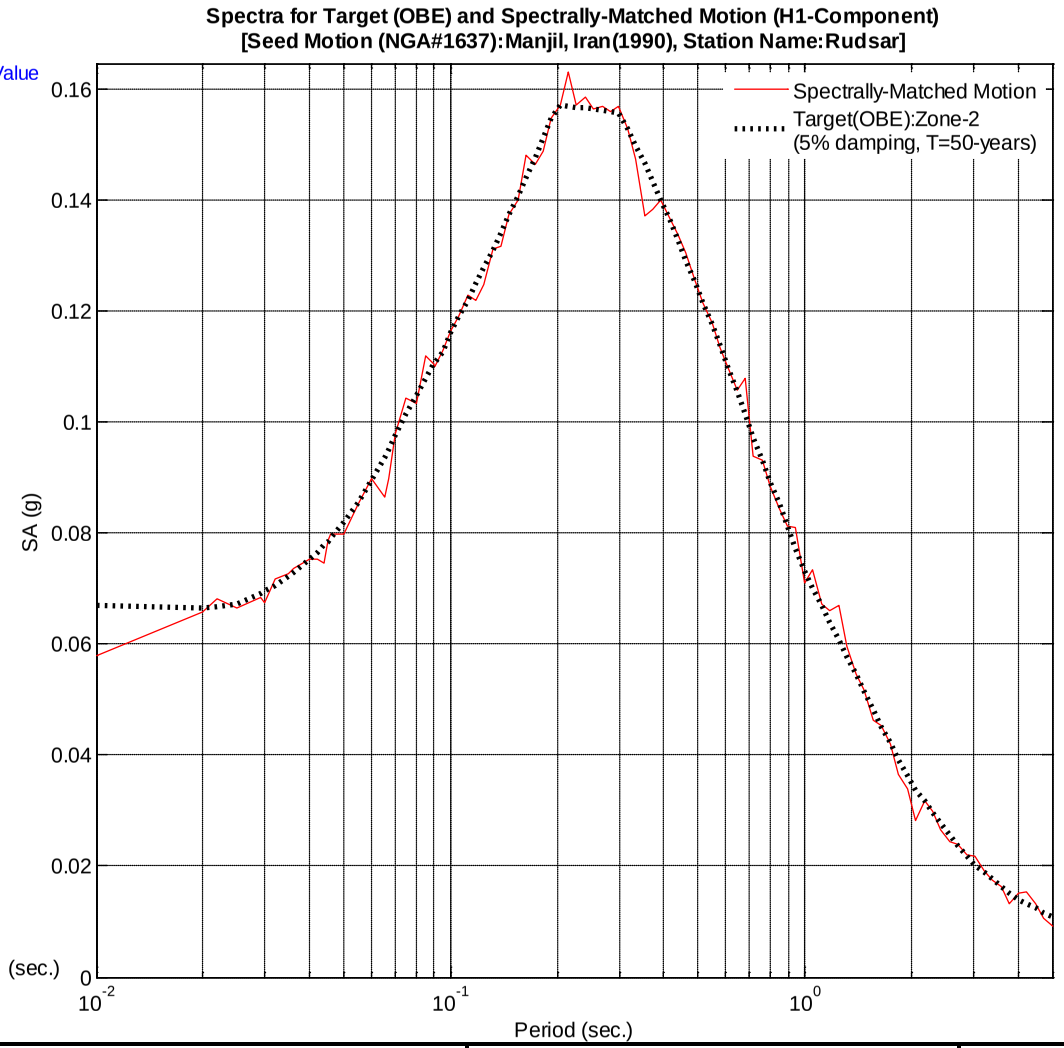
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 2 – SET NO. 1 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE

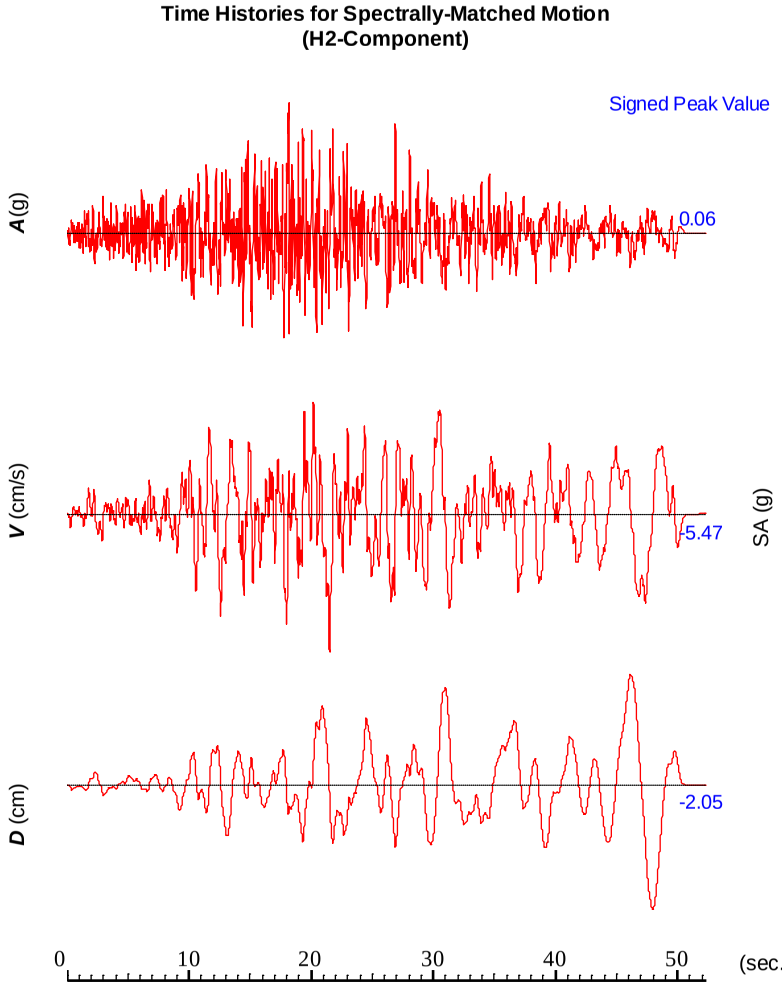
A2-3

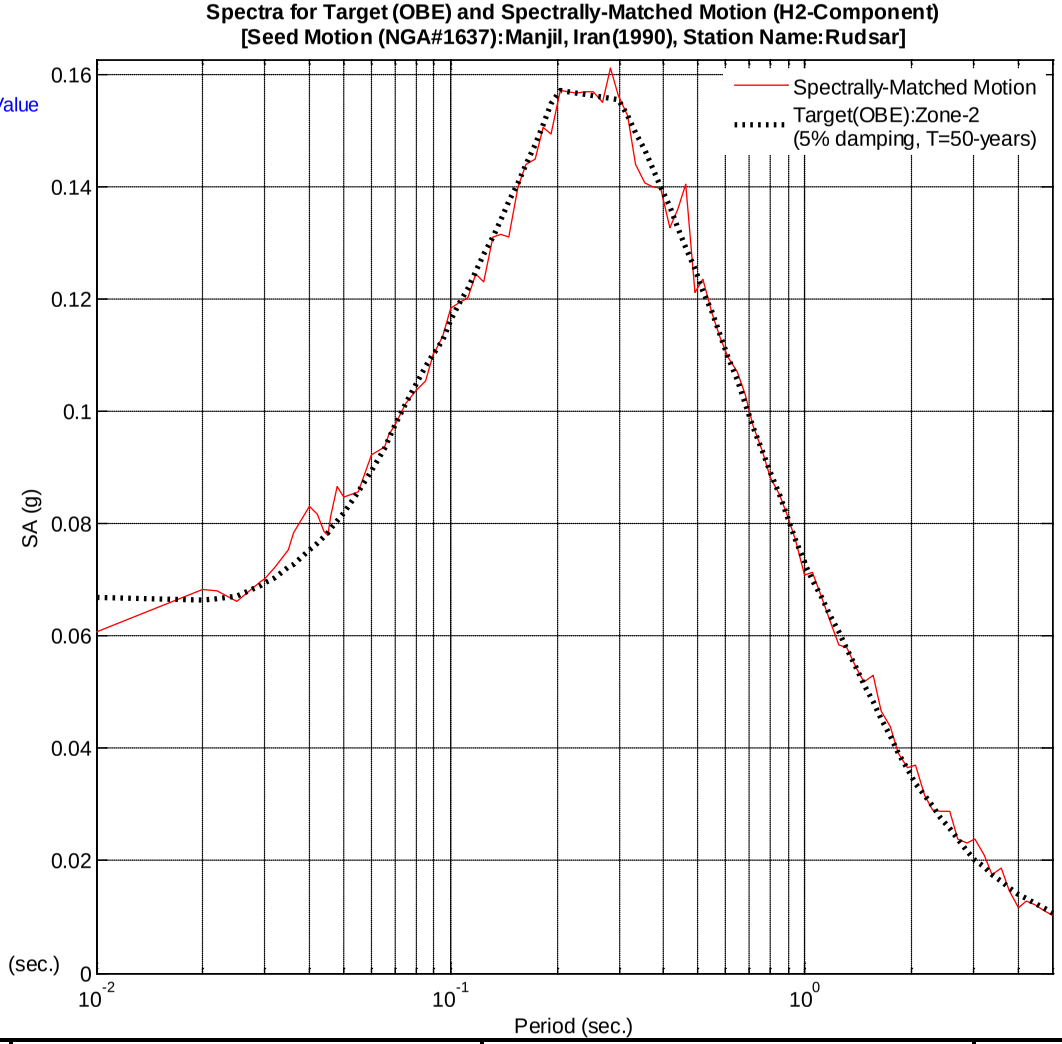




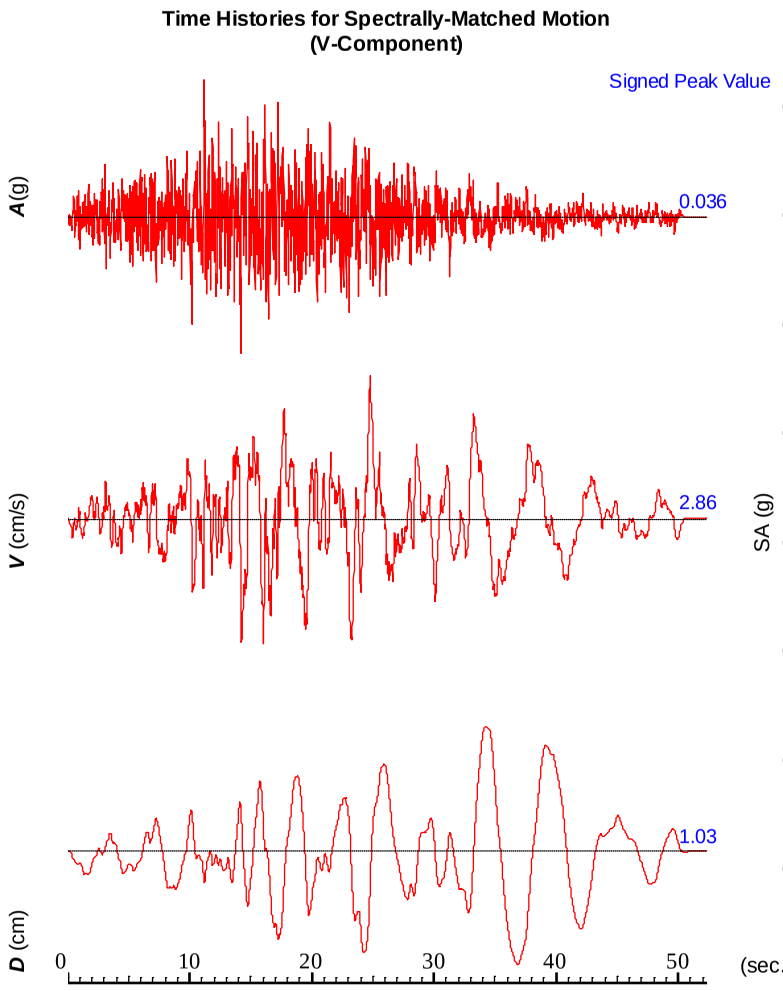
SC SOLUTIONS

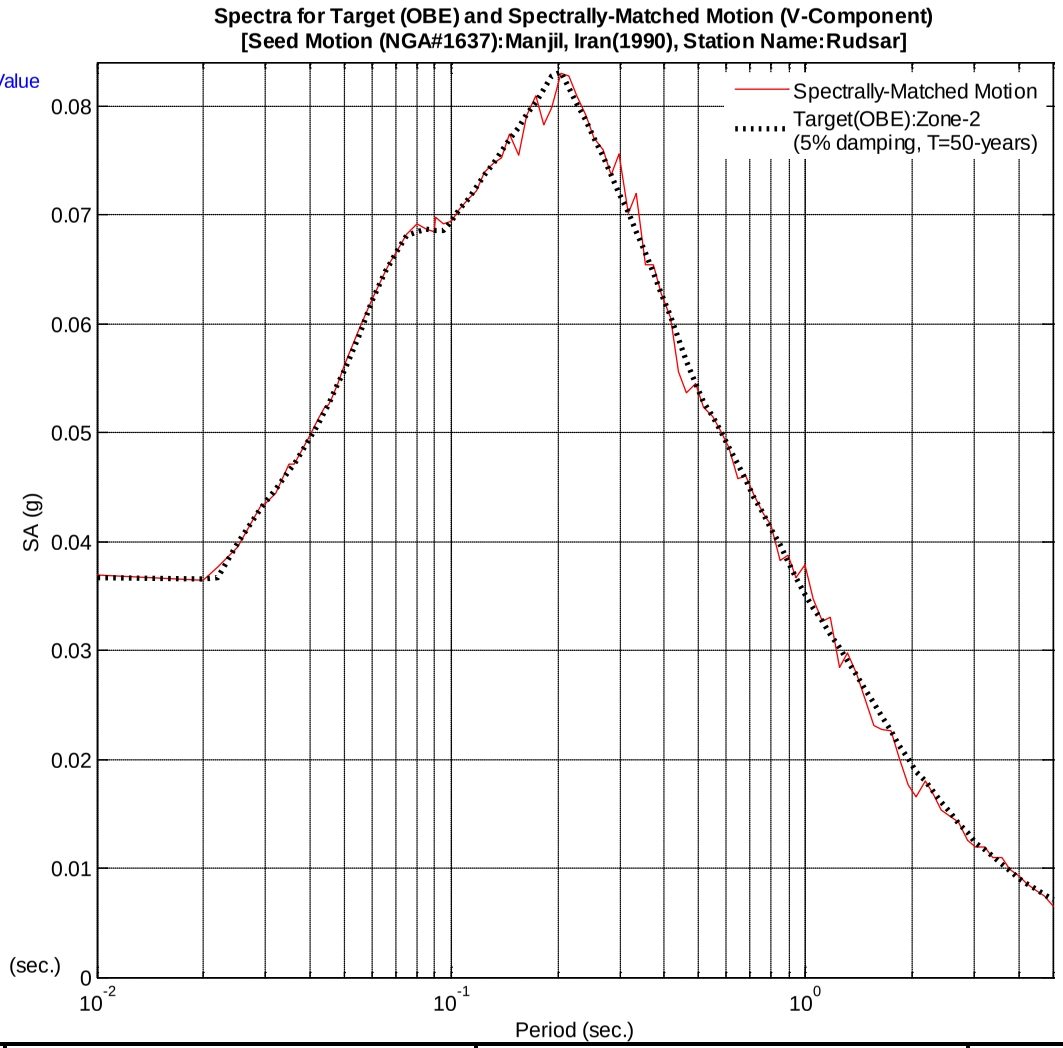
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 2 – SET NO. 2 – HORIZONTAL 1**	PLATE **A2-4**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 2 – SET NO. 2 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A2-5**





SC SOLUTIONS

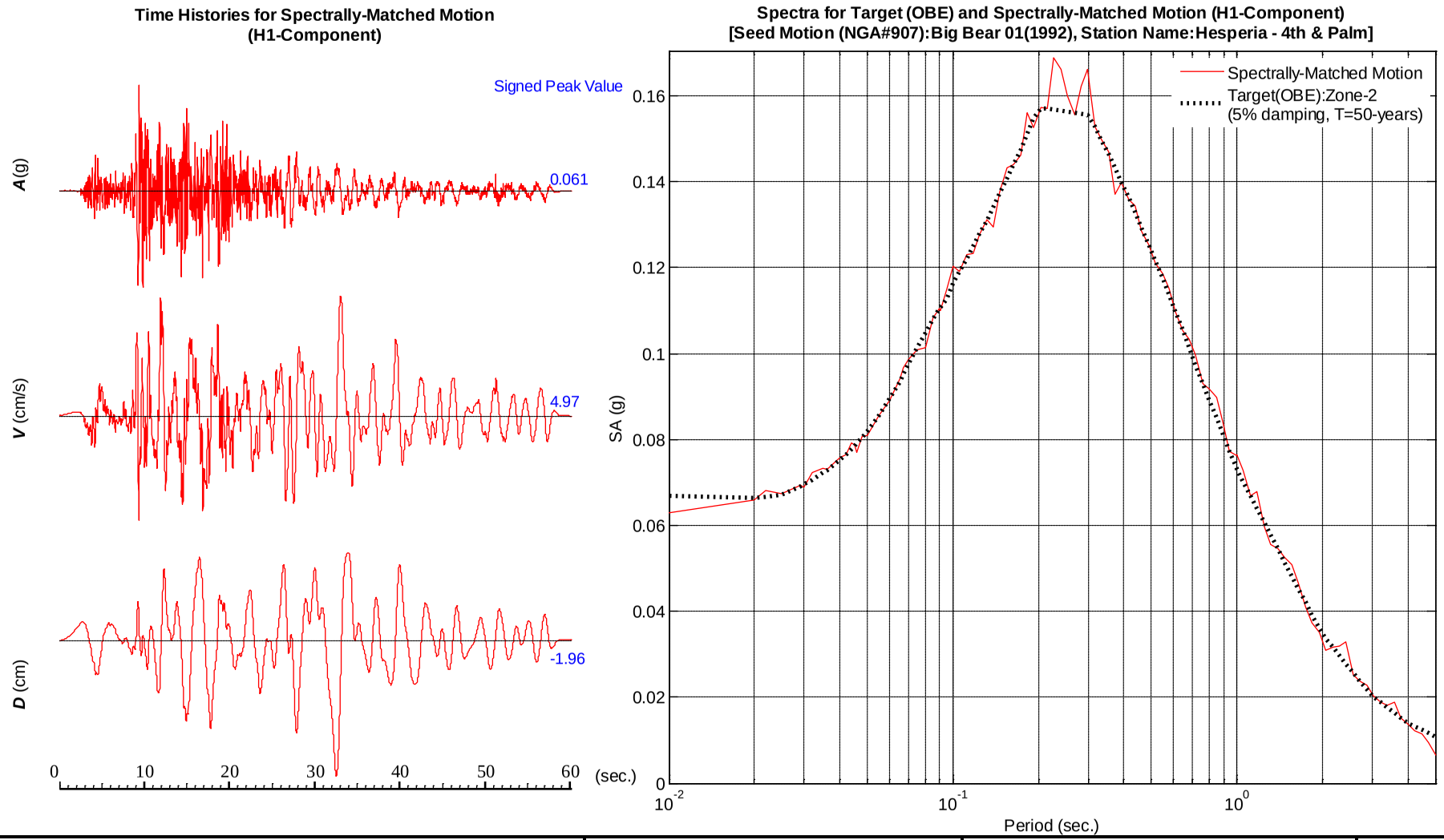
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 2 – SET NO. 2 – VERTICAL

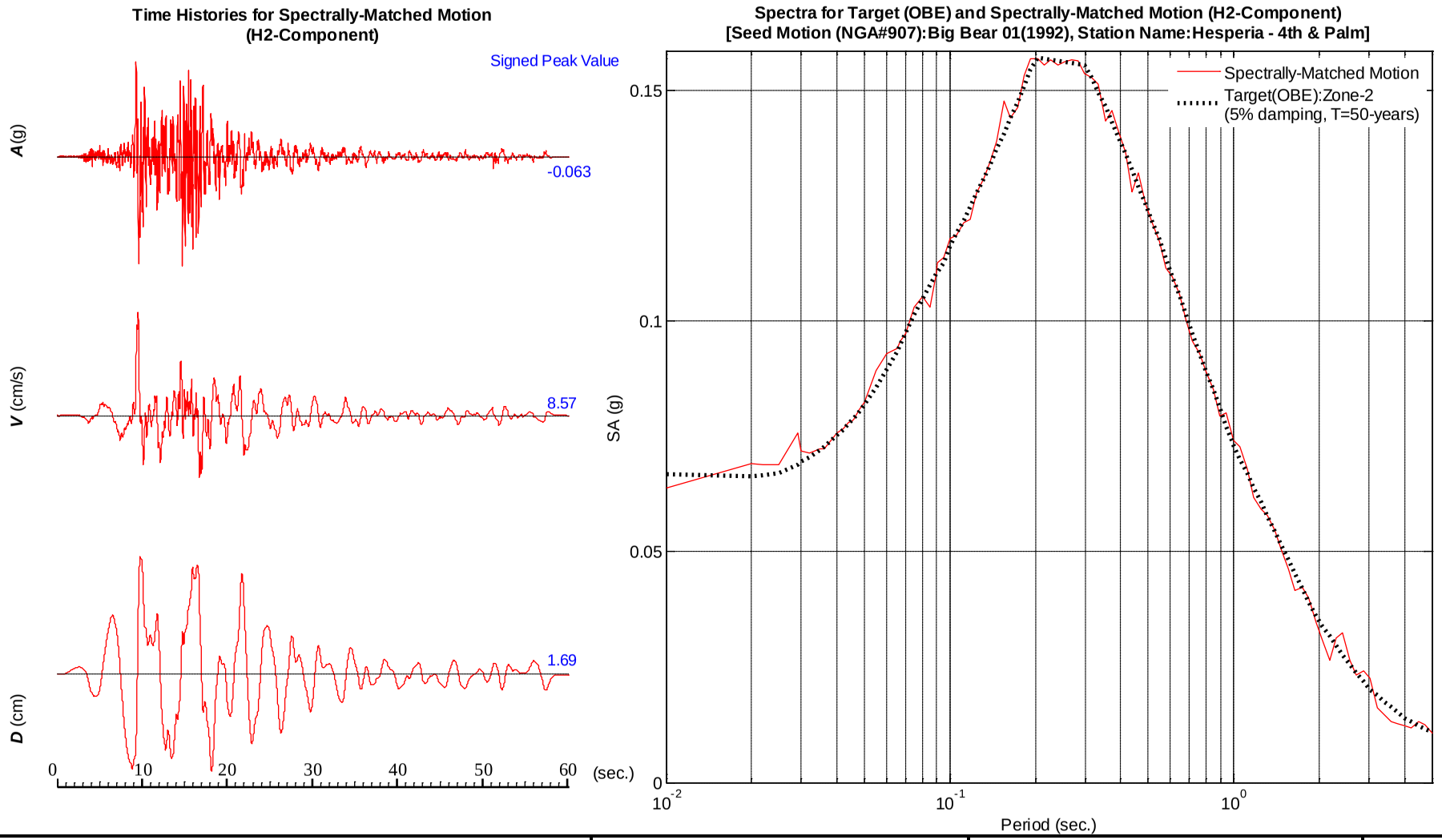
CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE

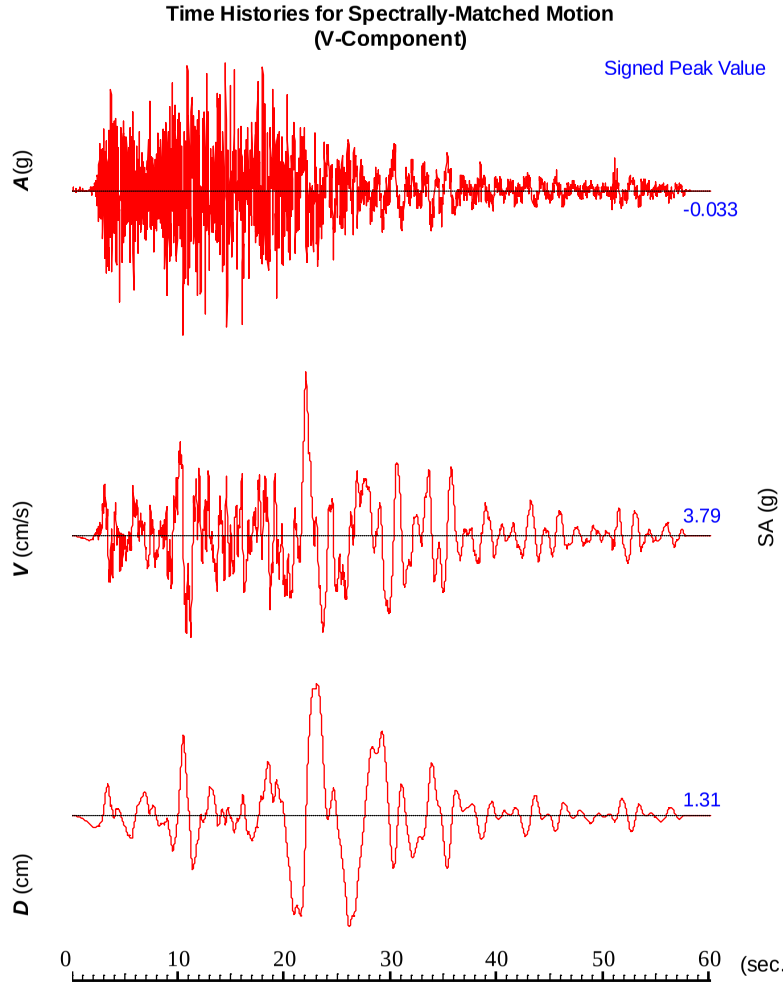
A2-6

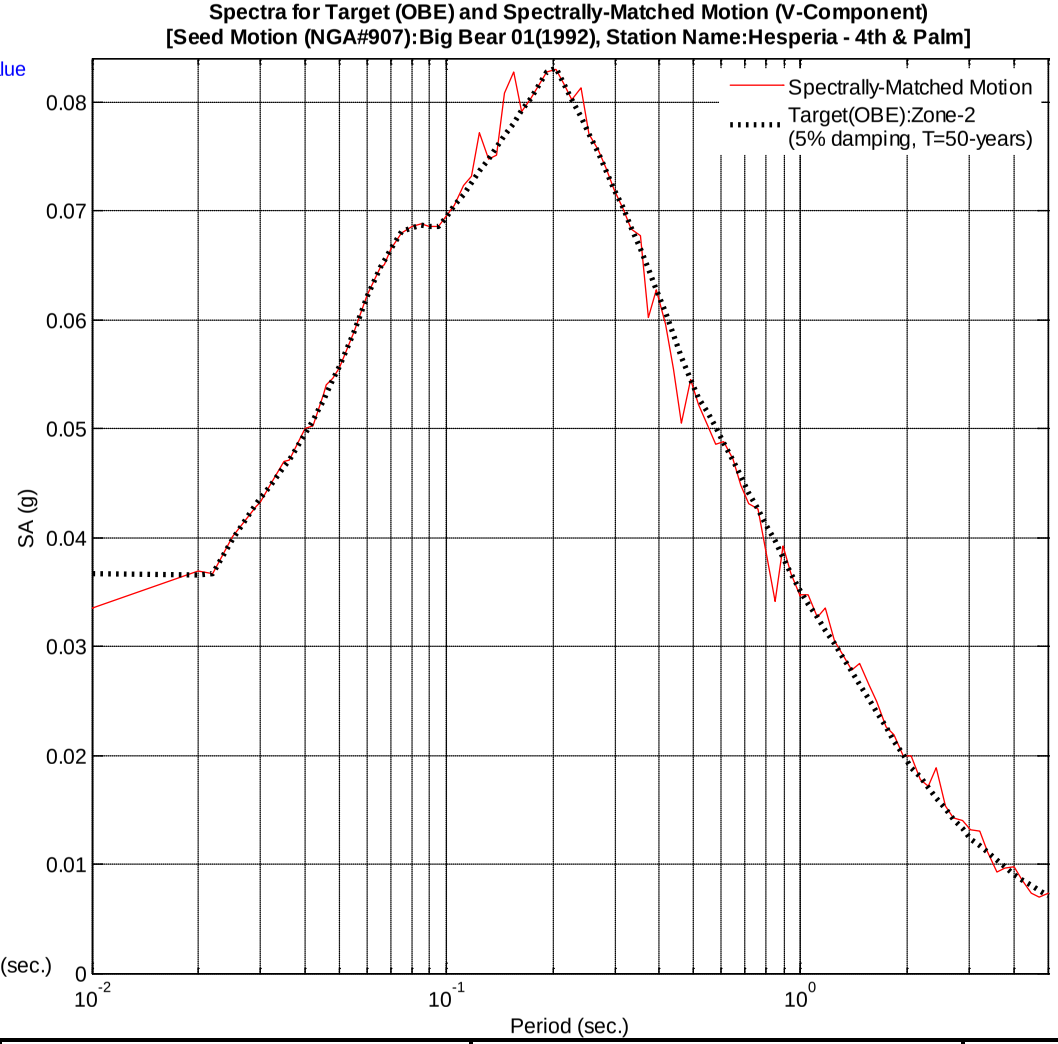


SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 2 – SET NO. 3 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A2-7**



SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 2 – SET NO. 3 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A2-8**





SC SOLUTIONS

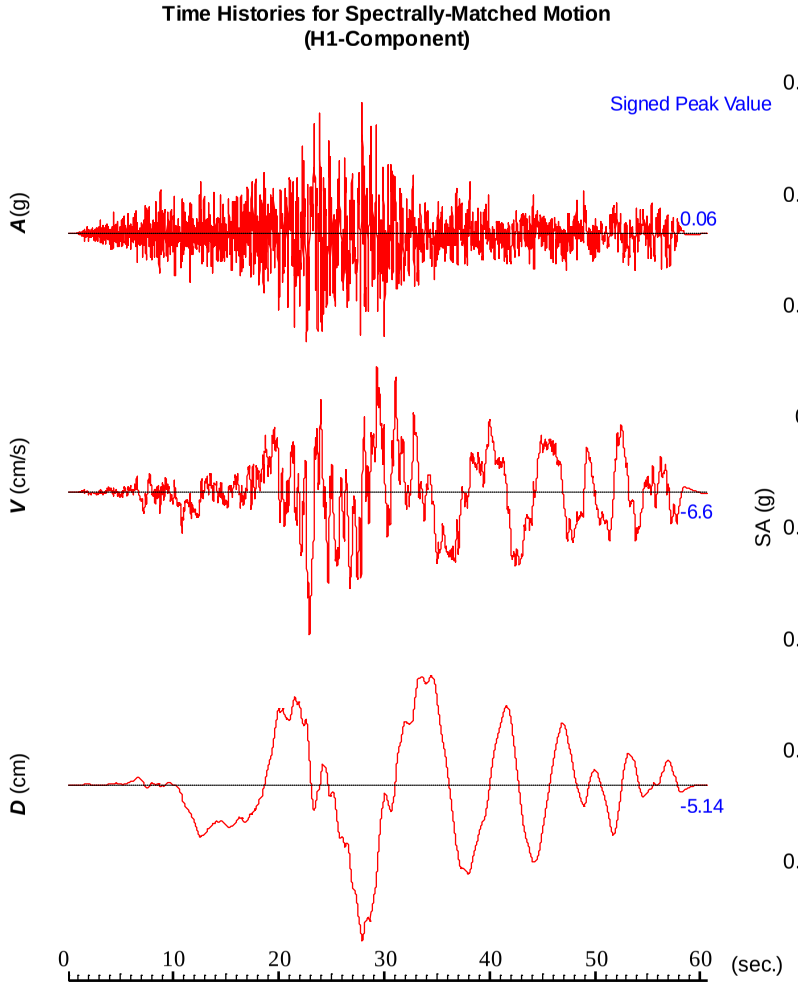
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

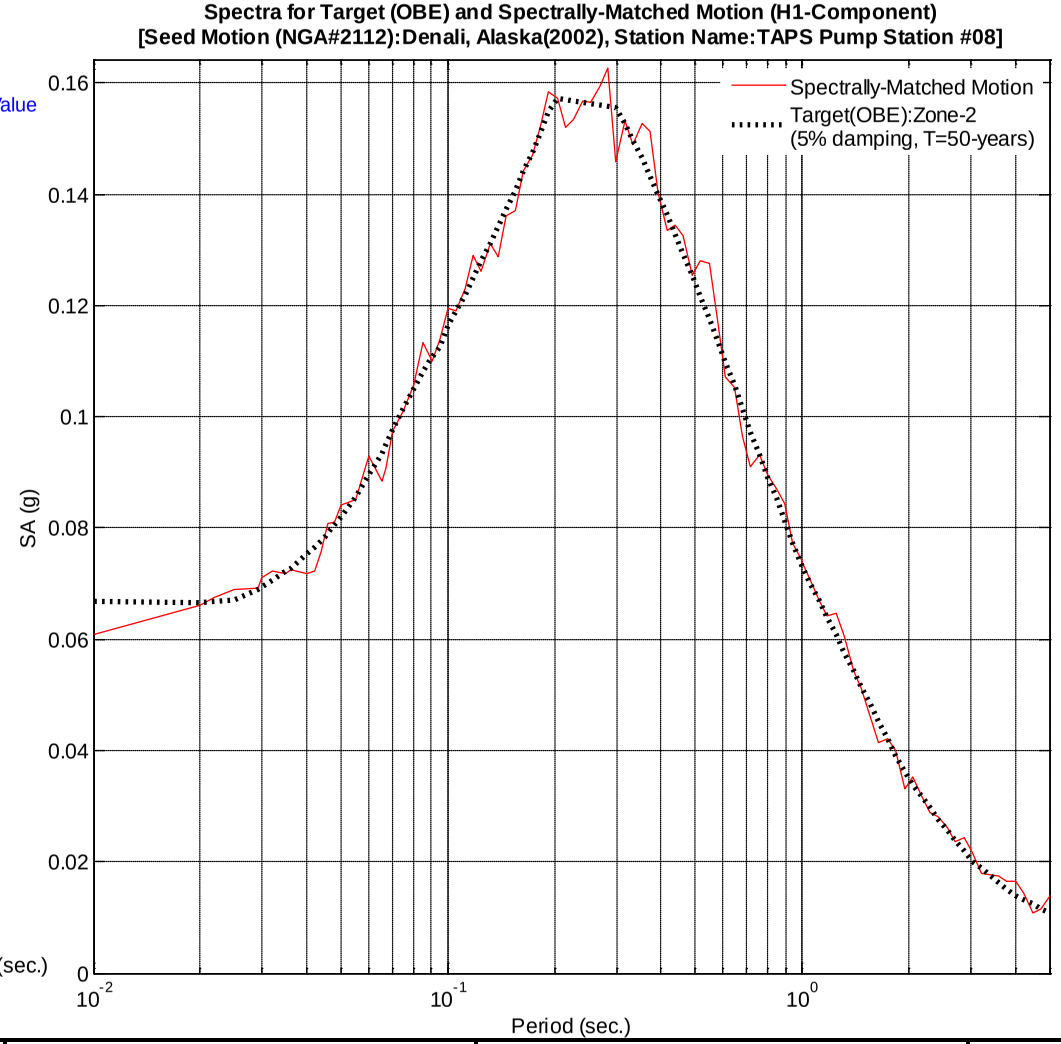
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 2 – SET NO. 3 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE

A2-9





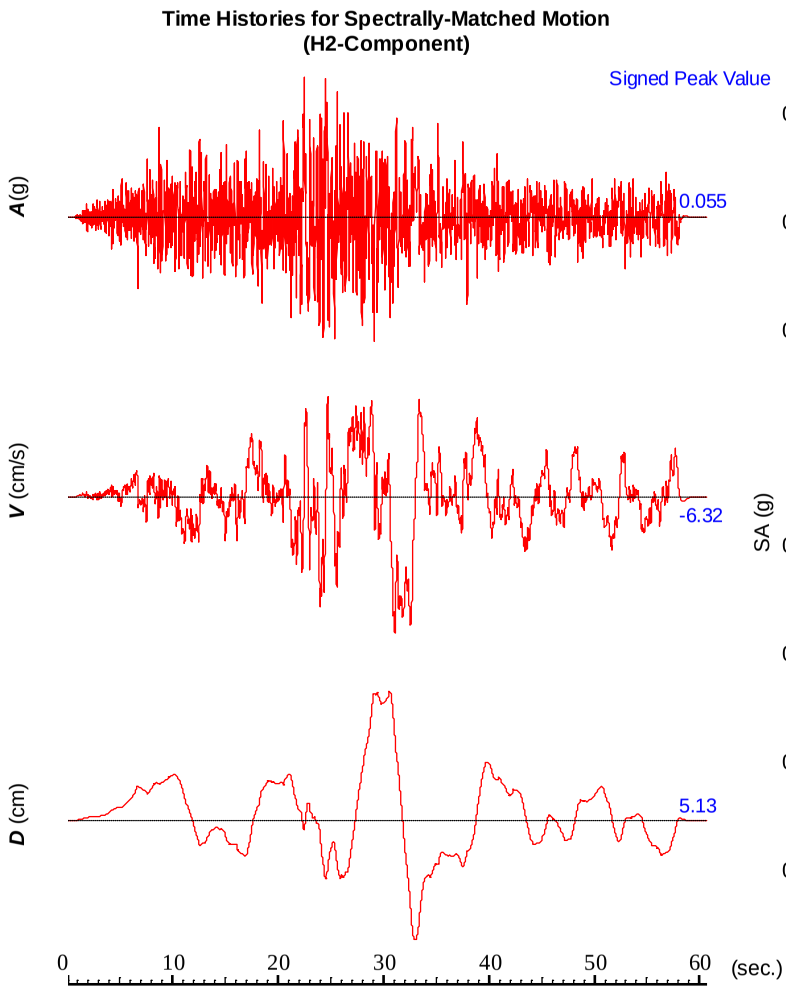
SC SOLUTIONS

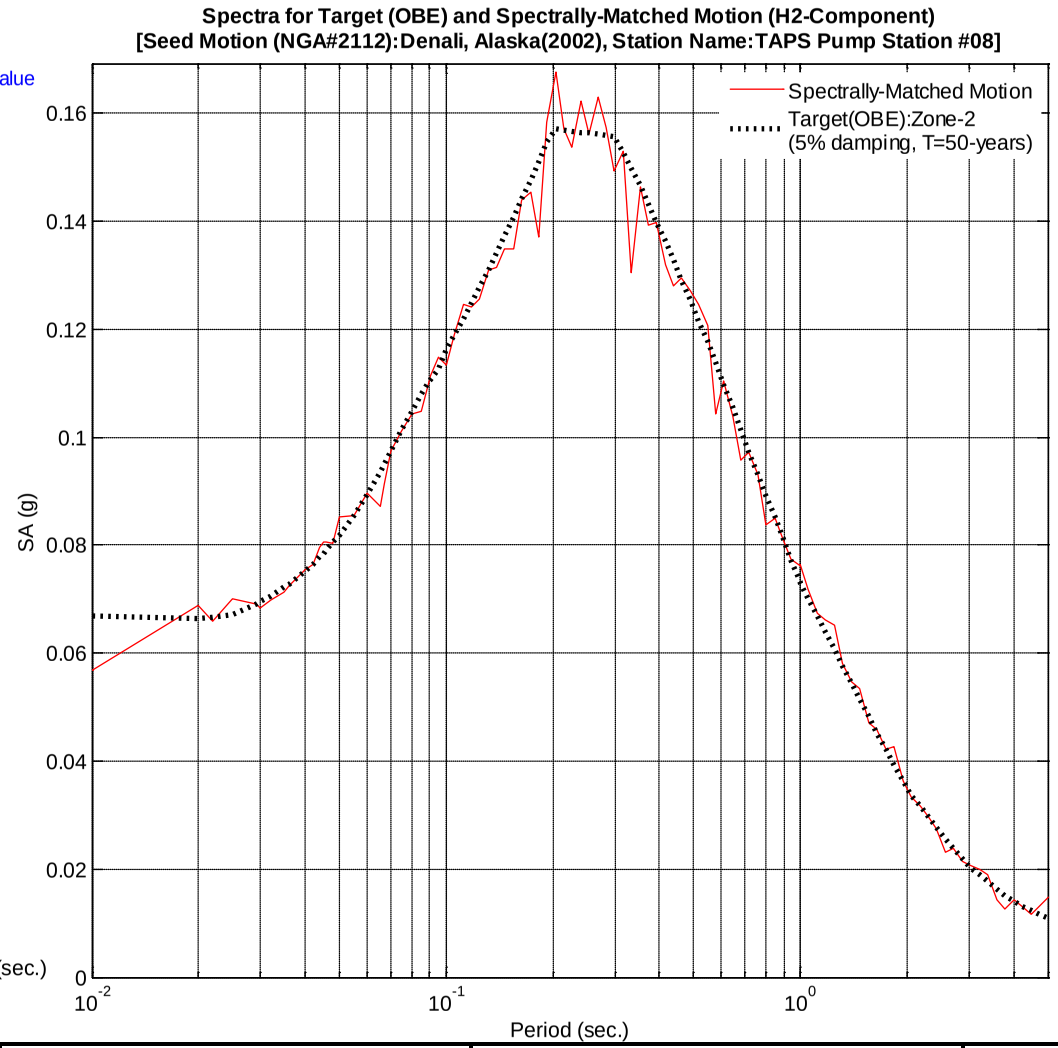
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 2 – SET NO. 4 – HORIZONTAL 1

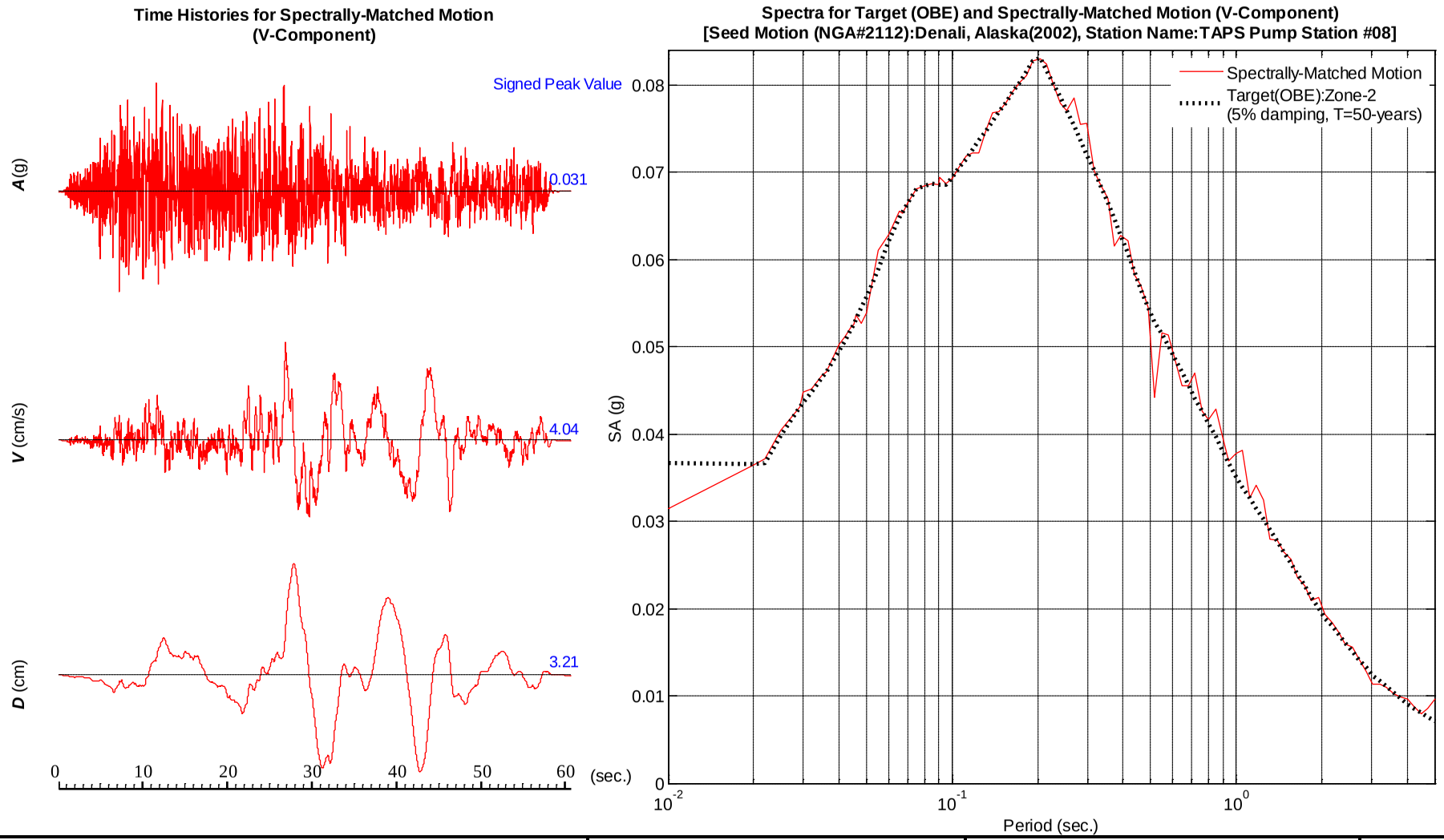
CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE
A2-10



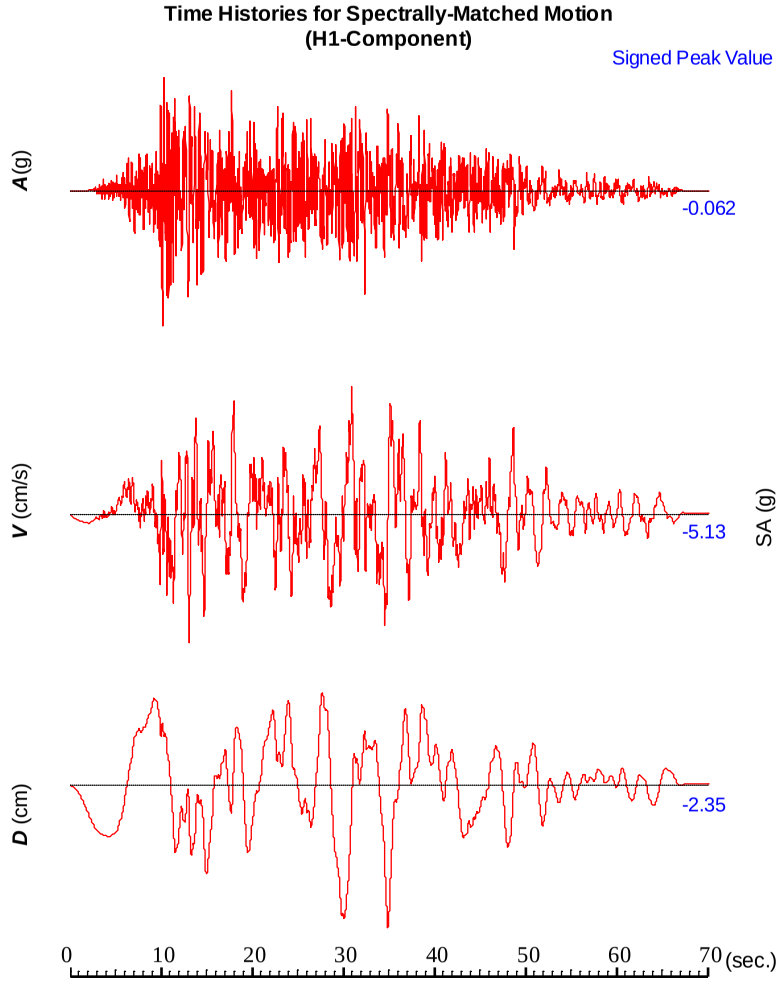


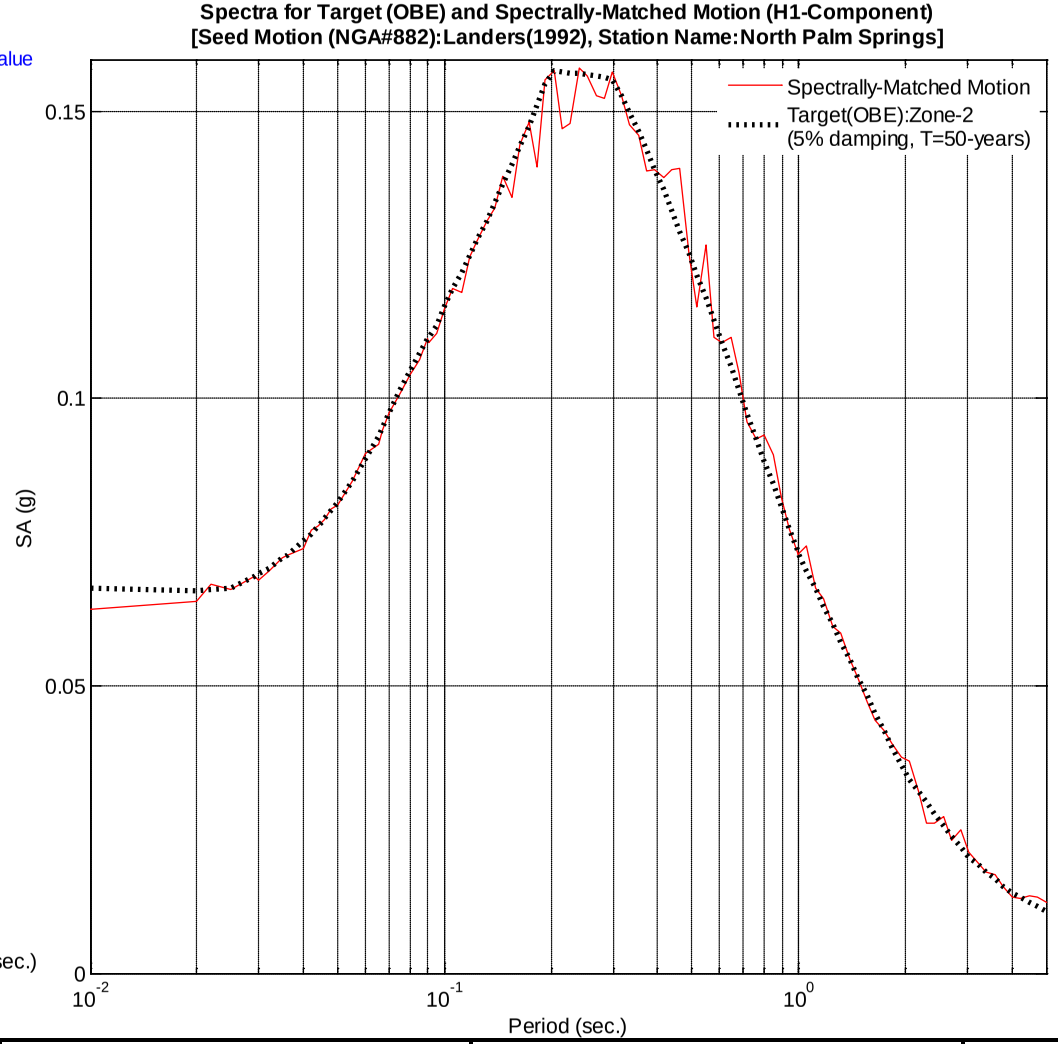
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 2 – SET NO. 4 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A2-11**



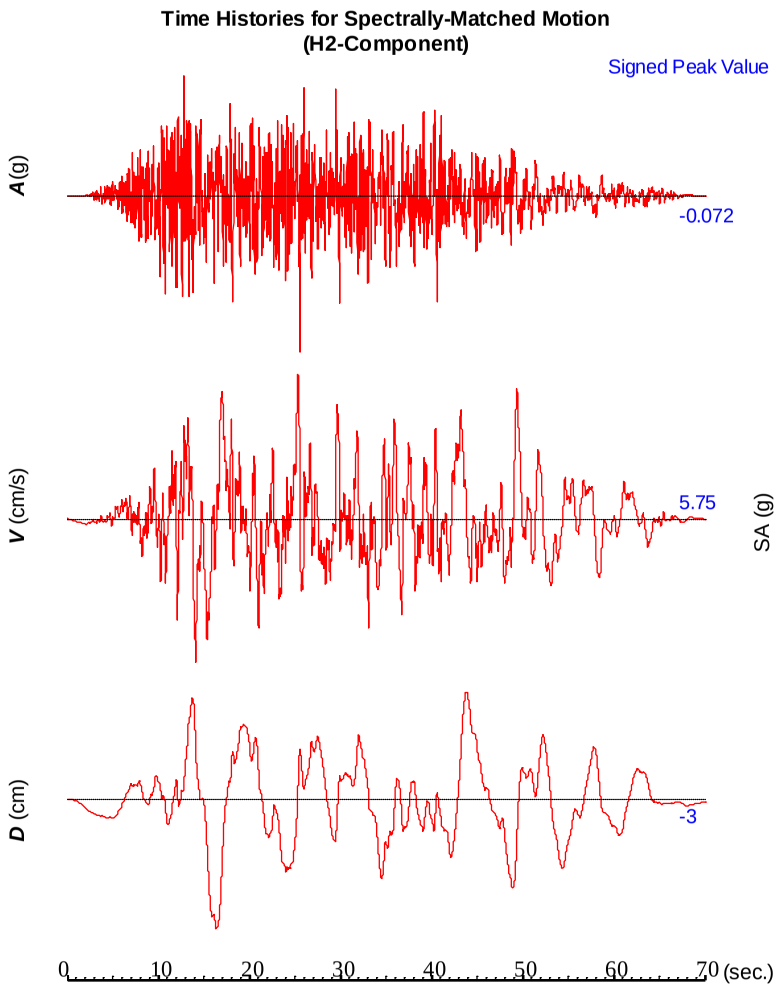
SC SOLUTIONS

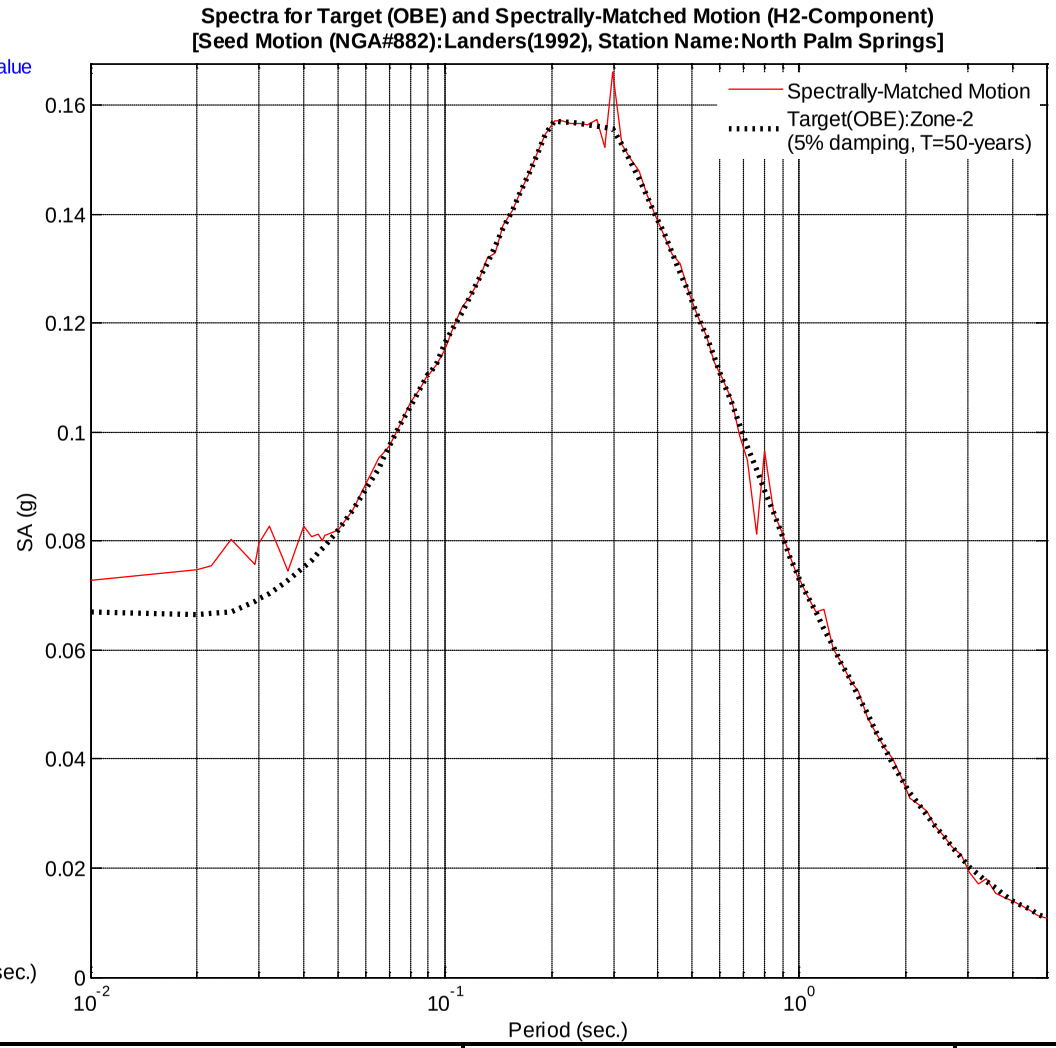
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 2 – SET NO. 4 – VERTICAL**	PLATE **A2-12**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 2 – SET NO. 5 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A2-13**





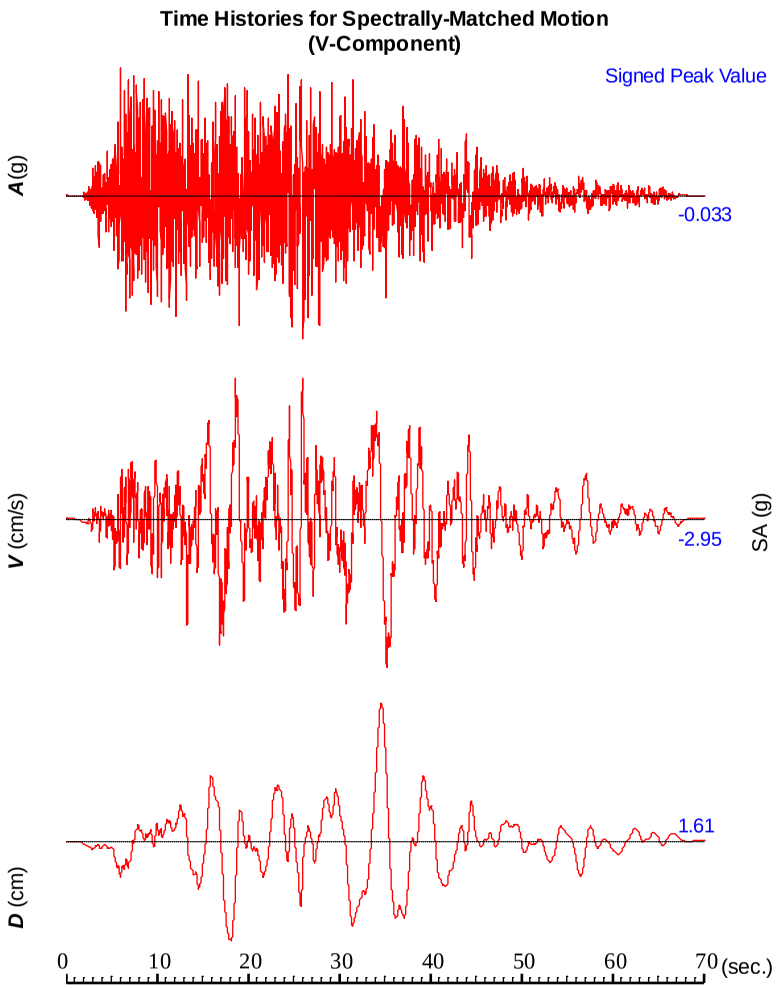
SC SOLUTIONS

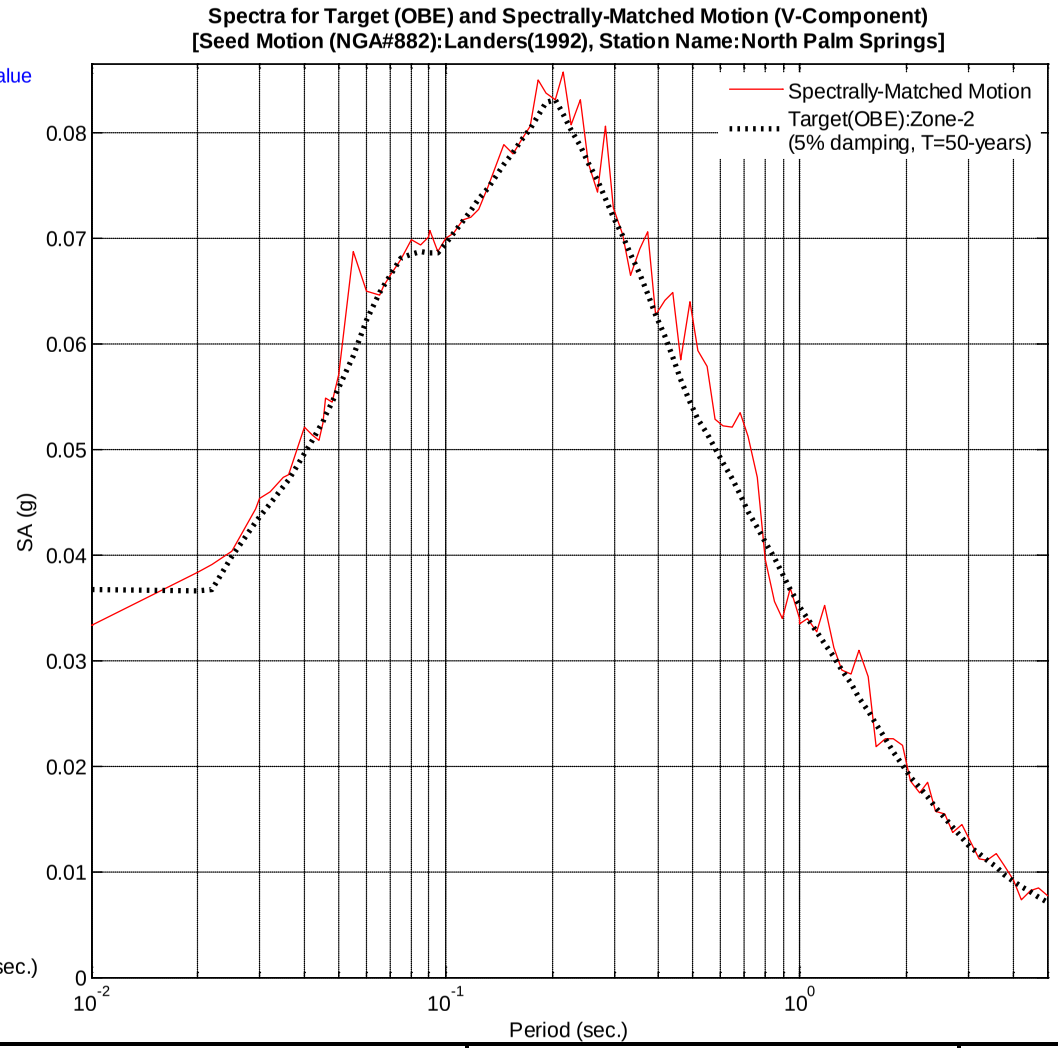
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 2 – SET NO. 5 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE
A2-14





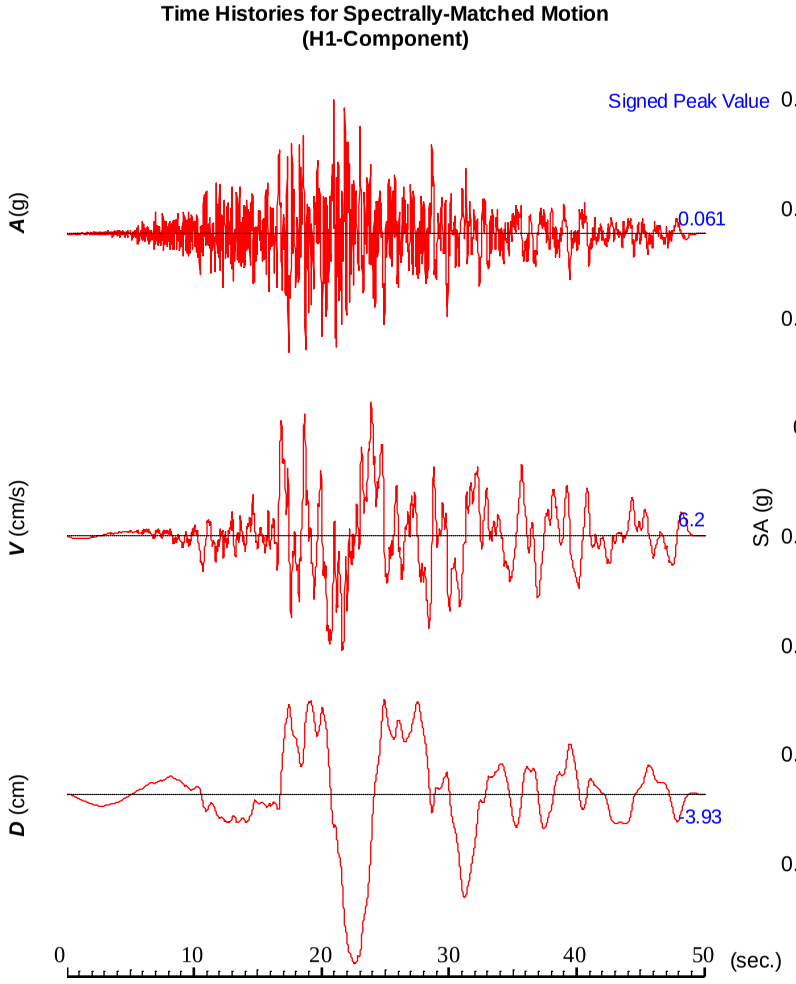
SC SOLUTIONS

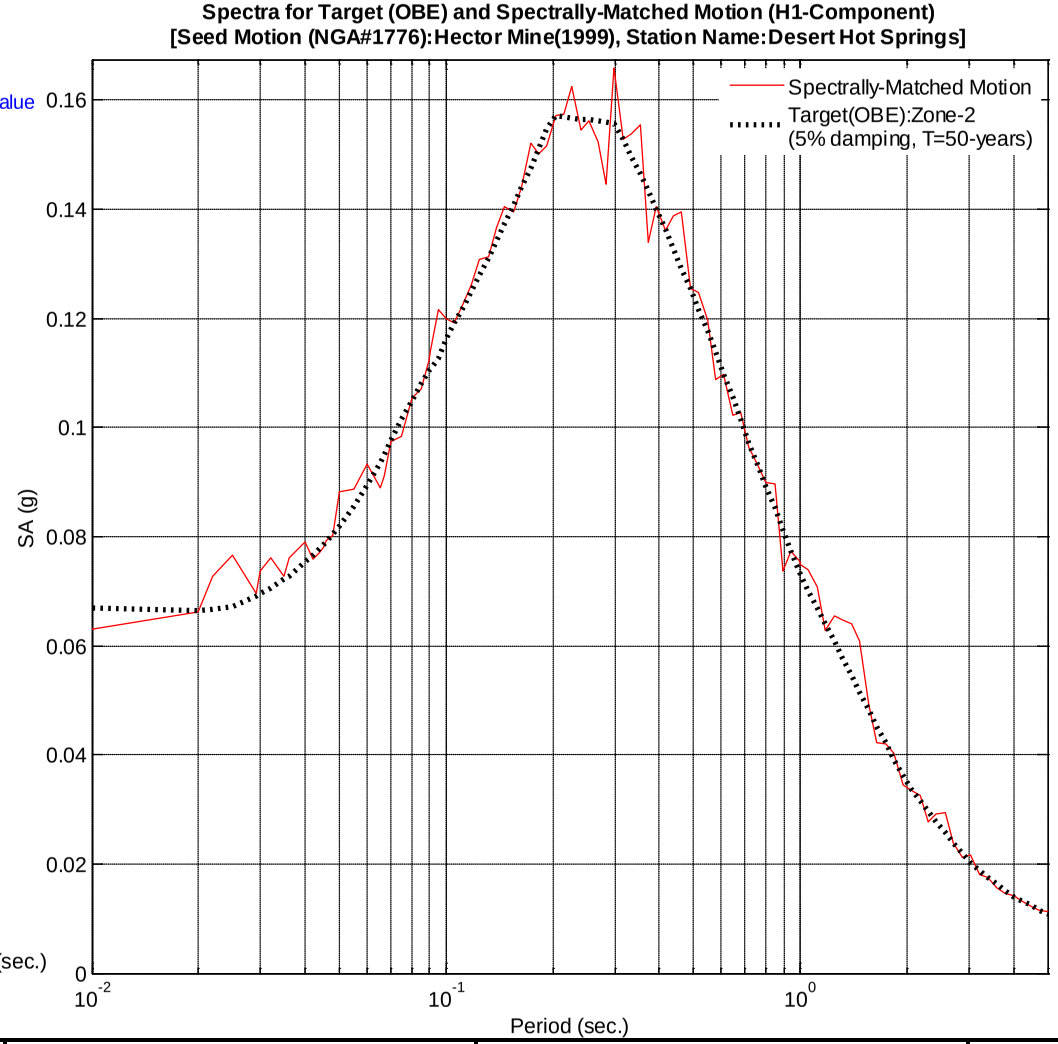
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 2 – SET NO. 5 – VERTICAL

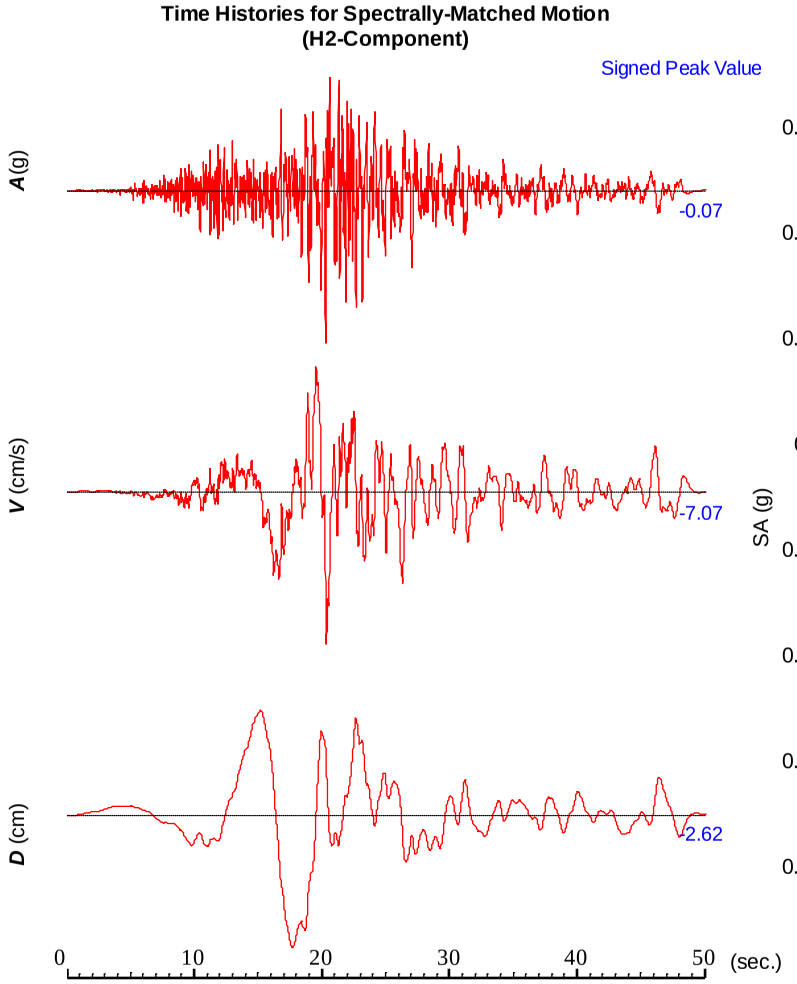
CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

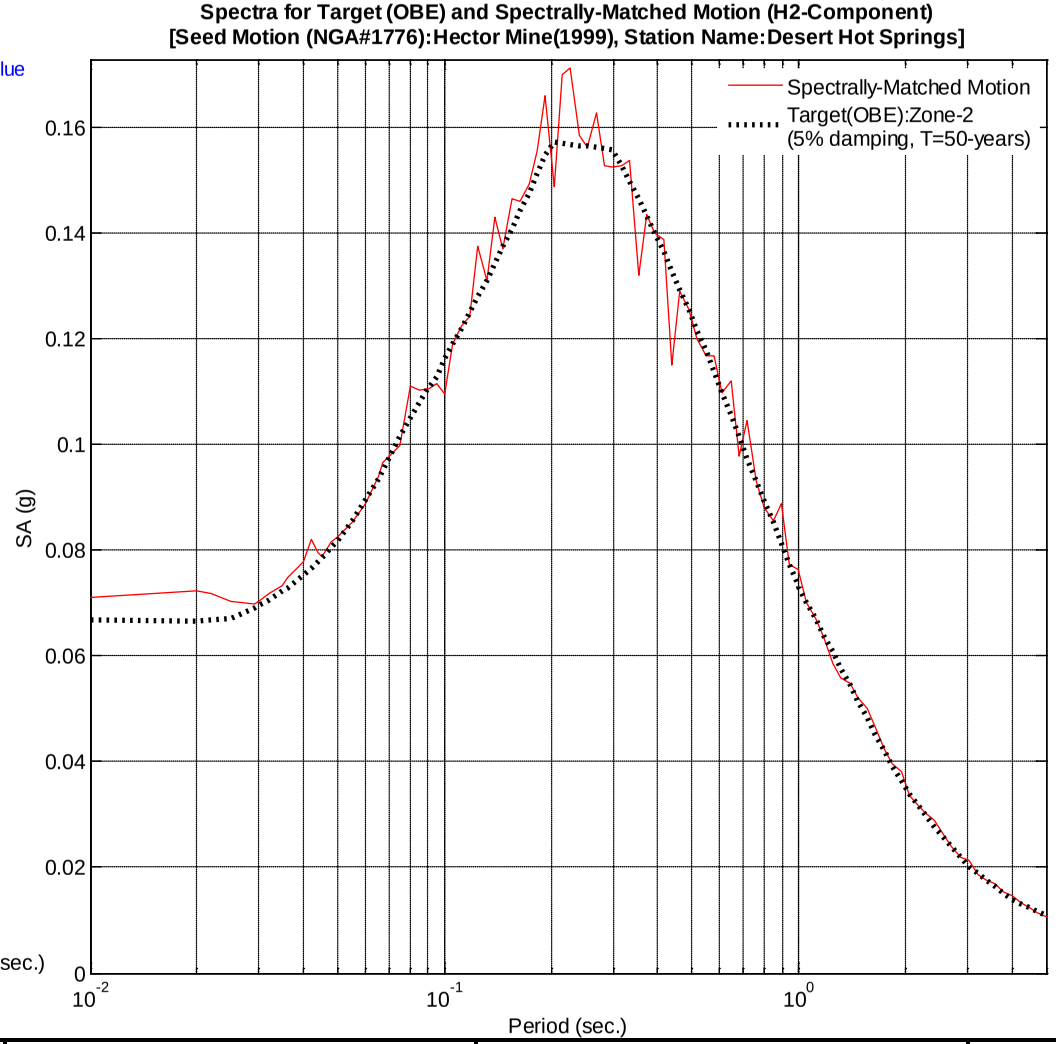
PLATE
A2-15





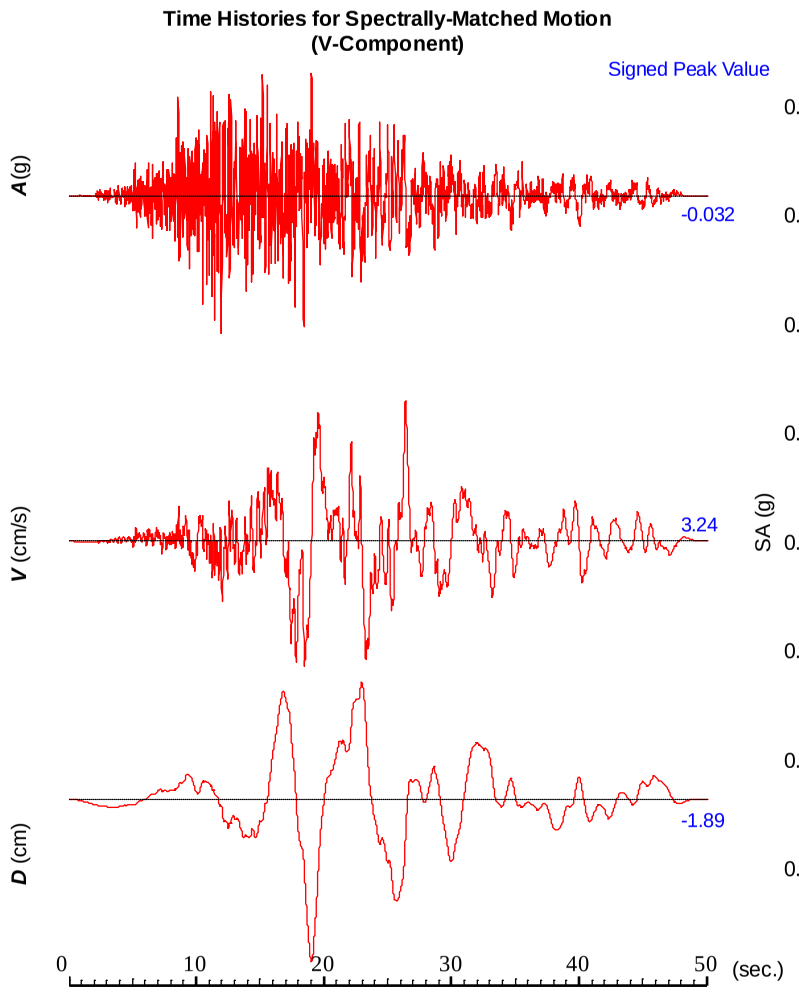
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 2 – SET NO. 6 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A2-16**

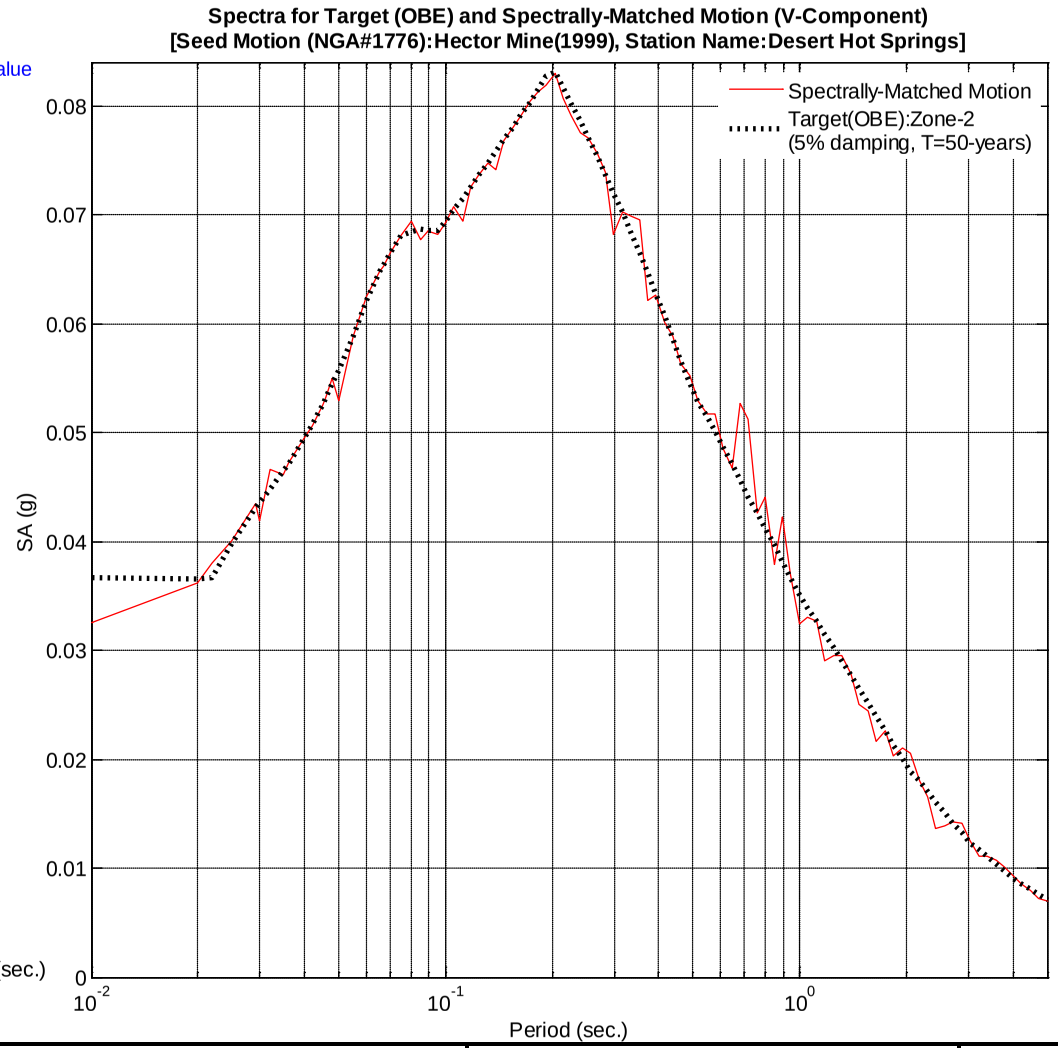




SC SOLUTIONS

PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 2 – SET NO. 6 – HORIZONTAL 2**	PLATE **A2-17**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie		
DATE:	02/24/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	





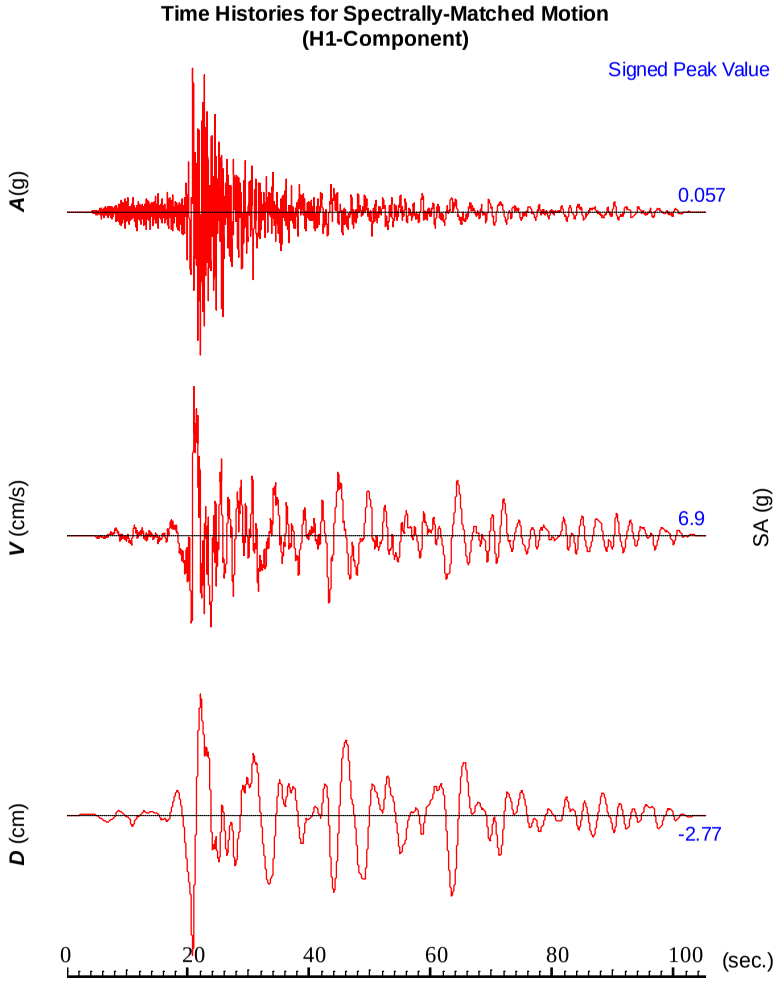
SC SOLUTIONS

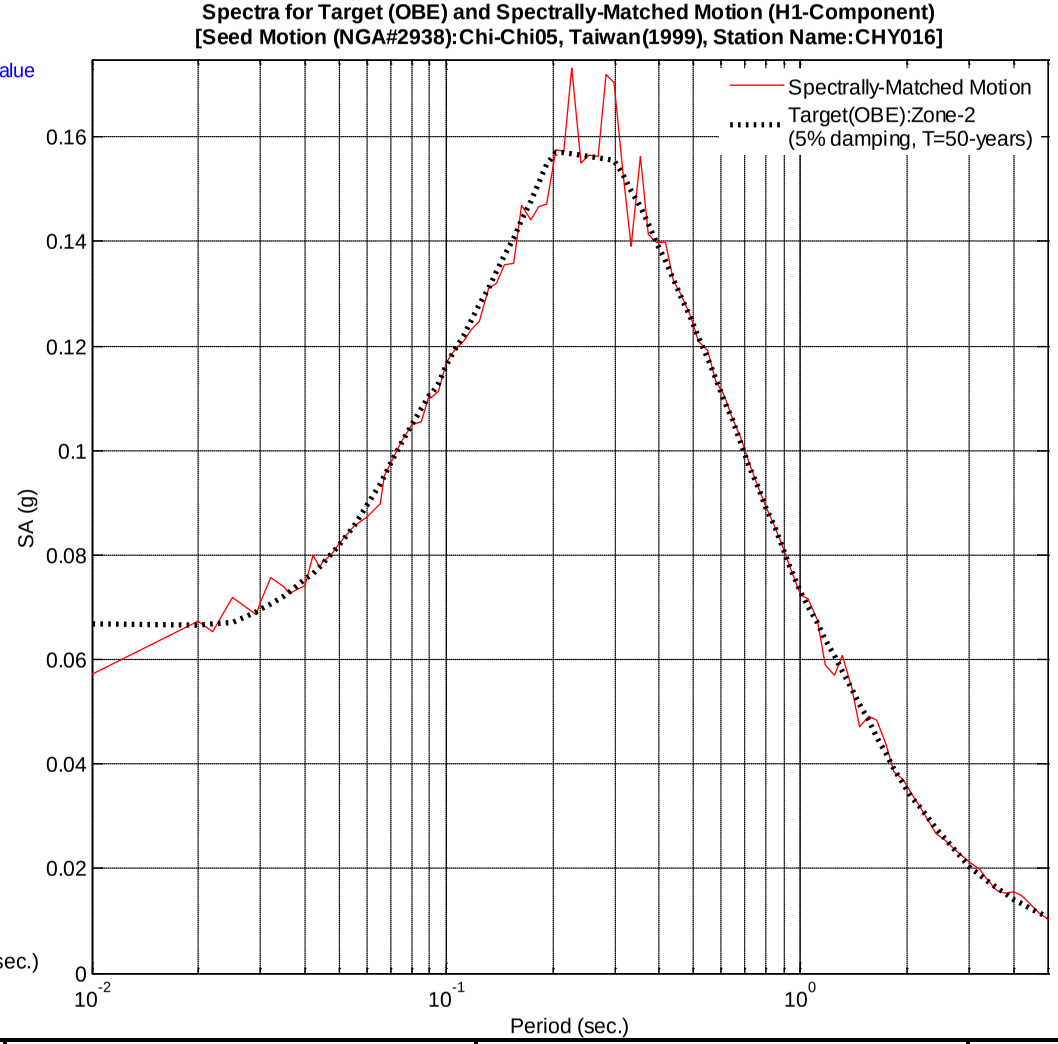
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 2 – SET NO. 6 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

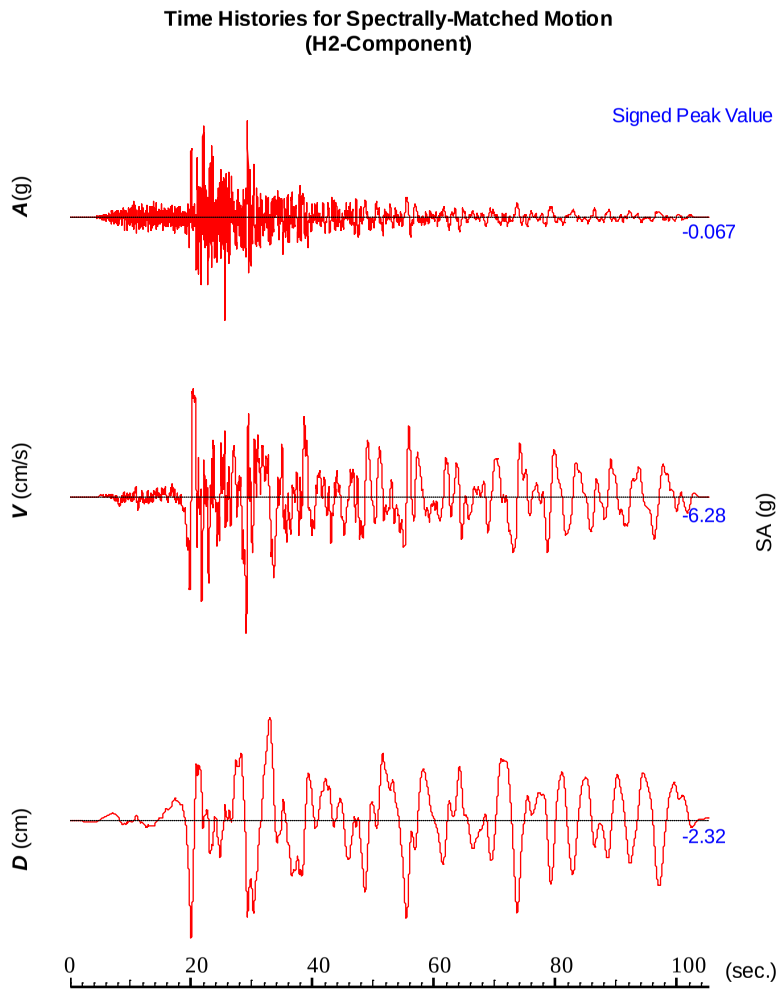
PLATE
A2-18

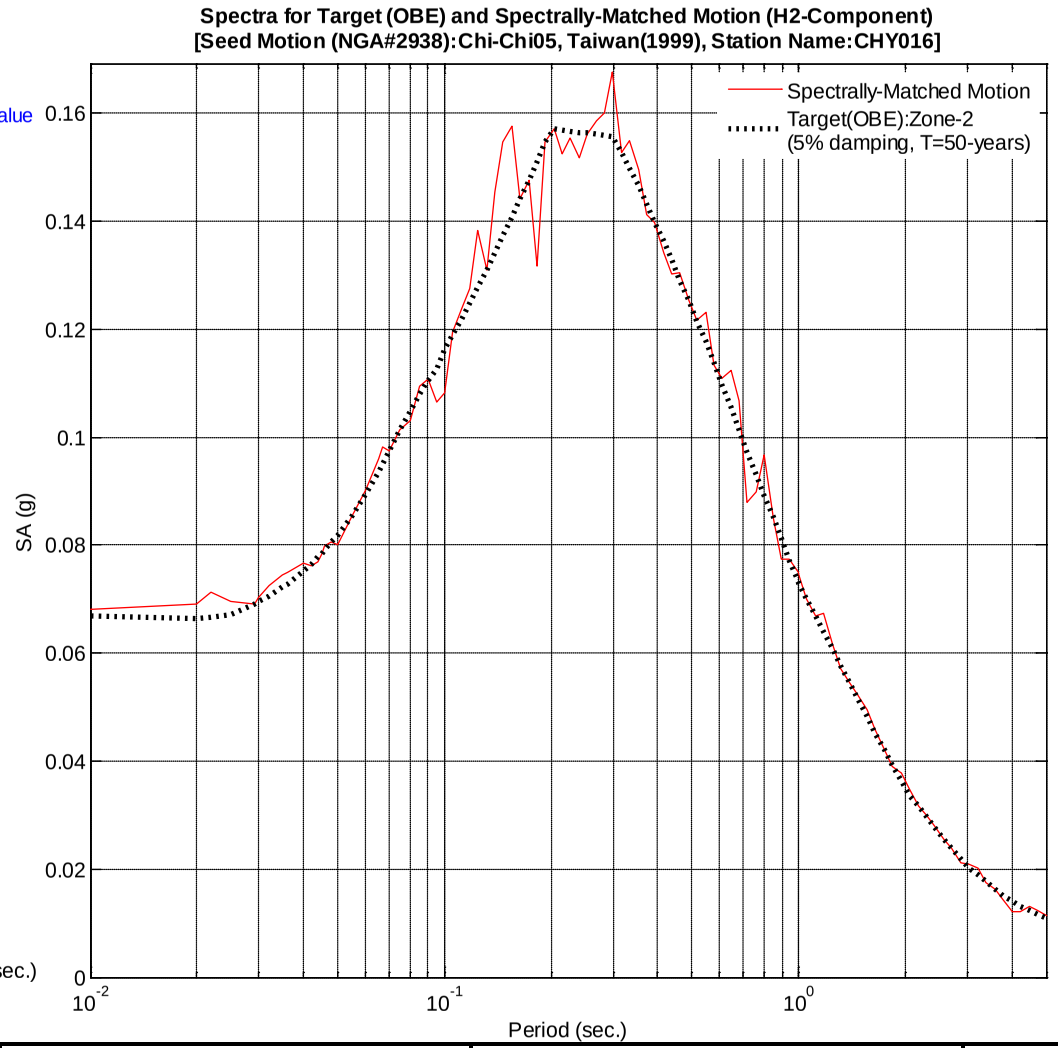




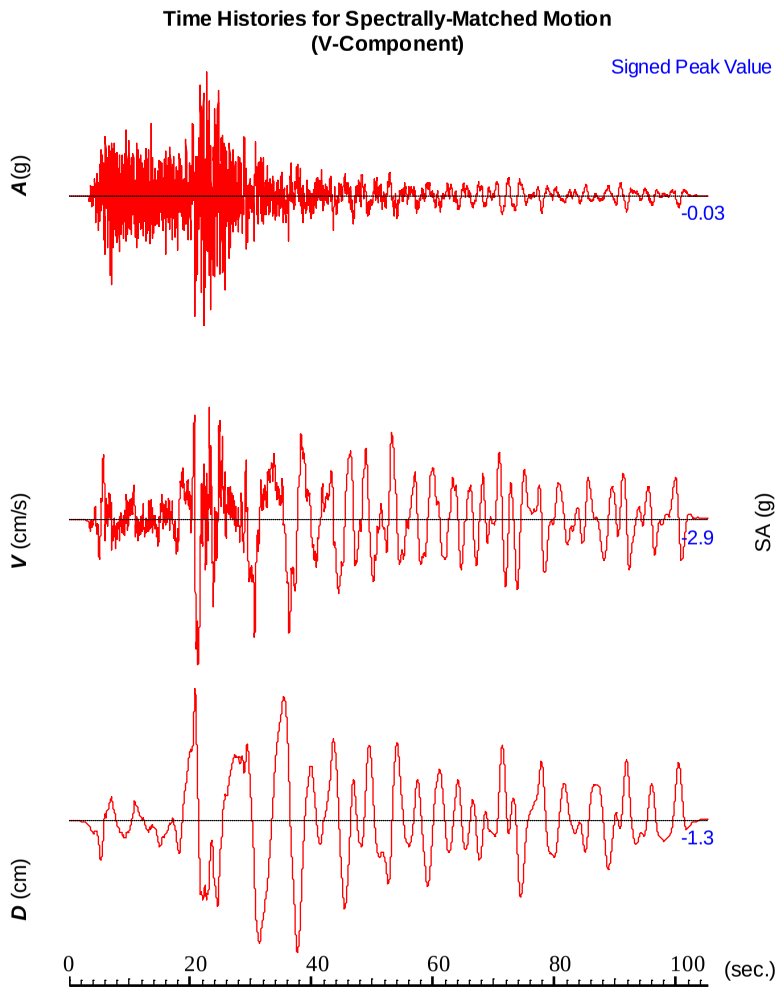
SC SOLUTIONS

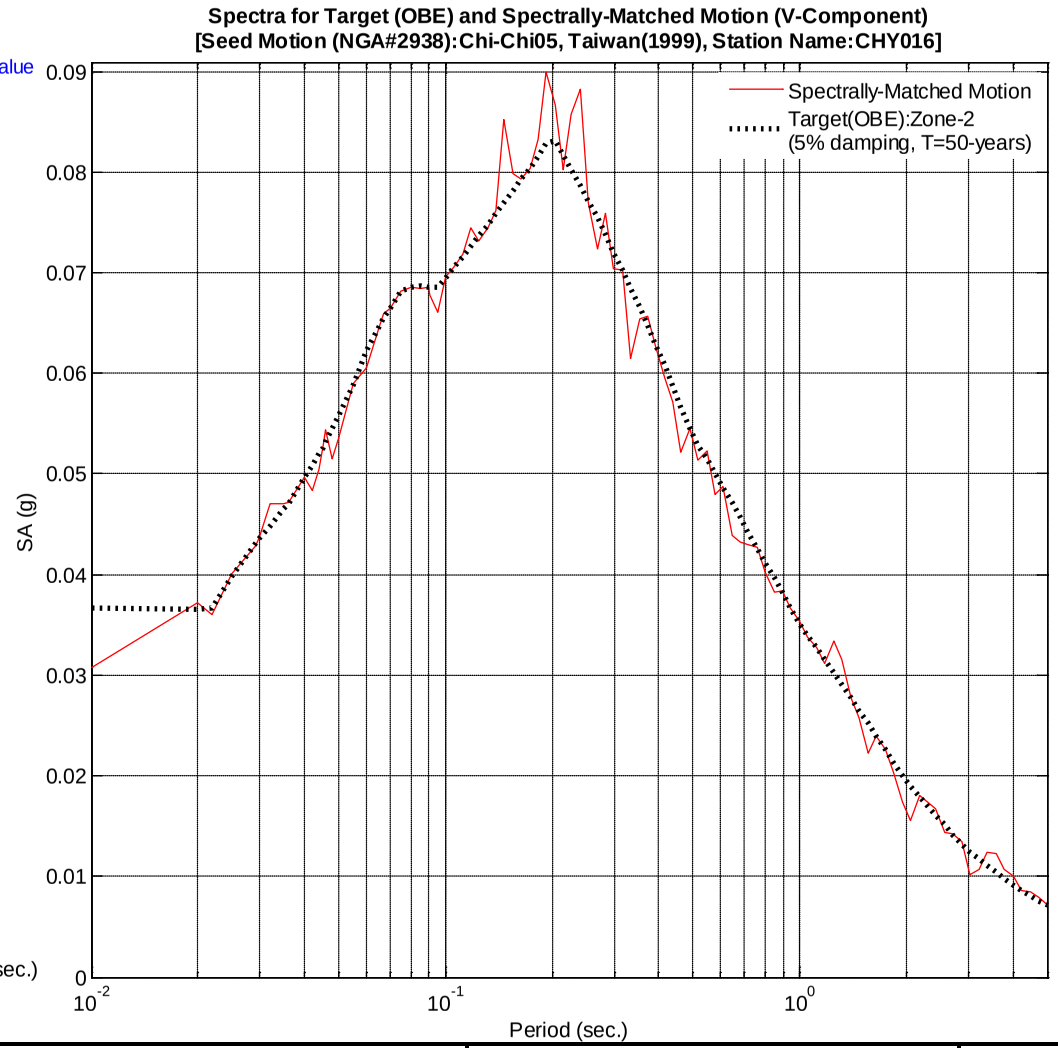
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 2 – SET NO. 7 – HORIZONTAL 1**	PLATE **A2-19**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 2 – SET NO. 7 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A2-20**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 2 – SET NO. 7 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A2-21**

Table A.3: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 3**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	832	Landers	1992	North Palm Springs	7.28	26.84	0.057	6.251	4.555	0.057	5.879	2.885	0.031	2.892	1.512
2	1637	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.054	4.582	1.281	0.051	4.671	1.326	0.031	2.464	0.887
3	907	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.056	4.220	1.623	0.057	7.436	1.413	0.031	3.362	1.114
4	2112	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.051	5.867	4.632	0.047	5.654	5.508	0.030	3.565	2.947
5	882	Imperial Valley-06	1979	Delta	6.53	22.03	0.054	3.881	1.768	0.059	4.674	2.445	0.028	2.499	1.360
6	1776	Manjil, Iran	1990	Rudsar	7.37	64.47	0.052	5.558	3.307	0.059	5.905	2.190	0.030	2.953	1.876
7	2938	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.048	5.640	2.379	0.059	5.464	2.026	0.029	3.238	1.444

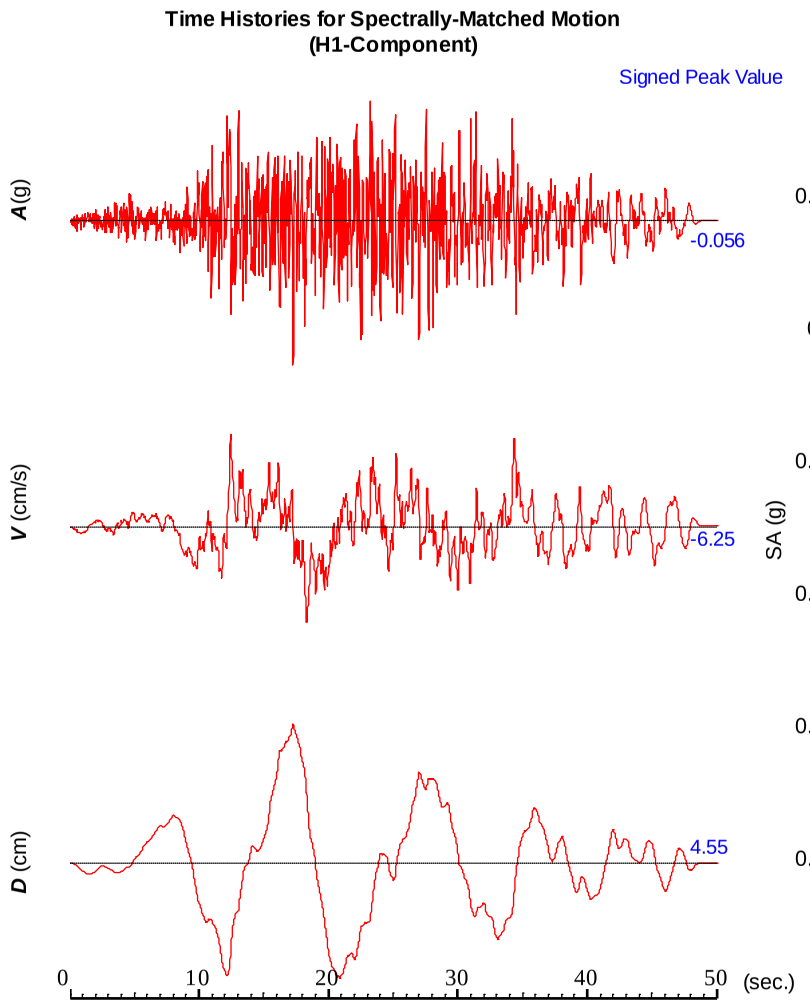
SC SOLUTIONS

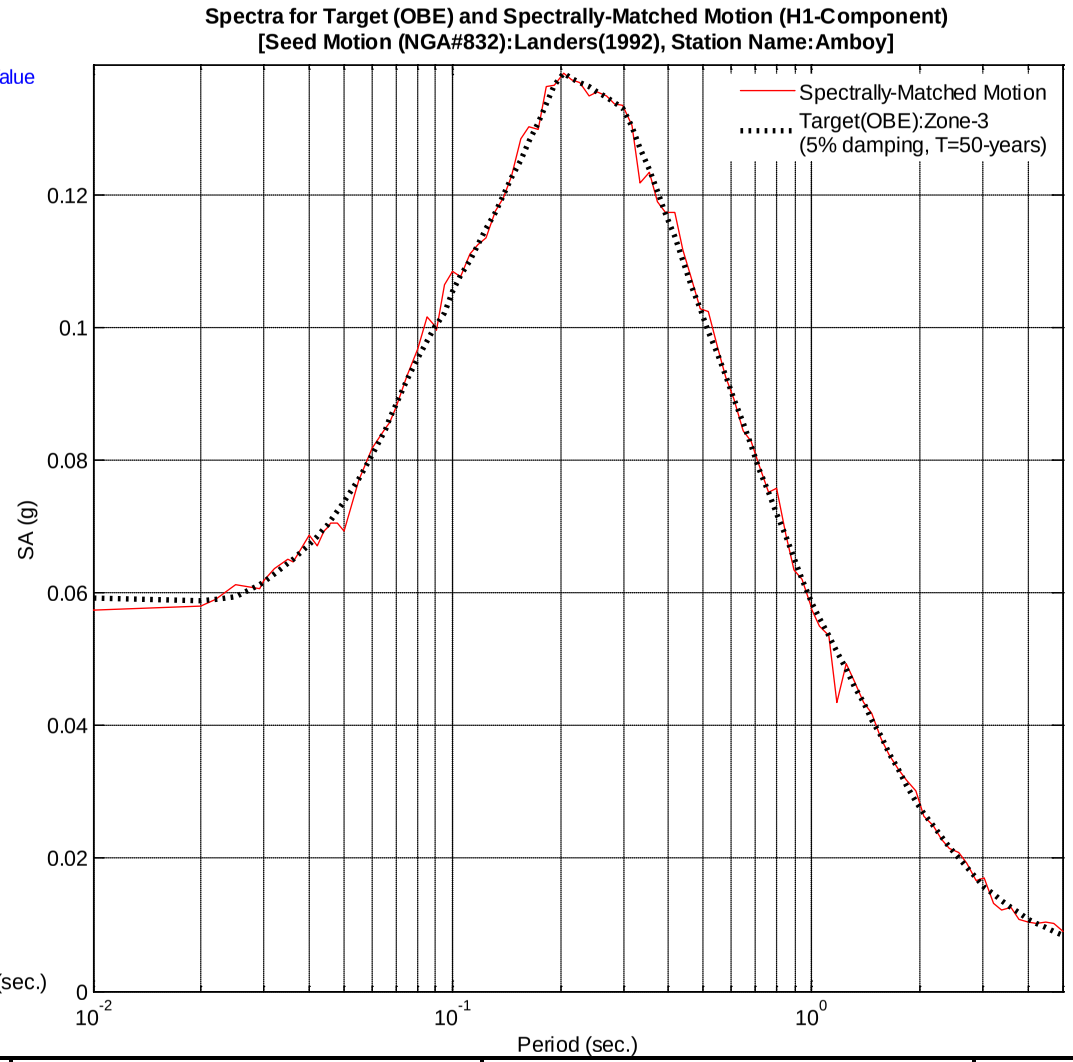
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS OBE – ZONE 3

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE
A3-0





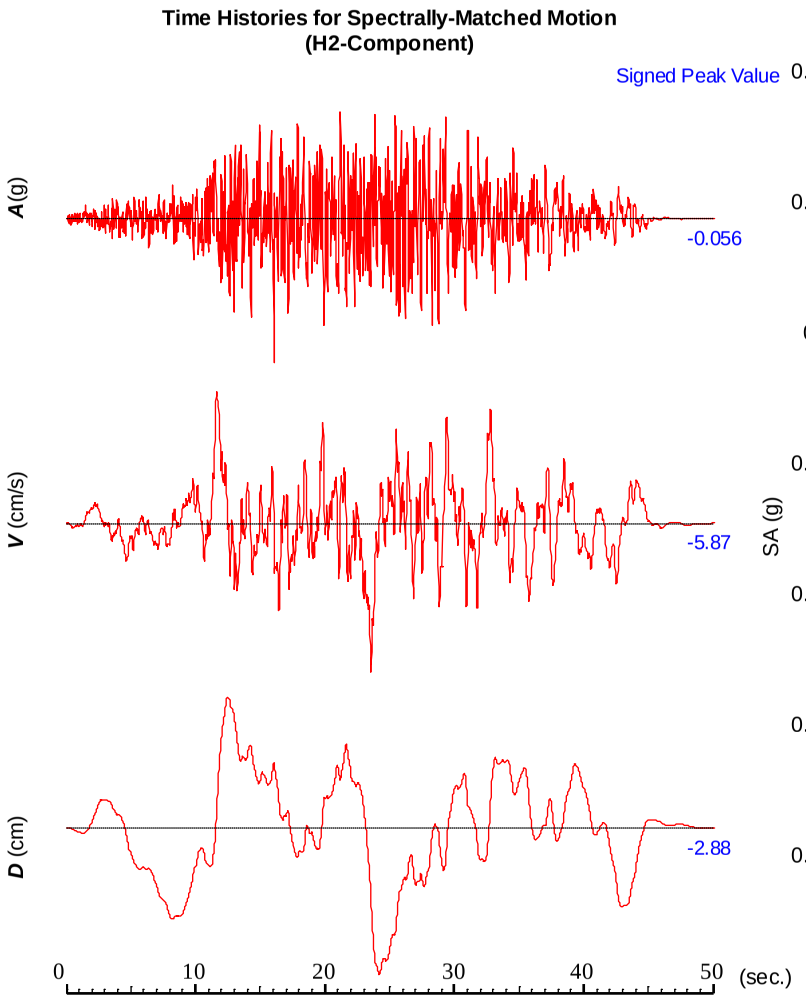
SC SOLUTIONS

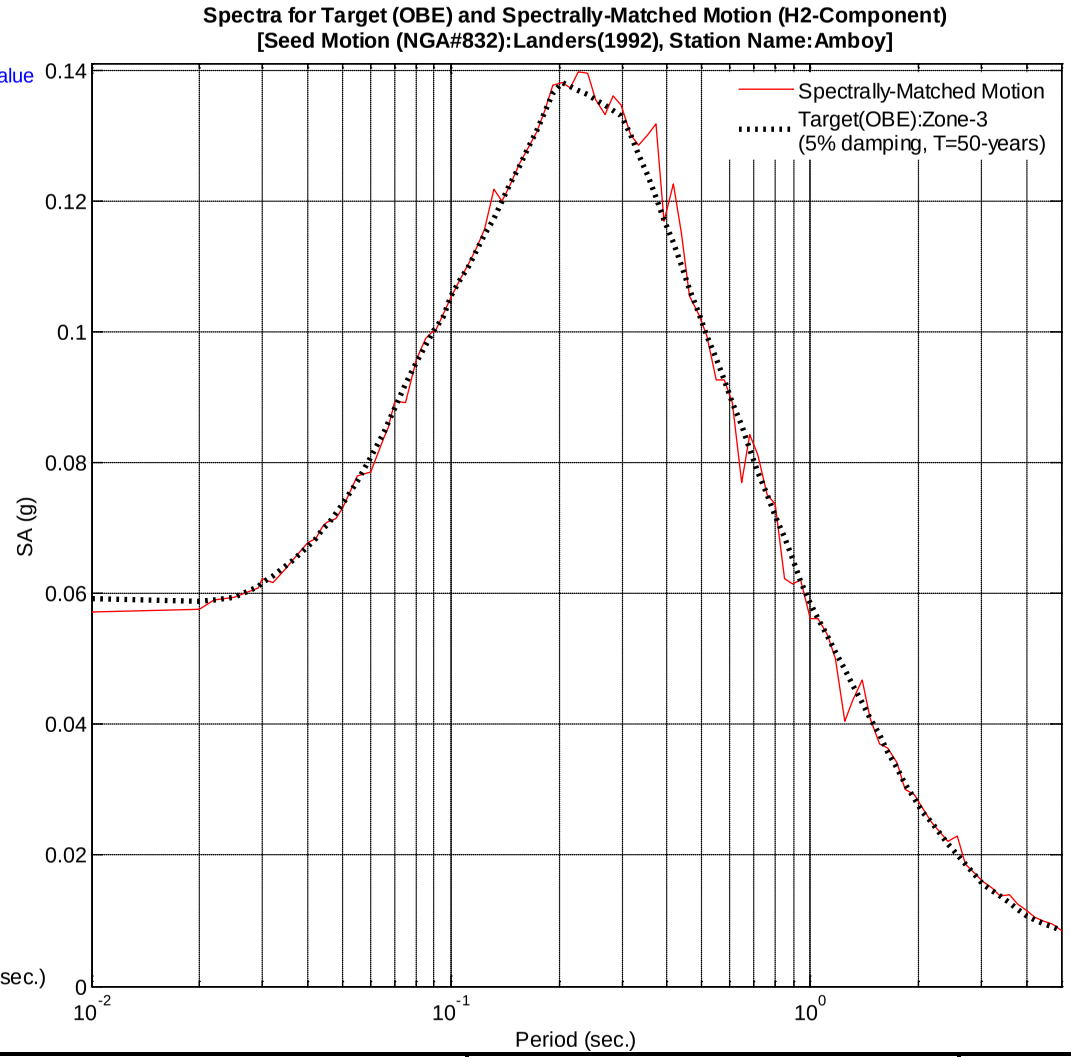
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 3 – SET NO. 1 – HORIZONTAL 1

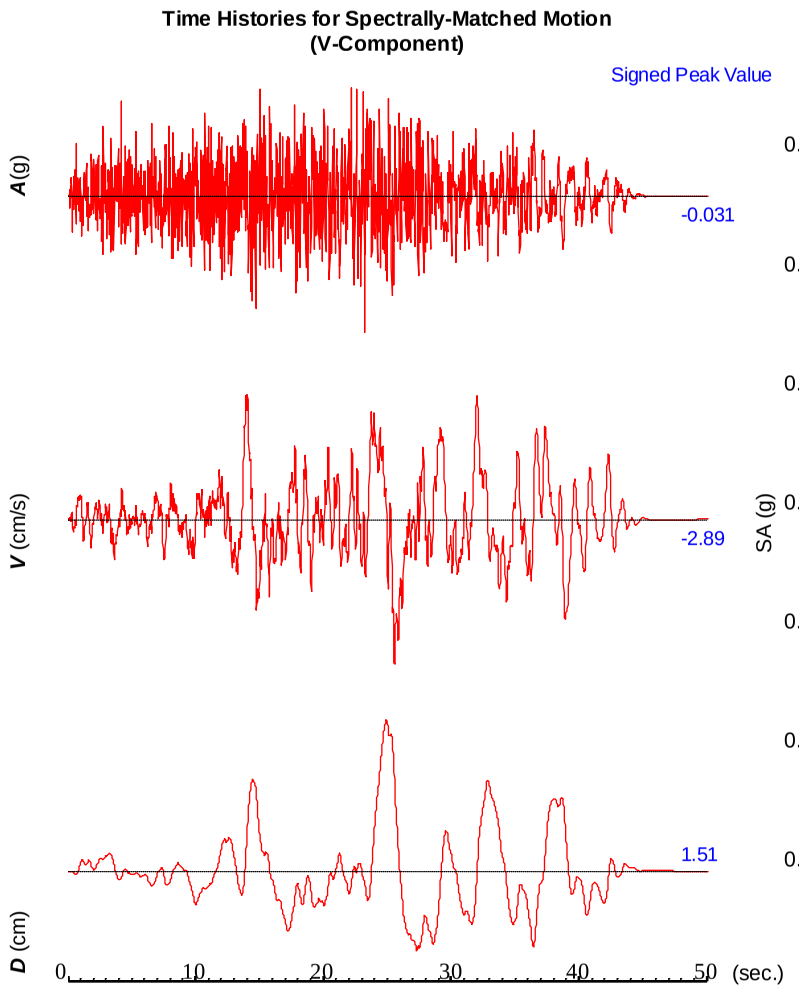
CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

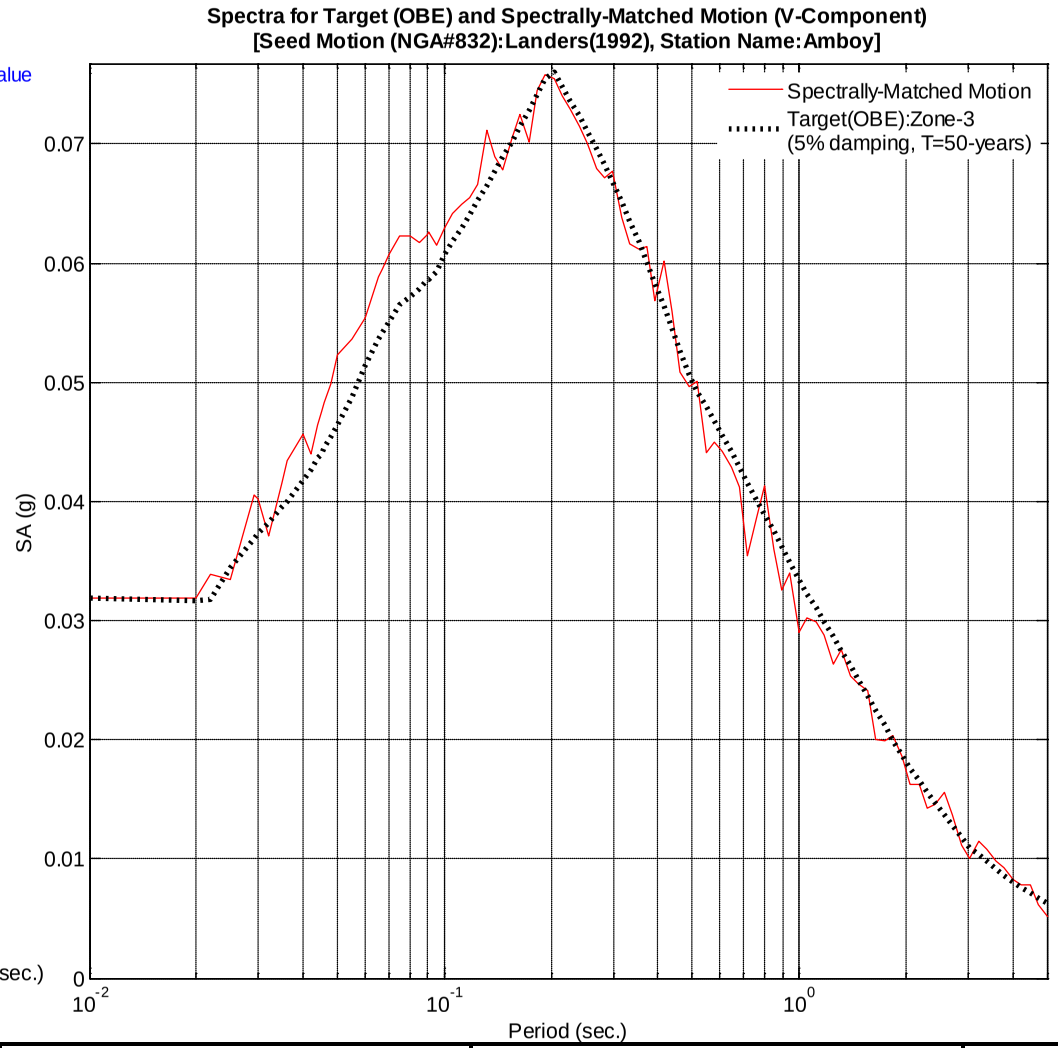
PLATE
A3-1





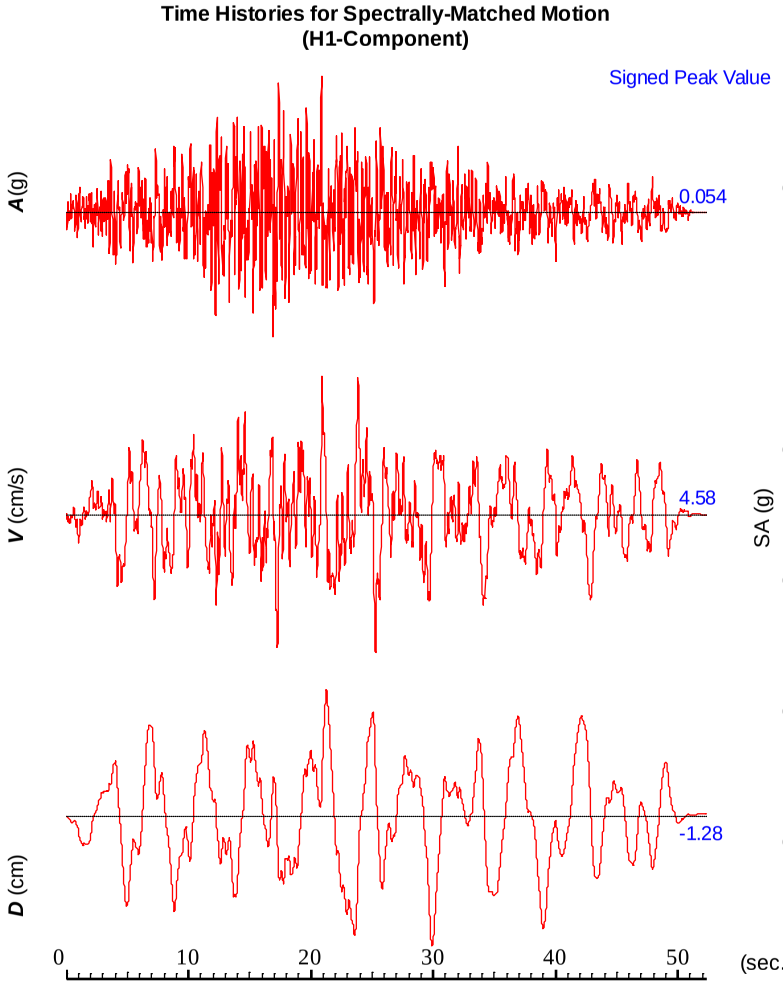
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 3 – SET NO. 1 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A3-2**

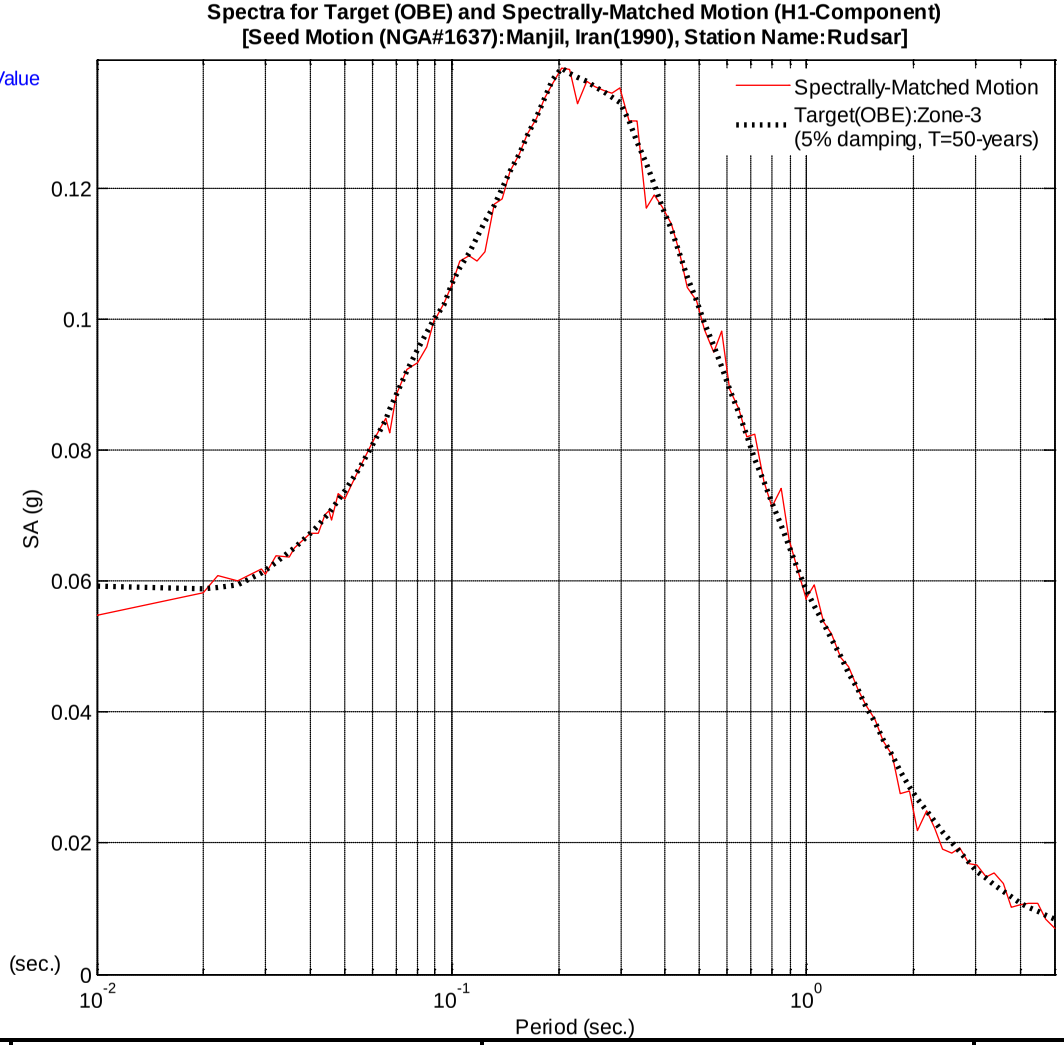




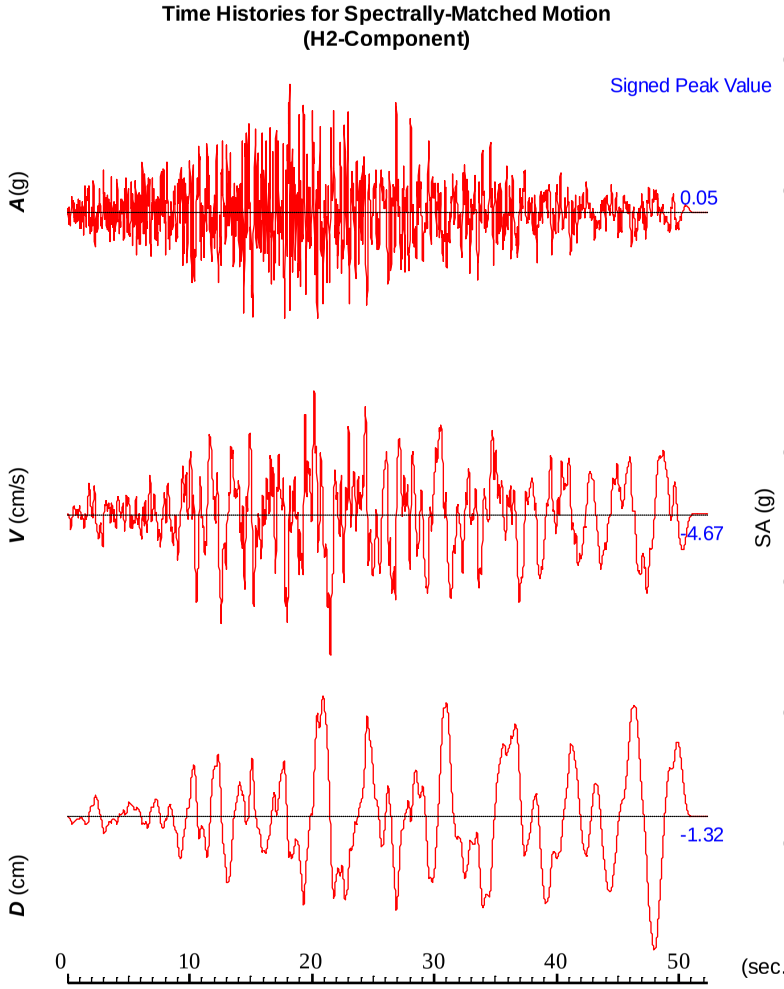
SC SOLUTIONS

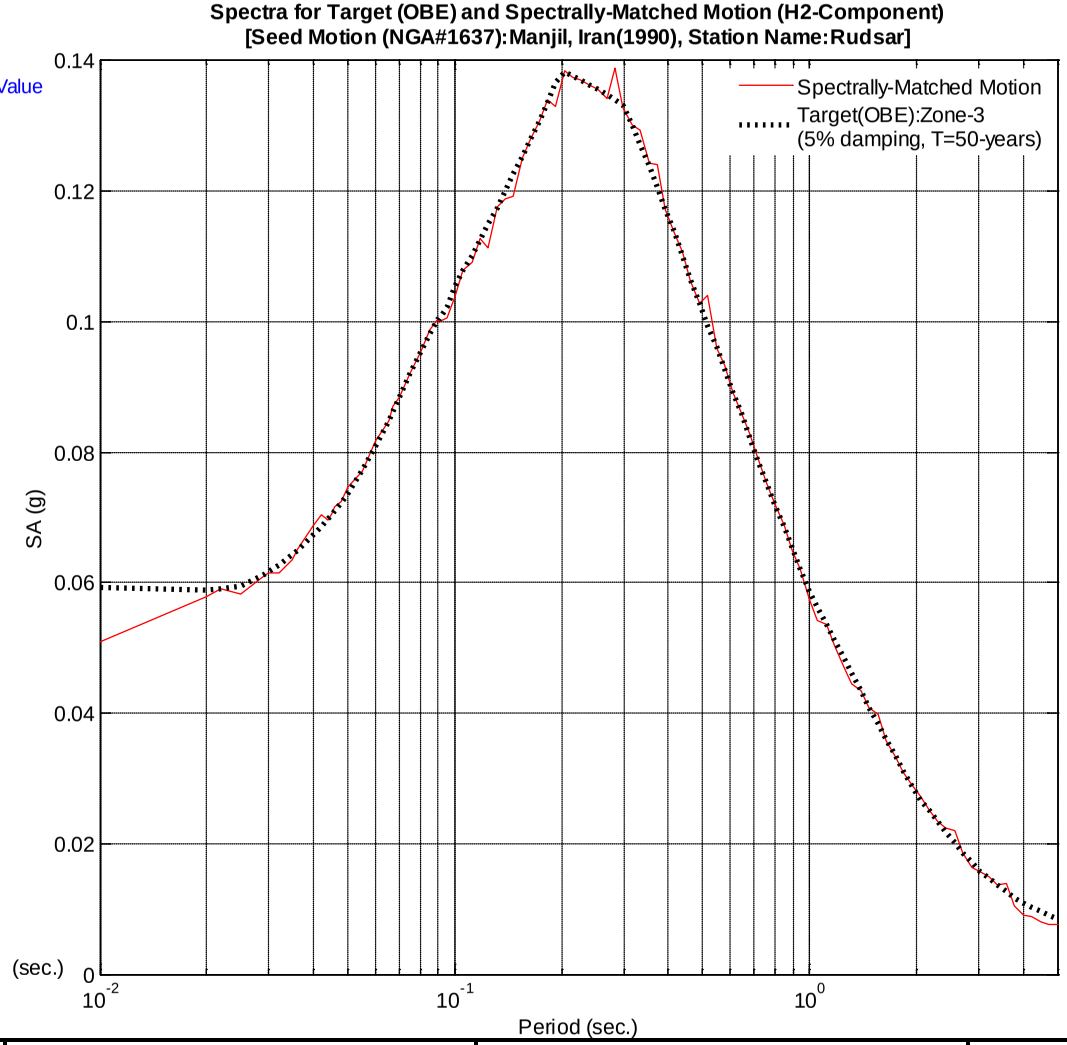
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 3 – SET NO. 1 – VERTICAL**	PLATE
BY:	J. Zhong		**A3-3**
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		



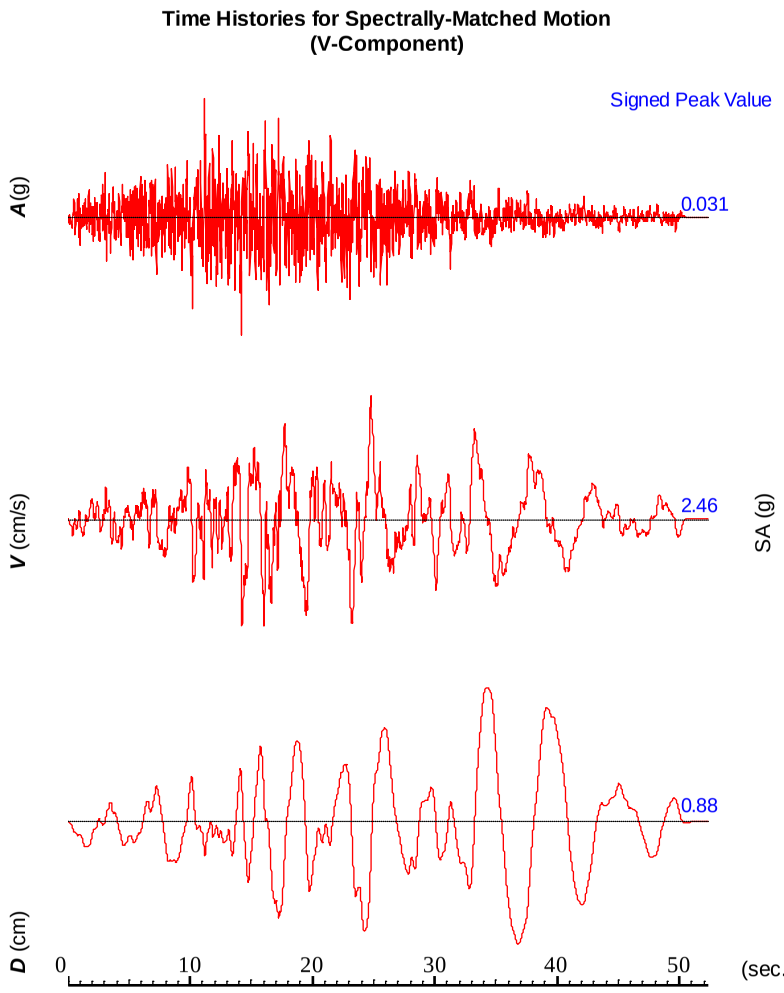


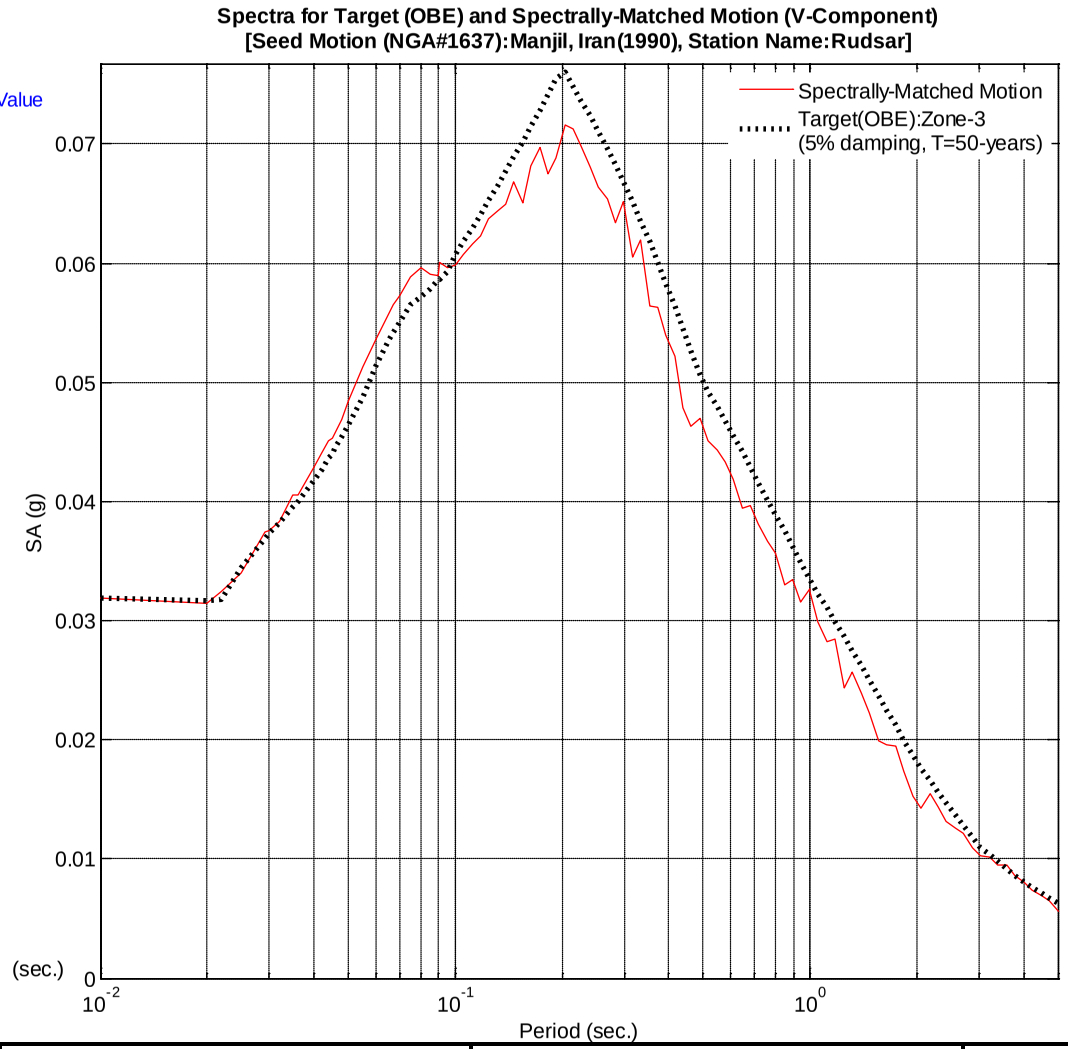
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 3 – SET NO. 2 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A3-4**





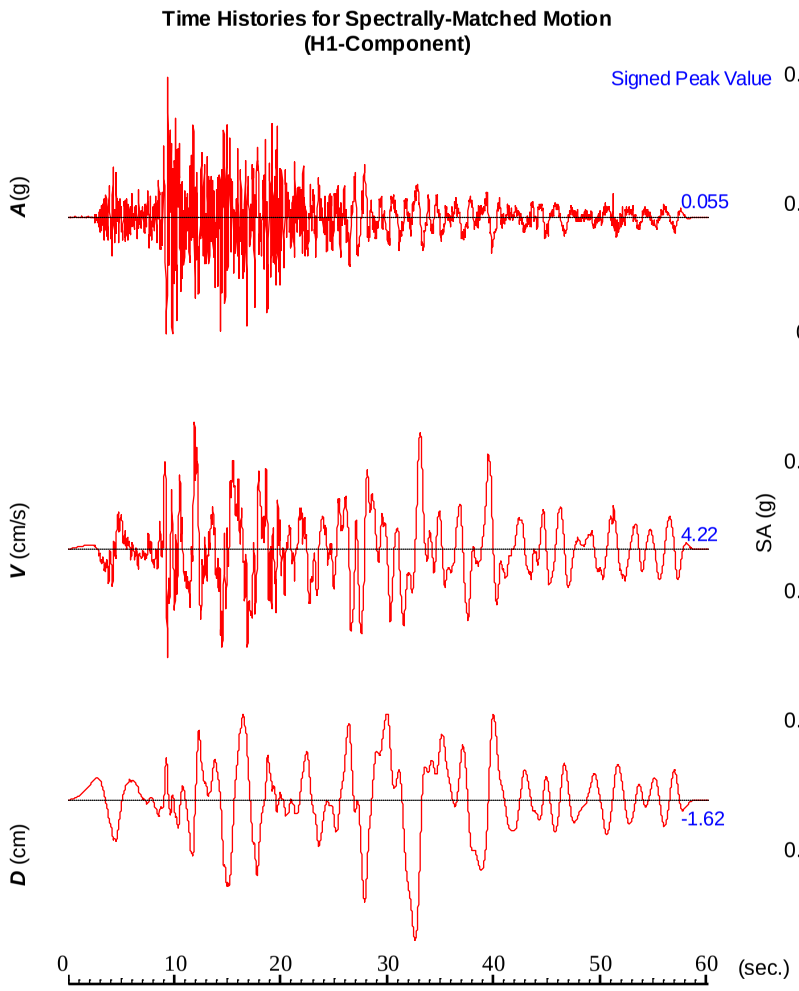
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 3 – SET NO. 2 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A3-5**

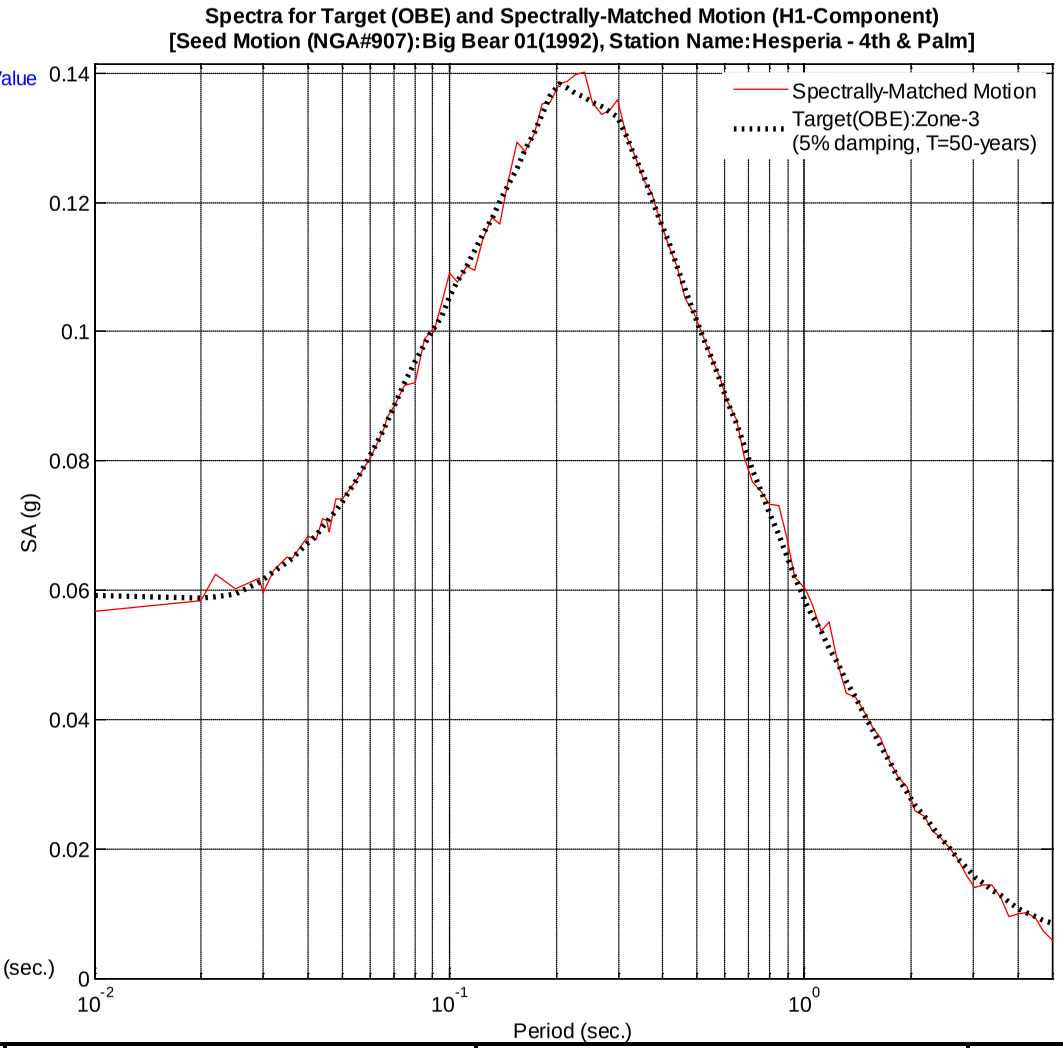




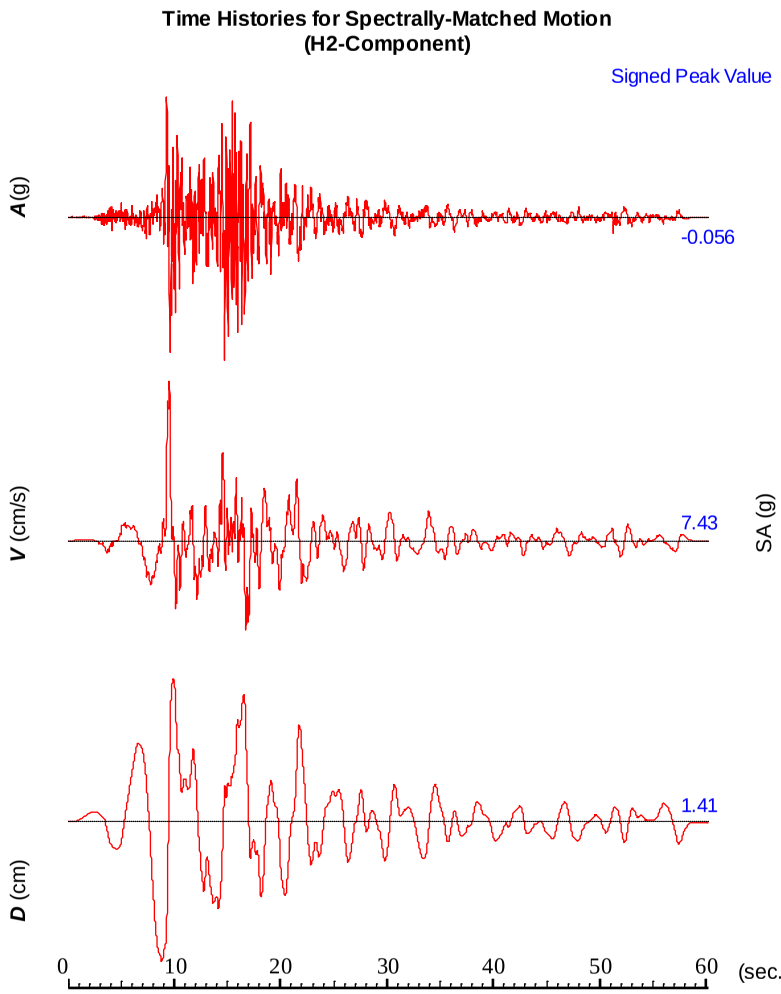
SC SOLUTIONS

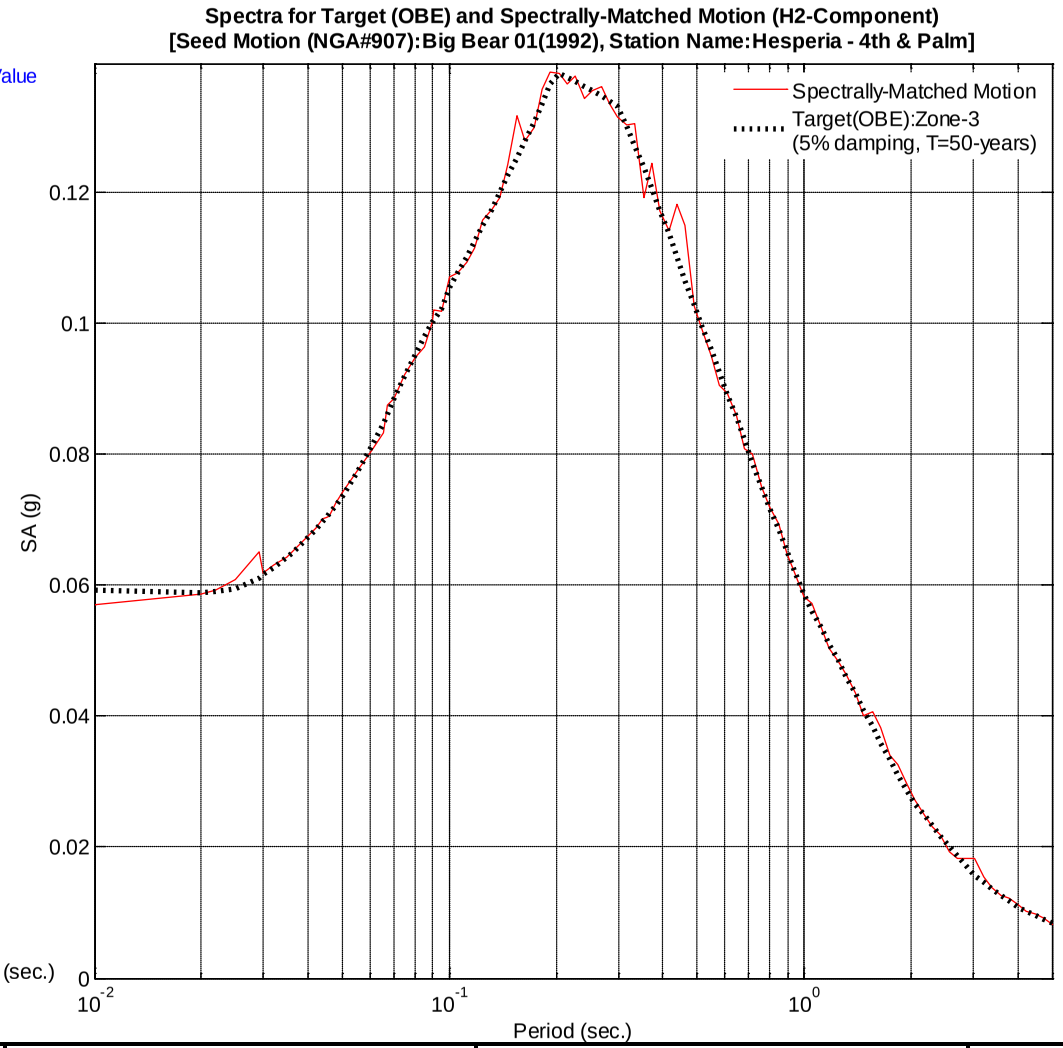
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 3 – SET NO. 2 – VERTICAL**	PLATE **A3-6**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 3 – SET NO. 3 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A3-7**





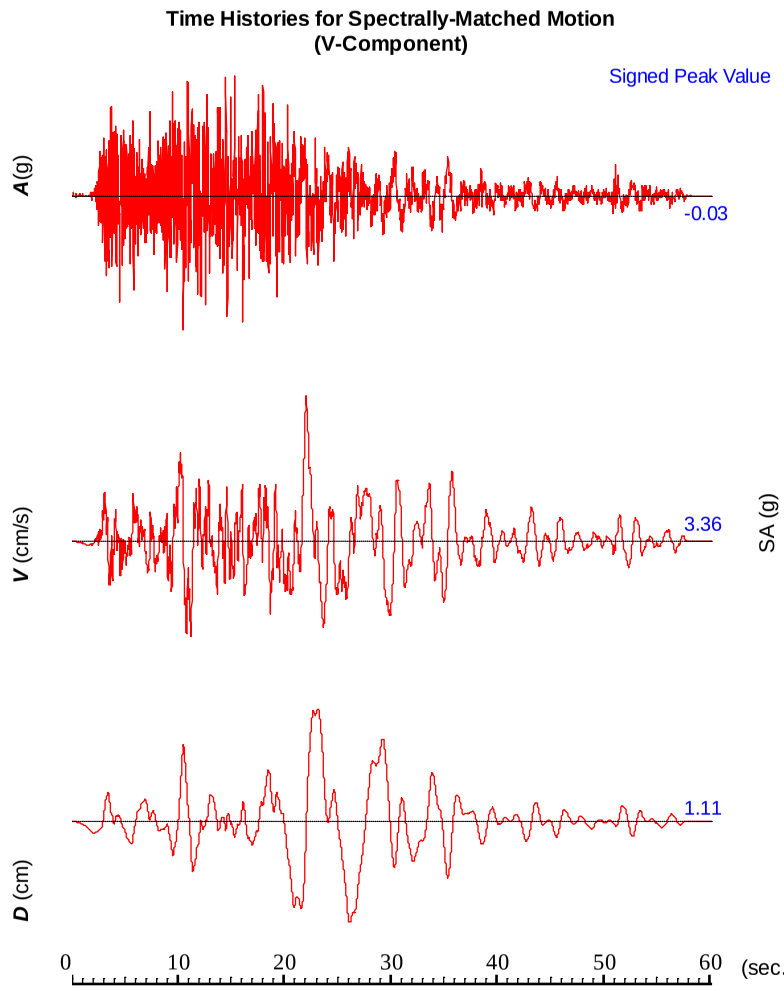
SC SOLUTIONS

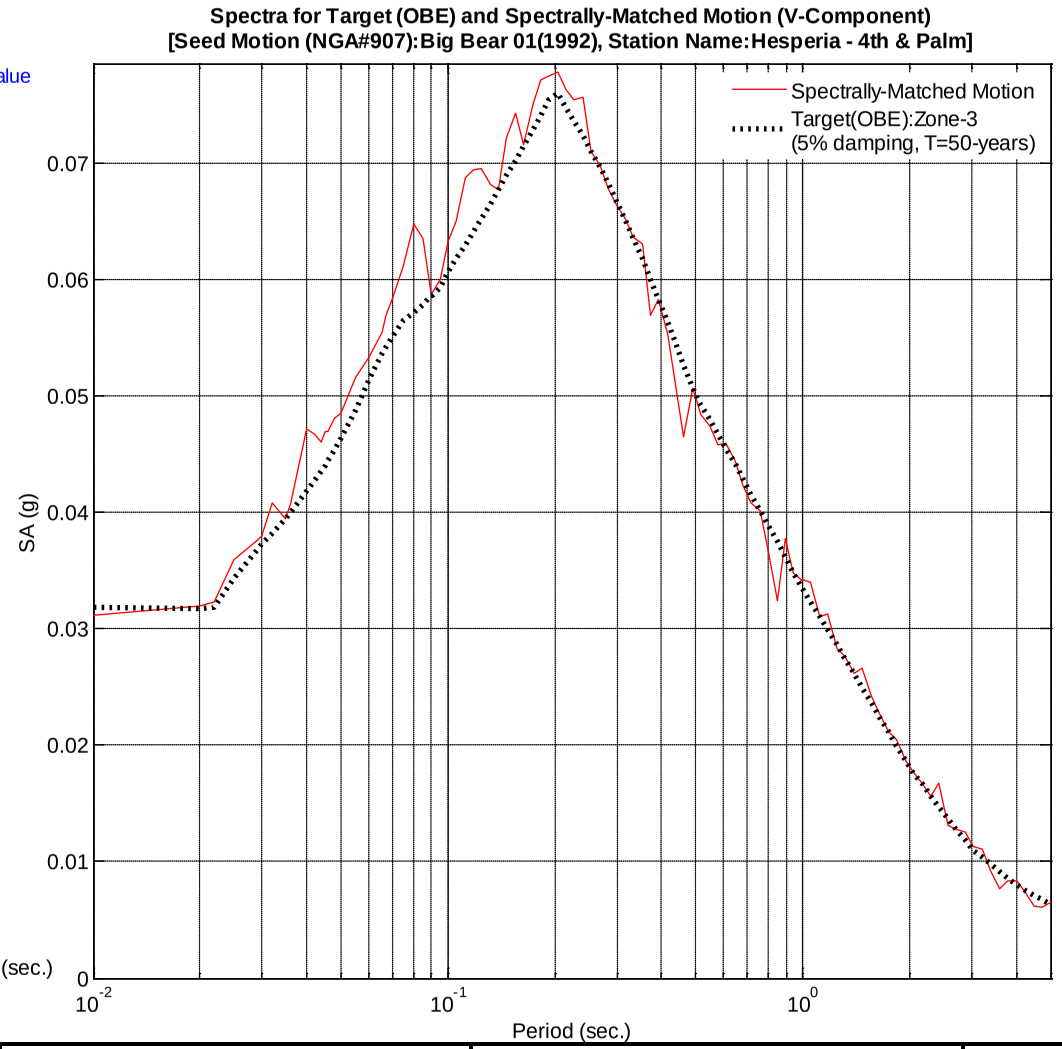
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 3 – SET NO. 3 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE
A3-8





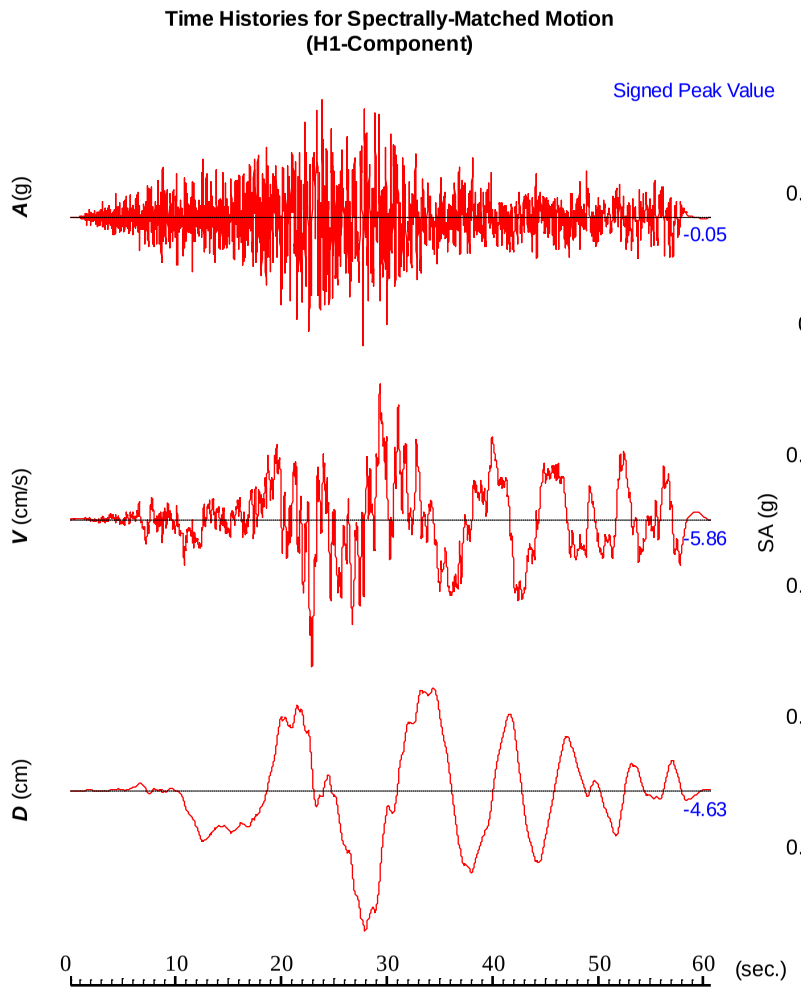
SC SOLUTIONS

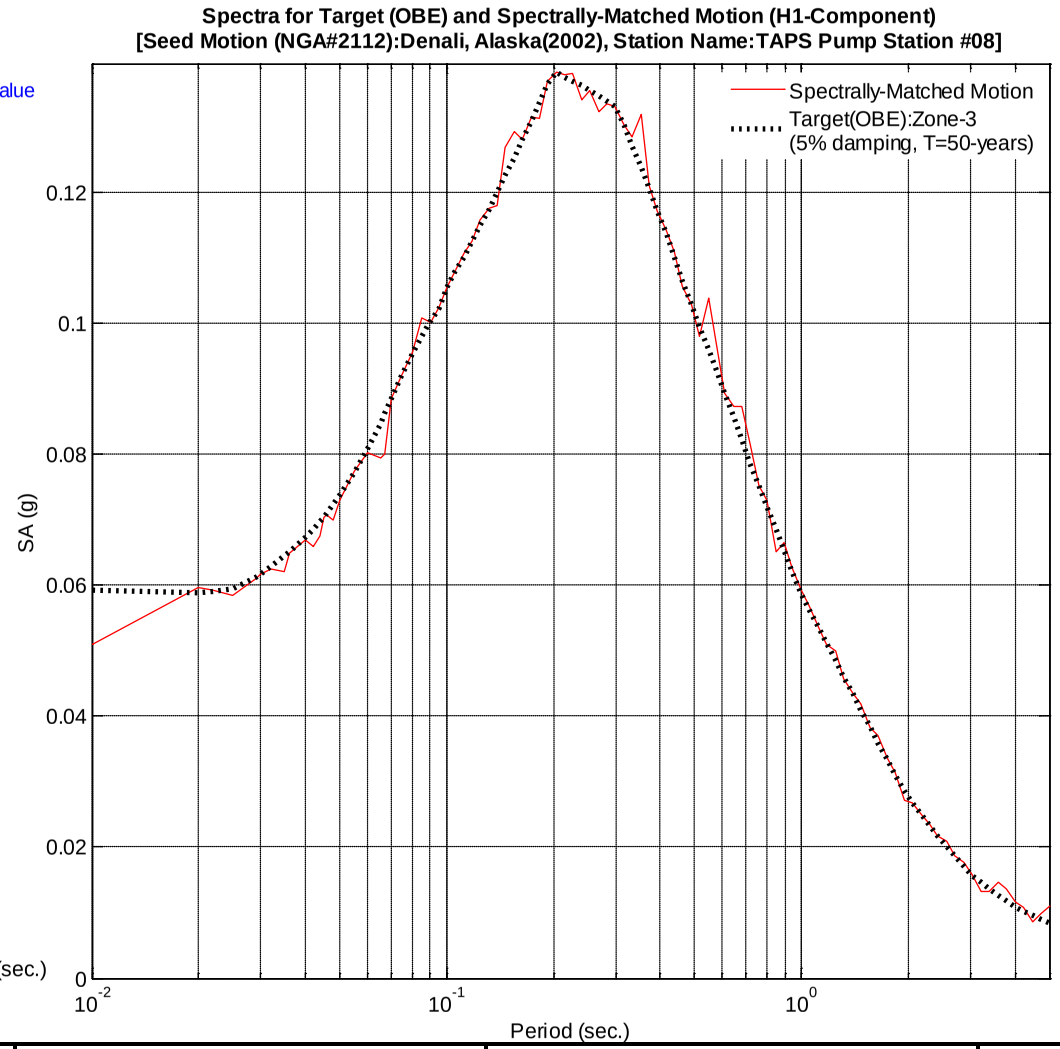
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 3 – SET NO. 3 – VERTICAL

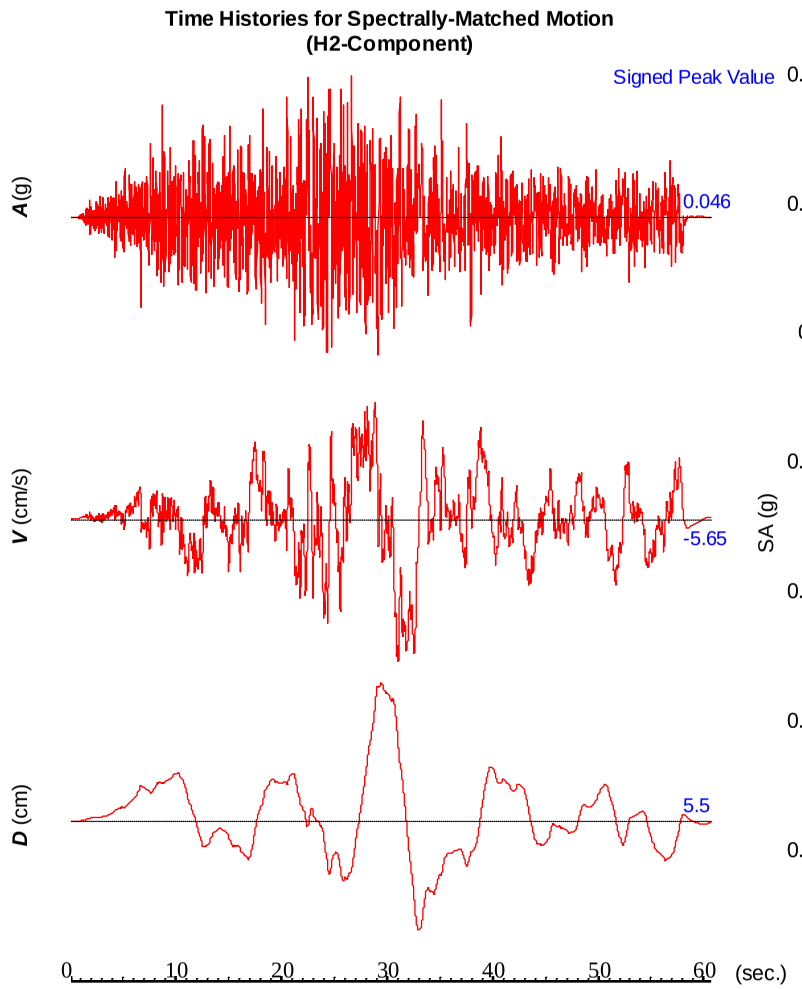
CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

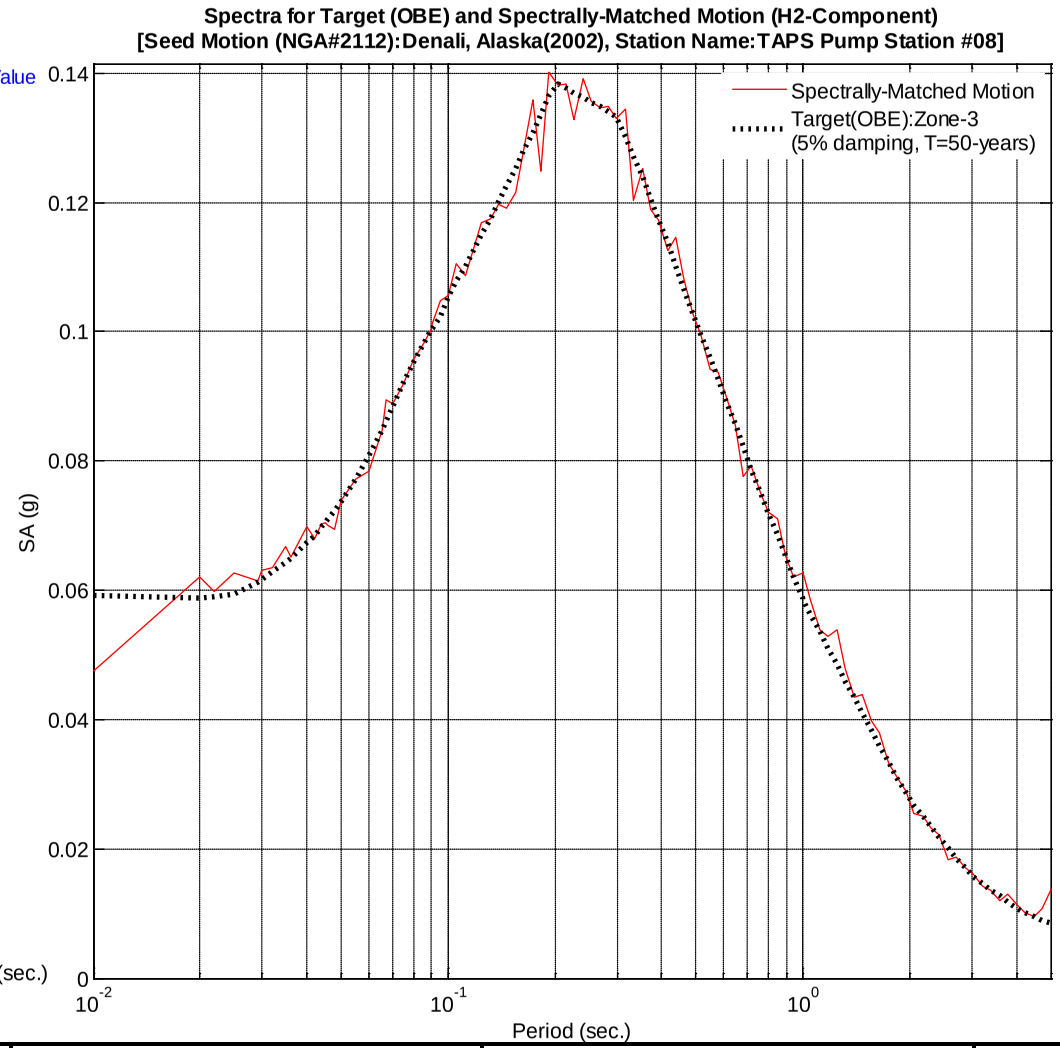
PLATE
A3-9





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 3 – SET NO. 4 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A3-10**





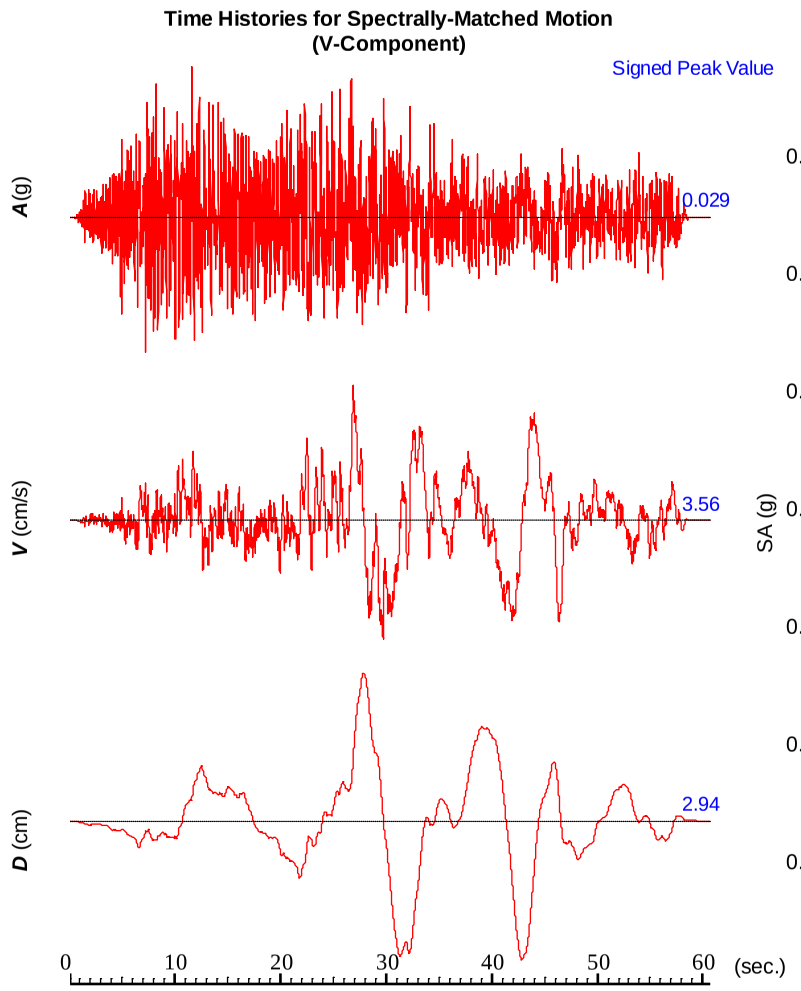
SC SOLUTIONS

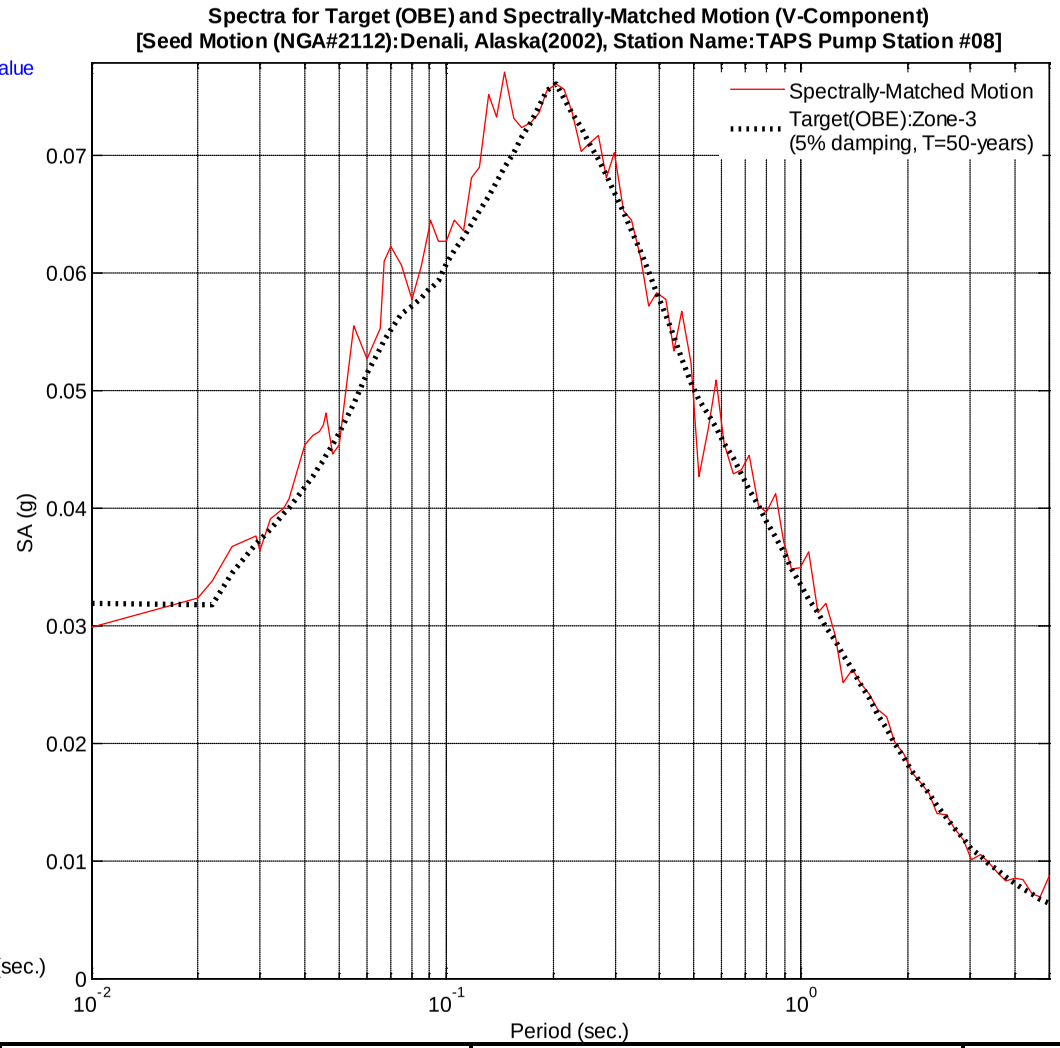
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 3 – SET NO. 4 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE
A3-11





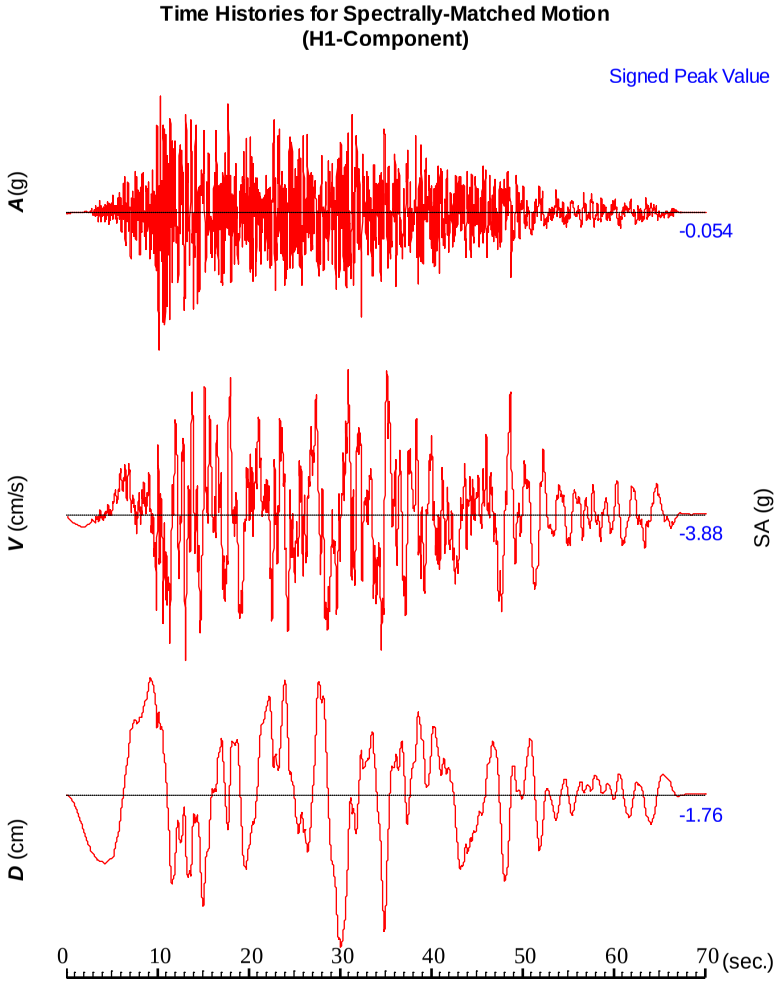
SC SOLUTIONS

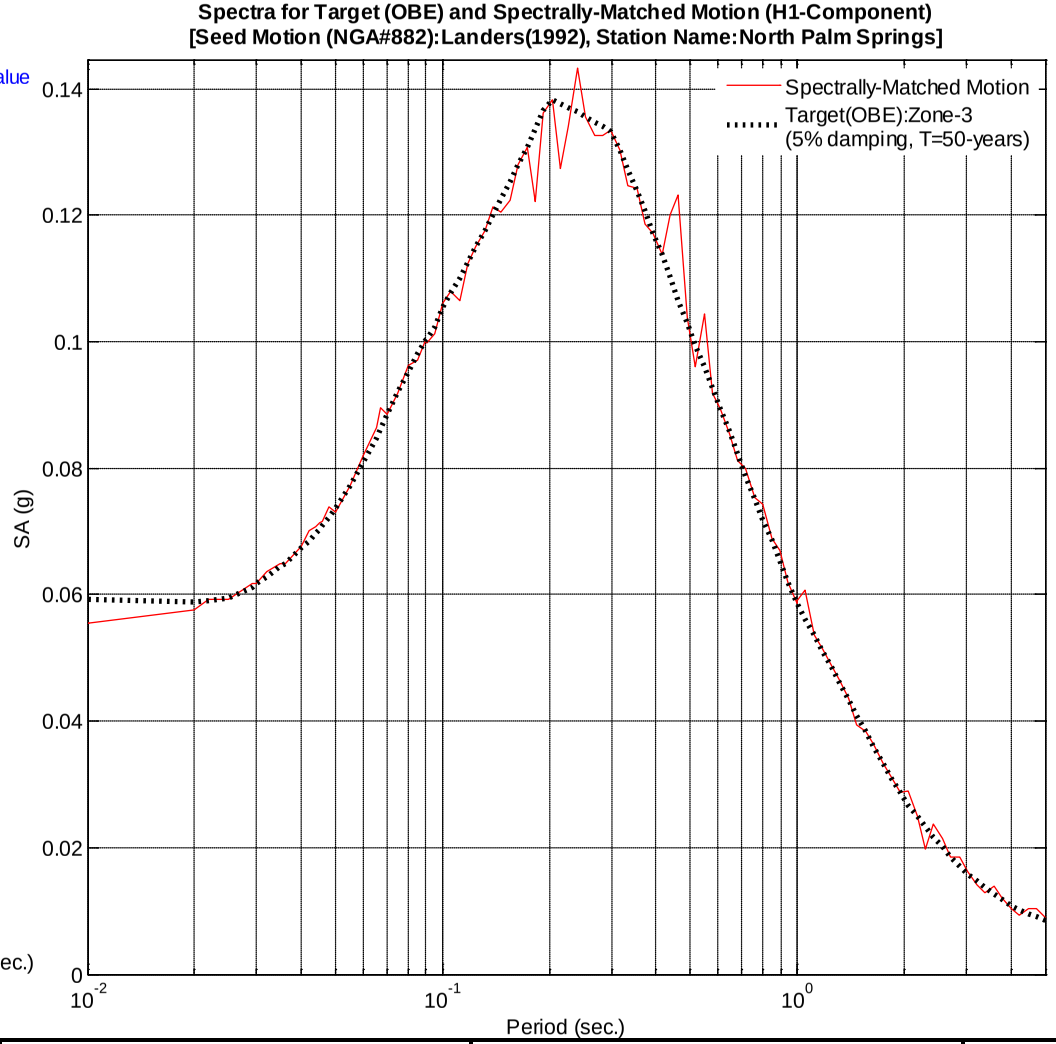
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 3 – SET NO. 4 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE
A3-12





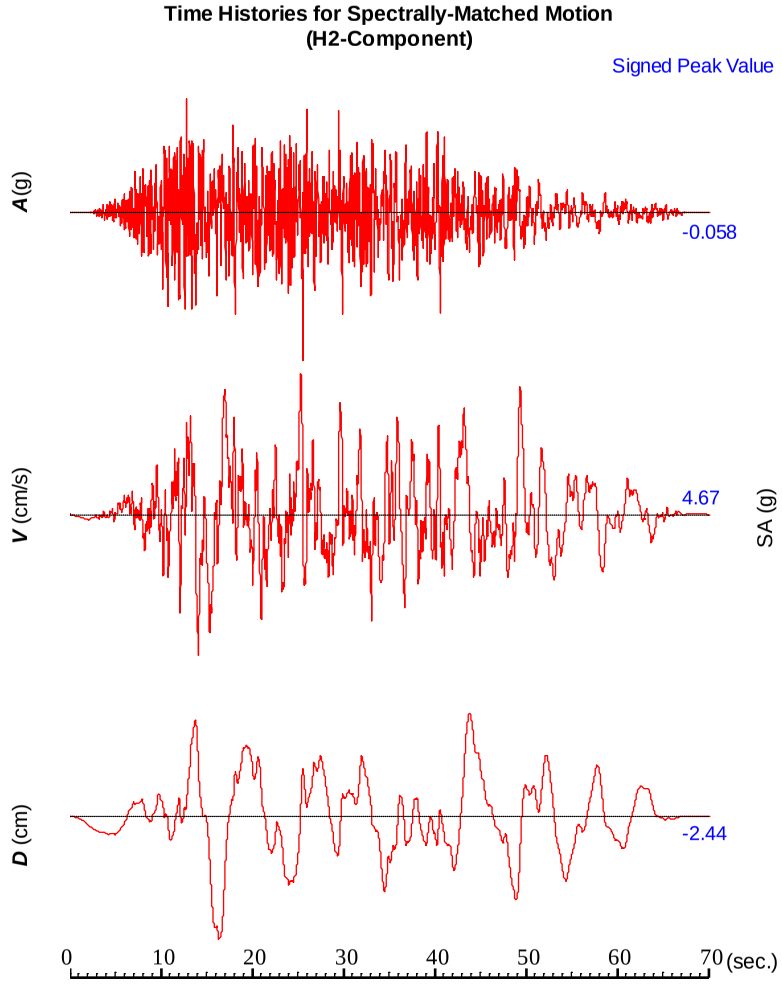
SC SOLUTIONS

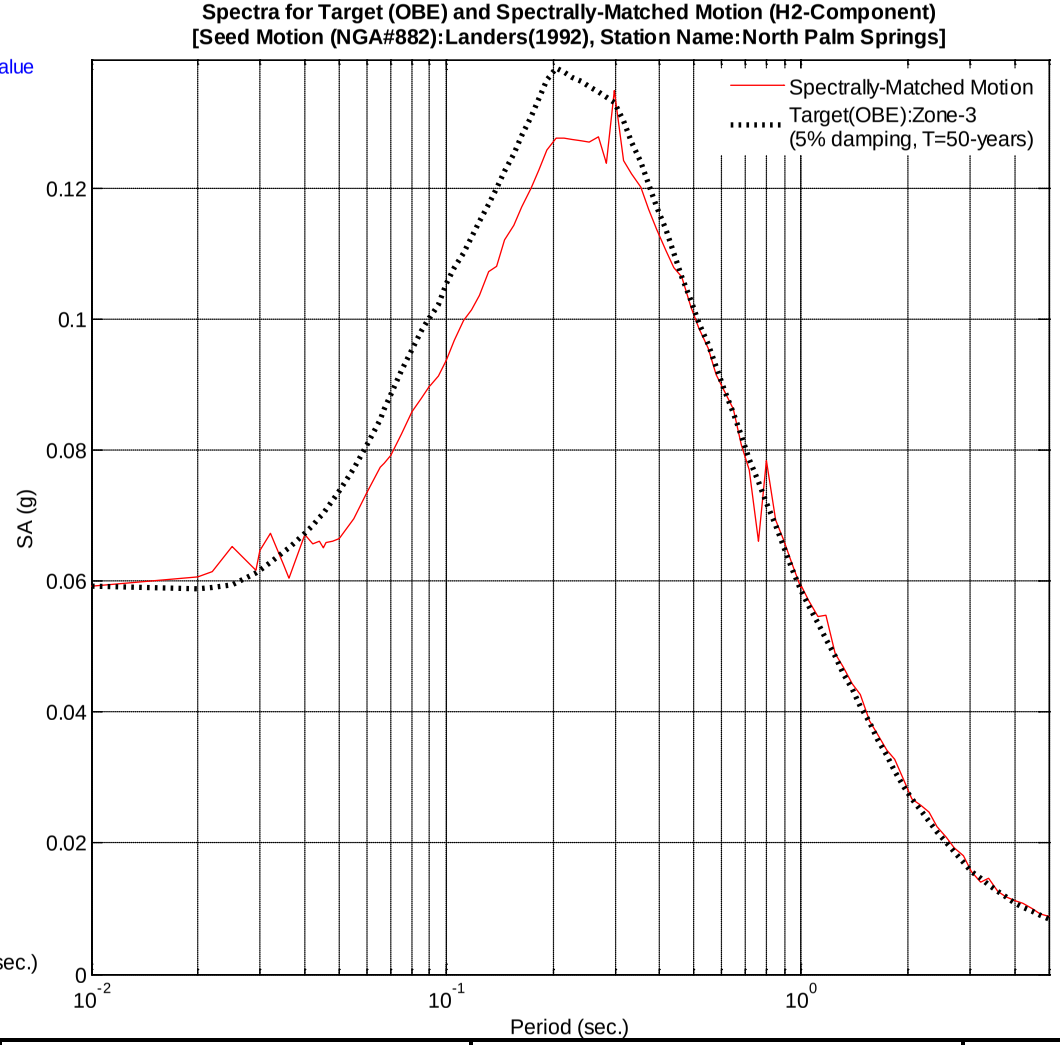
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 3 – SET NO. 5 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE
A3-13





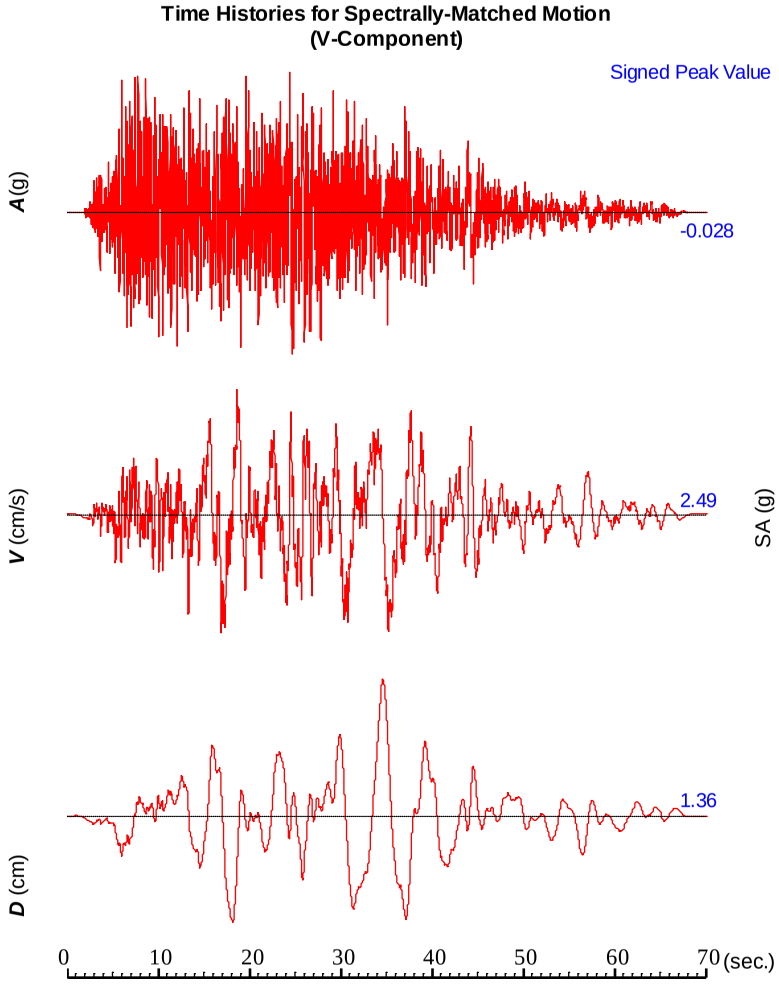
SC SOLUTIONS

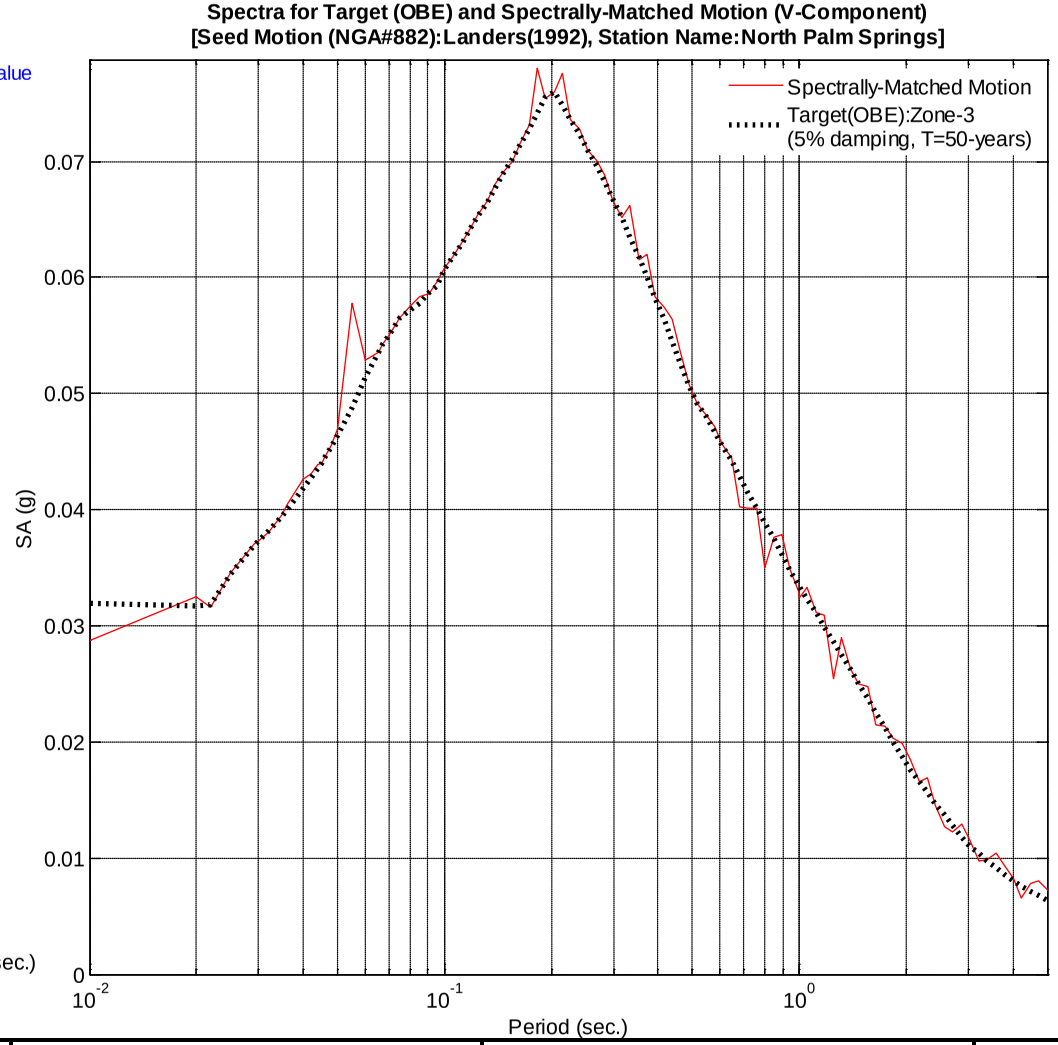
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 3 – SET NO. 5 – HORIZONTAL 2

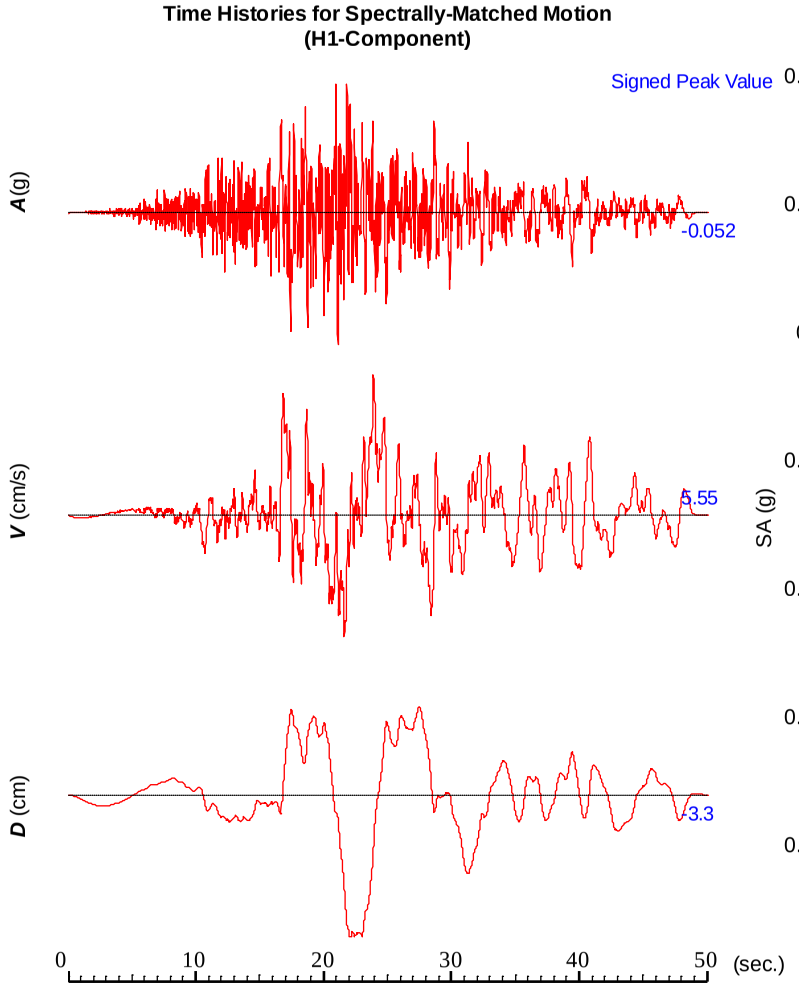
CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

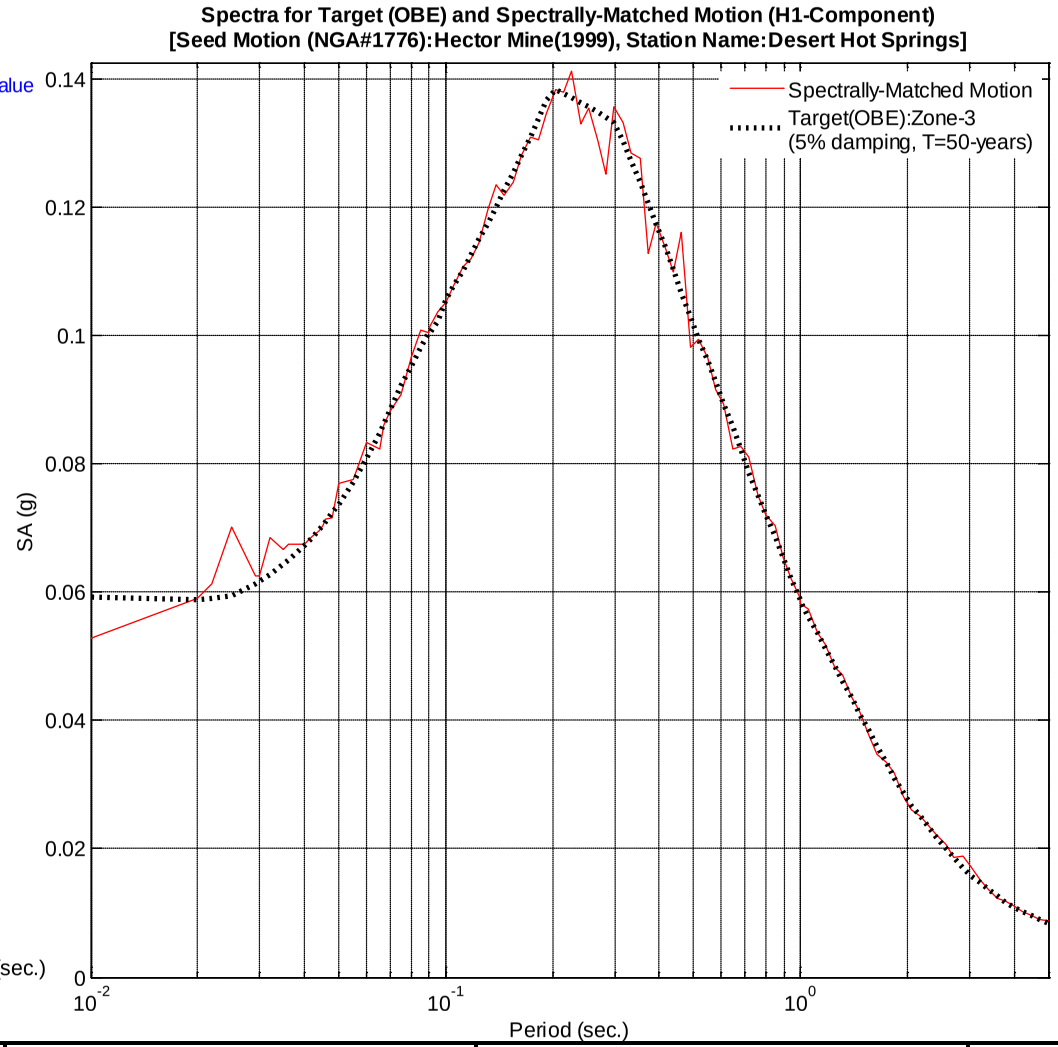
PLATE
A3-14





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 3 – SET NO. 5 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A3-15**





SC SOLUTIONS

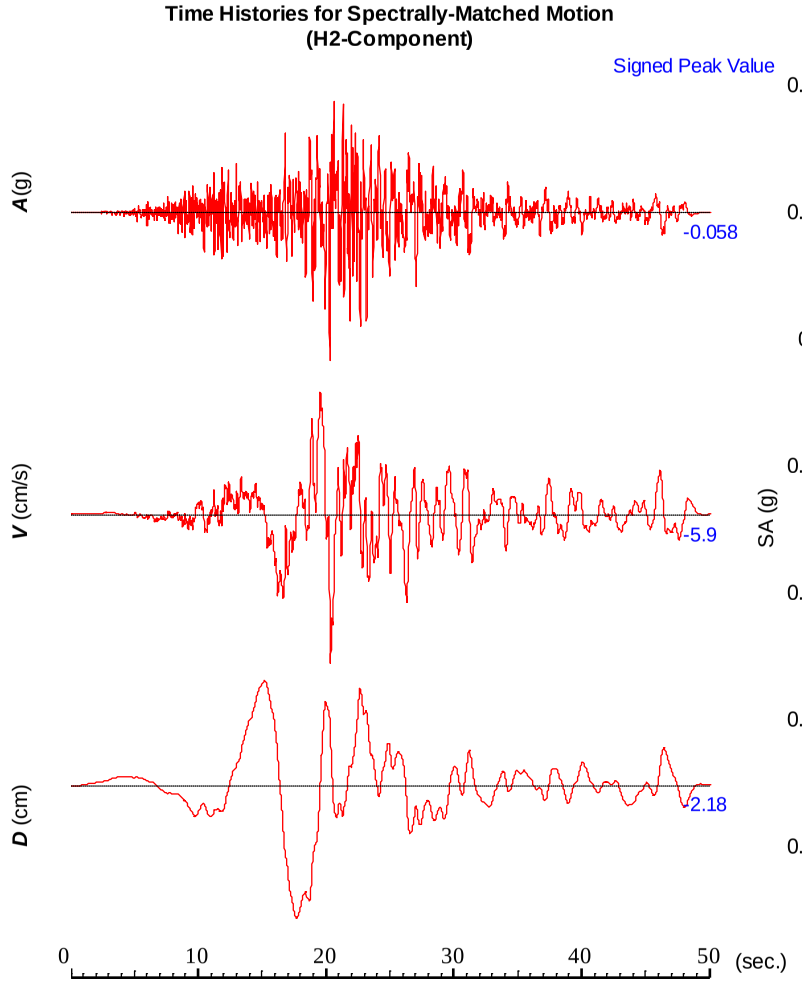
PROJ. NO:		
BY:	J. Zhong	
QC CHECK:	M. Perez	
QA CHECK:	M. Tabatabaie	
DATE:	02/24/2012	

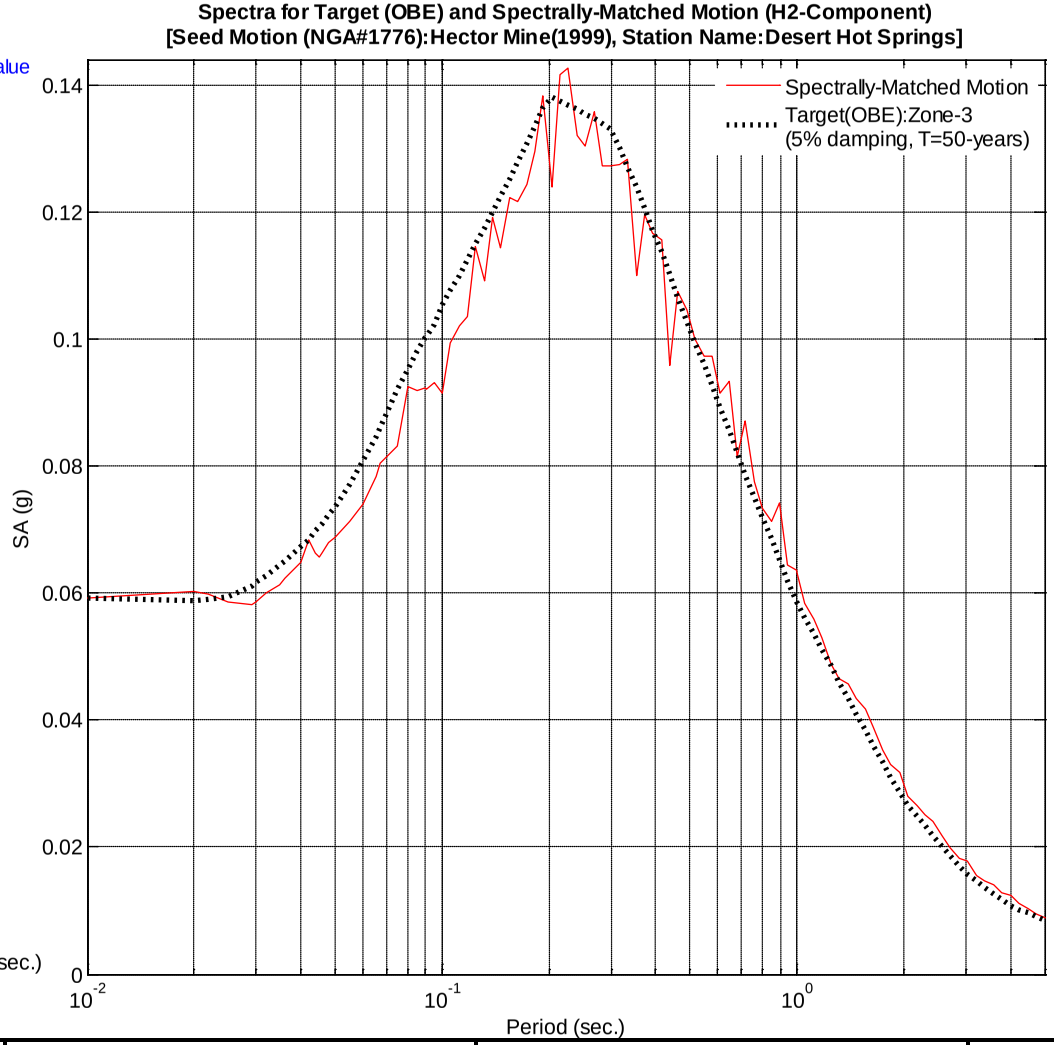
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 3 – SET NO. 6 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE

A3-16





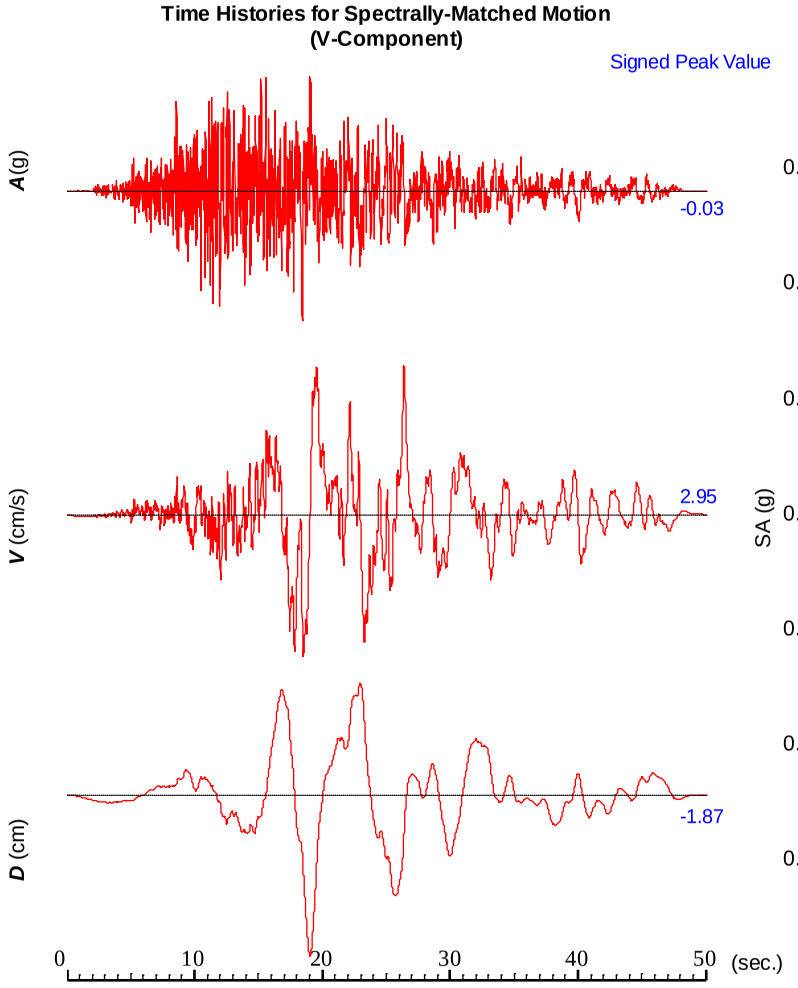
SC SOLUTIONS

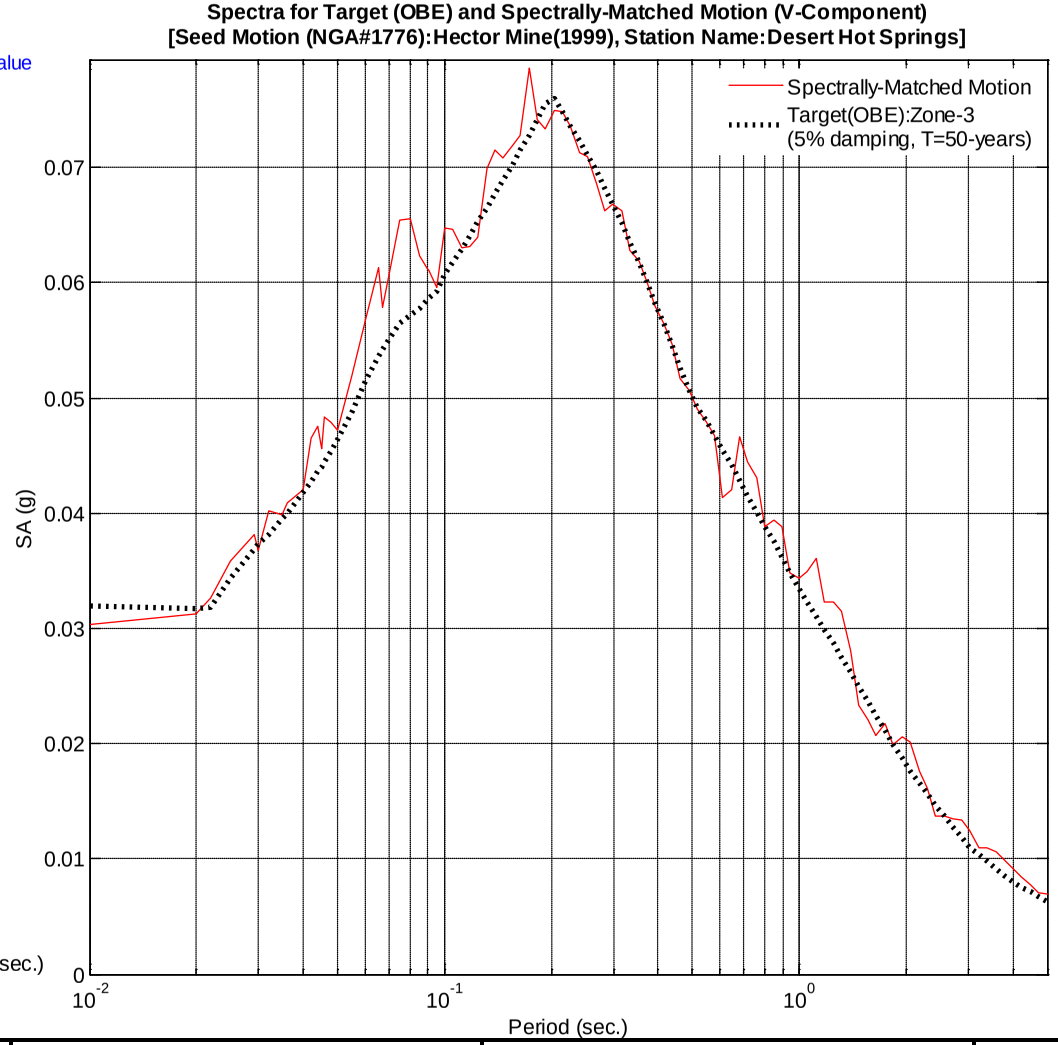
PROJ. NO:		
BY:	J. Zhong	
QC CHECK:	M. Perez	
QA CHECK:	M. Tabatabaie	
DATE:	02/24/2012	

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 3 – SET NO. 6 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE
A3-17





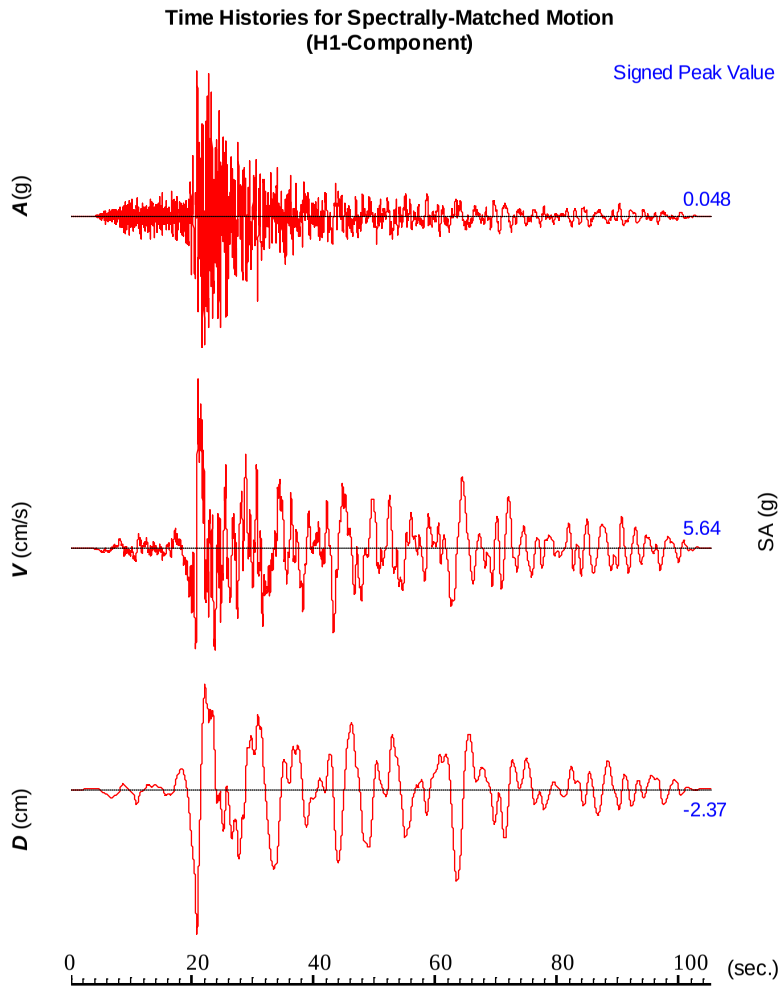
SC SOLUTIONS

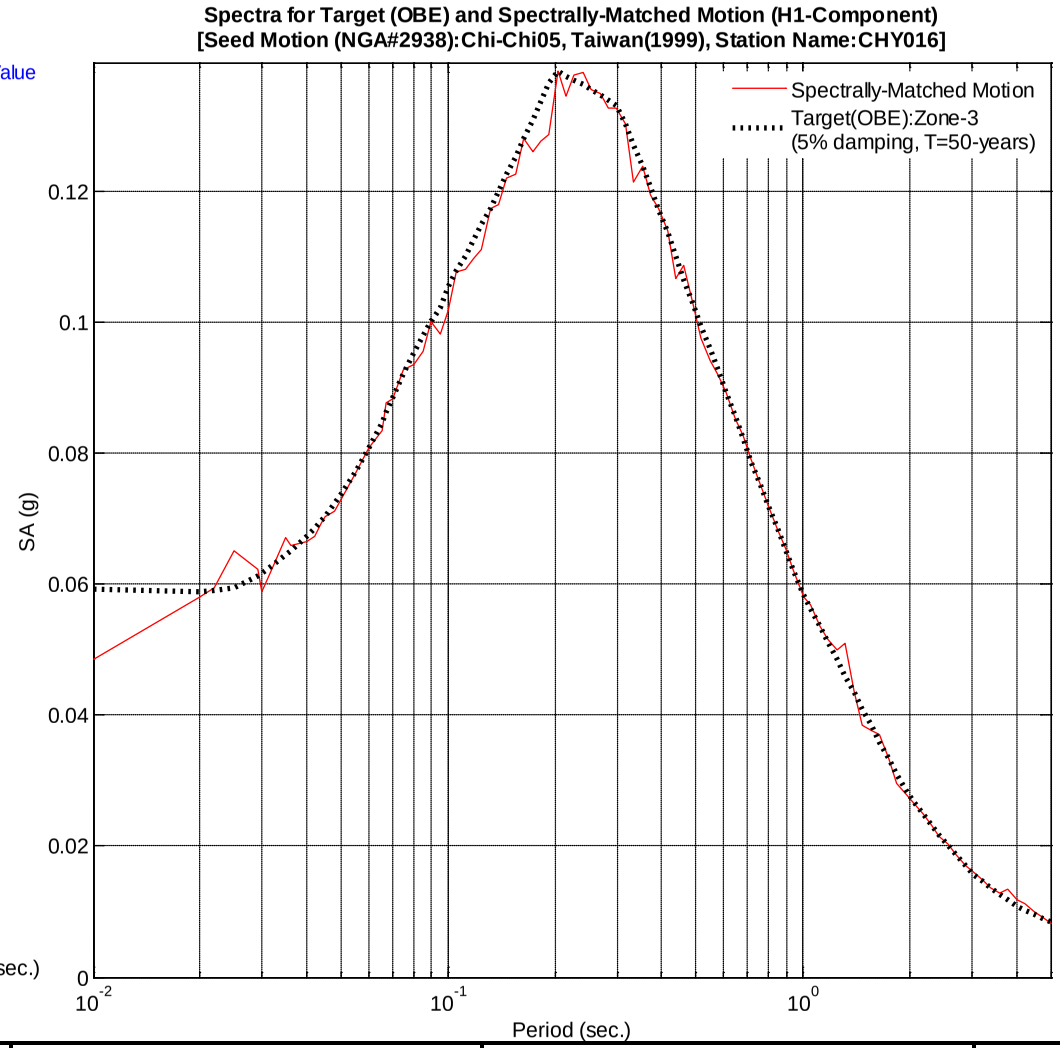
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 3 – SET NO. 6 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

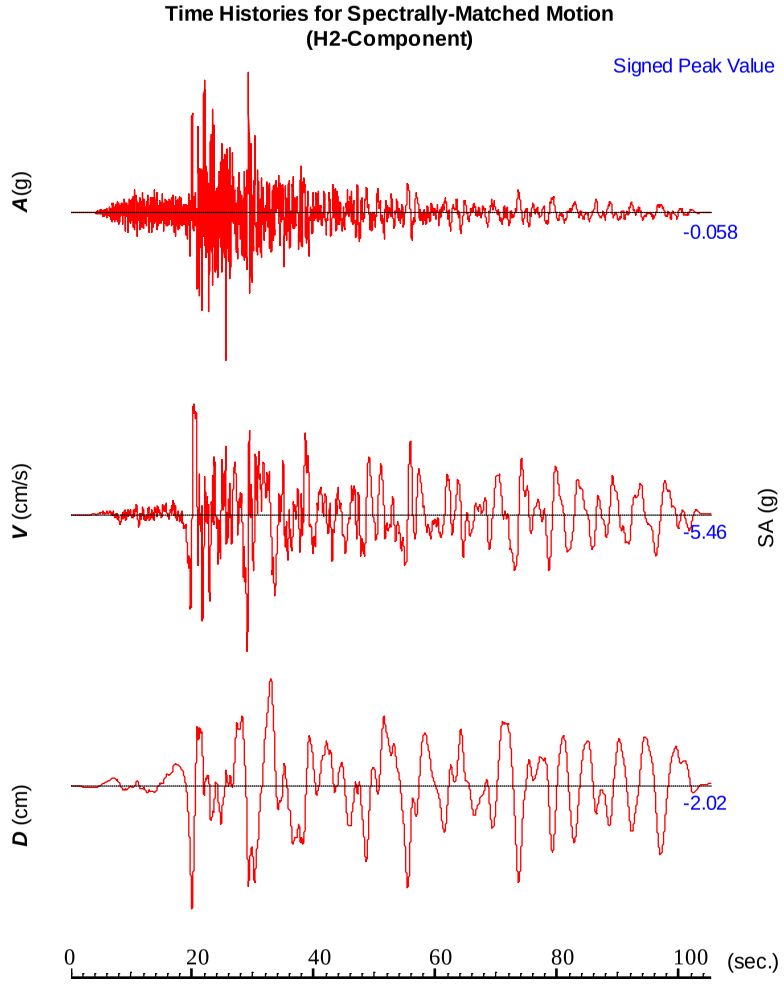
PLATE
A3-18

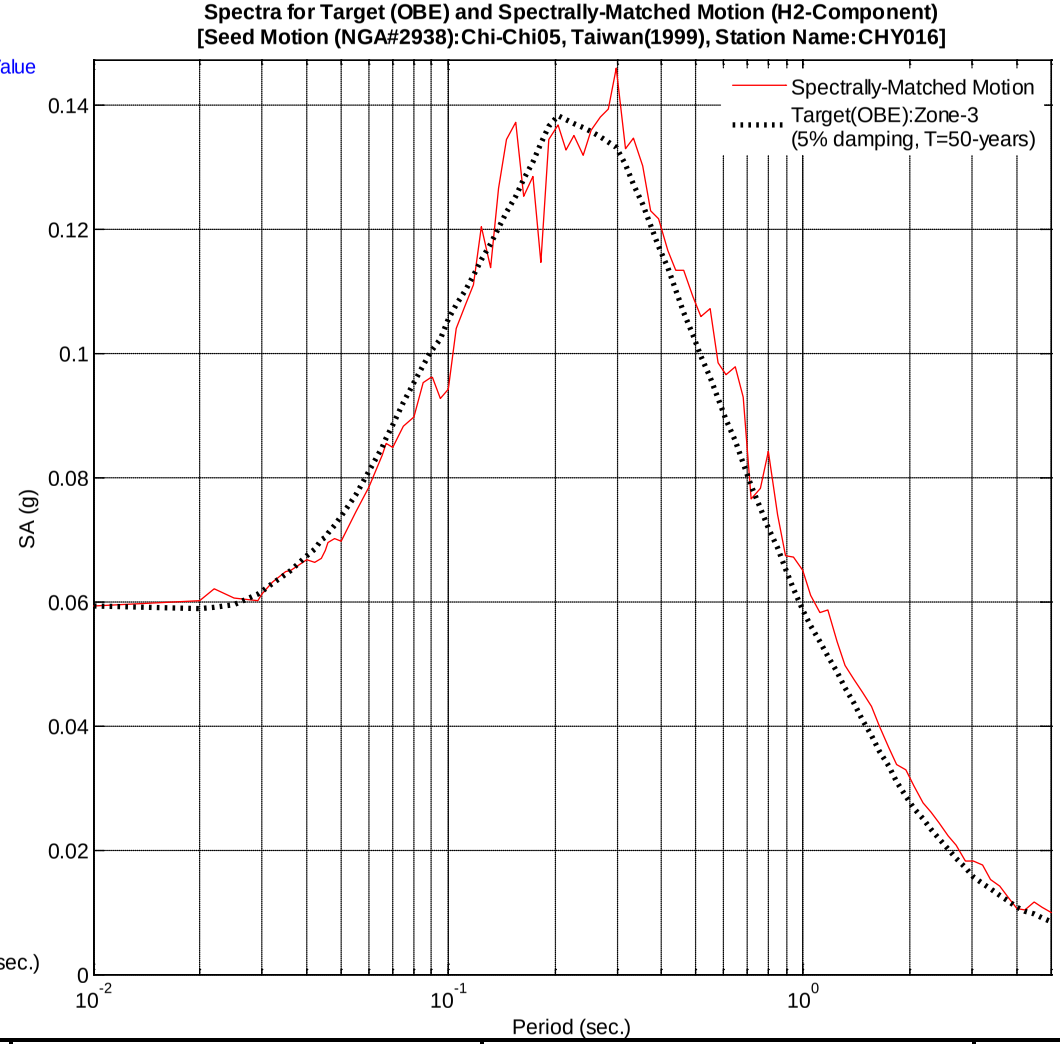




SC SOLUTIONS

PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 3 – SET NO. 7 – HORIZONTAL 1**	PLATE **A3-19**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		





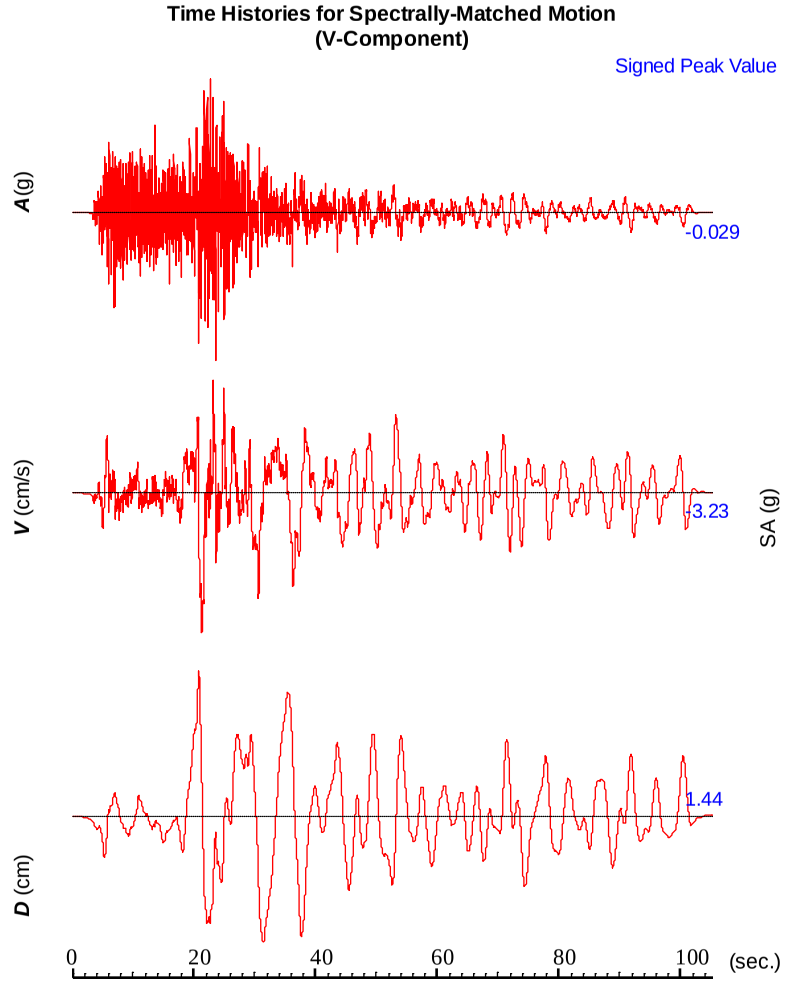
SC SOLUTIONS

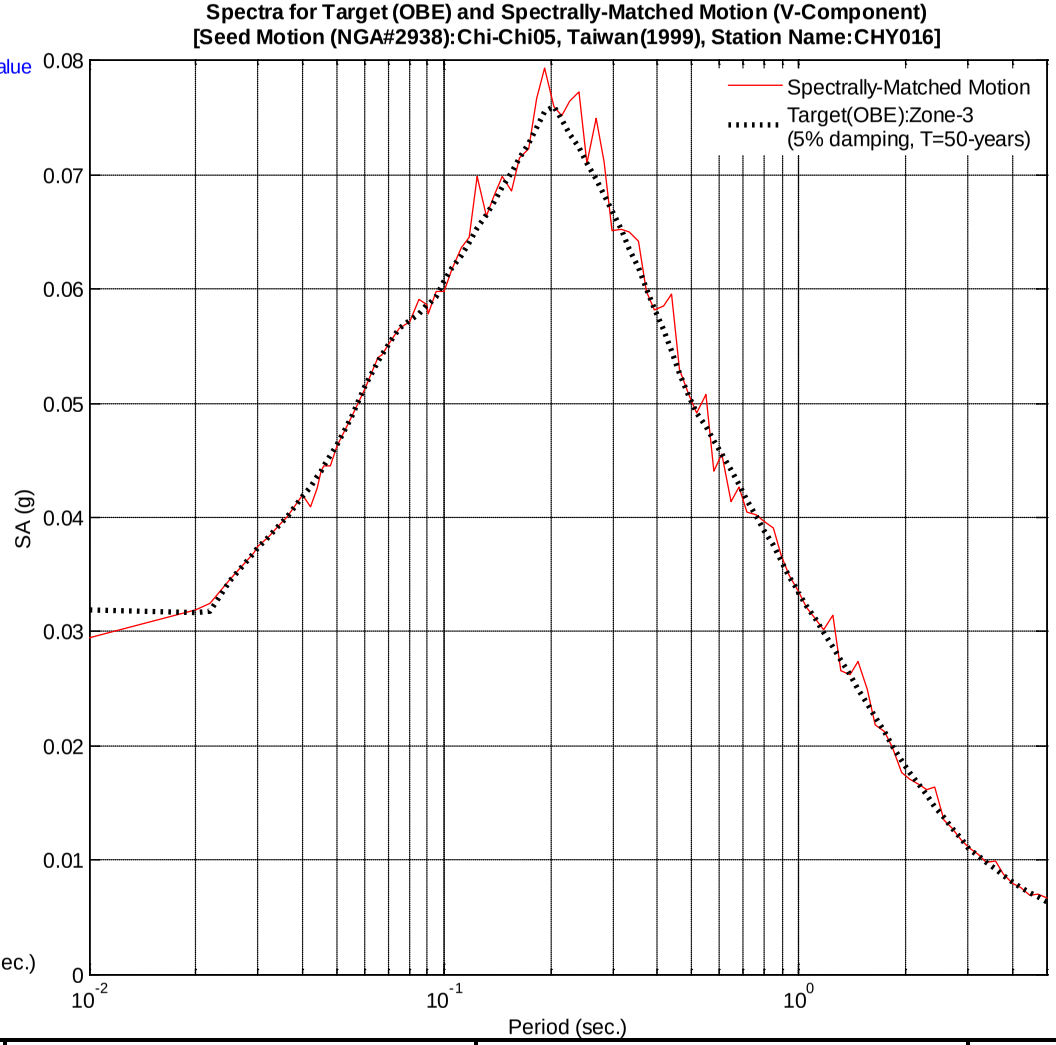
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 3 – SET NO. 7 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE
A3-20





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 3 – SET NO. 7 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **A3-21**

Table A.4: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 4**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	832	Landers	1992	North Palm Springs	7.28	26.84	0.075	8.988	6.127	0.075	8.688	4.190	0.040	3.594	1.885
2	1637	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.073	6.716	2.460	0.071	6.555	2.610	0.040	3.144	1.133
3	907	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.074	6.016	2.379	0.075	10.211	2.017	0.037	3.979	1.457
4	2112	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.069	8.159	6.410	0.065	8.149	7.158	0.037	4.045	3.701
5	882	Imperial Valley-06	1979	Delta	6.53	22.03	0.075	6.169	2.819	0.079	6.735	3.130	0.036	3.010	1.668
6	1776	Manjil, Iran	1990	Rudsar	7.37	64.47	0.069	7.431	4.749	0.076	7.590	2.815	0.038	3.180	2.110
7	2938	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.070	8.052	3.618	0.076	7.024	2.604	0.035	3.509	1.550

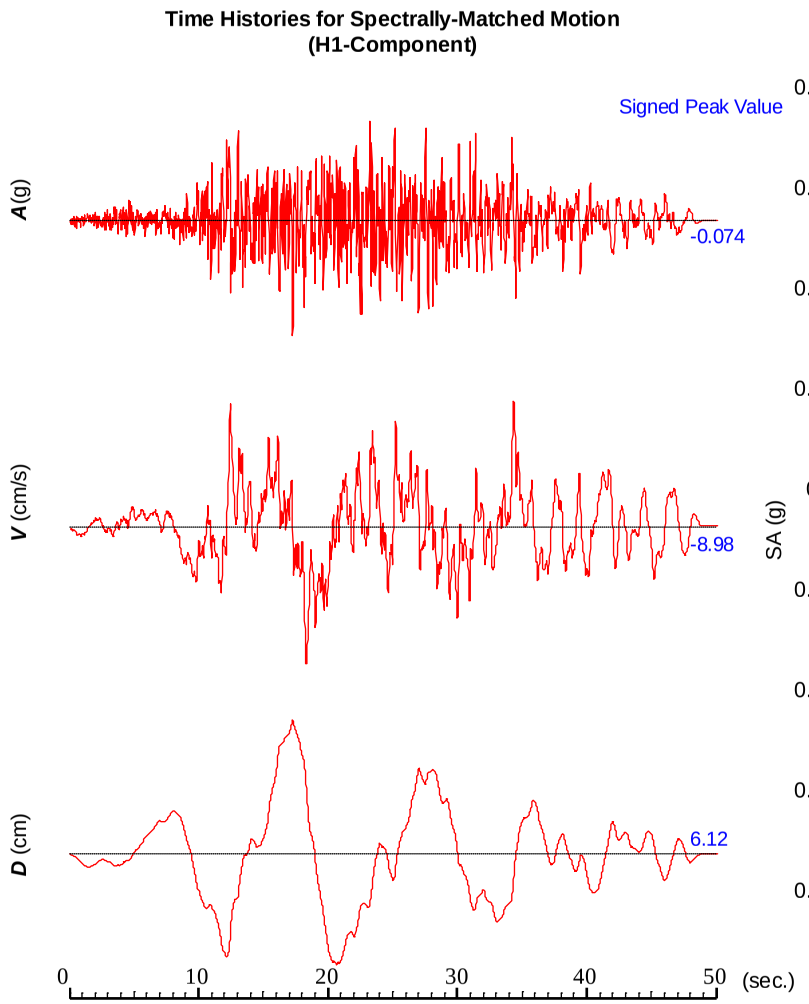
SC SOLUTIONS

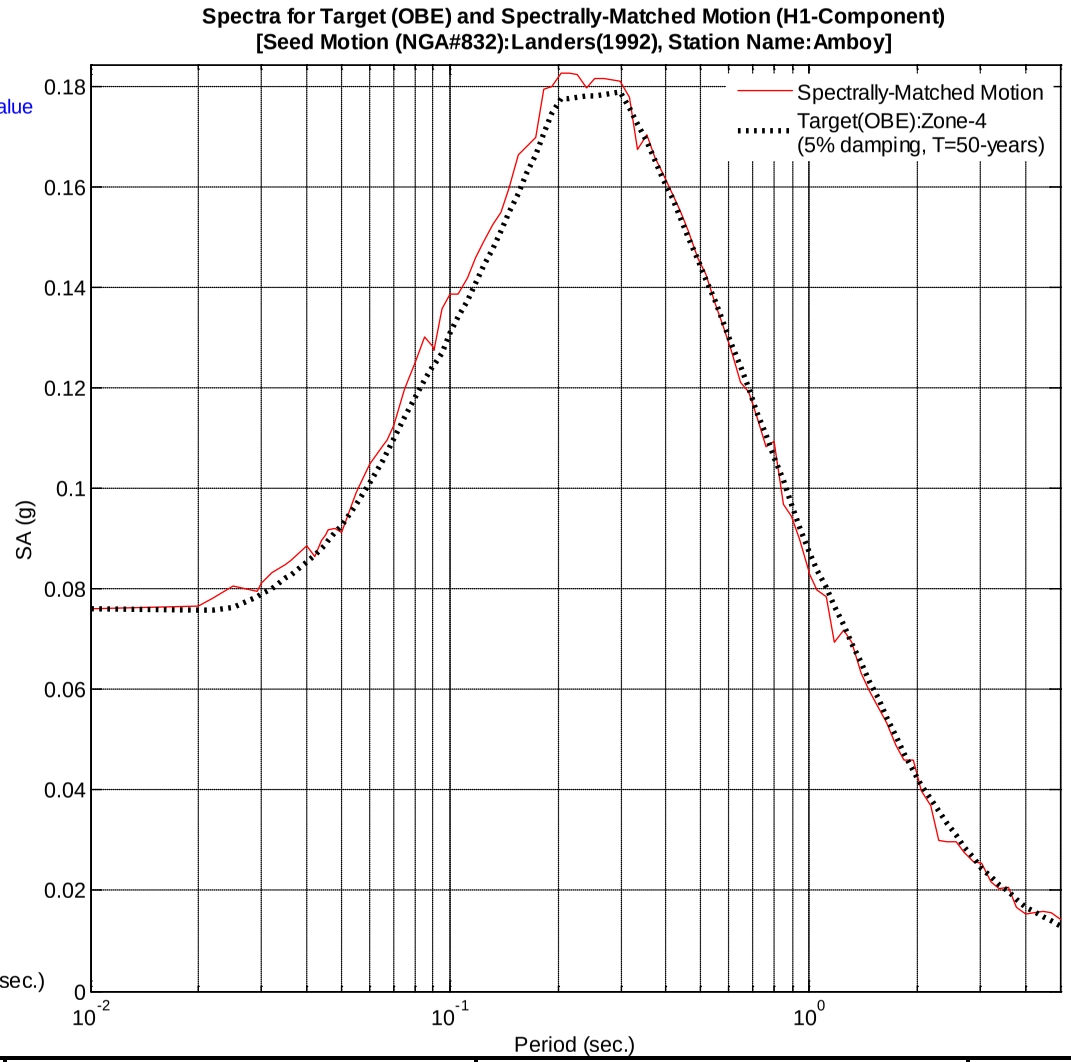
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS OBE – ZONE 4

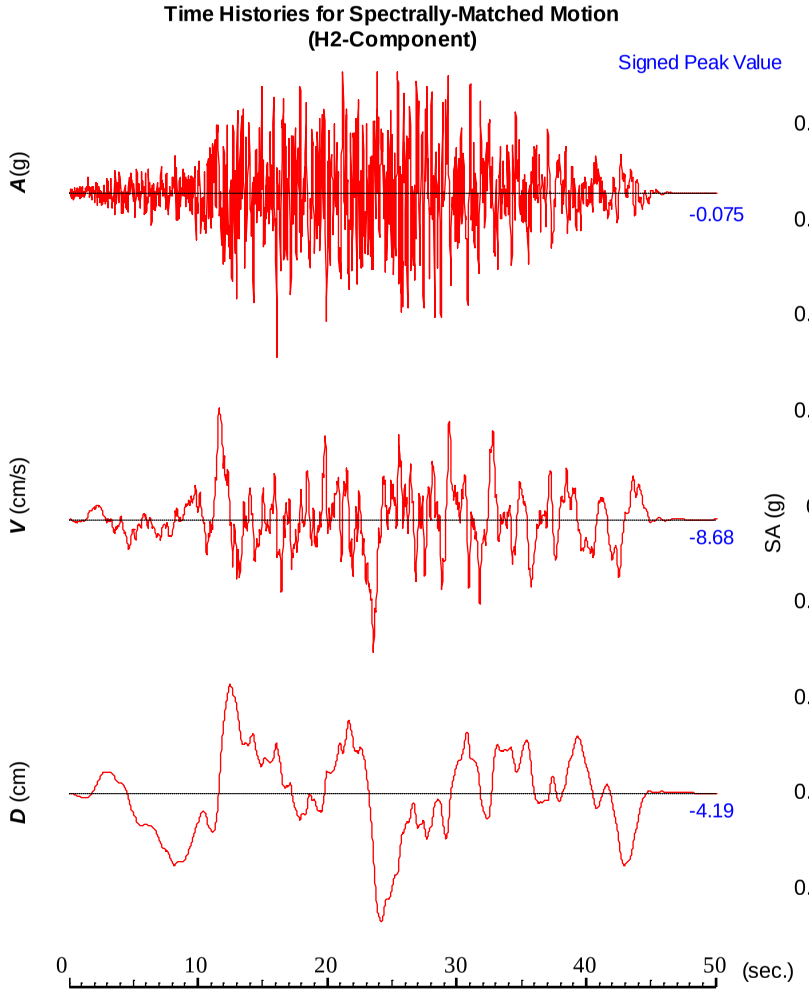
CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

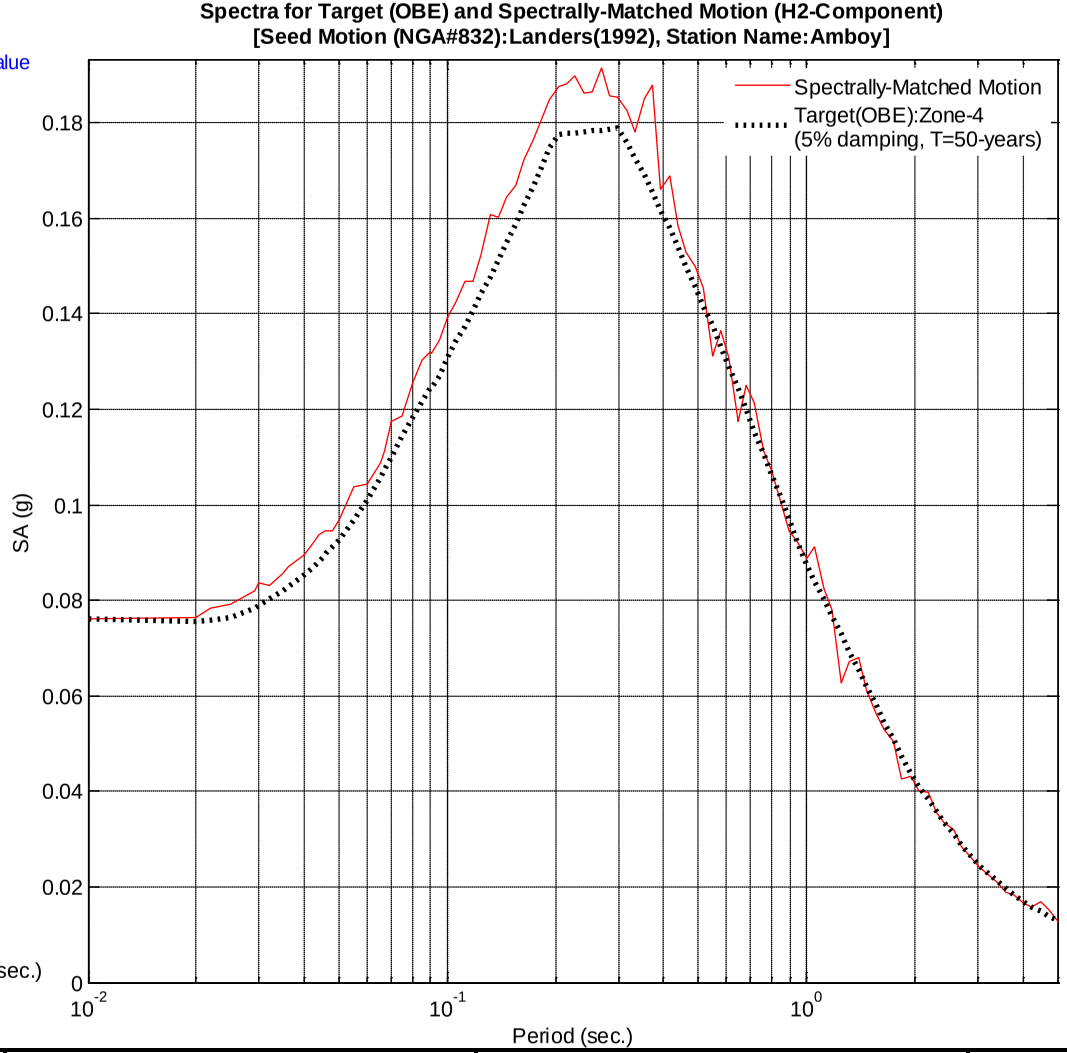
PLATE
A4-0



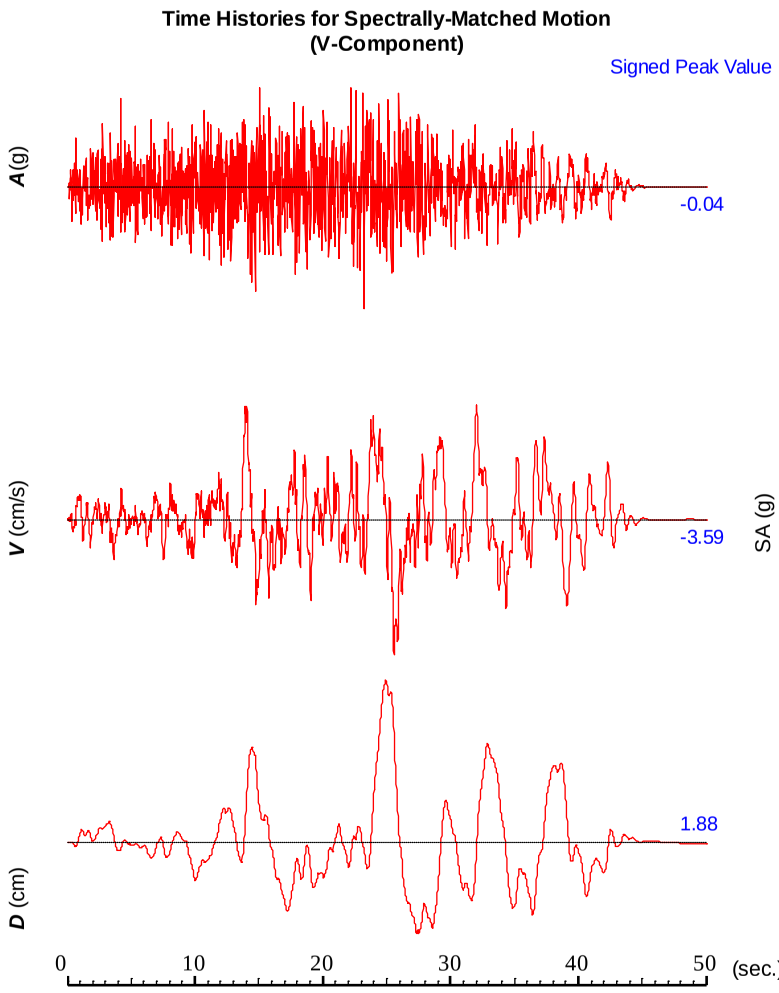


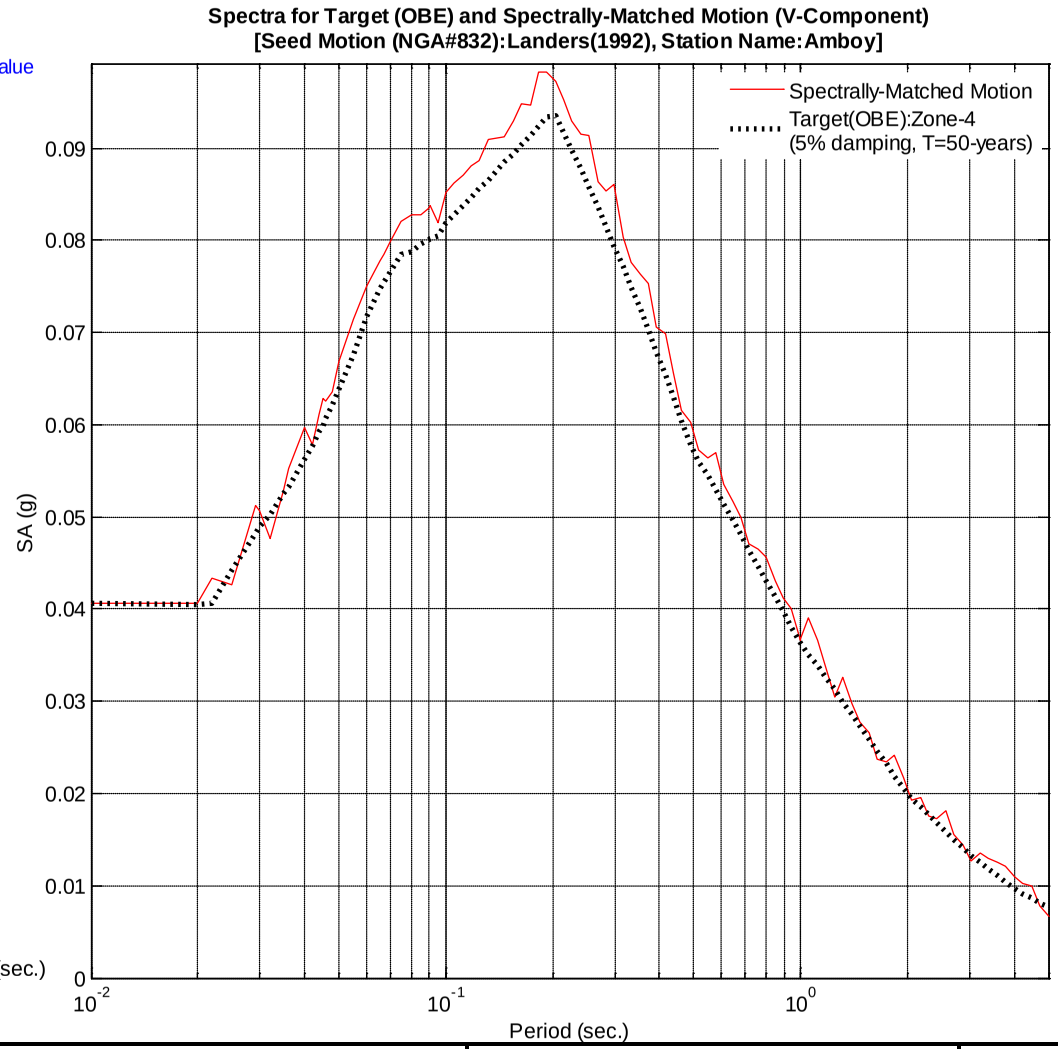
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 4 – SET NO. 1 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A4-1**





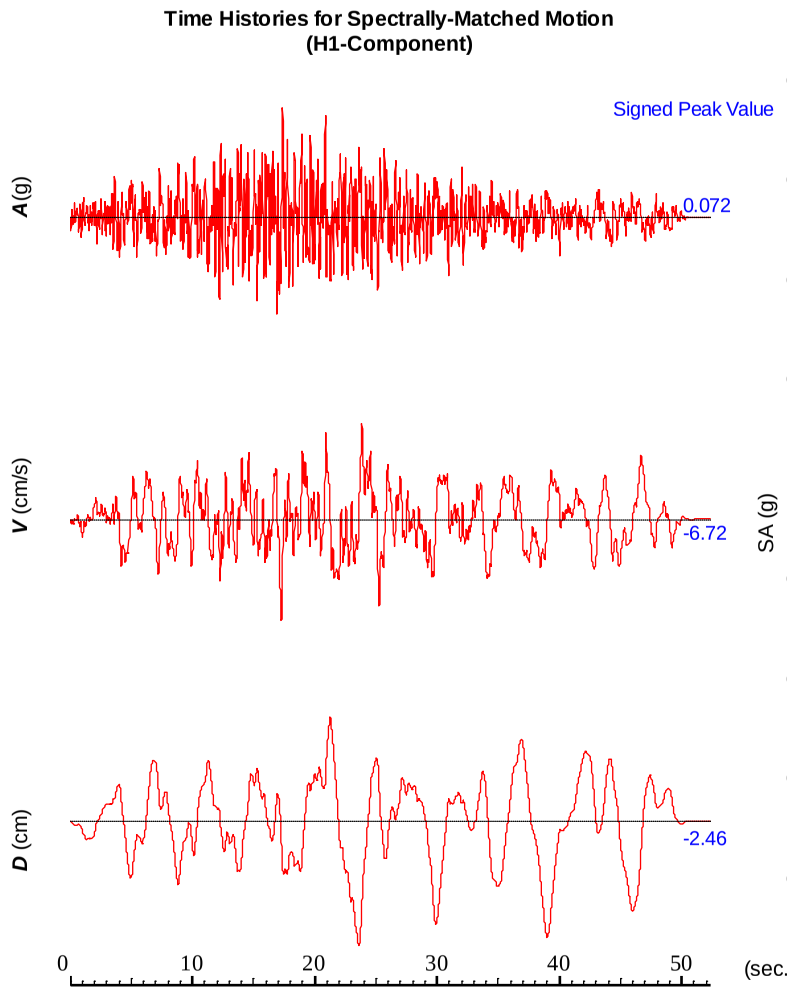
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 4 – SET NO. 1 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A4-2**

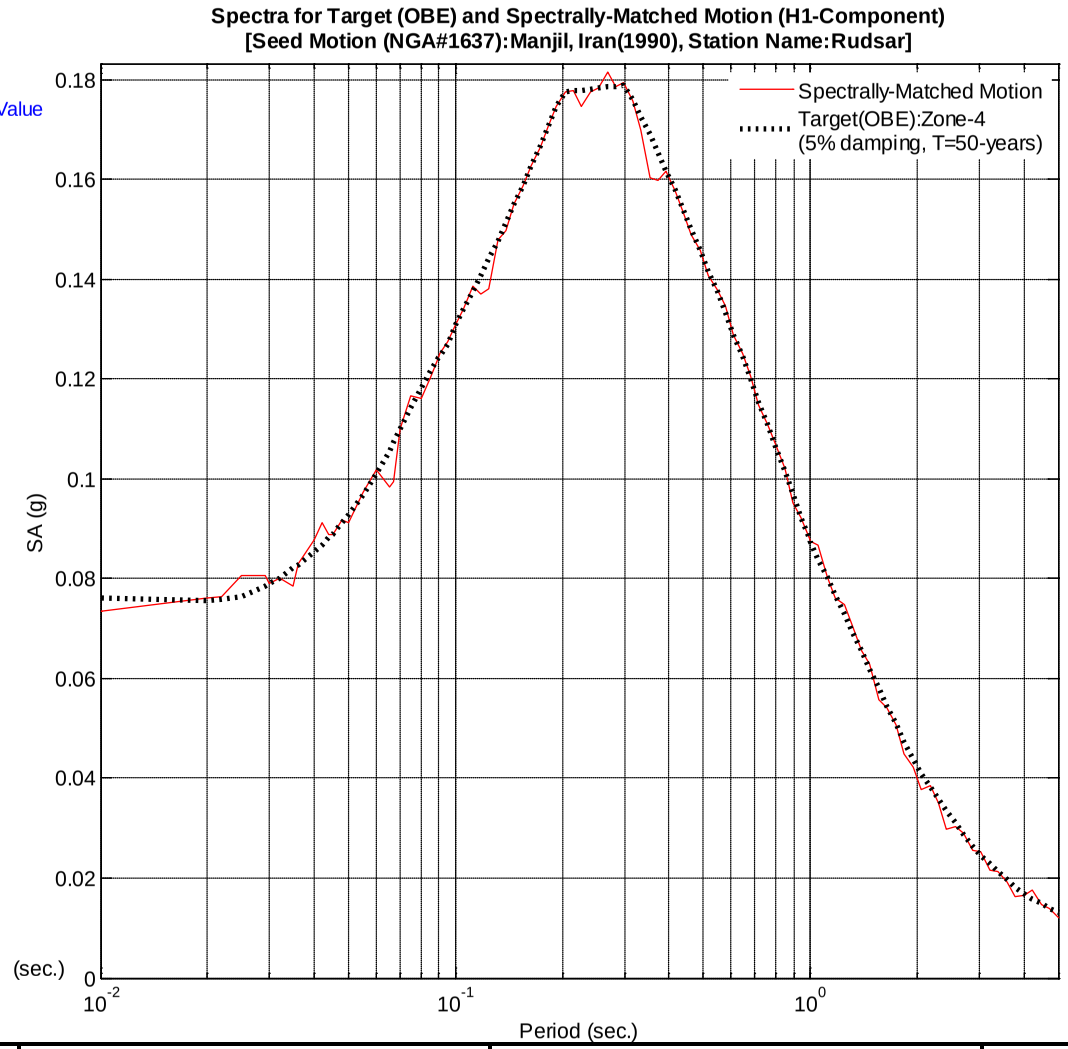




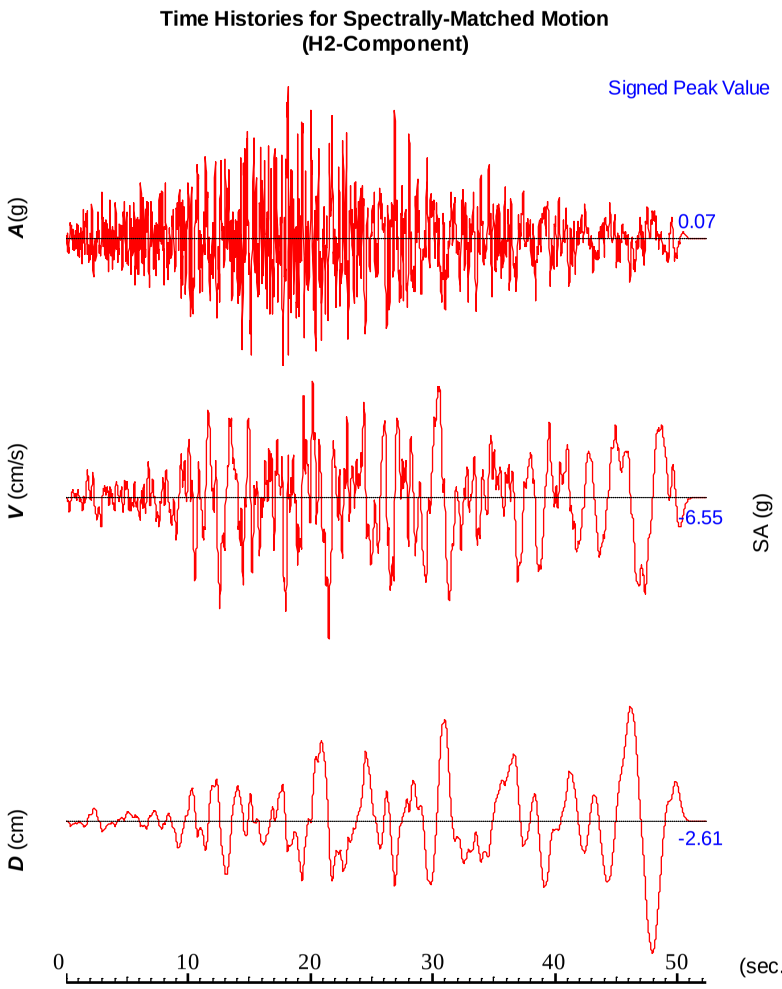
SC SOLUTIONS

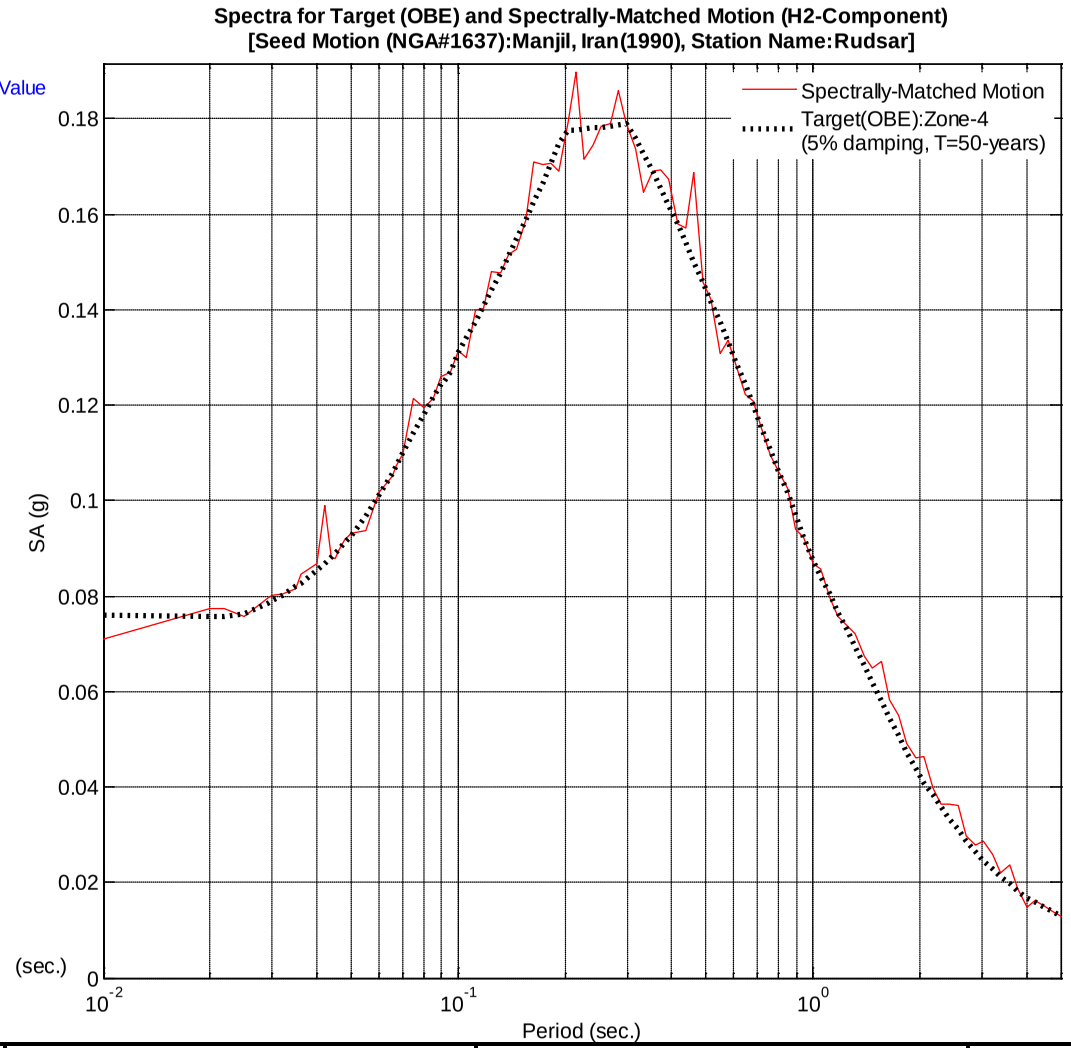
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 4 – SET NO. 1 – VERTICAL**	PLATE
BY:	J. Zhong		**A4-3**
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		



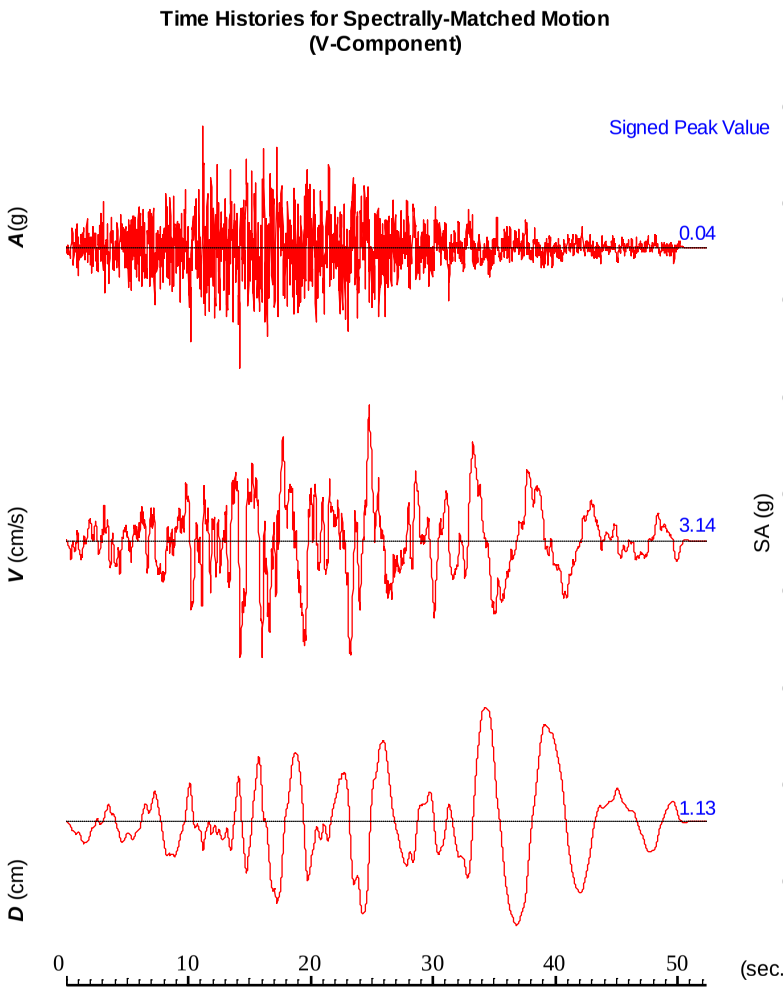


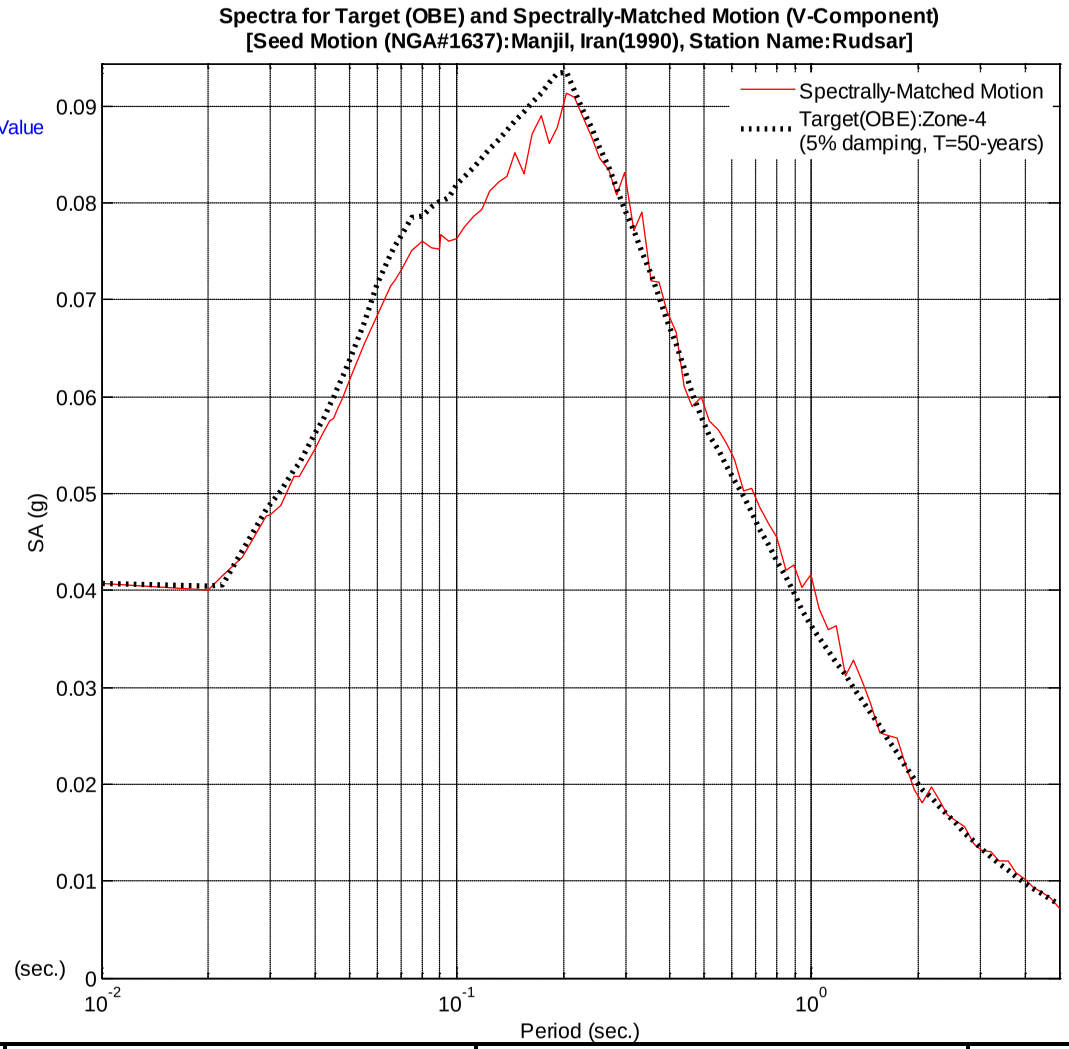
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 4 – SET NO. 2 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A4-4**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 4 – SET NO. 2 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A4-5**





SC SOLUTIONS

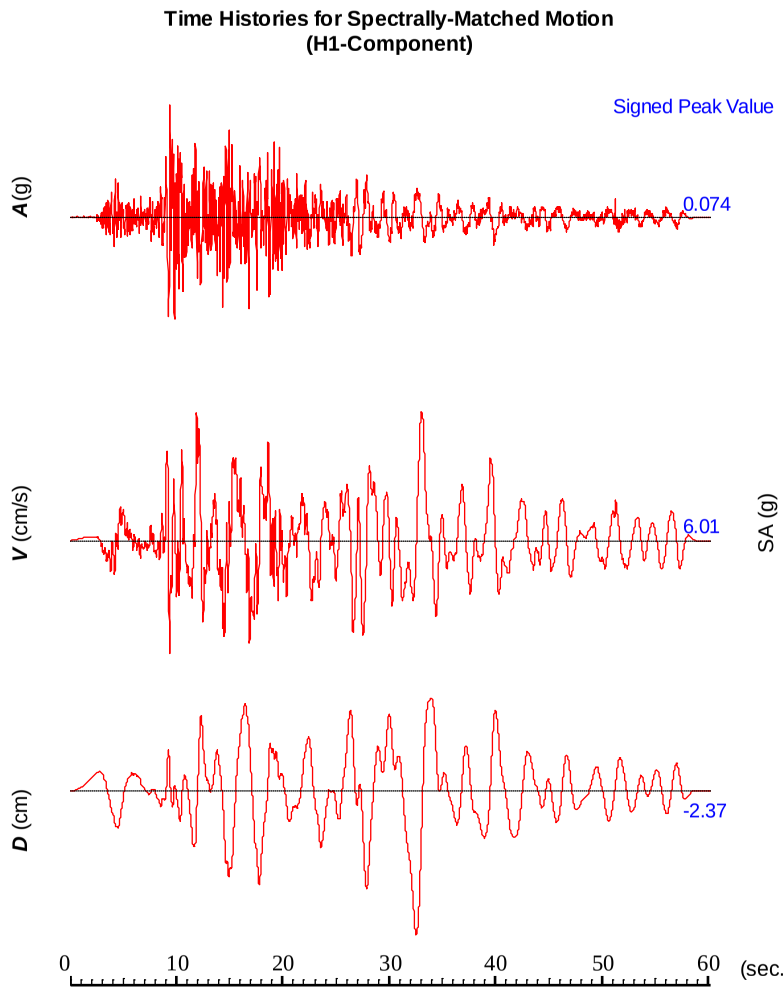
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

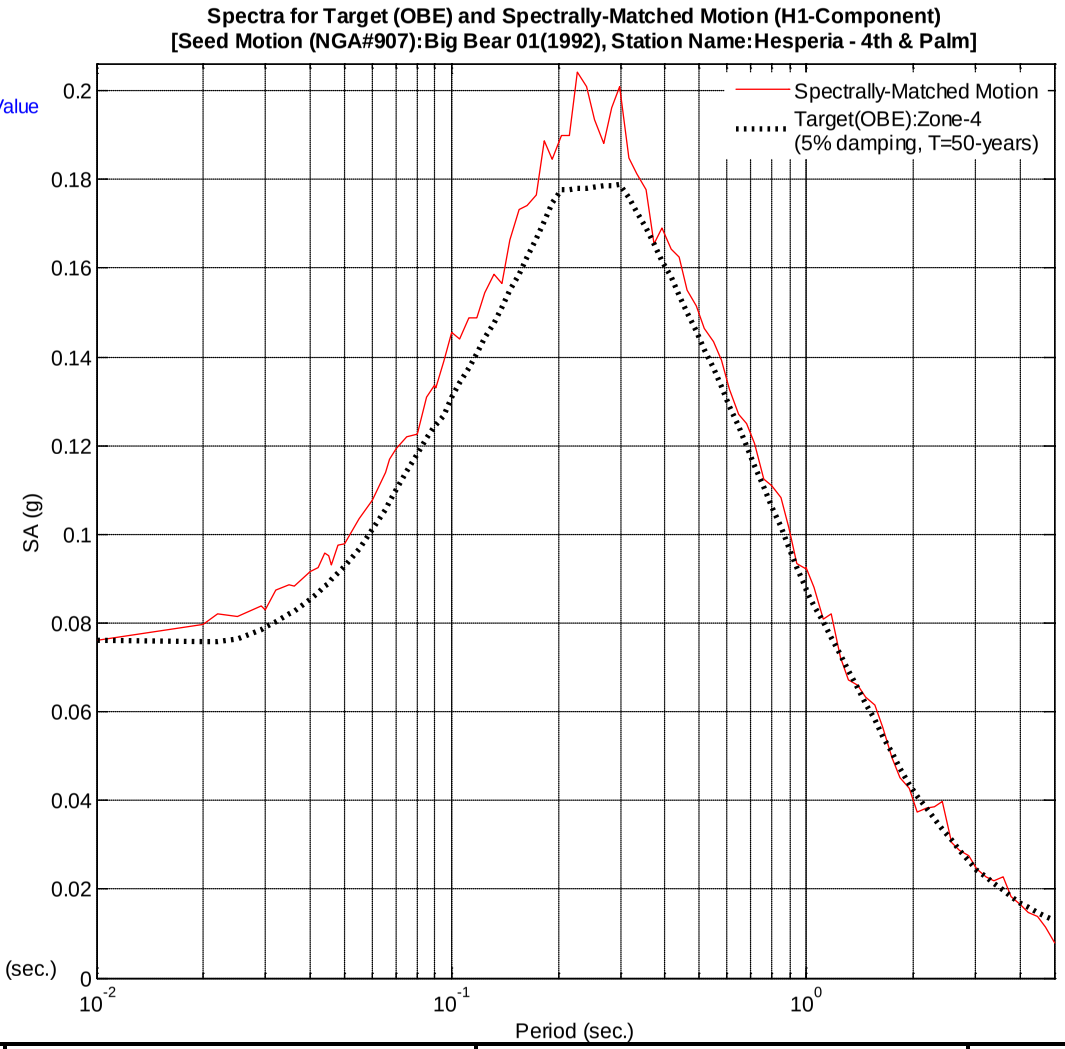
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 4 – SET NO. 2 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A4-6





SC SOLUTIONS

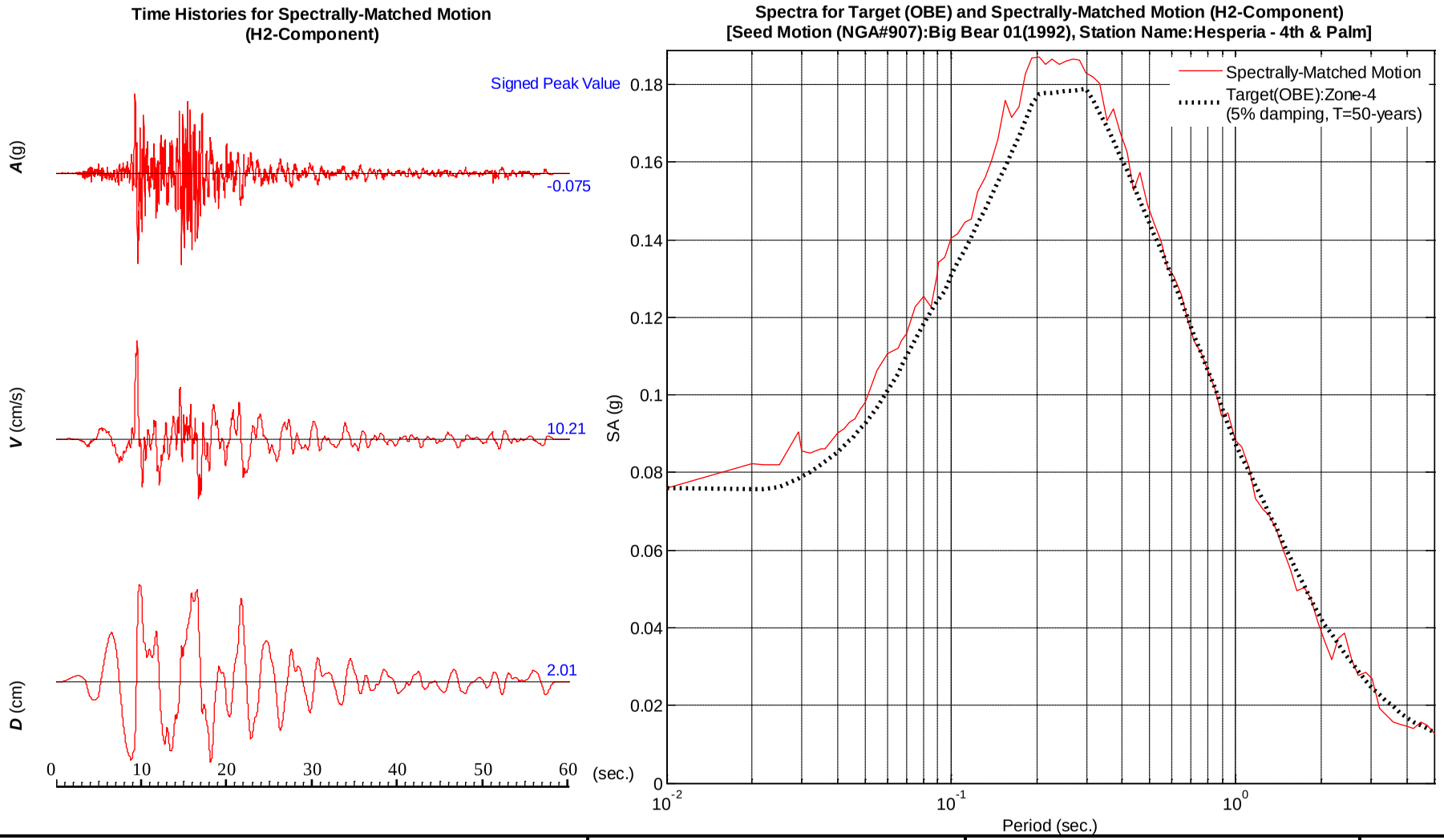
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 4 – SET NO. 3 – HORIZONTAL 1

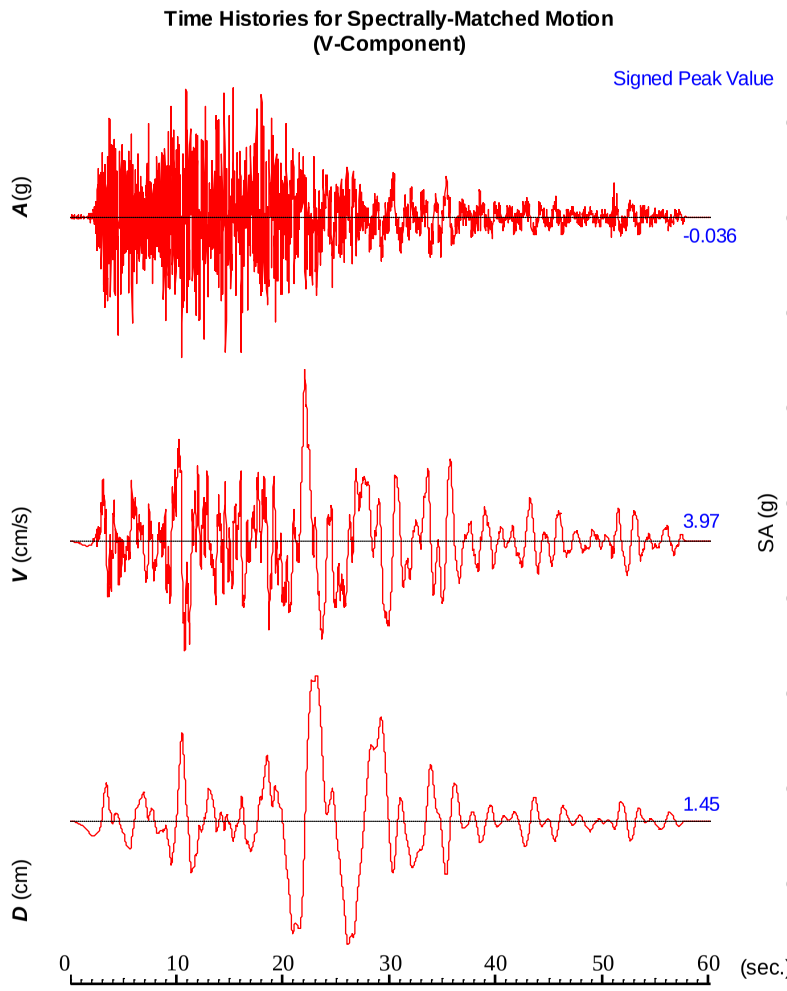
CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

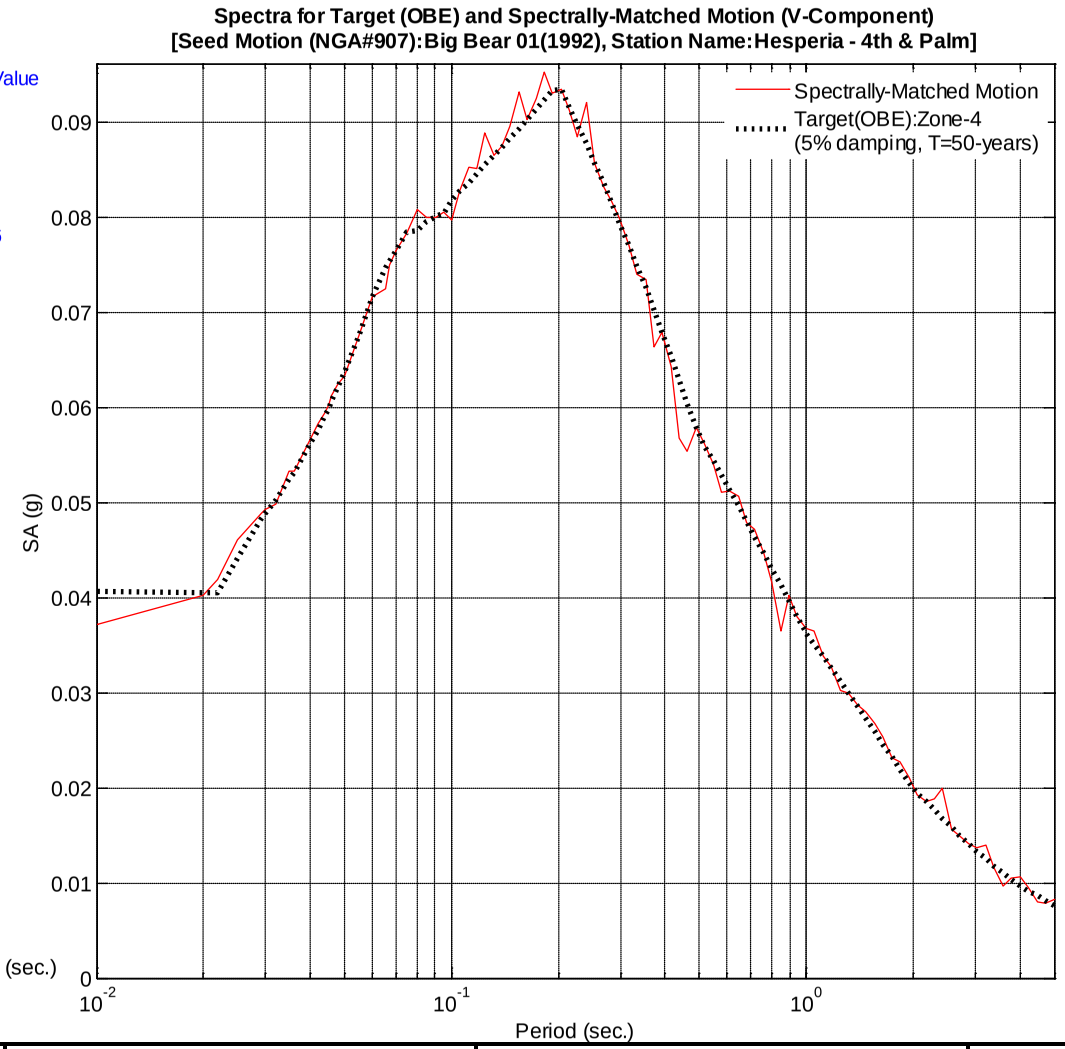
PLATE

A4-7



SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 4 – SET NO. 3 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A4-8**





SC SOLUTIONS

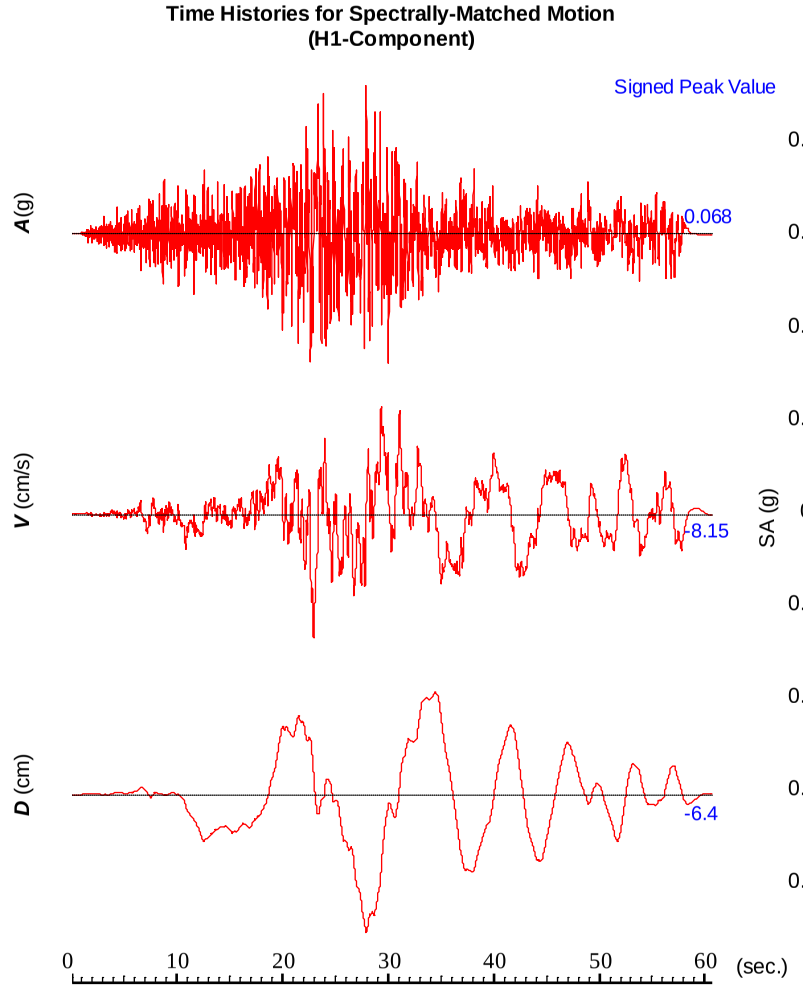
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

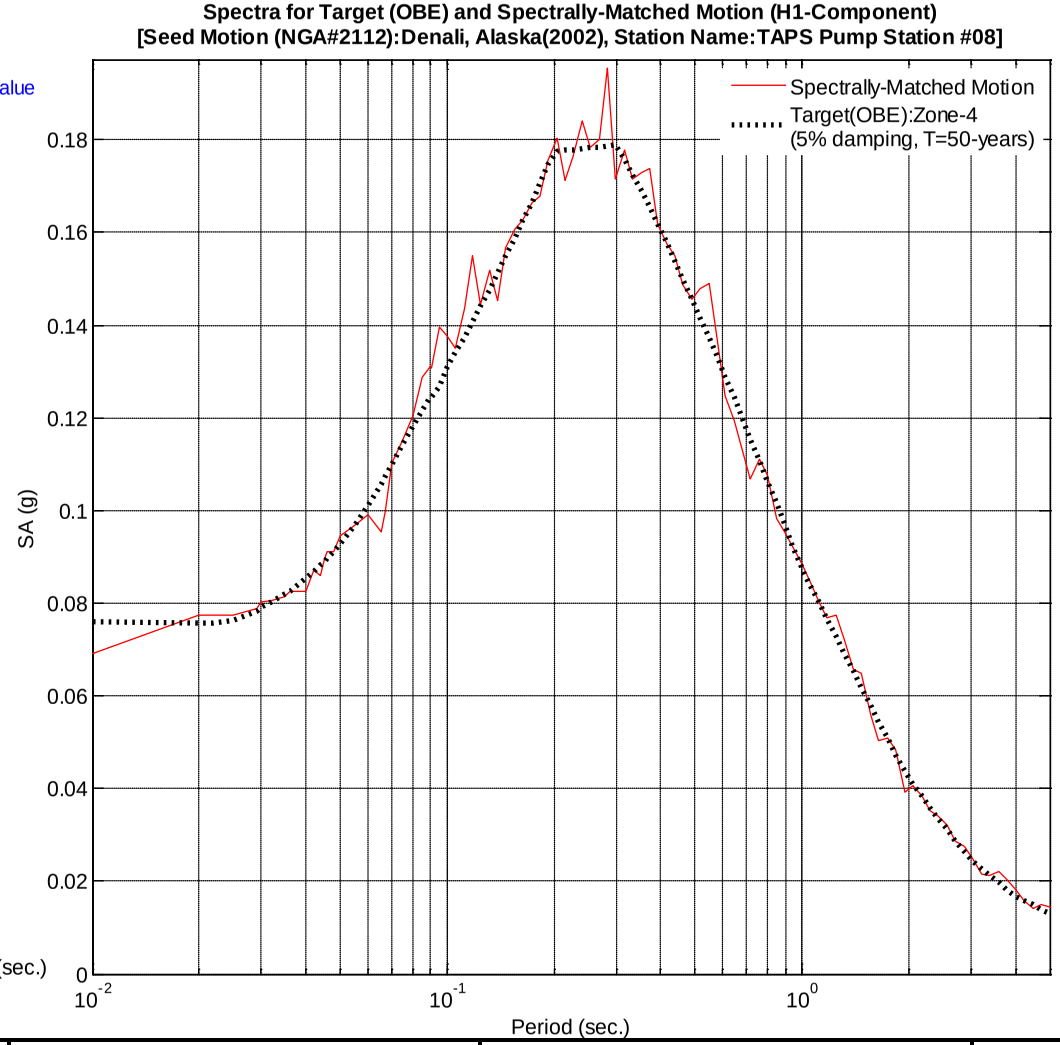
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 4 – SET NO. 3 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

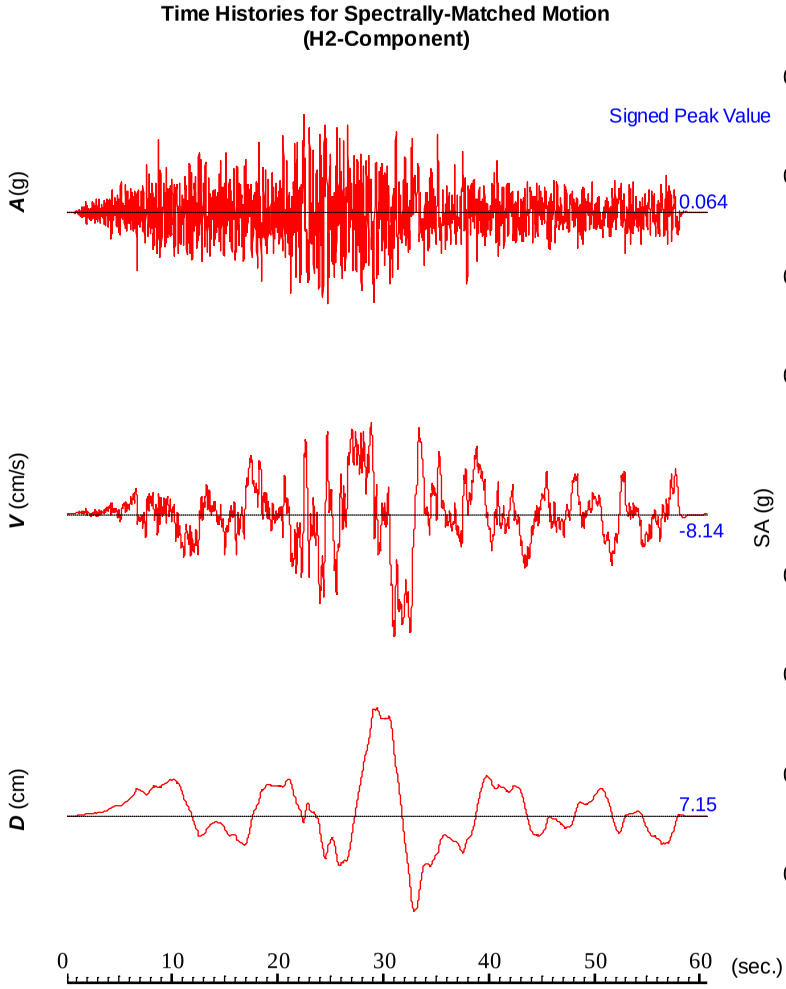
PLATE

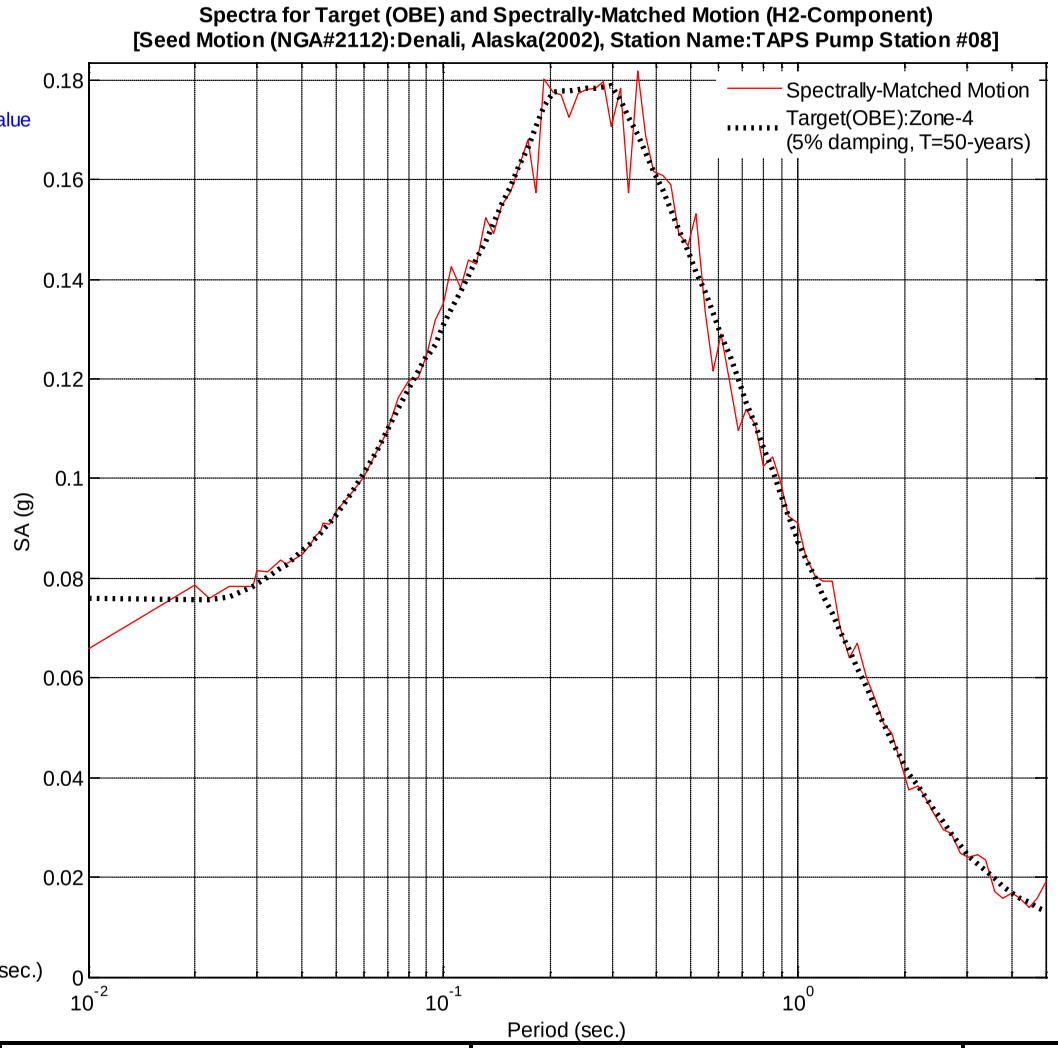
A4-9



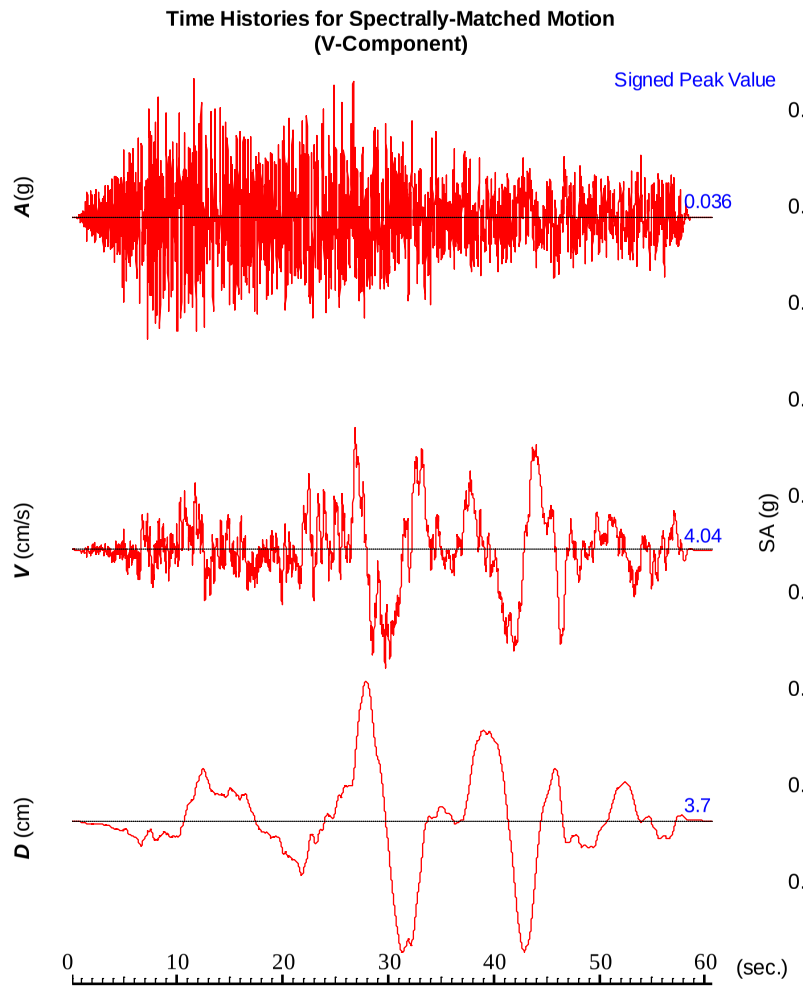


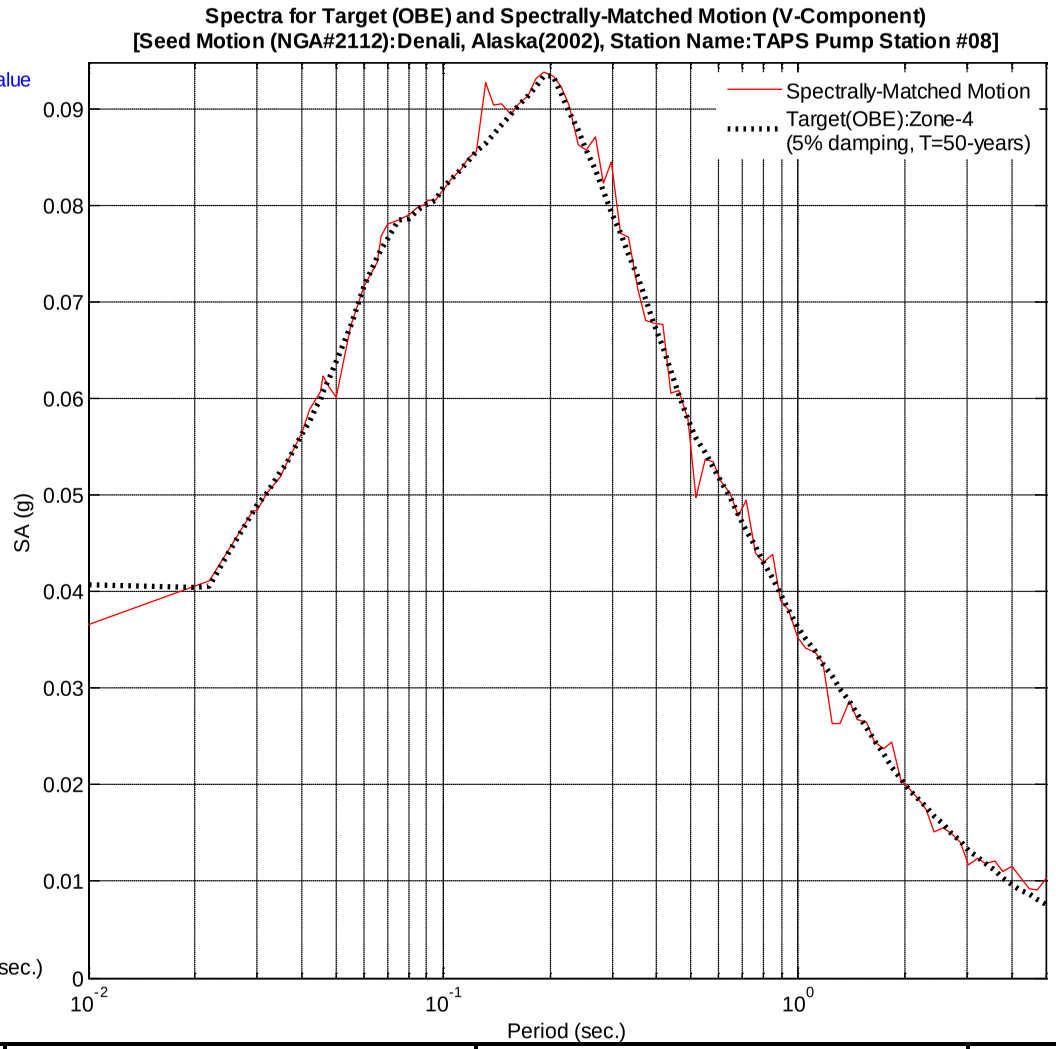
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 4 – SET NO. 4 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A4-10**





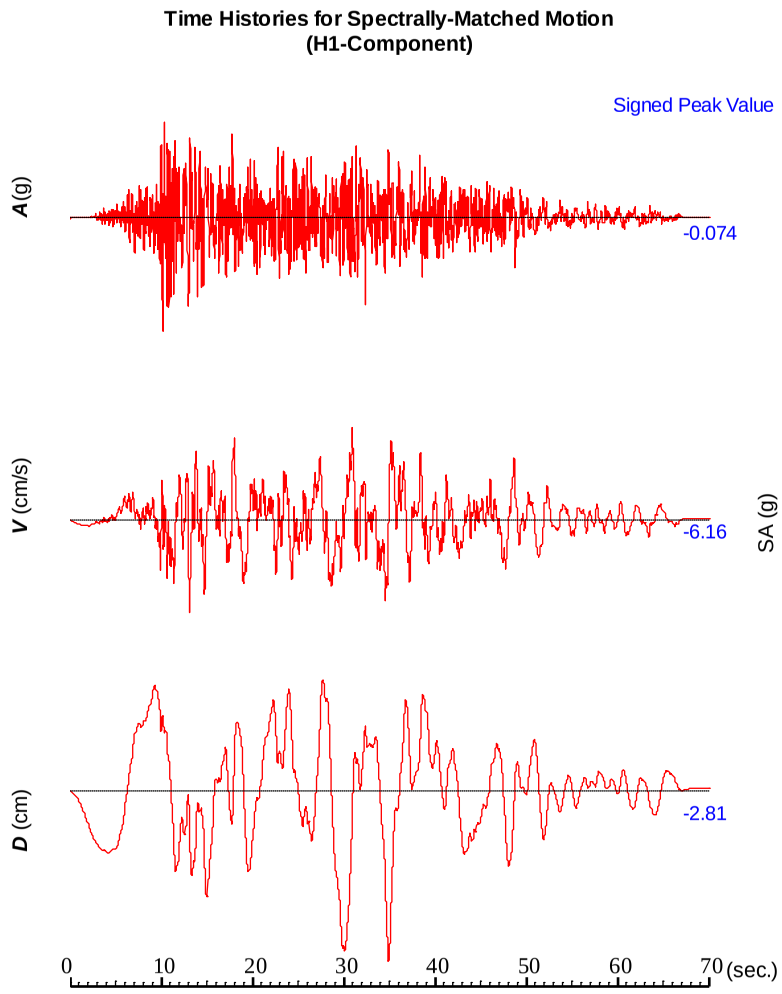
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 4 – SET NO. 4 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A4-11**

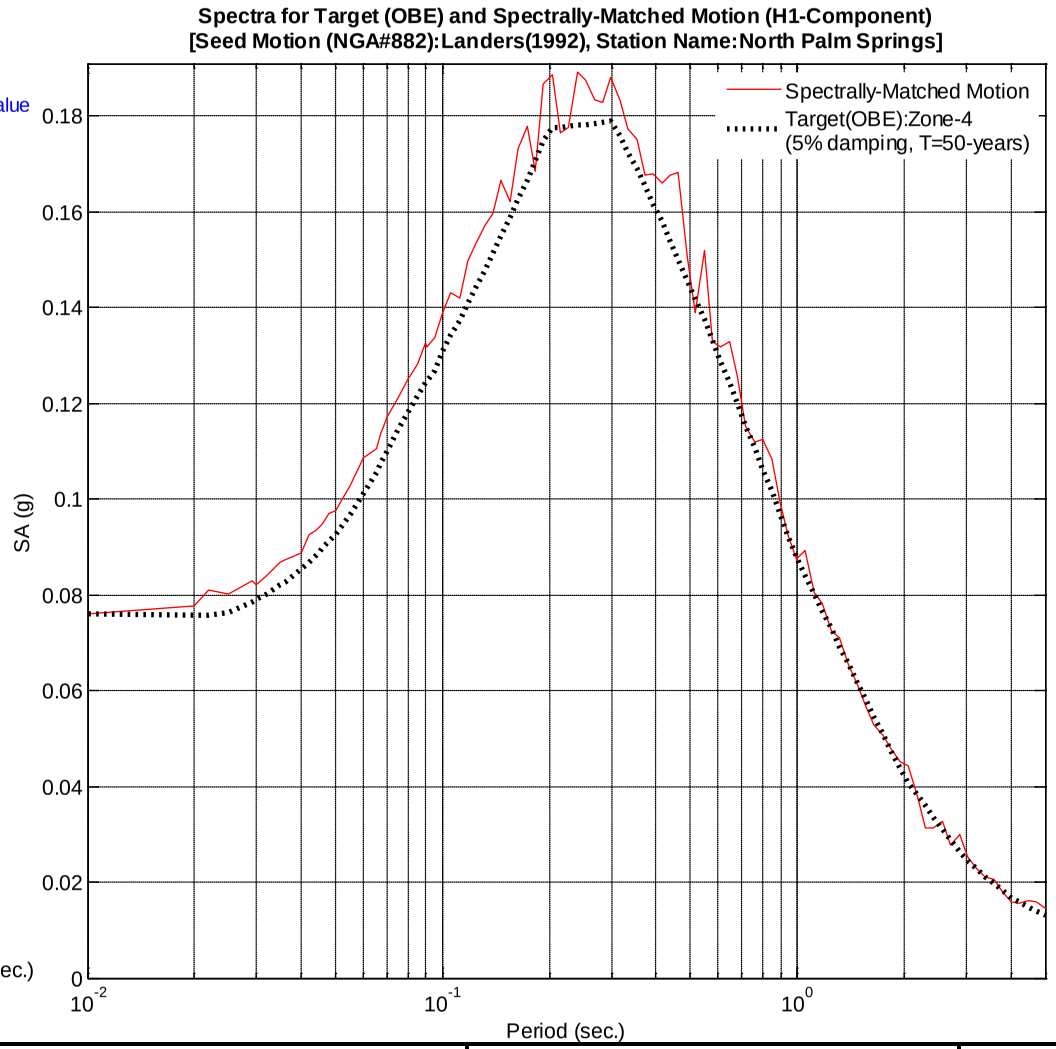




SC SOLUTIONS

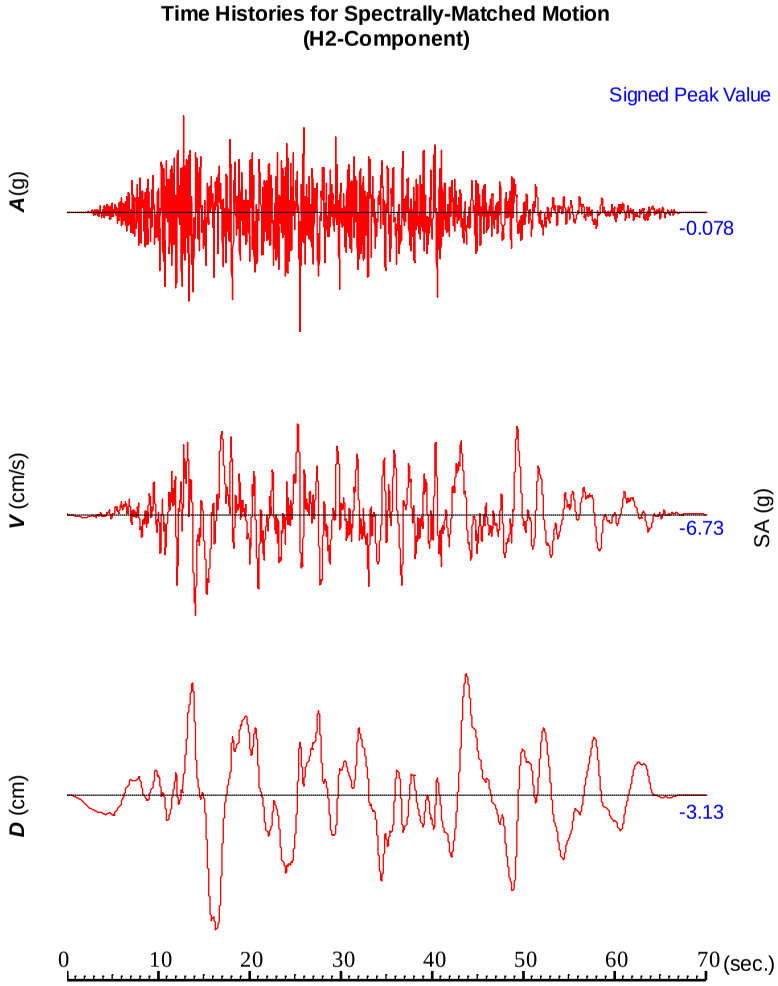
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 4 – SET NO. 4 – VERTICAL**	PLATE **A4-12**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		

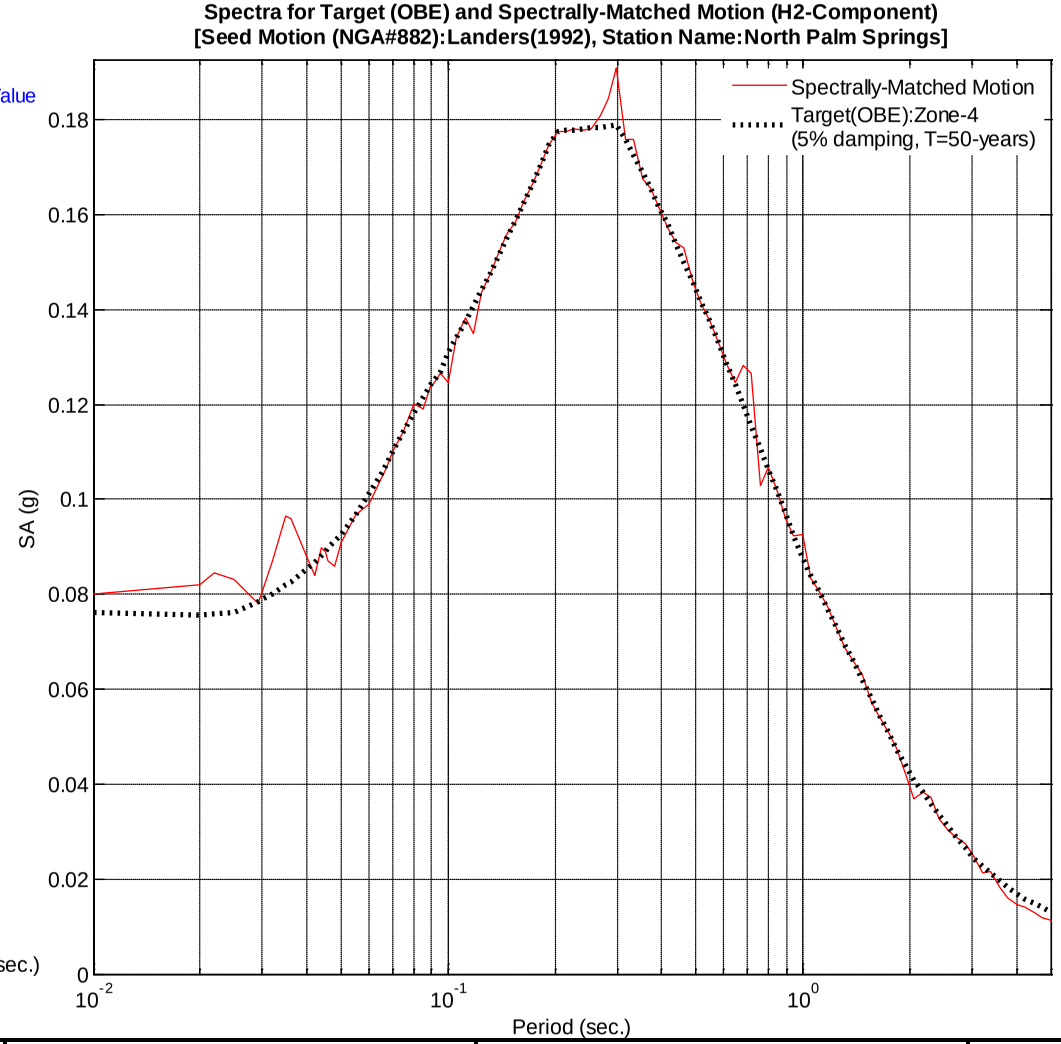




SC SOLUTIONS

PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 4 – SET NO. 5 – HORIZONTAL 1**	PLATE **A4-13**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		





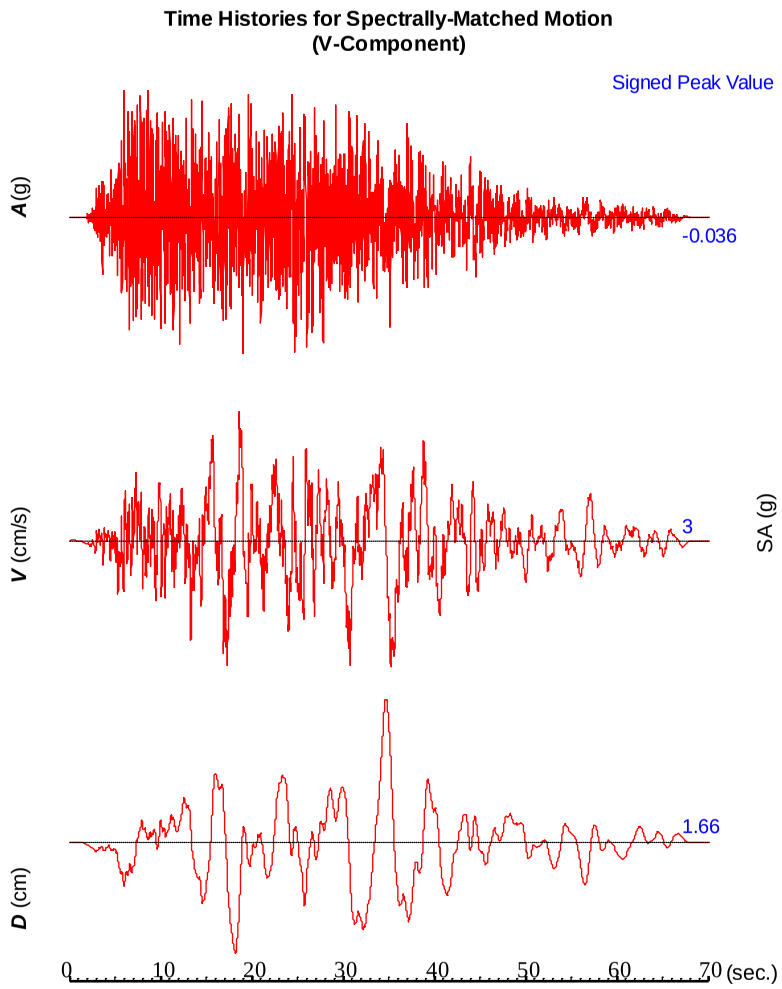
SC SOLUTIONS

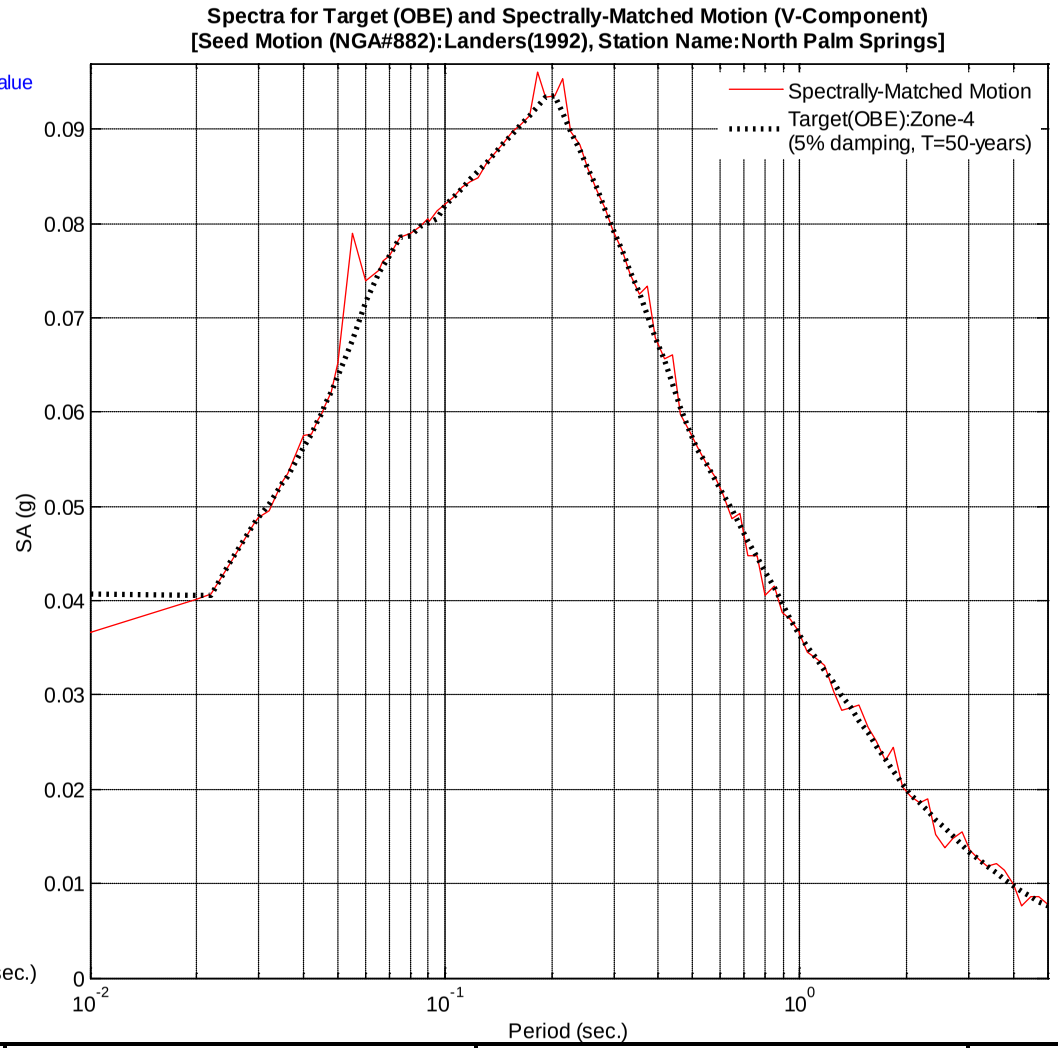
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 4 – SET NO. 5 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE
A4-14





SC SOLUTIONS

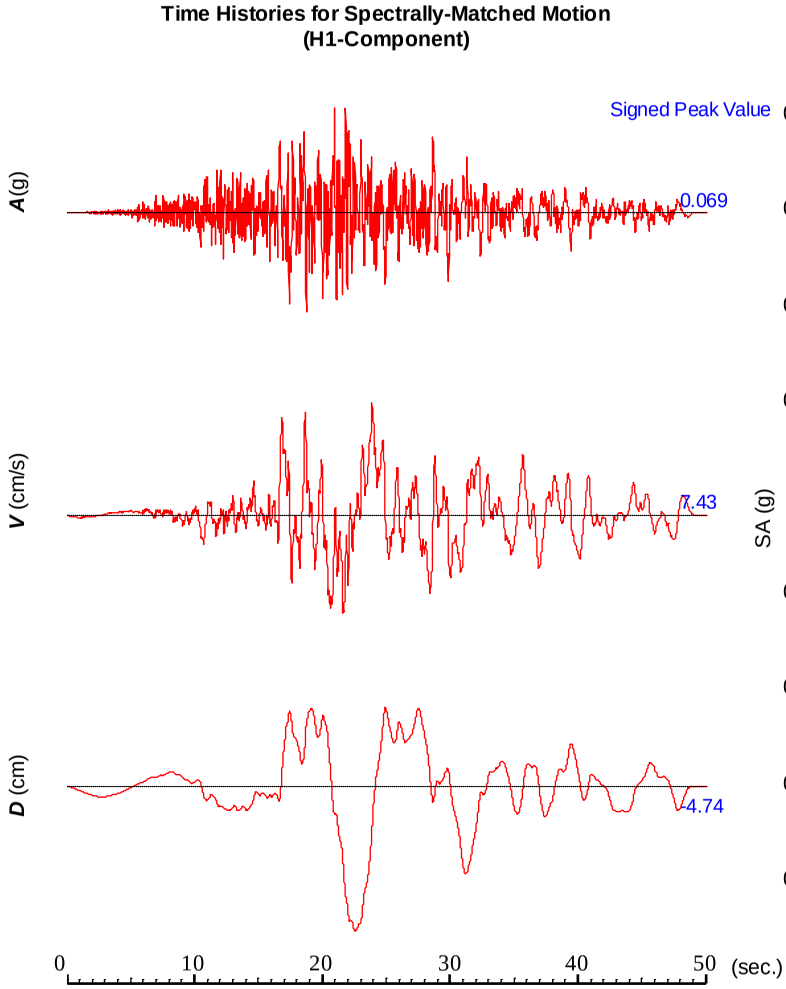
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

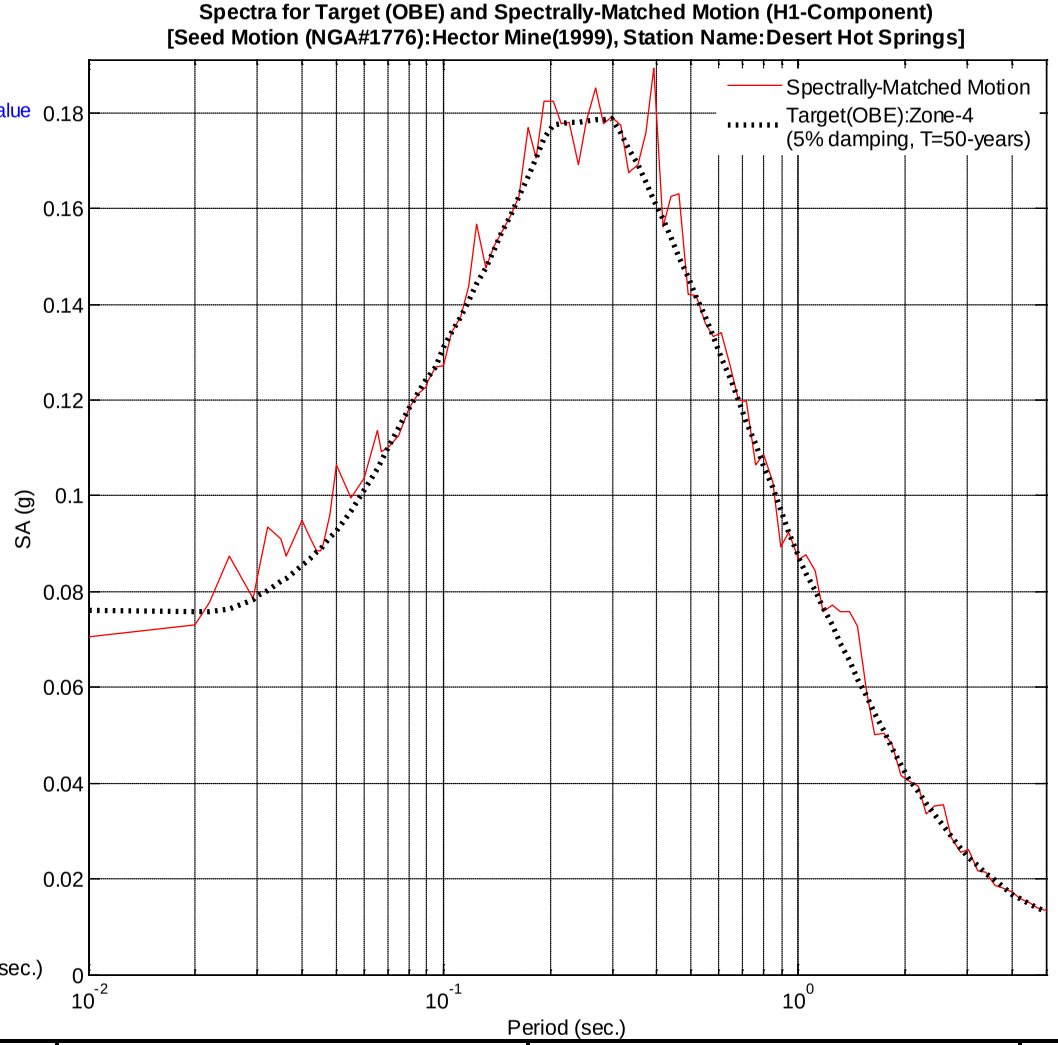
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 4 – SET NO. 5 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

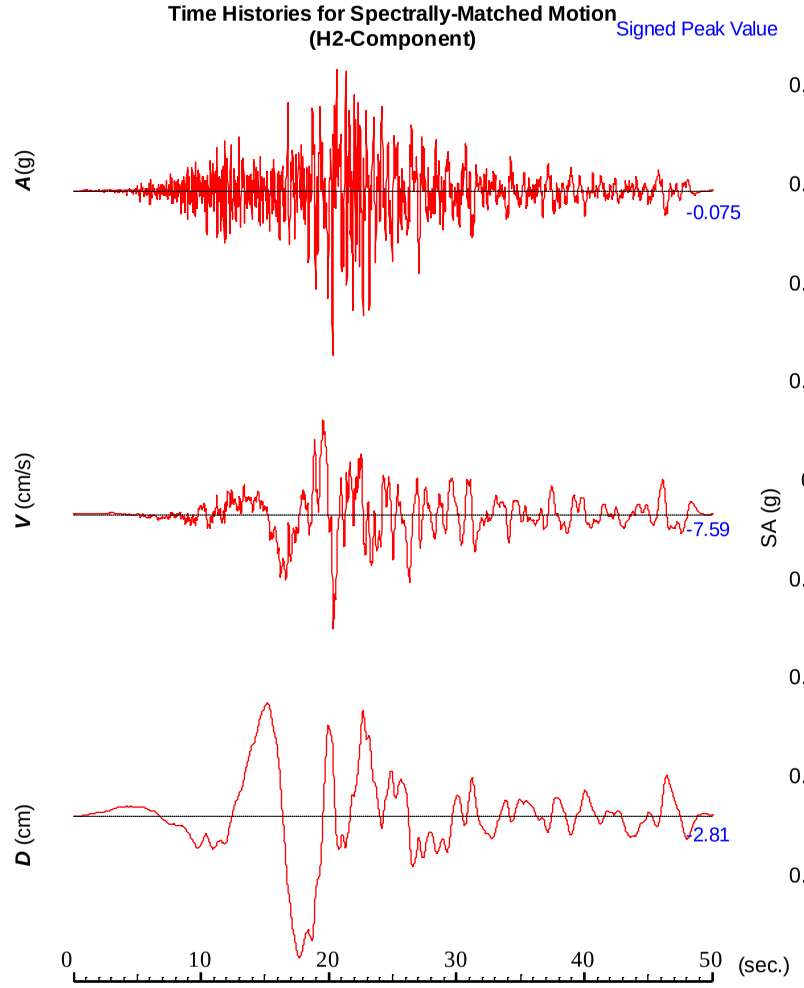
PLATE

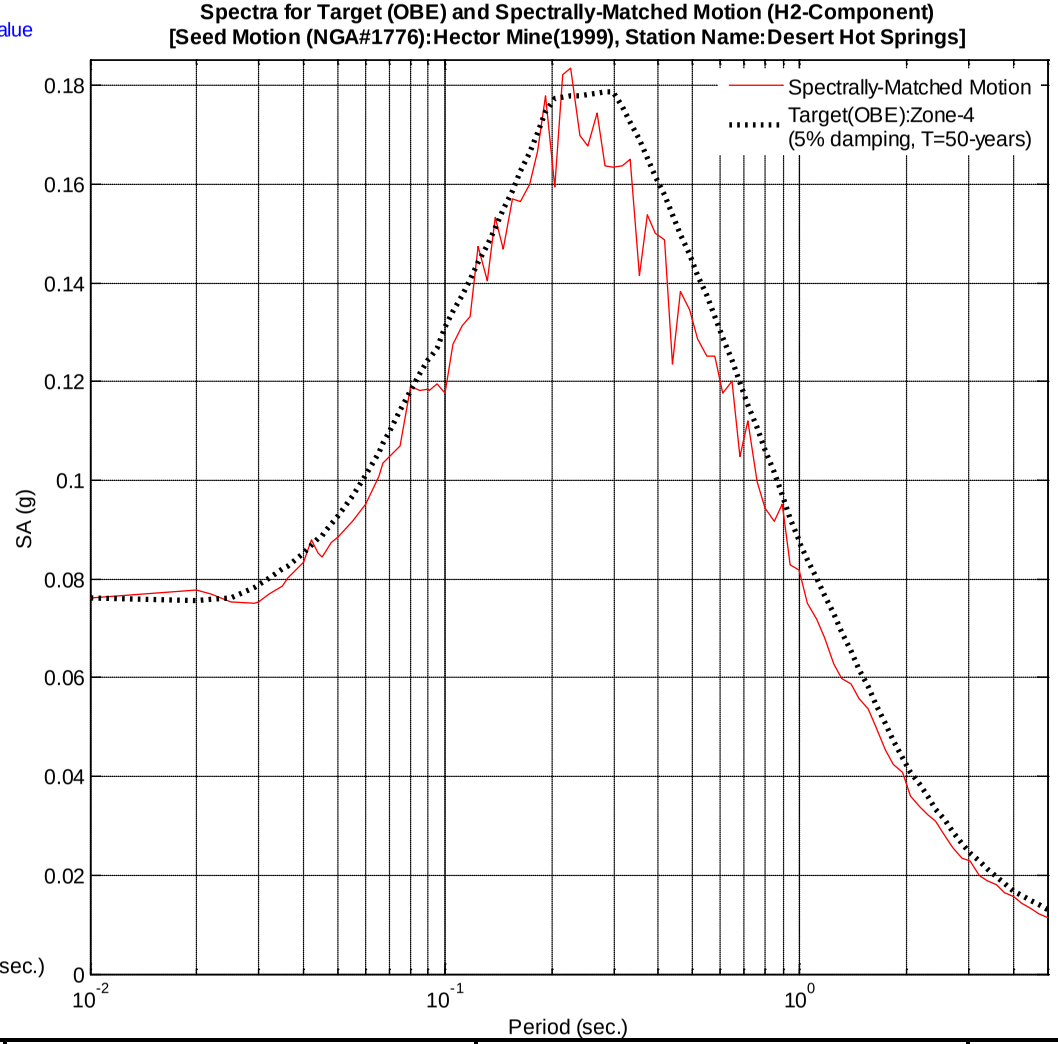
A4-15



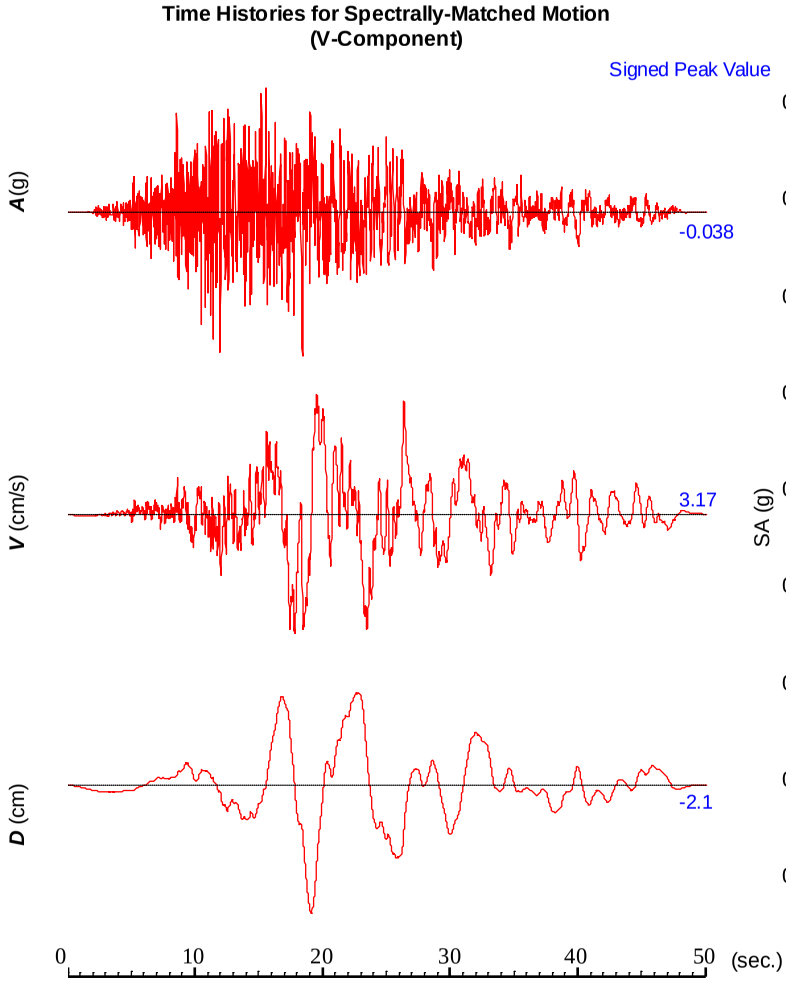


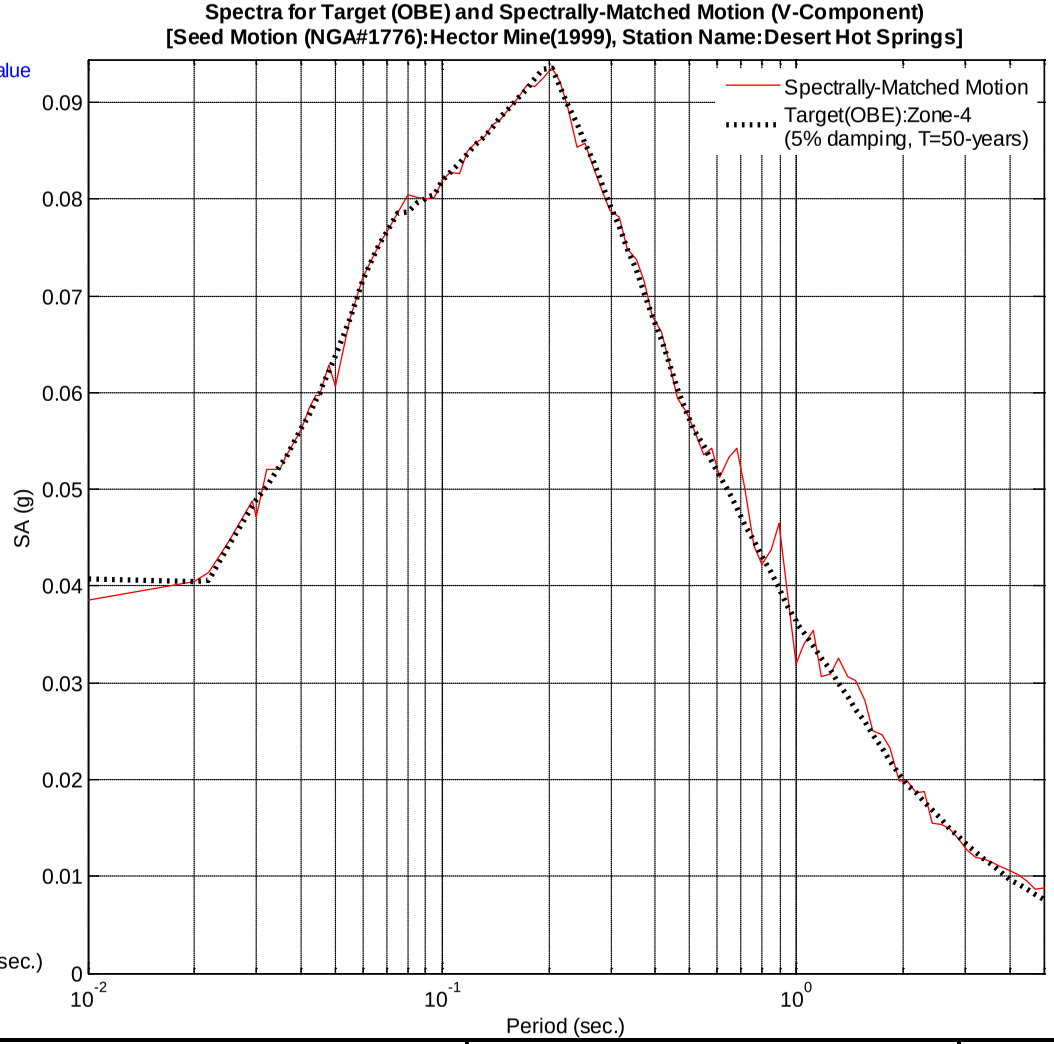
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 4 – SET NO. 6 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A4-16**



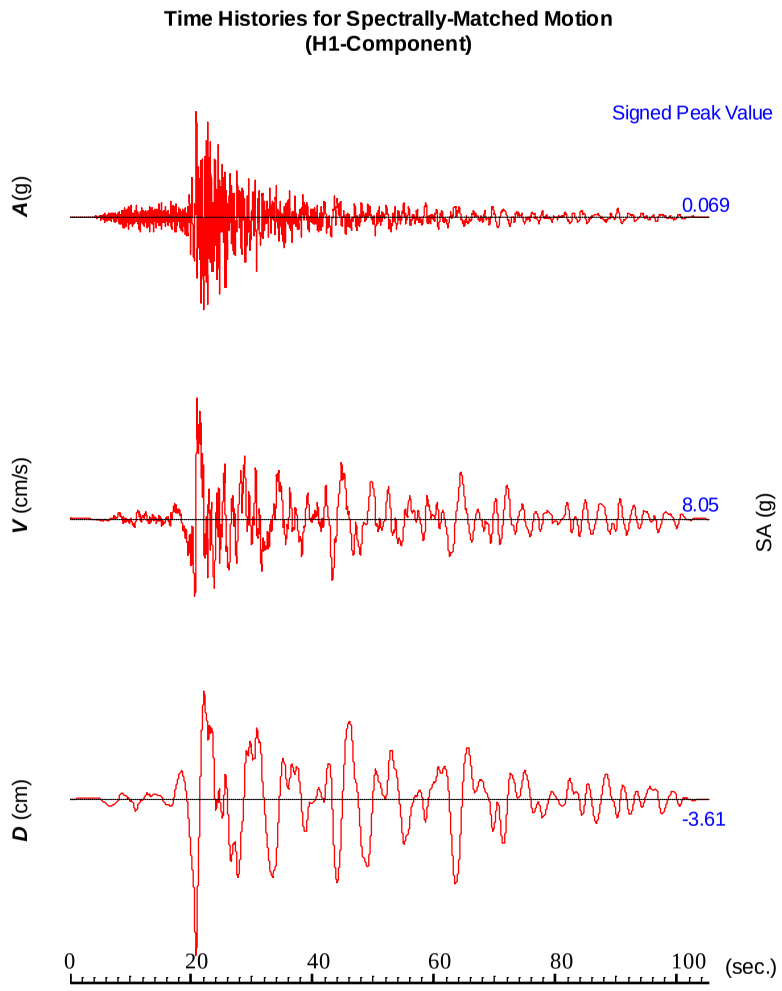


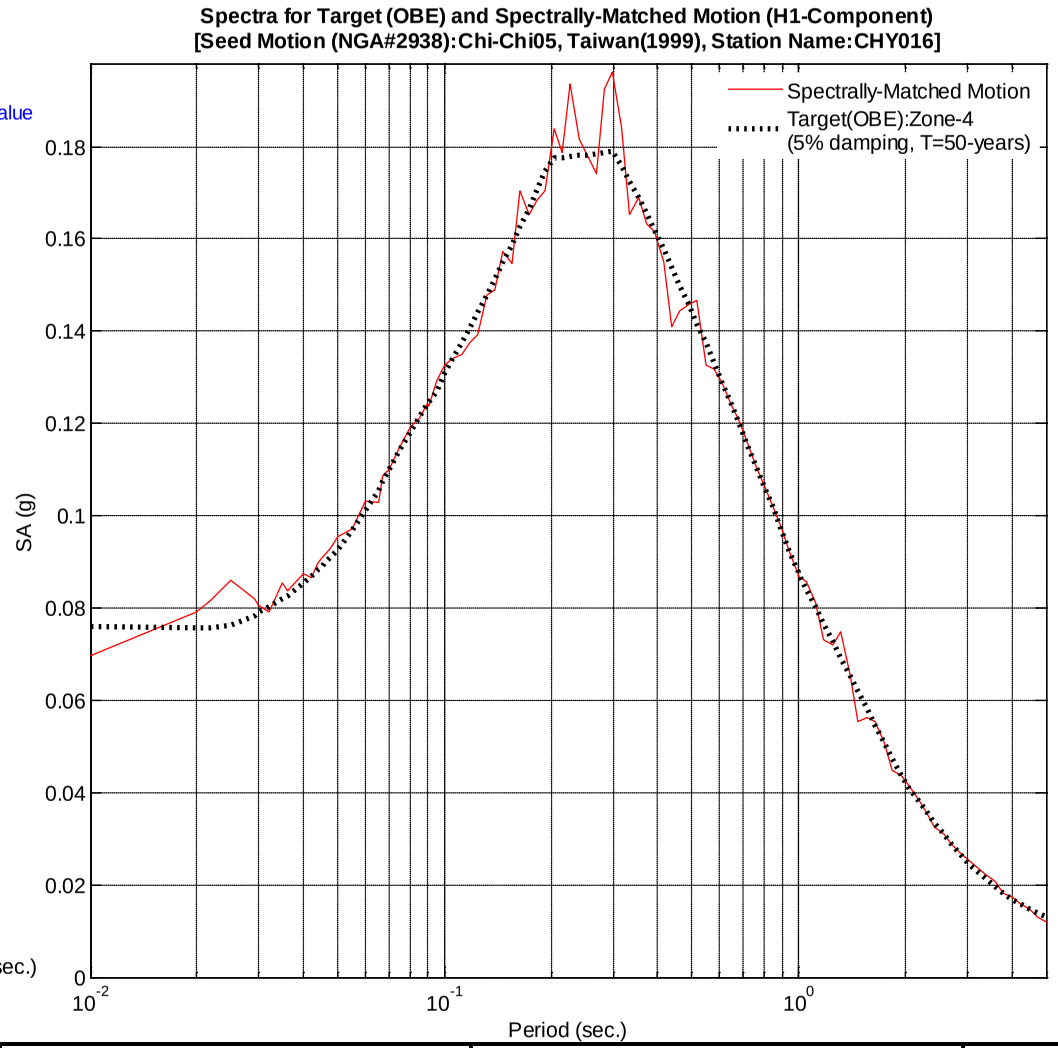
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 4 – SET NO. 6 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A4-17**



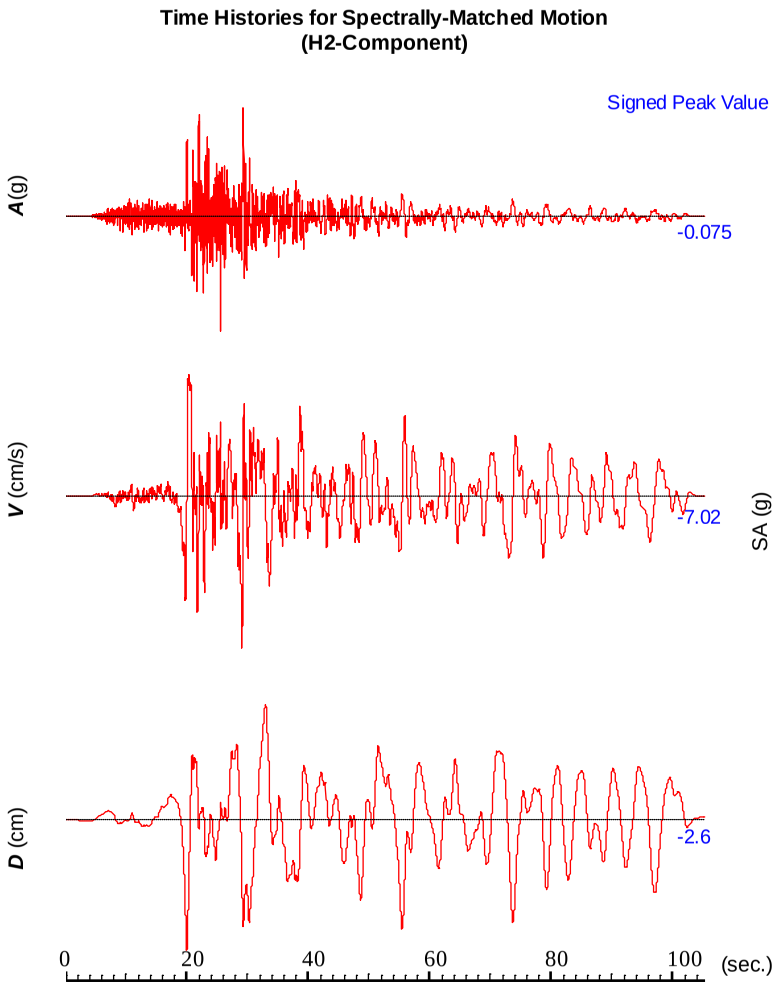


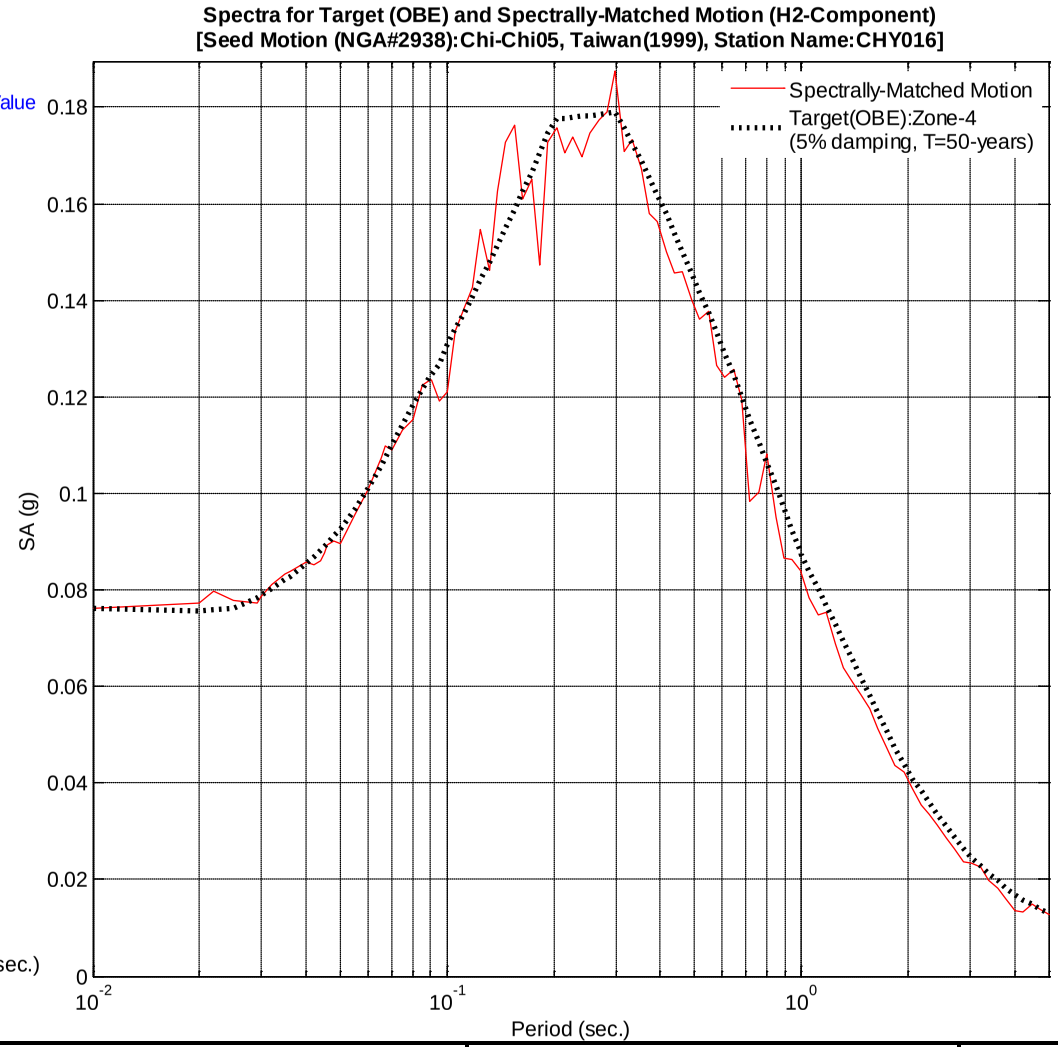
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 4 – SET NO. 6 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A4-18**



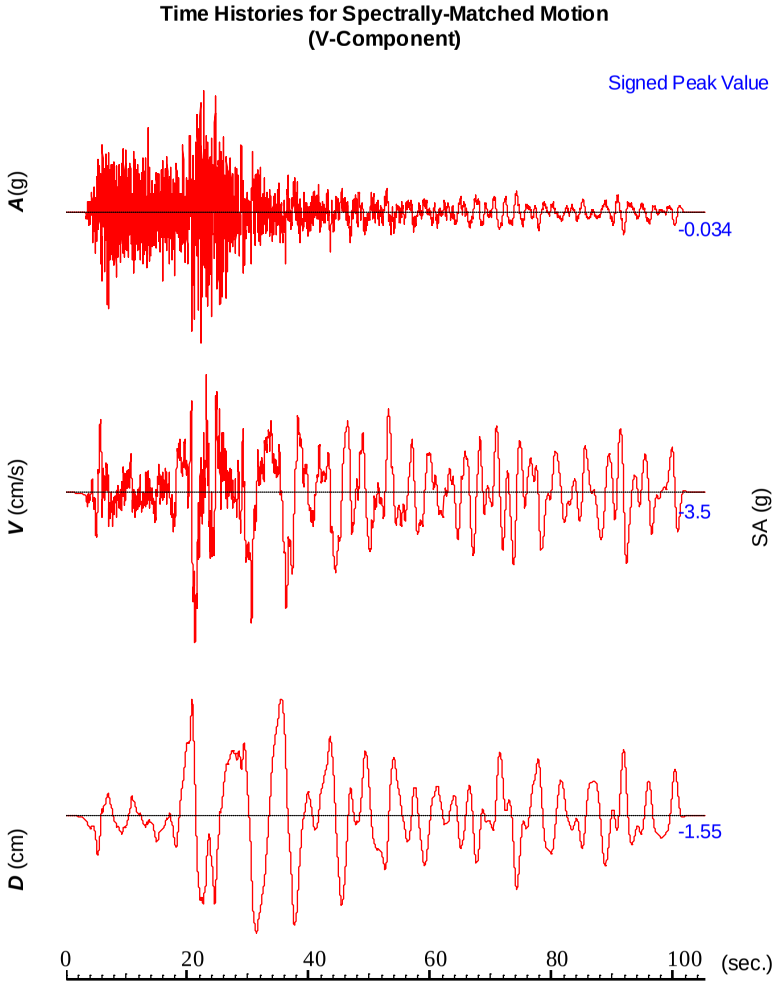


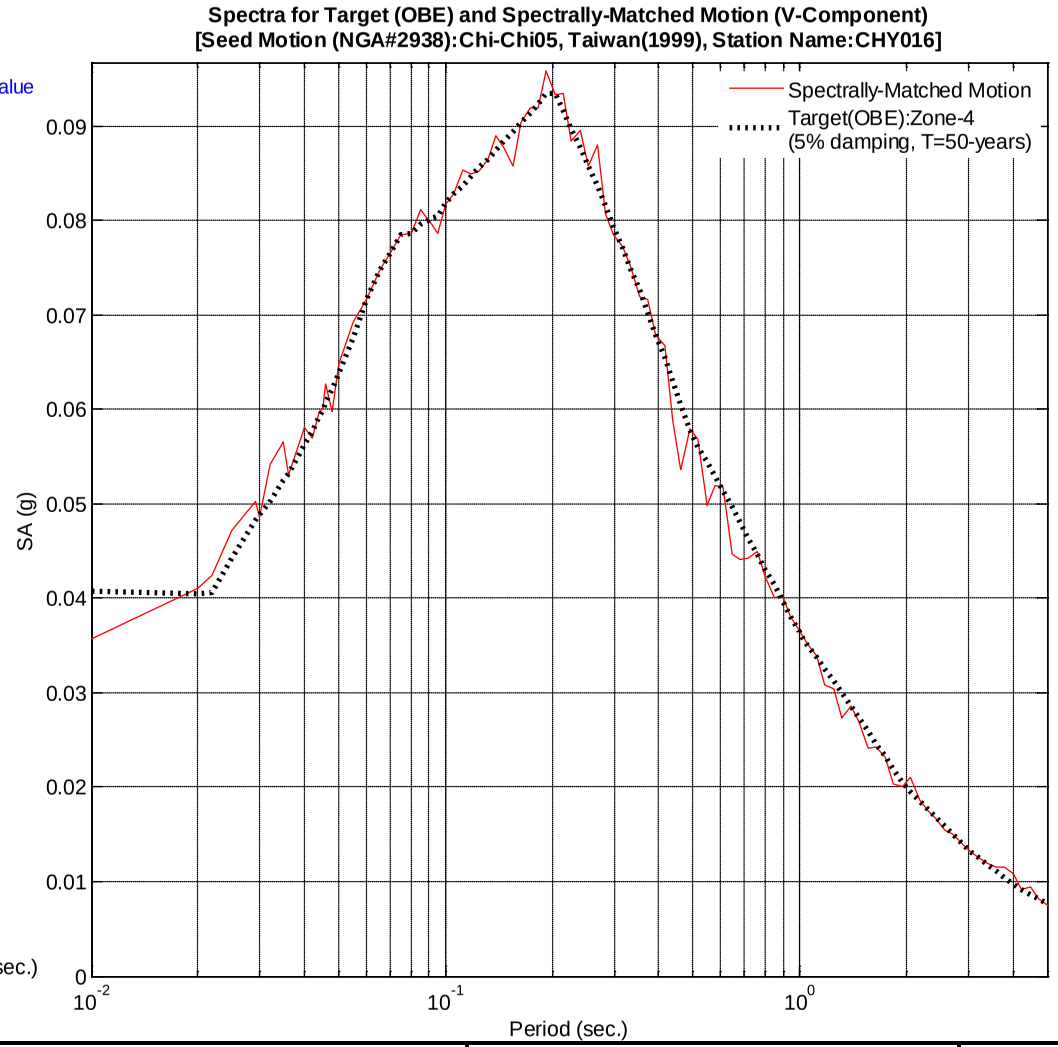
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 4 – SET NO. 7 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A4-19**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 4 – SET NO. 7 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A4-20**





SC SOLUTIONS

PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 4 – SET NO. 7 – VERTICAL**	PLATE **A4-21**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie		
DATE:	02/24/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

Table A.5: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 5**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	832	Landers	1992	North Palm Springs	7.28	26.84	0.084	10.016	6.828	0.084	9.681	4.668	0.047	4.040	2.223
2	1637	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.080	7.456	2.750	0.078	7.266	2.880	0.046	3.729	1.390
3	907	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.078	6.493	3.181	0.084	11.379	2.248	0.044	4.391	1.548
4	2112	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.077	9.059	7.132	0.072	9.016	7.968	0.042	4.519	4.292
5	882	Imperial Valley-06	1979	Delta	6.53	22.03	0.083	6.874	3.144	0.093	7.319	3.687	0.043	3.515	2.078
6	1776	Manjil, Iran	1990	Rudsar	7.37	64.47	0.079	8.286	5.292	0.084	8.458	3.137	0.047	3.773	2.329
7	2938	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.077	8.984	4.003	0.084	7.827	2.902	0.039	4.193	1.929

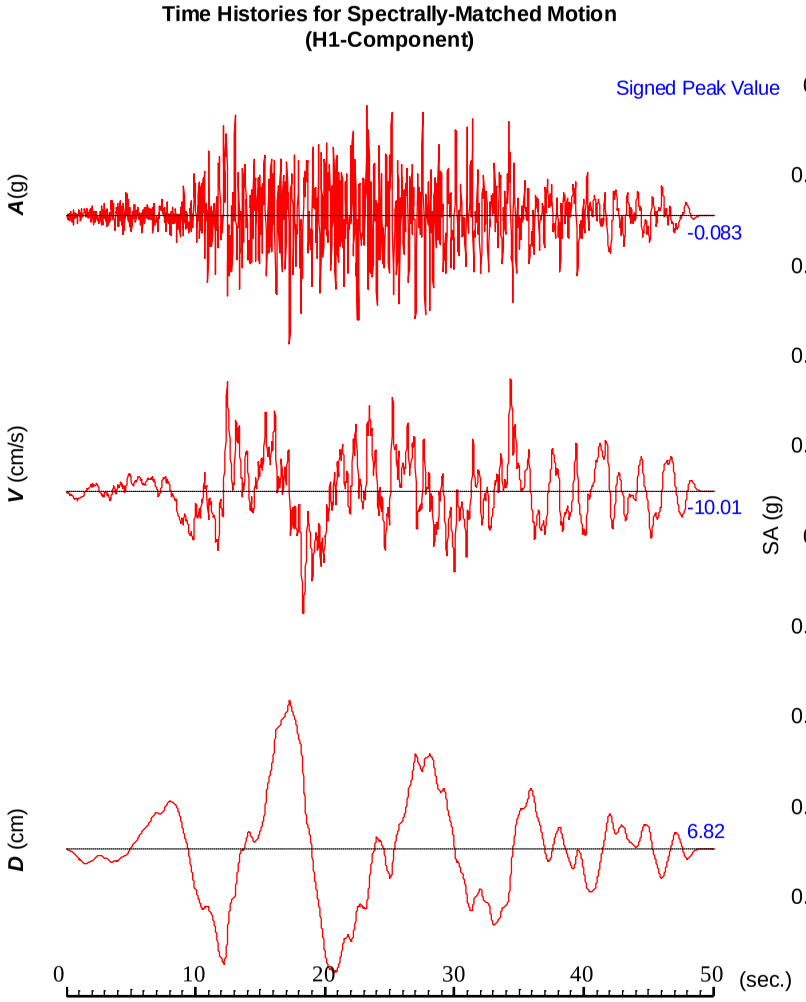
SC SOLUTIONS

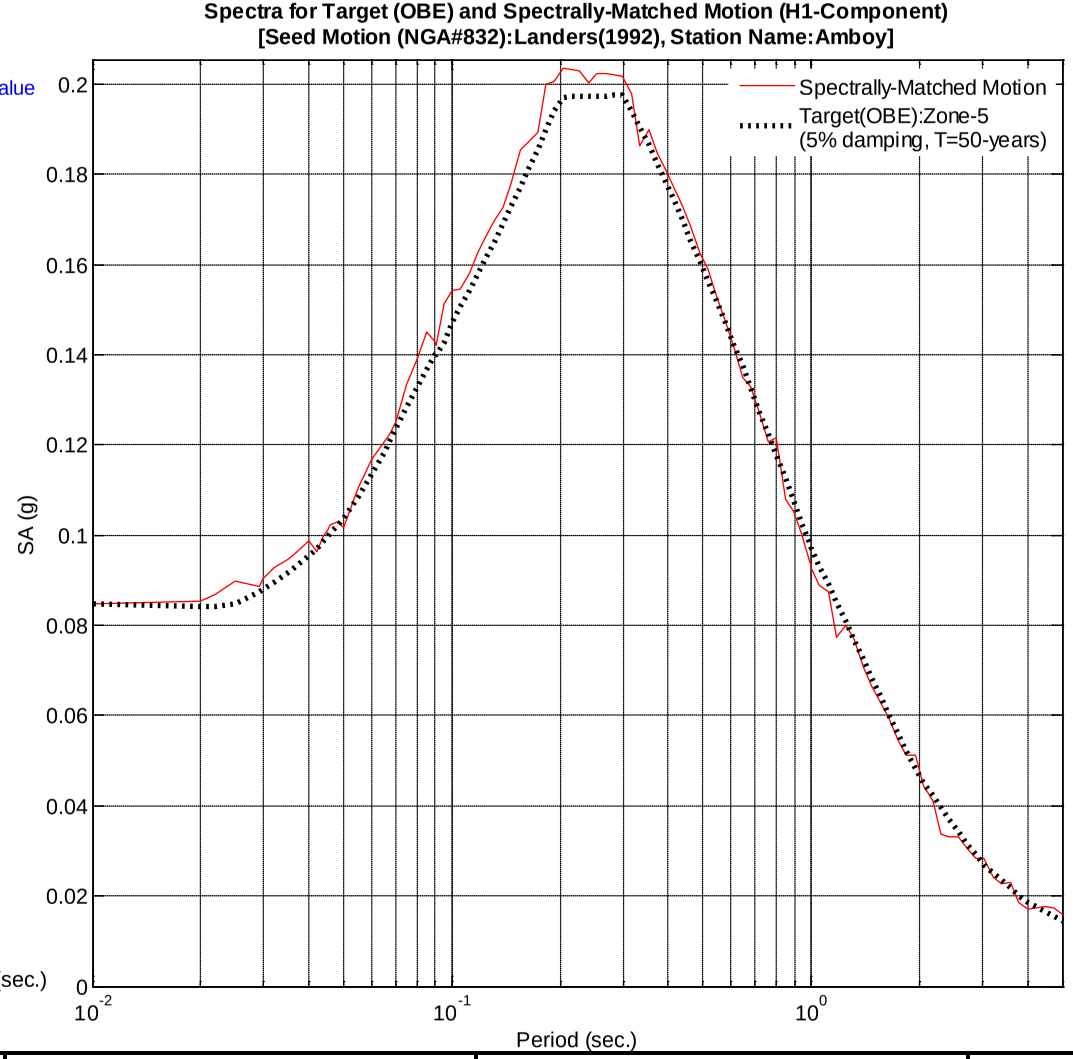
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS OBE – ZONE 5

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE
A5-0





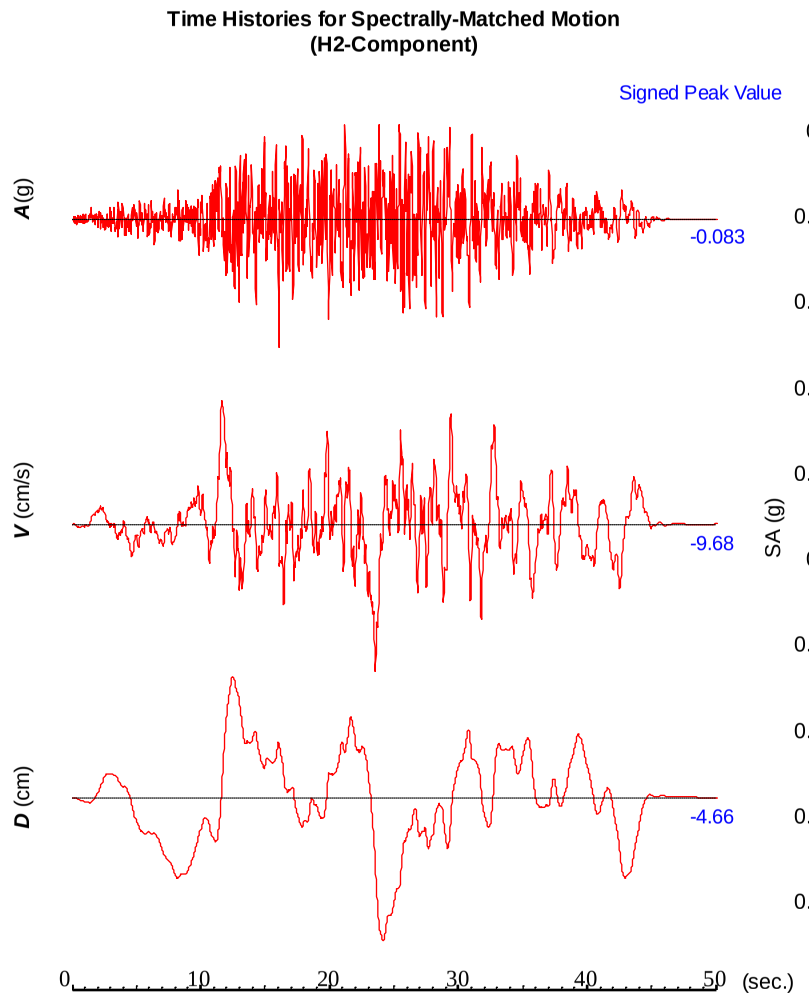
SC SOLUTIONS

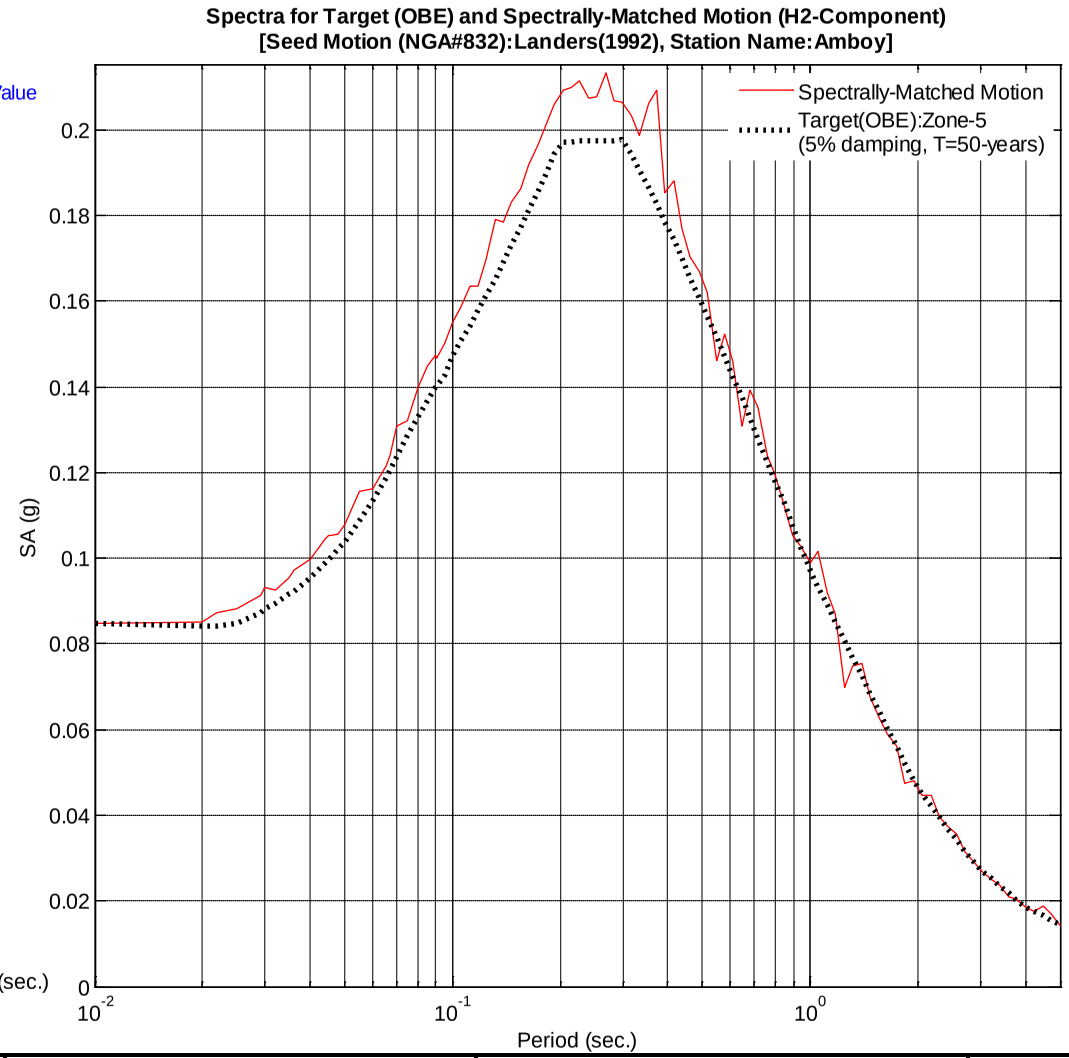
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 5 – SET NO. 1 – HORIZONTAL 1

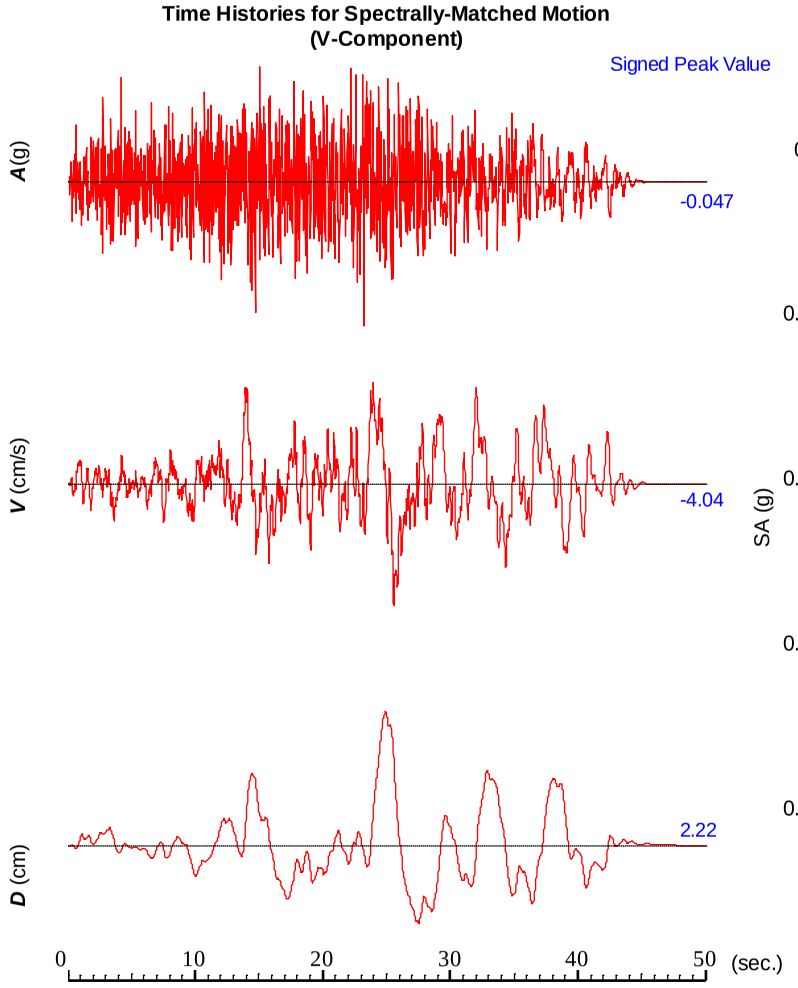
CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

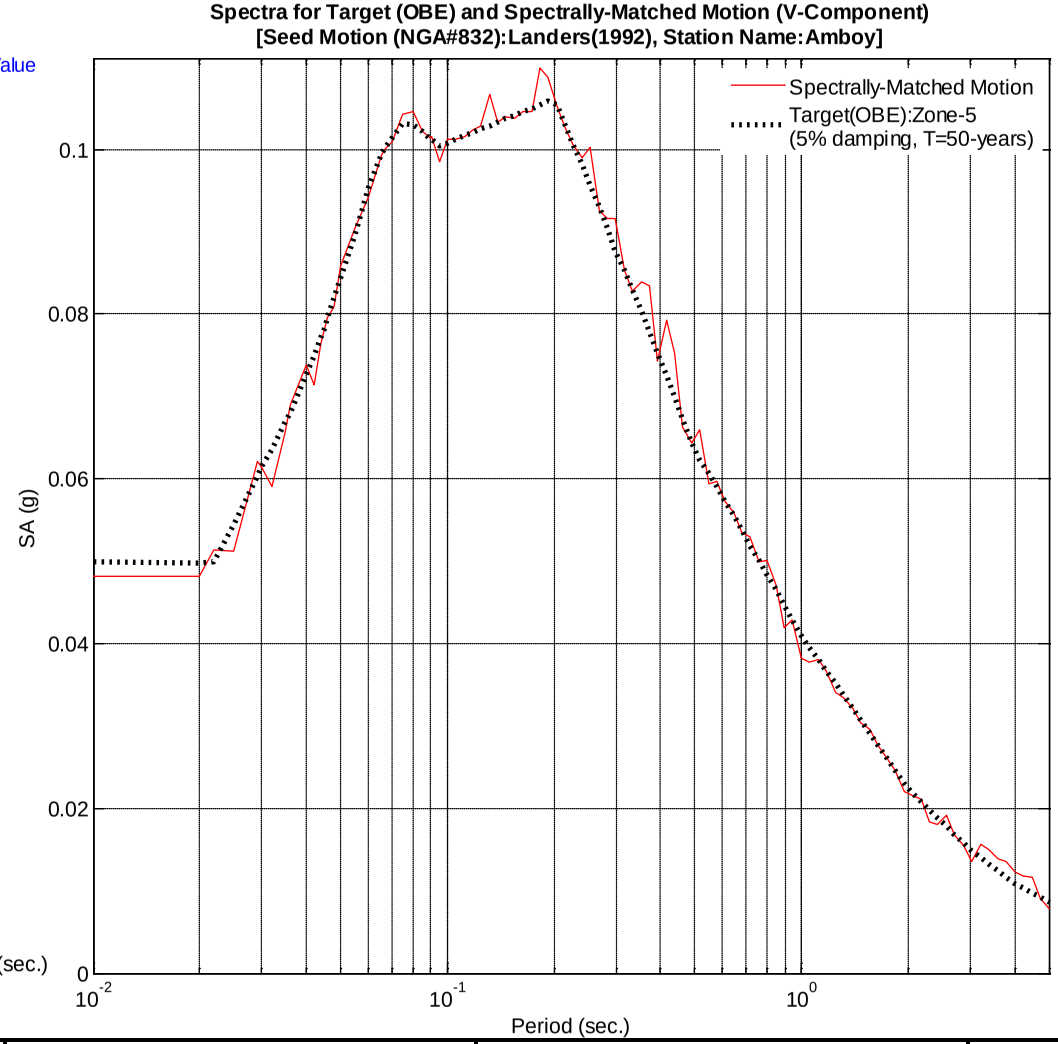
PLATE
A5-1





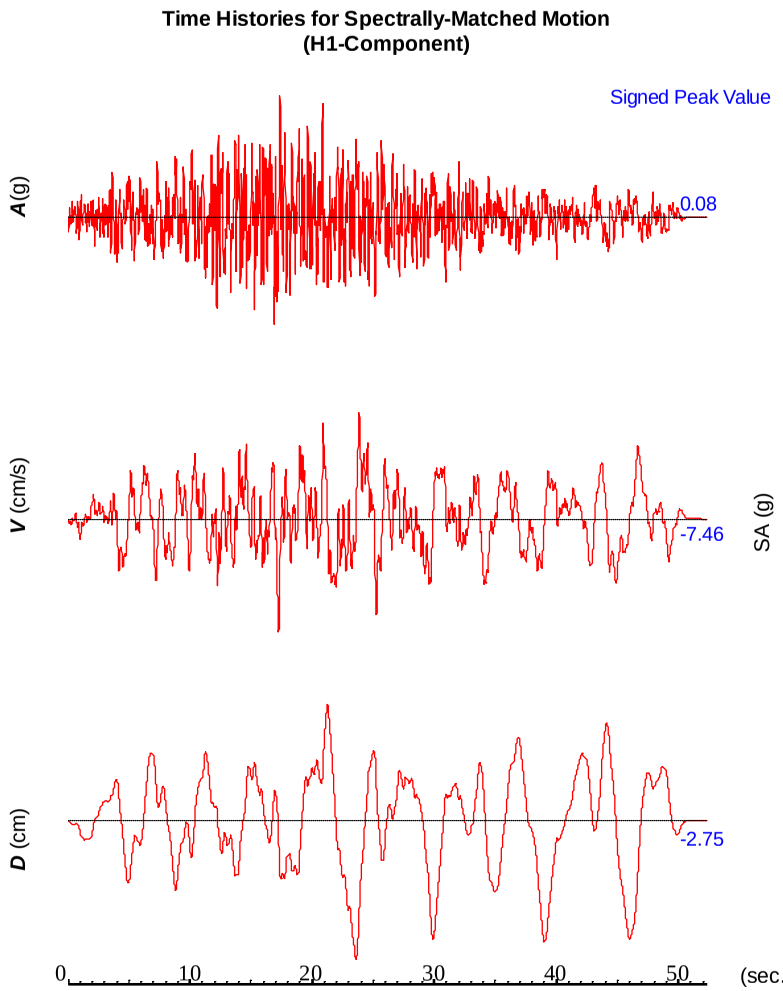
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 5 – SET NO. 1 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A5-2**

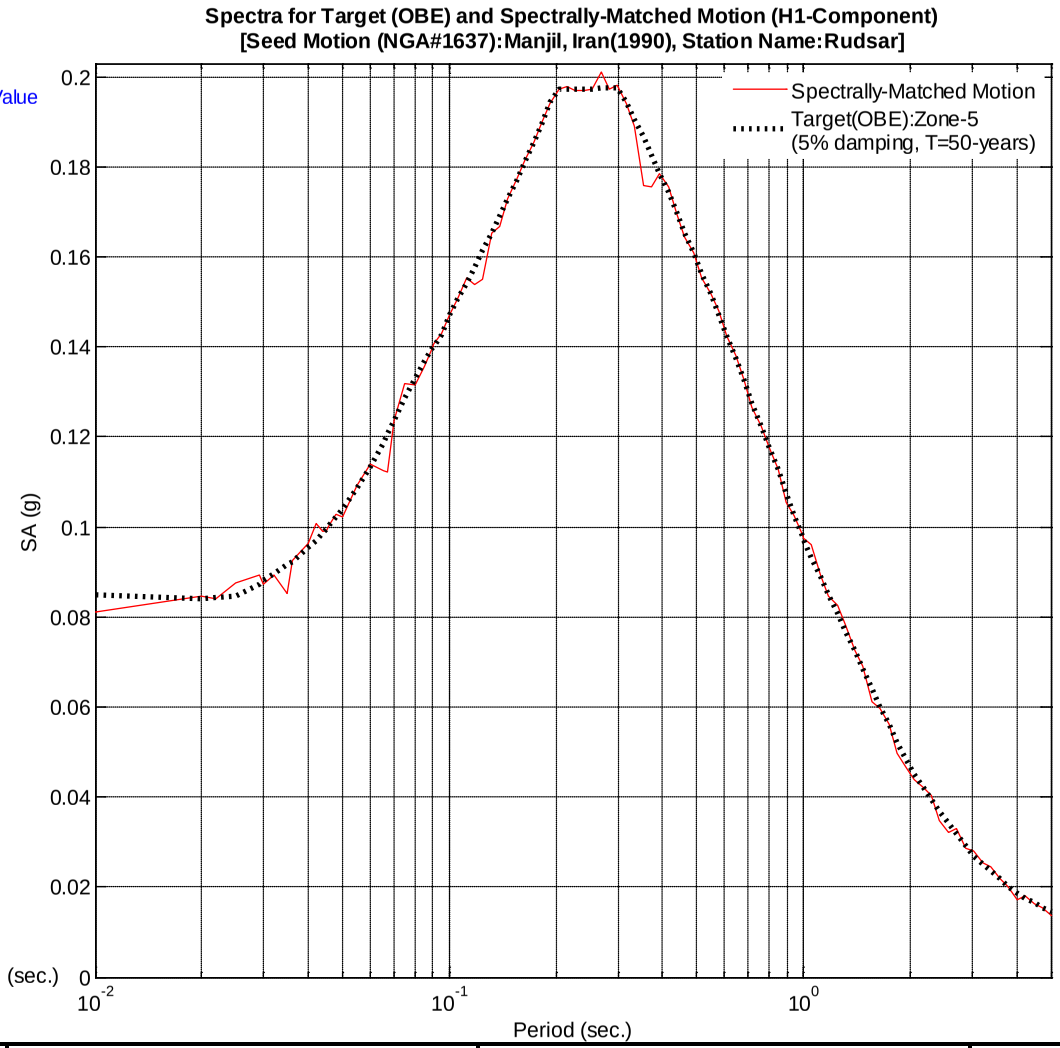




SC SOLUTIONS

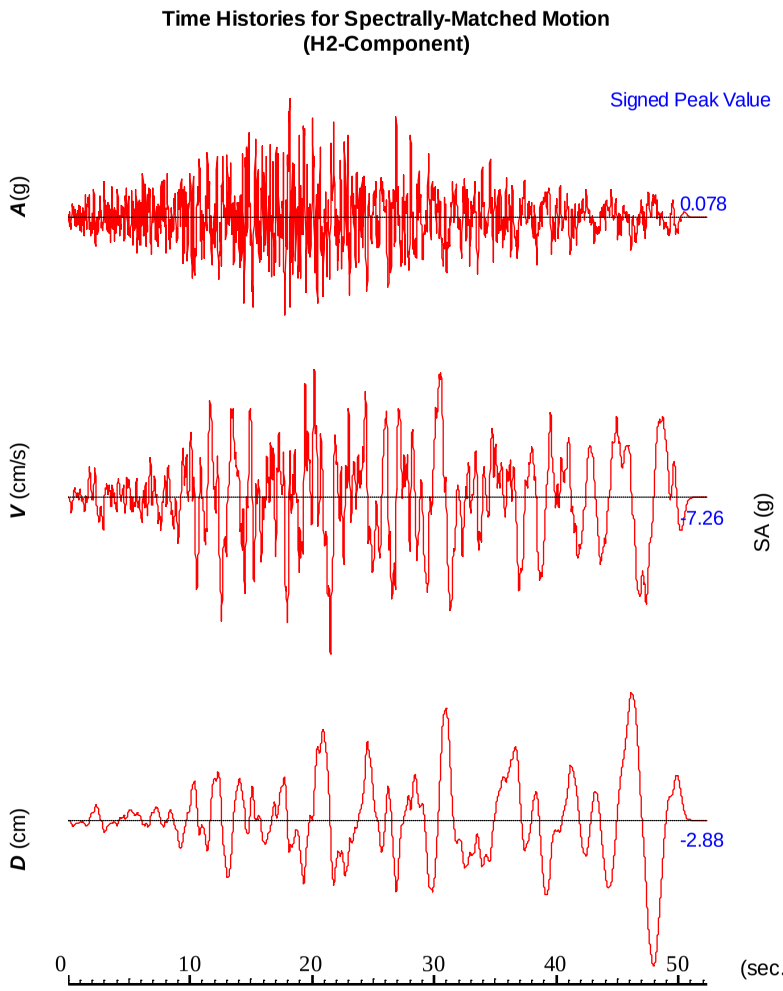
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 5 – SET NO. 1 – VERTICAL**	PLATE
BY:	J. Zhong		**A5-3**
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		

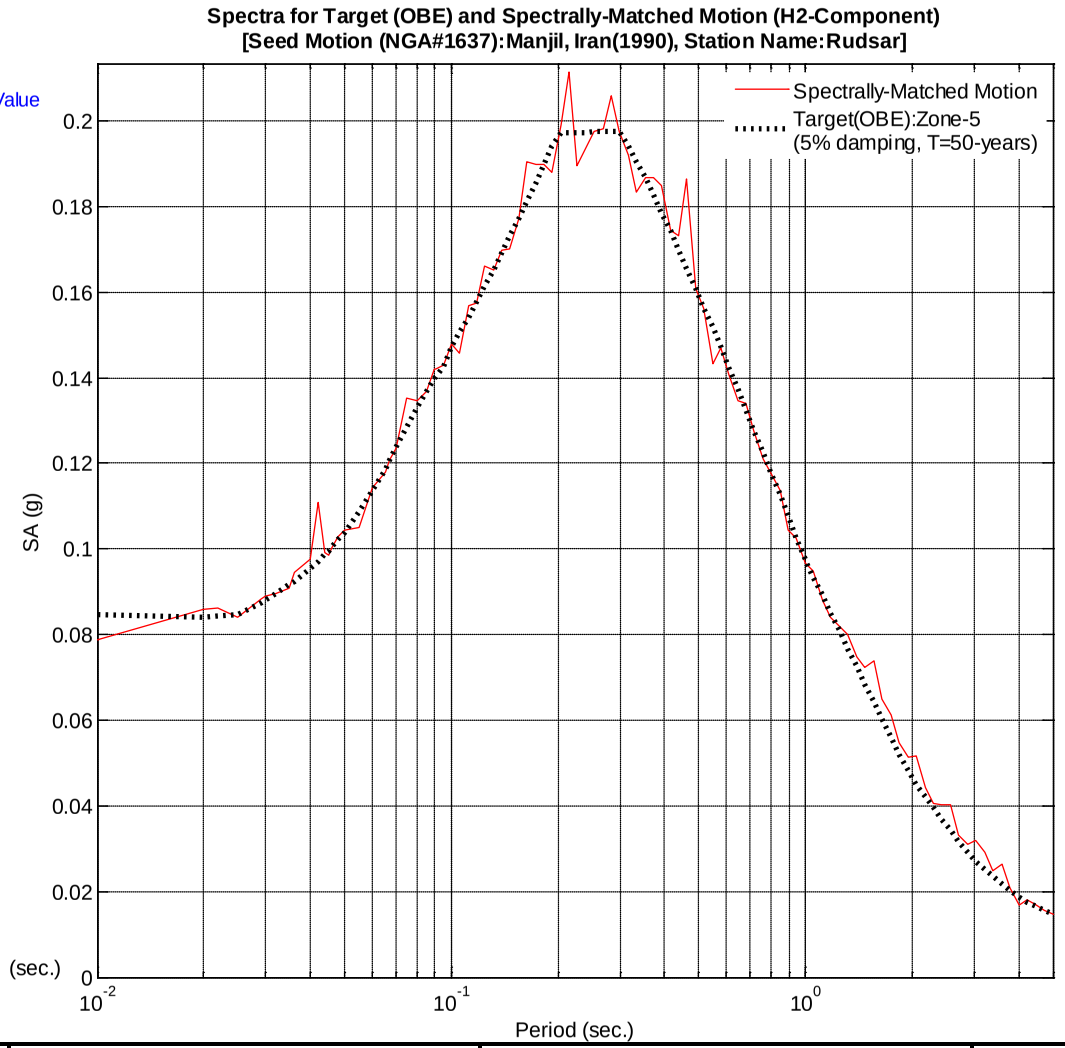




SC SOLUTIONS

PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 5 – SET NO. 2 – HORIZONTAL 1**	PLATE
BY:	J. Zhong		**A5-4**
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS

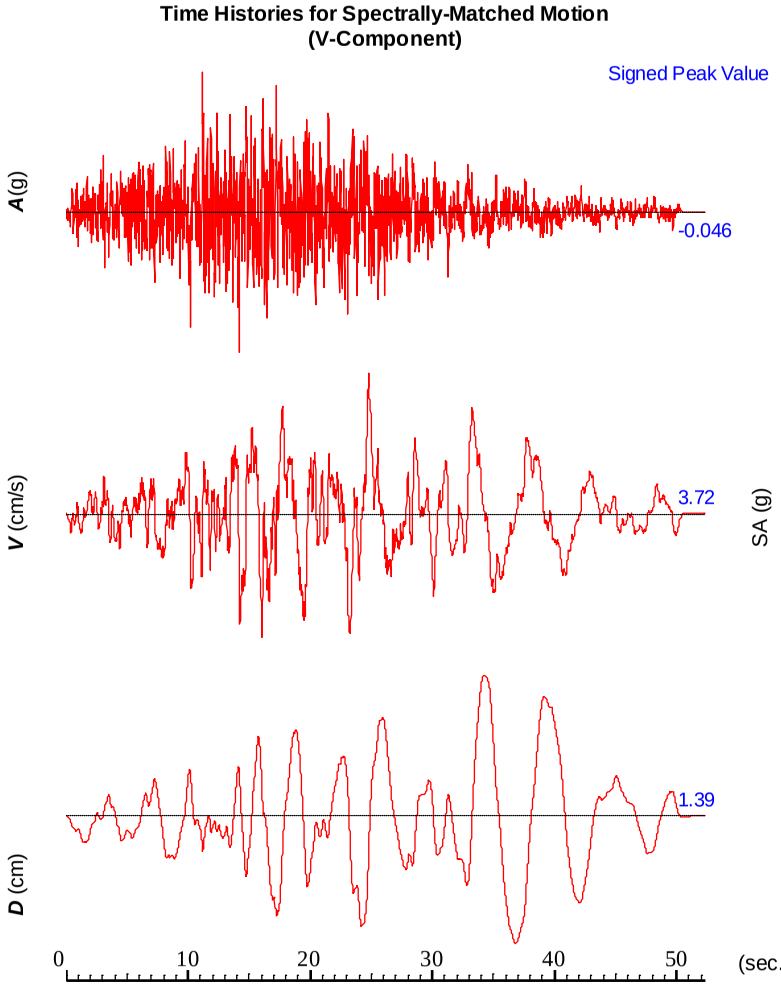
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

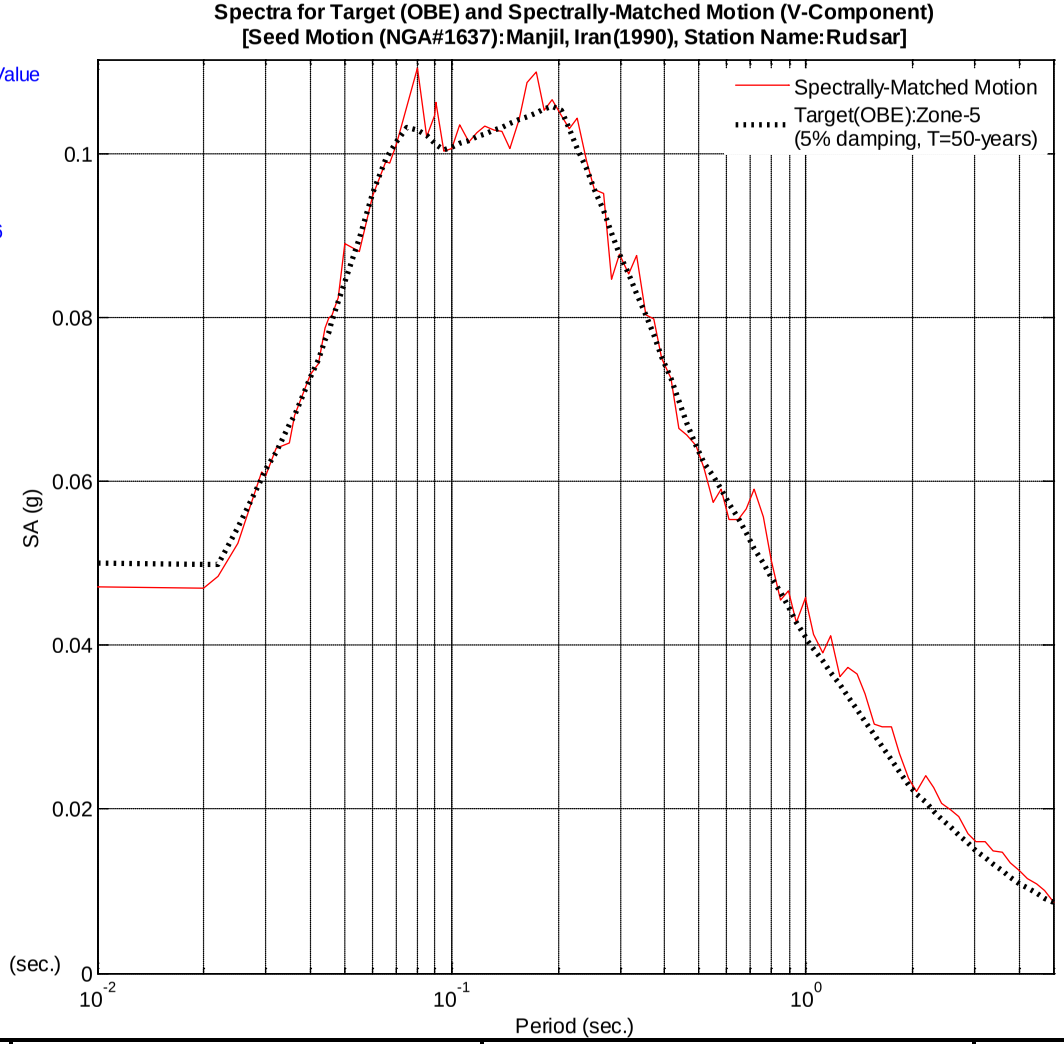
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 5 – SET NO. 2 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

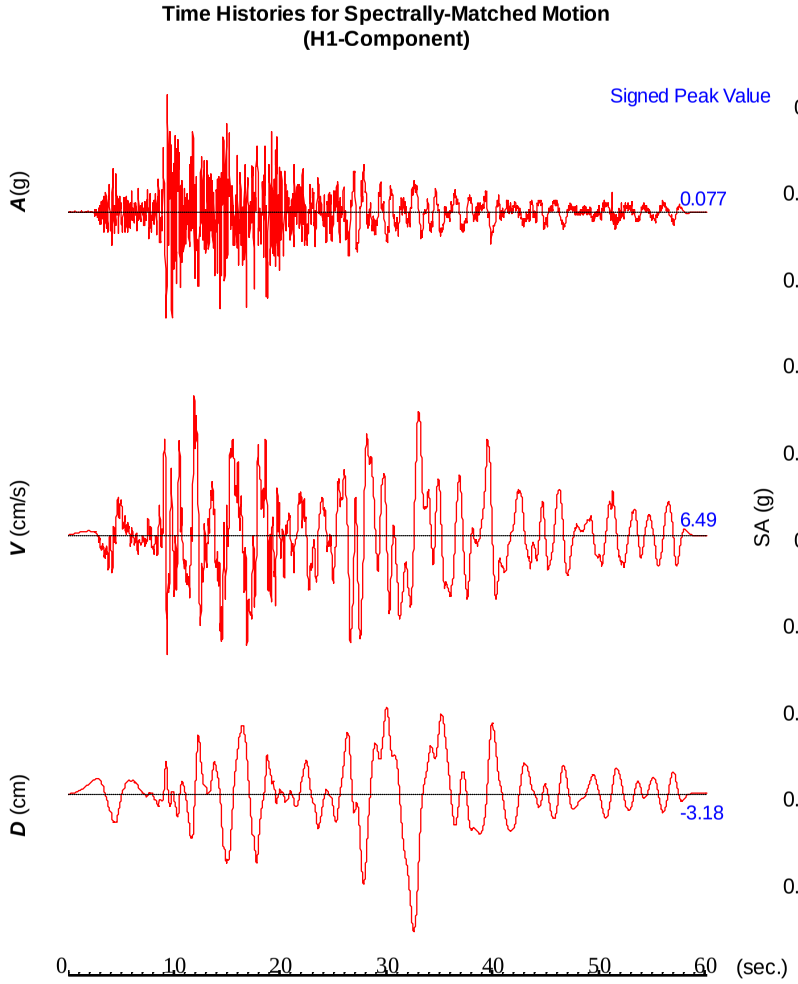
A5-5

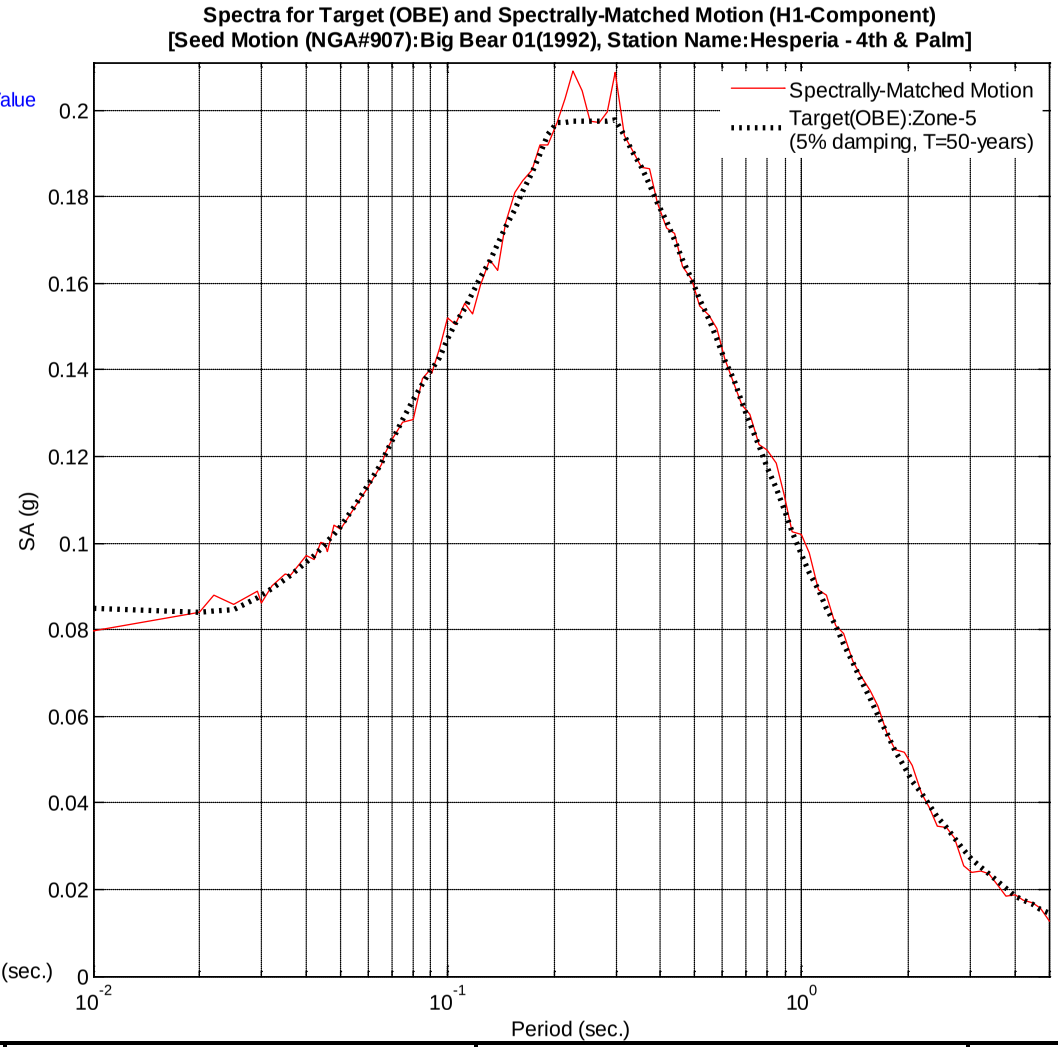




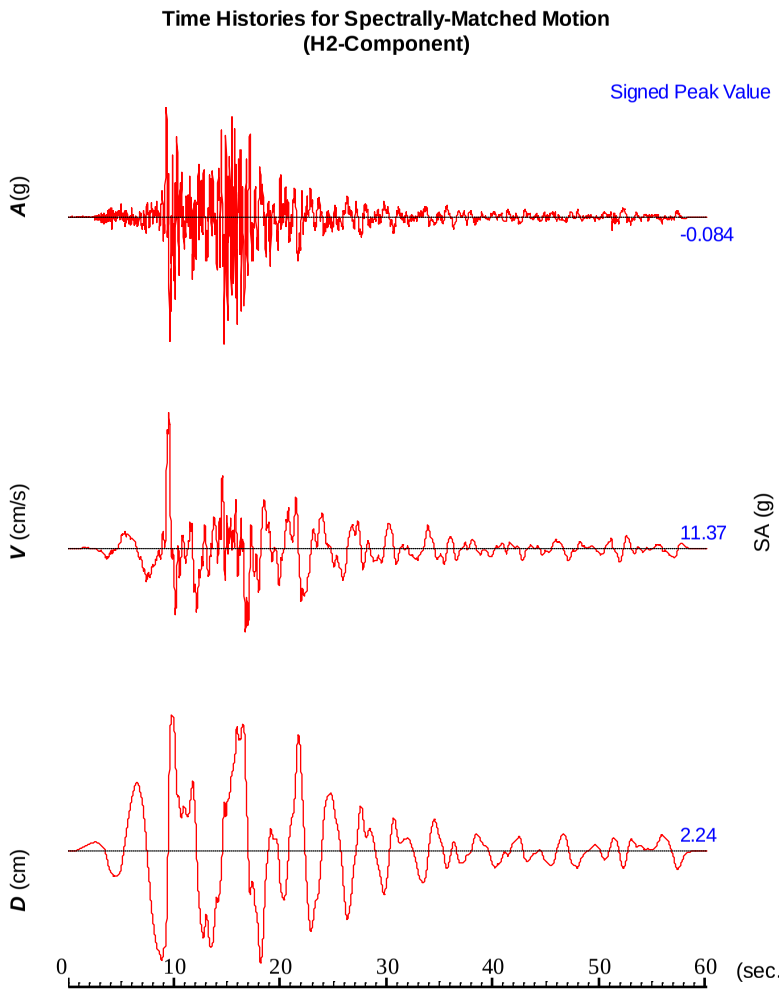
SC SOLUTIONS

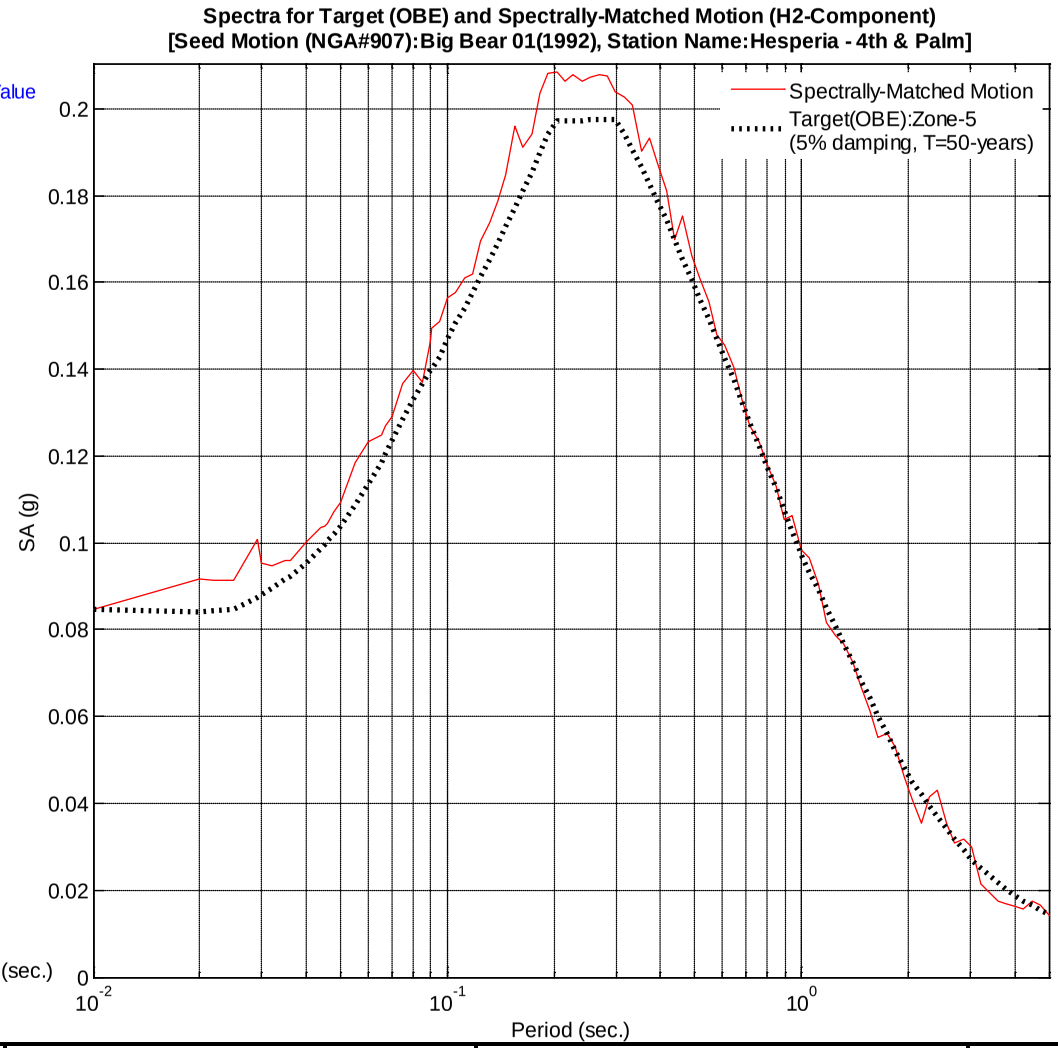
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 5 – SET NO. 2 – VERTICAL**	PLATE
BY:	J. Zhong		**A5-6**
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 5 – SET NO. 3 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A5-7**





SC SOLUTIONS

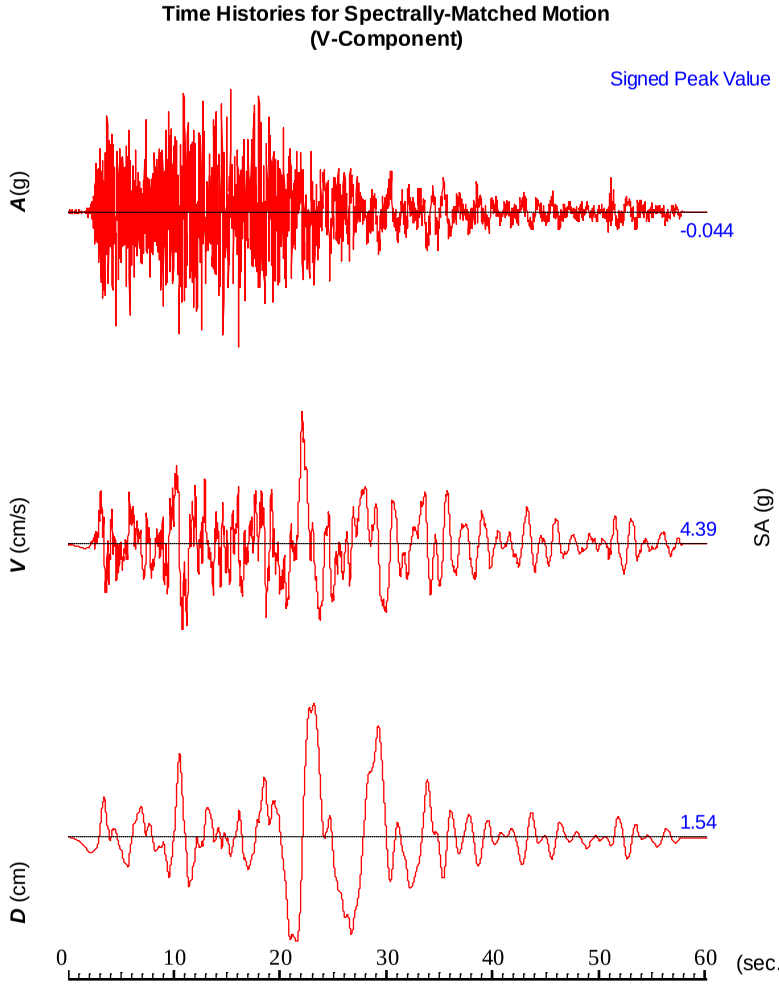
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

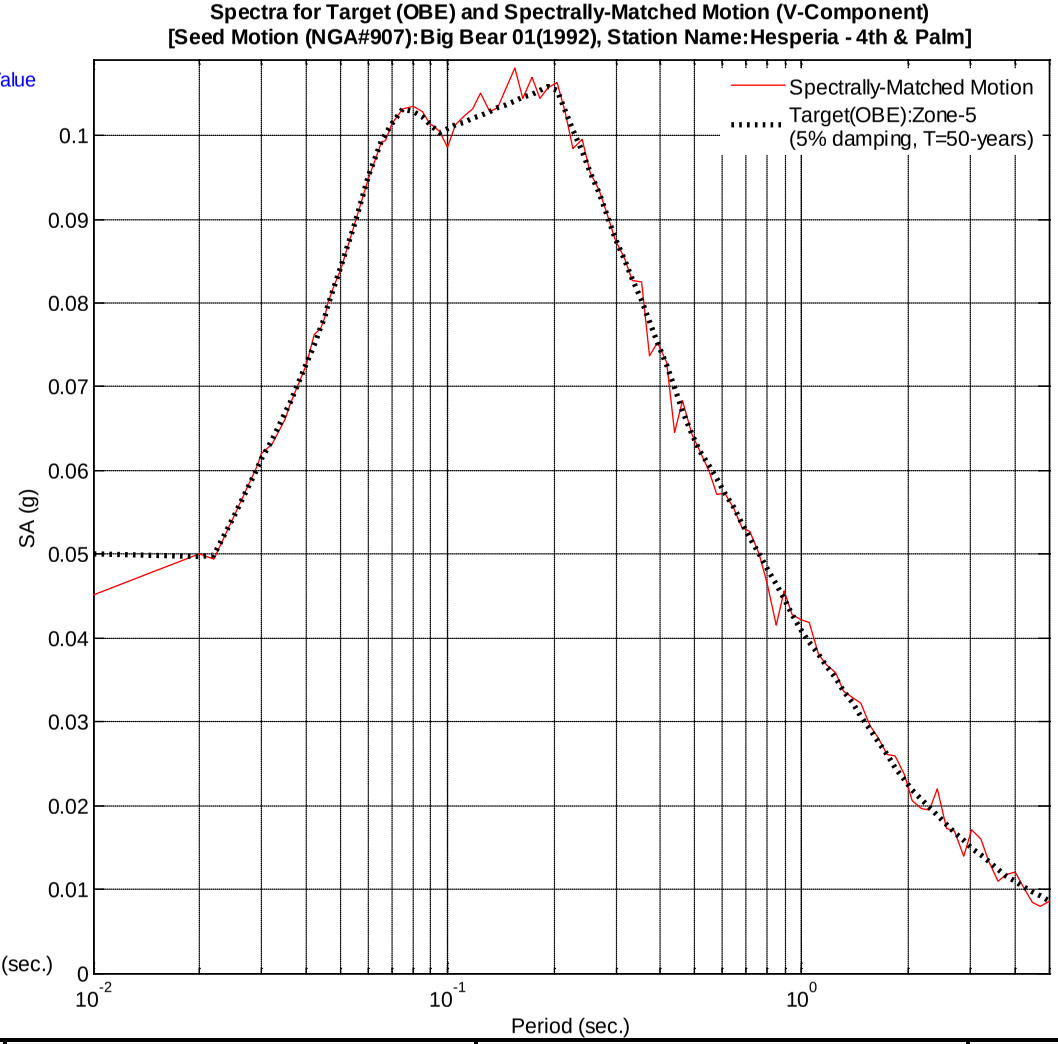
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 5 – SET NO. 3 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A5-8





SC SOLUTIONS

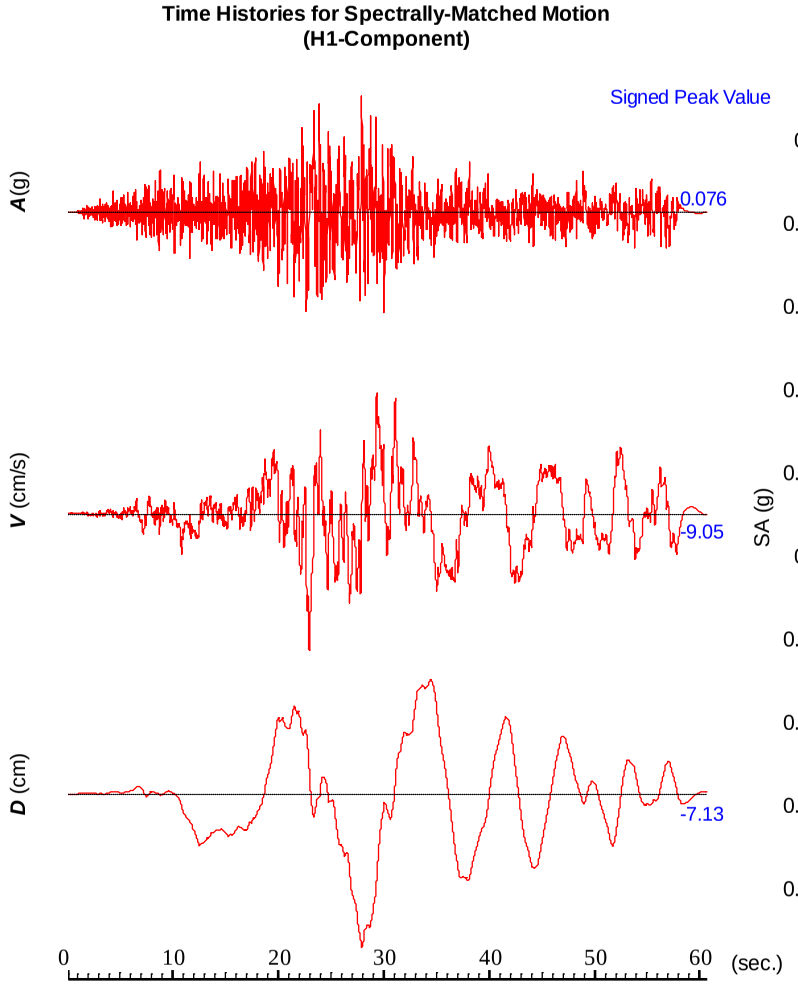
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

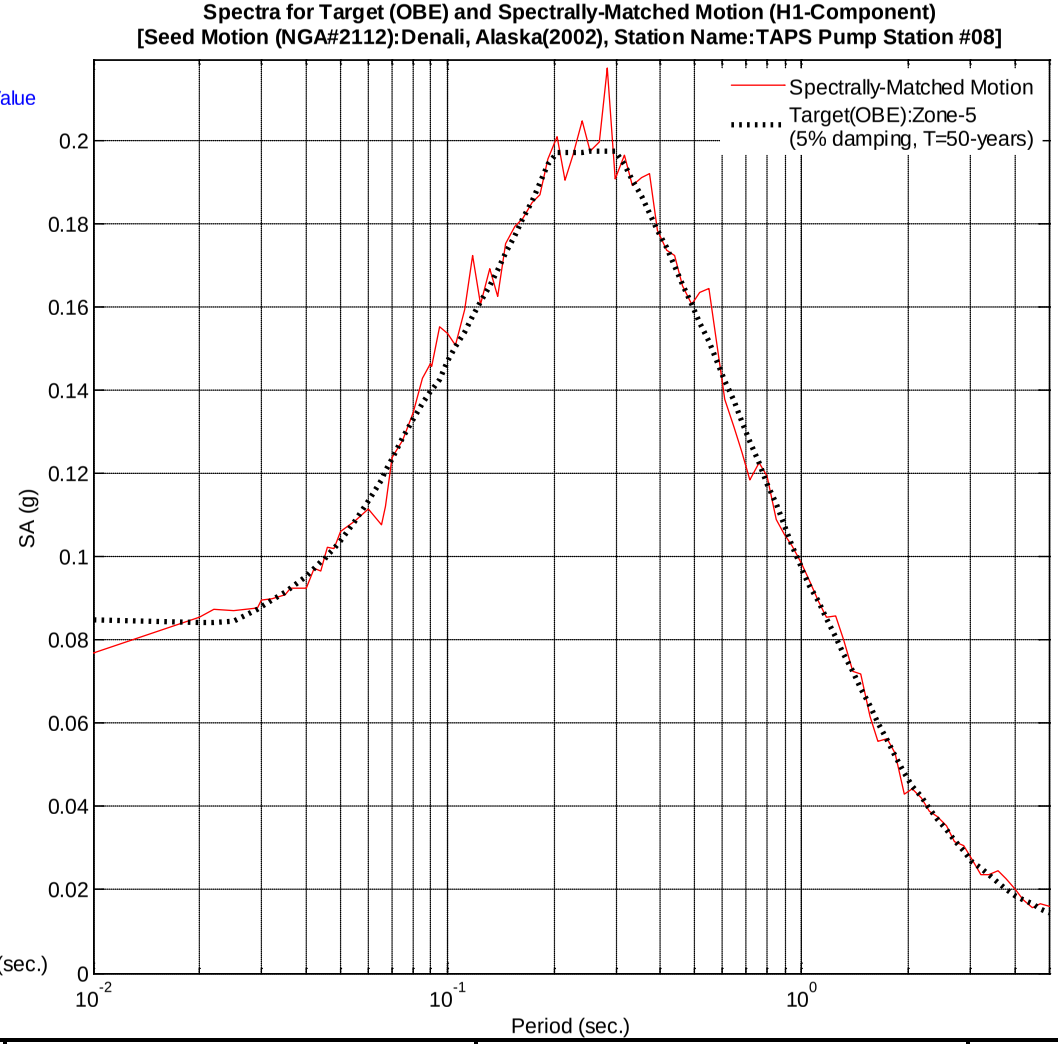
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 5 – SET NO. 3 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

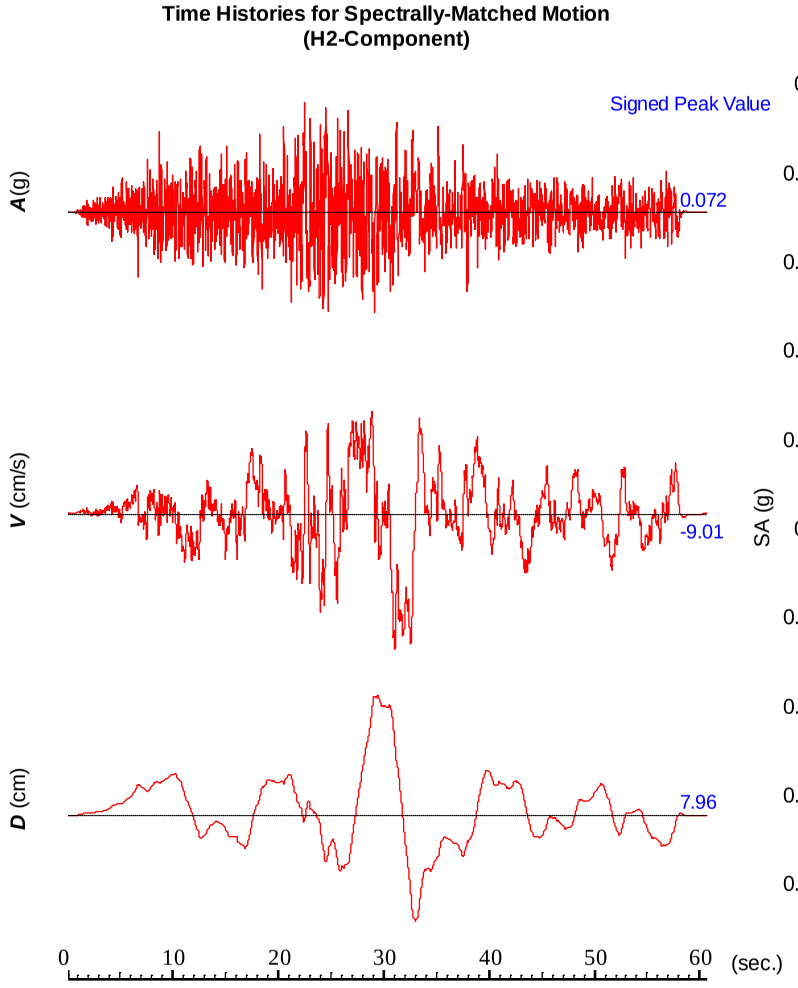
A5-9

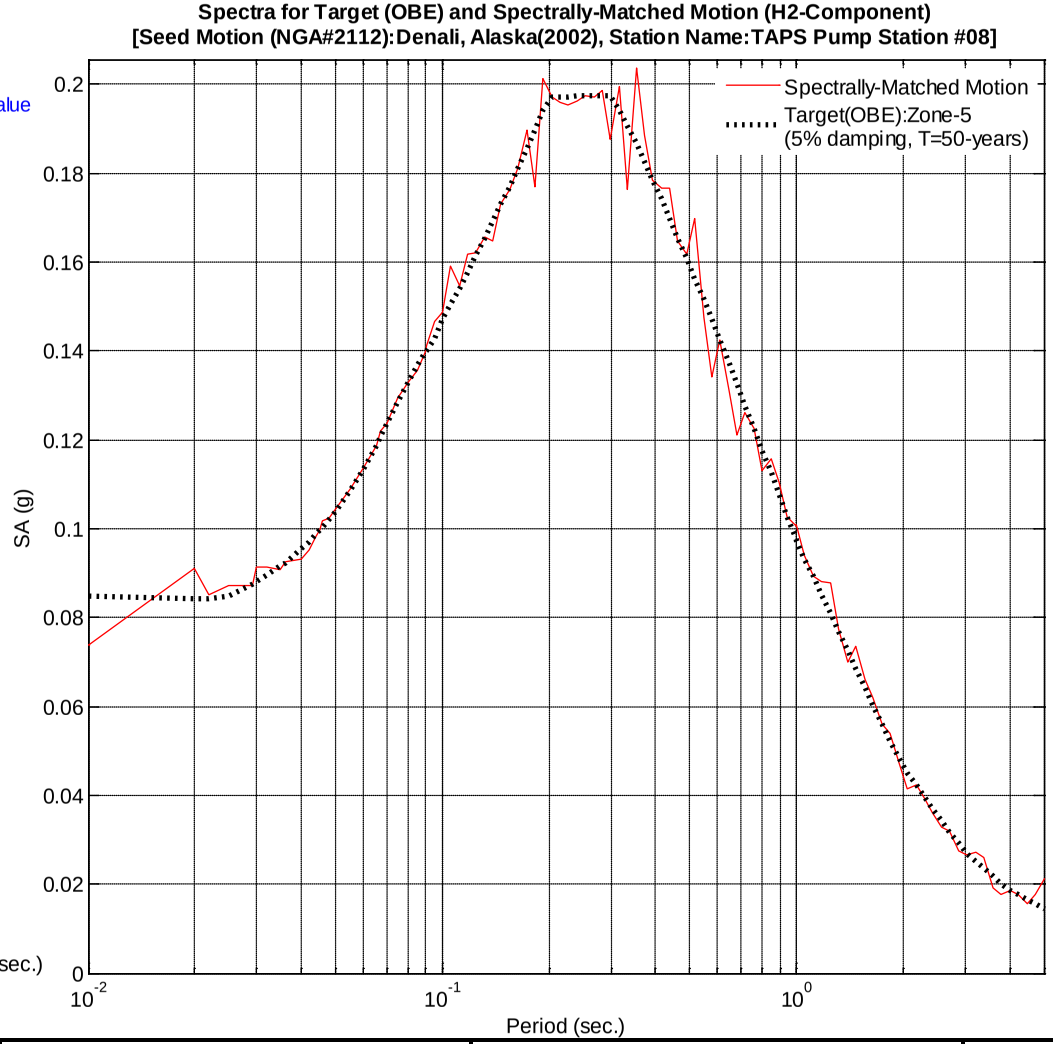




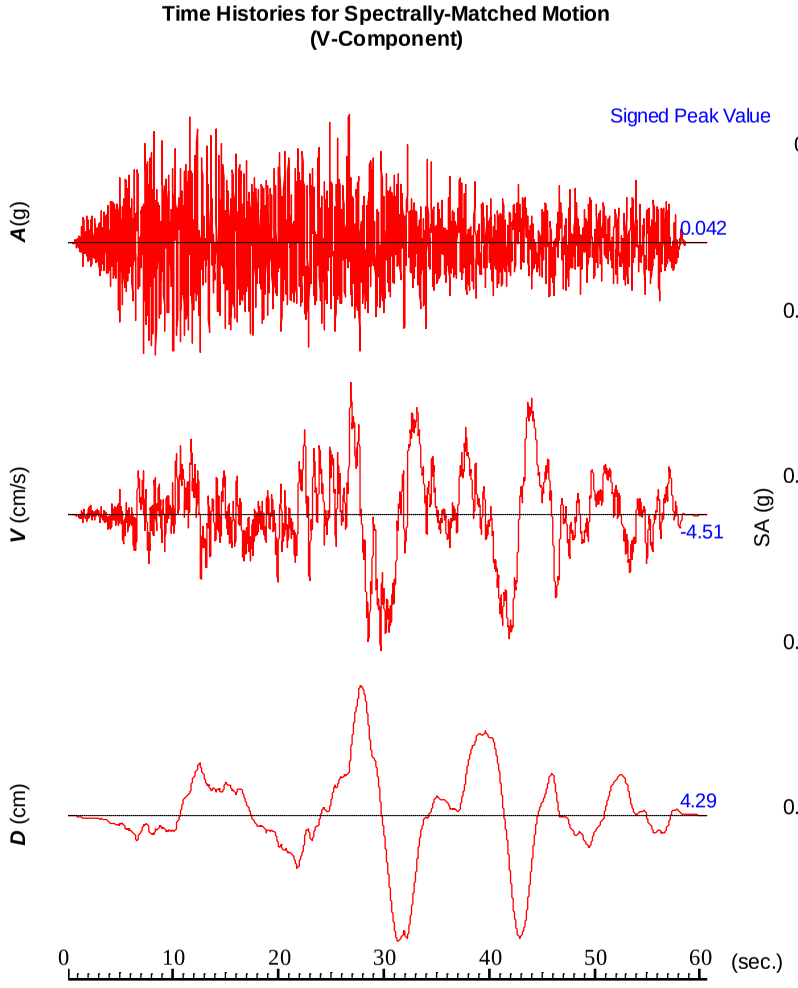
SC SOLUTIONS

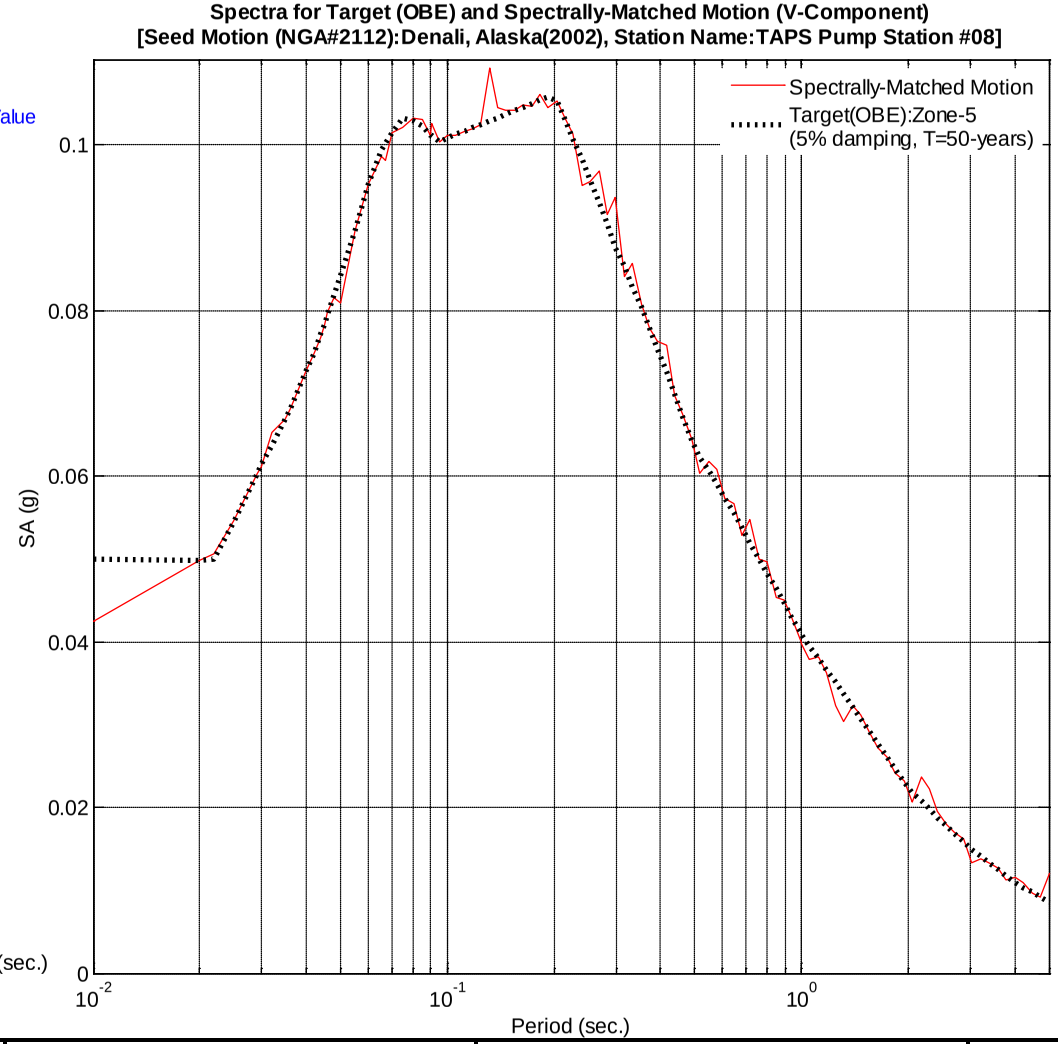
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 5 – SET NO. 4 – HORIZONTAL 1**	PLATE **A5-10**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 5 – SET NO. 4 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A5-11**





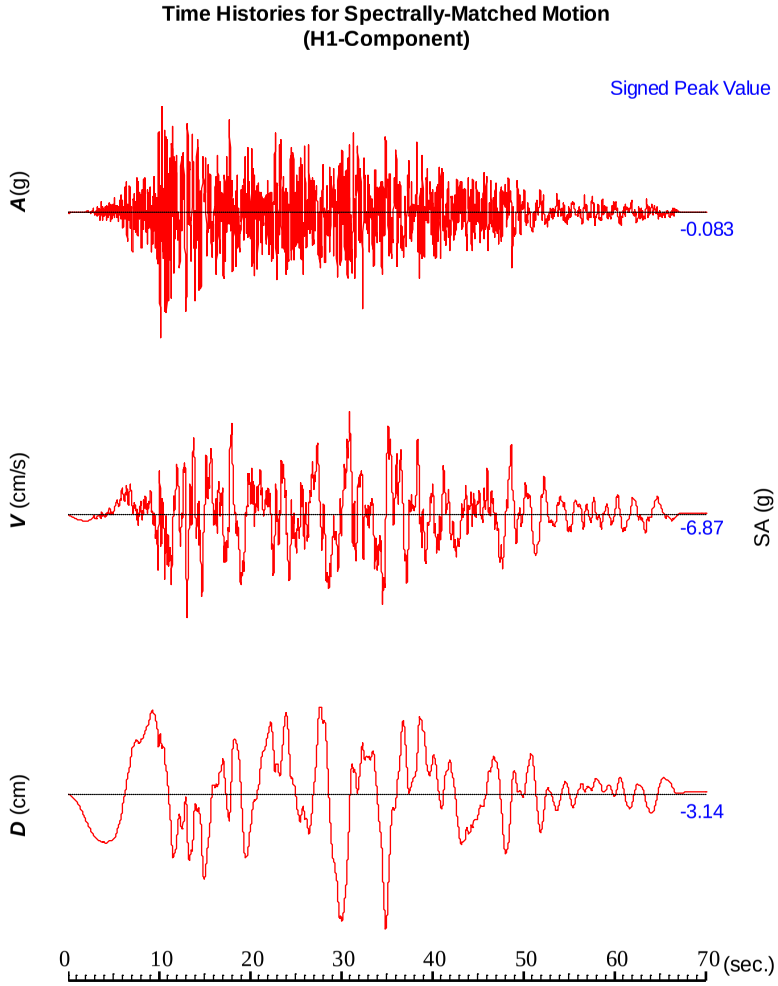
SC SOLUTIONS

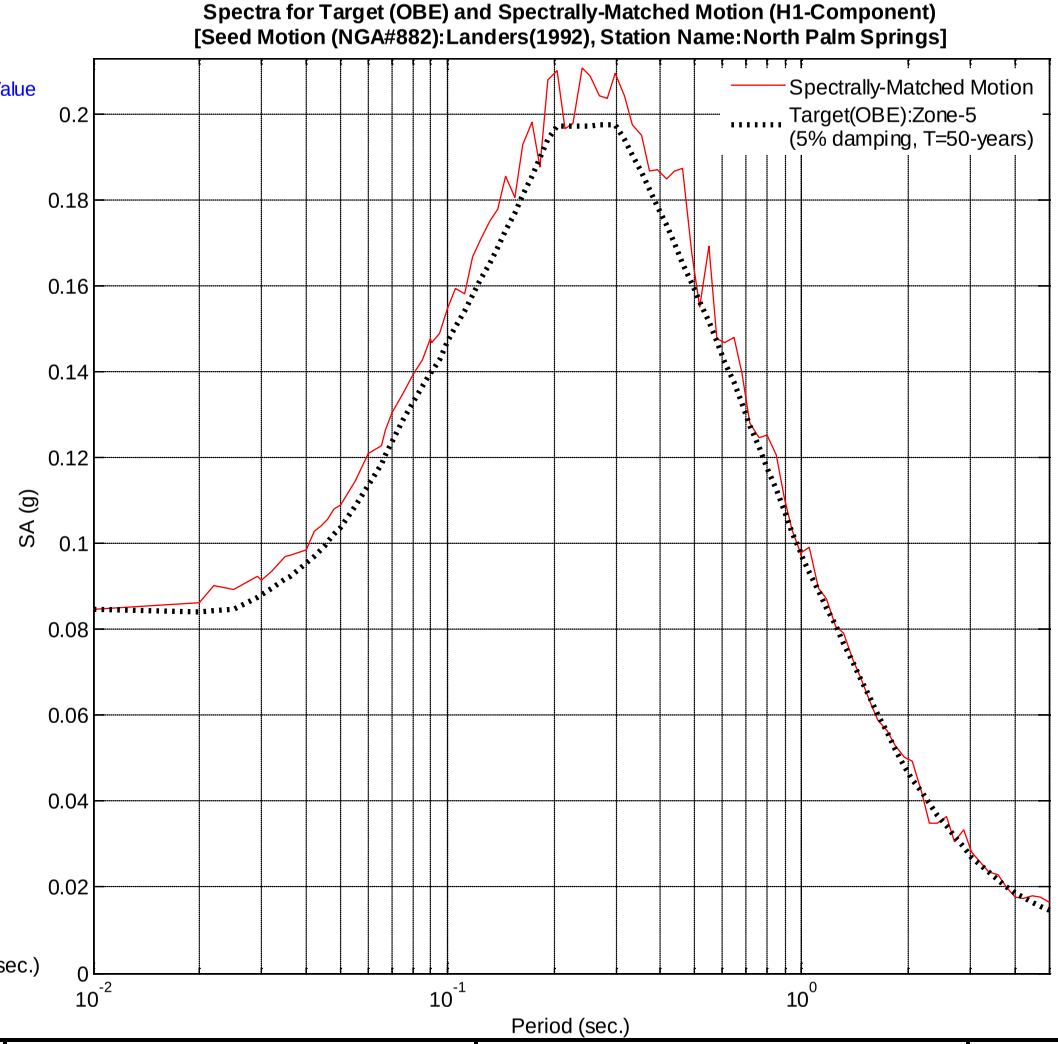
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 5 – SET NO. 4 – VERTICAL

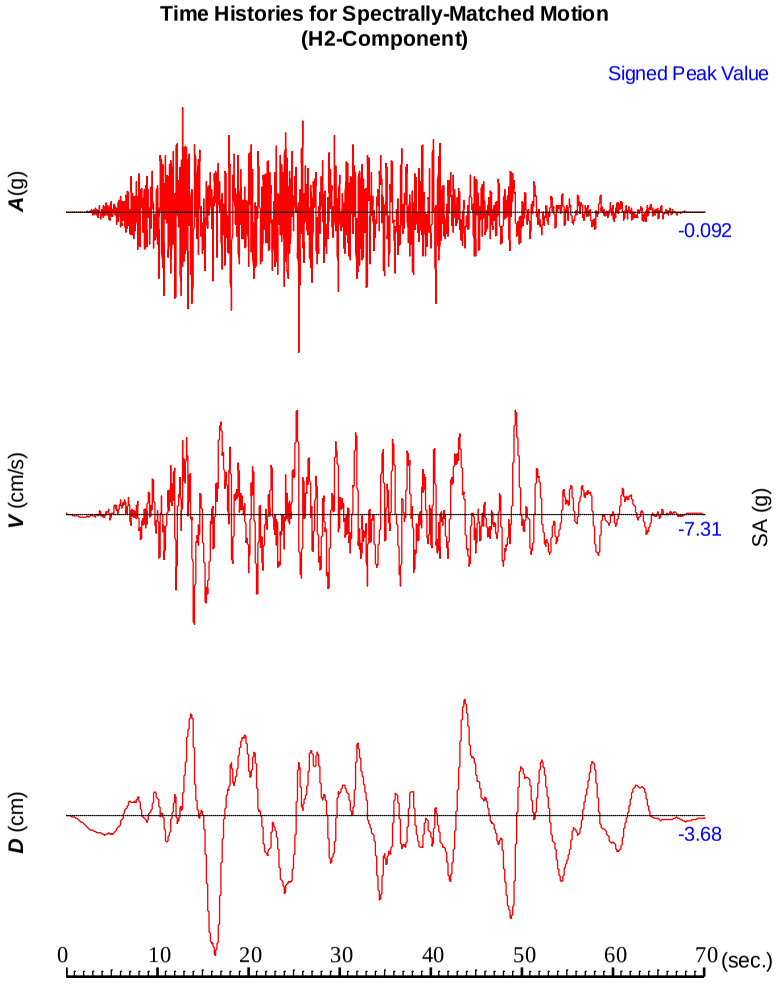
CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

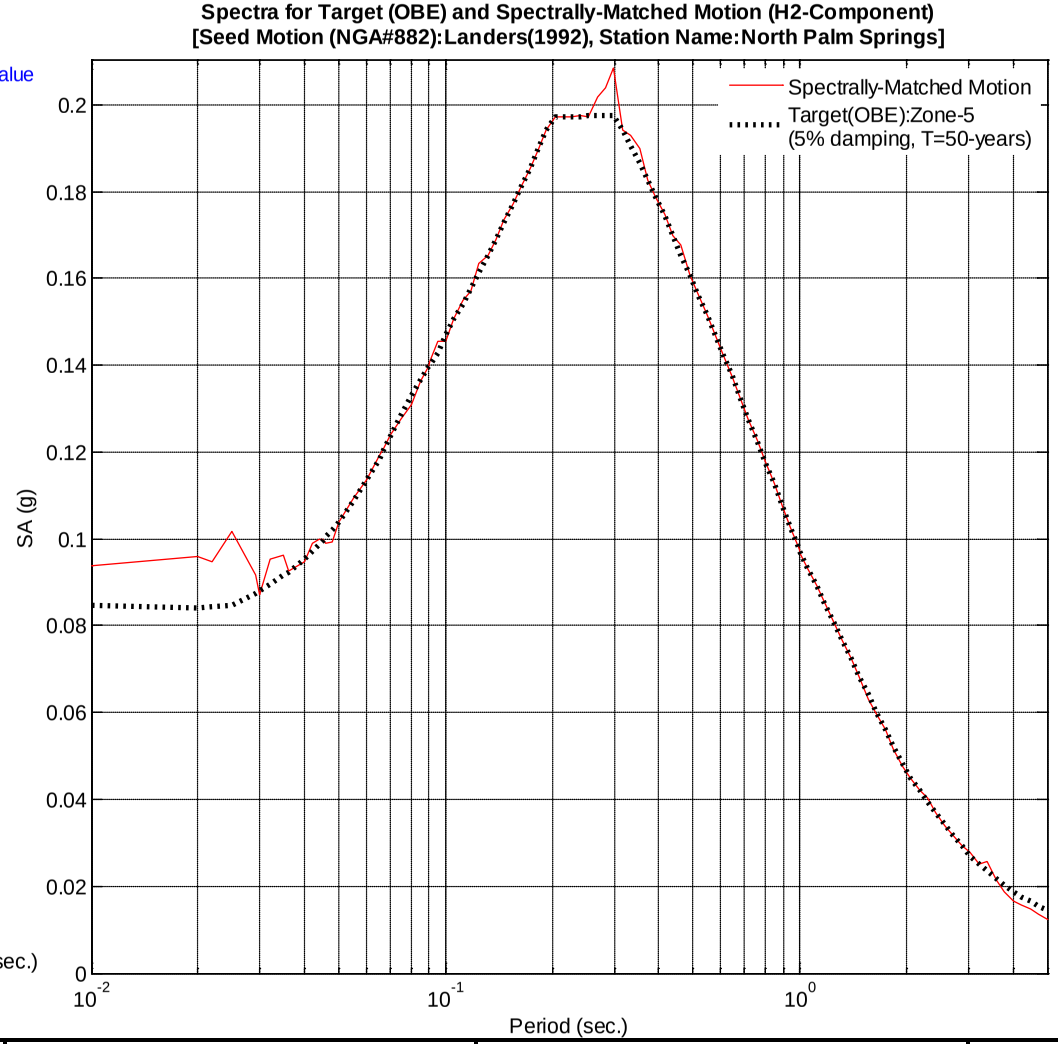
PLATE
A5-12





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 5 – SET NO. 5 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A5-13**





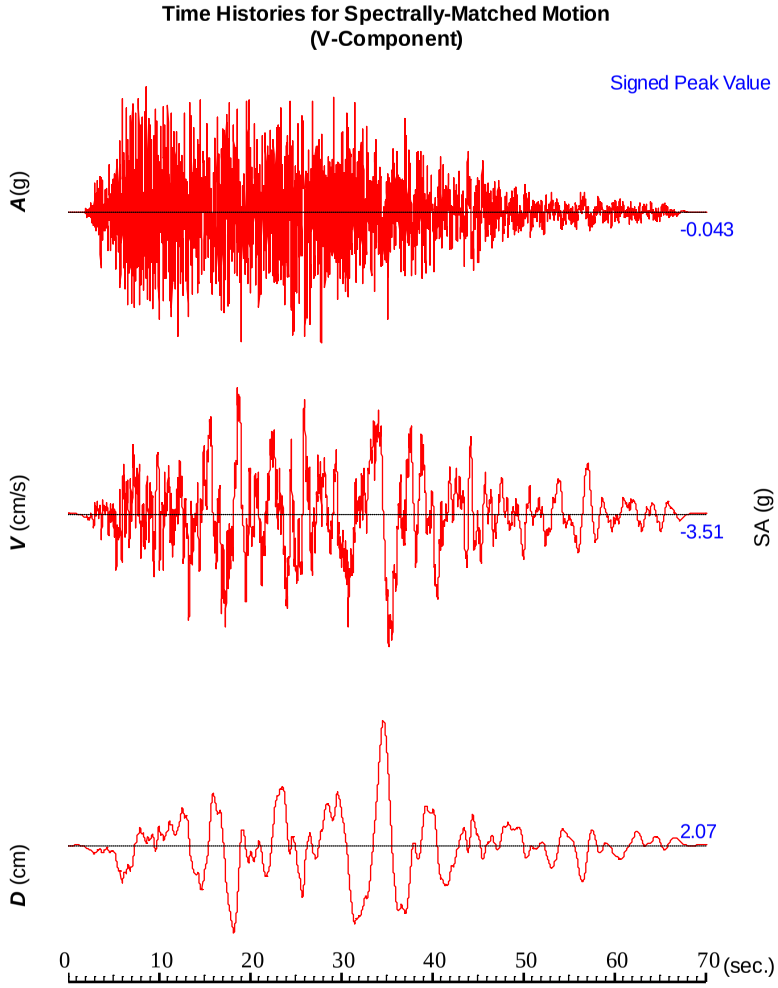
SC SOLUTIONS

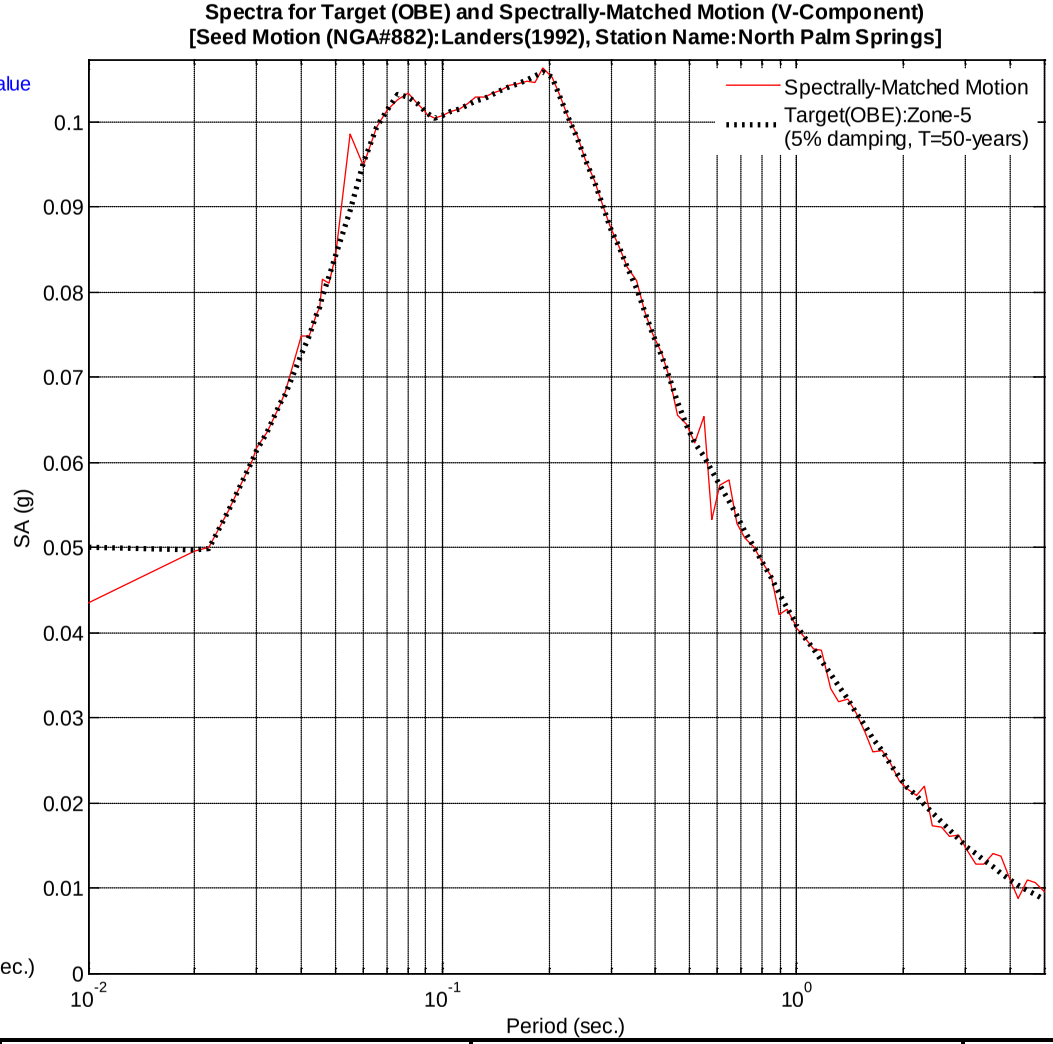
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 5 – SET NO. 5 – HORIZONTAL 2

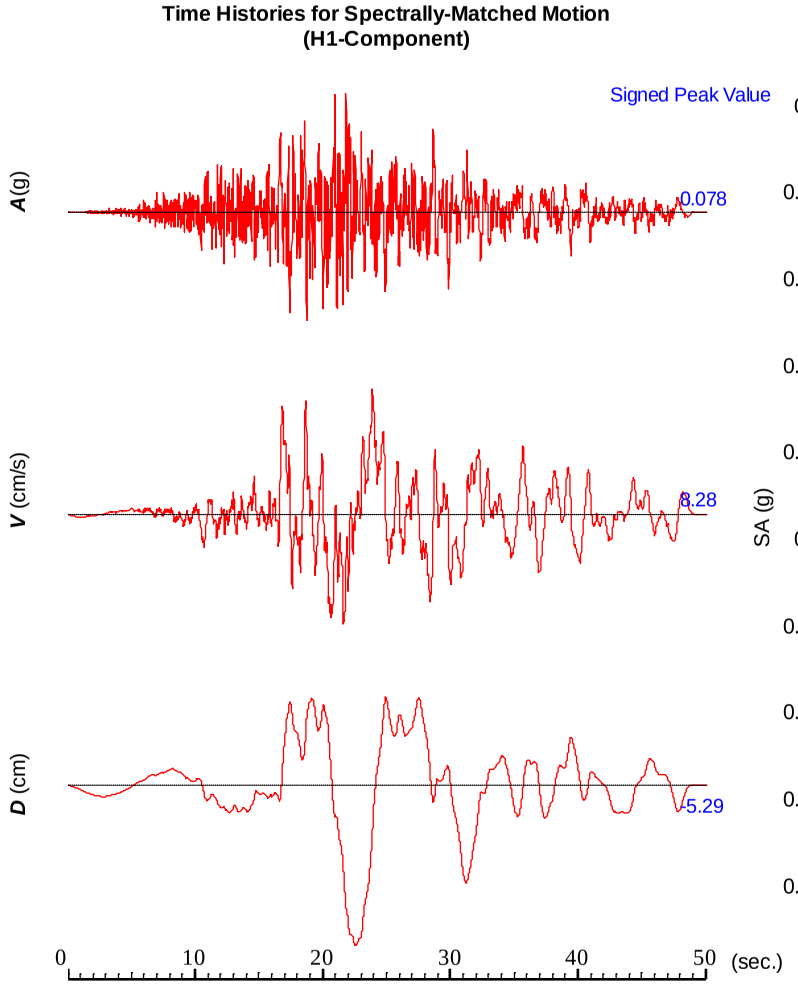
CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

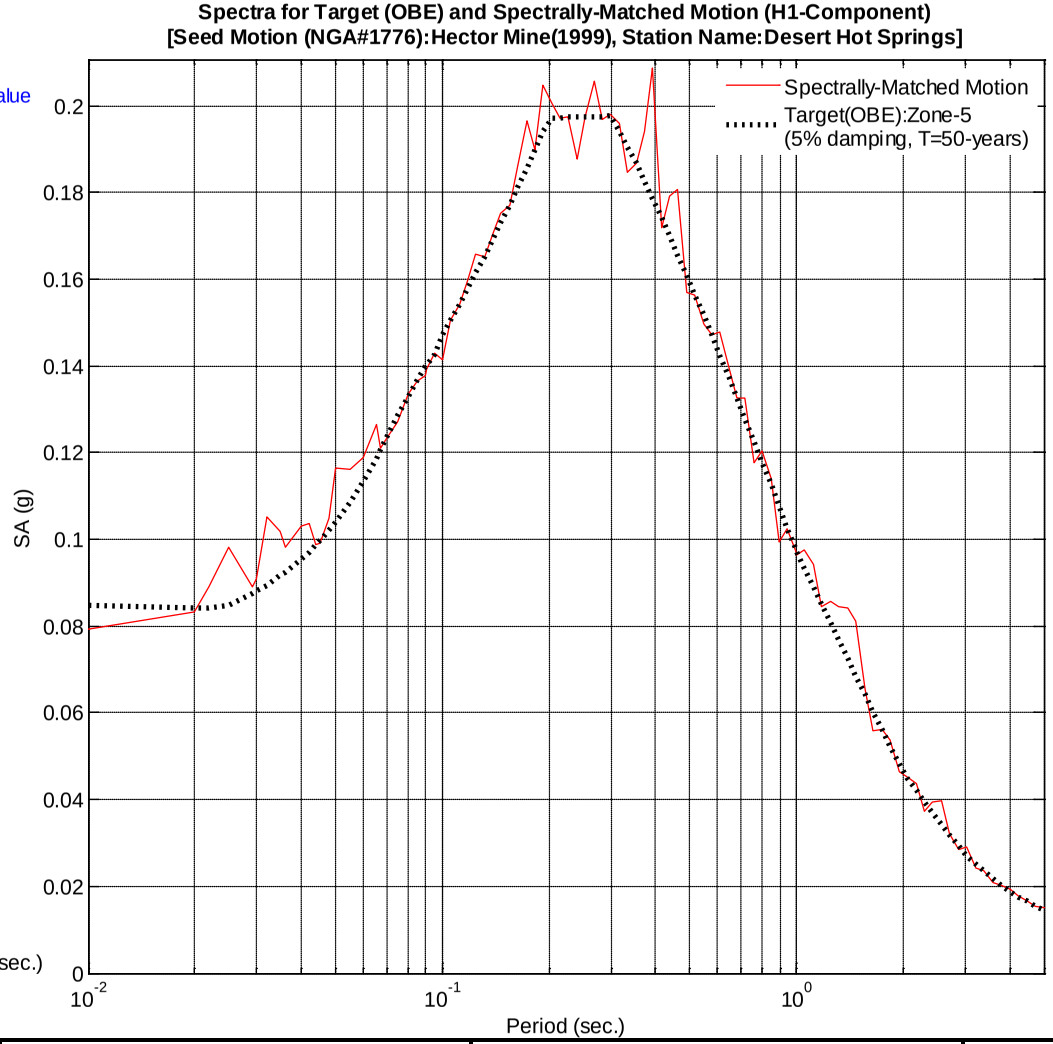
PLATE
A5-14



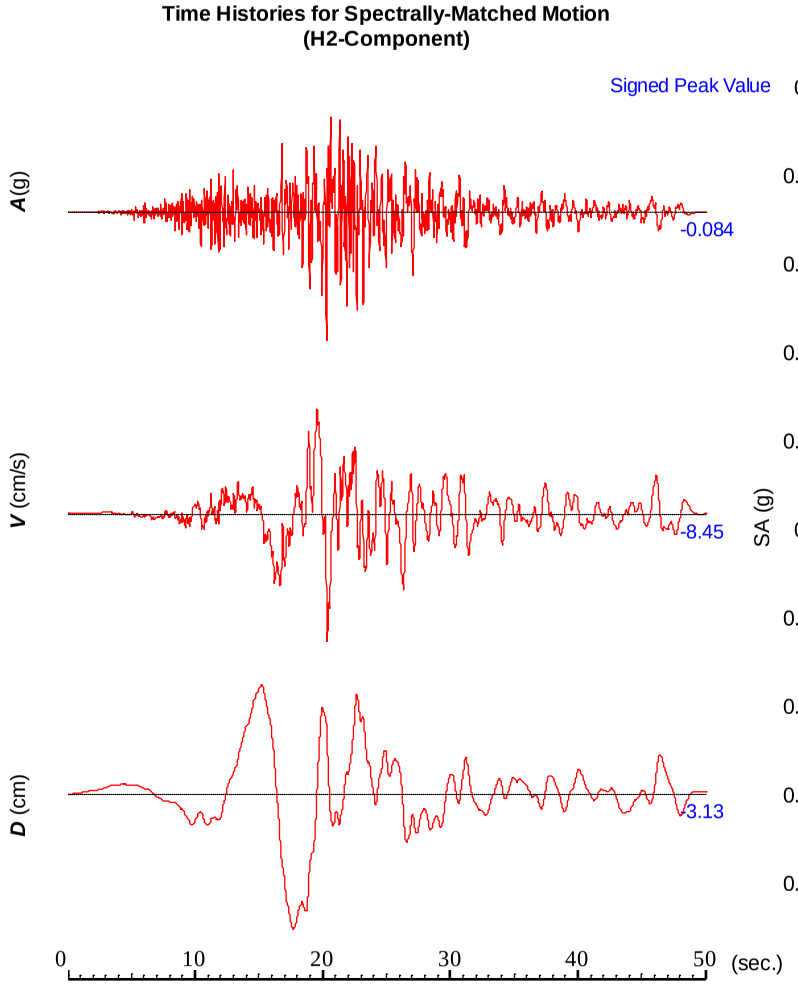


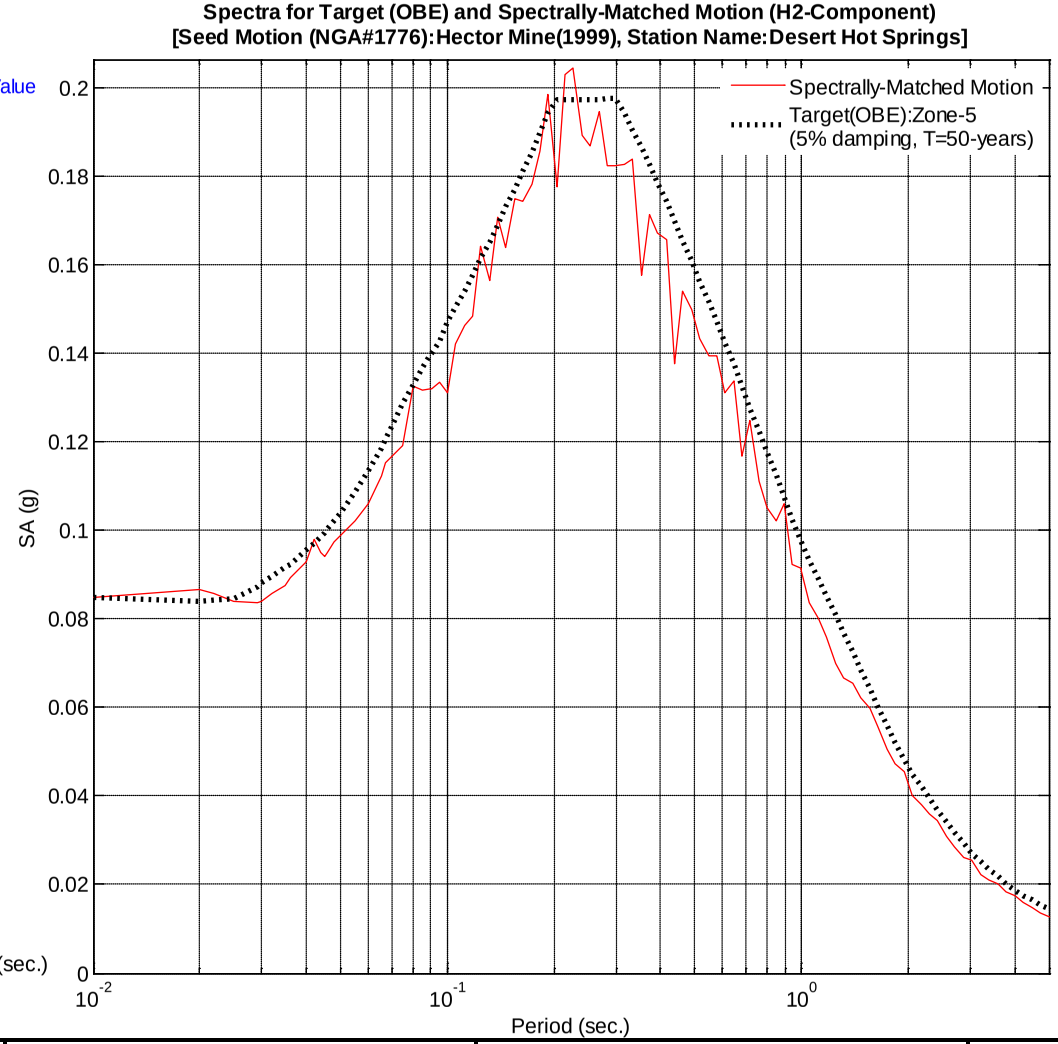
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 5 – SET NO. 5 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A5-15**



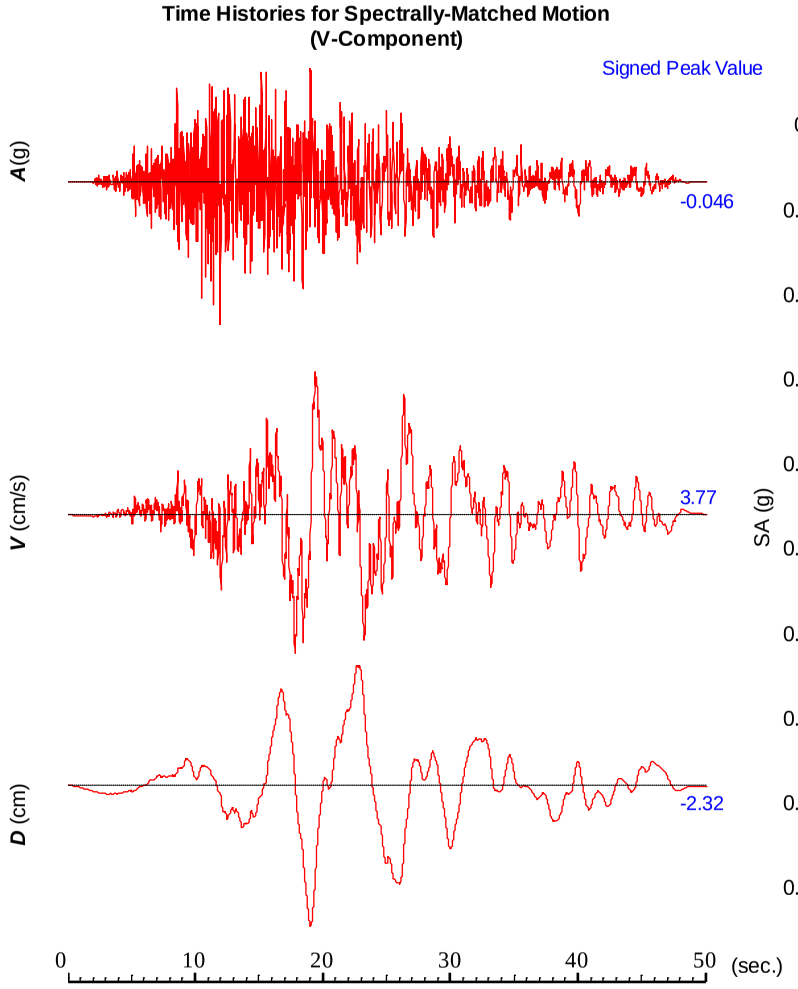


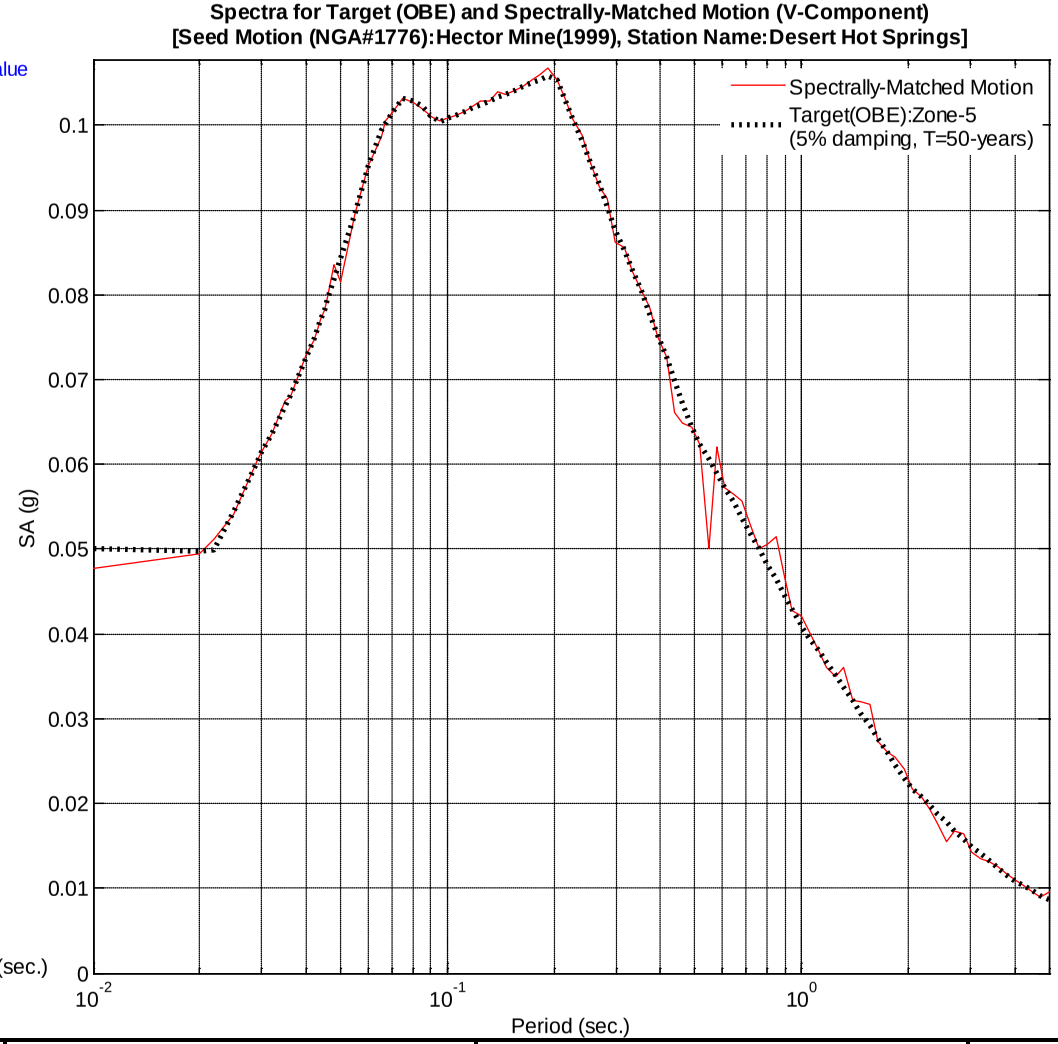
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 5 – SET NO. 6 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A5-16**



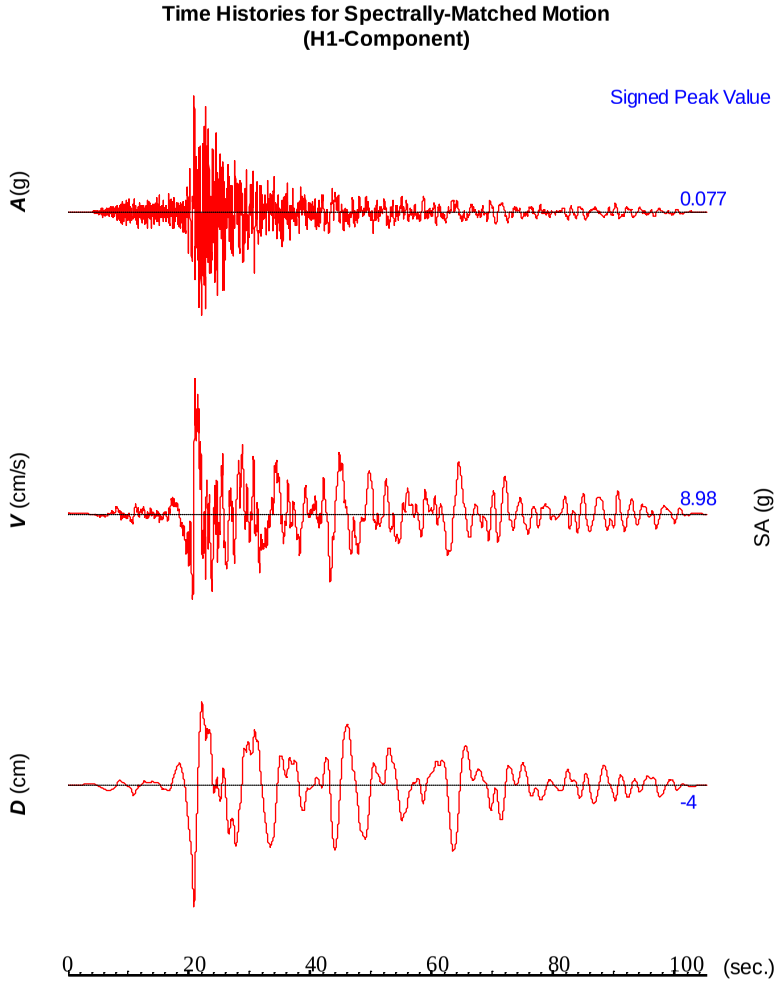


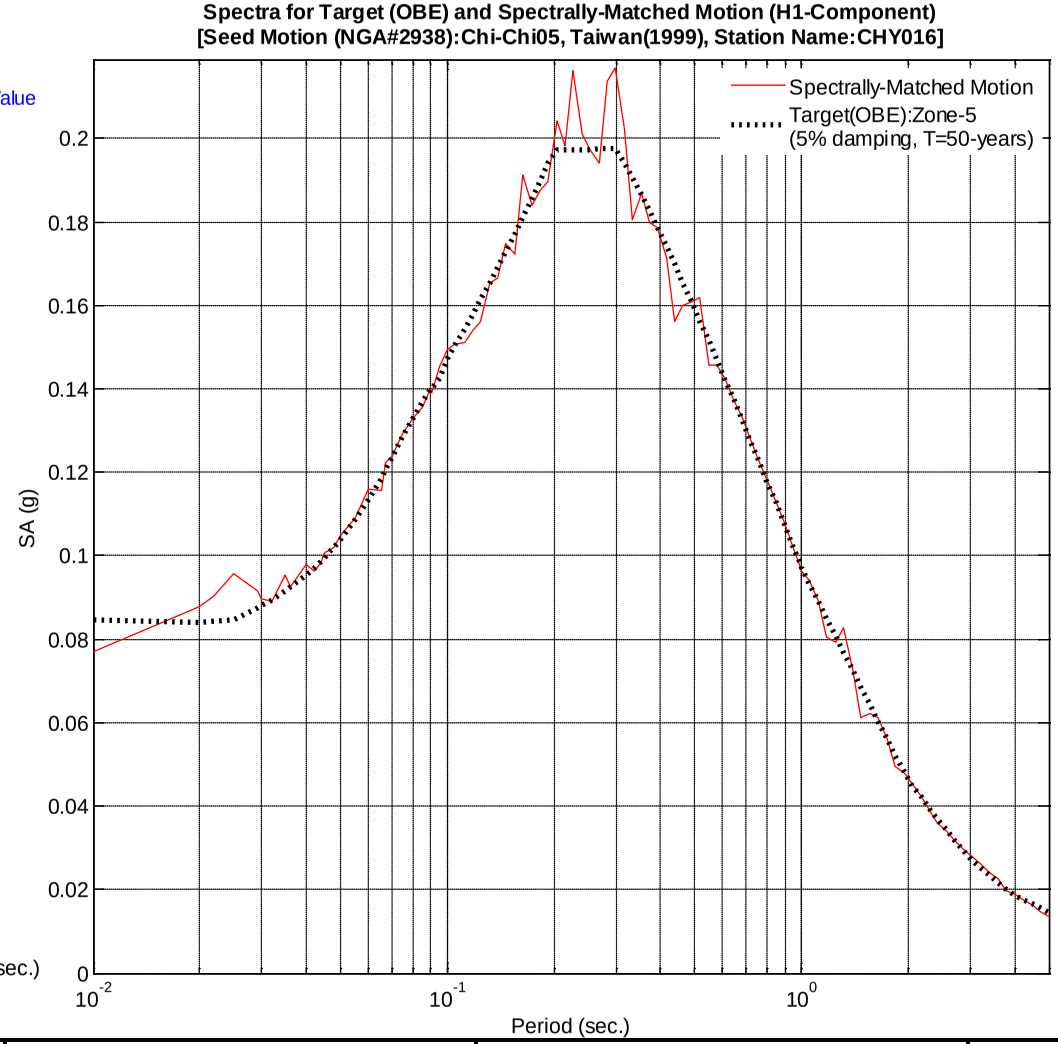
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 5 – SET NO. 6 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A5-17**



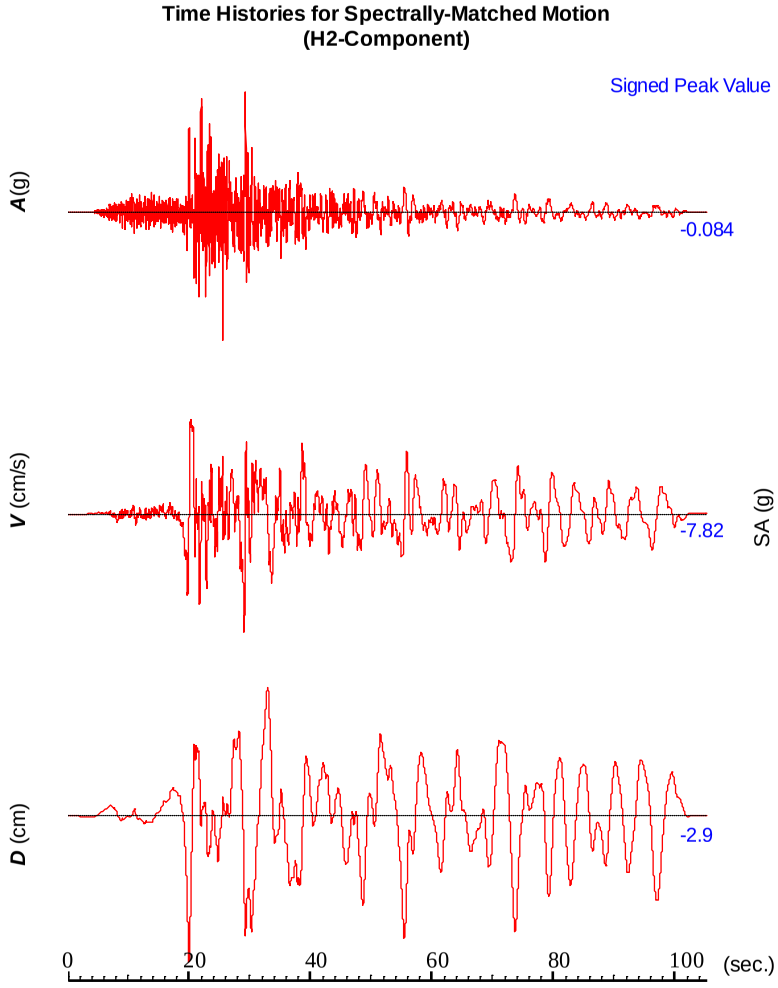


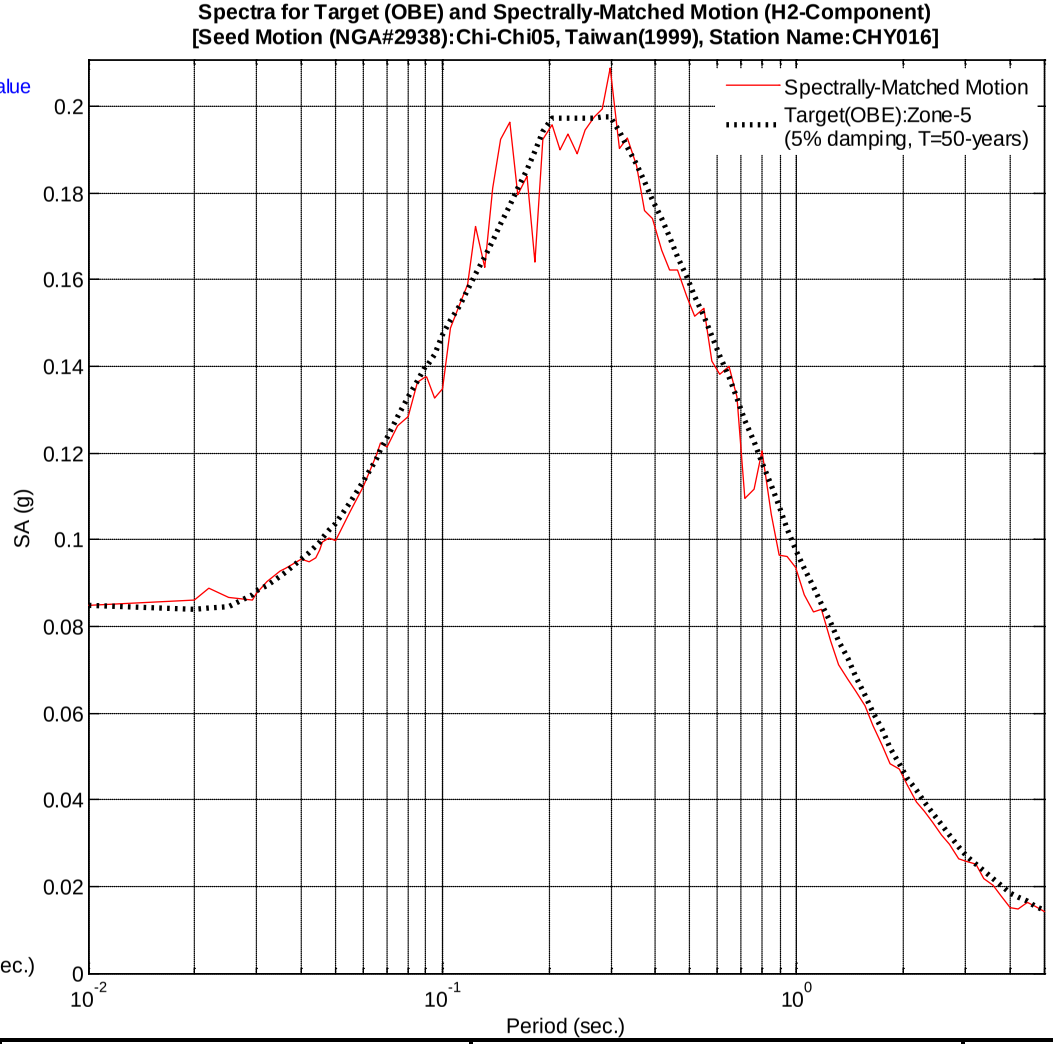
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 5 – SET NO. 6 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A5-18**



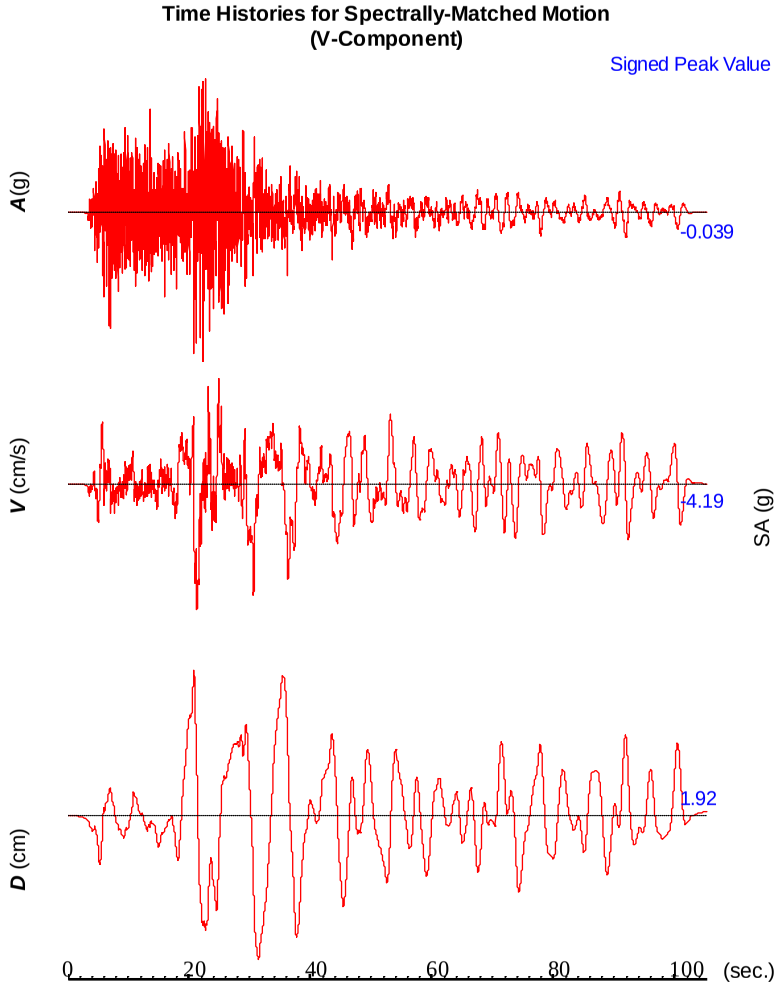


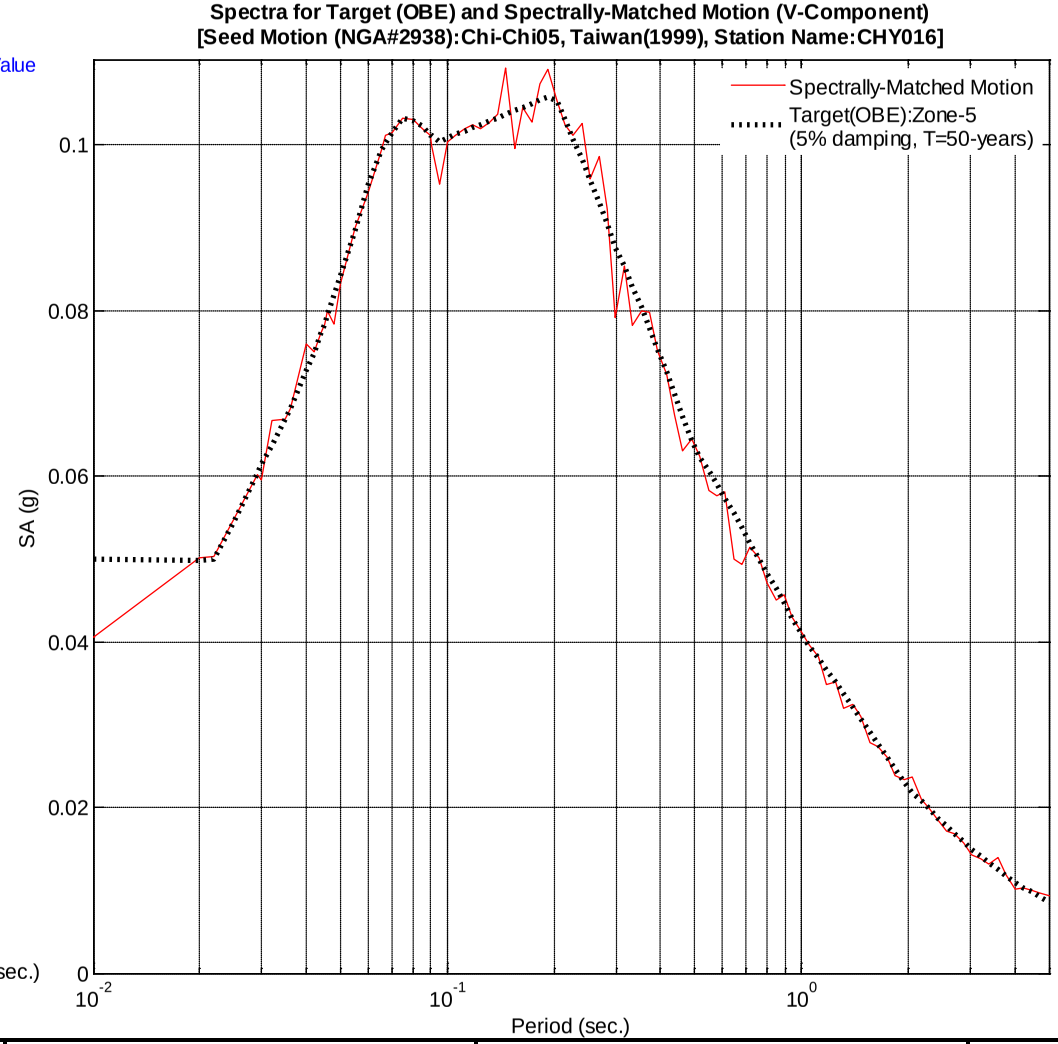
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 5 – SET NO. 7 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A5-19**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 5 – SET NO. 7 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A5-20**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 5 – SET NO. 7 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A5-21**

Table A.6: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 6**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	832	Landers	1992	North Palm Springs	7.28	26.84	0.098	11.799	8.043	0.099	11.405	5.500	0.059	4.746	2.239
2	1637	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.096	8.485	3.135	0.092	8.450	3.336	0.050	3.886	1.488
3	907	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.090	7.411	3.551	0.099	13.172	2.798	0.050	4.862	1.915
4	2112	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.086	10.663	8.219	0.085	9.884	9.260	0.048	5.203	4.795
5	882	Imperial Valley-06	1979	Delta	6.53	22.03	0.098	8.098	3.704	0.102	8.049	4.121	0.049	3.766	2.226
6	1776	Manjil, Iran	1990	Rudsar	7.37	64.47	0.092	9.972	6.309	0.099	9.964	3.695	0.055	4.106	2.435
7	2938	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.087	9.988	4.261	0.099	9.221	3.418	0.050	4.671	2.175

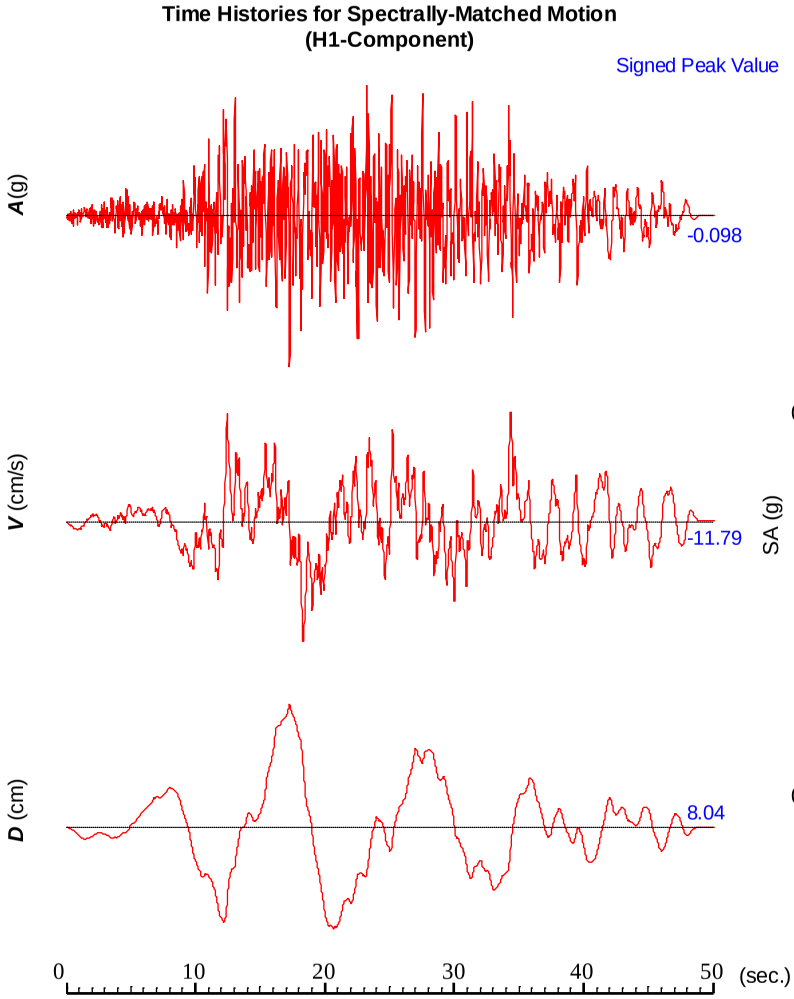
SC SOLUTIONS

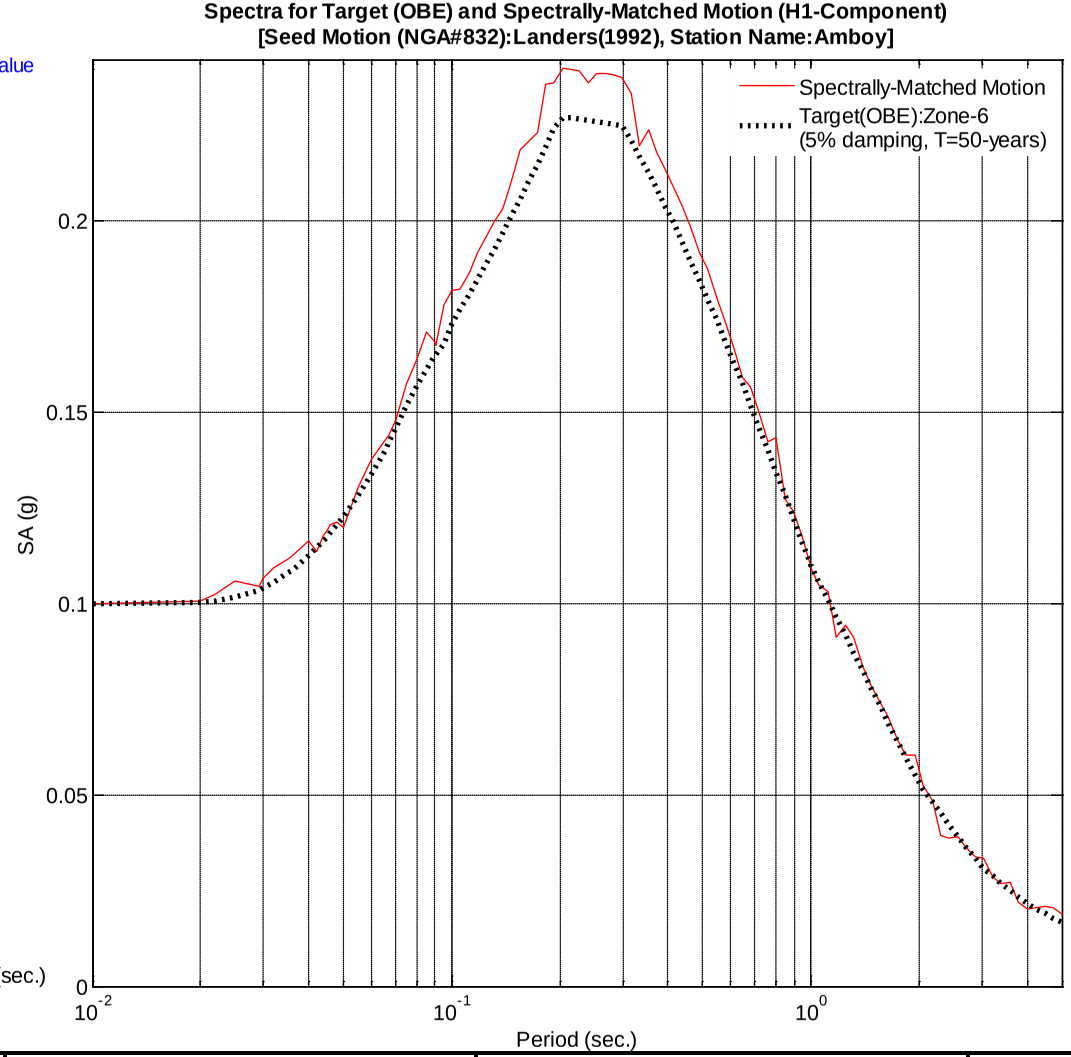
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS OBE – ZONE 6

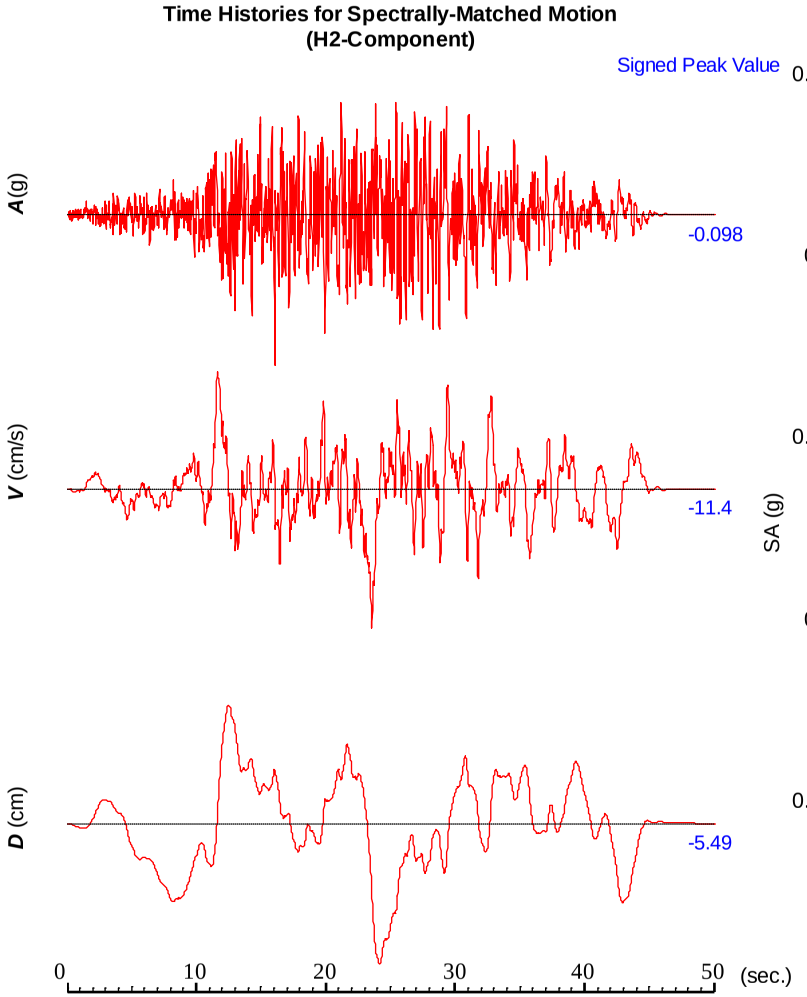
CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

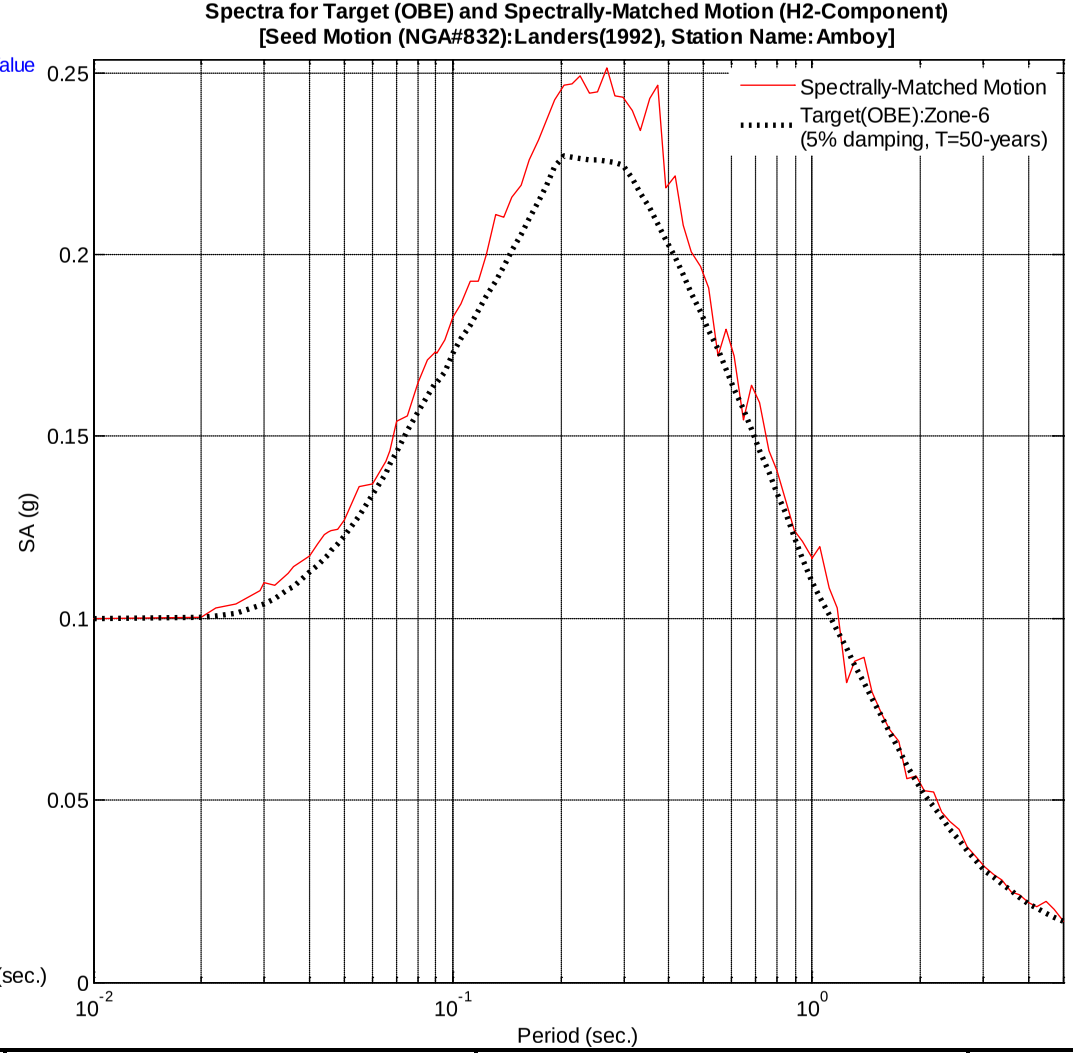
PLATE
A6-0



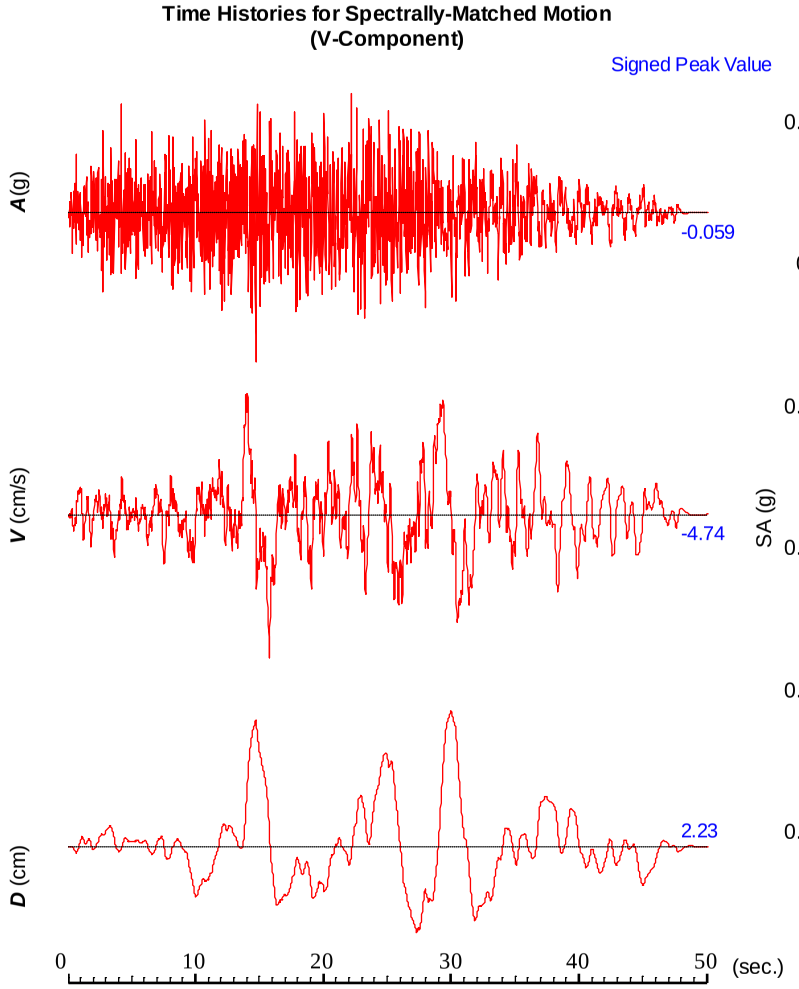


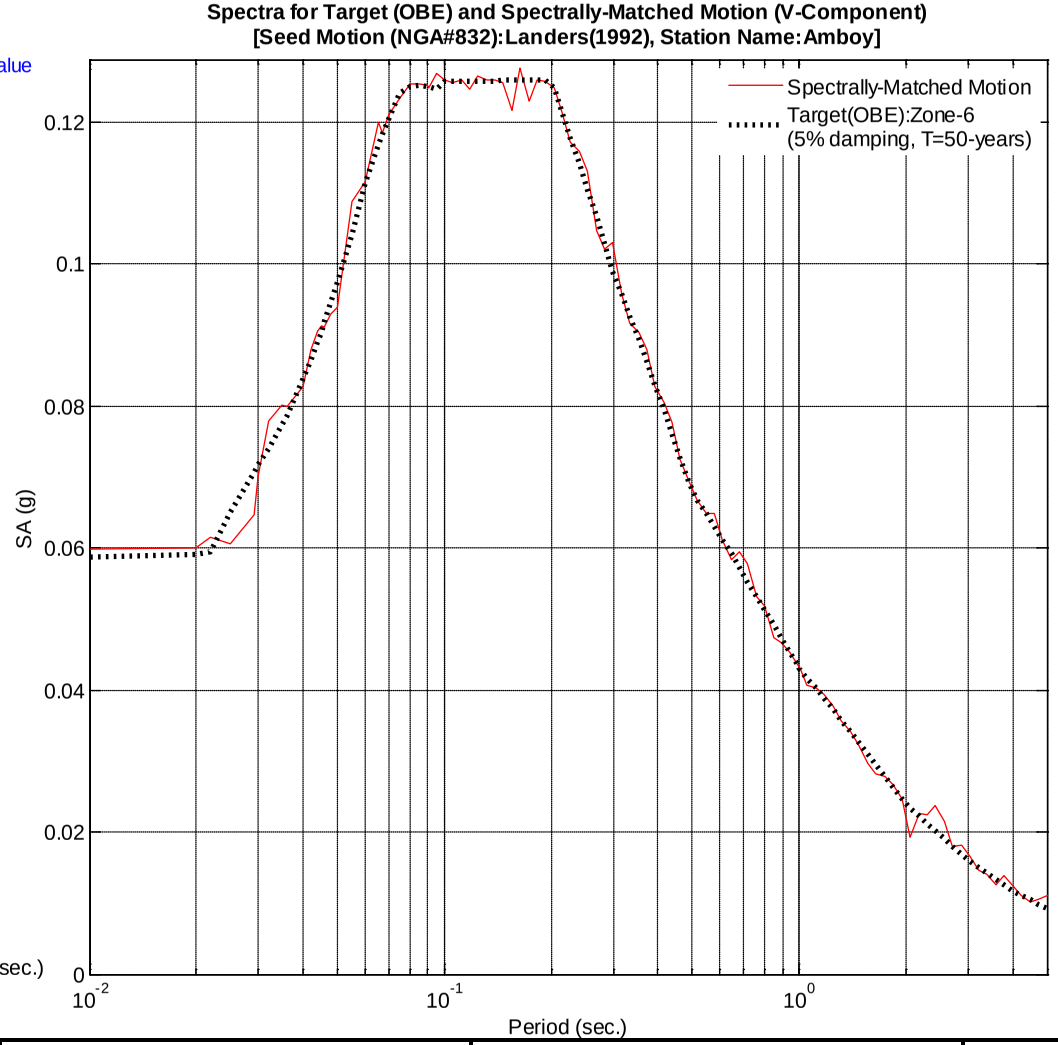
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 6 – SET NO. 1 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A6-1**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 6 – SET NO. 1 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A6-2**





SC SOLUTIONS

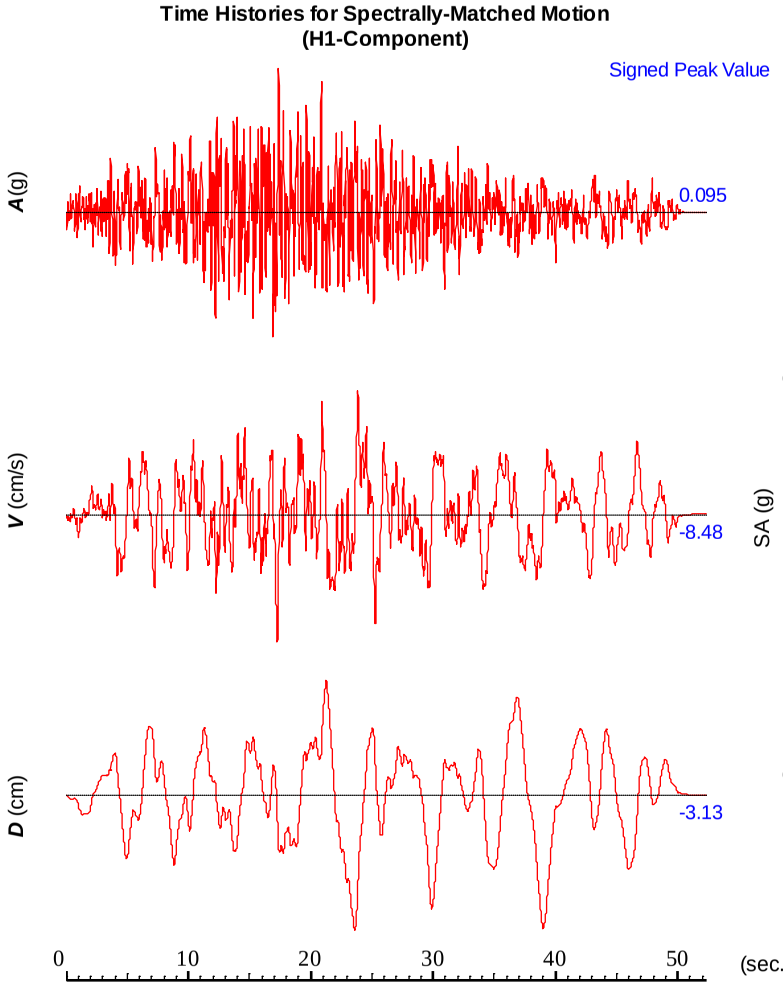
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

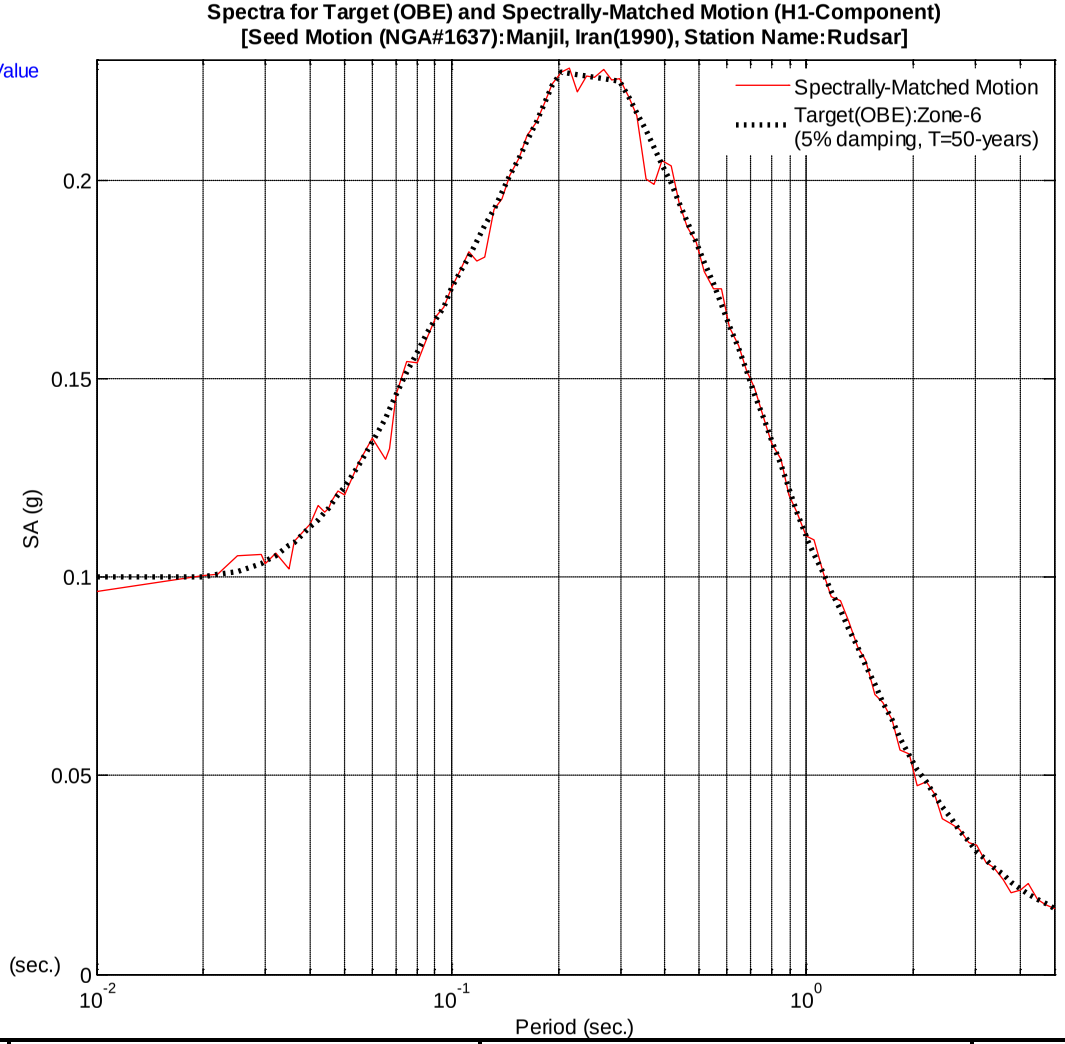
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 6 – SET NO. 1 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A6-3





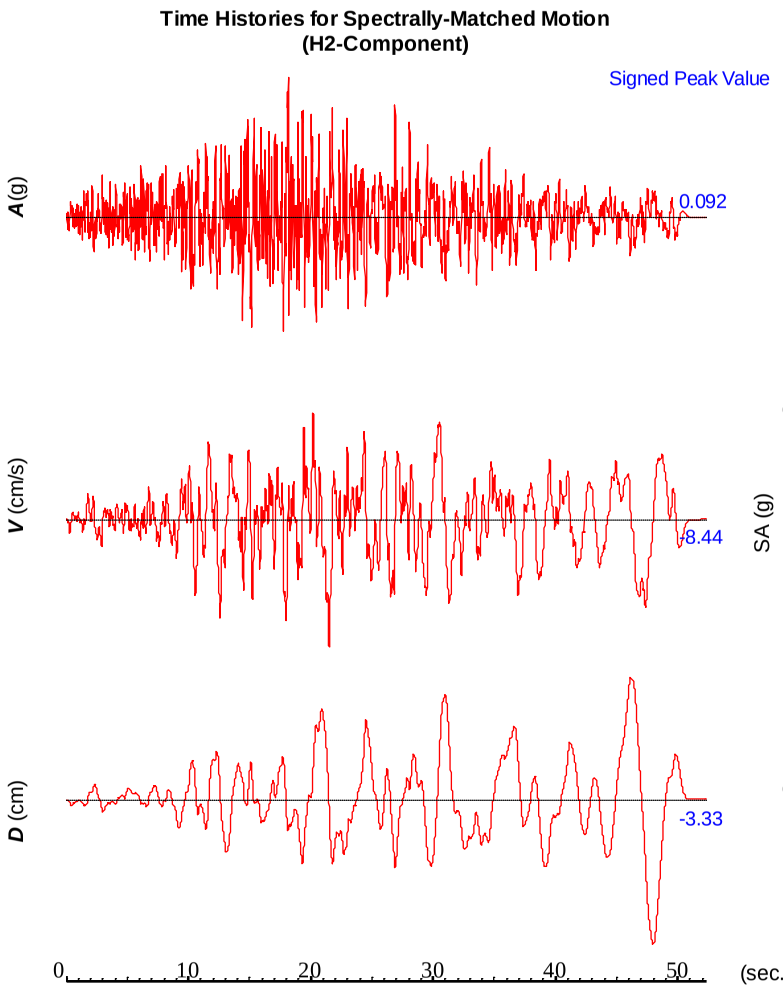
SC SOLUTIONS

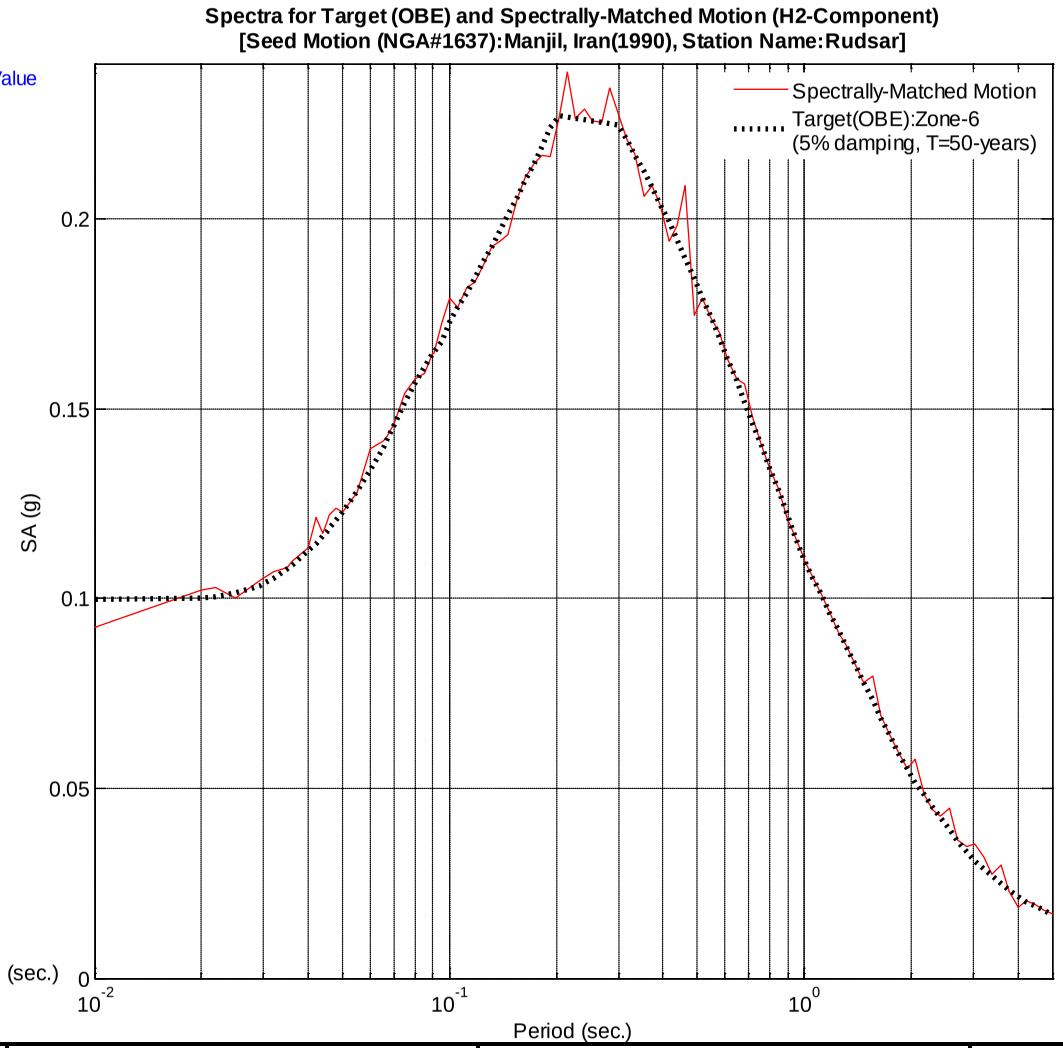
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 6 – SET NO. 2 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE
A6-4





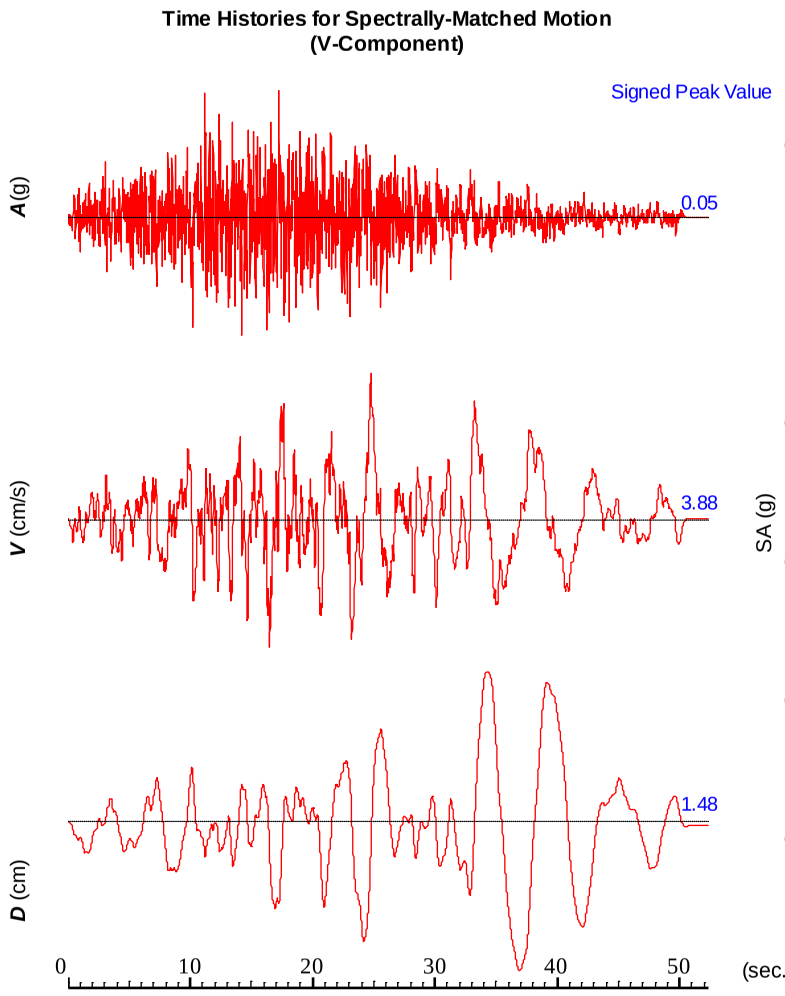
SC SOLUTIONS

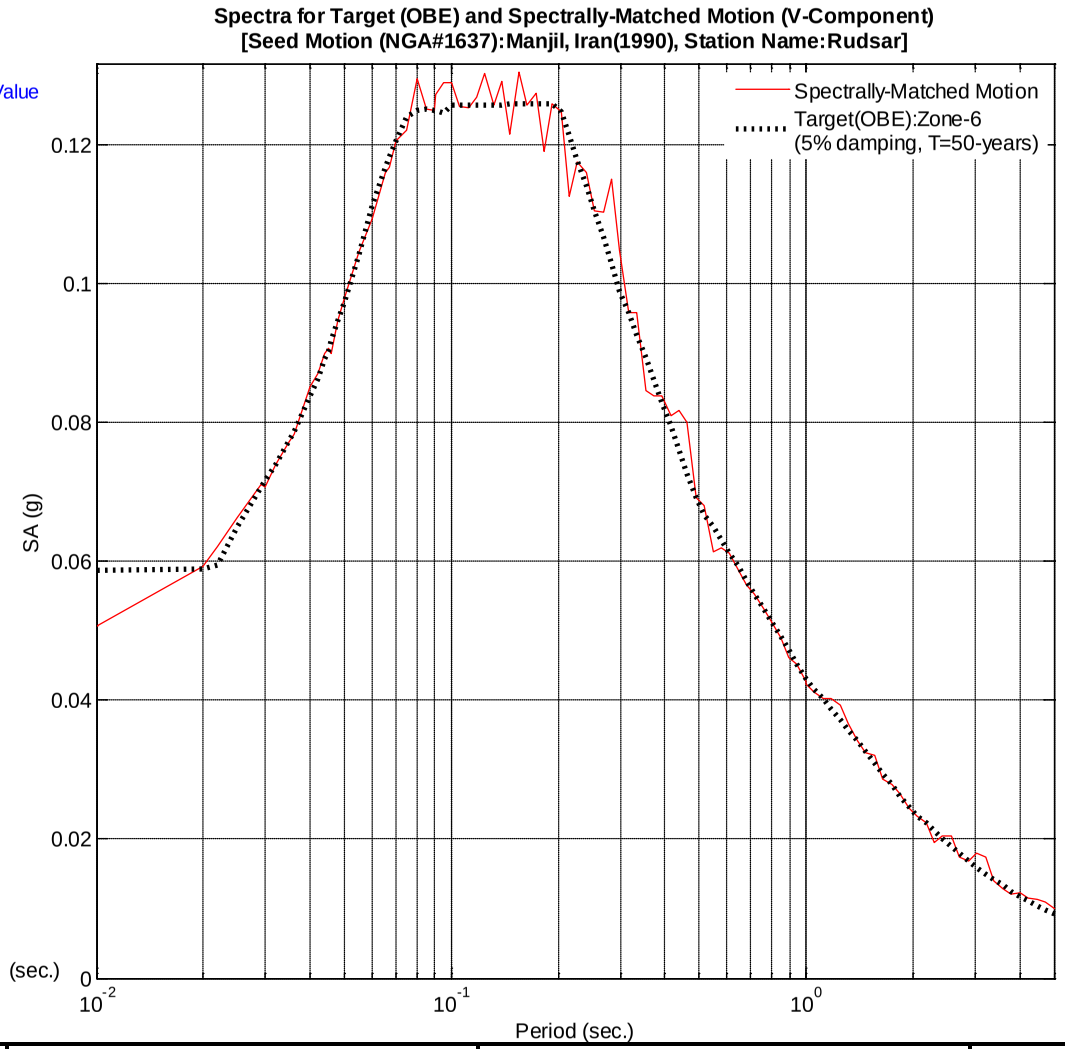
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 6 – SET NO. 2 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE
A6-5





SC SOLUTIONS

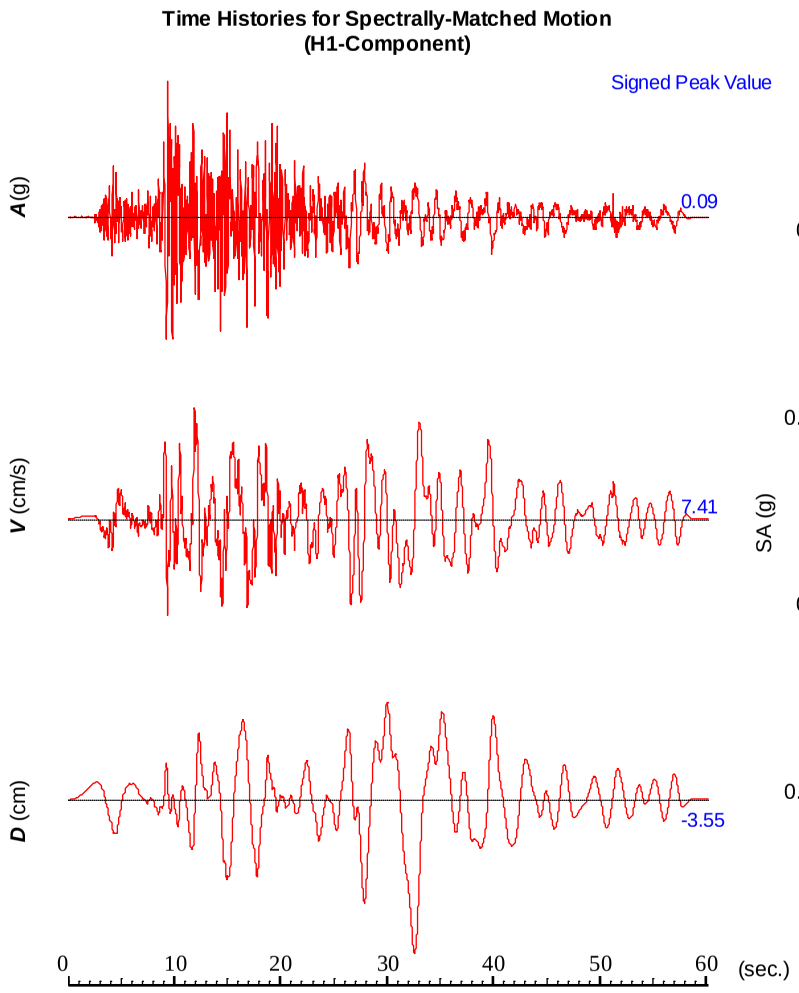
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

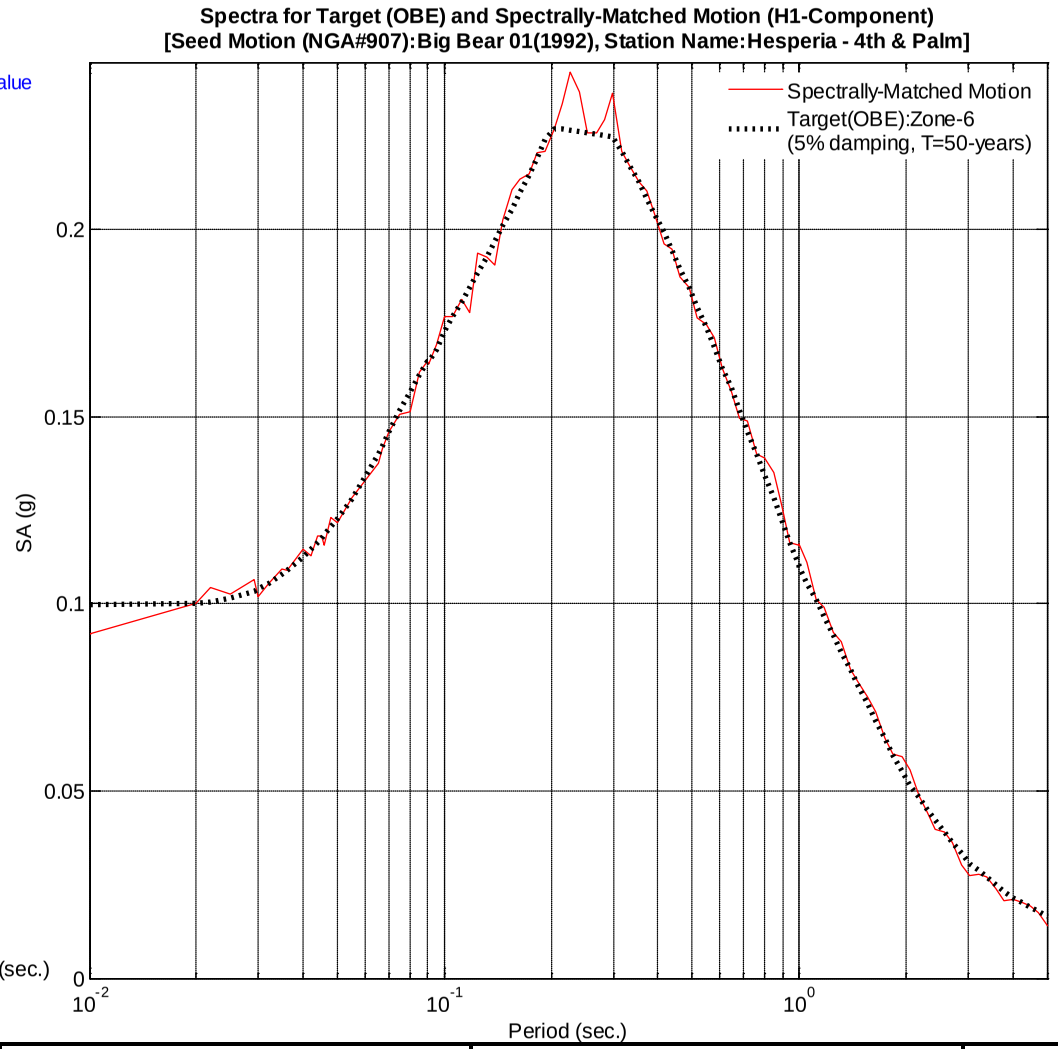
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 6 – SET NO. 2 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

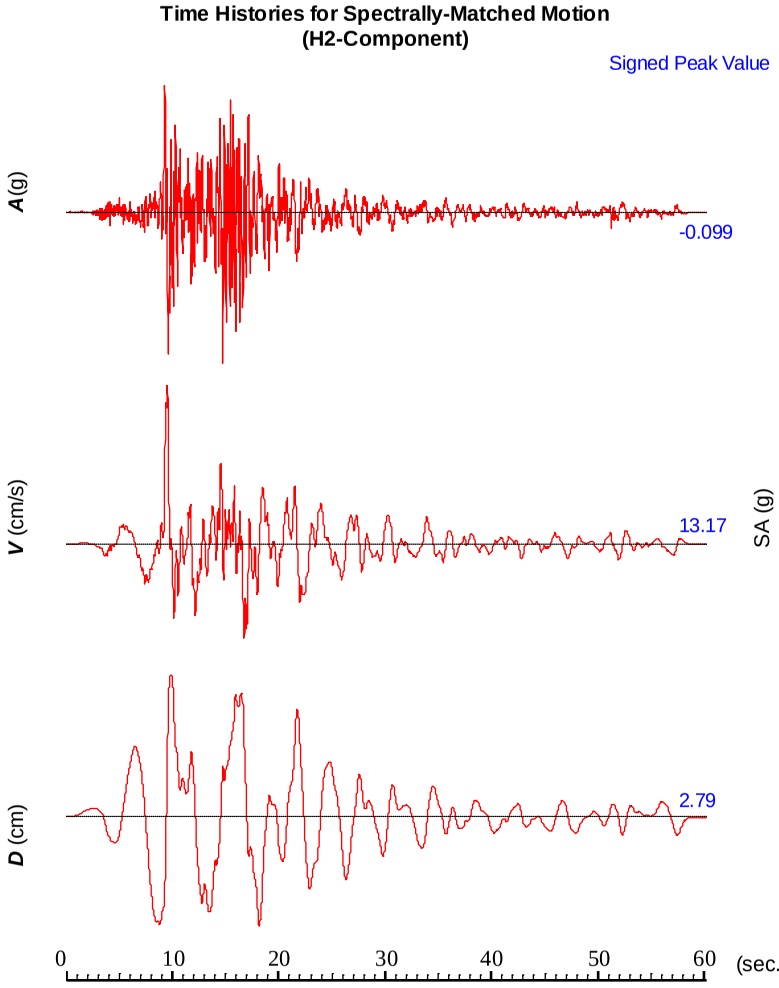
PLATE

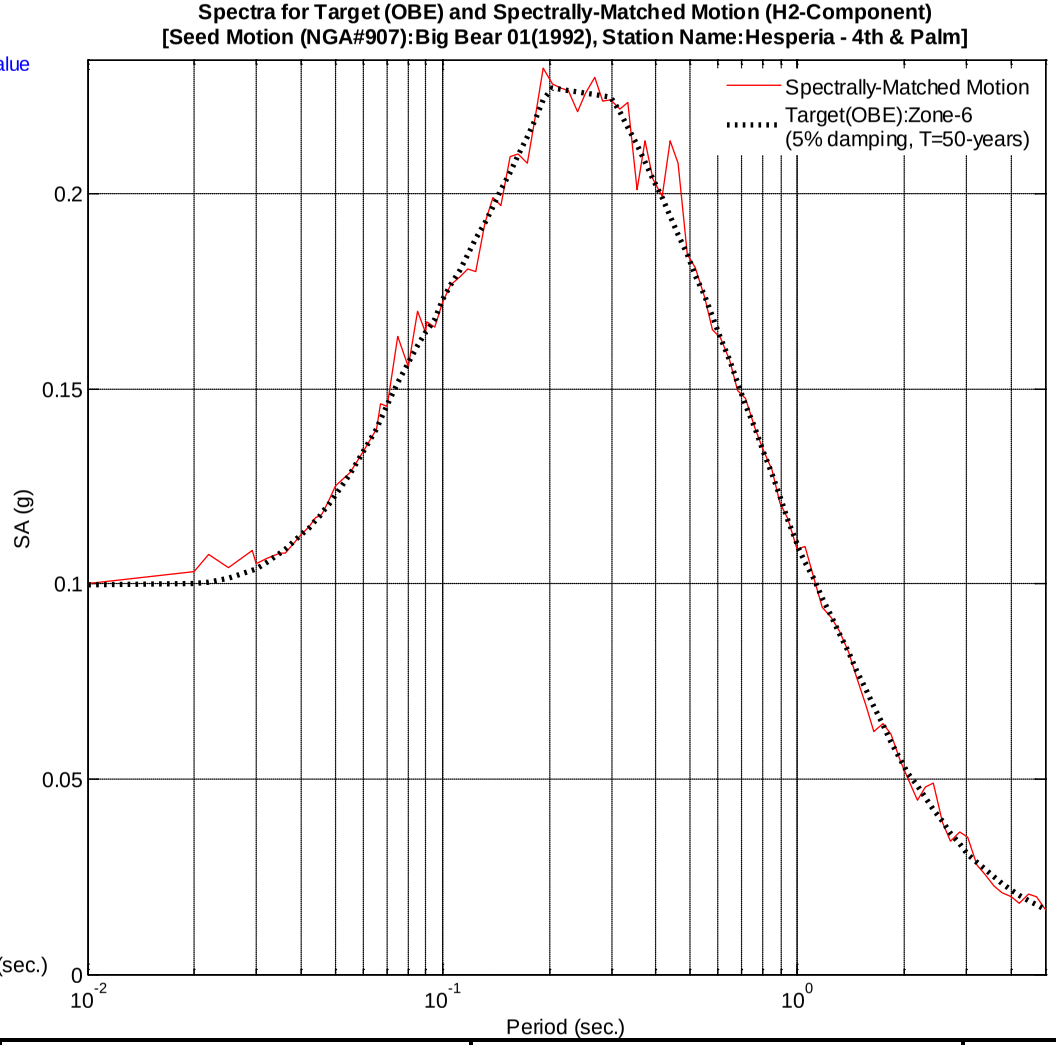
A6-6



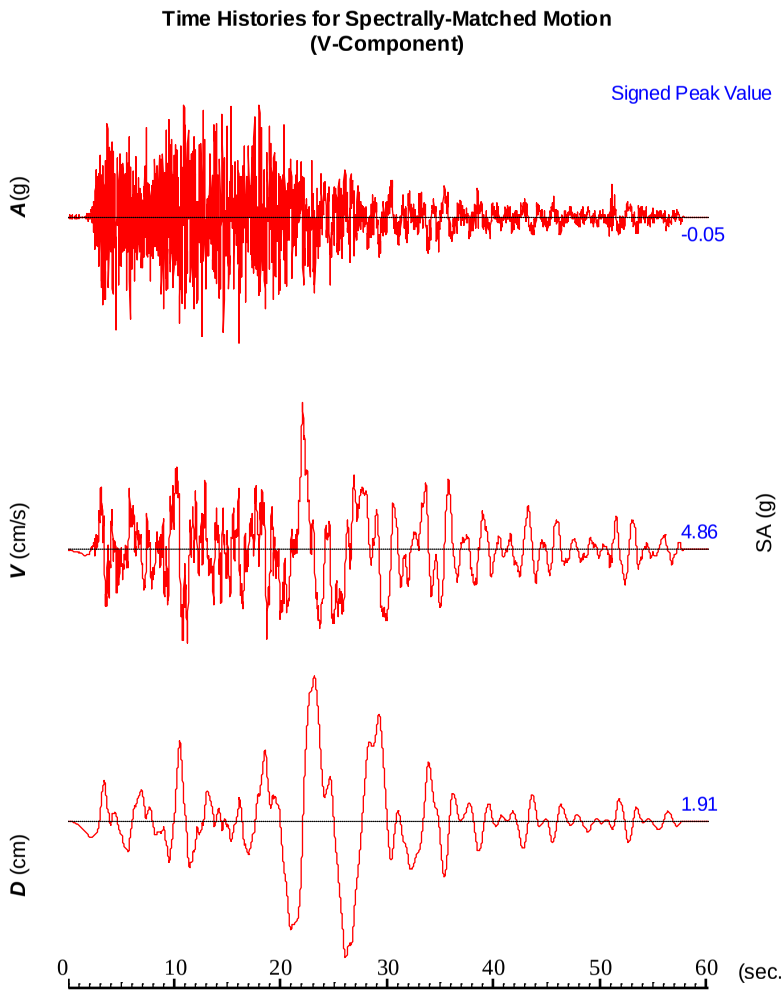


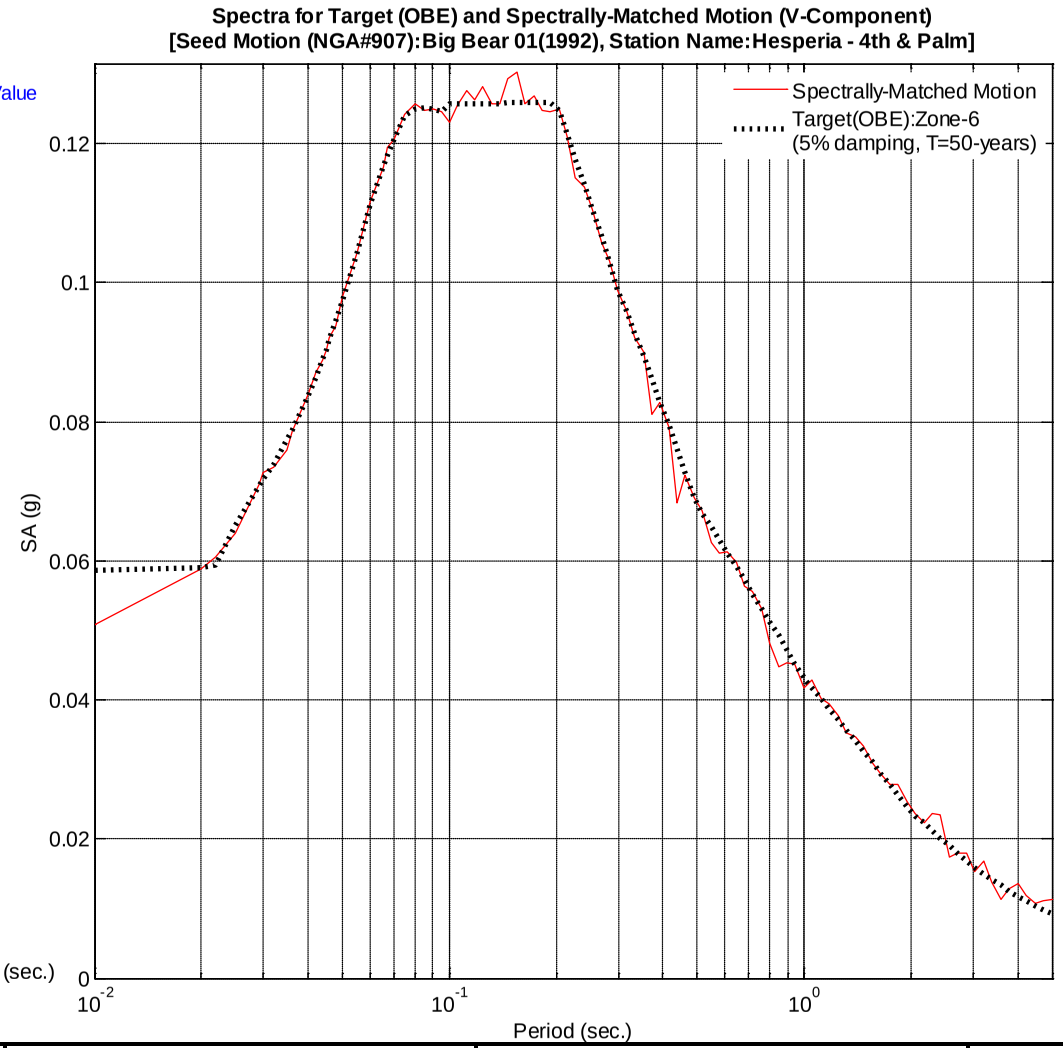
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 6 – SET NO. 3 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A6-7**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 6 – SET NO. 3 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A6-8**





SC SOLUTIONS

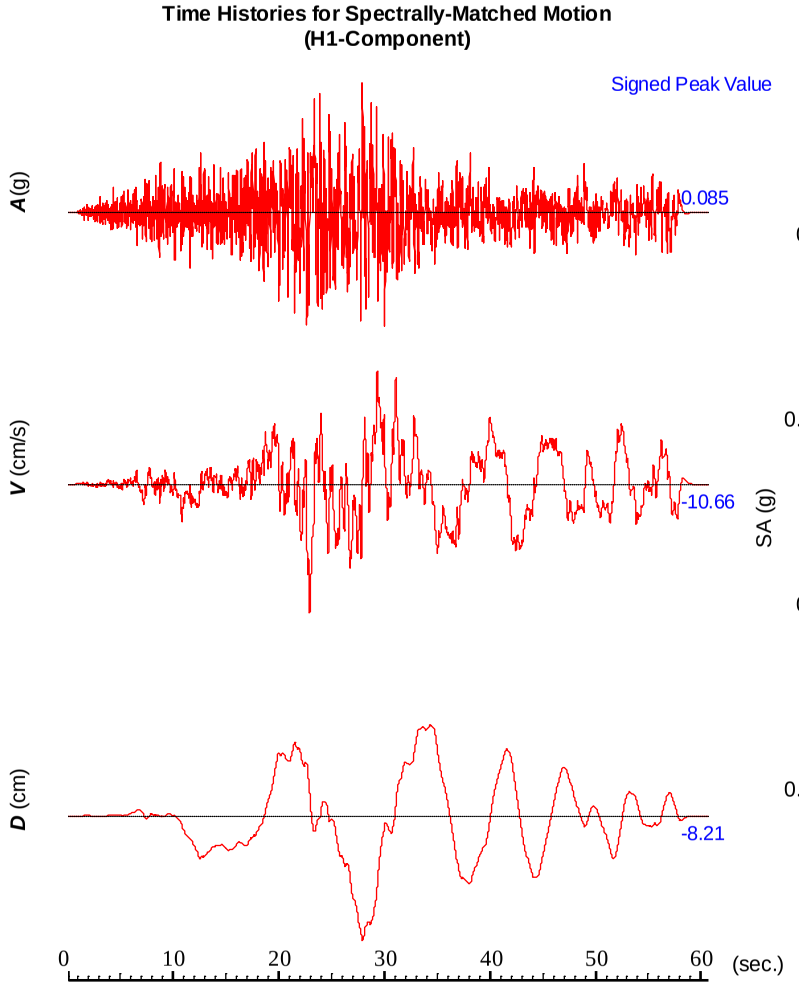
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

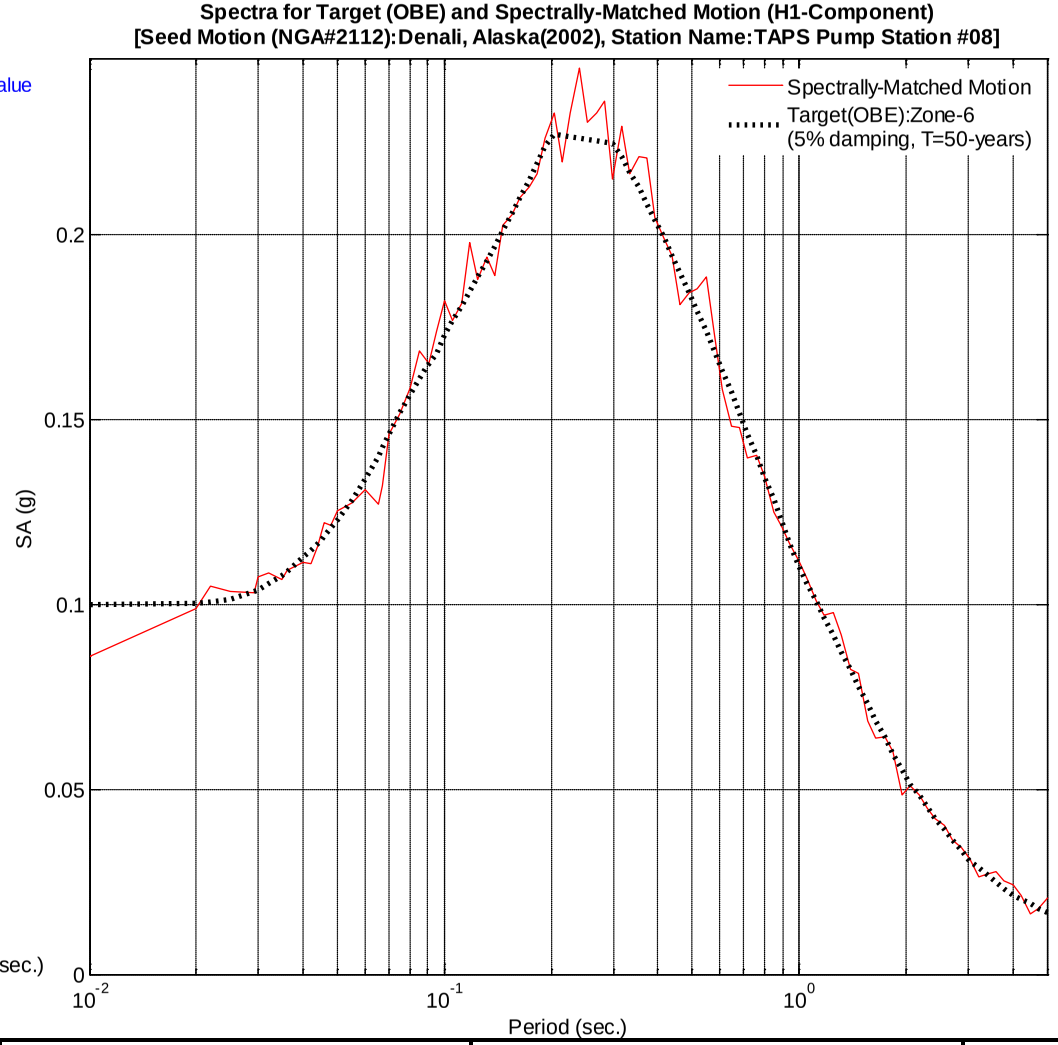
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 6 – SET NO. 3 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

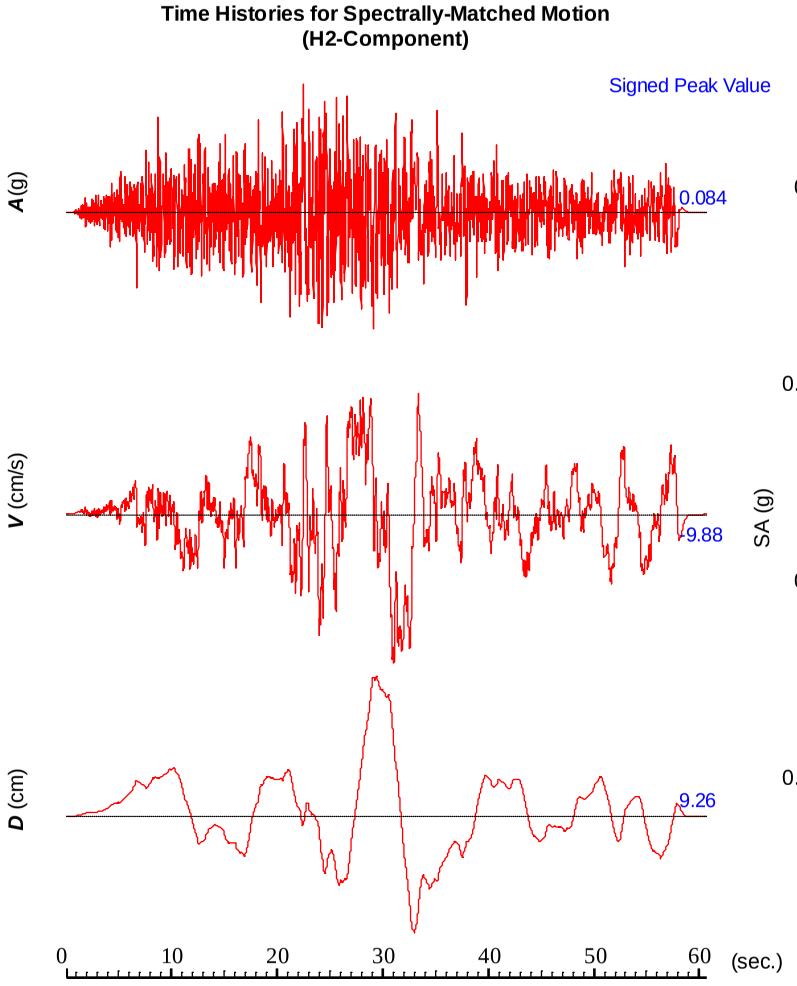
A6-9

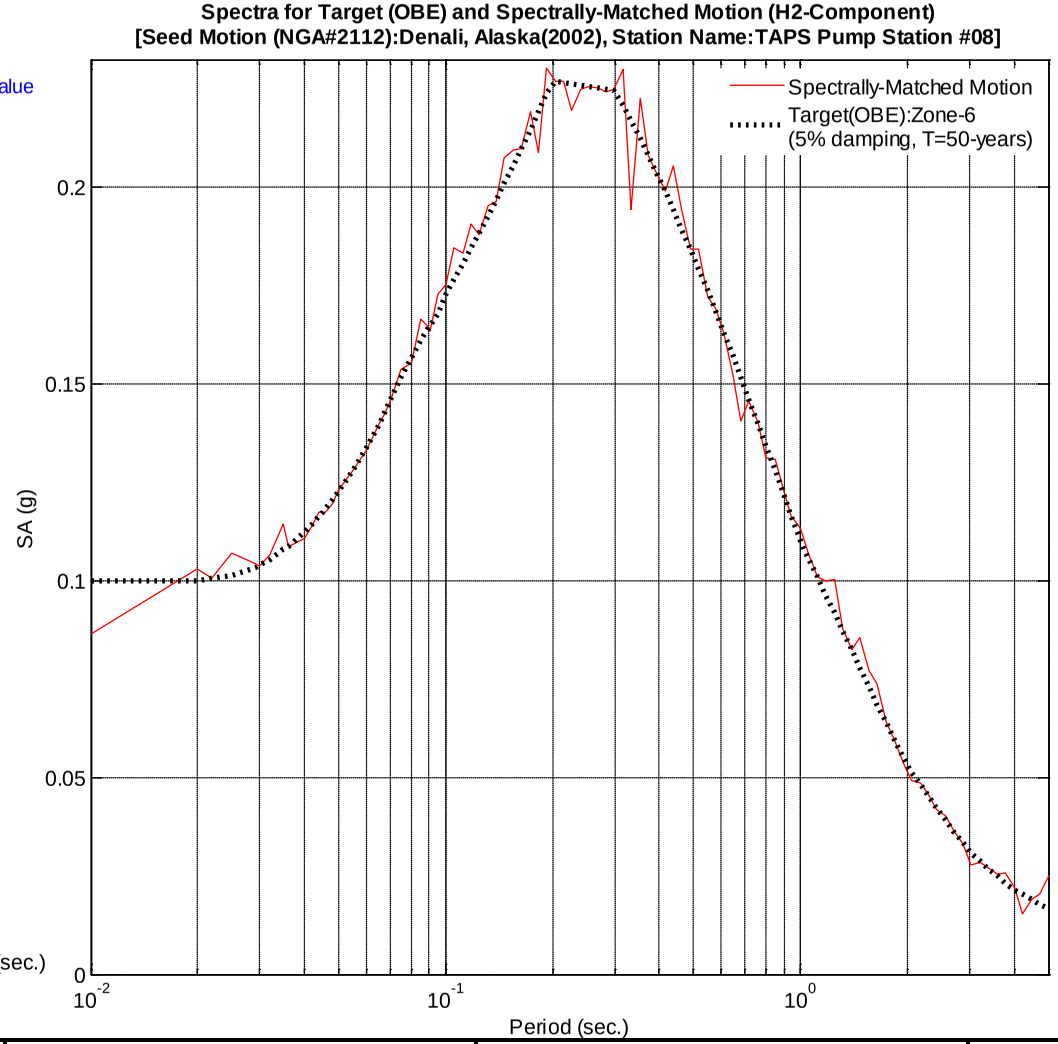




SC SOLUTIONS

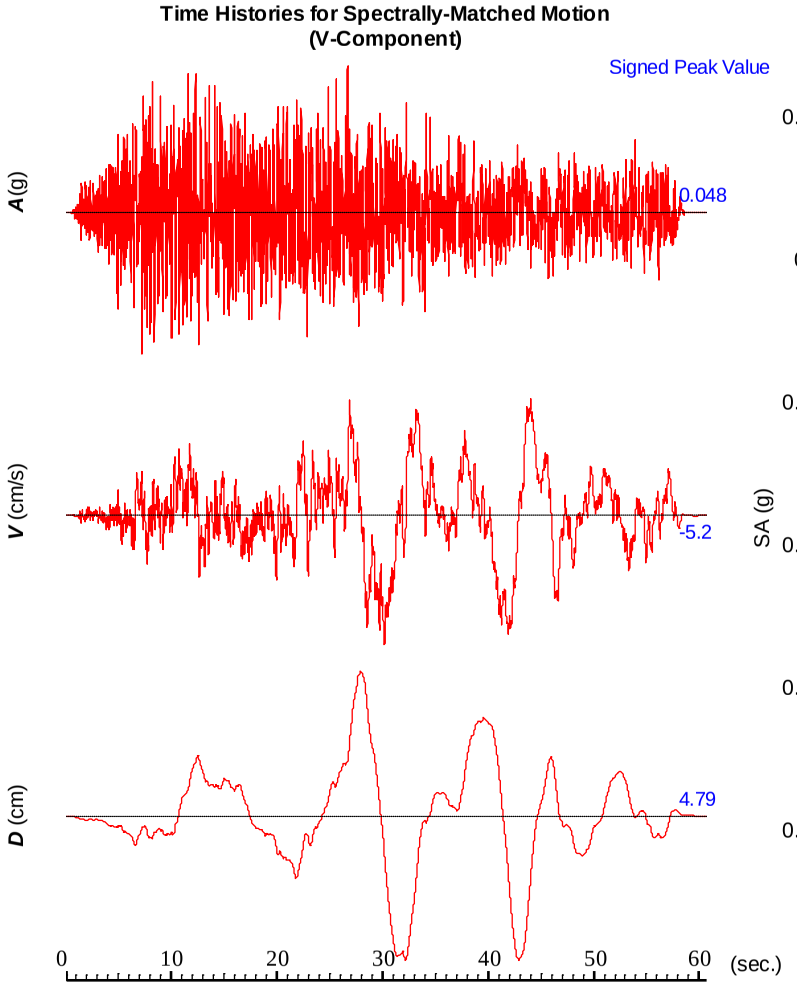
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 6 – SET NO. 4 – HORIZONTAL 1**	PLATE
BY:	J. Zhong		**A6-10**
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		

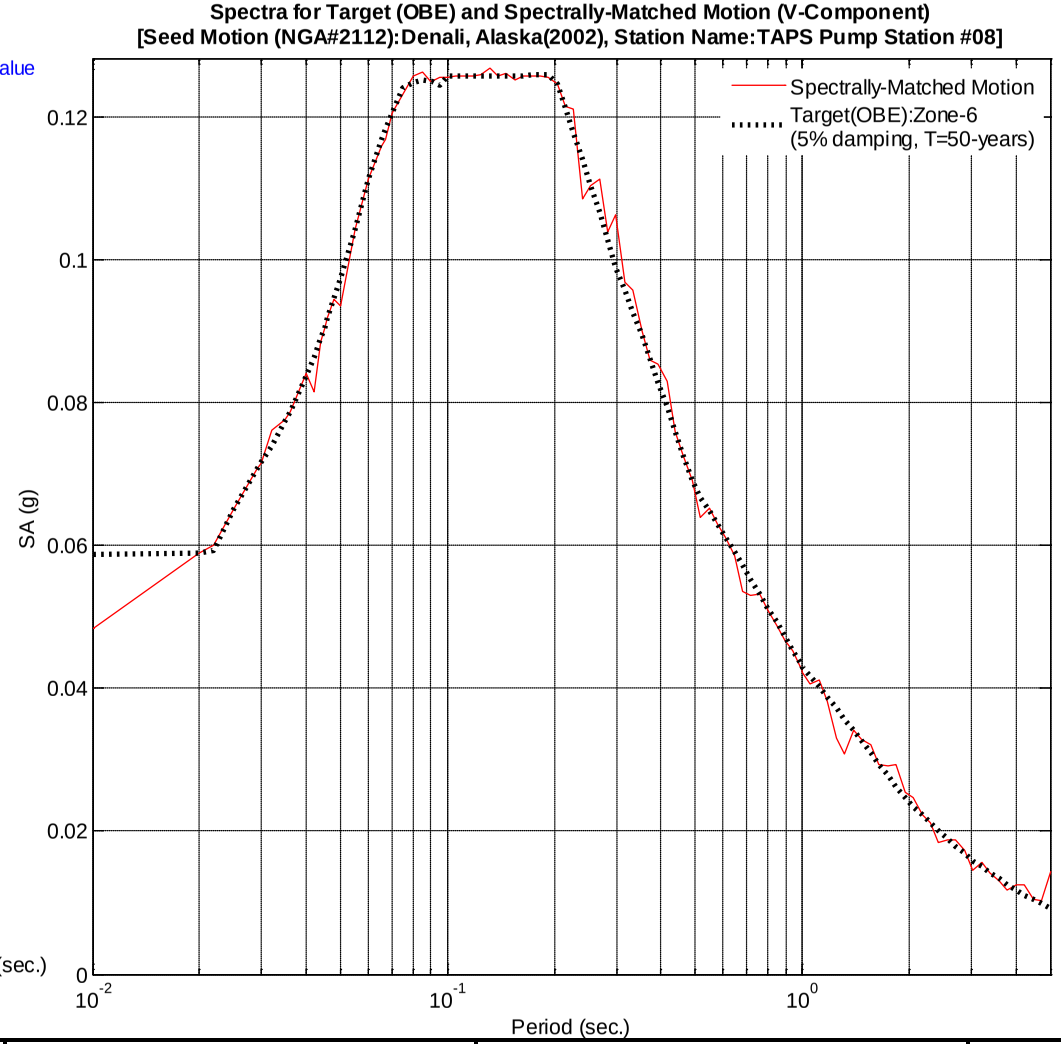




SC SOLUTIONS

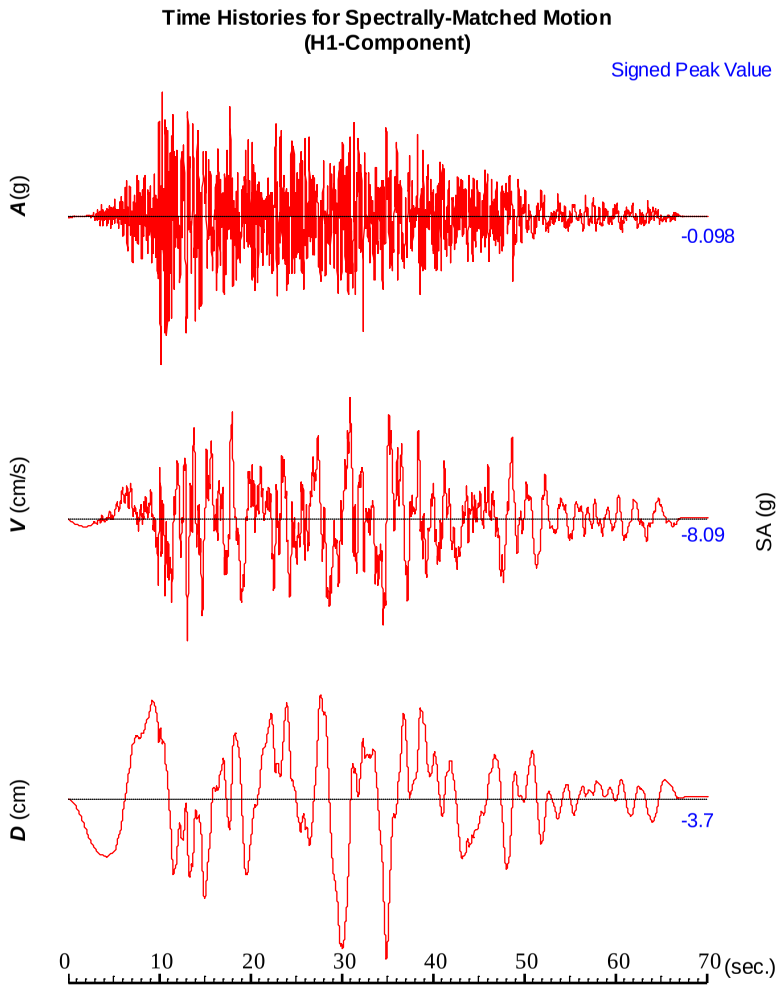
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 6 – SET NO. 4 – HORIZONTAL 2**	PLATE
BY:	J. Zhong		**A6-11**
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		

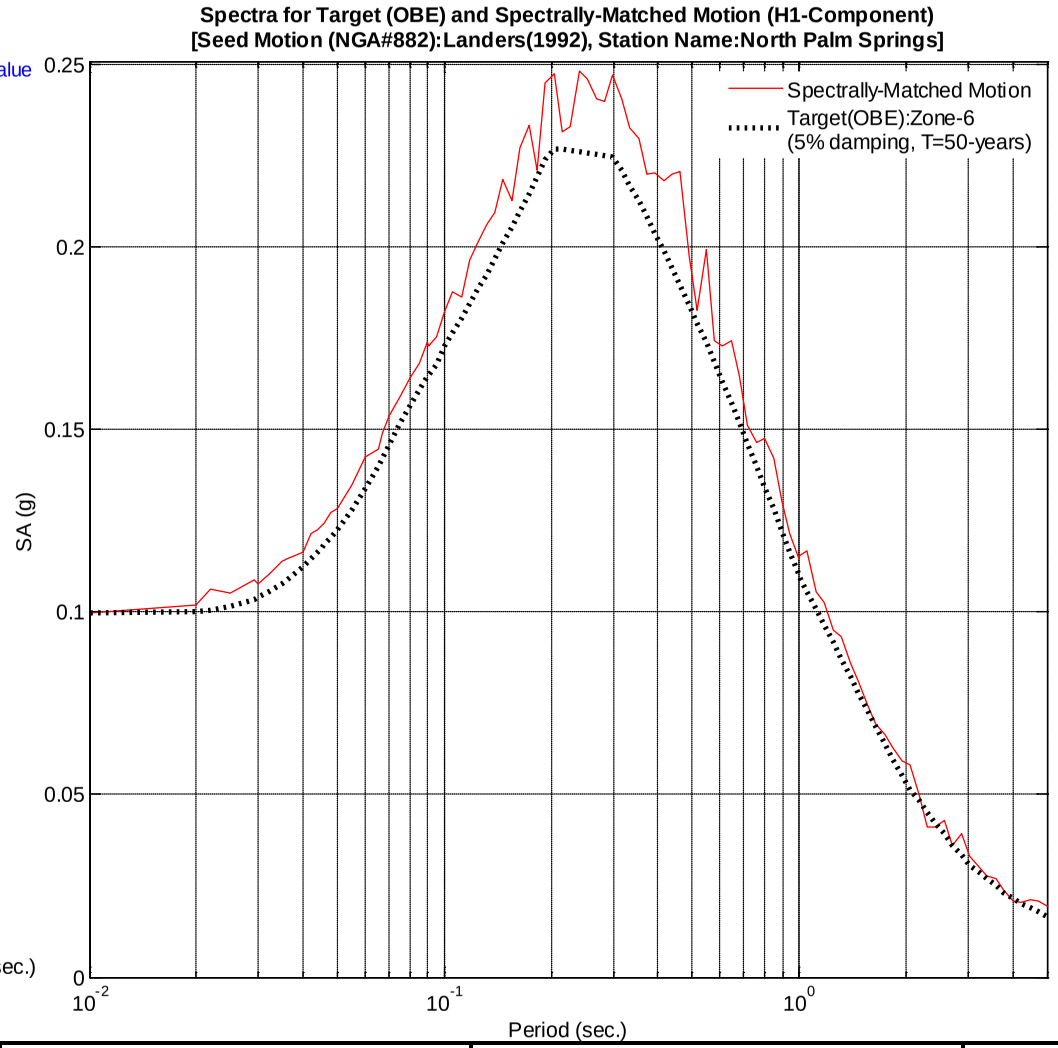




SC SOLUTIONS

PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 6 – SET NO. 4 – VERTICAL**	PLATE **A6-12**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS

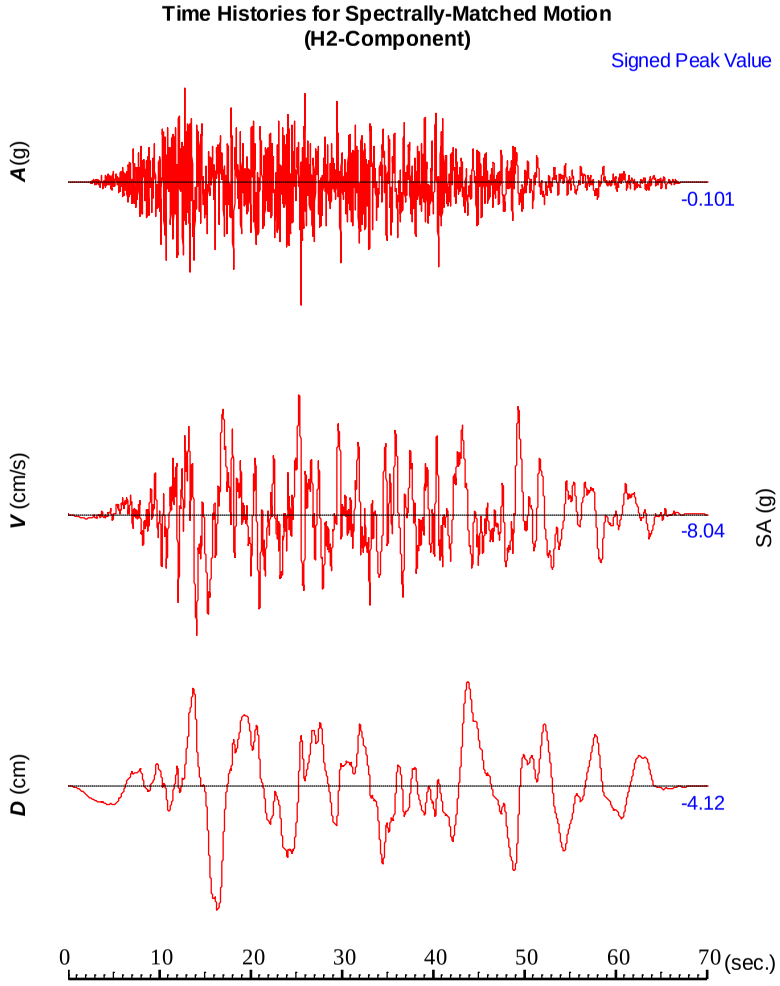
PROJ. NO:		
BY:	J. Zhong	
QC CHECK:	M. Perez	
QA CHECK:	M. Tabatabaie	
DATE:	02/24/2012	

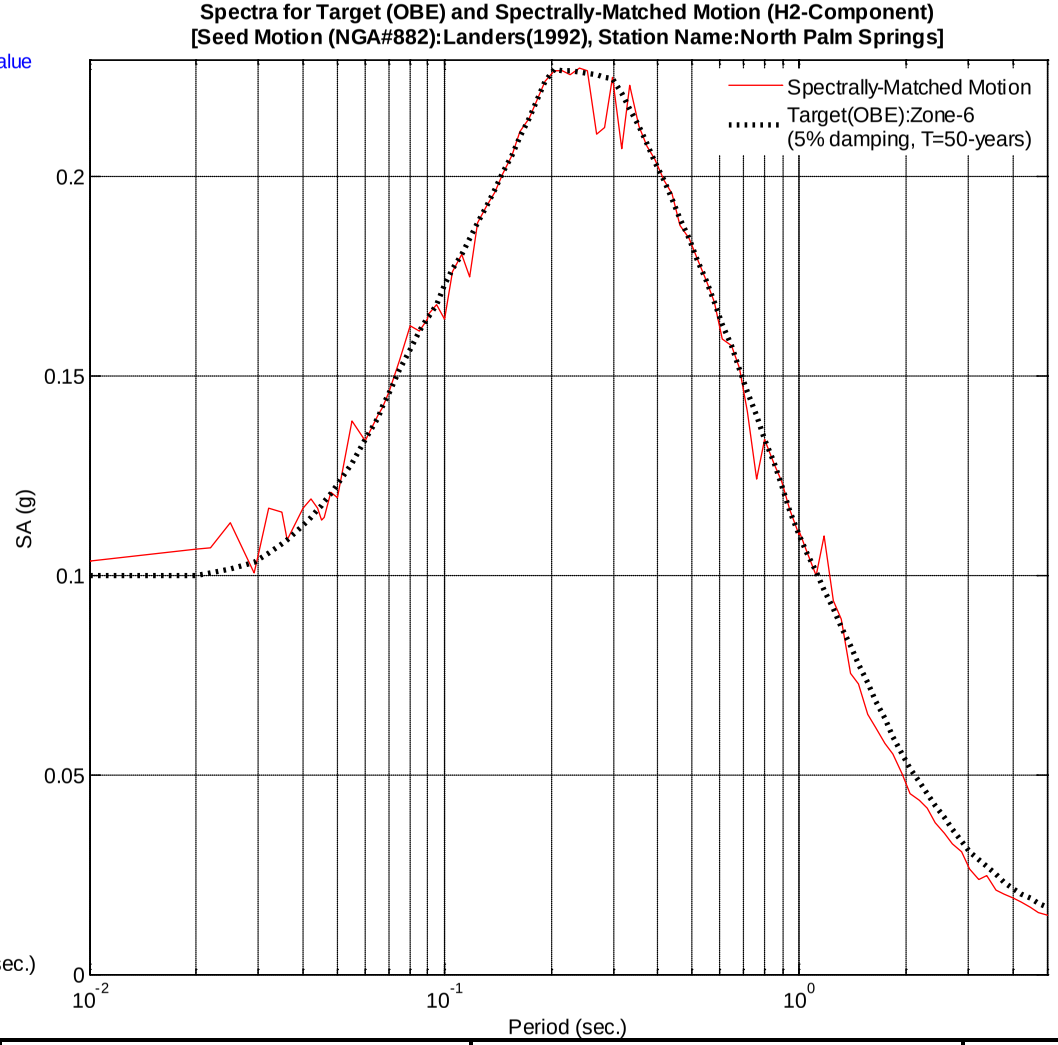
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 6 – SET NO. 5 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A6-13





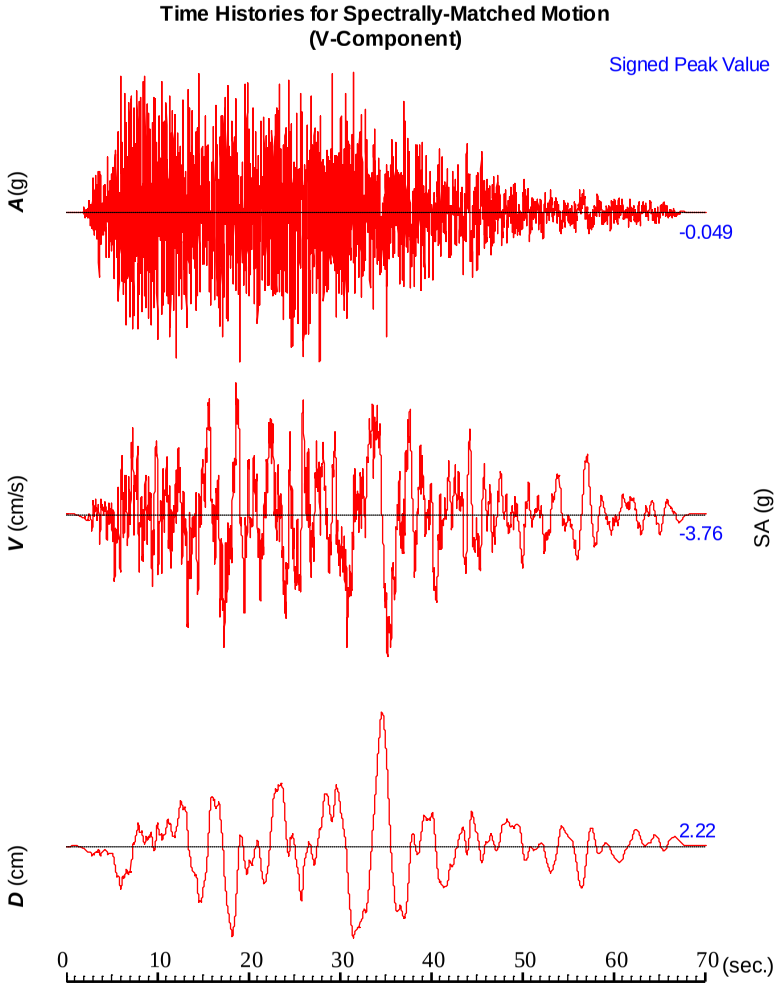
SC SOLUTIONS

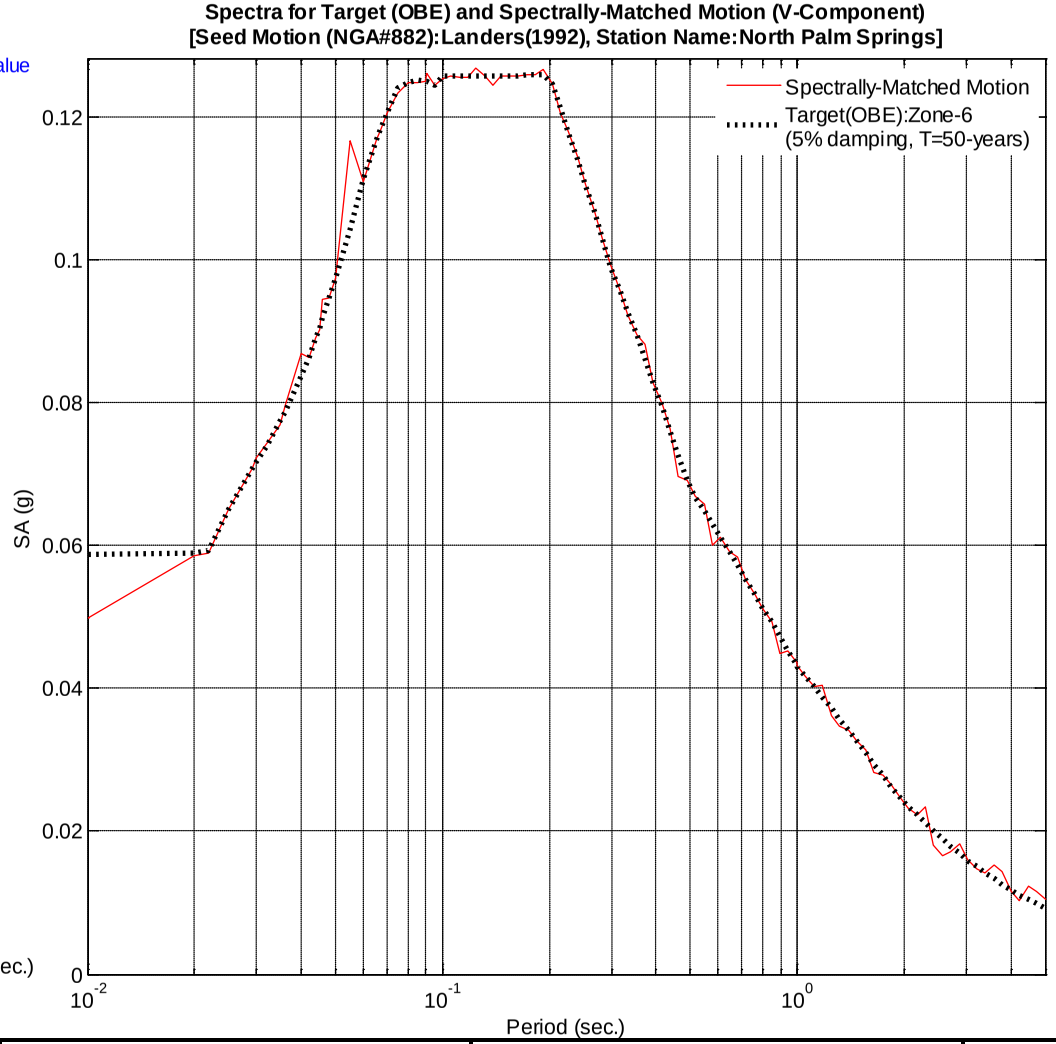
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 6 – SET NO. 5 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE
A6-14





SC SOLUTIONS

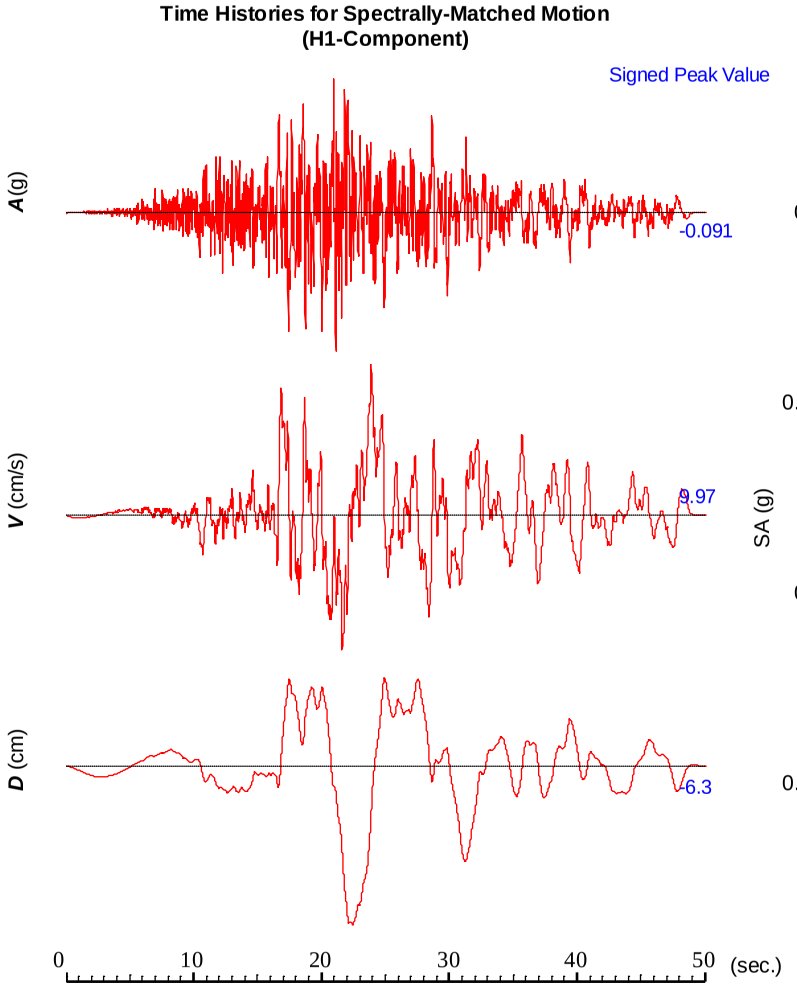
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

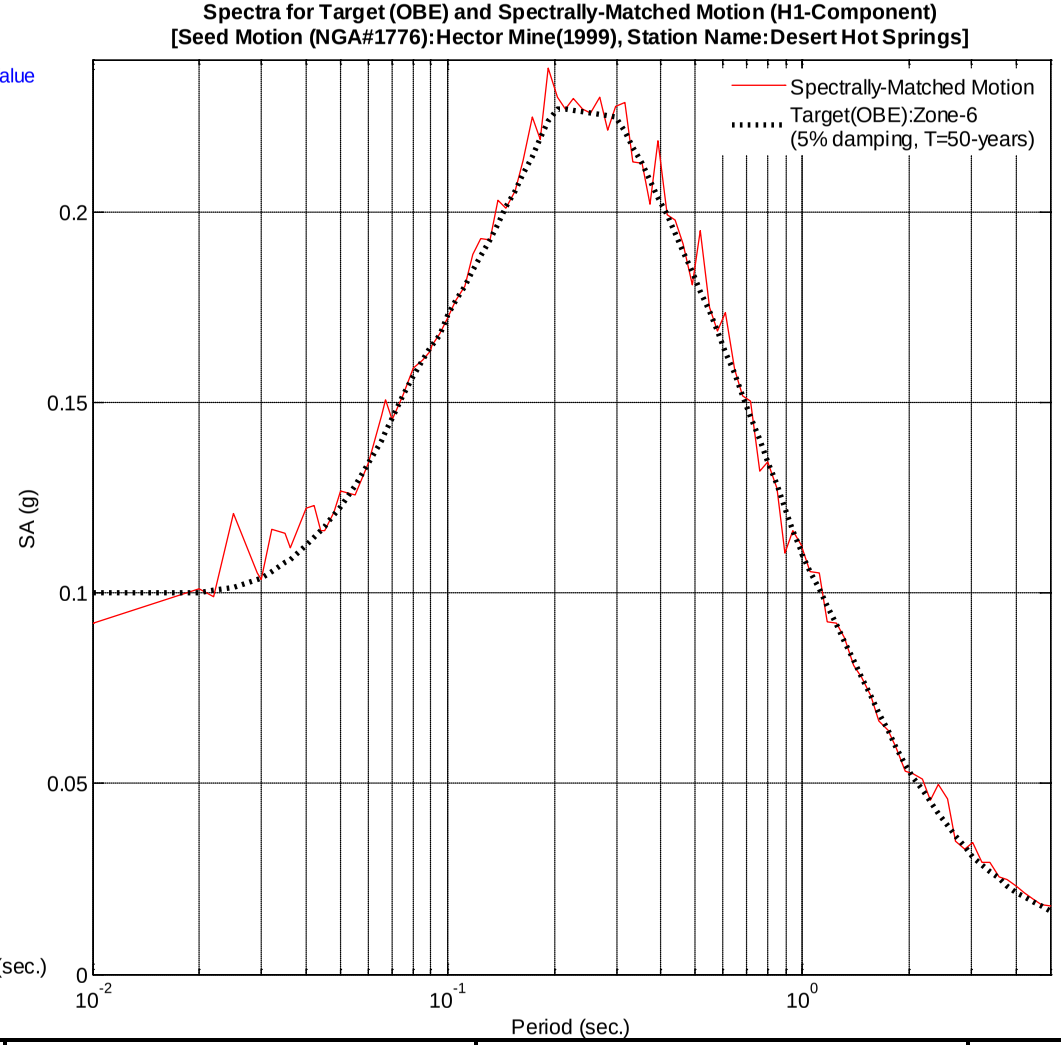
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 6 – SET NO. 5 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

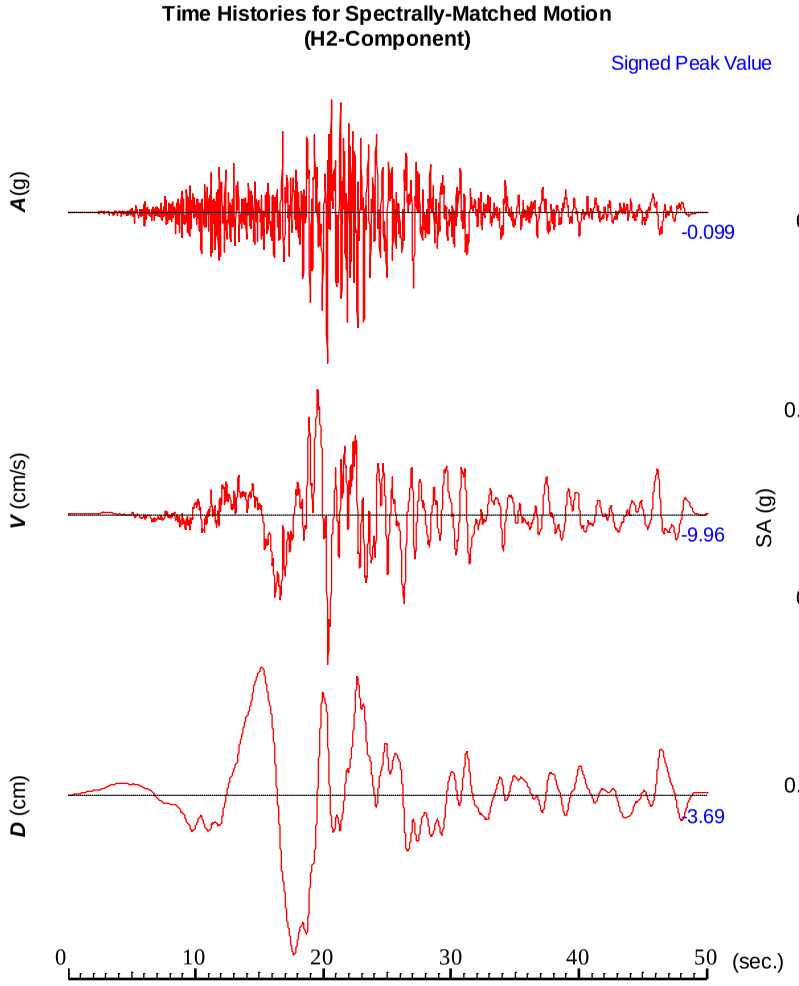
PLATE

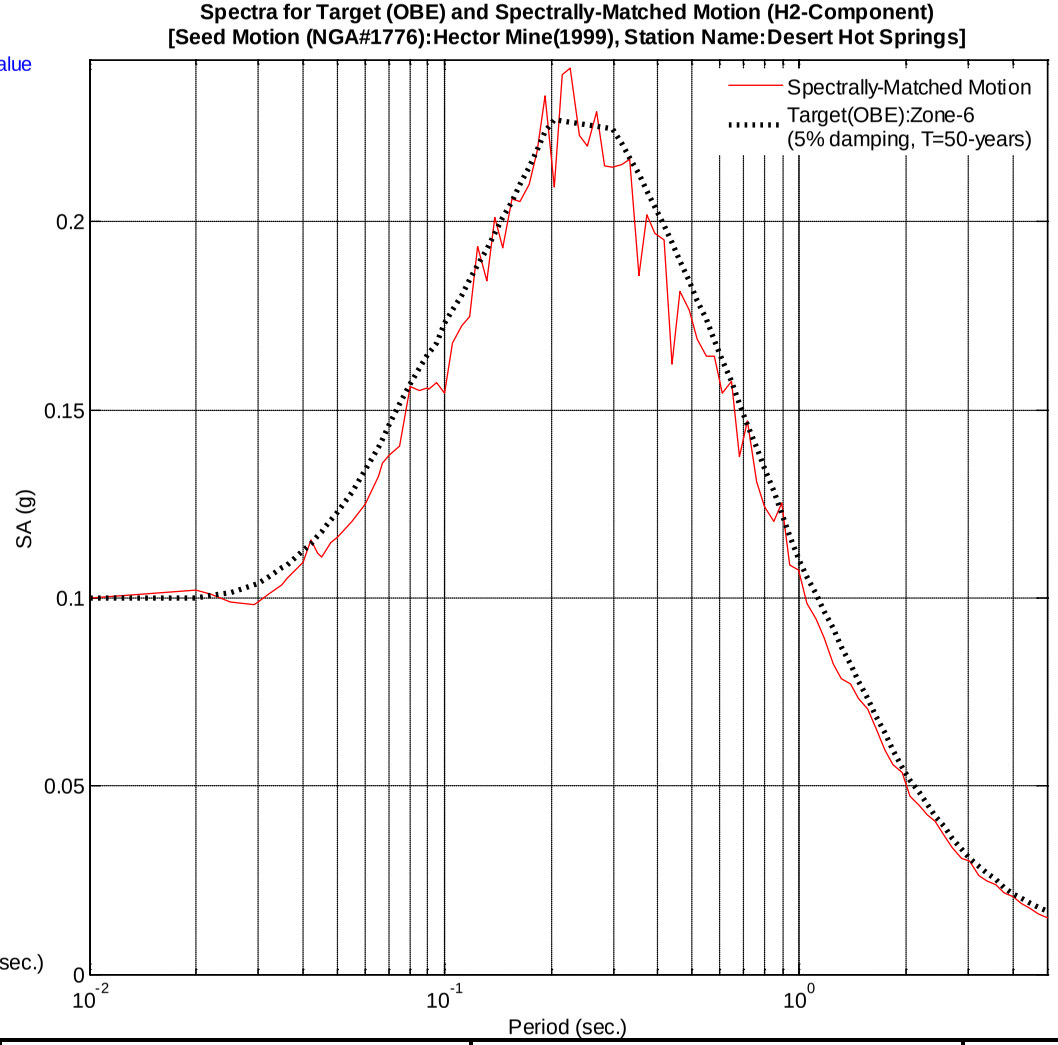
A6-15





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 6 – SET NO. 6 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A6-16**





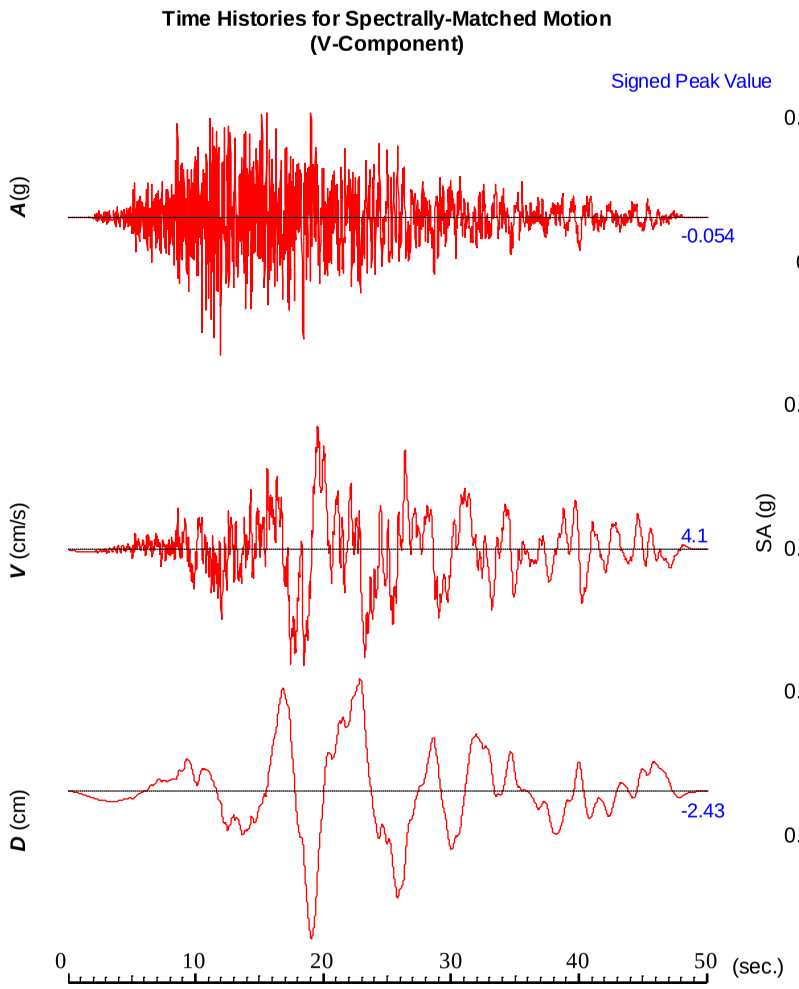
SC SOLUTIONS

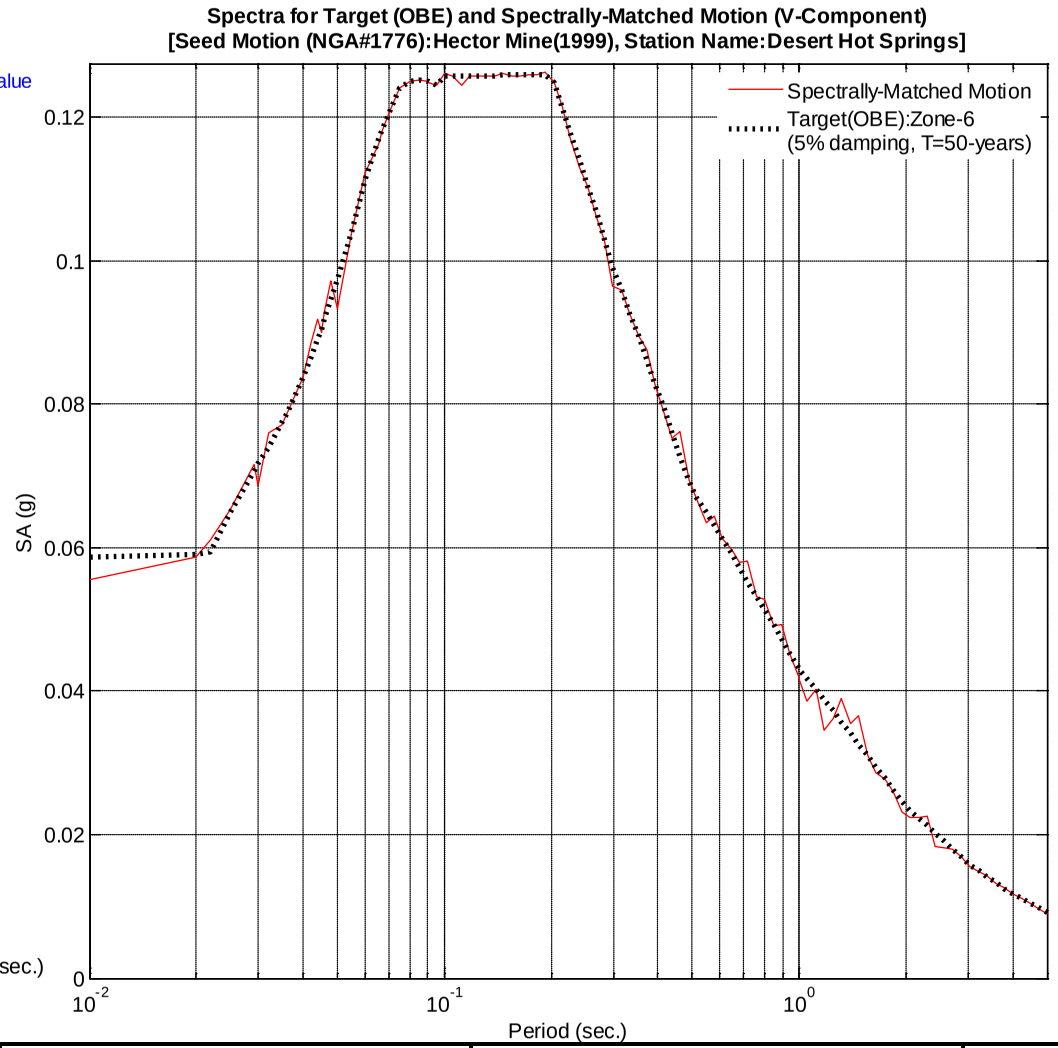
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 6 – SET NO. 6 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE
A6-17





SC SOLUTIONS

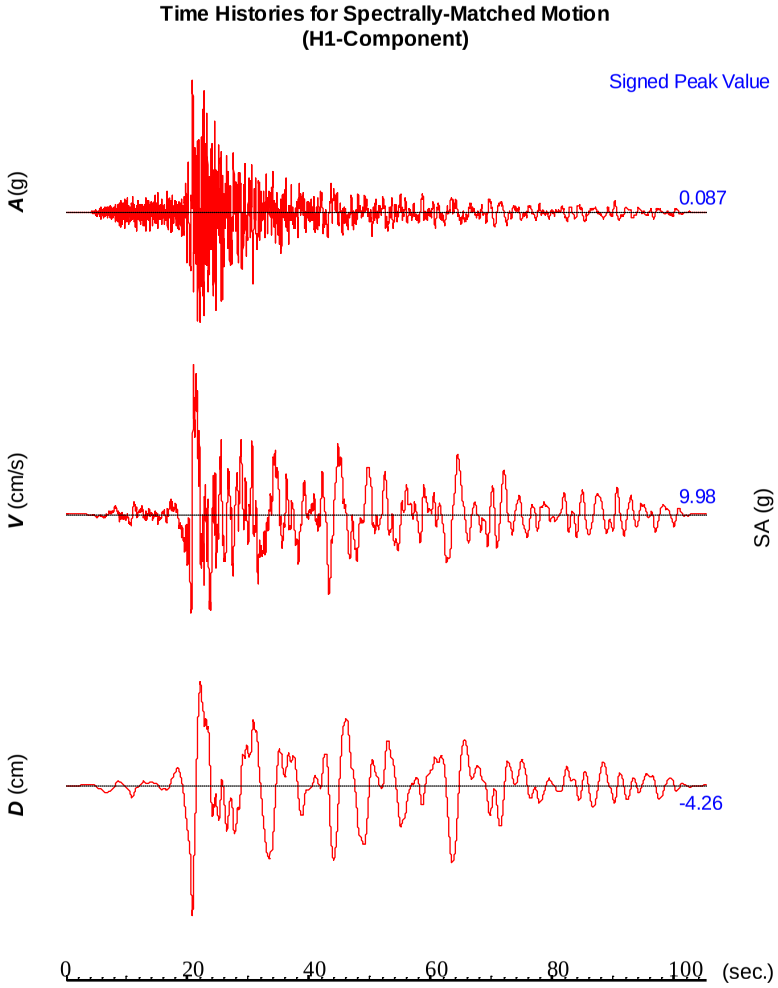
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

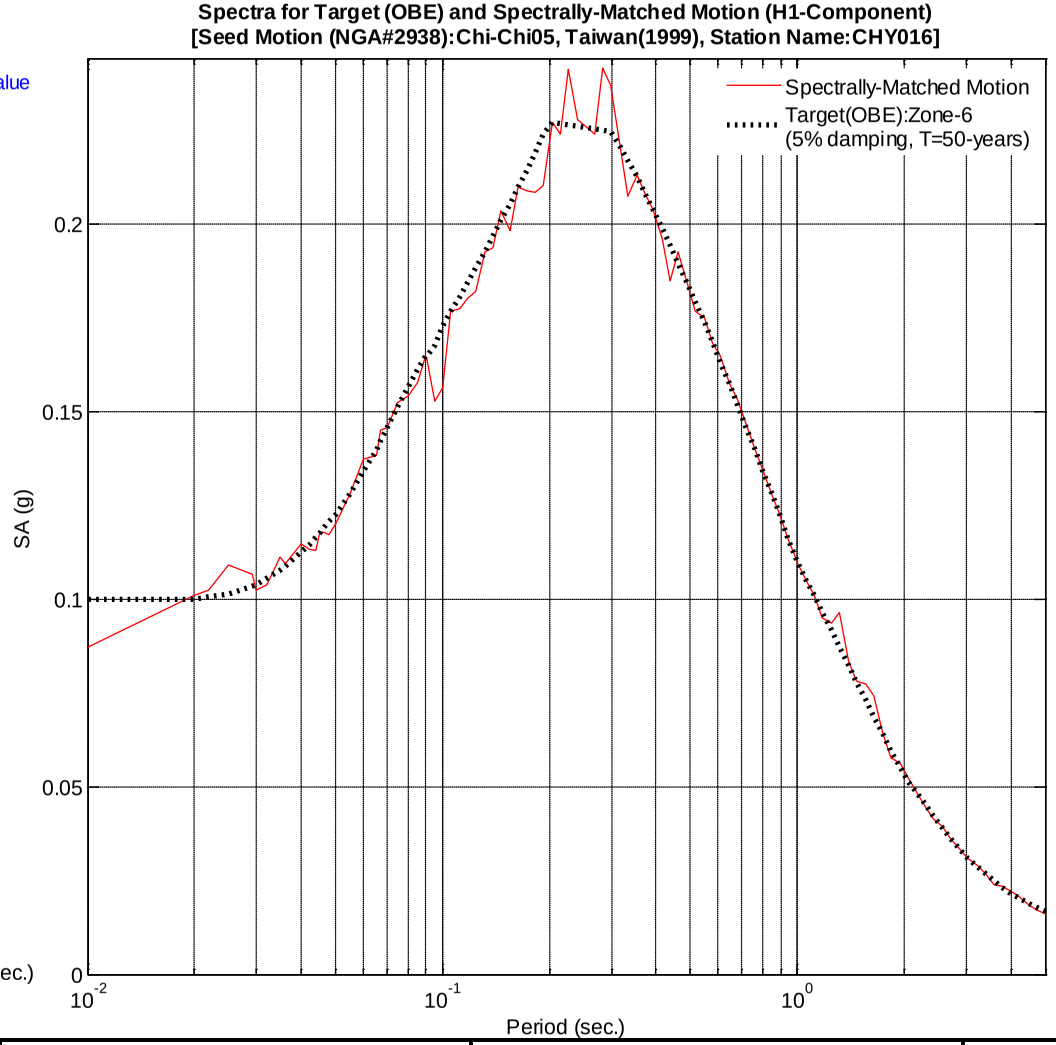
SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 6 – SET NO. 6 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

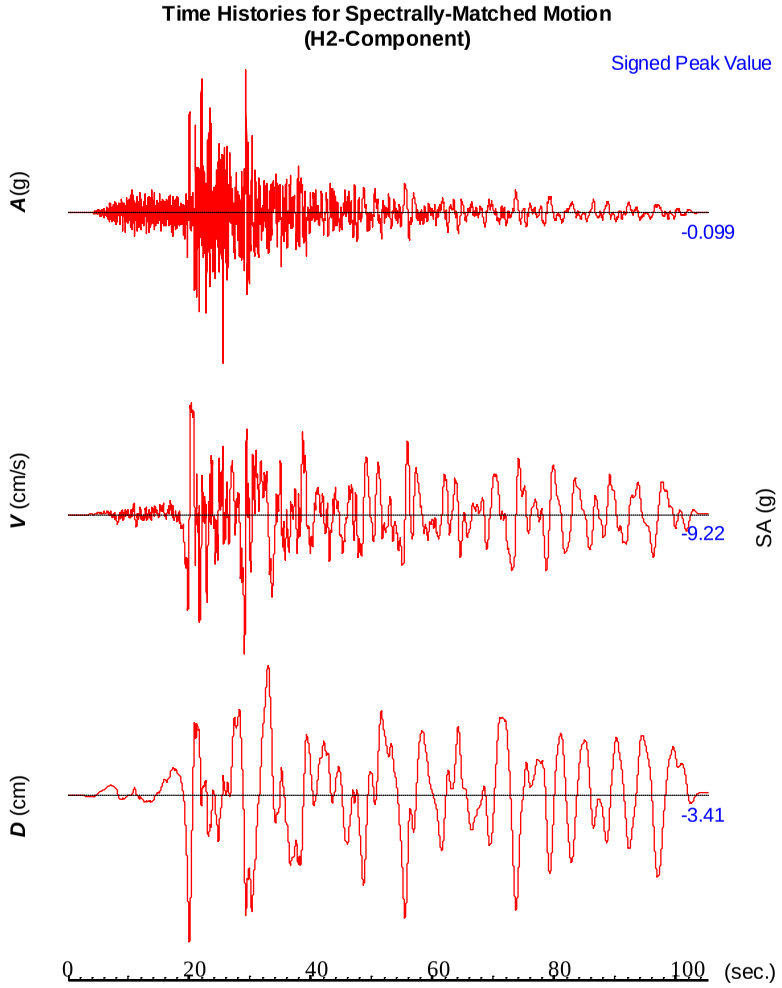
PLATE

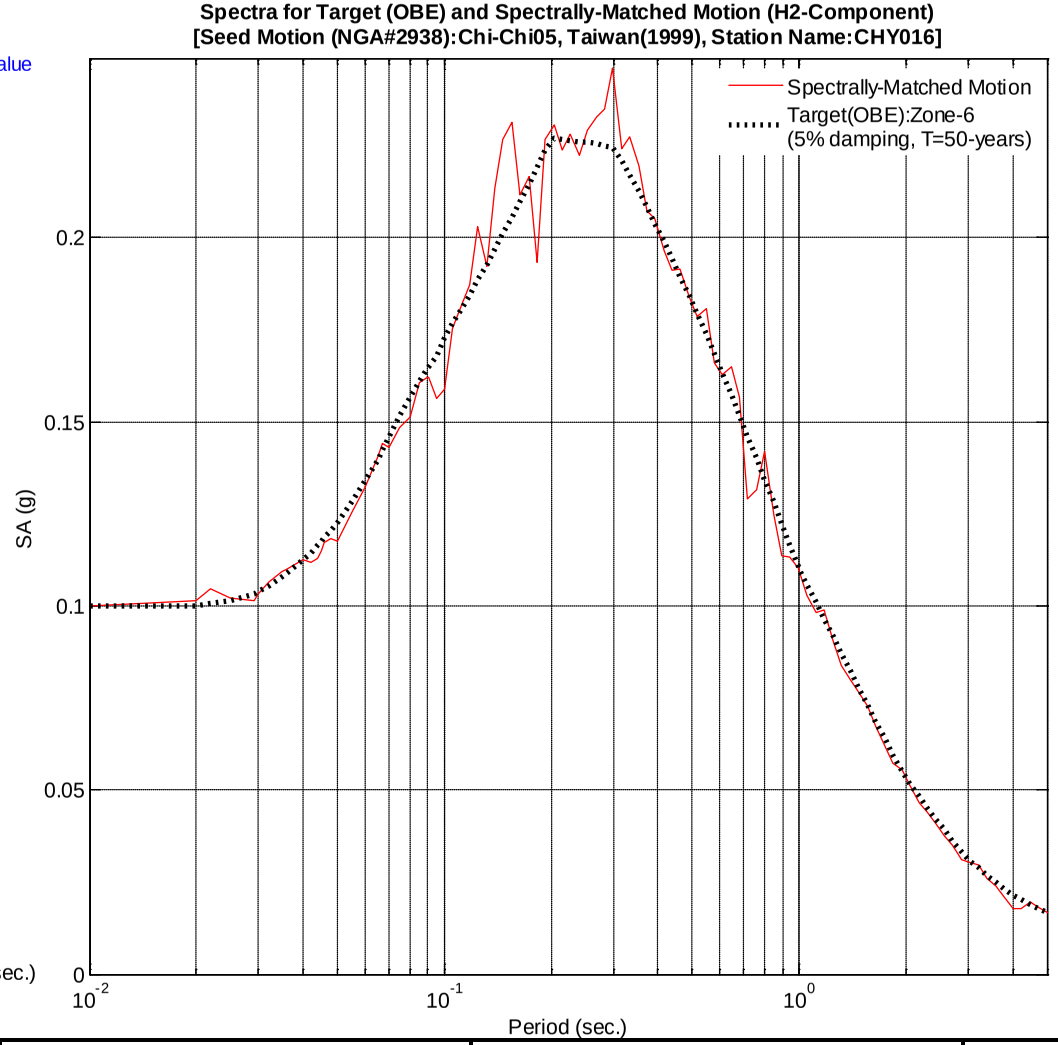
A6-18



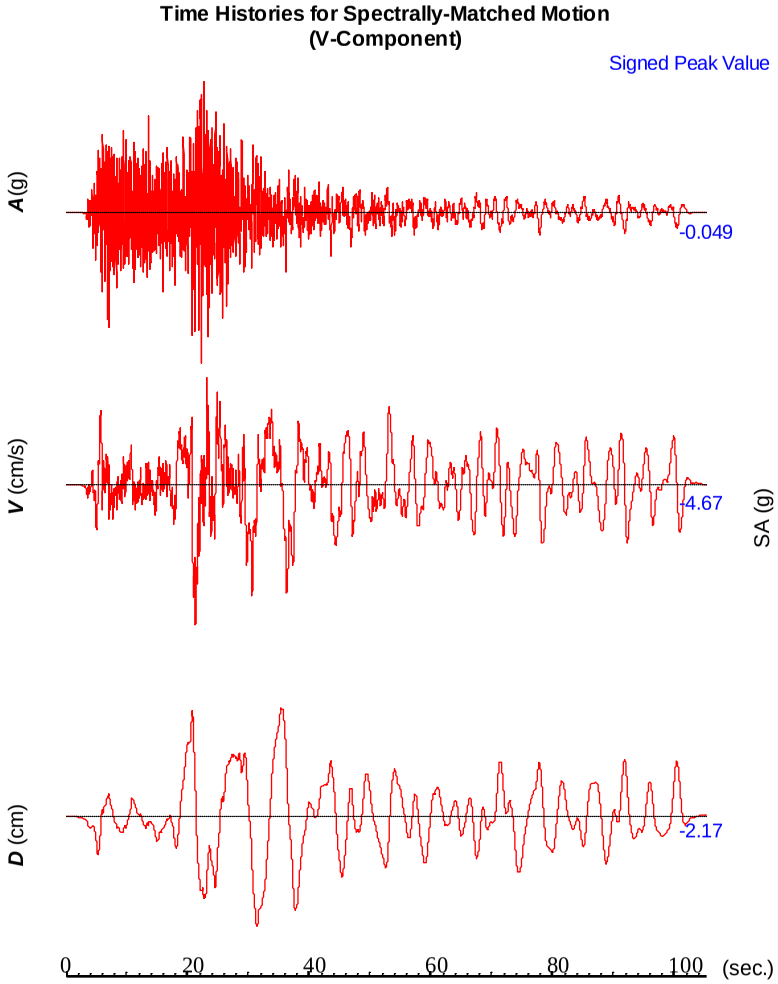


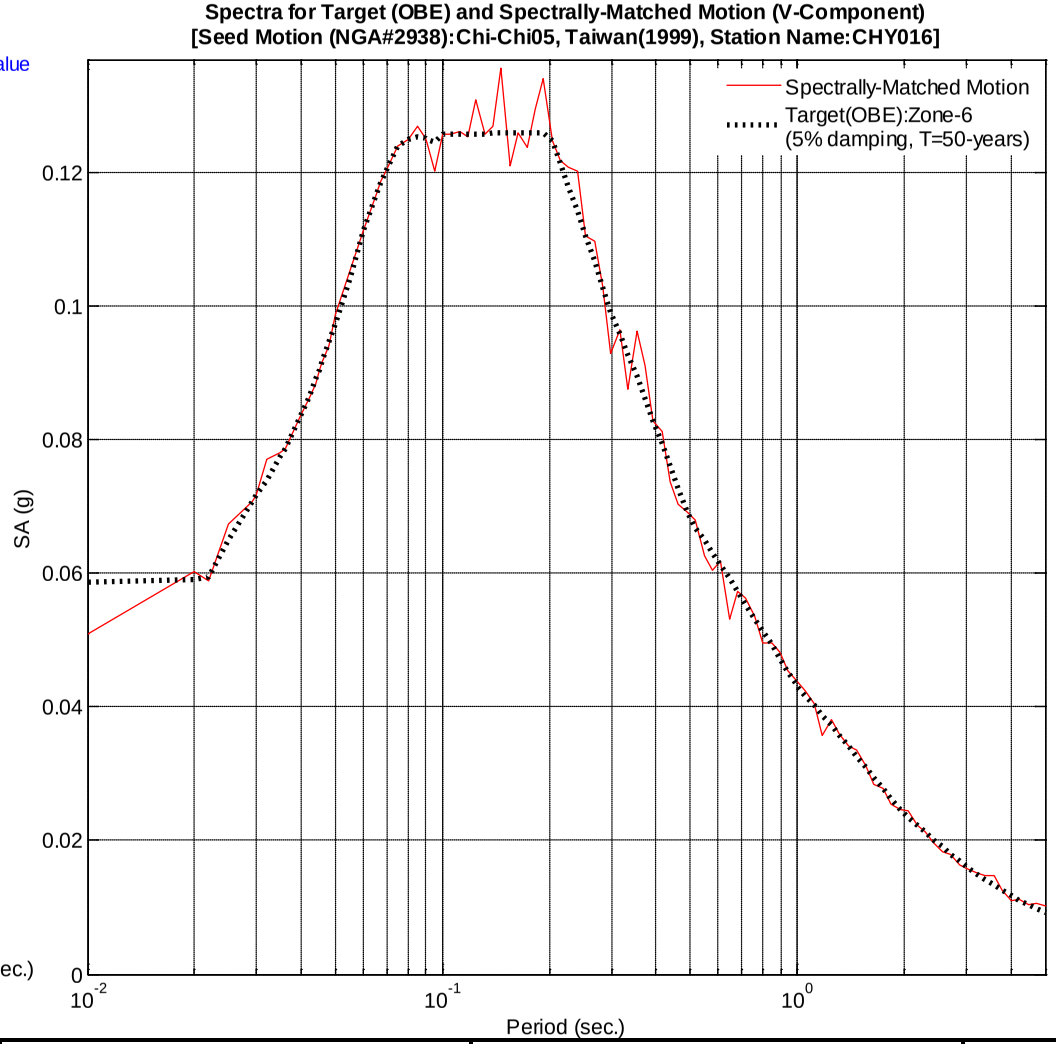
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 6 – SET NO. 7 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A6-19**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 6 – SET NO. 7 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A6-20**





SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 6 – SET NO. 7 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE
A6-21

Table A.7: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 7**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	832	Landers	1992	North Palm Springs	7.28	26.84	0.108	12.921	8.808	0.105	12.400	6.014	0.067	5.418	2.761
2	1637	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.105	9.156	3.420	0.095	9.204	3.660	0.057	3.927	2.131
3	907	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.099	8.006	3.982	0.109	14.283	3.059	0.056	4.925	1.833
4	2112	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.090	12.050	8.840	0.092	11.386	9.999	0.055	5.978	5.772
5	882	Imperial Valley-06	1979	Delta	6.53	22.03	0.107	8.868	4.055	0.108	8.637	4.519	0.058	4.098	2.357
6	1776	Manjil, Iran	1990	Rudsar	7.37	64.47	0.097	11.149	6.851	0.109	10.912	4.046	0.064	4.968	2.831
7	2938	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.094	10.916	4.573	0.109	10.098	3.743	0.057	4.911	2.320

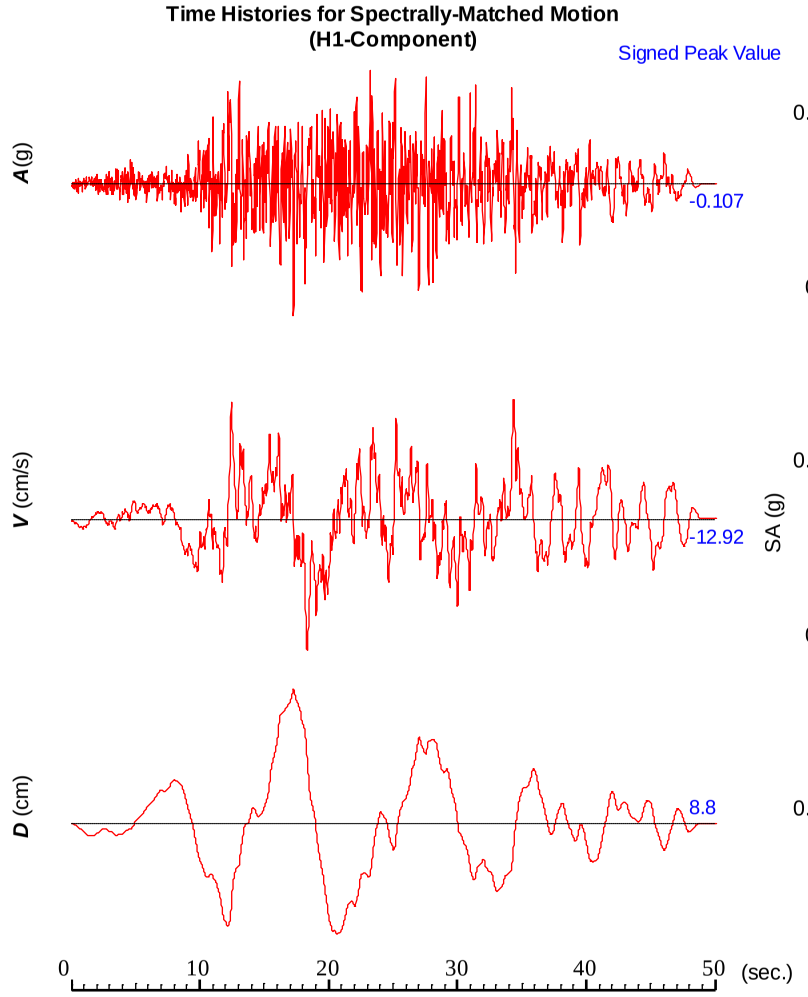
SC SOLUTIONS

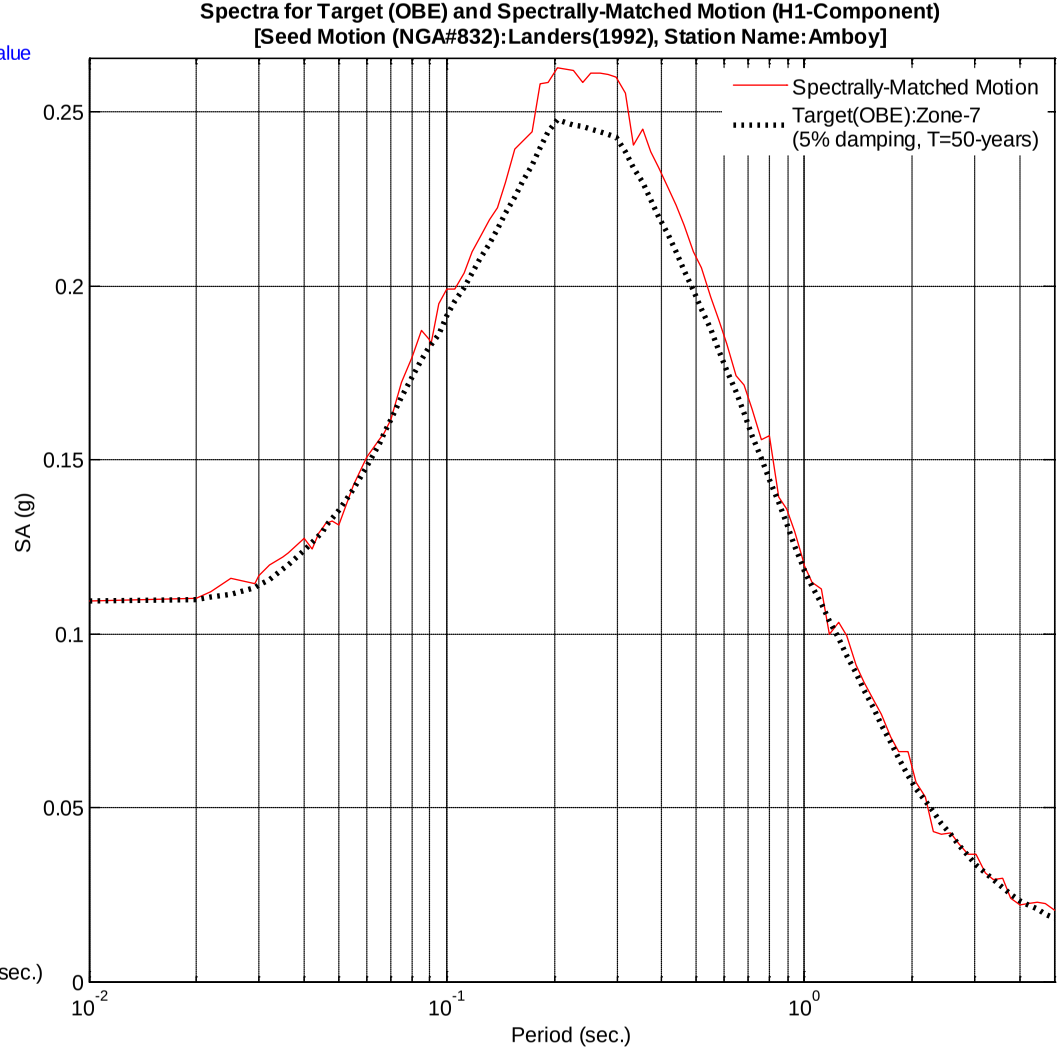
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS OBE – ZONE 7

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

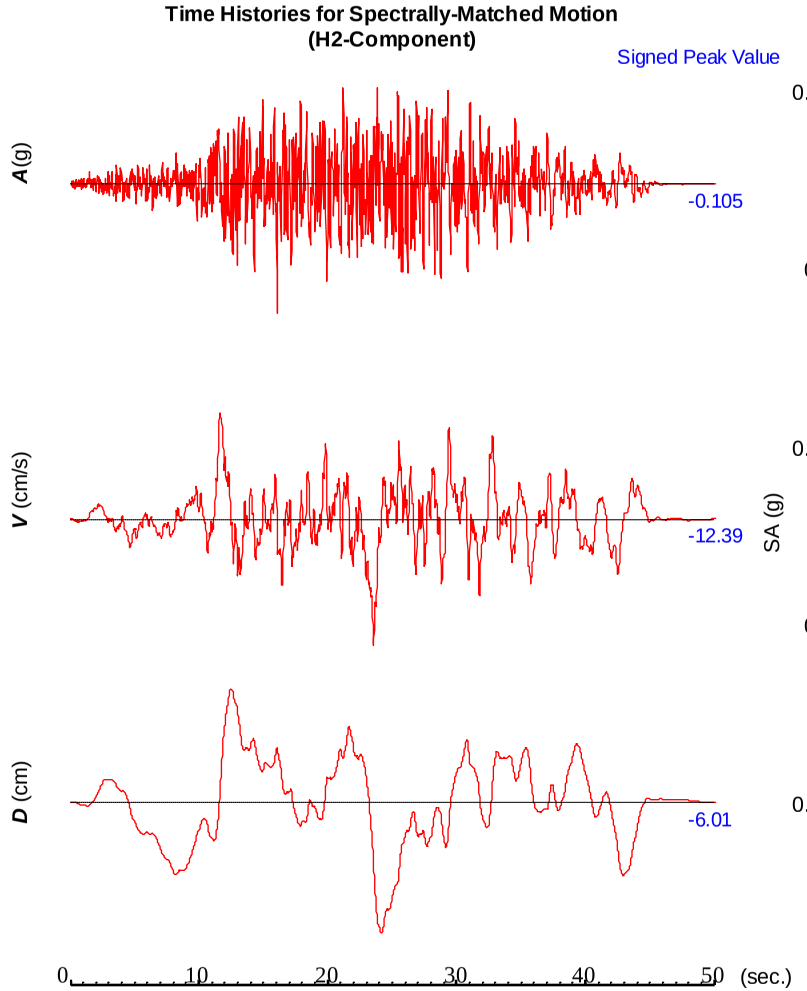
PLATE
A7-0

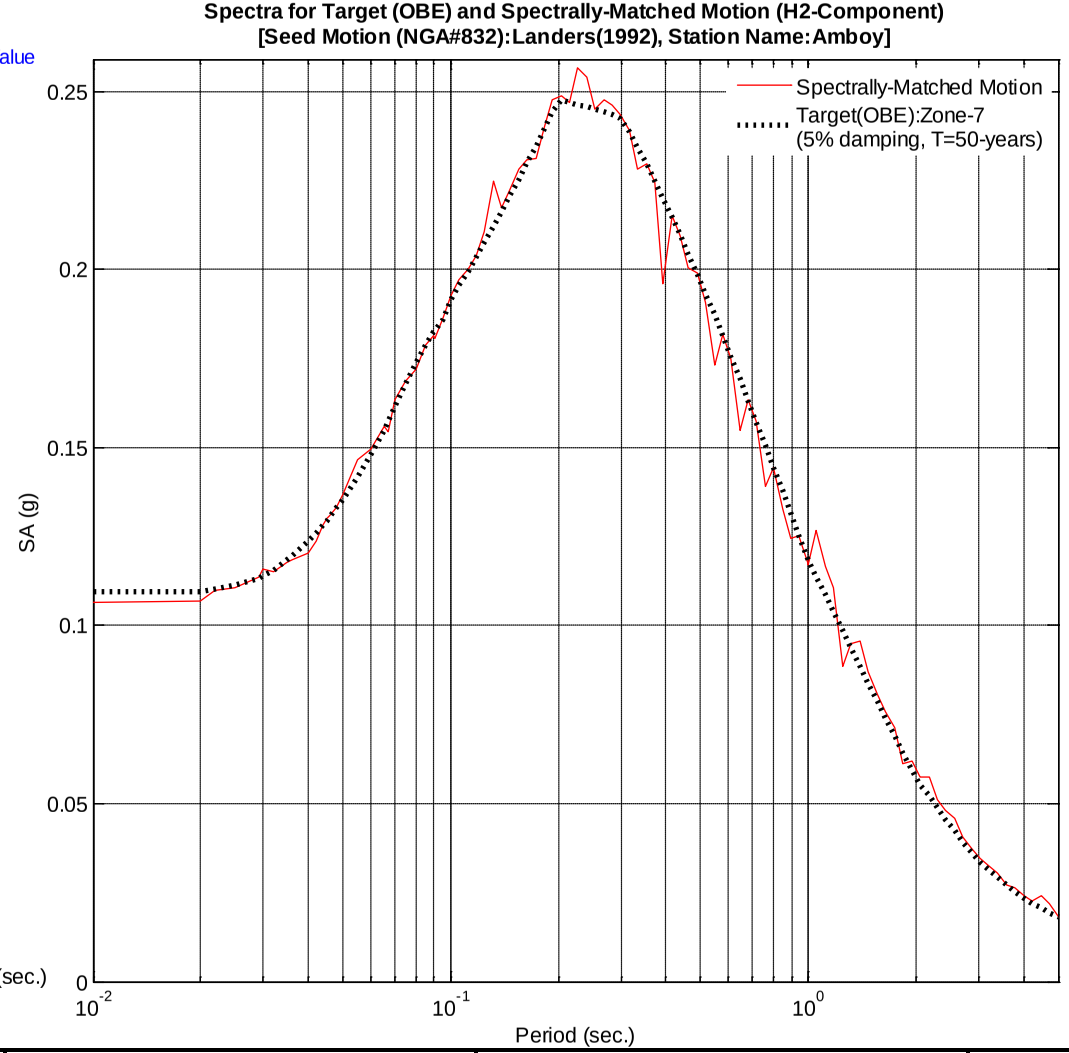




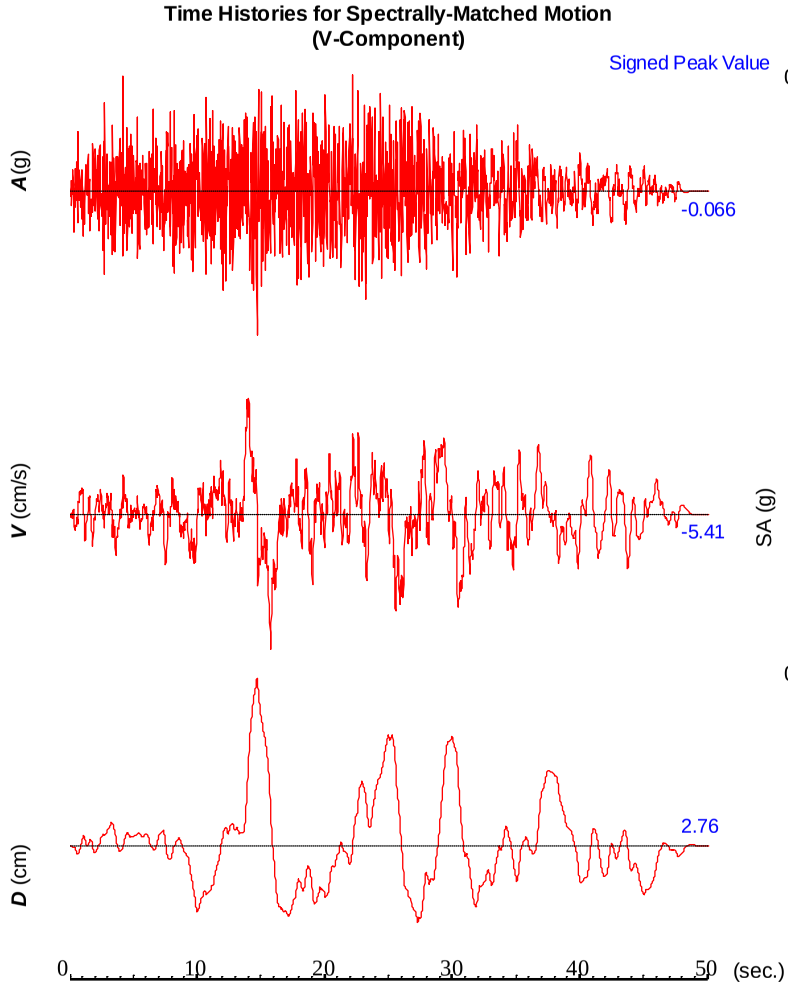
SC SOLUTIONS

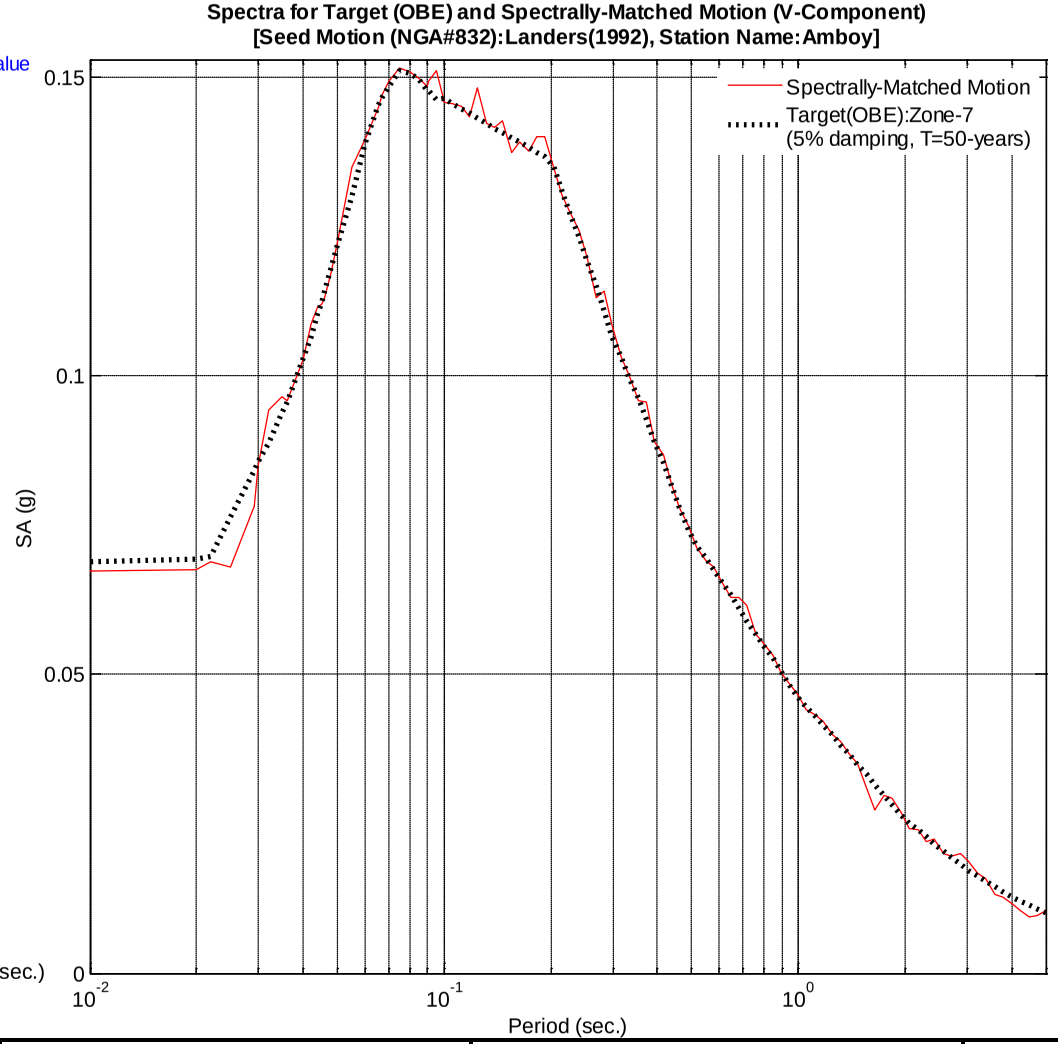
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 1 – HORIZONTAL 1**	PLATE **A7-1**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		





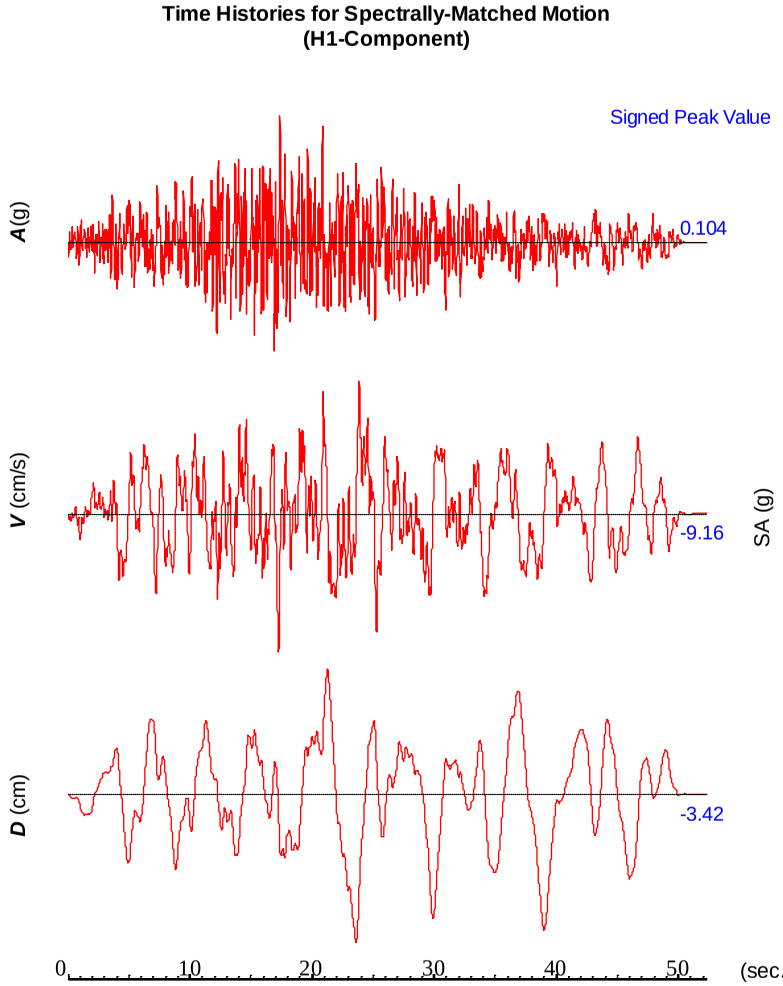
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 7 – SET NO. 1 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A7-2**

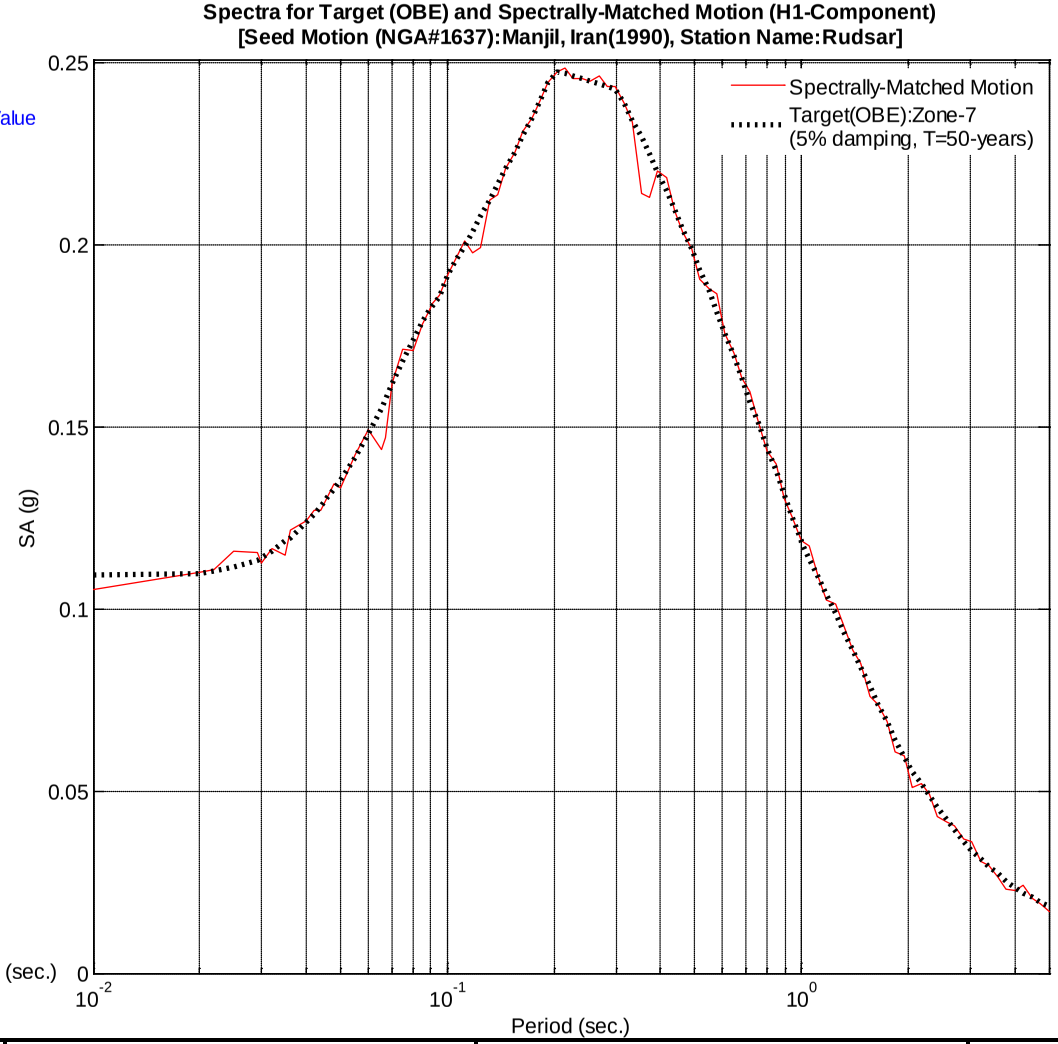




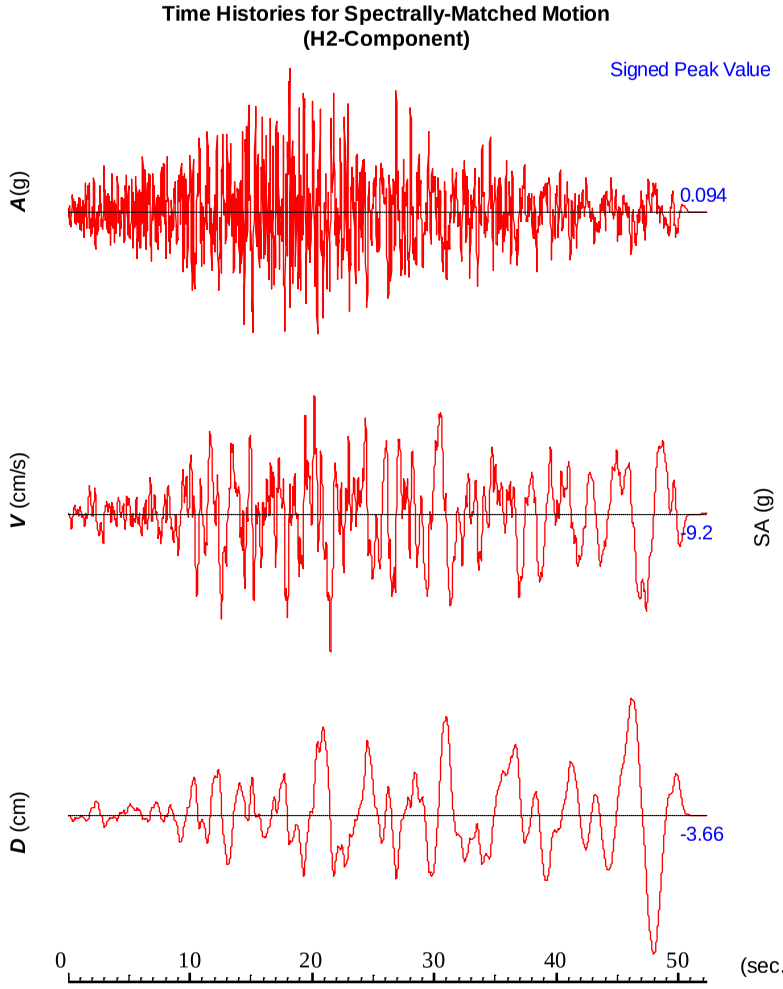
SC SOLUTIONS

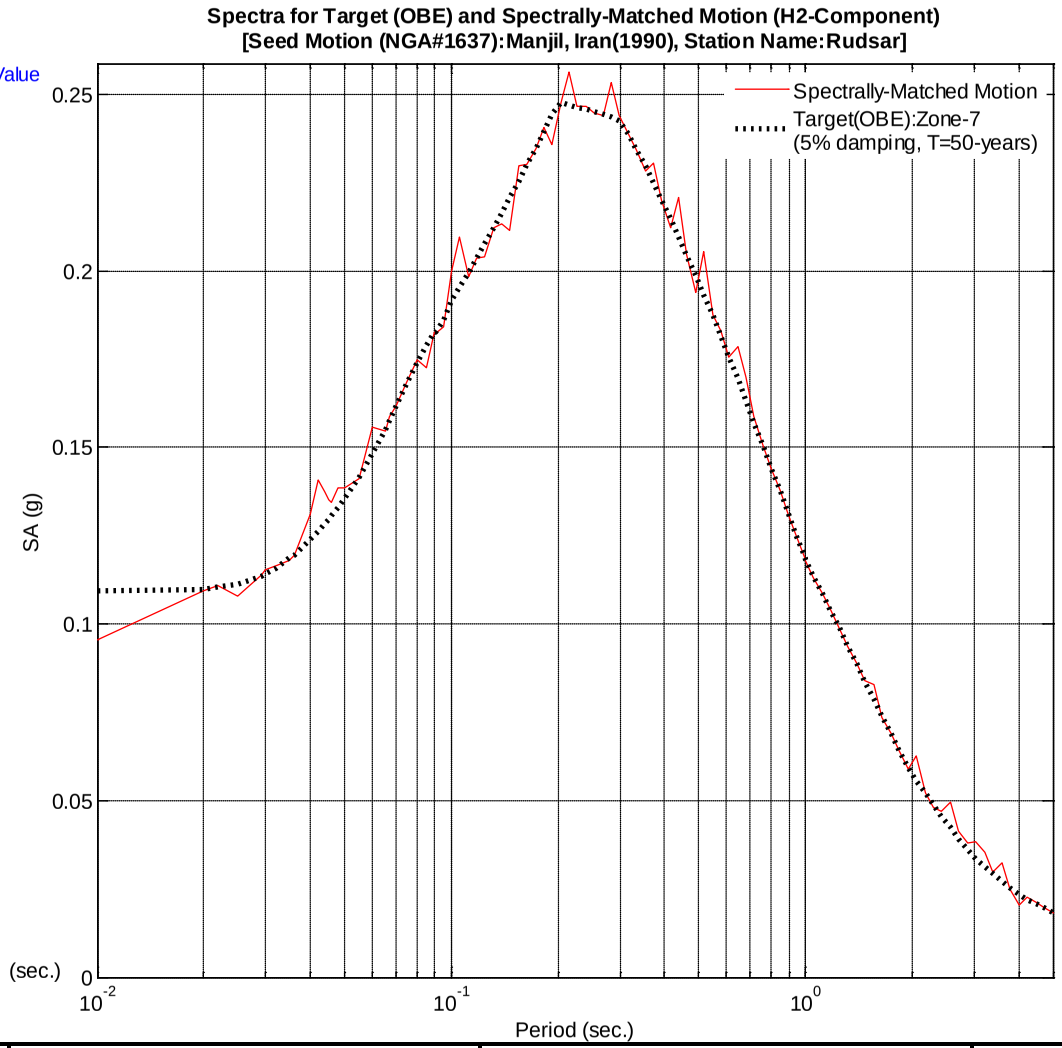
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 1 – VERTICAL**	PLATE
BY:	J. Zhong		**A7-3**
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		



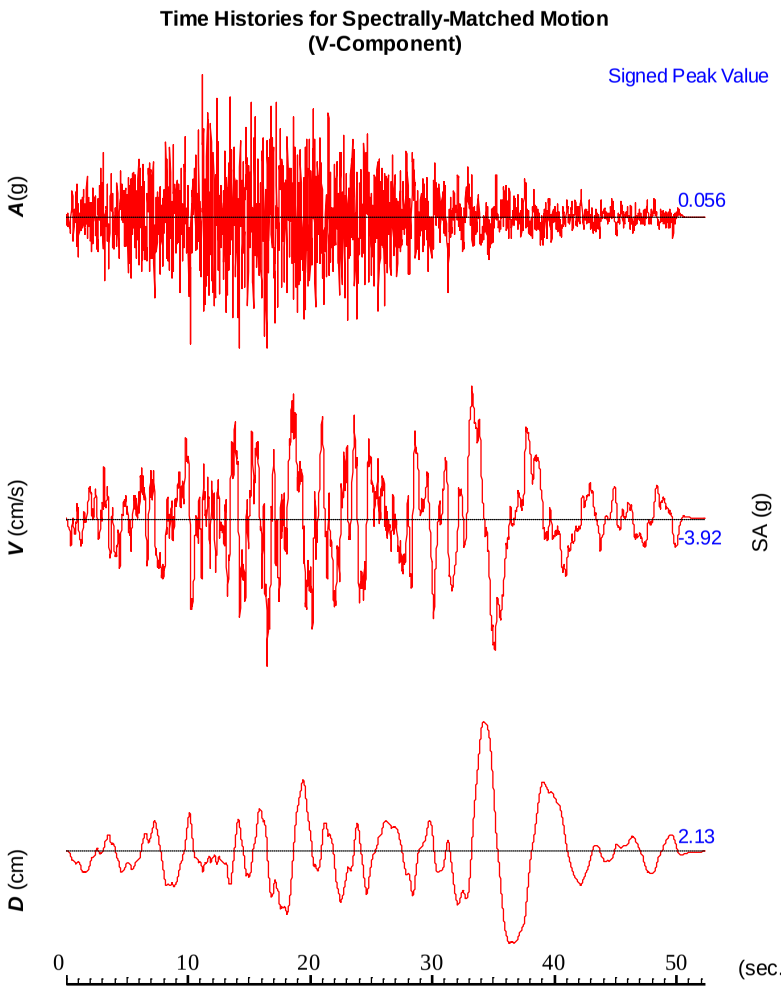


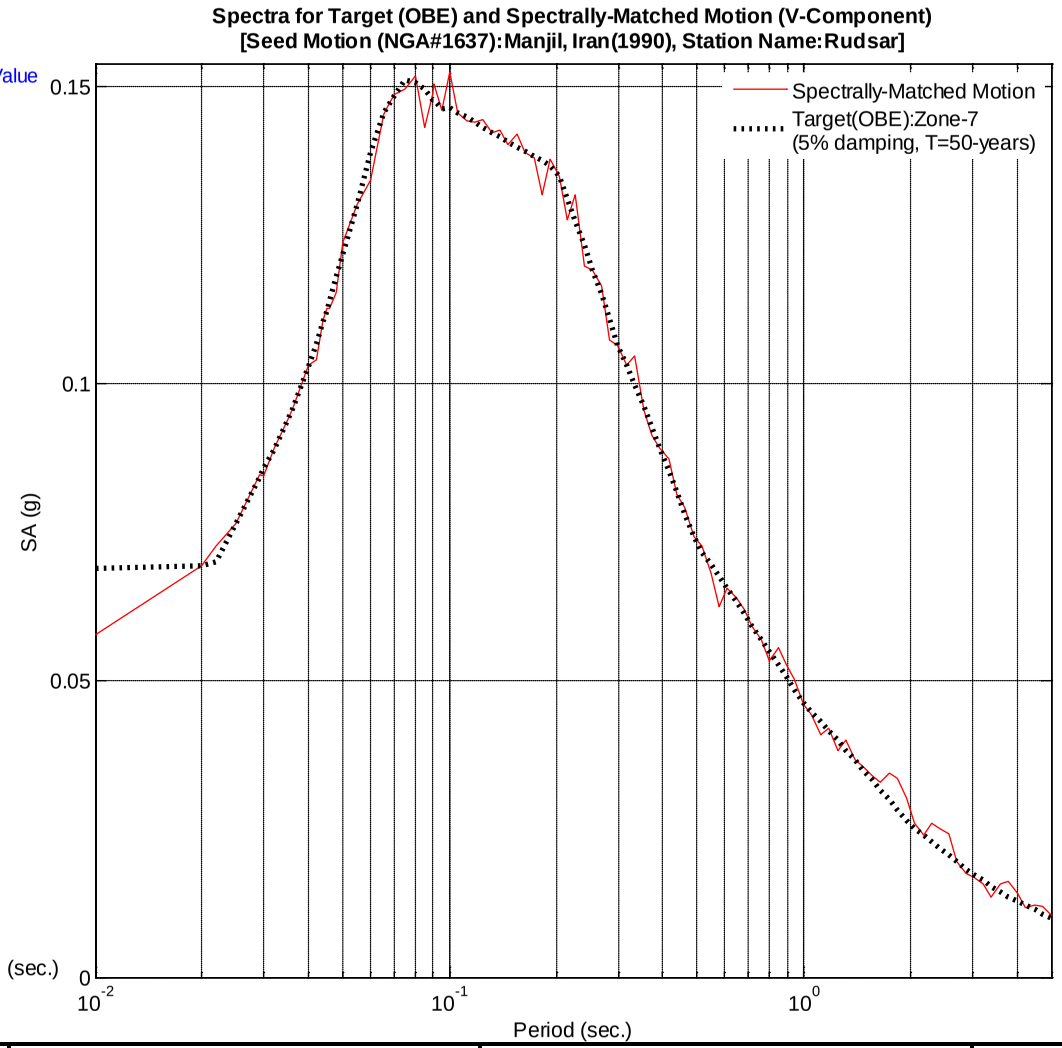
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 7 – SET NO. 2 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A7-4**



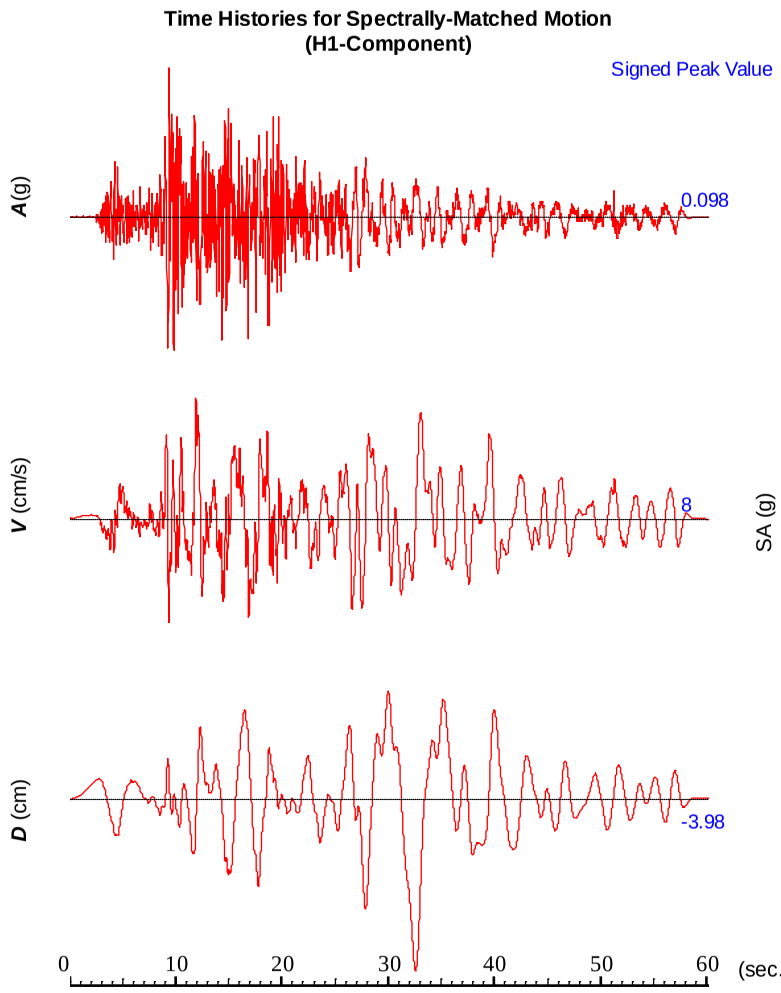


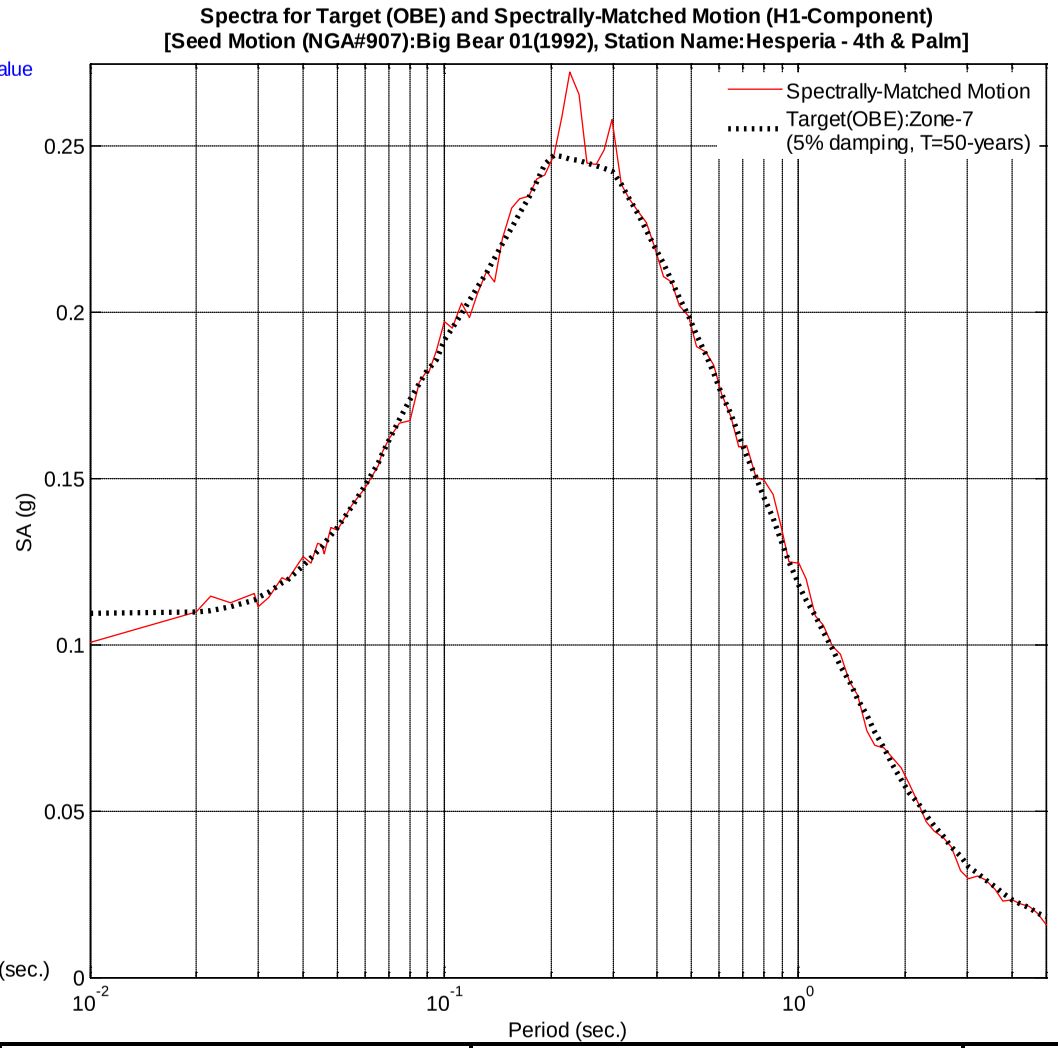
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 7 – SET NO. 2 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A7-5**





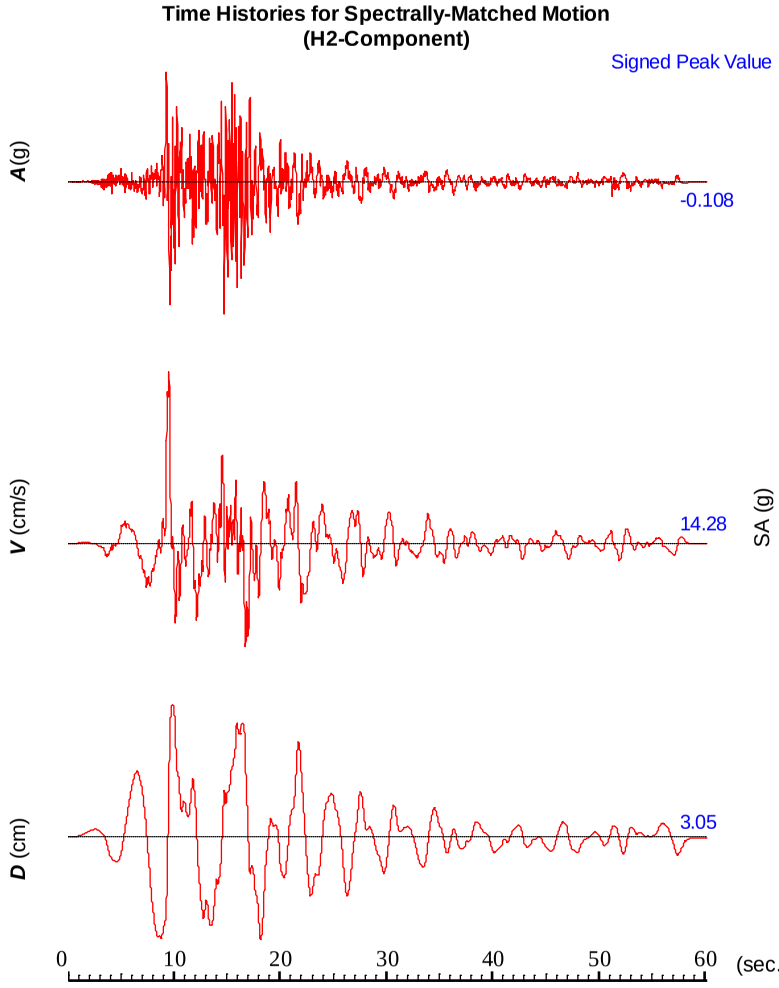
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 2 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A7-6**

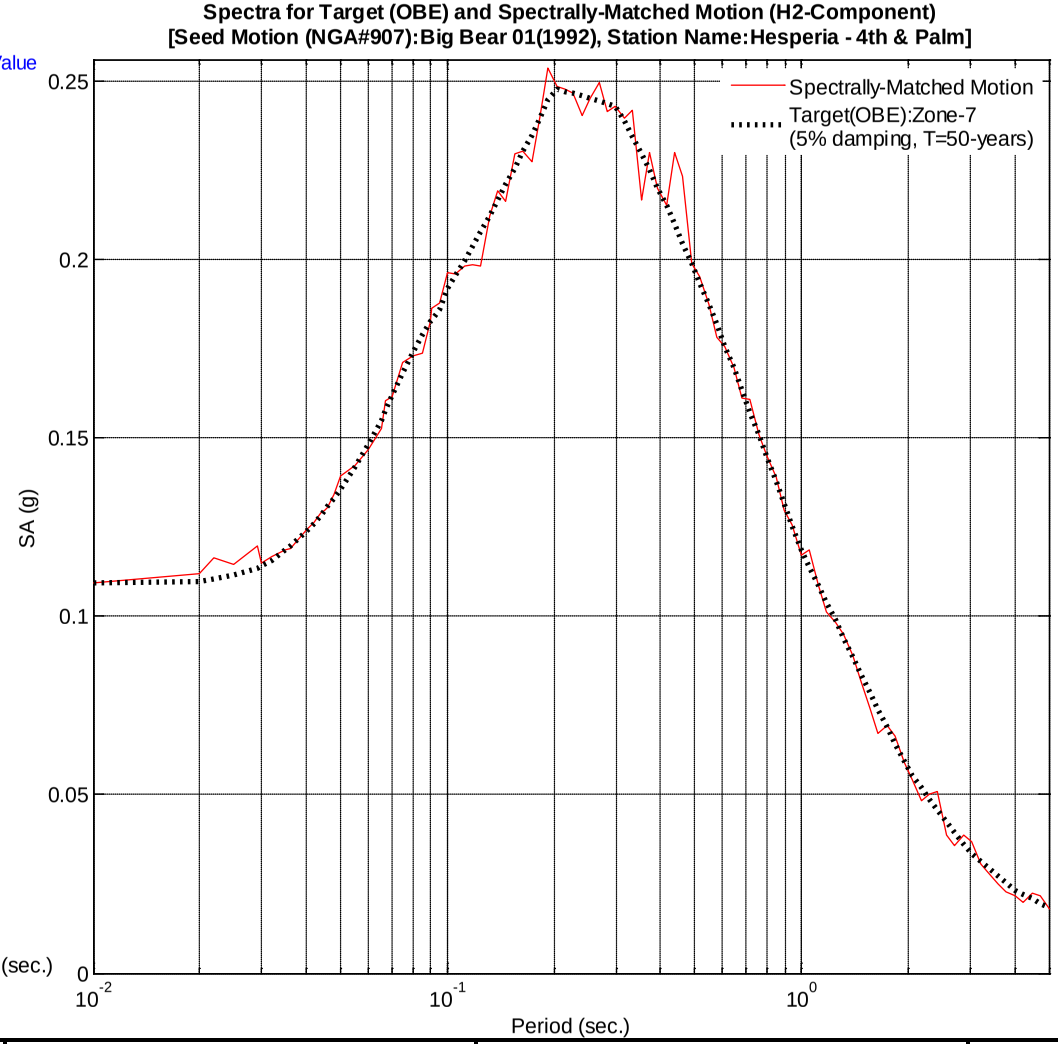




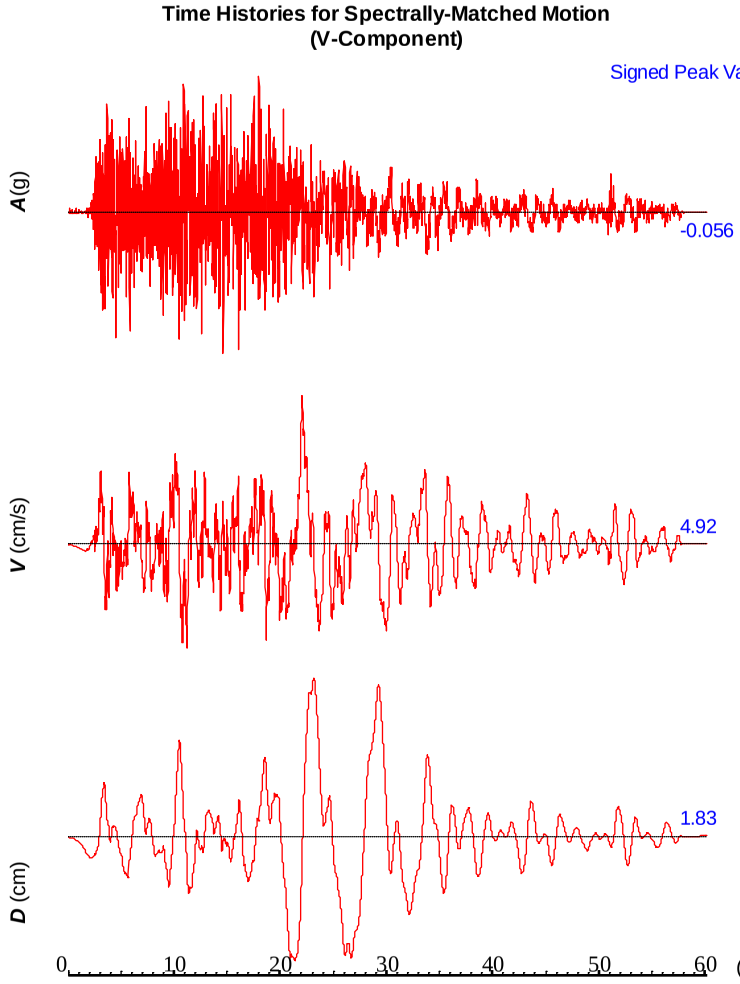
SC SOLUTIONS

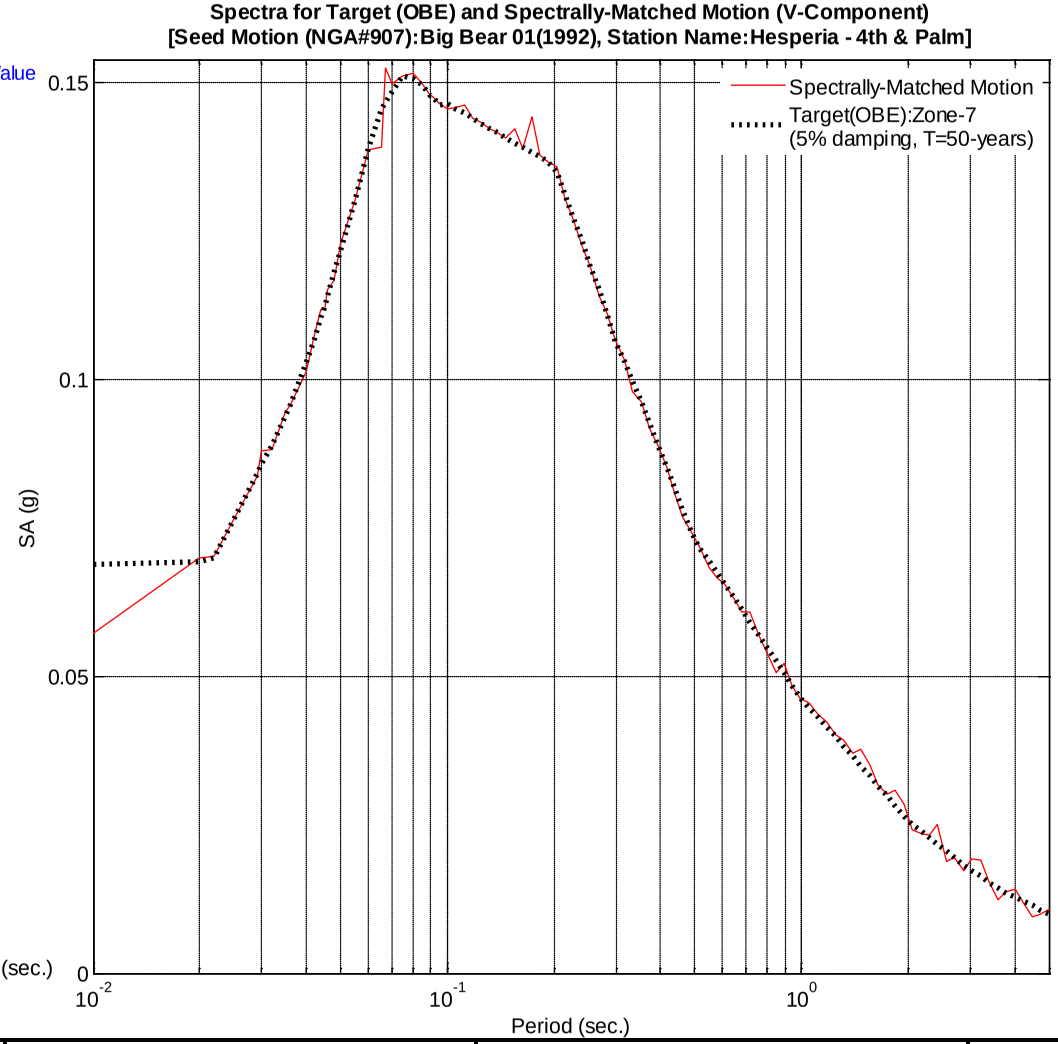
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 3 – HORIZONTAL 1**	PLATE **A7-7**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 7 – SET NO. 3 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A7-8**





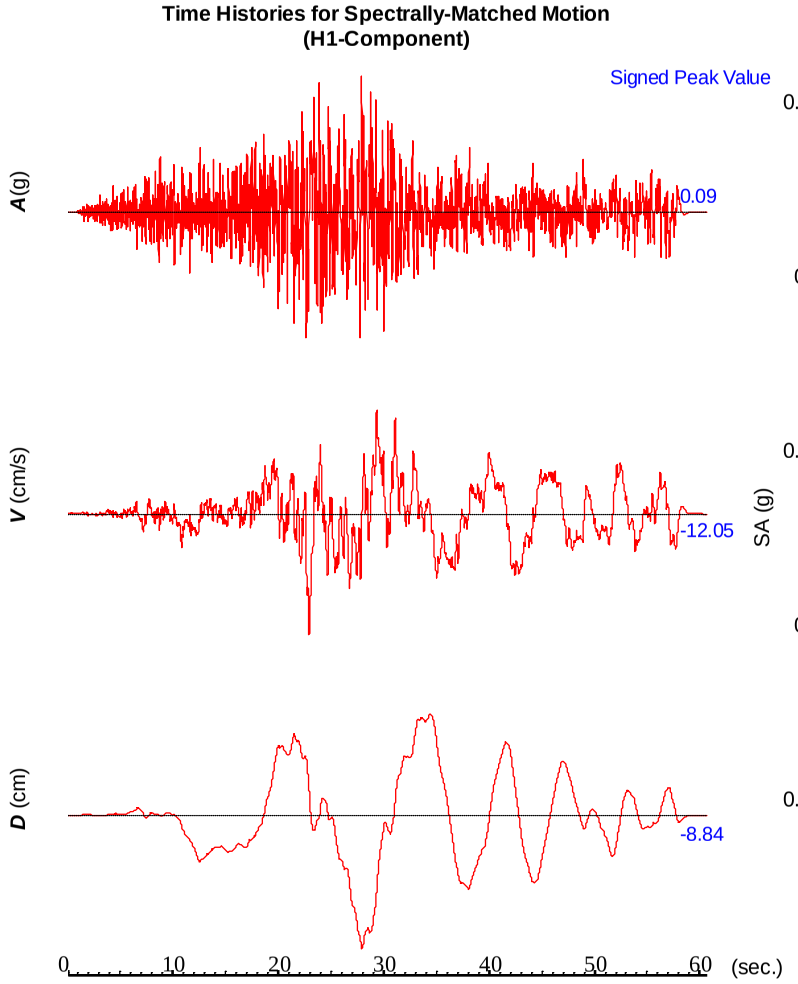
SC SOLUTIONS

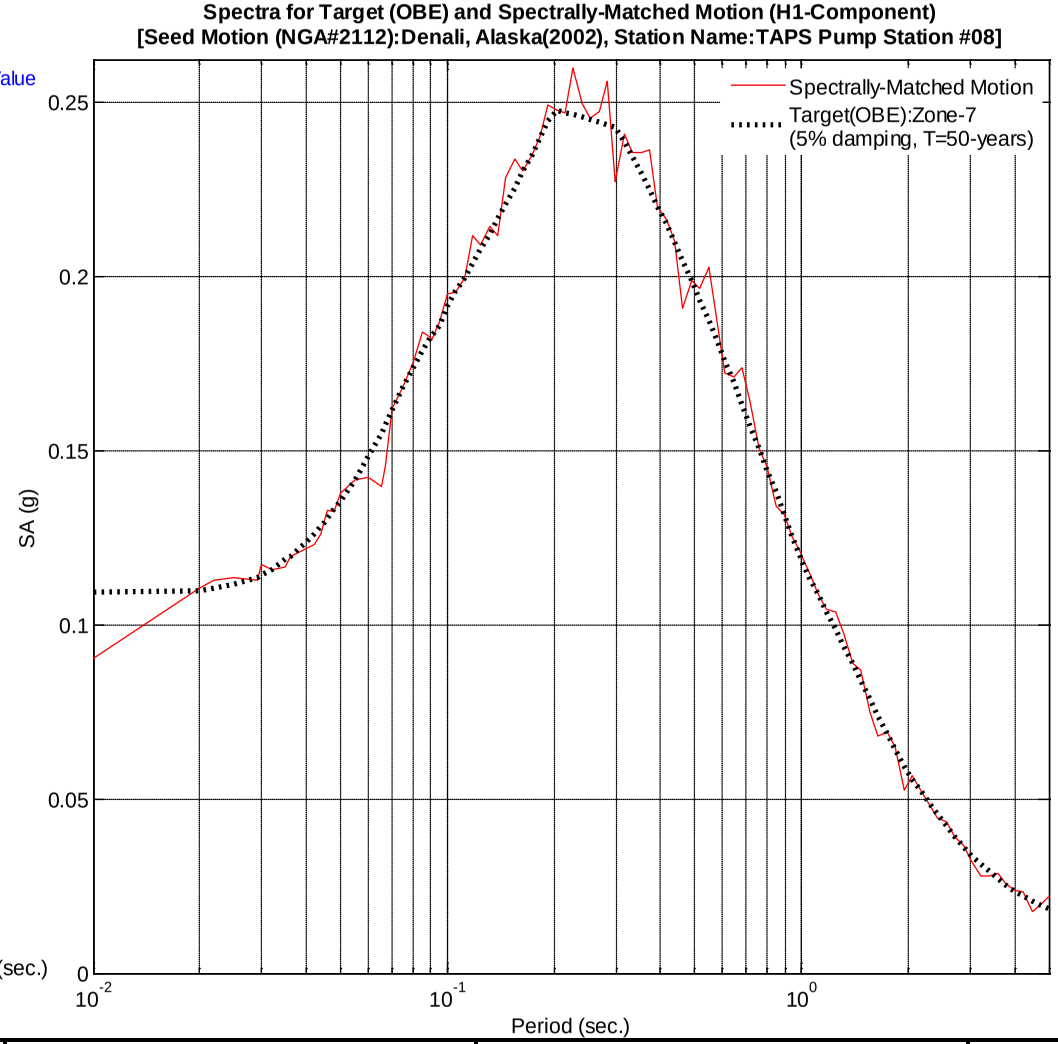
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – OBE
ZONE 7 – SET NO. 3 – VERTICAL

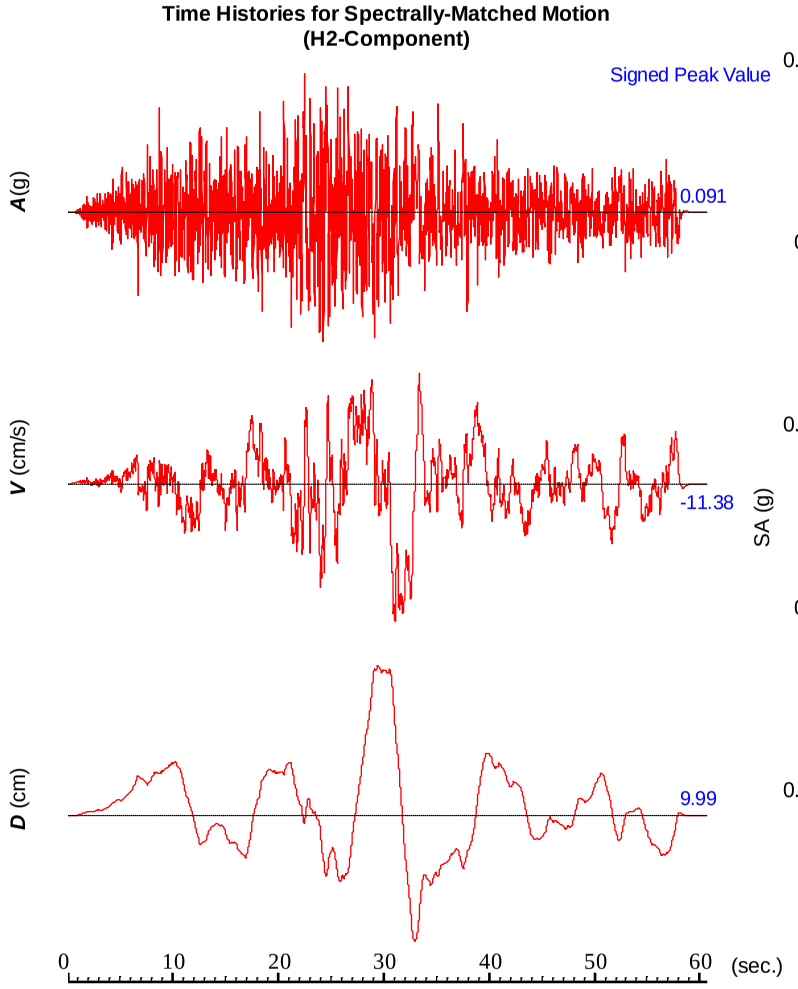
CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

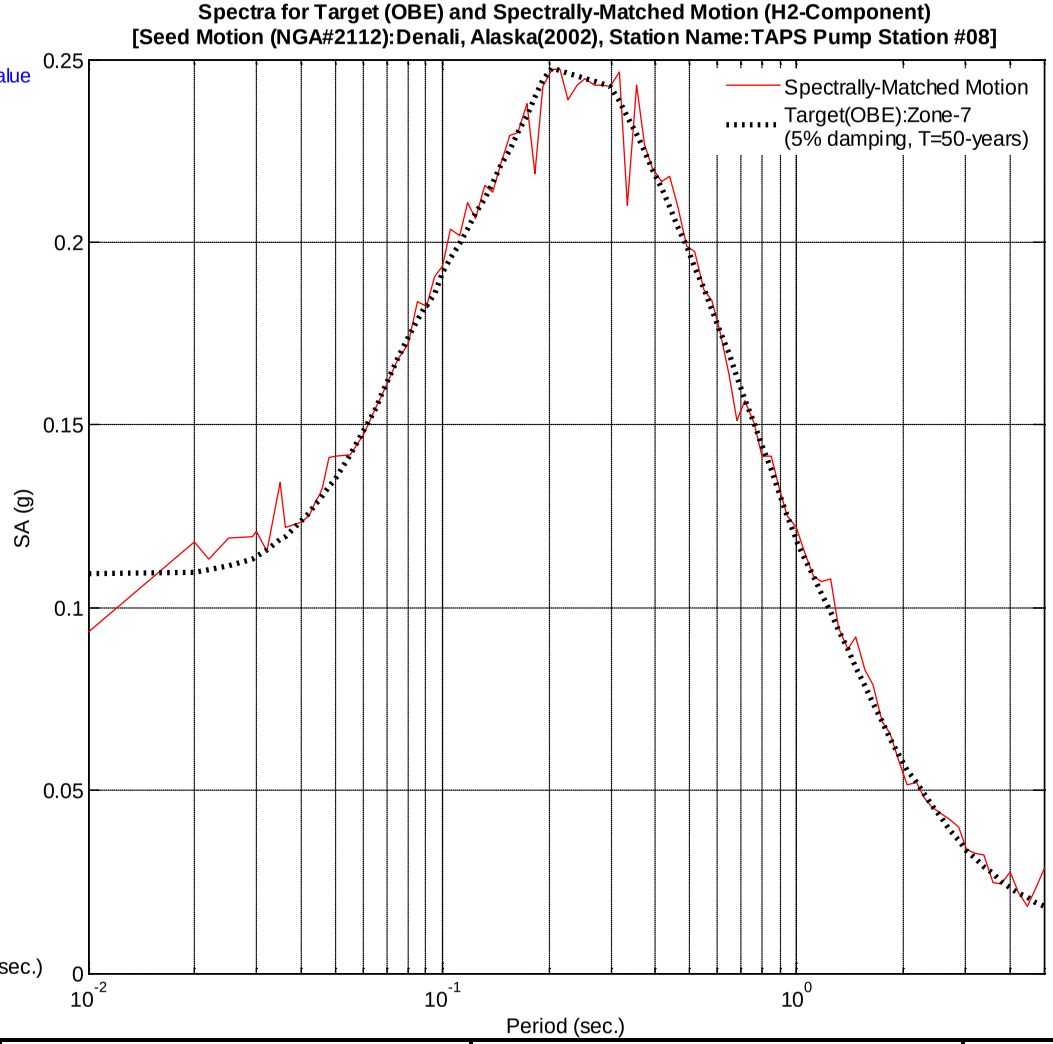
PLATE
A7-9



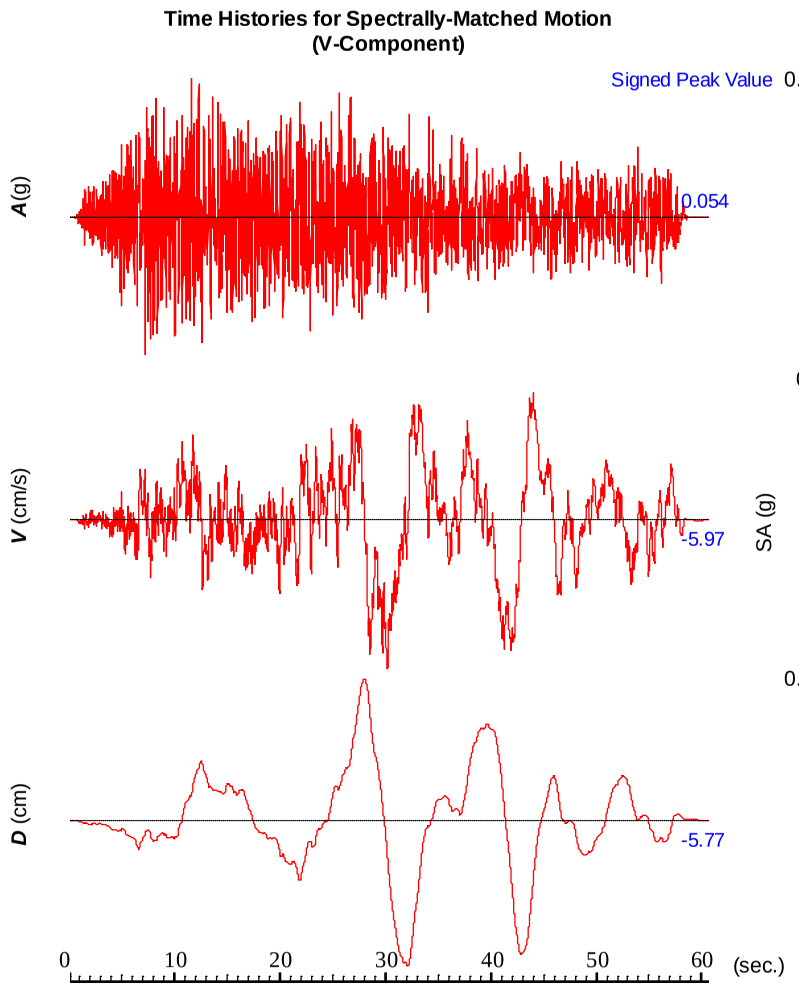


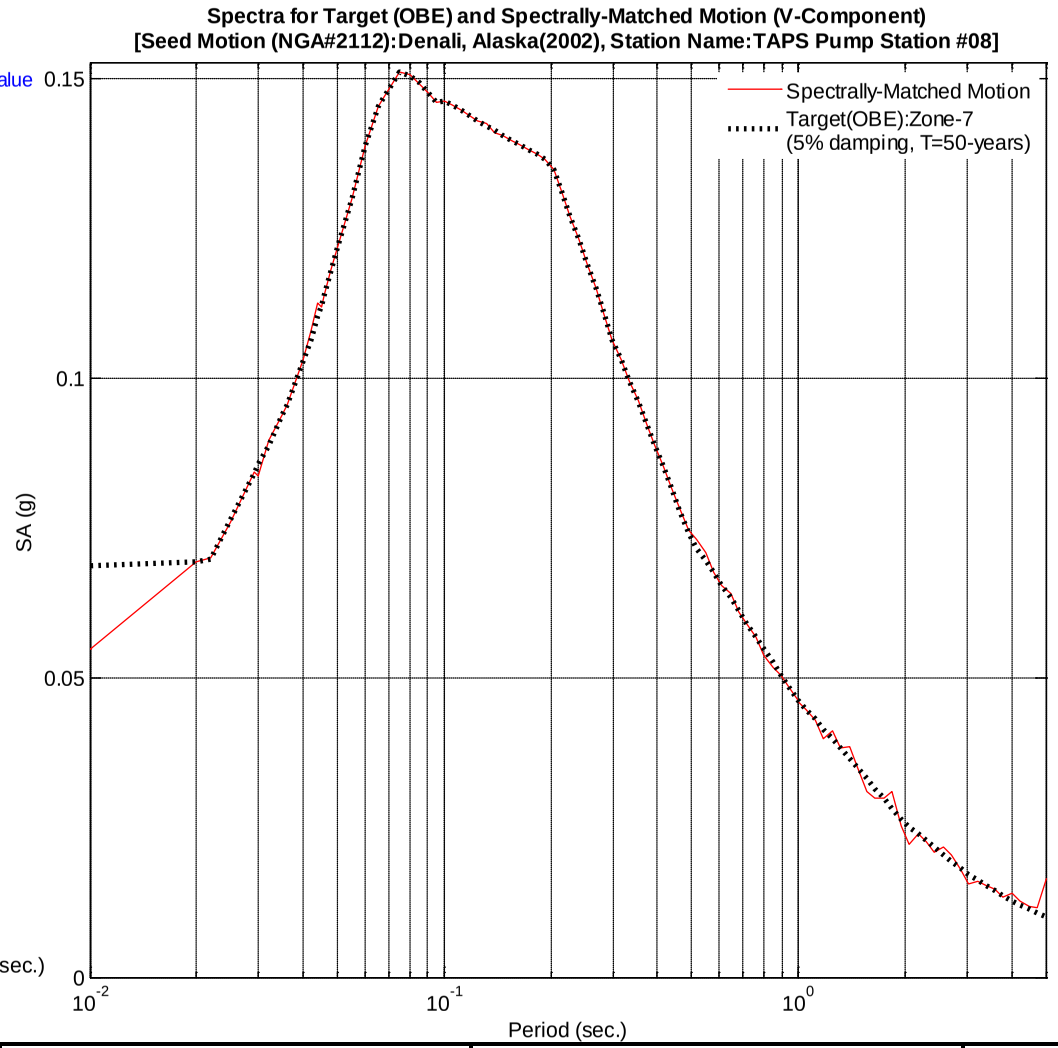
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 7 – SET NO. 4 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A7-10**





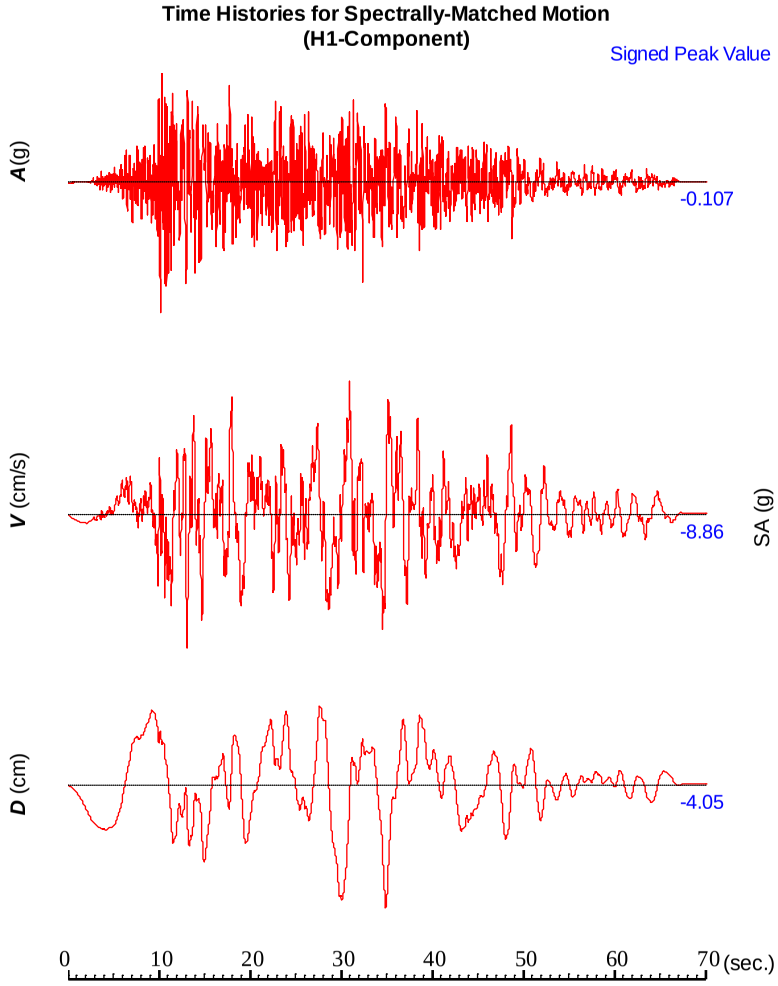
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 7 – SET NO. 4 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A7-11**

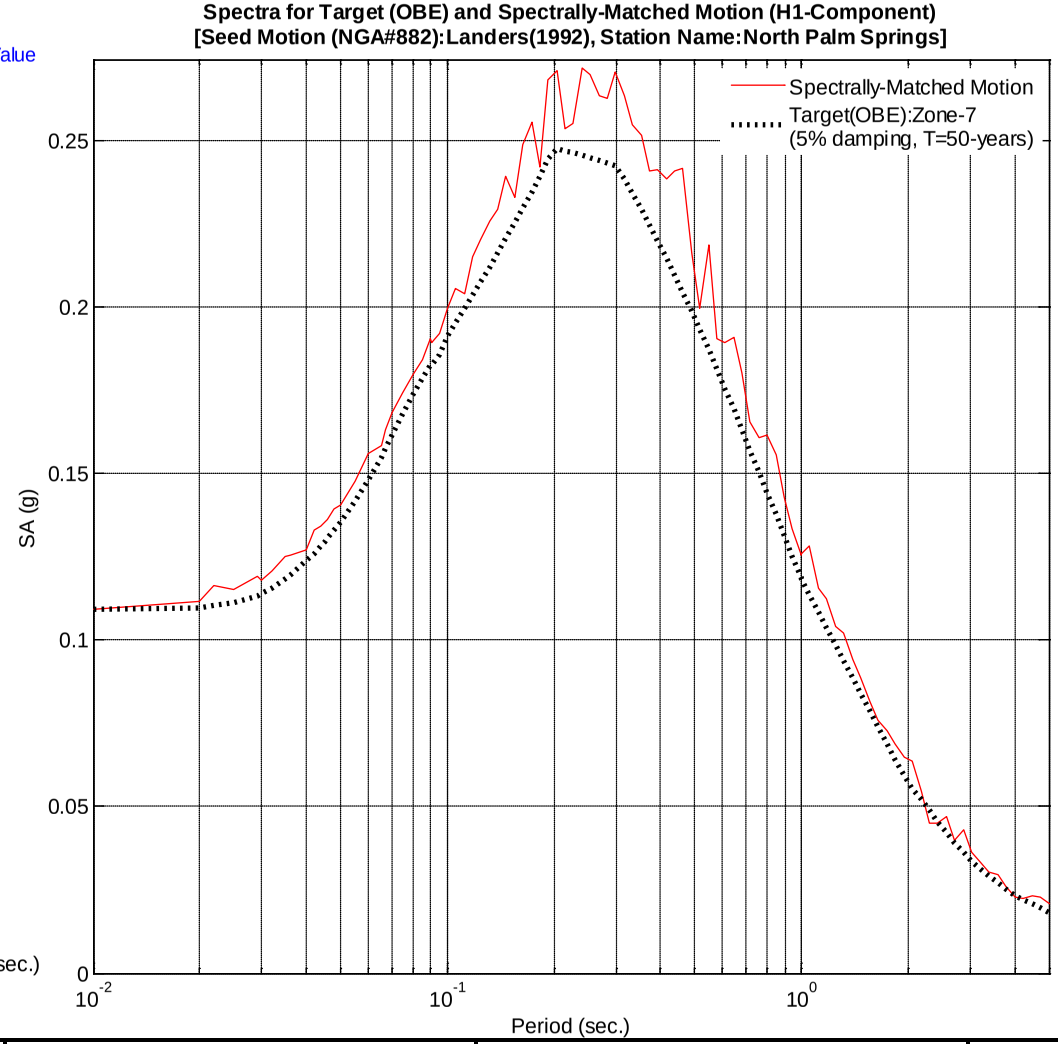




SC SOLUTIONS

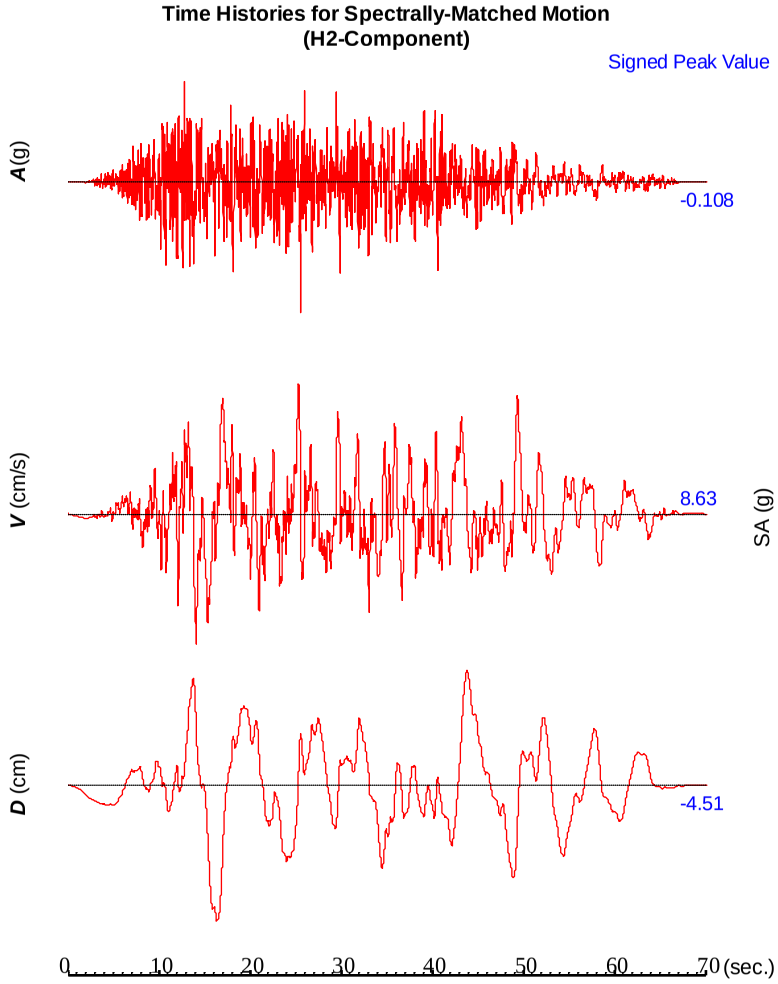
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 4 – VERTICAL**	PLATE **A7-12**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		

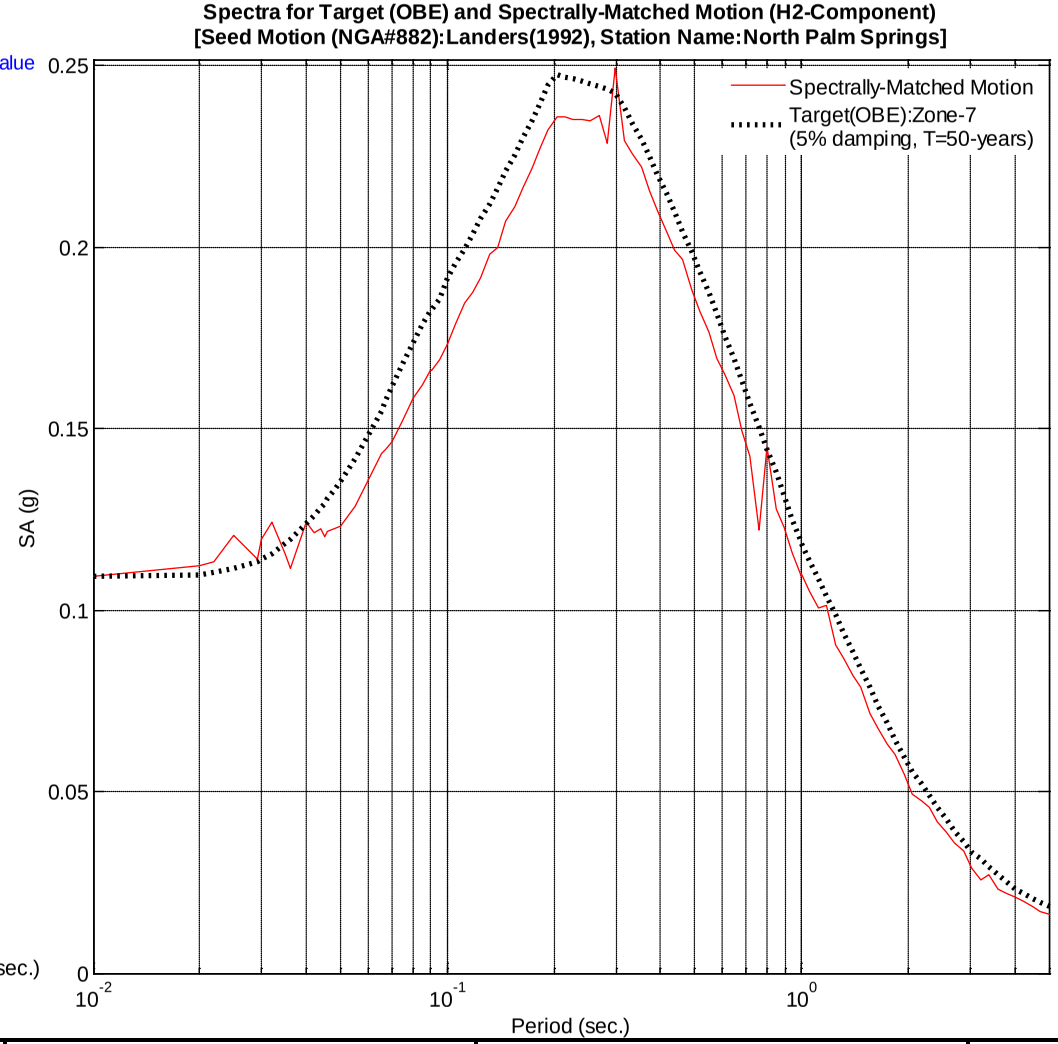




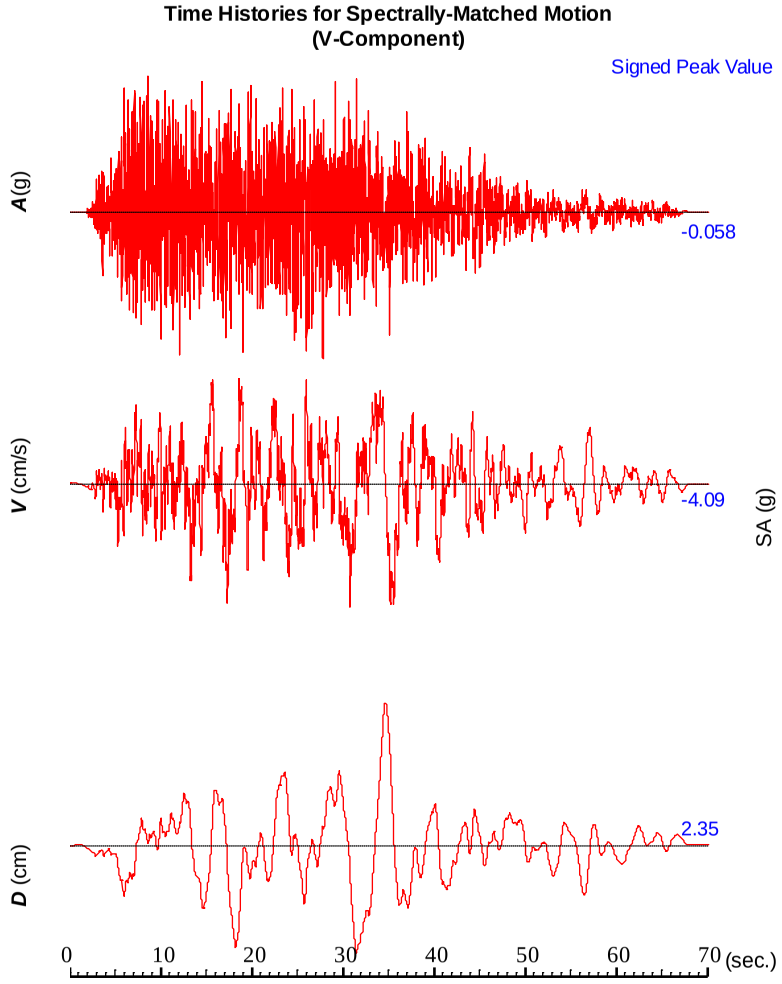
SC SOLUTIONS

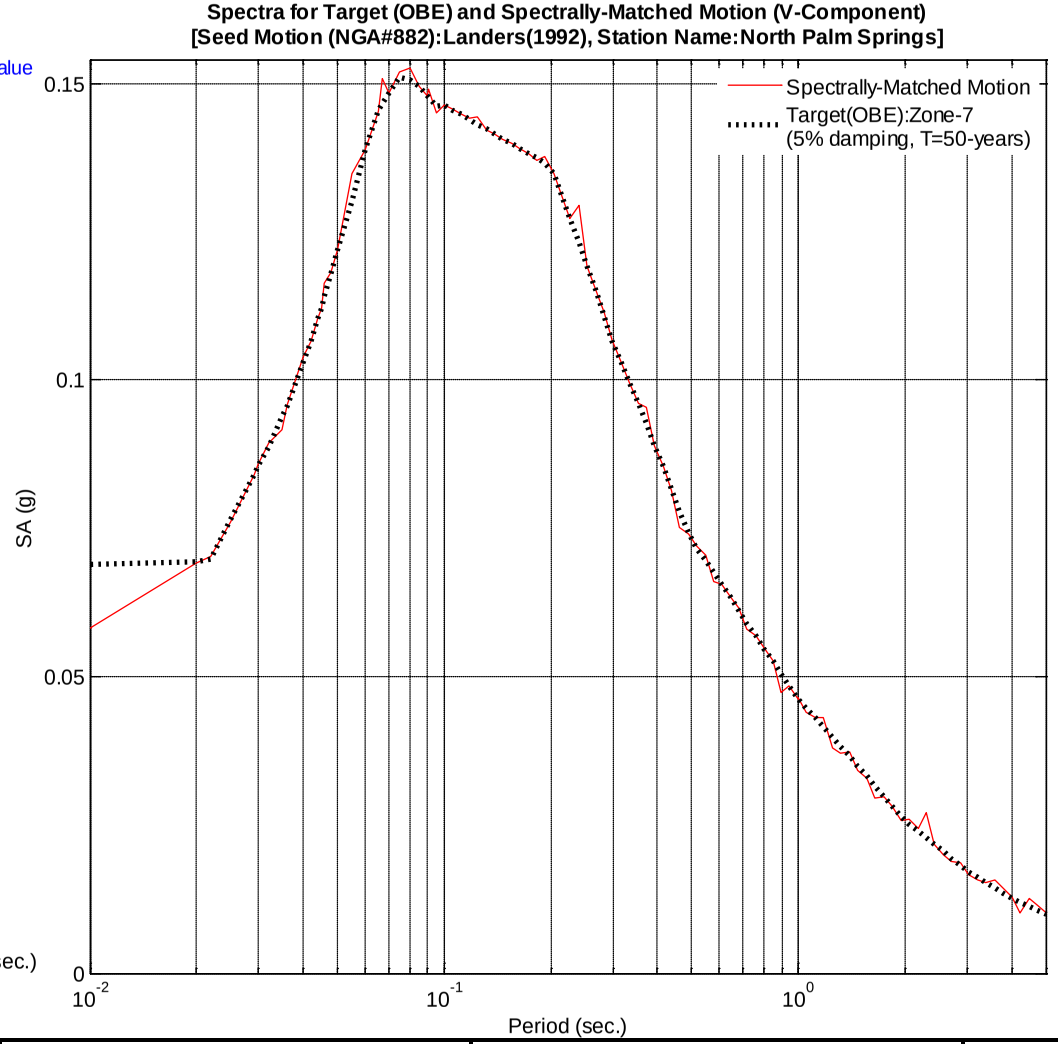
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 5 – HORIZONTAL 1**	PLATE **A7-13**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		





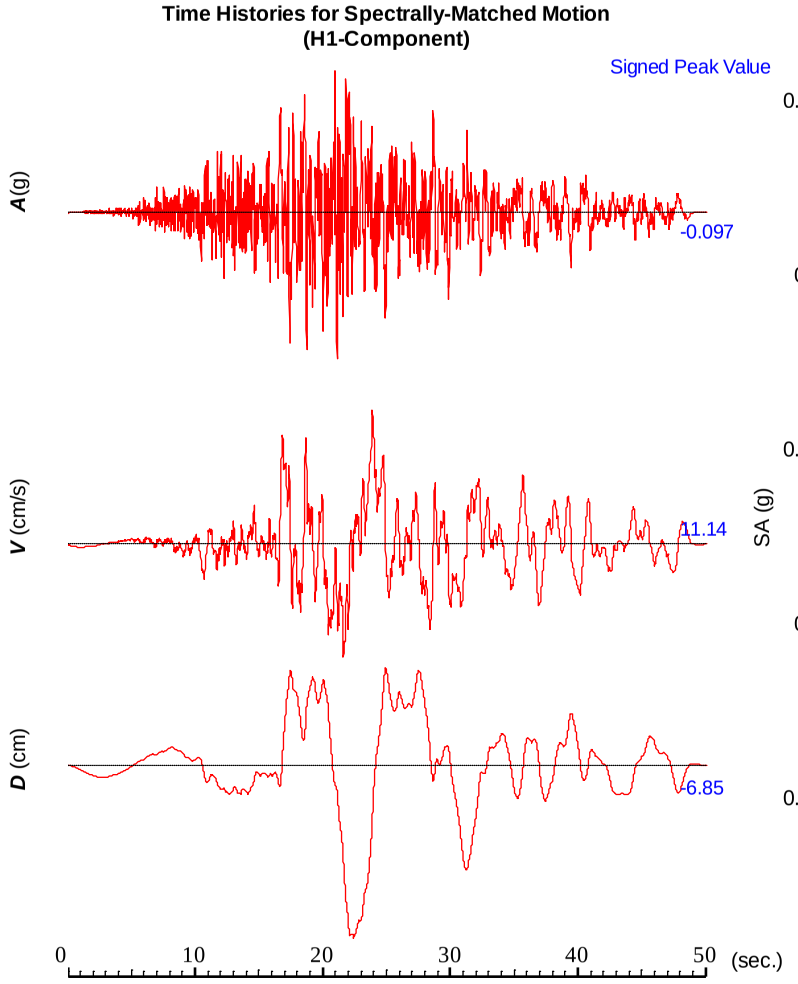
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 7 – SET NO. 5 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A7-14**

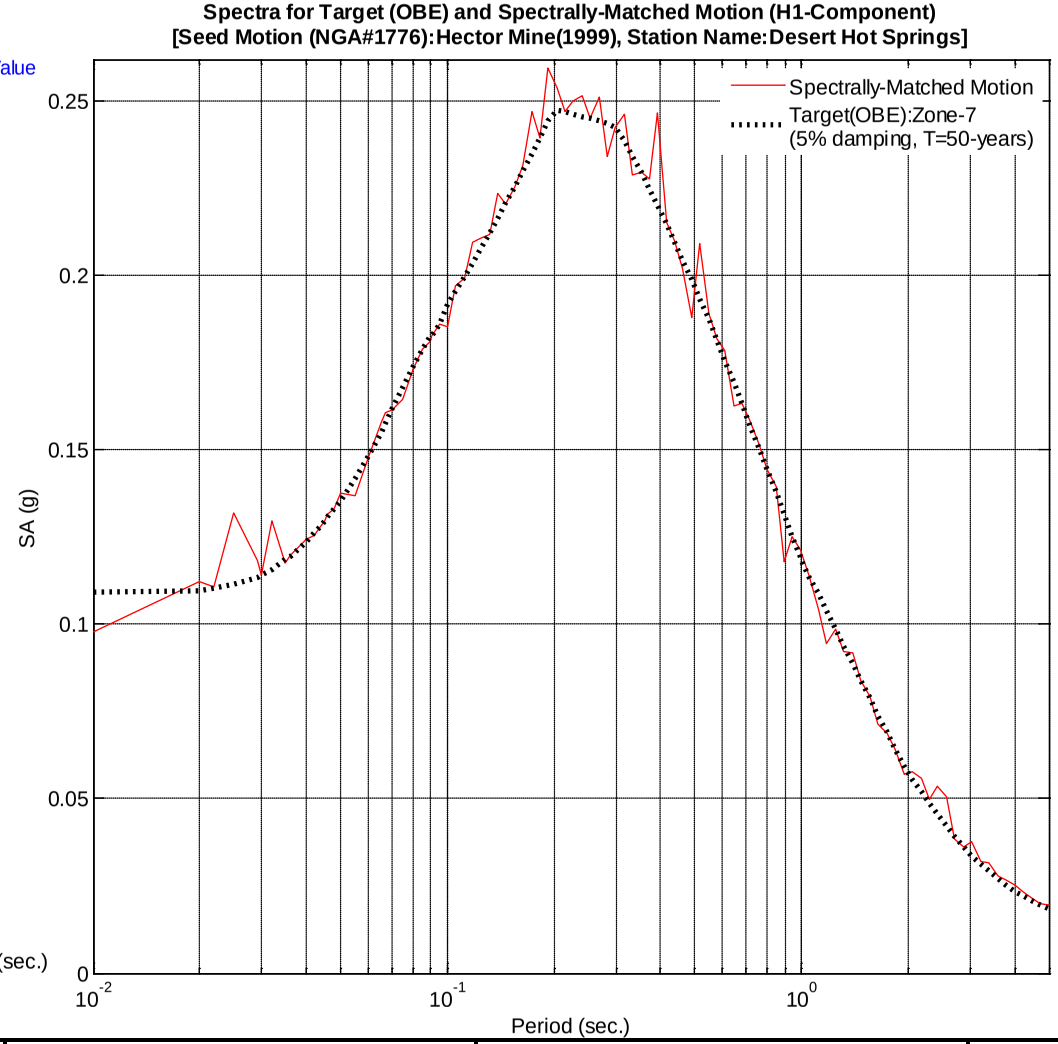




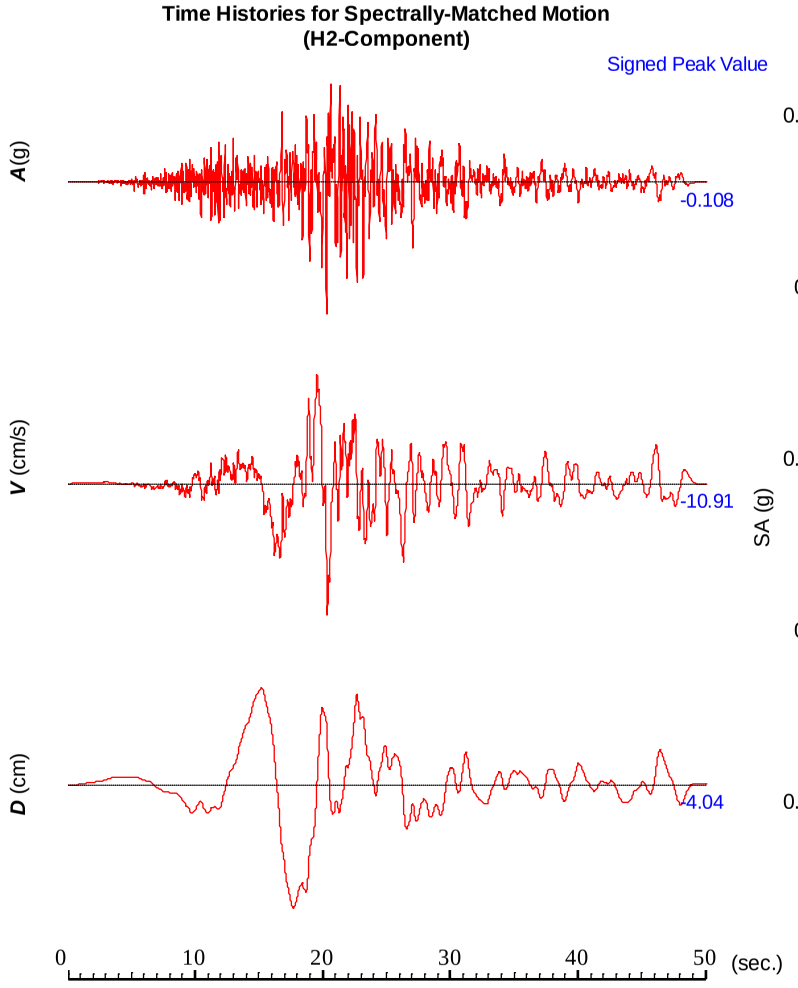
SC SOLUTIONS

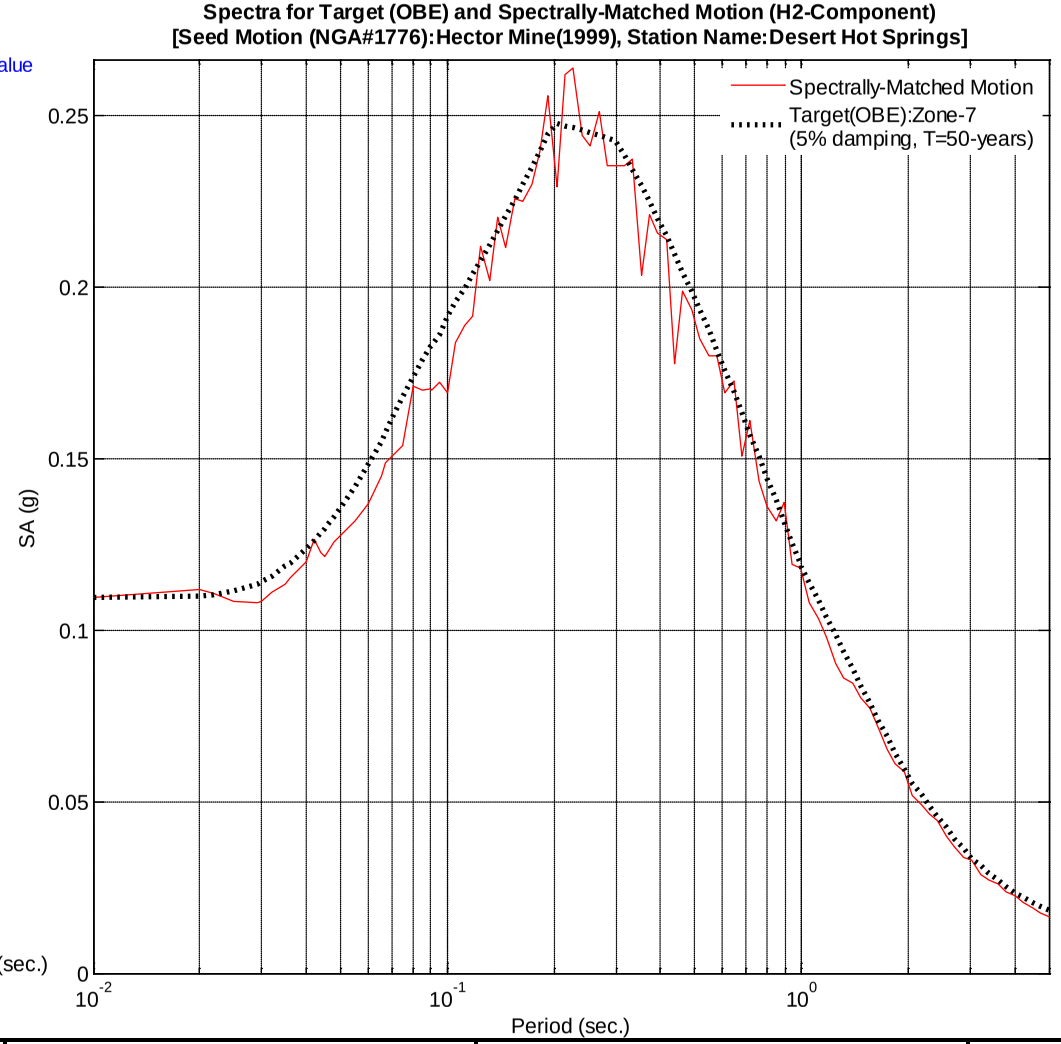
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 5 – VERTICAL**	PLATE **A7-15**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		





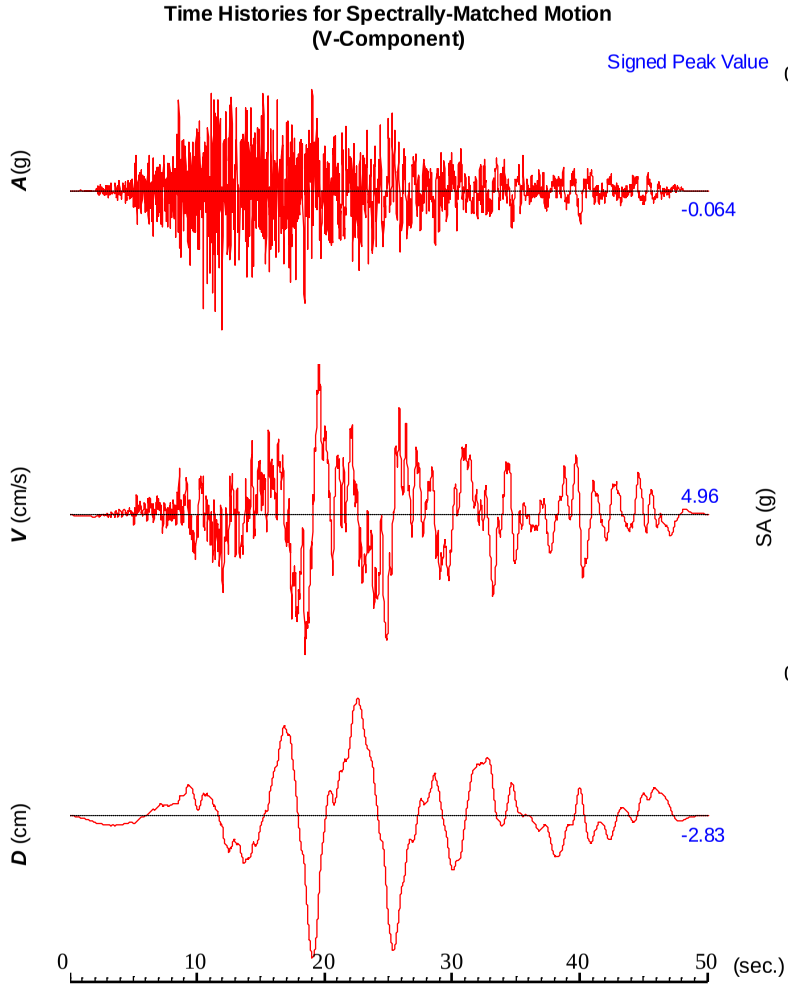
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 7 – SET NO. 6 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A7-16**

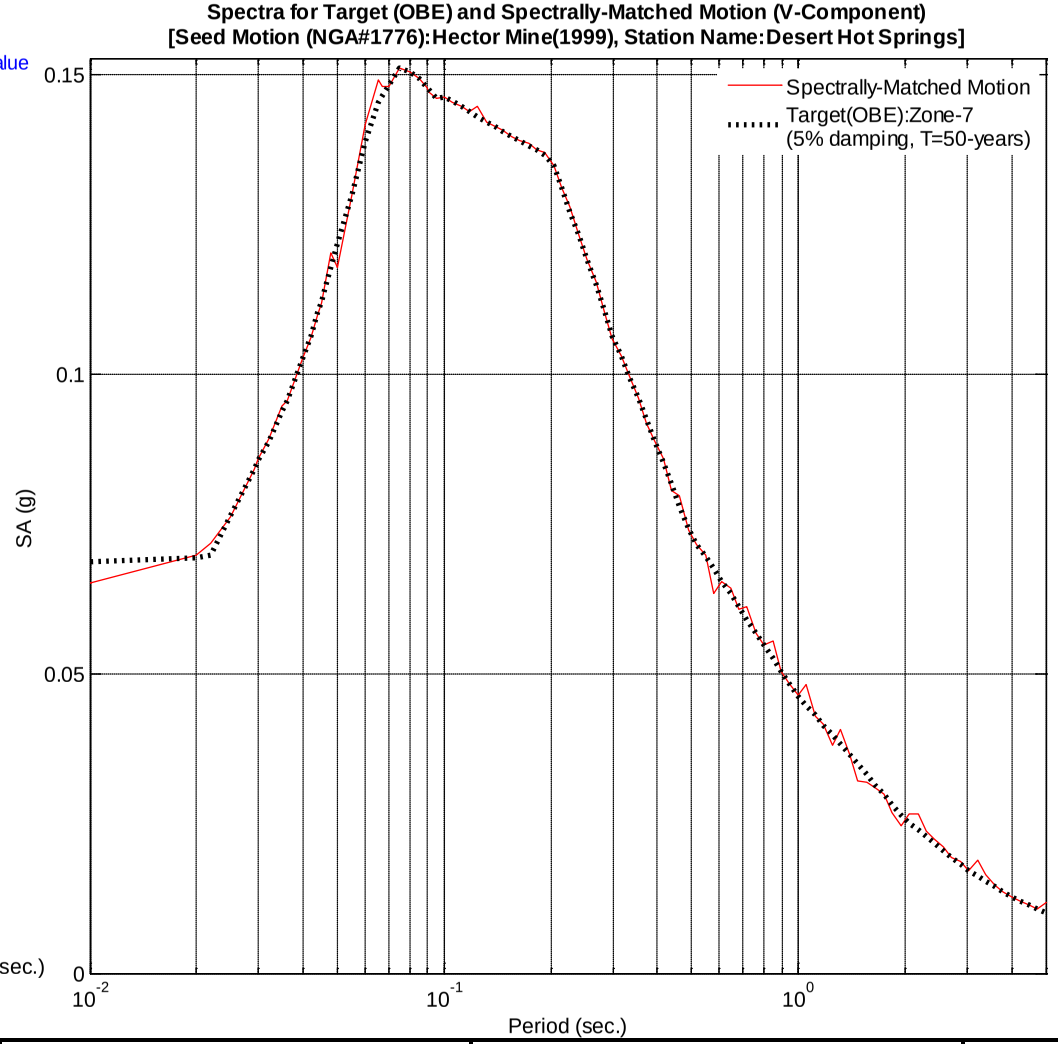




SC SOLUTIONS

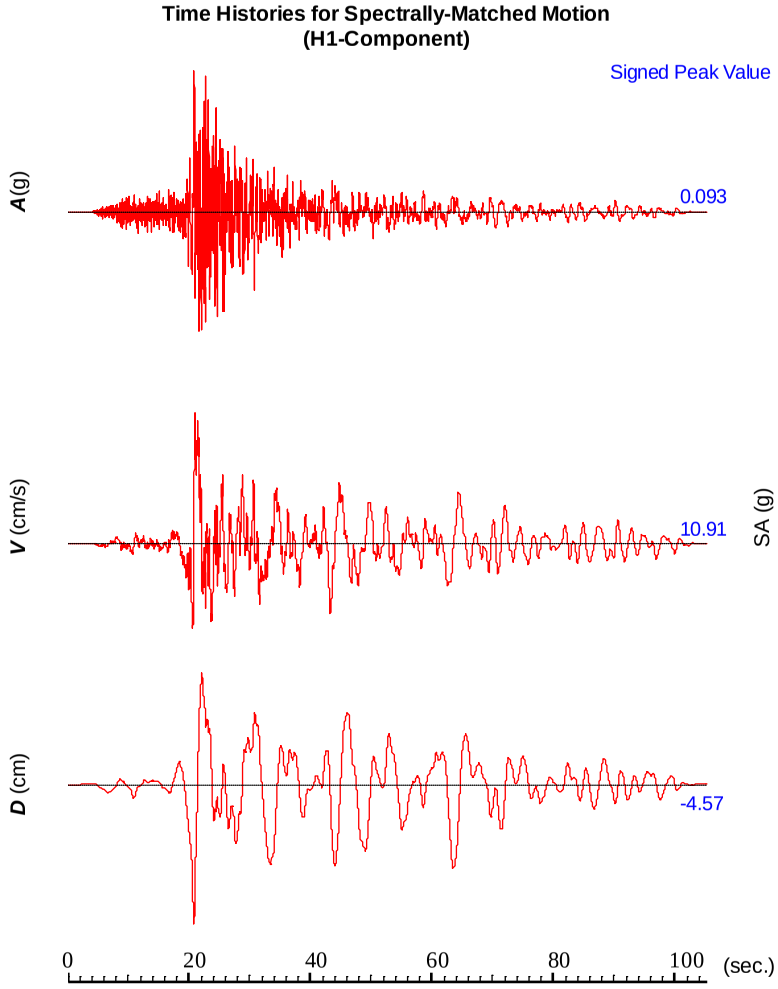
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 6 – HORIZONTAL 2**	PLATE **A7-17**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie		
DATE:	02/24/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

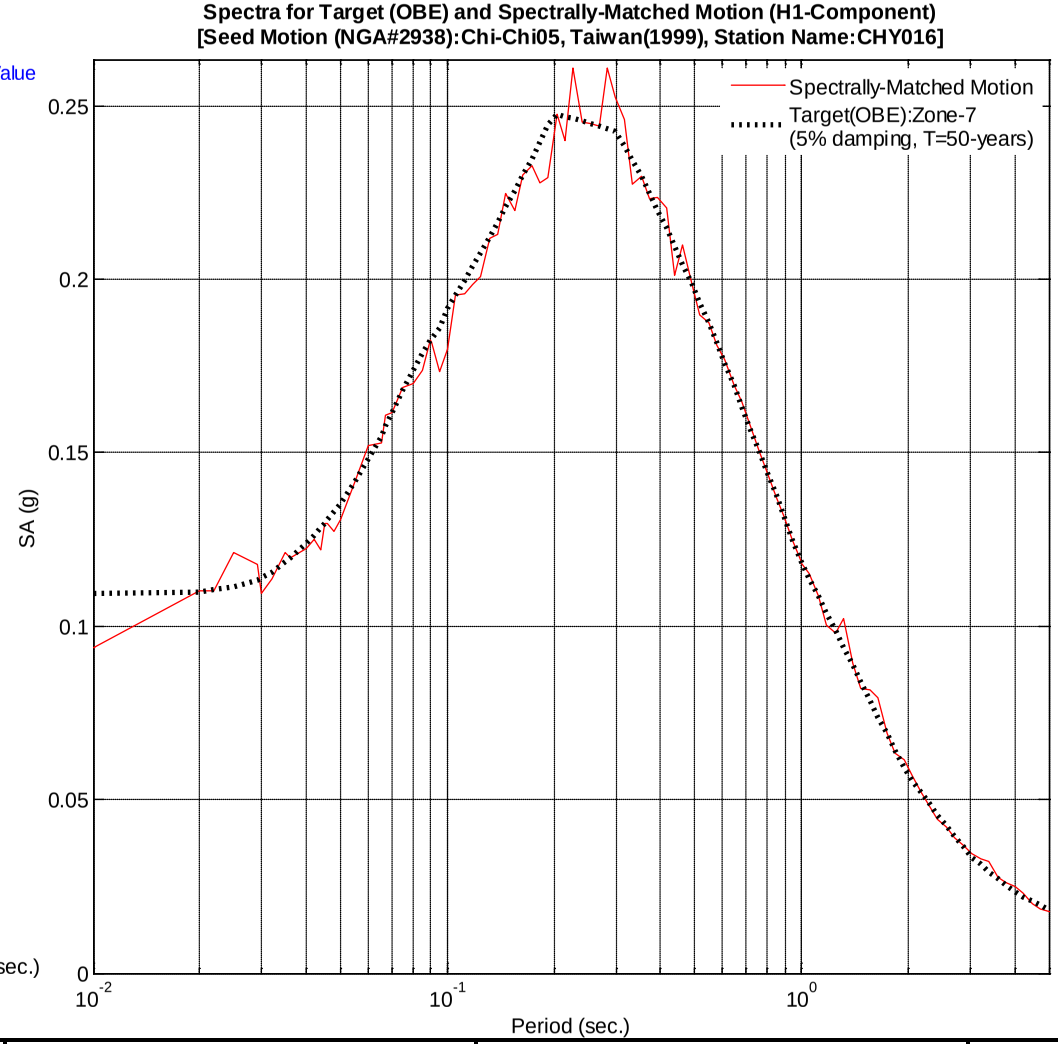




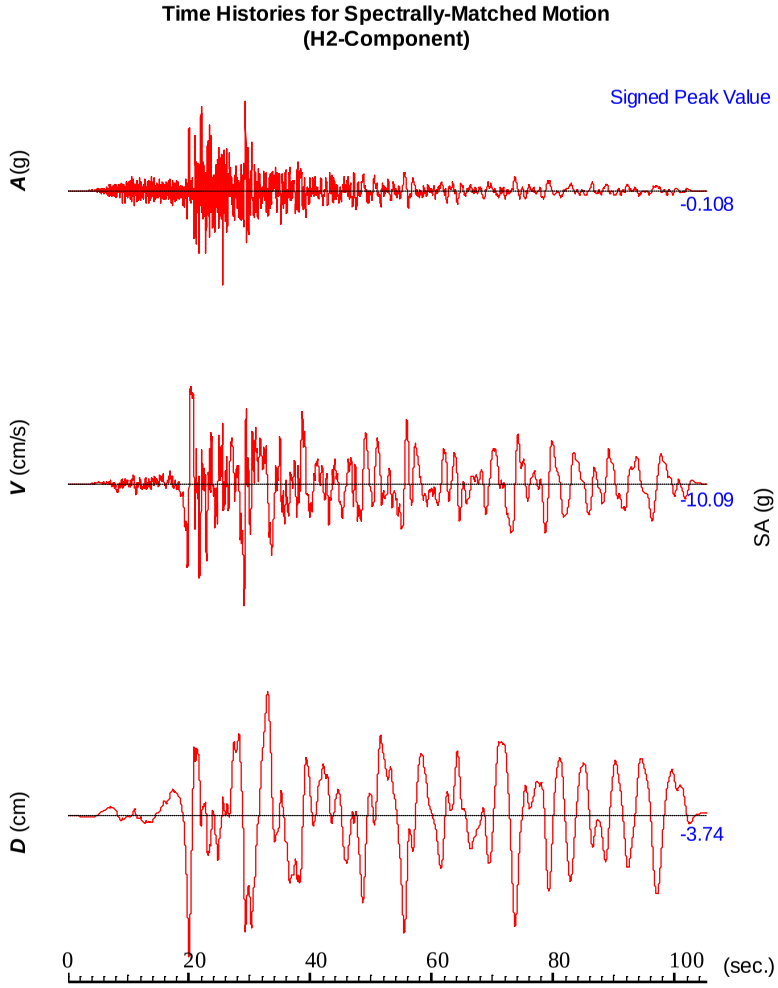
SC SOLUTIONS

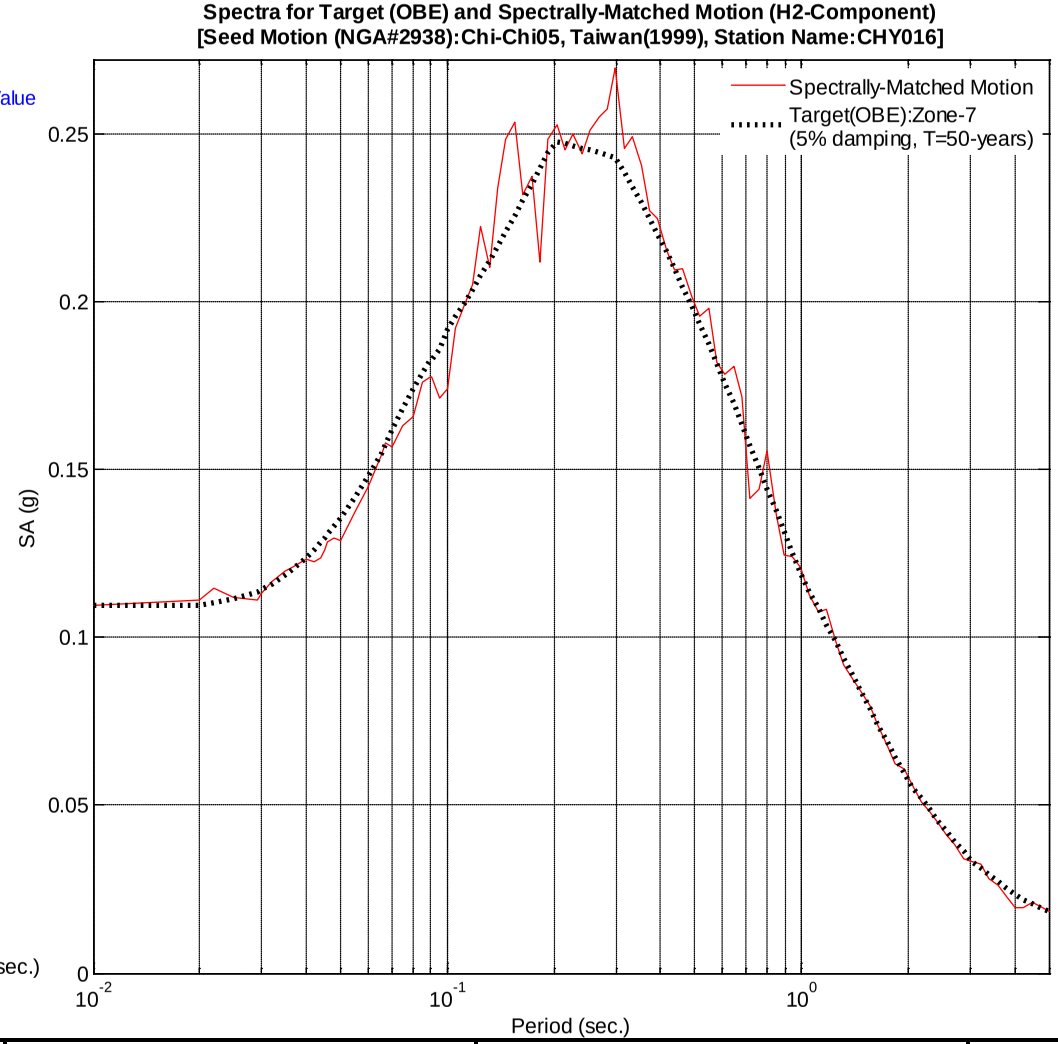
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 6 – VERTICAL**	PLATE **A7-18**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		



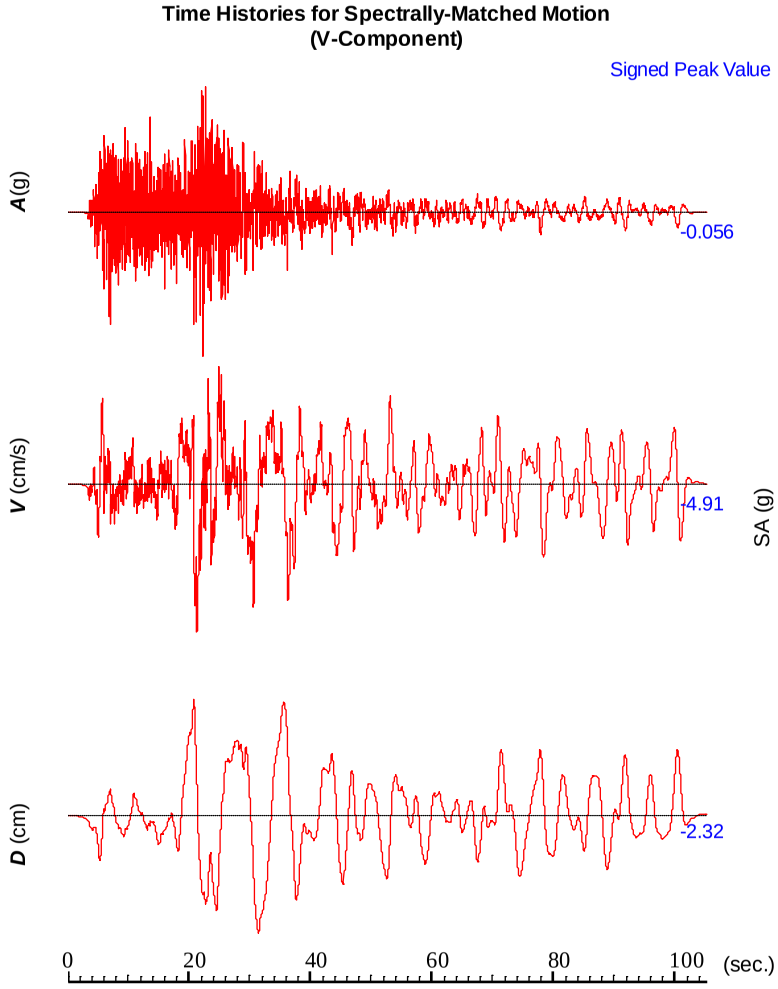


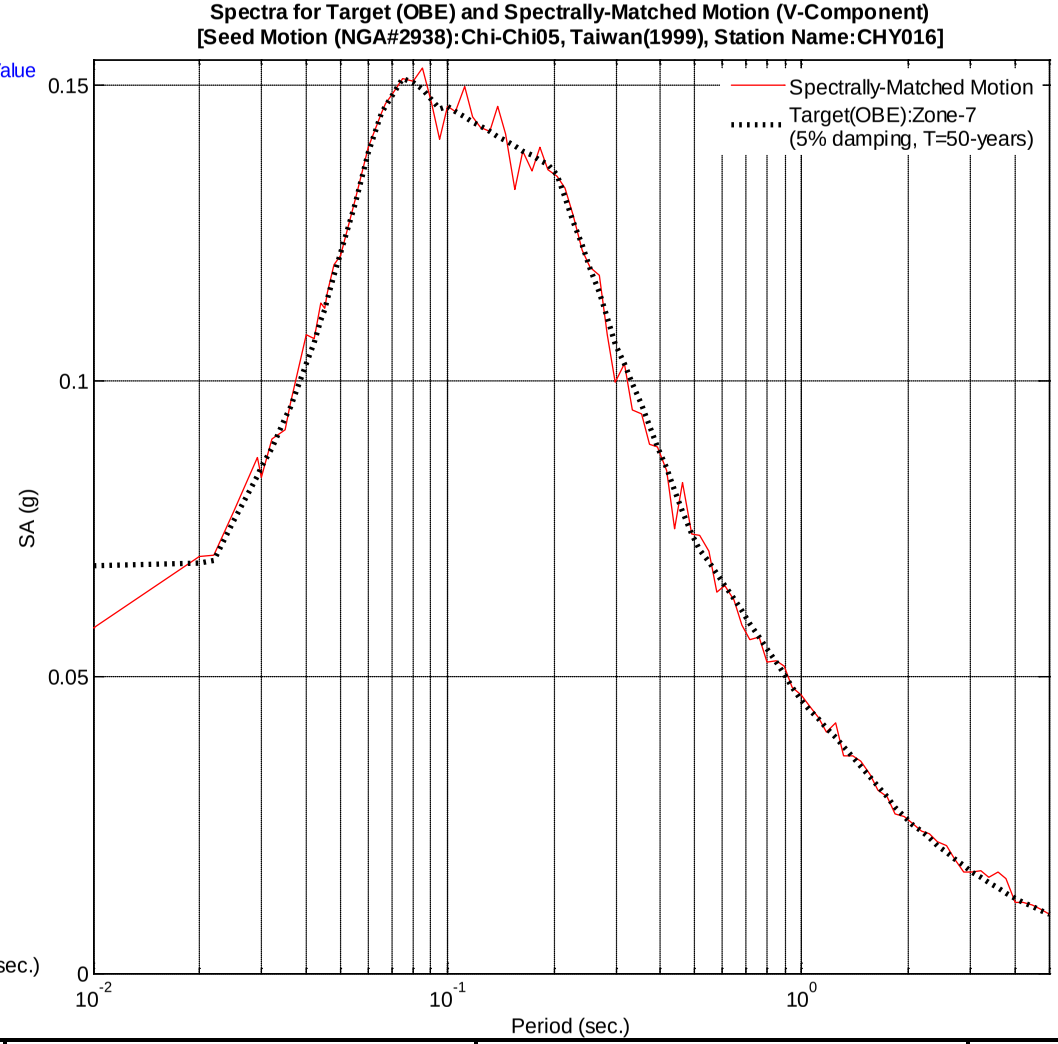
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 7 – SET NO. 7 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A7-19**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – OBE** **ZONE 7 – SET NO. 7 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **A7-20**





SC SOLUTIONS

PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 7 – VERTICAL**	PLATE **A7-21**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		

Table B.1: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 1**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	882	Landers	1992	North Palm Springs	7.28	26.84	0.220	24.605	10.991	0.238	23.561	10.516	0.154	13.318	7.121
2	1776	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.217	27.422	18.360	0.236	28.509	12.577	0.169	11.945	7.752
3	2112	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.236	30.040	19.901	0.258	25.959	20.024	0.158	16.885	16.339
4	2900	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.227	23.337	19.820	0.252	23.631	20.820	0.160	10.731	7.316
5	169	Imperial Valley-06	1979	Delta	6.53	22.03	0.224	20.118	15.687	0.217	25.748	13.166	0.149	11.760	8.683
6	1637	Manjil, Iran	1990	Rudsar	7.37	64.47	0.217	25.687	9.206	0.219	22.008	10.130	0.176	10.490	5.539
7	1208	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.227	25.150	16.380	0.221	27.177	18.391	0.172	16.439	13.705

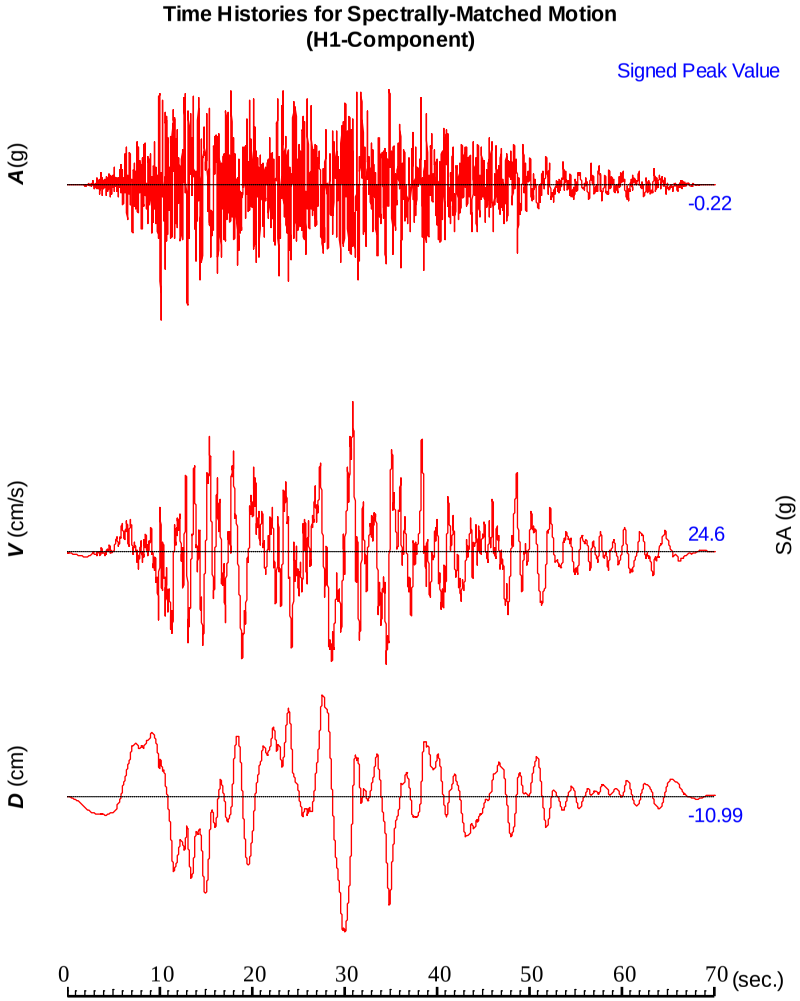
SC SOLUTIONS

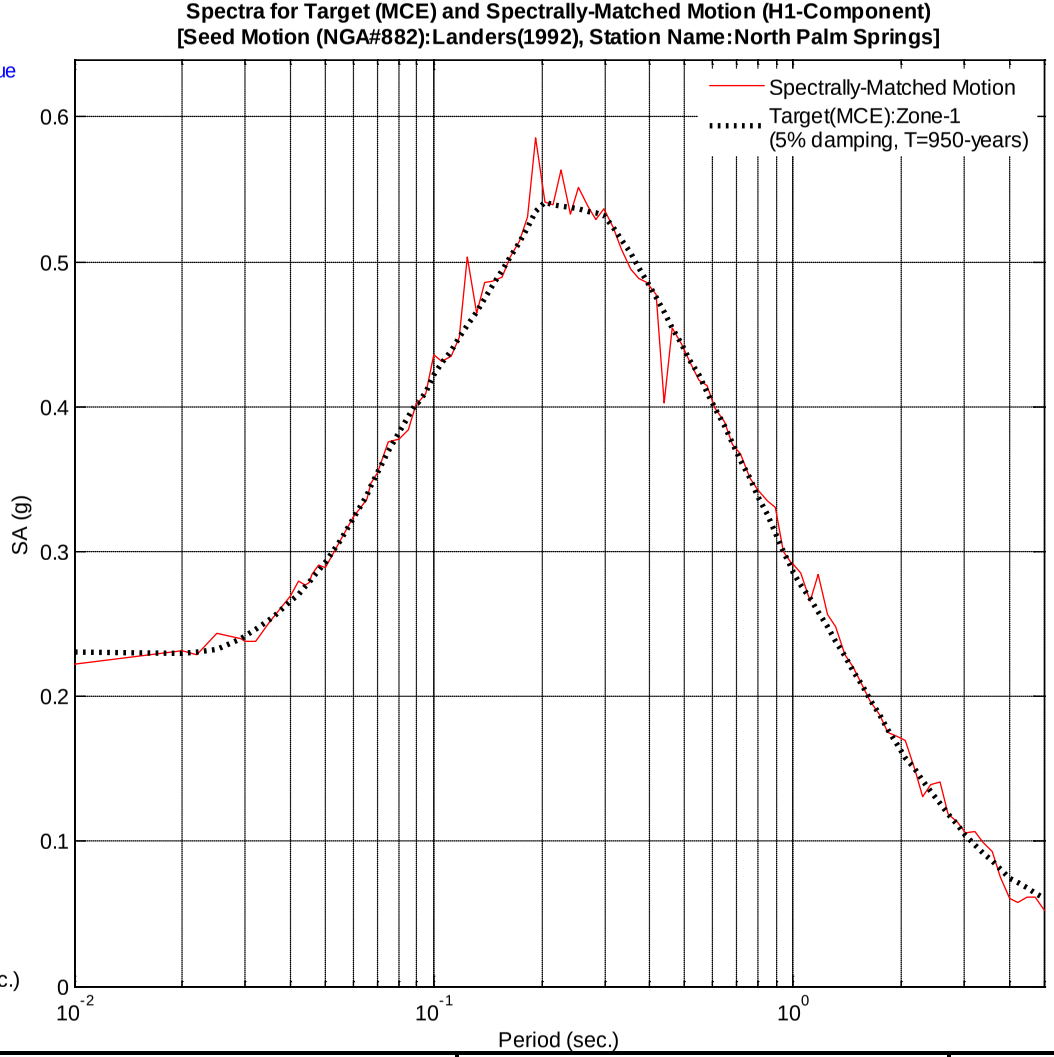
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS MCE – ZONE 1

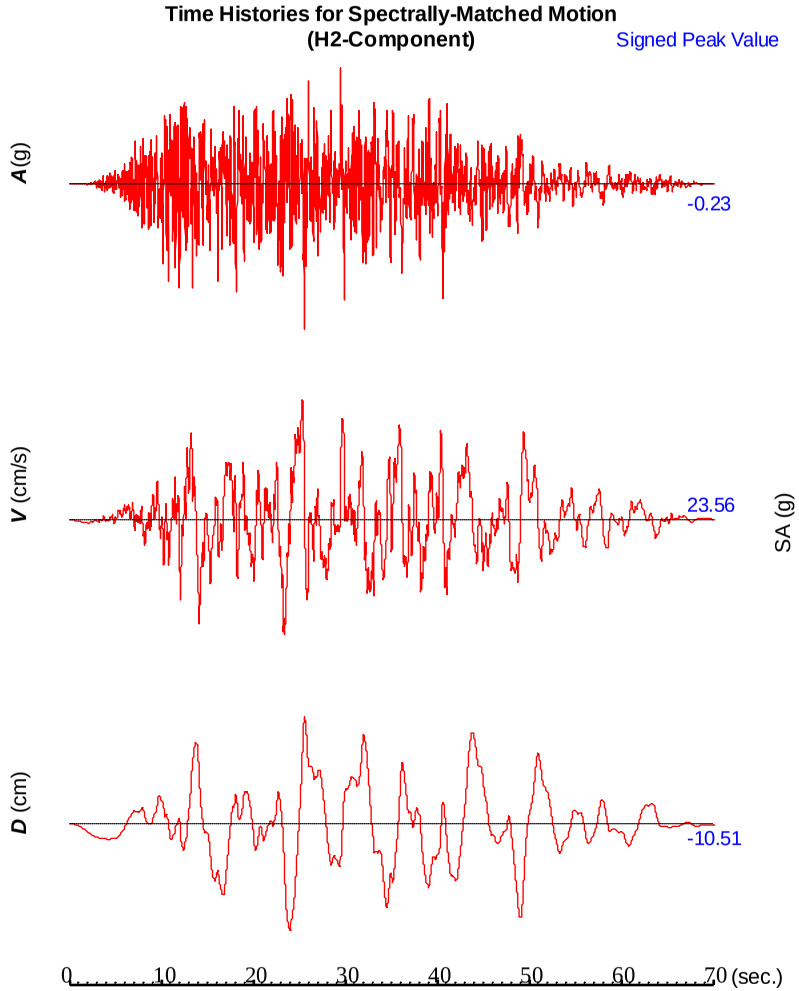
CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

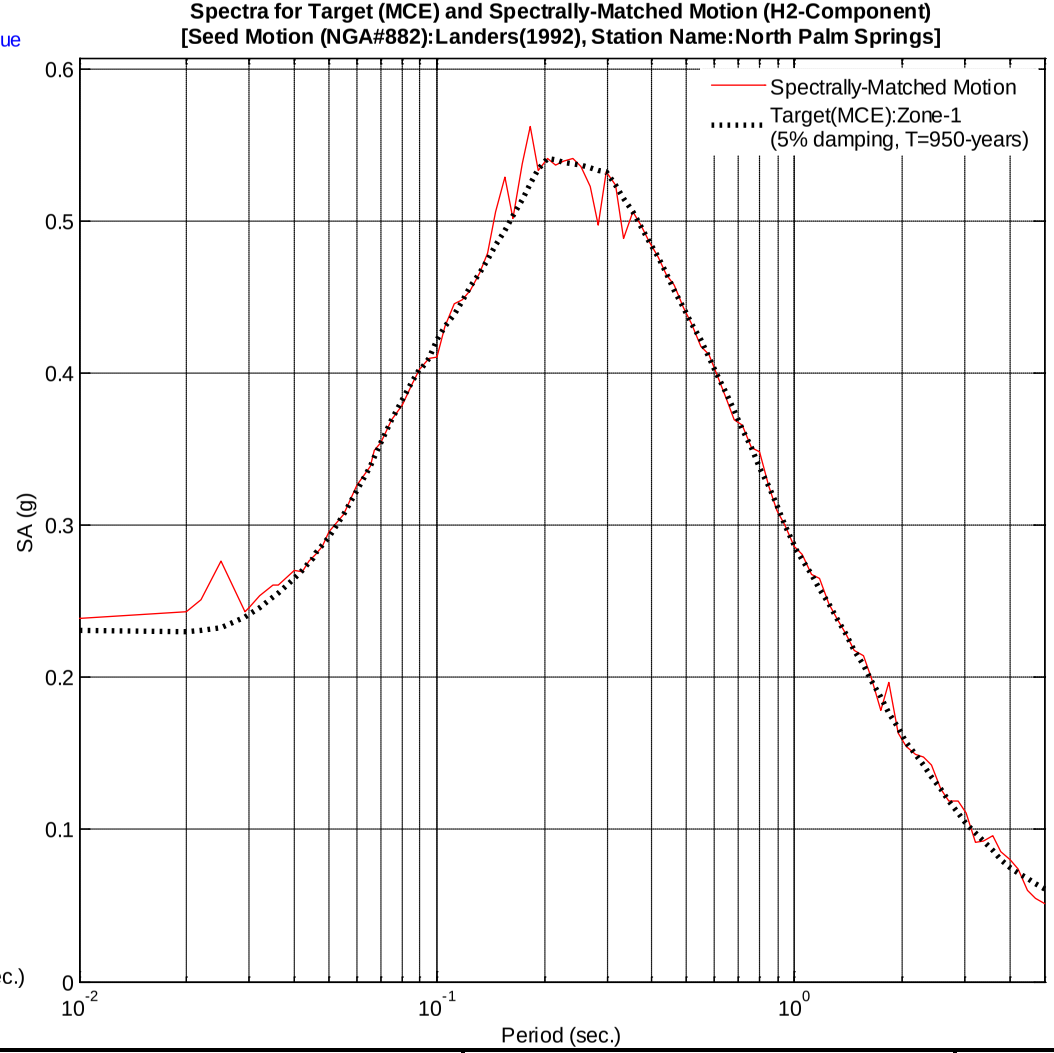
PLATE
B1-0



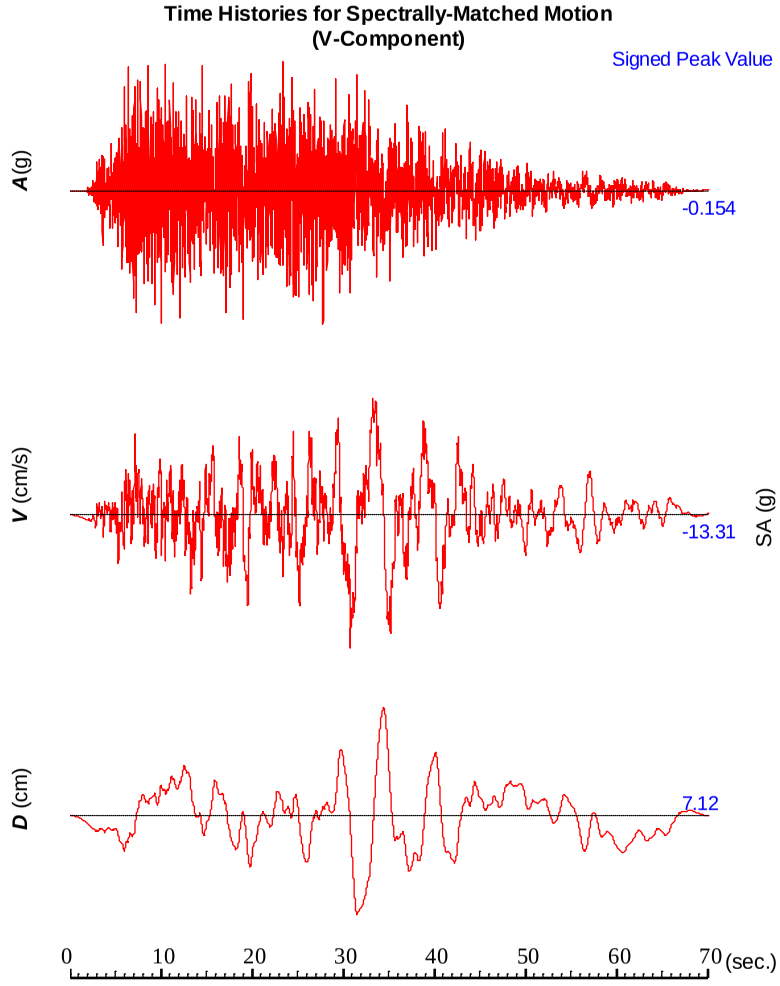


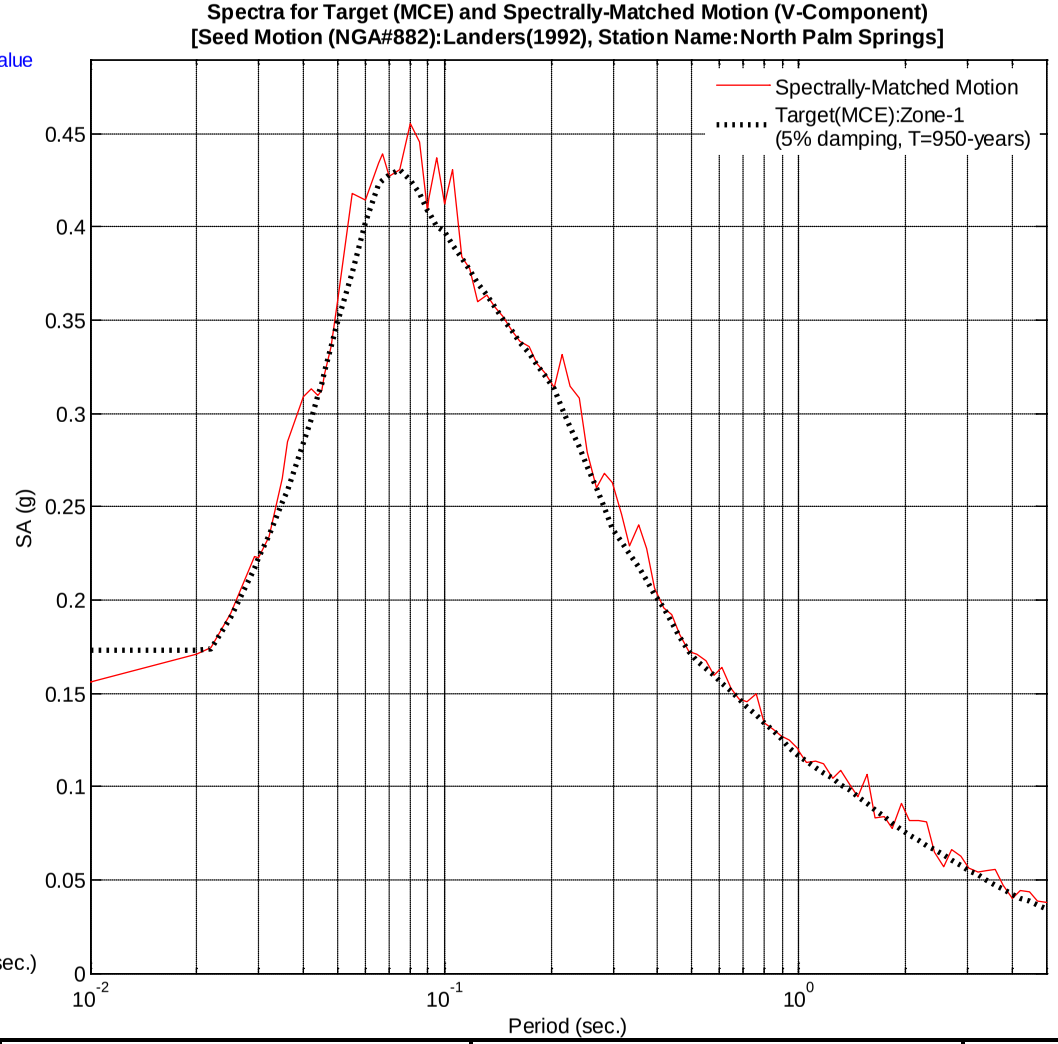
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 1 – SET NO. 1 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-1**





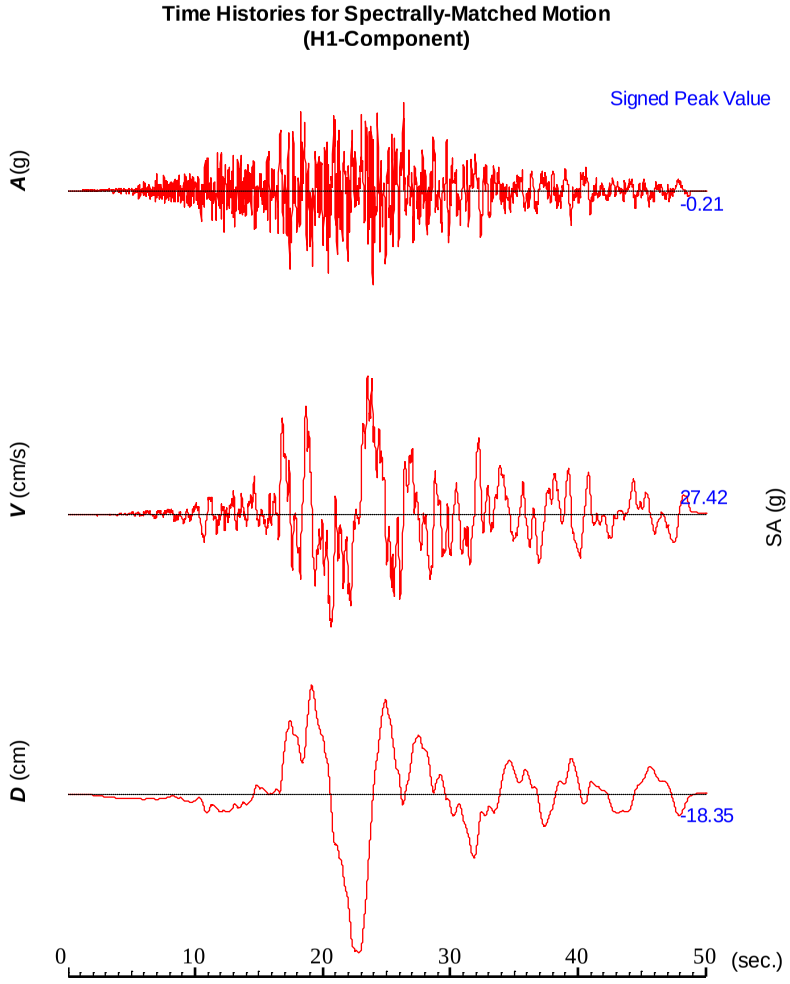
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 1 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-2**

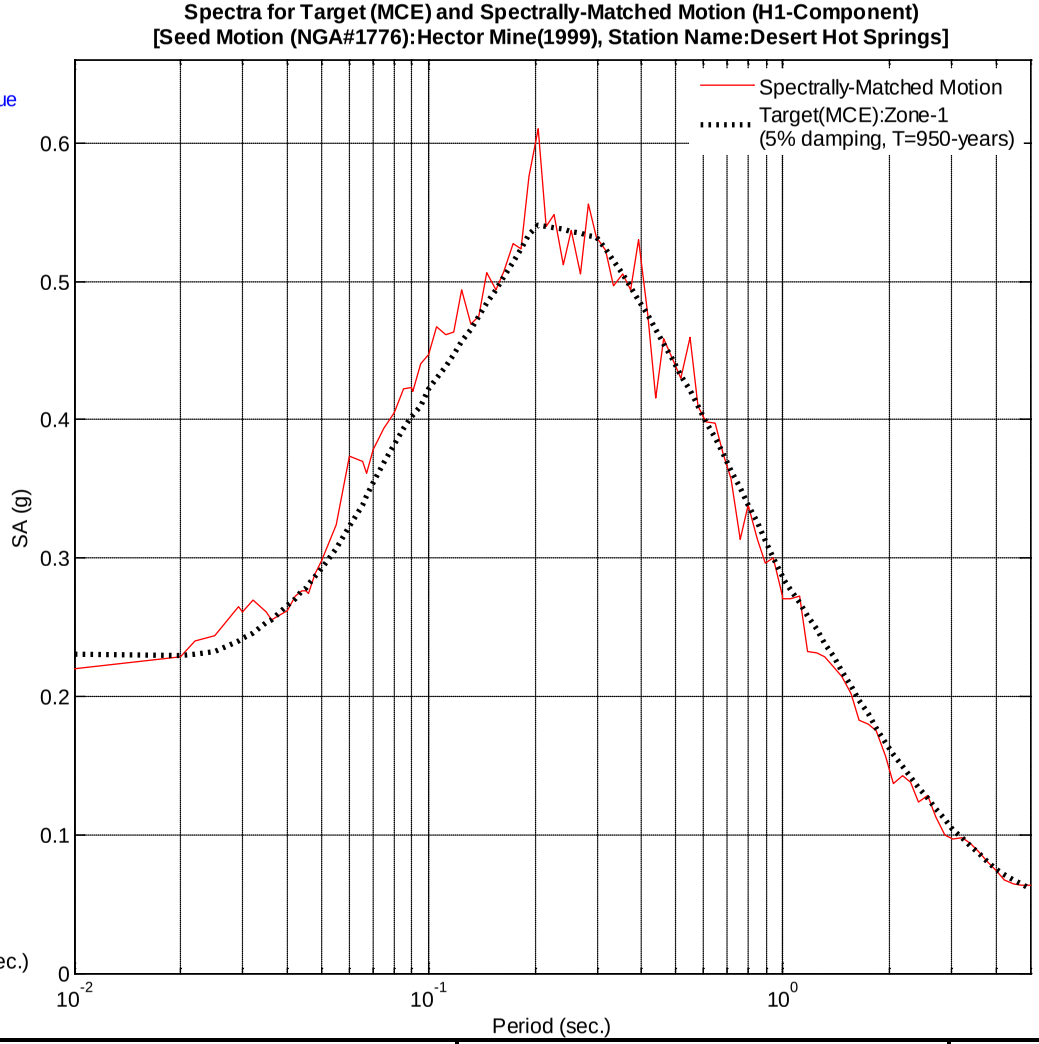




SC SOLUTIONS

PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 1 – SET NO. 1 – VERTICAL**	PLATE **B1-3**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS

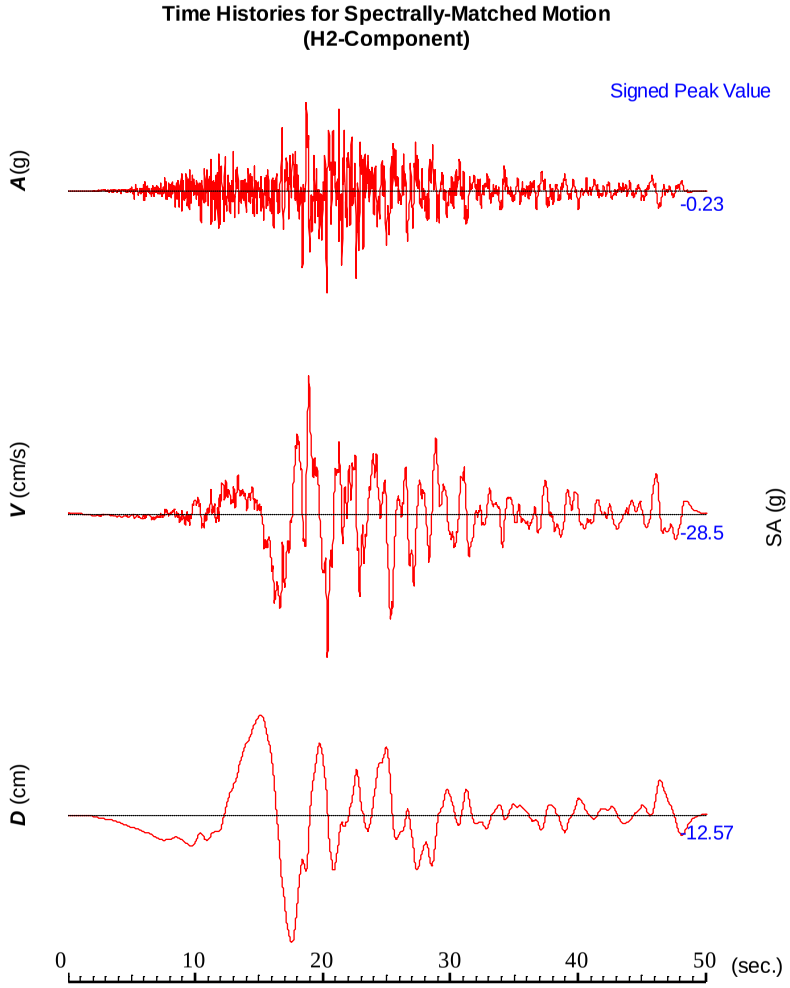
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

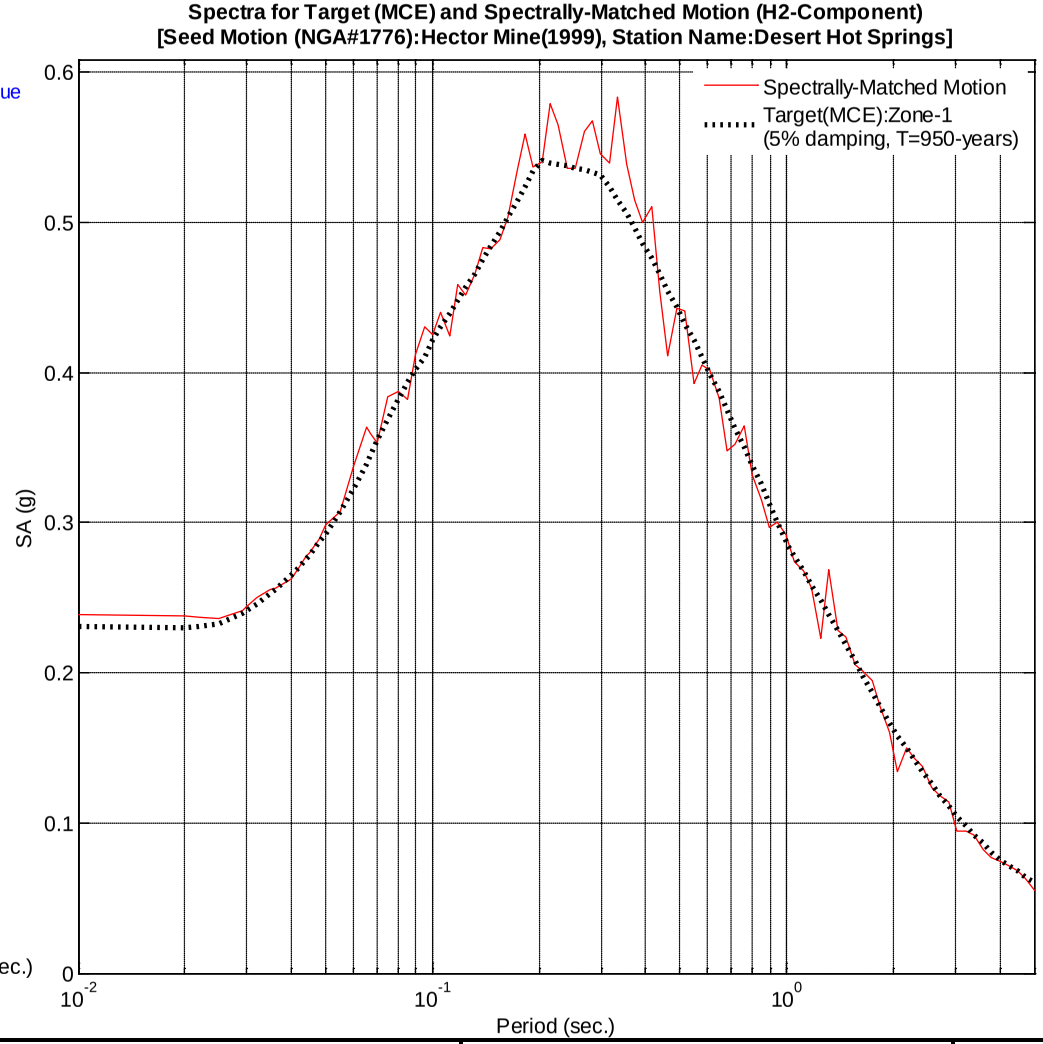
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 1 – SET NO. 2 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

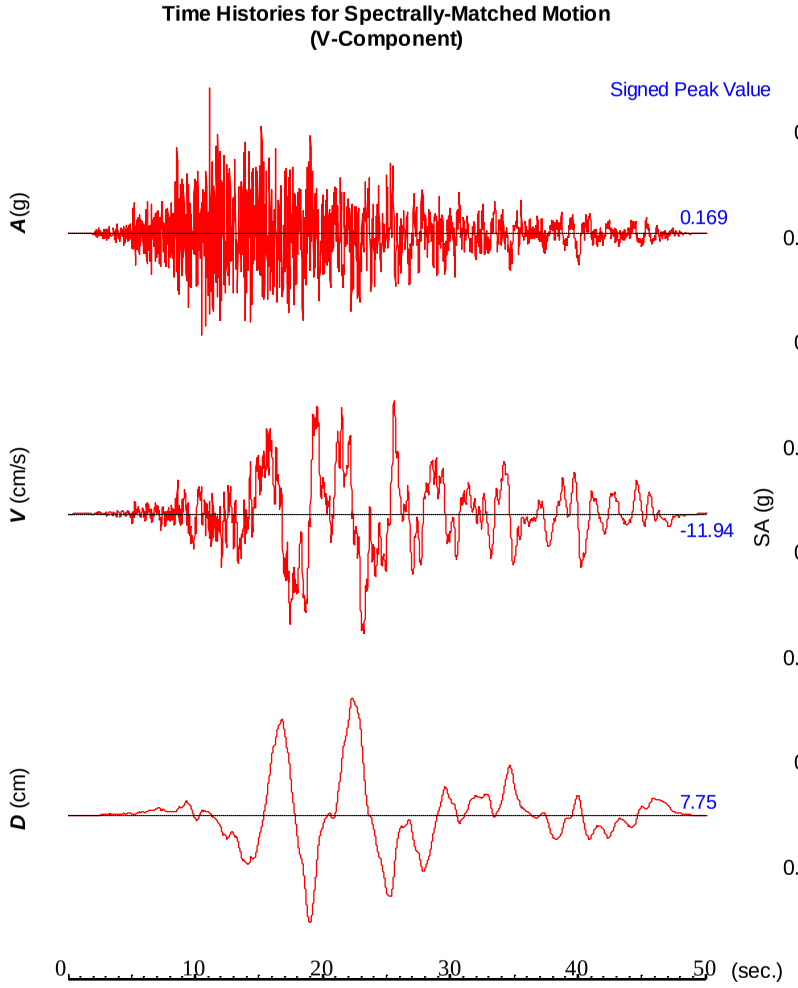
PLATE

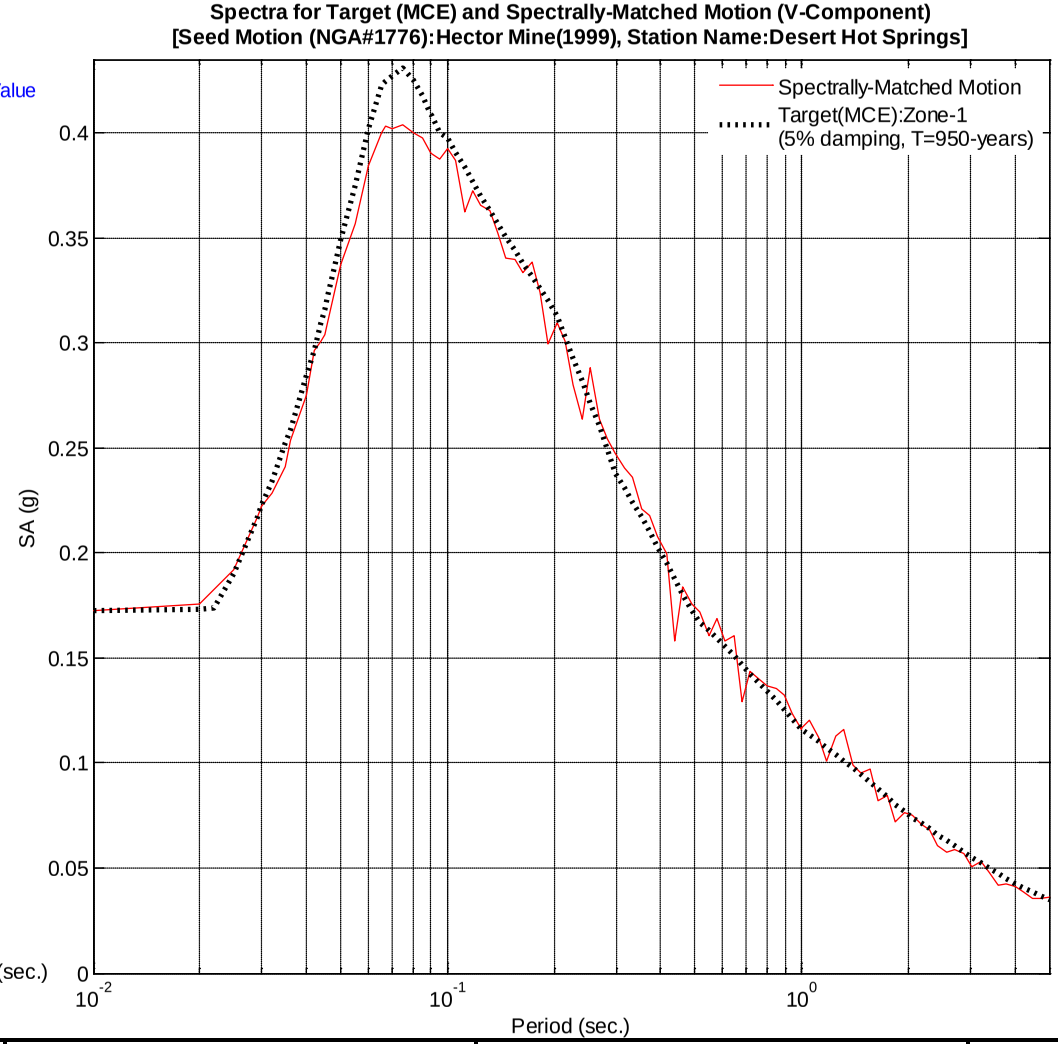
B1-4



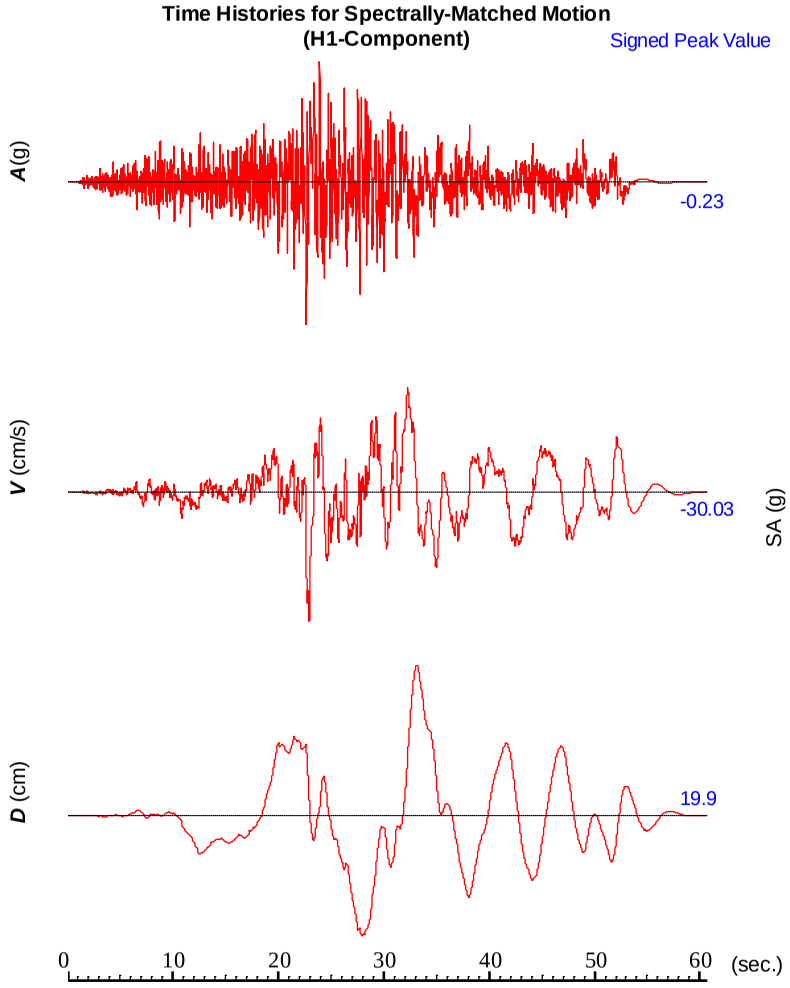


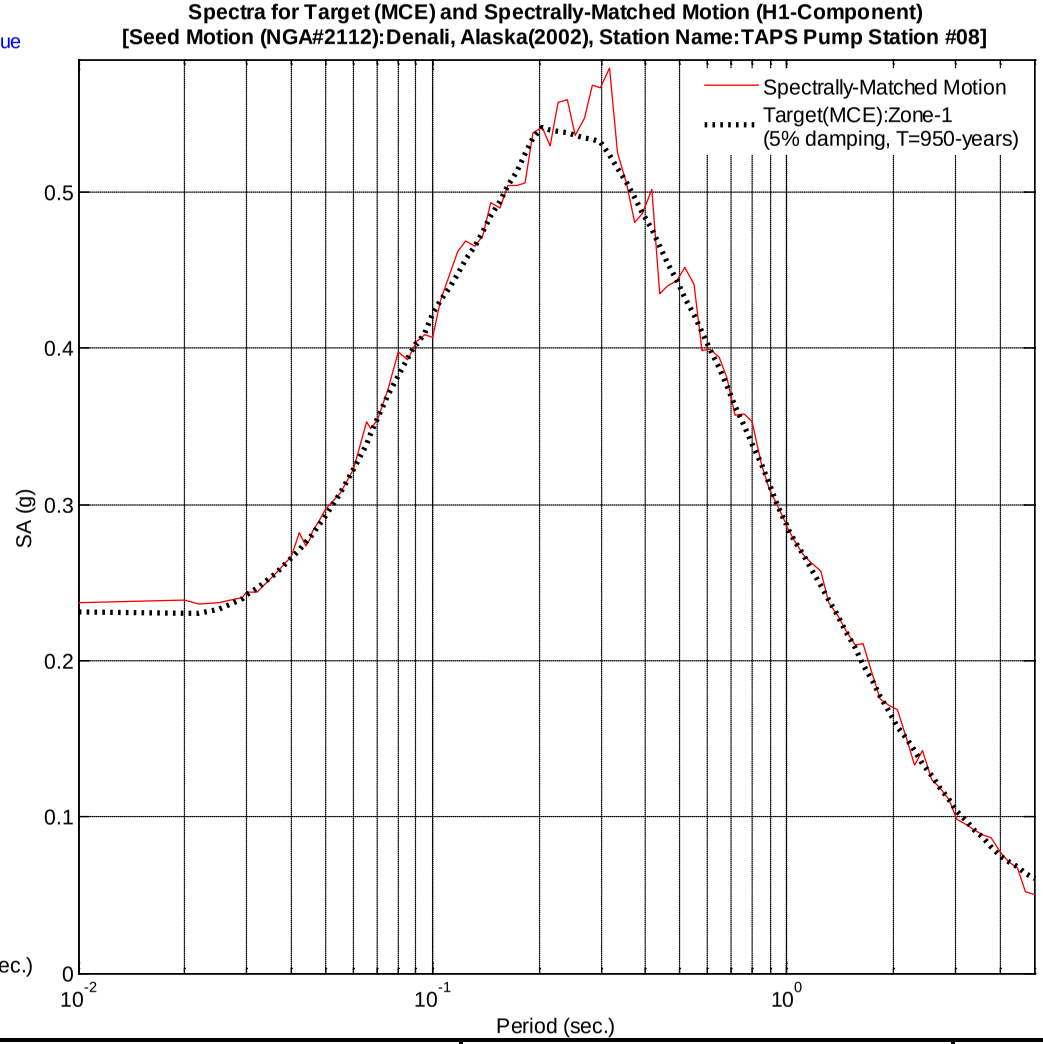
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 2 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-5**



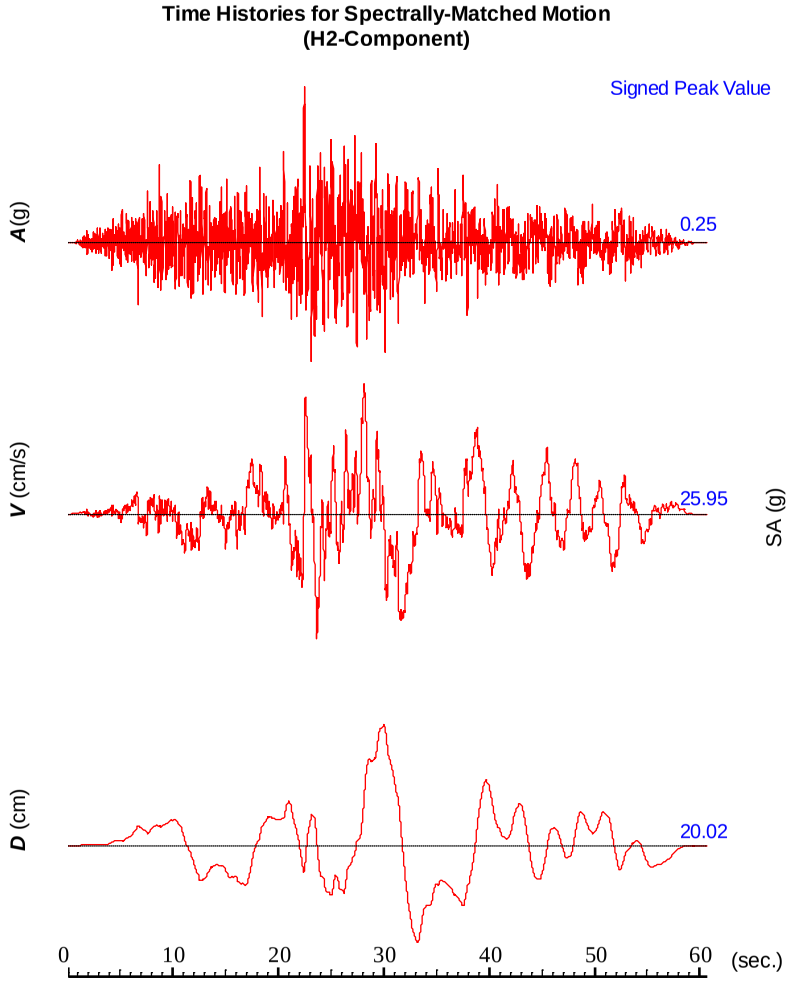


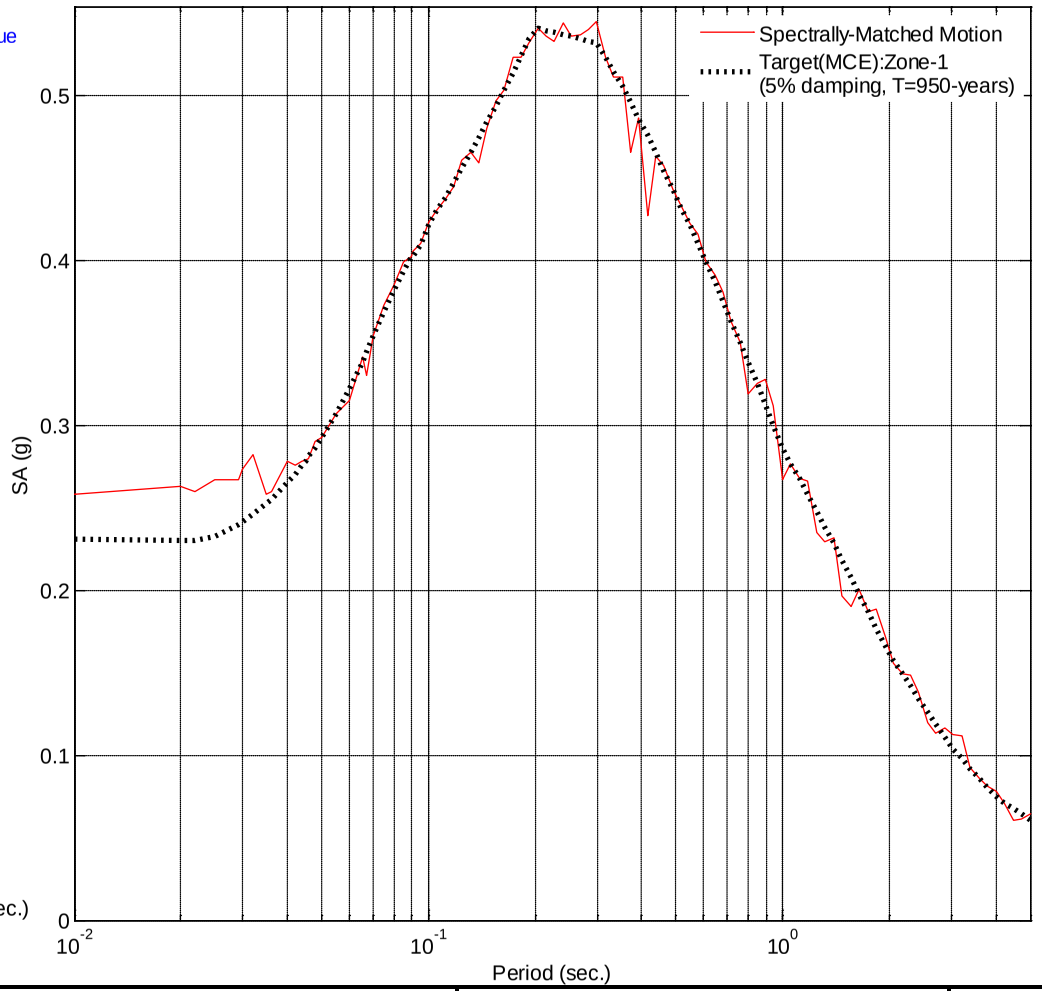
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 2 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-6**



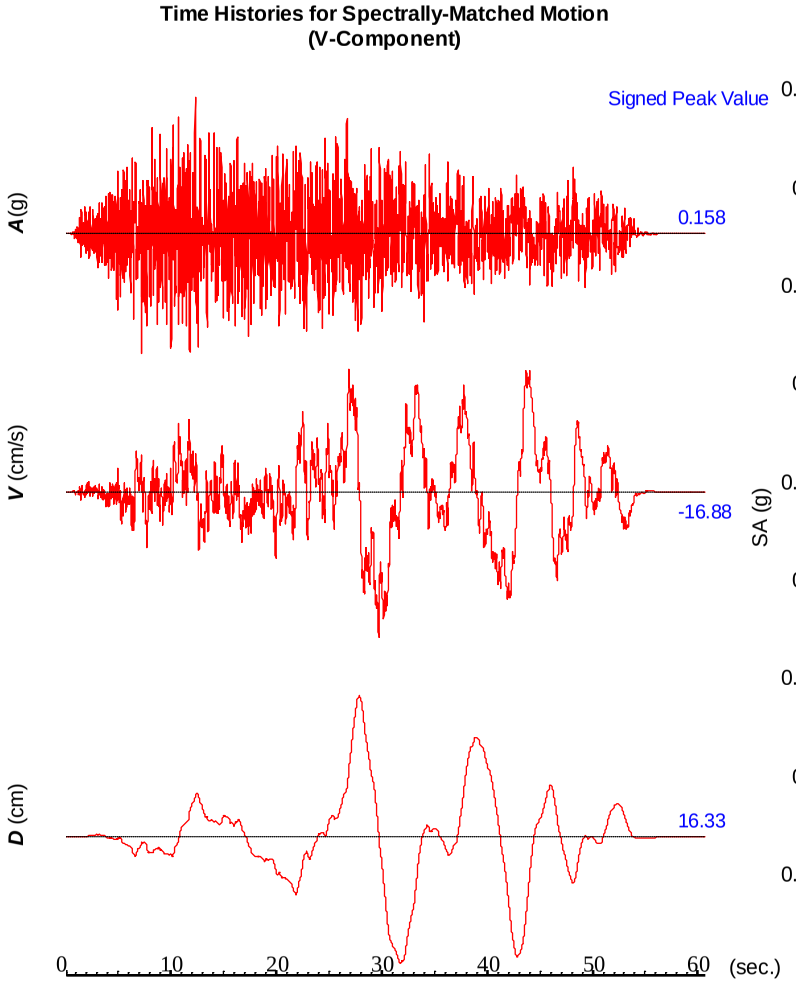


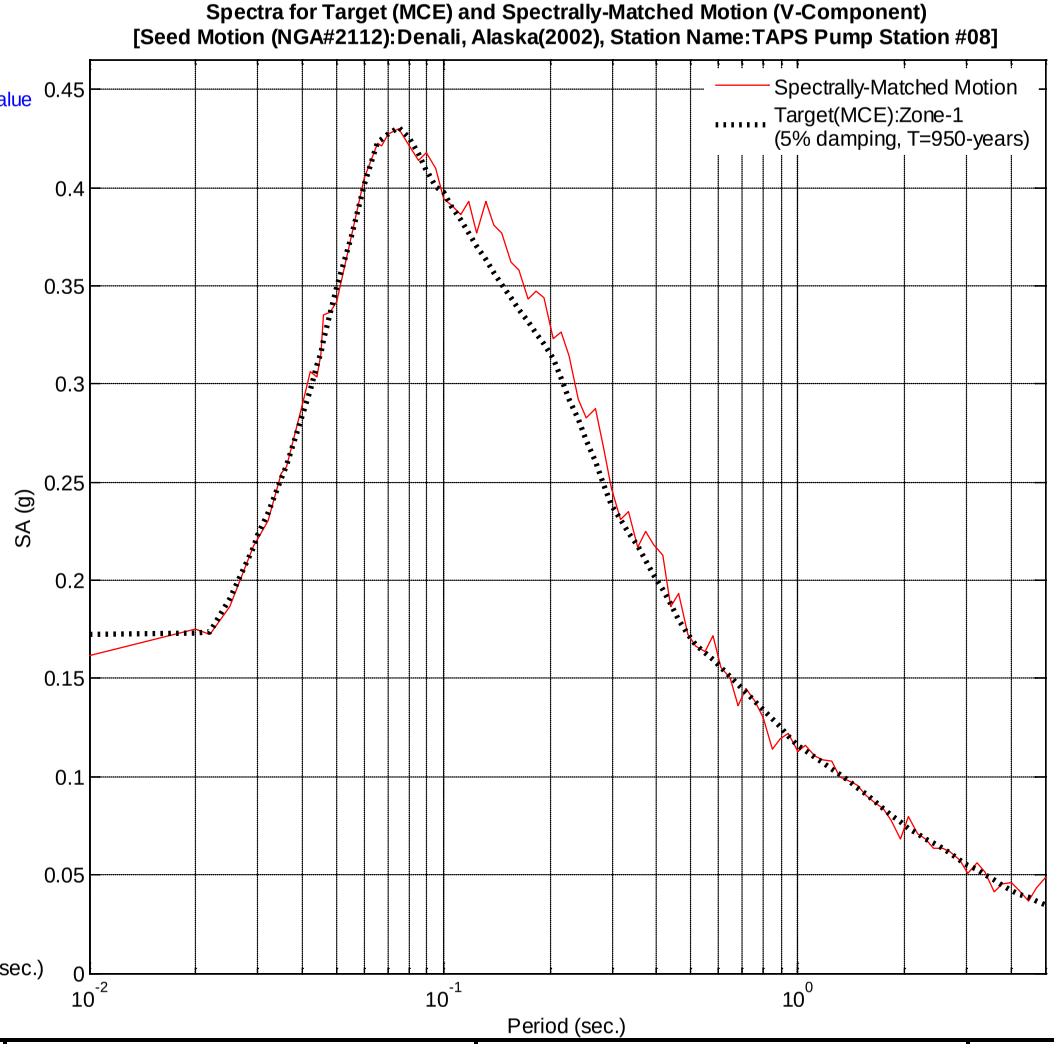
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 3 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-7**





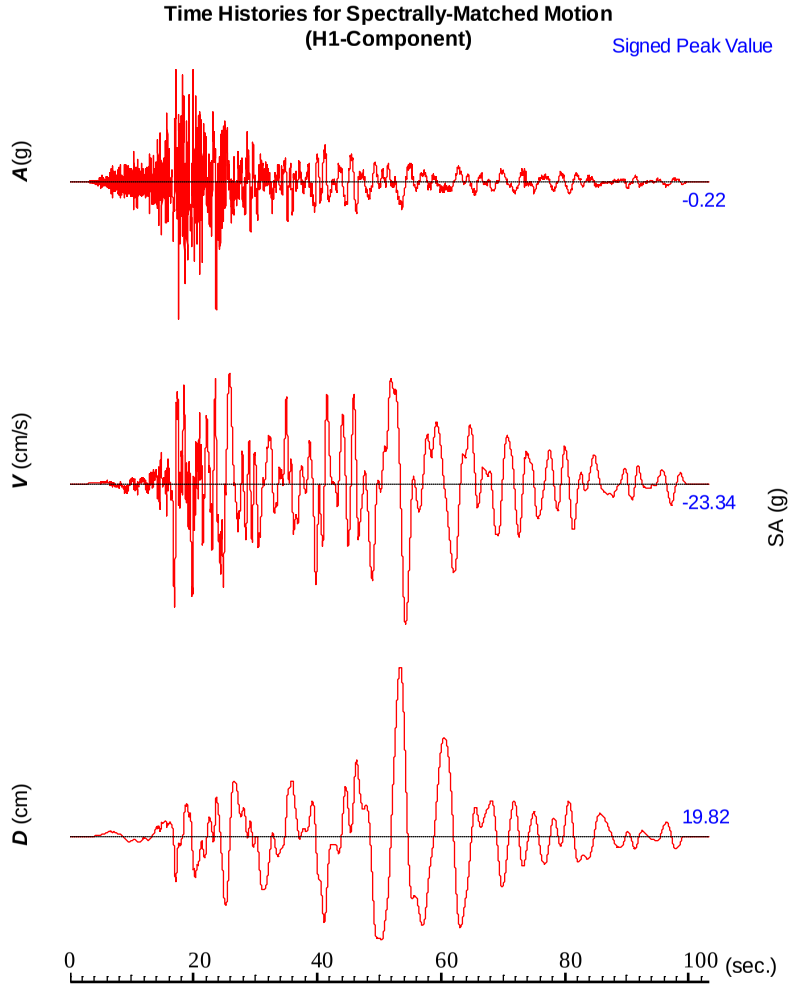
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 3 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-8**

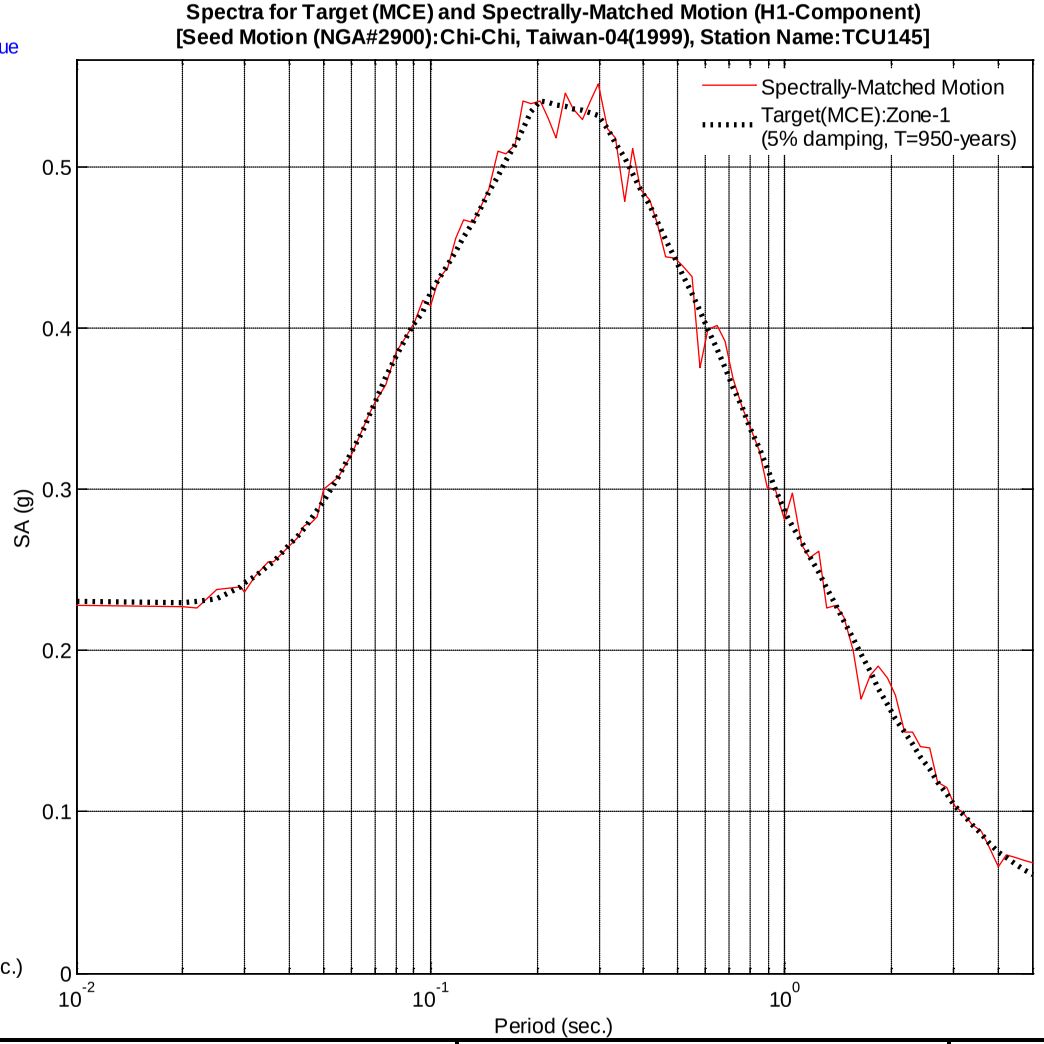




SC SOLUTIONS

PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 1 – SET NO. 3 – VERTICAL**	PLATE **B1-9**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	
DATE:	02/24/2012		





SC SOLUTIONS

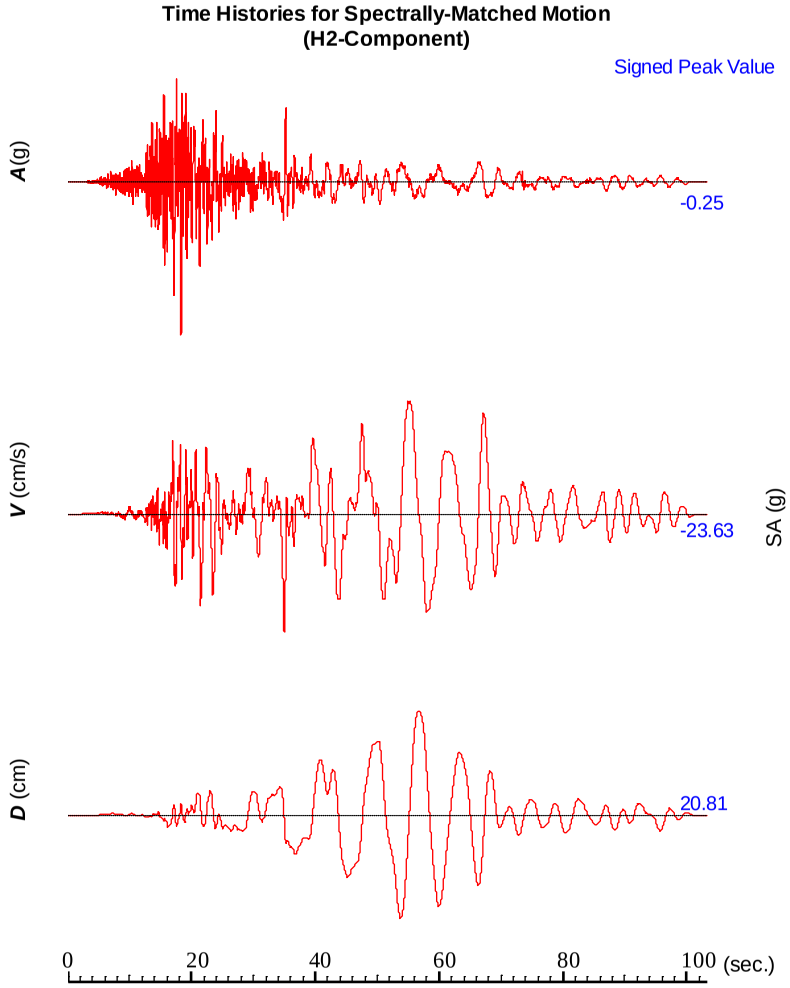
PROJ. NO:		
BY:	J. Zhong	
QC CHECK:	M. Perez	
QA CHECK:	M. Tabatabaie	
DATE:	02/24/2012	

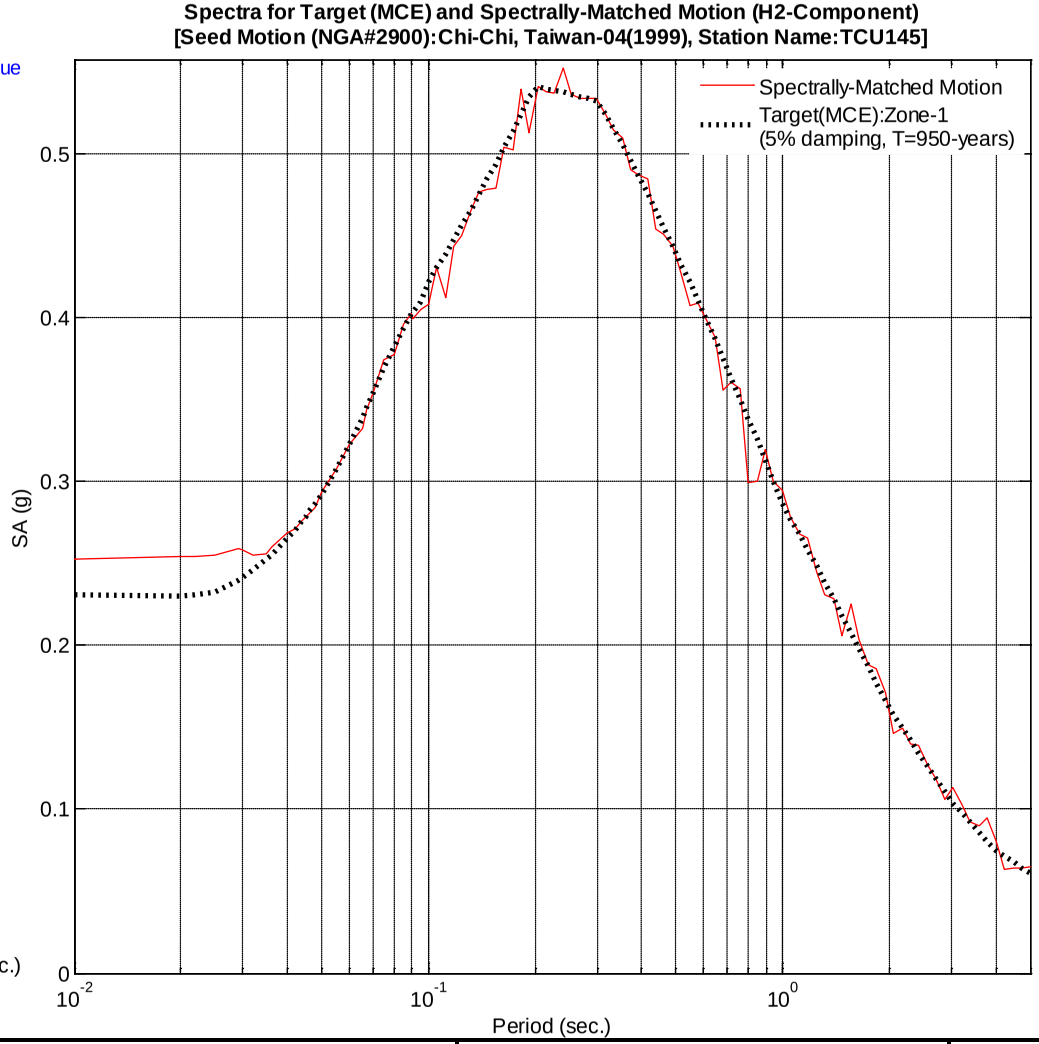
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 1 – SET NO. 4 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

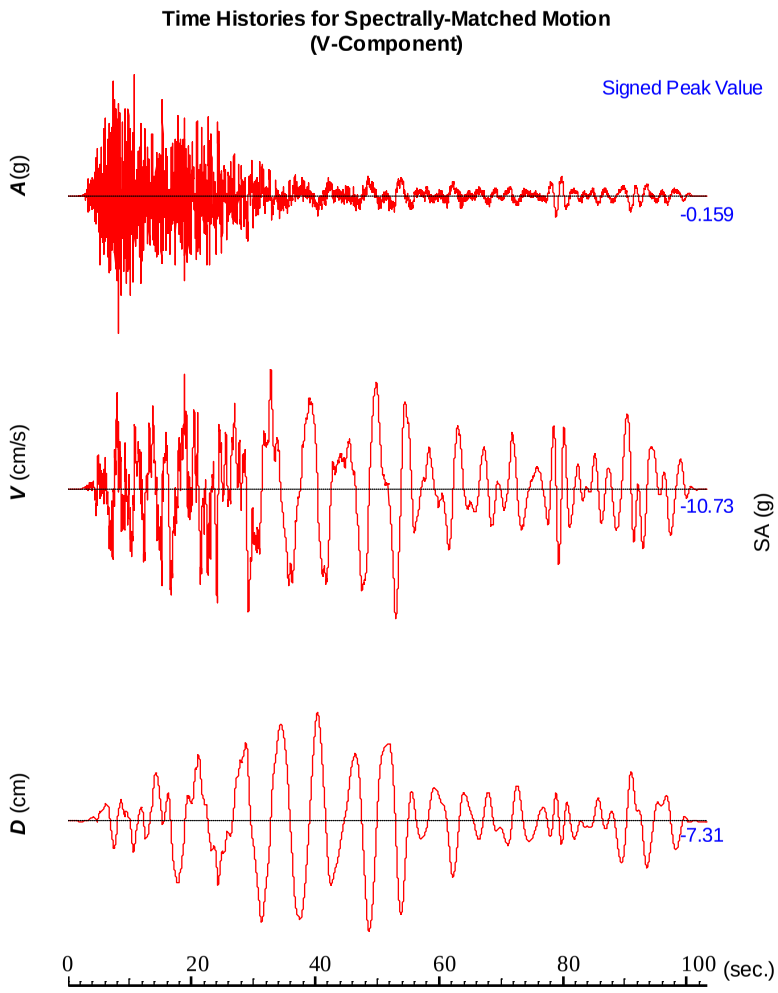
PLATE

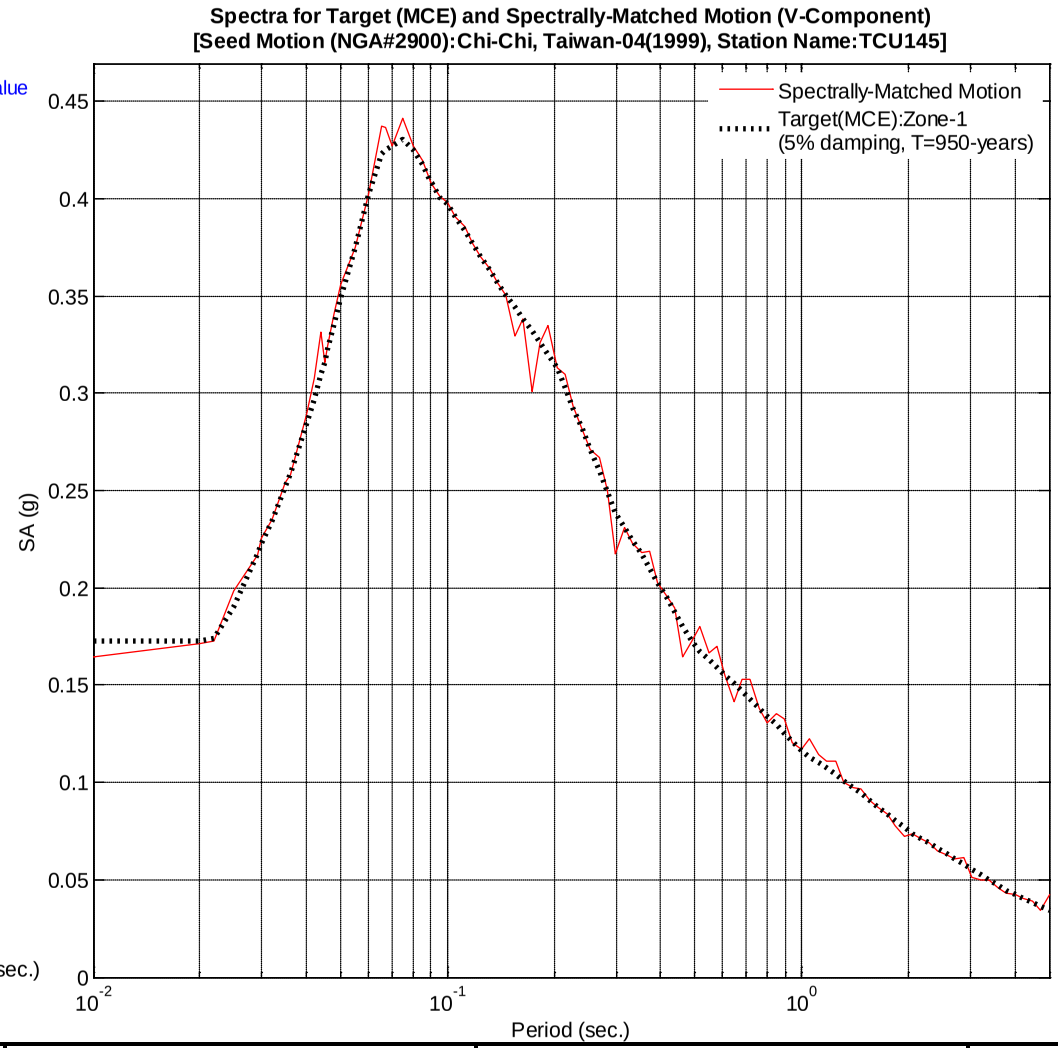
B1-10



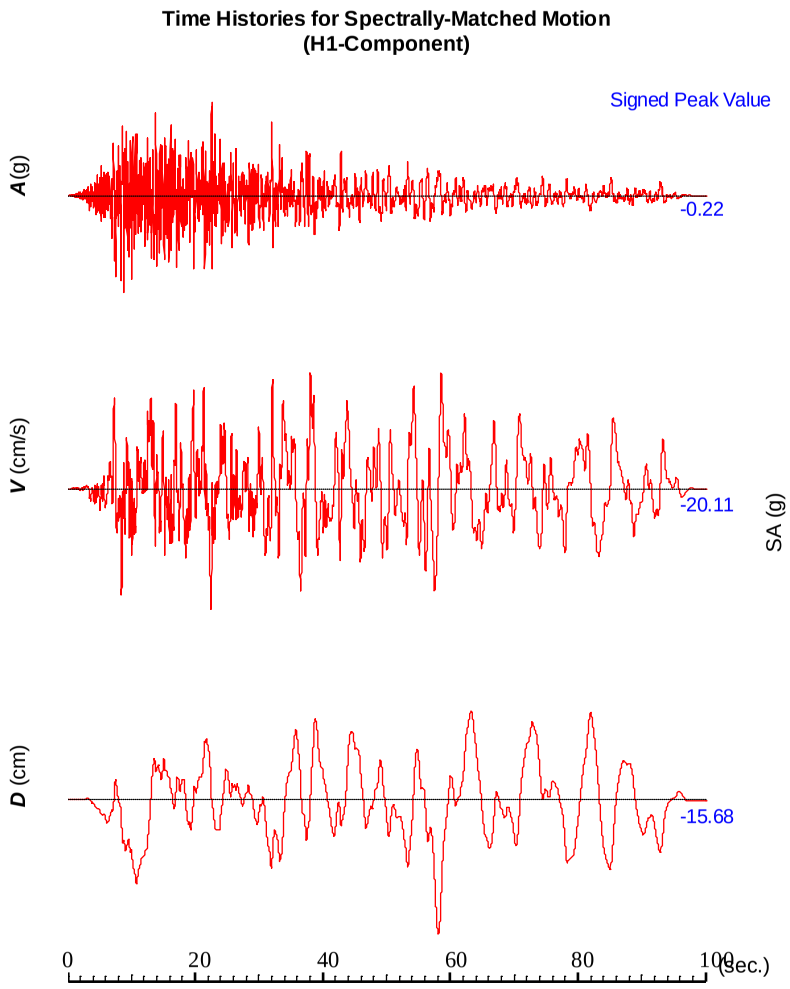


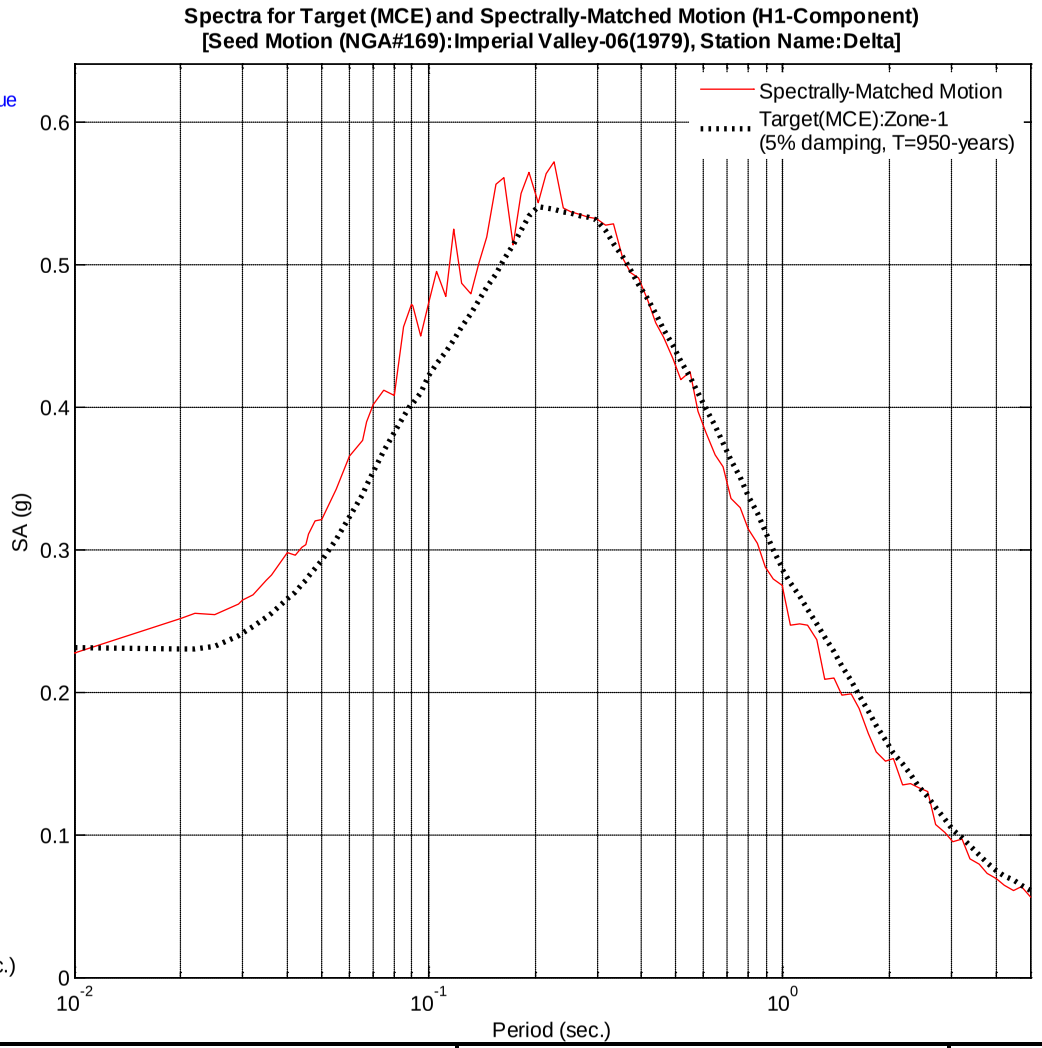
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 4 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-11**



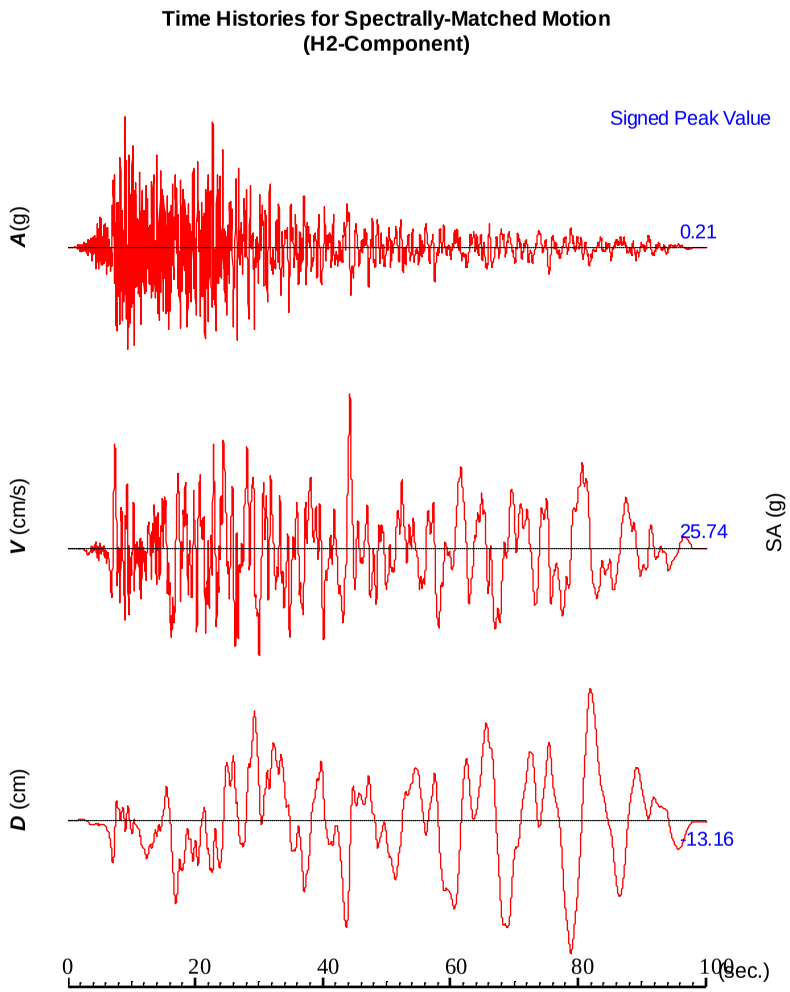


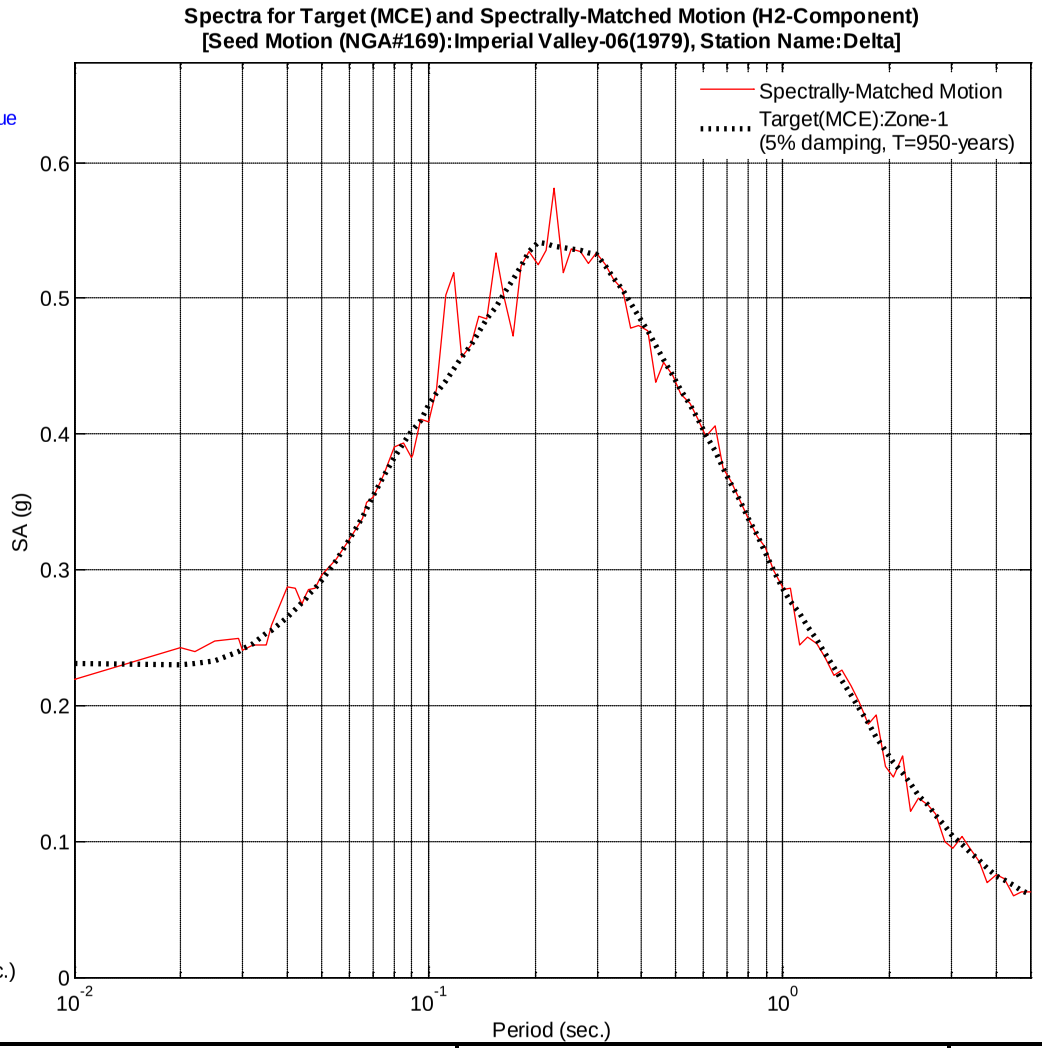
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 1 – SET NO. 4 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-12**



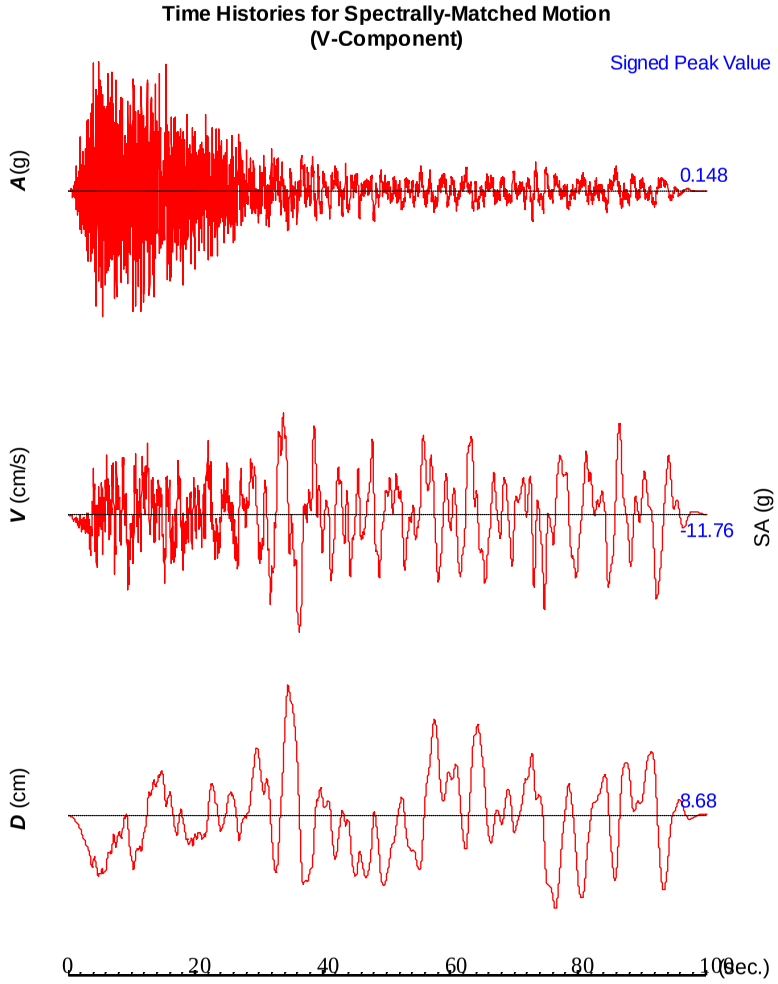


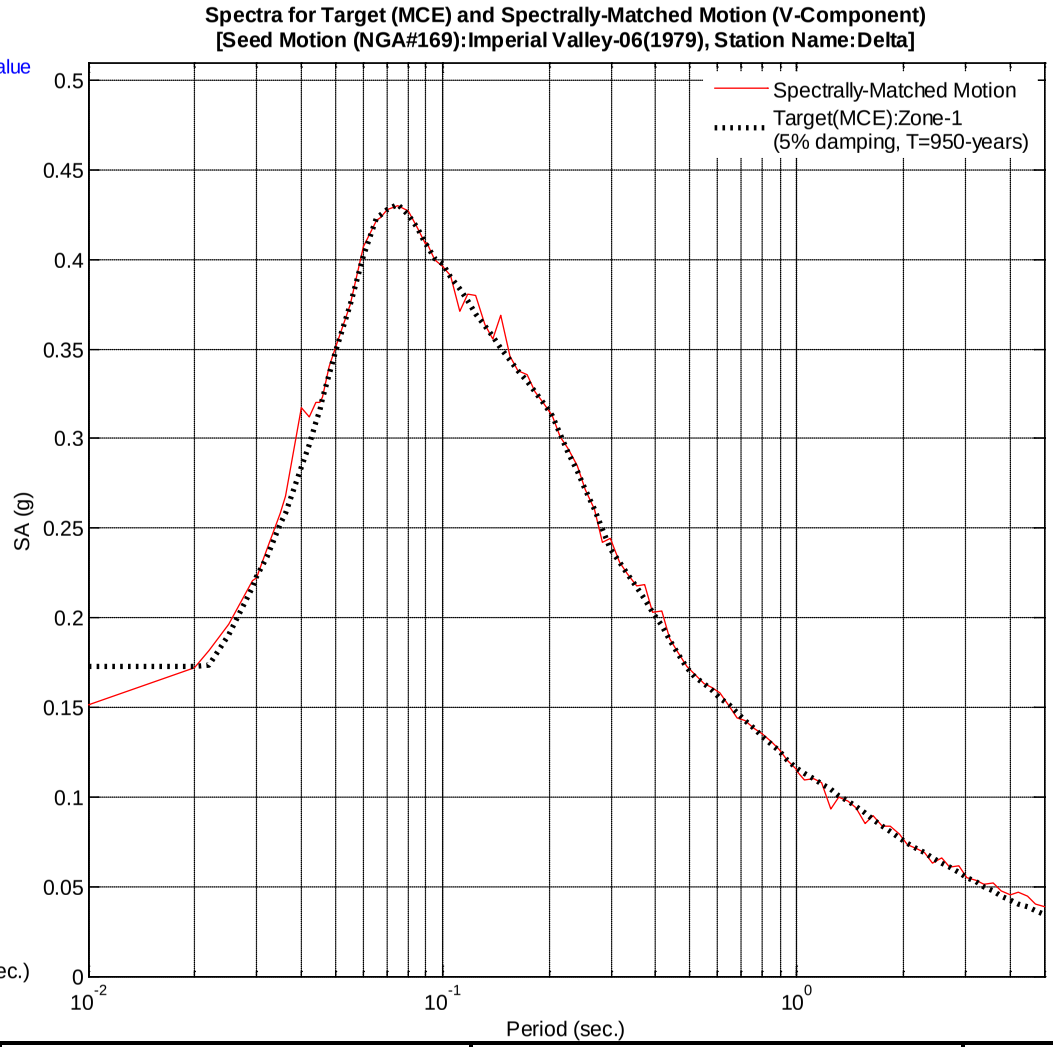
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 5 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-13**



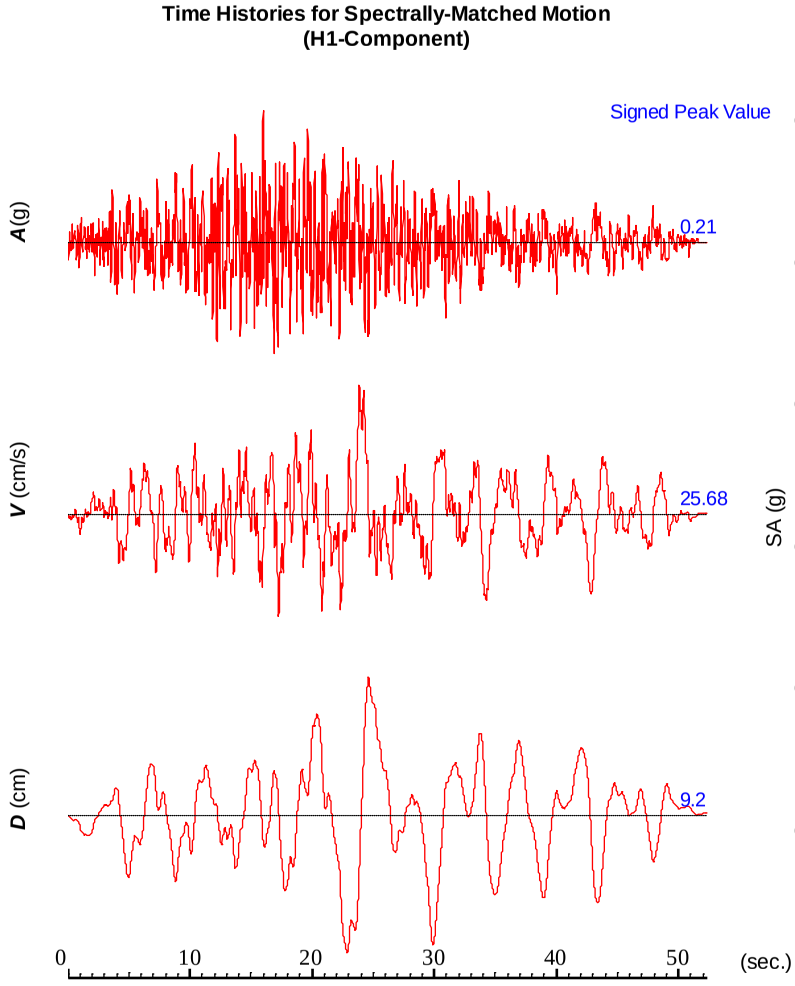


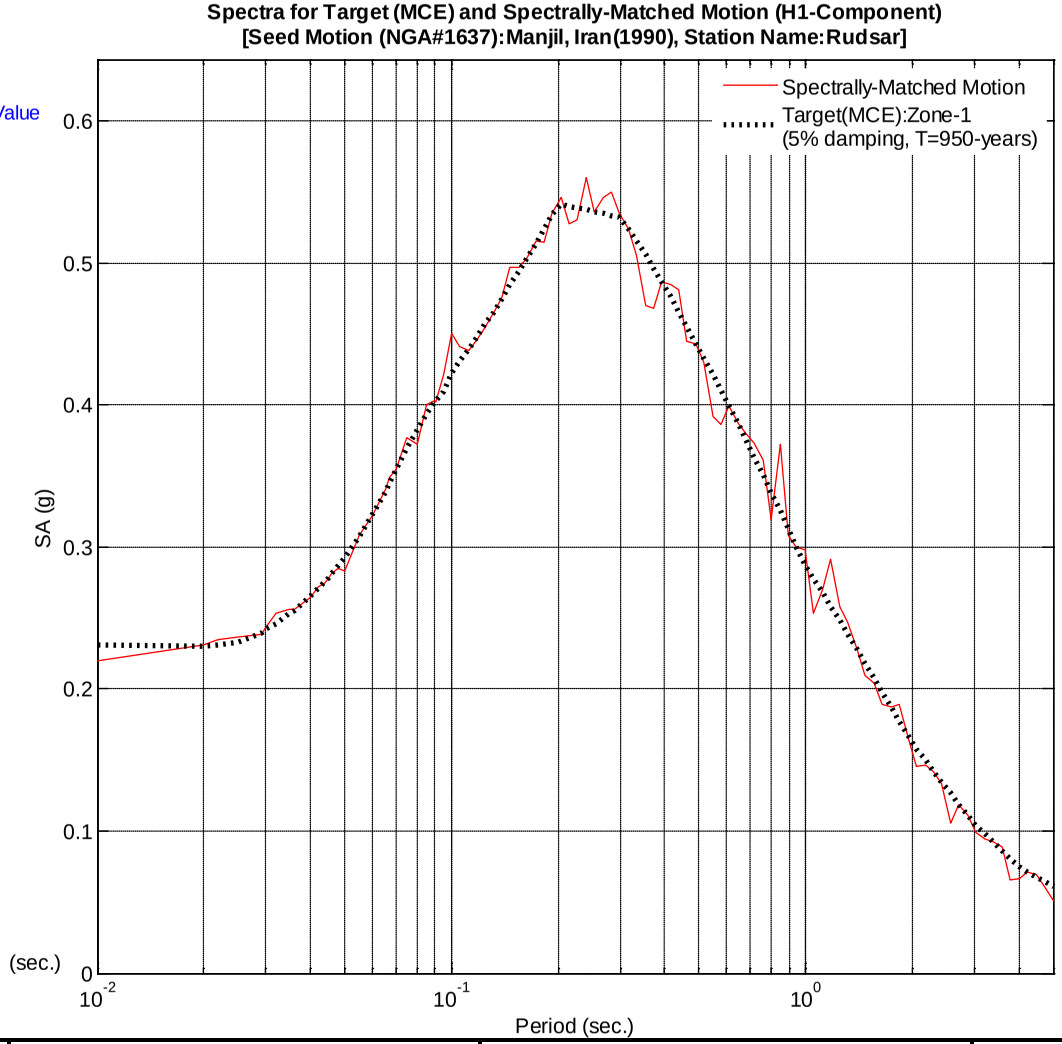
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 5 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-14**



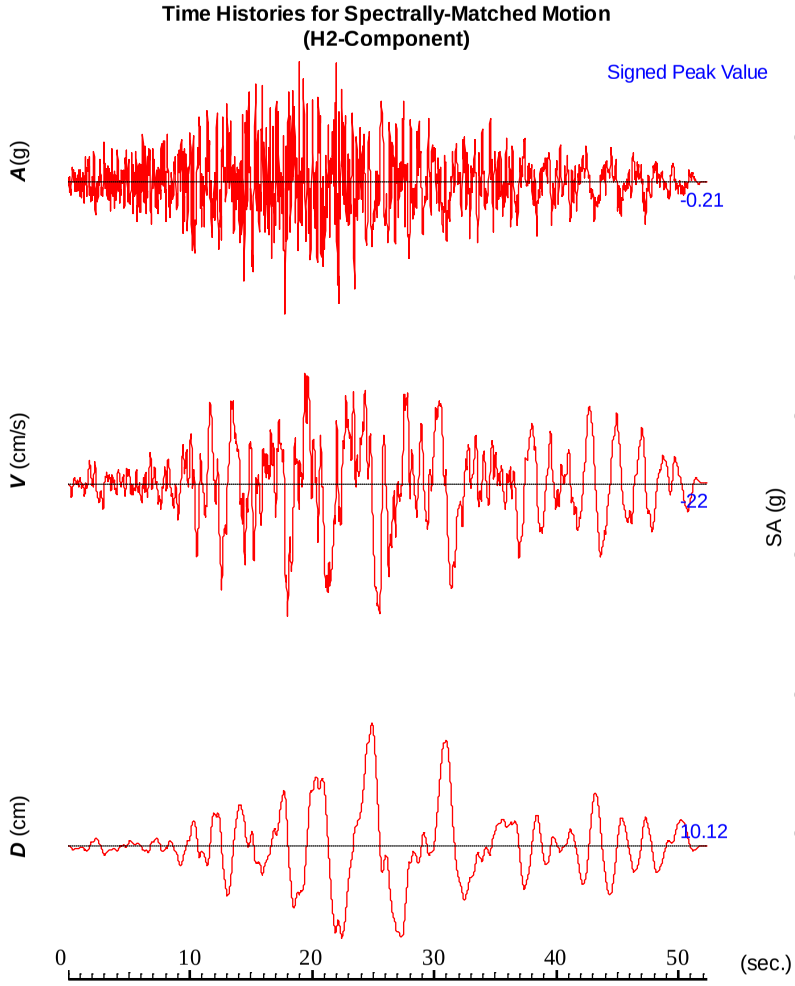


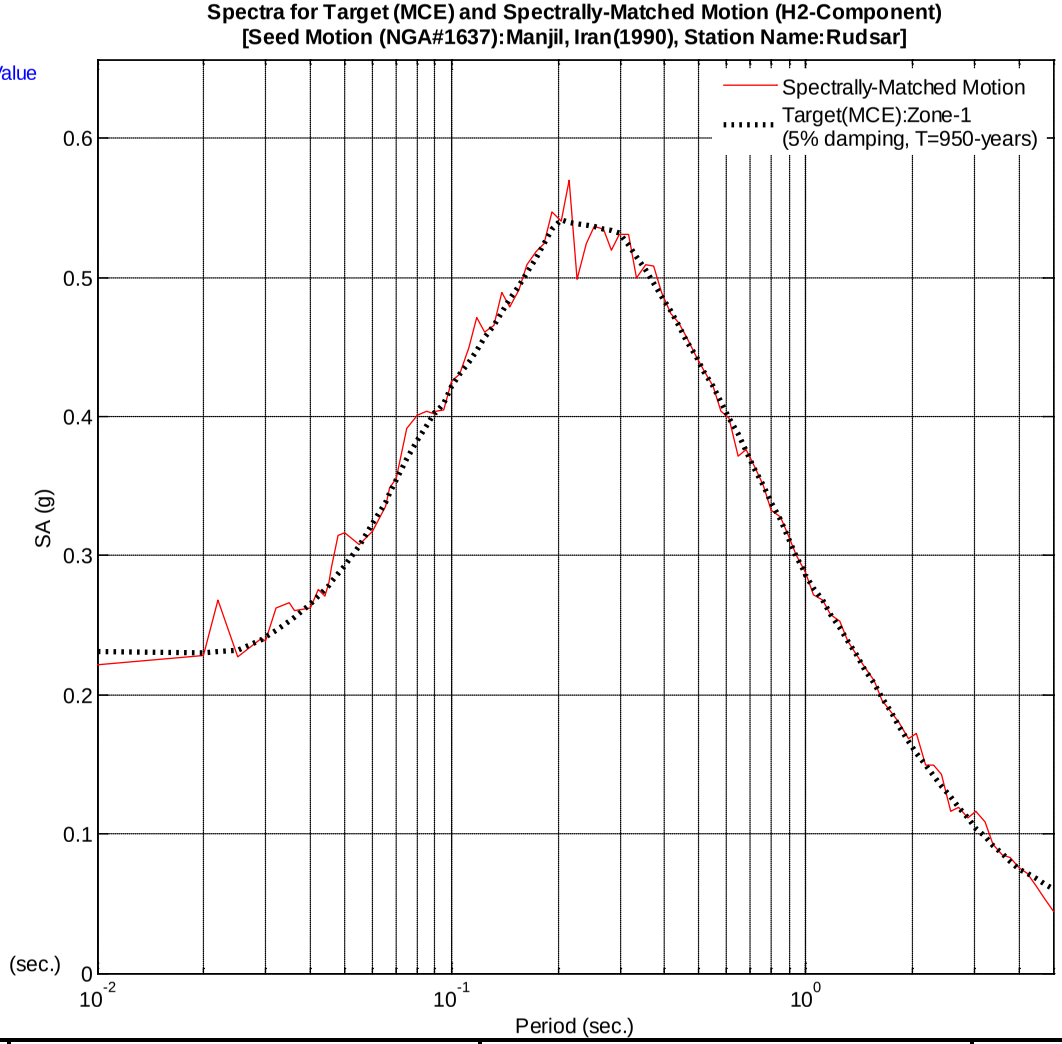
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 5 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-15**



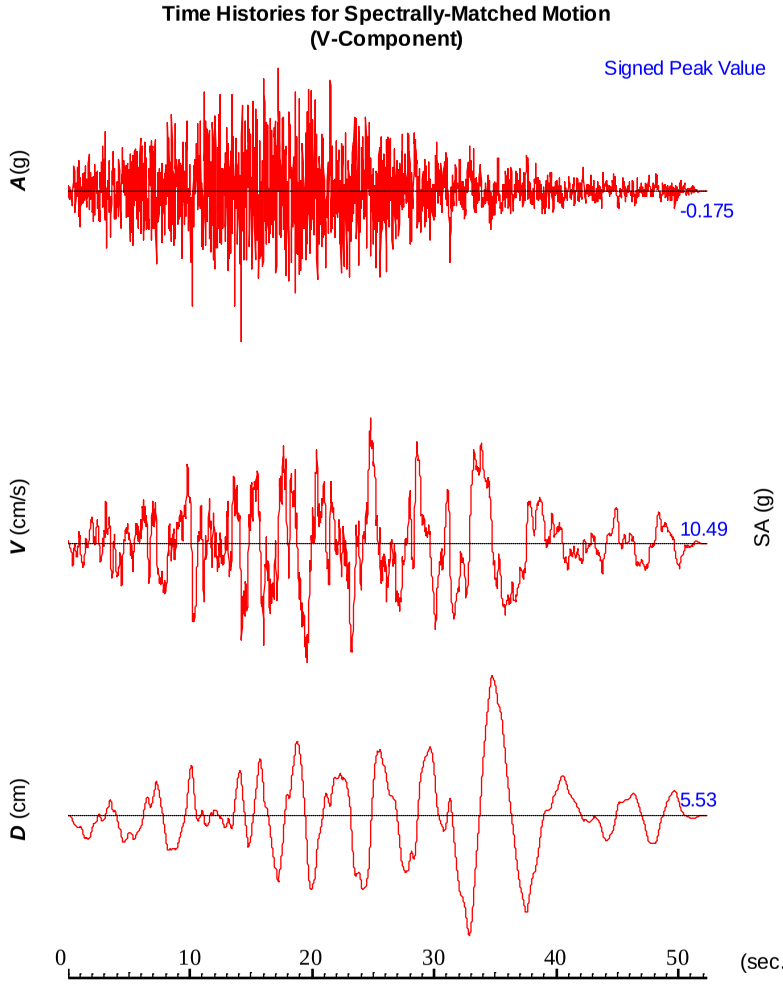


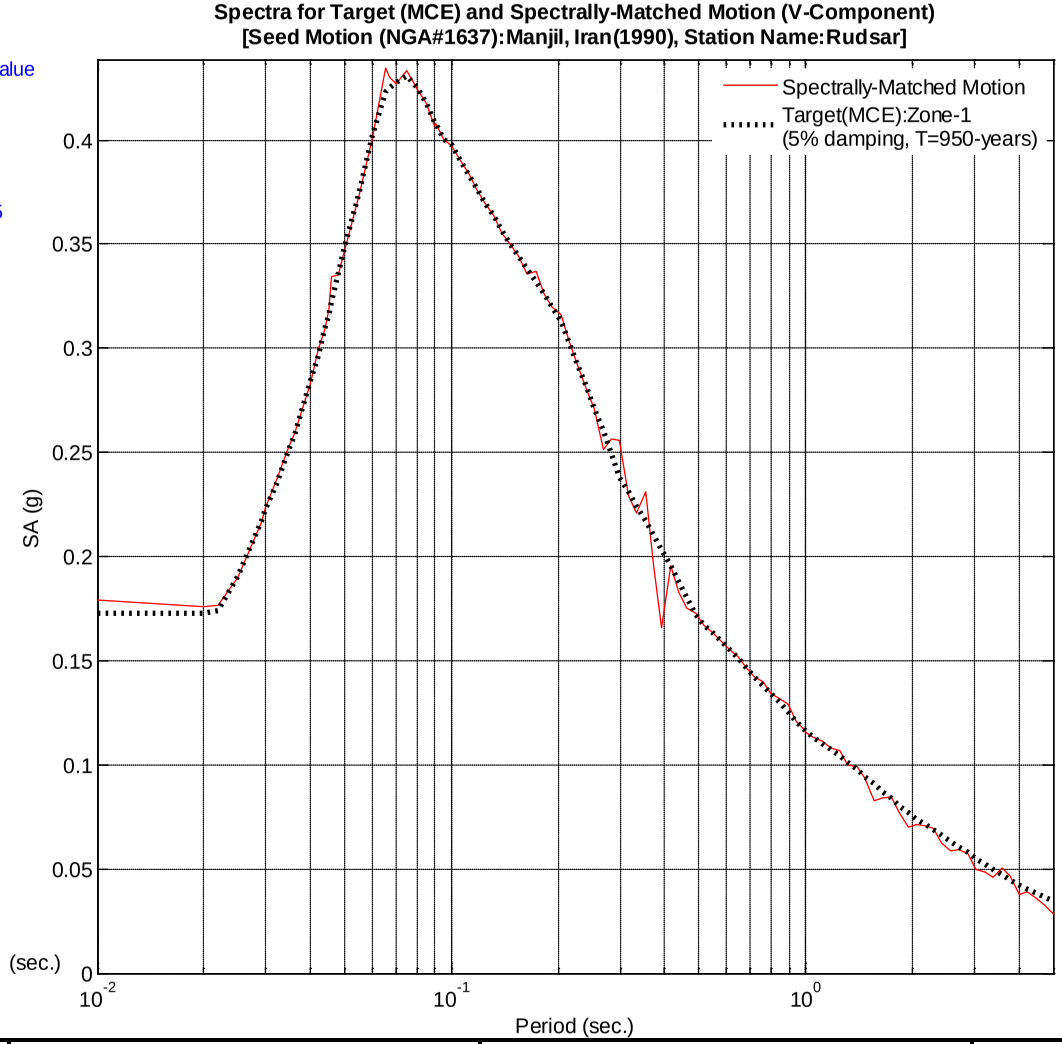
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 6 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-16**



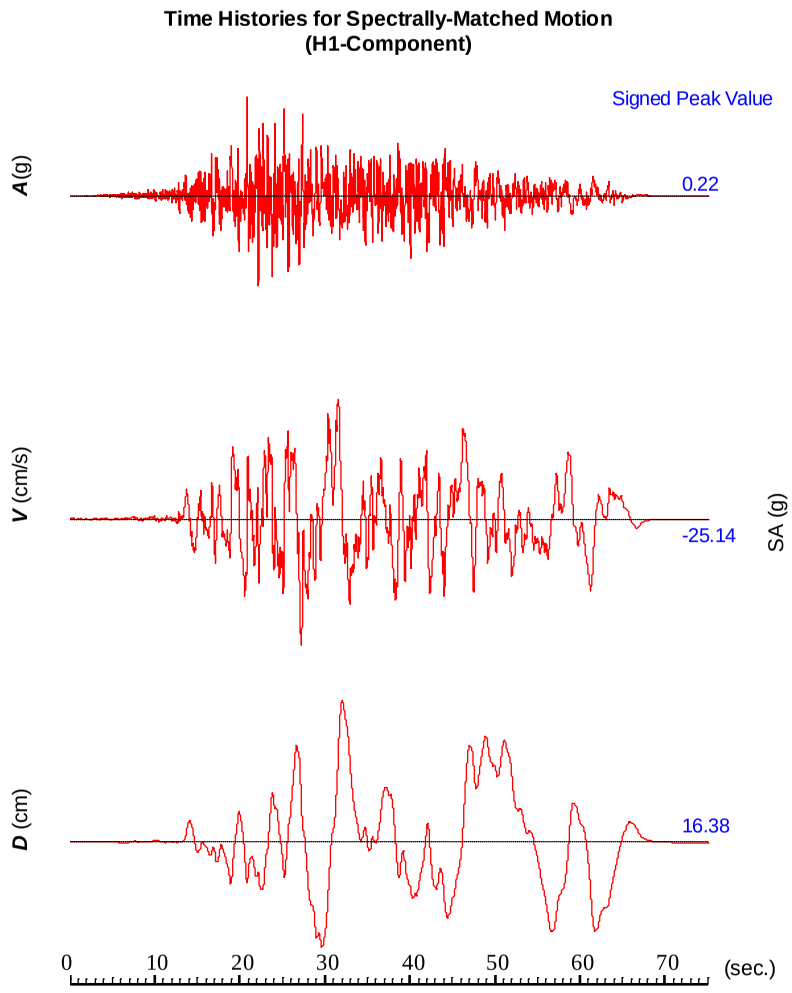


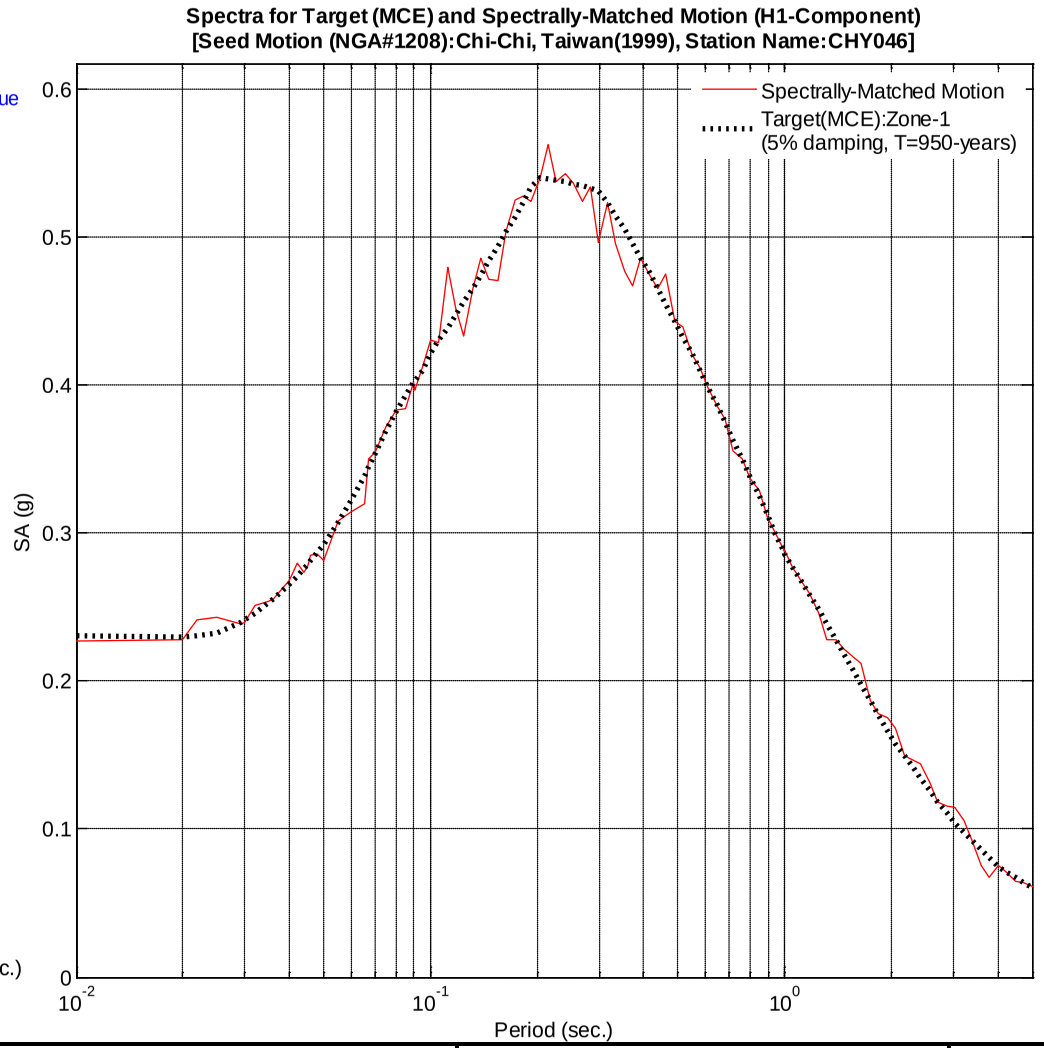
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 6 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-17**



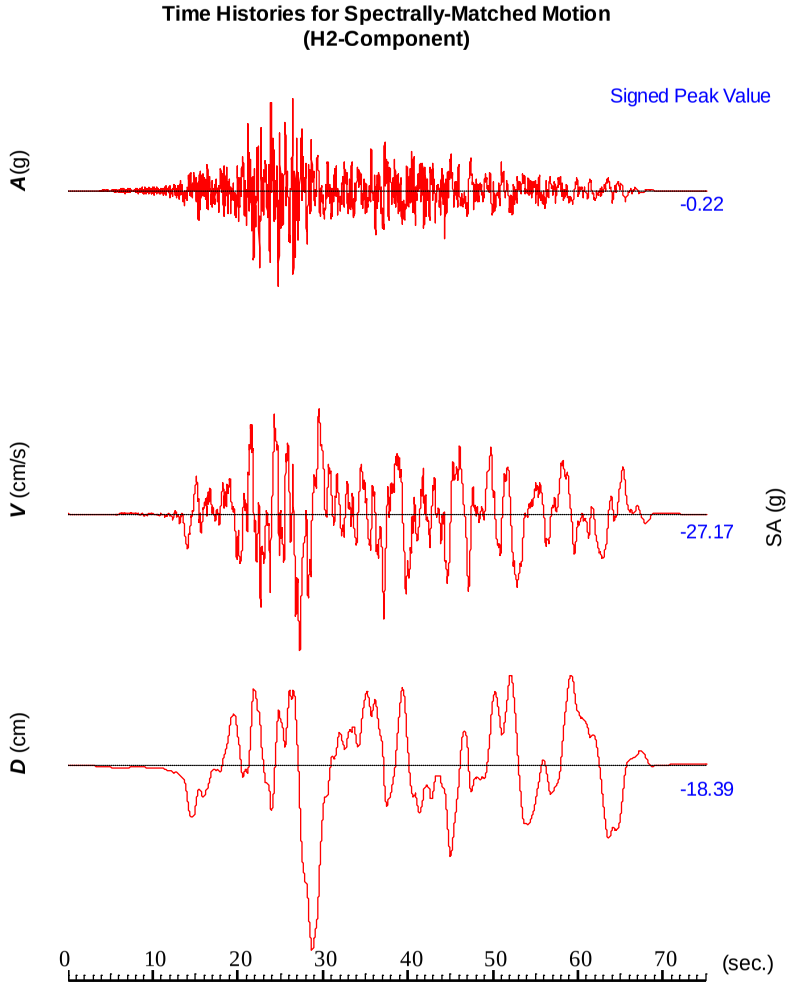


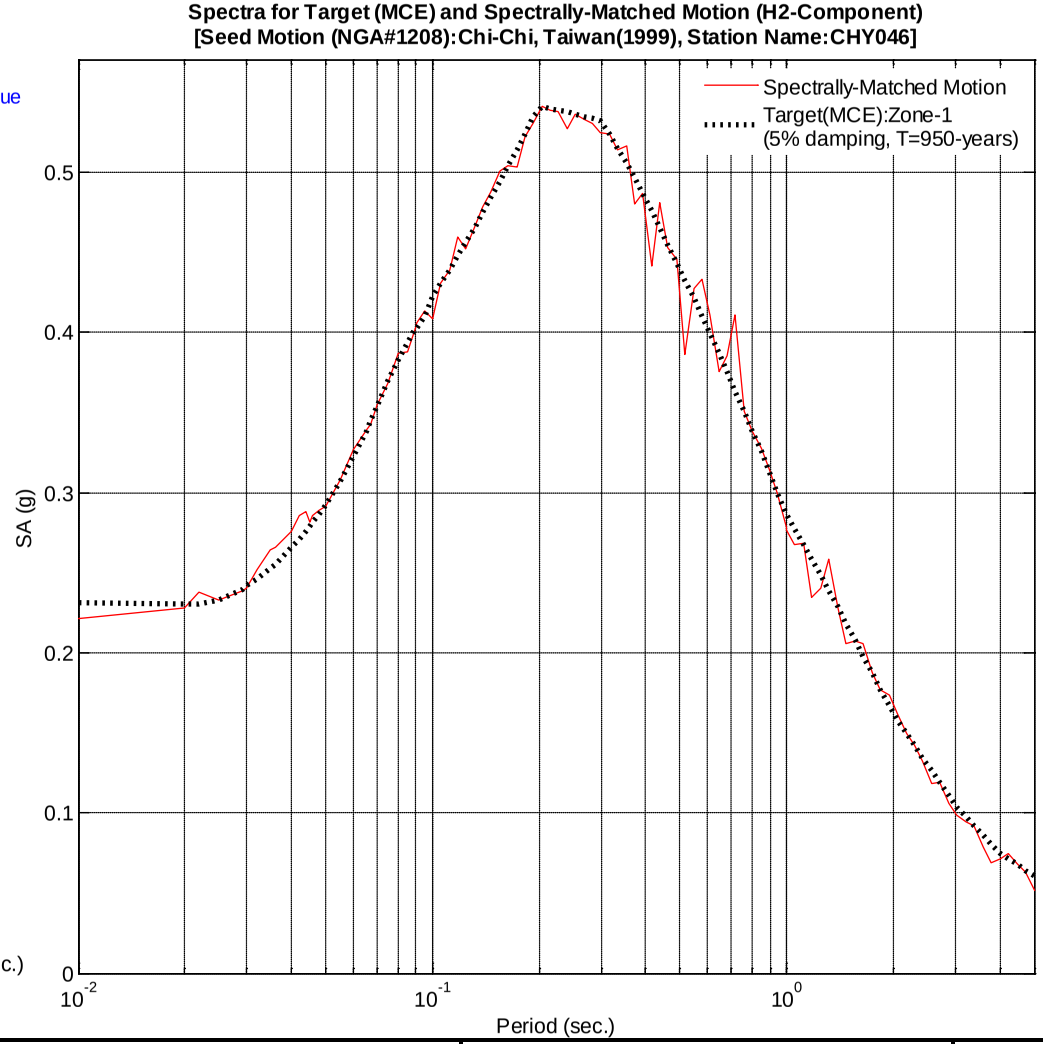
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 6 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-18**



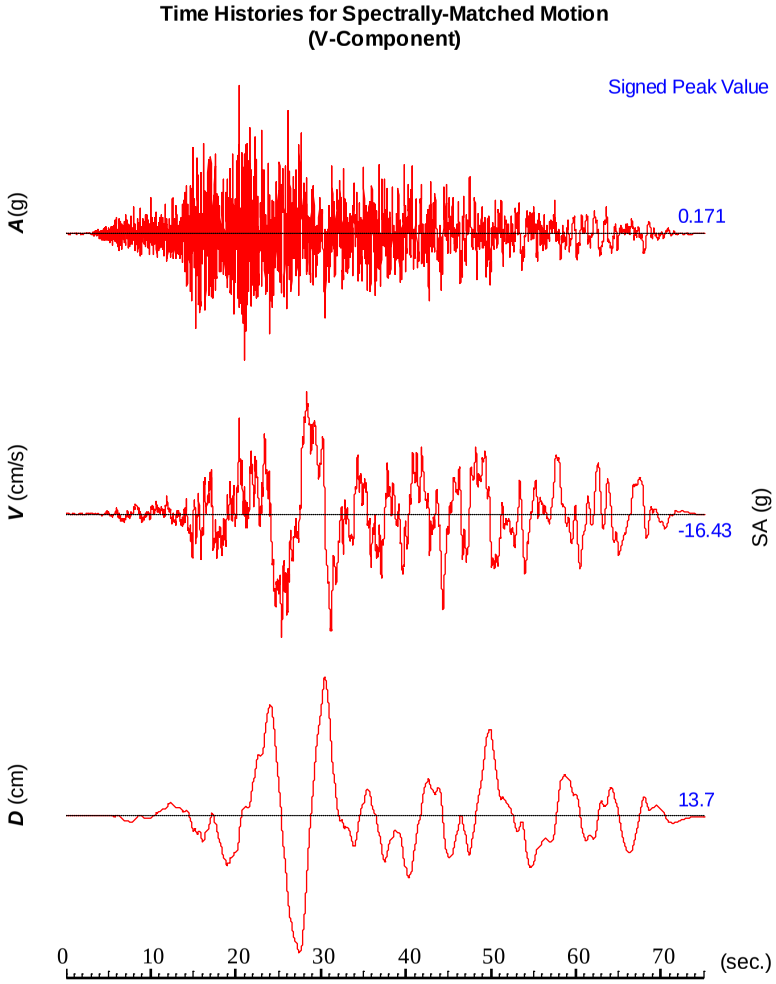


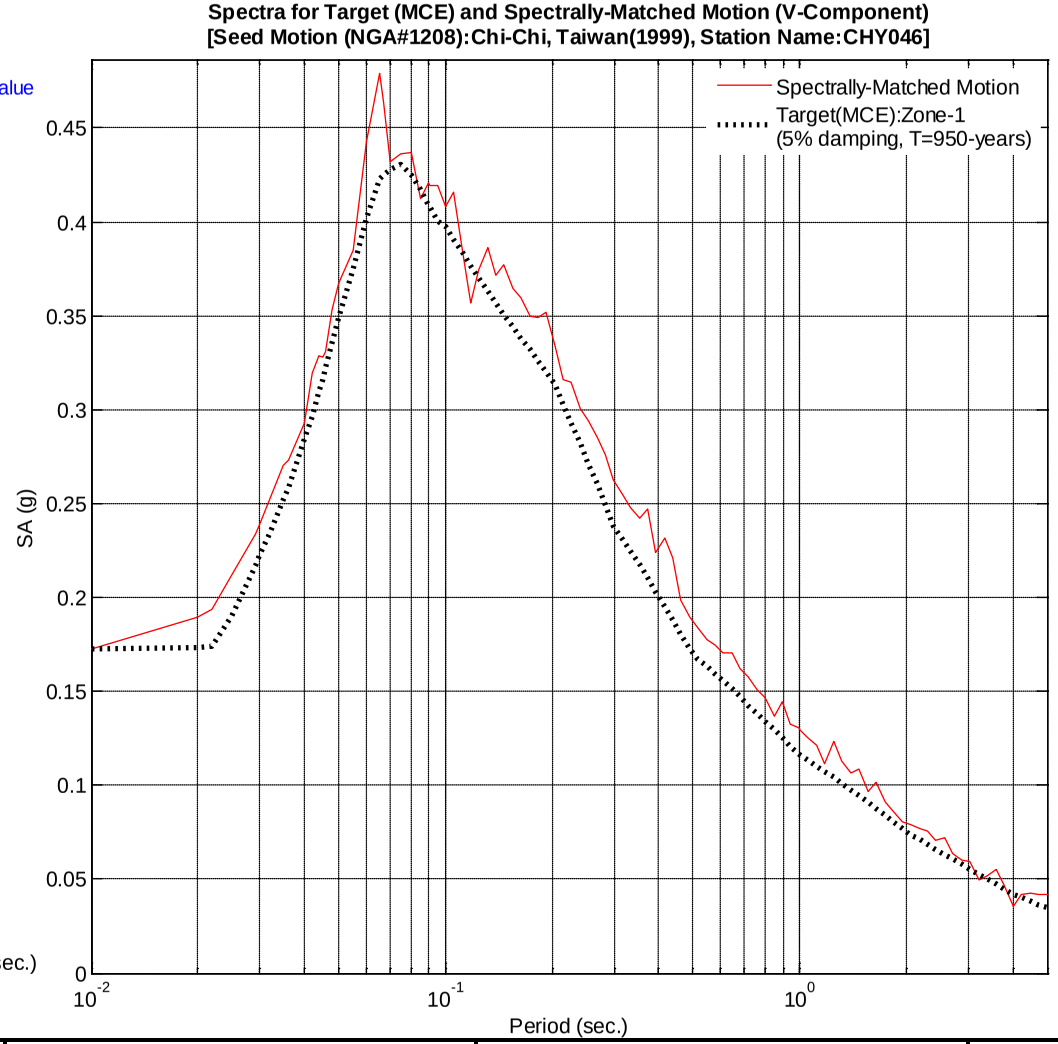
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 7 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-19**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 7 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-20**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 1 – SET NO. 7 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B1-21**

Table B.2: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 2**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	882	Landers	1992	North Palm Springs	7.28	26.84	0.206	19.935	9.250	0.208	20.274	8.431	0.136	10.000	5.729
2	1776	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.187	22.719	15.151	0.223	21.285	10.542	0.156	11.029	7.156
3	2112	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.211	24.734	14.631	0.225	22.136	18.360	0.141	14.382	13.979
4	2900	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.215	17.819	16.090	0.232	24.121	19.414	0.144	8.839	7.363
5	169	Imperial Valley-06	1979	Delta	6.53	22.03	0.200	17.740	13.564	0.181	20.372	10.430	0.128	8.927	6.325
6	1637	Manjil, Iran	1990	Rudsar	7.37	64.47	0.191	20.835	6.210	0.188	18.434	7.482	0.155	9.674	5.100
7	1208	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.197	21.664	13.597	0.213	20.458	14.507	0.147	14.079	11.737

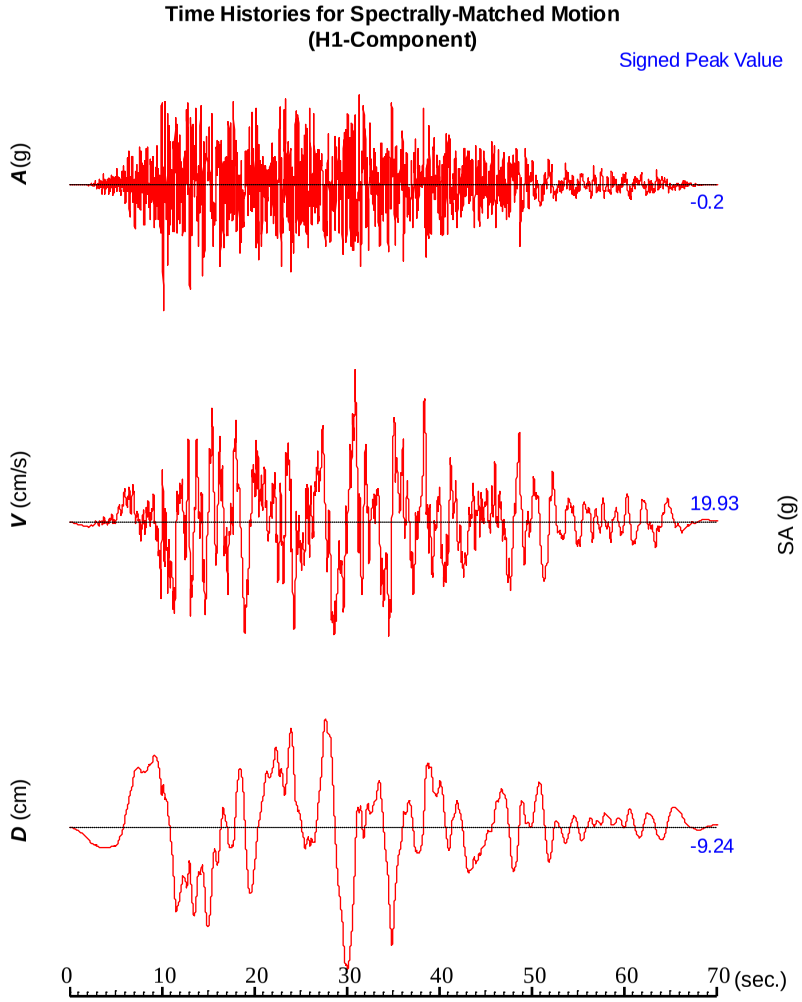
SC SOLUTIONS

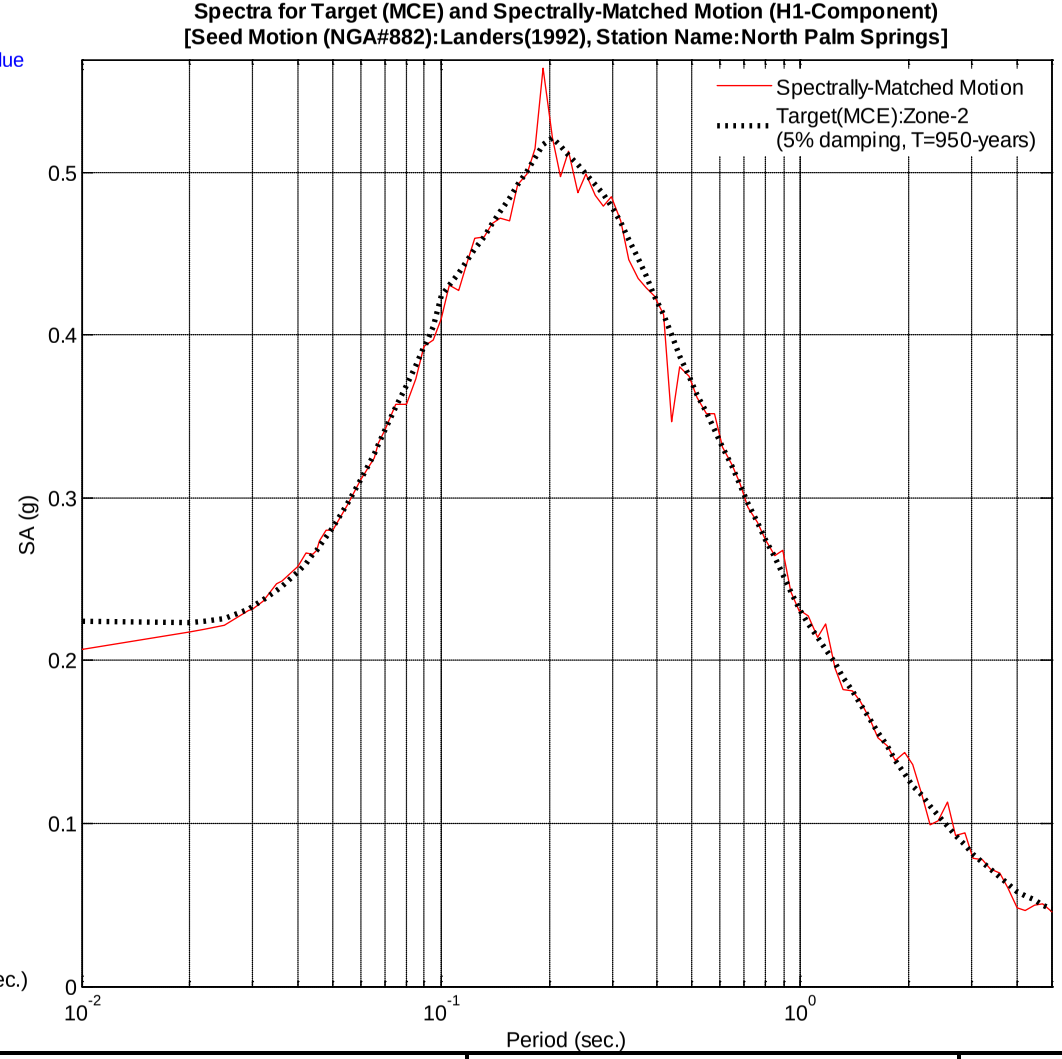
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS MCE – ZONE 2

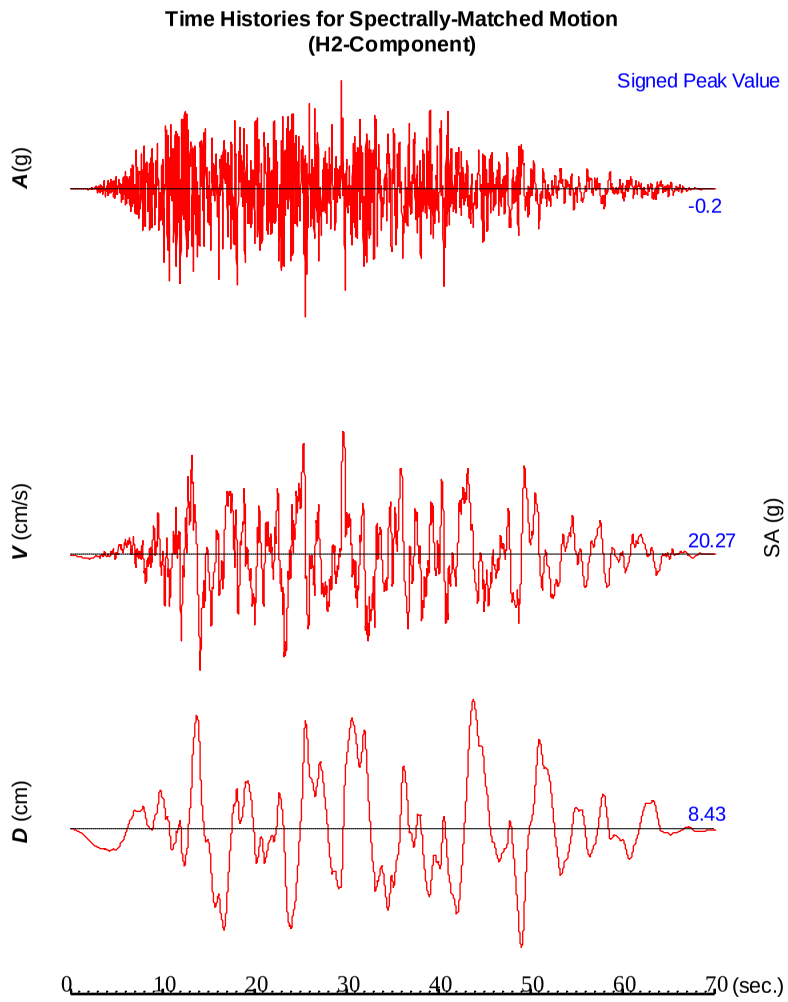
CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

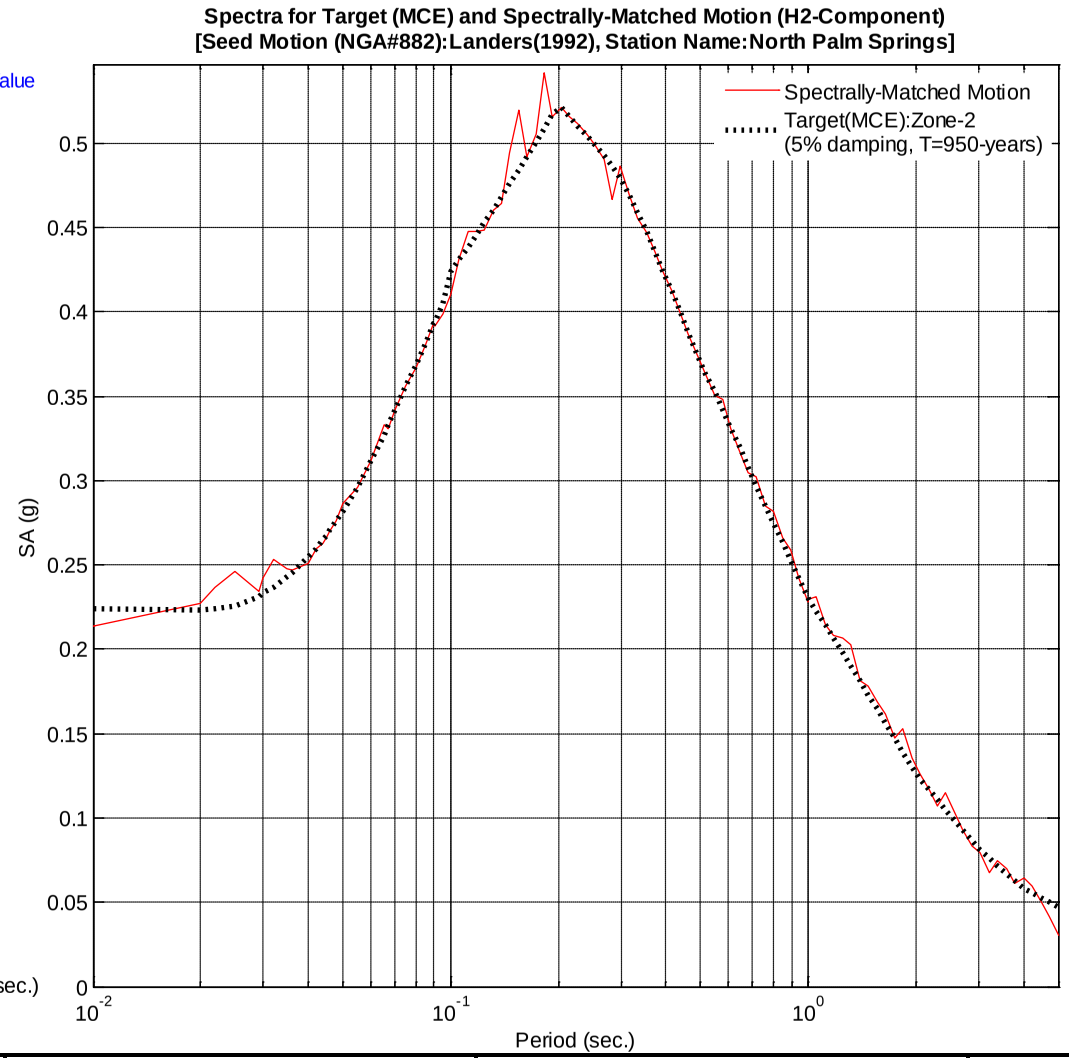
PLATE
B2-0



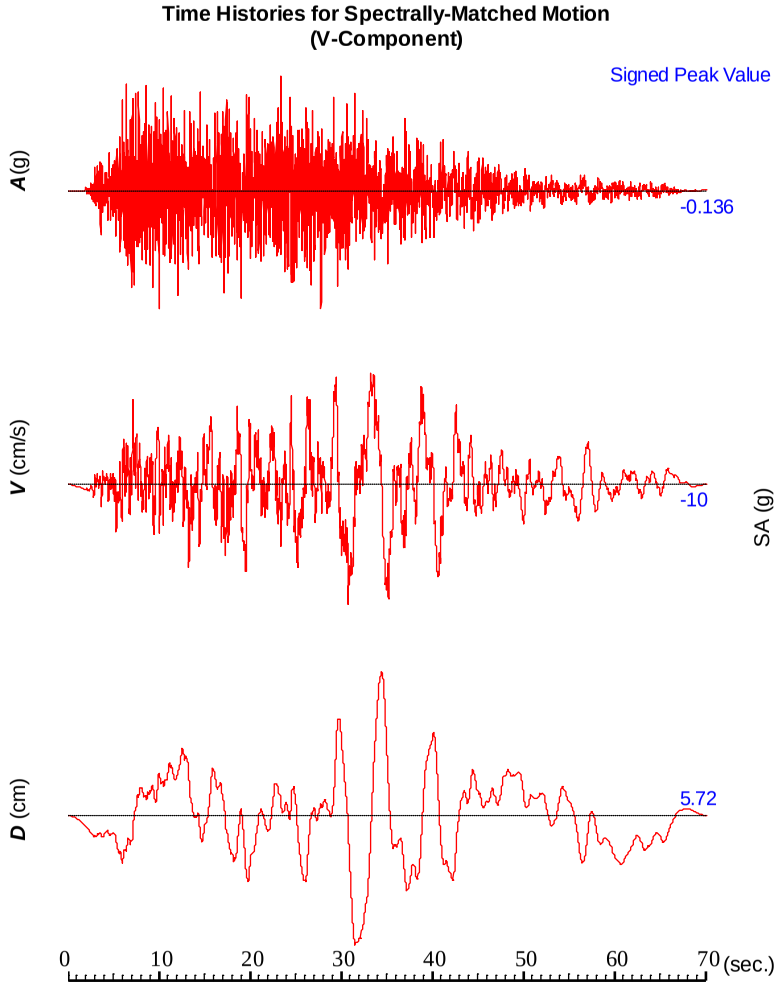


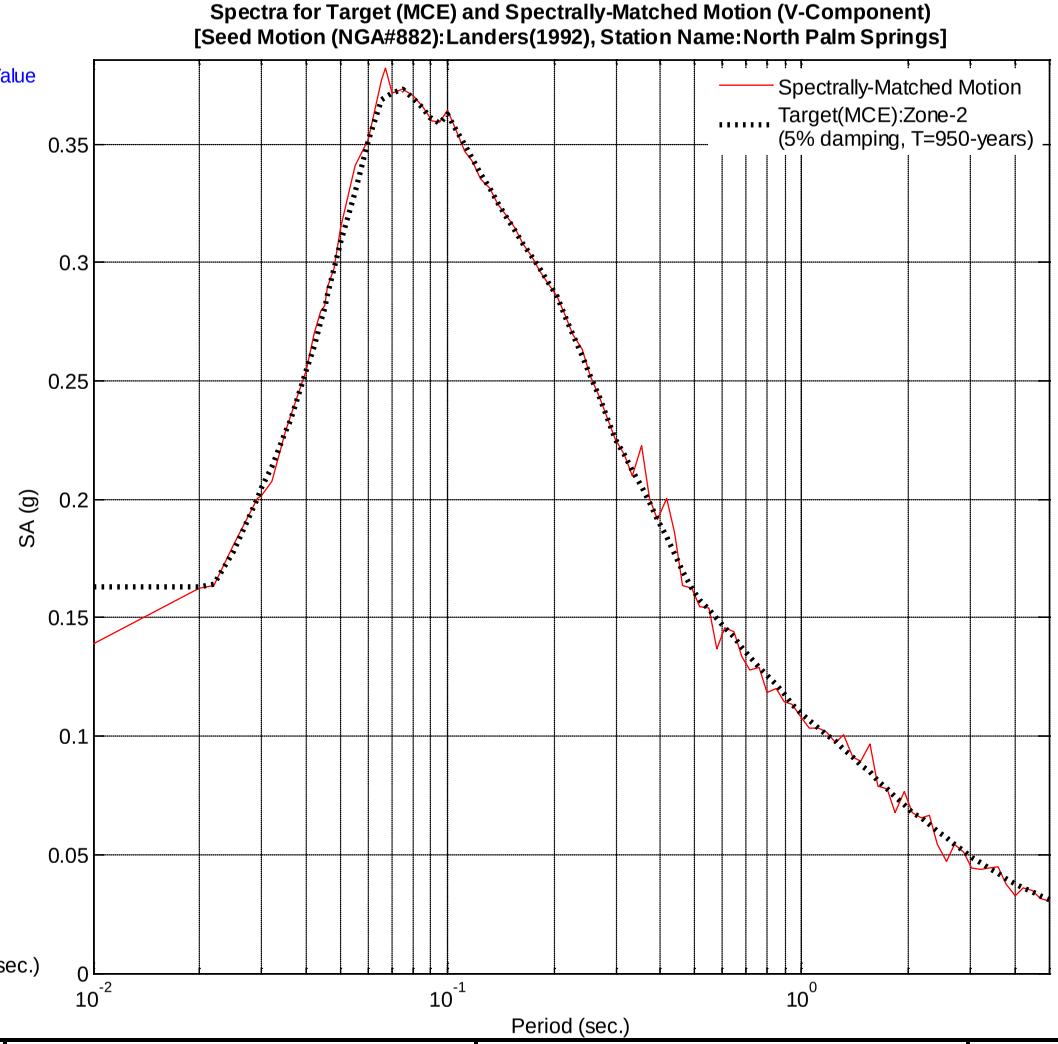
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 2 – SET NO. 1 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-1**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 2 – SET NO. 1 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-2**





SC SOLUTIONS

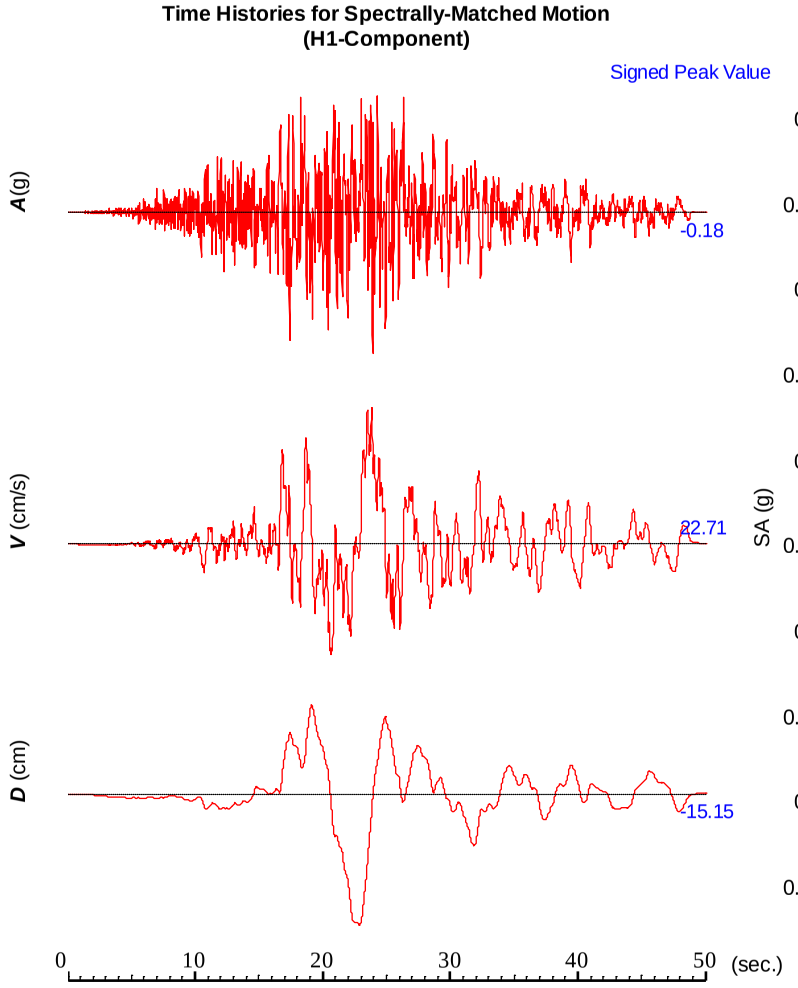
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

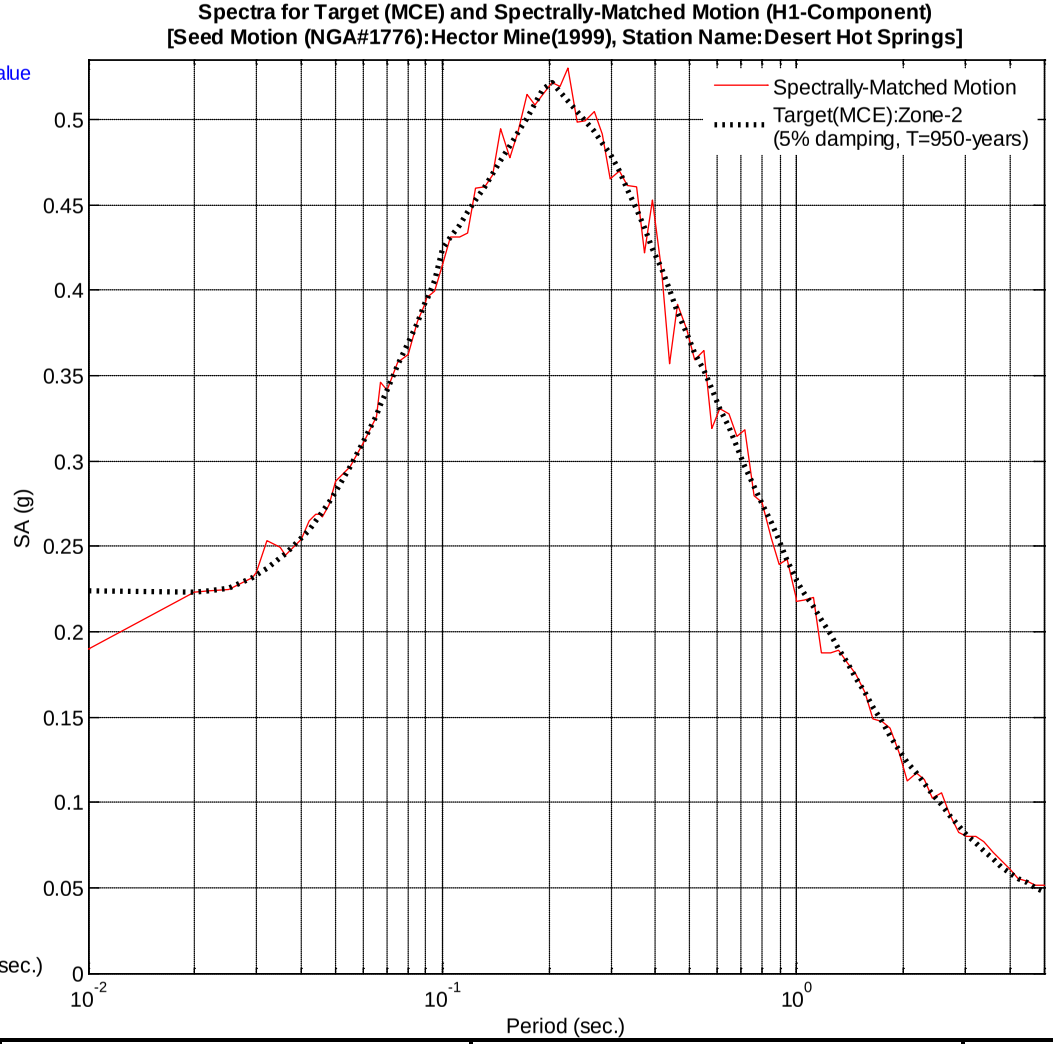
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 2 – SET NO. 1 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

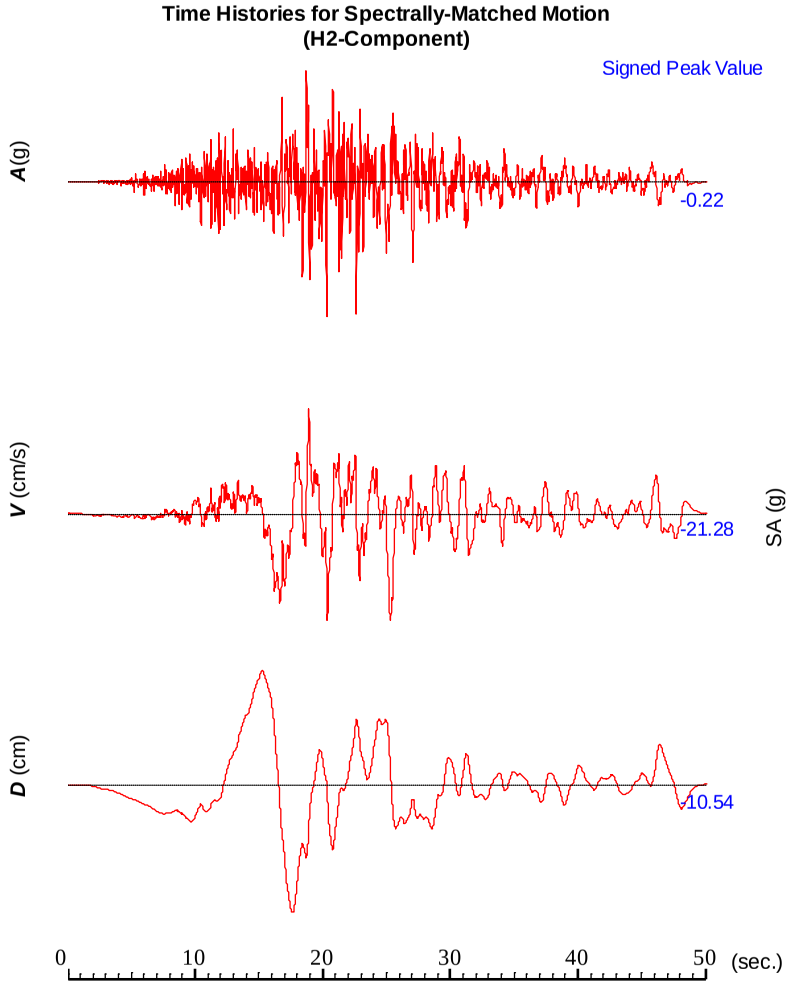
PLATE

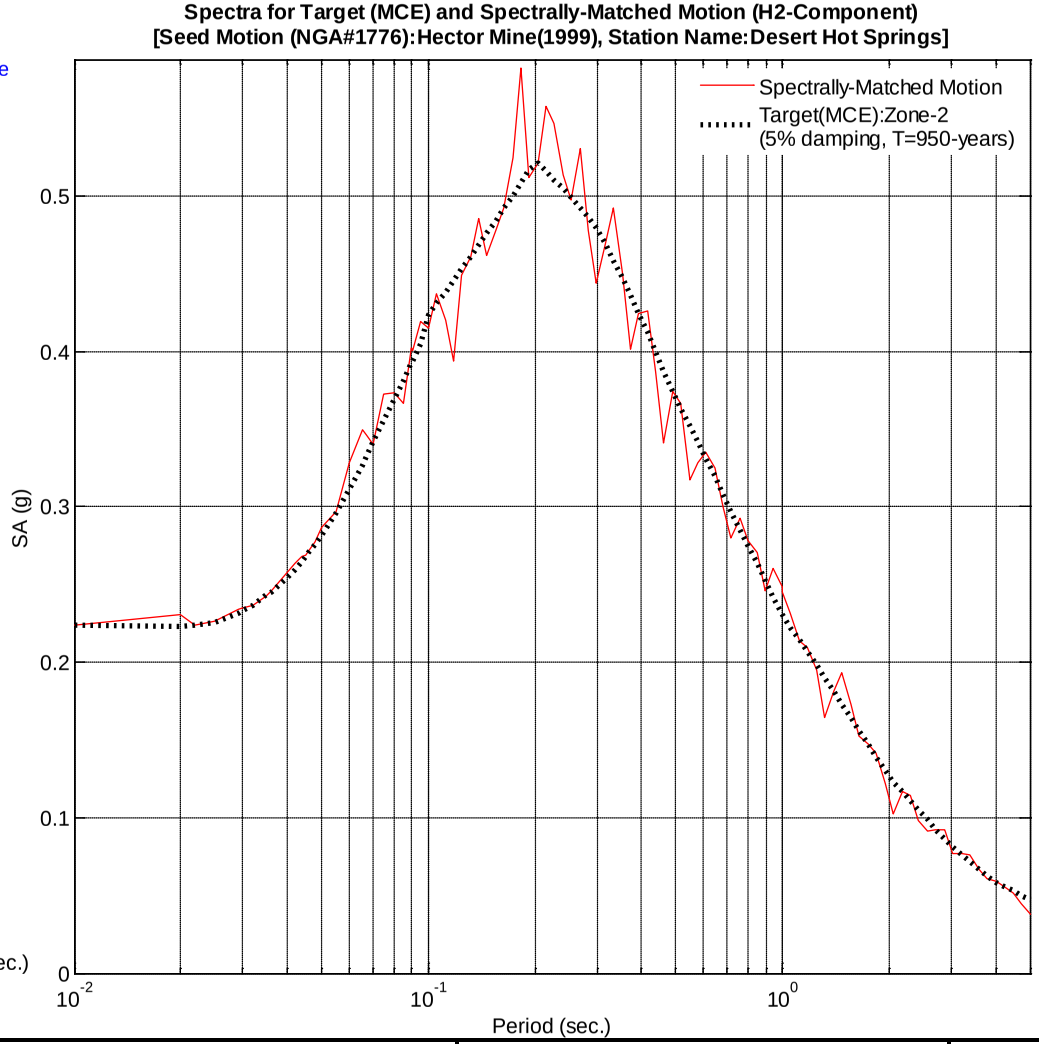
B2-3



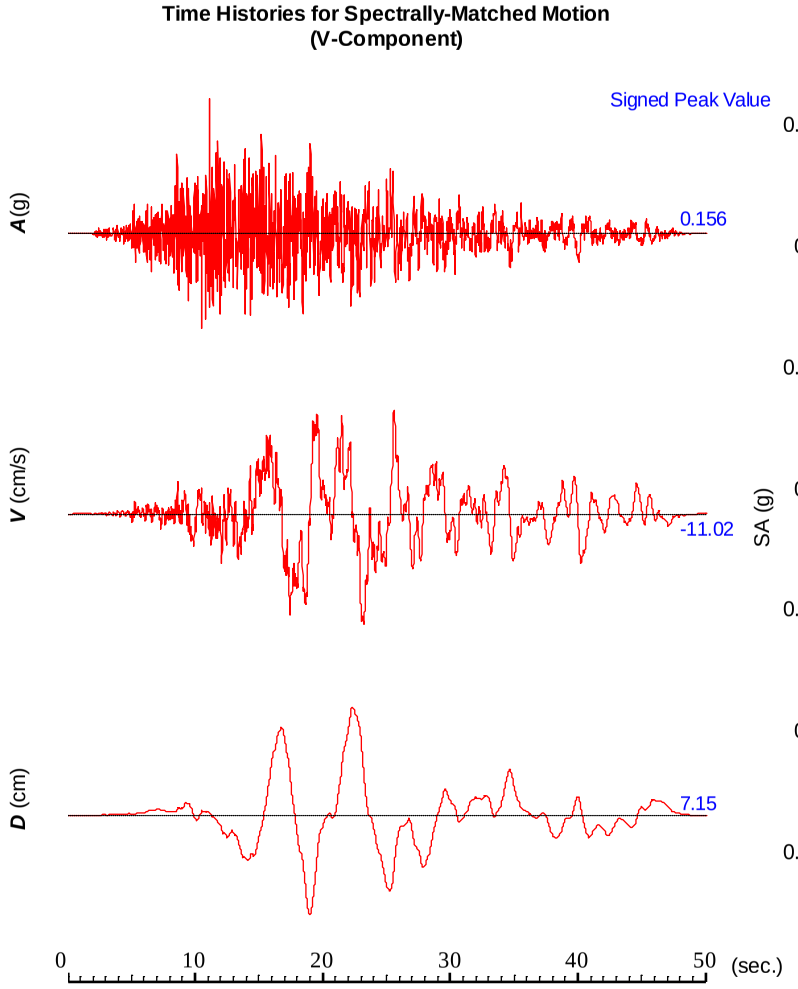


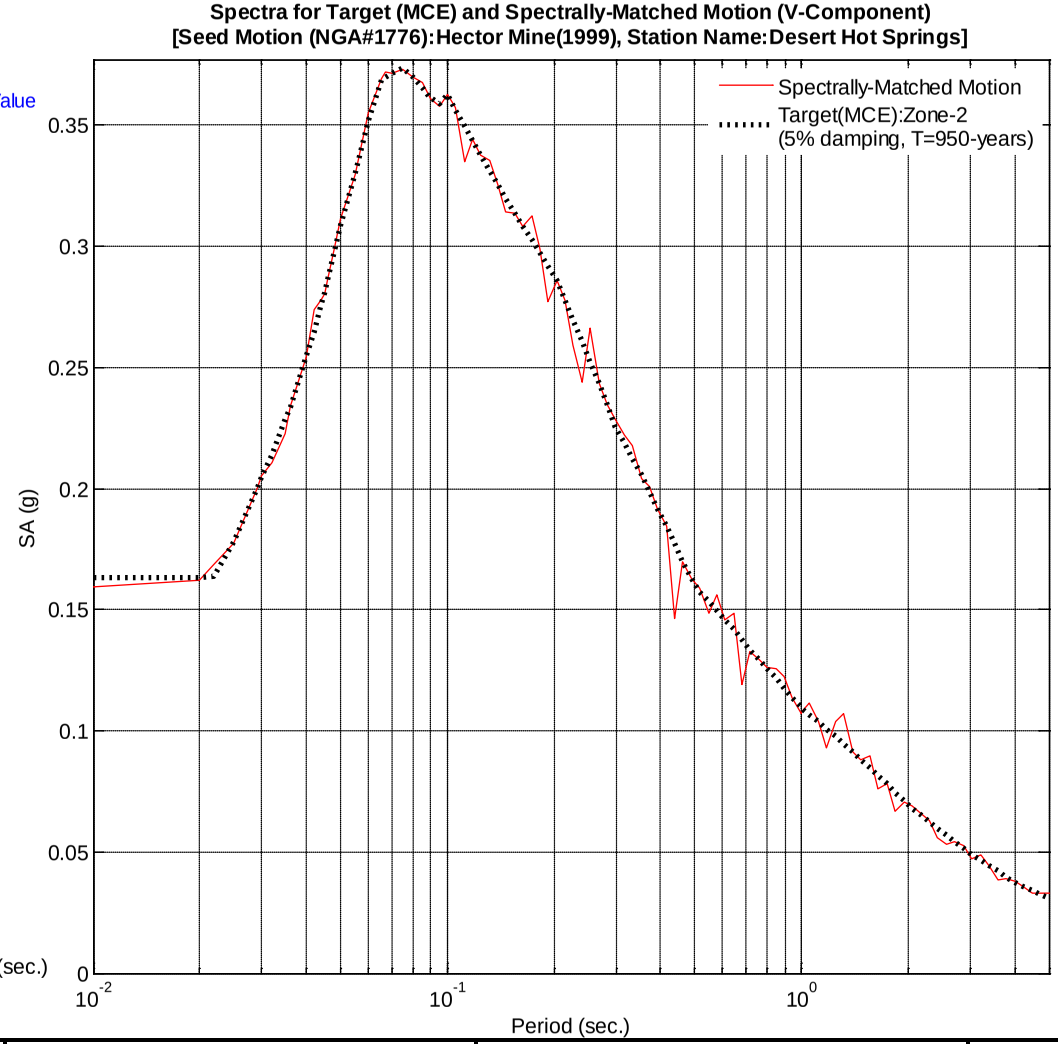
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 2 – SET NO. 2 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-4**



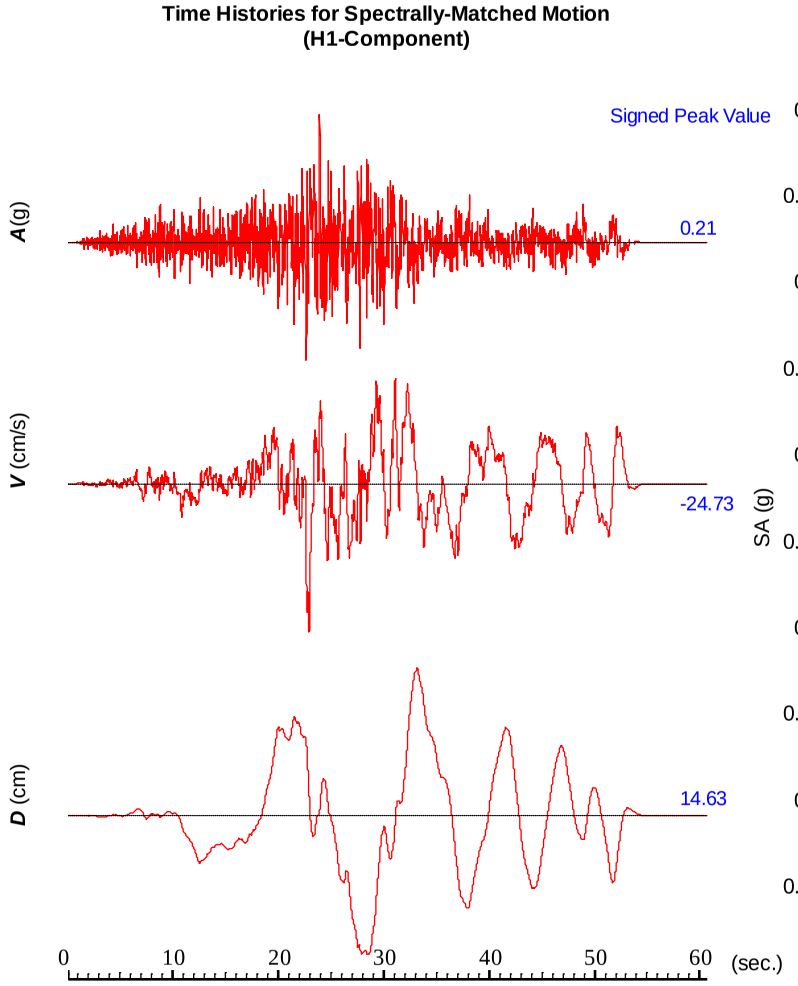


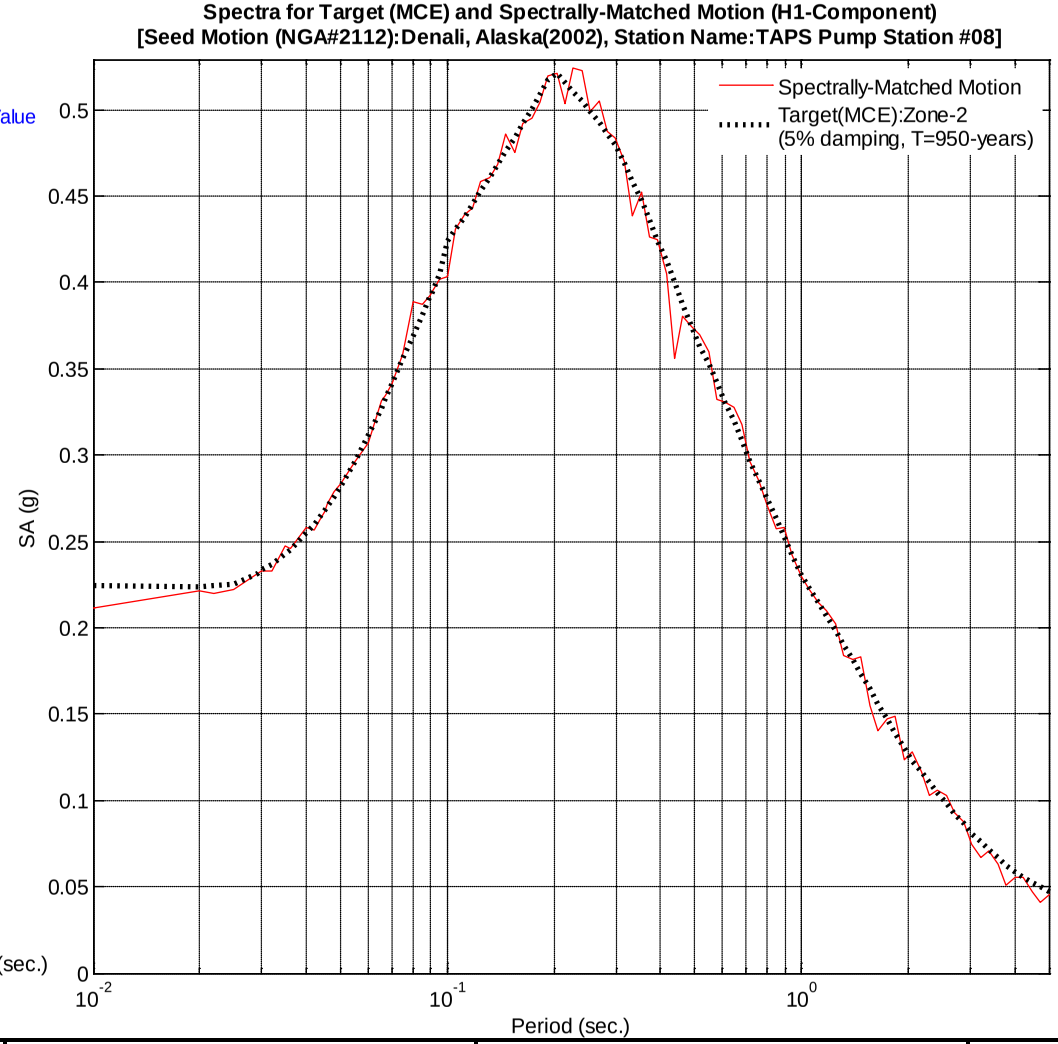
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 2 – SET NO. 2 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-5**



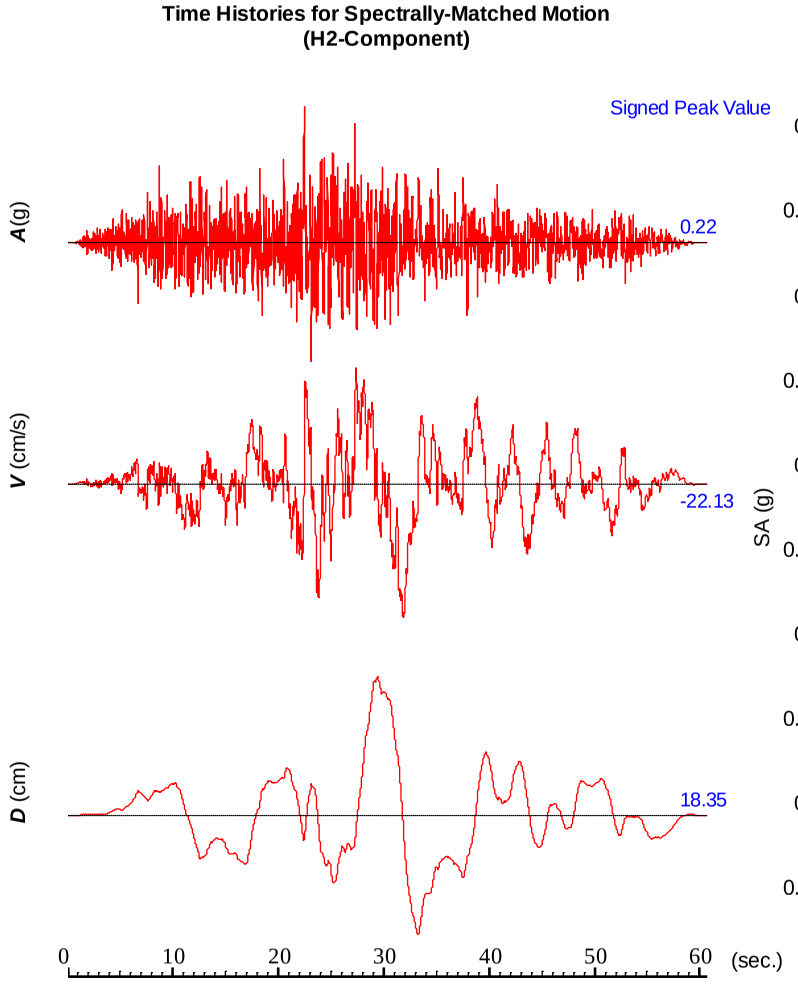


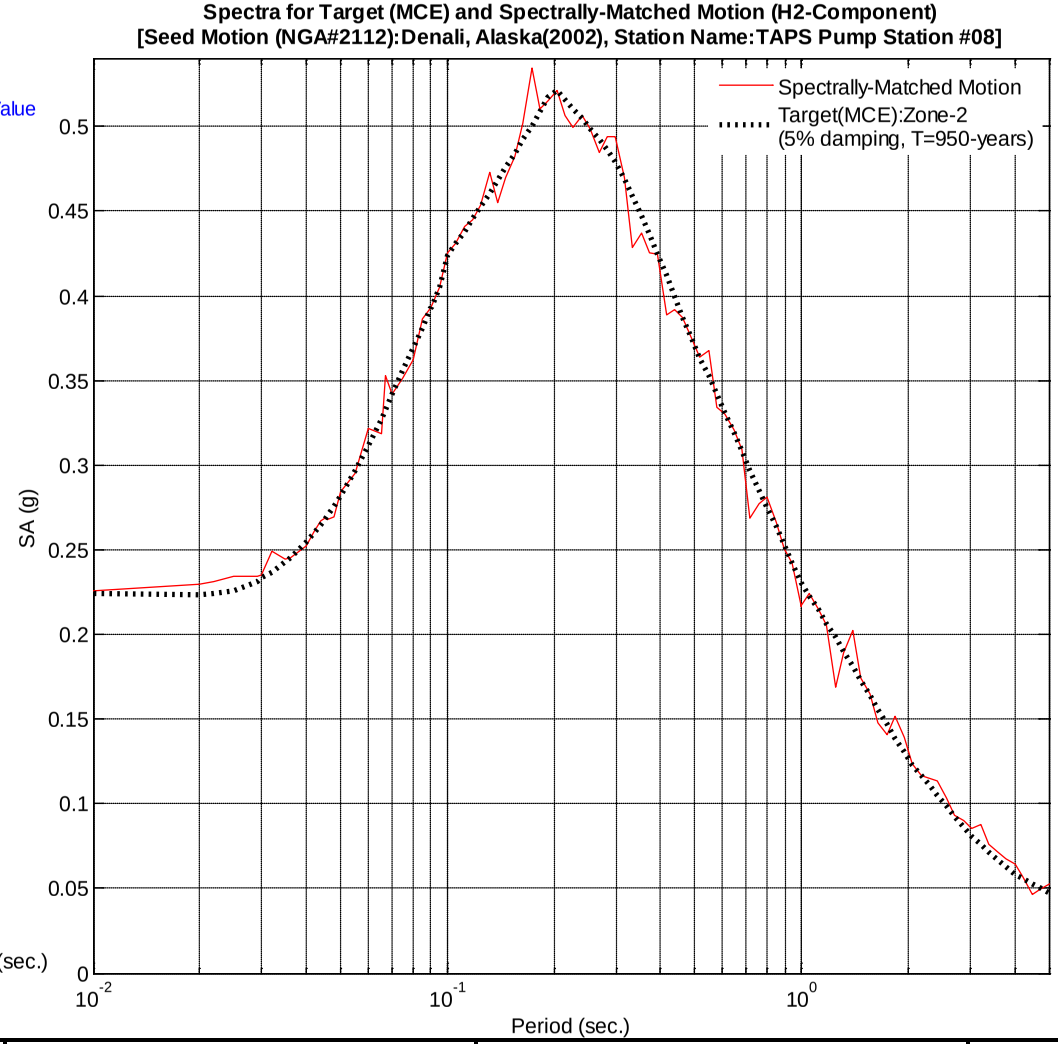
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 2 – SET NO. 2 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-6**



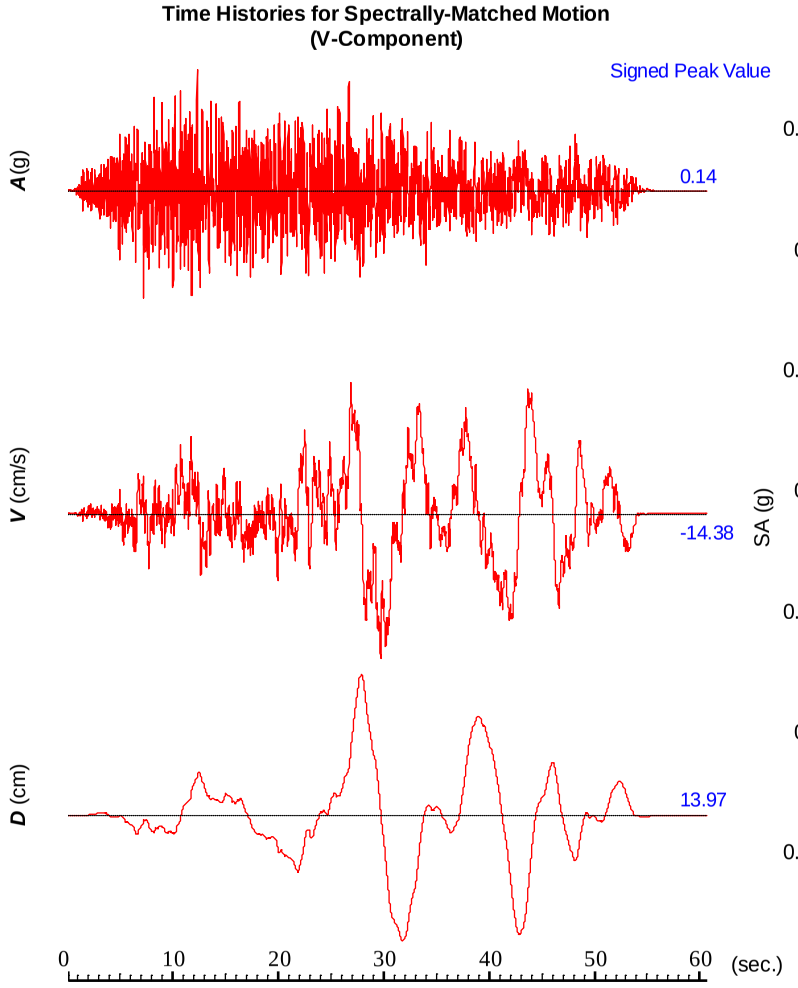


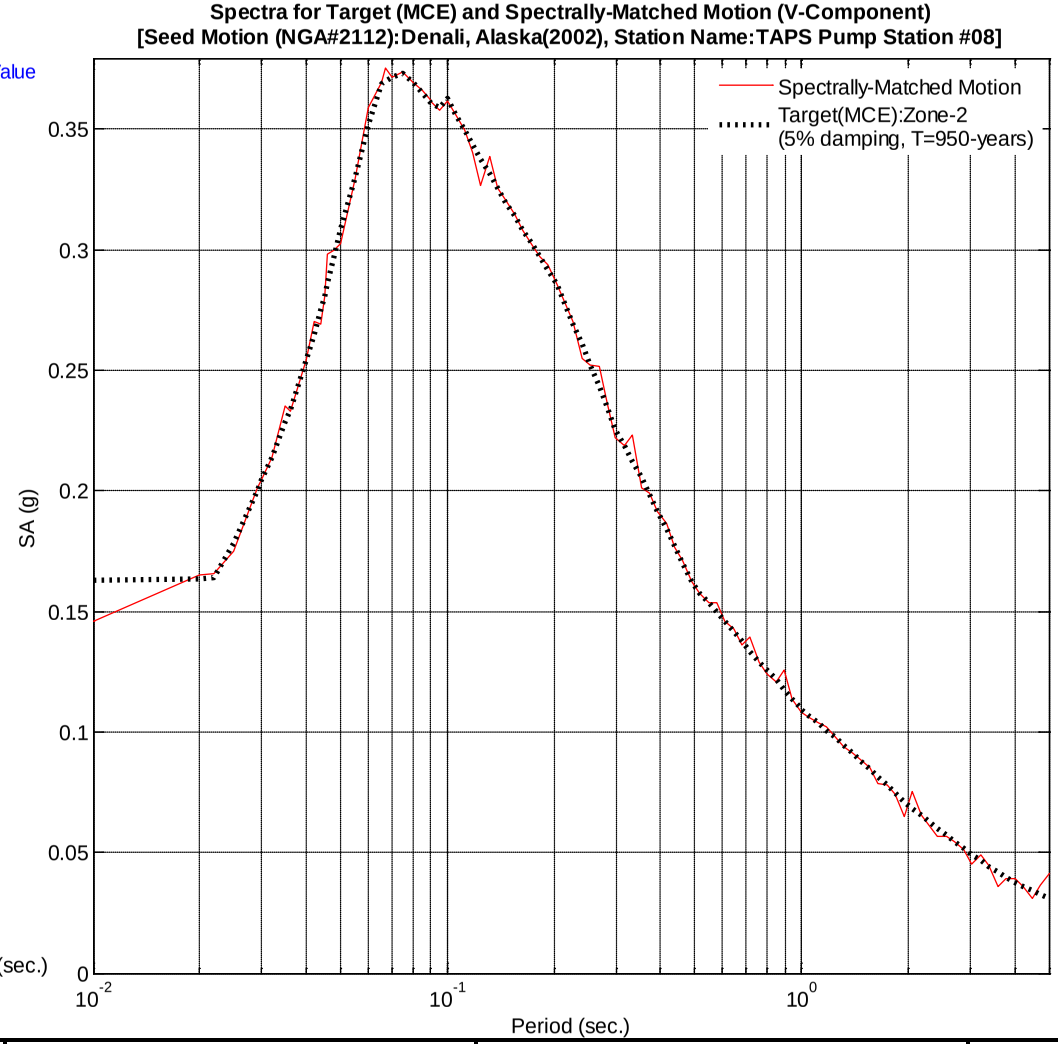
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	SPECTRALLY-MATCHED MOTIONS – MCE ZONE 2 – SET NO. 3 – HORIZONTAL 1 CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE B2-7



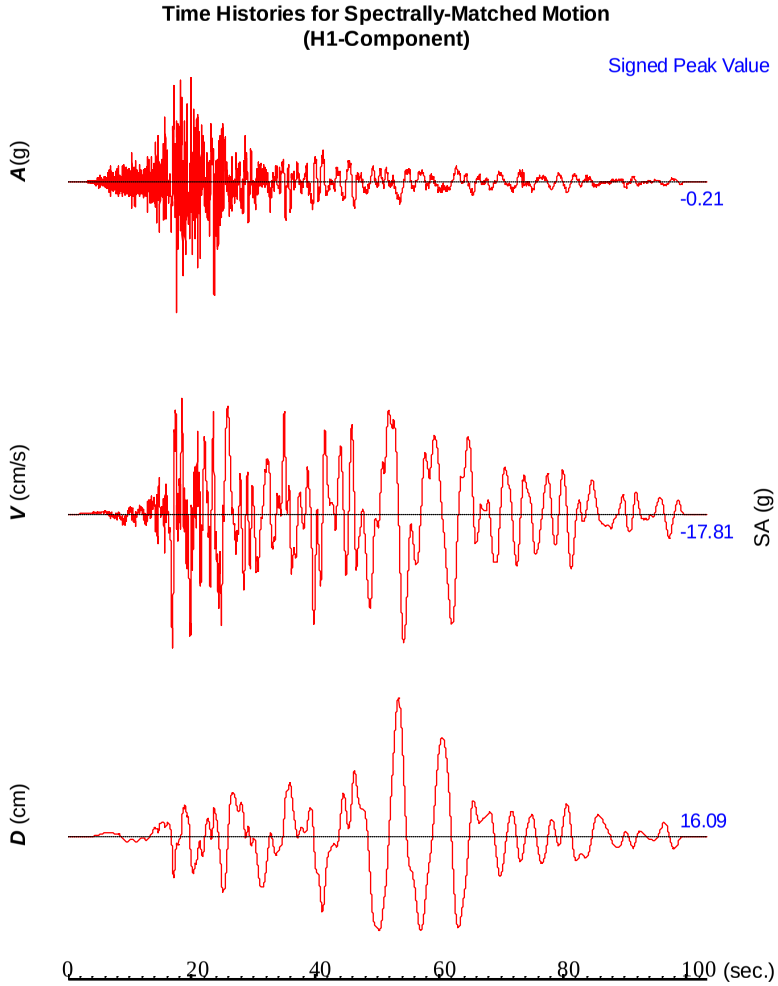


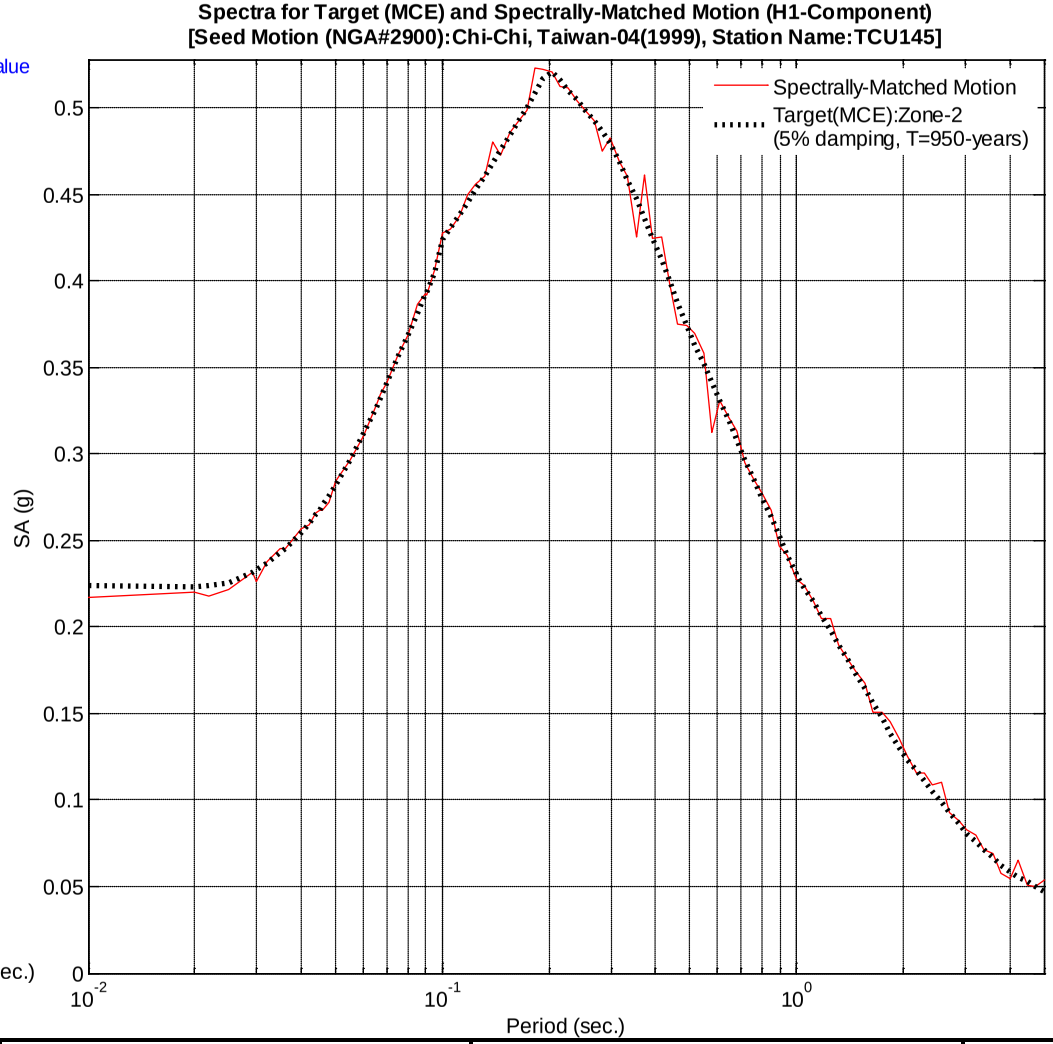
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 2 – SET NO. 3 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-8**



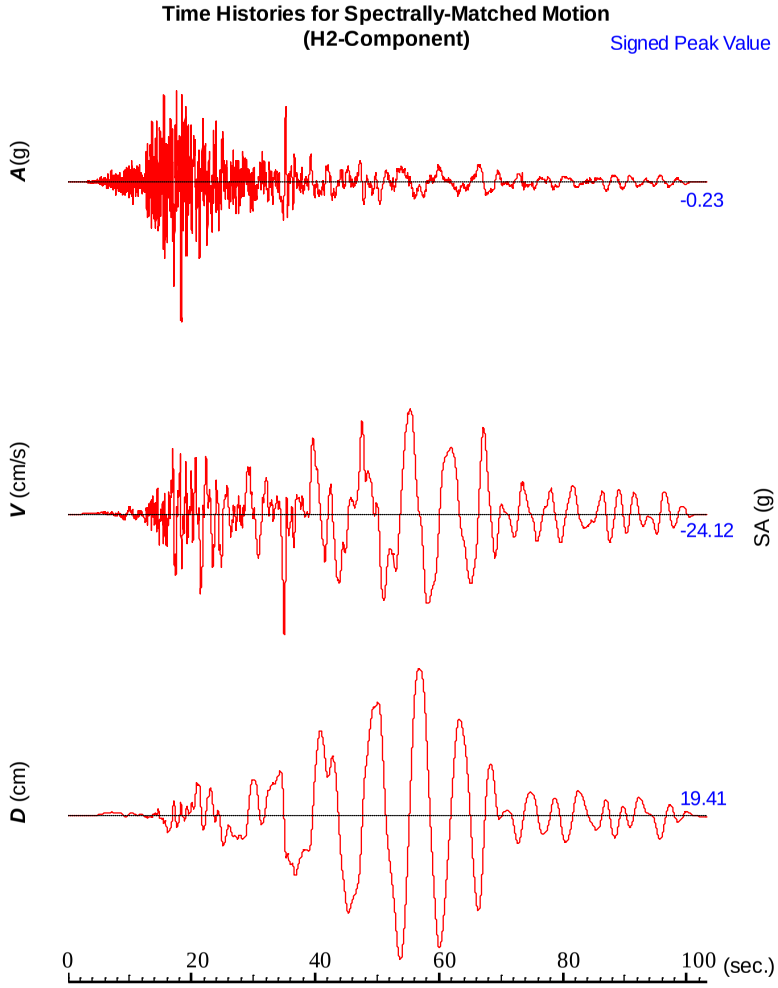


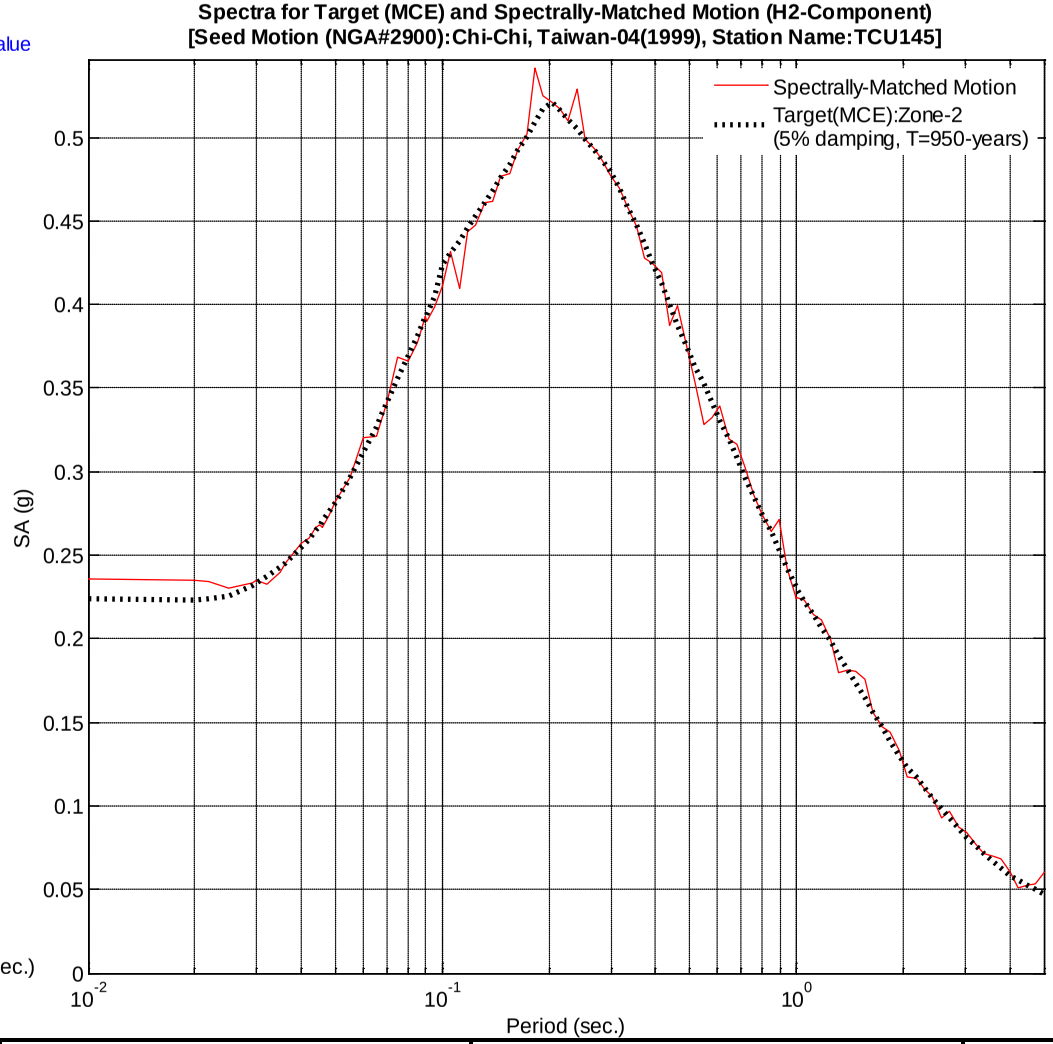
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 2 – SET NO. 3 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-9**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 2 – SET NO. 4 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-10**





SC SOLUTIONS

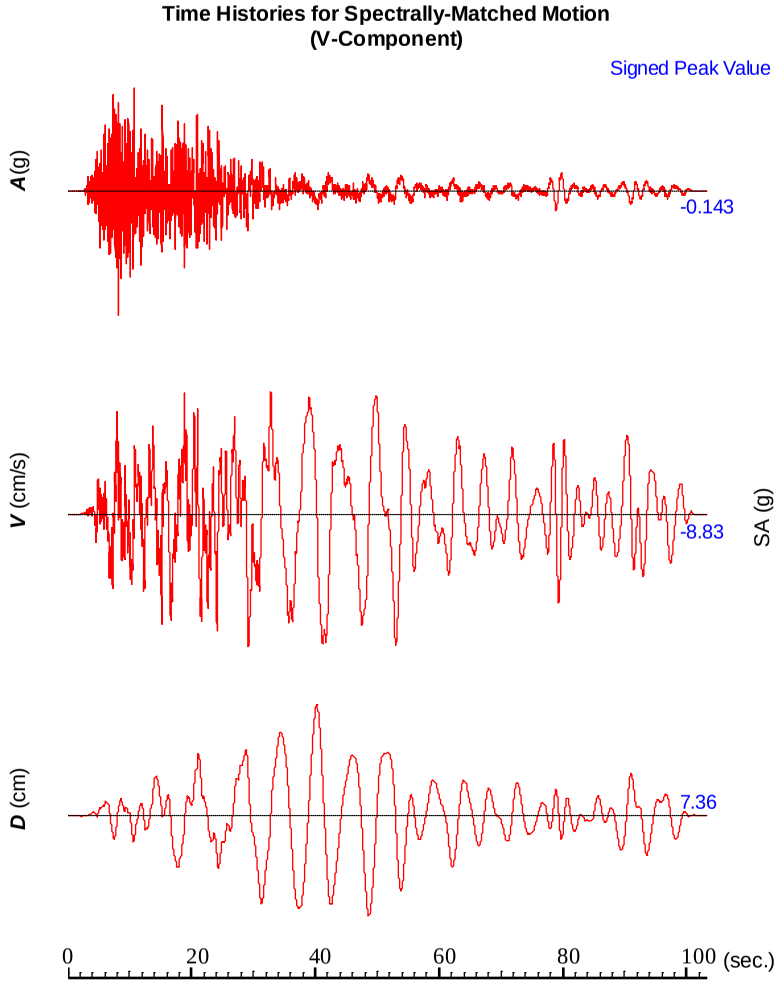
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

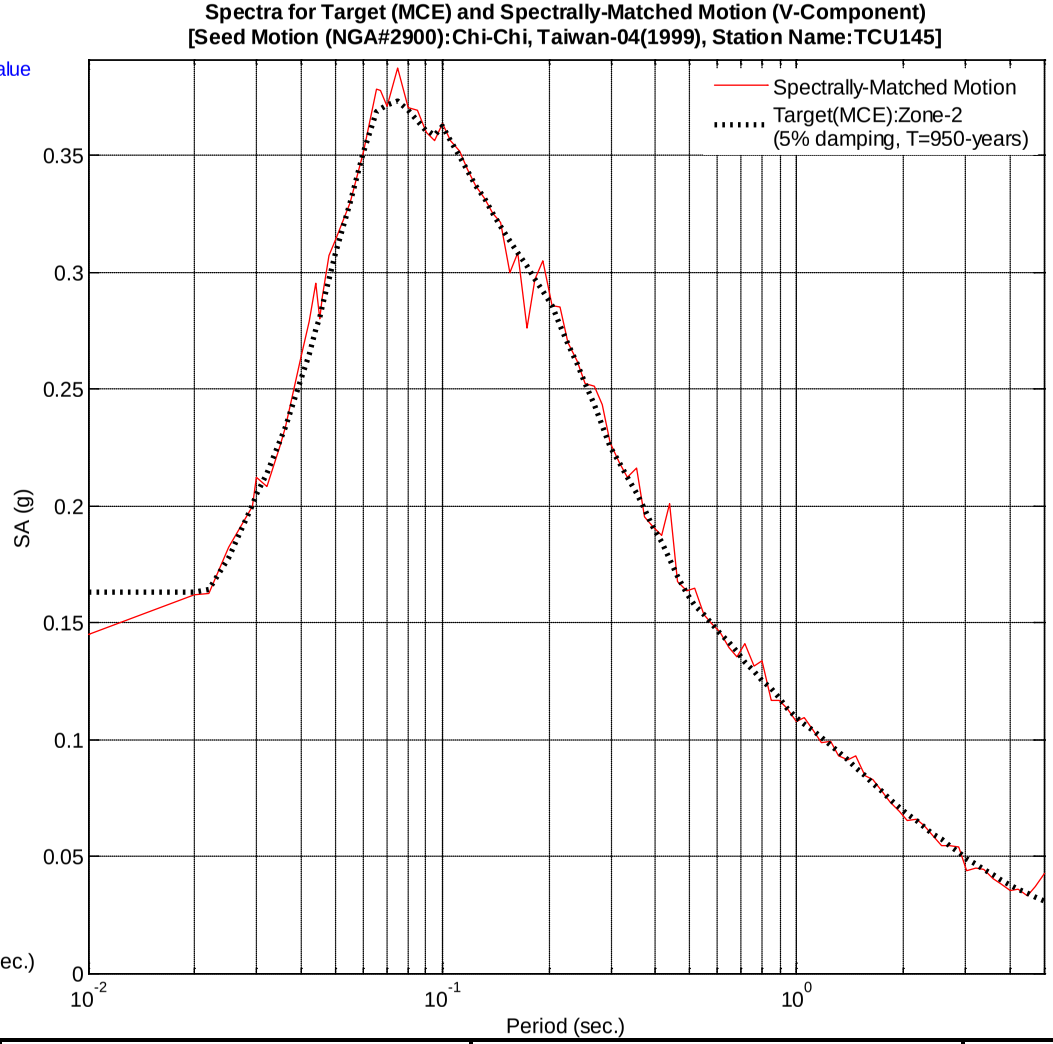
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 2 – SET NO. 4 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

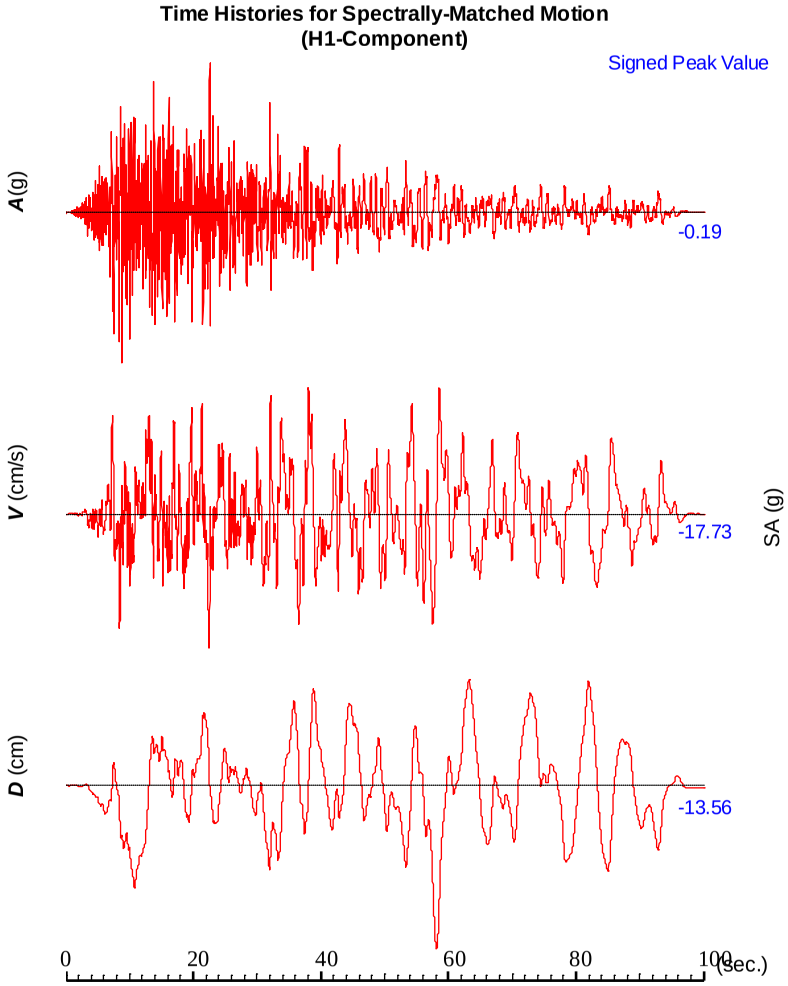
PLATE

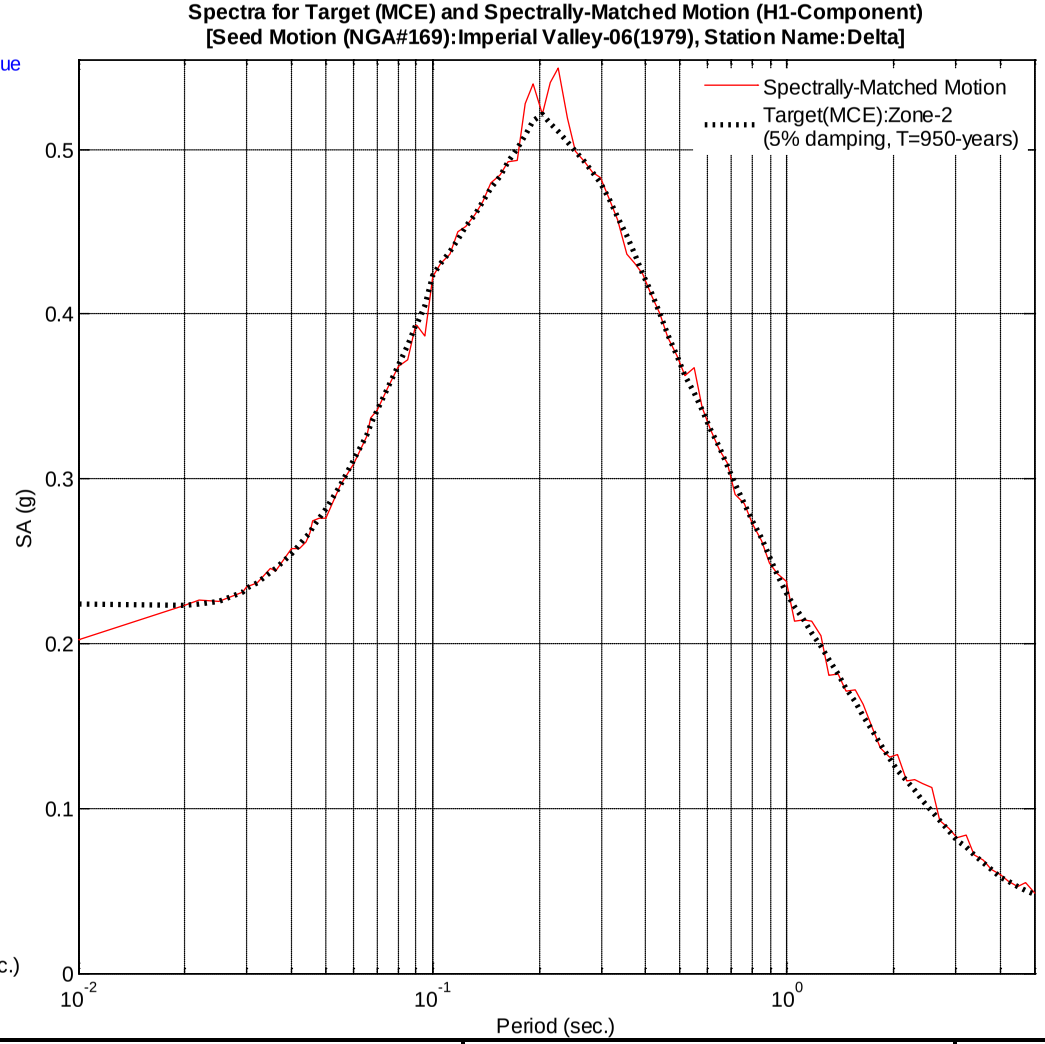
B2-11



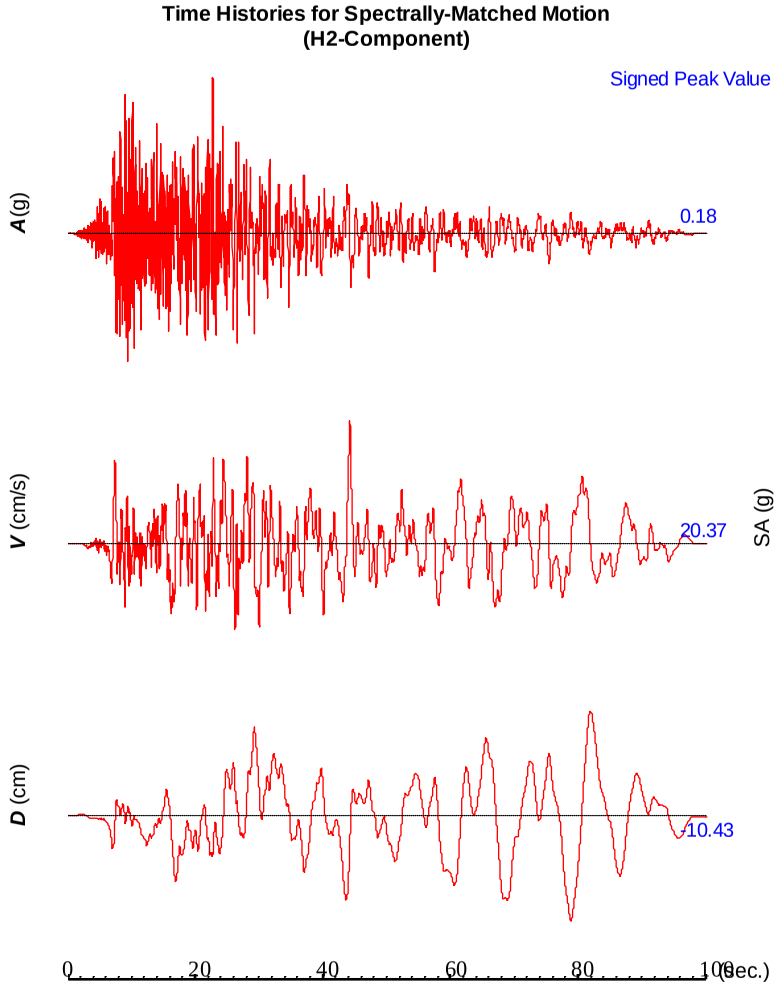


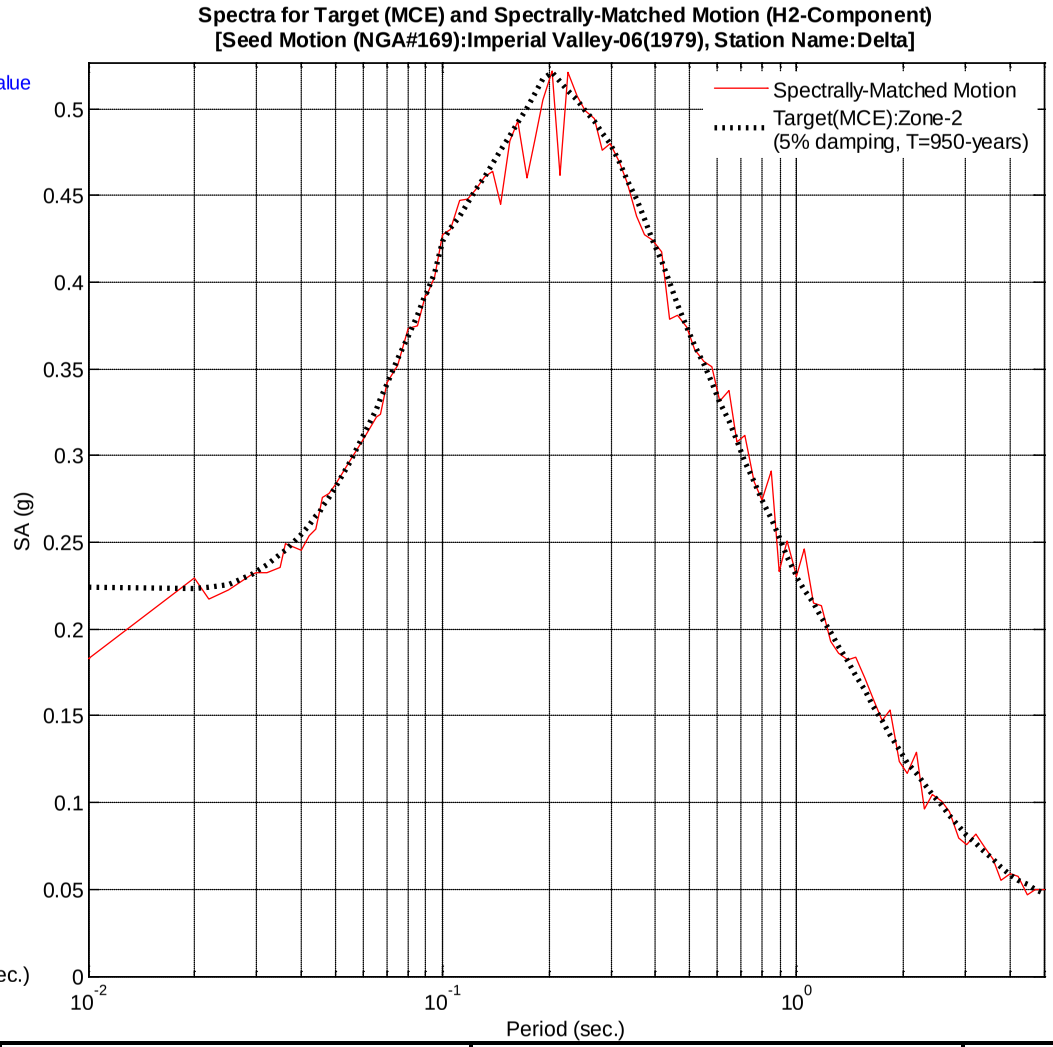
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 2 – SET NO. 4 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-12**



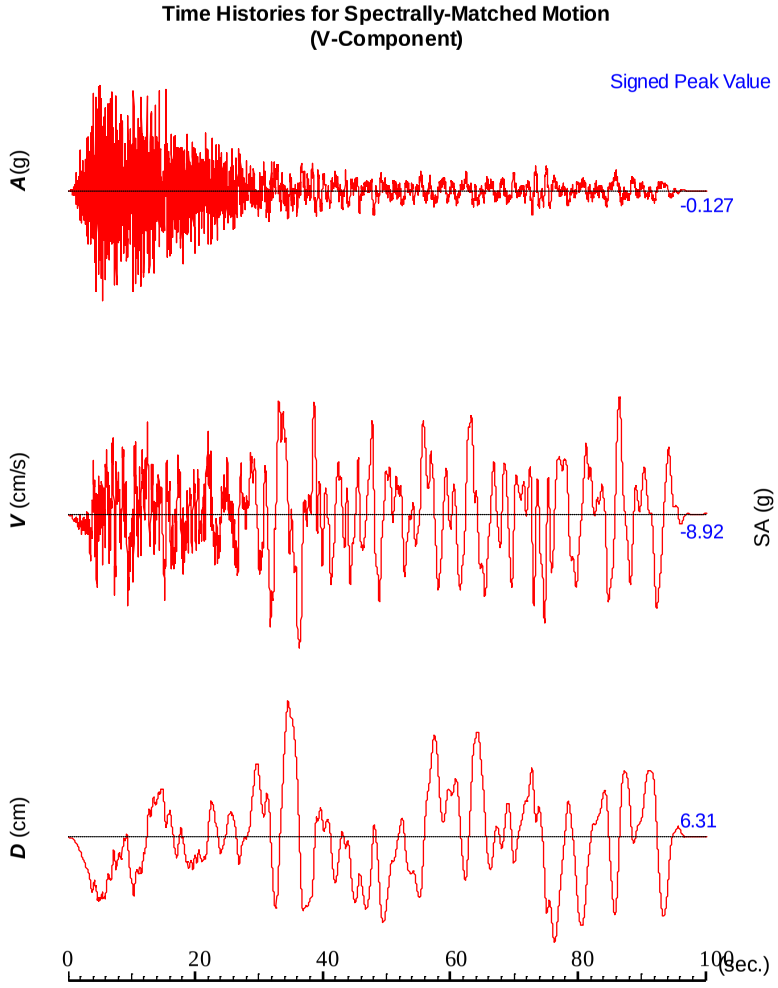


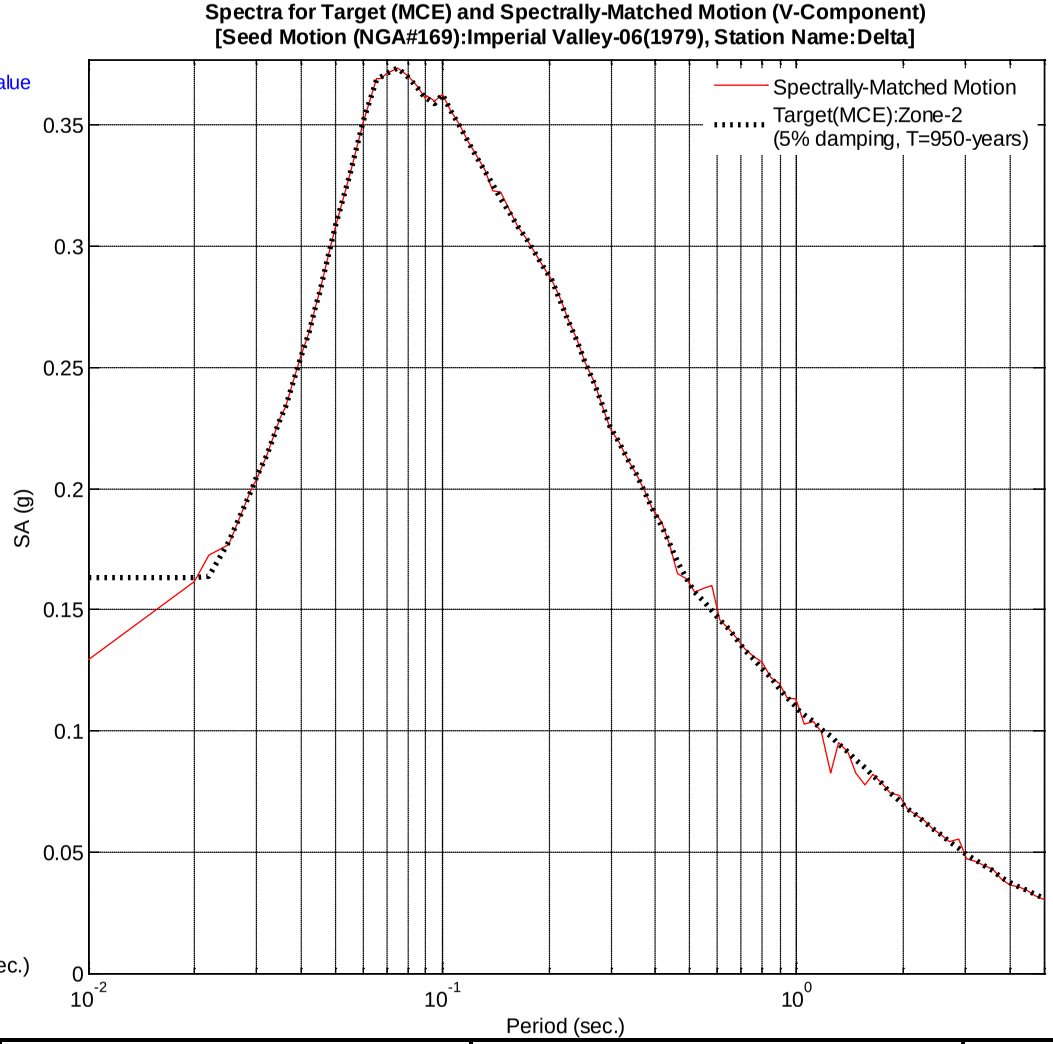
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 2 – SET NO. 5 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-13**



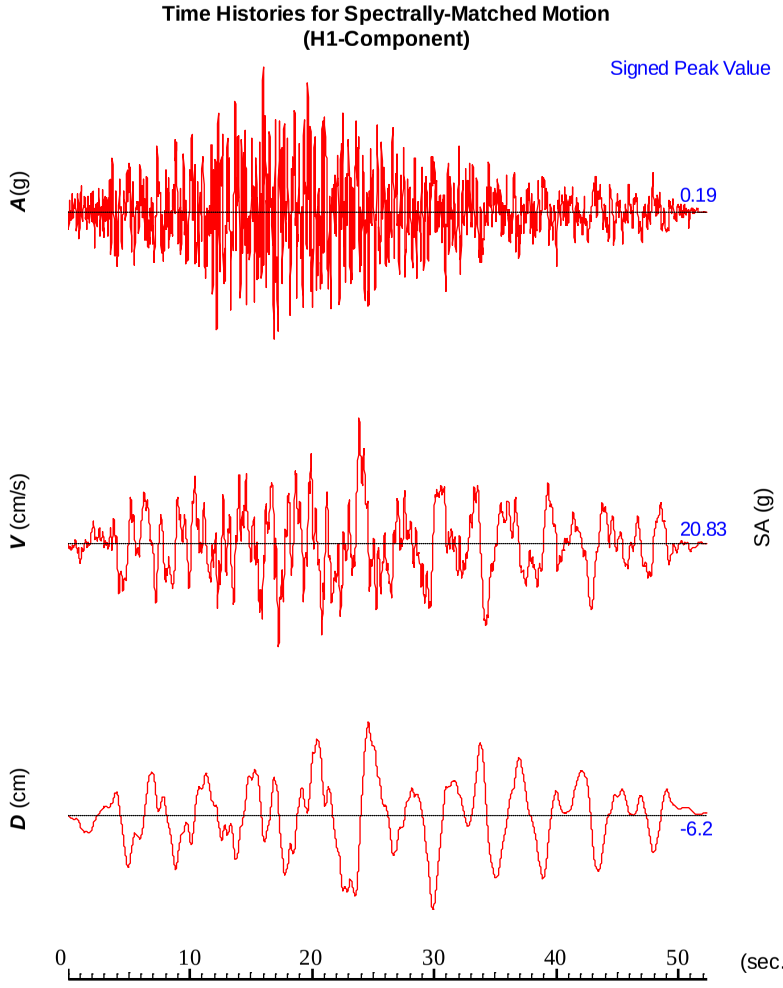


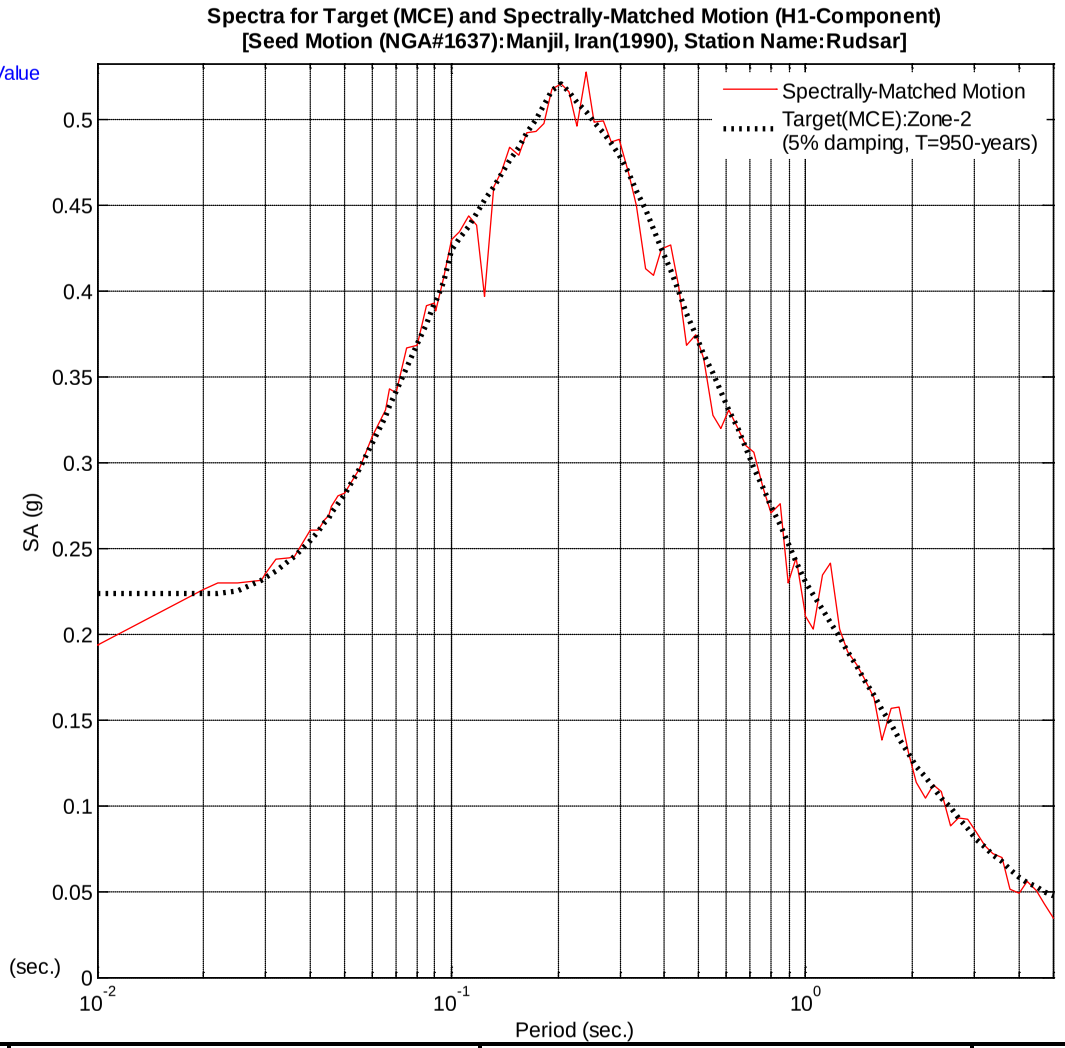
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 2 – SET NO. 5 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-14**



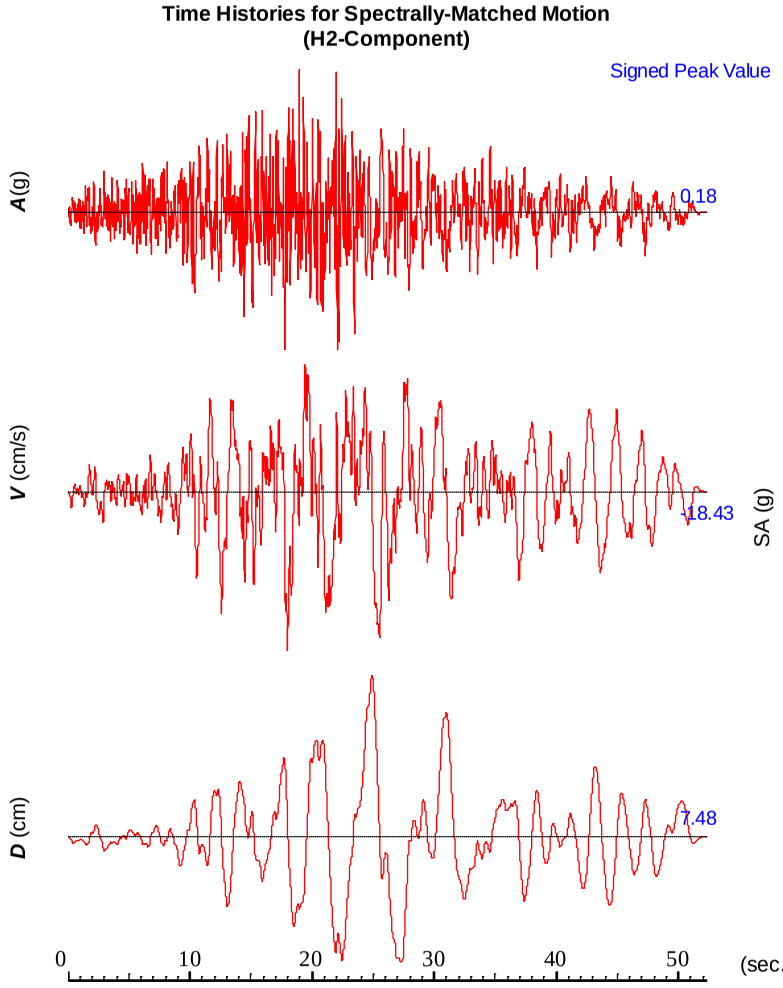


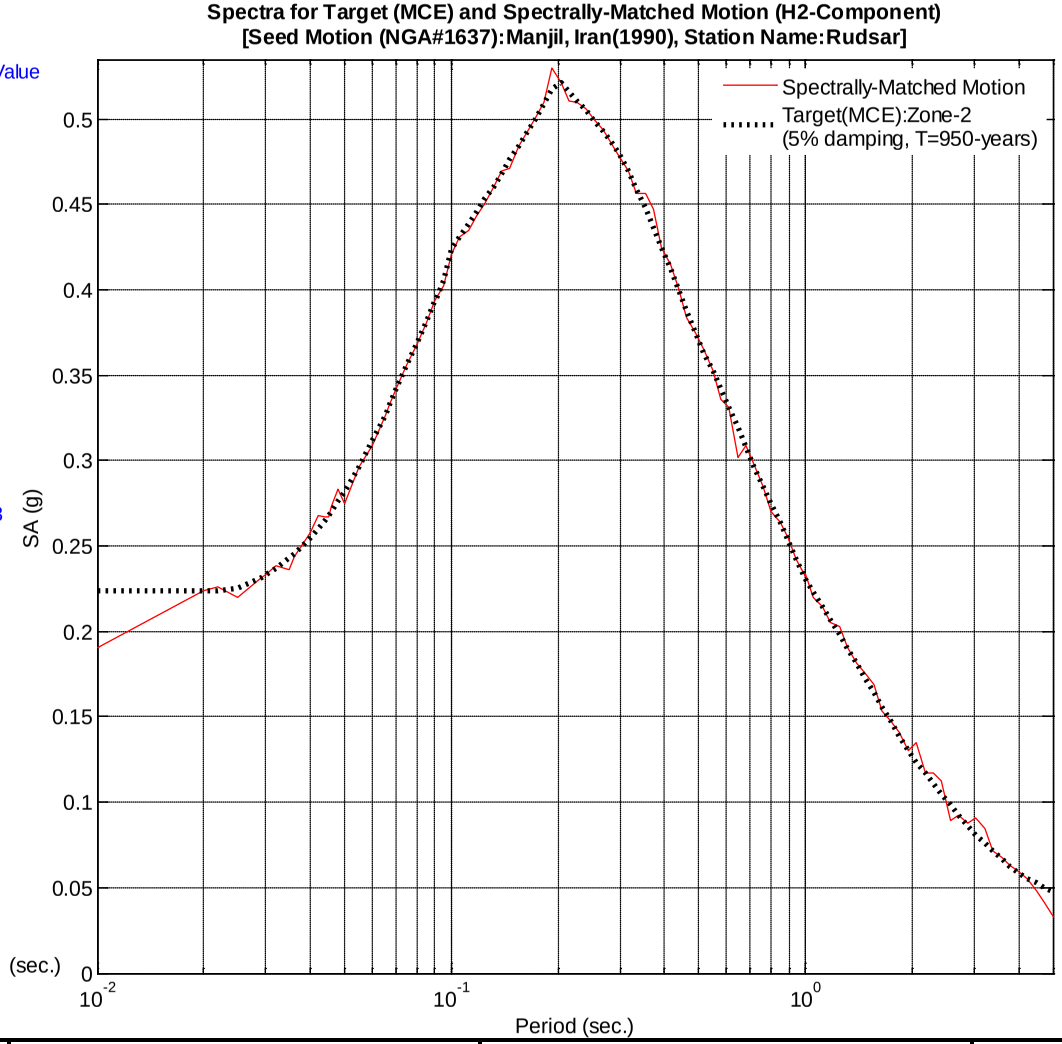
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 2 – SET NO. 5 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-15**



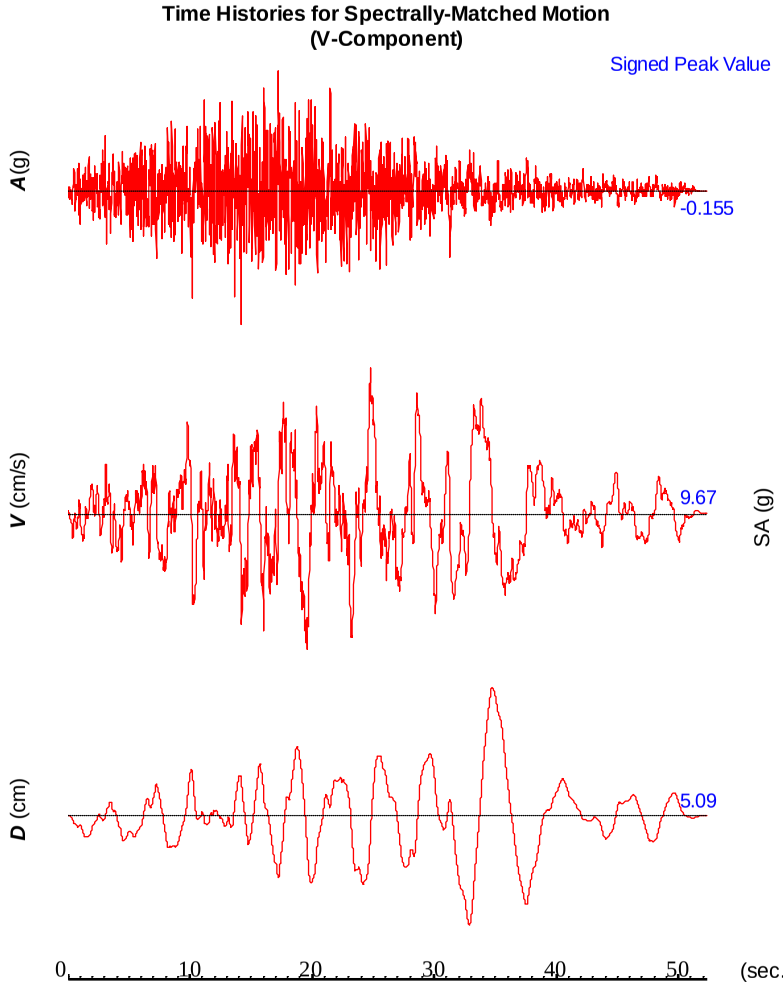


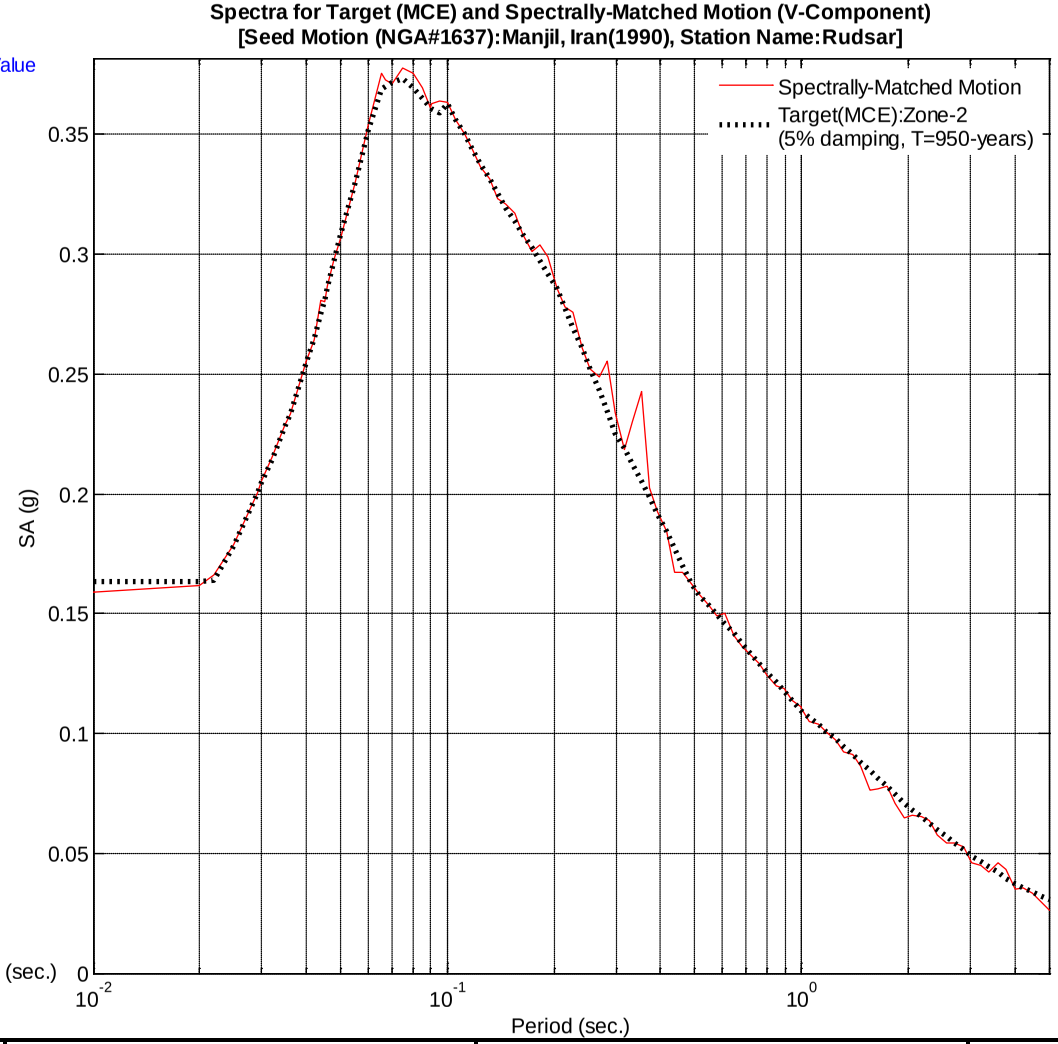
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 2 – SET NO. 6 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-16**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 2 – SET NO. 6 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-17**





SC SOLUTIONS

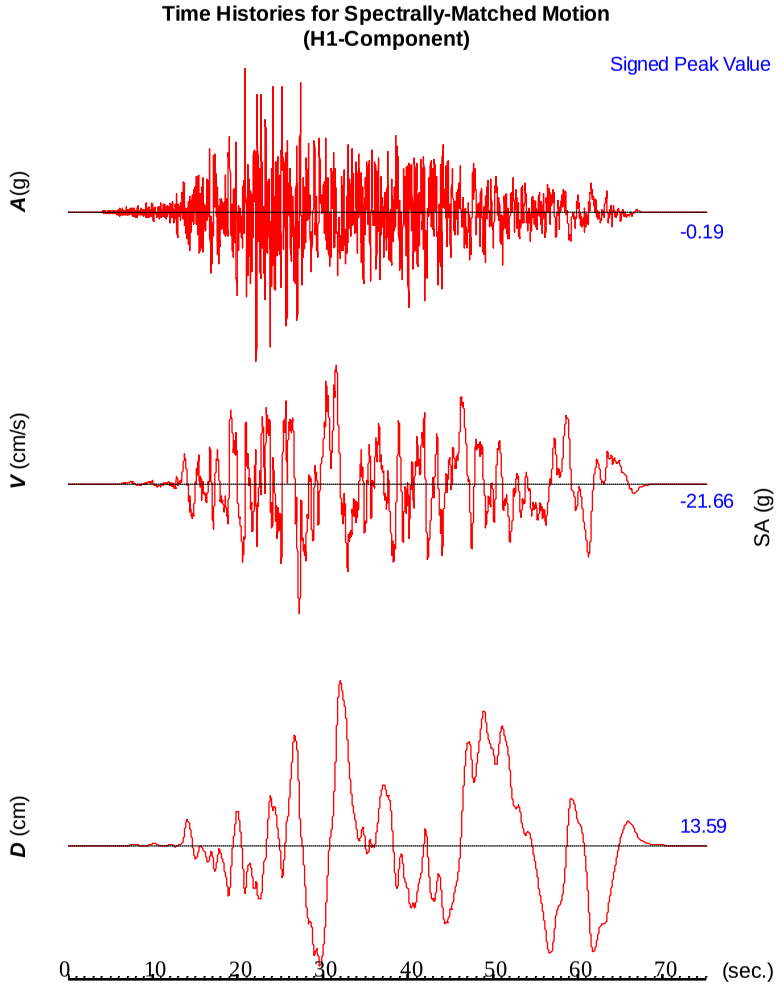
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

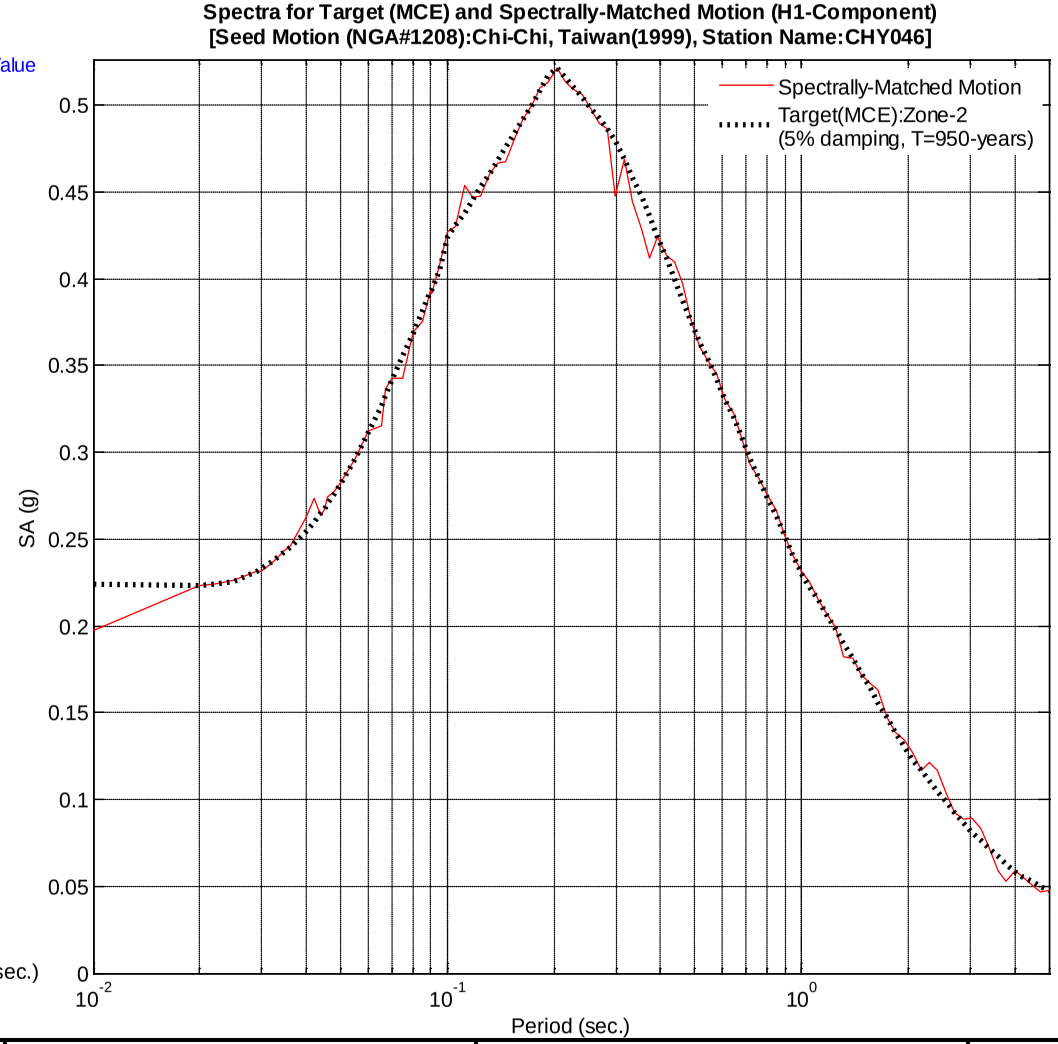
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 2 – SET NO. 6 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

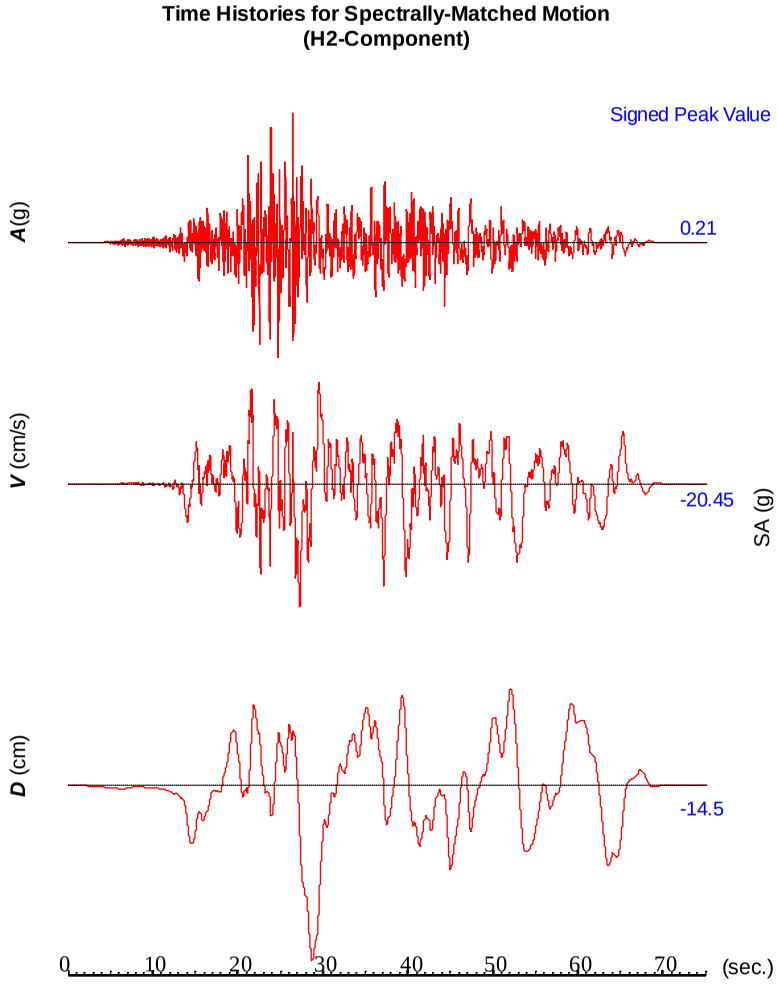
PLATE

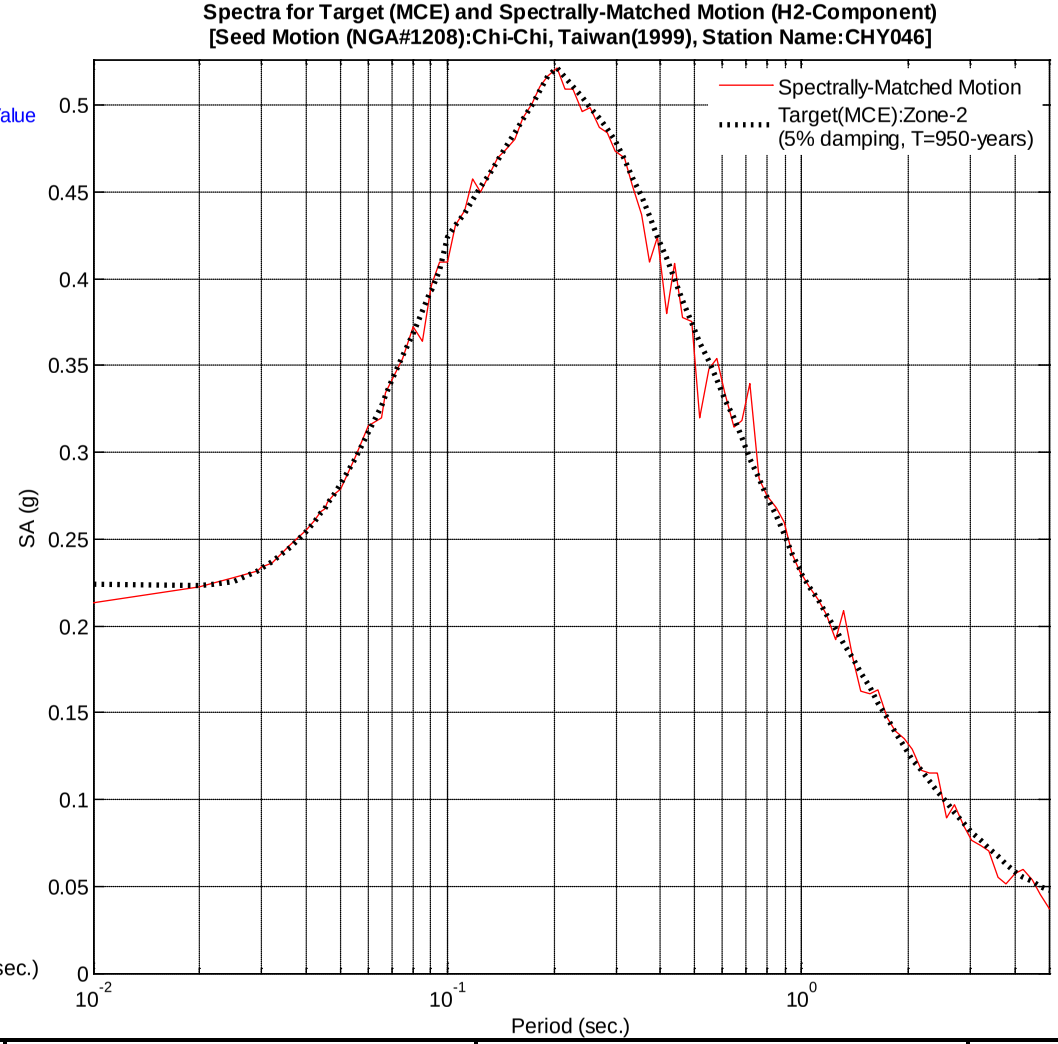
B2-18



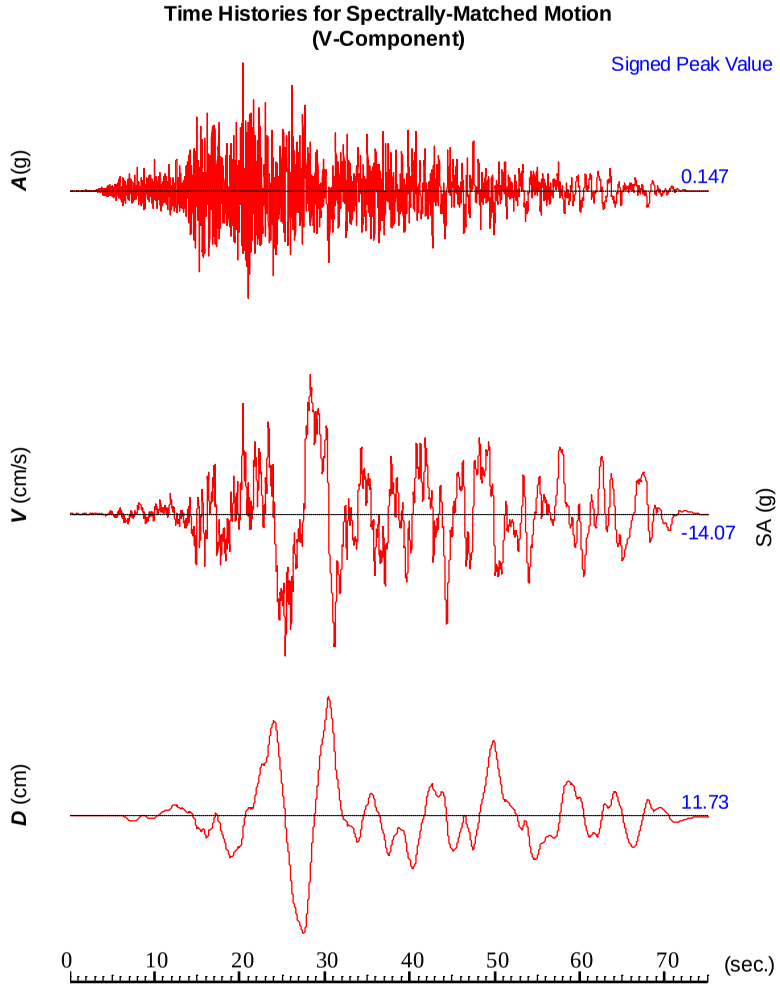


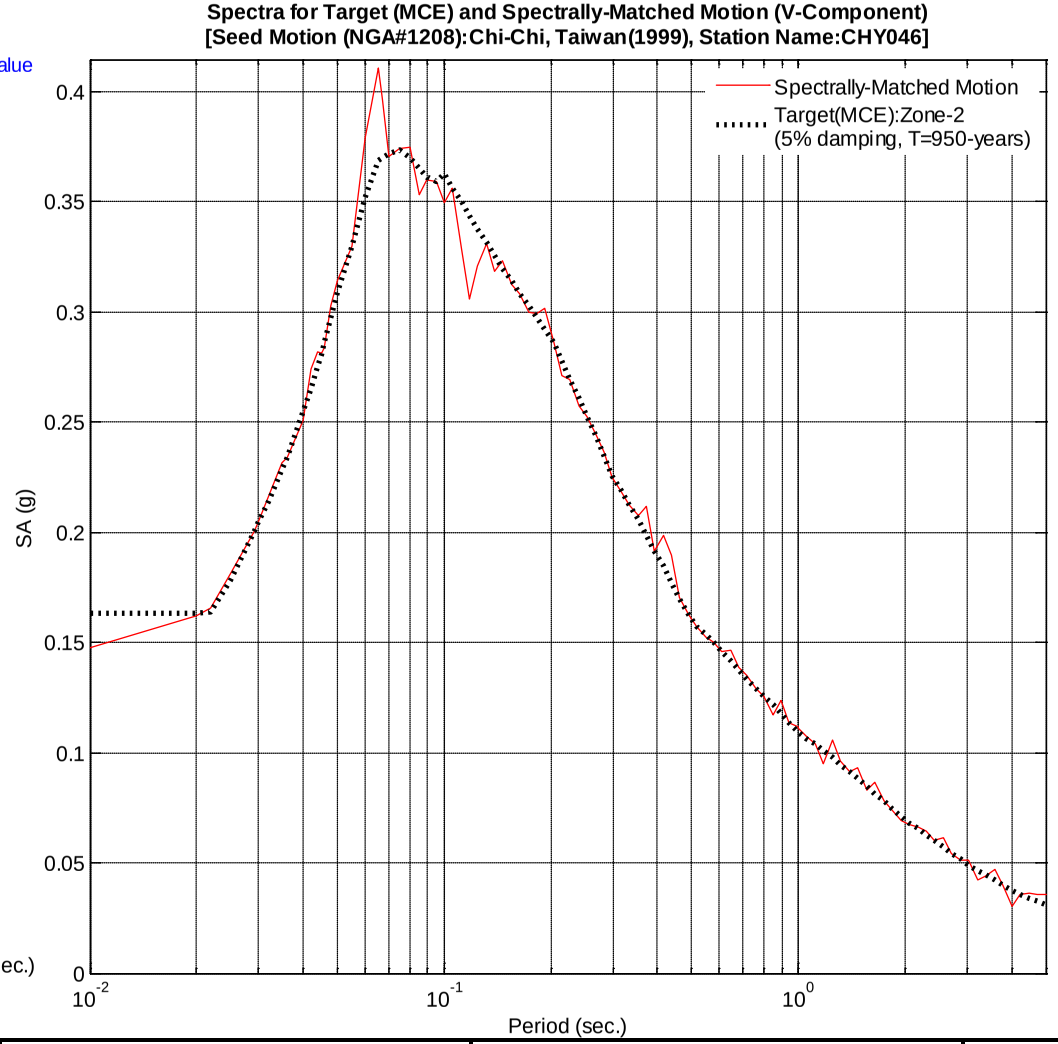
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	SPECTRALLY-MATCHED MOTIONS – MCE ZONE 2 – SET NO. 7 – HORIZONTAL 1 CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE B2-19





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 2 – SET NO. 7 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-20**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 2 – SET NO. 7 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B2-21**

Table B.3: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 3**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	882	Landers	1992	North Palm Springs	7.28	26.84	0.194	16.278	8.047	0.193	15.937	8.139	0.138	11.003	5.201
2	1776	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.177	22.091	15.215	0.206	19.946	9.817	0.153	10.776	6.991
3	2112	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.204	21.983	15.107	0.214	19.964	17.389	0.126	14.508	14.036
4	2900	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.202	15.747	14.160	0.212	20.468	16.865	0.140	9.607	6.862
5	169	Imperial Valley-06	1979	Delta	6.53	22.03	0.194	15.220	12.099	0.180	16.688	10.695	0.129	10.139	7.459
6	1637	Manjil, Iran	1990	Rudsar	7.37	64.47	0.197	18.061	6.249	0.193	15.171	7.938	0.153	9.489	5.014
7	1208	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.182	18.077	12.951	0.206	19.742	14.853	0.143	15.120	12.270

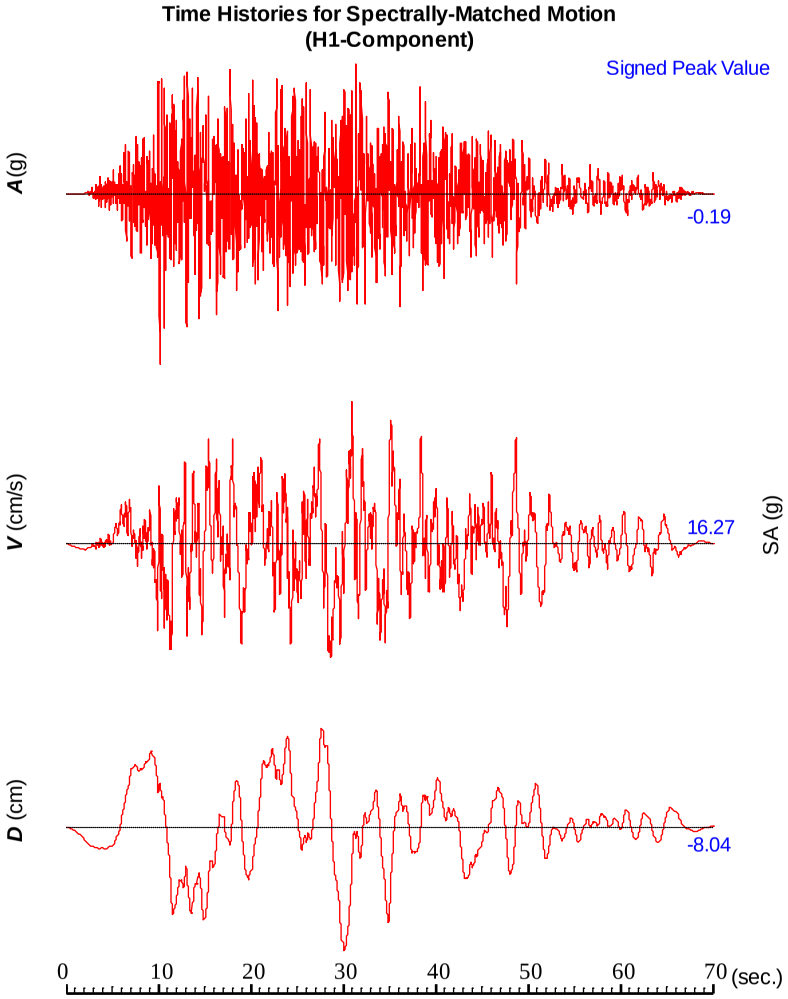
SC SOLUTIONS

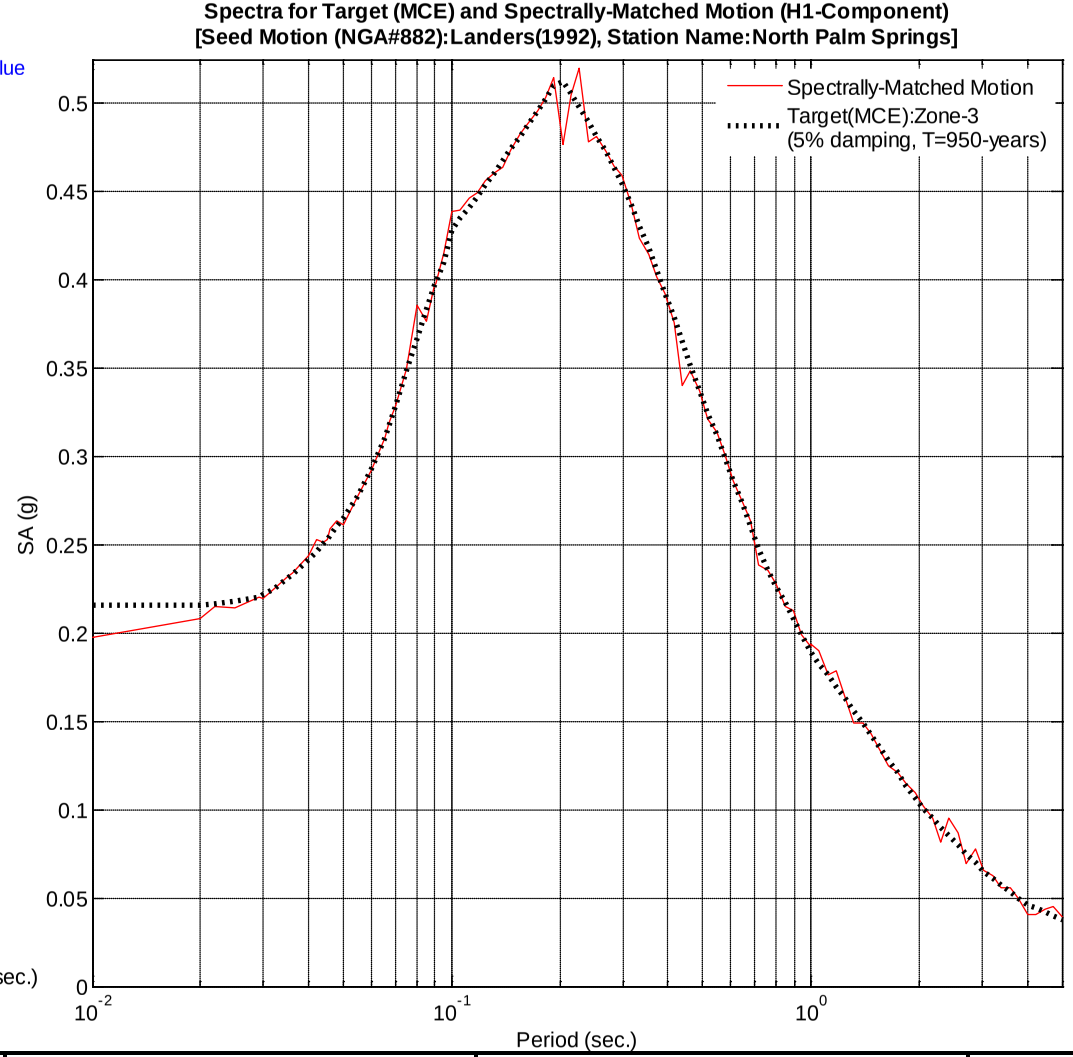
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS MCE – ZONE 3

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

PLATE
B3-0





SC SOLUTIONS

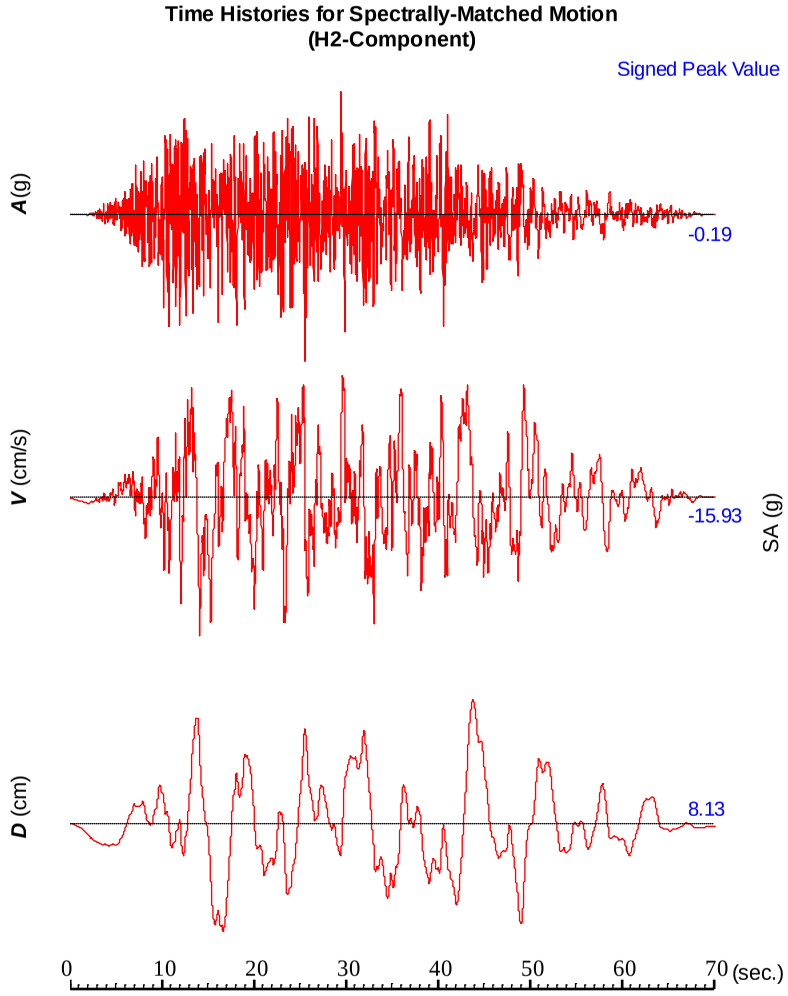
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

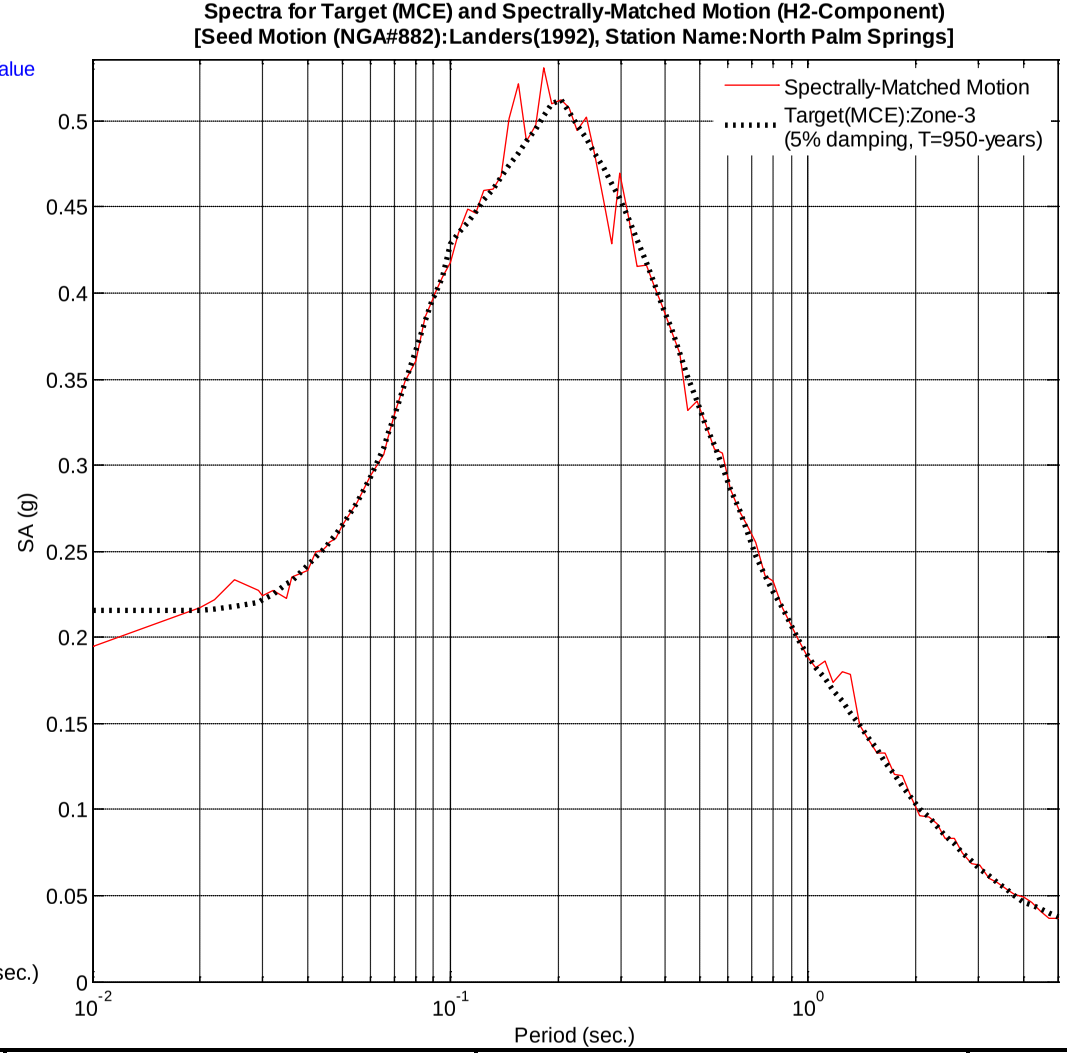
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 3 – SET NO. 1 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

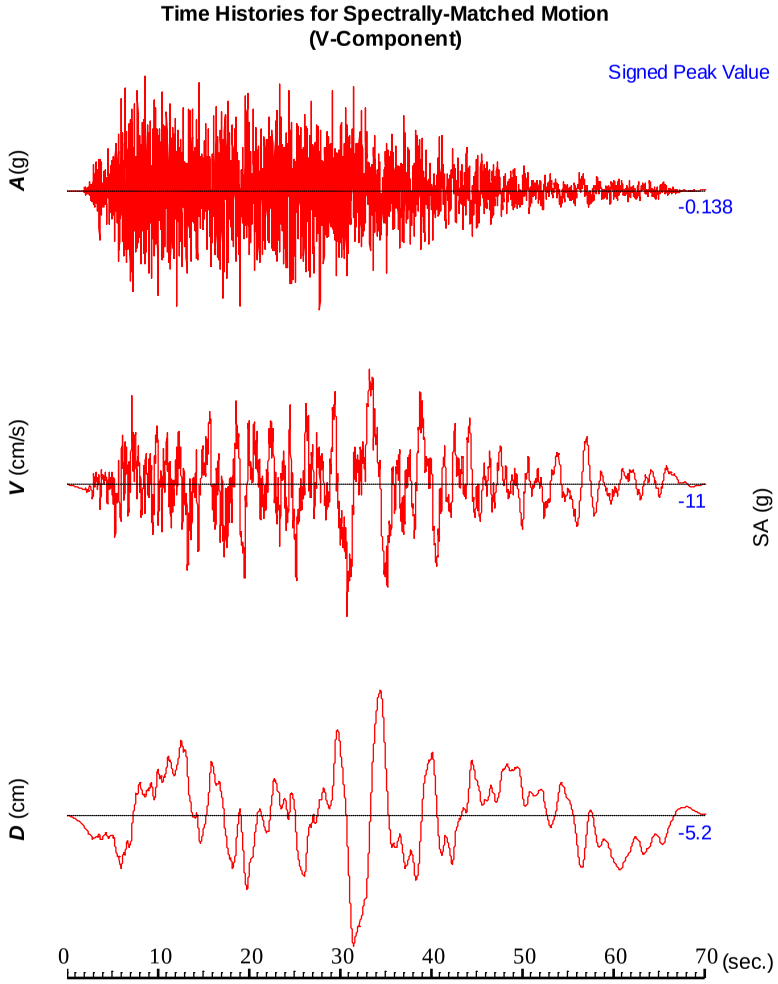
PLATE

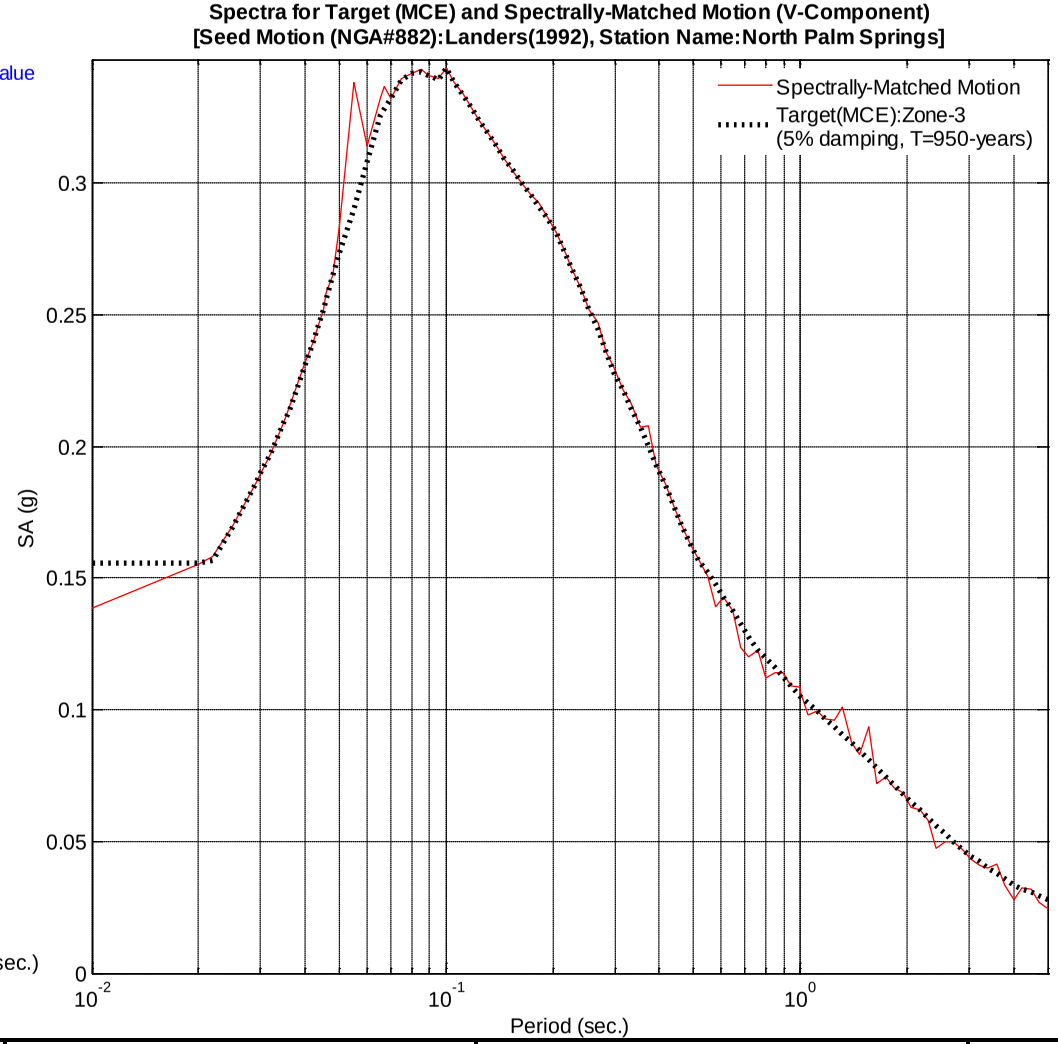
B3-1



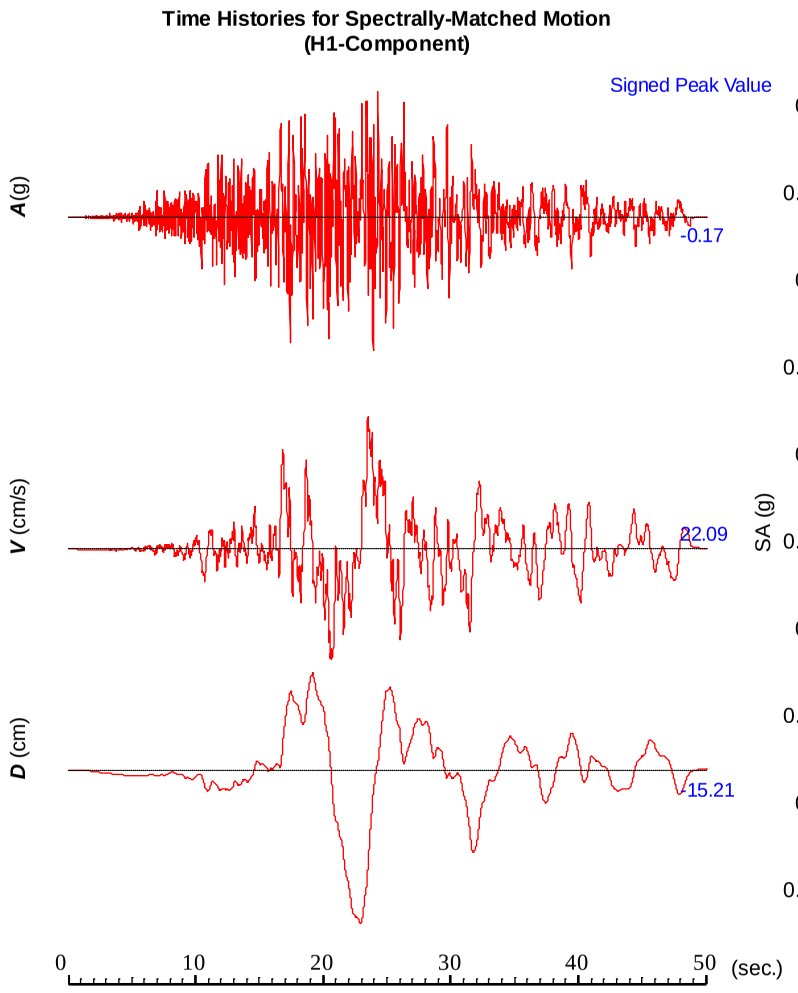


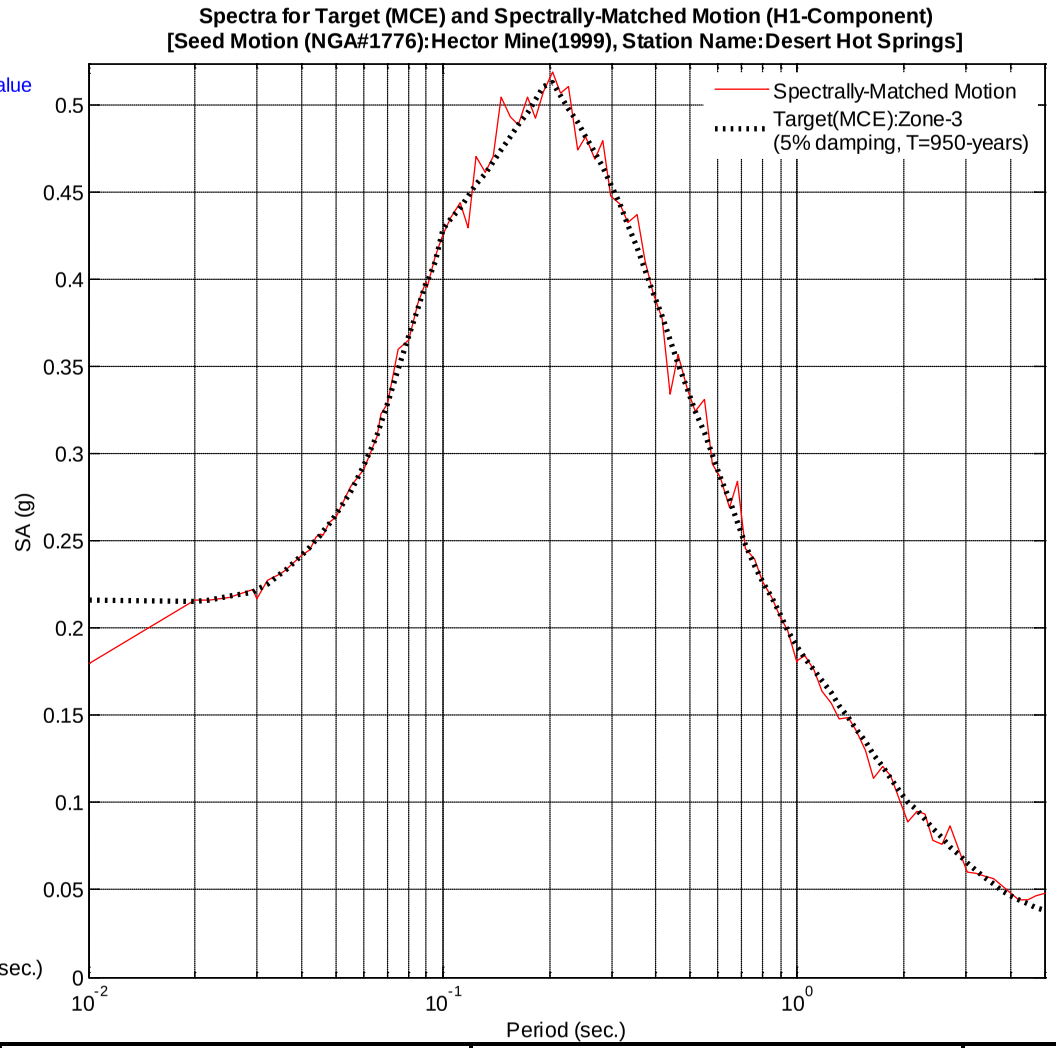
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 3 – SET NO. 1 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-2**



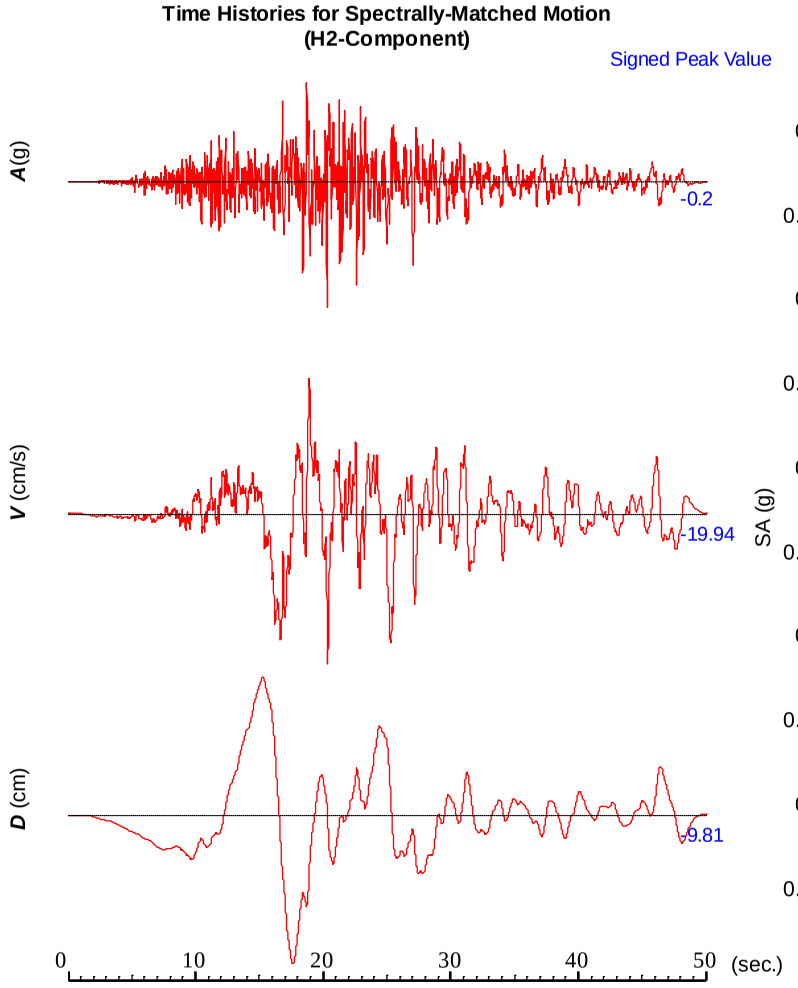


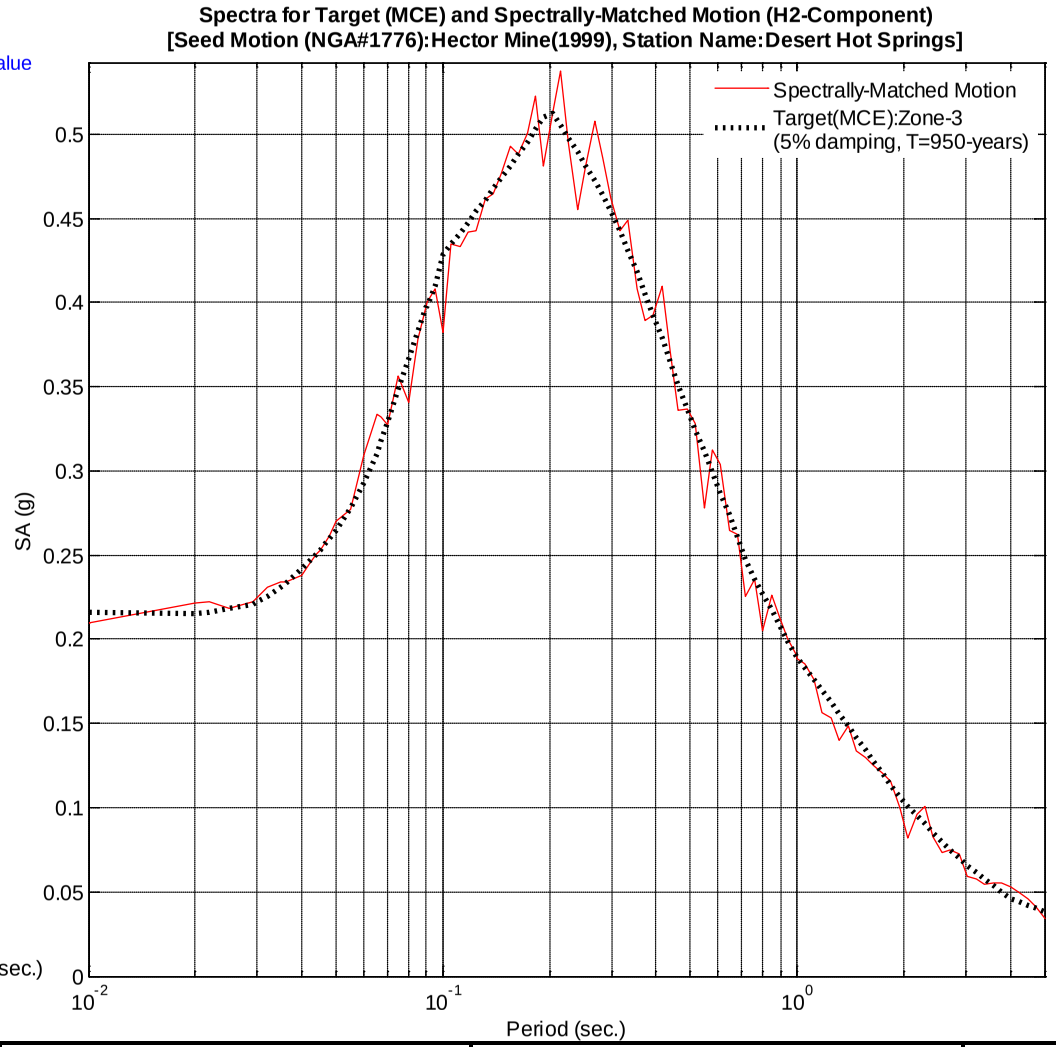
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 3 – SET NO. 1 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-3**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	SPECTRALLY-MATCHED MOTIONS – MCE ZONE 3 – SET NO. 2 – HORIZONTAL 1 CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE B3-4





SC SOLUTIONS

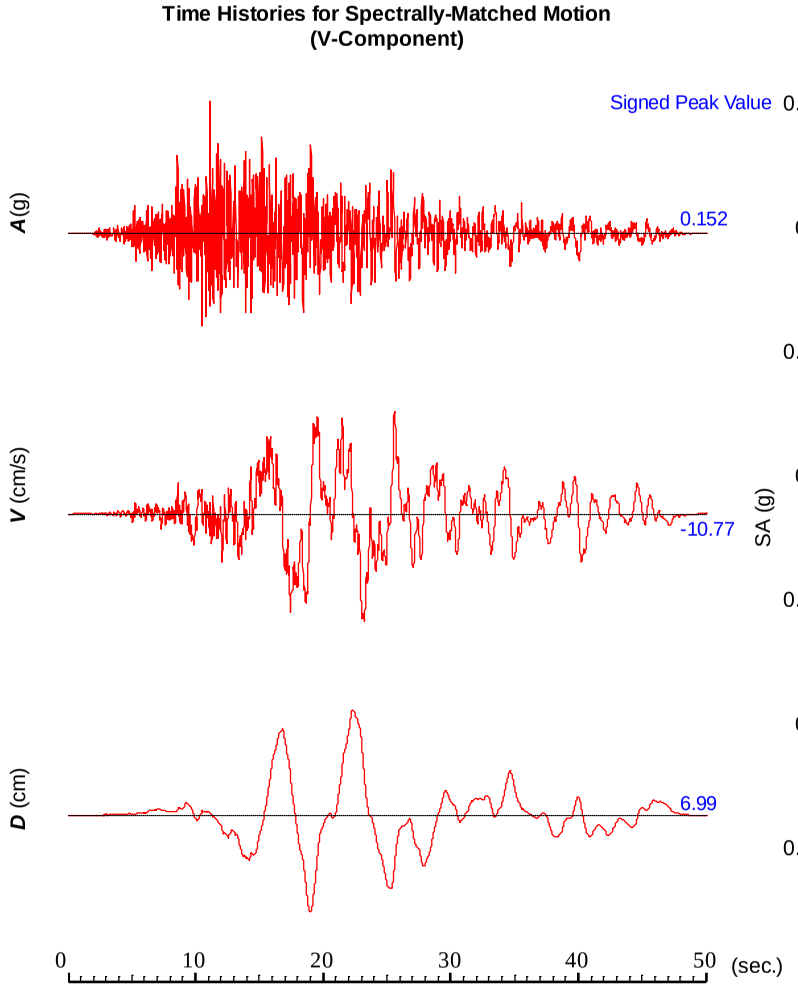
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

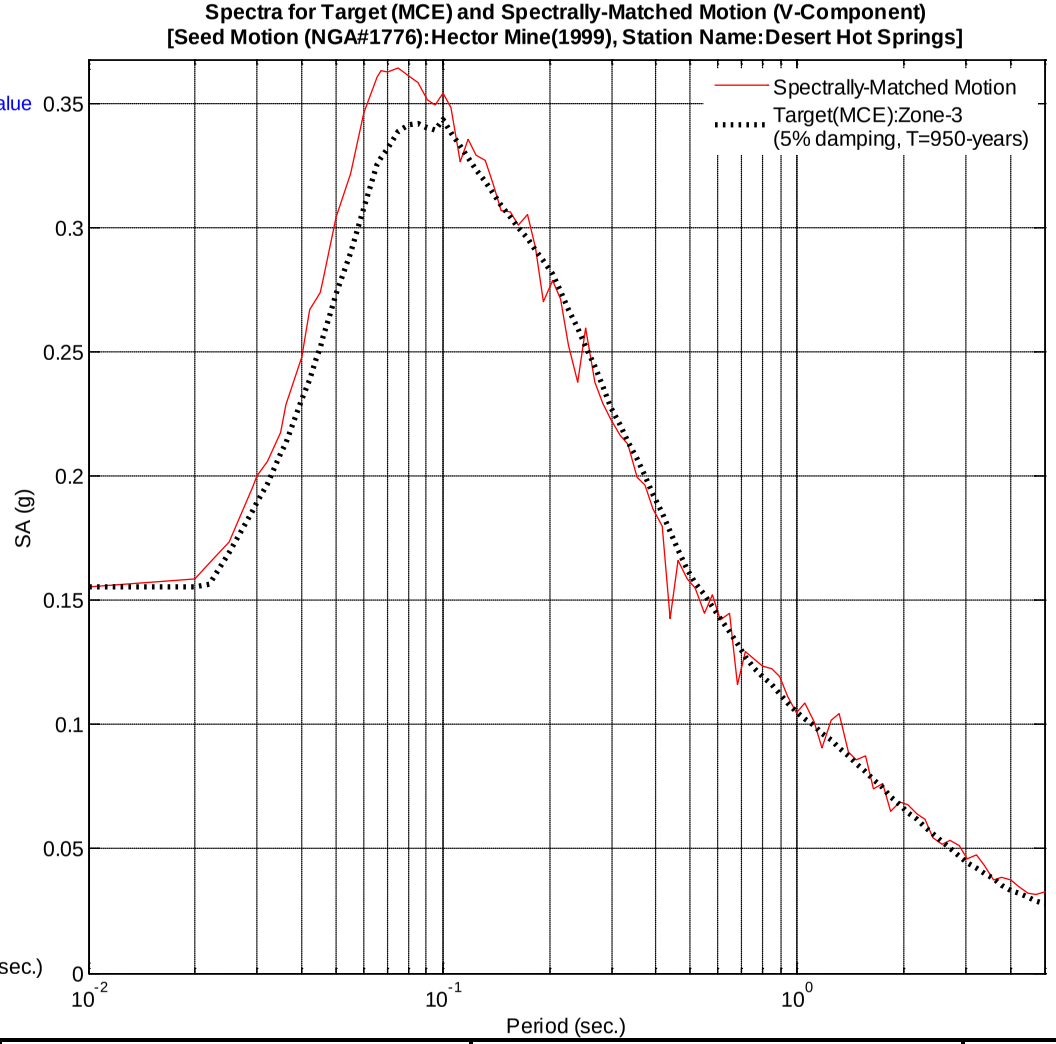
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 3 – SET NO. 2 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

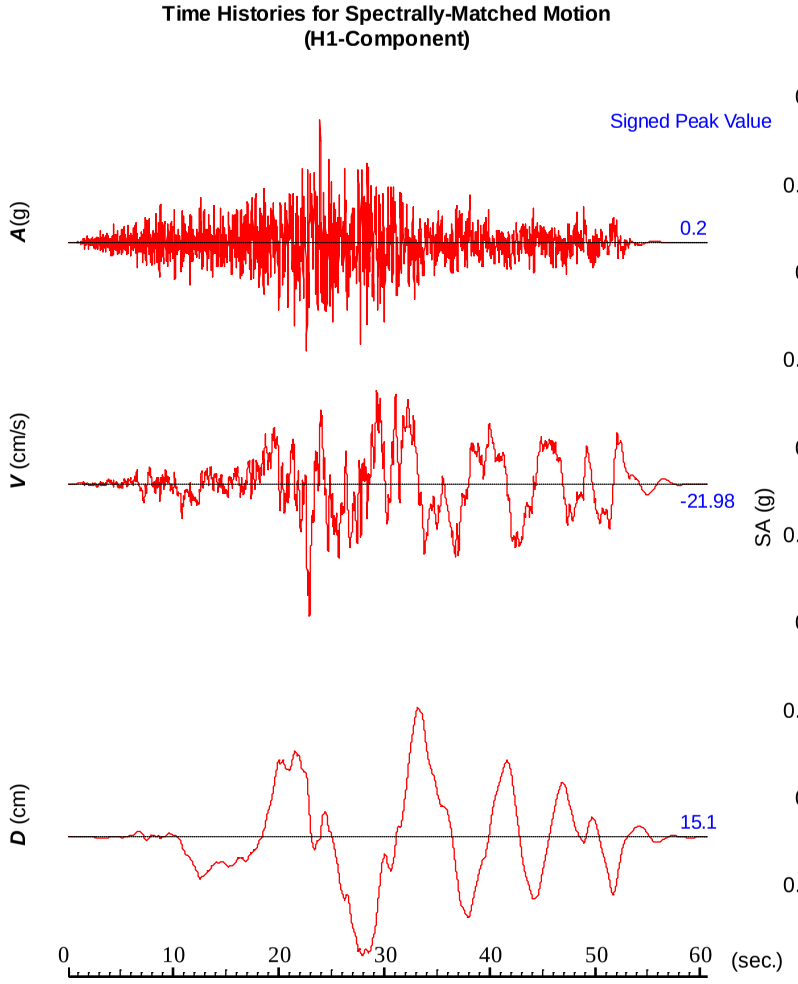
PLATE

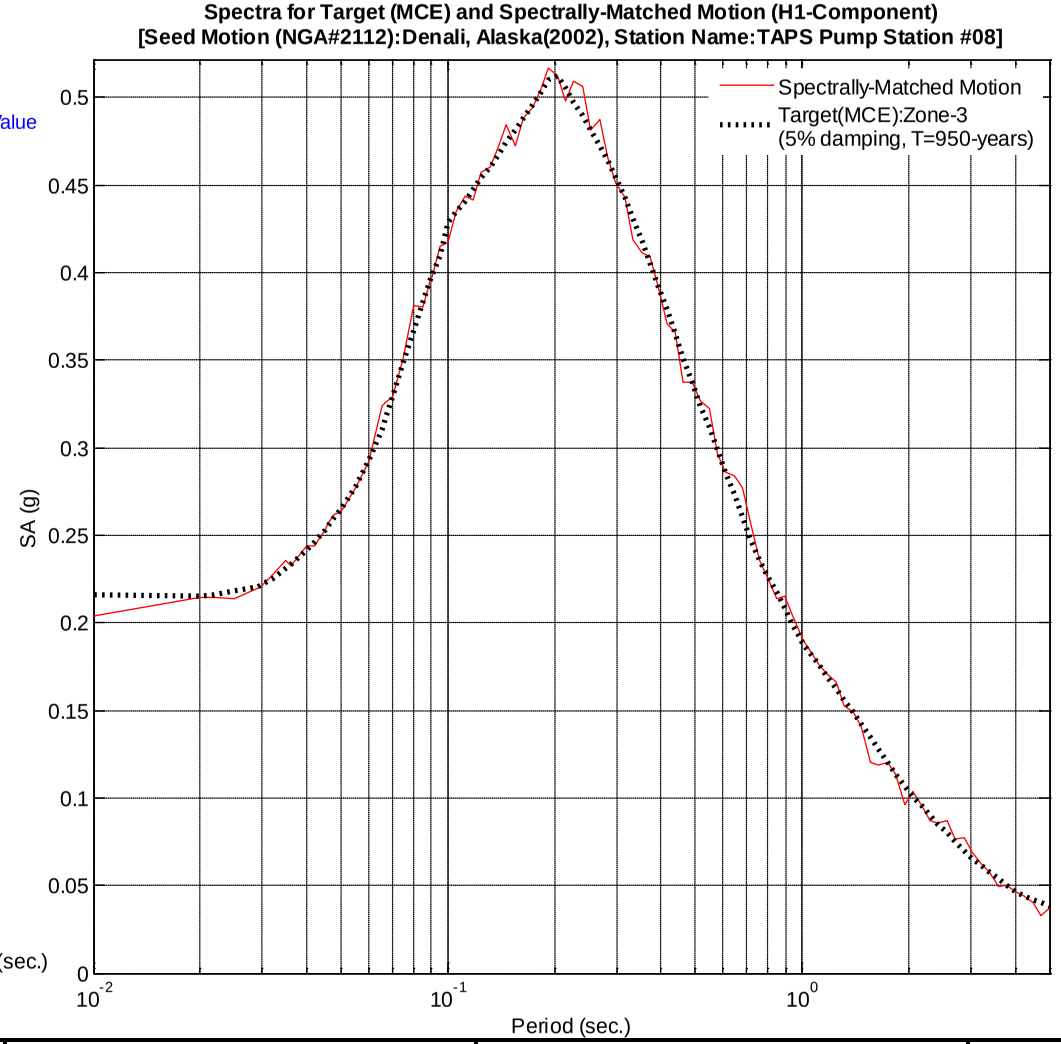
B3-5



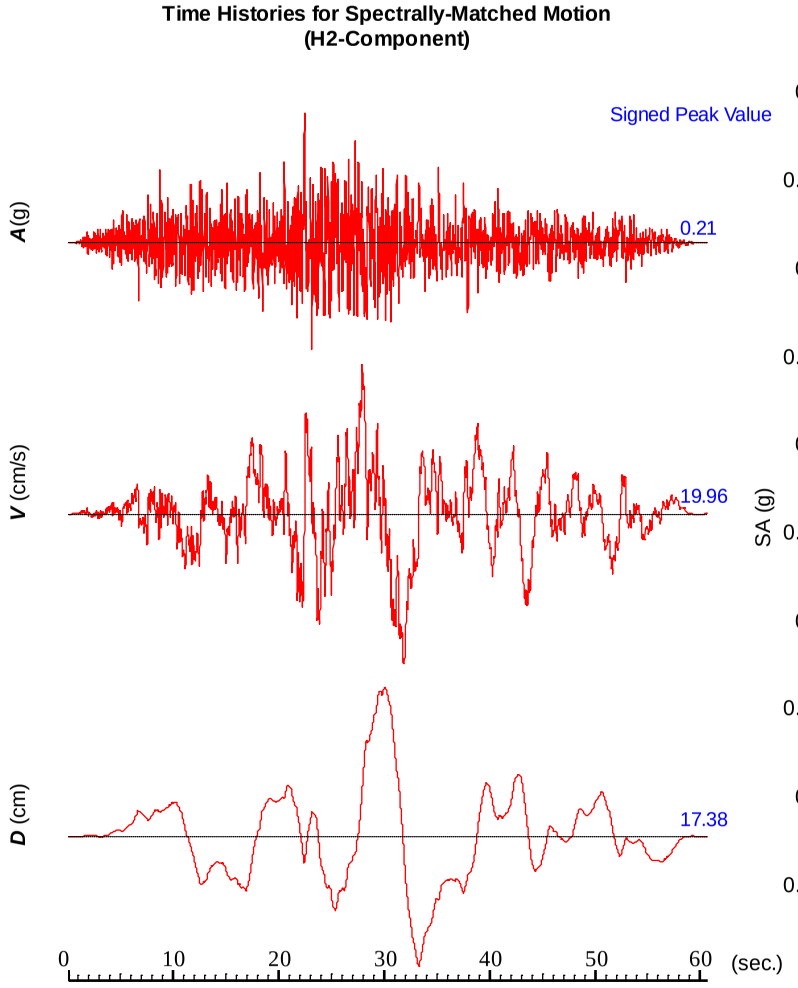


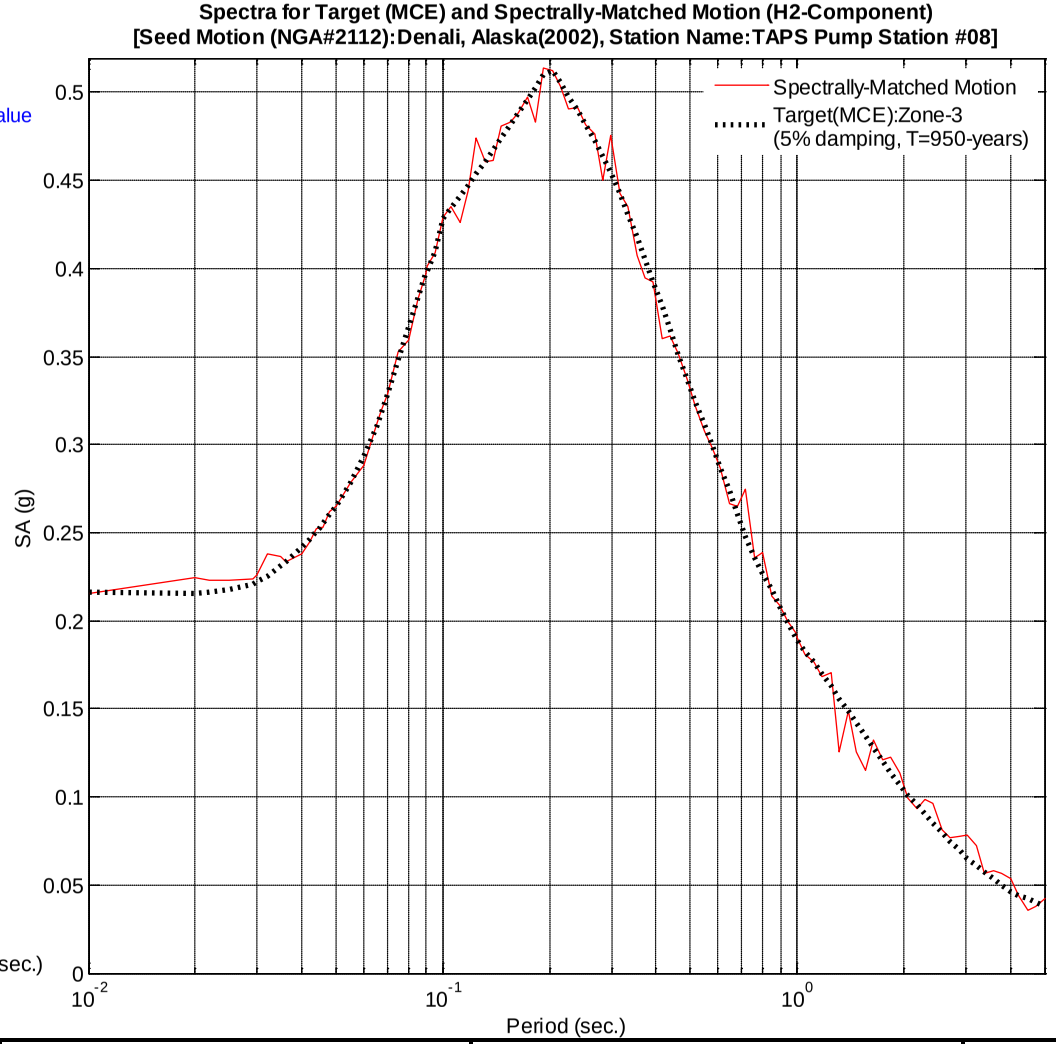
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 3 – SET NO. 2 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-6**



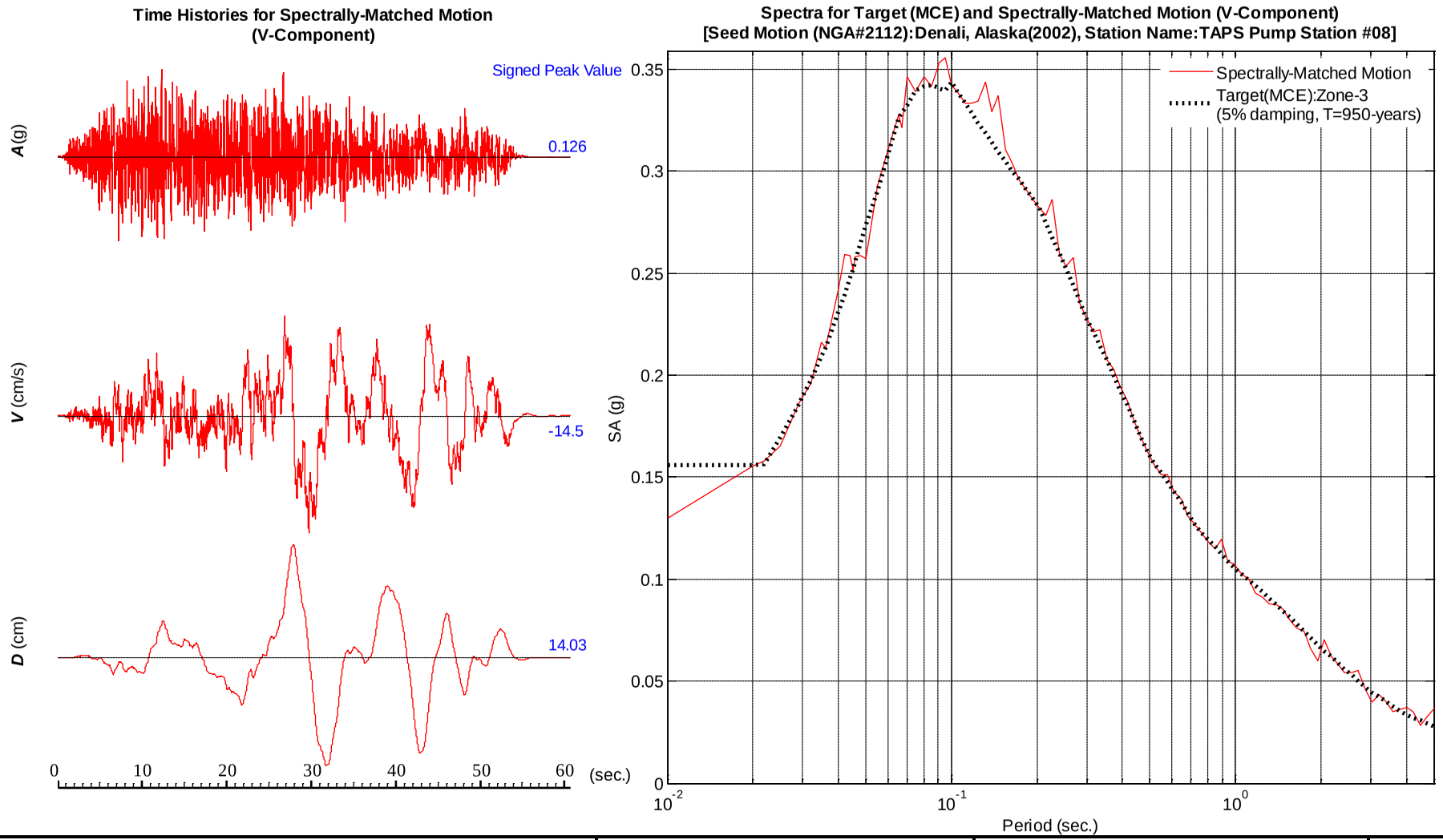


SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 3 – SET NO. 3 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-7**

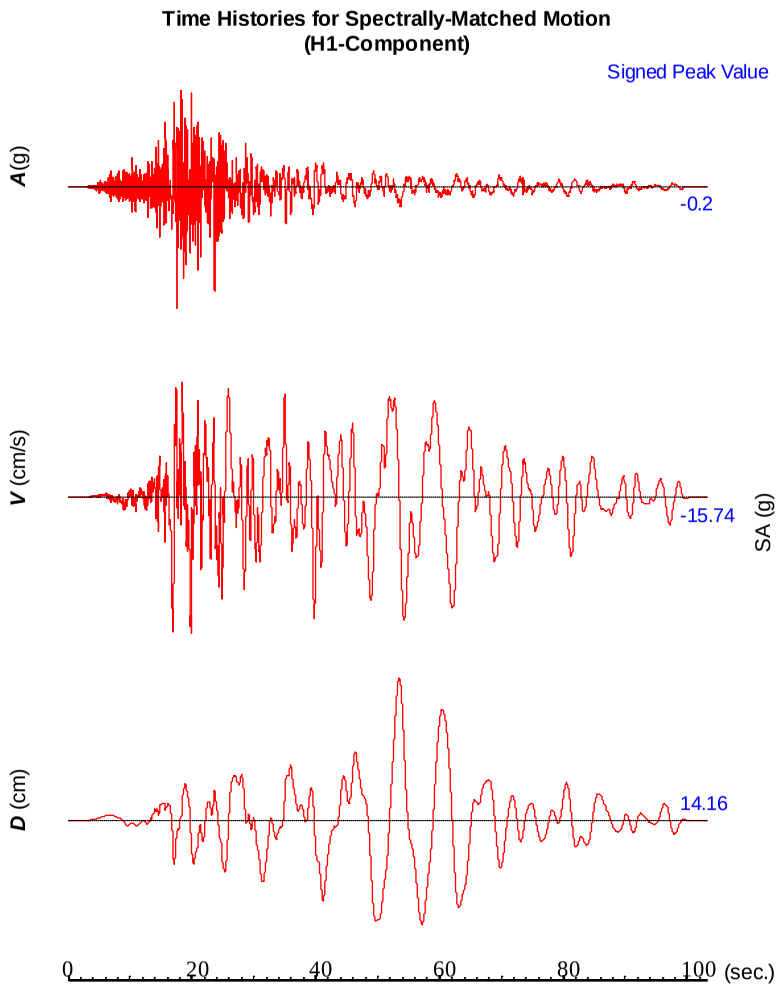


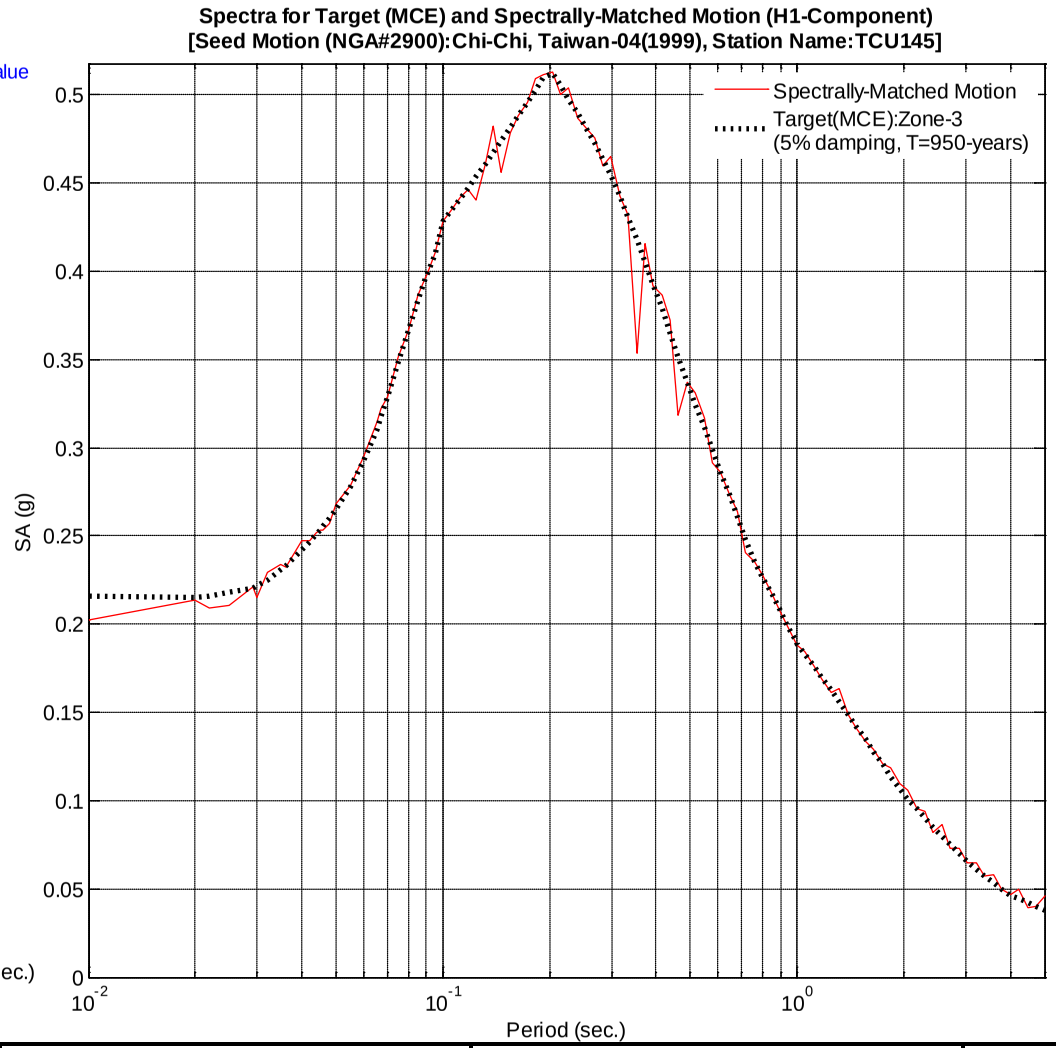


SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 3 – SET NO. 3 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-8**



SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 3 – SET NO. 3 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-9**





SC SOLUTIONS

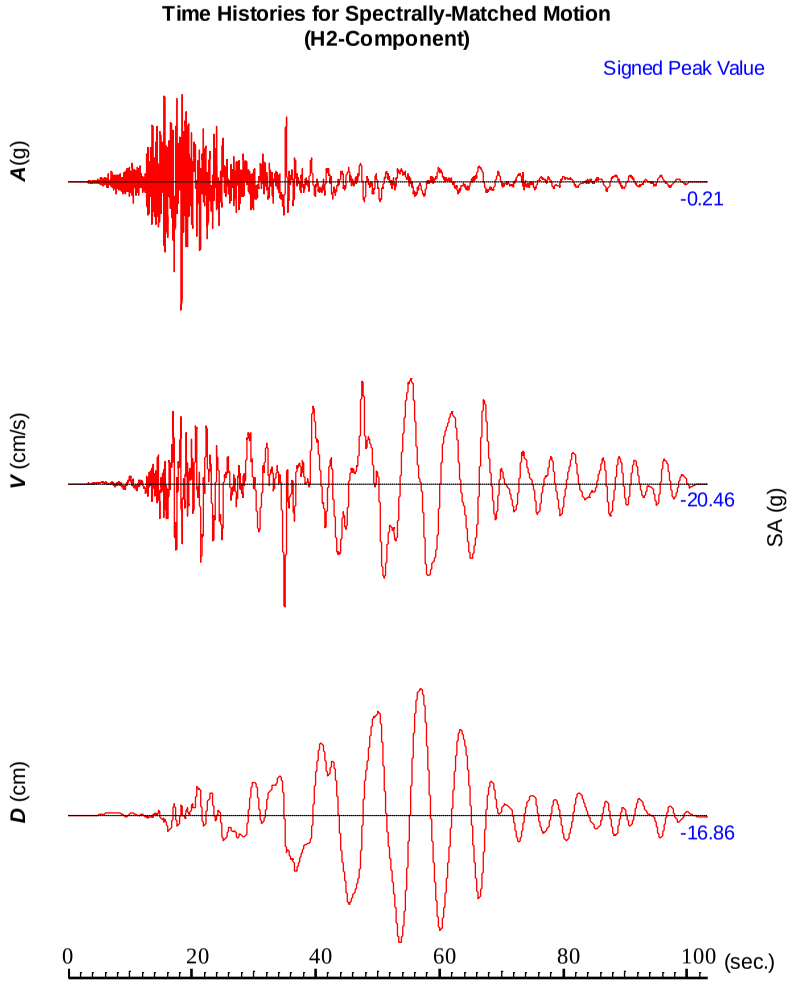
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

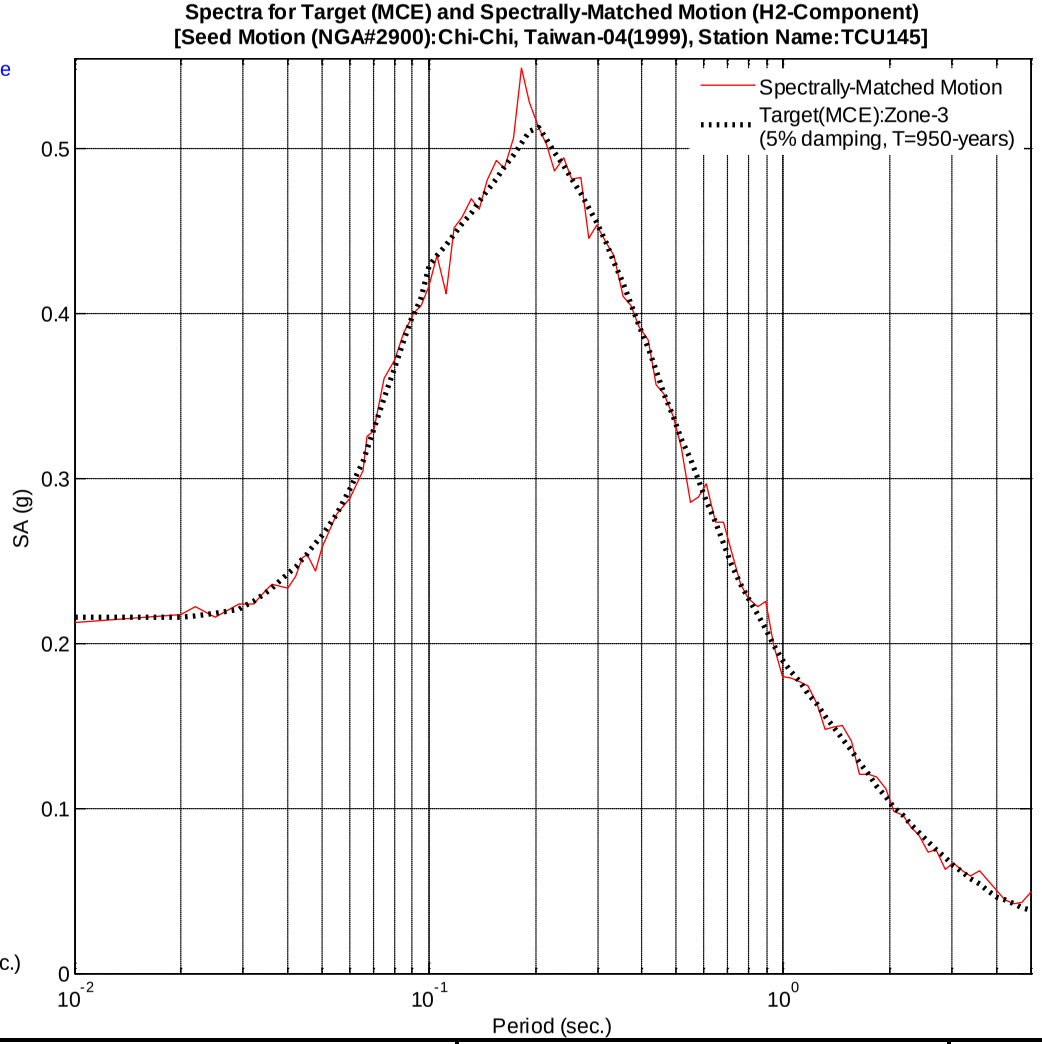
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 3 – SET NO. 4 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO FRESNO, CALIFORNIA

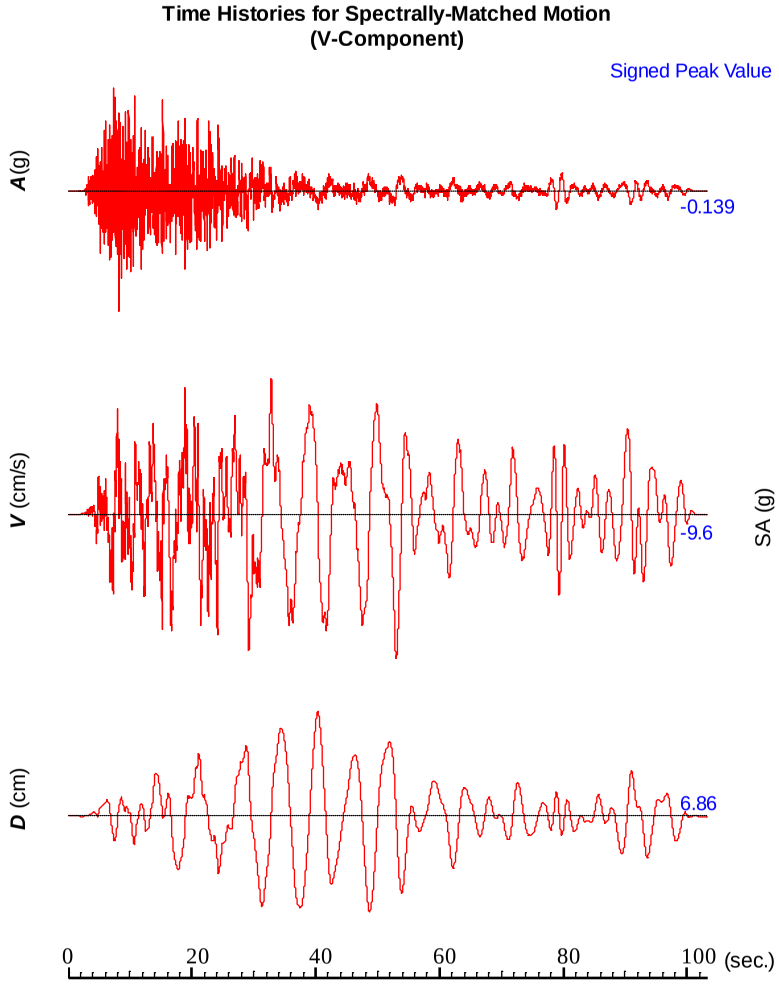
PLATE

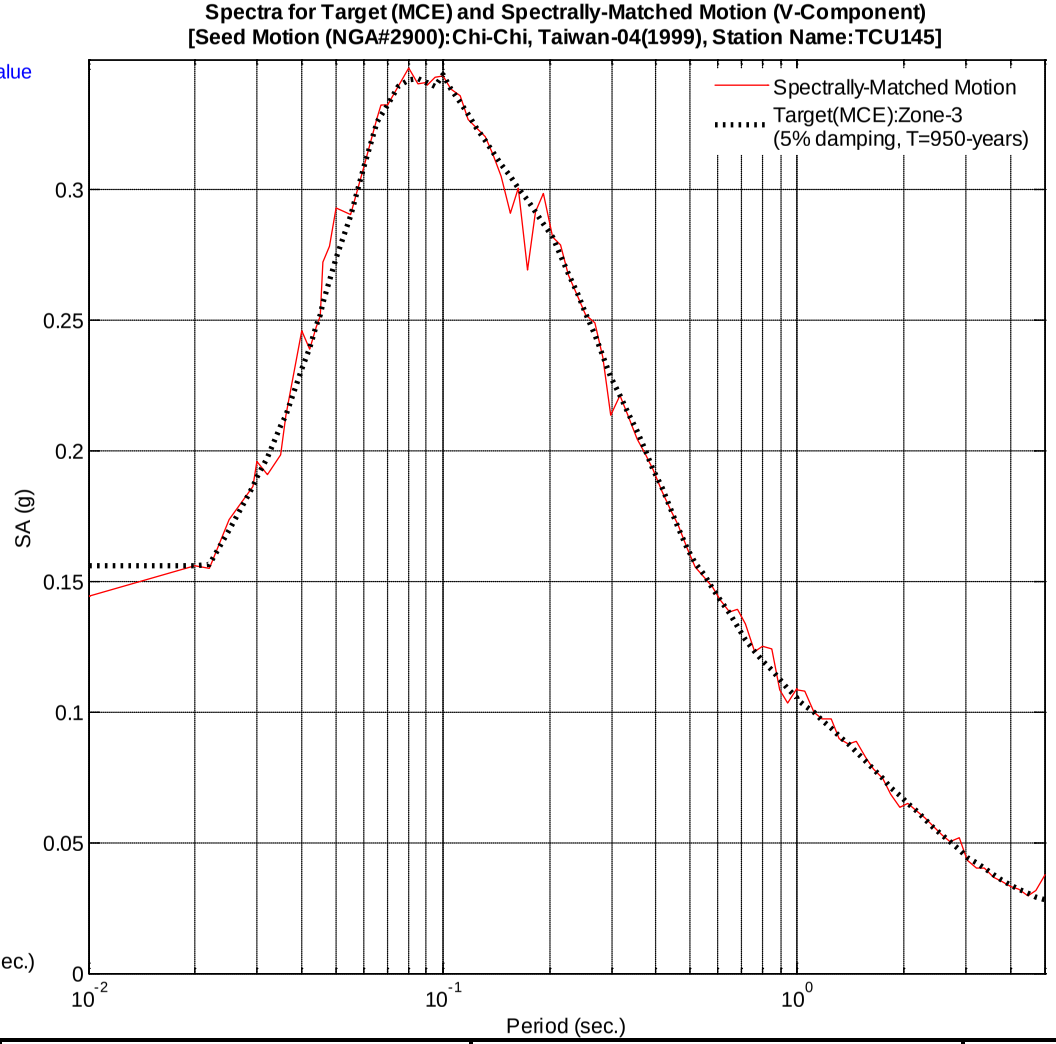
B3-10



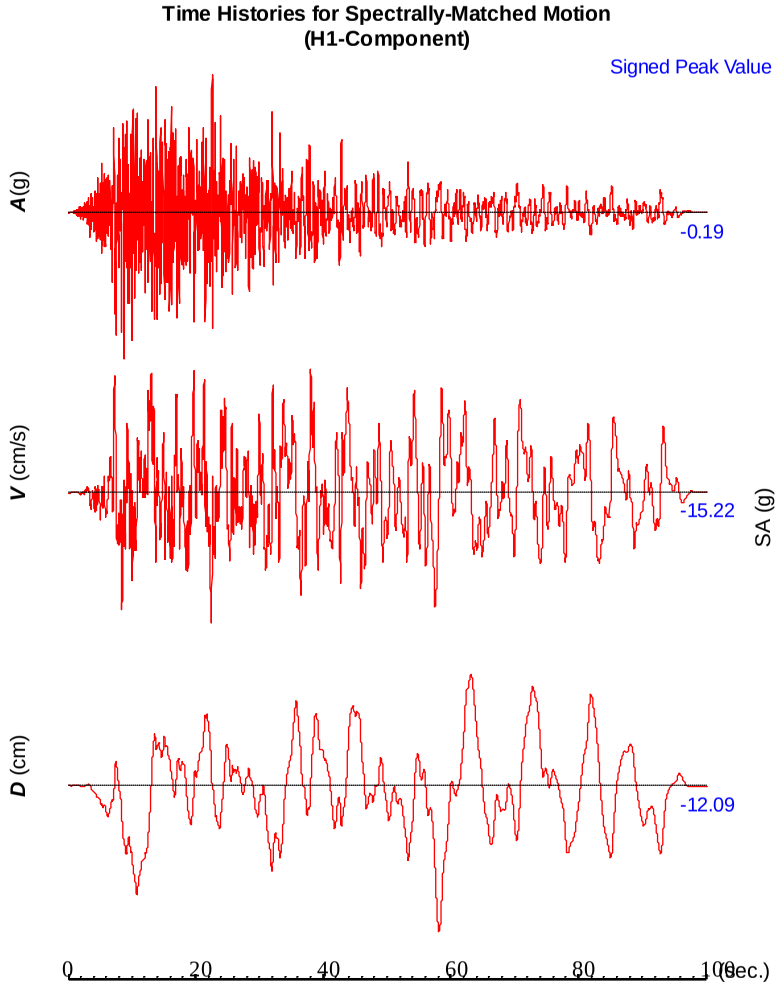


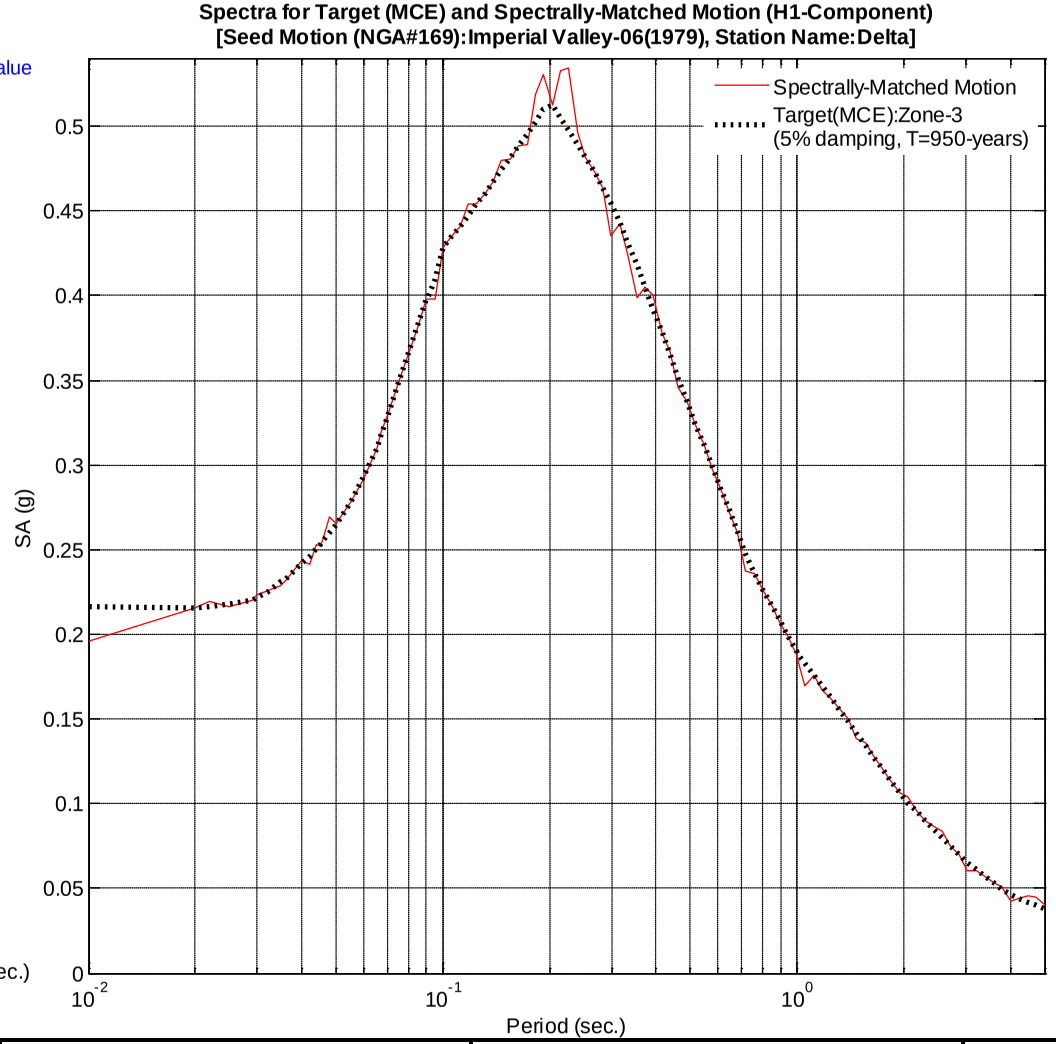
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 3 – SET NO. 4 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-11**



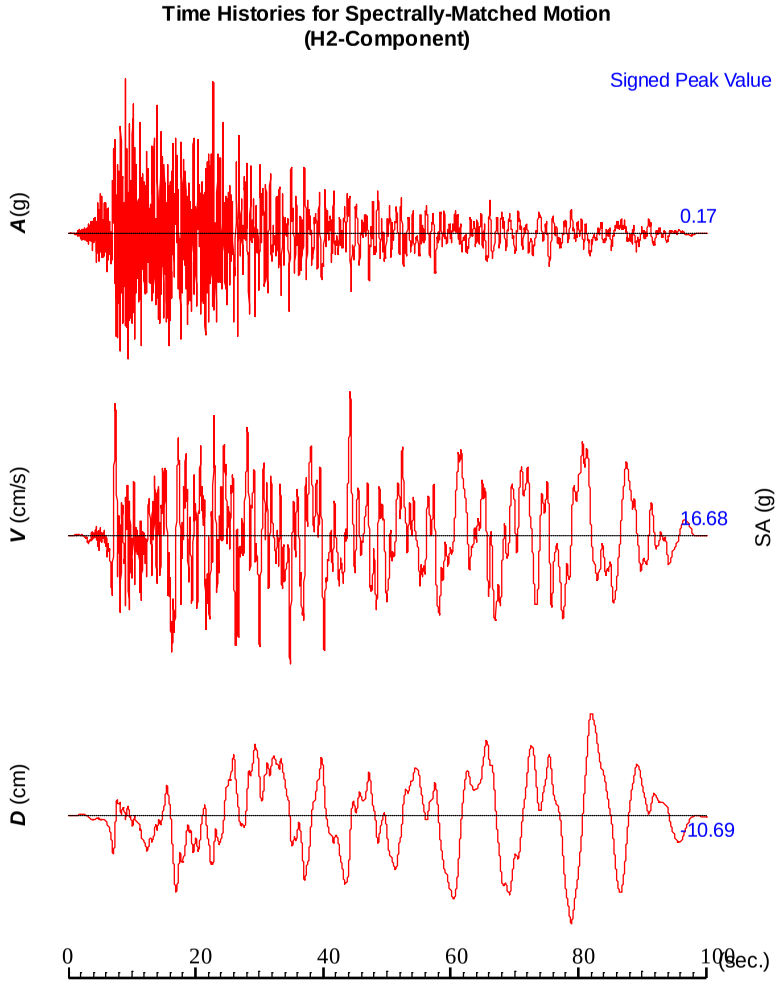


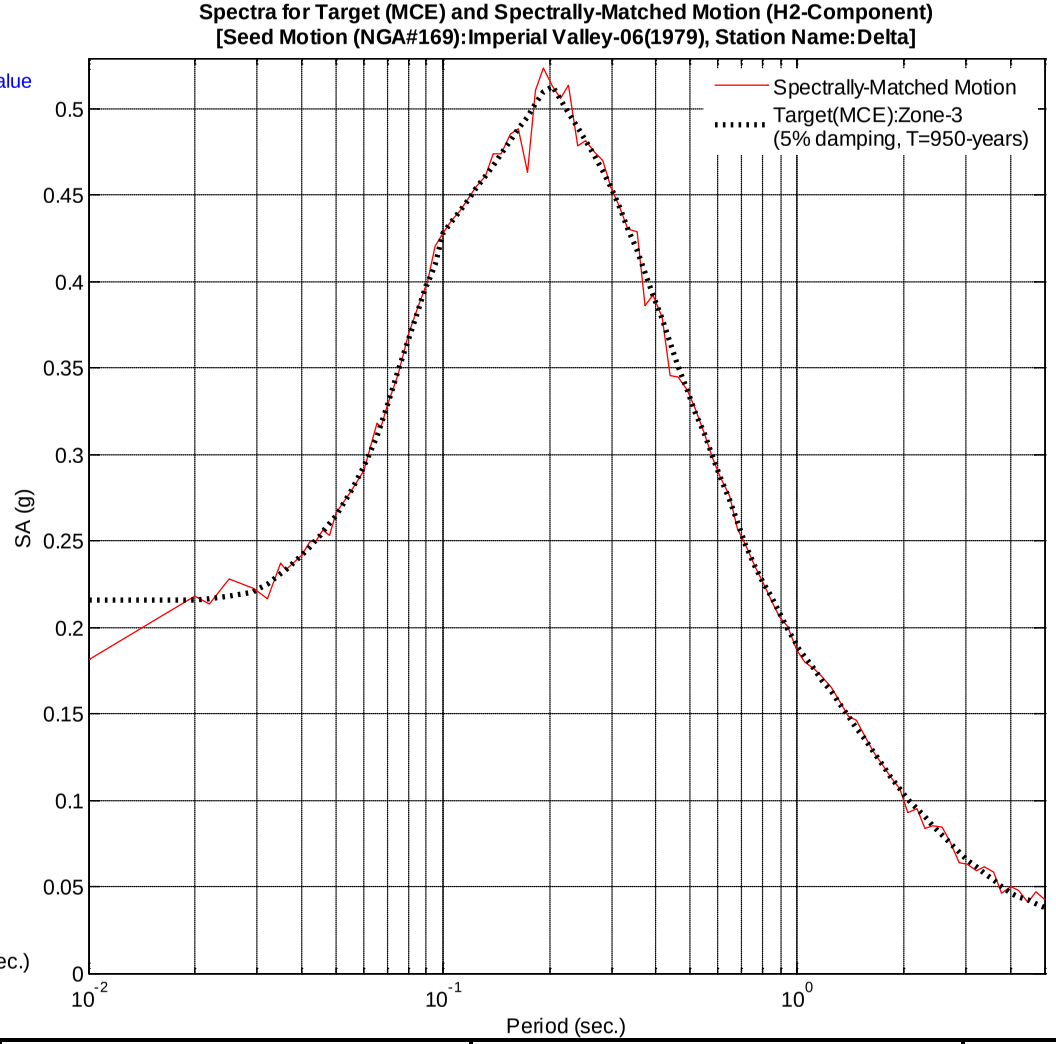
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 3 – SET NO. 4 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-12**



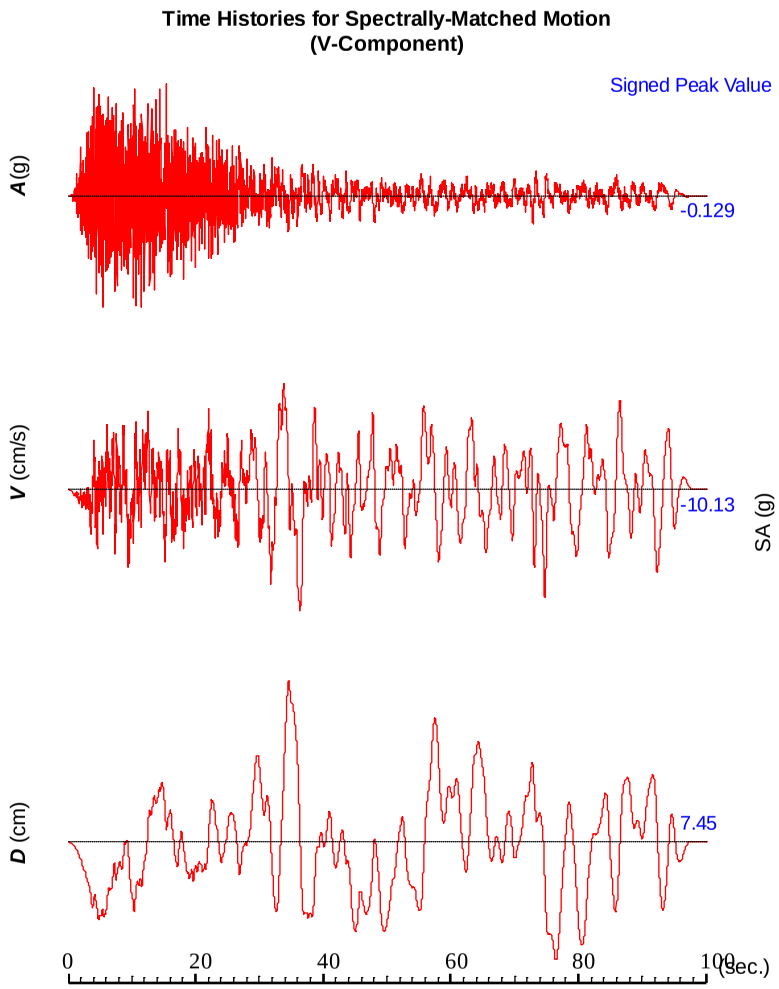


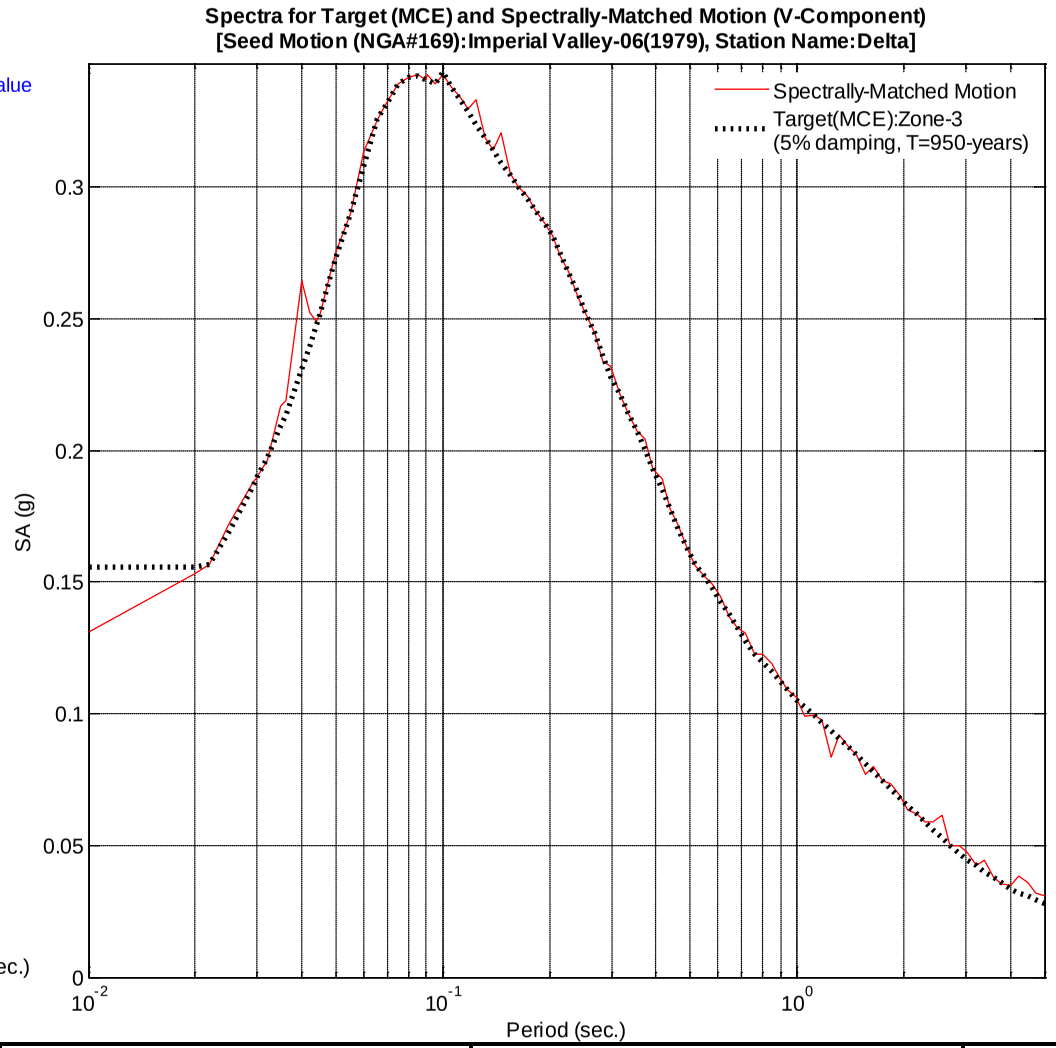
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 3 – SET NO. 5 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-13**



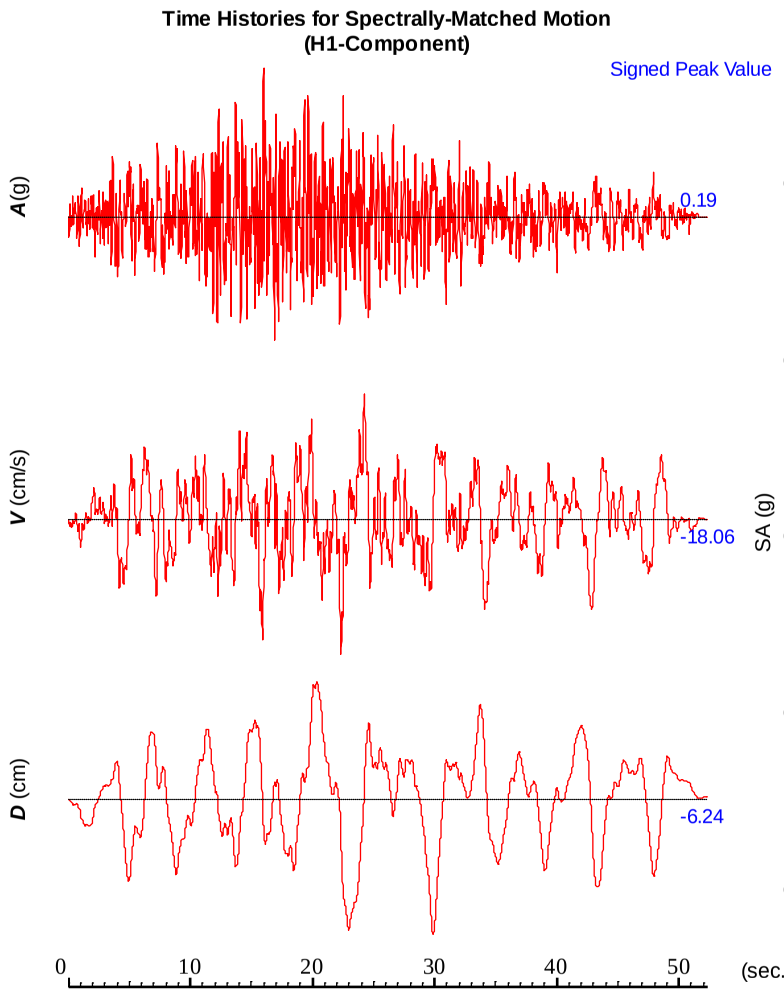


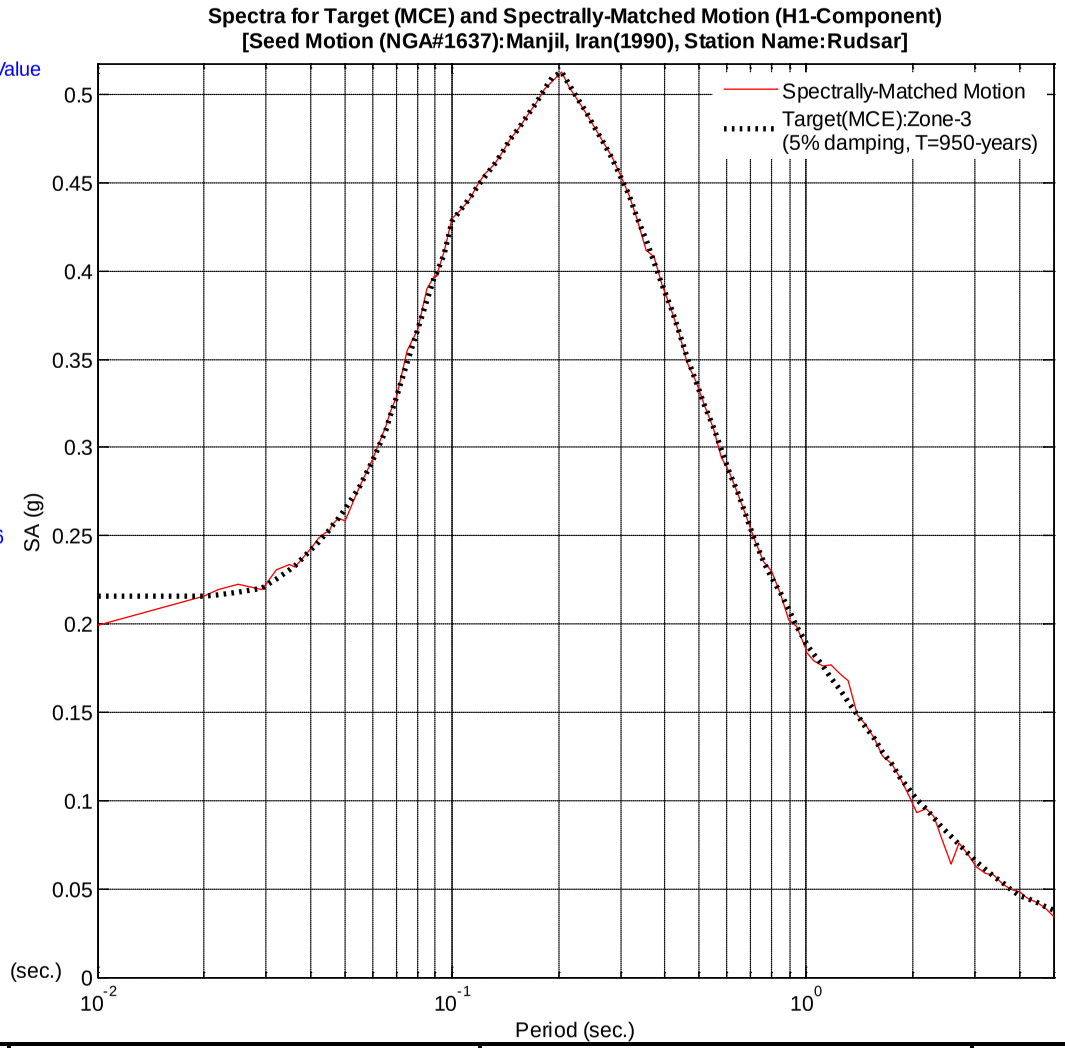
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 3 – SET NO. 5 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-14**



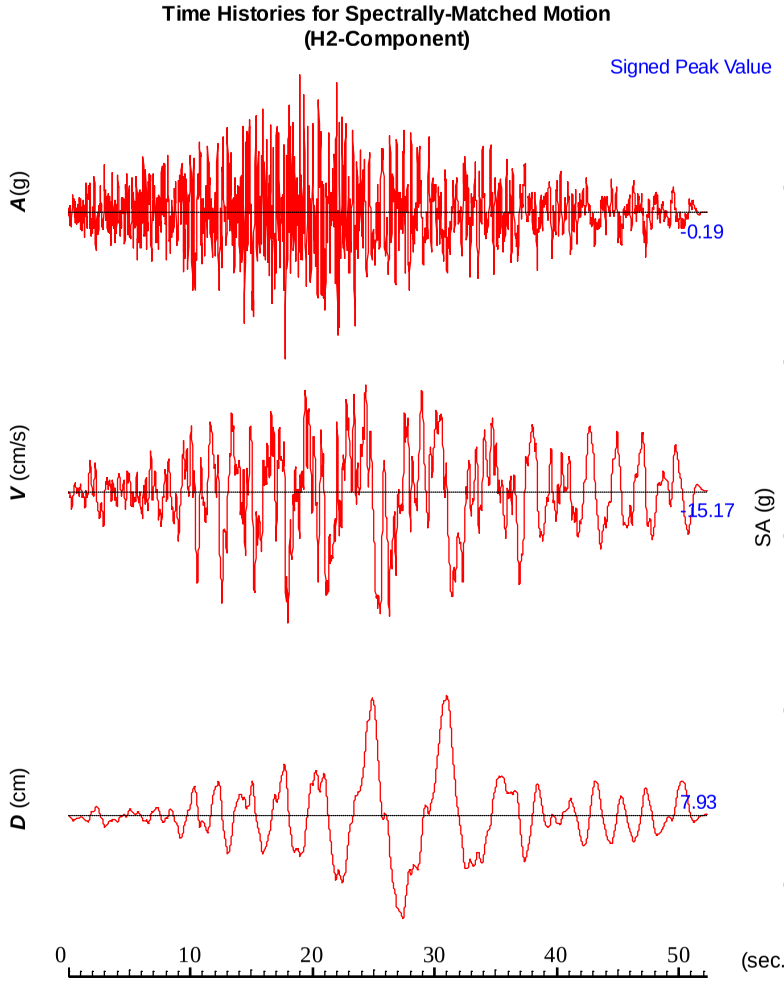


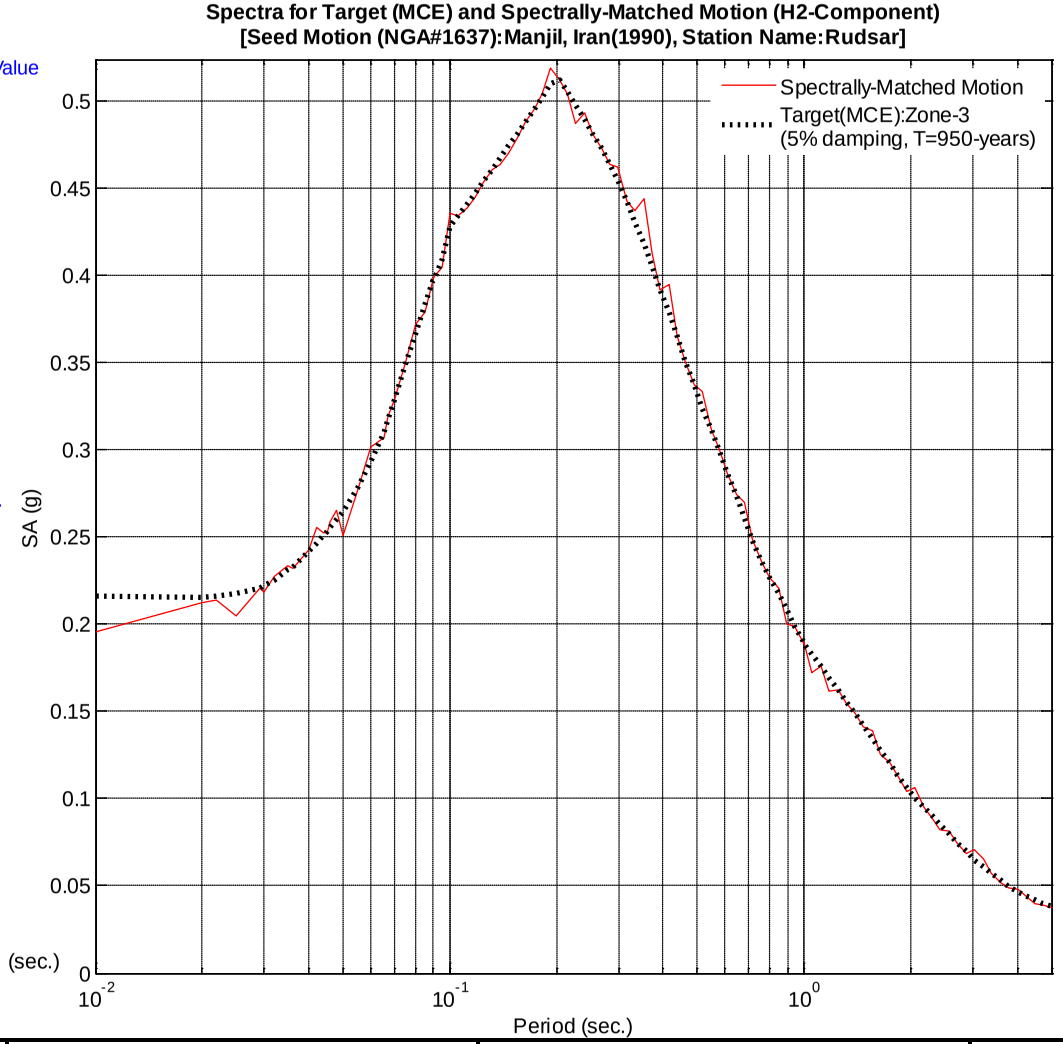
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 3 – SET NO. 5 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-15**



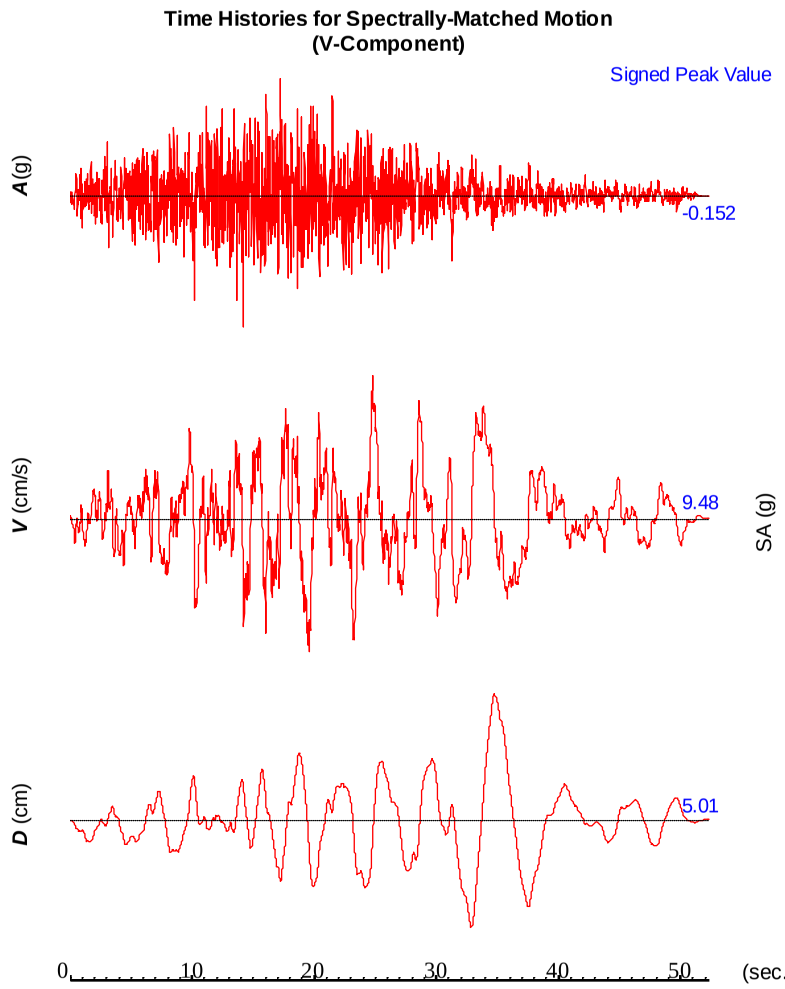


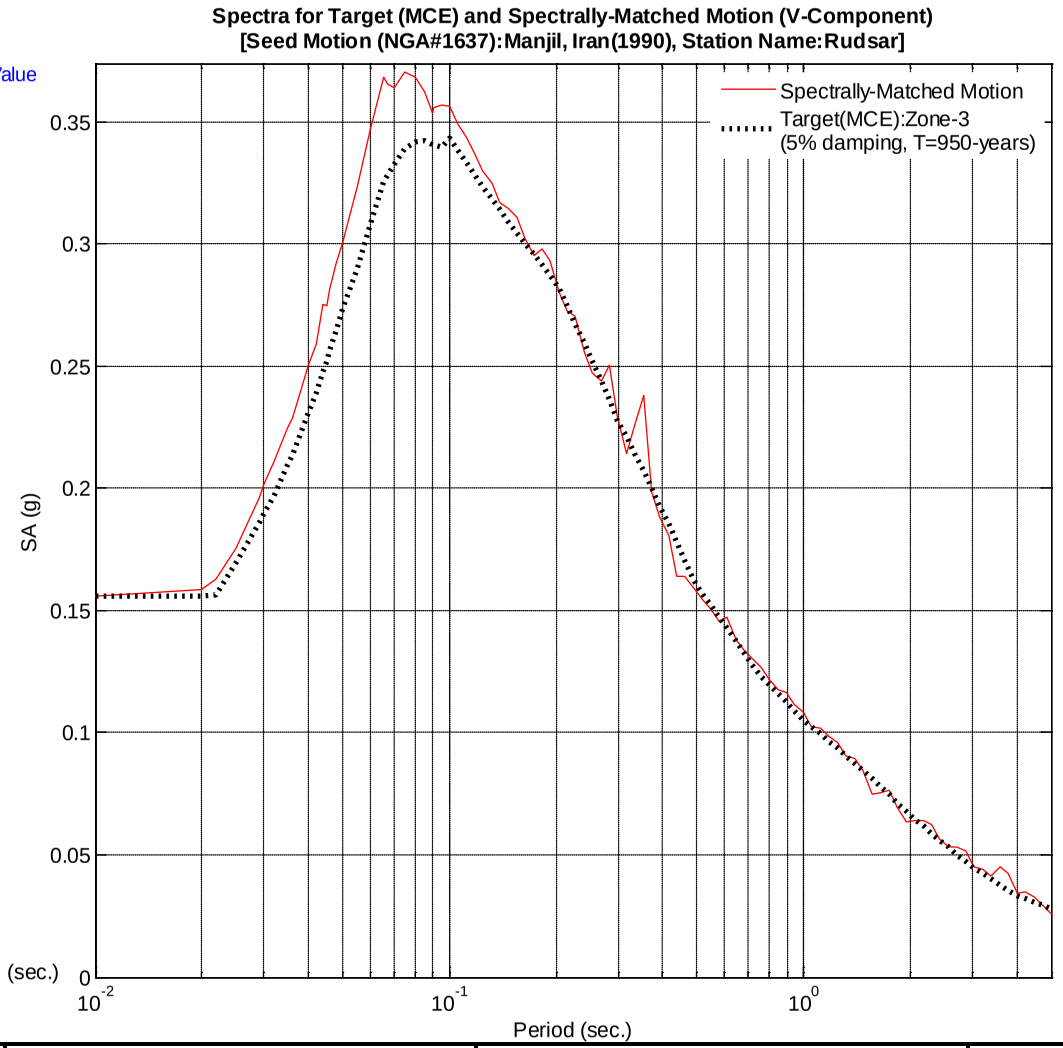
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 3 – SET NO. 6 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-16**



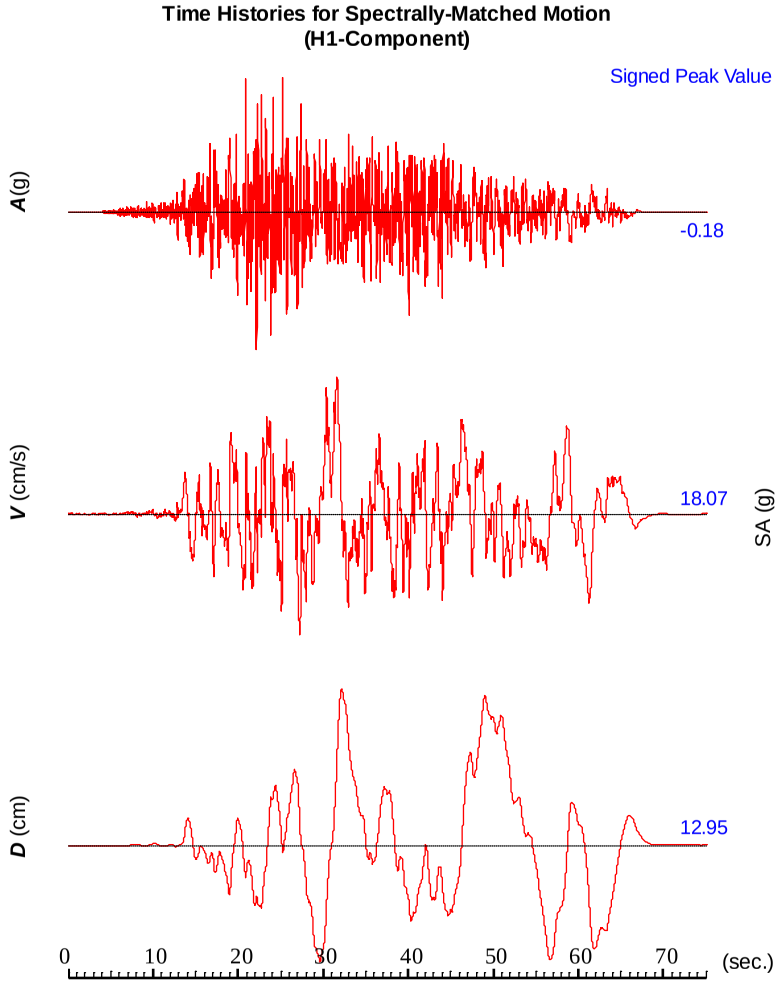


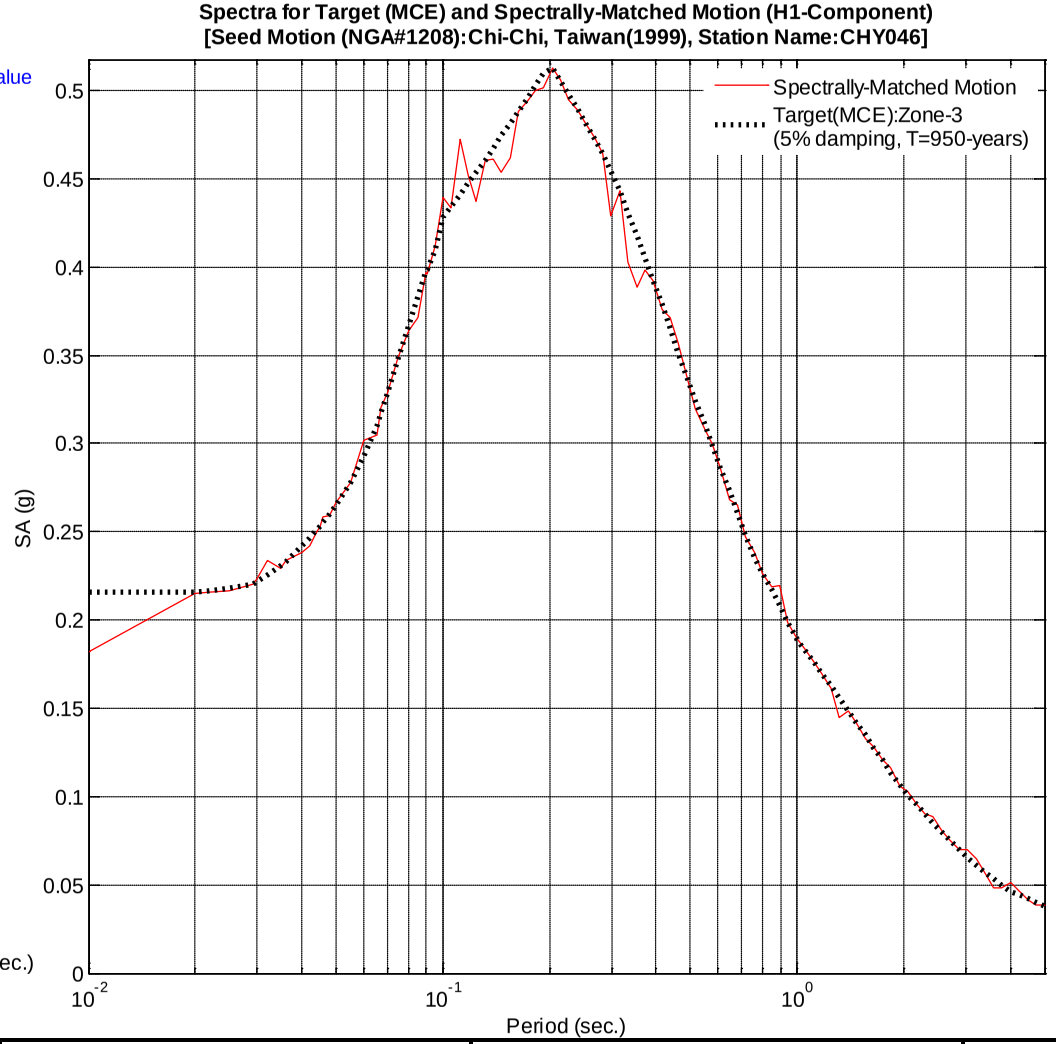
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	SPECTRALLY-MATCHED MOTIONS – MCE ZONE 3 – SET NO. 6 – HORIZONTAL 2 CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE B3-17



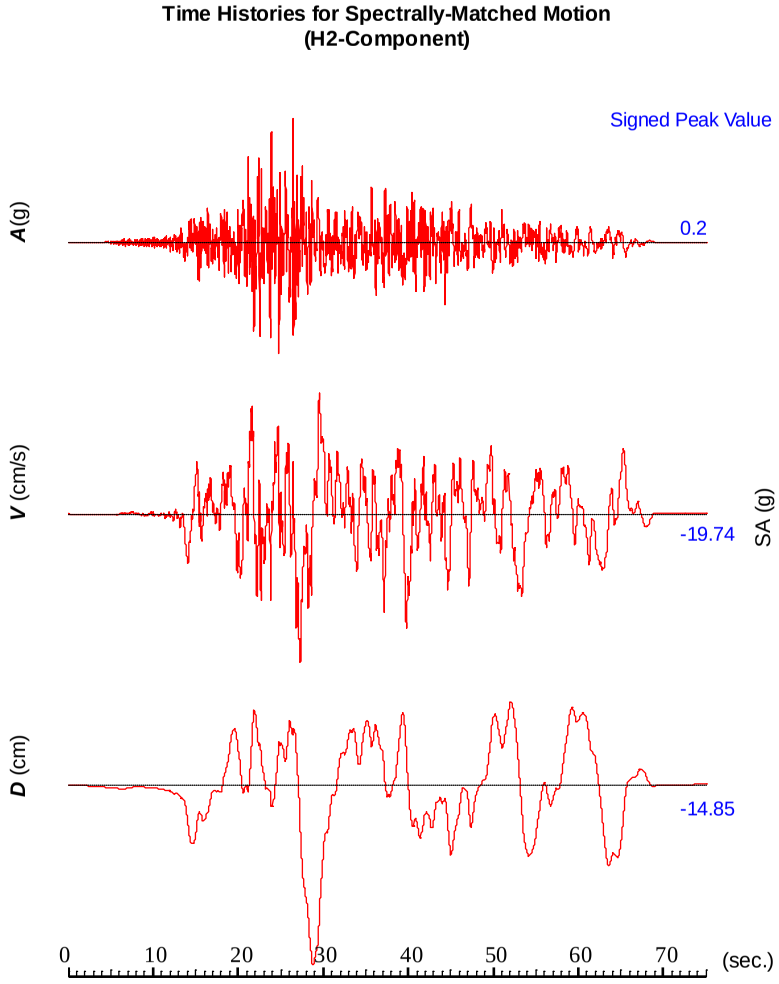


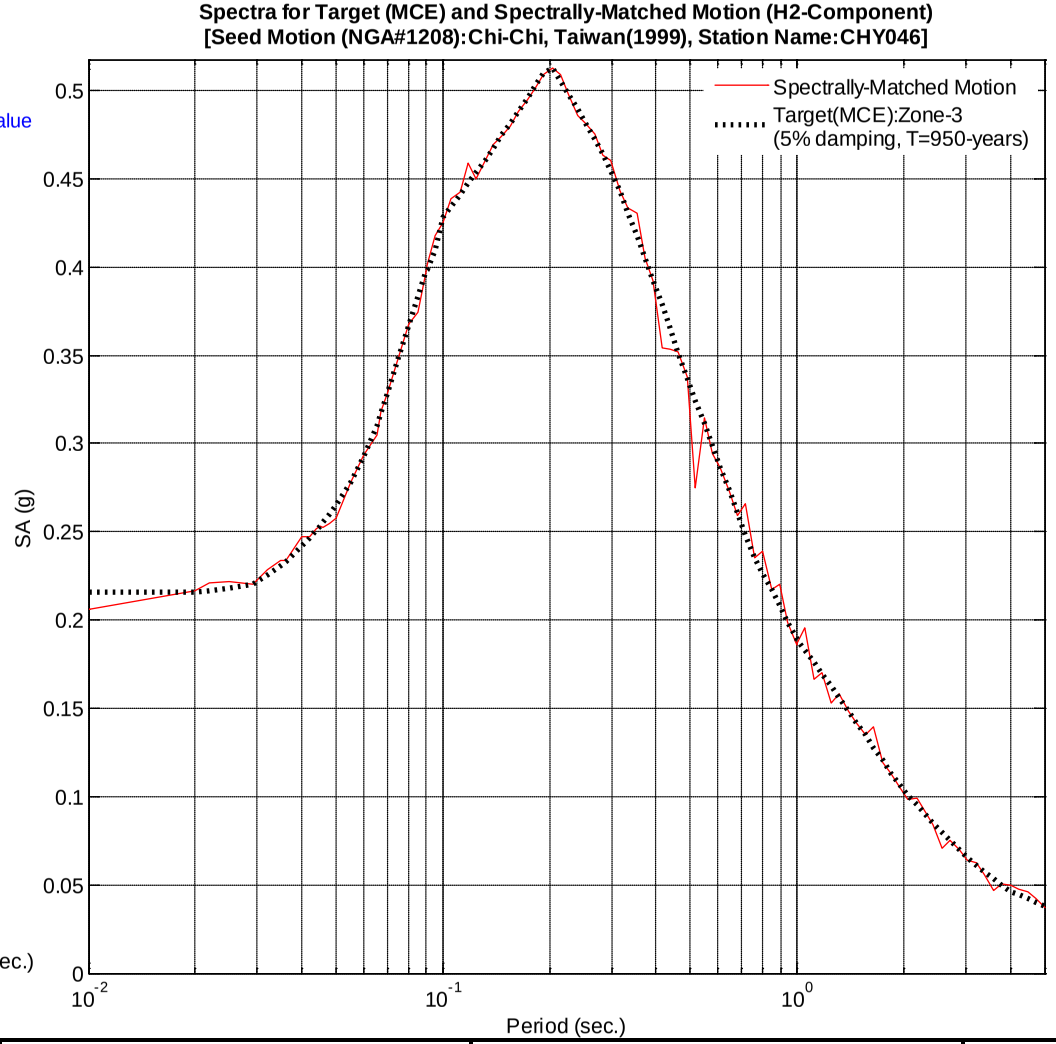
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 3 – SET NO. 6 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-18**



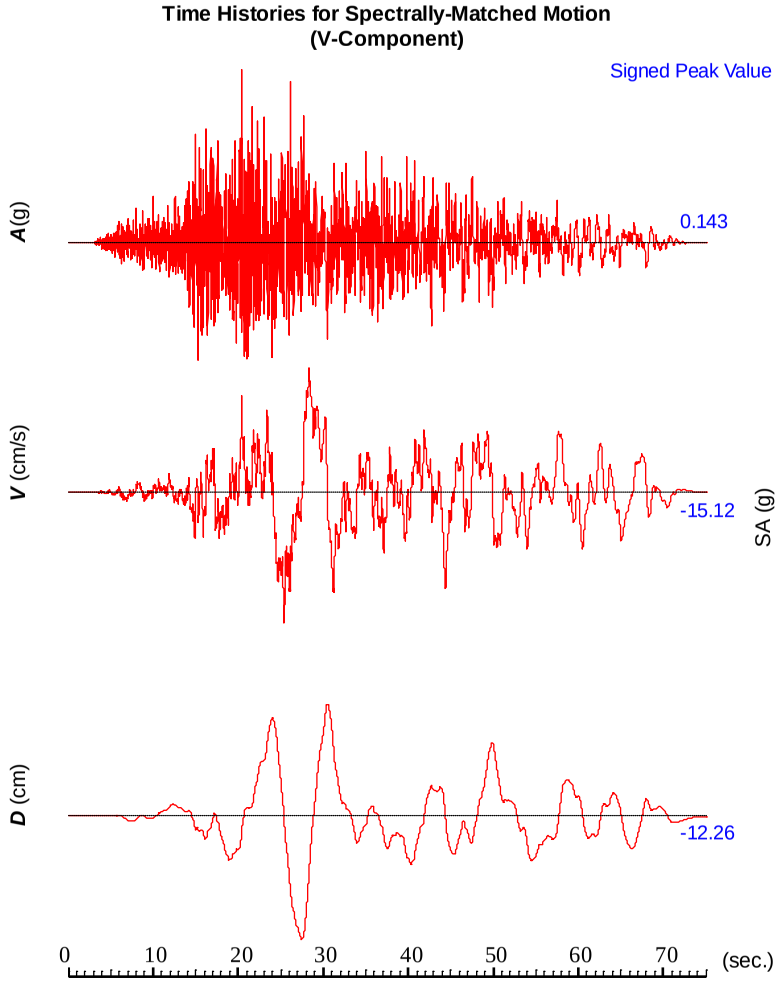


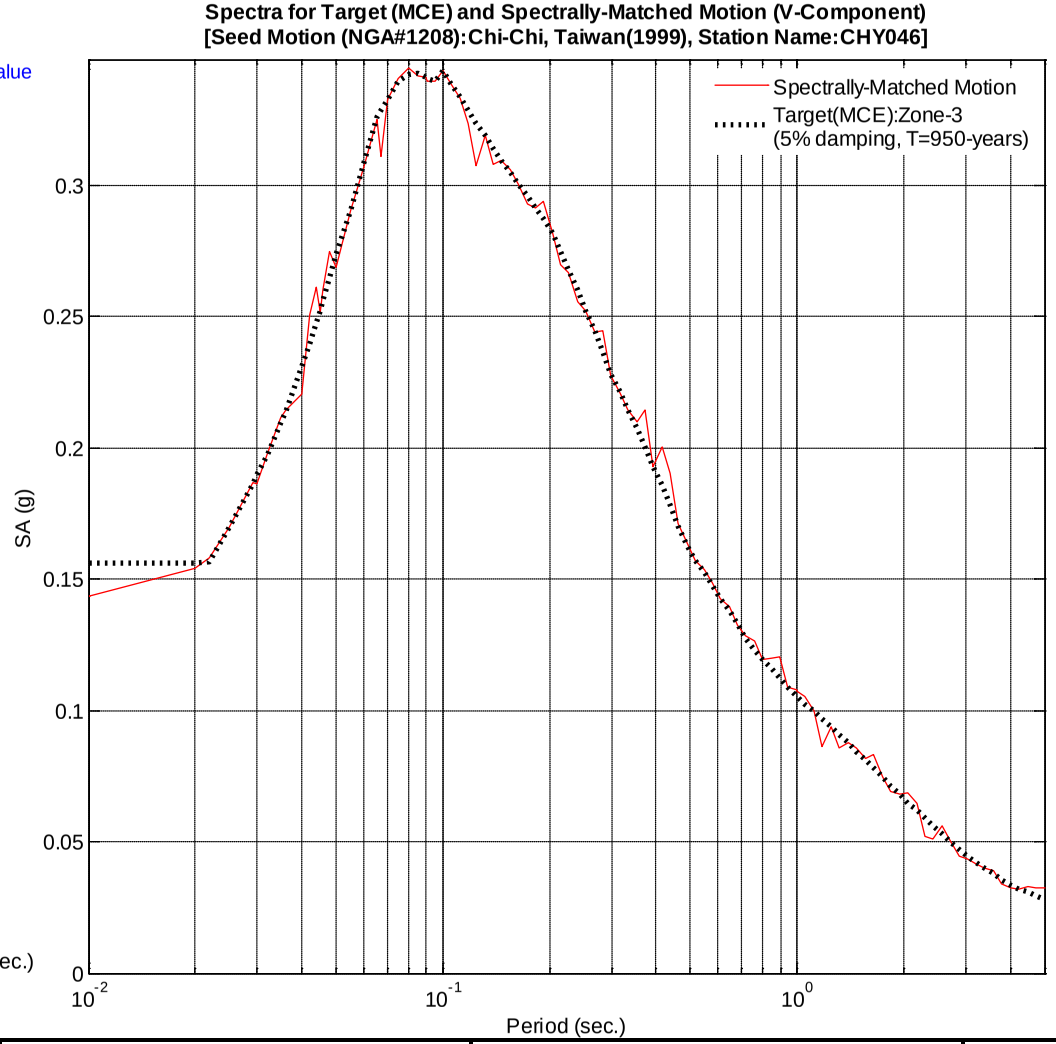
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	SPECTRALLY-MATCHED MOTIONS – MCE ZONE 3 – SET NO. 7 – HORIZONTAL 1 CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE B3-19





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	SPECTRALLY-MATCHED MOTIONS – MCE ZONE 3 – SET NO. 7 – HORIZONTAL 2 CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE B3-20





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 3 – SET NO. 7 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT MERCED TO FRESNO, CALIFORNIA	PLATE **B3-21**

Table B.4: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 4**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	882	Landers	1992	North Palm Springs	7.28	26.84	0.232	25.663	14.449	0.250	24.163	11.191	0.167	13.067	7.682
2	1776	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.218	30.071	19.820	0.249	28.536	13.323	0.183	12.920	8.383
3	2112	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.245	30.901	18.970	0.253	25.674	20.802	0.164	18.040	17.714
4	2900	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.243	23.408	20.350	0.267	25.566	23.228	0.172	11.606	7.876
5	169	Imperial Valley-06	1979	Delta	6.53	22.03	0.246	21.522	16.763	0.245	27.856	14.237	0.163	13.106	9.429
6	1637	Manjil, Iran	1990	Rudsar	7.37	64.47	0.237	27.271	9.848	0.232	22.983	9.790	0.190	11.356	5.998
7	1208	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.240	26.731	17.598	0.235	25.812	19.302	0.171	17.700	14.759

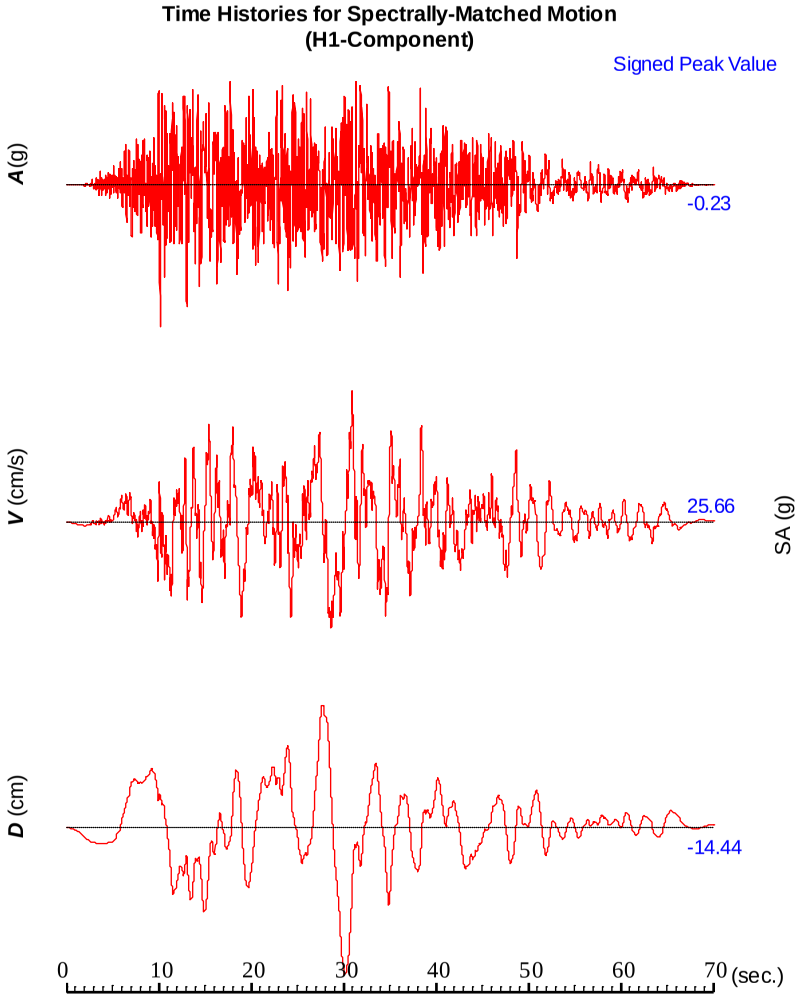
SC SOLUTIONS

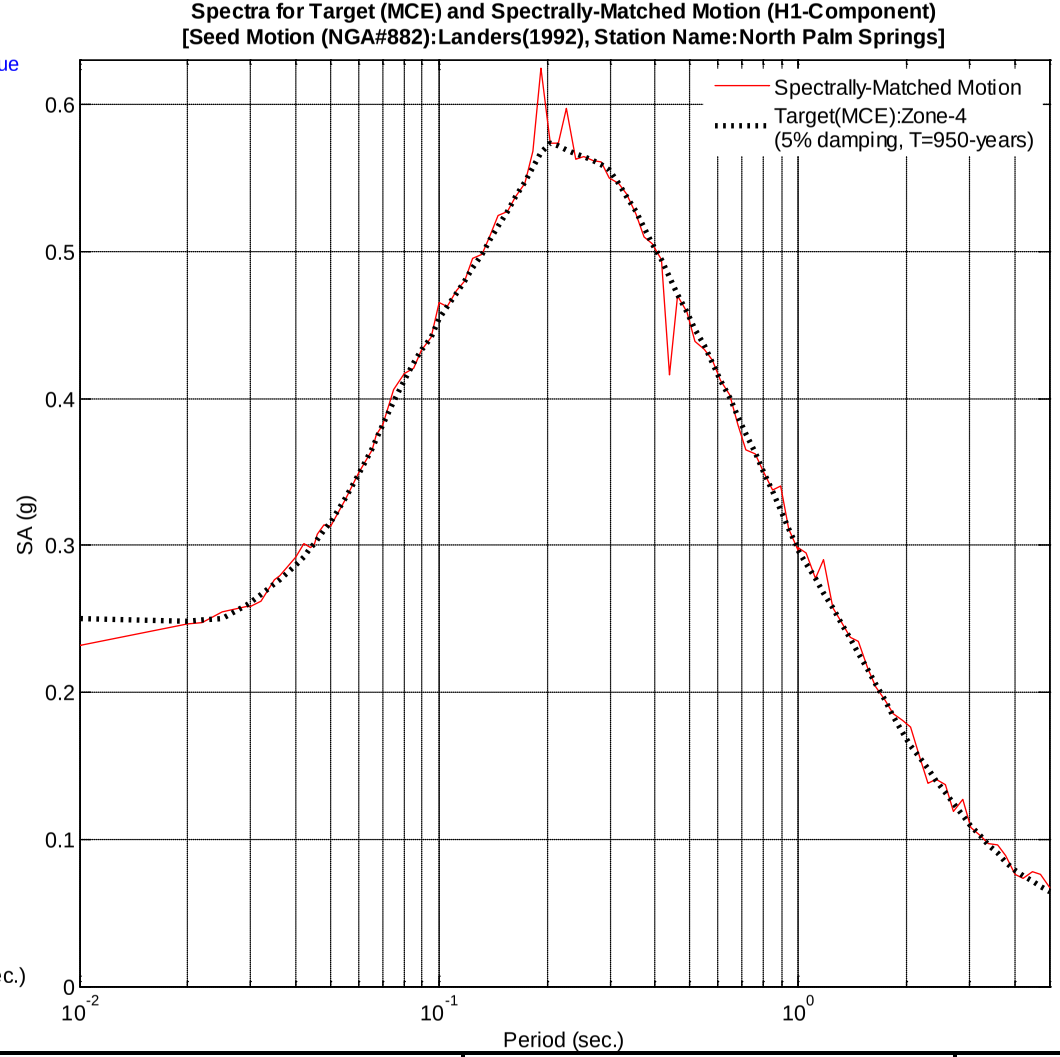
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS MCE – ZONE 4

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

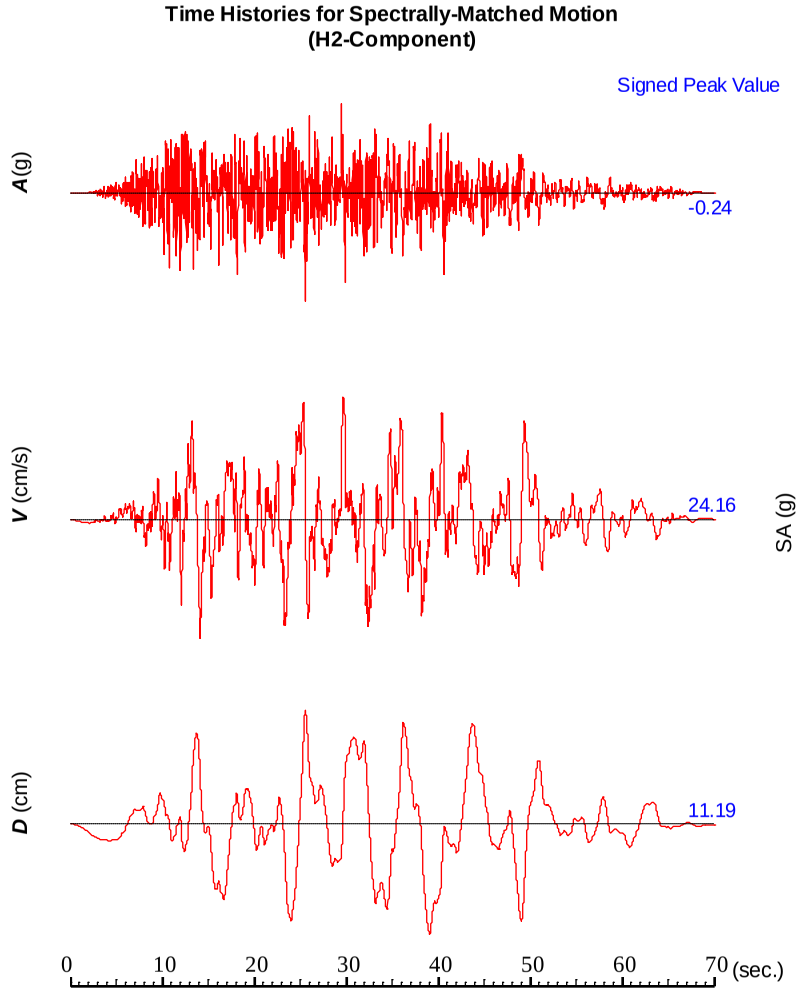
PLATE
B4-0

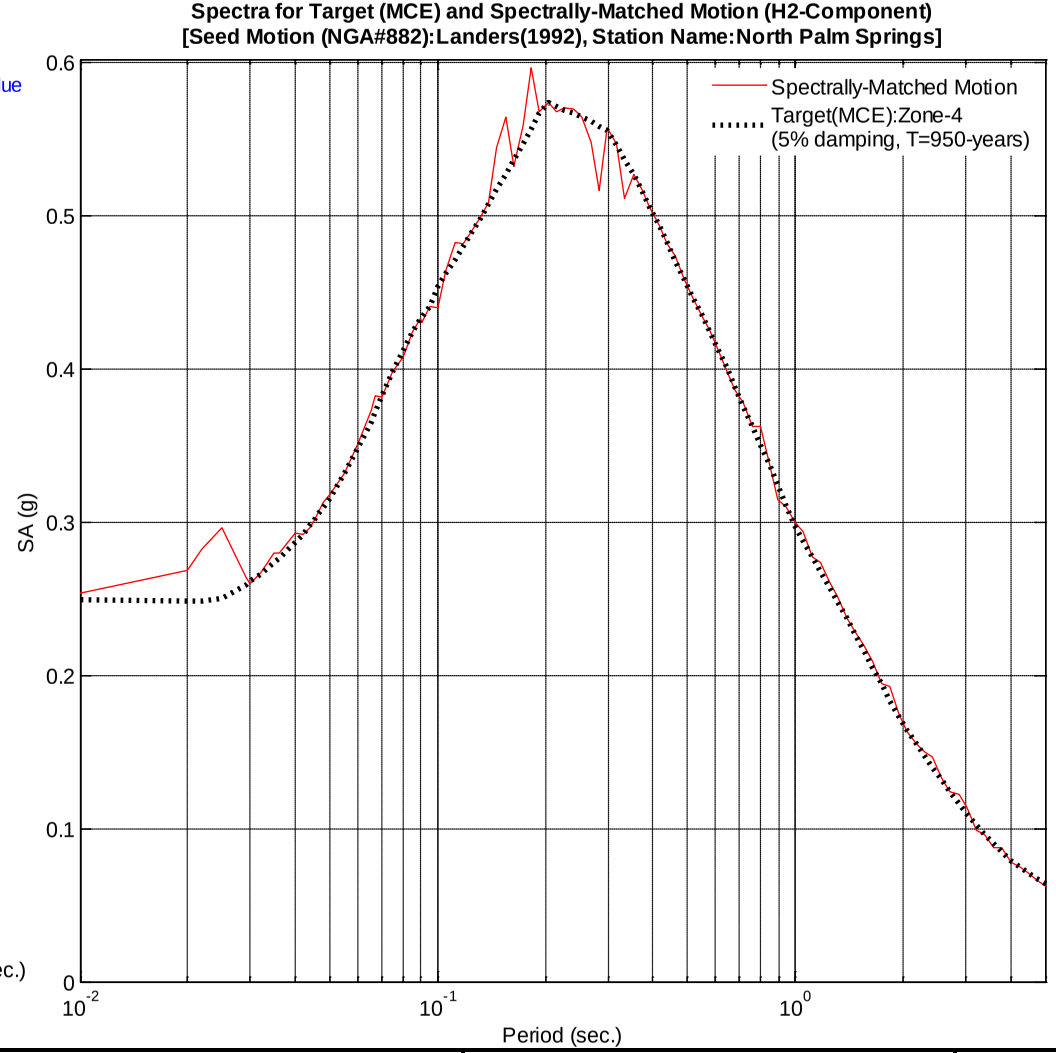




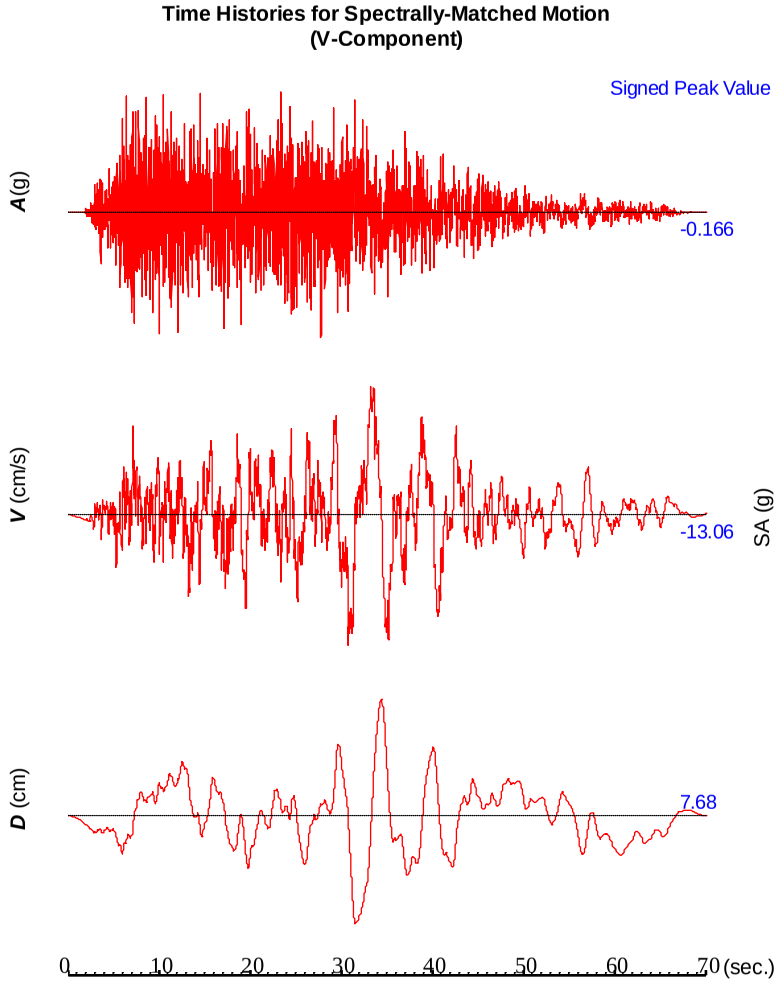
SC SOLUTIONS

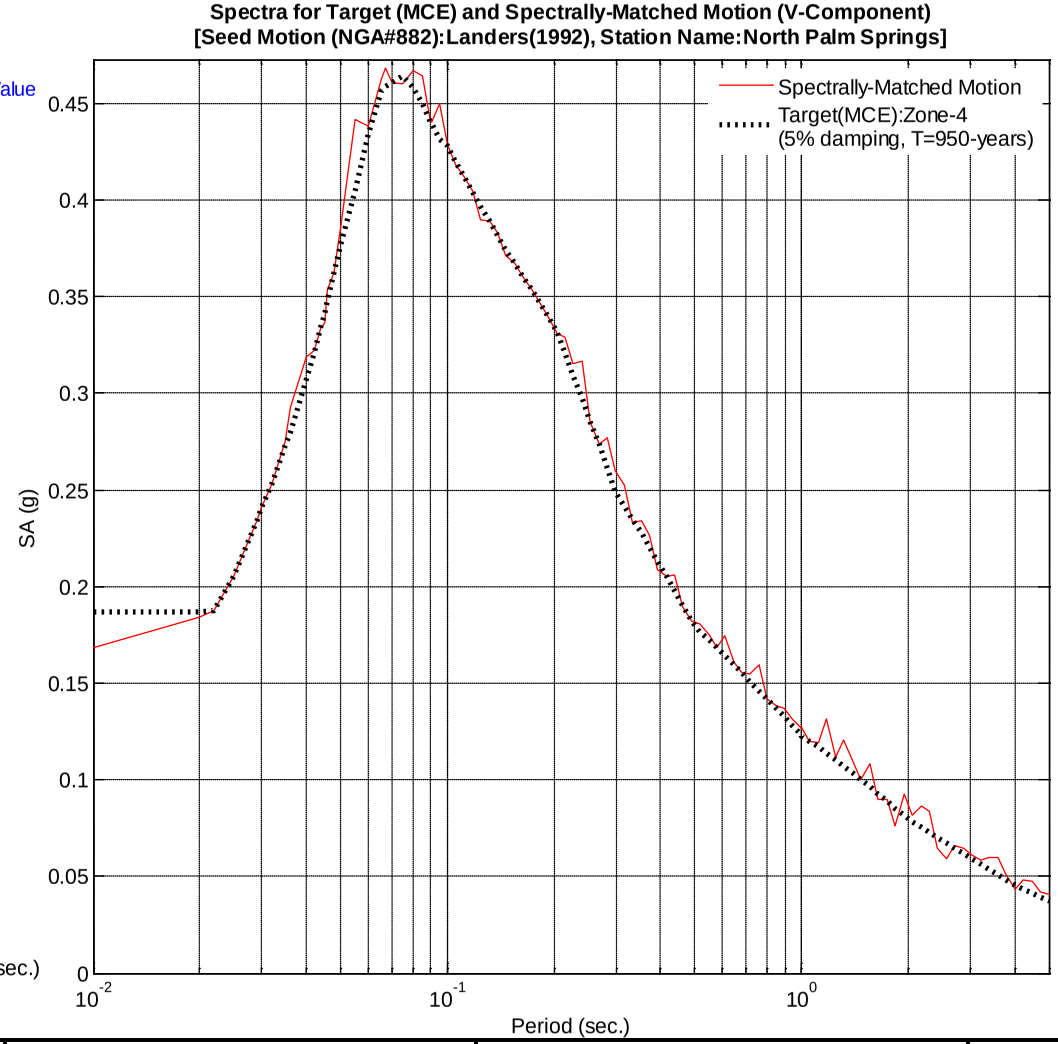
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 4 – SET NO. 1 – HORIZONTAL 1**	PLATE
BY:	J. Zhong		**B4-1**
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		



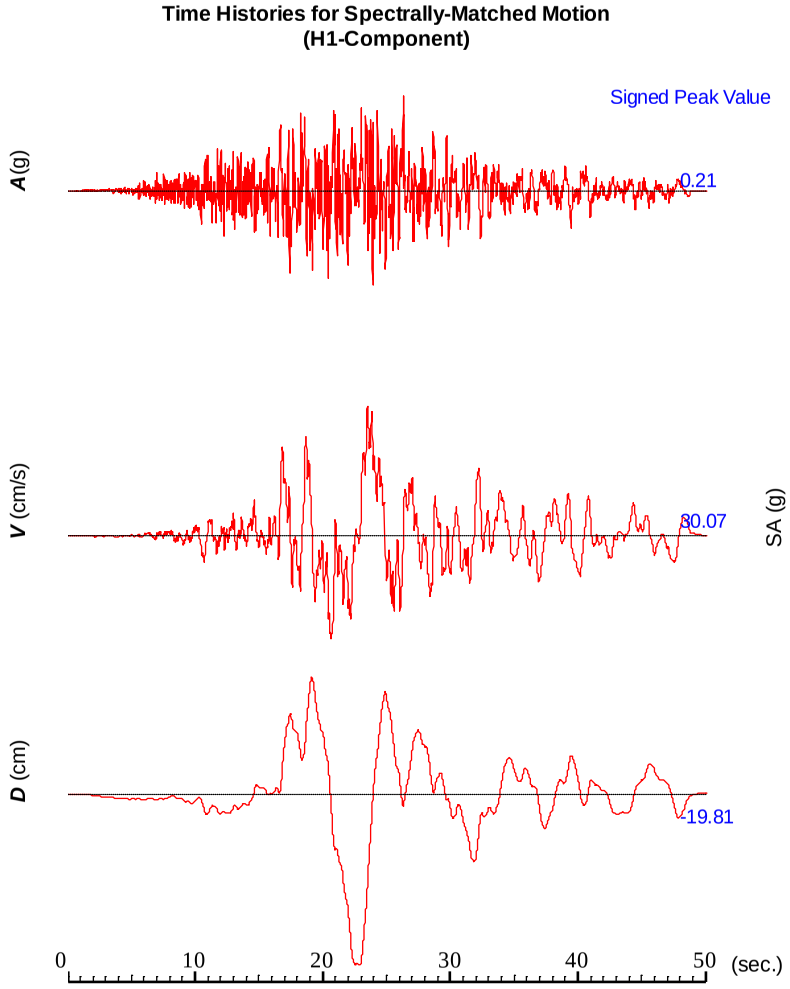


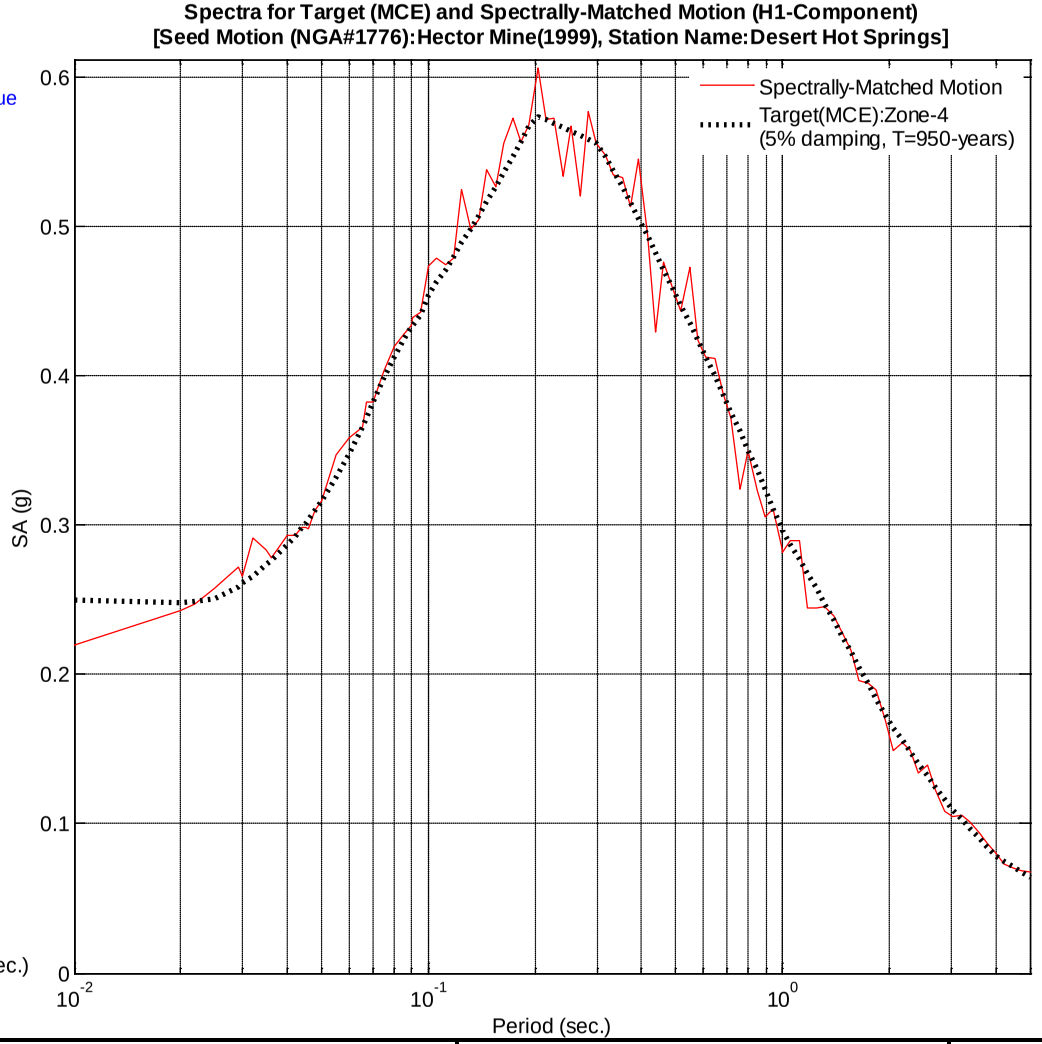
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 1 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-2**



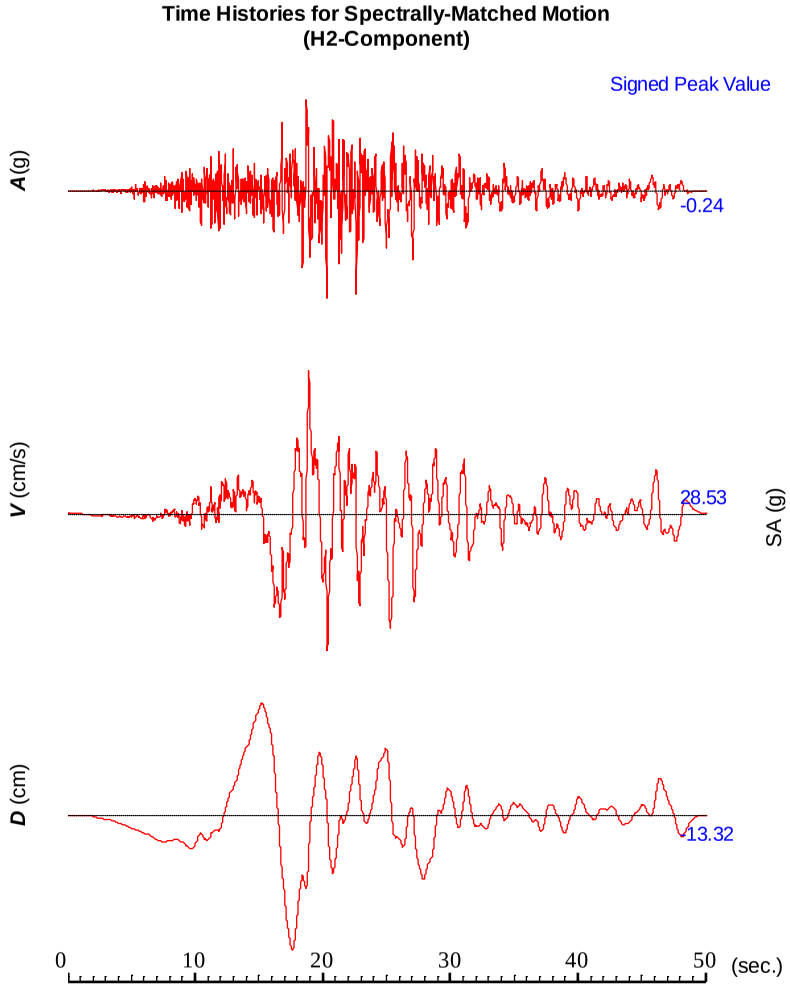


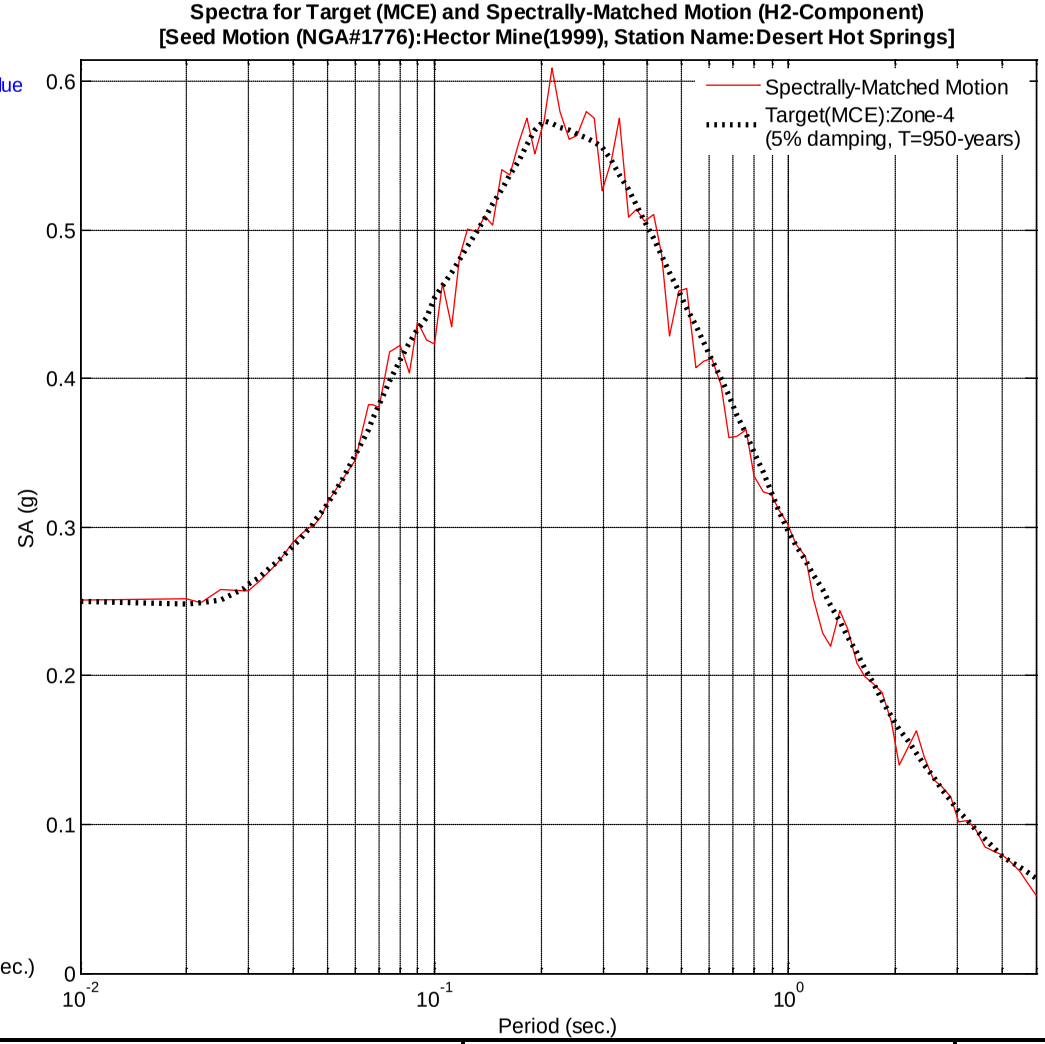
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 4 – SET NO. 1 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-3**



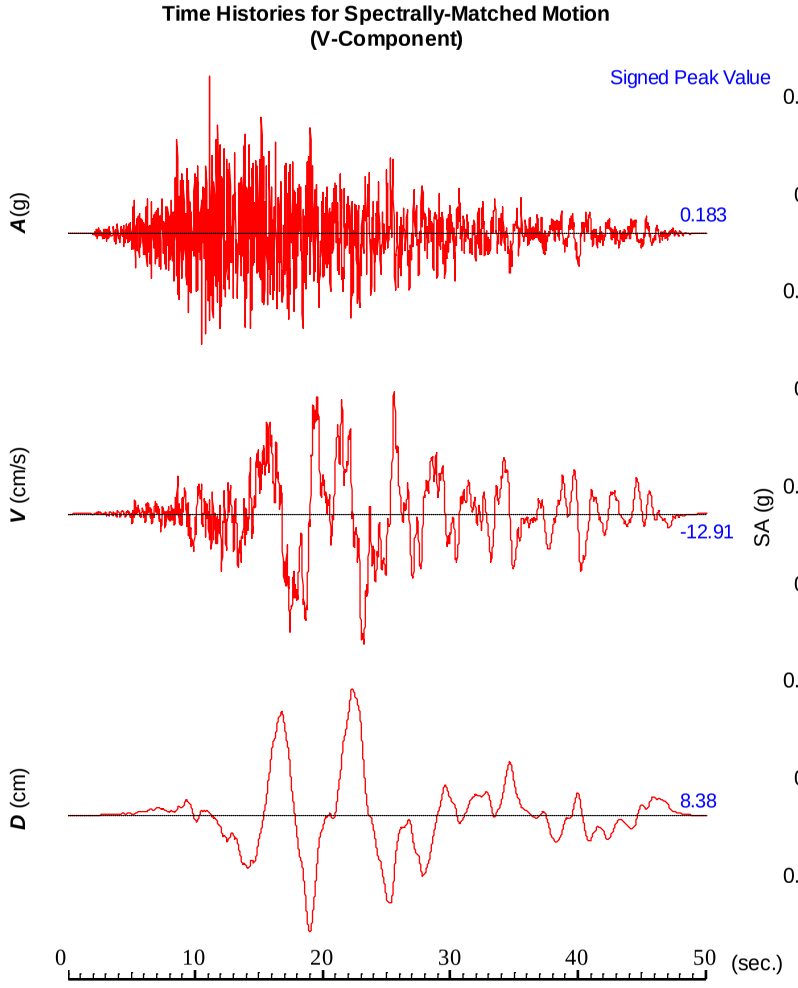


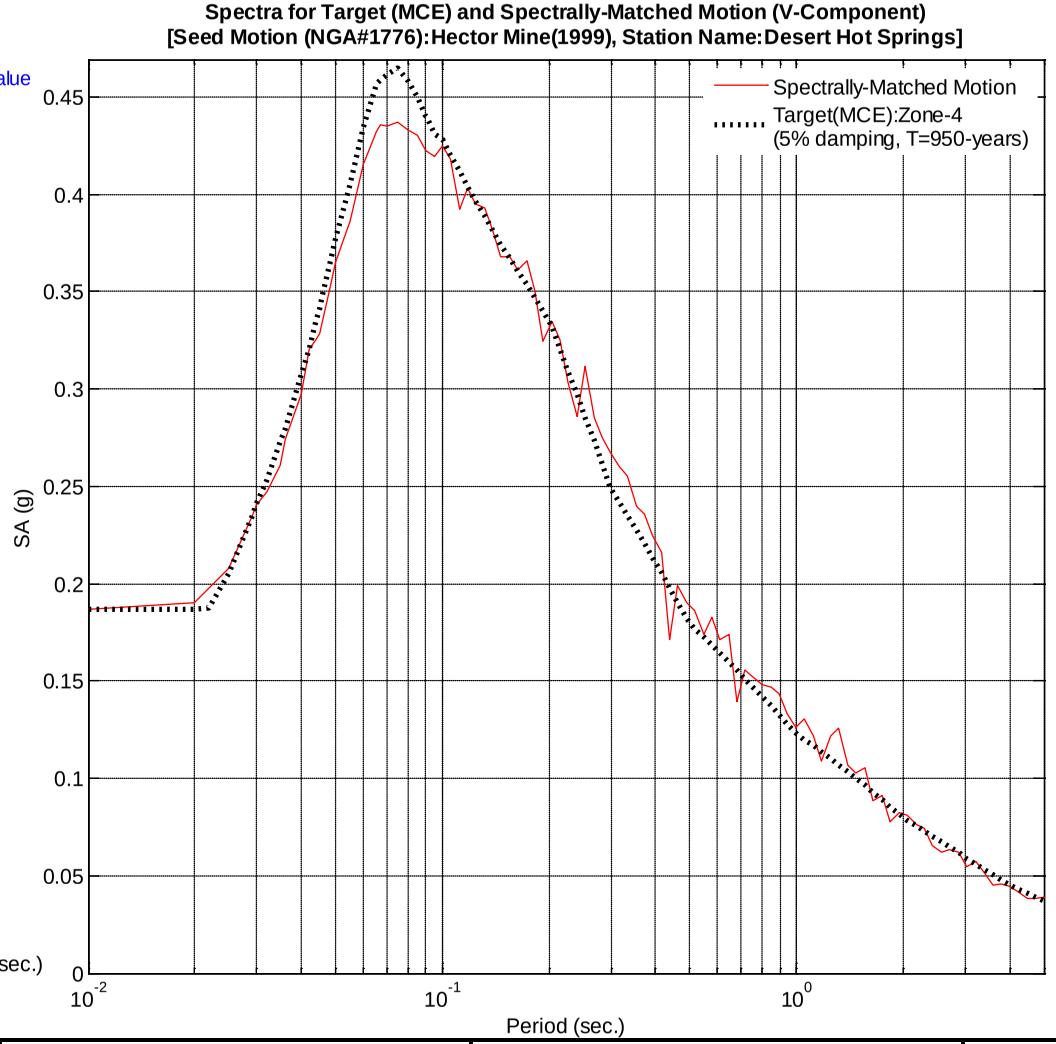
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 2 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-4**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 2 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-5**





SC SOLUTIONS

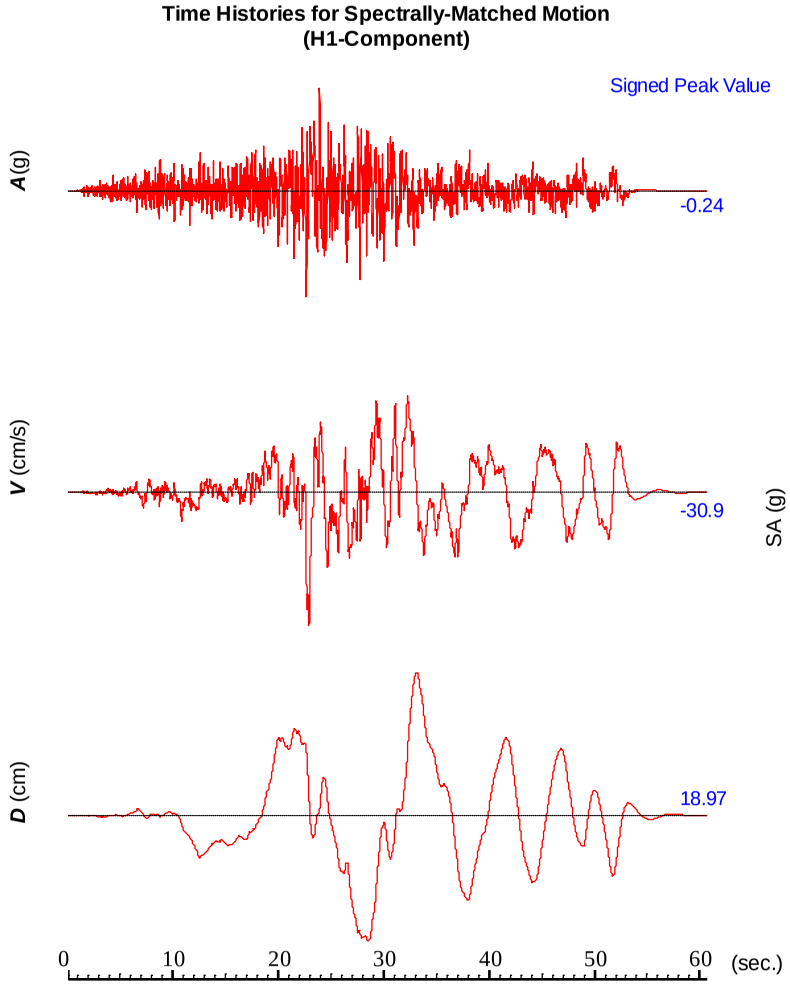
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

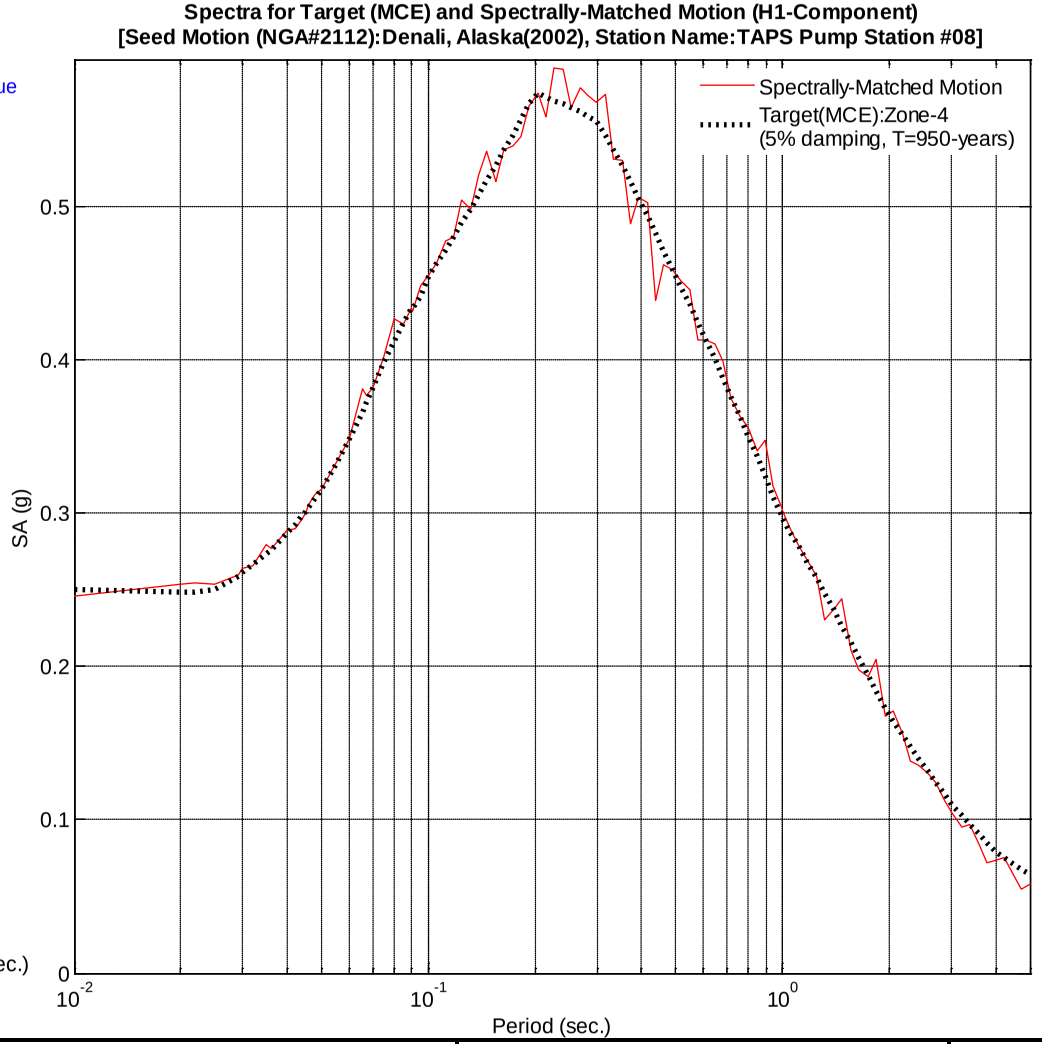
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 4 – SET NO. 2 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

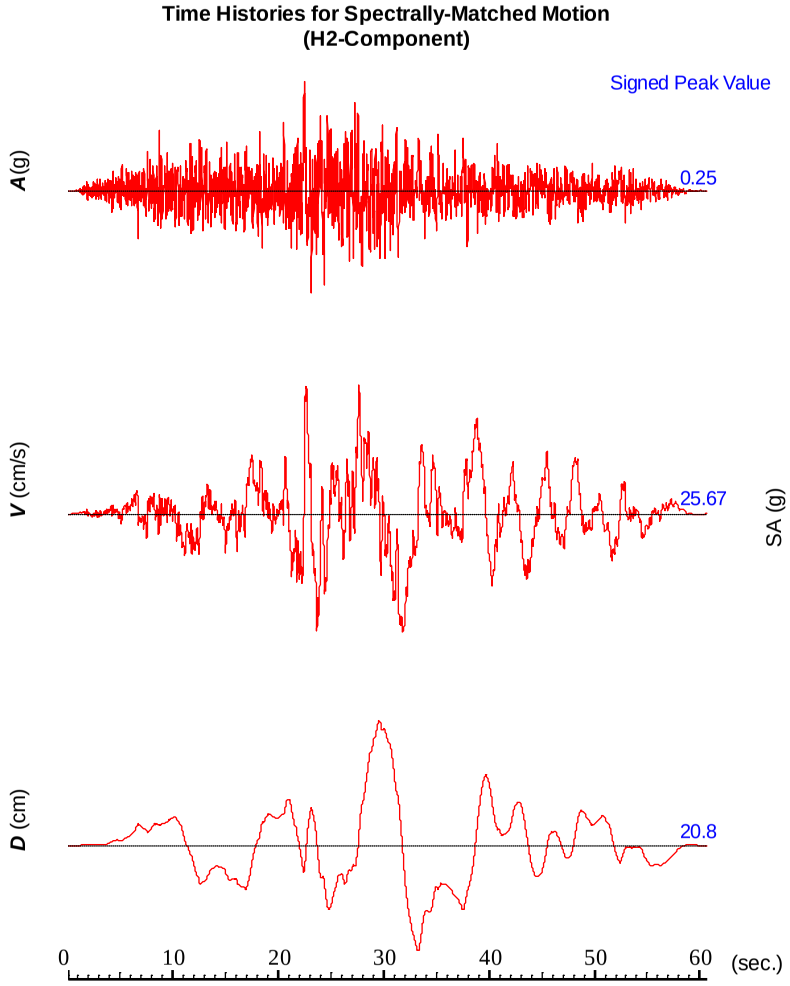
PLATE

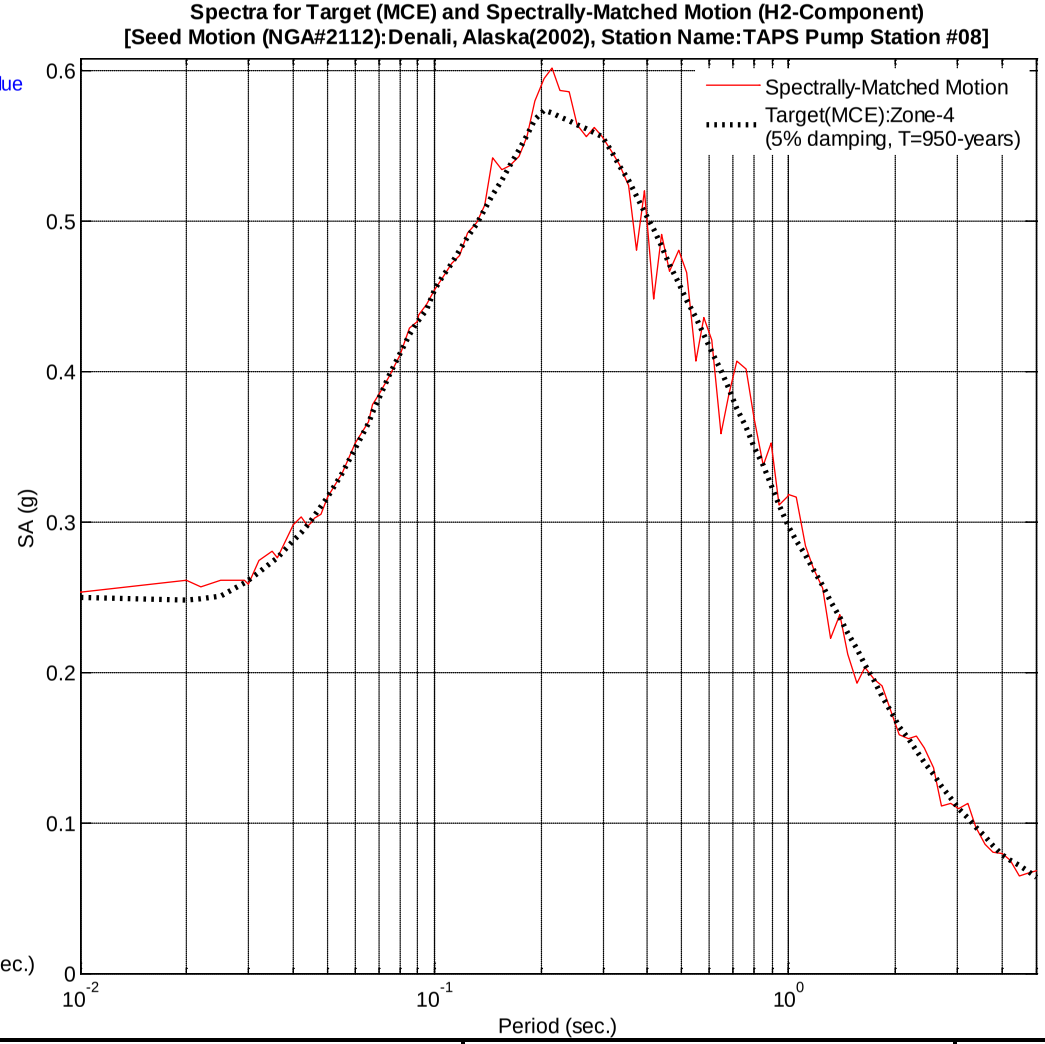
B4-6



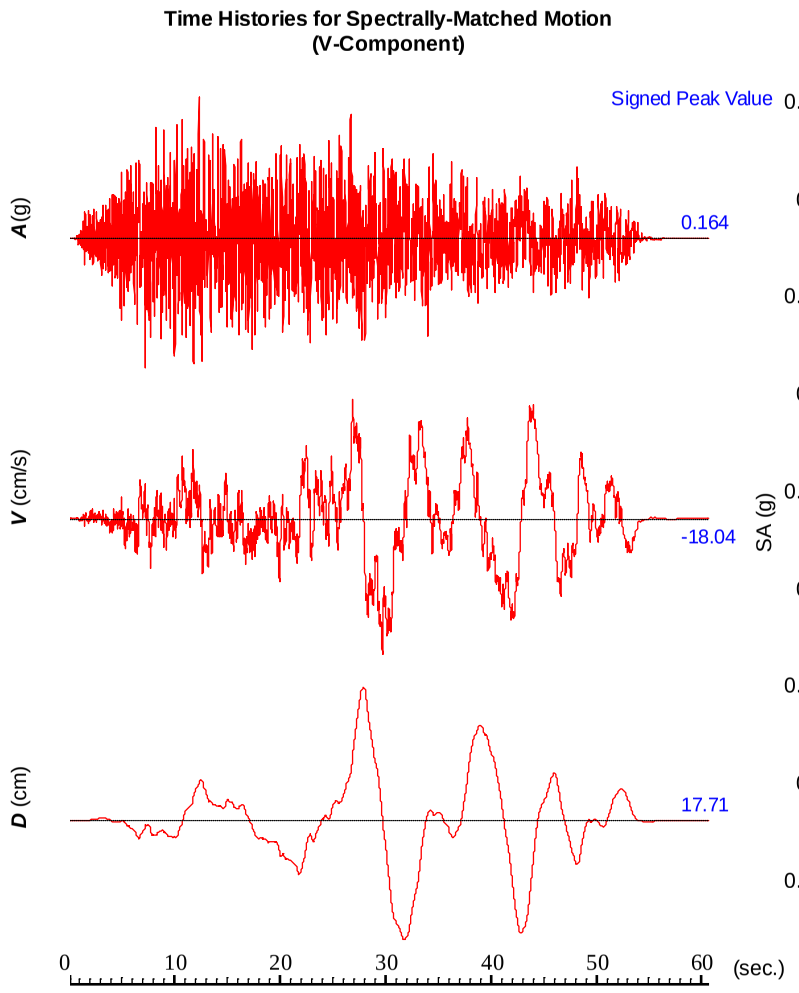


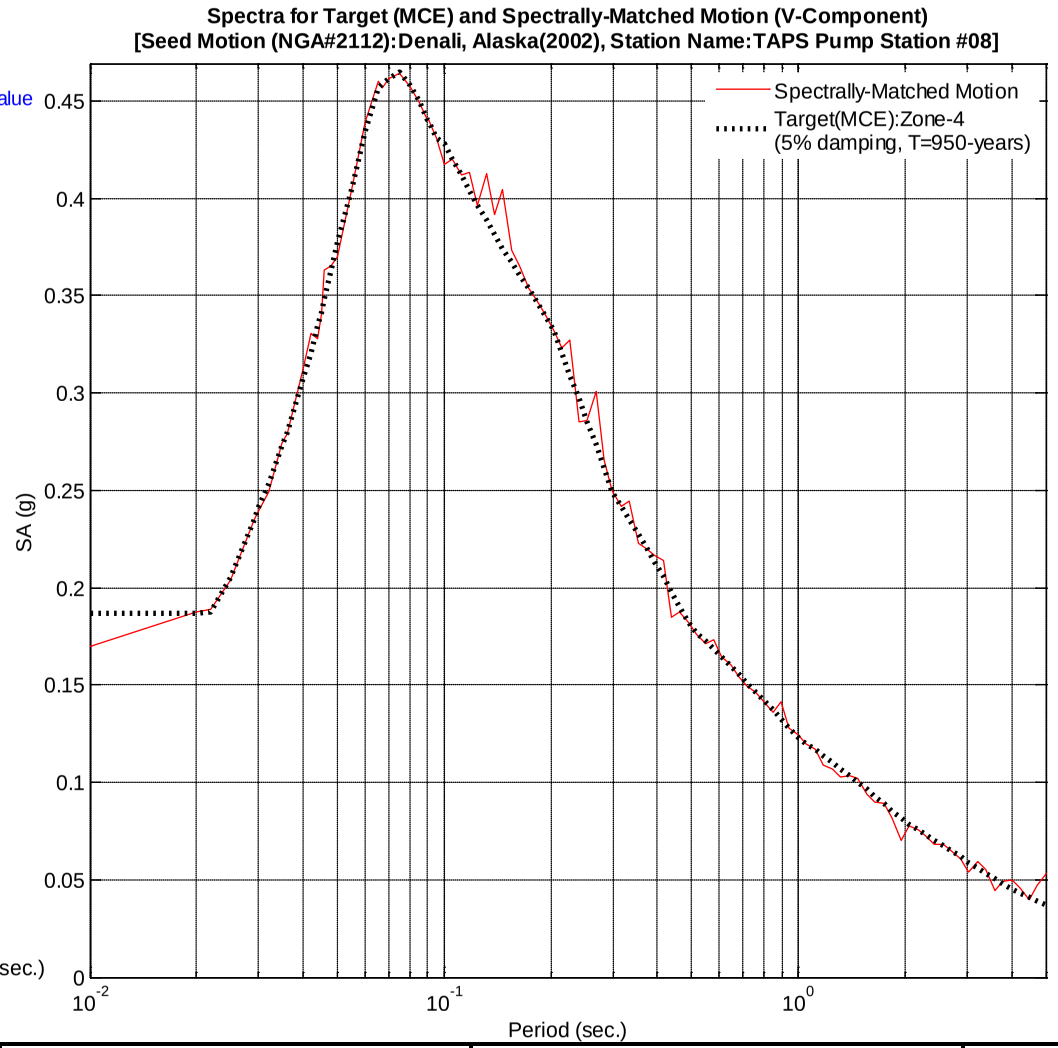
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 3 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-7**



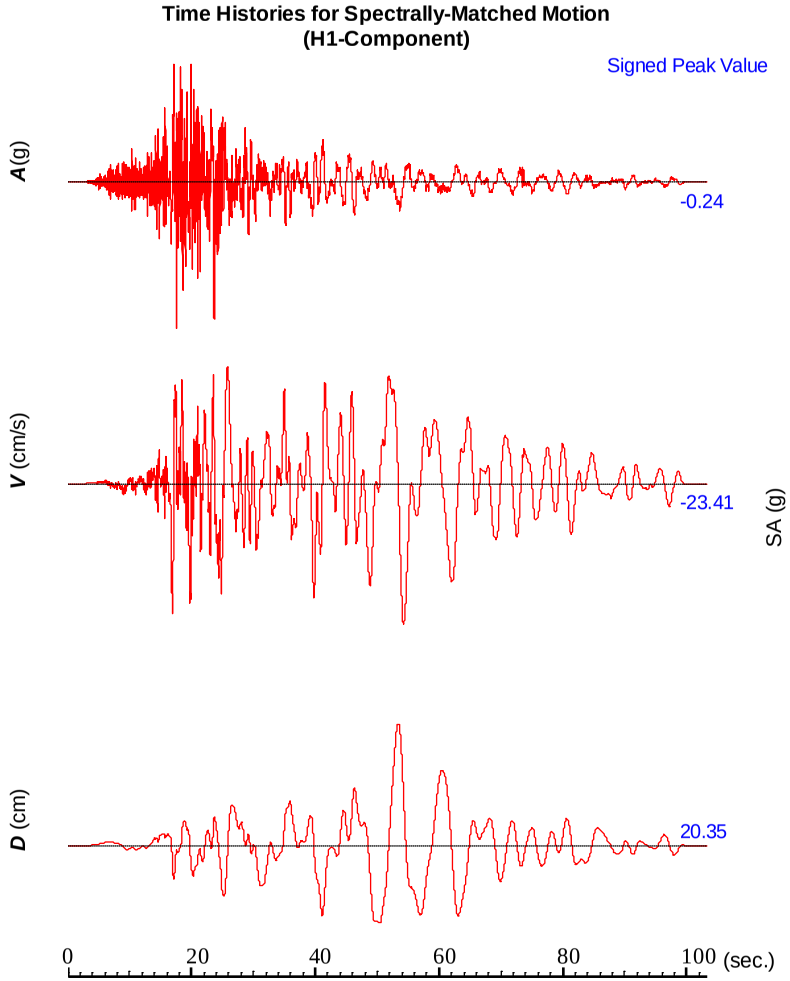


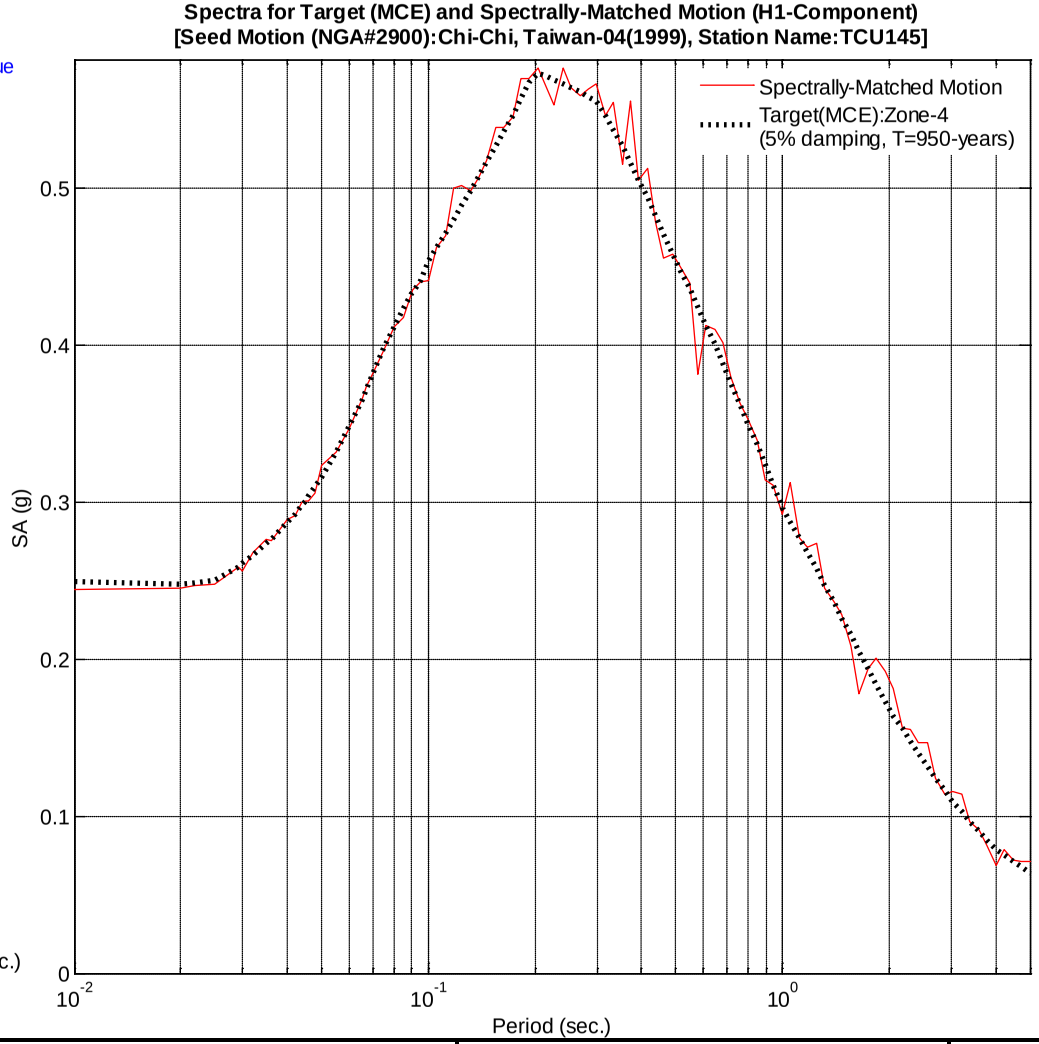
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 3 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-8**



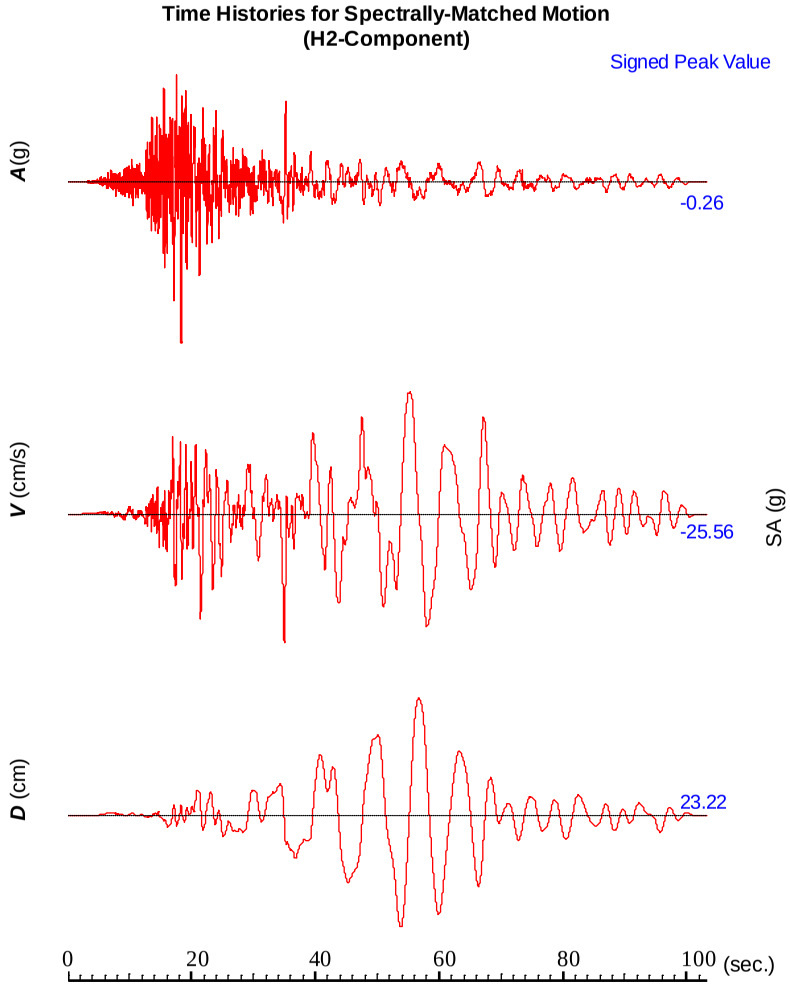


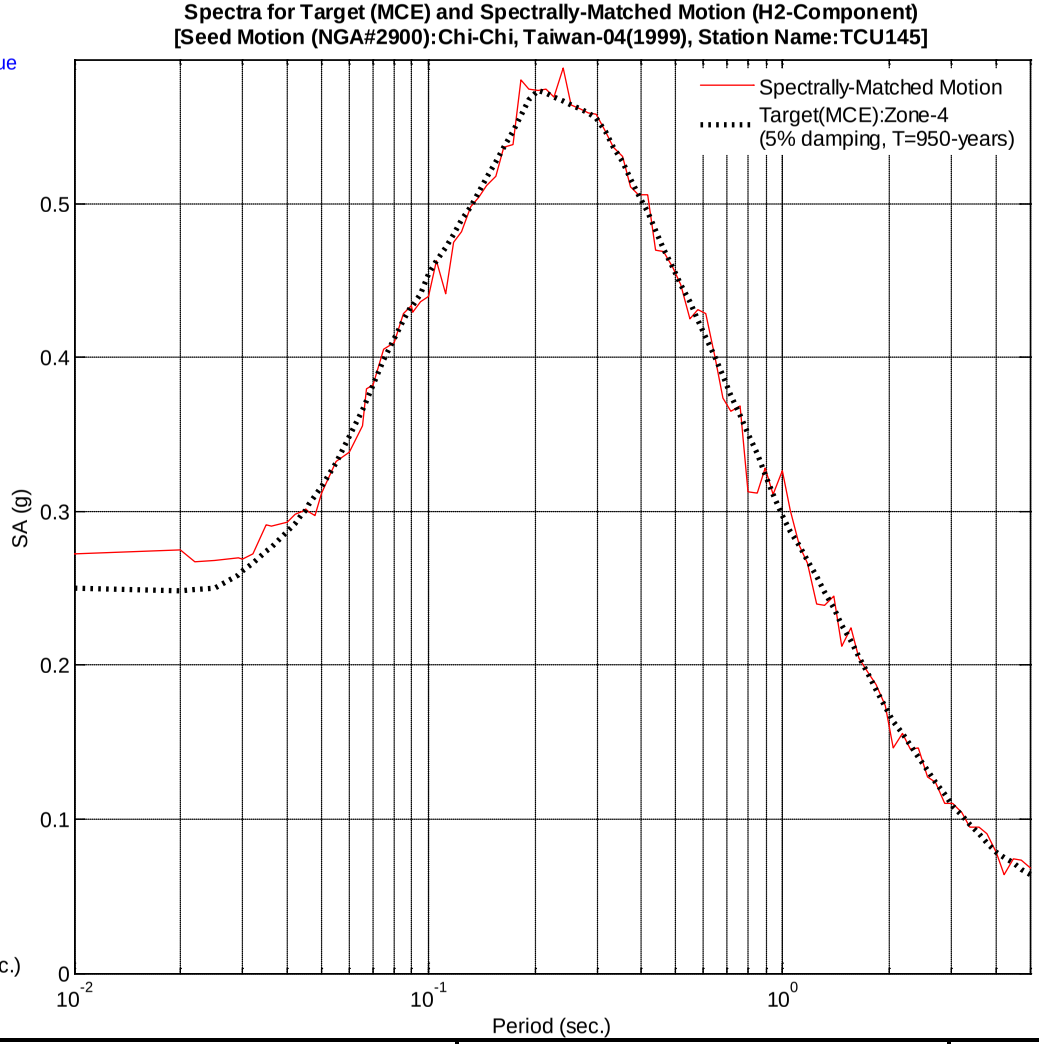
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 4 – SET NO. 3 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-9**



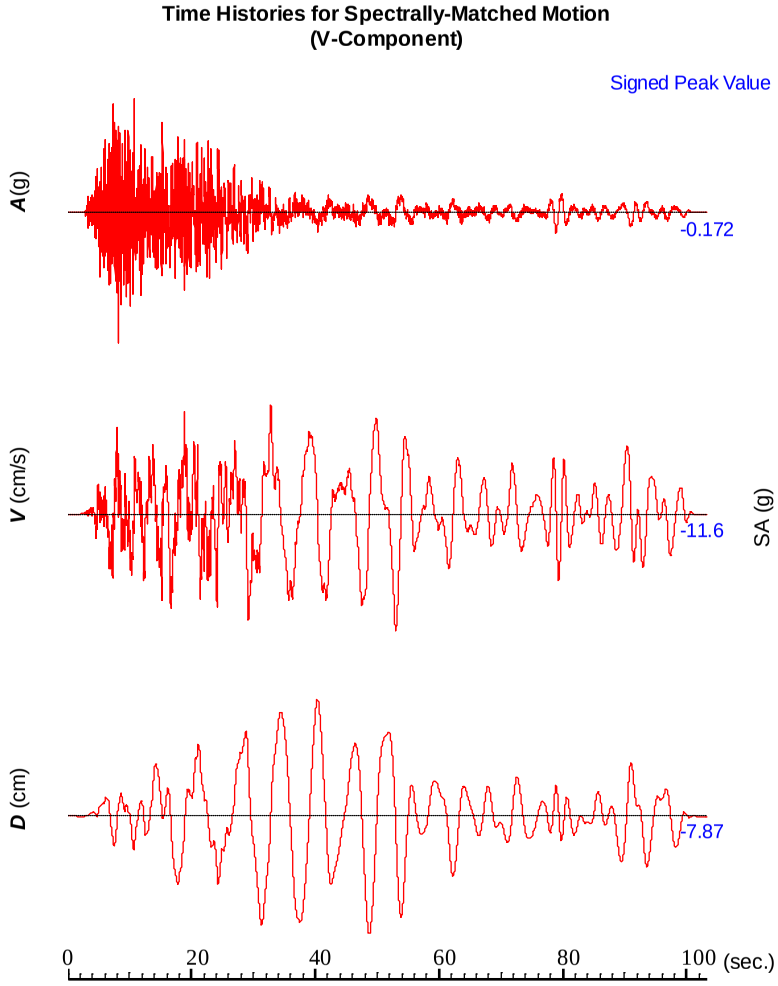


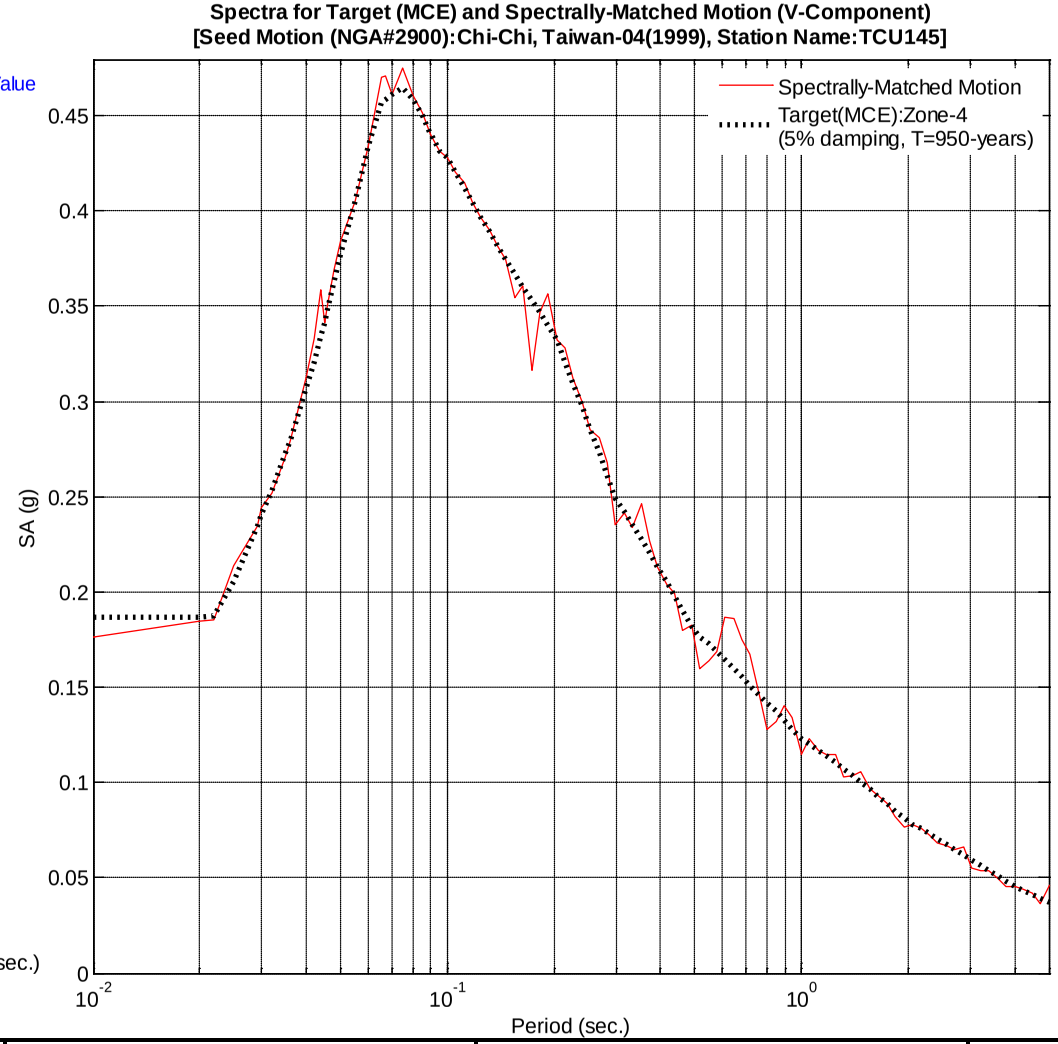
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 4 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-10**



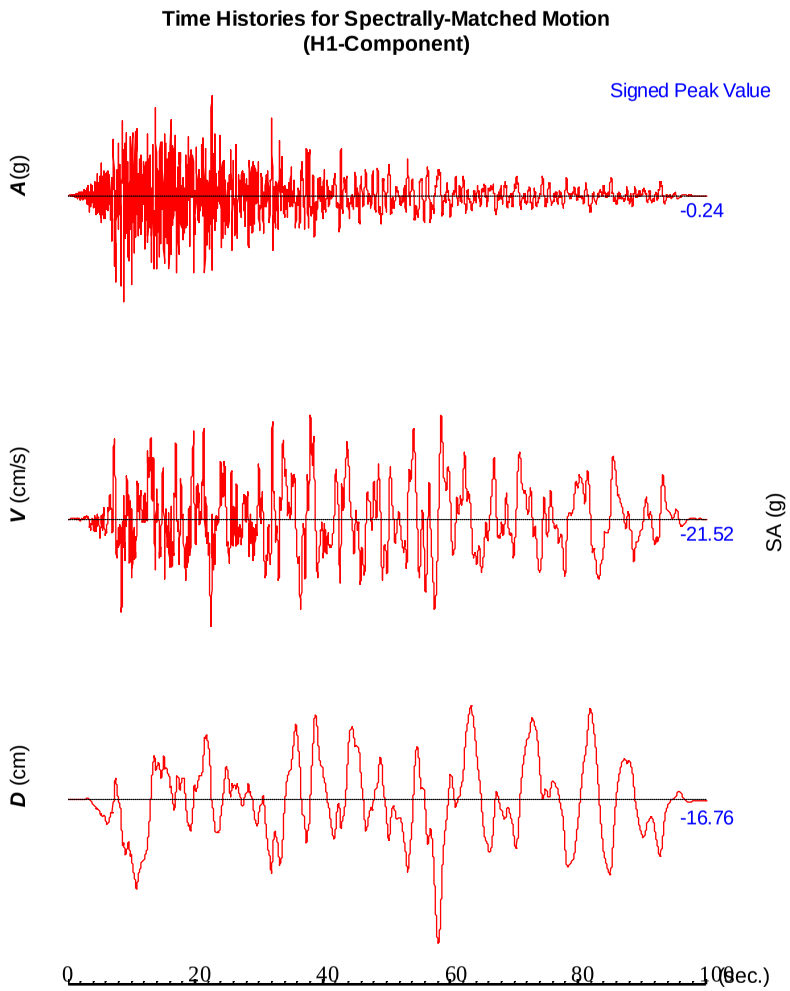


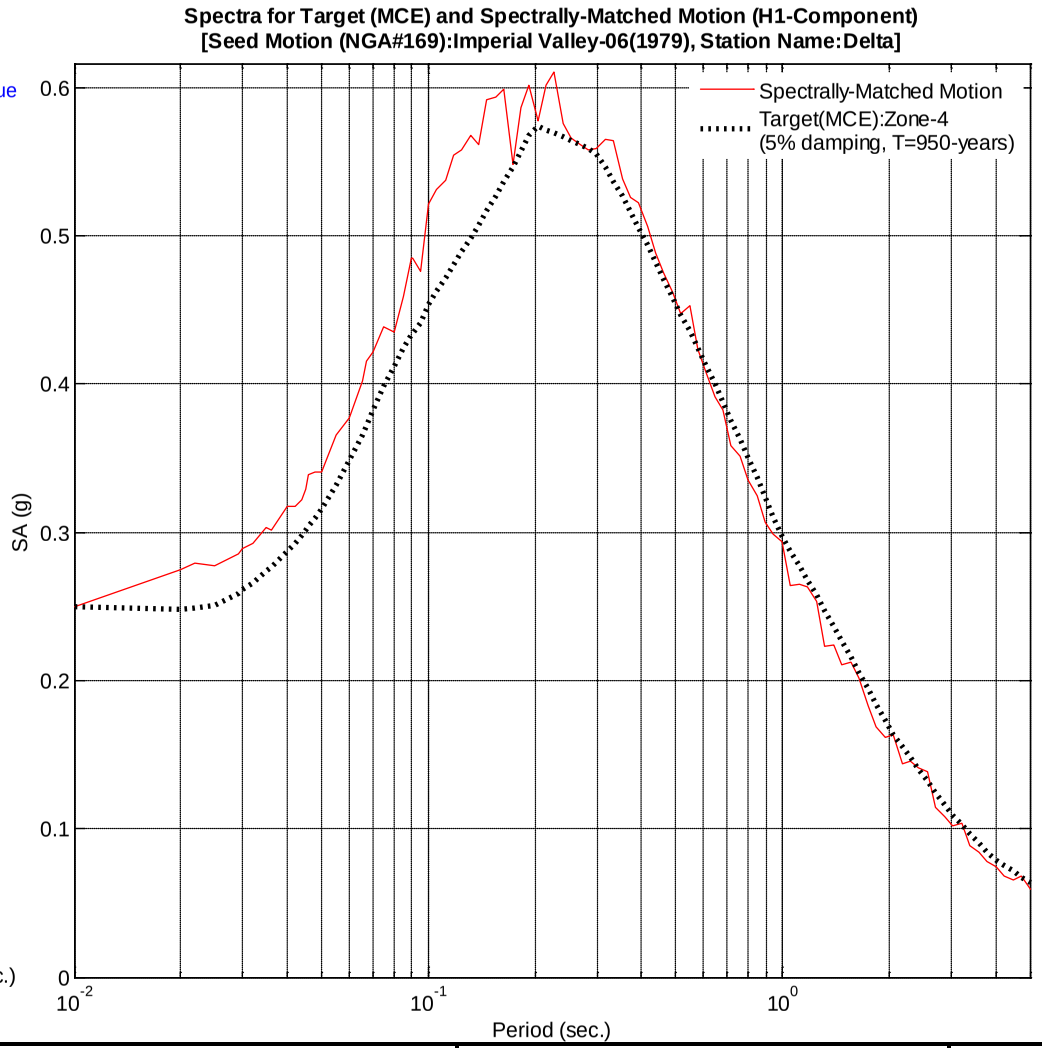
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 4 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-11**



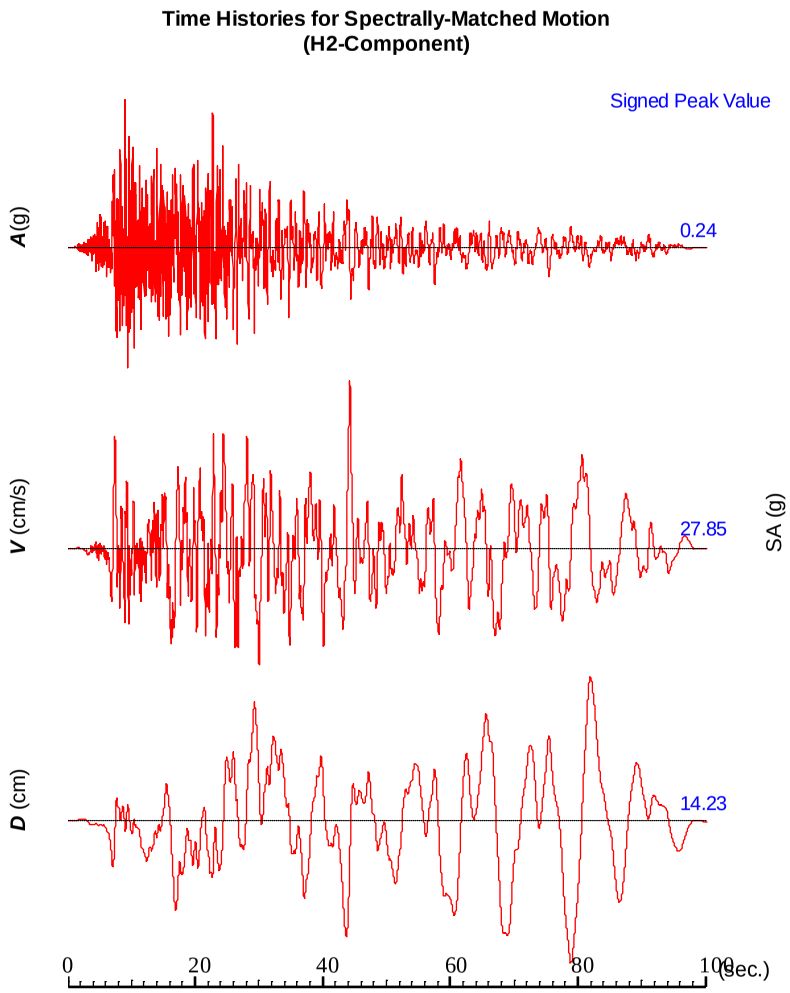


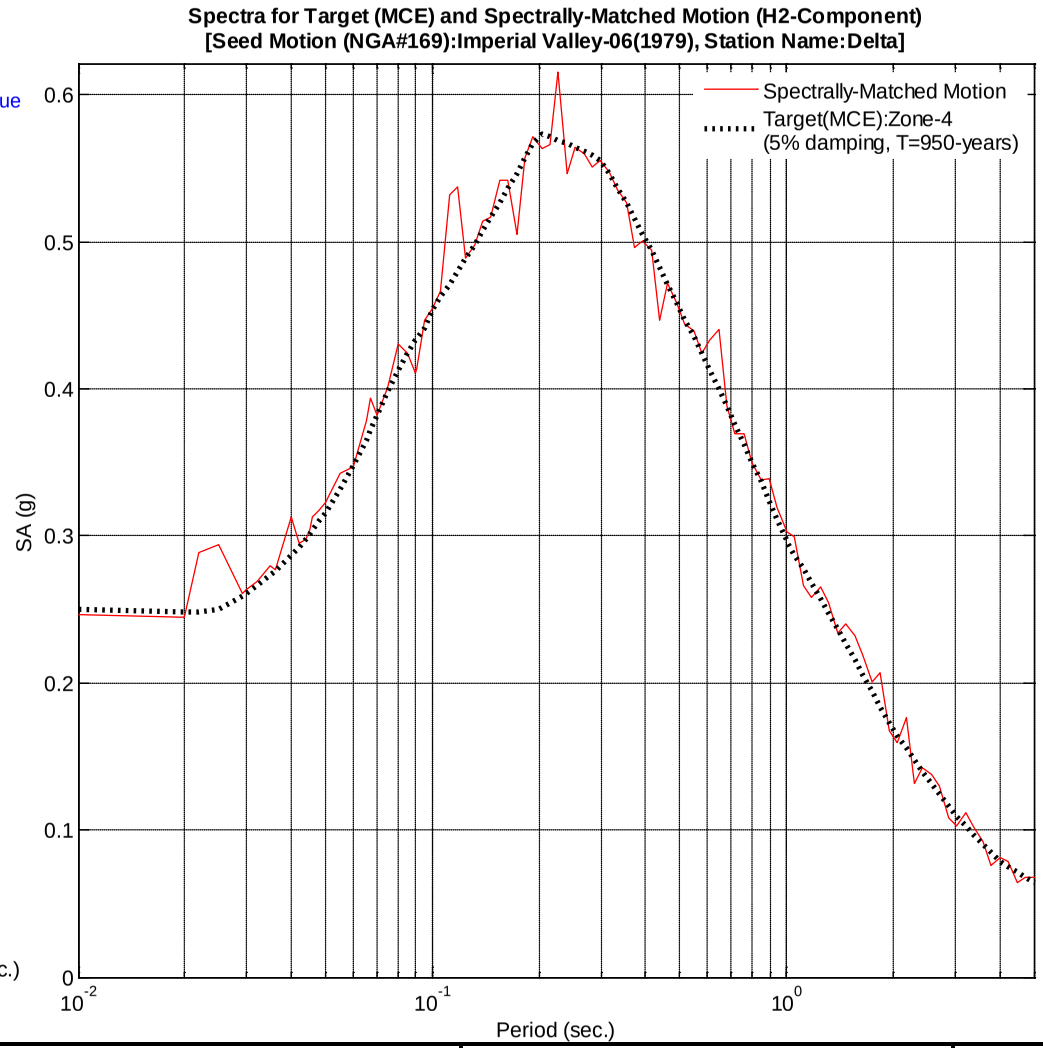
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 4 – SET NO. 4 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-12**



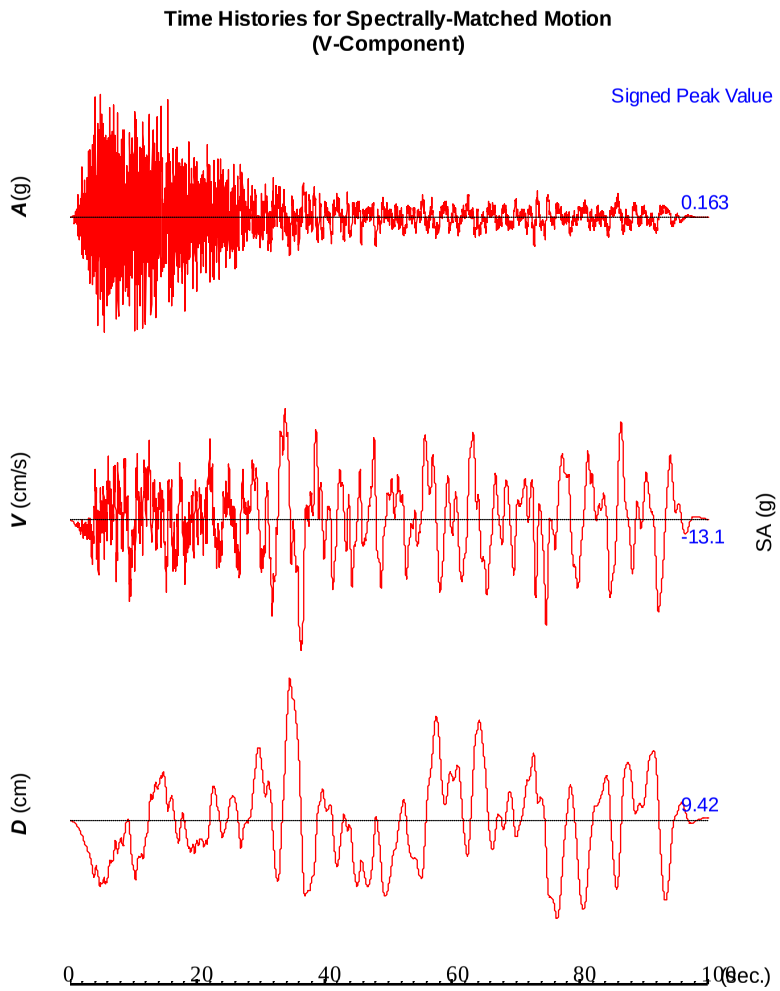


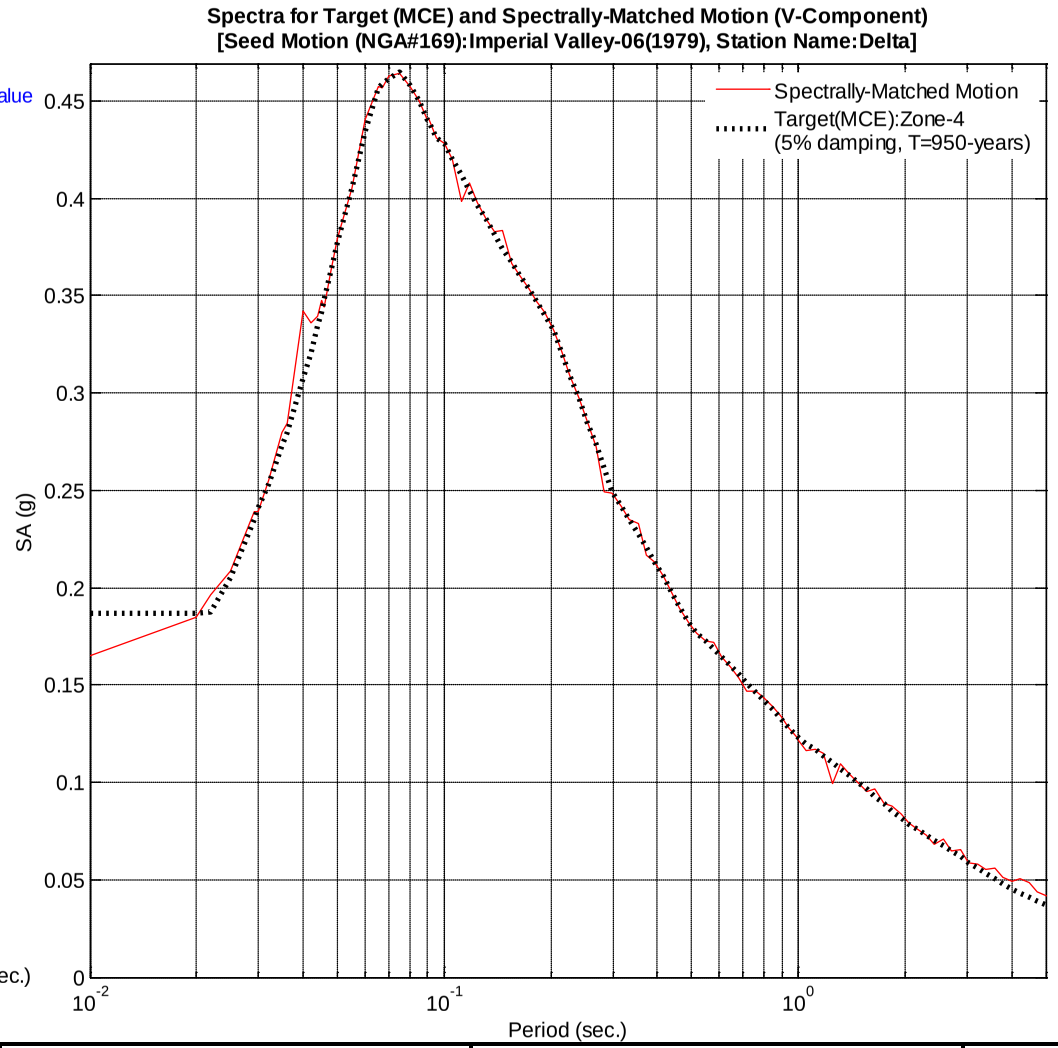
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 5 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-13**





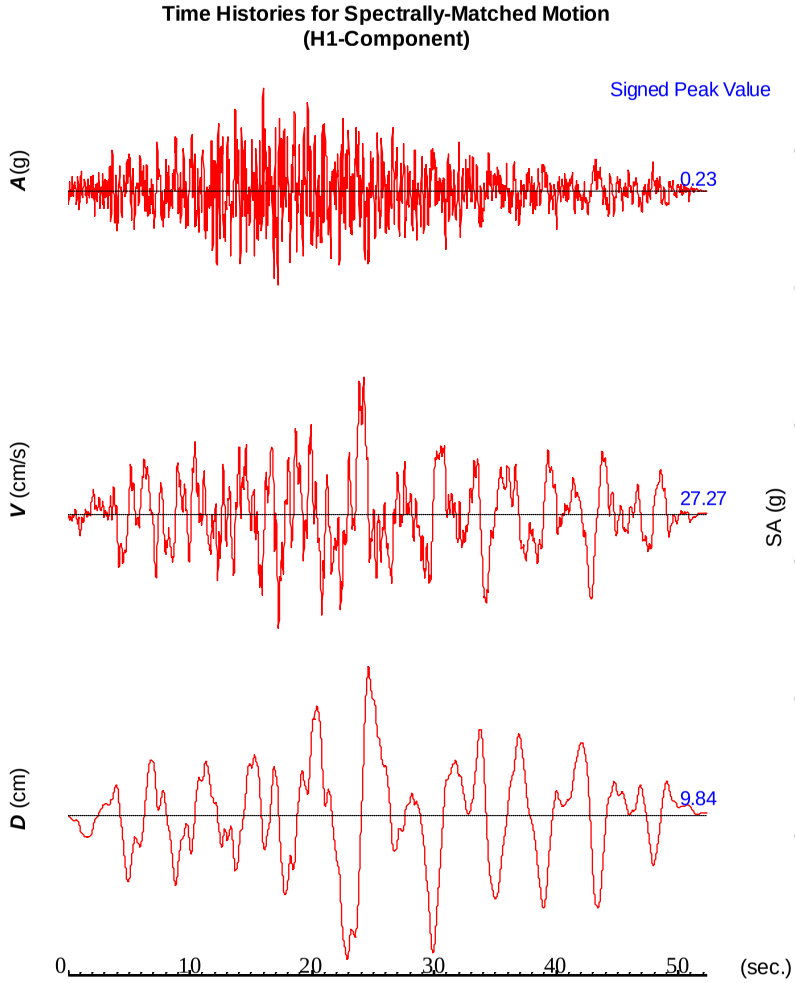
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 5 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-14**

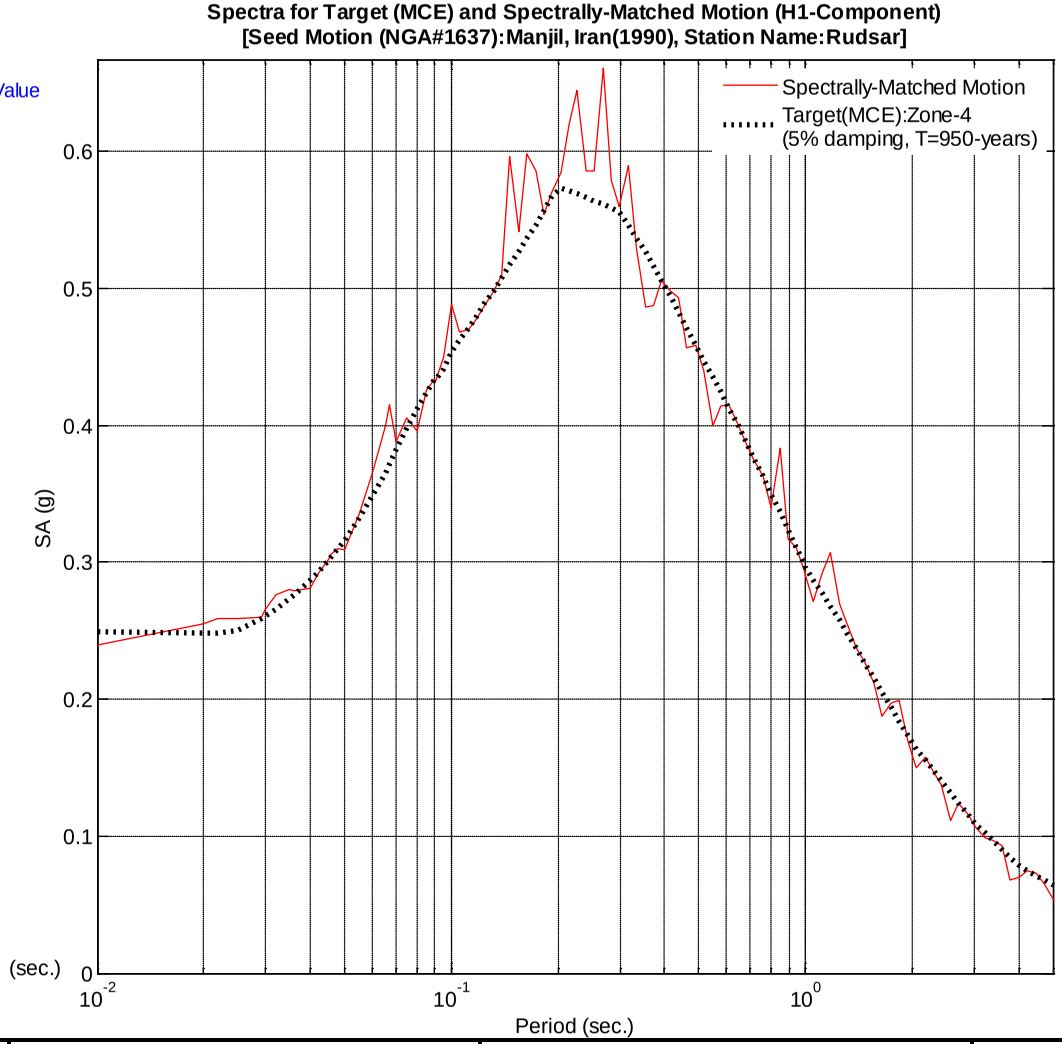




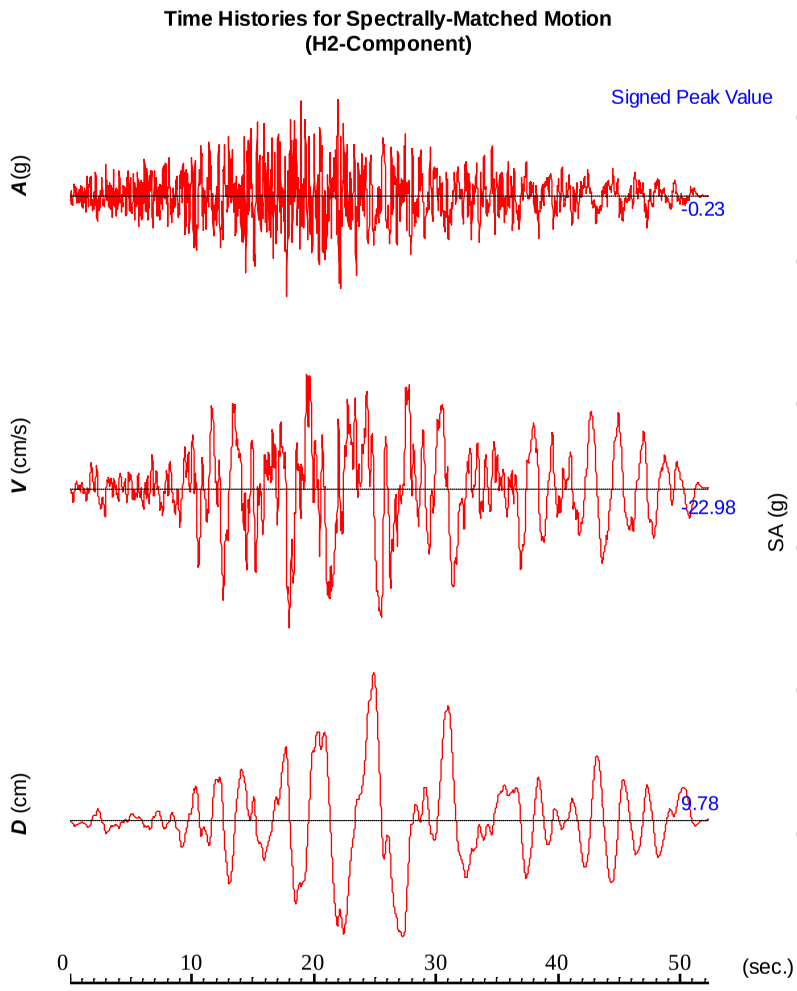
SC SOLUTIONS

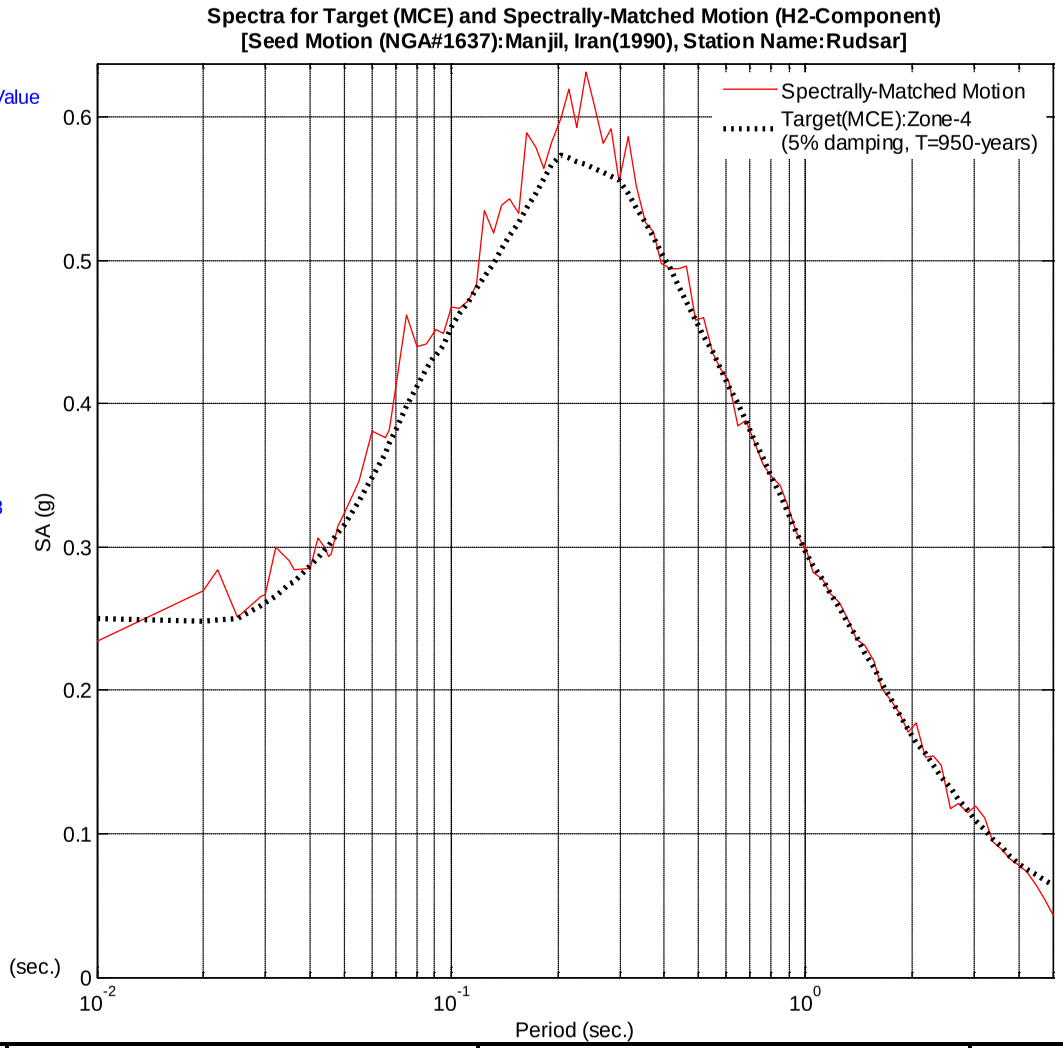
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 4 – SET NO. 5 – VERTICAL**	PLATE **B4-15**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		



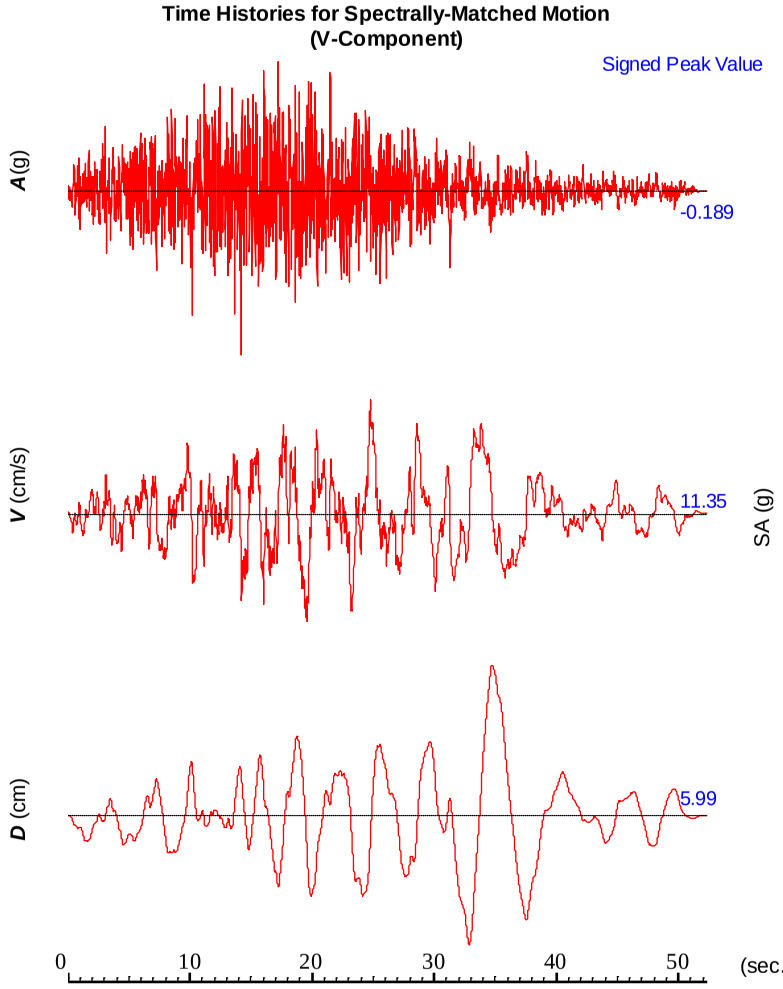


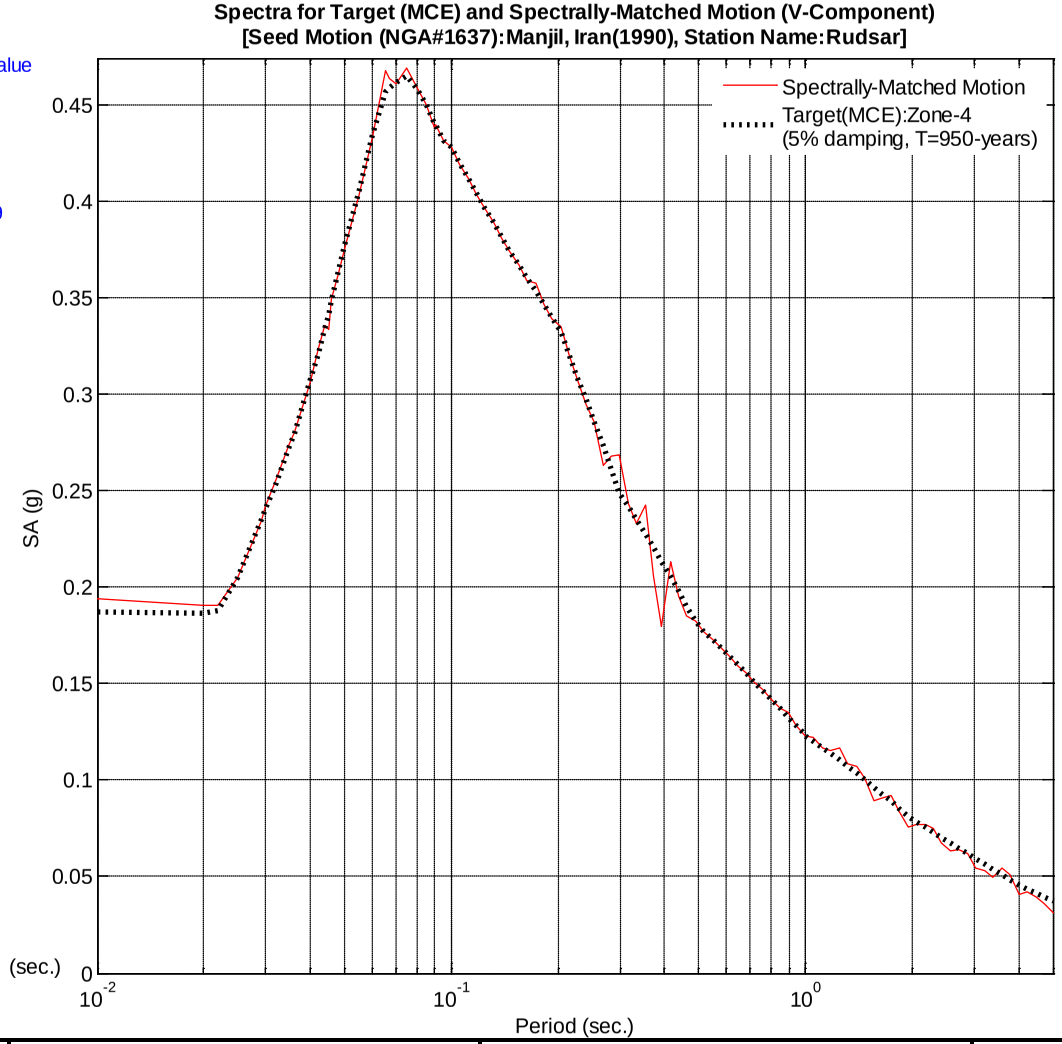
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 6 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-16**



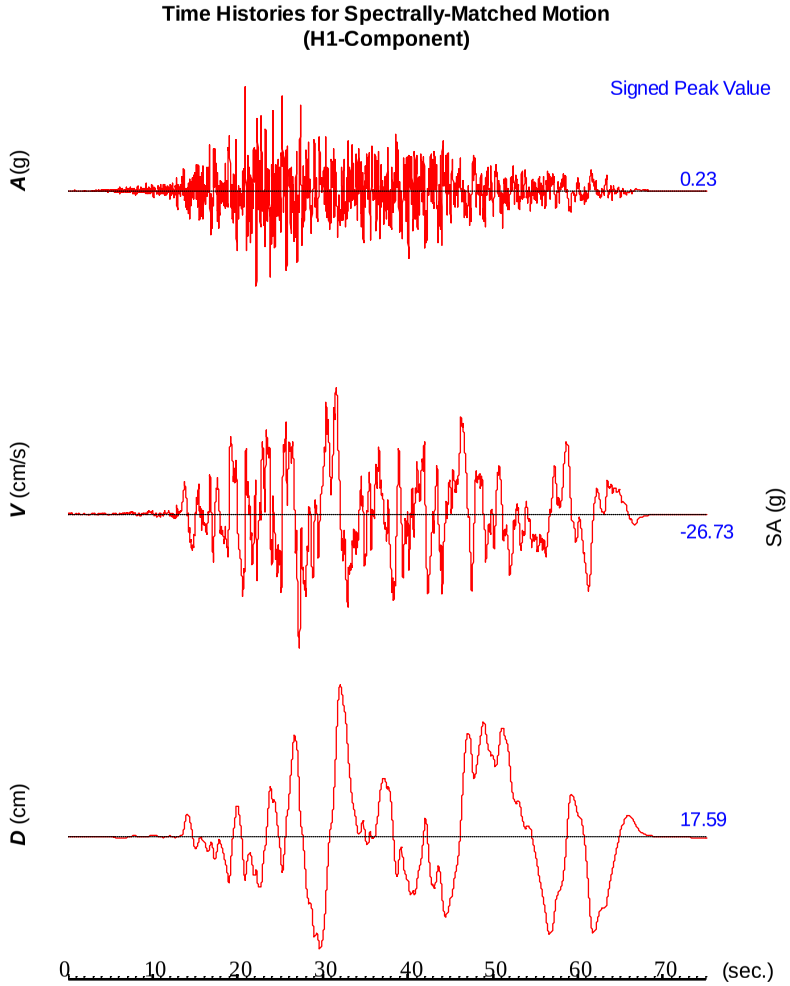


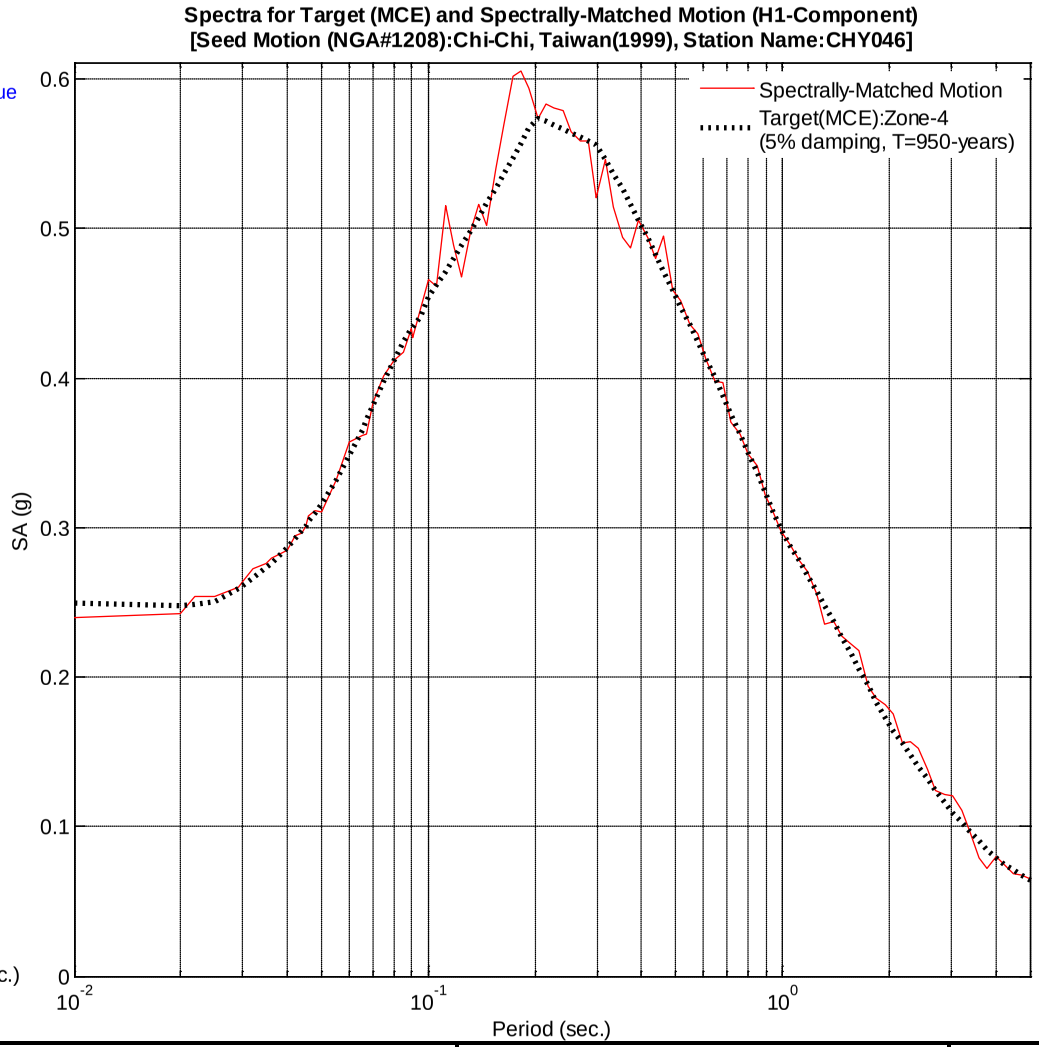
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 6 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-17**



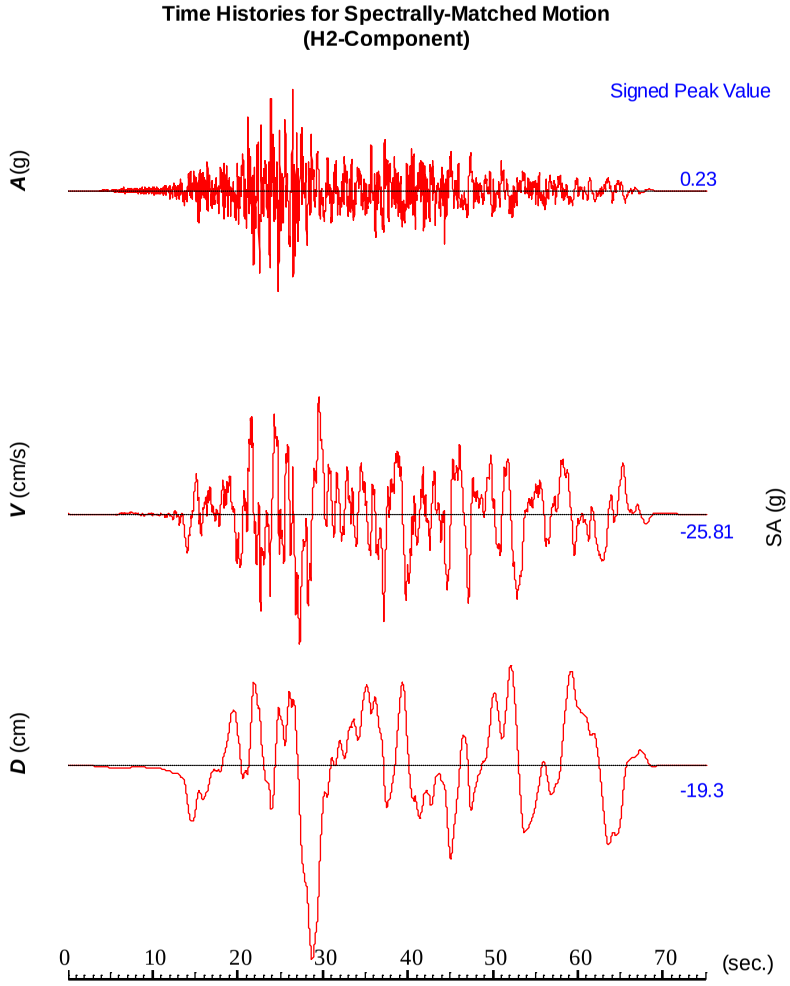


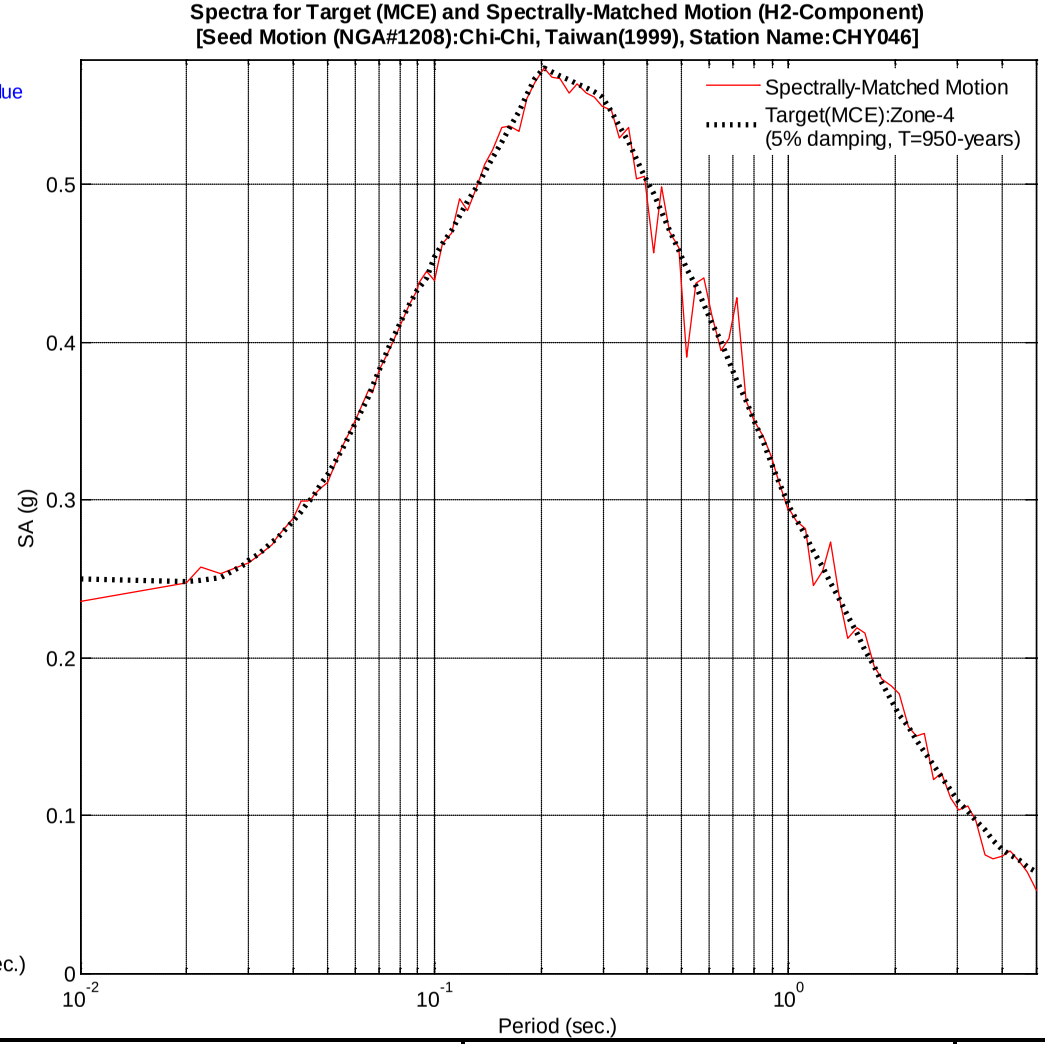
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 6 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-18**



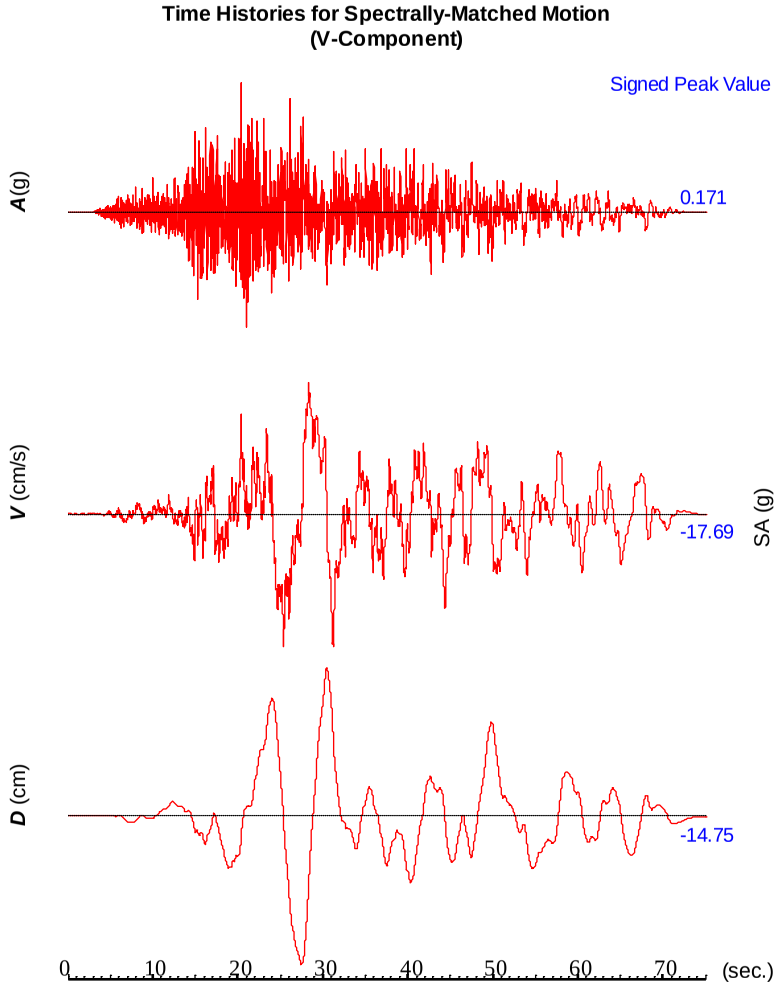


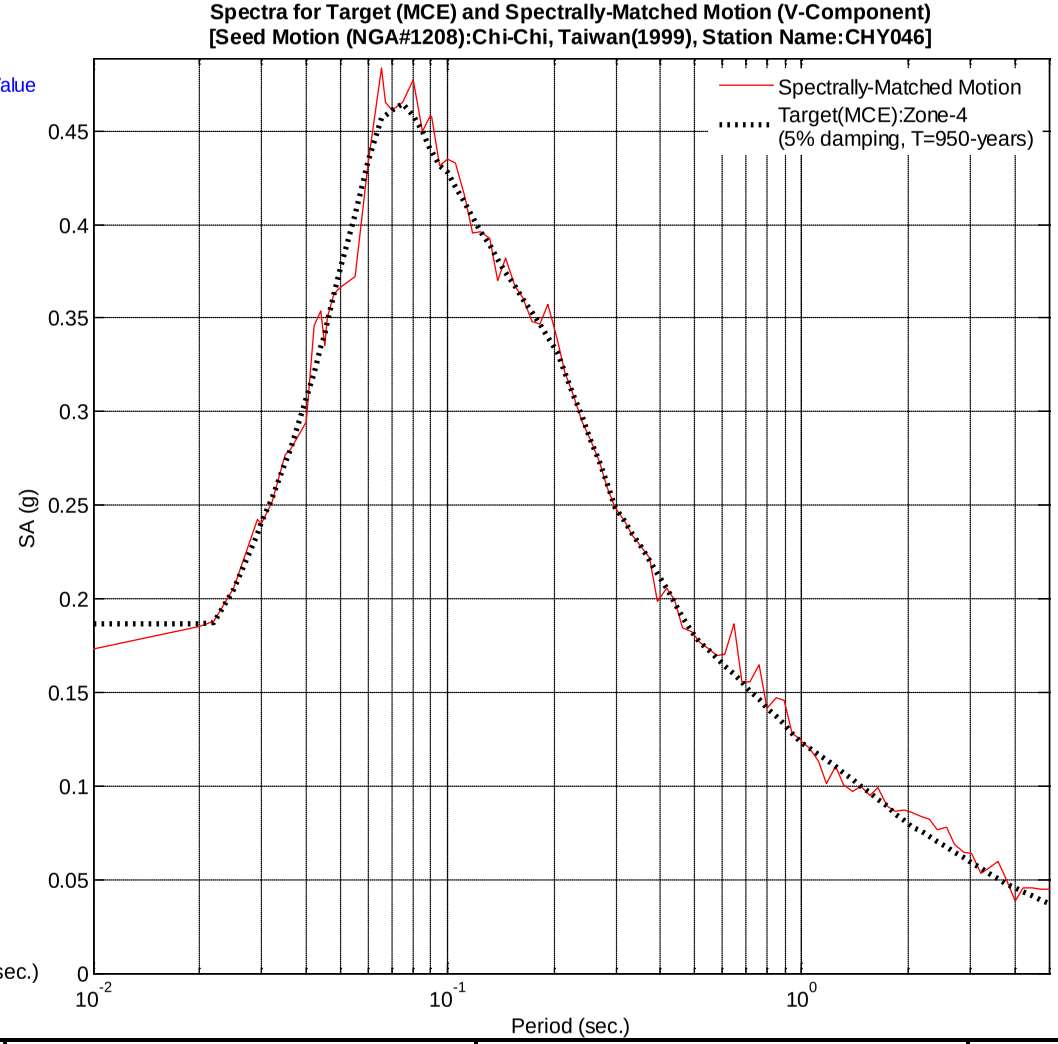
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 7 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-19**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 7 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-20**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 4 – SET NO. 7 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B4-21**

Table B.5: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 5**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	882	Landers	1992	North Palm Springs	7.28	26.84	0.261	30.888	17.662	0.295	30.589	14.156	0.188	14.874	7.632
2	1776	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.251	33.447	22.335	0.270	32.708	15.080	0.204	15.581	9.263
3	2112	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.285	35.450	22.425	0.283	31.217	26.639	0.187	19.815	19.241
4	2900	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.271	28.900	24.690	0.304	28.759	25.401	0.194	12.995	9.280
5	169	Imperial Valley-06	1979	Delta	6.53	22.03	0.256	23.622	18.818	0.261	31.334	16.034	0.182	13.132	9.872
6	1637	Manjil, Iran	1990	Rudsar	7.37	64.47	0.260	35.021	13.746	0.267	26.158	12.346	0.209	12.376	6.742
7	1208	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.273	30.619	20.686	0.265	32.685	22.451	0.190	19.969	16.632

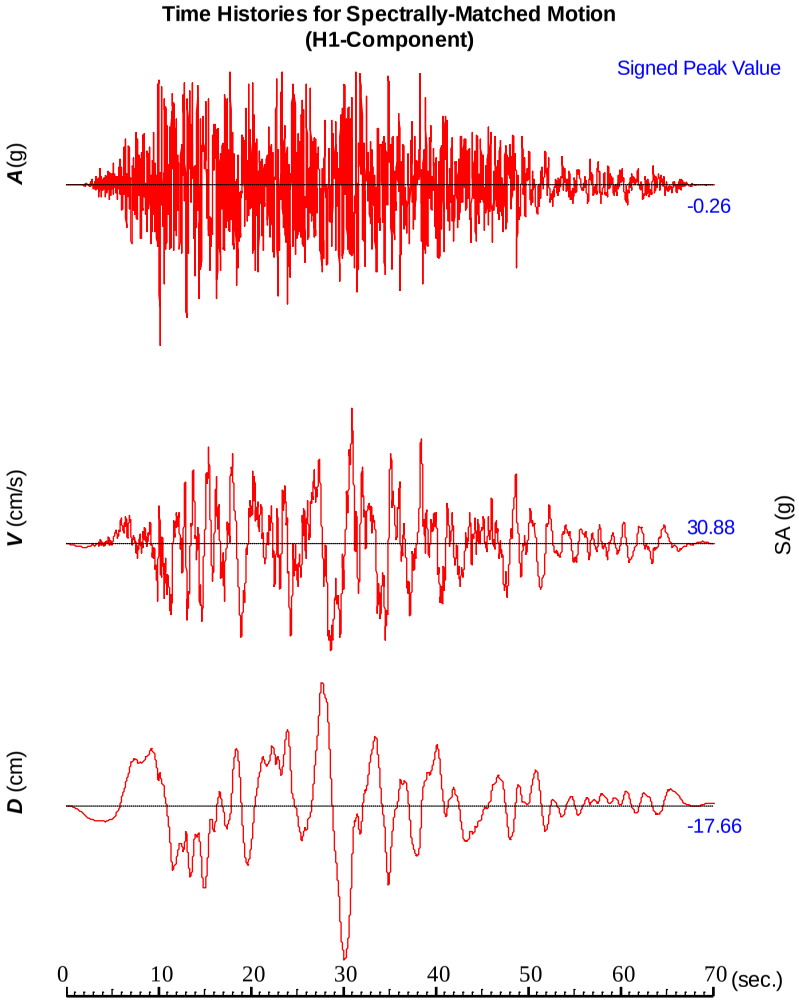
SC SOLUTIONS

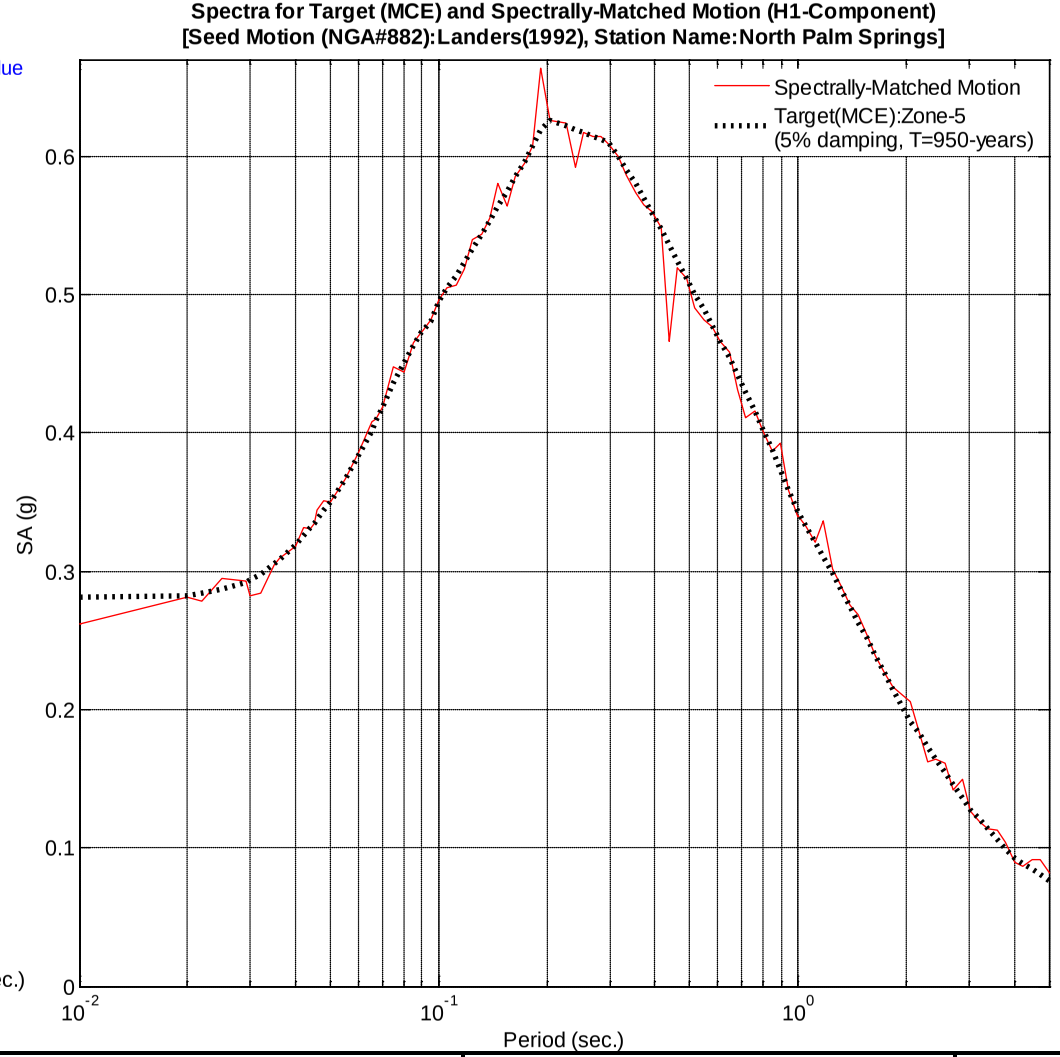
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS MCE – ZONE 5

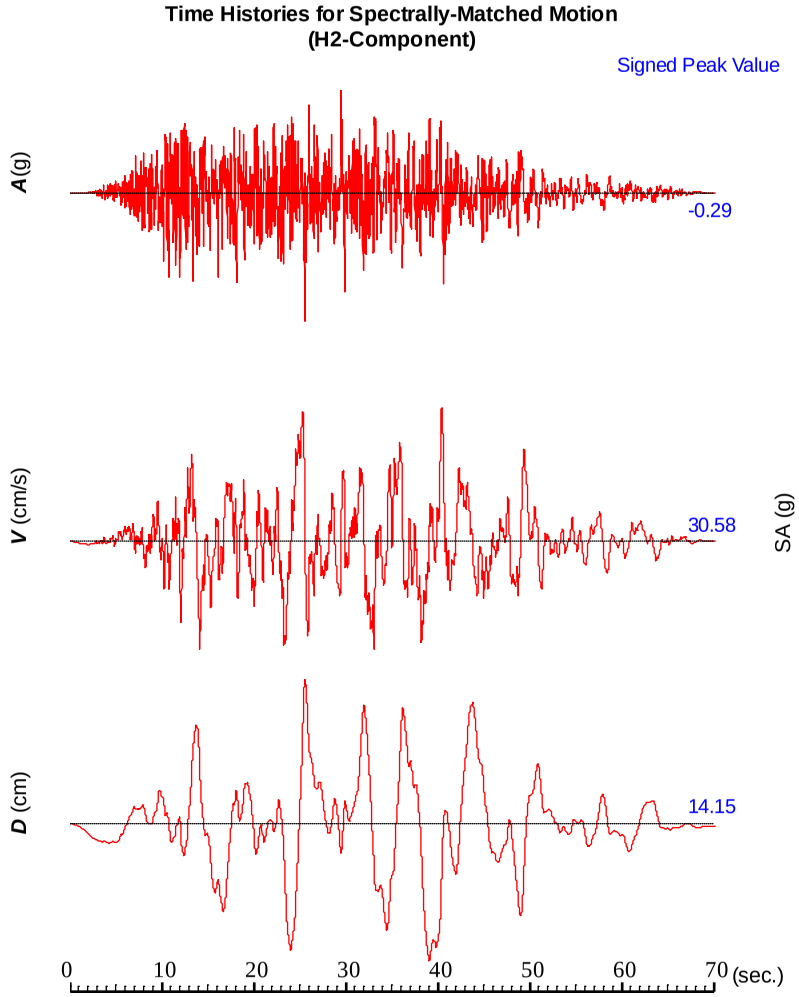
CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

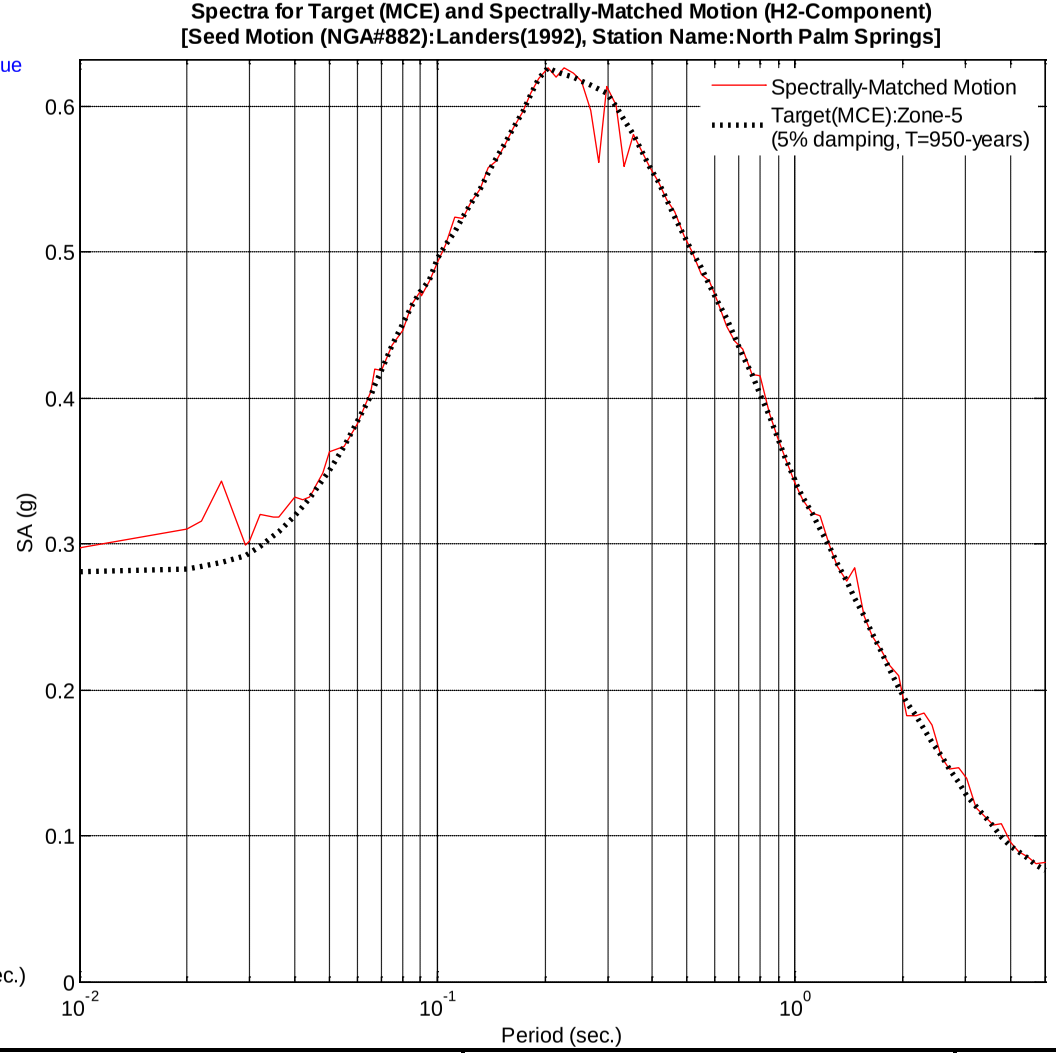
PLATE **B5-0**



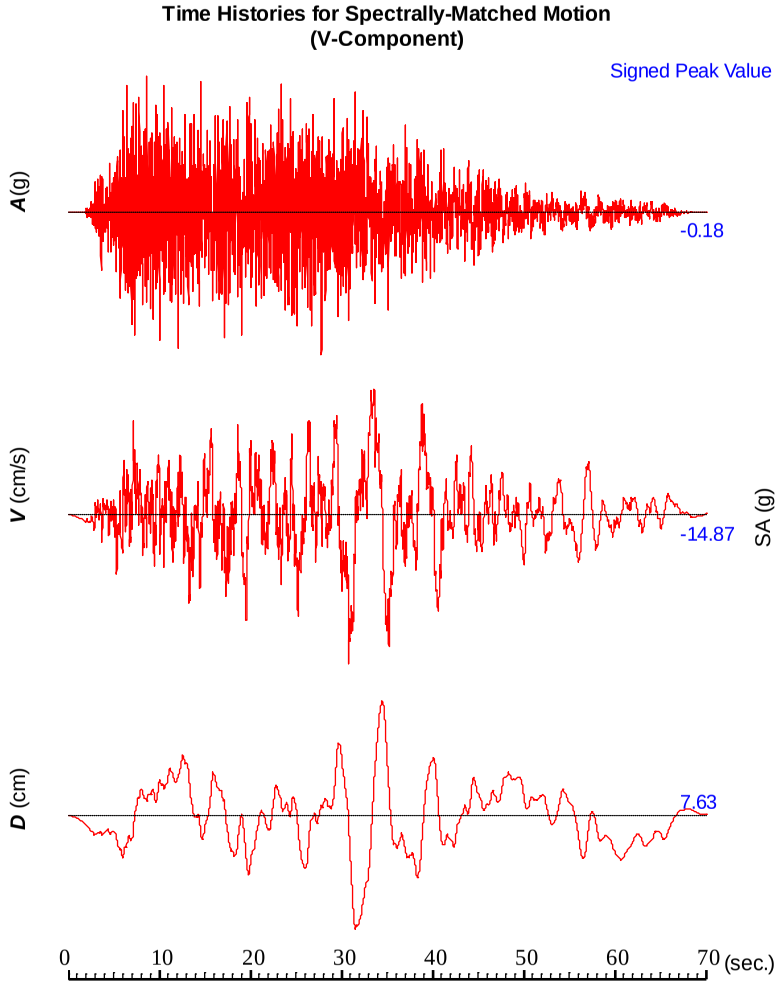


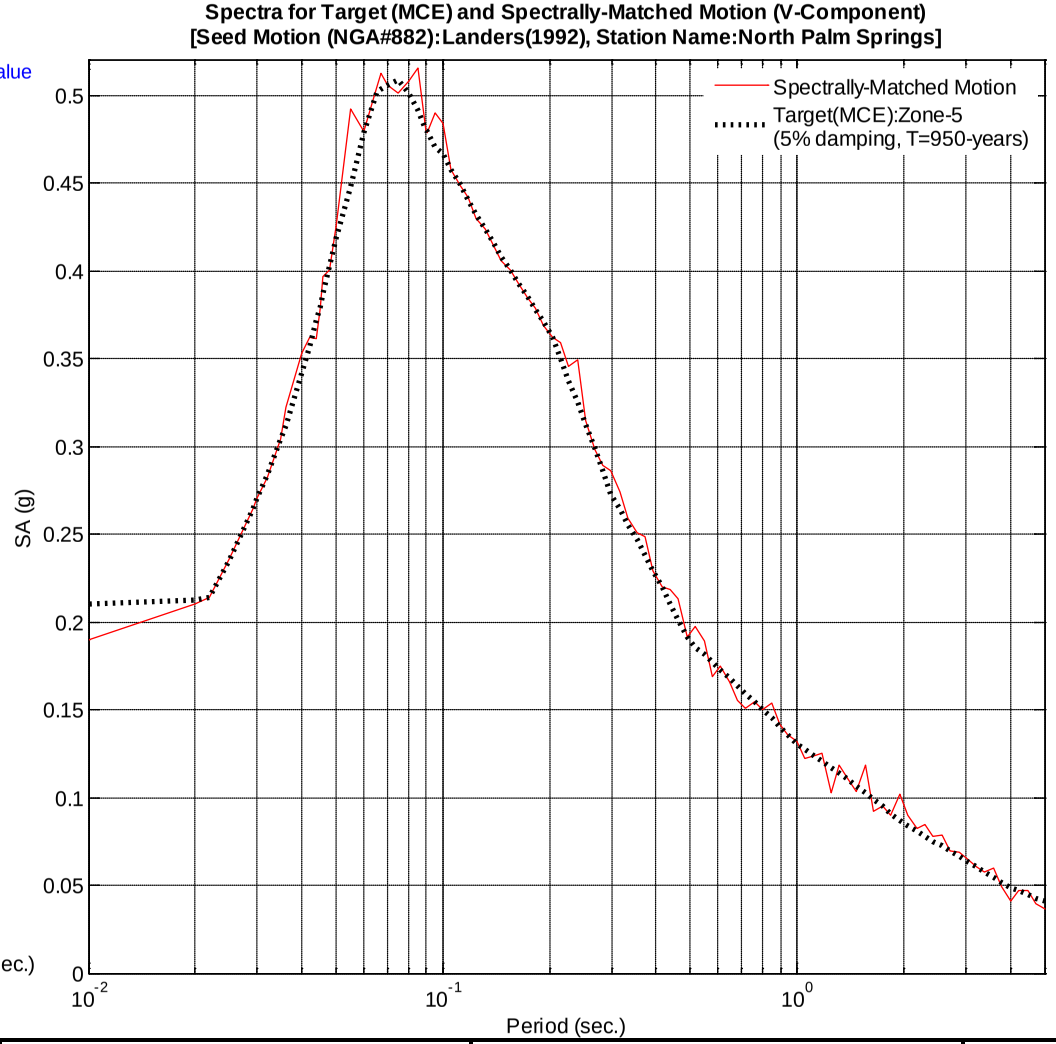
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 1 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-1**



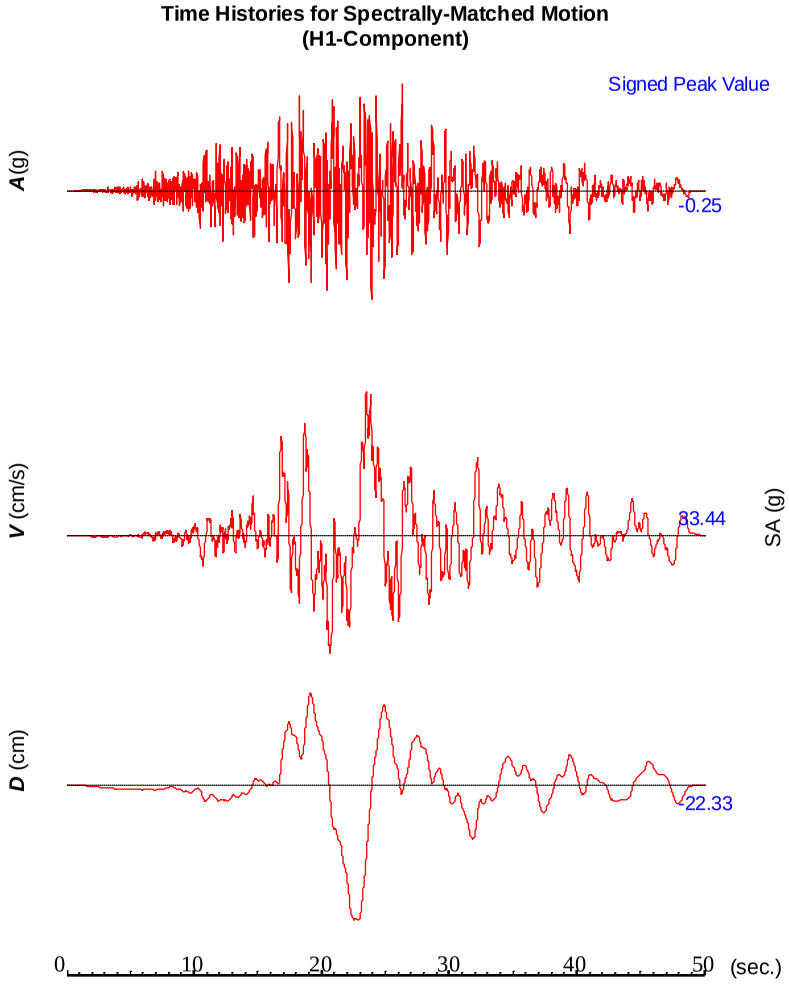


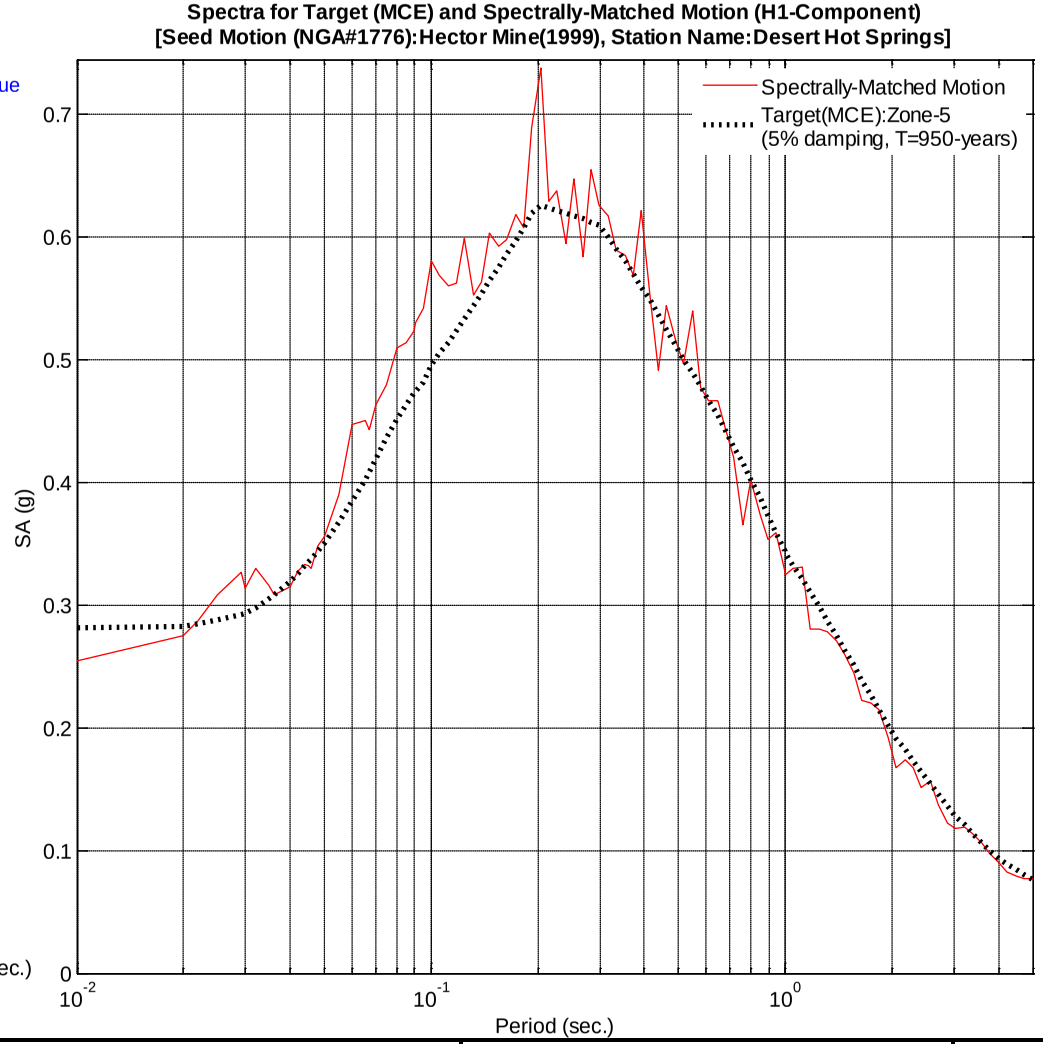
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 1 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-2**



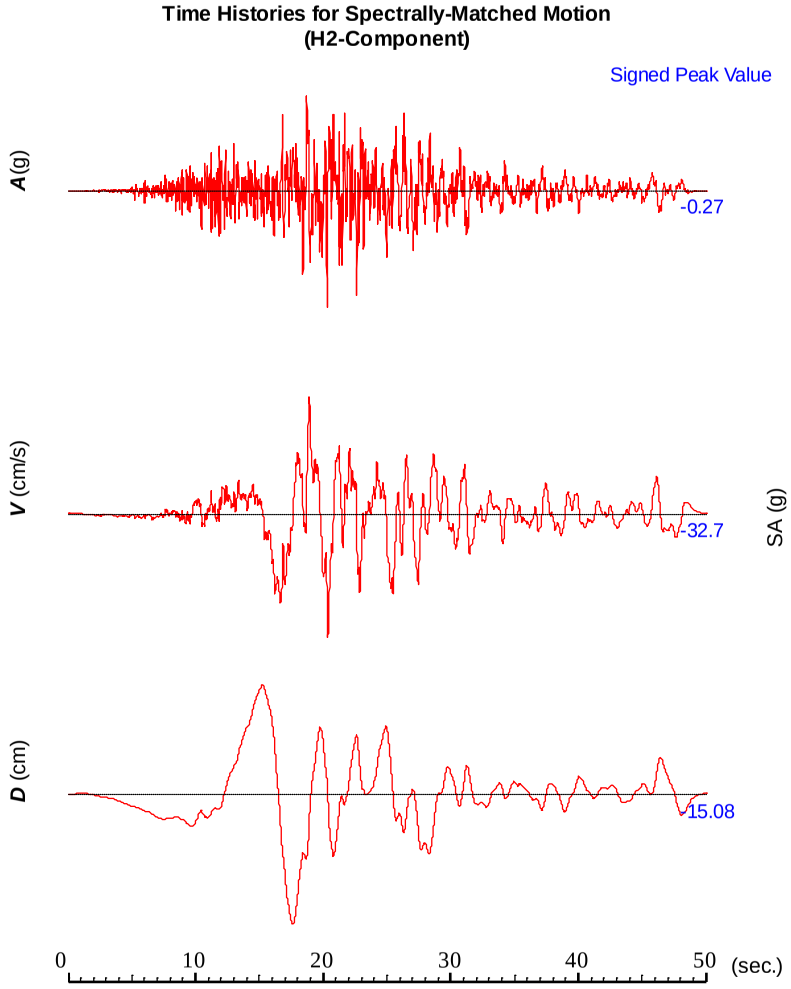


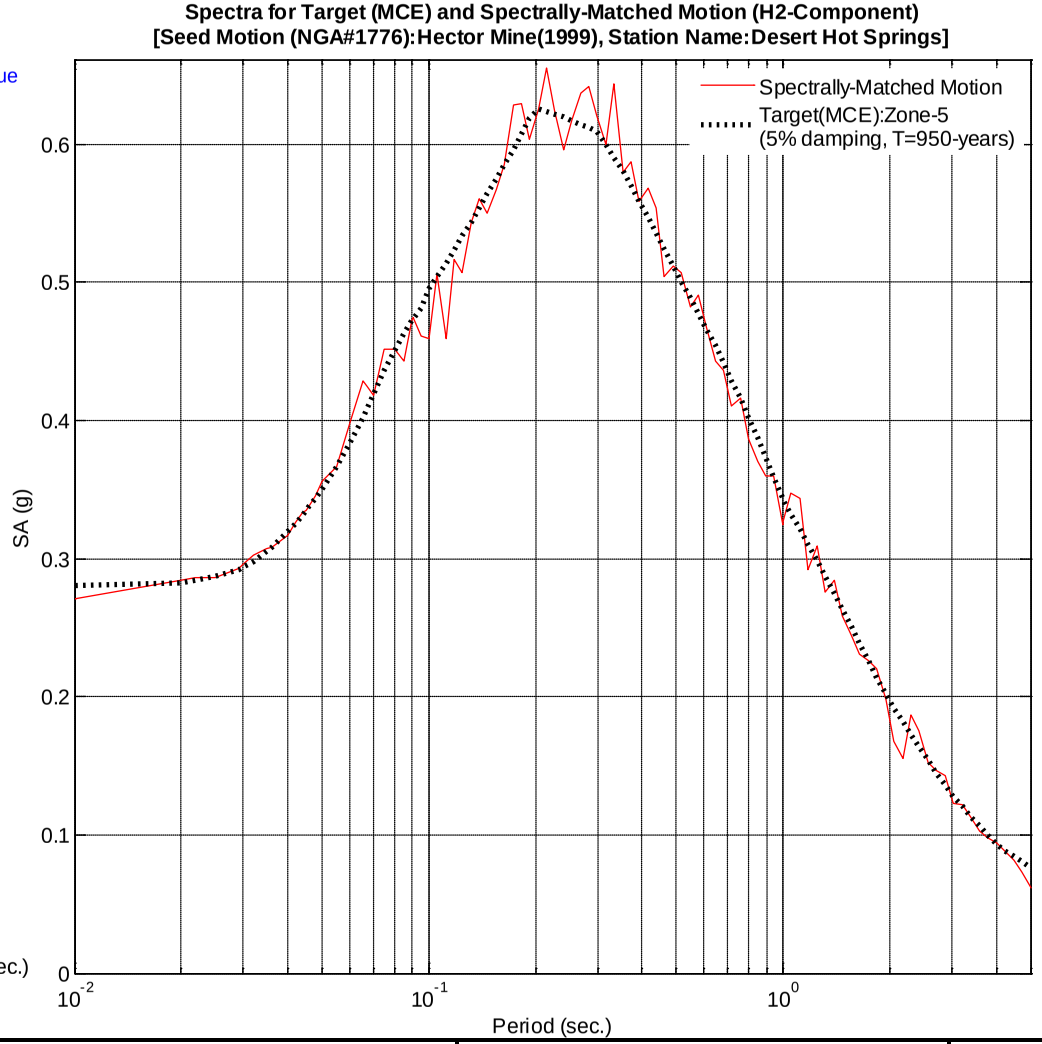
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 1 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-3**





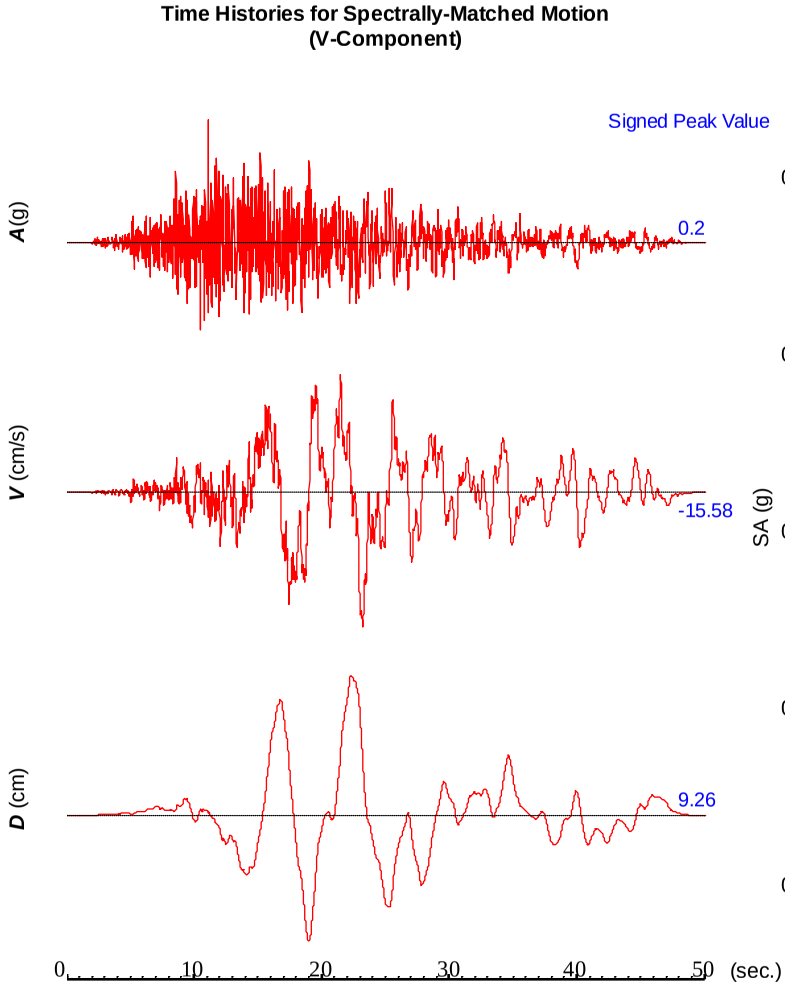
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 2 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-4**

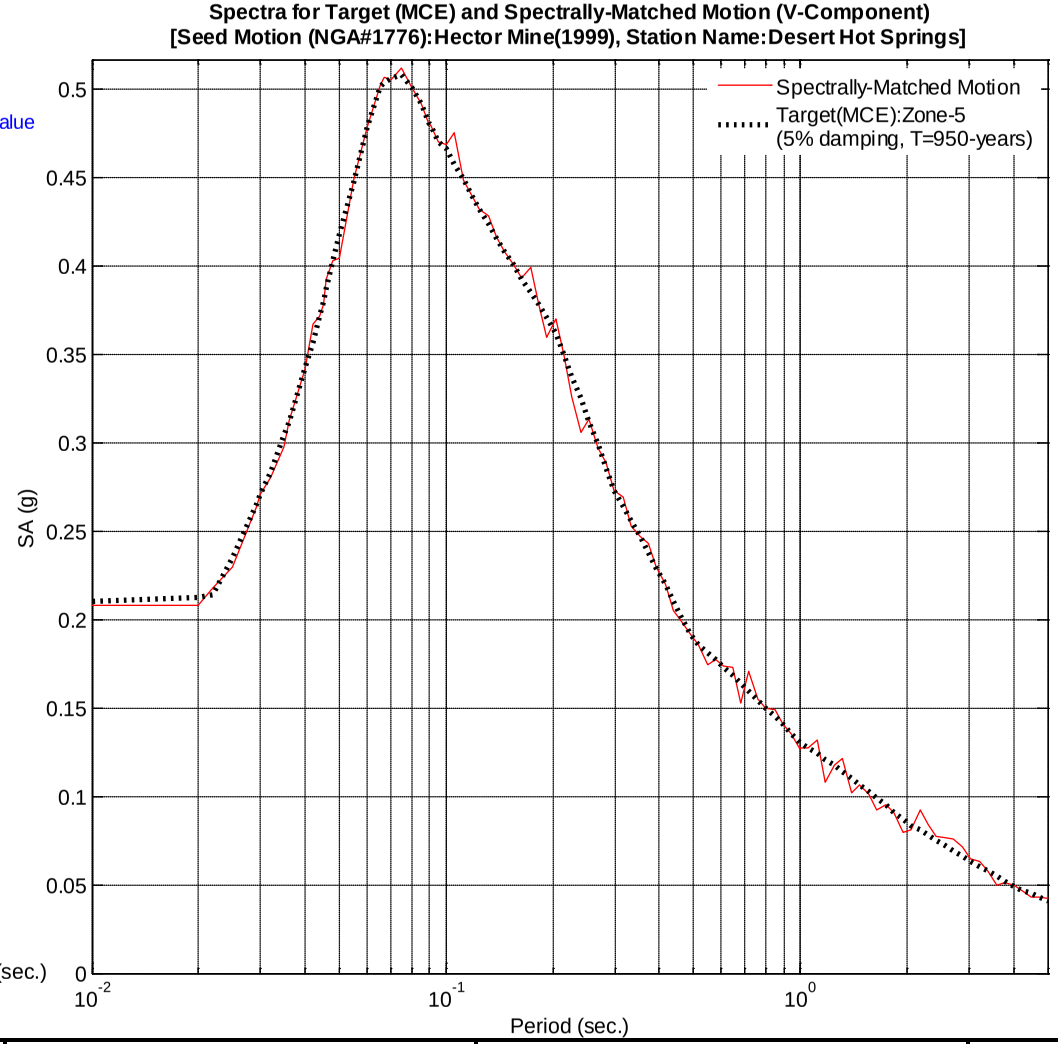




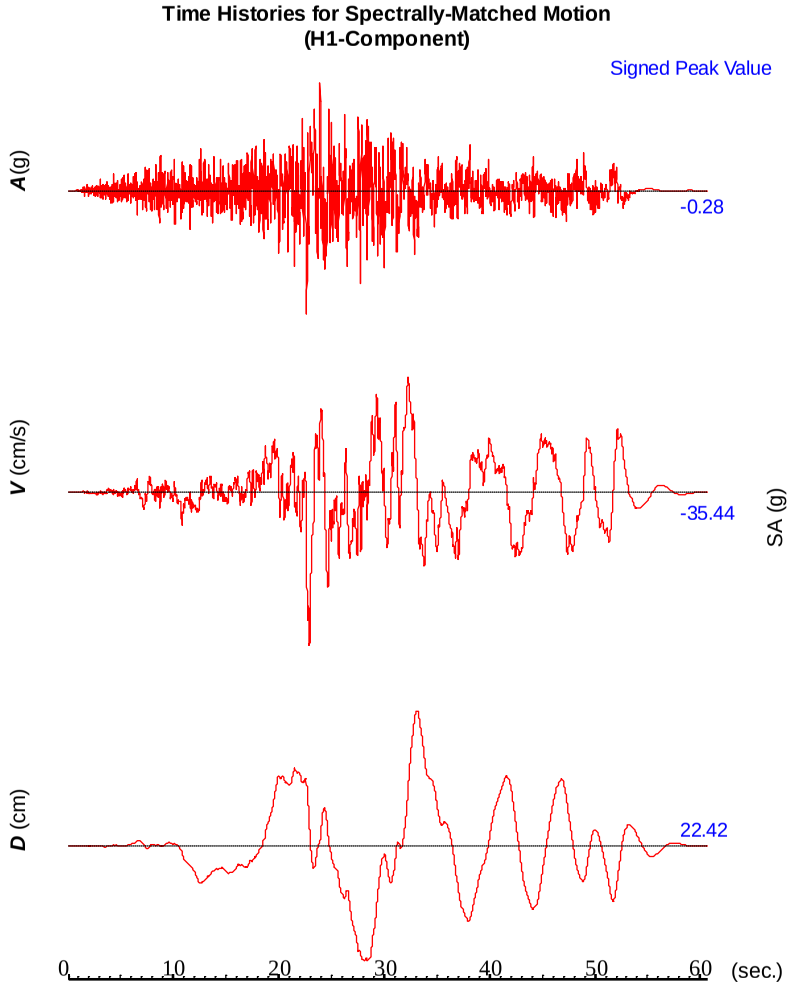
SC SOLUTIONS

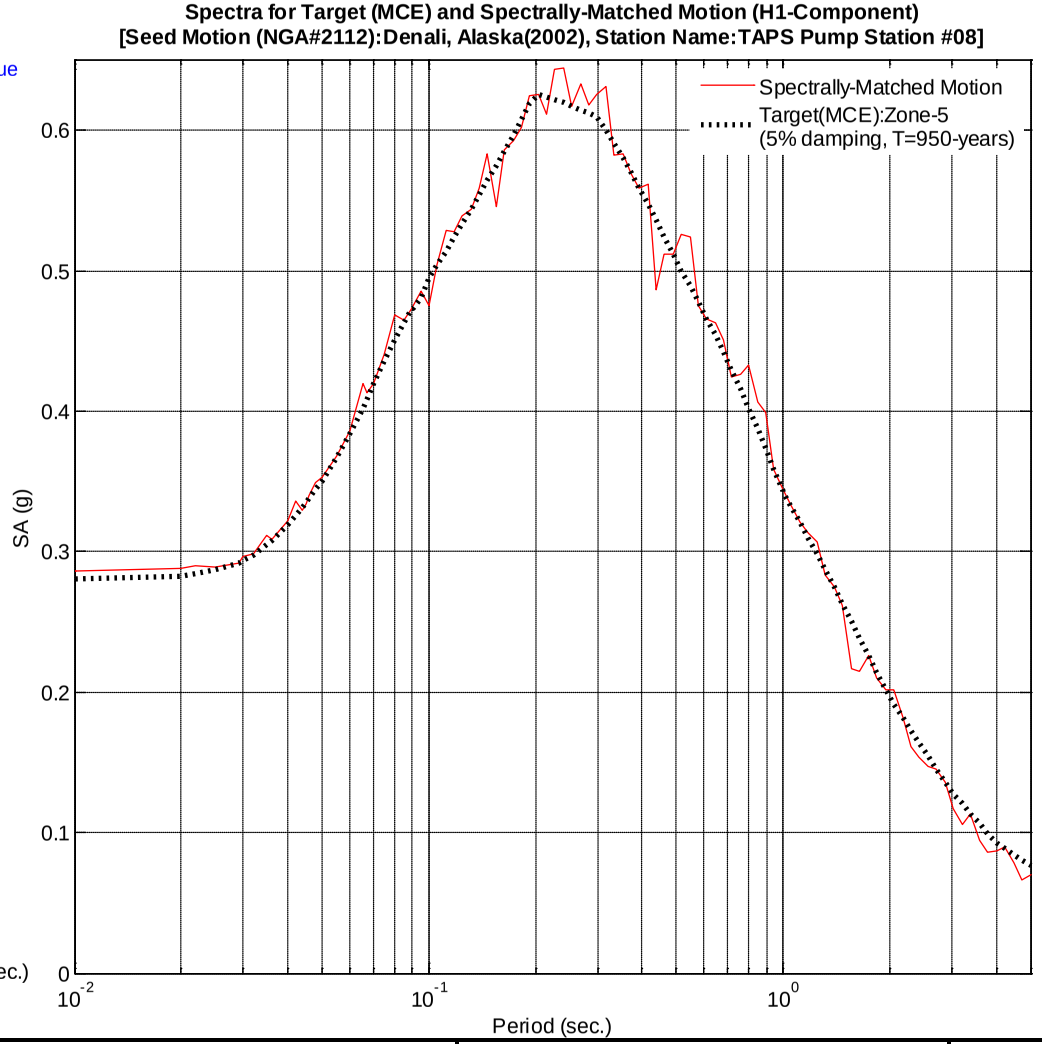
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 5 – SET NO. 2 – HORIZONTAL 2**	PLATE
BY:	J. Zhong		**B5-5**
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		



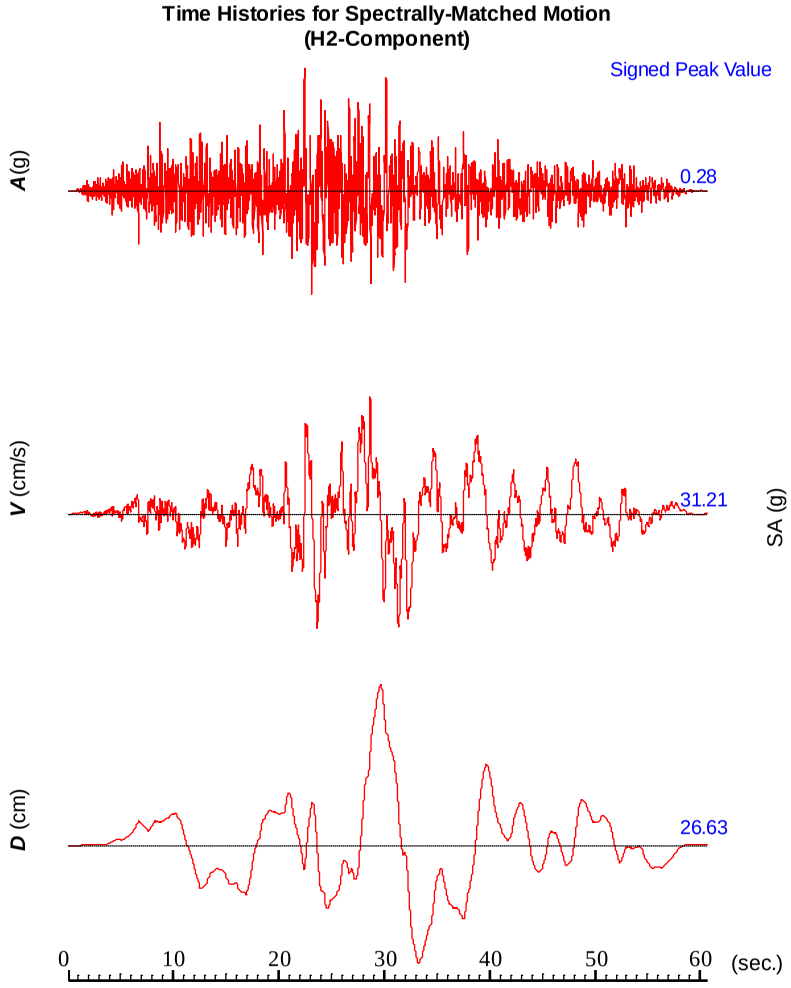


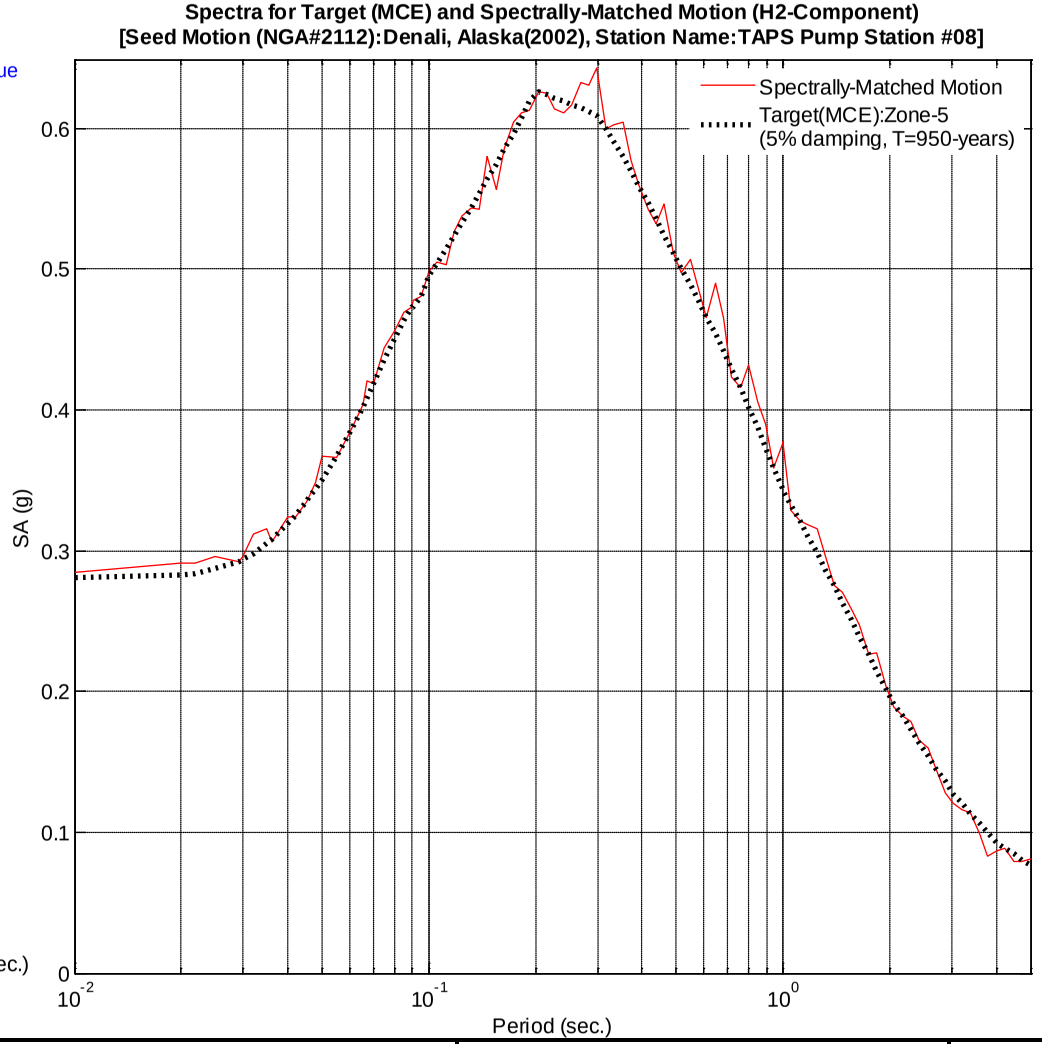
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 5 – SET NO. 2 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-6**



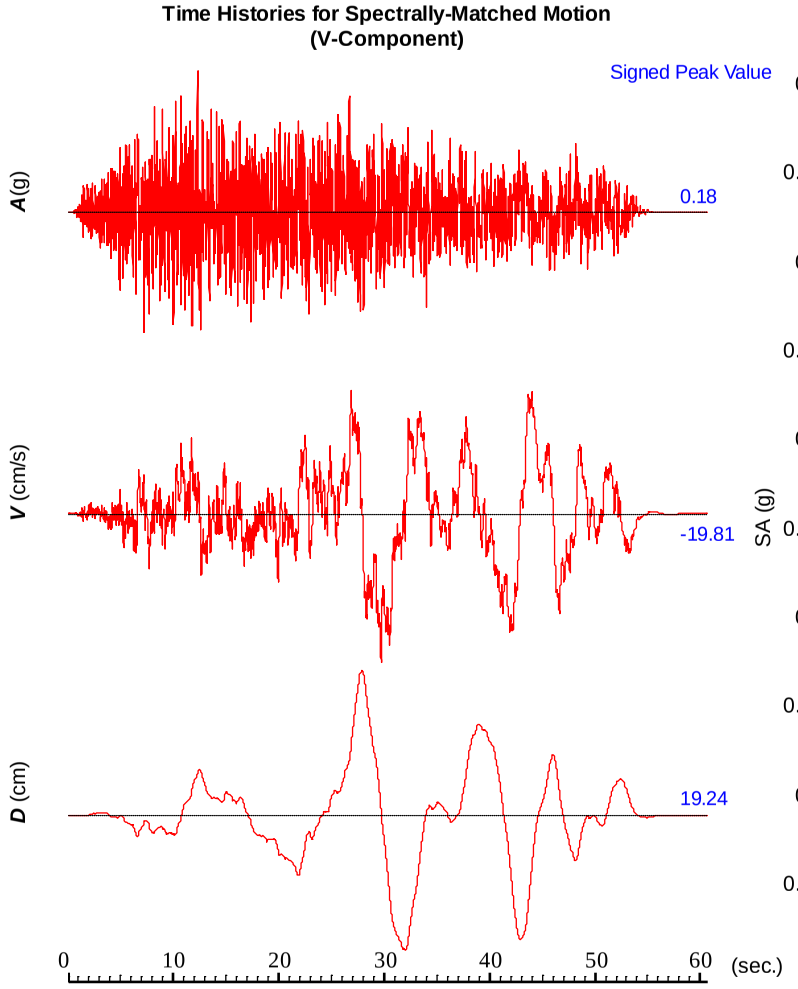


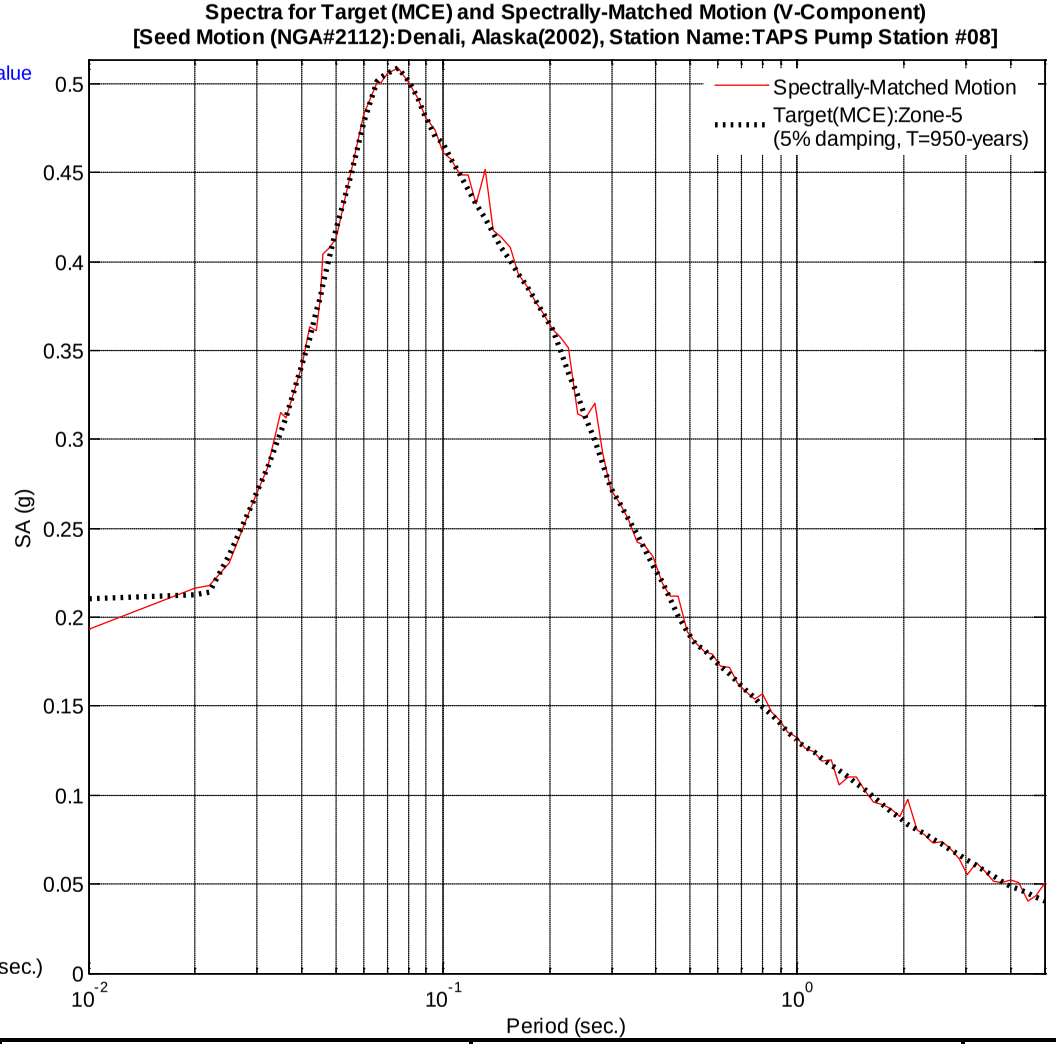
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 3 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-7**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 3 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-8**





SC SOLUTIONS

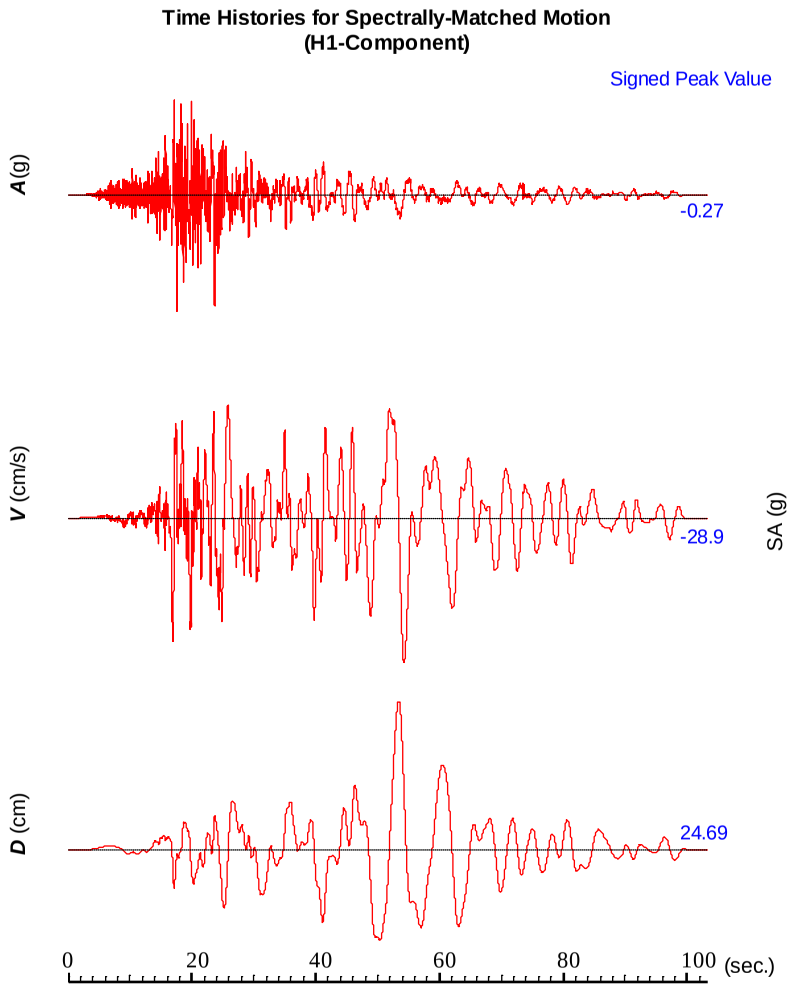
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

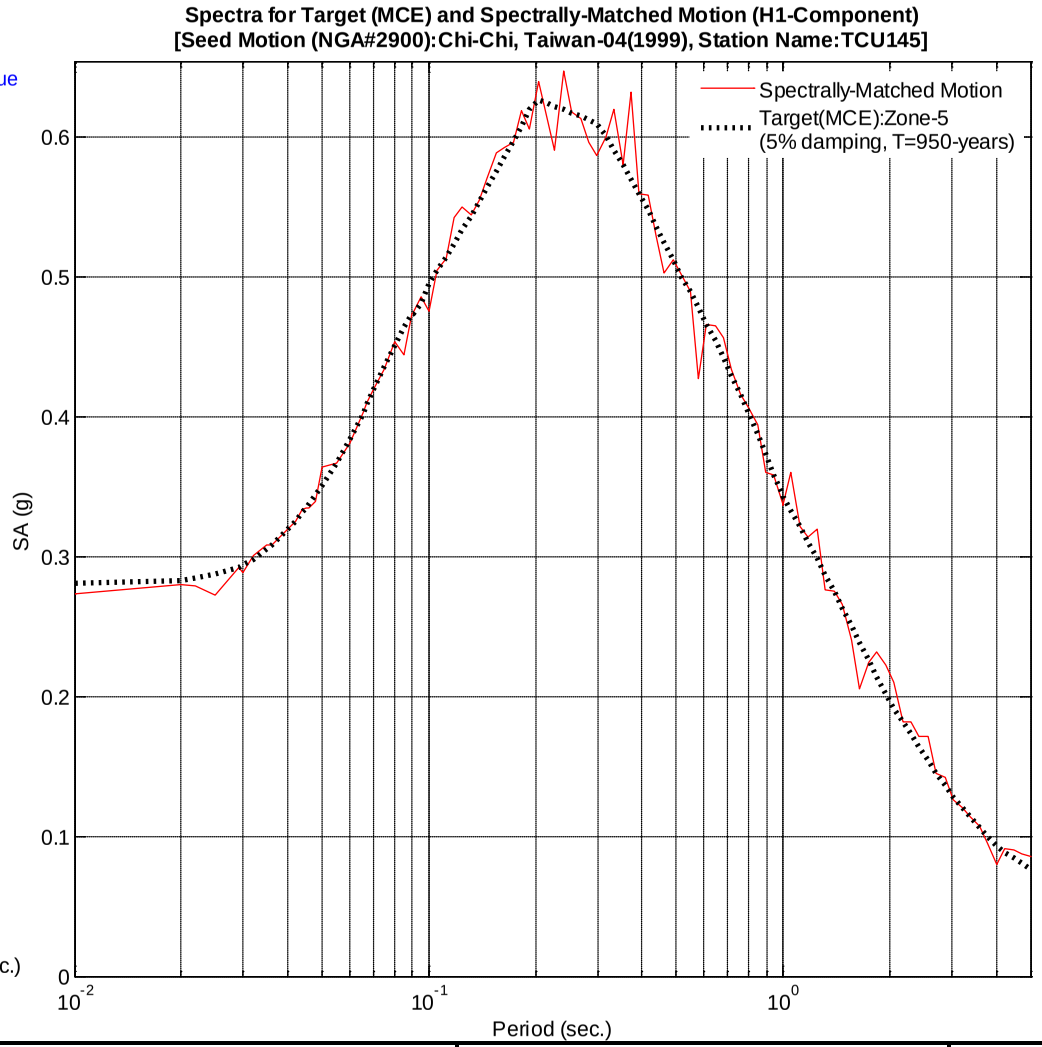
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 5 – SET NO. 3 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

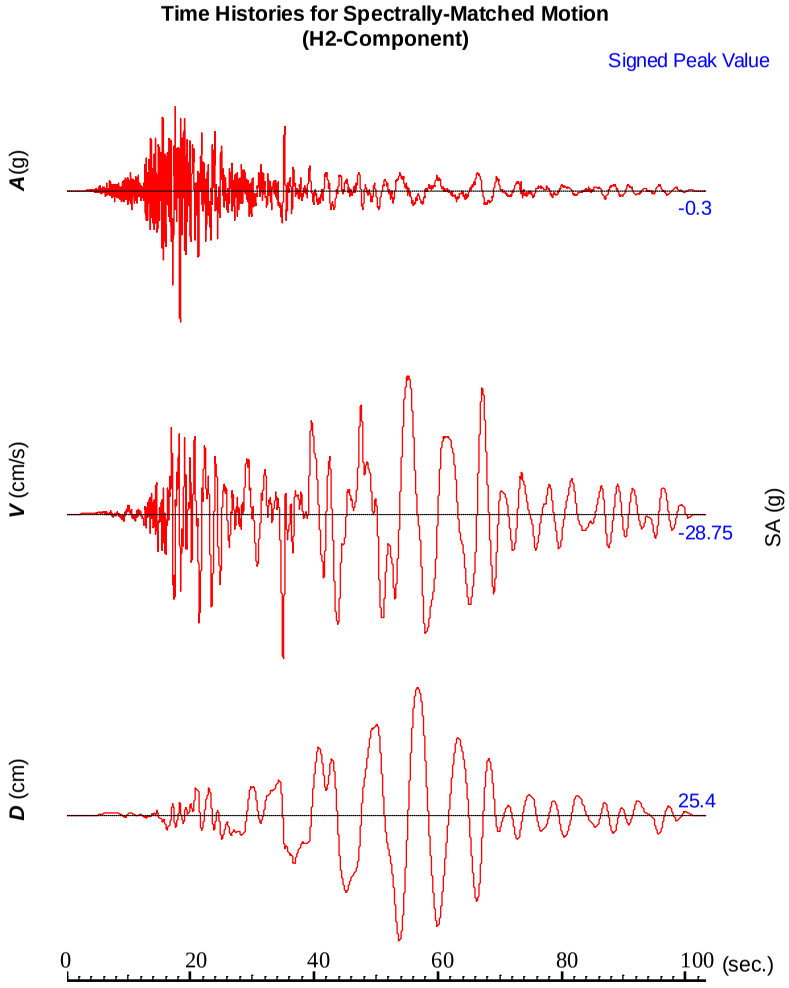
PLATE

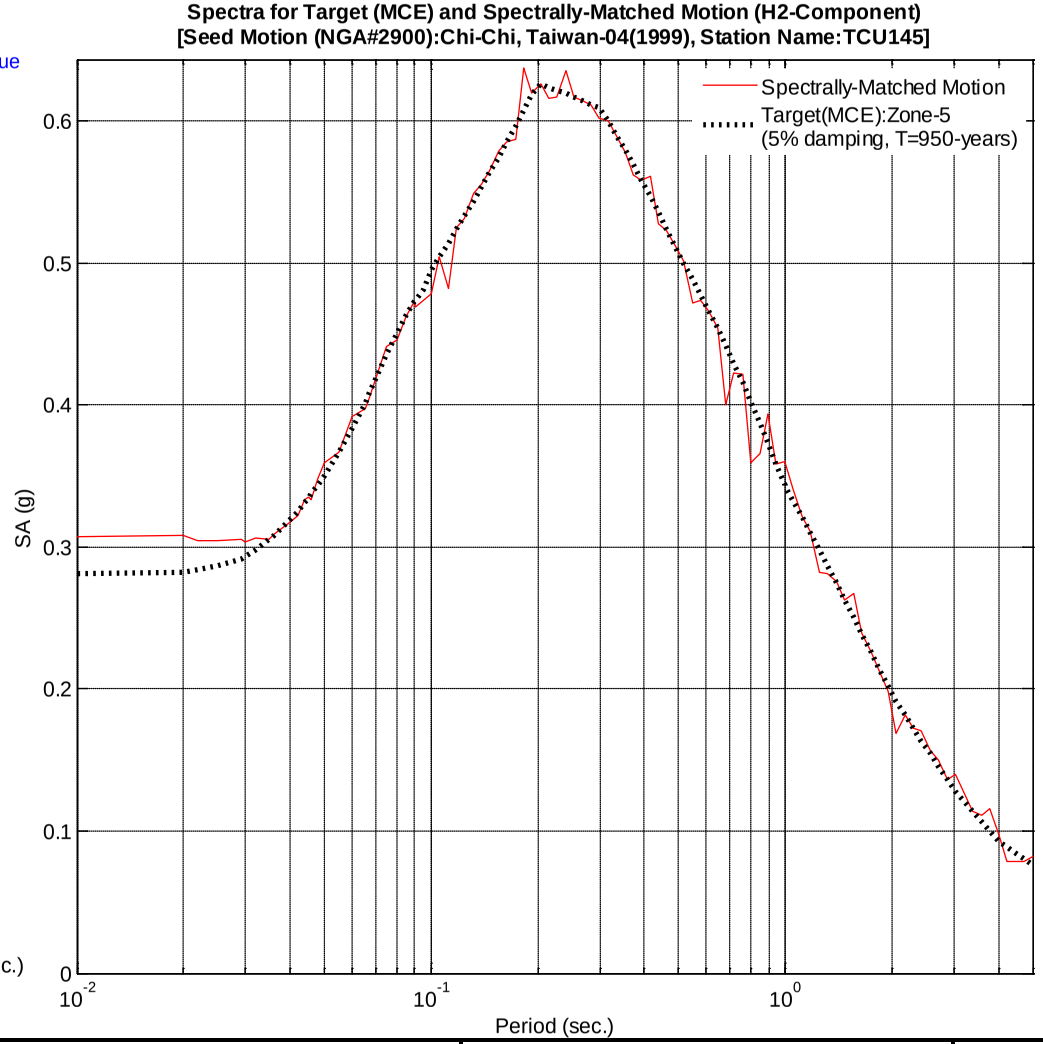
B5-9



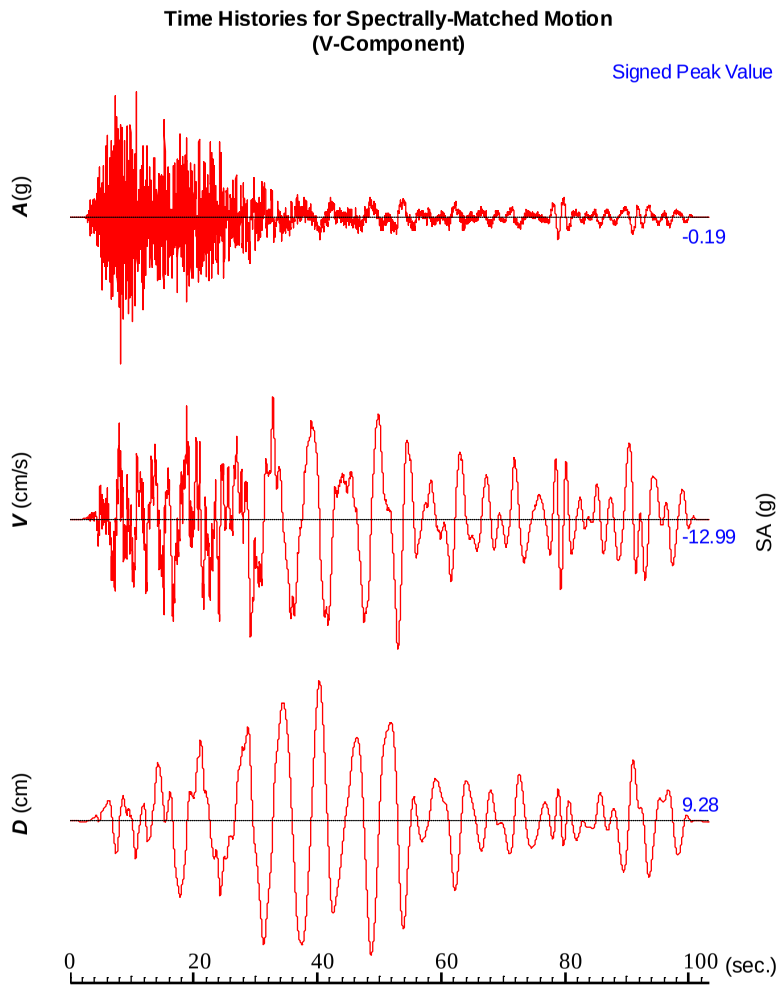


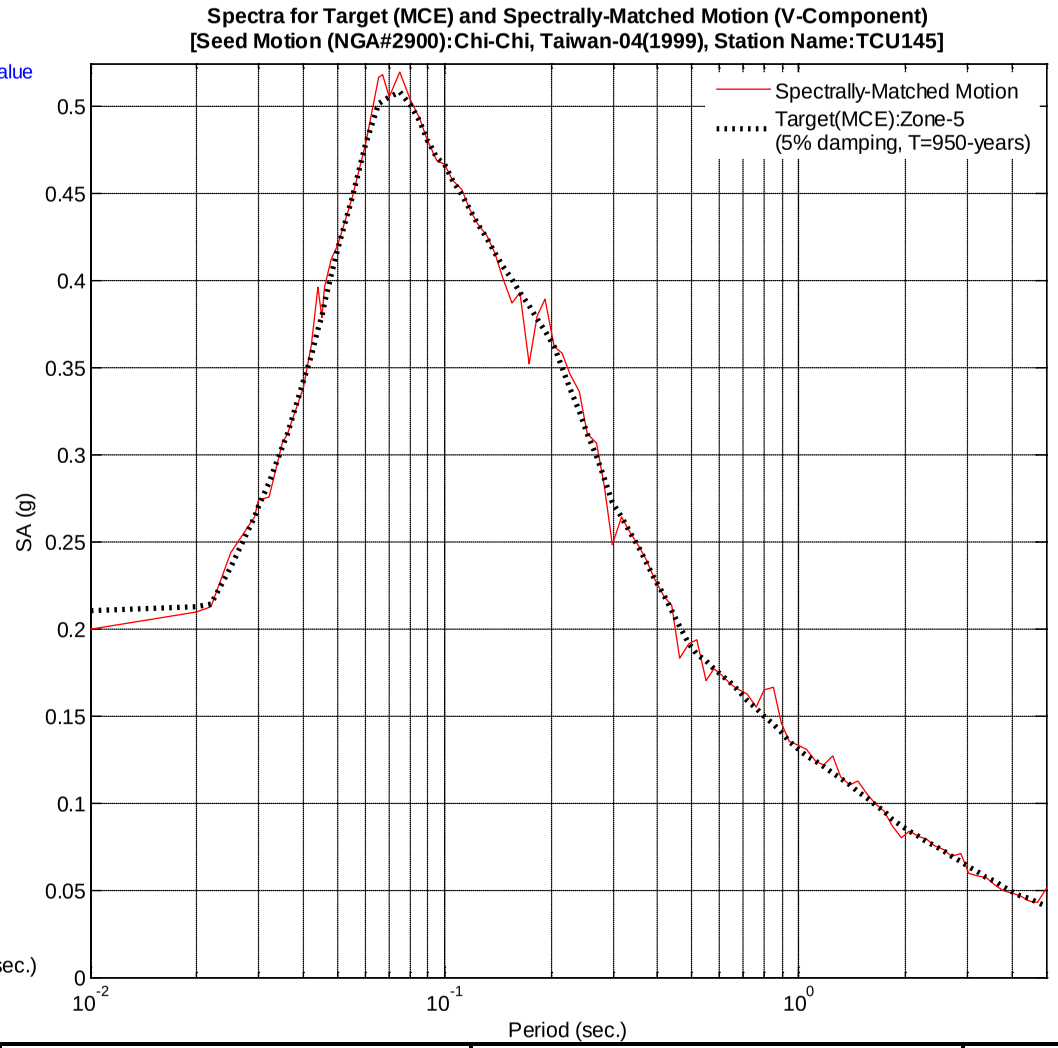
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 4 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-10**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 4 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-11**





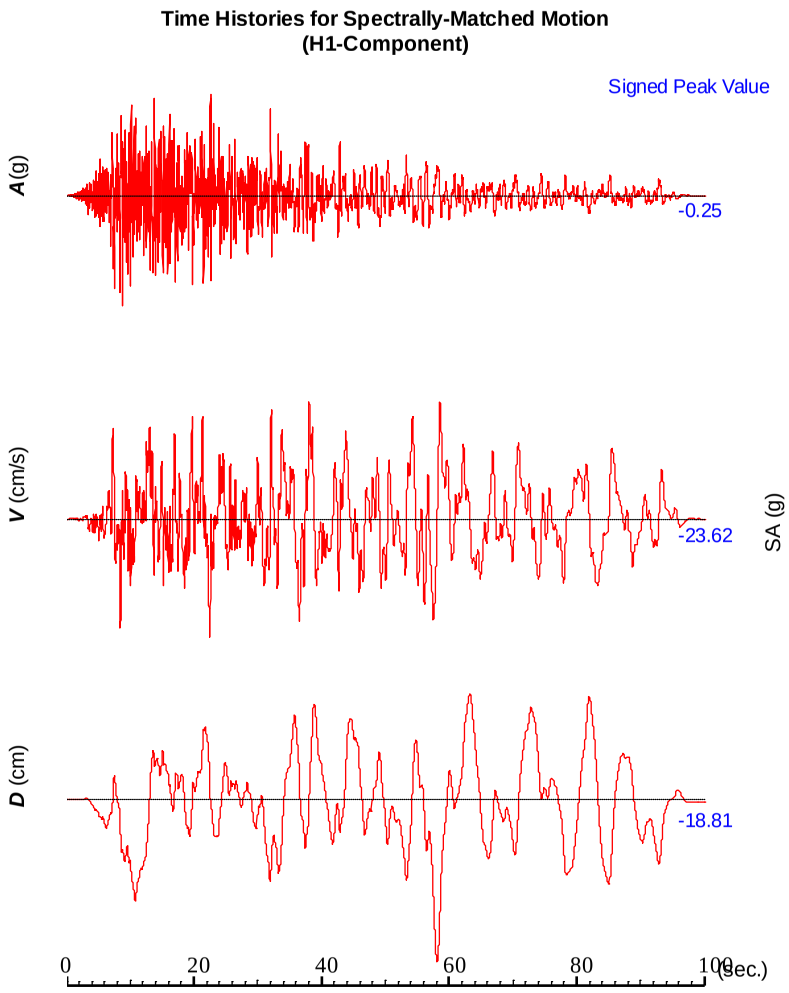
SC SOLUTIONS

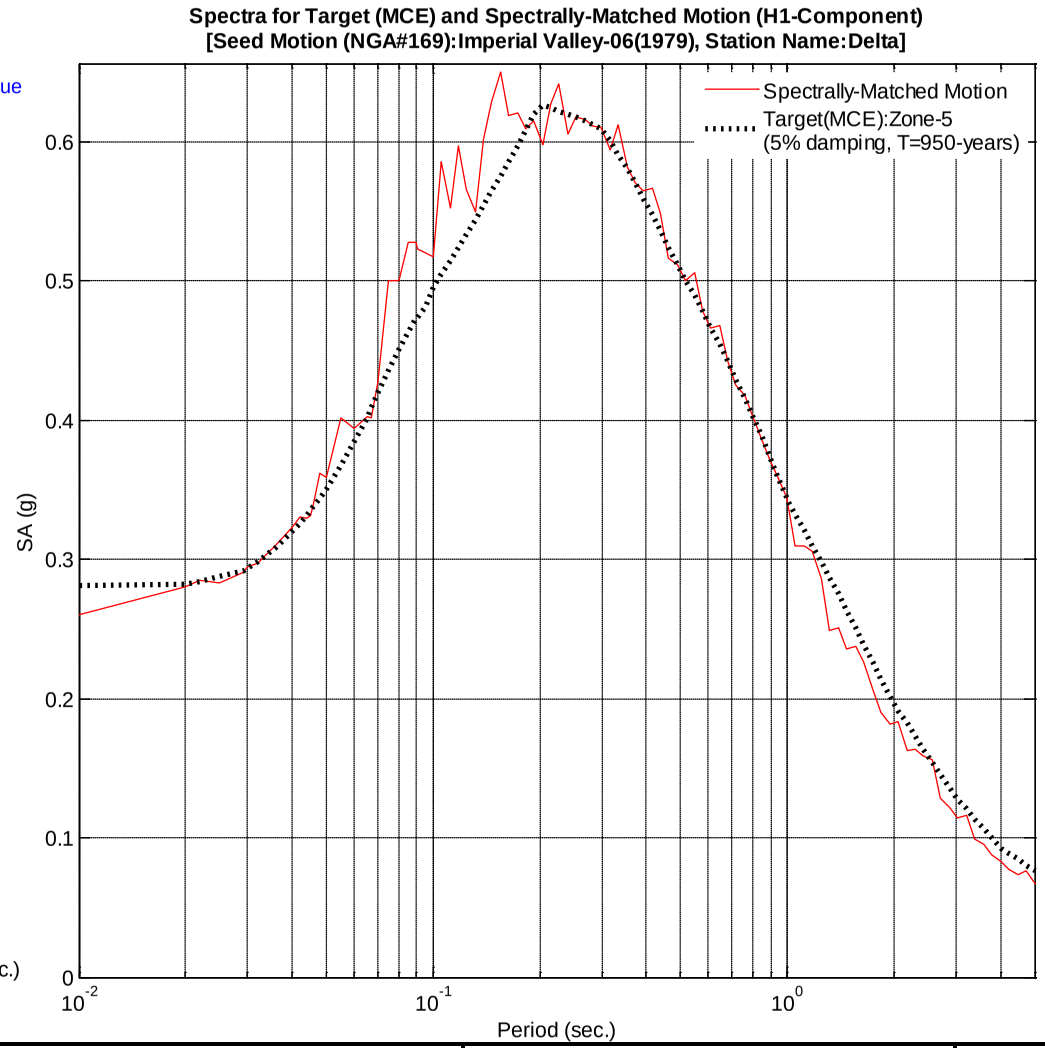
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 5 – SET NO. 4 – VERTICAL

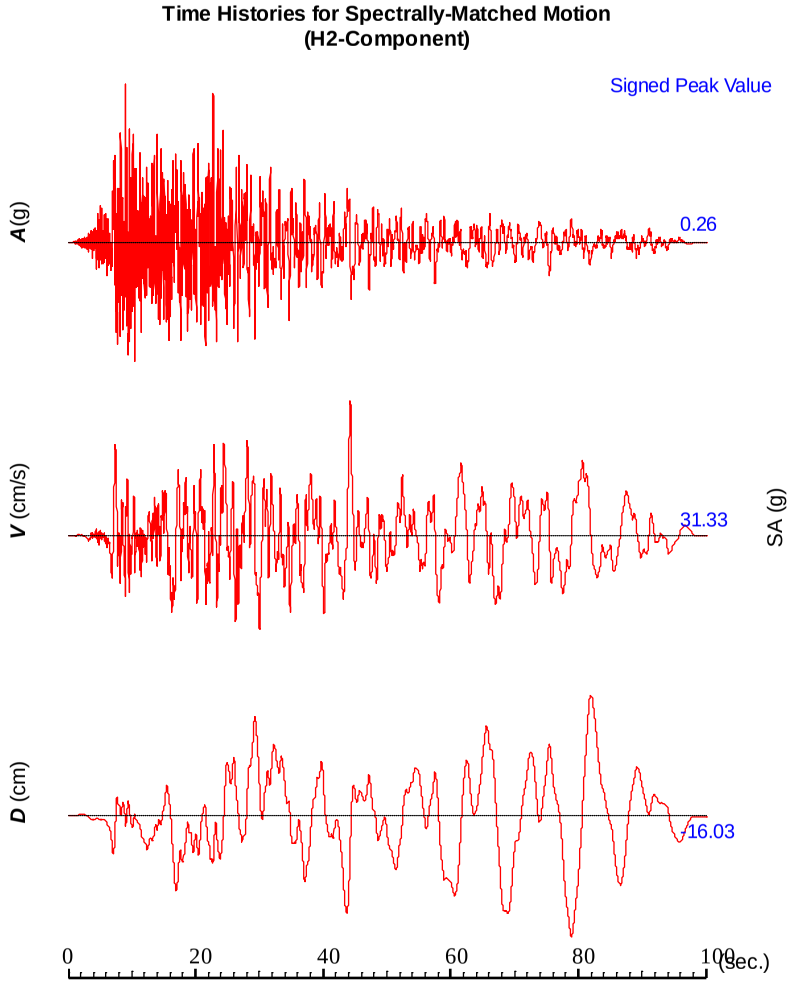
CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

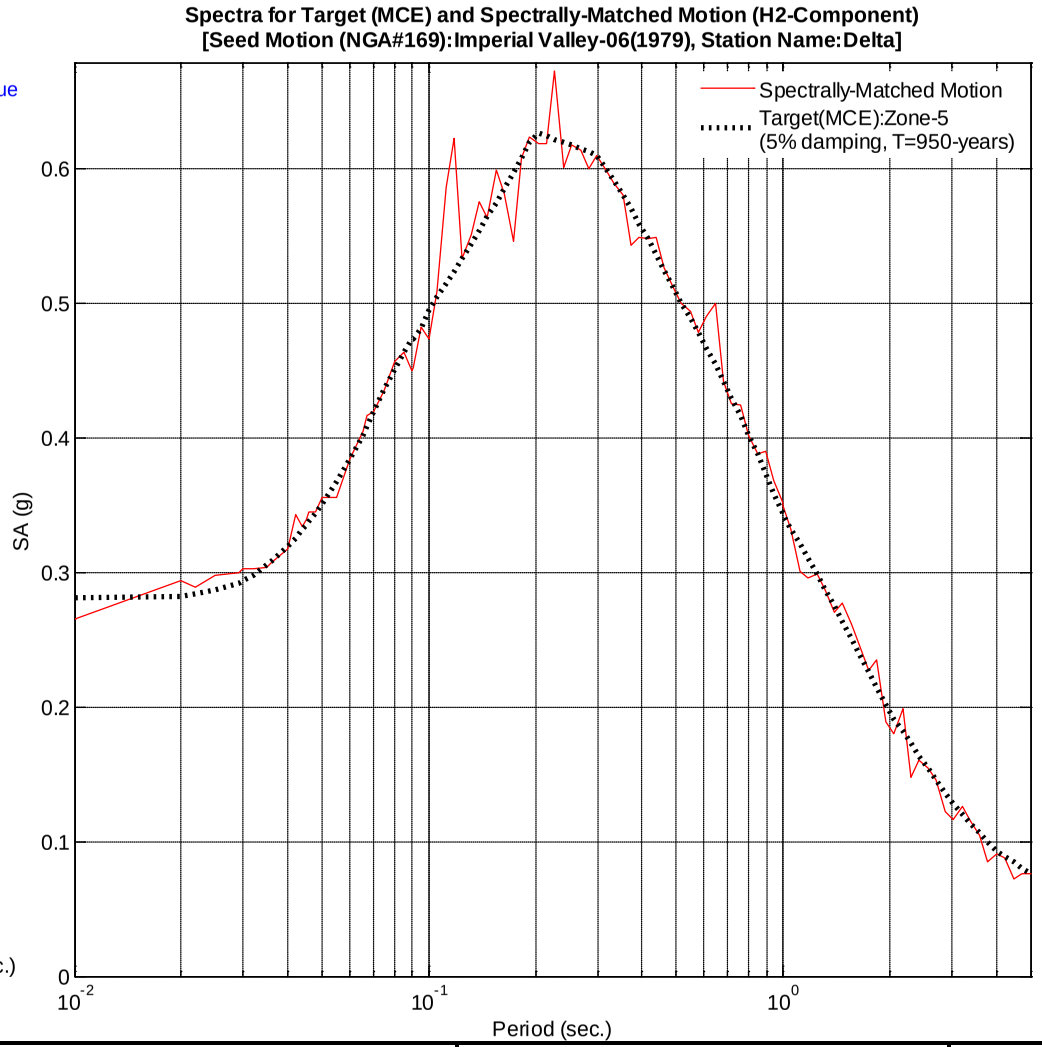
PLATE
B5-12



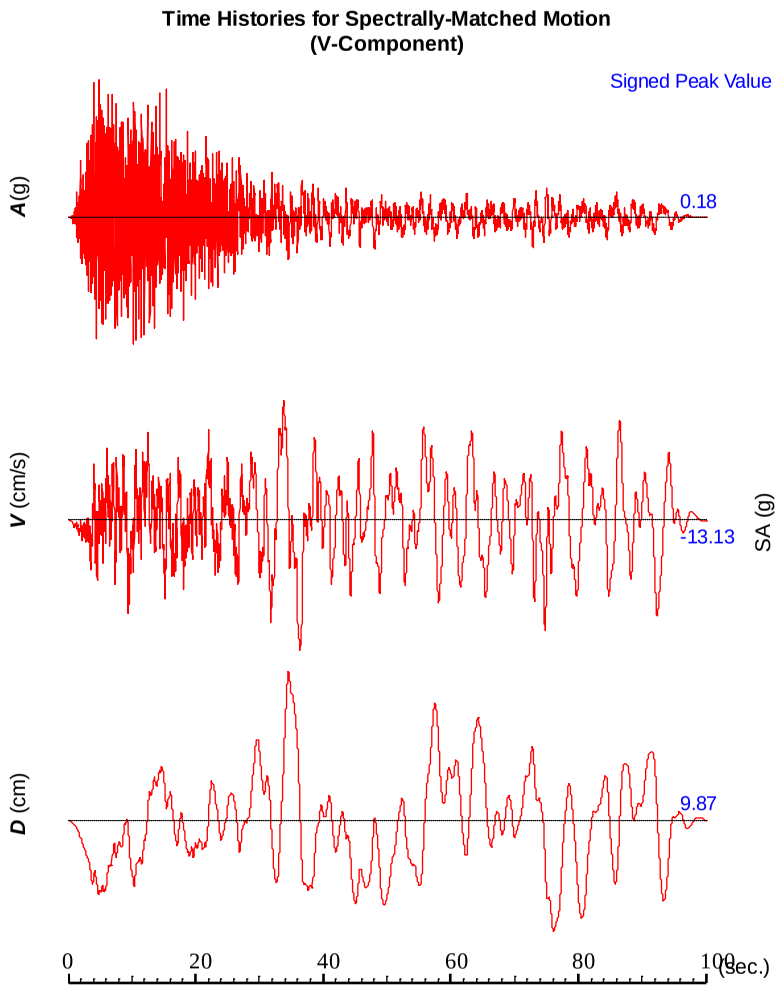


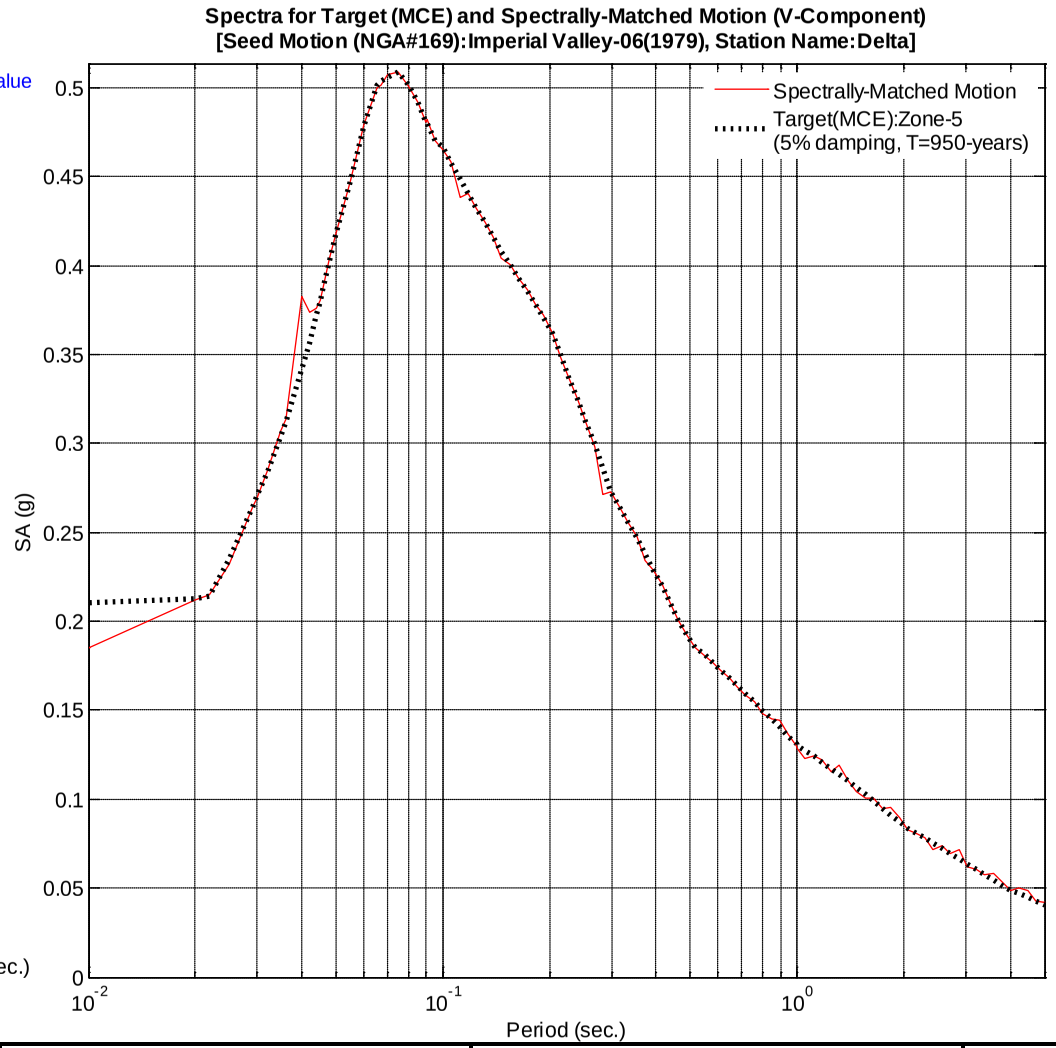
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 5 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-13**



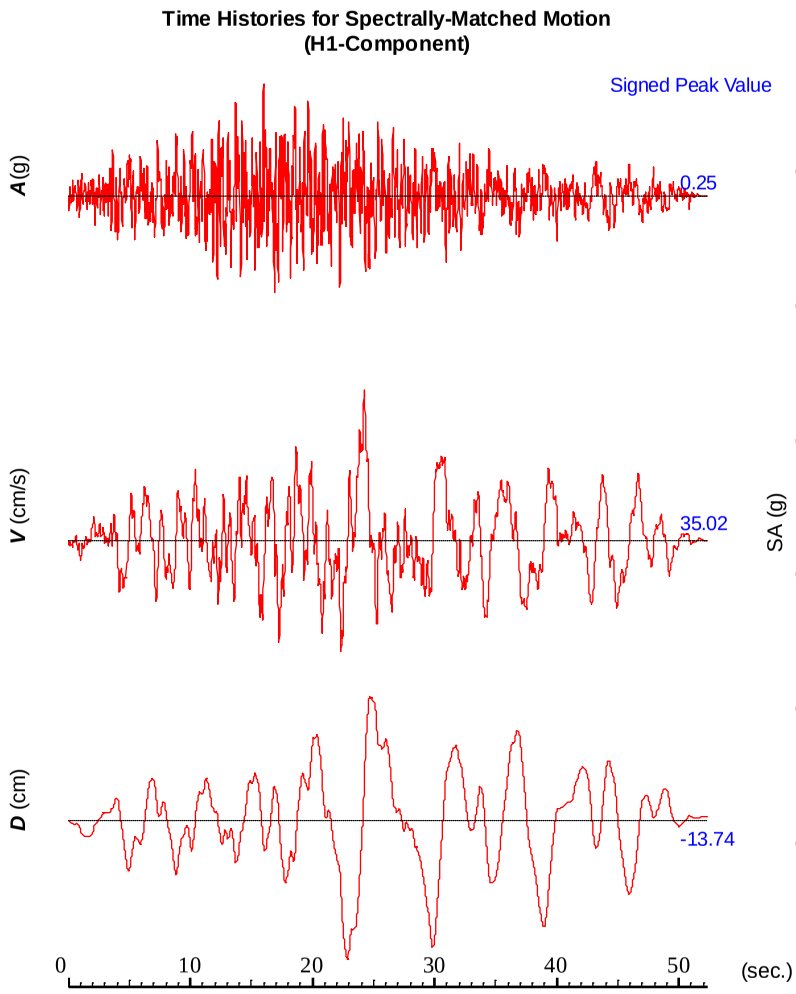


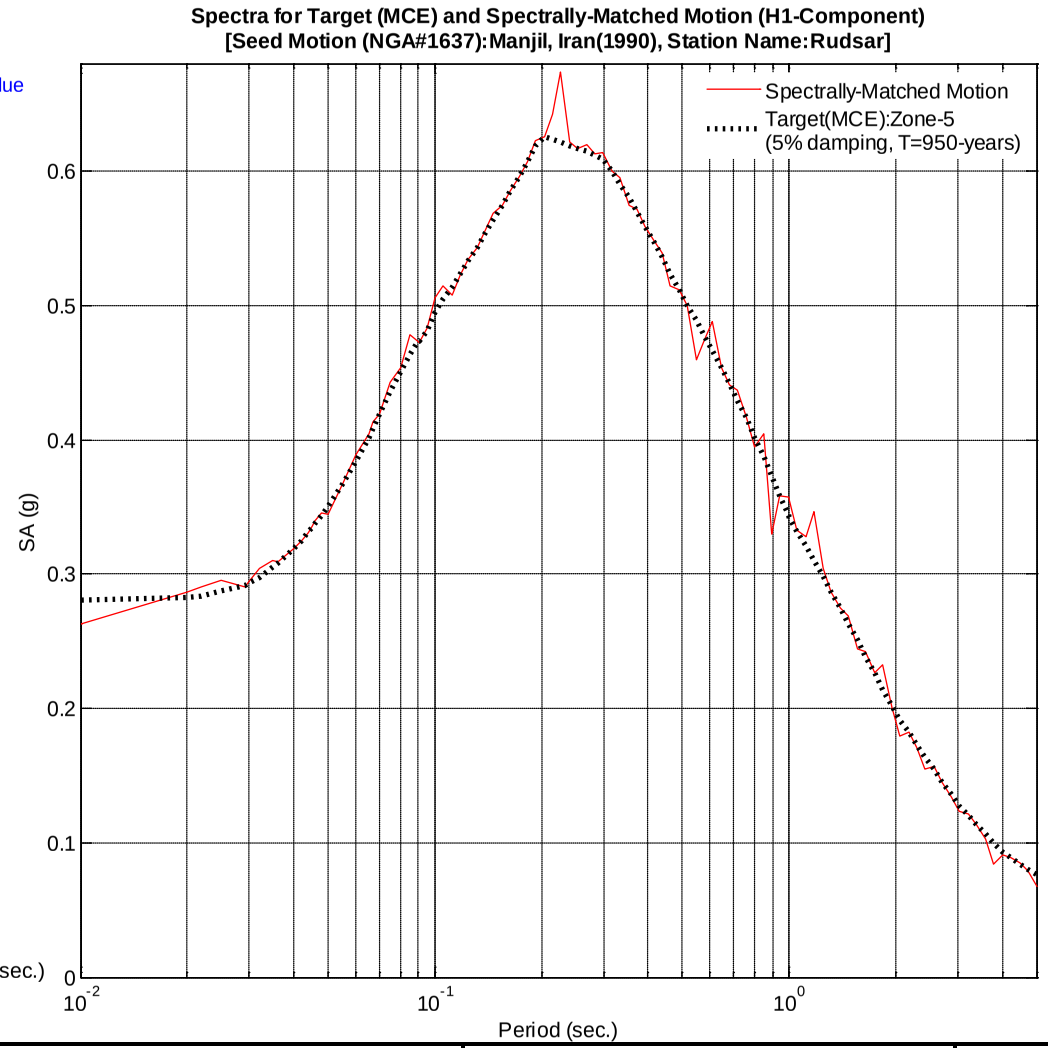
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 5 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-14**





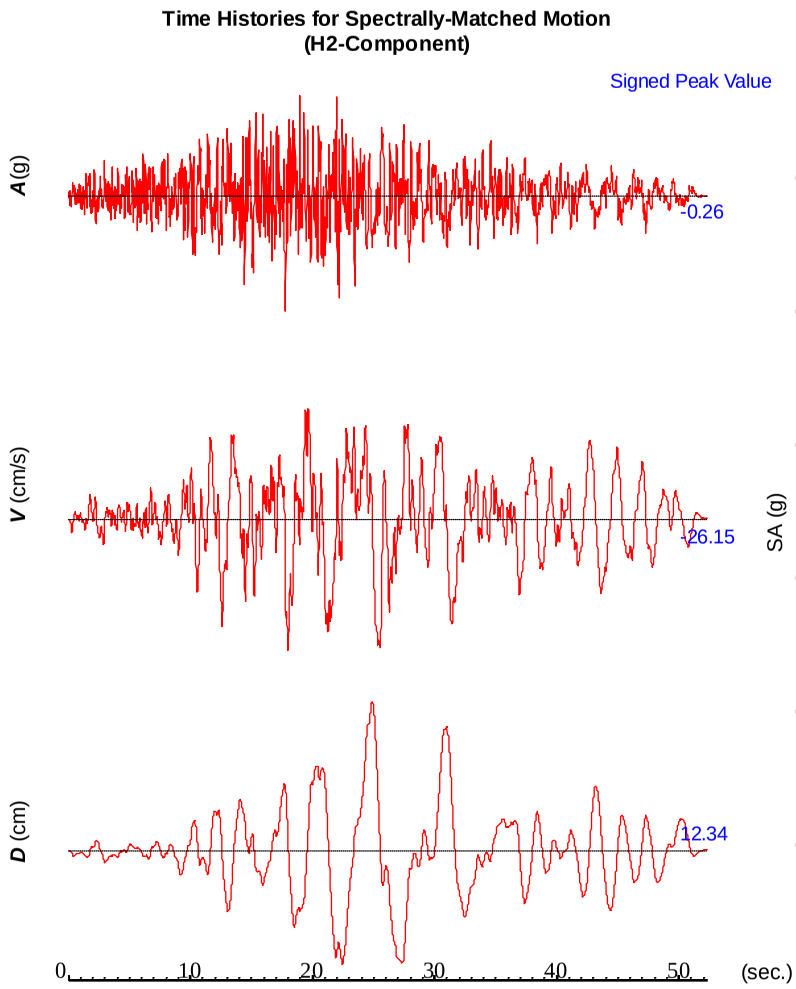
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 5 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-15**

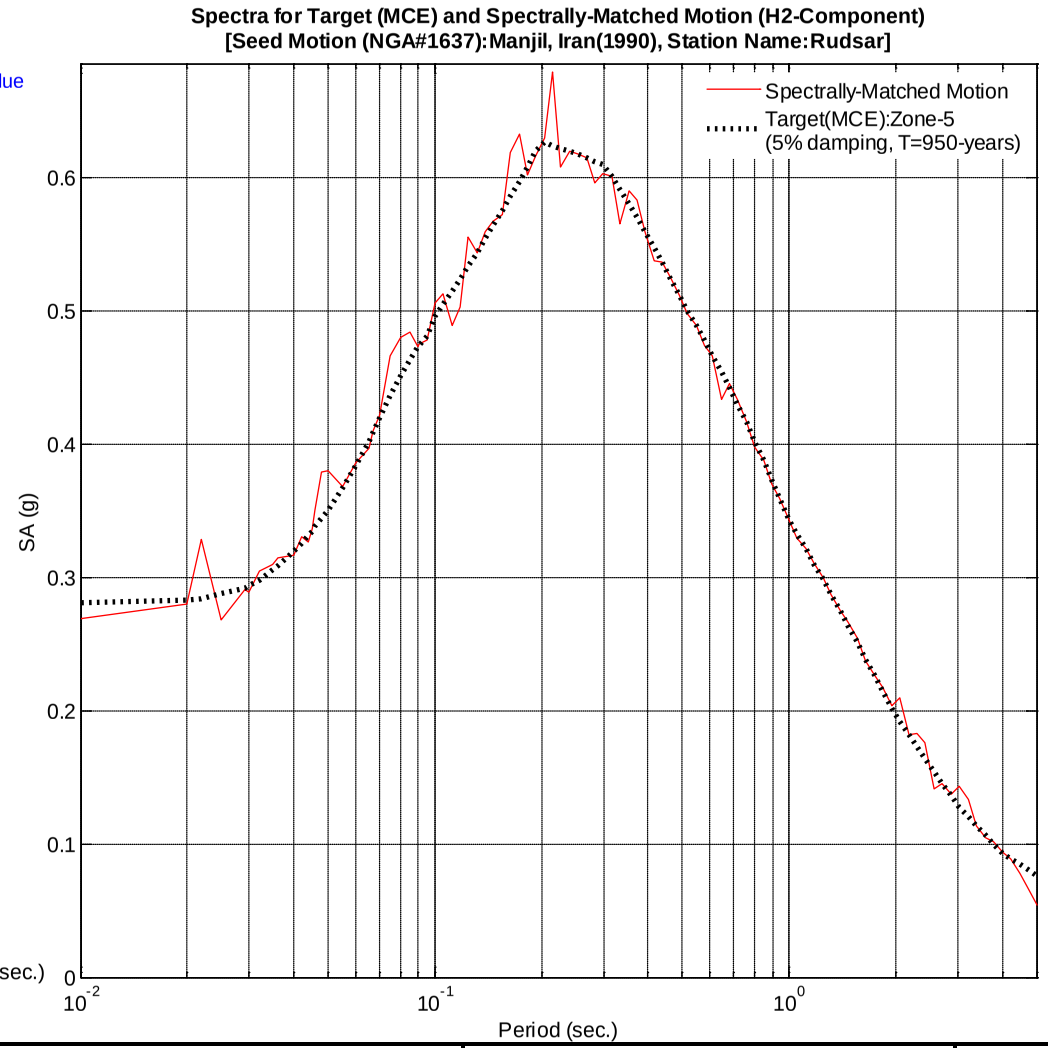




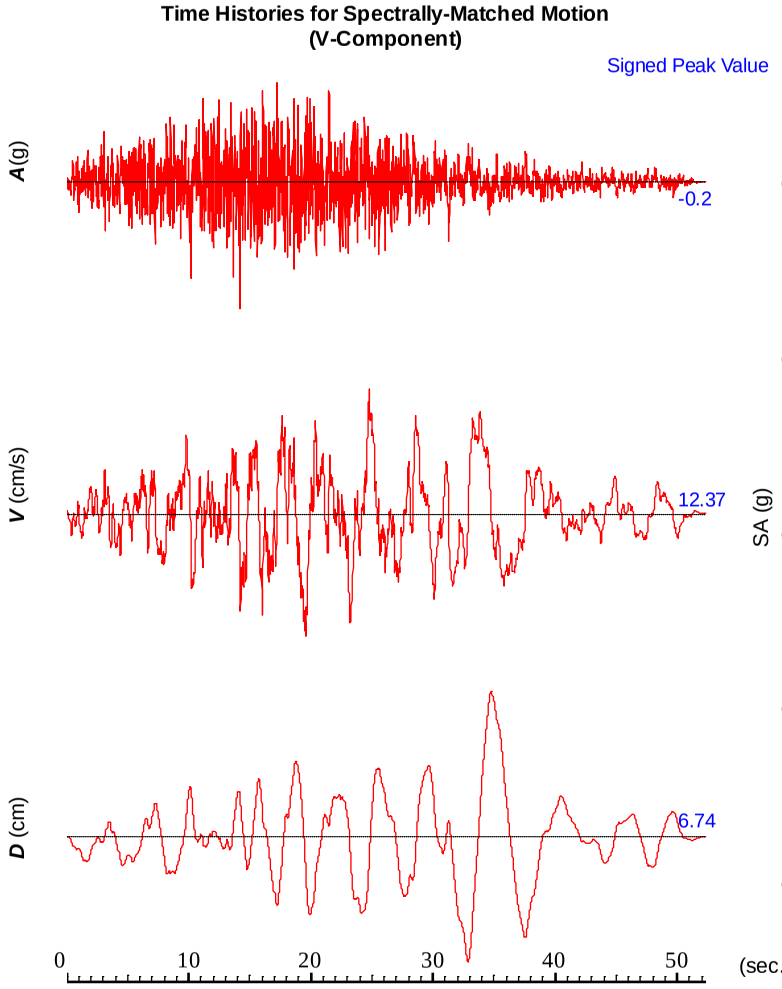
SC SOLUTIONS

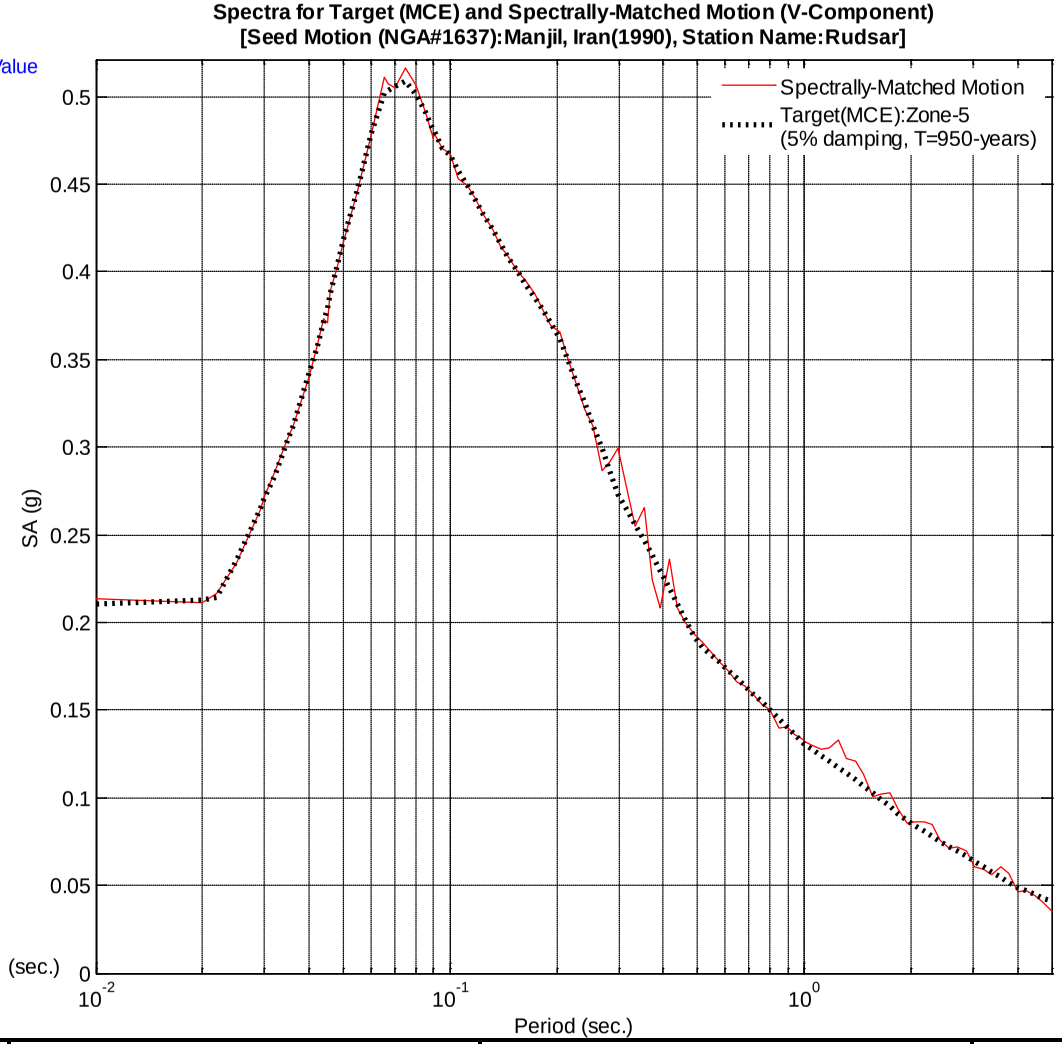
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 5 – SET NO. 6 – HORIZONTAL 1**	PLATE **B5-16**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		





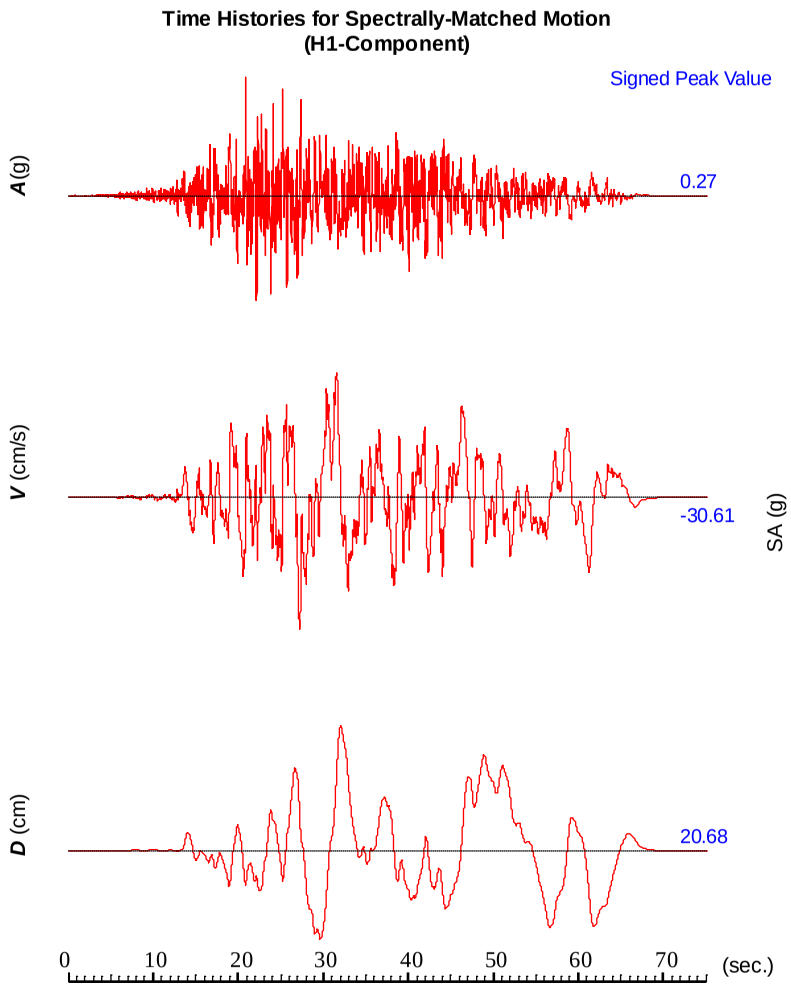
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 6 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-17**

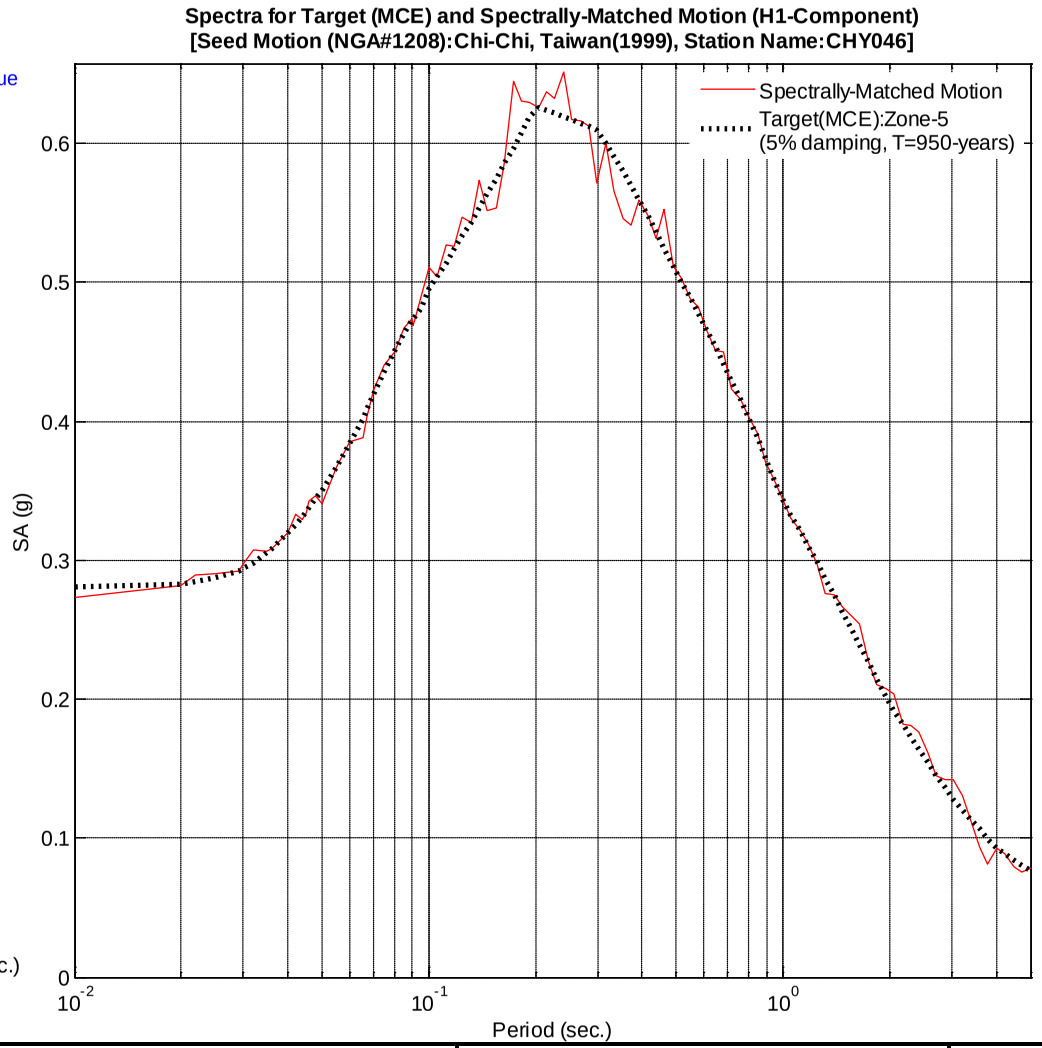




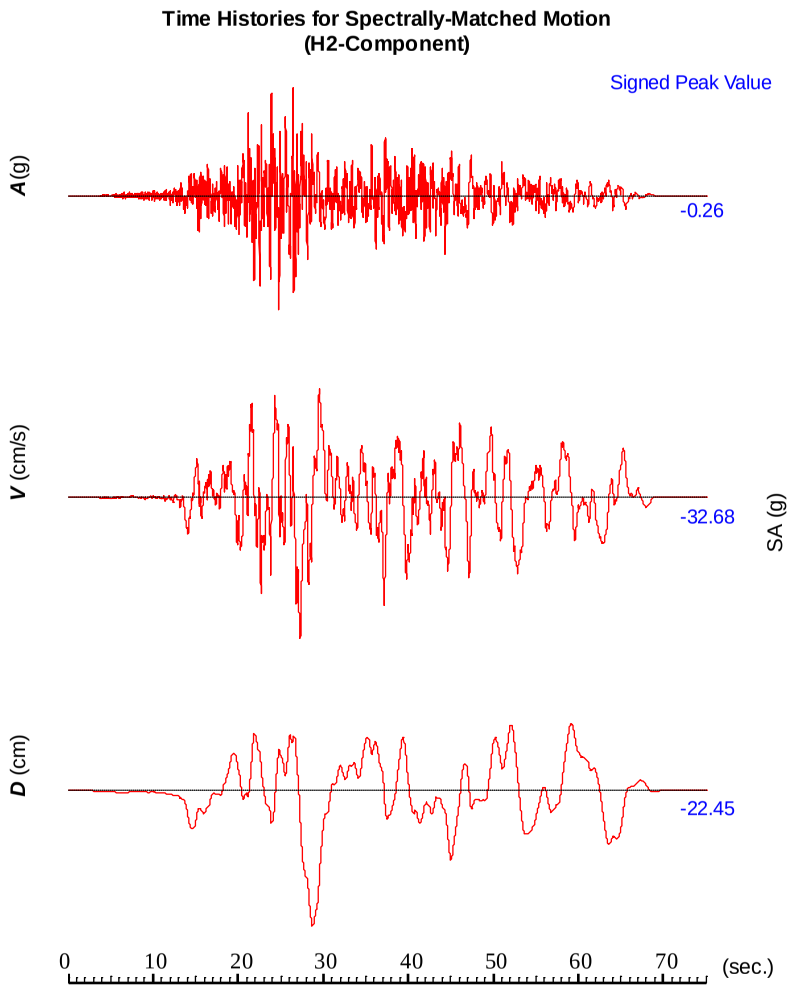
SC SOLUTIONS

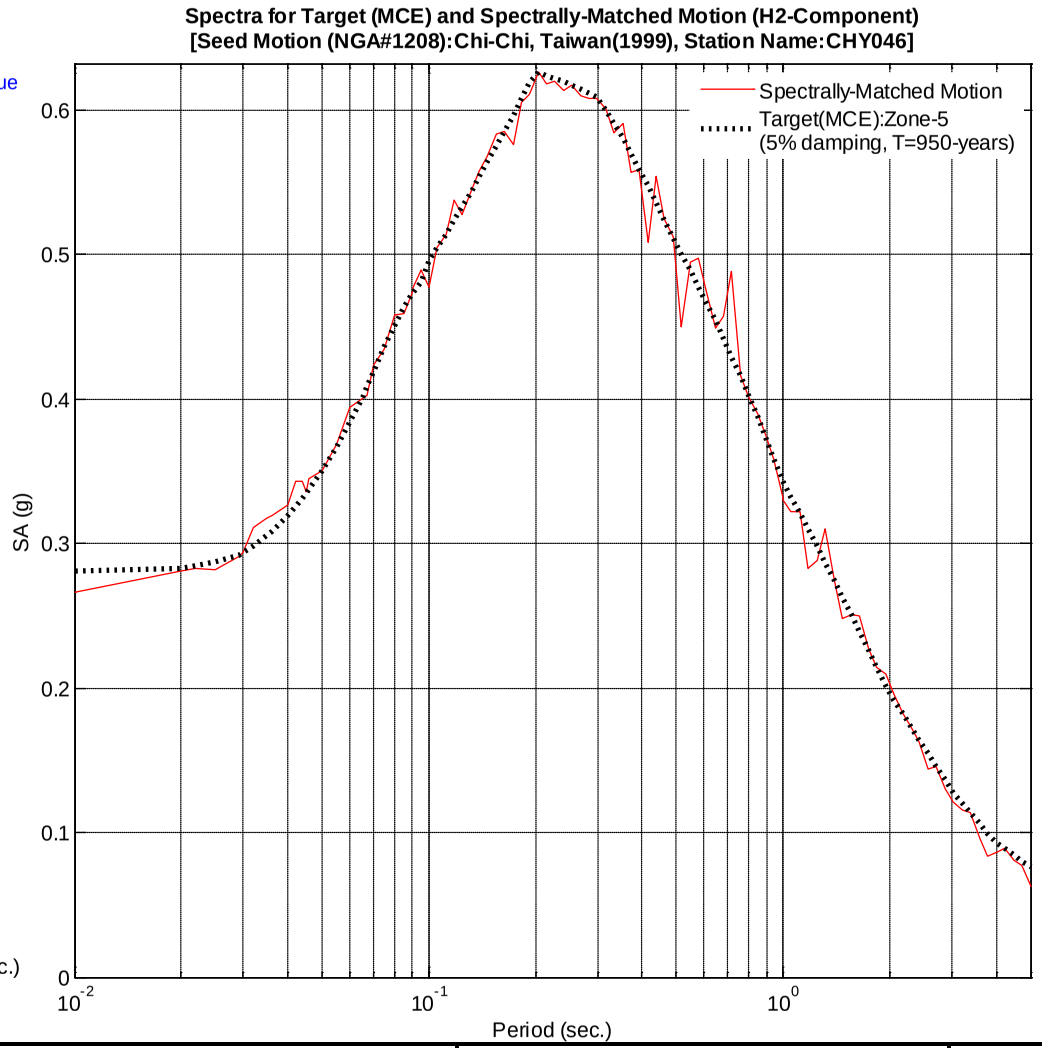
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 5 – SET NO. 6 – VERTICAL**	PLATE **B5-18**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		



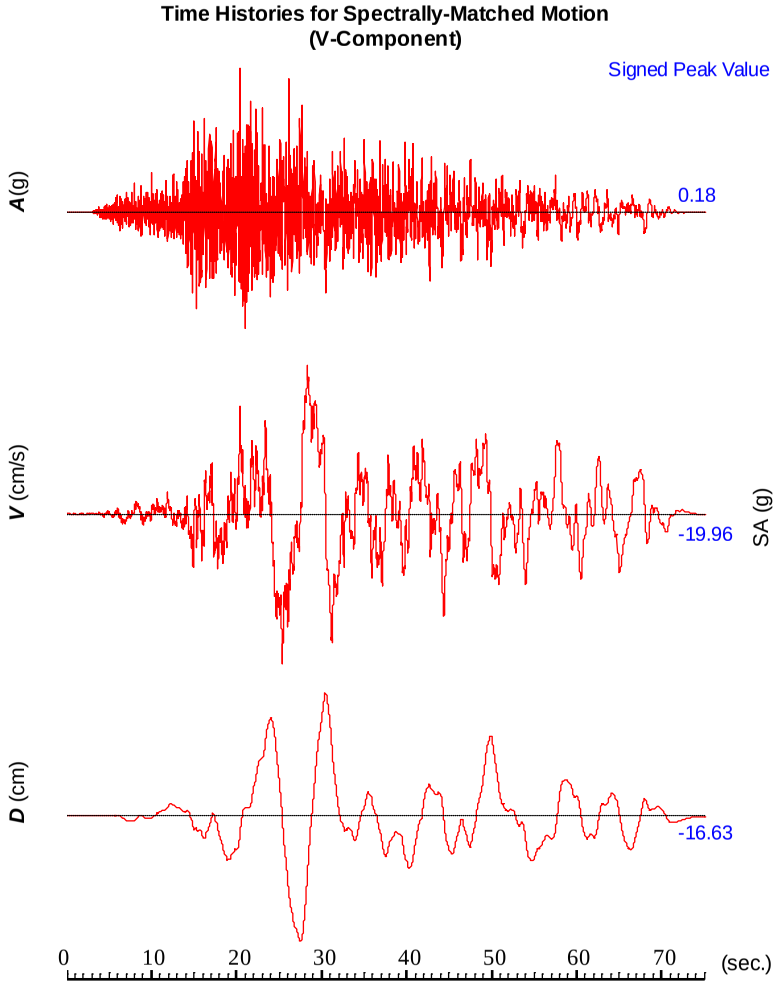


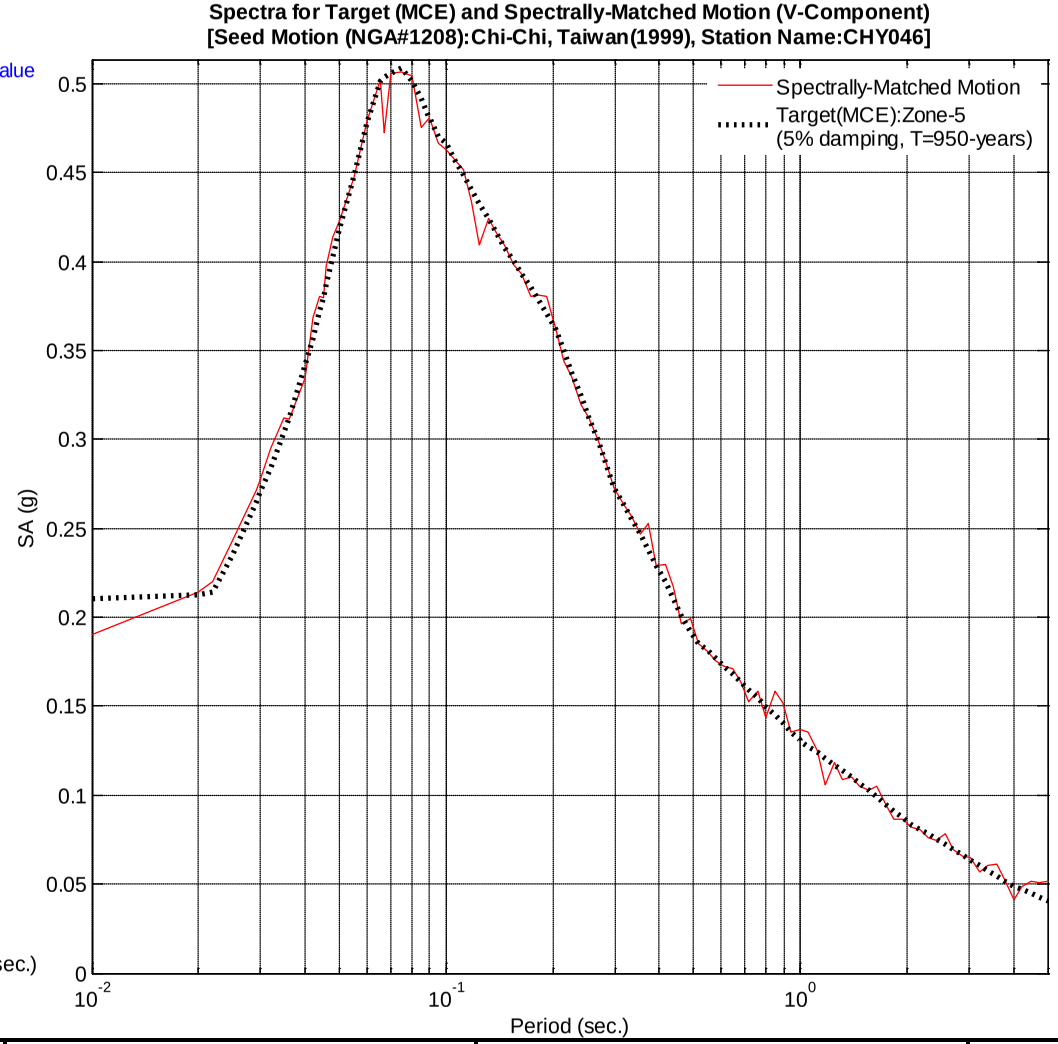
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 7 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-19**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 5 – SET NO. 7 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B5-20**





SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 5 – SET NO. 7 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

B5-21

Table B.6: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motion for **Zone 6**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	882	Landers	1992	North Palm Springs	7.28	26.84	0.301	34.444	19.617	0.332	32.941	15.250	0.220	16.676	8.856
2	1776	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.293	40.022	26.649	0.304	39.567	17.463	0.245	17.527	10.386
3	2112	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.323	40.794	25.452	0.362	35.218	28.178	0.224	23.279	22.410
4	2900	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.324	31.629	27.590	0.358	34.327	31.252	0.226	15.293	11.034
5	169	Imperial Valley-06	1979	Delta	6.53	22.03	0.305	28.094	22.432	0.309	37.399	19.230	0.221	15.112	11.820
6	1637	Manjil, Iran	1990	Rudsar	7.37	64.47	0.307	32.682	16.780	0.317	30.287	14.445	0.251	14.507	8.056
7	1208	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.322	35.632	23.544	0.317	34.500	25.878	0.224	24.376	19.918

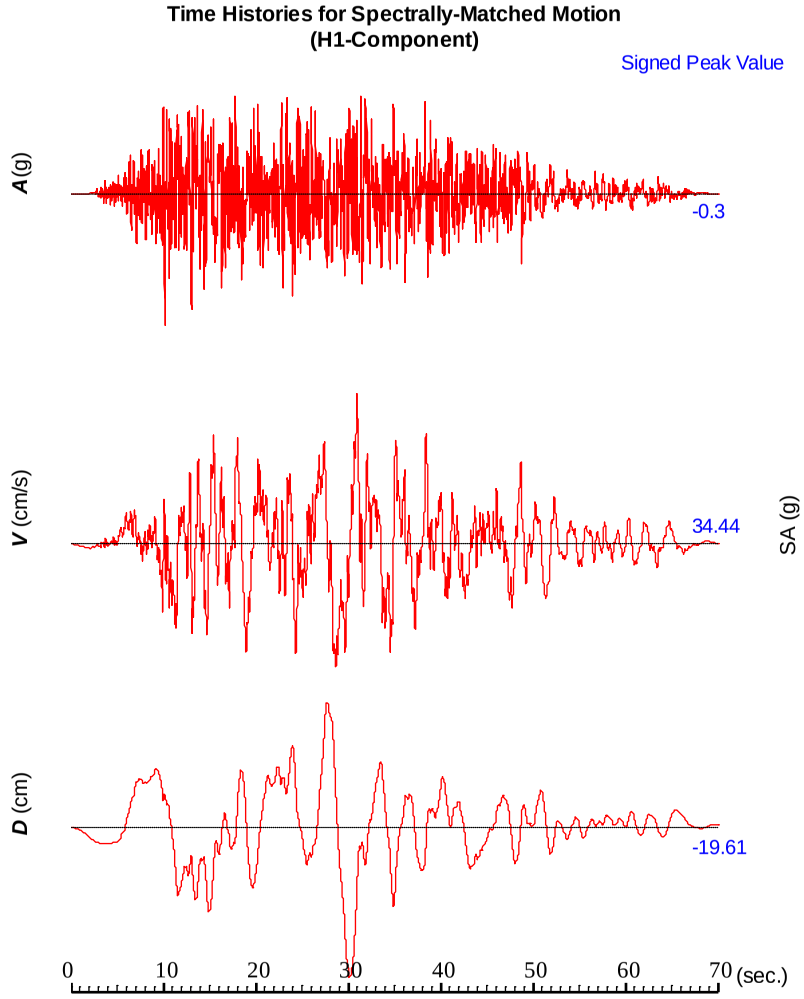
SC SOLUTIONS

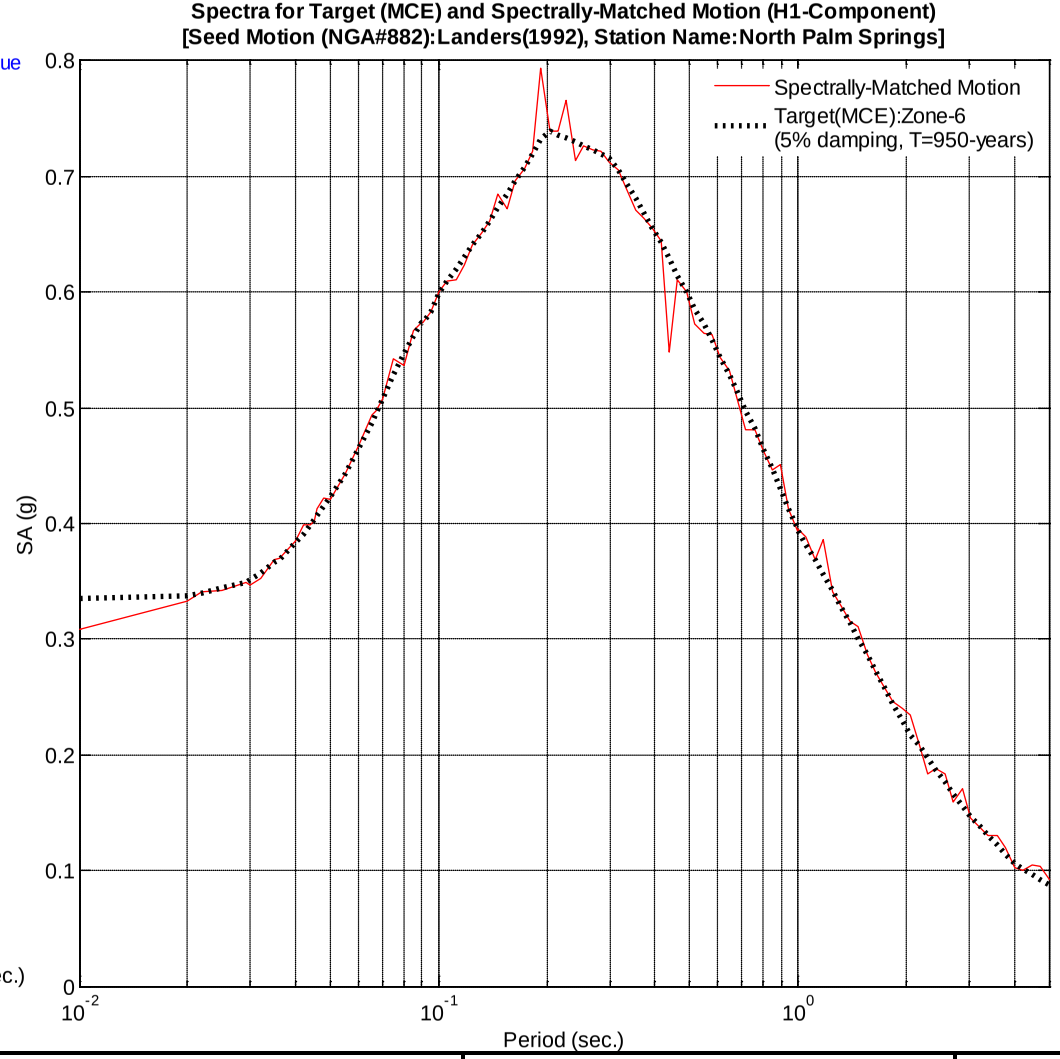
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS MCE – ZONE 6

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE **B6-0**





SC SOLUTIONS

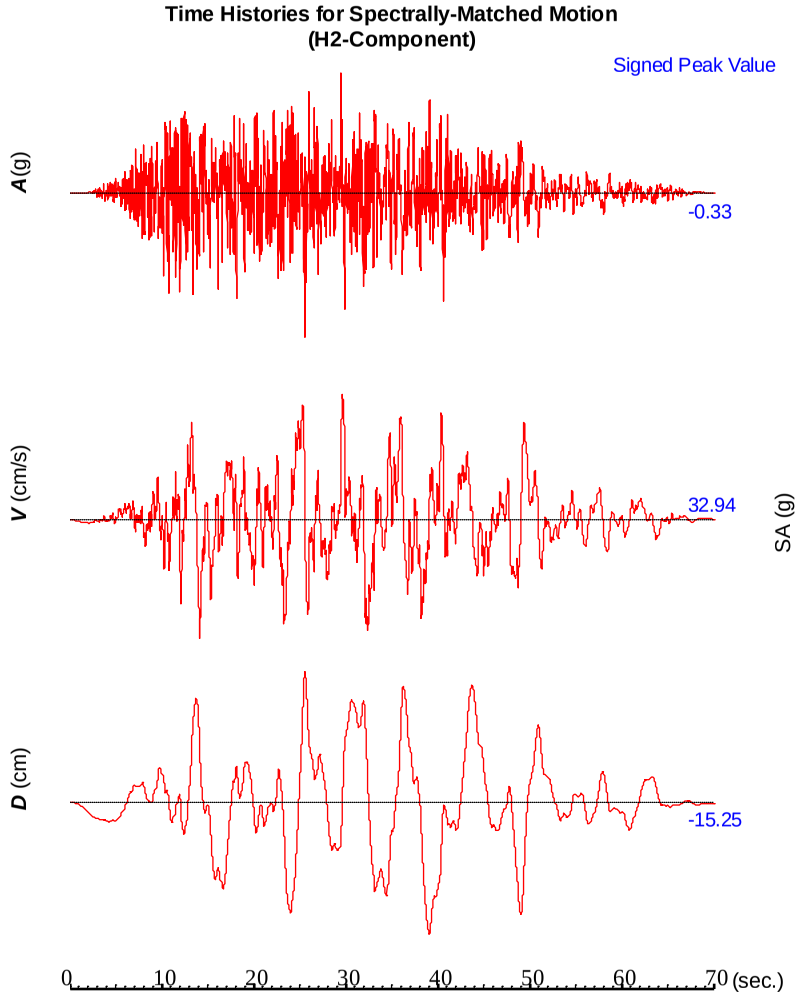
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

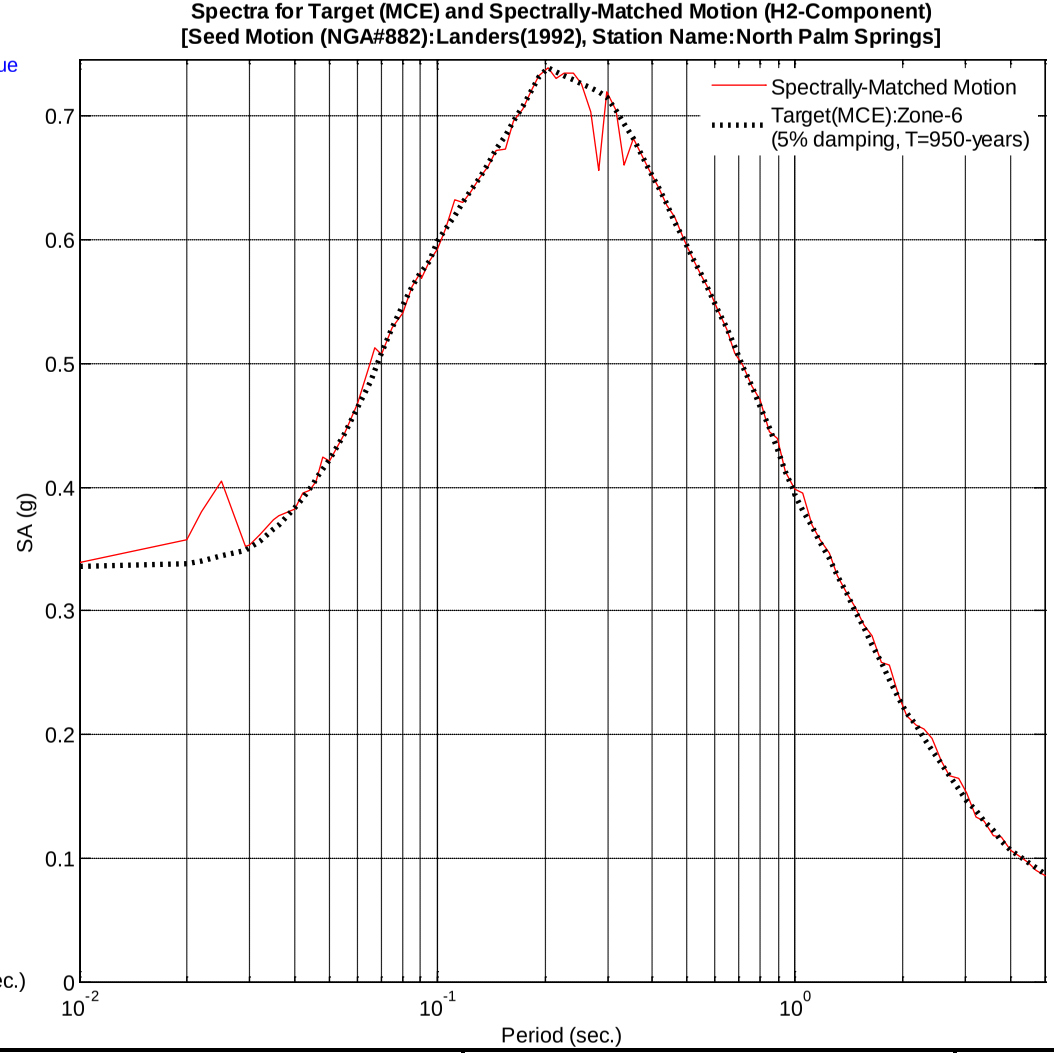
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 6 – SET NO. 1 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

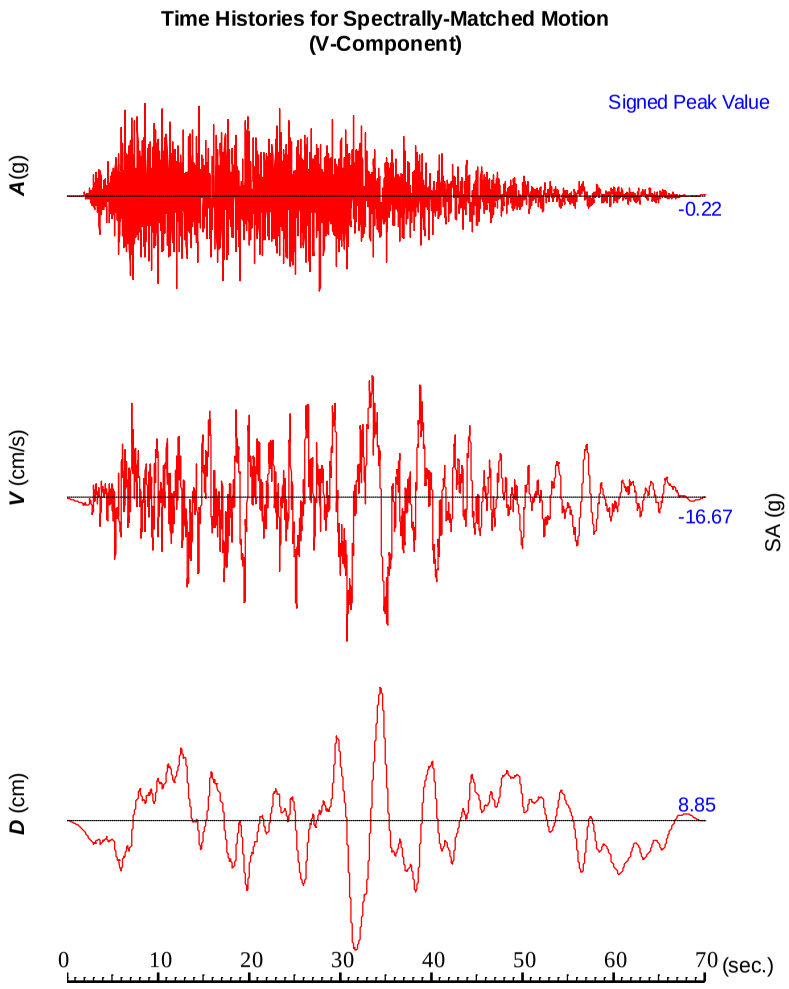
B6-1

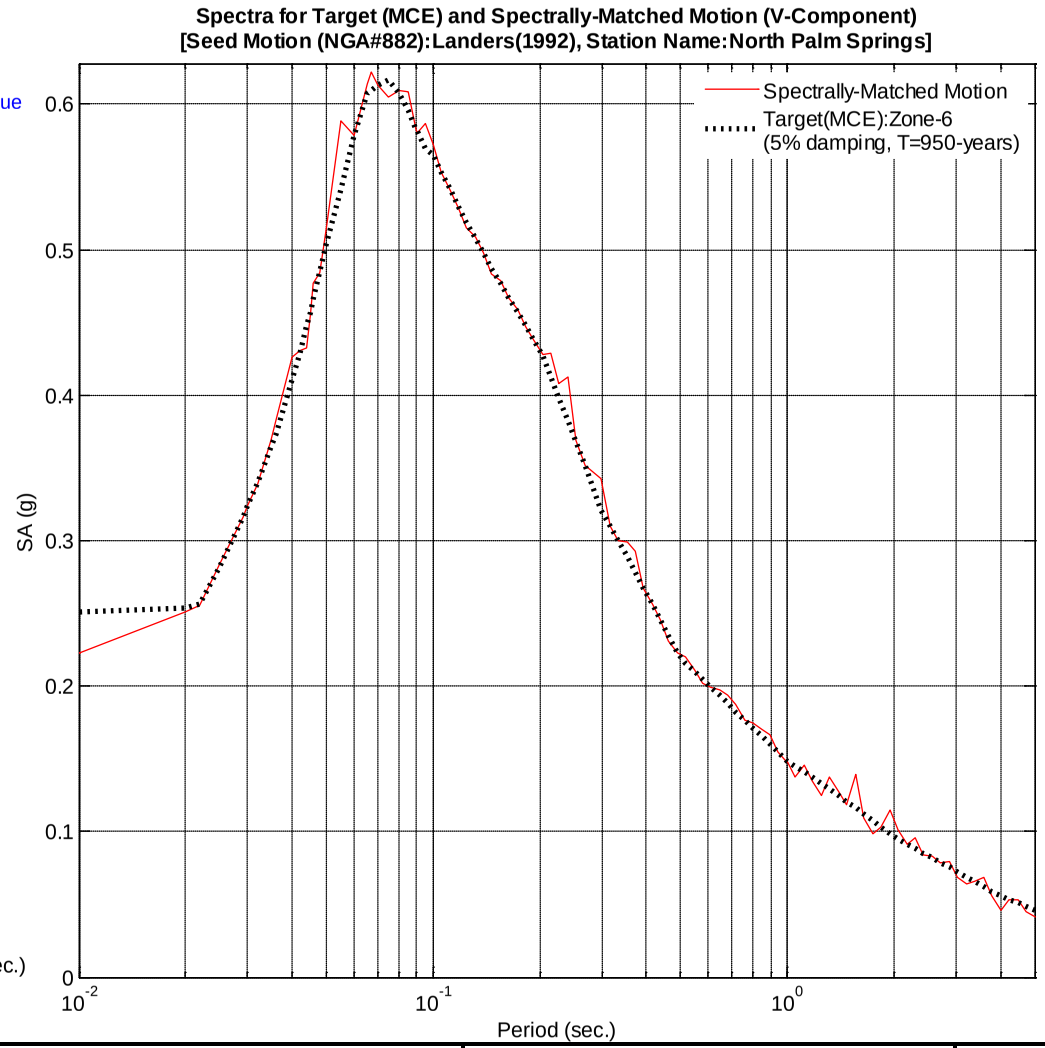




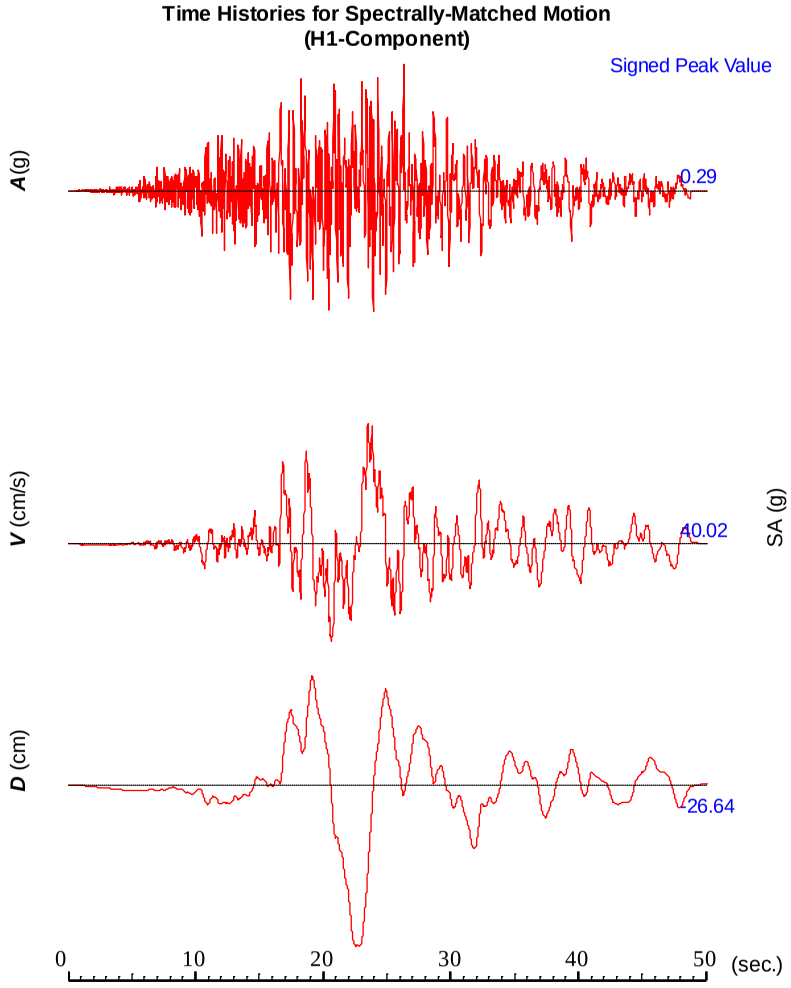
SC SOLUTIONS

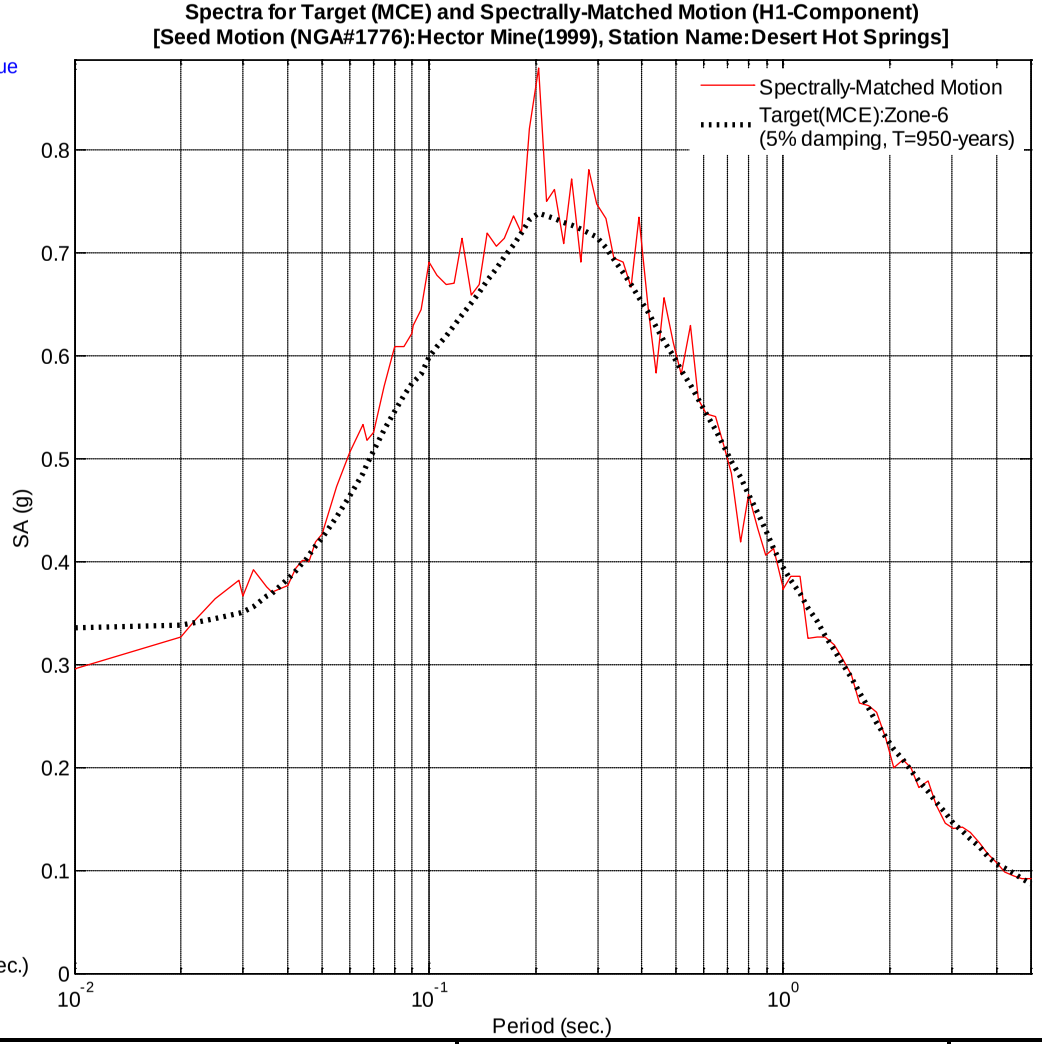
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 6 – SET NO. 1 – HORIZONTAL 2**	PLATE **B6-2**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		



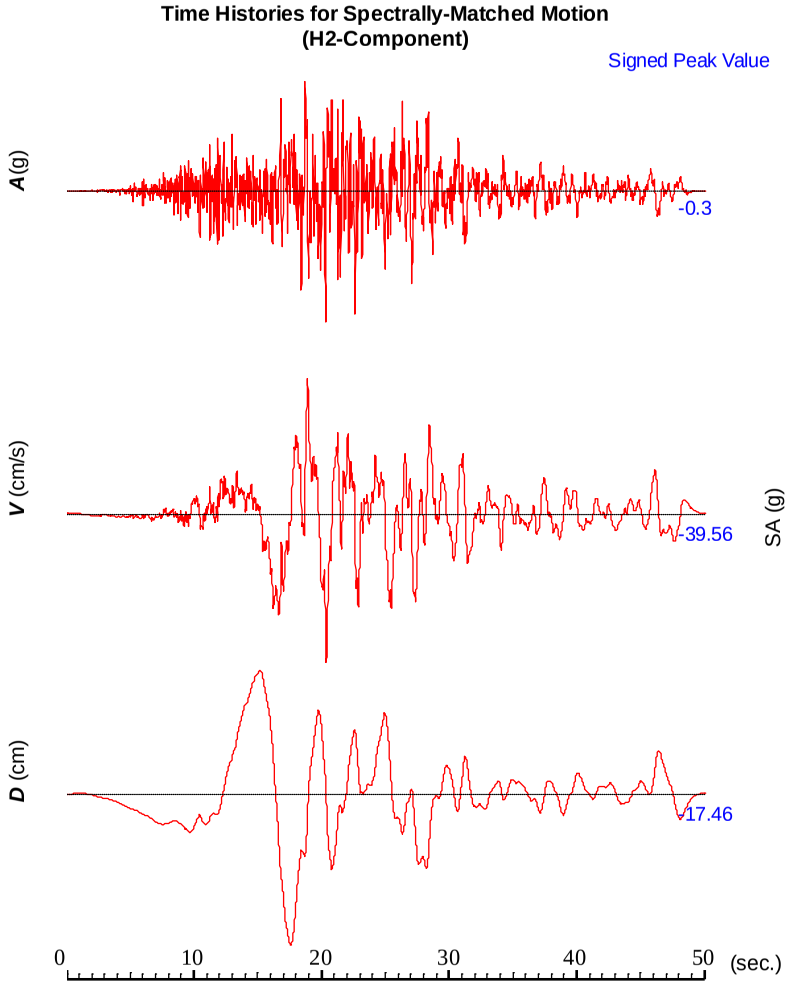


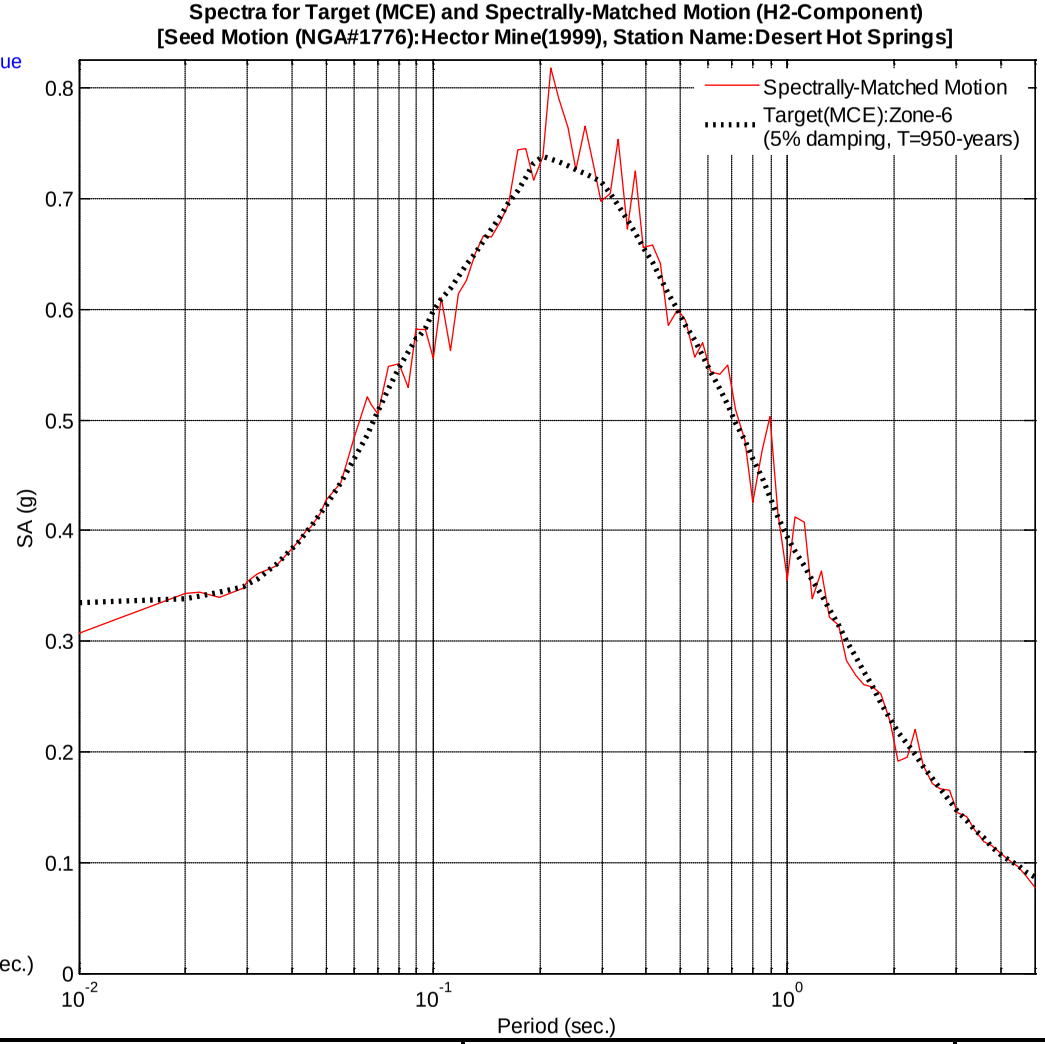
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 6 – SET NO. 1 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-3**



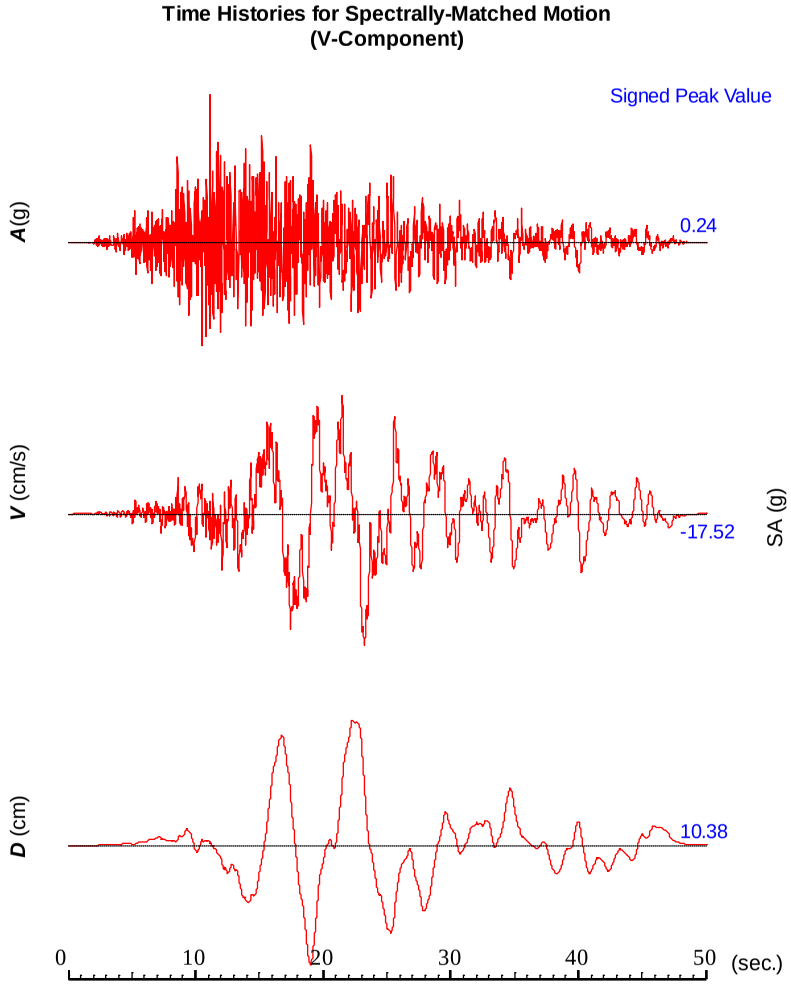


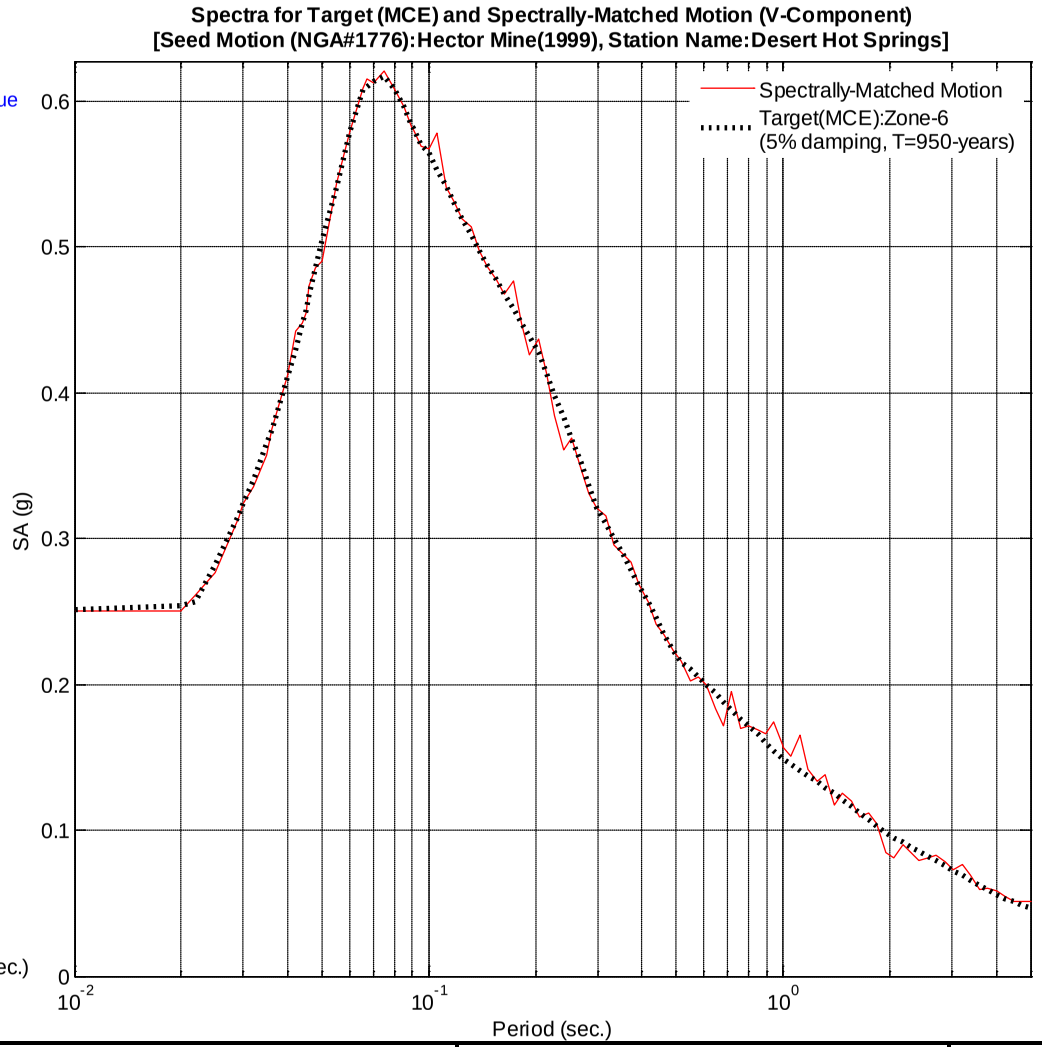
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 2 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-4**





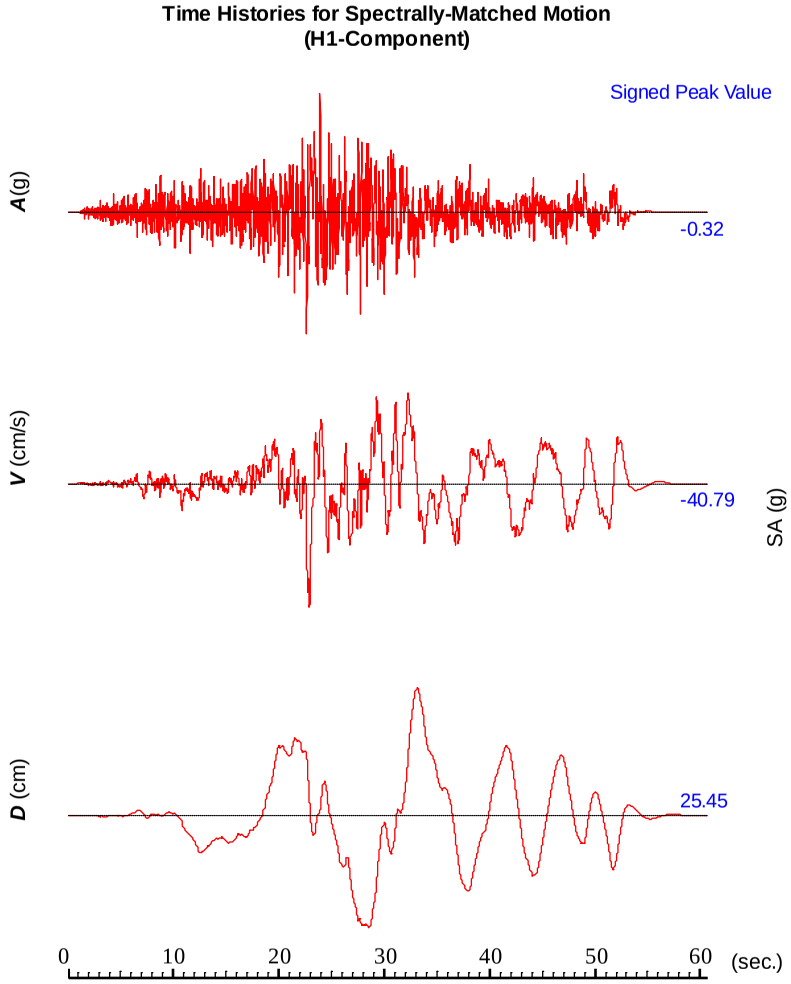
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 2 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-5**

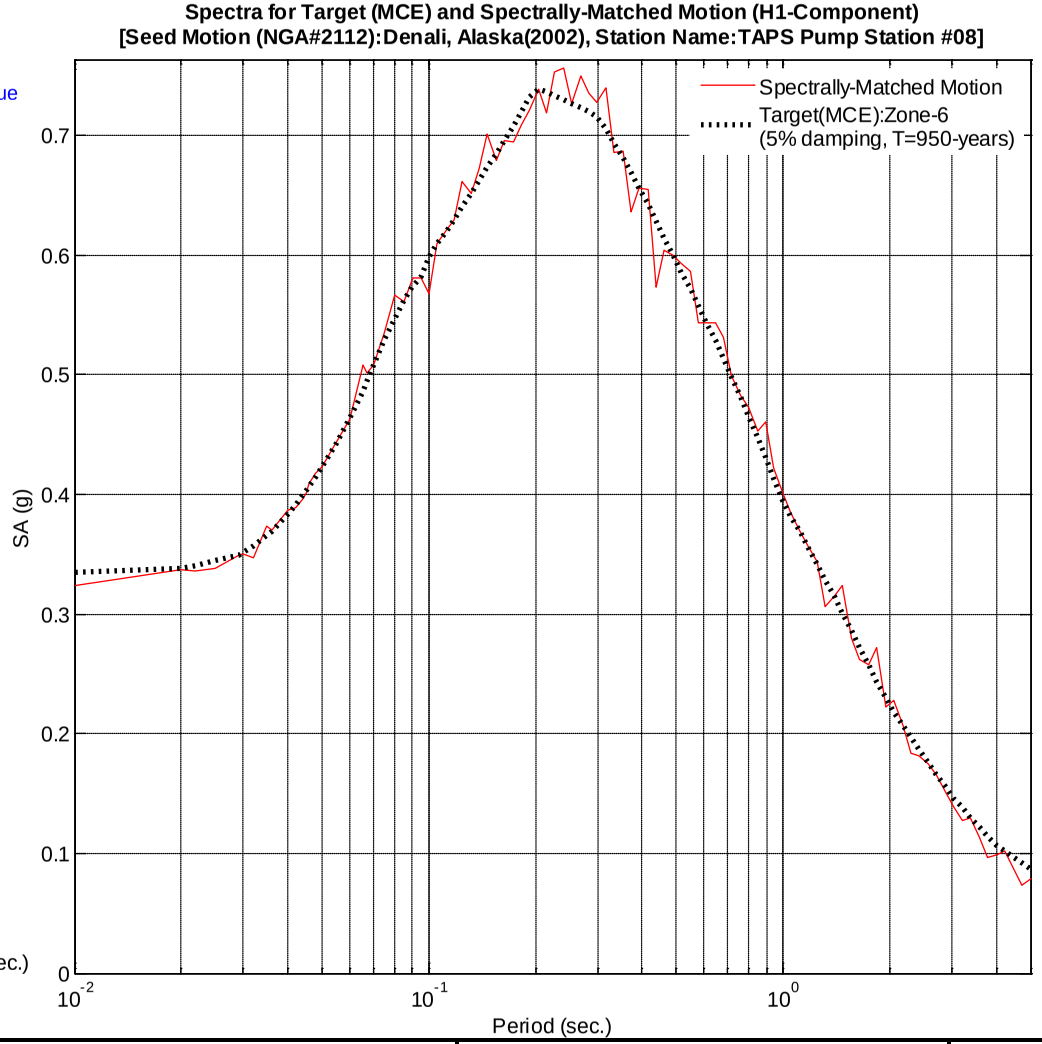




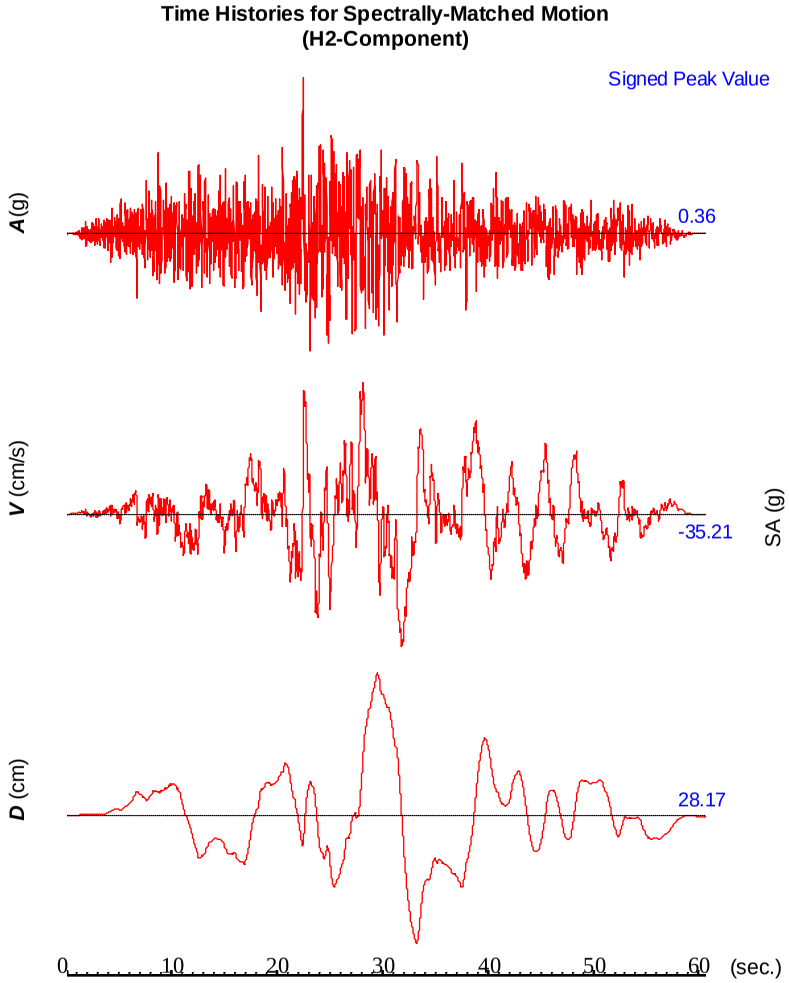
SC SOLUTIONS

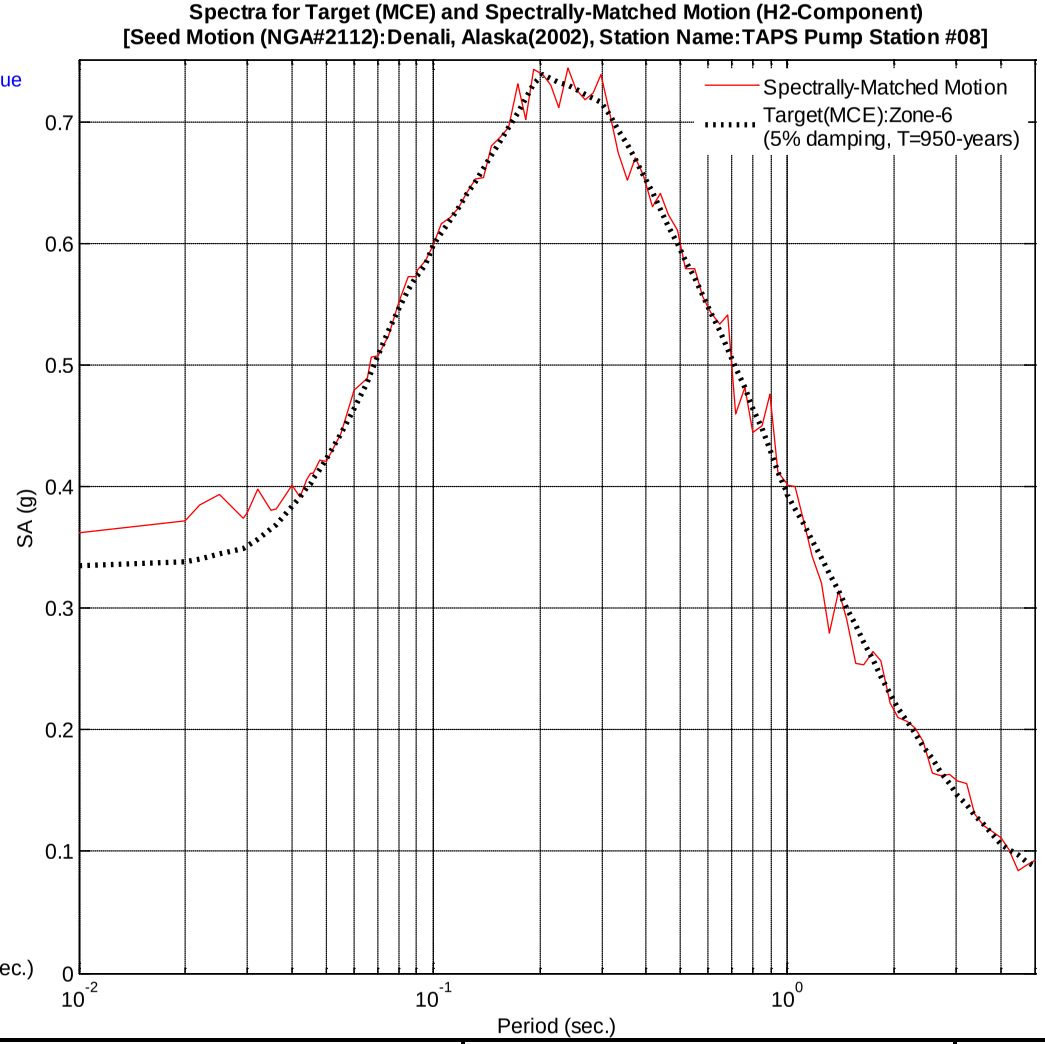
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 6 – SET NO. 2 – VERTICAL**	PLATE **B6-6**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		



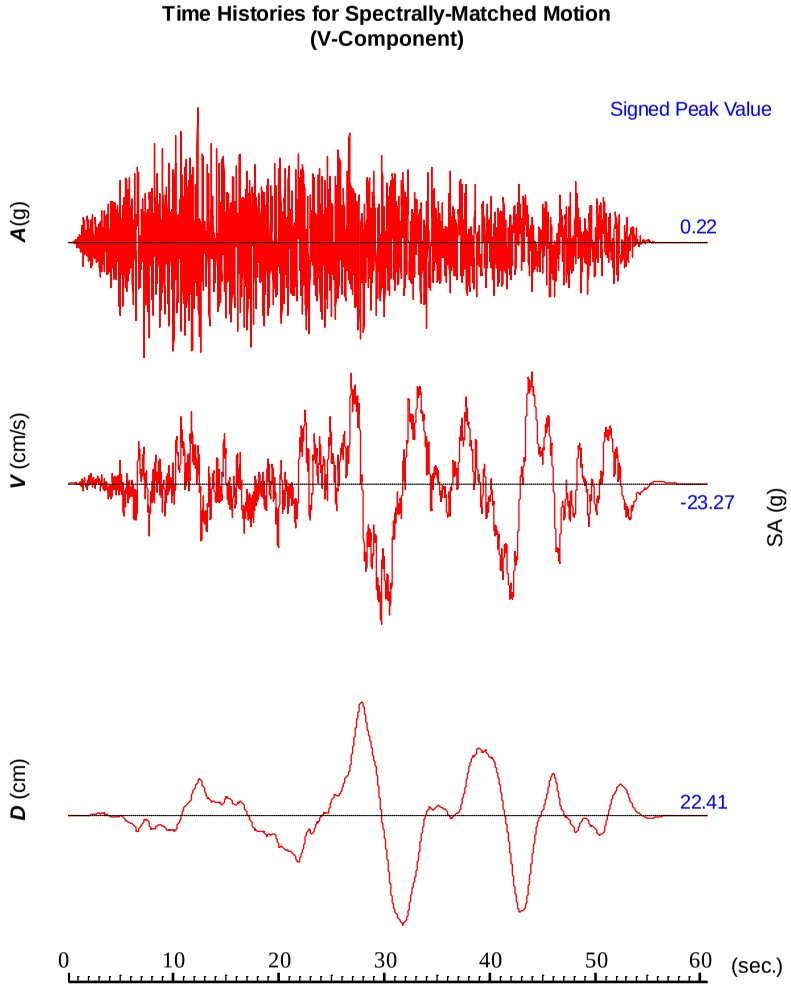


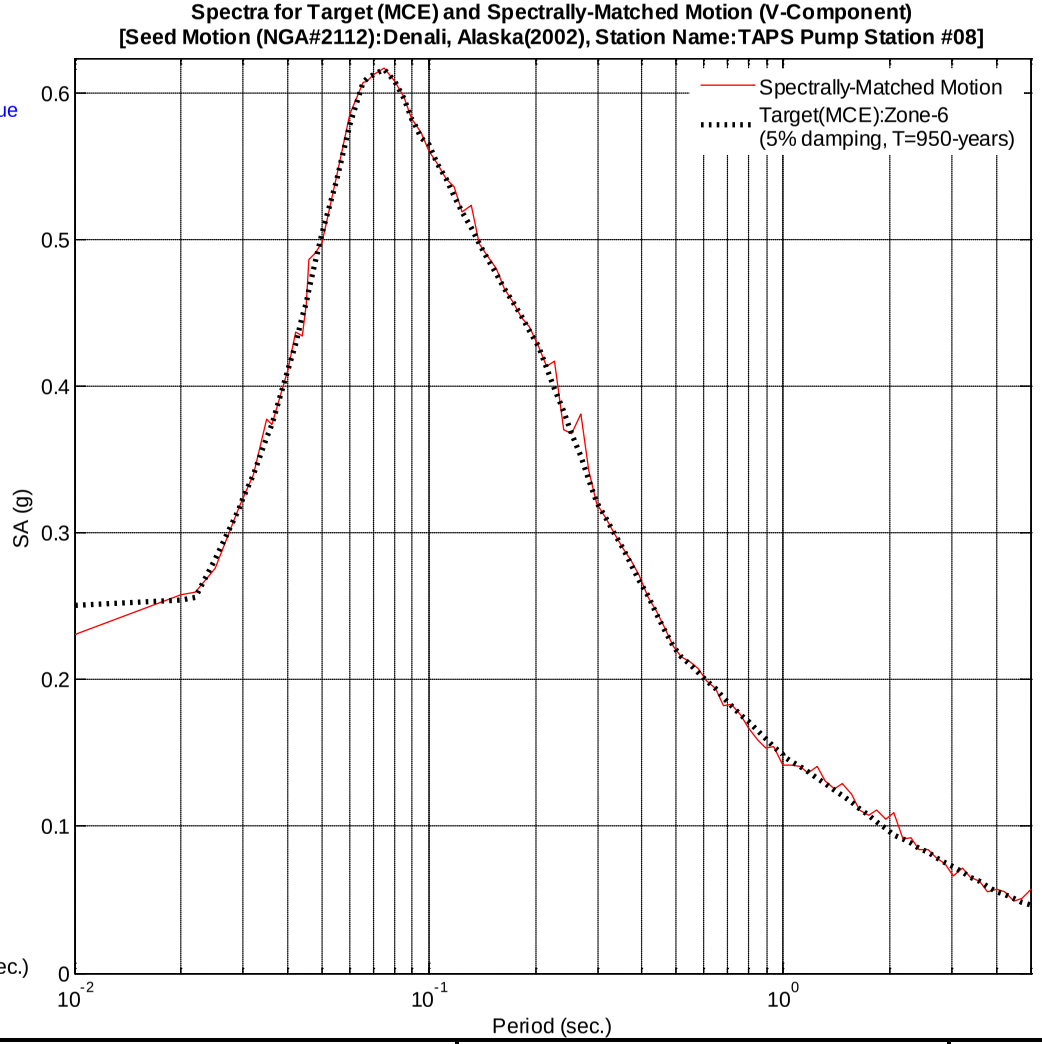
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 3 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-7**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 3 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-8**





SC SOLUTIONS

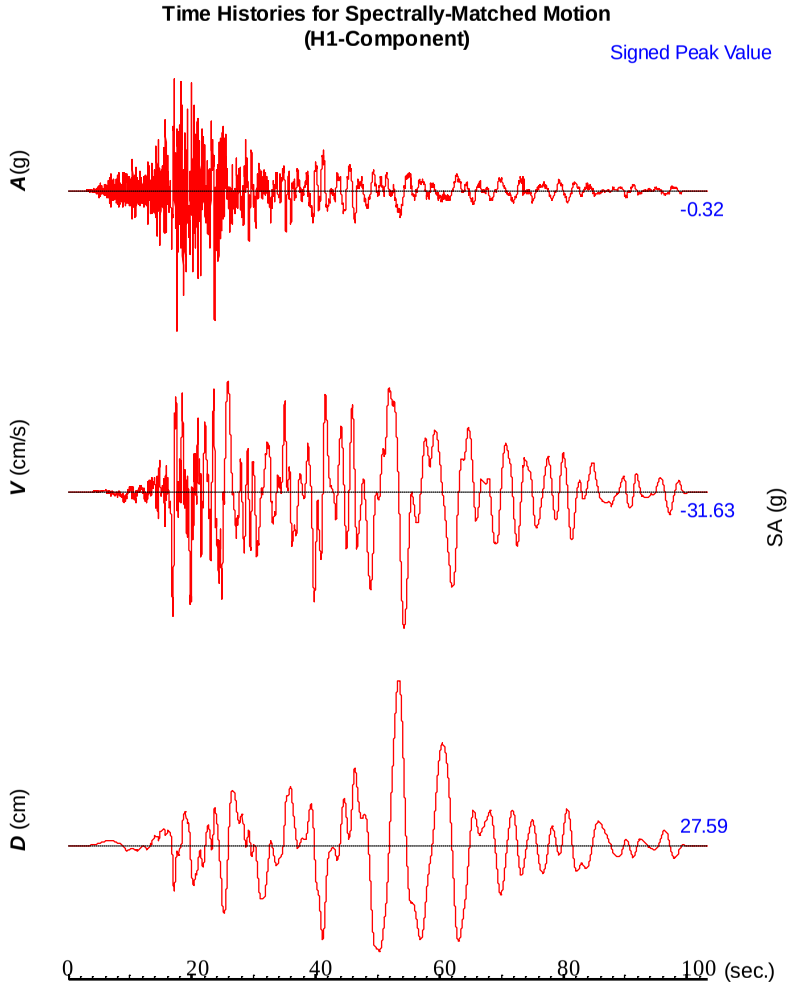
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

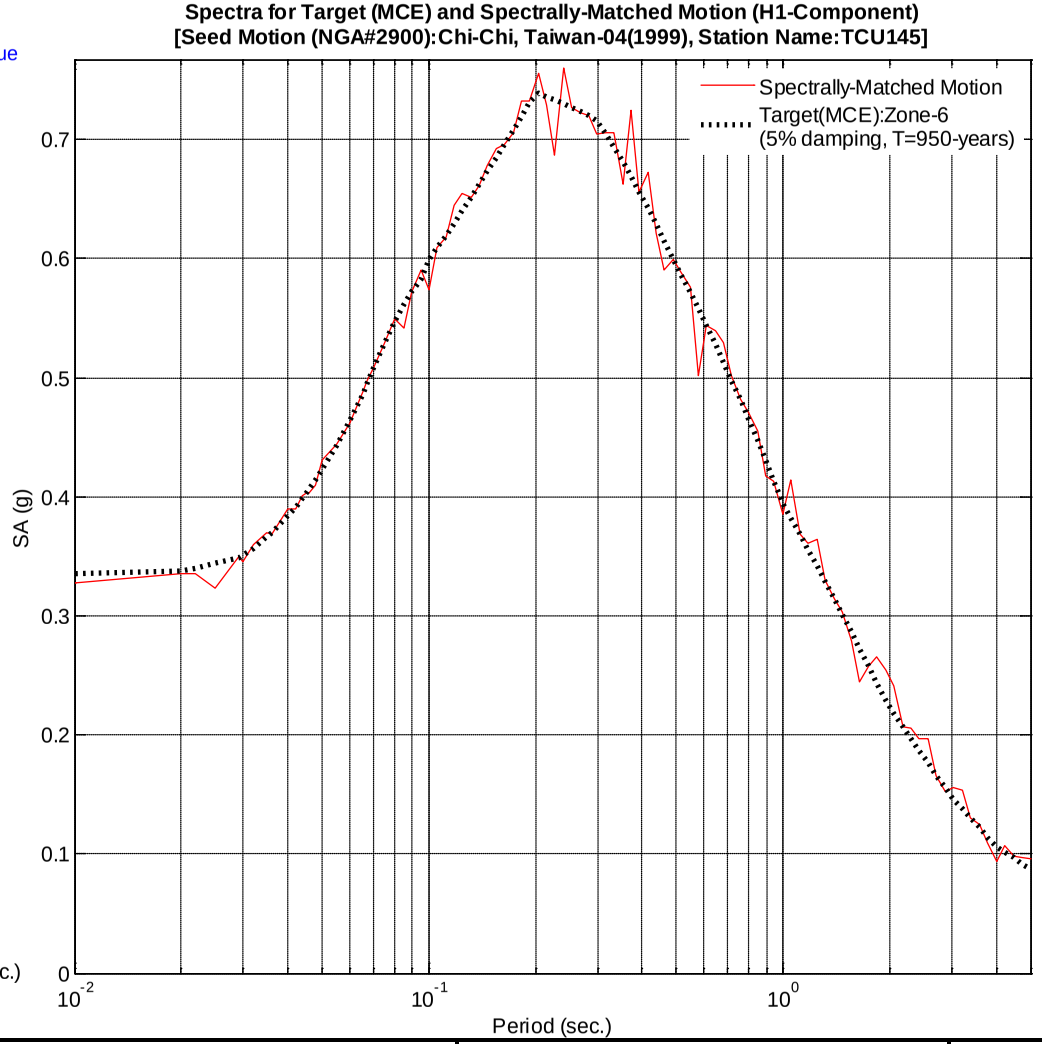
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 6 – SET NO. 3 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

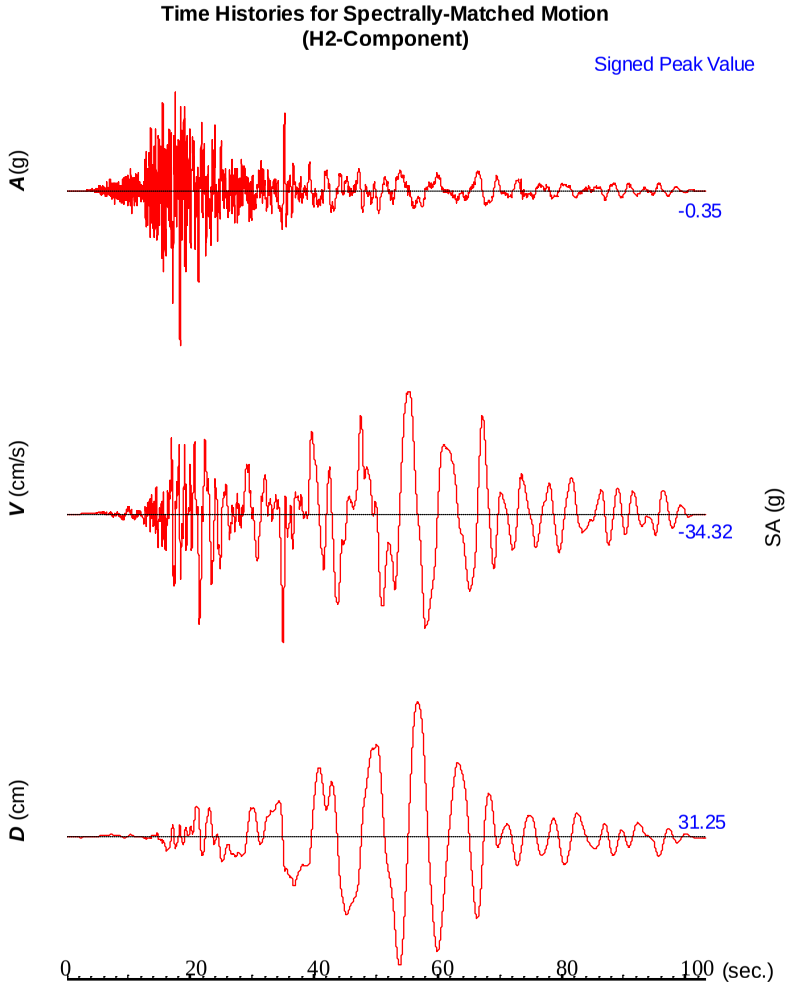
PLATE

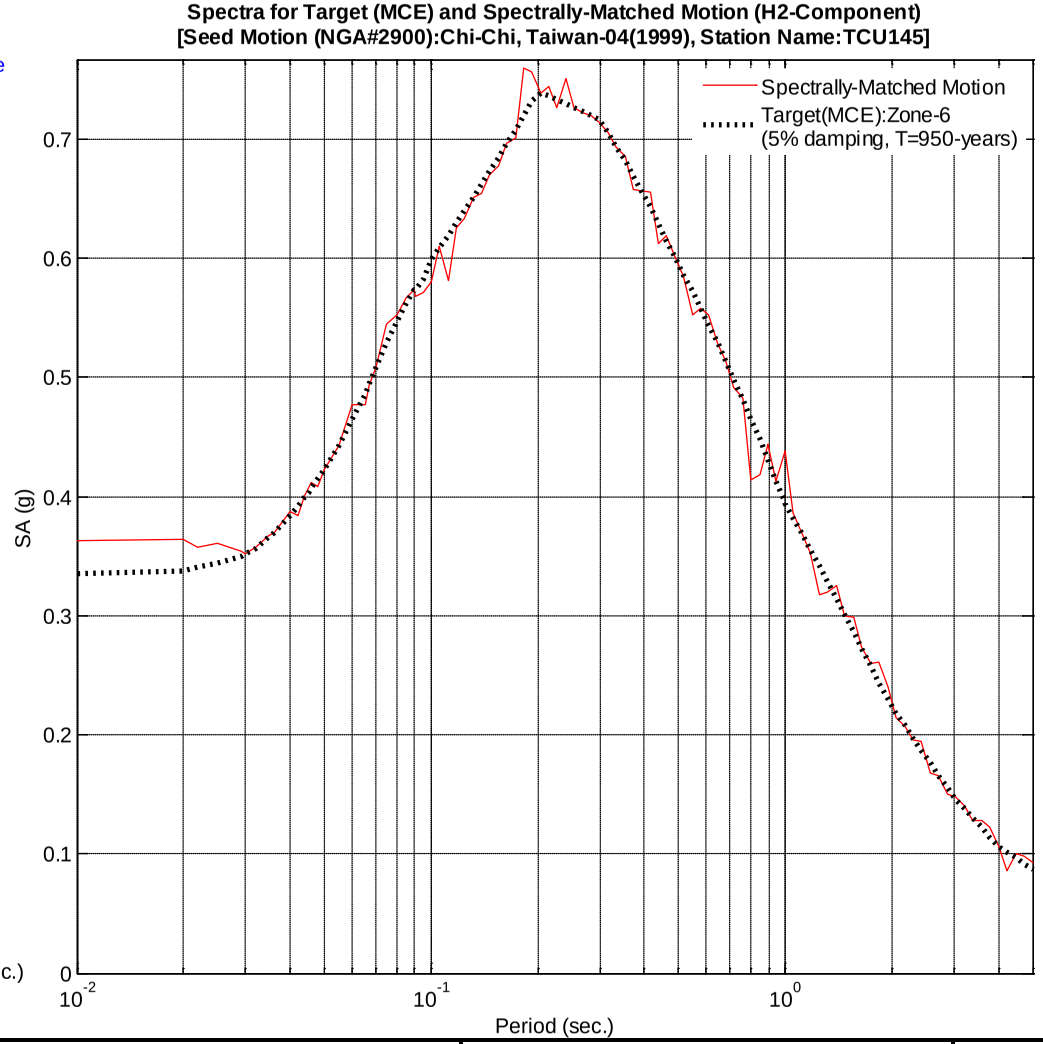
B6-9



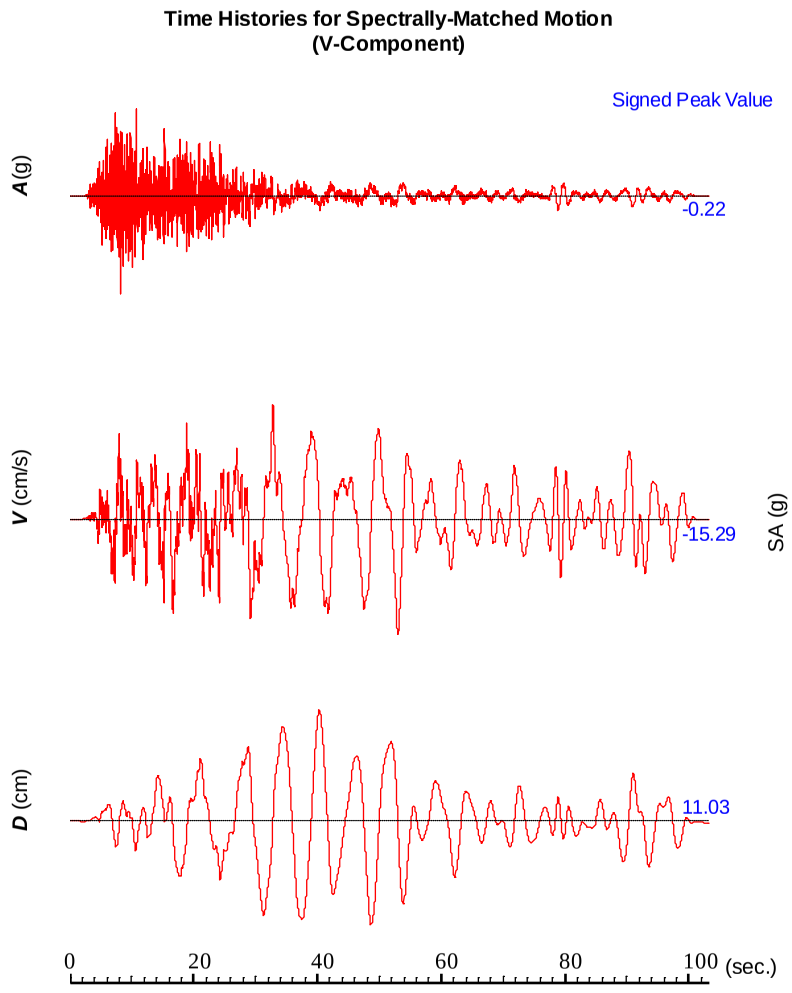


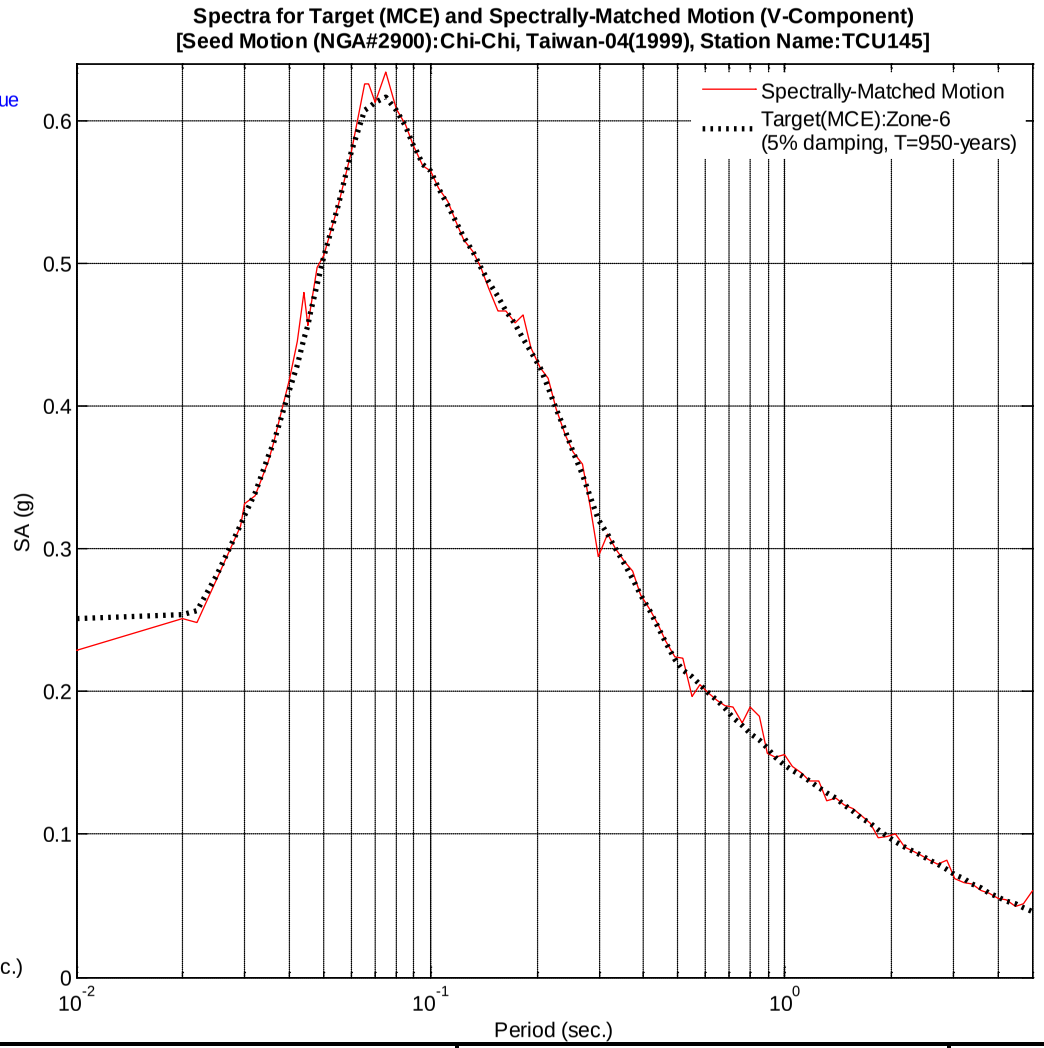
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 4 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-10**



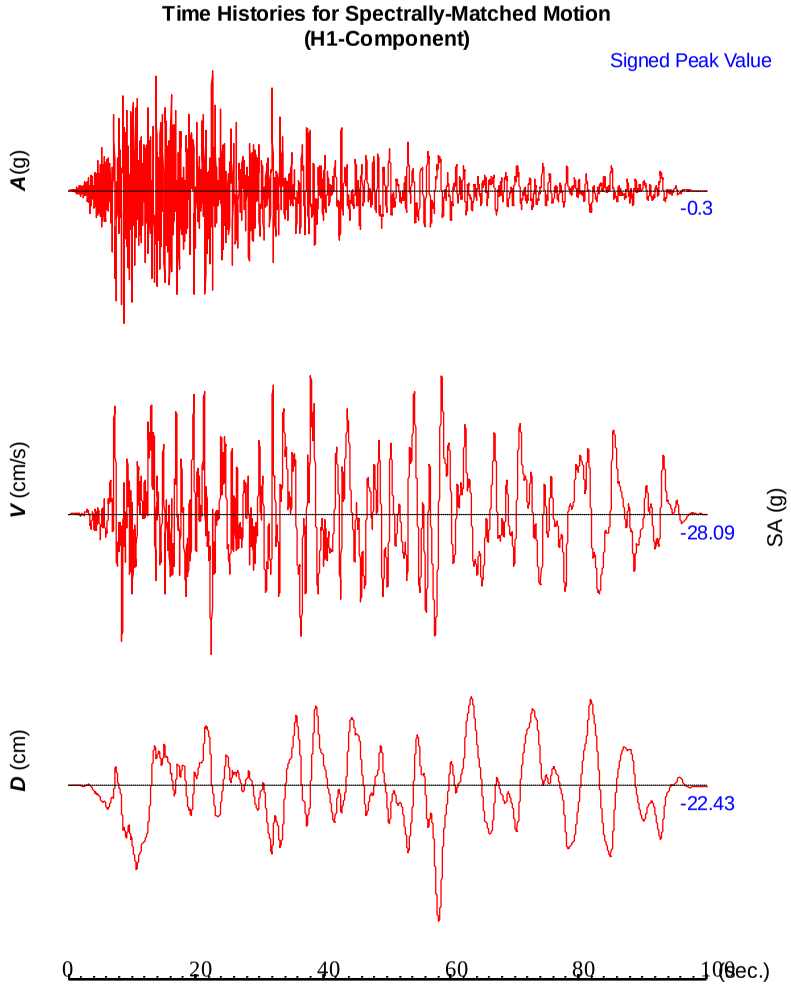


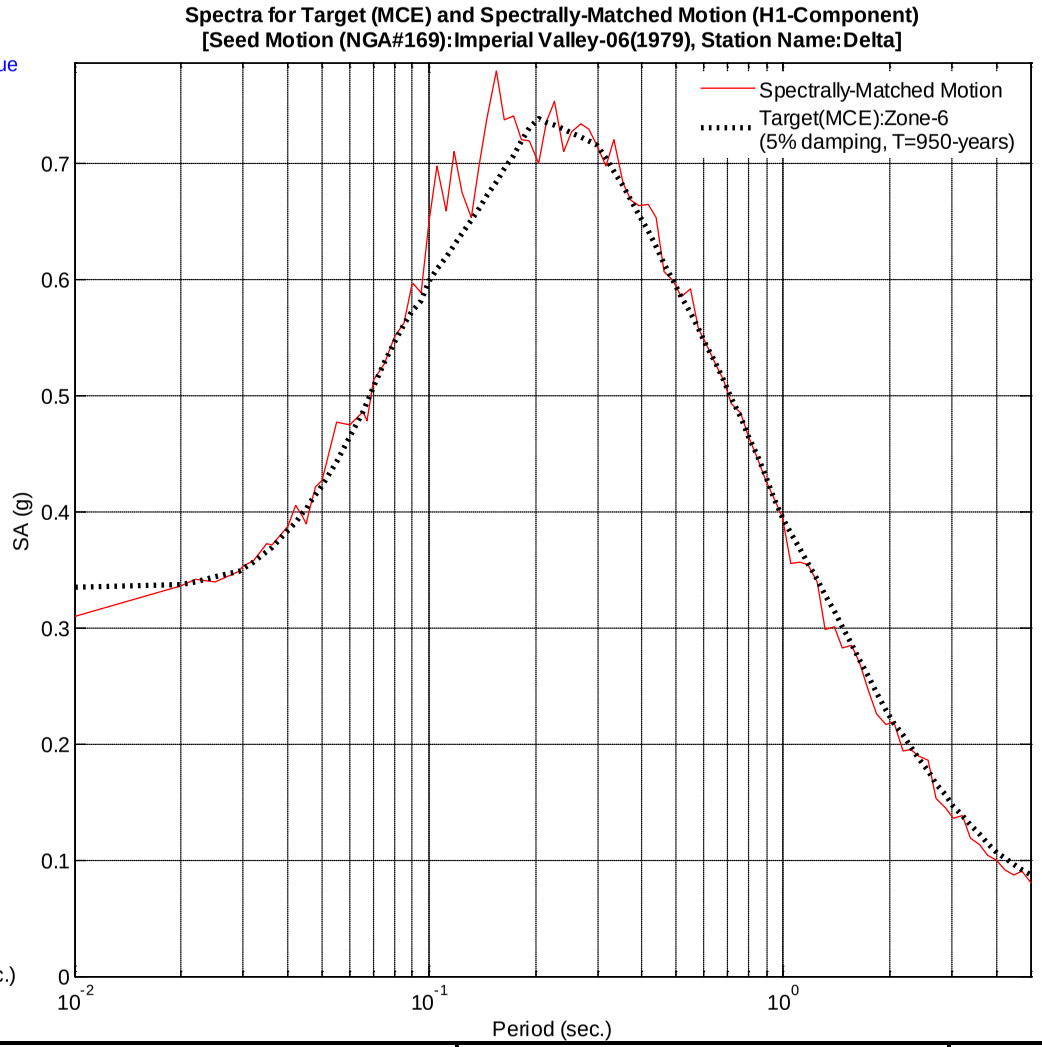
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 4 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-11**



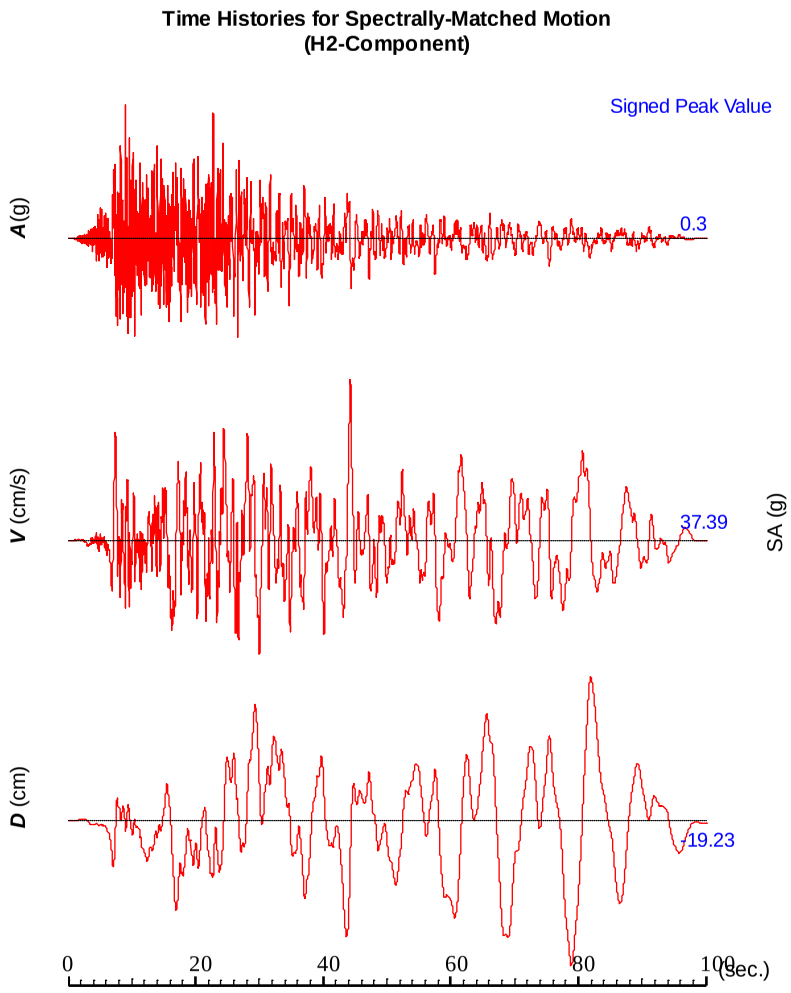


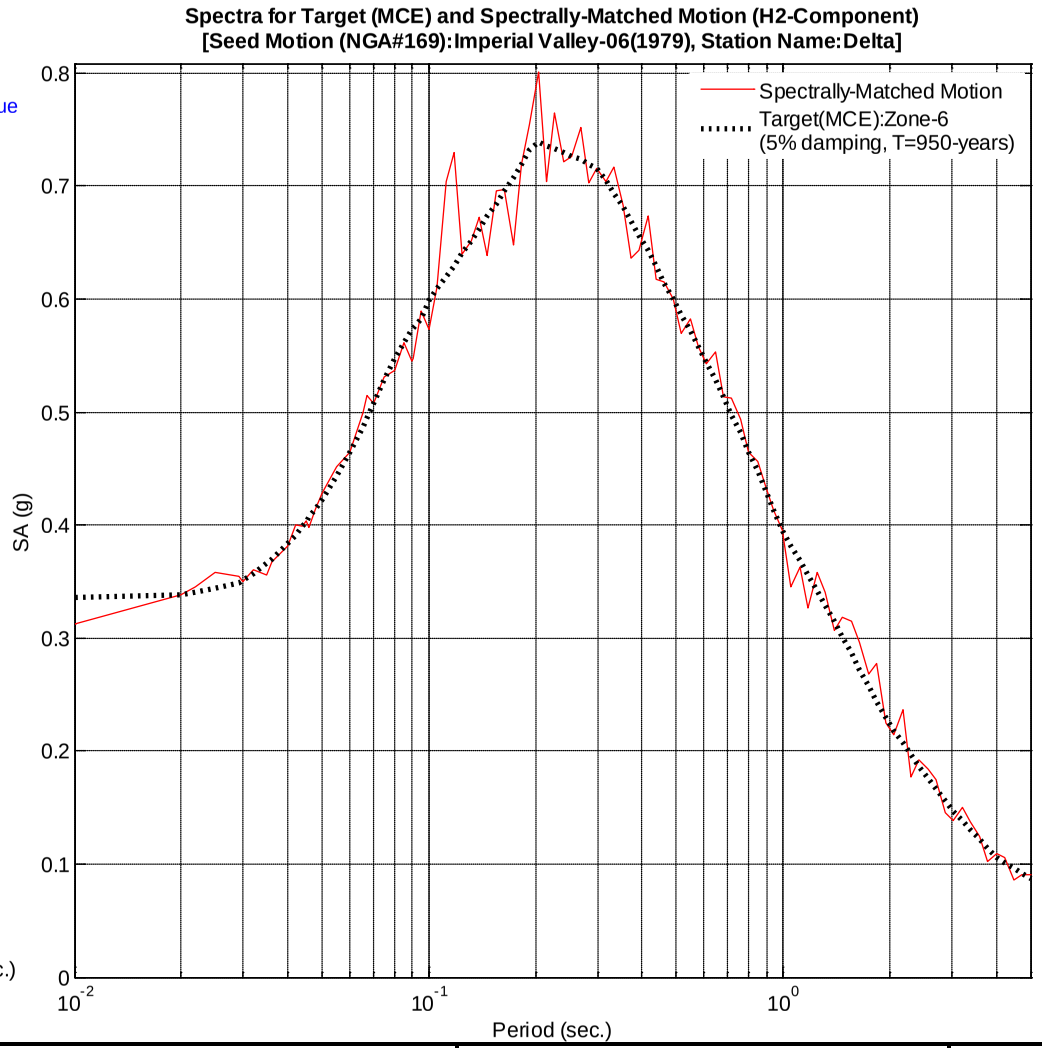
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 4 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-12**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 5 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-13**





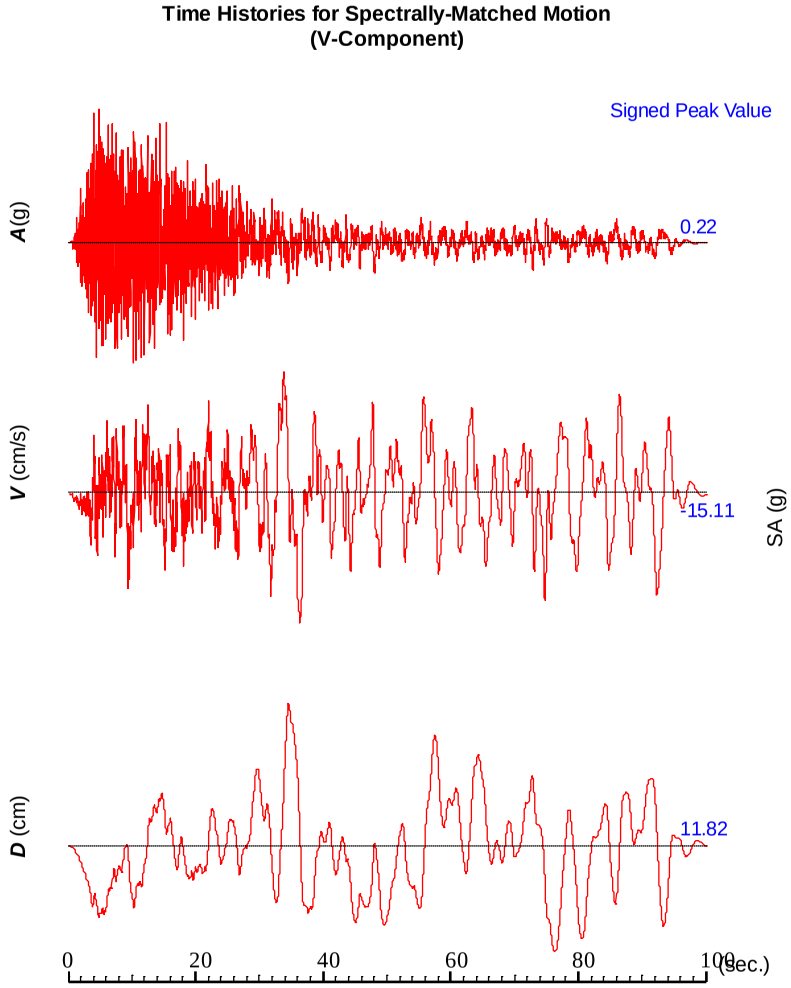
SC SOLUTIONS

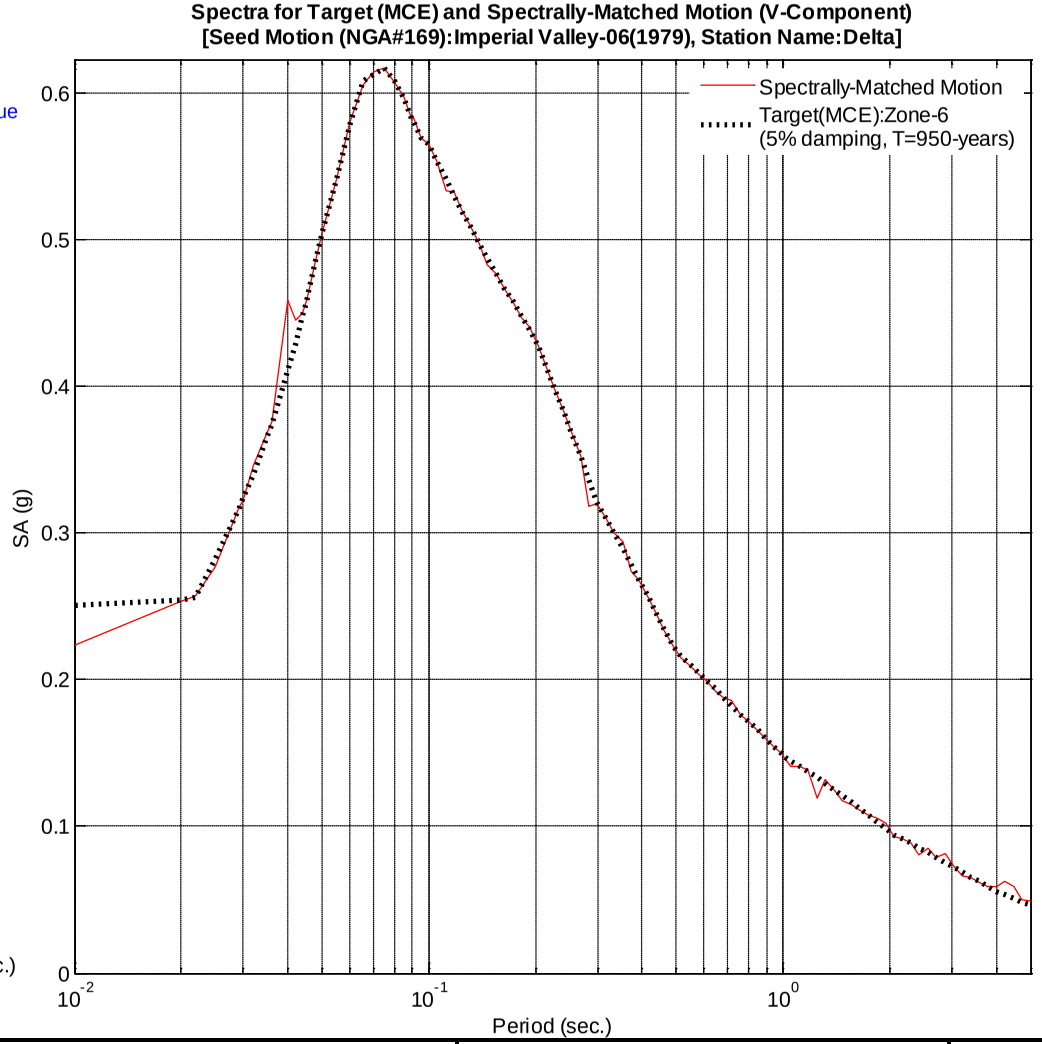
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 6 – SET NO. 5 – HORIZONTAL 2

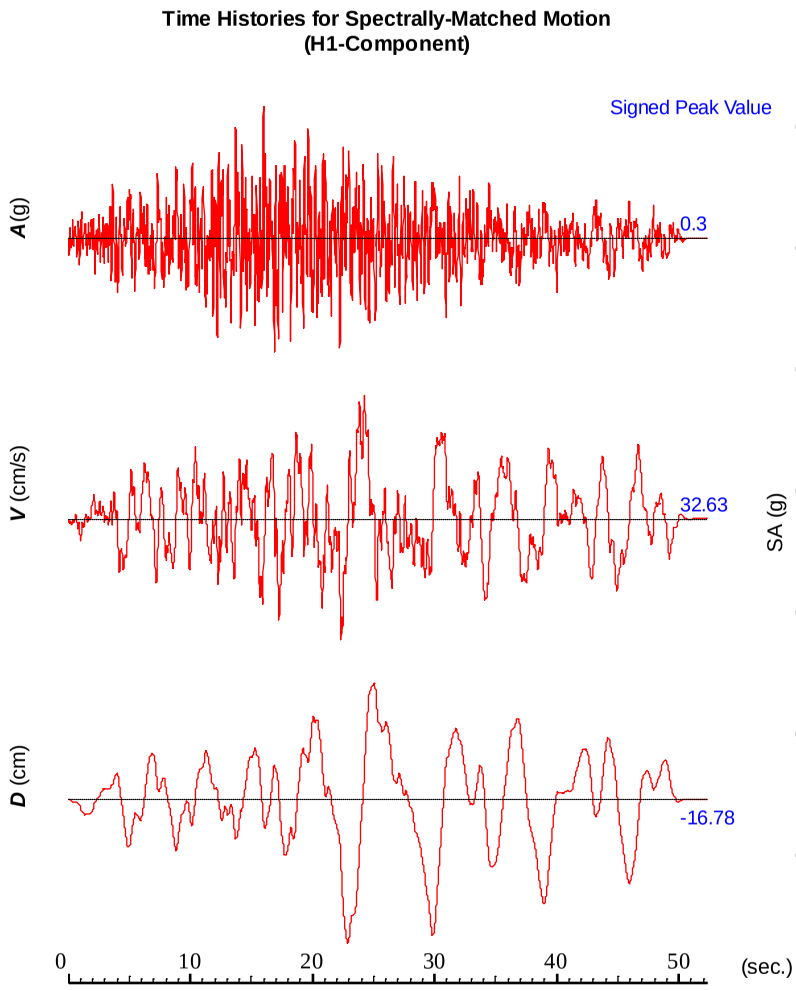
CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

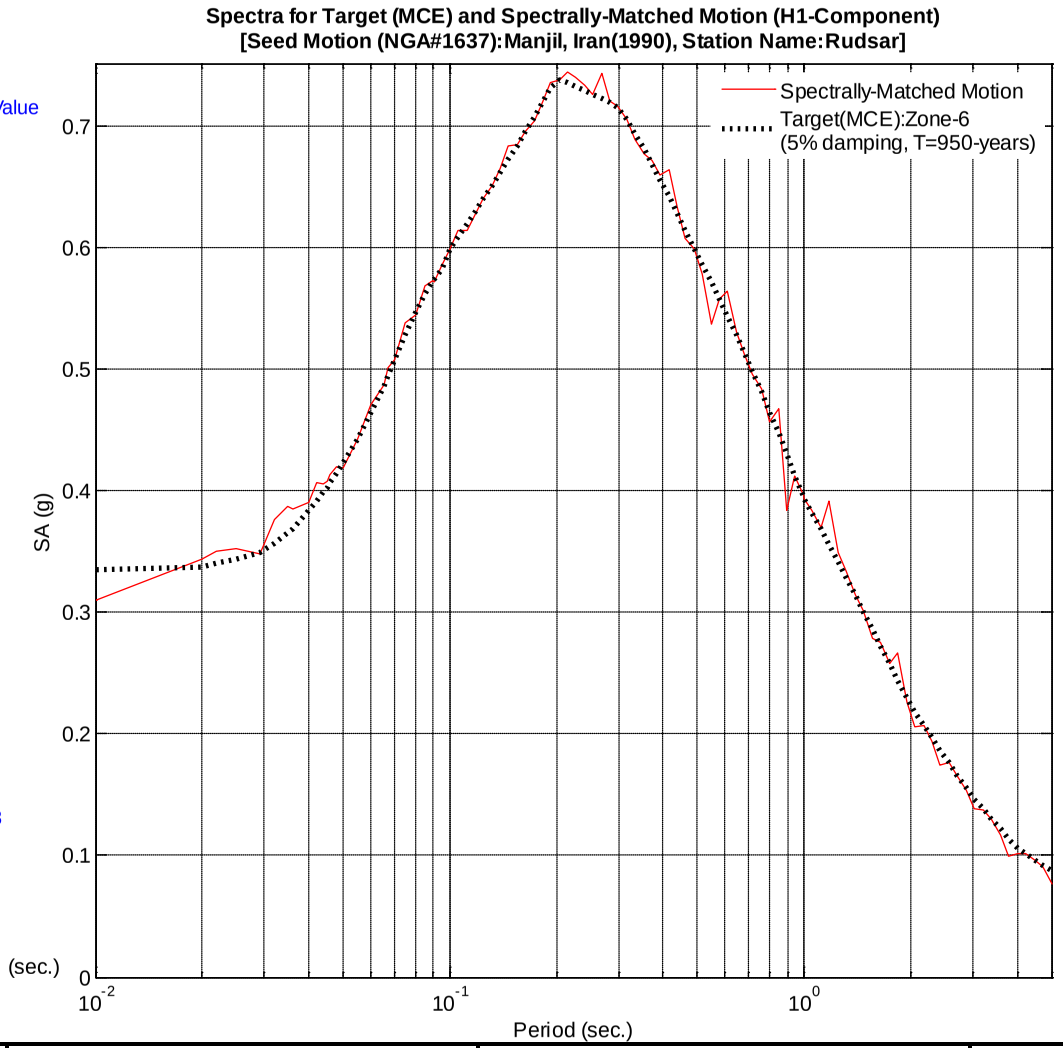
PLATE
B6-14



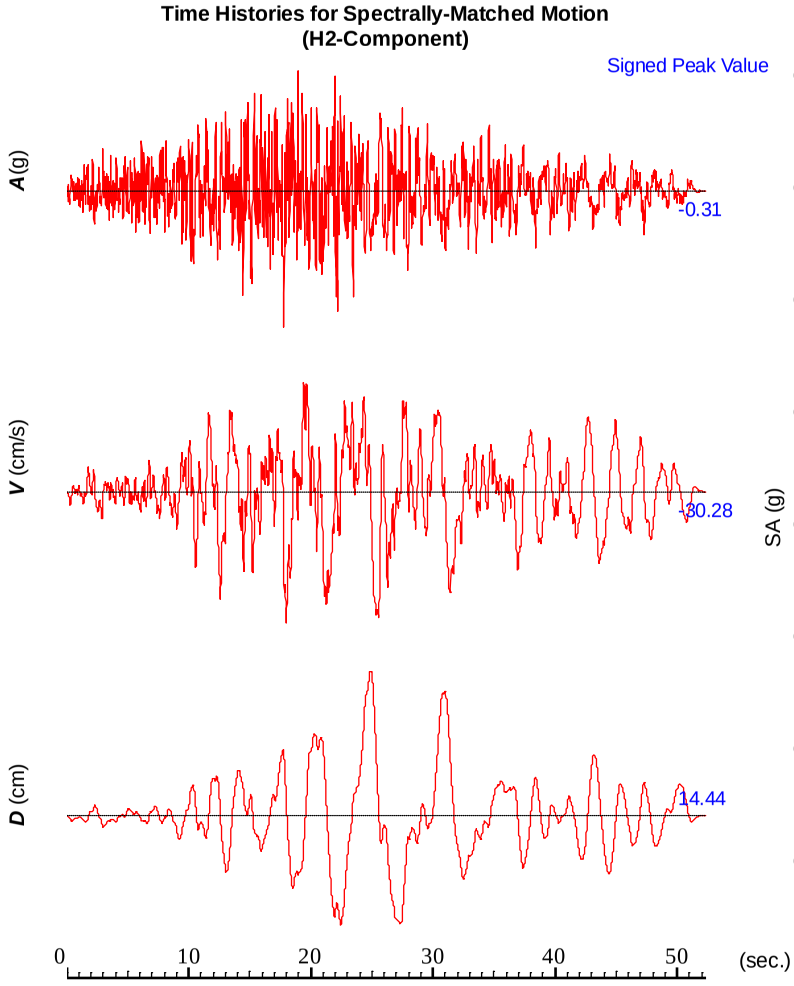


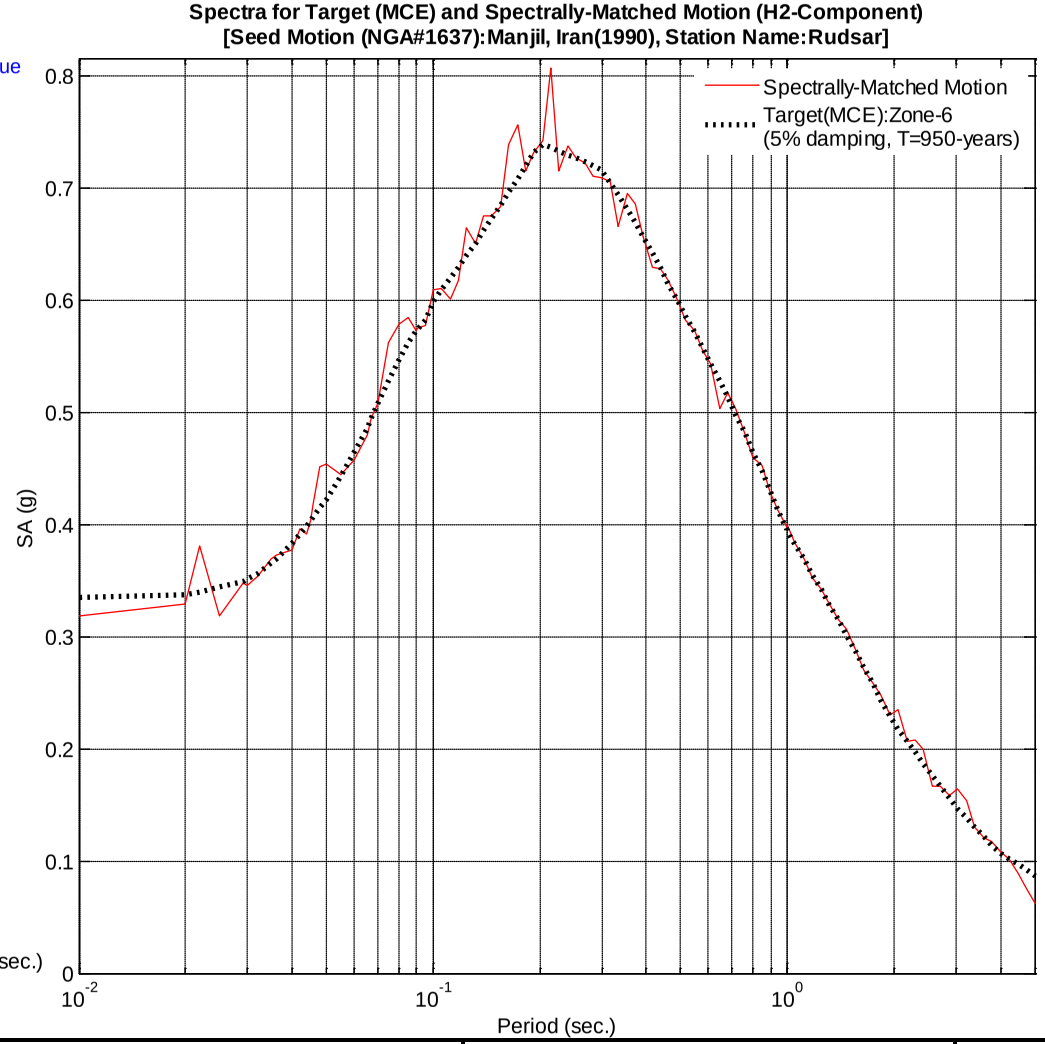
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 5 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-15**



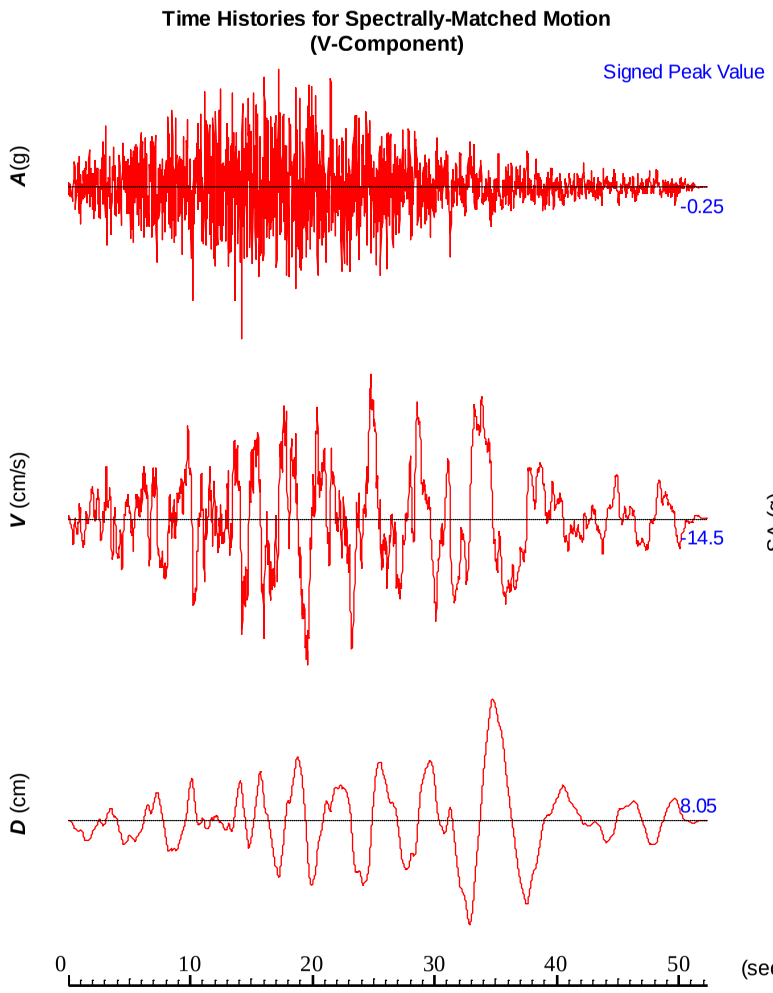


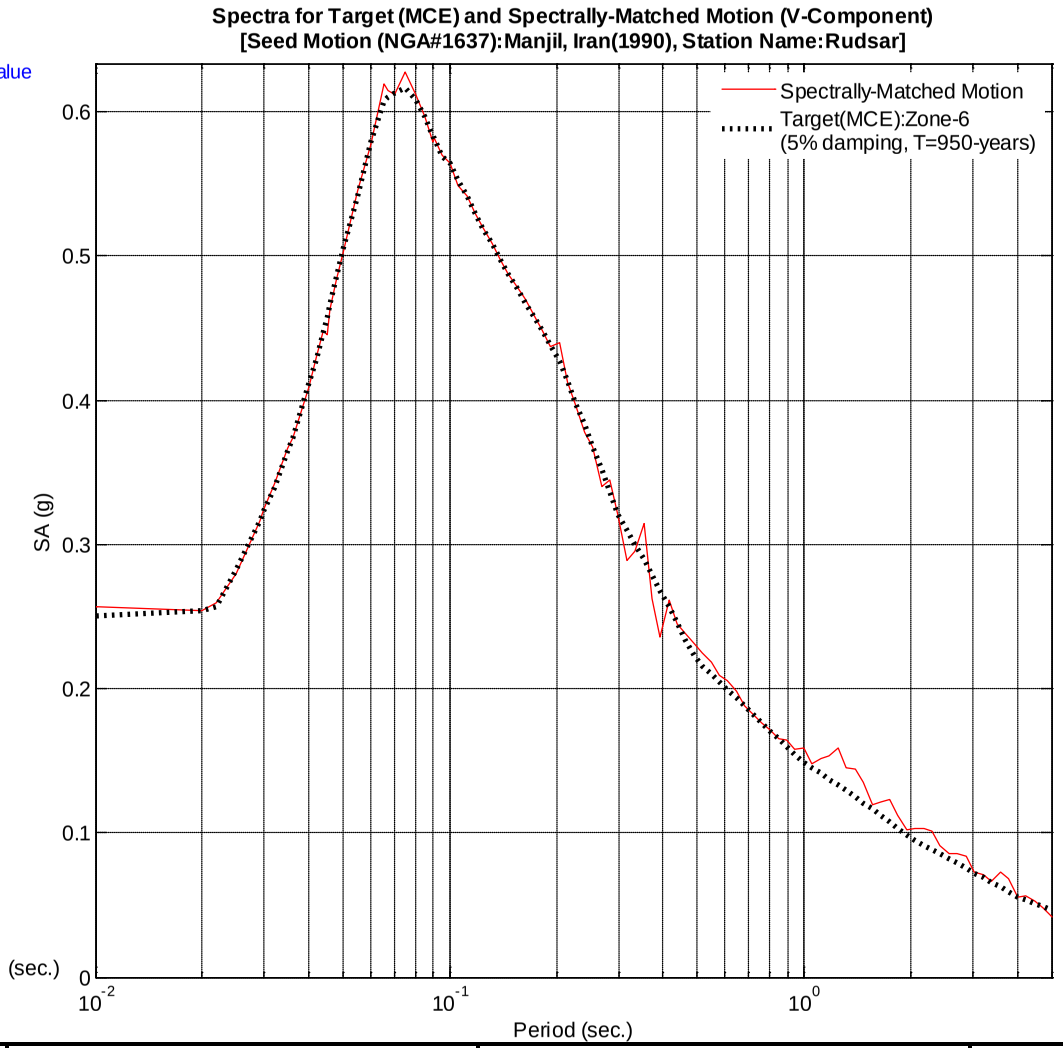
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	SPECTRALLY-MATCHED MOTIONS – MCE ZONE 6 – SET NO. 6 – HORIZONTAL 1 CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE B6-16



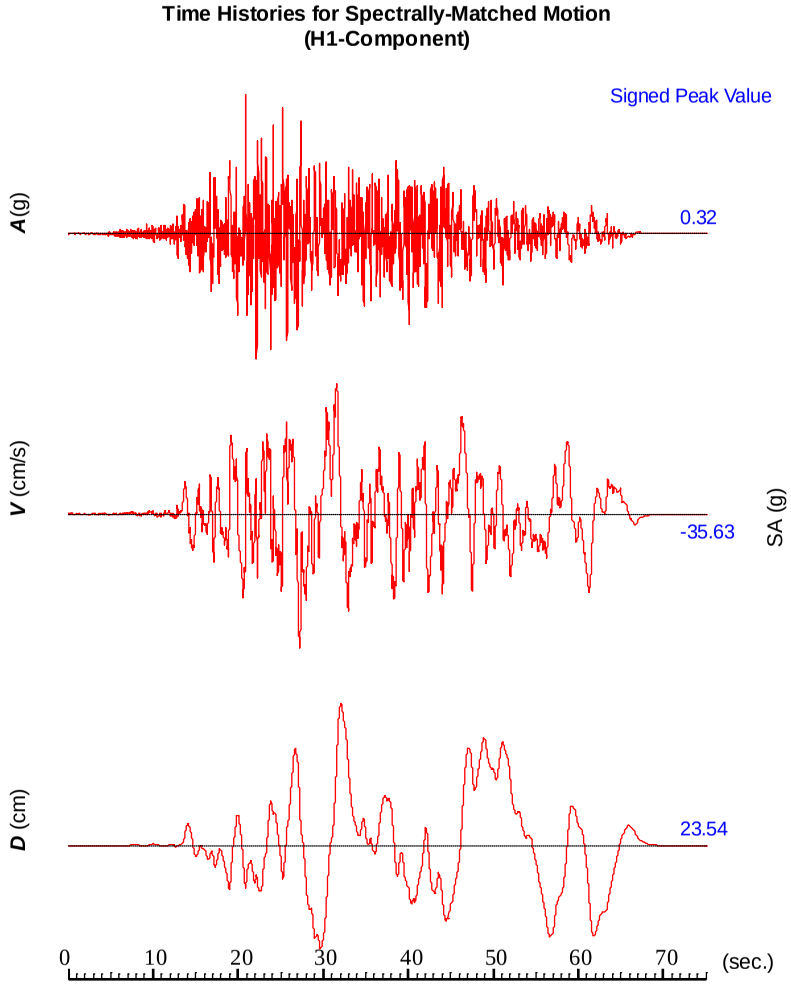


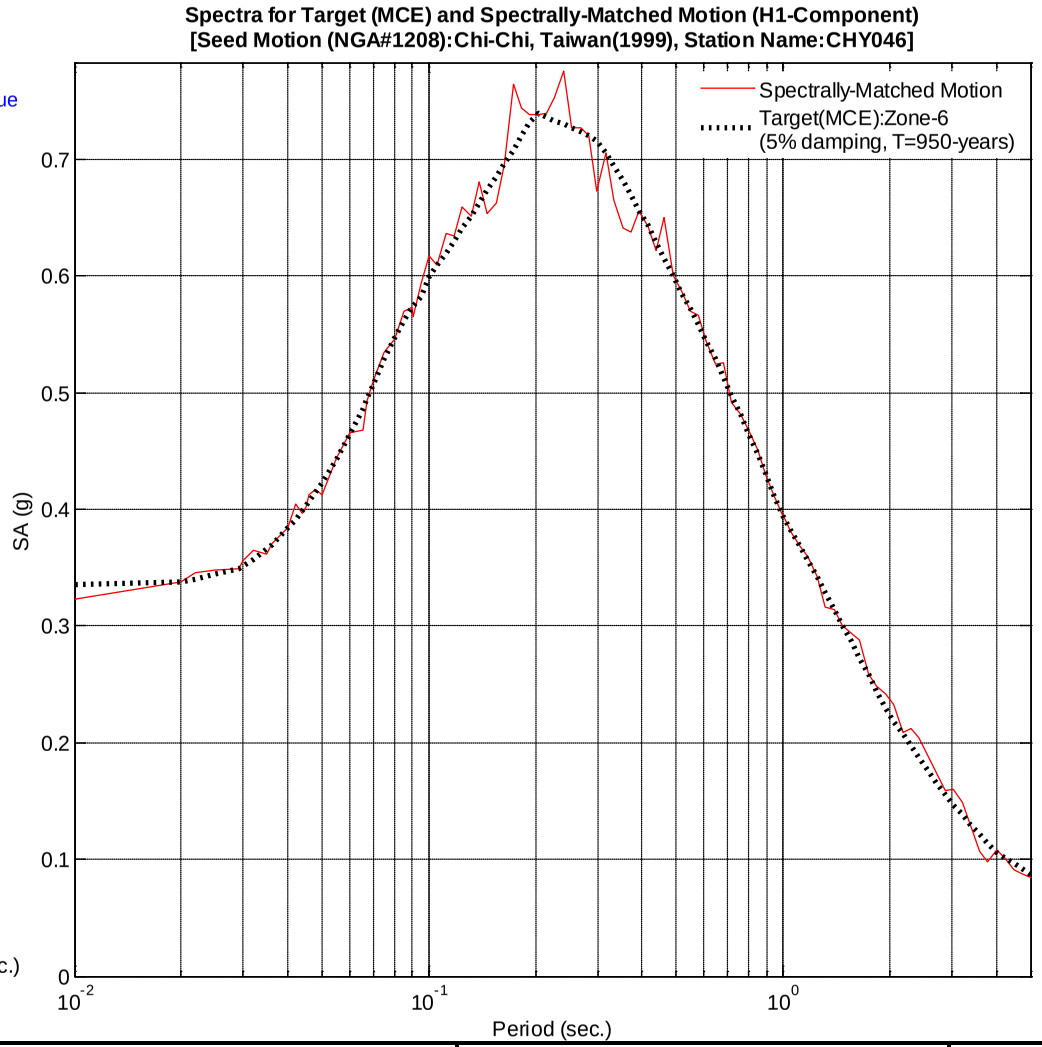
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 6 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-17**



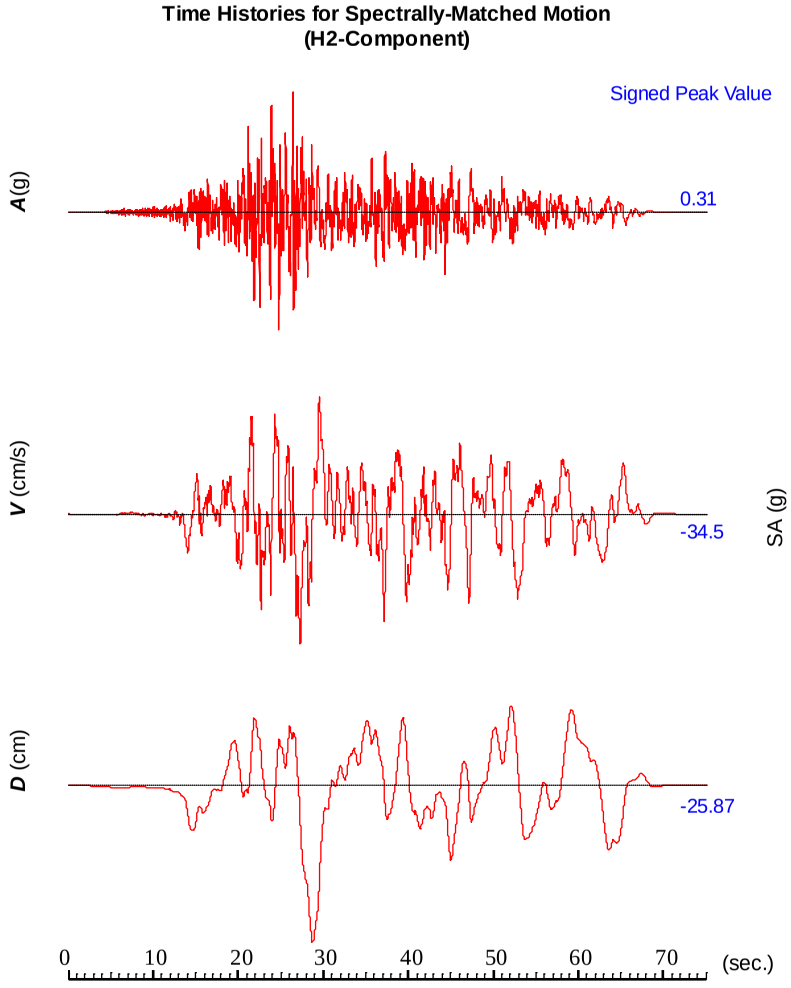


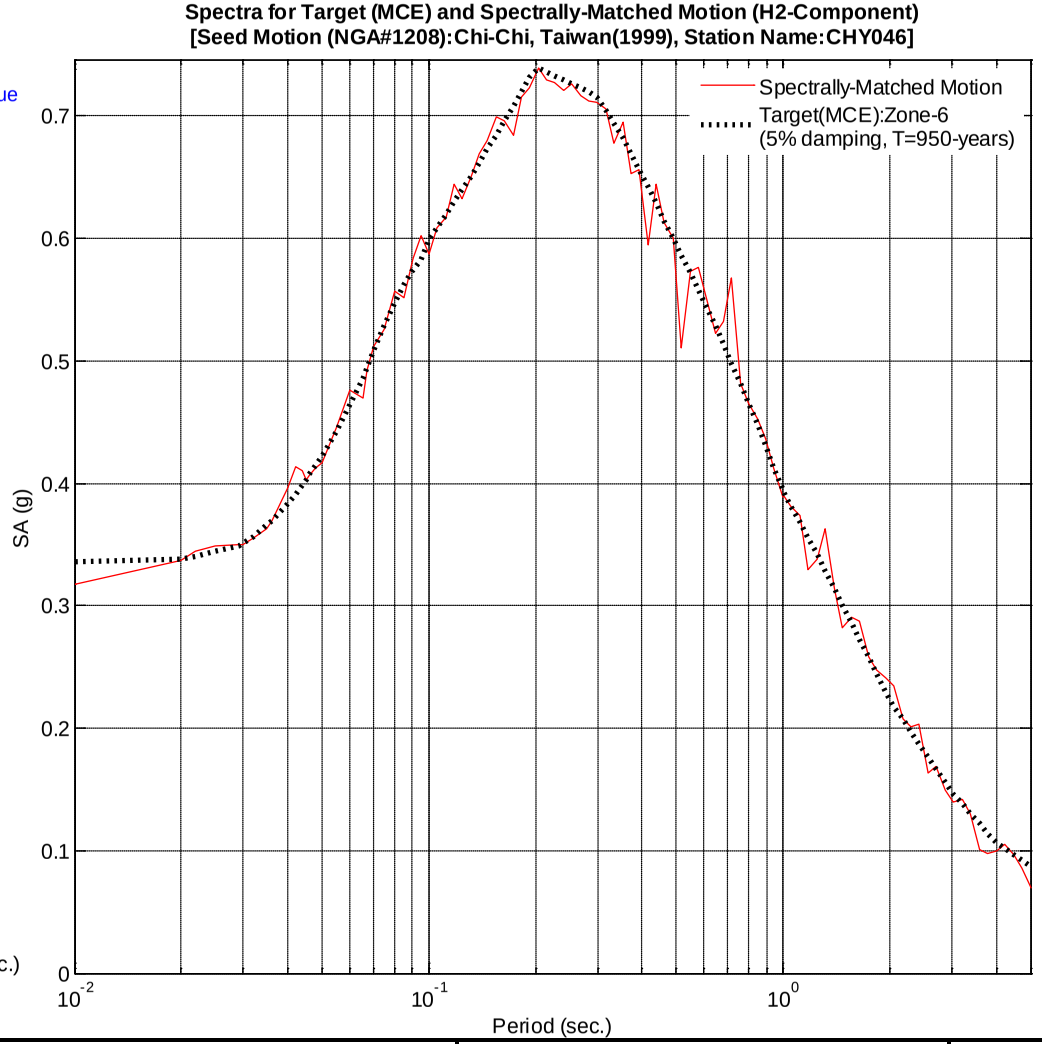
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 6 – SET NO. 6 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-18**



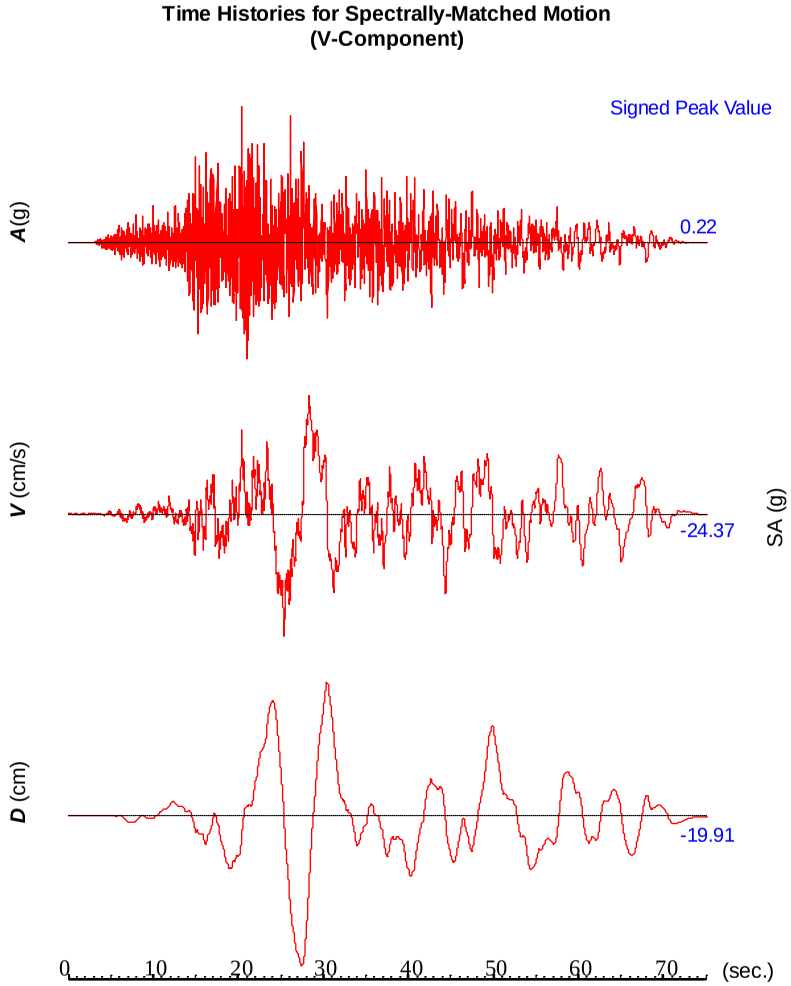


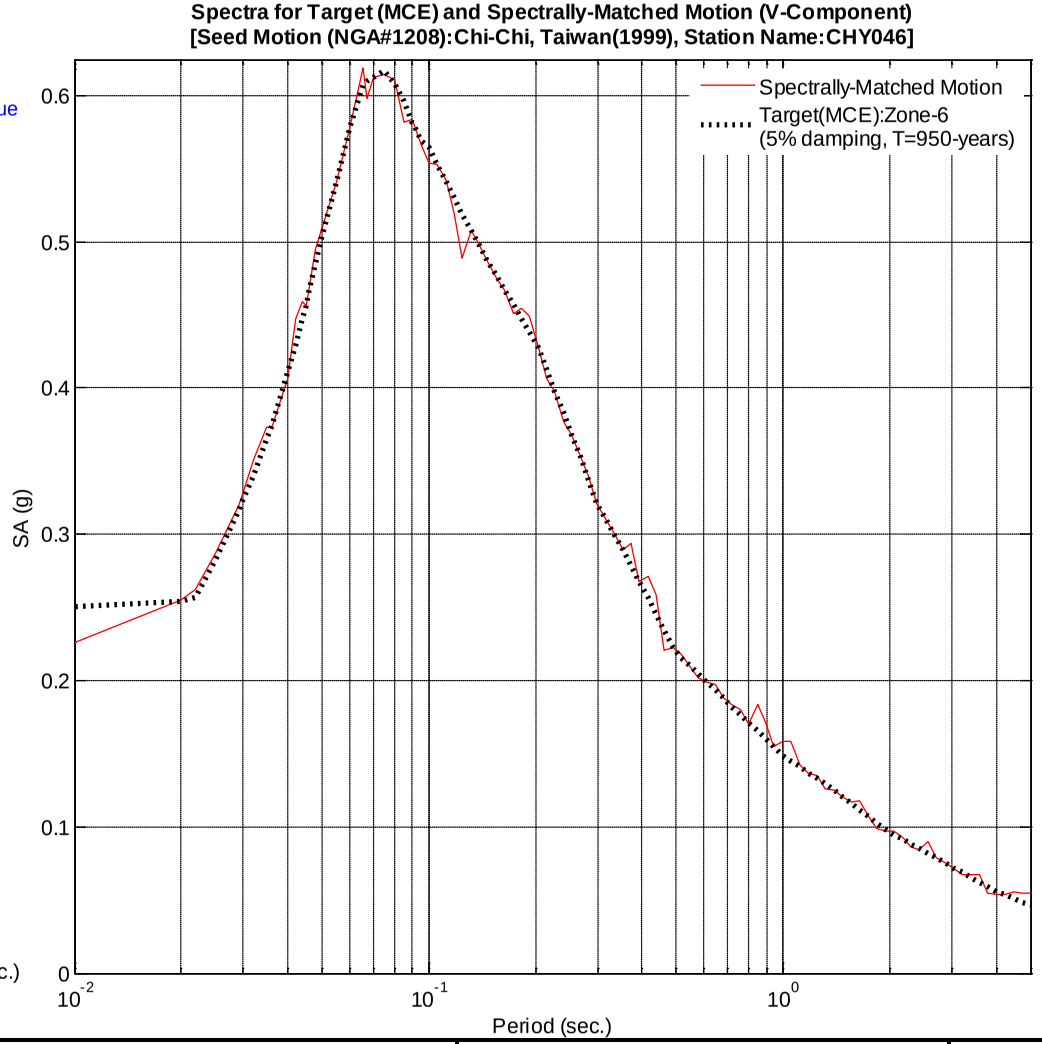
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 7 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-19**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 7 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-20**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 6 – SET NO. 7 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B6-21**

Table B.7: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motion for **Zone 7**

Set	NGA #	Selected Seed Motions					Spectrally-Matched Motions								
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	882	Landers	1992	North Palm Springs	7.28	26.84	0.326	36.231	20.503	0.357	35.504	14.256	0.240	16.418	9.461
2	1776	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.318	43.699	29.097	0.336	39.245	18.873	0.268	18.871	11.861
3	2112	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.359	43.342	26.486	0.393	38.582	29.057	0.242	26.226	24.184
4	2900	Chi-Chi, Taiwan-04	1999	TCU145	6.20	56.37	0.363	30.029	27.130	0.394	39.103	31.215	0.251	16.295	12.059
5	169	Imperial Valley-06	1979	Delta	6.53	22.03	0.334	30.672	24.502	0.326	40.834	20.965	0.246	15.926	12.195
6	1637	Manjil, Iran	1990	Rudsar	7.37	64.47	0.334	34.282	13.237	0.339	33.529	14.312	0.269	13.888	8.545
7	1208	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.345	39.256	25.200	0.346	38.637	27.640	0.244	27.076	21.580

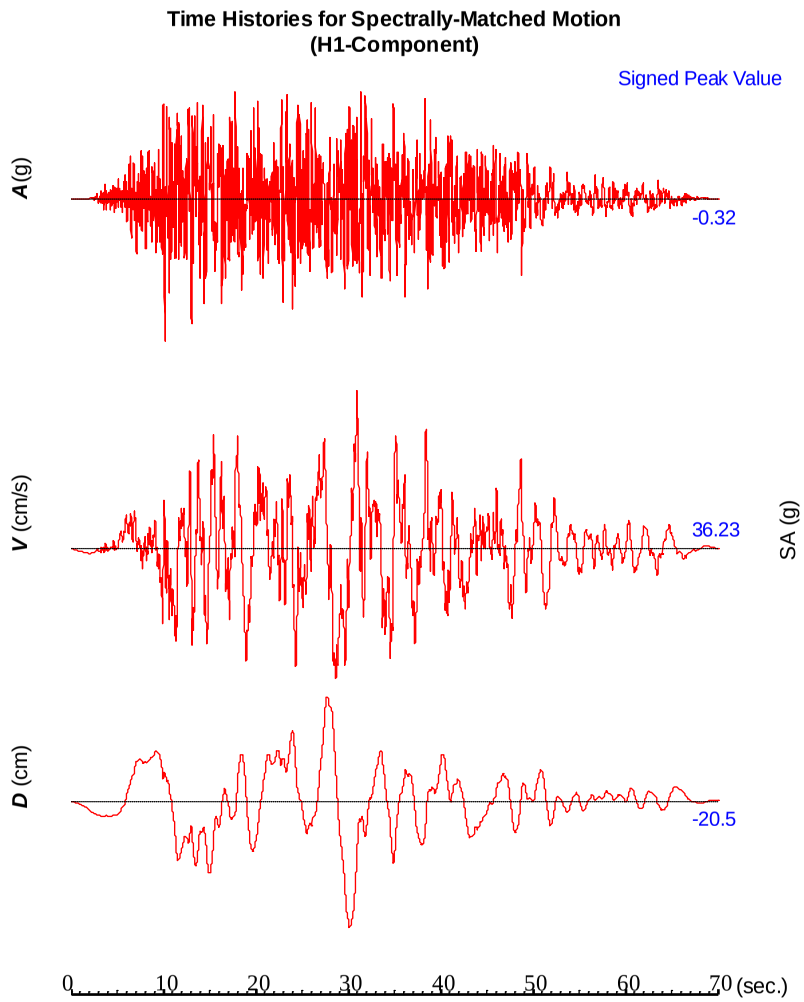
SC SOLUTIONS

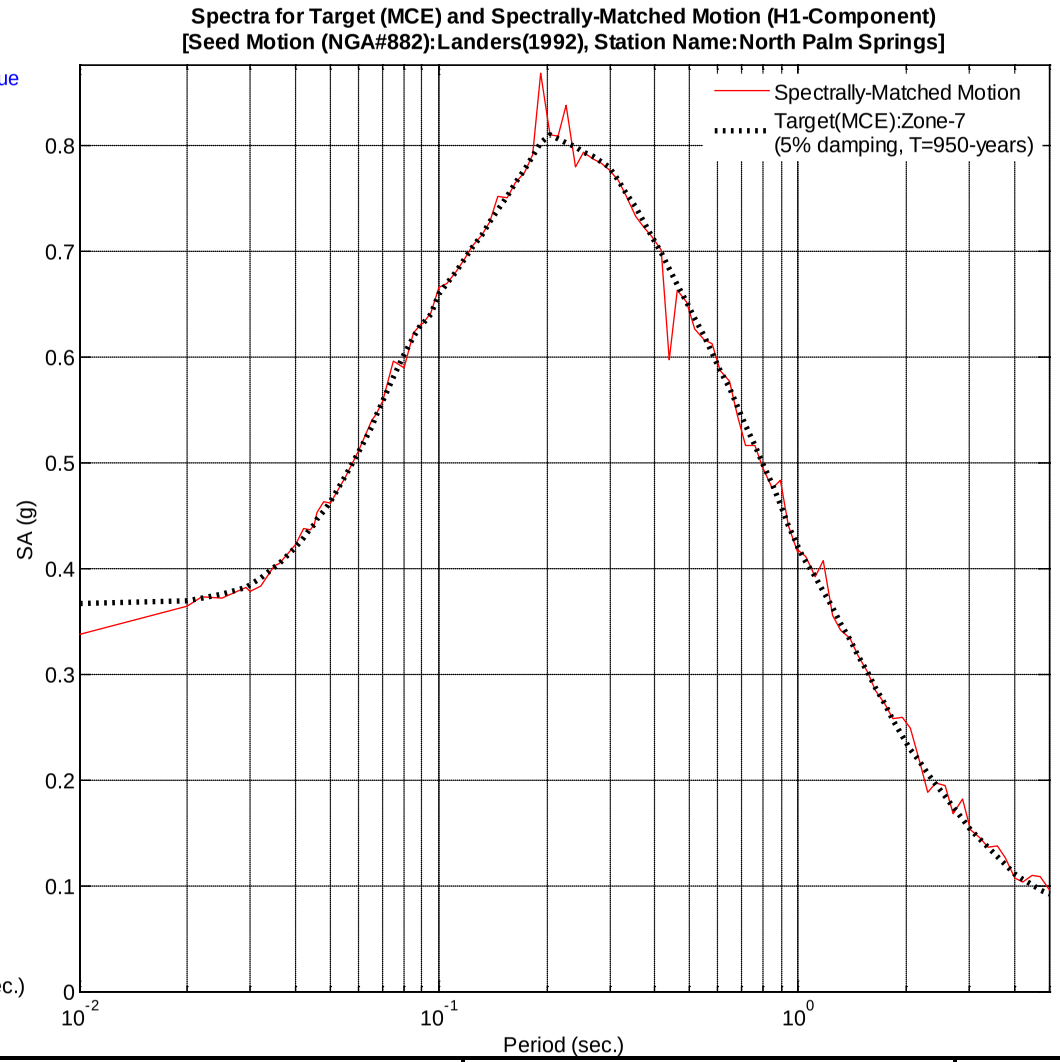
PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: M. Tabatabaie
DATE: 02/24/2012

SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS MCE – ZONE 7

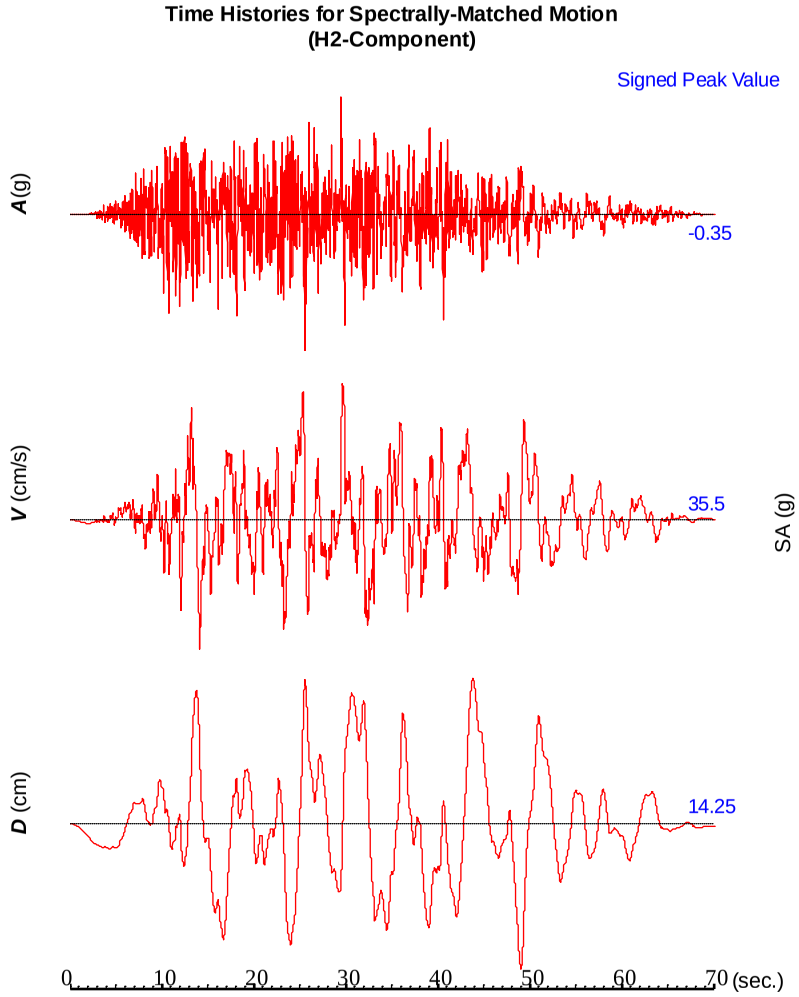
CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

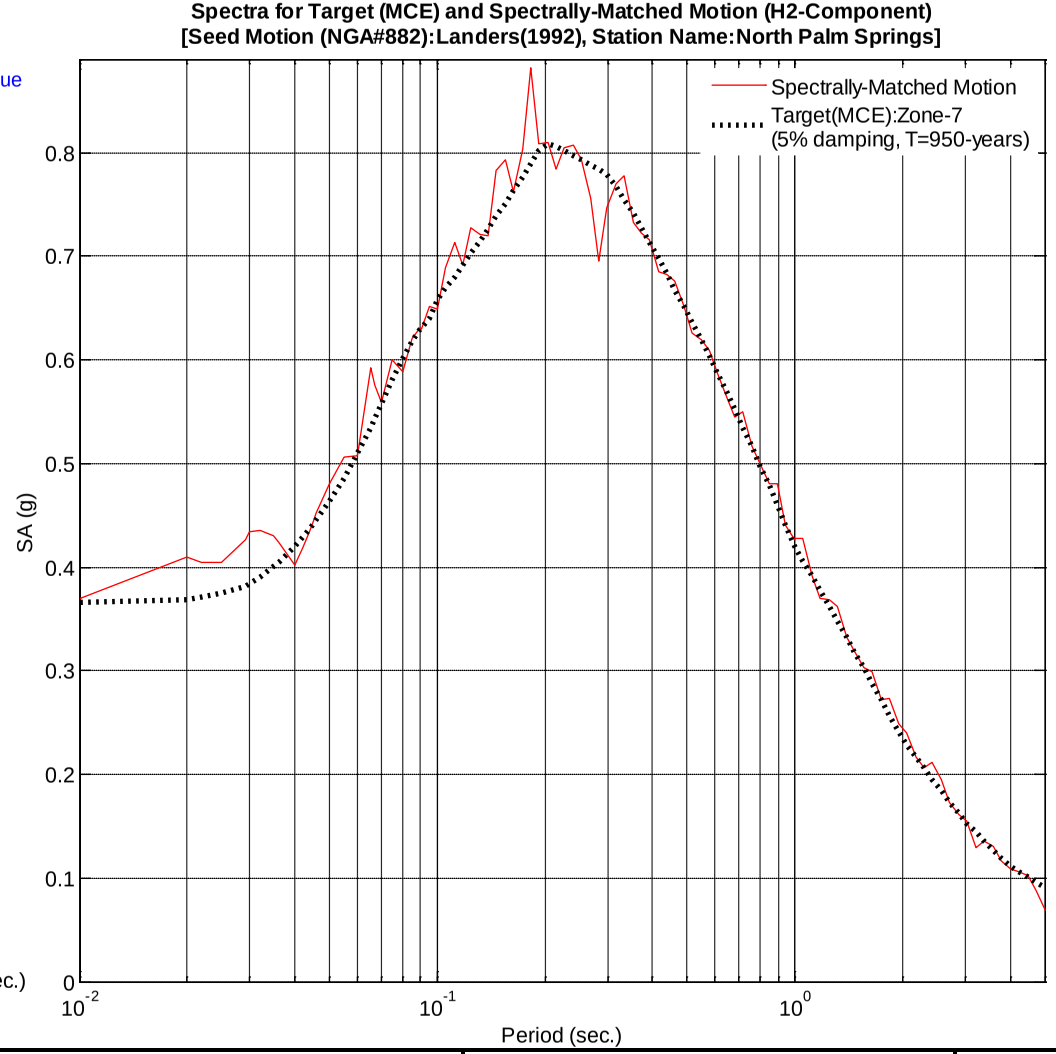
PLATE **B7-0**



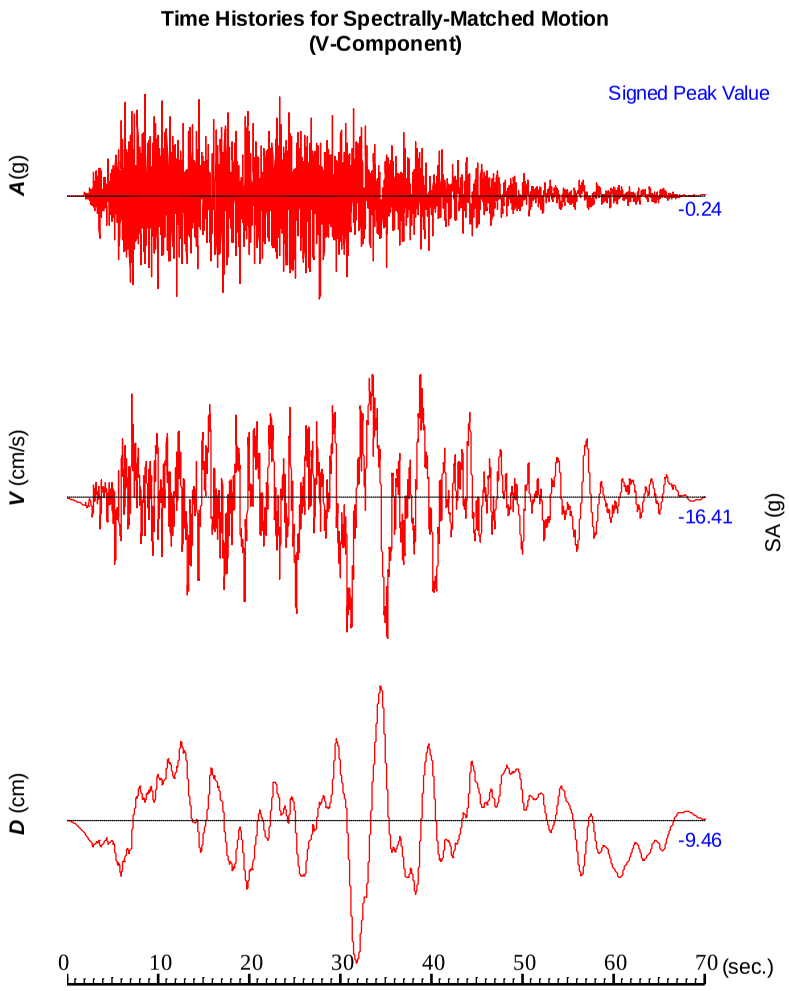


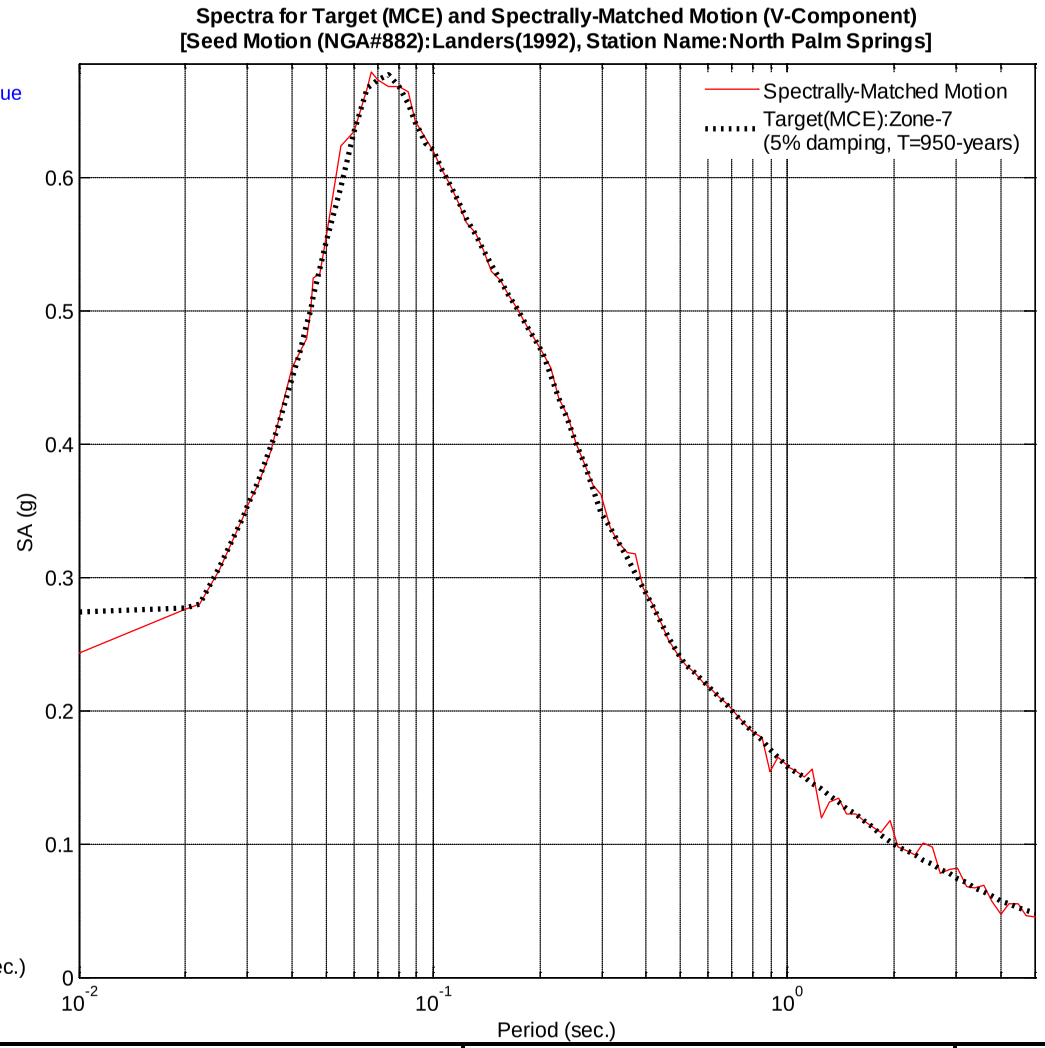
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 1 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-1**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 1 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-2**





SC SOLUTIONS

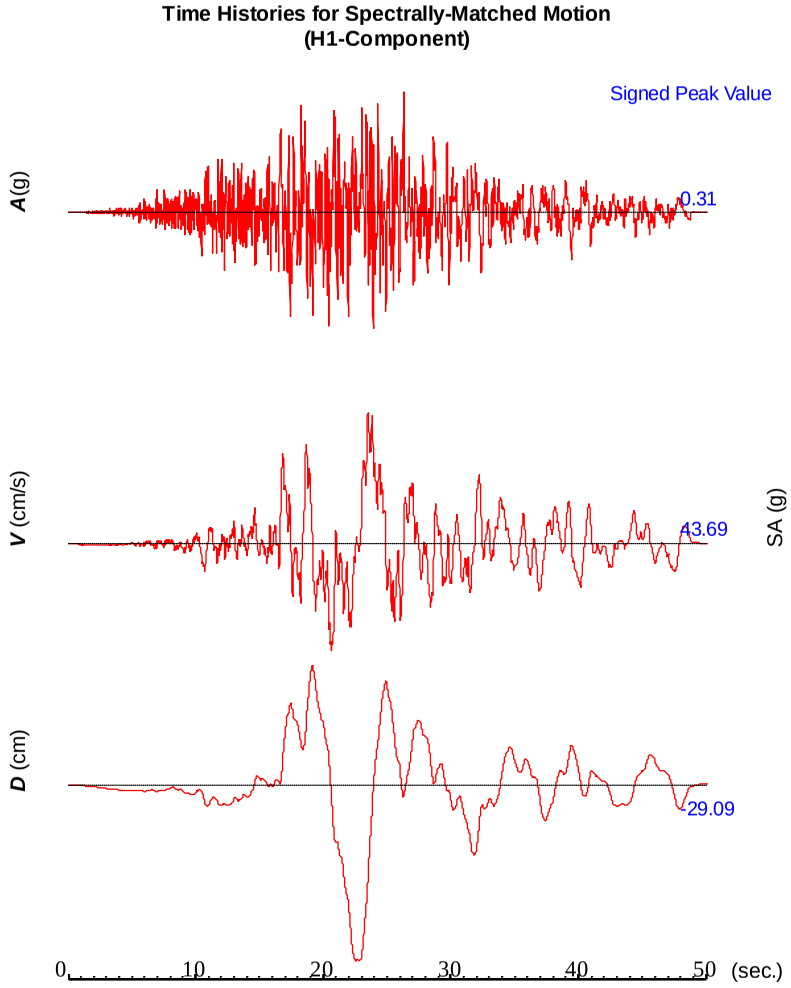
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/24/2012

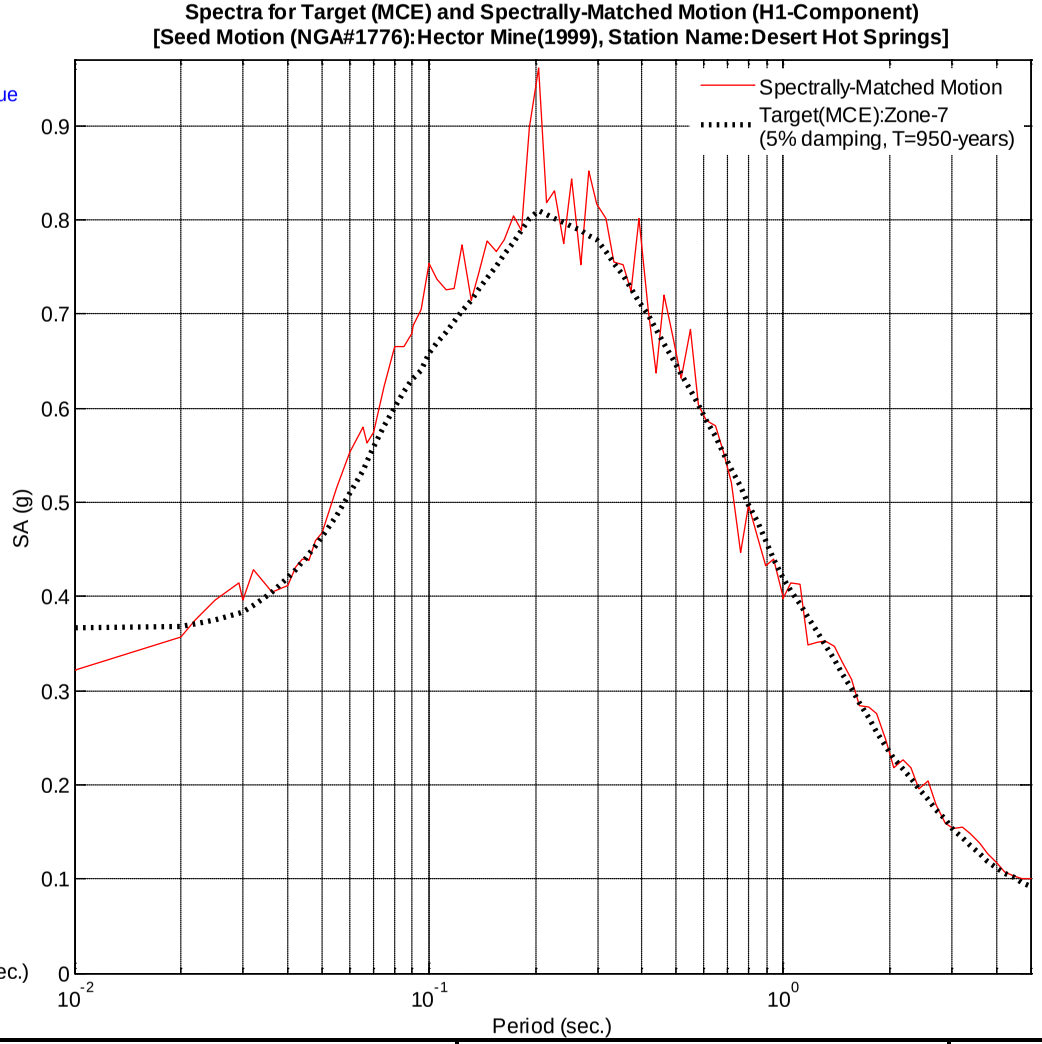
SPECTRALLY-MATCHED MOTIONS – MCE
ZONE 7 – SET NO. 1 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

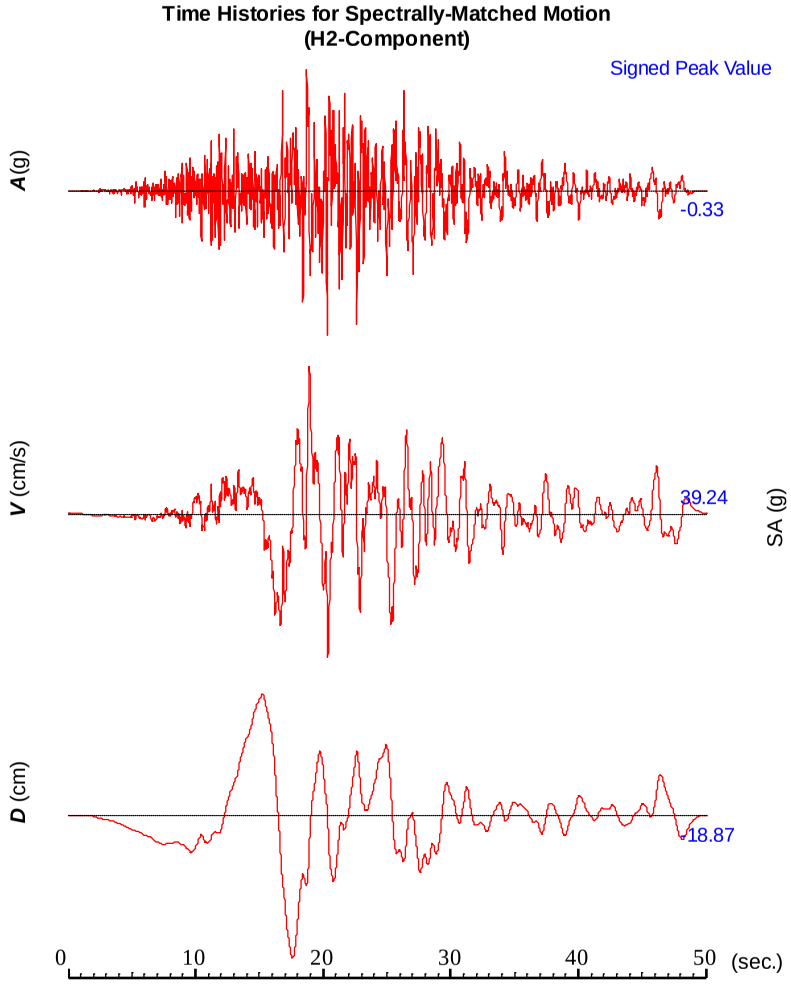
PLATE

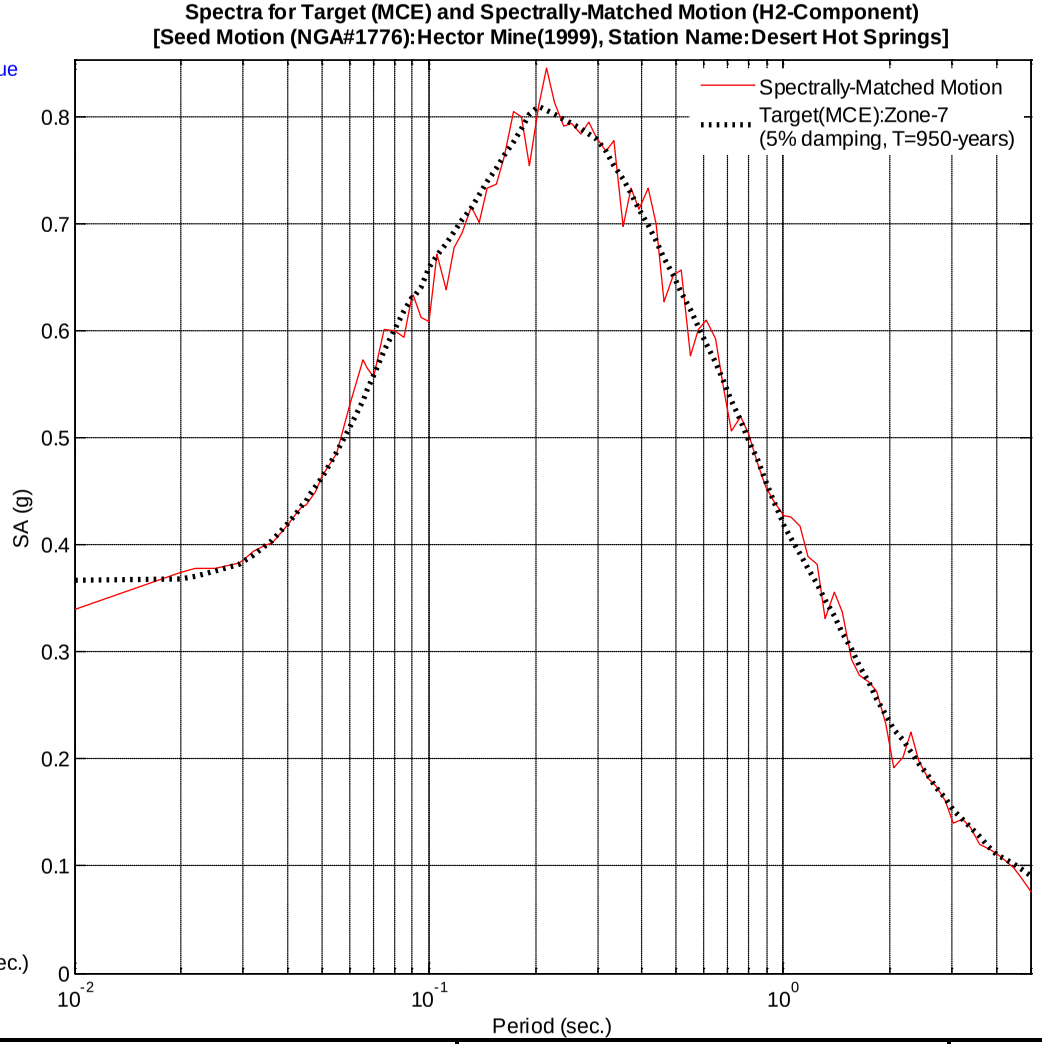
B7-3



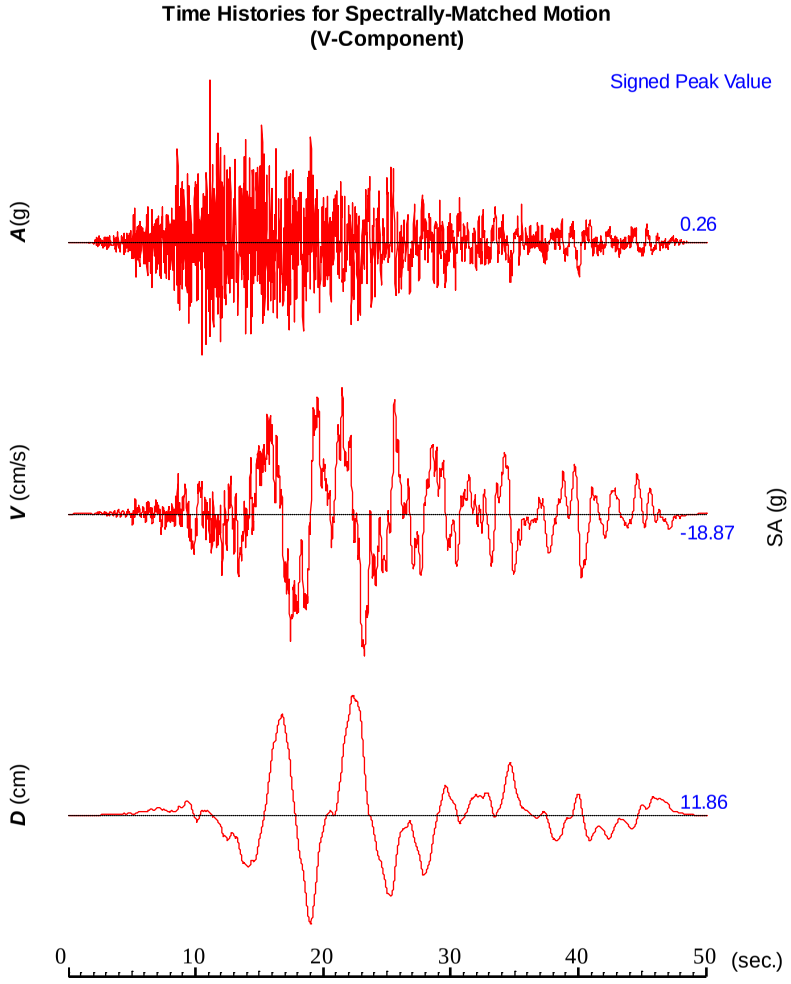


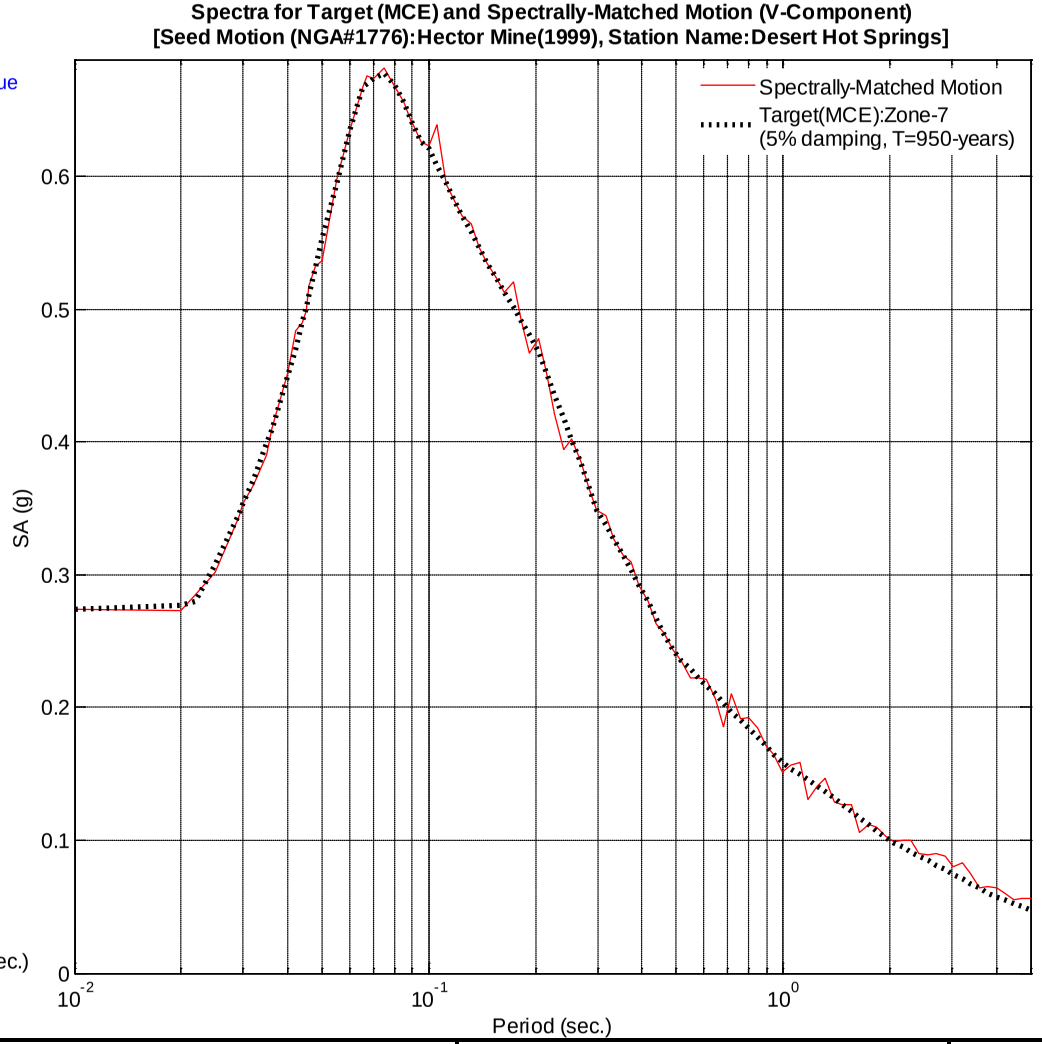
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 2 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-4**





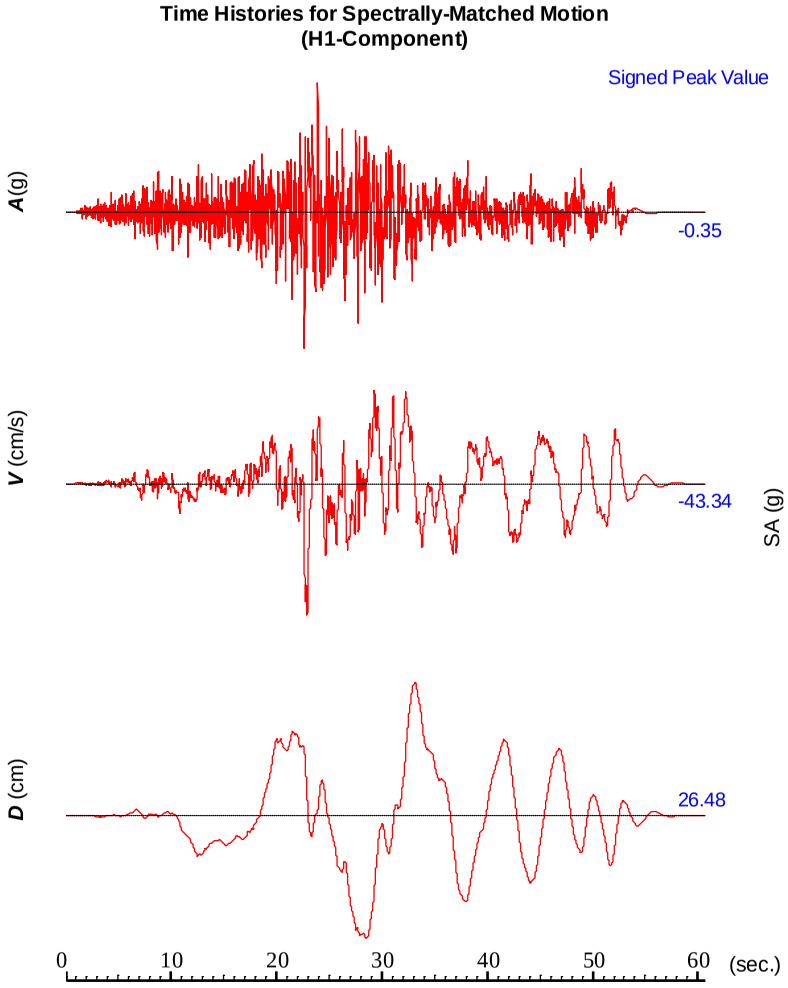
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 2 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-5**

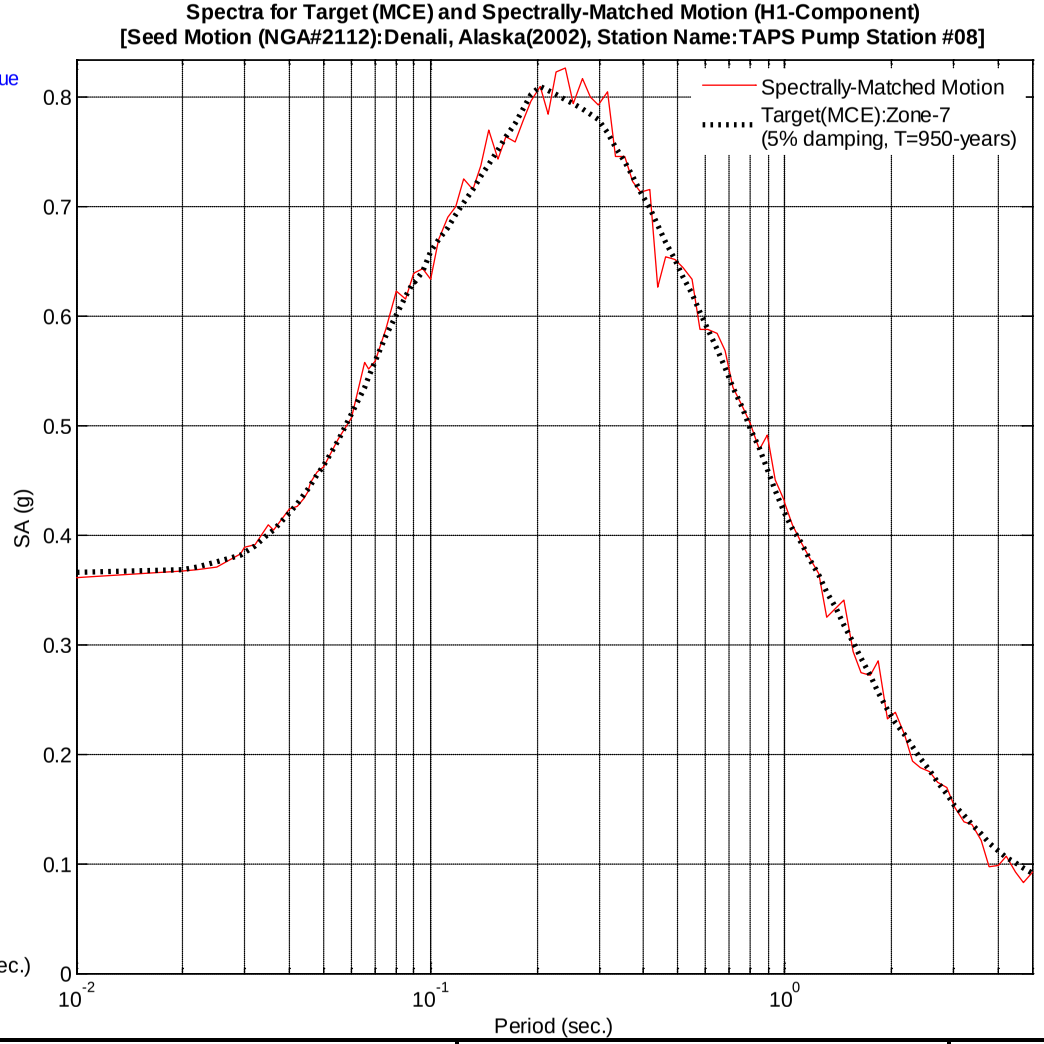




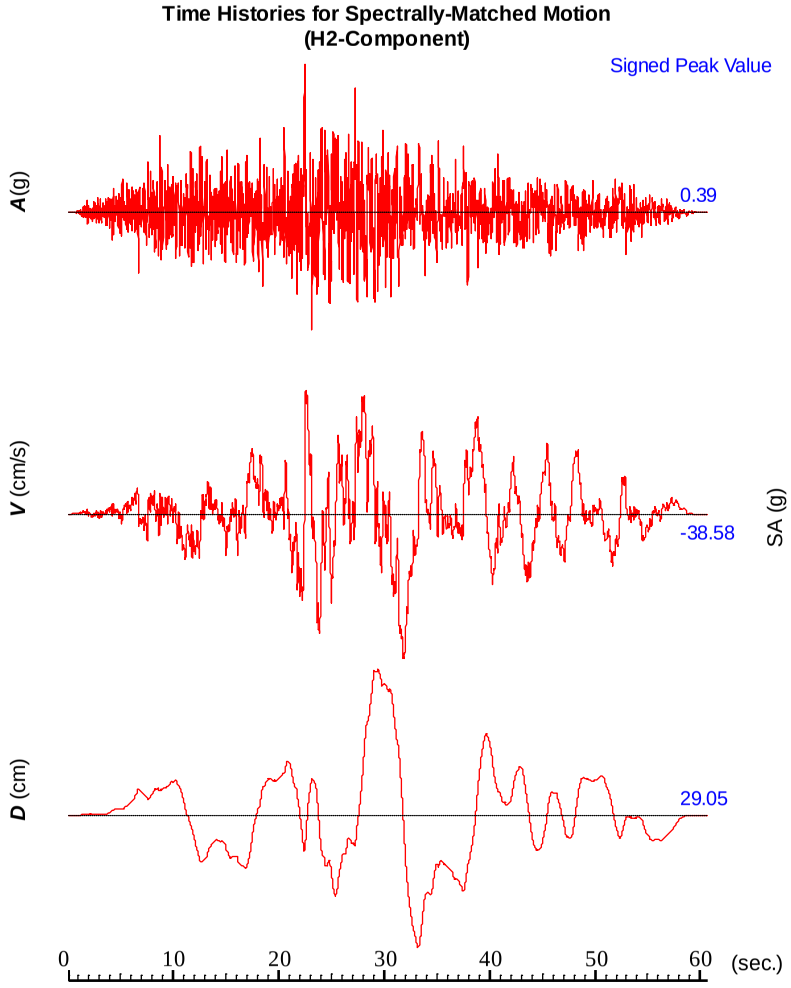
SC SOLUTIONS

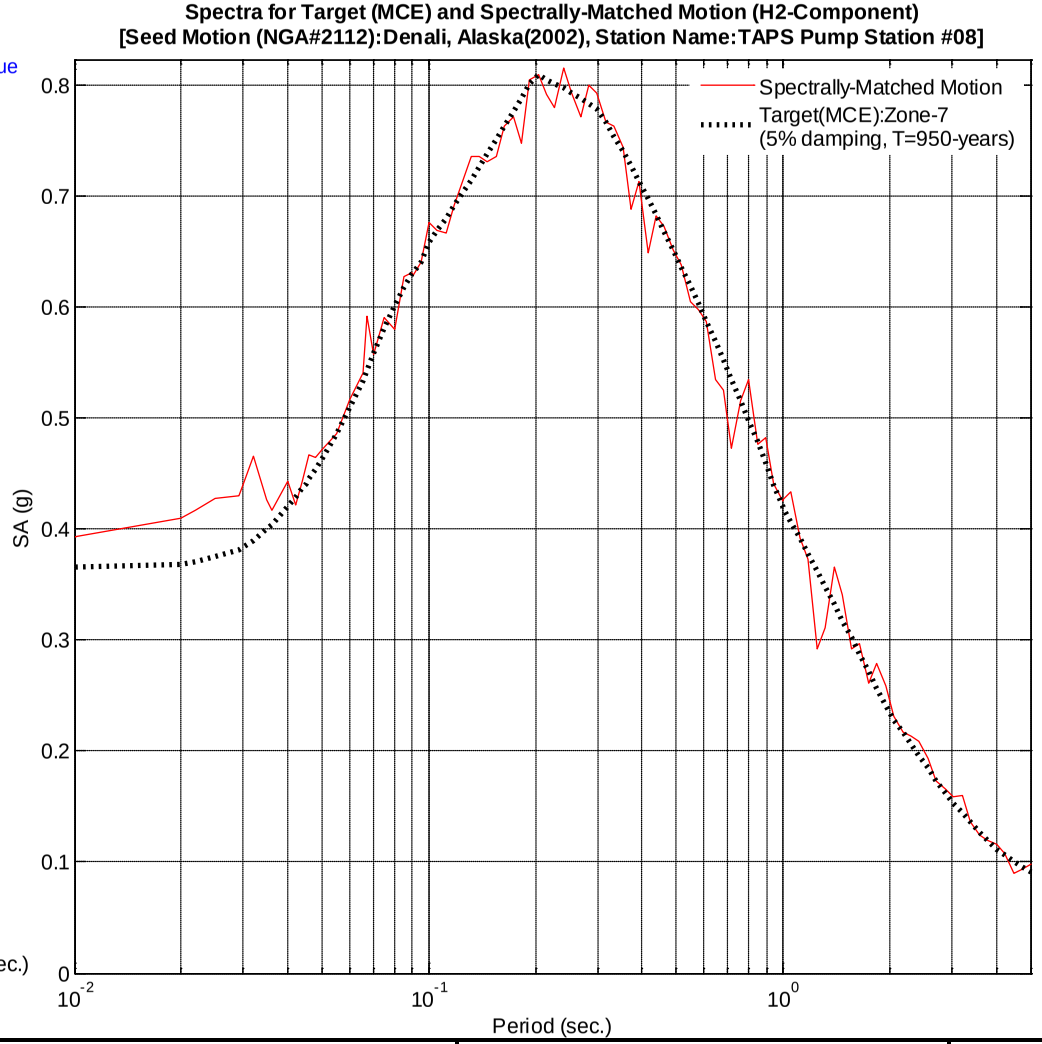
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 7 – SET NO. 2 – VERTICAL**	PLATE **B7-6**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		



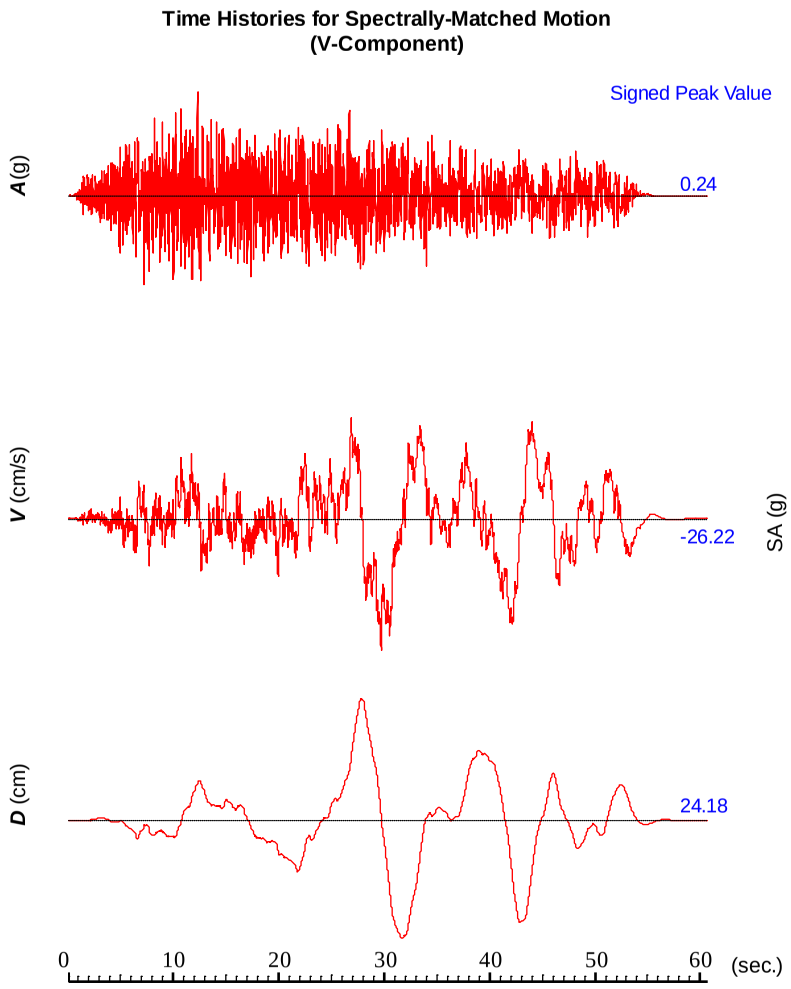


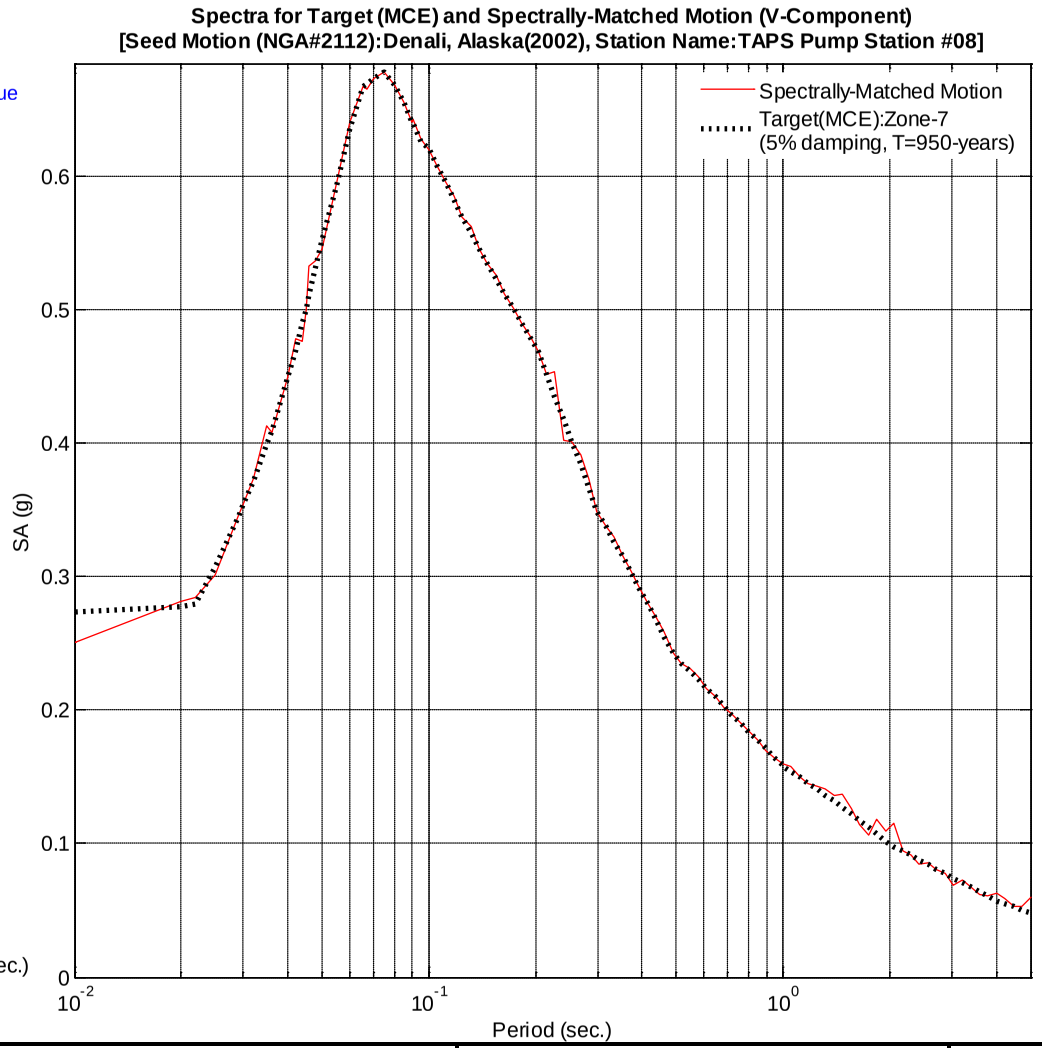
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 3 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-7**



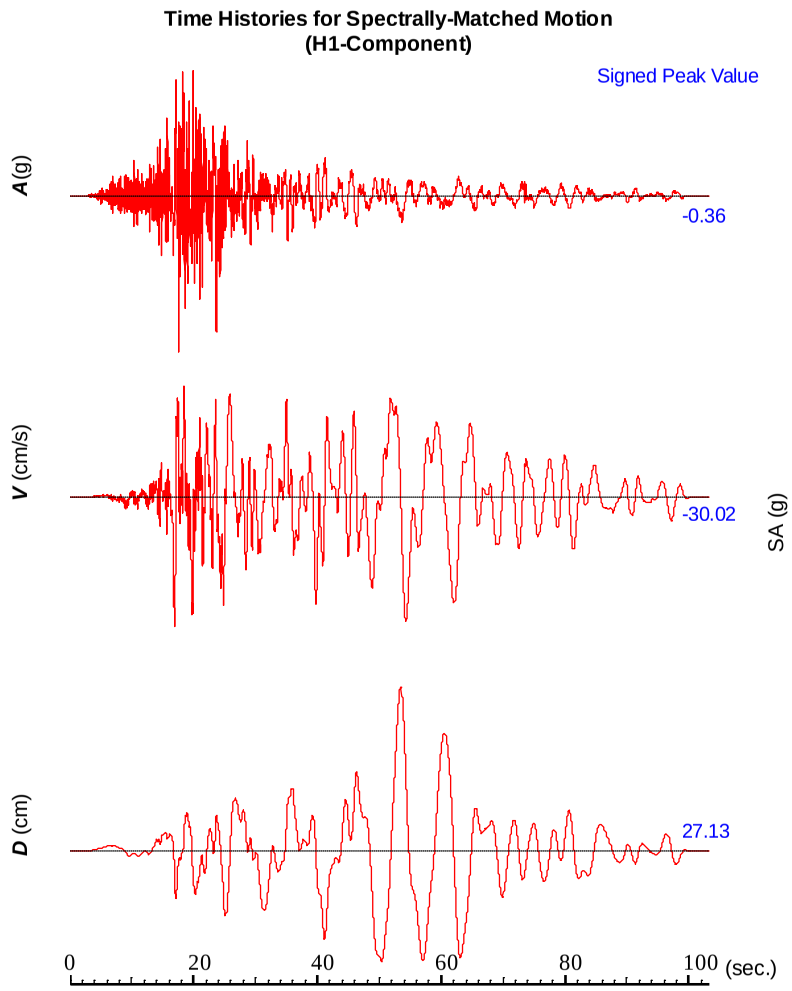


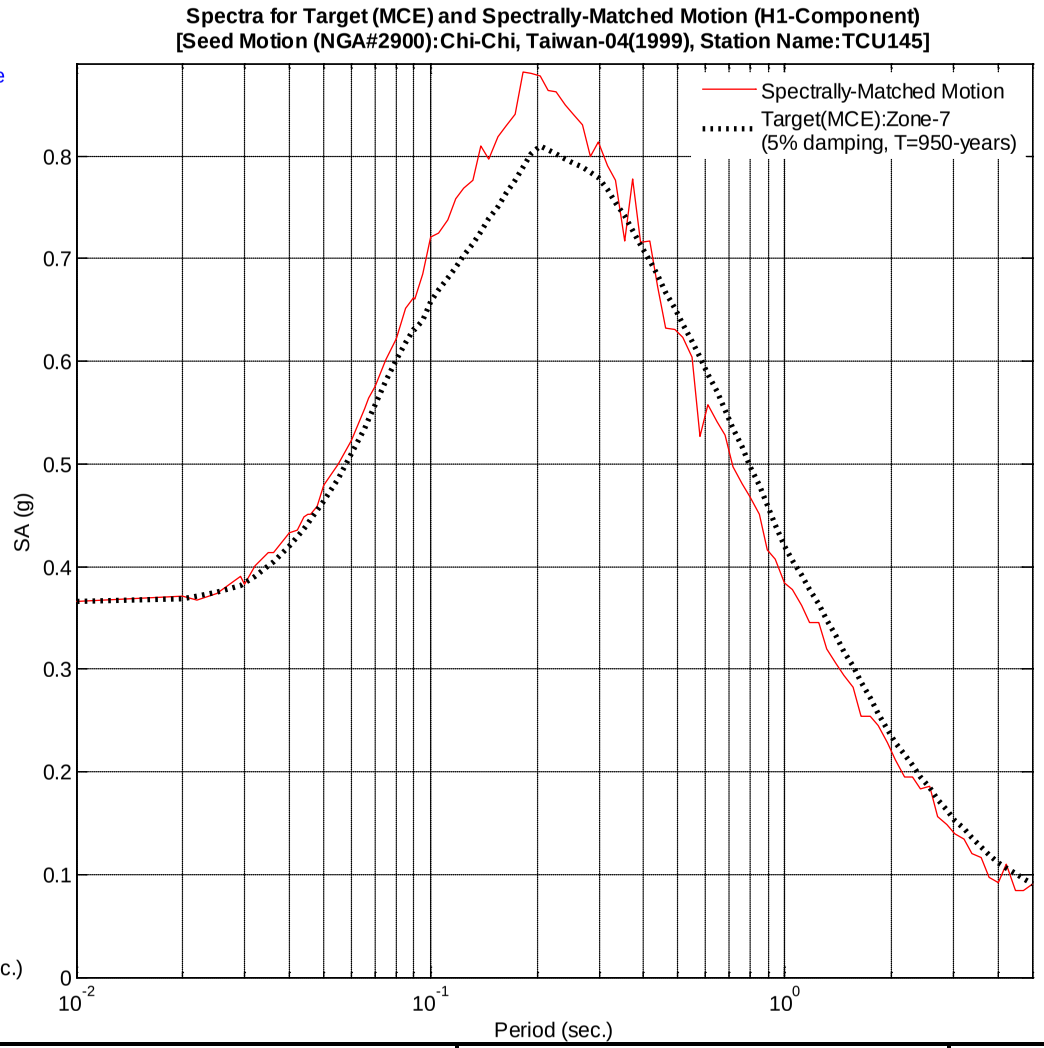
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 3 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-8**



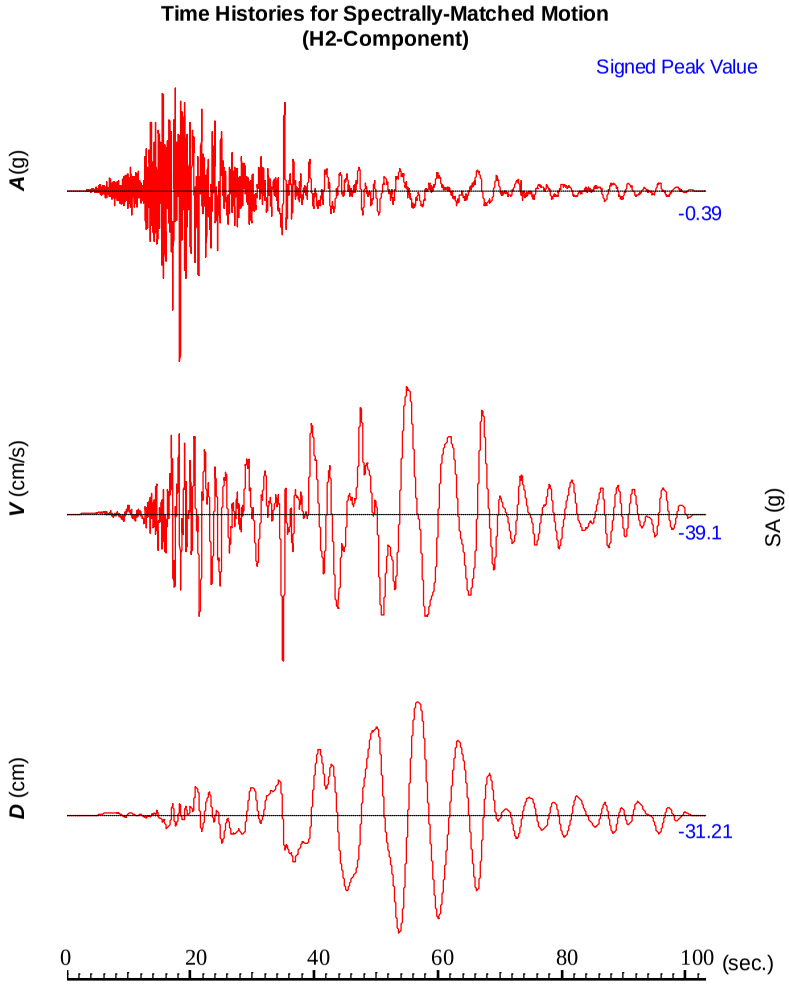


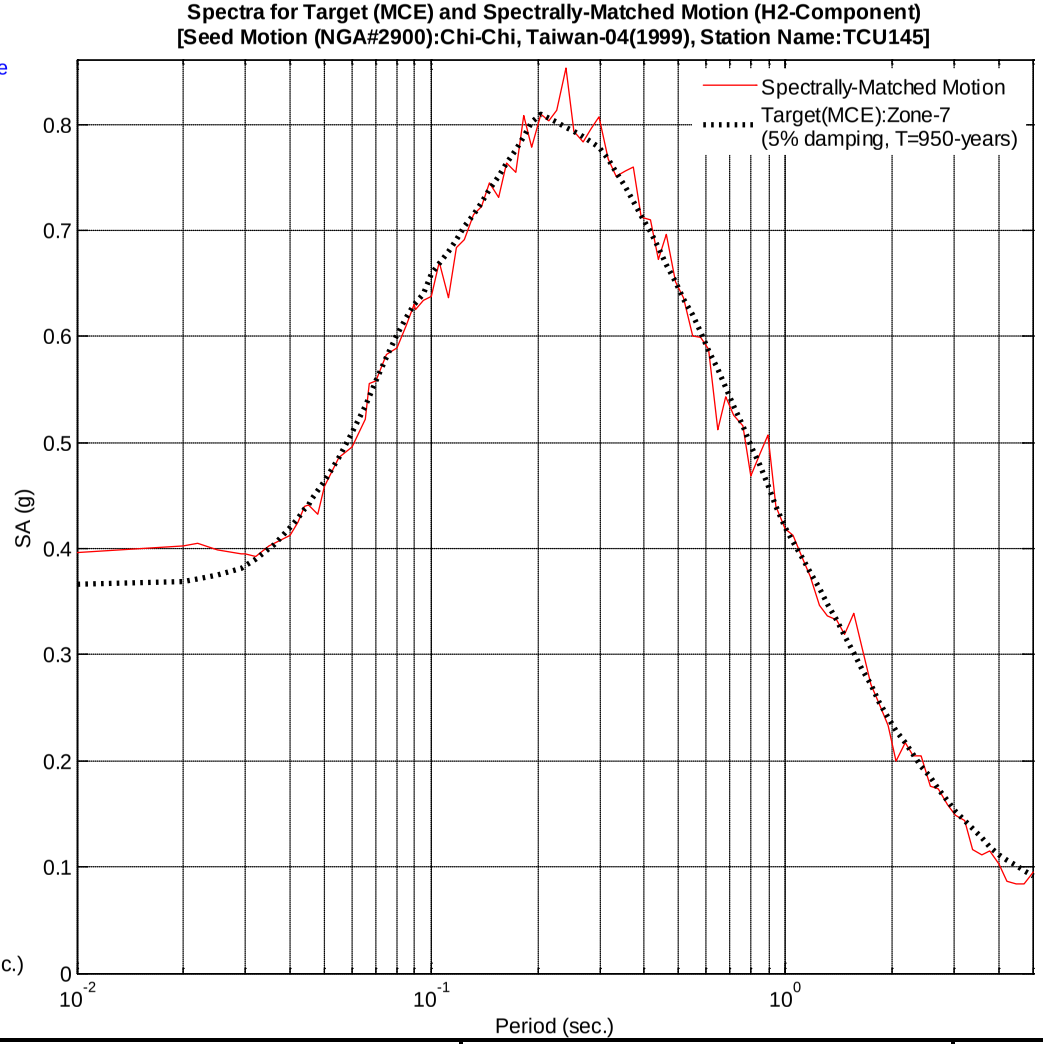
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 7 – SET NO. 3 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-9**



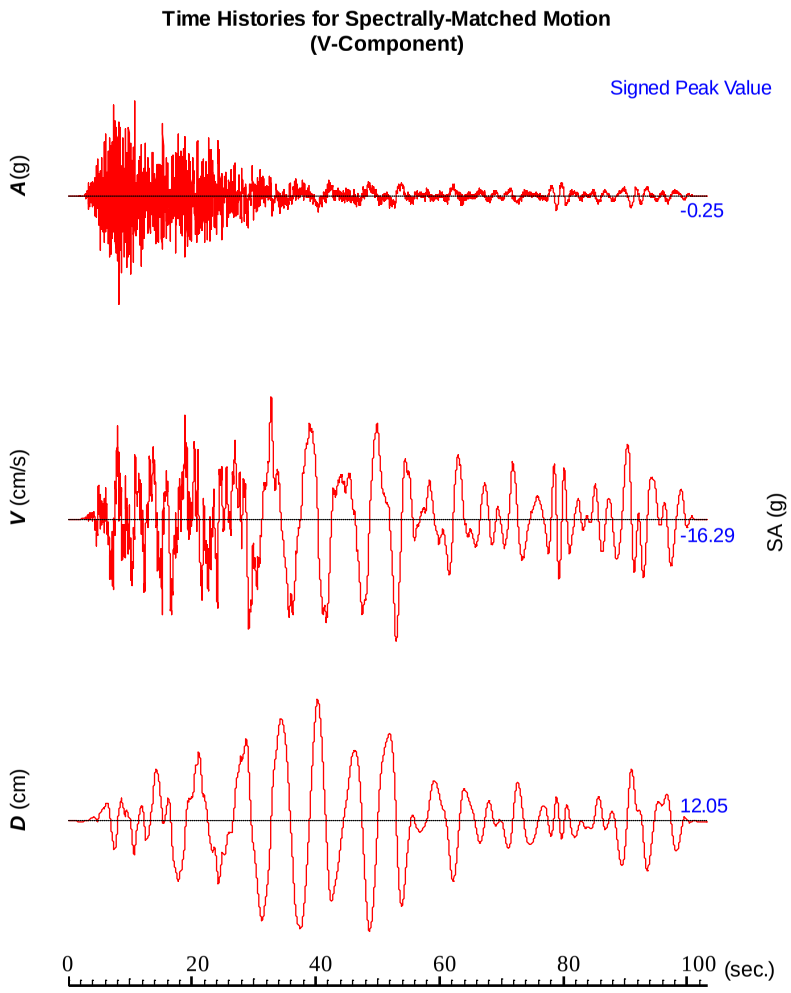


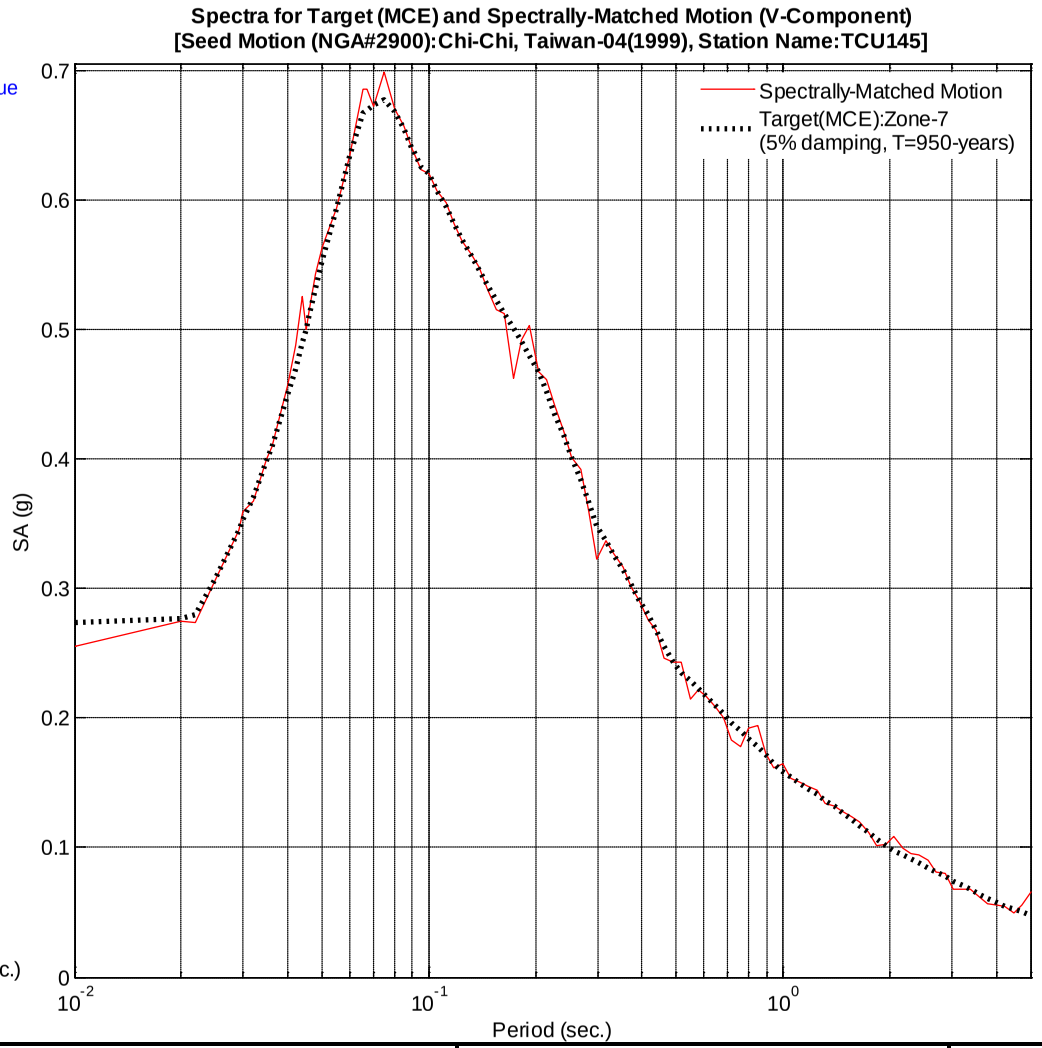
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 4 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-10**





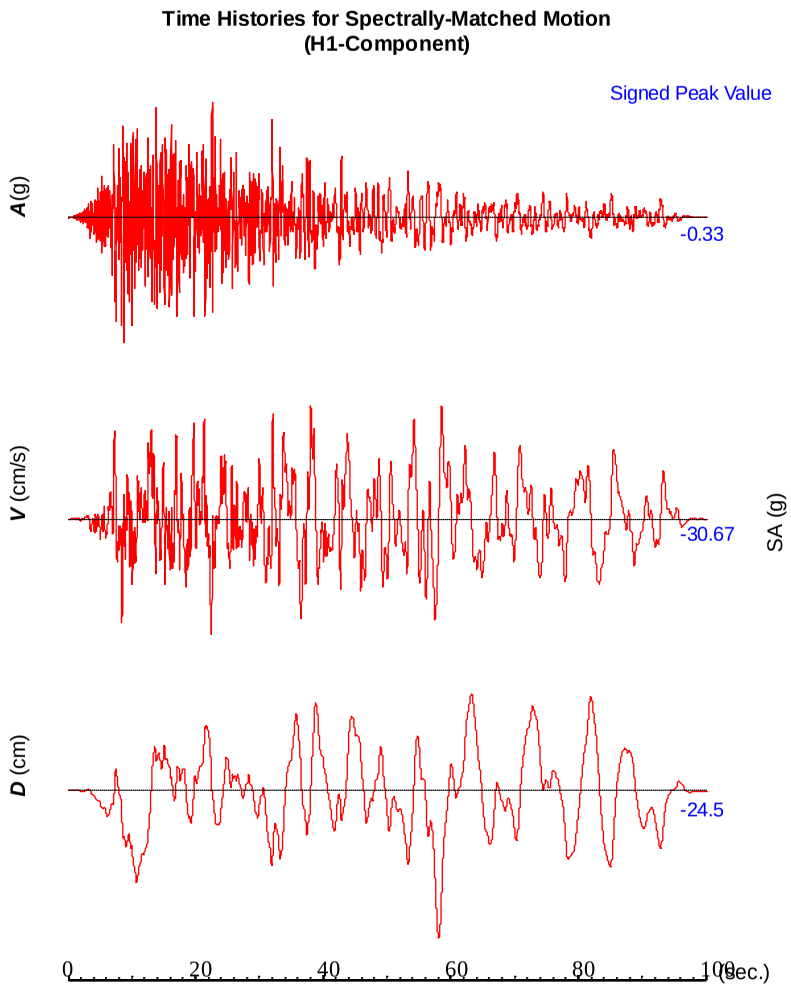
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 4 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-11**

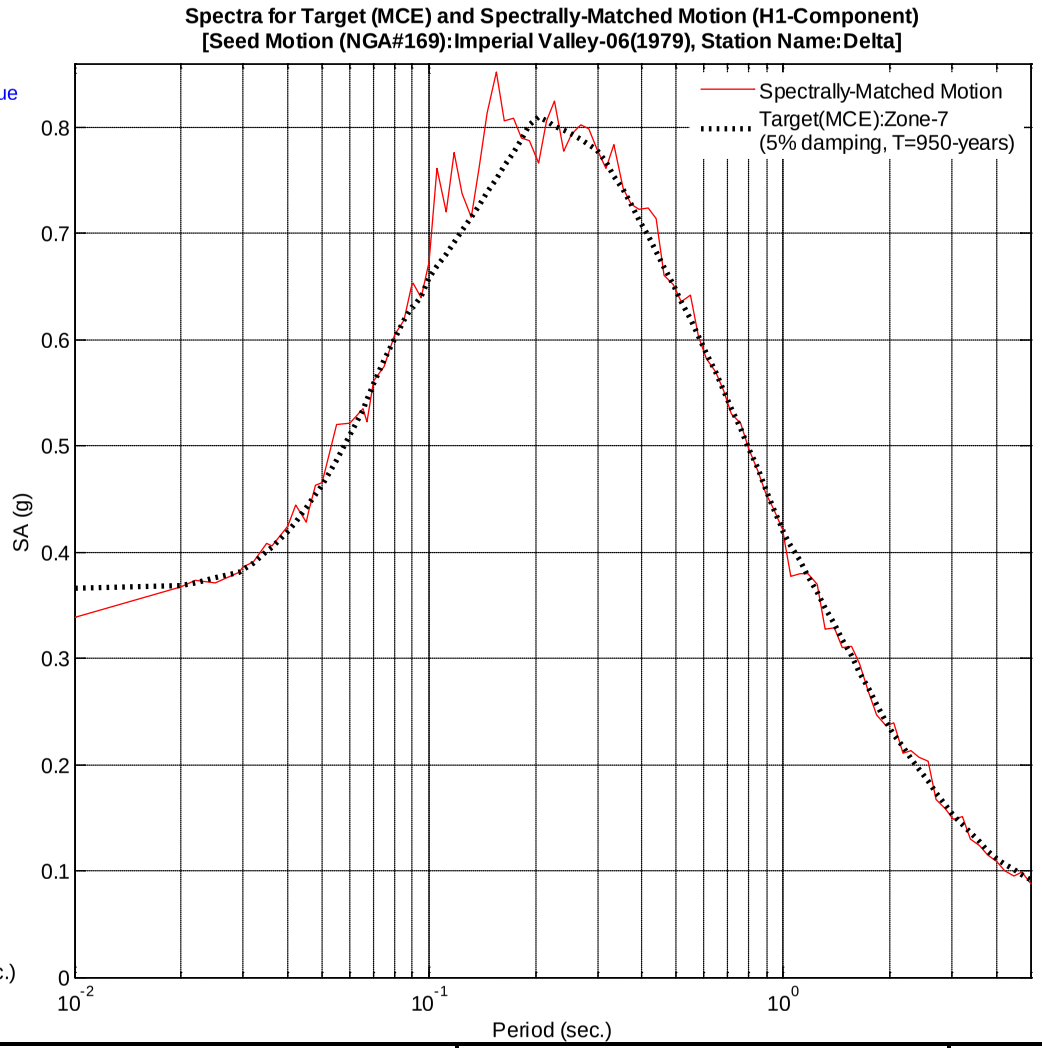




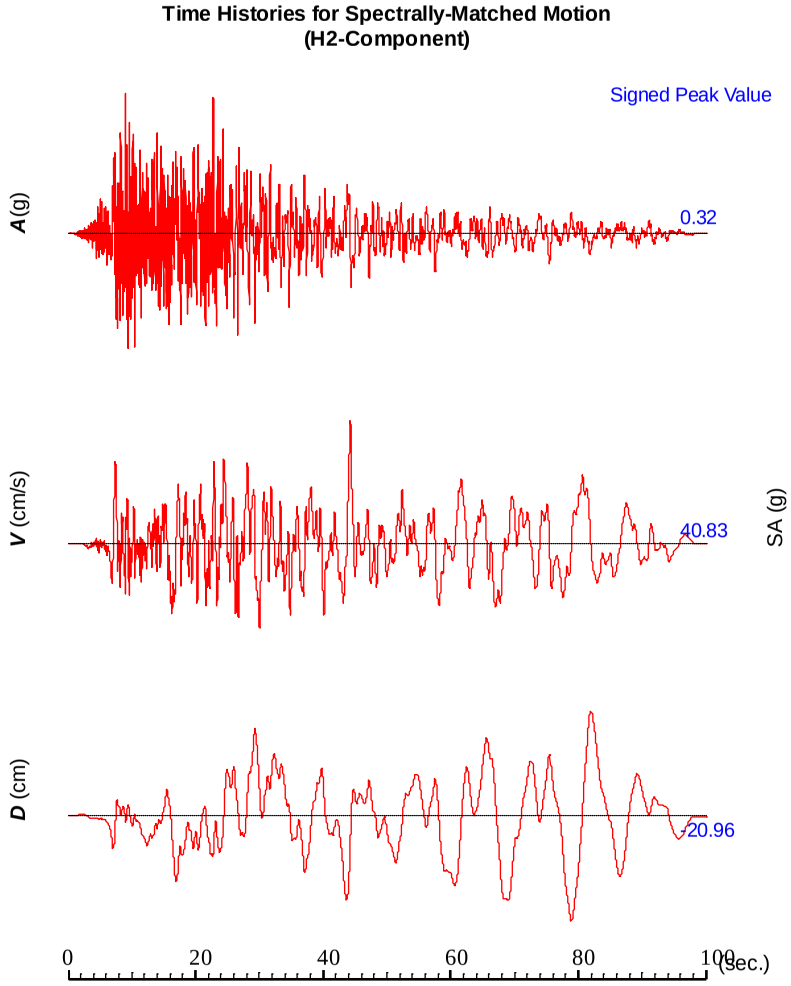
SC SOLUTIONS

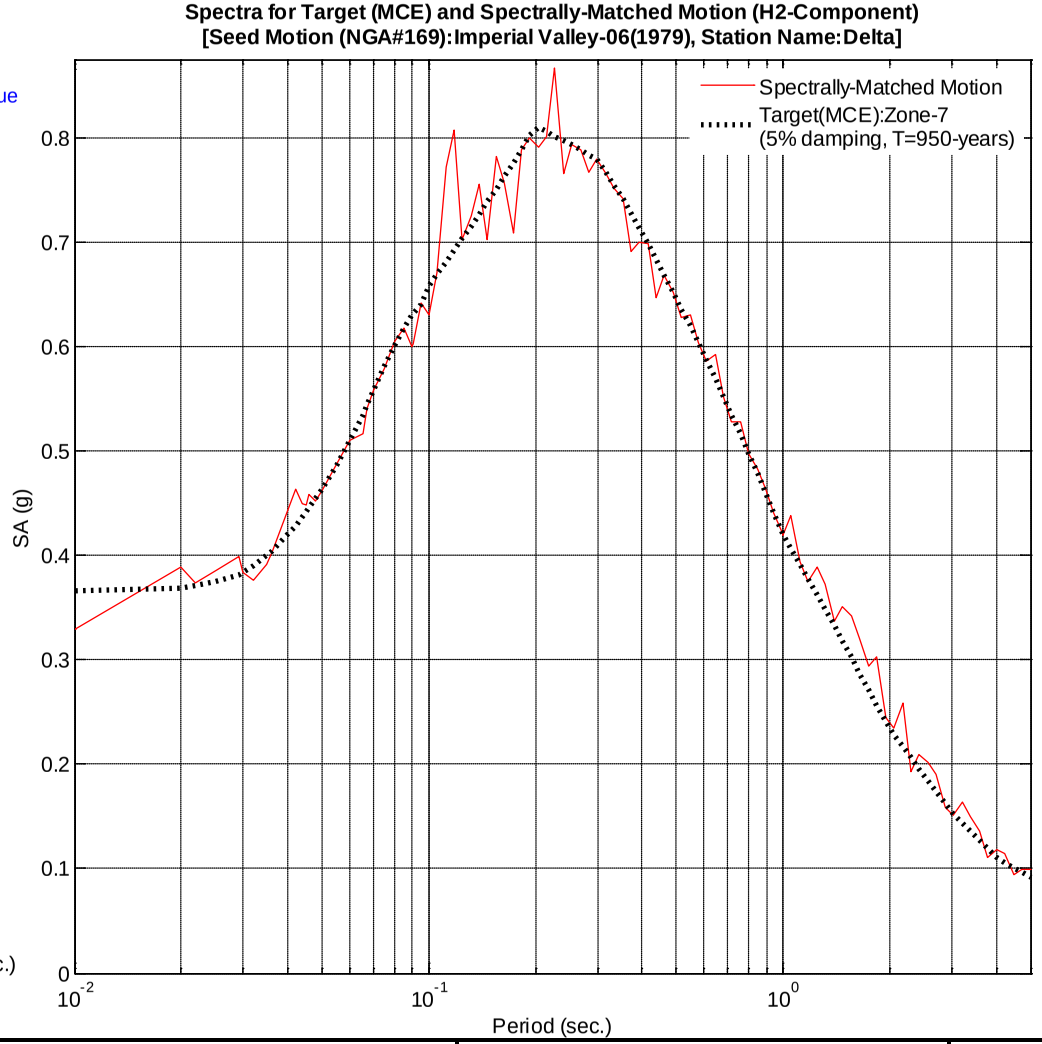
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 7 – SET NO. 4 – VERTICAL**	PLATE **B7-12**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		



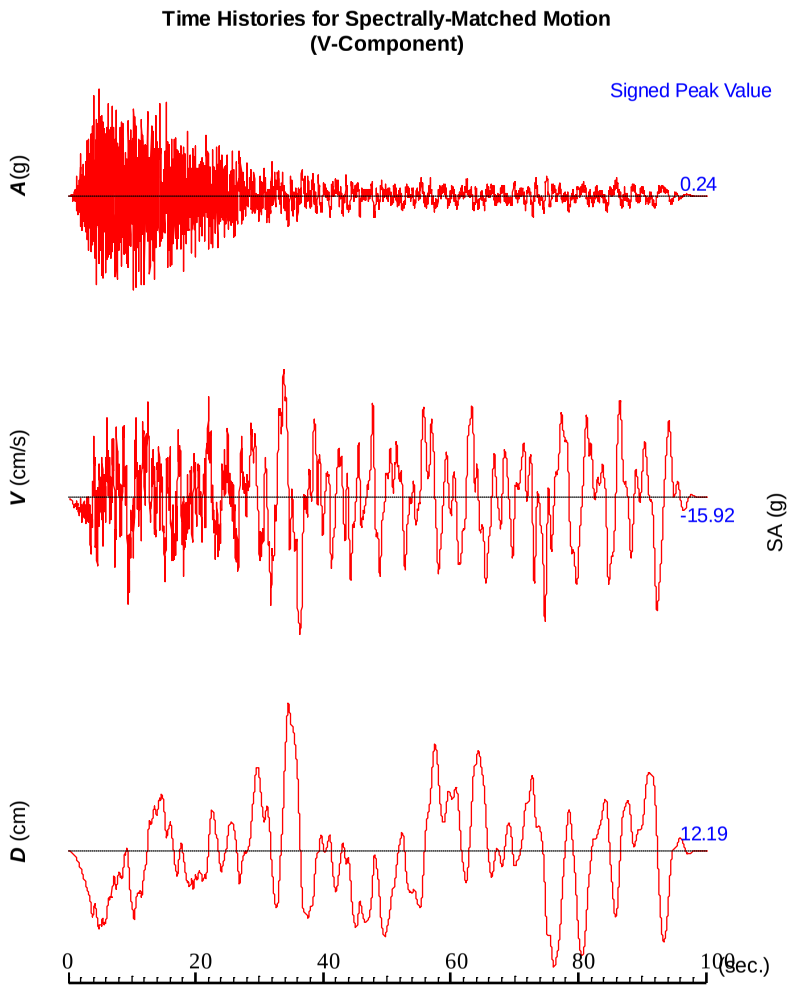


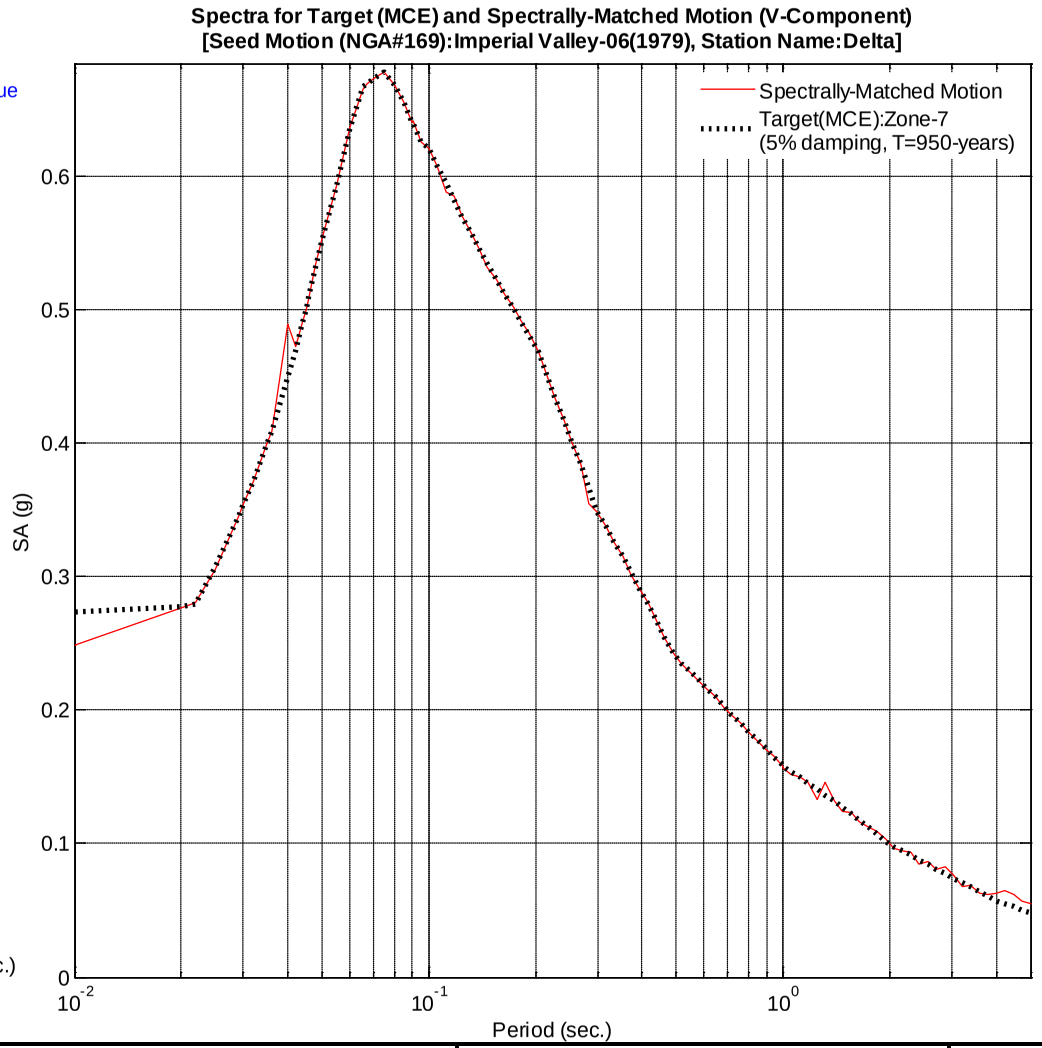
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 5 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-13**





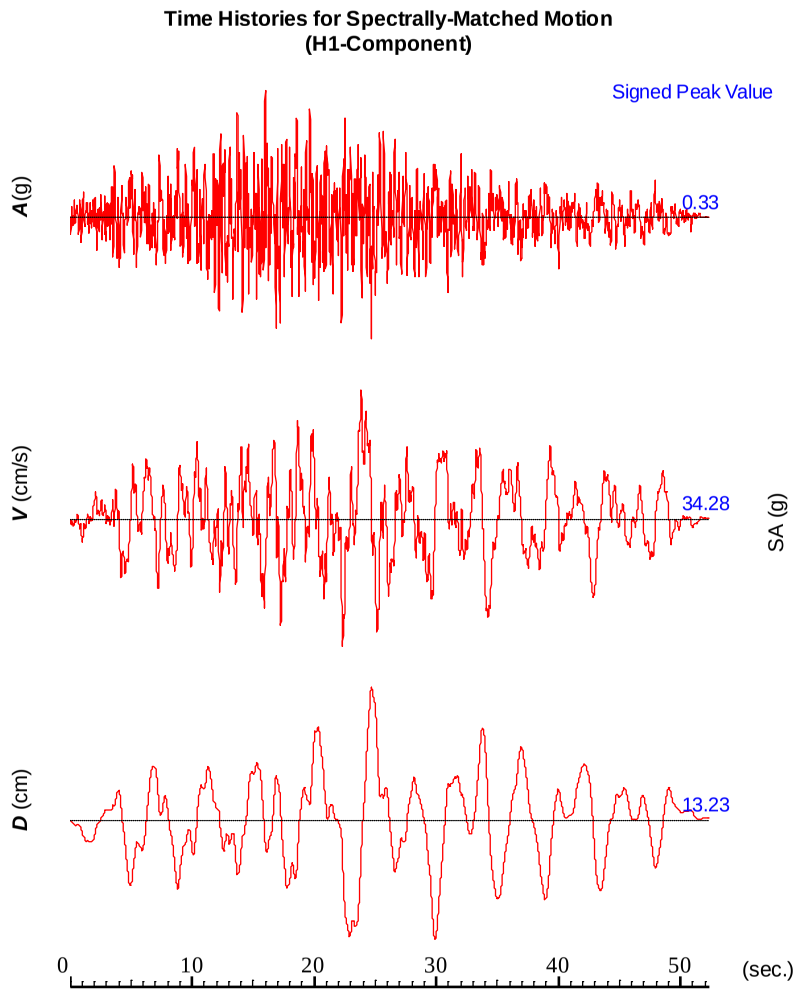
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 5 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-14**

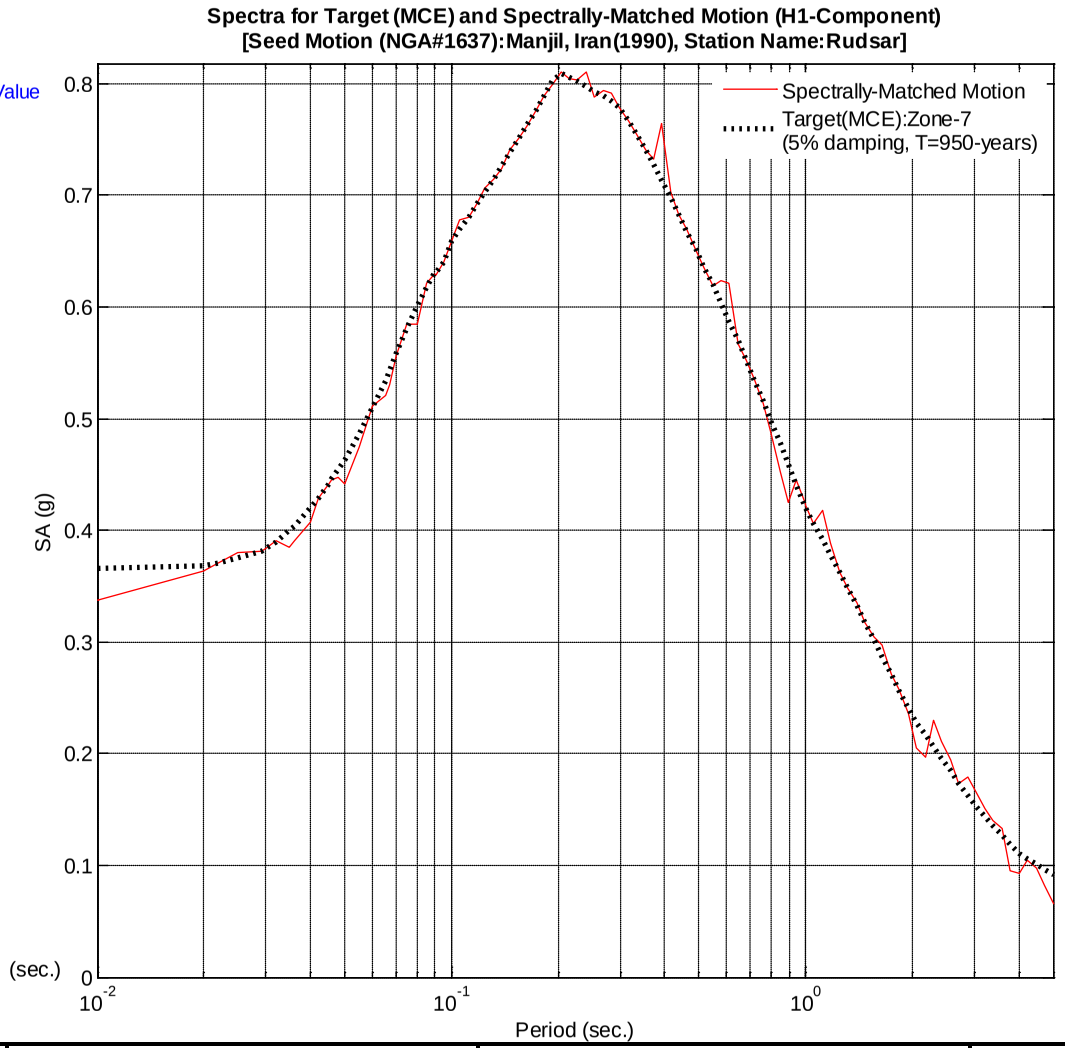




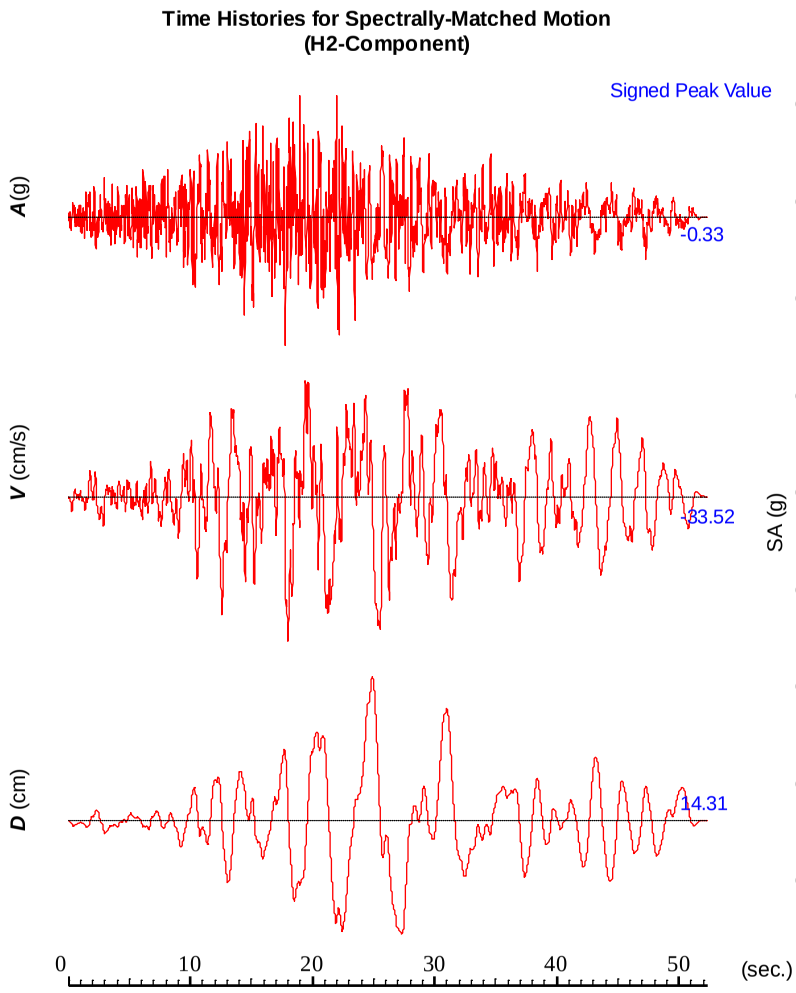
SC SOLUTIONS

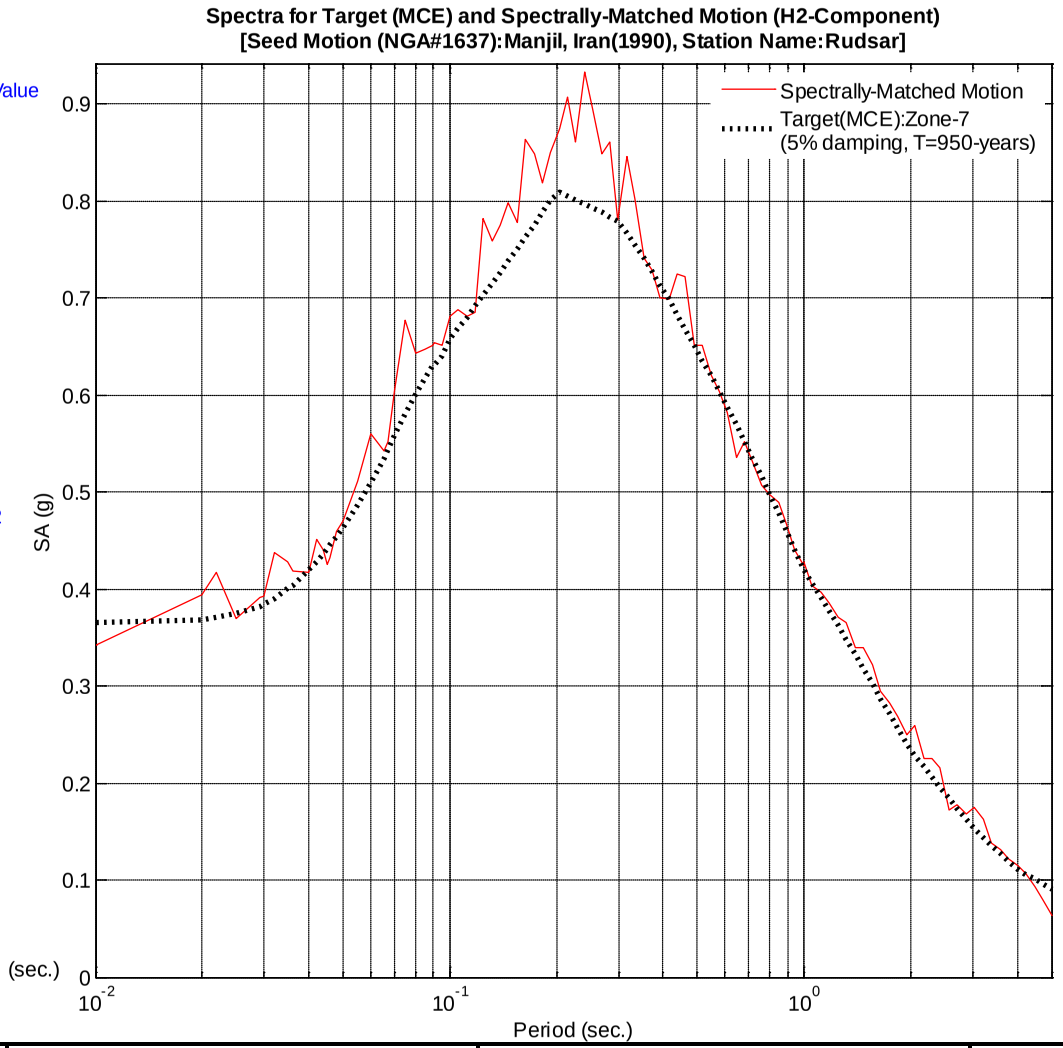
PROJ. NO:		**SPECTRALLY-MATCHED MOTIONS – MCE ZONE 7 – SET NO. 5 – VERTICAL**	PLATE **B7-15**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	M. Tabatabaie	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	02/24/2012		



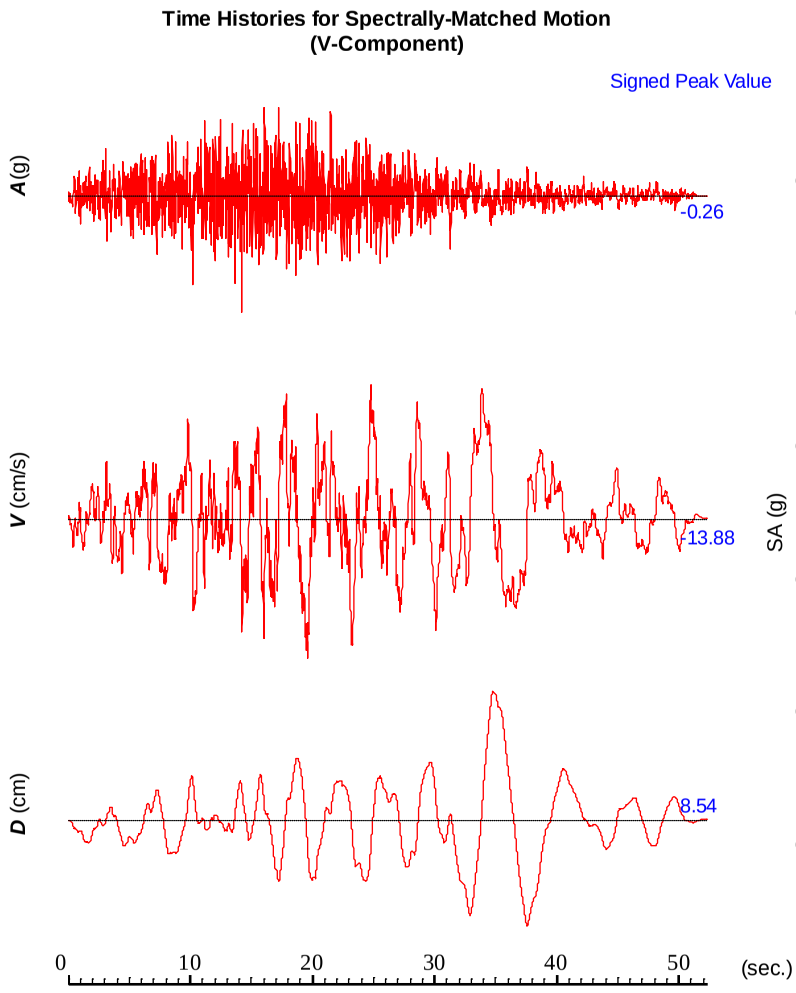


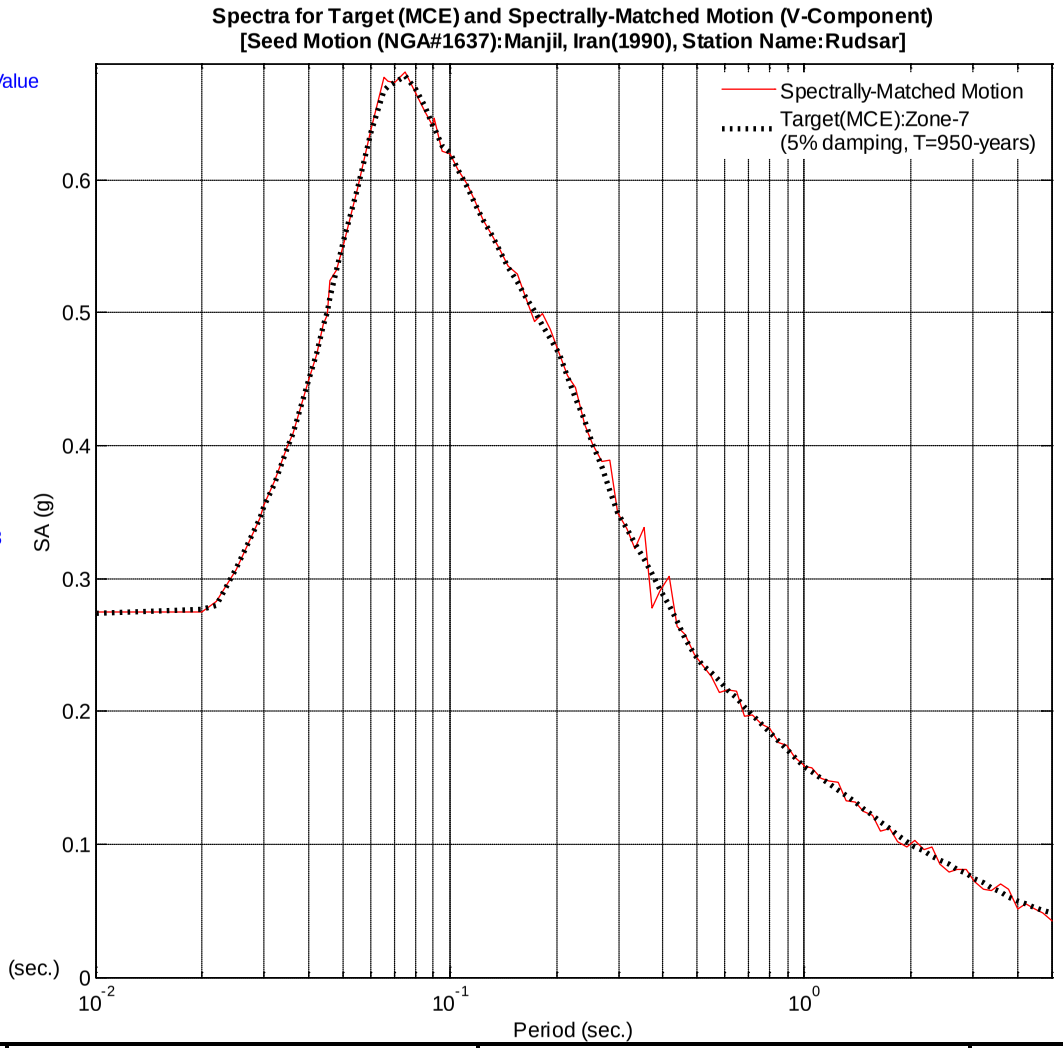
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 6 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-16**



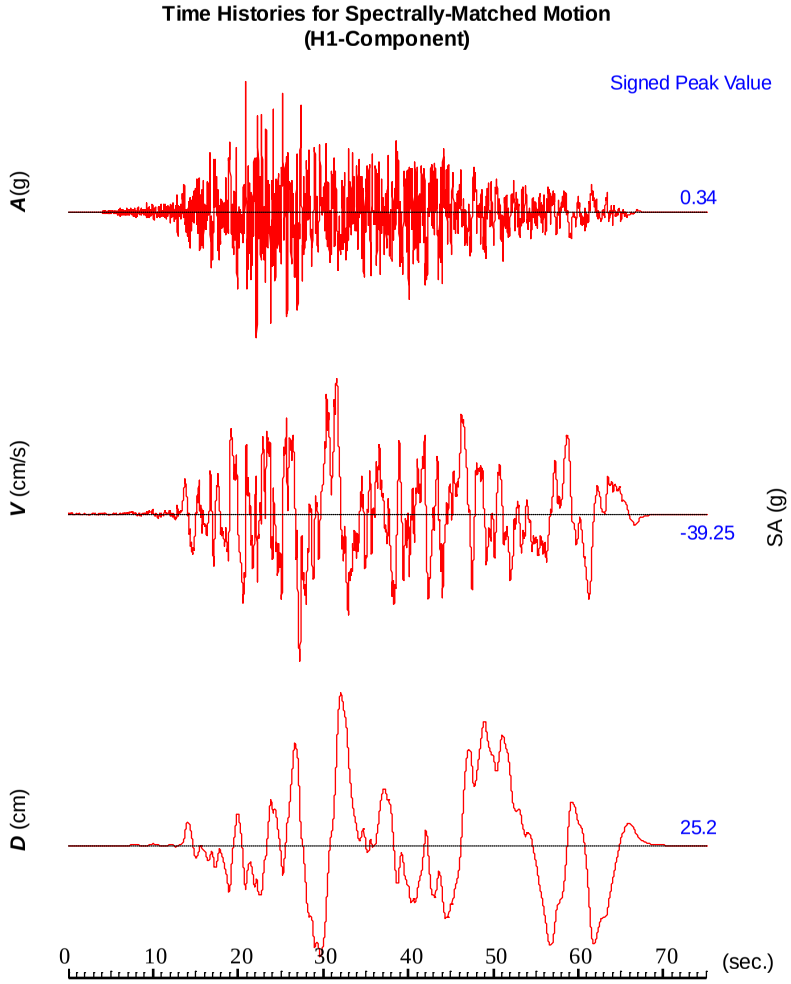


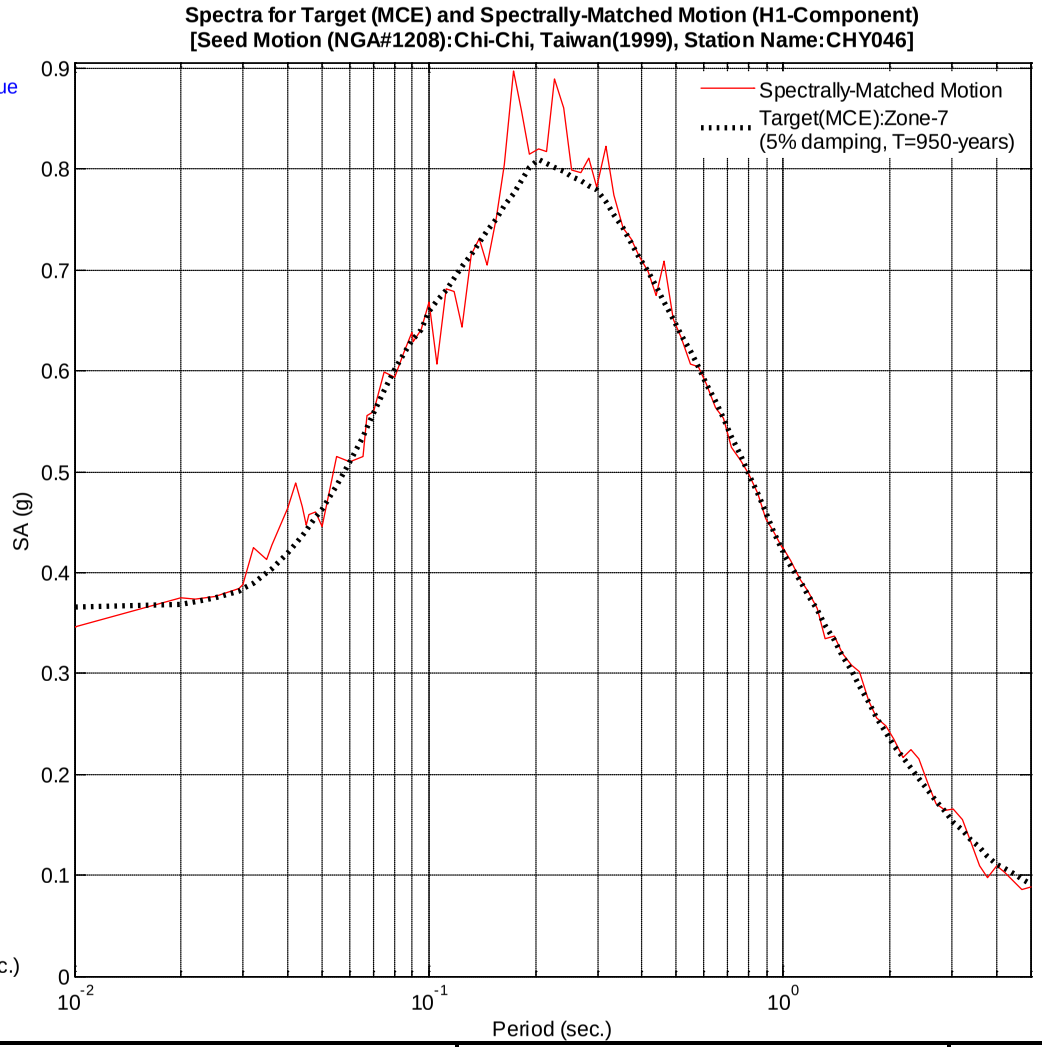
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 6 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-17**



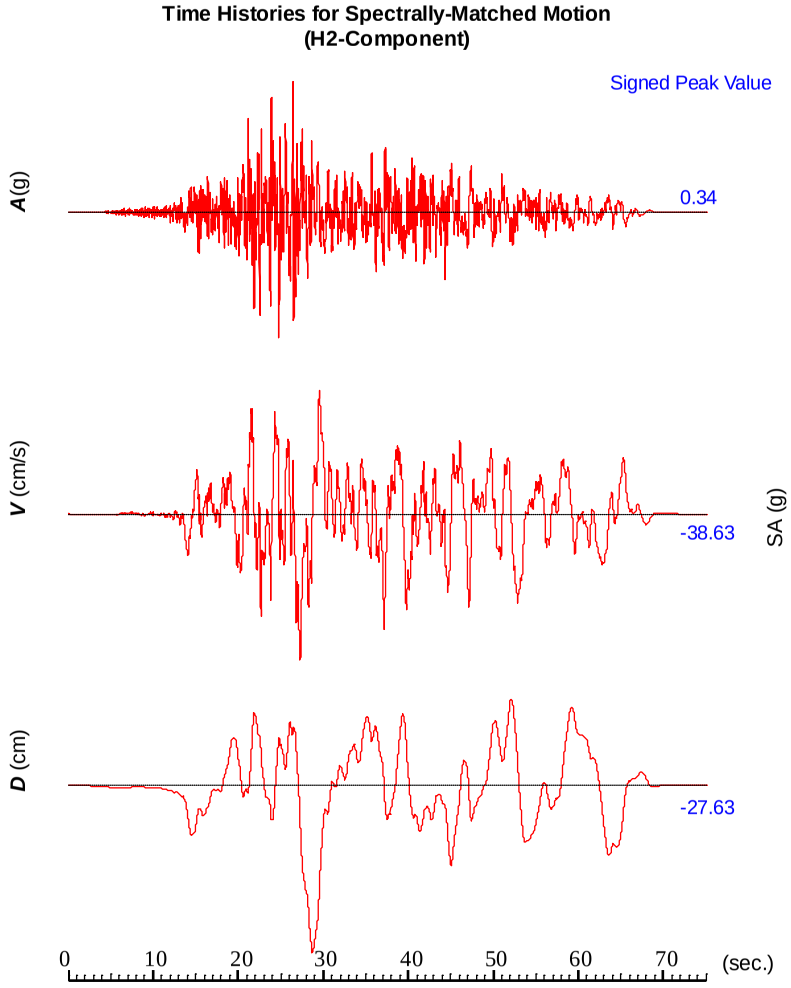


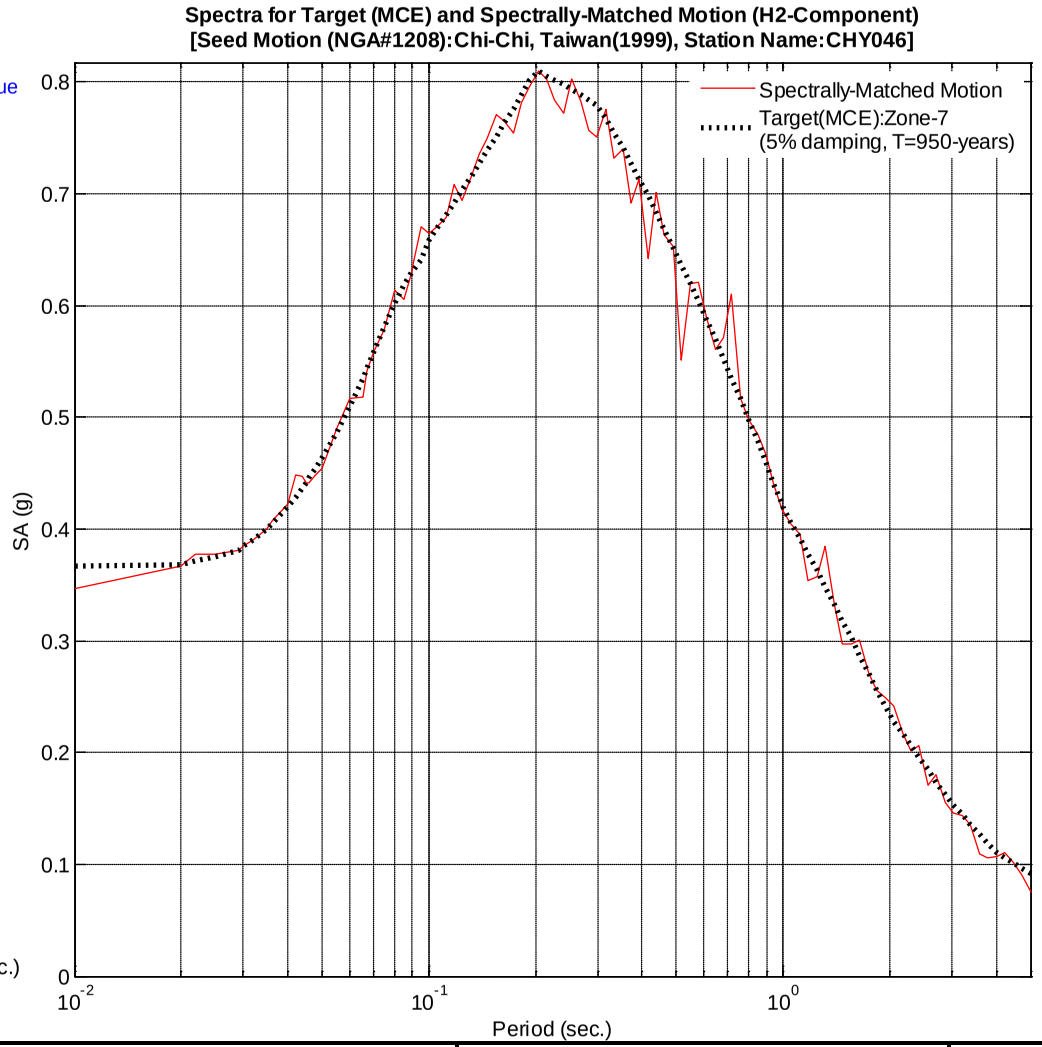
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 6 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-18**



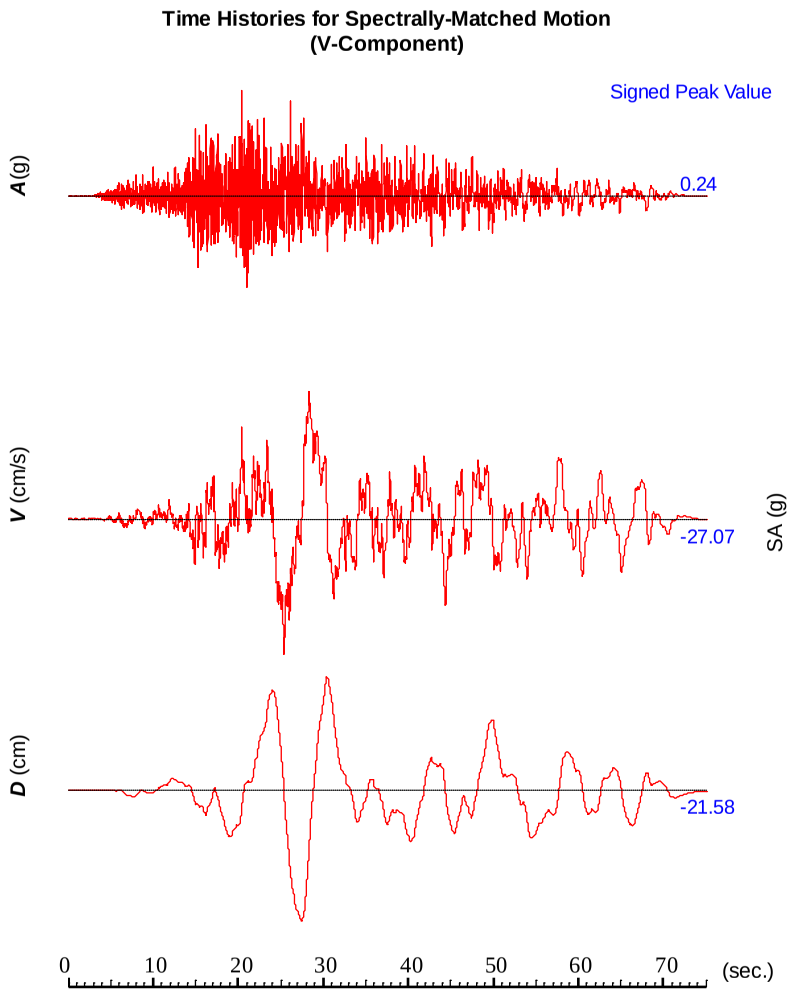


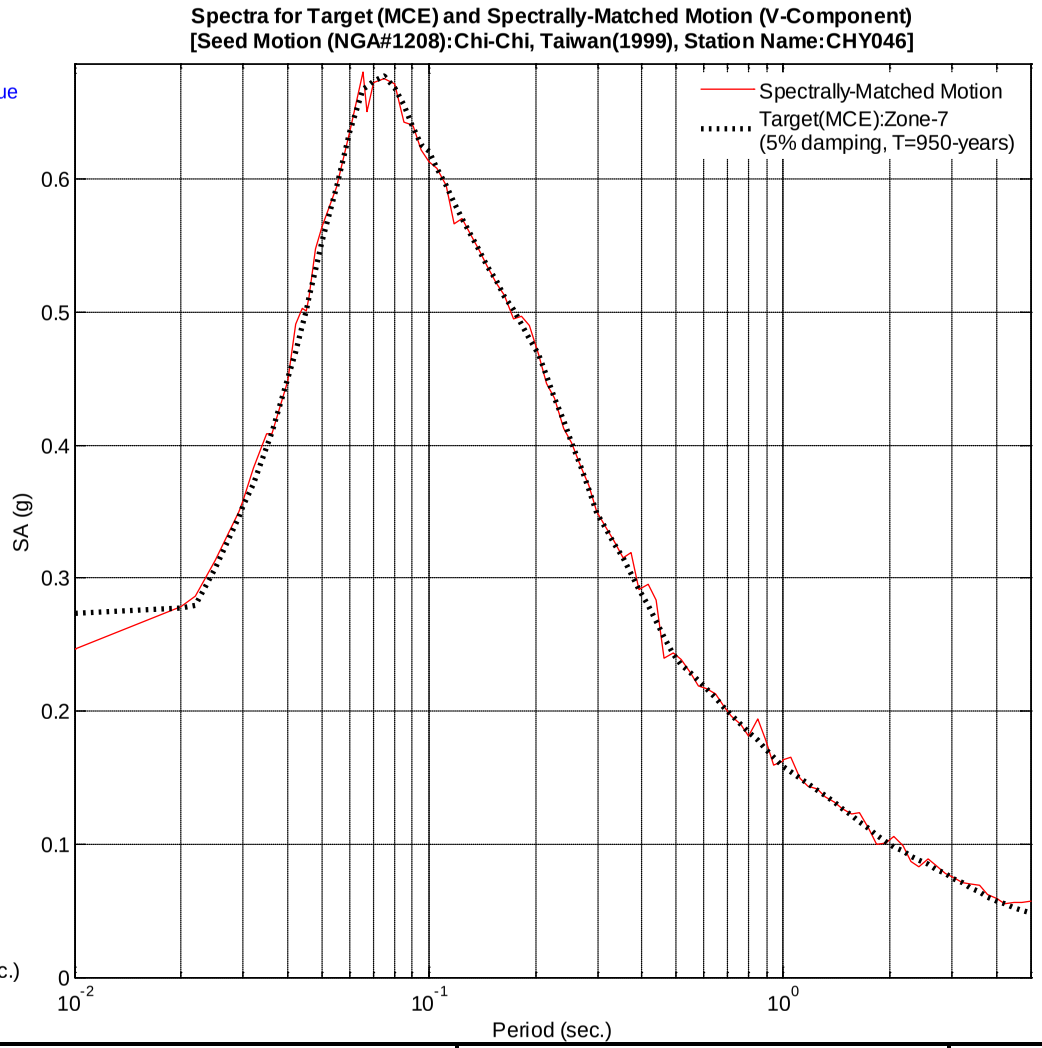
SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 7 – HORIZONTAL 1** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-19**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 7 – HORIZONTAL 2** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-20**





SC SOLUTIONS	PROJ. NO: BY: J. Zhong QC CHECK: M. Perez QA CHECK: M. Tabatabaie DATE: 02/24/2012	**SPECTRALLY-MATCHED MOTIONS – MCE** **ZONE 7 – SET NO. 7 – VERTICAL** CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	PLATE **B7-21**

California High-Speed Train Project

Request for Proposal for Design-Build Services

RFP No.: HSR 11-16
Record of Survey and Control Monument Data

03/07/2012 RFP HSR 11-16

Revision No.	Date	Description
0	01 Mar 12	Initial Release, R0

Prepared for

CALIFORNIA High-Speed Rail Authority

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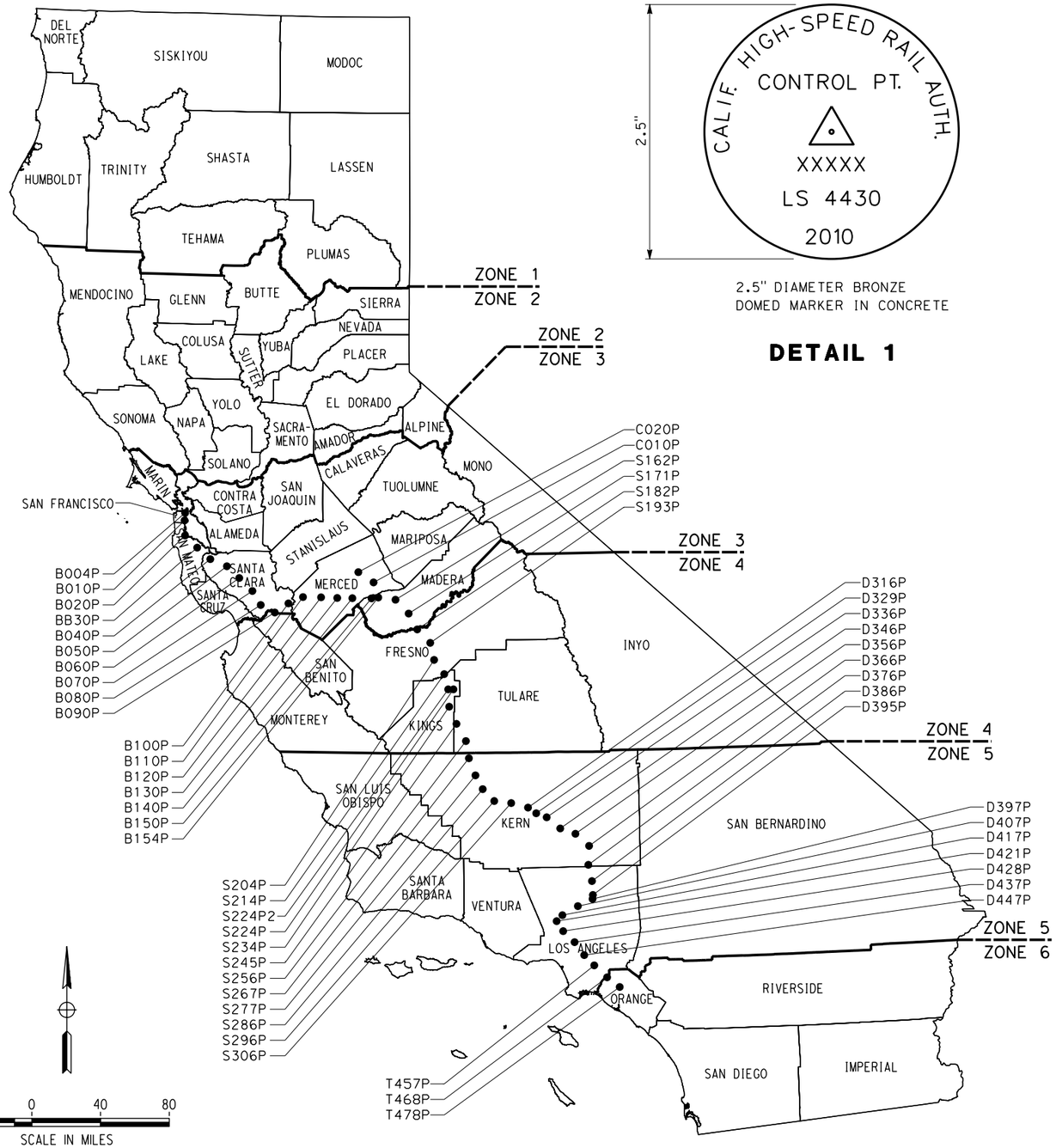
CONSTRUCTION PACKAGE 1 - SURVEY CONTROL MONUMENT DATA AND TIE SHEETS (3)

(1) To be added via addendum.

(2) Final Record to be added via addendum.

(3) Construction Package 1, Survey Control Monument Data and Tie Sheets within County of Madera to be added via addendum.

03/07/2012 RFP HSR 11-16



2.5" DIAMETER BRONZE DOMED MARKER IN CONCRETE

DETAIL 1

SURVEYOR'S NOTES:

1. THE EXHIBIT SHOWS THE PRIMARY SURVEY CONTROL MONUMENTS, BASED ON FIELD SURVEYS, FOR THE CALIFORNIA HIGH-SPEED TRAIN PROJECT (CHSTP).
2. THE CALIFORNIA SPATIAL REFERENCE NETWORK (CSRN) WAS USED TO DETERMINE MONUMENT POSITIONS SHOWN HEREON.
3. POSITIONS PUBLISHED BY THE CALIFORNIA SPATIAL REFERENCE (CSRC) FOR THE CSRN IS THE BASIS FOR ALL MONUMENT POSITIONS, BOTH HORIZONTAL AND VERTICAL.
4. THE DATUM FOR HORIZONTAL POSITIONS IS THE NORTH AMERICAN DATUM OF 1983 (NAD83), NATIONAL SPATIAL REFERENCE SYSTEM OF 2007 (NSR2007).
5. THE EPOCH DATE FOR ALL FOR ALL POSITIONS IS 2007.00
6. THE DATUM FOR VERTICAL POSITIONS IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
7. THE PLANE COORDINATES SHOWN FOR EACH MONUMENT ARE BASED ON THE CALIFORNIA COORDINATE SYSTEM OF 1983 (CCS83).
8. THE METHOD OF SURVEY FOR EACH MONUMENT WAS MULTIPLE OCCUPATIONS USING DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS) TIES TO THE CSRN.
9. ORTHOMETRIC HEIGHTS (ELEVATIONS) WERE DETERMINED BY THE USE OF A HIGH RESOLUTION GEOID MODEL GEOID09, AS PUBLISHED BY THE NATIONAL GEODETIC SURVEY.
10. UNITS FOR POSITIONS SHOWN HERON ARE "U.S. SURVEY FOOT" (ONE FOOT = 1200/3937 METERS).
11. FOR MONUMENTS LOCATED ADJACENT TO A CCS83 STATE PLANE ZONE BOUNDARY LINE, PLANE COORDINATES ARE SHOWN FOR EACH ZONE.
12. THE PREFIX LETTER FOR EACH MONUMENT NAME INDICATES THE SUBDIVISION NAME OF THE CHSTP: B-BAY; C-CAPITOL; D-DESERT; S-SIERRA; T-TONGVA; J-SAN JACINTO.
13. PRIMARY SURVEY CONTROL MONUMENT DESIGNATIONS HAVE THE SUFFIX LETTER "P" INDICATING A MINIMUM OF TWO SEPARATE ONE-HOUR OR LONGER STATIC GPS FIELD SURVEY OCCUPATIONS.
14. EQUIPMENT USED FOR DGPS SURVEYS: TRIMBLE 5700 RECEIVERS, MATCHING ZEPHYR GEODETIC ANTENNAS AND FIXED HEIGHT RODS.
15. POSITIONAL CONSTRAINTS APPLIED TO THE CSRN FOR THE VARIOUS DGPS ADJUSTMENT MODELS NEVER CROSSED MAJOR ACTIVE FAULTS.
16. FIELD SURVEYS WERE PERFORMED FROM SEPTEMBER 9, 2010 TO JANUARY 28, 2011.
17. EACH MONUMENT SHOWN HEREON HAS AN INDIVIDUAL RECORD TITLED "SURVEY CONTROL MONUMENT DATA SHEET" ON FILE IN THE OFFICE OF THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY.
18. EACH MONUMENT SHOWN HEREON HAS AN INDIVIDUAL RECORD TITLED "SURVEY CONTROL MONUMENT TIE SHEET" ON FILE IN THE OFFICE OF THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY.
19. REFER TO "SURVEY CONTROL MONUMENTS SYSTEMWIDE DATA TABLES" FOR POSITIONAL DATA.
20. MONUMENT S224P WILL BE DESTROYED BY NEW ROAD IMPROVEMENTS. MONUMENT S224P2 HAS BEEN SET NEARBY, OUTSIDE OF PLANNED CONSTRUCTION AREA.

LEGEND

ZONE 5 / ZONE 6	INDICATES BOUNDARY LINES BETWEEN ZONES OF THE CALIFORNIA COORDINATE SYSTEM OF 1983
●	INDICATES SET STANDARD MONUMENT
XXXXX	INDICATES MONUMENT DESIGNATION STAMPED ON BRONZE MARKER

SURVEYOR'S STATEMENT:

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME, OR UNDER MY DIRECTION, IN CONFORMANCE WITH THE REQUIREMENTS OF THE PROFESSIONAL LAND SURVEYORS' ACT, AT THE REQUEST OF THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY IN SEPTEMBER, 2010.

03/01/2012

JAMES JOHN IMBIORSKI L.S. 4430 DATE

LICENSED LAND SURVEYOR JAMES JOHN IMBIORSKI No. 4430 Exp. 09/30/13 STATE OF CALIFORNIA

03/07/2012 RFP HSR 11-16

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY L. GILL
DRAWN BY V. HUANTE
CHECKED BY J. ELLIOTT
IN CHARGE J. IMBIORSKI
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT SURVEY CONTROL

SURVEY CONTROL MONUMENTS SYSTEMWIDE MAP

CONTRACT NO.
DRAWING NO. VS-001
SCALE AS SHOWN
SHEET NO.

huante 2/24/2012 5:20:16 PM CAHSRP.TBL CHSR_half_black.plt T:\13259B Calif High Speed Rail\CADD\Figures\Survey-Control-Report\VS-001.dgn

ZONE 3 (0403)

STATION	NAD 83 LATITUDE	NAD 83 LONGITUDE	ELLIPSOID HEIGHT US FEET	GEOID HEIGHT US FEET	CONVERGENCE ANGLE	SCALE FACTOR	ELEVATION FACTOR	COMBINATION FACTOR	CCS83 ZONE 3 NORTHING US FEET	CCS83 ZONE 3 EASTING US FEET	NAVD88 ELEVATION US FEET	DESCRIPTION
B004P	37-47-28.03656	122-23-21.23148	-95.988	-106.552	-01-09-23.93	0.99992942	1.00000459	0.99993401	2116037.08	6015794.03	10.56	2-1/2 INCH BRASS DISK STAMPED "B004P LS4430 2010"
B010P	37-43-39.89477	122-23-34.93581	-76.437	-106.781	-01-09-32.32	0.99992926	1.00000365	0.99993292	2092988.73	6014227.52	30.34	2-1/2 INCH BRASS DISK STAMPED "B010P LS4430 2010"
B020P	37-36-02.71150	122-23-02.37438	-100.347	-106.961	-01-09-12.39	0.99993260	1.00000480	0.99993740	2046704.43	6015911.98	6.61	2-1/2 INCH BRASS DISK STAMPED "B020P LS4430 2010"
B030P	37-30-04.74660	122-15-06.96148	-89.983	-106.902	-01-04-21.32	0.99993863	1.00000430	0.99994293	2009762.51	6053484.48	16.92	2-1/2 INCH BRASS DISK STAMPED "B030P LS4430 2010"
B040P	37-24-25.37433	122-06-37.52658	-60.061	-107.073	-00-59-09.43	0.99994710	1.00000287	0.99994997	1974705.88	6093937.24	47.01	2-1/2 INCH BRASS DISK STAMPED "B040P LS4430 2010"
B050P	37-20-59.37810	121-55-58.60959	-41.253	-107.208	-00-52-38.27	0.99995355	1.00000197	0.99995552	1953035.70	6145160.13	65.96	2-1/2 INCH BRASS DISK STAMPED "B050P LS4430 2010"
B060P	37-15-10.42320	121-48-00.02353	88.428	-106.489	-00-47-45.26	0.99996673	0.99999577	0.99996250	1917181.68	6183308.34	194.92	2-1/2 INCH BRASS DISK STAMPED "B060P LS4430 2010"
B070P	37-08-44.88213	121-39-31.50038	256.284	-106.281	-00-42-33.93	0.99998459	0.99998774	0.99997233	1877651.15	6223935.07	362.57	2-1/2 INCH BRASS DISK STAMPED "B070P LS4430 2010"
B080P	37-01-43.93503	121-34-05.18184	102.438	-107.057	-00-39-14.14	1.00000803	0.99999510	1.00000313	1834765.12	6249867.26	209.49	2-1/2 INCH BRASS DISK STAMPED "B080P LS4430 2010"
B090P	36-58-03.91222	121-25-07.55163	58.894	-107.537	-00-33-44.99	1.00002191	0.99999718	1.00001909	1812050.27	6293242.83	166.43	2-1/2 INCH BRASS DISK STAMPED "B090P LS4430 2010"
B100P	37-02-45.22131	121-16-34.09708	468.324	-106.060	-00-28-30.64	1.00000436	0.99997760	0.99998196	1840123.58	6335147.06	574.38	2-1/2 INCH BRASS DISK STAMPED "B100P LS4430 2010"
B110P	37-06-03.51225	121-07-24.35863	448.347	-106.886	-00-22-54.07	0.99999309	0.99997855	0.99997164	1859844.98	6379847.64	555.23	2-1/2 INCH BRASS DISK STAMPED "B110P LS4430 2010"
B120P	37-06-00.34798	120-55-57.53063	-6.617	-108.865	-00-15-53.57	0.99999326	1.00000032	0.99999358	1859211.00	6435486.70	102.25	2-1/2 INCH BRASS DISK STAMPED "B120P LS4430 2010"
B130P	37-05-45.34939	120-45-43.56007	-13.462	-108.872	-00-09-37.68	0.99999408	1.00000064	0.99999473	1857509.43	6485221.77	95.41	2-1/2 INCH BRASS DISK STAMPED "B130P LS4430 2010"
B140P	37-05-42.26397	120-36-09.41450	-2.090	-108.055	-00-03-46.17	0.99999425	1.00000010	0.99999435	1857106.73	6531737.24	105.96	2-1/2 INCH BRASS DISK STAMPED "B140P LS4430 2010"
B150P	37-05-40.27229	120-24-02.30461	61.286	-106.992	00-03-38.99	0.99999436	0.99999707	0.99999143	1856904.27	6590646.84	168.28	2-1/2 INCH BRASS DISK STAMPED "B150P LS4430 2010"
B154P	37-06-07.30586	120-19-44.04282	95.467	-106.748	00-06-17.11	0.99999288	0.99999543	0.99998831	1859668.67	6611565.97	202.21	2-1/2 INCH BRASS DISK STAMPED "B154P LS4430 2010"
C010P	37-13-44.34838	120-22-46.05440	90.443	-105.307	00-04-25.68	0.99997042	0.99999567	0.99996609	1905870.75	6596761.50	195.75	2-1/2 INCH BRASS DISK STAMPED "C010P LS4430 2010"
C020P	37-18-52.08478	120-32-28.16420	55.879	-104.730	-00-01-30.71	0.99995803	0.99999733	0.99995536	1936975.13	6549697.75	160.61	2-1/2 INCH BRASS DISK STAMPED "C020P LS4430 2010"
S162P	37-05-00.66353	120-08-49.94698	172.439	-106.510	00-12-57.57	0.99999656	0.99999175	0.99998831	1853076.85	6664580.14	278.95	2-1/2 INCH BRASS DISK STAMPED "S162P LS4430 2010"
S171P	36-58-01.08145	120-00-30.43866	179.946	-106.496	00-18-03.38	1.00002210	0.99999139	1.00001349	1810823.49	6705278.29	286.44	2-1/2 INCH BRASS DISK STAMPED "S171P LS4430 2010"
S182P	36-50-00.81370	119-55-05.93458	194.502	-106.136	00-21-22.05	1.00005633	0.99999070	1.00004703	1762400.74	6731915.56	300.64	2-1/2 INCH BRASS DISK STAMPED "S182P LS4430 2010"

ZONE 4 (0404)

STATION	NAD 83 LATITUDE	NAD 83 LONGITUDE	ELLIPSOID HEIGHT US FEET	GEOID HEIGHT US FEET	CONVERGENCE ANGLE	SCALE FACTOR	ELEVATION FACTOR	COMBINATION FACTOR	CCS83 ZONE 4 NORTHING US FEET	CCS83 ZONE 4 EASTING US FEET	NAVD88 ELEVATION US FEET	DESCRIPTION
S182P	36-50-00.81370	119-55-05.93458	194.502	-106.136	-00-32-52.28	0.99994731	0.99999070	0.99993801	2187855.88	6292923.69	300.64	2-1/2 INCH BRASS DISK STAMPED "S182P LS4430 2010"
S193P	36-43-12.41590	119-46-54.71065	180.532	-105.506	-00-27-59.22	0.99994211	0.99999136	0.99993347	2146202.84	6332518.62	286.04	2-1/2 INCH BRASS DISK STAMPED "S193P LS4430 2010"
S204P	36-34-35.14633	119-44-30.21848	169.624	-106.303	-00-26-33.02	0.99994113	0.99999189	0.99993302	2093801.33	6343877.62	275.93	2-1/2 INCH BRASS DISK STAMPED "S204P LS4430 2010"
S214P	36-27-22.93081	119-38-09.89001	162.393	-106.068	-00-22-46.12	0.99994511	0.99999223	0.99993735	2049872.14	6374608.10	268.46	2-1/2 INCH BRASS DISK STAMPED "S214P LS4430 2010"
S224P	36-19-40.85606	119-35-23.23985	138.801	-106.959	-00-21-06.70	0.99995420	0.99999336	0.99994756	2003059.67	6387934.43	245.76	2-1/2 INCH BRASS DISK STAMPED "S224P LS4430 2010"
S224P2	36-19-40.57910	119-35-42.90083	136.848	-107.019	-00-21-18.43	0.99995420	0.99999345	0.99994766	2003041.59	6386325.54	243.87	2-1/2 INCH BRASS DISK STAMPED "S224P2 LS4430 2010"
S234P	36-10-53.78621	119-35-08.69642	96.279	-109.066	-00-20-58.02	0.99997063	0.99999539	0.99996603	1949754.96	6388799.36	205.35	2-1/2 INCH BRASS DISK STAMPED "S234P LS4430 2010"
S245P	36-02-12.11815	119-30-39.43538	86.139	-110.334	-00-18-17.38	0.99999326	0.99999588	0.99998914	1896877.75	6410592.04	196.47	2-1/2 INCH BRASS DISK STAMPED "S245P LS4430 2010"
S256P	35-53-28.80672	119-24-49.28885	84.857	-110.557	-00-14-48.49	1.00002232	0.99999594	1.00001826	1843821.62	6439121.77	195.41	2-1/2 INCH BRASS DISK STAMPED "S256P LS4430 2010"
S267P	35-44-45.36386	119-23-01.40870	137.326	-110.883	-00-13-44.13	1.00005773	0.99999343	1.00005116	1790853.29	6447787.06	248.21	2-1/2 INCH BRASS DISK STAMPED "S267P LS4430 2010"

ZONE 5 (0405)

STATION	NAD 83 LATITUDE	NAD 83 LONGITUDE	ELLIPSOID HEIGHT US FEET	GEOID HEIGHT US FEET	CONVERGENCE ANGLE	SCALE FACTOR	ELEVATION FACTOR	COMBINATION FACTOR	CCS83 ZONE 5 NORTHING US FEET	CCS83 ZONE 5 EASTING US FEET	NAVD88 ELEVATION US FEET	DESCRIPTION
S256P	35-53-28.80672	119-24-49.28885	84.857	-110.557	-00-48-20.96	1.00012022	0.99999594	1.00011616	2513706.33	6142870.27	195.41	2-1/2 INCH BRASS DISK STAMPED "S256P LS4430 2010"
S267P	35-44-45.36386	119-23-01.40870	137.326	-110.883	-00-47-19.46	1.00007282	0.99999343	1.00006625	2460652.92	6151018.45	248.21	2-1/2 INCH BRASS DISK STAMPED "S267P LS4430 2010"
S277P	35-36-05.37267	119-19-02.31515	226.879	-110.819	-00-45-03.18	1.00003217	0.99998915	1.00002132	2407810.37	6170038.16	337.70	2-1/2 INCH BRASS DISK STAMPED "S277P LS4430 2010"
S286P	35-29-06.51621	119-14-35.38619	239.708	-110.609	-00-42-31.02	1.00000408	0.99998853	0.99999261	2365179.86	6191556.66	350.32	2-1/2 INCH BRASS DISK STAMPED "S286P LS4430 2010"
S296P	35-23-01.63232	119-07-30.19155	261.353	-110.241	-00-38-28.66	0.99998298	0.99998750	0.99997048	2327874.00	6226305.36	371.59	2-1/2 INCH BRASS DISK STAMPED "S296P LS4430 2010"
S306P	35-21-55.14967	118-57-01.45356	311.977	-108.741	-00-32-30.27	0.99997948	0.99998507	0.99996455	2320614.82	6278300.46	420.72	2-1/2 INCH BRASS DISK STAMPED "S306P LS4430 2010"
D316P	35-19-31.18825	118-46-39.03954	797.119	-106.476	-00-26-35.49	0.99997225	0.99996187	0.99993411	2305616.51	6329735.31	903.59	2-1/2 INCH BRASS DISK STAMPED "D316P LS4430 2010"
D329P	35-16-35.11028	118-41-38.15295	1448.888	-104.803	-00-23-43.98	0.99996406	0.99993069	0.99989475	2287631.79	6354543.77	1553.69	2-1/2 INCH BRASS DISK STAMPED "D329P LS4430 2010"
D336P	35-14-28.56668	118-35-10.86622	2423.546	-102.111	-00-20-03.22	0.99995863	0.99988407	0.99984270	2274633.28	6386578.84	2525.66	2-1/2 INCH BRASS DISK STAMPED "D336P LS4430 2010"
D346P	35-08-44.32951	118-26-56.41331	3858.747	-100.360	-00-15-21.37	0.99994577	0.99981542	0.99976120	2239618.91	6427435.93	3959.11	2-1/2 INCH BRASS DISK STAMPED "D346P LS4430 2010"
D356P	35-05-54.70658	118-17-37.34609	3714.549	-101.448	-00-10-02.70	0.99994046	0.99982232	0.99976279	2222298.39	6473811.90	3816.00	2-1/2 INCH BRASS DISK STAMPED "D356P LS4430 2010"
D366P	34-59-39.46801	118-09-20.44174	2529.866	-104.251	-00-05-19.46	0.99993111	0.99987898	0.99981009	2184269.85	6515040.83	2634.12	2-1/2 INCH BRASS DISK STAMPED "D366P LS4430 2010"
D376P	34-50-04.29632	118-10-00.58022	2215.861	-105.555	-00-05-42.34	0.99992318	0.99989399	0.99981719	2126127.73	6511605.01	2321.42	2-1/2 INCH BRASS DISK STAMPED "D376P LS4430 2010"
D386P	34-41-49.07215	118-07-59.91459	2251.014	-106.053	-00-04-33.56	0.99992257	0.99989231	0.99981489	2076049.00	6521596.75	2357.07	2-1/2 INCH BRASS DISK STAMPED "D386P LS4430 2010"
D395P	34-34-46.90544	118-07-35.48556	2576.894	-105.126	-00-04-19.63	0.99992658	0.99987672	0.99980331	2033369.06	6523582.70	2682.02	2-1/2 INCH BRASS DISK STAMPED "D395P LS4430 2010"
D397P	34-32-45.38254	118-07-51.68396	2877.104	-104.828	-00-04-28.87	0.99992850	0.99986236	0.99979087	2021086.02	6522212.31	2981.93	2-1/2 INCH BRASS DISK STAMPED "D397P LS4430 2010"
D407P	34-29-17.49324	118-16-55.10721	2692.051	-105.460	-00-09-38.62	0.99993259	0.99987121	0.99980381	2000164.00	6476698.40	2797.51	2-1/2 INCH BRASS DISK STAMPED "D407P LS4430 2010"
D417P	34-24-49.67367	118-26-28.12813	1370.182	-109.364	-00-15-05.25	0.99993935	0.99993445	0.99987380	1973263.10	6428615.85	1479.55	2-1/2 INCH BRASS DISK STAMPED "D417P LS4430 2010"
D421P	34-21-51.66837	118-30-02.49066	1325.724	-111.206	-00-17-07.44	0.99994476	0.99993657	0.99988134	1955353.11	6410567.40	1436.93	2-1/2 INCH BRASS DISK STAMPED "D421P LS4430 2010"
D428P	34-16-44.53841	118-26-09.81259	941.347	-112.133	-00-14-54.81	0.99995584	0.99995496	0.99991080	1924215.19	6429937.53	1053.48	2-1/2 INCH BRASS DISK STAMPED "D428P LS4430 2010"
D437P	34-11-03.70573	118-19-19.49150	476.295	-112.205	-00-11-00.92	0.99997070	0.99997721	0.99994792	1889631.30	6464258.65	588.50	2-1/2 INCH BRASS DISK STAMPED "D437P LS4430 2010"
D447P	34-04-24.91688	118-13-35.17728	263.977	-114.467	-00-07-44.66	0.99999152	0.99998737	0.99997889	1849239.52	6493093.35	378.44	2-1/2 INCH BRASS DISK STAMPED "D447P LS4430 2010"
T457P	33-59-07.76276	118-07-36.96282	57.599	-115.963	-00-04-20.47	1.00001071	0.99999724	1.00000796	1817125.82	6523186.11	173.56	2-1/2 INCH BRASS DISK STAMPED "T457P LS4430 2010"
T468P	33-52-56.72989	117-59-55.67870	-22.285	-115.921	+00-00-02.46	1.00003612	1.00000107	1.00003719	1779593.98	6562031.01	93.64	2-1/2 INCH BRASS DISK STAMPED "T468P LS4430 2010"
T478P	33-47-54.03480	117-52-24.97307	40.730	-114.780	+00-04-19.37	1.00005922	0.99999805	1.00005727	1749018.54	6600069.85	155.51	2-1/2 INCH BRASS DISK STAMPED "T478P LS4430 2010"

ZONE 6 (0406)

STATION	NAD 83 LATITUDE	NAD 83 LONGITUDE	ELLIPSOID HEIGHT US FEET	GEOID HEIGHT US FEET	CONVERGENCE ANGLE	SCALE FACTOR	ELEVATION FACTOR	COMBINATION FACTOR	CCS83 ZONE 6 NORTHING US FEET	CCS83 ZONE 6 EASTING US FEET	NAVD88 ELEVATION US FEET	DESCRIPTION
T457P	33-59-07.76276	118-07-36.96282	57.599	-115.963	-01-01-53.07	1.00001867	0.99999724	1.00001591	2307345.37	5992693.05	173.56	2-1/2 INCH BRASS DISK STAMPED "T457P LS4430 2010"
T468P	33-52-56.72989	117-59-55.67870	-22.285	-115.921	-00-57-39.59	0.99999985	1.00000107	1.00000091	2269168.27	6030902.89	93.64	2-1/2 INCH BRASS DISK STAMPED "T468P LS4430 2010"
T478P	33-47-54.03480	117-52-24.97307	40.730	-114.780	-00-53-31.92	0.99998690	0.99999805	0.99998495	2237959.56	6068420.46	155.51	2-1/2 INCH BRASS DISK STAMPED "T478P LS4430 2010"

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY L. GILL
DRAWN BY V. HUANTE
CHECKED BY J. ELLIOTT
IN CHARGE J. IMBIORSKI
DATE 03/01/2012

PARSONS BRINCKERHOFF

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
SURVEY CONTROL

SURVEY CONTROL MONUMENTS
SYSTEMWIDE DATA TABLES

CONTRACT NO.
DRAWING NO. VS-002
SCALE NO SCALE
SHEET NO.

03/07/2012 RFP HSR 11-16

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IN THE COUNTY OF FRESNO

SHEET 1 OF 2

RECORD OF SURVEY No. xxxx

PARSONS BRINCKERHOFF 2010 - 2011

SURVEYOR'S NOTES:

1. THE CALIFORNIA SPATIAL REFERENCE NETWORK (CSRN) WAS USED TO DETERMINE MONUMENT POSITIONS SHOWN HEREON.
2. POSITIONS PUBLISHED BY THE CALIFORNIA SPATIAL REFERENCE CENTER (CSRC) FOR THE CSRN IS THE BASIS FOR ALL MONUMENT POSITIONS.
3. THE DATUM FOR HORIZONTAL POSITIONS IS THE NORTH AMERICAN DATUM OF 1983 (NAD83), NATIONAL SPATIAL REFERENCE SYSTEM OF 2007 (NSRS2007).
4. THE EPOCH DATE FOR ALL POSITIONS IS 2007.00.
5. THE HORIZONTAL PLANE COORDINATES SHOWN FOR EACH MONUMENT IS BASED ON THE CALIFORNIA COORDINATE SYSTEM OF 1983 (CCS83).
6. THE METHOD OF SURVEY FOR EACH MONUMENT WAS MULTIPLE OCCUPATIONS USING DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS) TIES TO THE CSRN.
7. UNITS FOR POSITIONS SHOWN HEREON ARE "U.S. SURVEY FOOT" (ONE FOOT = 1200/3937 METERS).
8. FOR MONUMENTS LOCATED ADJACENT TO A CCS83 STATE PLANE ZONE BOUNDARY LINE, HORIZONTAL PLANE COORDINATES ARE SHOWN FOR EACH ZONE.
9. THE PREFIX LETTER FOR EACH MONUMENT NAME INDICATES THE SUBDIVISION NAME OF THE CHSTP: D–DESERT; S–SIERRA.
10. THE CONTROL CONSISTS OF PRIMARY STATIONS ESTABLISHED AT APPROXIMATE 10–MILE INTERVALS AND SECONDARY STATIONS ESTABLISHED AT APPROXIMATE 2–MILE INTERVALS.
11. PRIMARY SURVEY CONTROL MONUMENT DESIGNATIONS HAVE THE SUFFIX LETTER "P", INDICATING A MINIMUM OF TWO SEPARATE 1–HOUR OR LONGER STATIC GPS FIELD SURVEY OCCUPATIONS.
12. ALL OTHER SECONDARY SURVEY CONTROL STATIONS UTILITIZED REDUNDANT 30 MINUTE OR LONGER STATIC GPS FIELD SURVEY OCCUPATIONS.
13. EQUIPMENT USED FOR DGPS SURVEYS WAS TRIMBLE 5700 RECEIVERS, MATCHING ZEPHYR GEODETIC ANTENNAS AND FIXED HEIGHT RODS.
14. EACH MONUMENT SHOWN HEREON HAS AN INDIVIDUAL RECORD TITLED "SURVEY CONTROL MONUMENT DATA SHEET", ON FILE IN THE OFFICE OF THE CALIFORNIA HIGH–SPEED RAIL AUTHORITY.
15. EACH MONUMENT SHOWN HEREON HAS AN INDIVIDUAL RECORD TITLED "SURVEY CONTROL MONUMENT TIE SHEET", ON FILE IN THE OFFICE OF THE CALIFORNIA HIGH–SPEED RAIL AUTHORITY.
16. SEE SHEET 2 OF 2 FOR POSITIONAL DATA.

PURPOSE STATEMENT:

THIS PURPOSE OF THIS SURVEY WAS TO ESTABLISH HORIZONTAL GEODETIC CONTROL TO SUPPORT THE CALIFORNIA HIGH–SPEED TRAIN PROJECT (CHSTP).

BASIS OF BEARINGS STATEMENT:

THIS BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA COORDINATE SYSTEM, ZONE 5 NAD83 (NSRS2007), EPOCH 2007.00 AS DETERMINED LOCALLY BY A LINE BETWEEN CONTINUOUS GLOBAL POSITIONING SYSTEMS (CGPS) STATIONS 'GR8R' AND 'P572' BEARING NORTH 81°25'33.14" EAST AS DERIVED FROM GEODETIC VALUES PUBLISHED BY THE CALIFORNIA SPATIAL REFERENCE CENTER.

SURVEYOR'S STATEMENT:

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF THE PROFESSIONAL LAND SURVEYORS' ACT AT THE REQUEST OF THE CALIFORNIA HIGH–SPEED RAIL AUTHORITY BETWEEN SEPTEMBER OF 2010 AND DECEMBER OF 2011.

JAMES JOHN IMBIORSKI, L.S. 4430
LICENSE EXPIRES 09/30/13

DATE 2/20/12

LICENSED LAND SURVEYOR
JAMES JOHN IMBIORSKI
No. 4430
Exp. 9–30–13
STATE OF CALIFORNIA

COUNTY SURVEYOR'S STATEMENT:

THIS MAP HAS BEEN EXAMINED IN ACCORDANCE WITH SECTION 8766 OF THE PROFESSIONAL LAND SURVEYORS' ACT THIS _____ DAY OF _____, 2012.

ALAN ISAAC WEAVER, P.L.S. 7009 EXPIRES 09/30/2013
COUNTY SURVEYOR

RECORDER'S STATEMENT

FILED THIS _____ DAY OF _____, 2012, AT _____.M. IN BOOK _____ OF _____ AT PAGE _____, AT THE REQUEST OF PARSONS BRINCKERHOFF.

PAUL DICTOS, COUNTY RECORDER

DATE=01/12/12 Path_Idg// T:\13259DCaHST\SUR\DWG\RECORD_OF_SURVEYS\FRESNO\RS_FRESNO_SHT1.dwg

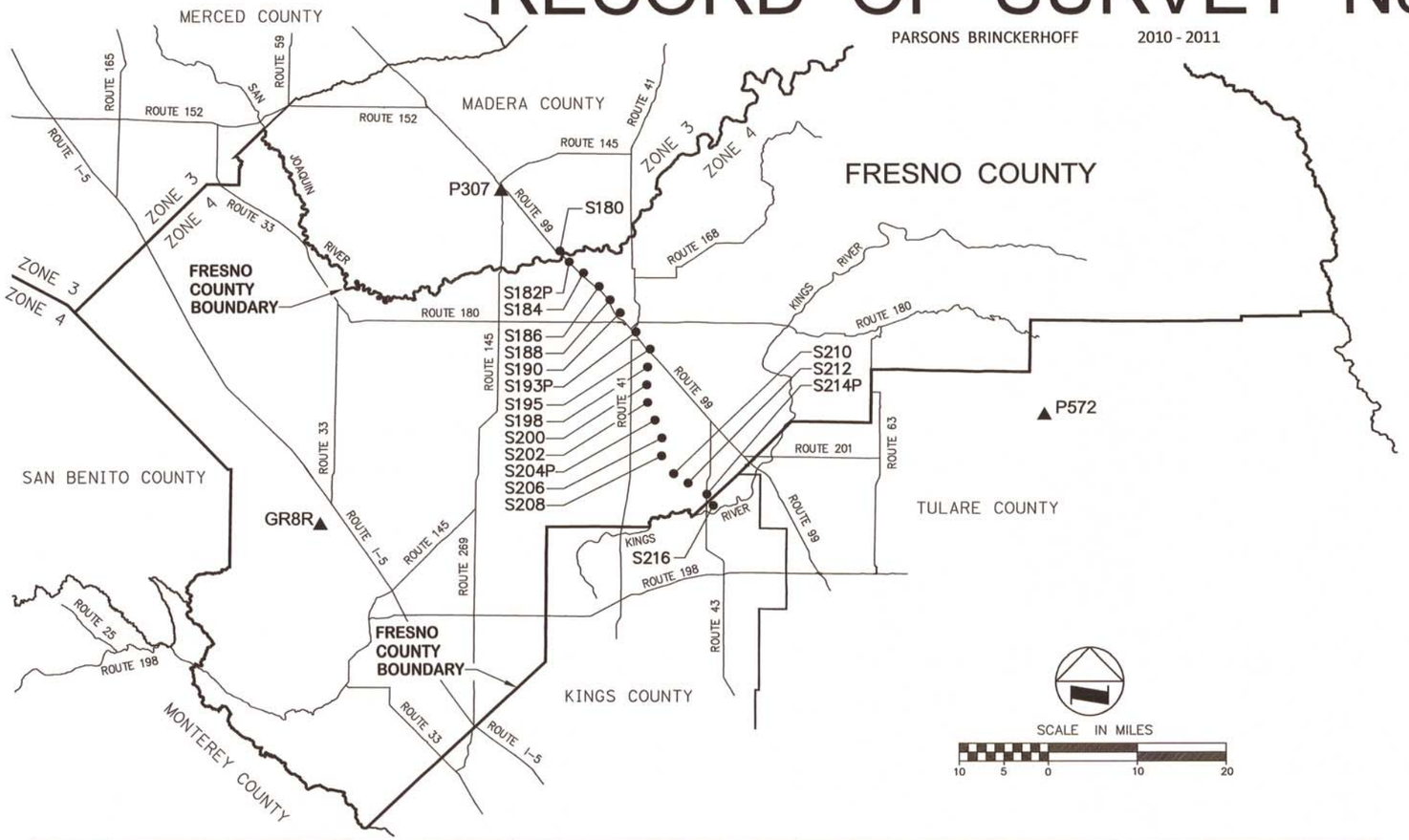
03/07/2012 RFP HSR 11-16

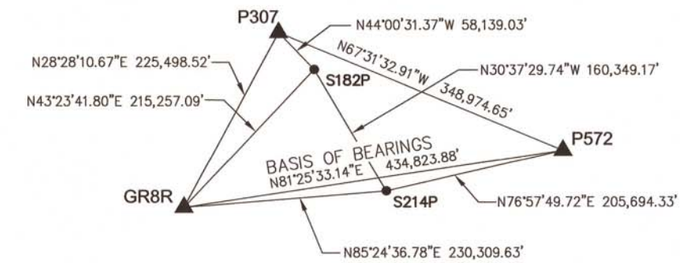
IN THE COUNTY OF FRESNO

SHEET 2 OF 2

RECORD OF SURVEY No. xxxx

PARSONS BRINCKERHOFF 2010 - 2011

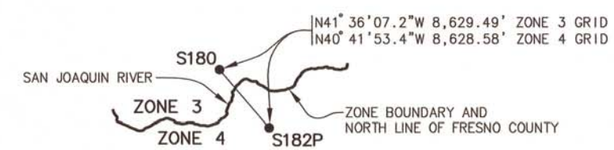




NOTE: BEARINGS AND DISTANCES SHOWN IN THIS CONTROL DIAGRAM ARE BASED ON ZONE 4 GRID COORDINATES.

ZONE 4 CONTROL DIAGRAM

SCALE: 1" = 20 MILES



ZONE BOUNDARY CROSSING DETAIL

SCALE: 1" = 2 MILES

POINT	CCS83 ZONE 3 (0403) NORTHING	CCS83 ZONE 3 (0403) EASTING	LATITUDE	LONGITUDE	COMBINATION FACTOR	MAPPING ANGLE	DESCRIPTION
S180	1768853.66	6726185.98	36° 51' 04.95968"	119° 56' 15.92989"	1.00004257	+00° 20' 39.20"	SET 2-1/2" BRASS DISK STAMPED "S180 LS 4430 2011"
S182P	1762400.74	6731915.56	36° 50' 00.81370"	119° 55' 05.93458"	1.00004703	+00° 21' 22.05"	SET 2-1/2" BRASS DISK STAMPED "S182P LS 4430 2010"

POINT	CCS83 ZONE 4 (0404) NORTHING	CCS83 ZONE 4 (0404) EASTING	LATITUDE	LONGITUDE	COMBINATION FACTOR	MAPPING ANGLE	DESCRIPTION
S180	2194397.68	6287297.21	36° 51' 04.95968"	119° 56' 15.92989"	0.99993960	-00° 33' 34.04"	SET 2-1/2" BRASS DISK STAMPED "S180 LS 4430 2011"
S182P	2187855.88	6292923.69	36° 50' 00.81370"	119° 55' 05.93458"	0.99993801	-00° 32' 52.28"	SET 2-1/2" BRASS DISK STAMPED "S182P LS 4430 2010"
S184	2181134.27	6301461.66	36° 48' 55.14614"	119° 53' 20.14568"	0.99993663	-00° 31' 49.17"	SET 2-1/2" BRASS DISK STAMPED "S184 LS 4430 2011"
S186	2173110.51	6310744.91	36° 47' 36.64259"	119° 51' 25.10077"	0.99993598	-00° 30' 40.53"	SET 2-1/2" BRASS DISK STAMPED "S186 LS 4430 2011"
S188	2165149.42	6317198.08	36° 46' 18.48573"	119° 50' 04.91204"	0.99993487	-00° 29' 52.69"	SET 2-1/2" BRASS DISK STAMPED "S188 LS 4430 2011"
S190	2157547.30	6323261.08	36° 45' 03.83038"	119° 48' 49.59979"	0.99993437	-00° 29' 07.76"	SET 2-1/2" BRASS DISK STAMPED "S190 LS 4430 2011"
S193P	2146202.84	6332518.62	36° 43' 12.41590"	119° 46' 54.71065"	0.99993347	-00° 27' 59.22"	SET 2-1/2" BRASS DISK STAMPED "S193P LS 4430 2010"
S195	2136079.76	6340915.81	36° 41' 32.98066"	119° 45' 10.59429"	0.99993254	-00° 26' 57.11"	SET 2-1/2" BRASS DISK STAMPED "S195 LS 4430 2011"
S198	2125483.45	6339418.46	36° 39' 48.08548"	119° 45' 27.95290"	0.99993222	-00° 27' 07.46"	SET 2-1/2" BRASS DISK STAMPED "S198 LS 4430 2011"
S200	2114907.66	6338933.28	36° 38' 03.47121"	119° 45' 32.88179"	0.99993224	-00° 27' 10.40"	SET 2-1/2" BRASS DISK STAMPED "S200 LS 4430 2011"
S202	2104318.67	6339455.01	36° 36' 18.80457"	119° 45' 25.45646"	0.99993259	-00° 27' 05.97"	SET 2-1/2" BRASS DISK STAMPED "S202 LS 4430 2011"
S204P	2093801.33	6343877.62	36° 34' 35.14633"	119° 44' 30.21848"	0.99993302	-00° 26' 33.02"	SET 2-1/2" BRASS DISK STAMPED "S204P LS 4430 2010"
S206	2083192.34	6347990.60	36° 32' 50.55107"	119° 43' 38.80778"	0.99993366	-00° 26' 02.35"	SET 2-1/2" BRASS DISK STAMPED "S206 LS 4430 2011"
S208	2072591.33	6347825.43	36° 31' 05.71078"	119° 43' 39.84742"	0.99993528	-00° 26' 02.97"	SET 2-1/2" BRASS DISK STAMPED "S208 LS 4430 2011"
S210	2061975.79	6354934.37	36° 29' 21.26248"	119° 42' 11.80407"	0.99993617	-00° 25' 10.44"	SET 2-1/2" BRASS DISK STAMPED "S210 LS 4430 2011"
S212	2056448.07	6363427.40	36° 28' 27.20345"	119° 40' 27.32002"	0.99993691	-00° 24' 08.11"	SET 2-1/2" BRASS DISK STAMPED "S212 LS 4430 2011"
S214P	2049872.14	6374608.10	36° 27' 22.93081"	119° 38' 09.89001"	0.99993735	-00° 22' 46.12"	SET 2-1/2" BRASS DISK STAMPED "S214P LS 4430 2010"
S216	2043175.55	6378386.12	36° 26' 16.95543"	119° 37' 23.11055"	0.99993830	-00° 22' 18.21"	SET 2-1/2" BRASS DISK STAMPED "S216 LS 4430 2011"
GR8R	2031442.489	6145037.029	36° 23' 56.440565"	120° 24' 56.579037"	0.99991613	-00° 50' 40.55"	CSRN CONTINUOUSLY OPERATING REFERENCE STATION
P307	2229671.454	6252530.565	36° 56' 50.158290"	120° 03' 28.457972"	0.99994859	-00° 37' 52.08"	CSRN CONTINUOUSLY OPERATING REFERENCE STATION
P572	2096269.882	6575001.228	36° 35' 07.842472"	118° 57' 16.493091"	0.99975776	+00° 01' 37.55"	CSRN CONTINUOUSLY OPERATING REFERENCE STATION

SURVEYOR'S NOTES:

1. HORIZONTAL DATUM IS NAD83 (NSRS2007) - EPOCH 2007.00
2. UNITS FOR HORIZONTAL STATE PLANE COORDINATES IS US SURVEY FEET. CONVERSION FACTOR: 1 FOOT = 1200/3937 METERS.

LEGEND

XXXX▲ — INDICATES CONTINUOUSLY OPERATING GPS REFERENCE STATION AND NAME CSRC POSITIONAL VALUES HELD FIXED FOR CONTROL FOR THIS SURVEY

CCS83 — INDICATES CALIFORNIA STATE PLANE COORDINATE SYSTEM 1983

ZONE 3 / ZONE 4 — INDICATES BOUNDARY LINE BETWEEN ZONES OF THE CALIFORNIA COORDINATE SYSTEM OF 1983

● — INDICATES SET 2-1/2" DIAMETER BRONZE DISK STAMPED AS SHOWN IN 1" IRON PIPE AND 8" CONCRETE PIER

XXXXX — INDICATES POINT DESIGNATION (NAME)

20xx — INDICATES YEAR

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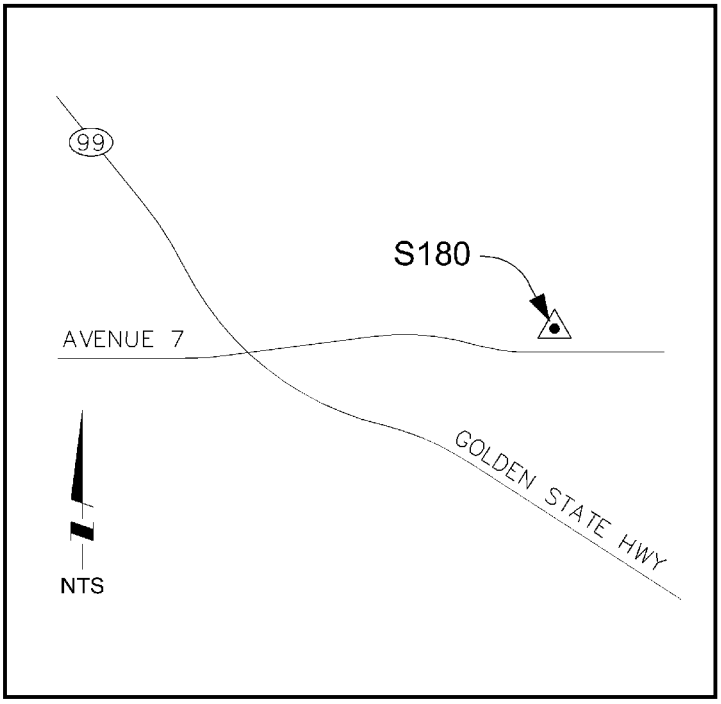
California High-Speed Train Project

SURVEY CONTROL MONUMENT DATA SHEET

Sheet of



Designation: **S180**

Date: **11/17/2011**

Monument Description:
2 ½" Bronze Disk in 1" Iron Pipe in 8" Concrete Pier

To Reach:
In the County of Madera, from the intersection of Highway 99 and Avenue 7, proceed east along Avenue 7, 0.5 mile to the Monument on the left.

HORIZONTAL

DATUM: NAD 83 (NSRS2007) **EPOCH: 2007.00**

Geodetic Coordinates			**Degrees**	**Minutes**	**Seconds**	
	Latitude	:	36°	51'	04.95968"	N
	Longitude	:	119°	56'	15.92989"	W

California Coordinate System (CCS83) US Survey Feet

Zone 3	**Northing**	:	1768853.66		
	Easting	:	6726185.98	**Comb. Factor:**	1.00004257
Zone 4	**Northing**	:	2194397.68		
	Easting	:	6287297.21	**Comb. Factor:**	0.99993960

VERTICAL

	US Survey Feet	**Method**
NAVD88:	Not established	Levels/GPS

Vertical elevations were established from differential levels between primary control monuments.

PARSONS BRINCKERHOFF

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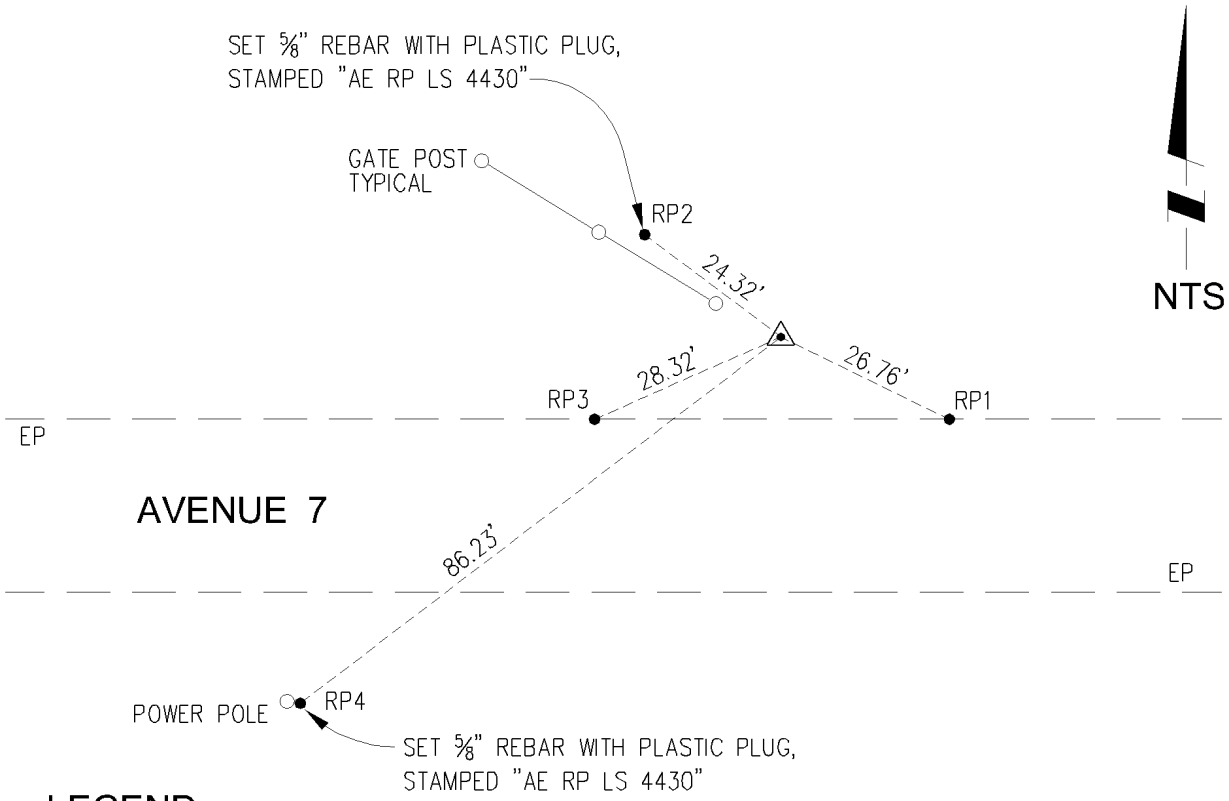
California High-Speed Train Project

SURVEY CONTROL MONUMENT TIE SHEET

Sheet of

PARTY CHIEF:			DATE OF SURVEY:	DESIGNATION:
J. TERRY	R. WILLIAMS		9/20/2011	**S180**



LEGEND:

△ CONTROL POINT, 2 ½" BRONZE DISK IN 1" IRON PIPE IN 8" CONC. PIER, STAMPED "CHSRA S180 LS 4430 2011"

• REFERENCE POINT, SET "C" NAIL AND TAG, STAMPED "AE RP LS 4430" UNLESS OTHERWISE NOTED.

Station	Back (+)	H.I.	Fore (-)	Elevation	Adj. Elev.	Description
S180			4.80			2-1/2" BRONZE DISK
	4.94					
RP4			5.15			5/8" REBAR LS 4430
	4.77					
RP3			4.51			NAIL & TAG LS 4430
	4.87					
RP2			5.12			5/8" REBAR LS 4430
	4.88					
RP1			4.58			NAIL & TAG LS 4430
	4.70					
S180						2-1/2" BRONZE DISK

PARSONS BRINCKERHOFF

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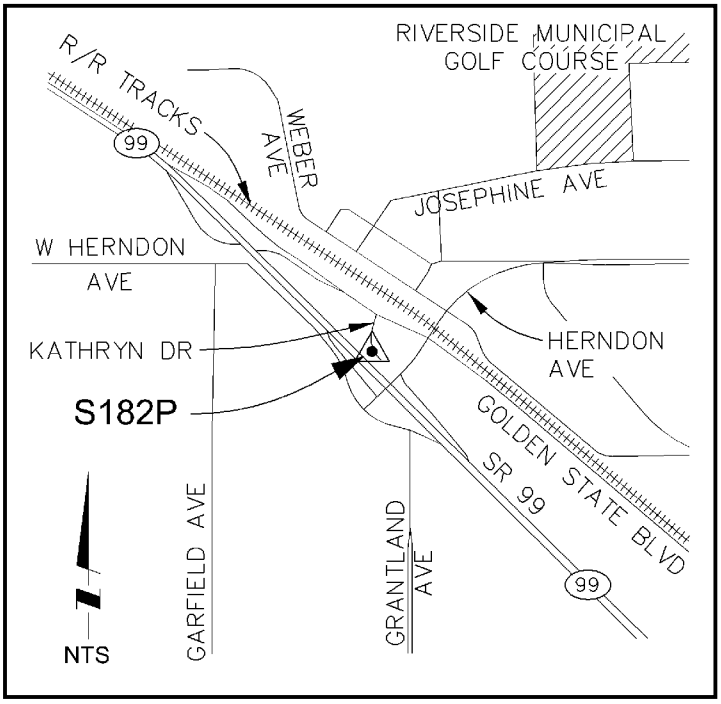
SURVEY CONTROL MONUMENT DATA SHEET

Sheet of



Designation: **S182P**

Date: **10/19/2010**

Monument Description:
2 ½" Bronze Disk in 1" Iron Pipe in 8" Concrete Pier

To Reach:
In the County of Fresno, City of Fresno, from the intersection of Golden State Boulevard and Kathryn Drive, southeasterly 510 feet along Kathryn Drive to the monument, 1.0 feet behind the back of walk on the southwesterly side of Kathryn Drive.

HORIZONTAL

DATUM: NAD 83 (NSRS2007) **EPOCH: 2007.00**

Geodetic Coordinates			**Degrees**	**Minutes**	**Seconds**	
	Latitude	:	36°	50'	00.81370"	N
	Longitude	:	119°	55'	05.93458"	W

California Coordinate System (CCS83) US Survey Feet

Zone 3	**Northing**	:	1762400.74		
	Easting	:	6731915.56	**Comb. Factor:**	1.00004703
Zone 4	**Northing**	:	2187855.88		
	Easting	:	6292923.69	**Comb. Factor:**	0.99993801

VERTICAL

	US Survey Feet	**Method**
NAVD88:	300.64	GPS

The orthometric height was determined by two, one-hour GPS observations, using GEOID09 and CGPS ellipsoid heights. Equipment used included fixed height 2.000 meter rods, Trimble 5700 receivers and matching Zephyr Geodetic antennas.

PARSONS BRINCKERHOFF

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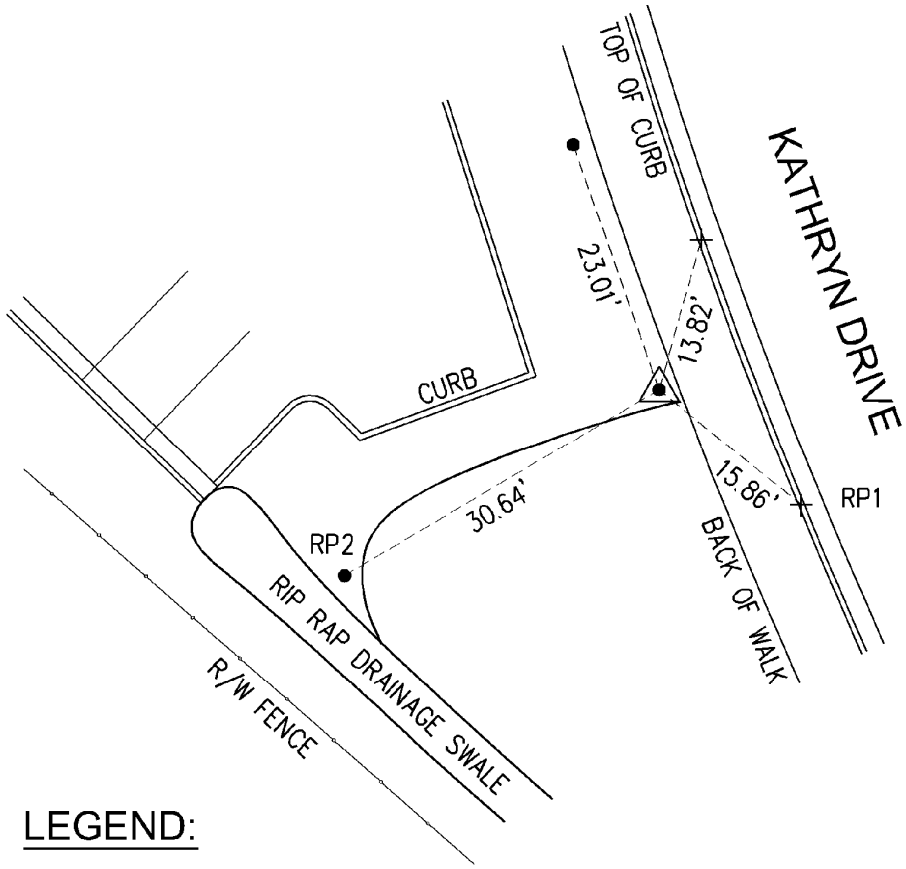
California High-Speed Train Project

SURVEY CONTROL MONUMENT TIE SHEET

Sheet of

PARTY CHIEF:			DATE OF SURVEY:	DESIGNATION:
W. Hoff	J. TERRY	R. WILLIAMS	10/19/2010	**S182P**



NTS

LEGEND:

- CONTROL POINT, 2 ½" BRONZE DISK IN 1" IRON PIPE IN 8" CONC. PIER, STAMPED "CHSRA S182P LS 4430 2010"
- REFERENCE POINT, SET ⅝" REBAR WITH PLASTIC PLUG, STAMPED "AE RP LS 4430" UNLESS OTHERWISE NOTED.
- + REFERENCE POINT, SET CHISELED "X" IN TOP OF CURB.

Station	Back (+)	H.I.	Fore (-)	Elevation	Adj. Elev.	Description
S182P			4.96			2-1/2" BRONZE DISK
	5.89					
RP2			5.57			5/8" REBAR LS 4430
	5.17					
RP1			5.31			CHISELED "X"
	4.78					
S182P						2-1/2" BRONZE DISK

PARSONS BRINCKERHOFF

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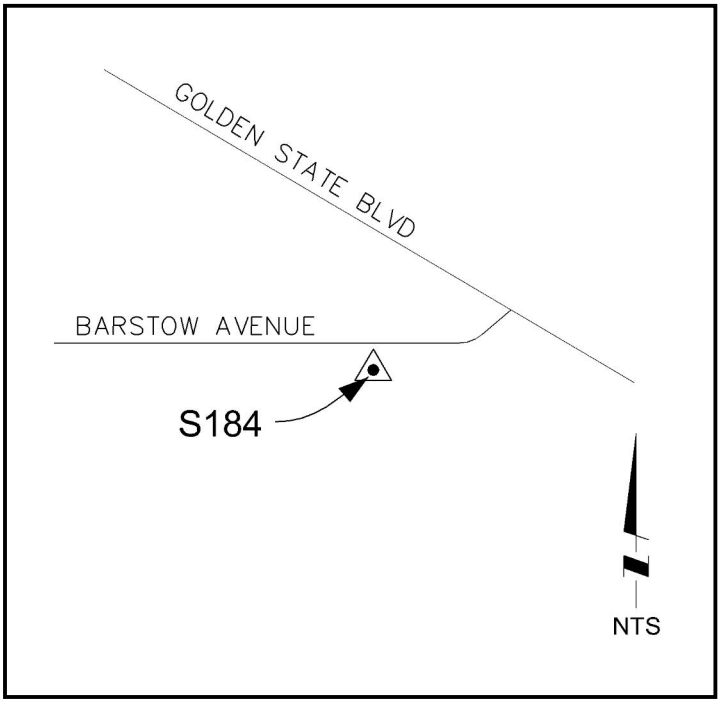

Designation: **S184**

Date: **11/17/2011**

Monument Description:
2 ½" Bronze Disk in 1" Iron Pipe in 8" Concrete Pier

To Reach:
In the City of Fresno, County of Fresno, from the intersection of Golden State Boulevard and Barstow Avenue, proceed westerly along Barstow Avenue, 250 feet to the Monument on the left.

HORIZONTAL

DATUM: NAD 83 (NSRS2007) **EPOCH: 2007.00**

Geodetic Coordinates		**Degrees**	**Minutes**	**Seconds**	
Latitude	:	36°	48'	55.14614"	N
Longitude	:	119°	53'	20.14568"	W

California Coordinate System (CCS83) US Survey Feet

Zone 4	**Northing**	:	2181134.27	
	Easting	:	6301461.66	**Comb. Factor:** 0.99993663

VERTICAL

	US Survey Feet	**Method**
NAVD88:	306.24	Levels/GPS

Vertical elevations were established from differential levels between primary control monuments.

PARSONS BRINCKERHOFF

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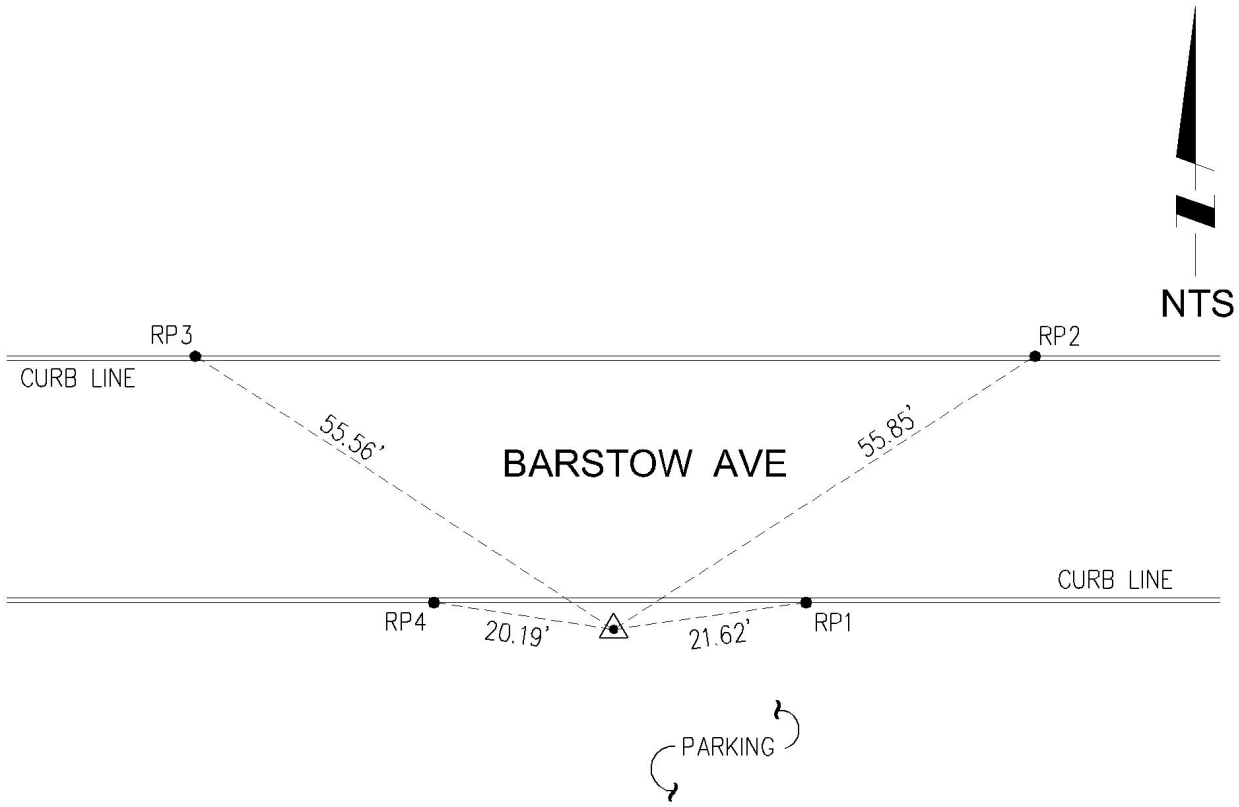
PARTY CHIEF:			DATE OF SURVEY:	DESIGNATION:
J. TERRY	R. WILLIAMS		9/20/2011	**S184**



LEGEND:

△ CONTROL POINT, 2 ½" BRONZE DISK IN 1" IRON PIPE IN 8" CONC. PIER, STAMPED "CHSRA S184 LS 4430 2011"

• REFERENCE POINT, SET "C" NAIL AND TAG, STAMPED "AE RP LS 4430" IN TOP OF CURB

Station	Back (+)	H.I.	Fore (-)	Elevation	Adj. Elev.	Description
S184			5.79			2-1/2" BRONZE DISK
	5.86					
RP4			5.65			NAIL & TAG LS 4430
	5.36					
RP3			5.52			NAIL & TAG LS 4430
	5.50					
RP2			5.24			NAIL & TAG LS 4430
	5.53					
RP1			5.71			NAIL & TAG LS 4430
	5.66					
S184						2-1/2" BRONZE DISK

PARSONS BRINCKERHOFF

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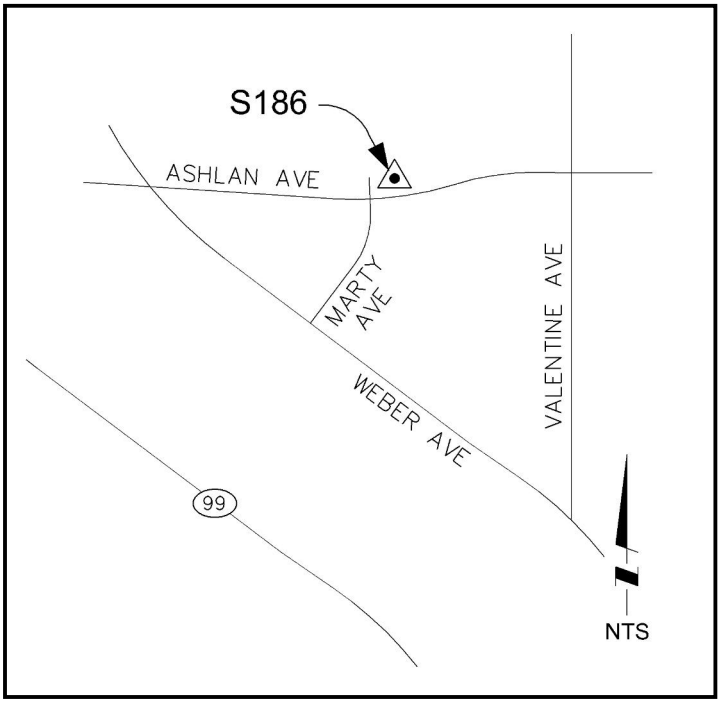

Designation: **S186**

Date: **11/17/2011**

Monument Description:
2 ½" Bronze Disk in 1" Iron Pipe in 8" Concrete Pier

To Reach:
In the City of Fresno, County of Fresno, Monument is at the northeast corner of Ashlan Avenue and Marty Avenue.

HORIZONTAL

DATUM: NAD 83 (NSRS2007) **EPOCH: 2007.00**

Geodetic Coordinates			**Degrees**	**Minutes**	**Seconds**	
	Latitude	:	36°	47'	36.64259"	N
	Longitude	:	119°	51'	25.10077"	W

California Coordinate System (CCS83) US Survey Feet

Zone 4	**Northing**	:	2173110.51		
	Easting	:	6310744.91	**Comb. Factor:**	0.99993598

VERTICAL

	US Survey Feet	**Method**
NAVD88:	294.70	Levels/GPS

Vertical elevations were established from differential levels between primary control monuments.

PARSONS BRINCKERHOFF

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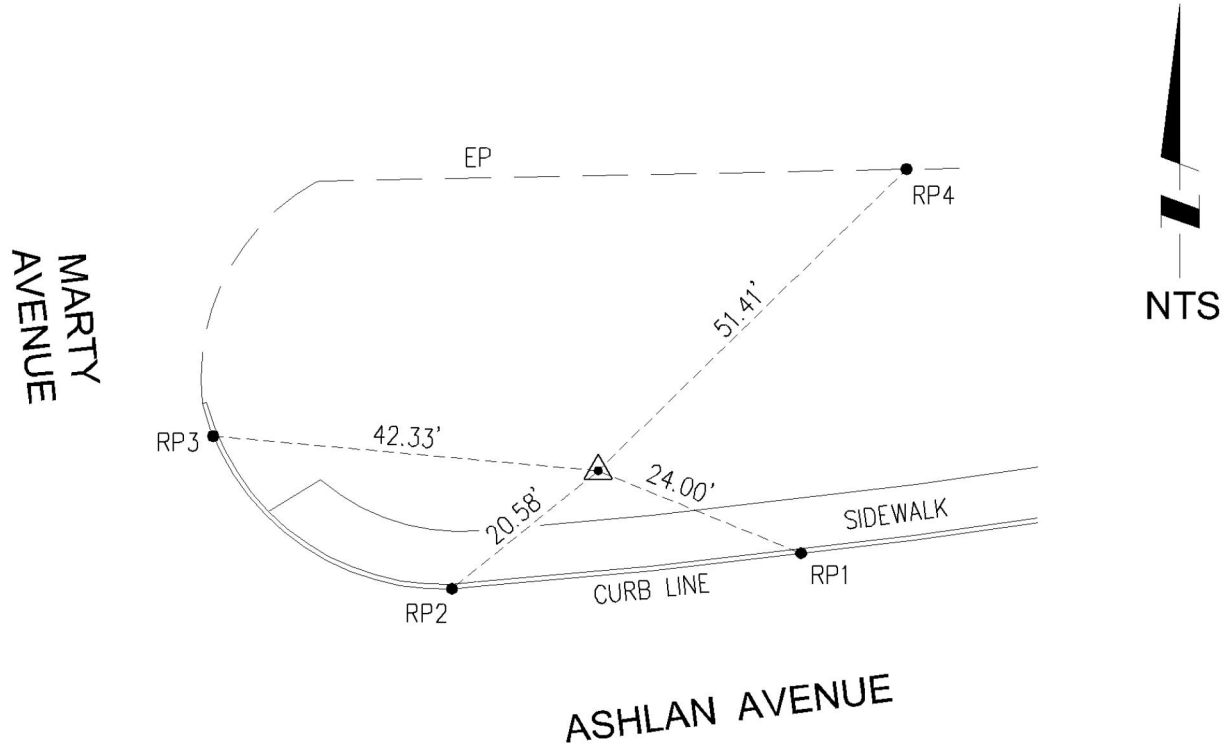
PARTY CHIEF:			DATE OF SURVEY:	DESIGNATION:
J. TERRY	R. WILLIAMS		9/20/2011	**S186**



LEGEND:

- ◬ CONTROL POINT, 2 ½" BRONZE DISK IN 1" IRON PIPE IN 8" CONC. PIER, STAMPED "CHSRA S186 LS 4430 2011"
- • REFERENCE POINT, SET "C" NAIL AND TAG, STAMPED "AE RP LS 4430" UNLESS OTHERWISE NOTED.

Station	Back (+)	H.I.	Fore (-)	Elevation	Adj. Elev.	Description
S186			5.99			2-1/2" BRONZE DISK
	4.45					
RP4			4.22			NAIL & TAG LS 4430
	4.75					
RP3			4.68			NAIL & TAG LS 4430
	5.68					
RP2			5.36			NAIL & TAG LS 4430
	6.00					
RP1			6.22			NAIL & TAG LS 4430
	5.59					
S186						2-1/2" BRONZE DISK

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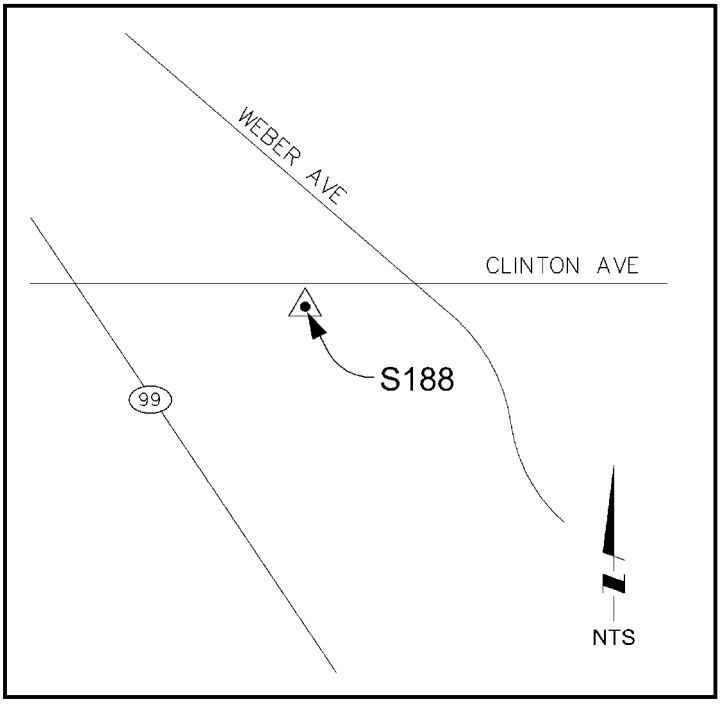

Designation: **S188**

Date: **11/17/2011**

Monument Description:
2 ½" Bronze Disk in 1" Iron Pipe in 8" Concrete Pier

To Reach:
In the City of Fresno, County of Fresno, from the intersection of Weber Avenue and Clinton Avenue, 150 feet west to the Monument on the left.

HORIZONTAL

DATUM: NAD 83 (NSRS2007) **EPOCH: 2007.00**

Geodetic Coordinates		**Degrees**	**Minutes**	**Seconds**	
Latitude	:	36°	46'	18.48573"	N
Longitude	:	119°	50'	04.91204"	W

California Coordinate System (CCS83) US Survey Feet

Zone 4	**Northing**	:	2165149.42		
	Easting	:	6317198.08	**Comb. Factor:**	0.99993487

VERTICAL

	US Survey Feet	**Method**
NAVD88:	296.43	Levels/GPS

Vertical elevations were established from differential levels between primary control monuments.

PARSONS BRINCKERHOFF

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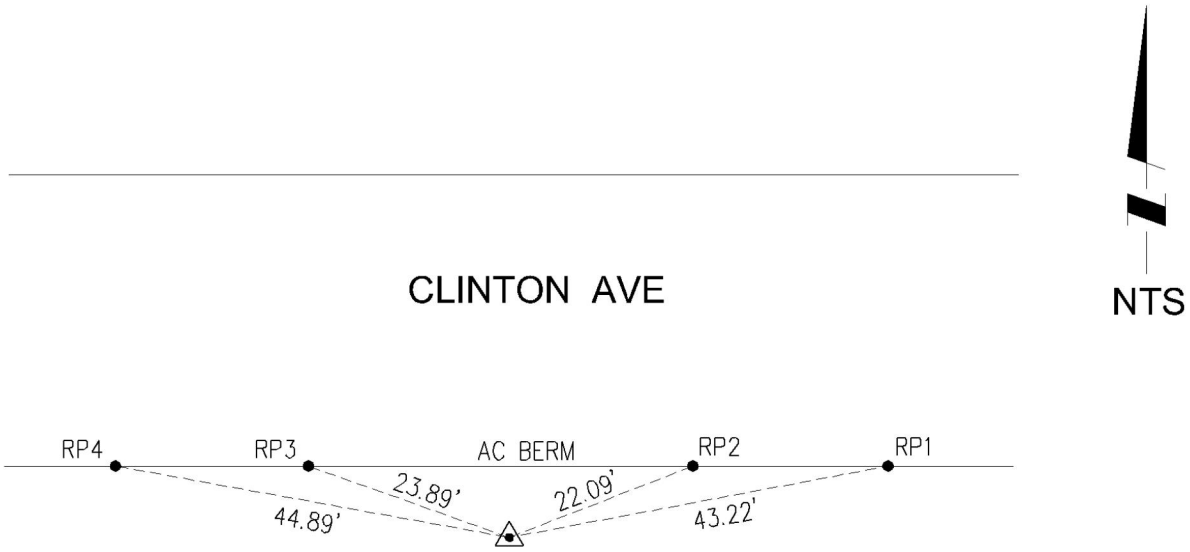
PARTY CHIEF:			DATE OF SURVEY:	DESIGNATION:
J. TERRY	R. WILLIAMS		9/20/2011	**S188**



LEGEND:

△ CONTROL POINT, 2 ½" BRONZE DISK IN 1" IRON PIPE IN 8" CONC. PIER, STAMPED "CHSRA S188 LS 4430 2011"

• REFERENCE POINT, SET "C" NAIL AND TAG, STAMPED "AE RP LS 4430" IN AC BERM.

Station	Back (+)	H.I.	Fore (-)	Elevation	Adj. Elev.	Description
S188			5.25			2-1/2" BRONZE DISK
	3.01					
RP4			3.30			NAIL & TAG LS 4430
	3.82					
RP3			3.46			NAIL & TAG LS 4430
	4.37					
RP2			4.60			NAIL & TAG LS 4430
	5.01					
RP1			4.69			NAIL & TAG LS 4430
	5.09					
S188						2-1/2" BRONZE DISK

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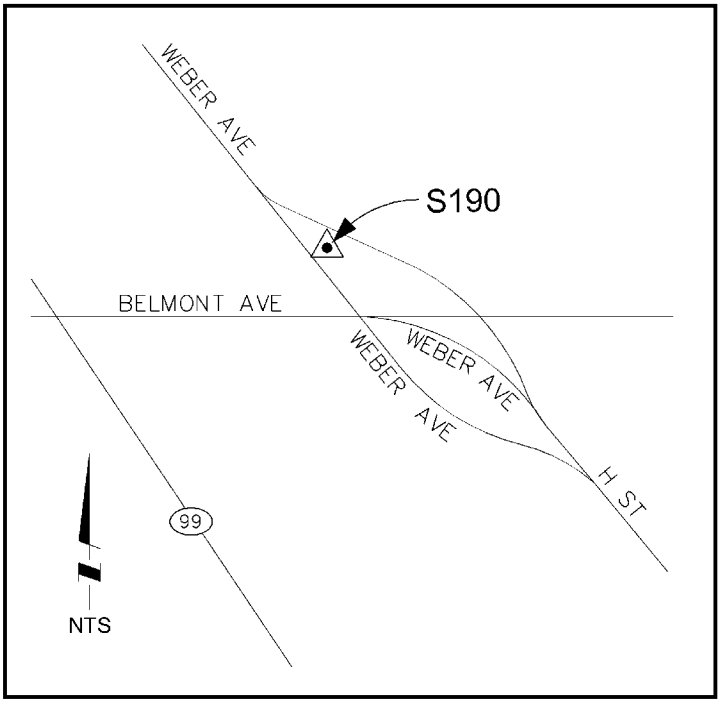

Designation: **S190**

Date: **11/17/2011**

Monument Description:
2 ½" Bronze Disk in 1" Iron Pipe in 8" Concrete Pier

To Reach:
In the City of Fresno, County of Fresno, Monument is 300 feet north of the Belmont Avenue and Weber Avenue split.

HORIZONTAL

DATUM: NAD 83 (NSRS2007) **EPOCH: 2007.00**

Geodetic Coordinates		**Degrees**	**Minutes**	**Seconds**	
Latitude	:	36°	45'	03.83038"	N
Longitude	:	119°	48'	49.59979"	W

California Coordinate System (CCS83) US Survey Feet

Zone 4	**Northing**	:	2157547.30	
	Easting	:	6323261.08	**Comb. Factor:** 0.99993437

VERTICAL

	US Survey Feet	**Method**
NAVD88:	288.96	Levels/GPS

Vertical elevations were established from differential levels between primary control monuments.

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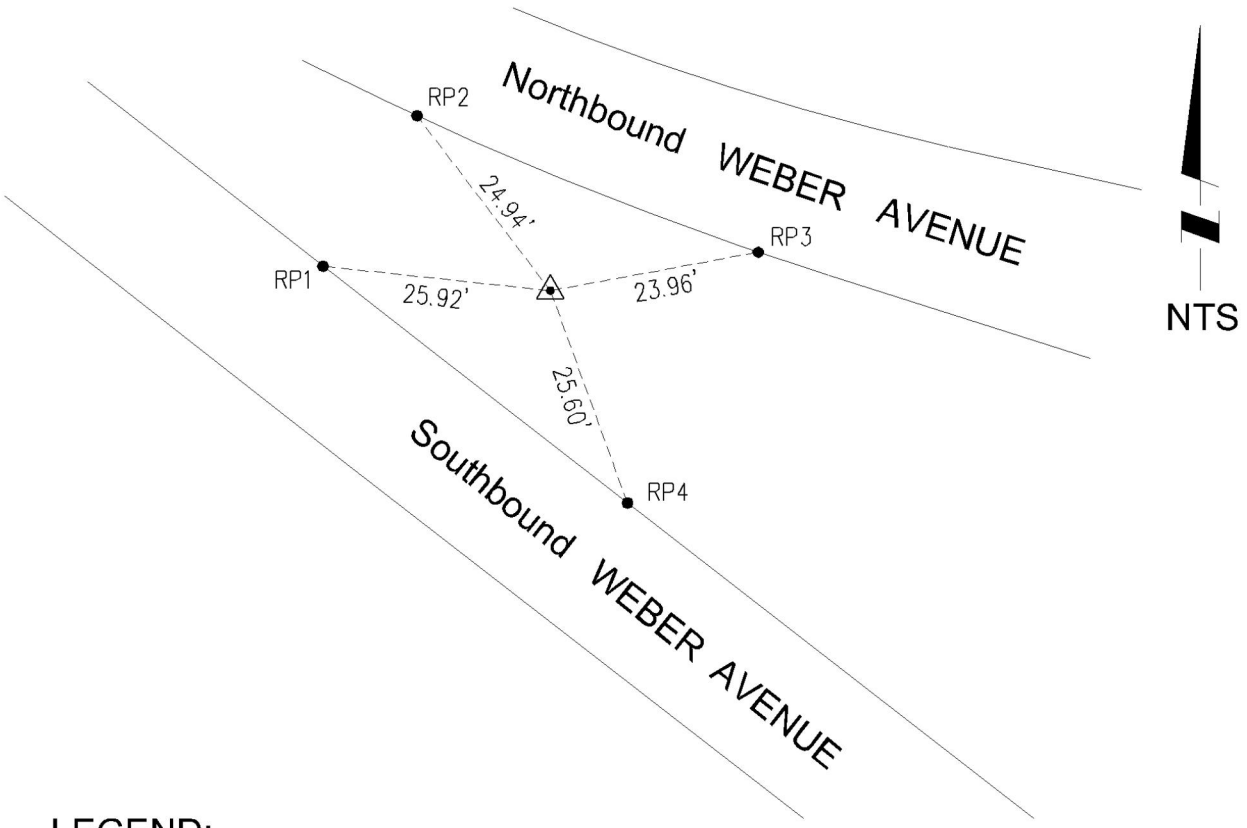
PARTY CHIEF:			DATE OF SURVEY:	DESIGNATION:
J. TERRY	R. WILLIAMS		9/20/2011	**S190**



LEGEND:

△ CONTROL POINT, 2 ½" BRONZE DISK IN 1" IRON PIPE IN 8" CONC. PIER, STAMPED "CHSRA S190 LS 4430 2011"

• REFERENCE POINT, SET "C" NAIL AND TAG, STAMPED "AE RP LS 4430" IN TOP OF CURB

Station	Back (+)	H.I.	Fore (-)	Elevation	Adj. Elev.	Description
S190			4.40			2-1/2" BRONZE DISK
	1.40					
RP4			1.70			NAIL & TAG LS 4430
	5.47					
RP3			5.29			NAIL & TAG LS 4430
	5.19					
RP2			5.43			NAIL & TAG LS 4430
	3.13					
RP1			2.93			NAIL & TAG LS 4430
	4.56					
S190						2-1/2" BRONZE DISK

PARSONS BRINCKERHOFF

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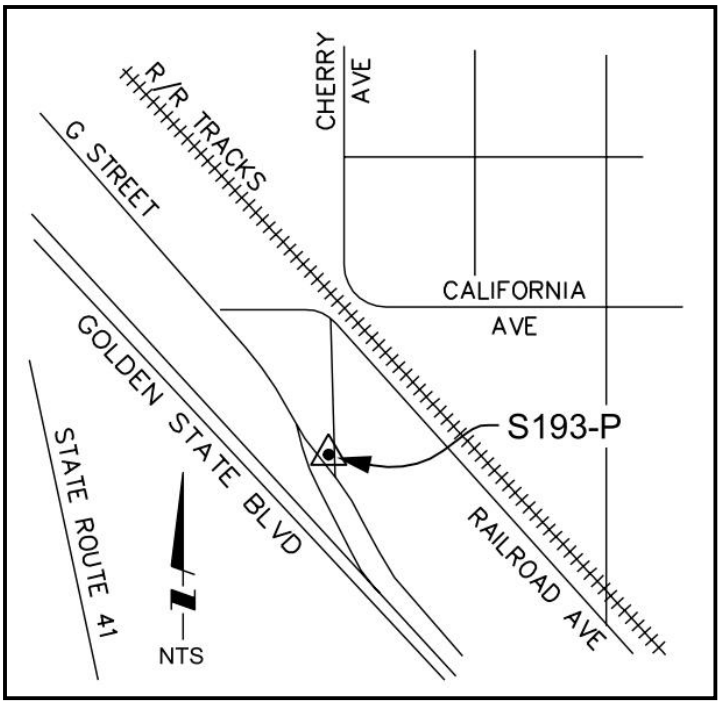

Designation: **S193P**

Date: **9/14/2010**

Monument Description:
2 ½" Bronze Disk in 1" Iron Pipe in 8" Concrete Pier

To Reach:
In the City of Fresno, County of Fresno, 450 southerly along Cherry Avenue from the intersection of California Avenue, 7.8 feet westerly of the west curb face of Cherry Avenue, 11.8 feet northeasterly of the northeasterly curb face of G Street.

HORIZONTAL

DATUM: NAD 83 (NSRS2007) **EPOCH: 2007.00**

Geodetic Coordinates		**Degrees**	**Minutes**	**Seconds**	
Latitude	:	36°	43'	12.41590"	N
Longitude	:	119°	46'	54.71065"	W

California Coordinate System (CCS83) US Survey Feet

Zone 4	**Northing**	:	2146202.84		
	Easting	:	6332518.62	**Comb. Factor:**	0.99993347

VERTICAL

	US Survey Feet	**Method**
NAVD88:	286.04	GPS

The orthometric height was determined by two, one-hour GPS observations, using GEOID09 and CGPS ellipsoid heights. Equipment used included fixed height 2.000 meter rods, Trimble 5700 receivers and matching Zephyr Geodetic antennas.

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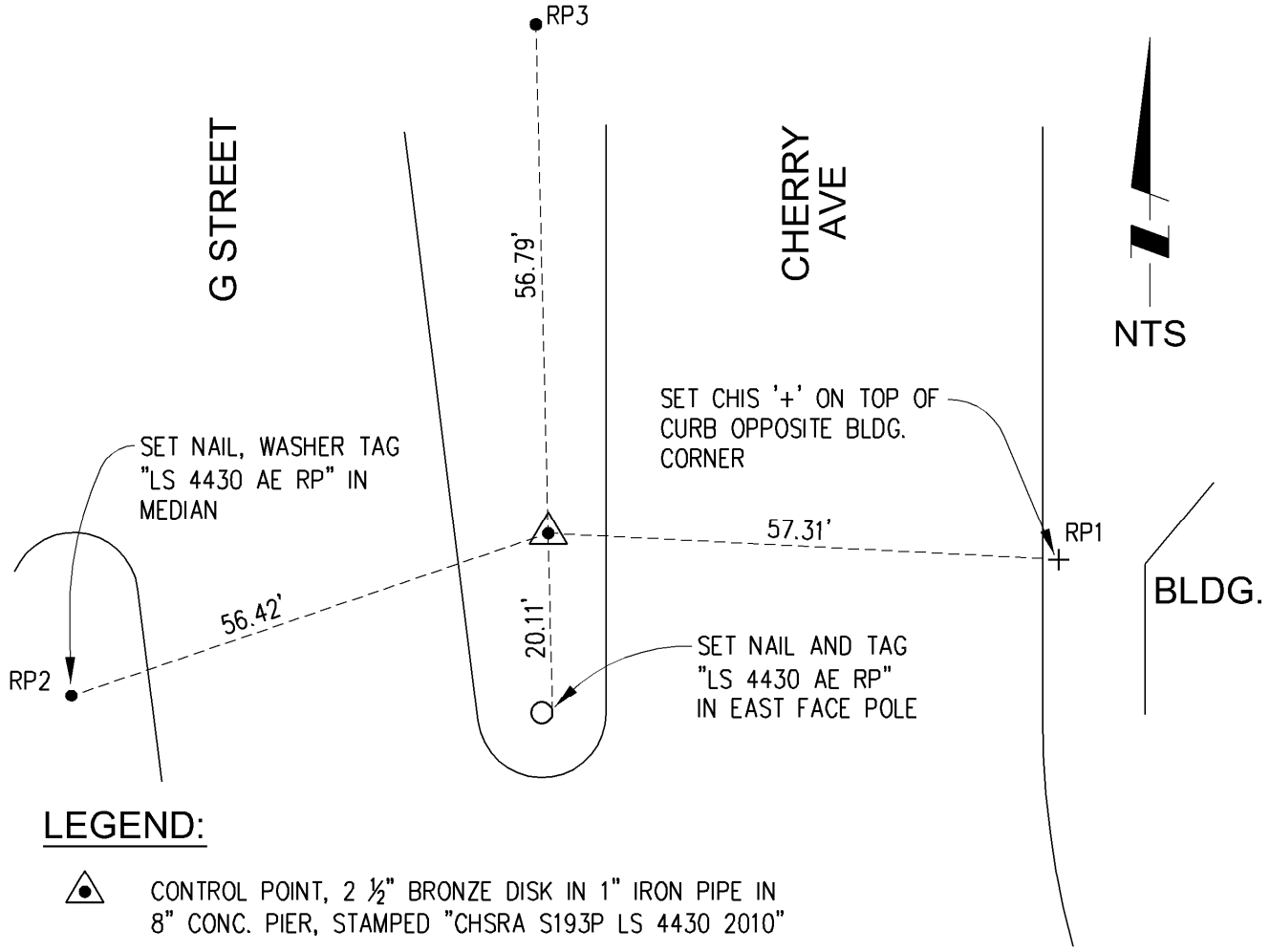
PARTY CHIEF:			DATE OF SURVEY:	DESIGNATION:
W. Hoff	M. Zwissler		9/10/2010	**S193P**



LEGEND:

CONTROL POINT, 2 ½" BRONZE DISK IN 1" IRON PIPE IN 8" CONC. PIER, STAMPED "CHSRA S193P LS 4430 2010"

REFERENCE POINT, SET ⅝" REBAR WITH PLASTIC PLUG, STAMPED "AE RP LS 4430" UNLESS OTHERWISE NOTED.

Station	Back (+)	H.I.	Fore (-)	Elevation	Adj. Elev.	Description
S193-P			4.12			2-1/2" BRONZE DISK
	3.90					
RP3			4.29			5/8" REBAR LS 4430
	4.45					
RP2			4.75			NAIL & TAG LS 4430
	5.52					
RP1			5.31			CHIS. "X" IN TC
	4.60					
S193-P						2-1/2" BRONZE DISK

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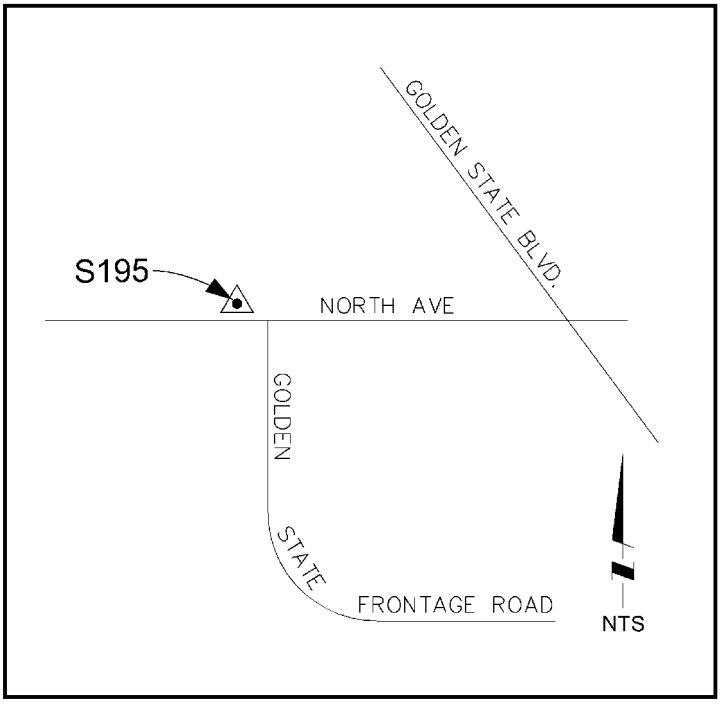

Designation: **S195**

Date: **11/17/2011**

Monument Description:
2 ½" Bronze Disk in 1" Iron Pipe in 8" Concrete Pier

To Reach:
In the City of Fresno, County of Fresno, Monument is at the northwest quadrant of the intersection of North Avenue and Golden State Frontage Road.

HORIZONTAL

DATUM: NAD 83 (NSRS2007) **EPOCH: 2007.00**

Geodetic Coordinates		**Degrees**	**Minutes**	**Seconds**	
Latitude	:	36°	41'	32.98066"	N
Longitude	:	119°	45'	10.59429"	W

California Coordinate System (CCS83) US Survey Feet

Zone 4	**Northing**	:	2136079.76	
	Easting	:	6340915.81	**Comb. Factor:** 0.99993254

VERTICAL

	US Survey Feet	**Method**
NAVD88:	291.36	Levels/GPS

Vertical elevations were established from differential levels between primary control monuments.

PARSONS BRINCKERHOFF

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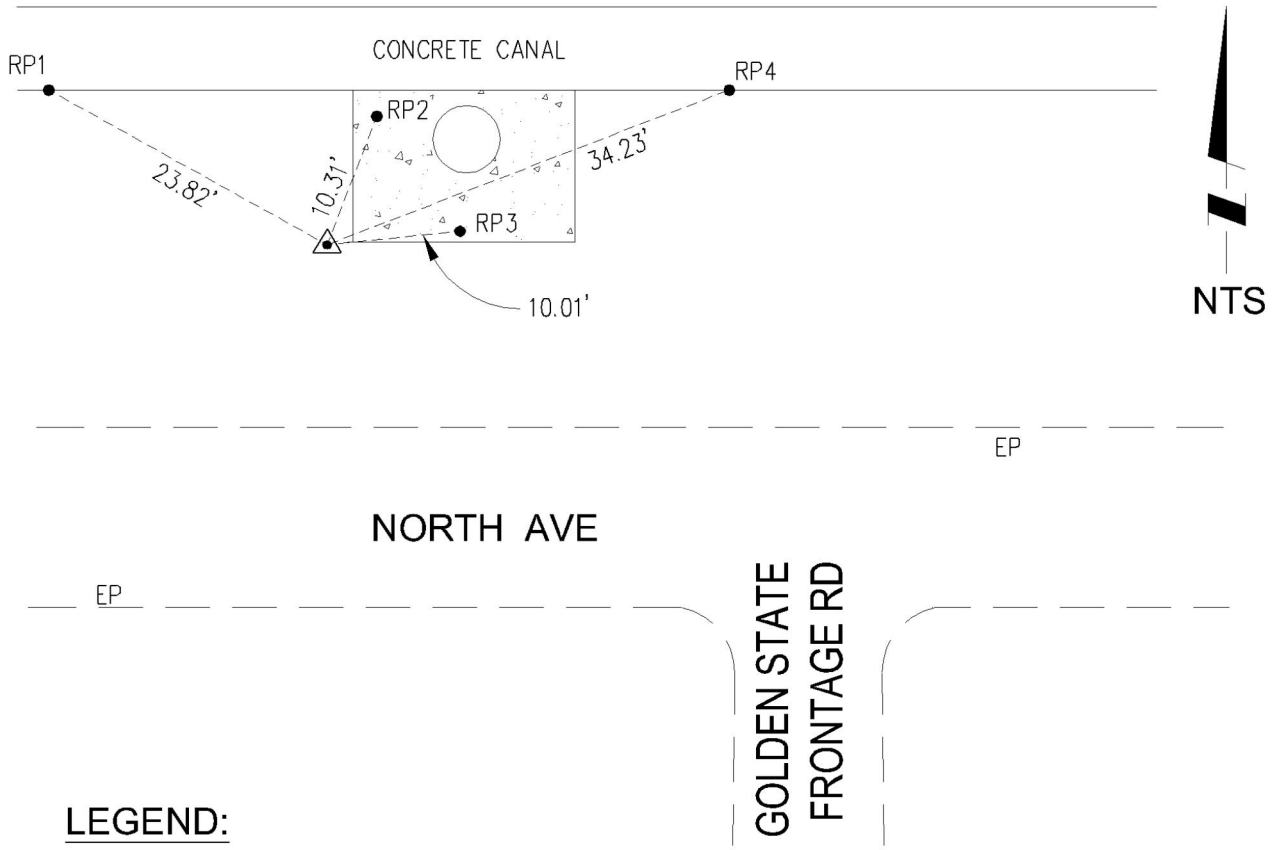
PARTY CHIEF:			DATE OF SURVEY:	DESIGNATION:
J. TERRY	R. WILLIAMS		9/20/2011	**S195**



LEGEND:

△ CONTROL POINT, 2 ½" BRONZE DISK IN 1" IRON PIPE IN 8" CONC. PIER, STAMPED "CHSRA S195 LS 4430 2011"

• REFERENCE POINT, SET "C" NAIL AND TAG, STAMPED "AE RP LS 4430" UNLESS OTHERWISE NOTED.

Station	Back (+)	H.I.	Fore (-)	Elevation	Adj. Elev.	Description
S195			5.69			2-1/2" BRONZE DISK
	5.32					
RP4			5.11			NAIL & TAG LS 4430
	5.54					
RP3			5.67			NAIL & TAG LS 4430
	5.31					
RP2			5.10			NAIL & TAG LS 4430
	5.05					
RP1			5.24			NAIL & TAG LS 4430
	5.59					
S195						2-1/2" BRONZE DISK

PARSONS BRINCKERHOFF

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Designation: **S198**

Date: **11/17/2011**

Monument Description:
2 ½" Bronze Disk in 1" Iron Pipe in 8" Concrete Pier

To Reach:
In the County of Fresno, from the intersection of Cedar Avenue and American Avenue, proceed west along American Avenue, 0.2 mile to the Monument on the left.

HORIZONTAL

DATUM: NAD 83 (NSRS2007) **EPOCH: 2007.00**

Geodetic Coordinates		**Degrees**	**Minutes**	**Seconds**	
Latitude	:	36°	39'	48.08548"	N
Longitude	:	119°	45'	27.95290"	W

California Coordinate System (CCS83) US Survey Feet

Zone 4	**Northing**	:	2125483.45		
	Easting	:	6339418.46	**Comb. Factor:**	0.99993222

VERTICAL

	US Survey Feet	**Method**
NAVD88:	288.65	Levels/GPS

Vertical elevations were established from differential levels between primary control monuments.

PARSONS BRINCKERHOFF

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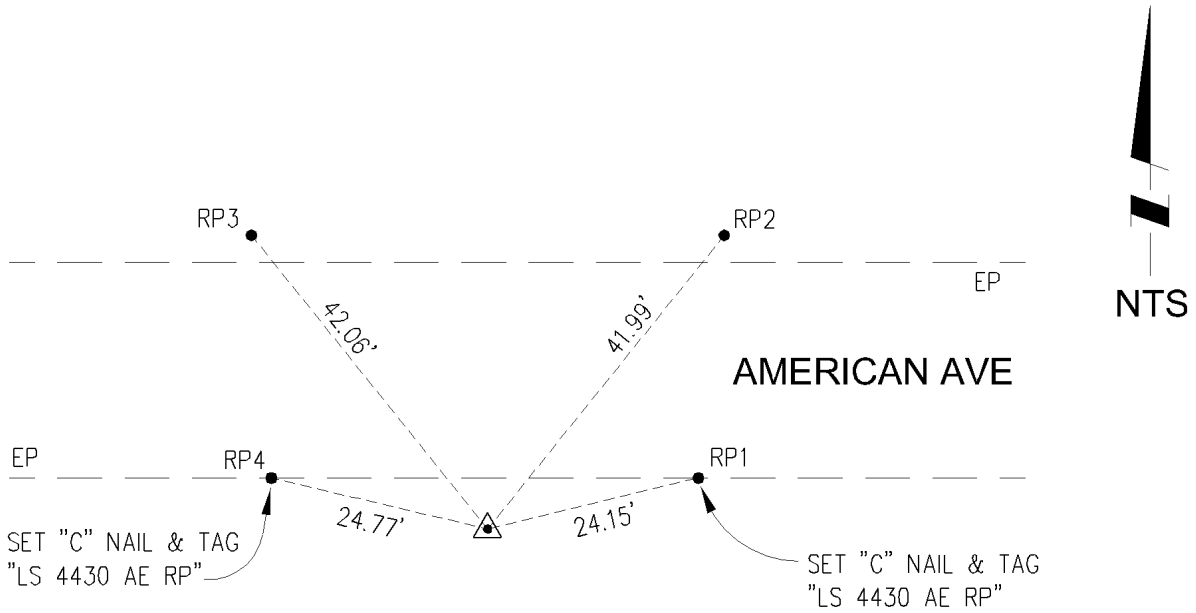
PARTY CHIEF:			DATE OF SURVEY:	DESIGNATION:
J. TERRY	R. WILLIAMS		9/20/2011	**S198**



LEGEND:

△ CONTROL POINT, 2 ½" BRONZE DISK IN 1" IRON PIPE IN 8" CONC. PIER, STAMPED "CHSRA S198 LS 4430 2011"

• REFERENCE POINT, SET ⅝" REBAR WITH PLASTIC PLUG, STAMPED "AE RP LS 4430" UNLESS OTHERWISE NOTED.

Station	Back (+)	H.I.	Fore (-)	Elevation	Adj. Elev.	Description
S198			5.29			2-1/2" BRONZE DISK
	5.42					
RP1			5.14			NAIL & TAG LS 4430
	5.51					
RP2			5.74			5/8" REBAR LS 4430
	5.81					
RP3			5.46			5/8" REBAR LS 4430
	5.08					
RP4			5.31			NAIL & TAG LS 4430
	5.12					
S198						2-1/2" BRONZE DISK

PARSONS BRINCKERHOFF

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Designation: **S200**

Date: **11/17/2011**

Monument Description:
2 ½" Bronze Disk in 1" Iron Pipe in 8" Concrete Pier

To Reach:
In the County of Fresno, from the intersection of Cedar Avenue and E. Adams Avenue, proceed west along E. Adams Avenue, 0.2 mile to the Monument on the left.

HORIZONTAL

DATUM: NAD 83 (NSRS2007) **EPOCH: 2007.00**

Geodetic Coordinates		**Degrees**	**Minutes**	**Seconds**	
Latitude	:	36°	38'	03.47121"	N
Longitude	:	119°	45'	32.88179"	W

California Coordinate System (CCS83) US Survey Feet

Zone 4	**Northing**	:	2114907.66	
	Easting	:	6338933.28	**Comb. Factor:** 0.99993224

VERTICAL

	US Survey Feet	**Method**
NAVD88:	284.41	Levels/GPS

Vertical elevations were established from differential levels between primary control monuments.

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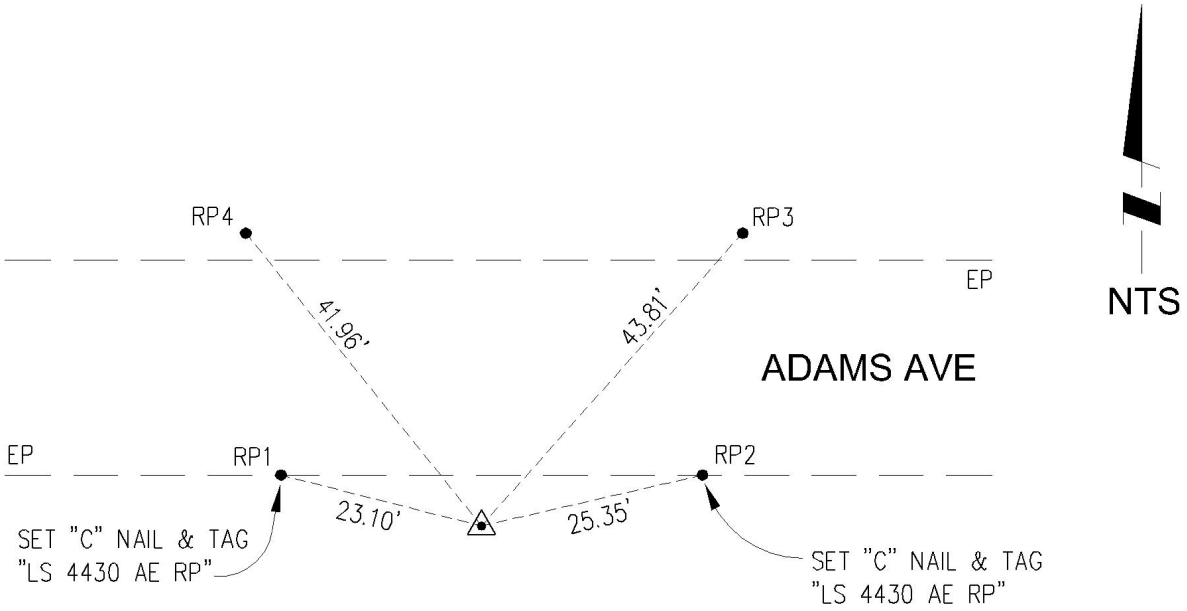
PARTY CHIEF:			DATE OF SURVEY:	DESIGNATION:
J. TERRY	R. WILLIAMS		9/20/2011	**S200**



LEGEND:

△ CONTROL POINT, 2 ½" BRONZE DISK IN 1" IRON PIPE IN 8" CONC. PIER, STAMPED "CHSRA S200 LS 4430 2011"

• REFERENCE POINT, SET ⅝" REBAR WITH PLASTIC PLUG, STAMPED "AE RP LS 4430" UNLESS OTHERWISE NOTED.

Station	Back (+)	H.I.	Fore (-)	Elevation	Adj. Elev.	Description
S200			5.31			2-1/2" BRONZE DISK
	5.09					
RP4			5.32			5/8" REBAR LS 4430
	5.34					
RP3			5.08			5/8" REBAR LS 4430
	5.00					
RP2			5.27			NAIL & TAG LS 4430
	5.22					
RP1			5.03			NAIL & TAG LS 4430
	5.36					
S200						2-1/2" BRONZE DISK

PARSONS BRINCKERHOFF

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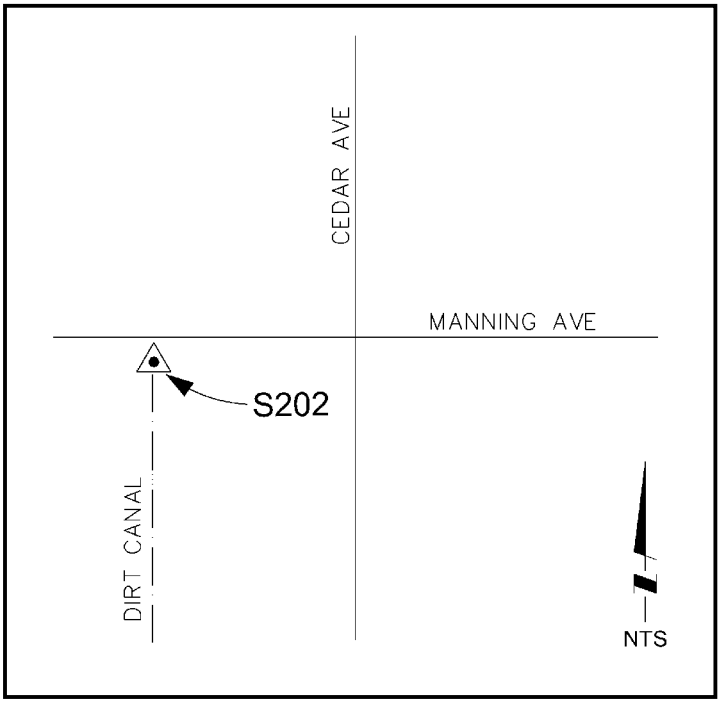
SURVEY CONTROL MONUMENT DATA SHEET

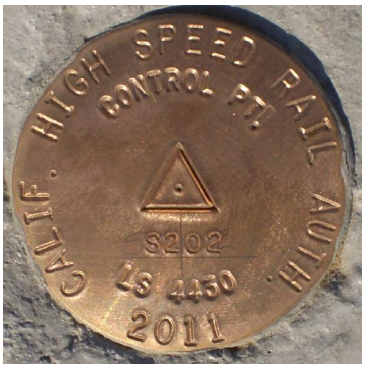
Sheet of



Designation: **S202**

Date: **11/17/2011**

Monument Description:
2 ½" Bronze Disk in 1" Iron Pipe in 8" Concrete Pier



To Reach:
In the County of Fresno, from the intersection of Cedar Avenue and Manning Avenue, proceed west along Manning Avenue, 0.1 mile to the Monument on the left.

HORIZONTAL

DATUM: NAD 83 (NSRS2007) **EPOCH: 2007.00**

Geodetic Coordinates		**Degrees**	**Minutes**	**Seconds**	
Latitude	:	36°	36'	18.80457"	N
Longitude	:	119°	45'	25.45646"	W

California Coordinate System (CCS83) US Survey Feet

Zone 4	**Northing**	:	2104318.67	
	Easting	:	6339455.01	**Comb. Factor:** 0.99993259

VERTICAL

	US Survey Feet	**Method**
NAVD88:	278.34	Levels/GPS

Vertical elevations were established from differential levels between primary control monuments.

PARSONS BRINCKERHOFF

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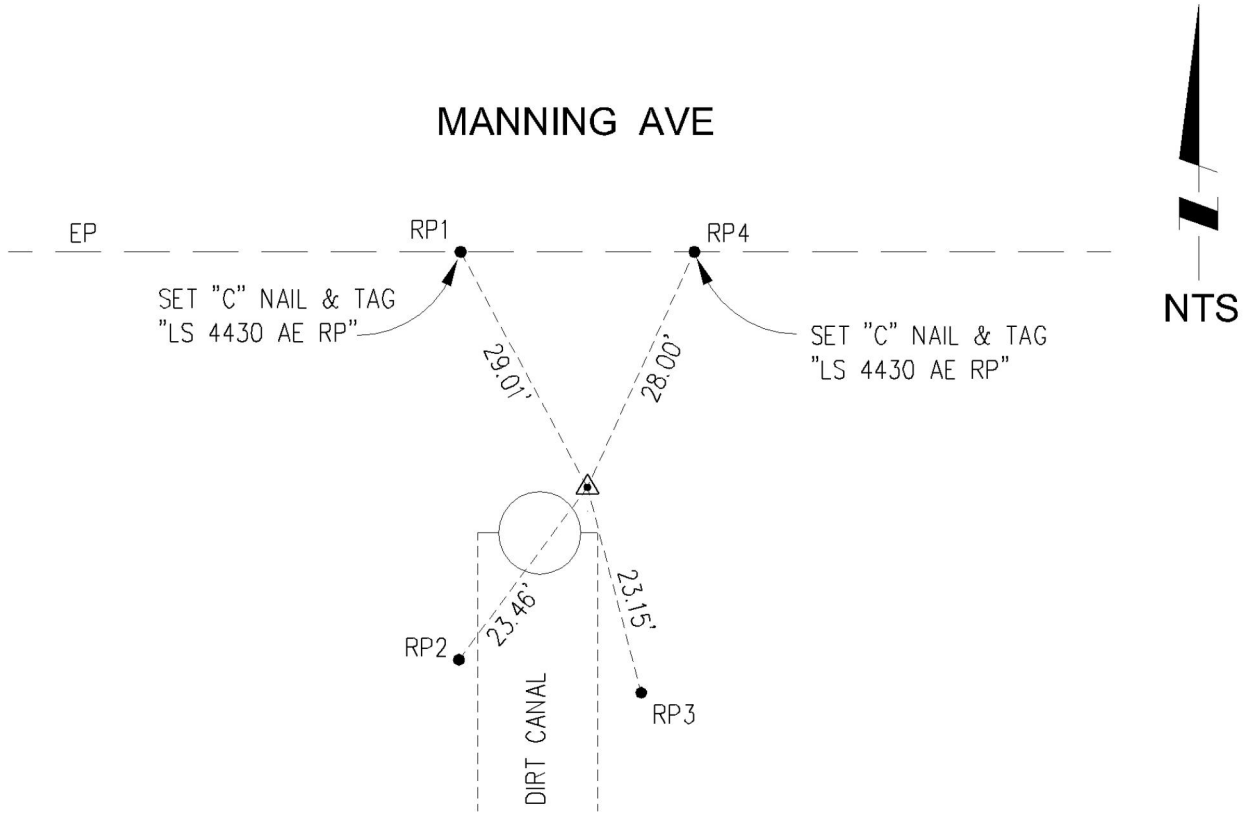
03/07/2012 RFP HSR 11-16

California High-Speed Train Project

SURVEY CONTROL MONUMENT TIE SHEET

Sheet of

PARTY CHIEF:			DATE OF SURVEY:	DESIGNATION:
J. TERRY	R. WILLIAMS		9/20/2011	**S202**



LEGEND:

△ CONTROL POINT, 2 ½" BRONZE DISK IN 1" IRON PIPE IN 8" CONC. PIER, STAMPED "CHSRA S202 LS 4430 2011"

• REFERENCE POINT, SET ⅝" REBAR WITH PLASTIC PLUG, STAMPED "AE RP LS 4430" UNLESS OTHERWISE NOTED.

Station	Back (+)	H.I.	Fore (-)	Elevation	Adj. Elev.	Description
S202			5.07			2-1/2" BRONZE DISK
	5.19					
RP4			5.35			NAIL & TAG LS 4430
	5.01					
RP3			4.74			5/8" REBAR LS 4430
	5.41					
RP2			5.64			5/8" REBAR LS 4430
	5.37					
RP1			5.16			NAIL & TAG LS 4430
	4.98					
S202						2-1/2" BRONZE DISK

PARSONS BRINCKERHOFF

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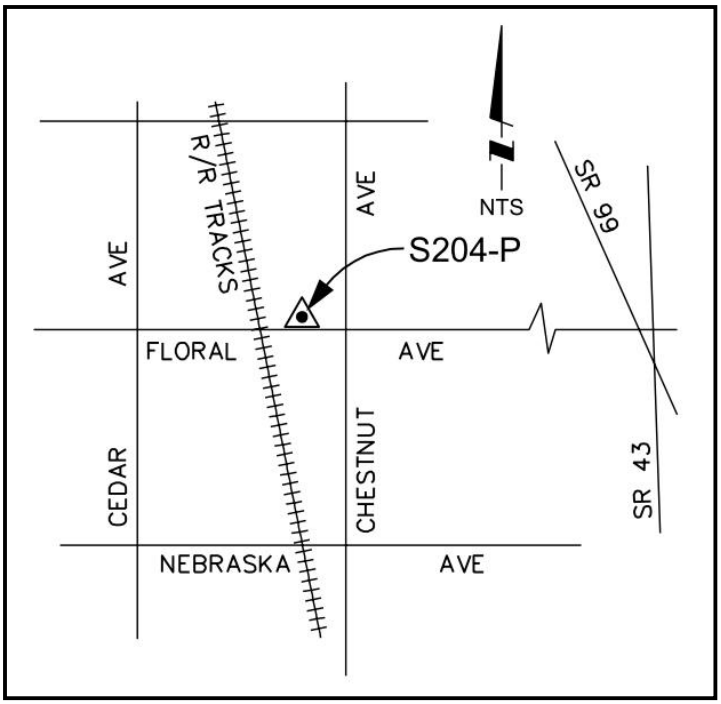
03/07/2012 RFP HSR 11-16

SURVEY CONTROL MONUMENT DATA SHEET

Sheet of



Designation: **S204P**

Date: **9/14/2010**

Monument Description:
2 ½" Bronze Disk in 1" Iron Pipe in 8" Concrete Pier

To Reach:
In the County of Fresno, north side of Floral Avenue, 0.28 mile west of Chestnut Avenue, 700 feet east of the centerline of railroad tracks.

HORIZONTAL

DATUM: NAD 83 (NSRS2007) **EPOCH: 2007.00**

Geodetic Coordinates		**Degrees**	**Minutes**	**Seconds**	
Latitude	:	36°	34'	35.14633"	N
Longitude	:	119°	44'	30.21848"	W

California Coordinate System (CCS83) US Survey Feet

Zone 4	**Northing**	:	2093801.33		
	Easting	:	6343877.62	**Comb. Factor:**	0.99993302

VERTICAL

	US Survey Feet	**Method**
NAVD88:	275.93	GPS

The orthometric height was determined by two, one-hour GPS observations, using GEOID09 and CGPS ellipsoid heights. Equipment used included fixed height 2.000 meter rods, Trimble 5700 receivers and matching Zephyr Geodetic antennas.

PARSONS BRINCKERHOFF

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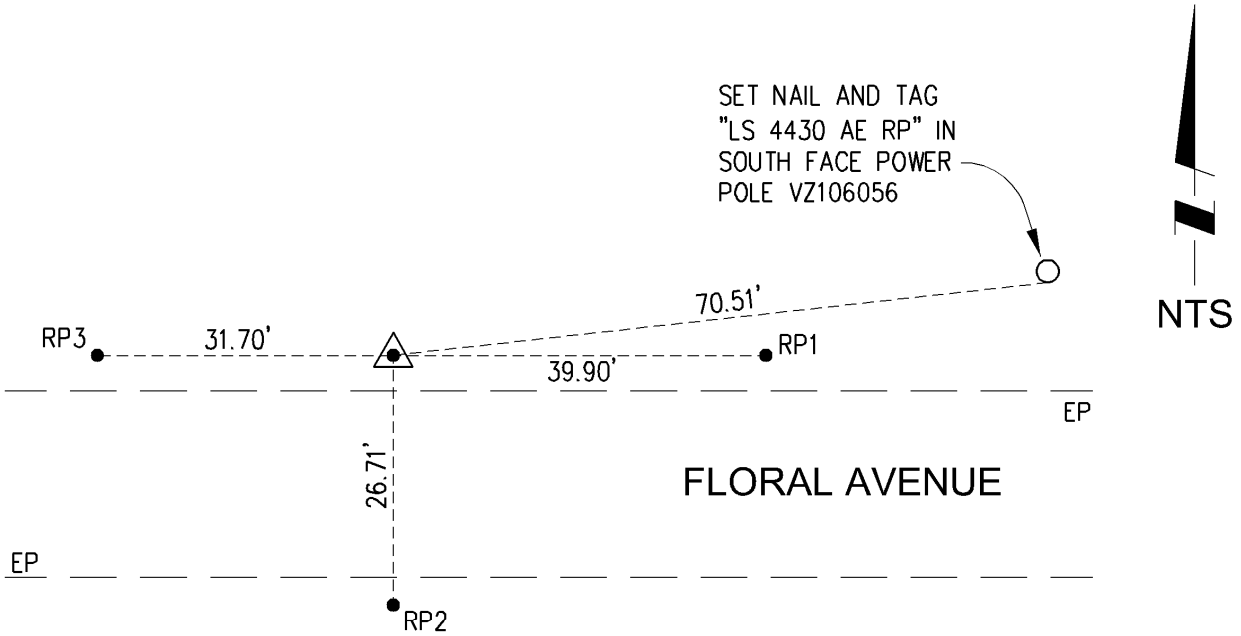
California High-Speed Train Project

SURVEY CONTROL MONUMENT TIE SHEET

Sheet of

PARTY CHIEF:			DATE OF SURVEY:	DESIGNATION:
W. Hoff	M. Zwissler		9/09/2010	**S204P**



LEGEND:

CONTROL POINT, 2 ½" BRONZE DISK IN 1" IRON PIPE IN 8" CONC. PIER, STAMPED "CHSRA S204P LS 4430 2010"

REFERENCE POINT, SET ⅝" REBAR WITH PLASTIC PLUG, STAMPED "AE RP LS 4430" UNLESS OTHERWISE NOTED.

Station	Back (+)	H.I.	Fore (-)	Elevation	Adj. Elev.	Description
S204-P			4.44			2-1/2" BRONZE DISK
	4.57					
RP3			5.12			5/8" REBAR LS 4430
	5.51					
RP2			5.65			5/8" REBAR LS 4430
	5.22					
RP1			4.84			5/8" REBAR LS 4430
	4.75					
S204-P						2-1/2" BRONZE DISK

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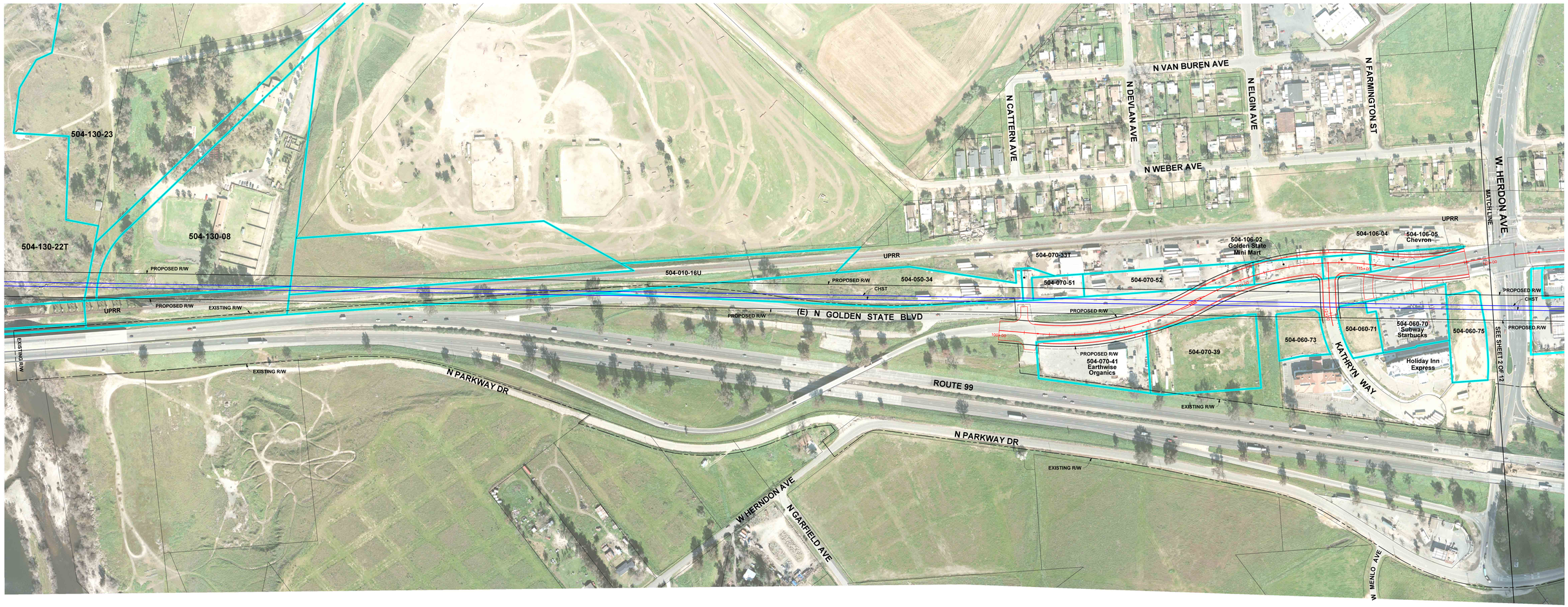
03/07/2012 RFP HSR 11-16



Legend

- Impacted Parcel
- Proposed Drainage Basin
- Caltrans R/W (Access Prohibited)
- Caltrans R/W (Relinquished)
- Proposed R/W
- Existing R/W

2-24-12
30% DESIGN
SUBJECT TO CHANGE

100 0 100 200
1"=100'

AECOM
Technical Services, Inc.
2020 L Street, Suite 300
Sacramento, CA 95811

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
SIERRA SUBDIVISION - PACKAGE 1A & 1B

RIGHT-OF-WAY EXHIBIT

1 OF 12

FEBRUARY 2012

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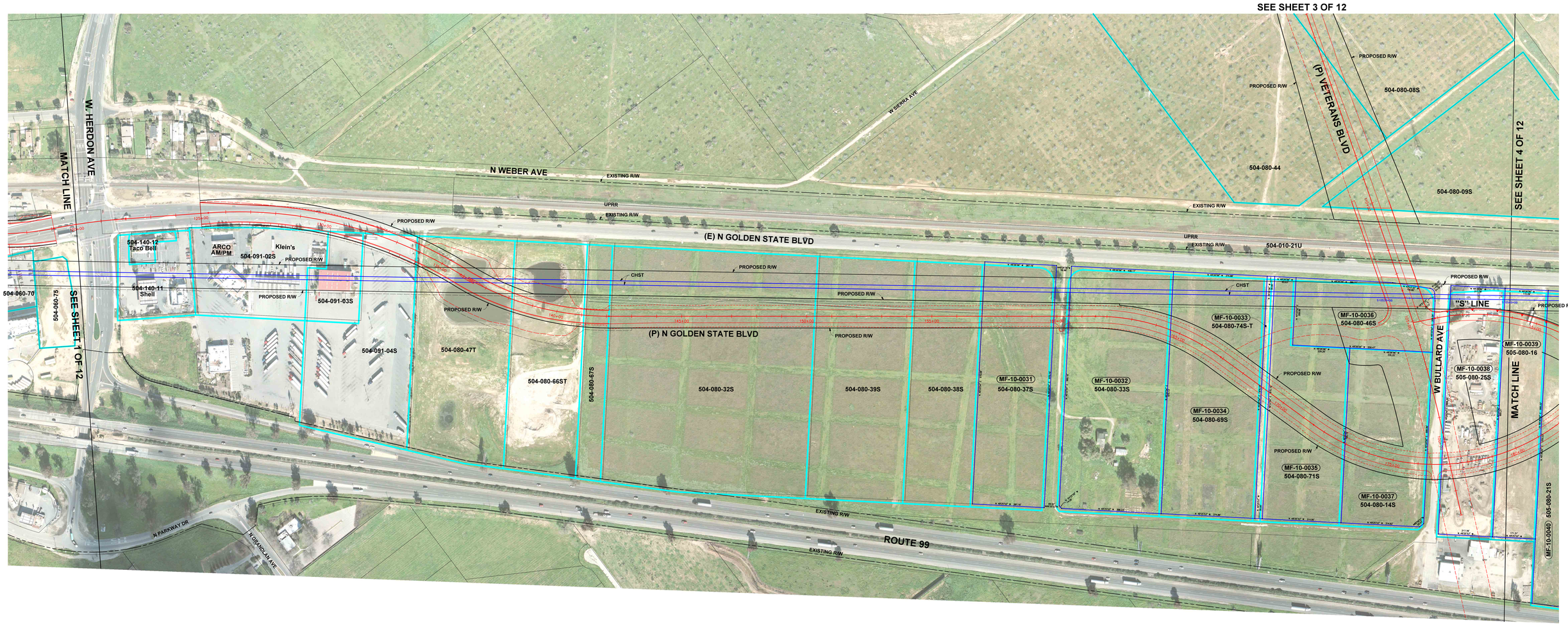

Legend

- Impacted Parcel
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CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
SIERRA SUBDIVISION - PACKAGE 1A & 1B

RIGHT-OF-WAY EXHIBIT

2 OF 12

FEBRUARY 2012

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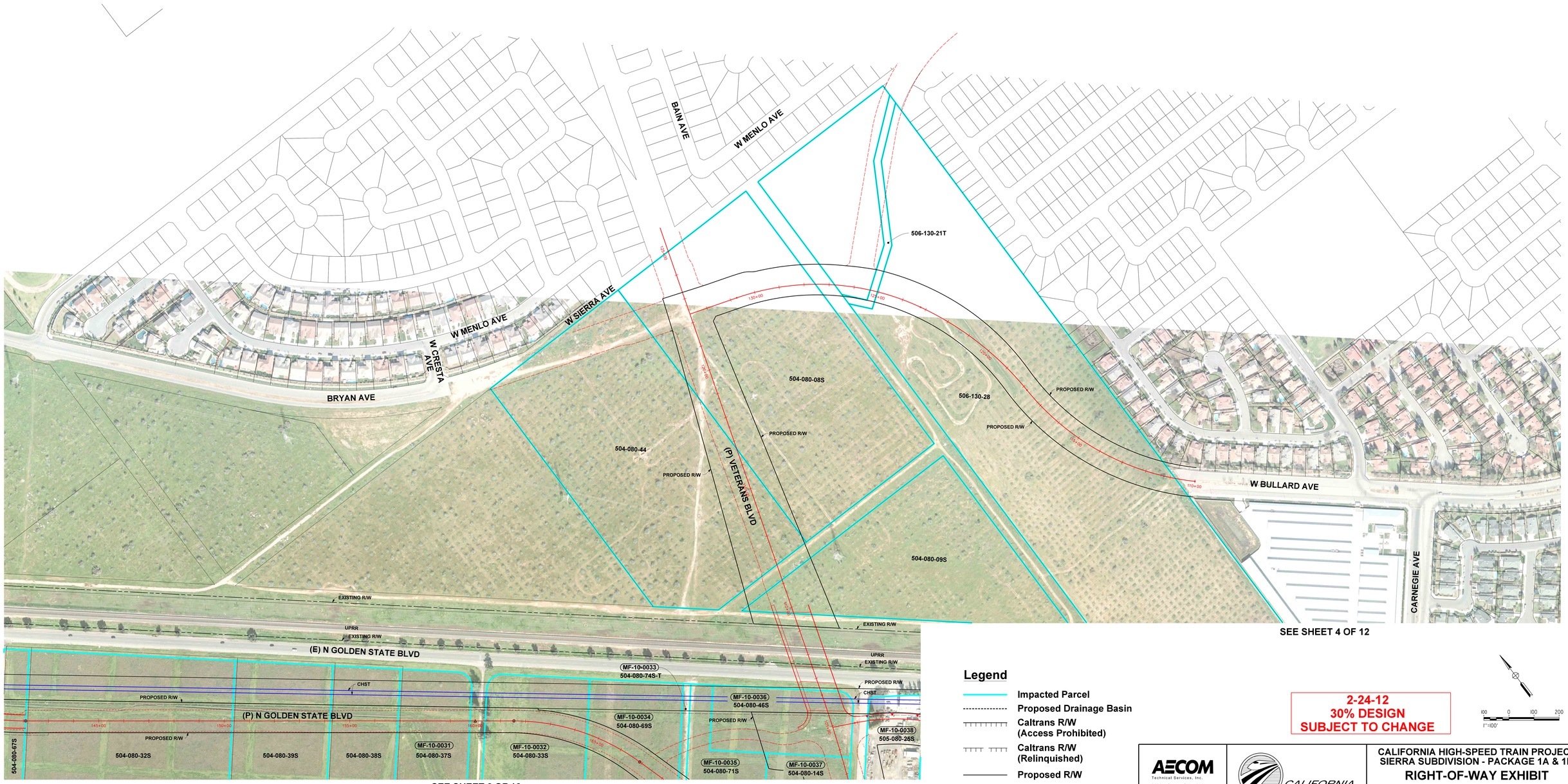

Legend

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RIGHT-OF-WAY EXHIBIT

3 OF 12

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SEE SHEET 3 OF 12

Legend

- Impacted Parcel
- Proposed Drainage Basin
- Caltrans R/W (Access Prohibited)
- Caltrans R/W (Relinquished)
- Proposed R/W
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2-24-12
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RIGHT-OF-WAY EXHIBIT

4 OF 12

FEBRUARY 2012

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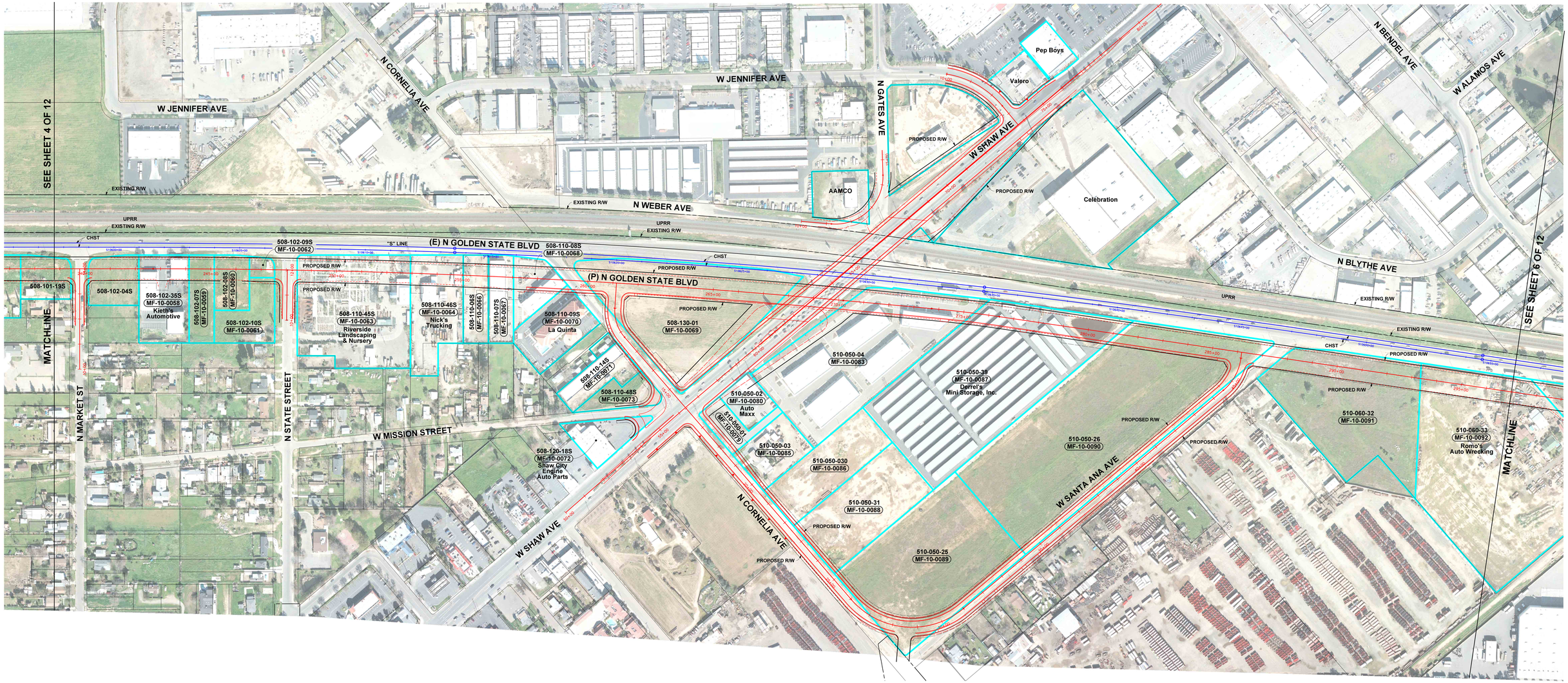

Legend

- Impacted Parcel
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5 OF 12

FEBRUARY 2012

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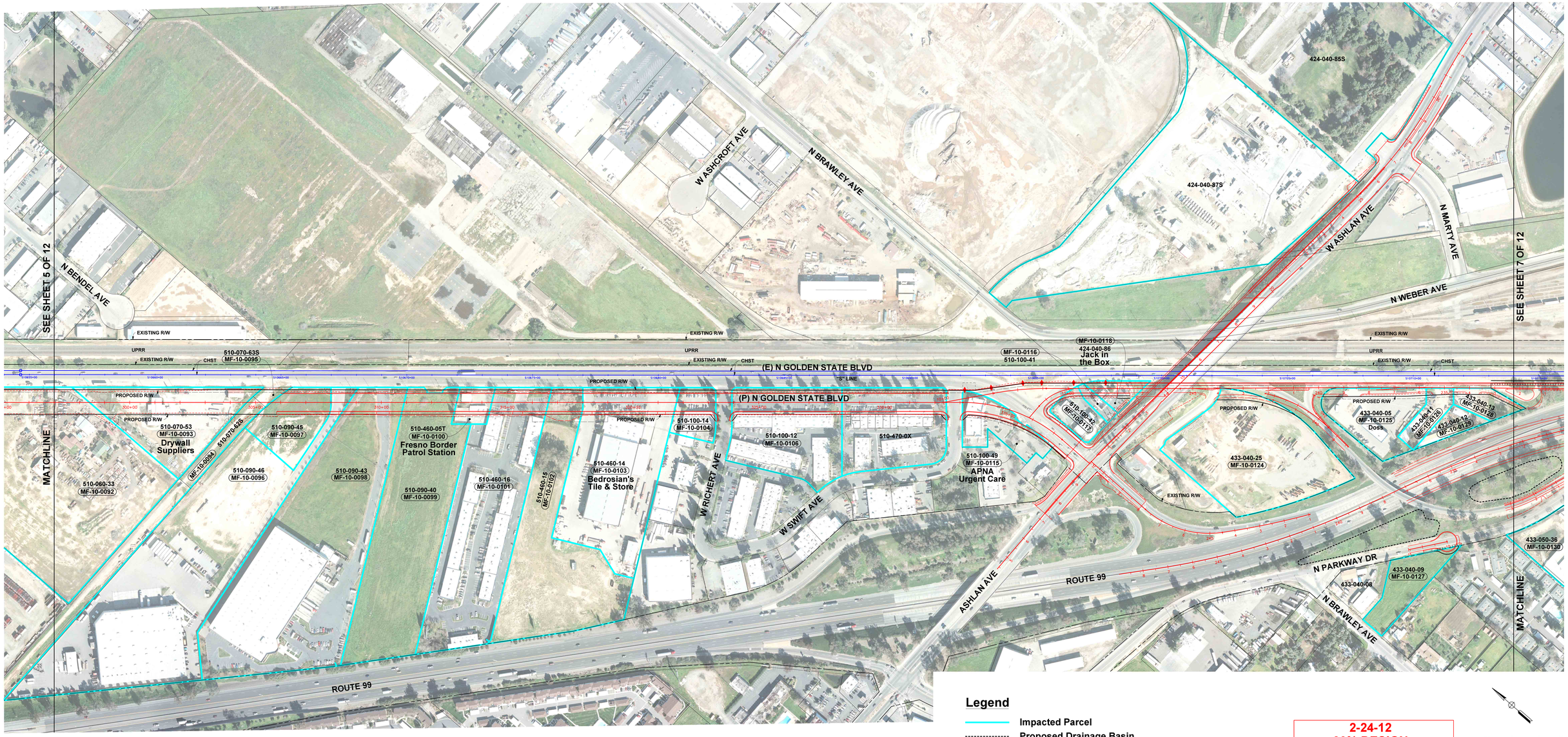

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6 OF 12

FEBRUARY 2012

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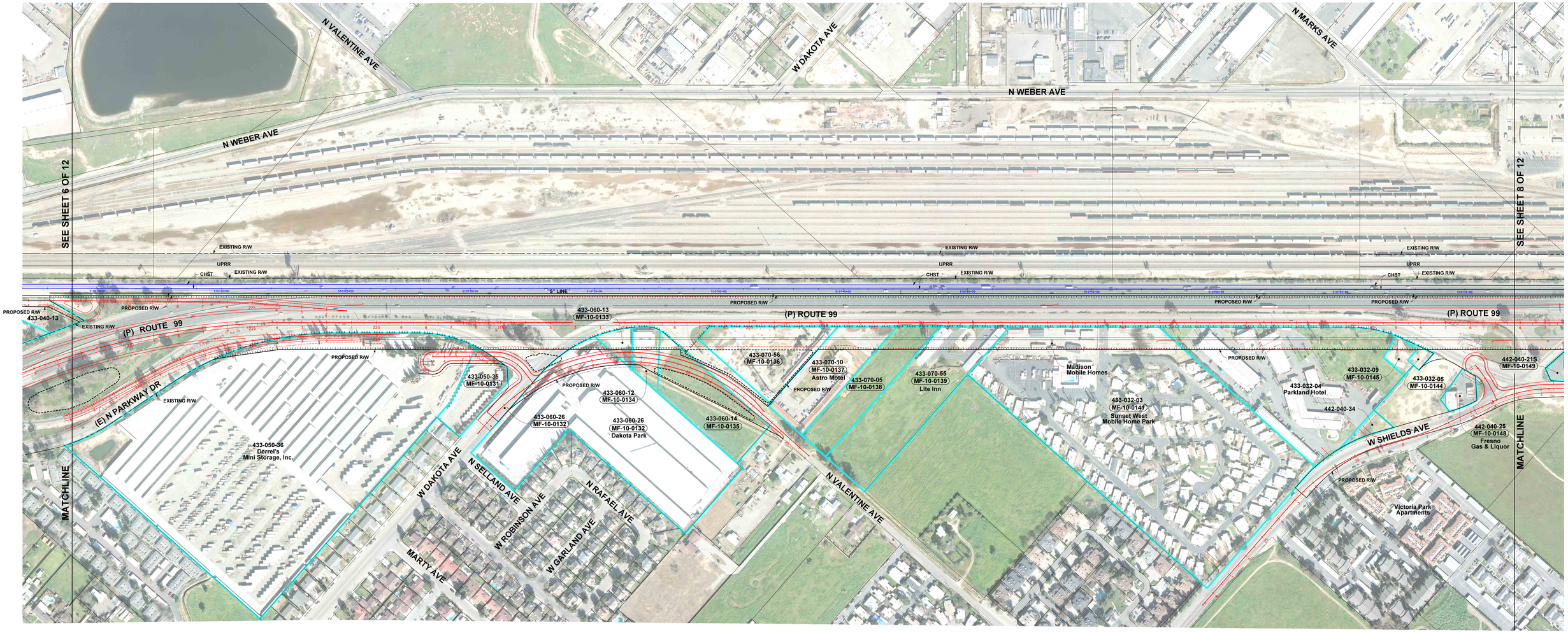

Legend

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SIERRA SUBDIVISION - PACKAGE 1A & 1B

RIGHT-OF-WAY EXHIBIT

7 OF 12

FEBRUARY 2012

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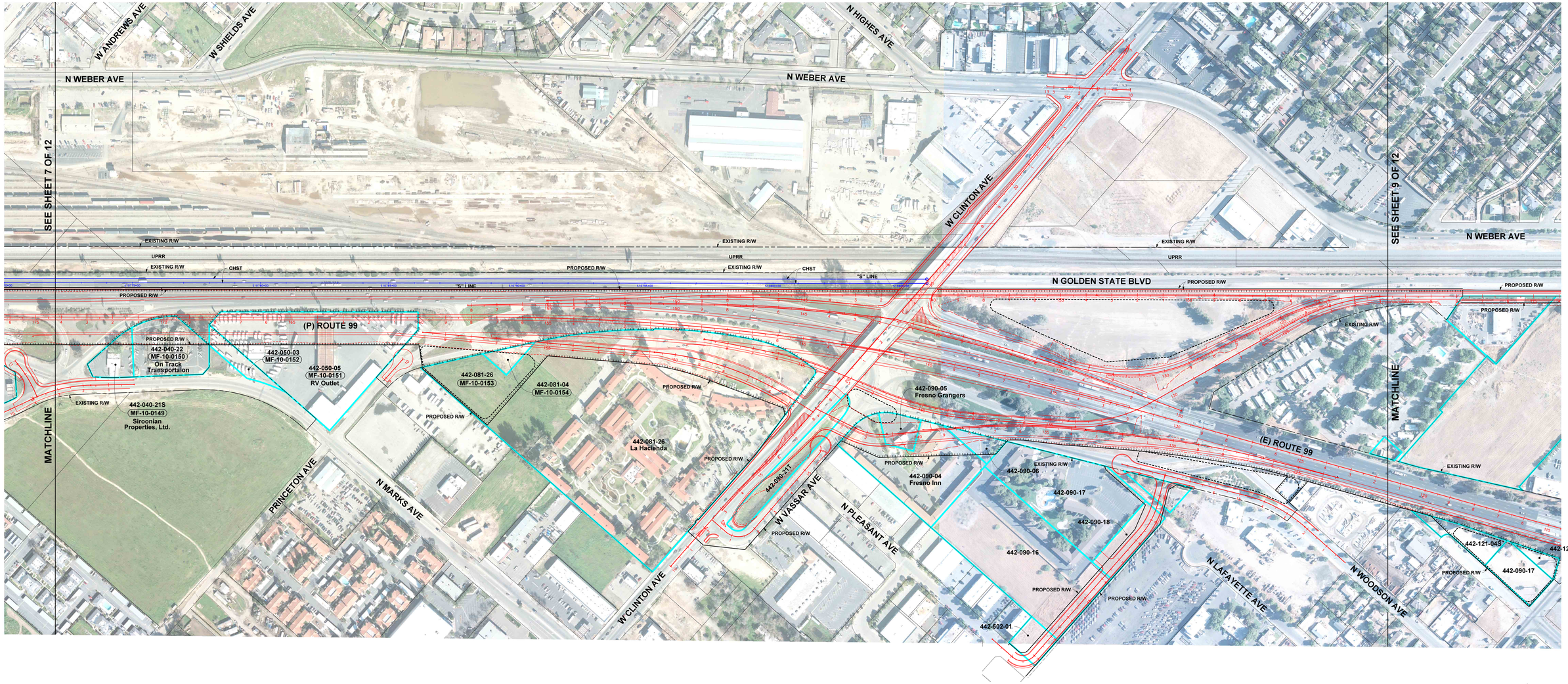

Legend

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Sacramento, CA 95811

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

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SIERRA SUBDIVISION - PACKAGE 1A & 1B

RIGHT-OF-WAY EXHIBIT

8 OF 12

FEBRUARY 2012

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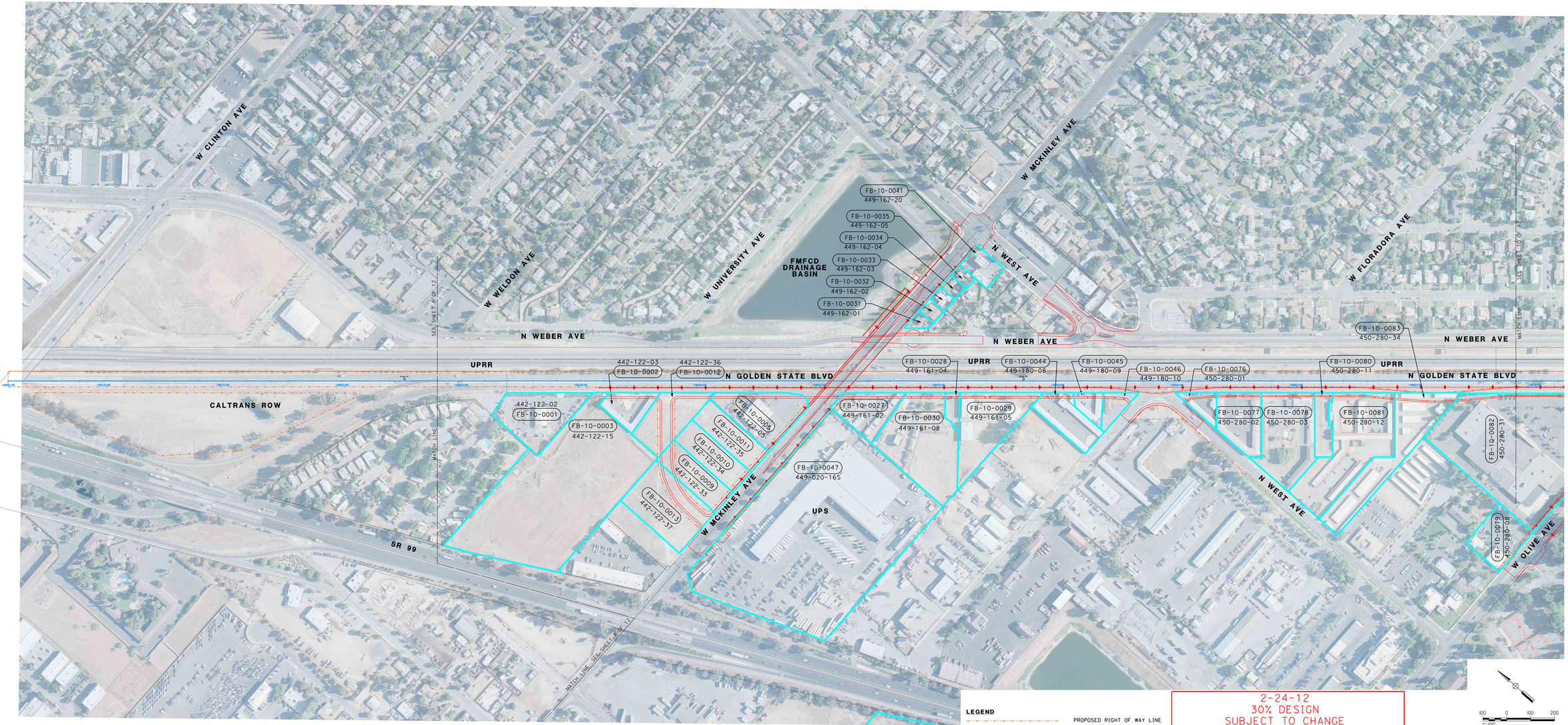

LEGEND

- PROPOSED RIGHT OF WAY LINE
- EXIST PROPERTY LINE
- EST EXIST PROPERTY LINE- FOR SCHEMATIC PURPOSES ONLY
- IMPACTED PARCEL
- PROPOSED HST ALIGNMENT
- PROPOSED IMPROVEMENTS

2-24-12
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CALIFORNIA HIGH-SPEED RAIL AUTHORITY

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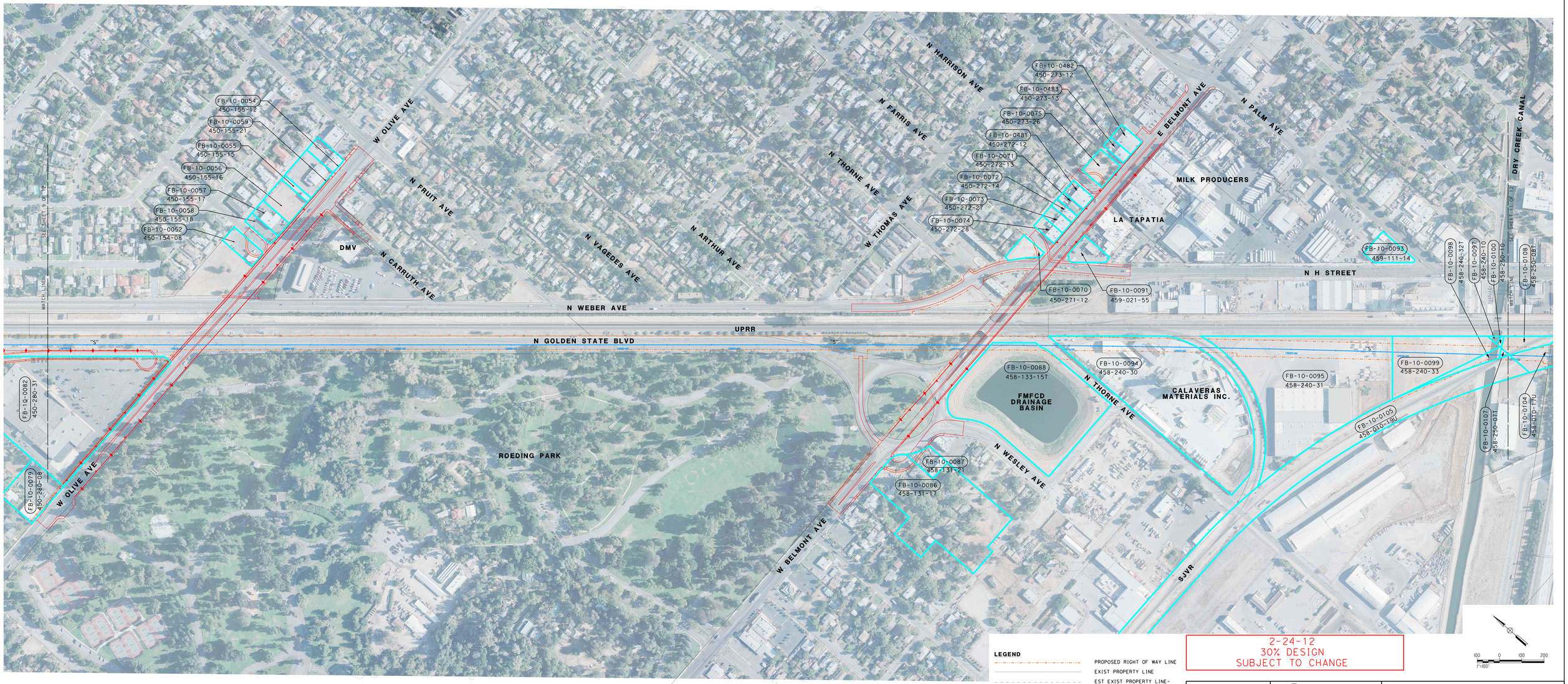
SIERRA SUBDIVISION - PACKAGE 1A & 1B
RIGHT-OF-WAY EXHIBT
SHEET 9 OF 12
FEBRUARY 2012



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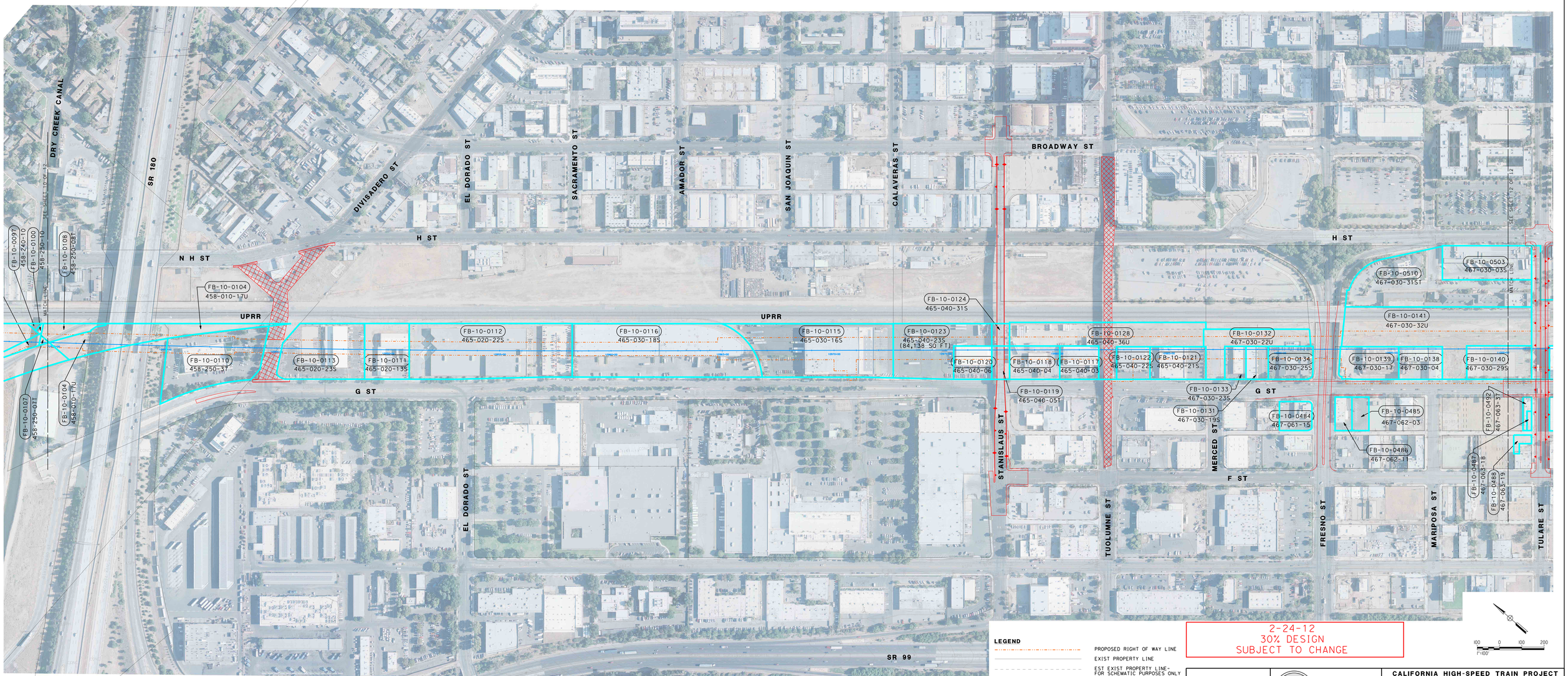
CALIFORNIA HIGH-SPEED TRAIN PROJECT
SIERRA SUBDIVISION - PACKAGE 1A & 1B
RIGHT-OF-WAY EXHIBT
SHEET 10 OF 12
FEBRUARY 2012



LEGEND

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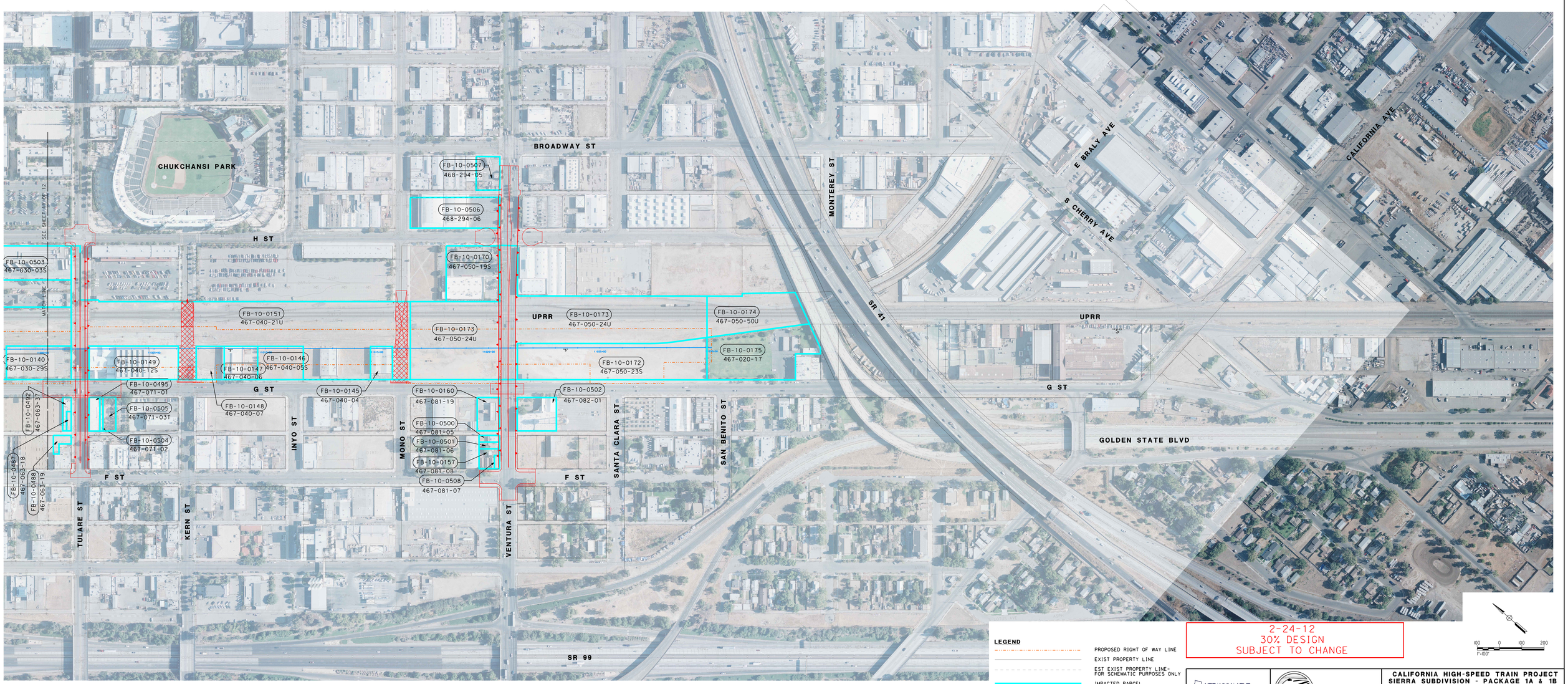
URS | HMM | ARUP
CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
SIERRA SUBDIVISION - PACKAGE 1A & 1B
RIGHT-OF-WAY EXHIBIT
SHEET 11 OF 12
FEBRUARY 2012



LEGEND

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- EXIST PROPERTY LINE
- EST EXIST PROPERTY LINE- FOR SCHEMATIC PURPOSES ONLY
- IMPACTED PARCEL
- PROPOSED HST ALIGNMENT
- PROPOSED IMPROVEMENTS

2-24-12
30% DESIGN
SUBJECT TO CHANGE

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URS | HMM | ARUP
CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
SIERRA SUBDIVISION - PACKAGE 1A & 1B
RIGHT-OF-WAY EXHIBT
SHEET 12 OF 12
FEBRUARY 2012