Prepared for

San Diego Gas & Electric Company
8316 Century Park Court, CP52G
San Diego, California 92123

GEOTECHNICAL INVESTIGATION

SUNRISE POWERLINK PROJECT

230 kV UNDERGROUND

ALPINE, CALIFORNIA

Prepared by

Geosyntec consultants

engineers | scientists | innovators

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Ms. Molly Frisbie
San Diego Gas & Electric Company
8316 Century Park Court, CP-52G
San Diego, California 92123

Subject: **Final Geotechnical Investigation**
230 kV Underground
Sunrise Powerlink Project
Alpine, California

Dear Ms. Frisbie:

Geosyntec Consultants (Geosyntec) is pleased to provide the San Diego Gas & Electric Company (SDG&E) the accompanying final geotechnical investigation for the proposed 230 kV underground portion of the Sunrise Powerlink Project in Alpine, California. This report presents our conclusions and recommendations pertaining to the project as well as the results of the field exploration program and laboratory testing.

We appreciate the opportunity to provide geotechnical consulting services to SDG&E on this important project. If you have any questions or require additional information, please contact the undersigned at (858) 674-6559

Sincerely,

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1. INTRODUCTION

1.1 Terms of Reference

This report presents the results of the geotechnical investigation for the San Diego Gas & Electric Company (SDG&E) proposed underground portion of the Sunrise Powerlink (SRPL) Project in the Alpine area of San Diego County, California (Site). This report was prepared by Messrs. Alexander Greene, C.E.G., and Steve Fitzwilliam, G.E. and has been reviewed by Mr. Ron Johnson, G.E., of Geosyntec Consultants (Geosyntec), in accordance with the peer review policies of the firm.

1.2 Project Description

We understand that SDG&E is proposing an approximately 6 mile, twin circuit 230 kV transmission line, to be placed underground in the Alpine area of San Diego County, California (Figure 1). The project entails construction of 40 vault structures, 2 sets of cable riser poles, an approximately 225 foot long trenchless (tunnel) segment beneath Interstate 8 (I-8), and the excavation of two utility trenches along the approximate 6 mile alignment. The eastern end of the underground alignment begins approximately 0.5 miles south of Alpine Blvd along the west side of Star Valley Road. From the eastern cable pole location, which marks the beginning of the underground segment, the route extends to the north across private property and curves to the west at Alpine Boulevard. The majority of the proposed underground segment extends along the major thoroughfare of Alpine Boulevard, sub-parallel to and south of I-8, from Star Valley Road to just west of Peutz Valley Road. West of Peutz Valley Road the proposed route turns to the north, crosses beneath I-8, and extends approximately 0.2 miles northeast before connecting with a proposed overhead transmission line at the western cable pole location. The proposed underground transmission line alignment is shown on Figure 2.

1.3 Purpose and Scope of Services

The purpose of our geotechnical investigation was to provide geotechnical engineering recommendations for the design and construction of the proposed underground segment of the transmission line through the Alpine area. The scope of the investigation was outlined in our proposal dated 18 February 2008, but due to County of San Diego restrictions pothole explorations were not completed at four of the vault pair structures (MH-14 through 17).

This geotechnical engineering report presents our findings, conclusions, and engineering recommendations for excavation and foundation design and includes seismic design parameters in accordance with the 2007 California Building Code [CBC, 2007] for the proposed project. Additionally, the report describes the anticipated subsurface conditions, geology, and a geological engineering evaluation of the potential geologic hazards. This report also provides discussions and recommendations regarding the following:

- Surface and subsurface conditions of the site;
- Earthwork and on-site grading;
- Rippability assessment for excavation of construction trenches;
- Appropriate foundation systems for the proposed cable poles;
- Earth pressures for retaining walls;
- Allowable foundation bearing pressures for shallow foundations and mat foundations;
- Soil parameters for design of foundation in accordance with the EPRI program MFAD; and
- Flexible pavements.

2. FIELD INVESTIGATION AND LABORATORY TESTING

The field and laboratory exploration program consisting of a site reconnaissance, geologic mapping, geophysical seismic refraction surveys, exploratory borings, potholing explorations, and a geotechnical laboratory testing. A summary of field explorations is presented in Table 1. Exploratory borings were advanced by Tri-County Drilling of San Diego, California and pothole explorations were performed by Underground Solutions Incorporated of San Diego, California. The geotechnical laboratory testing of soil samples was performed by G Force of San Diego, California and testing of rock core samples was performed by Sierra Testing Laboratories of El Dorado Hills, California. Samples collected for thermal resistivity testing were sent to the Geotherm USA laboratory in Dublin, California.

2.1 Pre-Field Activities

Prior to conducting field explorations, a site-specific health and safety plan (HASP) was prepared to protect Geosyntec personnel in accordance with Geosyntec and Occupational Safety and Health Administration (OSHA) requirements. Underground Service Alert (USA) was contacted to identify subsurface utilities at each of the areas to be investigated. Due to the high density of underground utilities along portions of Alpine Blvd., Geosyntec participated in several on-site meetings with utility locators to revise exploration locations as a result of potential conflicts with existing buried utilities. Additionally, six of the boring locations were potholed (excavated) via vacuum methods to confirm the locations of existing utilities prior to conducting field explorations. Per County of San Diego regulations, traffic control and excavation permits were obtained prior to the start of work for the locations of field explorations performed within the street right-of-way. Due to the rural location of the explorations, a boring permit waiver for obtained from the County of San Diego, Department of Environmental Health. In addition to the San Diego County permits, a Caltrans right-of-way permit was obtained for boring explorations along the proposed I-8 crossing.

2.2 Site Reconnaissance and Geologic Mapping

Site reconnaissance and geologic mapping was performed along the proposed alignment by a Certified Engineering Geologist (C.E.G.). The reconnaissance and mapping task consisted of mapping surficial exposures along the proposed alignment and utilization of aerial photography to determine areas of resistant bedrock for siting of geophysical surveys. Results from the surficial geologic mapping were used in combination with geophysical surveys and boring explorations to characterize the subsurface along the proposed alignment. These geologic profiles are presented in Appendix A as Figures A-1 through A-28.

2.3 Seismic Refraction Surveys

Seventeen seismic refraction traverses were completed along the proposed alignment between 19 January and 28 April 2009. The seismic refraction surveys were performed using a Geometrics Smartseis 12-channel seismograph with 10-foot spacing between geophones along a 110-foot long spread. The surveys were primarily sited to assess stretches of the alignment where resistant rock might preclude conventional methods of excavation. The seismic refraction technique is based on the measurement of the time required for a shockwave to travel from a sourcepoint (shotpoint) to one or more co-linear sensors (geo-phones). The seismic source consisted of multiple sledgehammer blows to a steel groundplate. Shotpoints were nominally placed at points near the center of each line, at each end, and at offsets ranging from 25 to 50-feet beyond each end of the spread. The primary constraint on data quality was either wind or traffic noise. The data collected from the surveys was used to assess the excavation characteristics of the subsurface materials.

The seismic travel times were plotted on time-distance graphs and interpreted using time-term methods (the generalized reciprocal method). The resulting velocity profiles represent the rock and soil depths, and velocities that would account for the measured travel times. Basic assumptions inherent in this geophysical method include the expectation that velocity increases downward, that layers are relatively continuous and thick enough to be individually resolved, and that significant velocity differences are present between the layers of interest. The generally accepted value for depth accuracy is 20 percent. A summary of the geophysical data is presented in Table 2 and locations of the seismic refraction surveys and interpretive profiles are presented in Appendix A on Figures A-1, A-5 through A-7, A-11, A-14, A-19, A-21, A-23, A-24, A-26, and A-27. The individual travel-time plots presenting the first arrivals and velocities at each of the shot point locations are included in Appendix B.

2.4 Exploratory Borings

2.4.1 Vault Exploratory Borings

Twenty exploratory borings (B-1 through B-20), were advanced for the proposed vault locations between 7 October 2008 and 14 May 2009. The borings were advanced using a truck-mounted CME-75 drill rig equipped with 8-inch diameter hollow-stem augers and a Dietrich 120 all terrain drill rig equipped with 10-inch diameter hollow-stem augers. The borings were advanced to depths ranging between 12 and 22 feet below ground surface (bgs). Equipment on the CME drill rig was converted for HQ rock coring when crystalline rock was encountered. One boring (B-10) required the utilization of HQ rock coring techniques from 11 to 18.3 feet bgs due to auger refusal on crystalline rock. The approximate locations of the borings are shown on the Site Plan (Figure 2) and on the geologic profiles in Appendix A. A summary of field explorations is presented in Table 1.

2.4.2 Interstate 8 Crossing Exploratory Borings

Three exploratory borings (I8-1 through I8-3) were advanced within the Caltrans right-of-way for the proposed trenchless crossing beneath I-8 between 1 and 2 December 2008. The borings were drilled using a truck-mounted CME-75 drill rig equipped with 8-inch diameter hollow-stem augers. The borings were advanced to depths ranging from approximately 26.5 to 35.5 feet bgs. The first several attempts to advance the I8-2 exploration met shallow refusal on oversize rock fragments in the fill prior to obtaining the total depth of 35.5 feet bgs. The approximate locations of the borings are shown on the Site Plan (Figure 2) and on the geologic profiles in Appendix A.

2.4.3 Cable Riser Pole Exploratory Borings

Two exploratory borings (CP-1 and CP-2) were advanced at the respective western and eastern cable riser pole locations between5 March and 15 May 2009. The borings were drilled using a Dietrich 120 all-terrain drill rig equipped with 10-inch diameter hollow-stem augers and were advanced to respective depths of 49 and 53 feet, bgs. Equipment on the Dietrich ATV drill rig was converted for HQ coring techniques when sampling in crystalline rock resulted in no recovery. HQ rock coring techniques were utilized from depths of 14.5 to 49 feet bgs on the western cable pole location and from 10 to 53 feet bgs on the eastern cable pole location. The approximate locations of the borings are shown on the Site Plan (Figure 2) and on the geologic profiles in Appendix A.

2.4.4 Exploratory Borings Sampling and Logging

At each of the exploratory borings, soil samples were collected using a Standard Penetration Test or a 3-inch diameter, split-spoon California sampler using an automatic hammer (140-pound hammer falling approximately 30 inches). Bulk samples of the soil cuttings were also collected in buckets from exploratory borings at eight locations at the site. The soil samples from the borings were transported to either the geotechnical or thermal testing laboratory for further laboratory testing and classification. Rock core samples recovered from the CP-1, CP-2, I8-1, and B-10 explorations were retrieved using a wireline core barrel. Core samples were logged in the field, placed in a core box at the time of drilling, and select samples of core were transported to a geotechnical laboratory for laboratory testing. The remainder of the core was retained at the San Diego North Geosyntec office.

Descriptions and visual classifications of the subsurface materials were logged by a geologist from our firm and subsurface descriptions were based on the recovered soil samples, soil cuttings, and rock core. The subsurface descriptions were developed in general accordance with American Society for Testing and Materials (ASTM) standard D2488 [ASTM, 2005]. A key to logs along with the individual boring logs are presented as Appendix C in this report. Sampling information, and other pertinent field data and observations are included on the boring logs.

2.5 Pothole Explorations

A total of 227 pothole explorations were performed between 29 September 2008 and 13 April 2009 along Alpine Blvd using a *VACMASTER 4000* vacuum truck. 142 of the pothole explorations were sited to confirm the presence of utilities at priority crossings. The priority utility locations were performed to assist with the spatial layout of the alignment and associated vaults at the project design level. One pothole was performed along the western side of a drainage crossing just west of the MH-11 vault to confirm the depth of crystalline bedrock. The remaining 84 potholes were sited at the individual vault locations between MH-2 through MH-13, MH-18, and MH-19. The MH-14 through MH-17 vault locations were not potholed due to County restrictions. The MH-1 and MH-20 vault locations were not potholed due to their remote location and lack of nearby utilities. At the 28 evaluated vault locations on the right and left circuits, three potholes were advanced in a diagonal alignment to "clear" the proposed vault excavation of unknown utilities. These explorations were advanced until refusal was encountered on weathered bedrock or the proposed excavation depth of the evaluated structure was obtained. Results from the potholing explorations were summarized in 5 separate reports by Underground Solutions dated 11 November and 16 December 2008 and 6 January, 6 April and 15 2009. These data reports are not included within this geotechnical report, but were transmitted separately to Black & Veatch and SDG&E.

2.6 Field Temperature Testing

Nineteen insitu field temperature tests were performed at 15 of the exploration locations (CP-1, B-1 through B-4, B-6, B-8, B-10, B-12, B-16 through B-18, and I8-1 through I8-3). At each location, the temperature testing was recorded within soil or completely weathered rock at approximate depths of 5, 10, or 15 feet bgs. A summary of testing results is presented in Table 3. The testing procedure generally consisted of advancing the hollow stem auger to the desired test depth, and prior to insertion of the temperature probe the augers were removed from the boring (to reduce additional heat transfer). The temperature probe, consisted of a PVC pipe with a soil thermometer (containing a 12-inch probe with 2-degree Farenheit increments) installed at one end. The device was placed down the open borehole and the thermometer was embedded into the bottom of the boring approximately 6 to 12 inches. The probe was left in place approximately 30 minutes, during which time the temperature was monitored approximately every 5 minutes and allowed to stabilize. At the end of the 30 minute period, the temperature was recorded and the probe was removed from the boring.

2.7 Laboratory Testing

2.7.1 Geotechnical Testing

Soil and rock core samples retrieved from the test borings were tested to verify field classifications and evaluate the physical and engineering properties of the subsurface materials. The laboratory tests were performed in general accordance with the testing procedures of ASTM or other generally accepted test methods. Laboratory testing included:

Laboratory Tests	ASTM Designation
Moisture Content/Dry Density	D2216 / D2937
Grain Size Analysis	D422
Laboratory Compaction	D1557
Corrosivity	Cal 643
R-value	D2844 / Cal 301
Unconfined Compression (Soil)	D2166
Unconfined Compression (Rock)	D4832 / D1633 / D2938

Corrosion tests for chloride and sulfate concentrations, resistivity, and pH were also performed on selected samples. The results of the laboratory testing program are presented in Appendix D and summarized in Table 4.

2.7.2 Thermal Resistivity Testing

Thermal analysis of the subsurface materials was performed on samples from 14 of the boring explorations (B-2, B-3, B-4, B-6, B-8, B-10, B-12, B-14, B16, B-17, B18, B-20, I8-2, and I8-3). Thirteen soil samples from the test borings were sent to the Geotherm Laboratory (the thermal testing laboratory subcontractor) and 11 soil samples were tested by Geosyntec in the field using a KD2 Pro Thermal Properties Analyzer. The samples were tested to record the thermal resistivity at various moisture contents in compliance with IEEE 442 specifications. The results of Geosyntec's thermal resistivity testing are summarized in Table 5, and data plots for the various samples are included in Appendix E. Results from the Geotherm laboratory testing along with the corresponding thermal dryout curves are also included in Appendix E.

3. SITE AND SUBSURFACE CONDITIONS

Our knowledge of the site conditions has been developed from a review of geologic literature, professional experience, and field and laboratory investigations performed for this study.

3.1 Geologic and Seismic Setting

The proposed underground portion of the SRPL extends across a portion of the western Peninsular Ranges physiographic province. Within the general site area the Peninsular Ranges is comprised of igneous and metamorphic rock collectively referred to as the Peninsular Range Batholith (PRB). The PRB is made up of bodies of early Cretaceous-age igneous rocks know as plutons, which formed beneath the surface of the earth from cooled magma. Subsequent uplift and erosion has exposed the crystalline granitic rocks which underlie the entire alignment (Figure 3). Previous regional geologic mapping within the western PRB has identified two distinct igneous bodies identified as the Las Bancas and Alpine plutons within the immediate site area, both of which are classified as tonalite [Todd, 2004].

The Peninsular Ranges is known to be seismically active and has experienced historic seismic shaking as a result of activity on both nearby and distant faults. The PRB is dominated by the regional northwest-southeast structure of the San Andreas transform zone which marks the tectonic plate boundary between the North American plate to the east and the Pacific plate to the west. Within the immediate site area, the seismic expression is controlled by the Elsinore and Rose Canyon fault zones situated at respective distances of 18.7 miles (30 km) east and 21.8 miles (35 km) west of the alignment. A regional fault and epicenter map is presented on Figure 4.

3.2 Surface Conditions

The majority of the proposed underground portion of the SRPL project generally extends along the existing asphalt paved roadway of Alpine Boulevard from Star Valley Road to west of Peutz Valley Road in the Alpine area of San Diego County. Subsurface explorations performed along Alpine Blvd indicate that much of the existing roadway is underlain by a remnant concrete surface associated with the Old Highway 80. The eastern end of the alignment extends across a short stretch of undeveloped private property and down a private degraded asphalt drive before intersecting Alpine Blvd. At the western end of the alignment the route deviates from Alpine Blvd., crosses beneath

I-8, and extends to the northeast down an undeveloped ridgeline above the El Capitan reservoir. Along the proposed route, the proposed alignment is bounded by open space and both residential and commercial properties. The ground surface along the proposed route generally slopes downward to the west and varies from a maximum elevation of approximately +2326 feet, Mean Sea Level (MSL) to +1170 feet, MSL.

3.3 Subsurface Conditions

The subsurface explorations performed along Alpine Blvd. encountered fill and residual soils, and tonalitic crystalline bedrock at depth. Within the limits of our explorations the fill soils ranged up to a maximum of 16.5 feet thick and generally consisted of fine to coarse sand with trace gravels and varying silt and clay content. Residual soils were typically encountered beneath the fill soils or at the ground surface and ranged up to a maximum of 6.5 feet thick. Within the limits of our explorations, the residual soils generally consisted of loose to dense, silty fine sand with gravel, to medium to very stiff, fine sandy silt and clay.

Variably weathered tonalite rock associated with the Las Bancas and Alpine plutons underlies the entire alignment at depth (Figure 3). Within the western PRB the tonalite exhibits a distinctive morphology, typically characterized by relatively low, rolling terrain with scattered dark gray outcrops and grayish soils (Walawender, 2000). A geologic reconnaissance of road cuts along the western portion of the alignment noted the presence of a localized weathering phenomenon known as “core stones” in the exposed crystalline bedrock. The core stones occur as resistant spheroidal boulders in a more weathered matrix and are highly variable in size ranging up to multiple feet in diameter.

Within the limits of our explorations, granitic rock was encountered between 2.5 and greater than 21.5 feet bgs. Typically, the weathered granitic rock was found within the upper 5 feet bgs. The weathering and strength profile of the crystalline rock generally ranged from completely to slightly weathered and extremely weak to very strong rock. Resistant granitic rock, which resulted in auger refusal, was only encountered in the CP-1, CP-2, B-7 and B-10 explorations at respective depths of 14.75, 10.0, 12.25 and 11.0 feet bgs.

3.4 Groundwater

Groundwater was encountered in exploration B-11 at a depth of 4.25 feet bgs and as a minor seep in exploration B-8 at a depth of approximately 15 feet bgs. Pothole explorations performed at the MH-11L location and along the western margin of the proposed drainage crossing just west of MH-11 also encountered groundwater at respective depths of approximately 7 and 8 feet bgs. It is anticipated that perched groundwater may be encountered along the soil-bedrock interface as a result of seasonal conditions.

4. SEISMIC AND GEOLOGIC HAZARDS

4.1 Seismic Hazards

4.1.1 Fault Ground Rupture

Fault rupture is not considered to be a constraint to the underground portion of the SRPL studied within this investigation. The potential for fault surface rupture is generally considered to be significant along "active" faults (defined as exhibiting surface rupture within the past 11,000 years) and to a lesser degree along "potentially active" faults (surface rupture within the past 1.6 million years). A review of published geologic maps did not identify the presence of any active or potentially active faults crossing on or projecting near the project site. The nearest mapped active fault traces are approximately 18.7 miles (30 km) to the northeast of the project area within the Elsinore fault zone, and 21.8 miles (35 km) to the west-southwest within the Rose Canyon fault zone [Jennings, 1994]. Therefore it is our opinion that the potential for fault related surface rupture along the proposed project alignment is low.

4.1.2 Strong Ground Shaking

The project site is situated within a seismically-active region and will likely experience moderate to severe ground shaking in response to a large magnitude earthquake occurring on a local or more distant active fault during the expected lifespan for the proposed project. As a result, seismically-induced ground shaking in response to an earthquake occurring on a nearby active fault, such as the Elsinore or Rose Canyon fault zones is considered to be the major geologic hazard affecting the project. Other active faults in the vicinity include the Coronado Bank fault zone to the west and the San Jacinto fault zone to the east. These fault zones and their respective distance from the site and design Maximum Moment Magnitudes are presented below.

Fault Name	**Distance and Direction from Site(1)**	**Maximum Moment Magnitude(2)**
Elsinore	18.7 miles (30 km) to northeast	7.1
Rose Canyon	21.8 miles (35 km) to southwest	6.9
Coronado Bank	34.8 miles (56 km) to southwest	7.4
San Jacinto	38.5 miles (62 km) to northeast	6.8

(1) Distances from site noted are the closest distance to the surface trace or inferred projection of the fault as measured from the California Division of Mines and Geology (1998).

(2) Maximum moment magnitude values reported by California Division of Mines and Geology [CDMG, 1998].

Specific seismic design recommendations are presented in the Design Recommendations section of this report. The location of regional faults and historic earthquake epicenters are shown on Figure 4.

USGS's National Seismic Hazards Mapping Program (USGS, 1996) performed a probabilistic seismic hazard assessment (PSHA) which included the continental United States. The USGS PSHA established ground motion parameters for soft rock/stiff soil conditions (NEHRP Site Class B-C; an average shear wave velocity in the top 100 feet of 2,500 feet per second) which are subject to modification (based on amplification effects) for hard rock and soft soil sites. Based on this mapping, the equivalent soft rock/stiff soil PGA at the site corresponding to a probability of exceedence of 10-percent in 50-years (a recurrence interval of 475-years) is about 0.19g. The equivalent soft rock/stiff soil PGA corresponding to a probability of exceedence of 2-percent in 50 years (a recurrence interval of 2,475 years) is about 0.35g.

4.1.3 Soil Liquefaction

Seismically-induced soil liquefaction can be described as a significant loss of strength and stiffness due to cyclic pore water pressure generation from seismic shaking or other large cyclic loading. The material types considered most susceptible to liquefaction are granular soils and low-plasticity fine grained soils which are saturated and loose to medium dense. Manifestations of soil liquefaction can include the loss of bearing capacity below foundations, surface settlements and tilting in level ground, and instabilities in areas of sloping ground. Soil liquefaction can also result in increased lateral and uplift pressures on buried structures. Lightweight or unrestrained buried structures may float upward to the ground surface during a liquefaction event.

Due to the relatively dense nature of the compacted fill, residual soil, and crystalline bedrock underlying the alignment and on the lack of permanent groundwater within the depths of recent borings (49 feet below the ground surface), the probability of soil liquefaction at the project site is very low.

4.1.4 Secondary Effects of Seismic Activity

The secondary effects of seismic activity resulting from ground shaking include liquefaction-induced settlement, lateral spreading, tsunamis and seiches. The probability of occurrence of each depends on the severity of earthquake, distance from the epicenter, faulting mechanism, topography, soil and groundwater conditions, and other factors.

Due to the very low potential for soil liquefaction, the potential for damage due to seismic settlement and lateral spreading is also considered very low.

Tsunamis are seismically-induced waves generated by sudden movements of the ocean bottom during submarine earthquakes, landslides, or volcanic activity. Seiches are similarly generated, but are waves in lakes or reservoirs. Based on the inland location, site elevation, and the location and lower elevation of the nearest large lake (El Capitan Reservoir), the potential for damage due to a tsunami or seiche is considered very low and does not constitute a significant developmental hazard for the underground portion of the project.

4.2 Geologic Hazards

4.2.1 Landslides and Slope Stability

In general, the crystalline bedrock along the alignment is not considered landslide prone and previous and current mapping efforts have not identified landslides along any portion of the proposed underground alignment. As a result landslides are not considered to constitute a significant developmental hazard for the underground portion of the project.

4.2.2 Expansive Soil

The results of laboratory testing performed by Geosyntec as part of this investigation, as well as our site reconnaissance, indicate that the near-surface soil is not considered expansive in accordance with California Building Code Section 1802A.3.2 [CBC, 2007].

4.2.3 Collapsible Soil

Collapsible soils are not present in significant quantities along the proposed alignment and do not constitute a significant hazard during project construction

4.2.4 Other Geologic Hazards

Other geologic hazards, including volcanic activity, are not considered to be a significant hazard given the geologic setting of the site.

5. DESIGN RECOMMENDATIONS

The recommendations presented in this report are intended for the proposed underground portion of the SRPL Project in the Alpine area of San Diego County, California. Further, the recommendations presented are based on our understanding of the proposed project, site reconnaissance, field explorations, and laboratory testing performed for this investigation, and the reviewed reference documents. In our opinion, the site is suitable for the construction of the proposed project.

5.1 Soil Characteristics

Results of the current investigation indicate that the near-surface fill and natural deposits consist primarily of silty fine sand, poorly graded sand, and sandy gravel. A majority of the soils exposed along the alignment and encountered in the subsurface explorations performed for this project may be classified as having a low expansion potential.

The near-surface fill and weathered bedrock materials may be excavated with moderate to high effort using conventional heavy-duty excavating and grading equipment, such as a Caterpillar D-8 dozer, Caterpillar 245 excavator, or equivalent. Further discussion on excavatability of the subsurface soils is included in Section 6.2. The sandy soils are generally suitable for re-use as fill when recompacted. Although not anticipated, highly expansive clay soils, if encountered, should not be placed within the upper 36 inches of the subgrade for foundations or pavements. These soils should be compacted at depths in excess of 36 inches or exported from the site.

5.2 Trenchless Technology

A trenchless crossing is proposed where the underground alignment crosses under I-8 just west of Peutz Valley Road. We understand that an approximately 63-inch diameter reinforced concrete or HOBAS pipe is proposed for the I-8 crossing at approximately Station 22+23 to Station 20+13. Due to traffic considerations and California Department of Transportation (Caltrans) constraints along the I-8, trenchless construction techniques are planned for this crossing.

5.2.1 Trenchless Construction Methods

Several trenchless construction techniques may be appropriate for the trenchless pipeline segment for the approximately 210-foot trenchless crossing under I-8 including: auger boring, pipe jacking (jack & bore), microtunneling, and horizontal directional drilling (HDD).

5.2.1.1 Auger Boring

Auger boring is a trenchless method for installing a steel casing from a jacking pit to a receiving shaft by directly advancing a steel casing into the subsurface. HOBAS pipe and reinforced concrete pipe may also be used as casing or may be directly jacked as the final product pipe. With auger boring, soil and rock are excavated using continuous flight augers within the casing which transport the soil and rock cuttings (muck) through the casing back to the jacking pit for removal. Excavation at the face is performed using a cutting head attached to the augers. In general, auger boring is not considered a “steerable” trenchless method and pipeline segments between the jacking and receiving pits are straight. However rudimentary steering capability is possible with specialized equipment.

For this project the auger and cutting head should not be advanced beyond the leading edge of the casing unless cemented soil conditions or stable rock are encountered. If obstructions are encountered, the augers can be removed to allow manned access to the face for obstruction removal by manual methods such as jackhammering or drilling and splitting.

5.2.1.2 Pipe Jacking

Pipe jacking is an alternative trenchless method which typically involves hydraulically-jacking a steel or equivalent jackable pipe, such as reinforced concrete or HOBAS, from a jacking pit to a receiving shaft through the subsurface. Unlike auger boring, a steerable jacking shield at the leading edge of the pipe being jacked is typically used to excavate the face.

Excavation of the soil and rock at the leading edge of the jacking shield can be conducted manually with hand-held tools or mechanically with wheel-type or hydraulic excavators at the face. Open face shields are those without a system for pressure regulation at the face in order to prevent uncontrolled ground and groundwater inflow into the face, and wherein the excavation face is readily accessible by the workers. Open face shields are typically used in soil types with good stand-up time, or in soils that have been dewatered or otherwise prestabilized by ground improvement methods, such as grouting.

For open face shields used on pipe jacking projects, removal of excavated muck is typically done using small carts winched between the jacking shaft and the face. The process requires personnel entry into the pipe being jacked to operate excavation equipment. If obstructions are encountered, jackhammering or other hand-mining methods may be used to excavate the obstructions, cemented zones, or concretions.

5.2.1.3 Microtunneling

Microtunneling is a trenchless construction technique that uses a remotely controlled microtunnel boring machine at the face of the excavation combined with pipe jacking techniques to directly install a product pipe. In the United States, microtunneling generally refers to a tunneling techniques where personnel to not routinely enter the excavation to access the face of the microtunnel boring machine. Microtunnel excavations in the United States are commonly installed from 12 inches to 12 feet in diameter. Microtunneling directly installs the product pipe, which may consist of reinforced concrete pipe, steel pipe, HOBAS pipe, or other jackable pipe materials. Microtunneling is a steerable method, but is generally used for straight pipe alignments. If obstructions are encountered, the obstruction cannot generally be accessed from the excavation, but rather rescue shafts must be excavated. The pipeline alignment does not usually need to be dewatered except at the jacking and receiving pits.

5.2.1.4 Horizontal Directional Drilling

Horizontal directional drilling (HDD) is a steerable trenchless construction technique for installing a product pipe or casing using a hydraulically powered rotational drill rig. HDD is a three pass method consisting of first, drilling the pilot hole a predetermined alignment using a steerable cutting head that is controlled by rotation and pressure. Next, the hole is reamed to the desired final diameter (generally 1.5 times the diameter of the product pipe or the casing for pipe diameters of approximately 3 feet and 1.3 to 1.5 times the product pipe diameter for pipe diameters larger than 3 feet). And finally, pulling the product pipe or casing is pulled into the hole. The drill hole is supported by drilling mud during the process. HDD pipe usually consist of high-density polyethylene (HDPE), steel, or ductile iron pipe.

5.2.2 Anticipated Ground Conditions

Ground conditions along the proposed trenchless alignments are anticipated to consist of fill and weathered granitic rock. The fill and highly weathered granitic rock are anticipated to exhibit firm to slow raveling behavior in accordance with the Tunnelman’s Ground Classification. The moderately weathered granitic rock is anticipated to be moderately jointed rock in accordance with the Tunnelman's Ground Classification. Subsurface obstructions from buried debris in the fill materials may be encountered along the alignments that may be difficult to penetrate. Additionally, core stones within the granitic rock may be encountered. Unconfined compressive strength of select samples recovered from borings along the I-8 crossing at the approximate depth of the trenchless alignment ranged from 306 to 354 pounds per square inch (psi). However, laboratory test results for the unconfined compressive strengths of fresh granitic rock along the underground portion of the alignment were as high as 13,374 psi. The anticipated ground conditions along the trenchless crossing are depicted in Figure 5.

5.2.3 Trenchless Technology Selection

The contractor selected to perform the trenchless construction under I-8 may select a method from the four alternatives listed above based on the contractors own experience. However, rescue shafts will not be permitted to remove obstructions under the freeway, if encountered. As the diameter of the proposed trenchless construction is large enough to allow for personnel entry into the cased alignment and groundwater is not anticipated to be encountered, any of the four methods presented above is feasible. However, the final product pipe should be considered when selecting a trenchless construction method.

We understand that a reinforced concrete pipe or HOBAS pipe has been selected for the trenchless crossing. As the trenchless crossing passes beneath the Caltrans right-of-way, coordination with Caltrans by the engineering design consultant (Black & Veatch) should be performed to ensure that a steel casing is not required for the utility crossing.

The alignment drops at approximately 1 percent from approximately Station 20+13 to Station 22+23. An approximately 20-foot by 30-foot bore pit should be located at the downslope end of the trenchless crossing (Station 22+23). An approximately 10-foot by 20-foot receiving pit should be excavated at the upslope end of the trenchless crossing (Station 20+13). Excavation and construction of the receiving and bore pits should be performed in conformance with the recommendations provided in Sections 5.7, 6.1 and 6.2 of this report.

5.2.4 Settlement Monitoring

As the proposed trenchless alignments pass under existing roadways, settlement monitoring of the ground surface will be required. Settlement monument points should be installed at the ground surface along the proposed alignments and monitoring during trenchless construction on a daily basis.

5.3 MFAD Parameters

We understand that deep foundations to support power poles, towers, and structures with high lateral loads will be designed using the EPRI computer programs Moment Foundation Analysis and Design (MFAD). We further understand that the design soil parameters for use with the MFAD program include:

- soil layer depths;
- groundwater depth;
- total unit weight;
- internal friction angle;
- cohesion;
- elastic pressuremeter modulus; and
- strength reduction factor.

Estimates of the required parameters were developed based on the results of our site reconnaissance, field exploration program, geotechnical laboratory testing, engineering analyses, empirical correlations, literature research, and our professional judgment. The estimated MFAD design parameters for the western and eastern cable poles are presented in Table 6. We recommend that a strength reduction factor of r = 1.0 be used in MFAD analyses and design of the deep foundations for the cable pole since thick deposits of soft, clayey materials are not anticipated at the site. The design parameters presented in this report in Table 6 are intended for use in the MFAD computer program. Pressuremeter testing was not performed as part of this project, and the elastic modulus values were obtained from correlations presented in the Electric Power Research Institute (EPRI) manual [EPRI, 1990]. Additional MFAD design recommendations for the cable pole at the east end of the underground portion of the alignment will be provided in an addendum report following the completion of field explorations at the cable pole location.

5.4 2007 CBC Seismic Design Considerations

Seismic design parameters were developed in accordance with Chapter 16 of the 2007 CBC. We recommend that the values listed below be used for design:

2007 CBC[1] Seismic Design Parameters (2% Probability of Exceedence in 50 years)	
Soil Class	D
Mapped Spectral Response Acceleration at 0.2s Period, S_S	1.07g
Mapped Spectral Response Acceleration at 1.0s Period, S_1	0.36g
Short Period Site Coefficient at 0.2s Period, F_a	1.07
Long Period Site Coefficient at 1.0s Period, F_v	1.682
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS}	1.15g
Adjusted Spectral Response Acceleration at 1.0s Period, S_{M1}	0.60g
Design Spectral Response Acceleration at 0.2s Period, S_{DS}	0.76g
Design Spectral Response Acceleration at 1.0s Period, S_{D1}	0.40g

[1] CBC, 2007, "California Code of Regulations, Title 24, Part 2, Vol. 2 of 2," Building Code (Based on 2006 International Building Code), California Building Standard Commission, Sacramento, California.

These are minimum values. The structural designer may utilize more conservative values at their discretion.

5.5 Seismic Qualification

Based on the IEEE Standard 693, "IEEE Recommended Practice for Seismic Design of Substations," prepared by IEEE Power Engineering Society, 2005, we recommend that a seismic qualification level of high be used in the design of equipment associated with the transmission line.

5.6 Corrosion Potential

The results of the corrosion testing performed are presented in Appendix D. Corrosion testing was performed on four discrete samples of the near-surface soils for this investigation. The results of the tests indicate the water soluble sulfate content of the soil were in the range of 0 to 100 parts per million (ppm). Sulfate contents in this range are generally considered to be negligible with respect to potential for sulfate attack of concrete in accordance with Table 4.3.1 of the 2005 American Concrete Institute (ACI) Manual. Based on soil resistivity tests (between approximately 1,800 and 53,000 ohm-cm), metallic utility piping and conduits should be designed for a moderately corrosive to corrosive environment. A corrosion engineer should be consulted if additional corrosion information is needed.

5.7 Utility Trenches

The contractor should follow all CAL-OSHA guidelines for trenching and excavation construction for utility trenches. Further discussion on trench excavatability is provided in Section 6.2. For the purpose of this section of the report, backfill is defined as material placed in a trench starting 6 inches above the pipe, and bedding is all material placed in a trench below the backfill. Pipe trench backfill should conform to the recommendations presented in this report and Section 306 of the Standard Specifications for Public Works Construction ("Greenbook"). Unless concrete bedding is required around utility pipes, free-draining sand should be used as bedding. Sand bedding should be clean sand. Native sandy soils with a maximum particle size of ½ inch may be used for utility trench backfill. Backfilling trenches located under and adjacent to structural fill, foundations, concrete slabs and pavements should be placed in horizontal layers no more than 6 inches thick and compacted to a minimum relative compaction of 90 percent based on ASTM Test Procedure D-1557. Pavement and subgrade requirements provided in Section 5.8 should be incorporated for trench backfill. Compaction of backfill by water jetting should not be permitted.

5.8 Pavements

We recommend that the pavement sections at the project site such as the access road be designed for a Traffic Index (T.I.) selected by the project civil engineer. The pavement section should consist of asphalt concrete (AC) over Class 2 aggregate base (as defined in Section 26 of the Caltrans Standard Specifications) over properly prepared subgrade. The subgrade soils should be proof-rolled prior to placing the pavement section. AC and aggregate base should be compacted to a minimum relative compaction of 95 percent. Based on laboratory testing performed for the project, we recommend the use of an R-value of 50 in design for the majority of the alignment. Within the vicinity of Boring B-14 (approximately Station 226+00 to 232+00) we recommend the use of an R-value of 12 in design due to the presence of clayey fill material that was used to span a pre-existing drainage. Based on the above assumptions, we recommend the following pavement sections for an R-value of 50:

TI	6	7	8	9	10
AC	**Pavement Section (inches)**				
	4	4	5	5	6
Base	4	5	5	8	8

We recommend the following pavement sections for an R-value of 12:

TI	6	7	8	9	10
AC	**Pavement Section (inches)**				
	5	5	7	8	9
Base	8	12	12	14	16

Additional pavement sections can be provided to evaluate the cost implications of using different base materials, or for full-depth AC. AC shall conform to the requirements for Dense Graded Asphalt Concrete as indicated in Section 39 of the latest edition of the Caltrans Standard Specifications.

Alternatively, Portland cement concrete (PCC) can be used for pavements where heavy truck traffic is anticipated. If PCC is used, we recommend that a minimum of 7½ inches of Class A PCC (per Caltrans Standard Specifications) be used over a subgrade surface that has been proof-rolled to identify and remove soft spots. We also recommend that concrete pavements be provided with expansion joints at regular intervals not exceeding every 15 feet each way.

6. CONSTRUCTION CONSIDERATIONS

6.1 Shoring

Internally braced or cantilevered shoring systems consisting of a trench shield, soldier piles and lagging, or sheet piles may be used to shore the vault excavations. Difficult drilling (and driving) should be anticipated in less weathered crystalline rock or where core stones are present.

Shored excavations should also be designed and constructed in accordance with current OSHA regulations; Table 7 provides the OSHA classification for the materials anticipated along the proposed alignment. The contractor's "Competent Person", in accordance with OSHA regulations, should confirm these soil classifications. Design of the shoring and bracing system is the responsibility of the contractor. The contractor should retain an engineer experienced in designing shoring systems. The shoring parameters presented in this report are for reference and preliminary design only; the contractor should develop his own parameters for final shoring design.

The shoring system should be designed to resist lateral earth pressures plus additional horizontal pressures imposed by adjacent surcharge loads. Cantilevered shoring should be designed to resist active lateral earth pressures as presented in Table 7. Tied-back or braced excavations should be designed to resist an at-rest earth pressure consisting of a uniform horizontal pressure as presented in Table 7. To account for construction and road traffic in adjacent areas, the actual wall heights on sides where traffic is expected should be increased 1.5 feet for the earth pressure calculations.

Lateral loads will also be imposed on the shoring due to loads placed adjacent to the shoring (i.e., crane tracks or stockpiled materials). The lateral stress imposed on shoring with loads immediately adjacent can be estimated as follows:

Depth Below Loaded Area	Lateral Pressure on Shoring Due to Adjacent Vertical Load
0	0
B/8	0.20q
B/4	0.15q
B/2	0.10q
B	0.05q
2B	0

Where B is the width of the loaded area (measured perpendicular to the shoring) and q is the surface pressure exerted by the load. These pressures can be assumed to act along a length equal to the length of the loading (measured parallel to the shoring).

Resistance to the lateral pressures can be provided by the passive soil pressure on the portions of the sheet piles or soldier piles embedded below the bottom of excavation and by bracing or anchor resistance. Allowable passive pressures against the embedded portion may be taken as equivalent to the pressure exerted by a fluid with a unit weight for each soil type encountered, presented in Table 7. To account for three-dimensional effects of passive resistance on soldier piles, the lateral pressure may be assumed to act on an area twice the soldier pile width.

6.2 <u>Excavation Characteristics</u>

Our evaluation of excavation characteristics is based on seismic refraction data and velocity correlations, drilling characteristics, and the proposed cut depths. The construction contractor should review this information along with other construction records from previous utility trenching within the area to assess excavation characteristics if available. The velocities obtained from the seismic refraction surveys were evaluated to determine the excavation characteristics within the proposed cut depths along the alignment. Within the proposed cut depths the seismic velocities ranged from 740 feet per second (fps) to 11,830 fps, averaging about 3,750 fps. A summary of the seismic refraction surveys is presented in Table 2 and the seismic refraction travel time plots are presented in Appendix B.

Rippable conditions are defined in this report as excavation that produces practical production quantities of fill. Correlations between strength data, seismic velocities, and rippability are based on a combination of experience and approximate values delineated in the Caterpillar Performance Handbook [Caterpillar, 2006]. Industry accepted values for rippablility of various material types at different seismic velocities is presented in Table B-1 of Appendix B.

The following section provides a preliminary assessment of trench excavation characteristics. The assessment assumes that the excavating equipment is well maintained and operating at factory-specified efficiencies. The choice of excavation method is often a function of economics, level of desired effort, logistics, quality and size of machinery used, permit conditions, and/or contractor convenience.

6.2.1 Trench Excavation

Trench excavation in surficial deposits (undocumented and engineered fill, residual soil, alluvium and colluvium) is expected to encounter little difficulty using modern trenching machines or backhoes. Trench excavations that require deeper penetration into crystalline bedrock should be performed with a large excavator. Data from the seismic refraction profiles assisted in evaluating rippability of portions of the alignment underlain by granitic rock. Local pipeline construction experience has shown that granitic materials with P-wave velocities up to about 4,500 feet per second are typically rippable with large excavators such as a Caterpillar 245 or equivalent (Stift and others, 1990). Materials with P-wave velocities greater than 4,500 feet per second may require blasting or use of pneumatic breakers. The rippable/non-rippable depth may vary significantly reflecting topographic, geologic, and equipment variability.

6.3 Construction Observation

Variations in subsurface conditions will likely be encountered during construction at the site. To permit correlation between the investigation data and the conditions encountered during construction, and to provide conformance with the plans and specifications as originally contemplated, we recommend that a geotechnical engineering consultant be retained to provide continuous observations of construction operations and to provide quality control testing of fill and backfill placement and compaction.

A California-registered Civil or Geotechnical Engineer should prepare a final report of earthwork testing and observation.

7. LIMITATIONS

The geotechnical investigation for this project provided for the observation of only a small portion of the pertinent subsurface conditions. The information provided herein is based on specific explorations and is of the assumption that soil conditions do not deviate appreciably from those encountered during the current field investigation. This geotechnical data report has been performed in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in this area. The conclusions contained in this report are based solely on the analysis of the conditions observed by Geosyntec personnel and as reported in the referenced geotechnical investigations for the project site. We cannot make any assurances concerning the completeness of the data presented to us.

No warranty, express or implied, is made regarding the professional opinions expressed in this report. Site grading and earthwork, subgrade preparation under concrete slabs and paved areas, utility trench backfill, and foundation excavations should be observed by a qualified engineer or geologist to verify that the site conditions area as anticipated. If actual conditions are found to differ from those described in the report, or if new information regarding the site is obtained, Geosyntec should be notified and additional recommendations, if required, will be provided. Geosyntec is not liable for any use of the information contained in this data report by persons other than SDG&E or their subconsultants, or the use of information in this report for any purposes other than referenced in this report without the expressed, written consent of Geosyntec.

8. REFERENCES

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TABLES

TABLE 1
SUMMARY OF FIELD EXPLORATIONS
Sunrise Powerlink Project - 230 kV Underground
Alpine, California

Geosyntec consultants

Proposed Structure	Project Stationing	Boring Exploration Identification	Approximate Exploration Elevation (feet MSL)	Exploration Location[1] (Latitude / Longitude)		Date of Exploration	Total Depth of Exploration (feet bgs)	Subsurface Conditions	Depth to Bedrock (feet bgs)	Field Testing
Riser Pole L	6+70.45	CP-1	1131	N32.85252	W116.80694	3/5/2009	49	Residual soil / Kgr	5.5	Insitu Temp Testing in soil (Depths of 5 feet)
Riser Pole R	6+92.12									
Riser Pole L	334+72.50	CP-2	2274	N32.82891	W116.71928	5/15/2009	53	Residual soil / Kgr	0.5	
Riser Pole R	334+66.81									
MH-1L	14+24.61	B-1	1222	N32.85178	W116.80755	3/4/2009	20.5	Residual soil / Kgr	4	Insitu Temp Testing in soil (Depths of 5 feet)
MH-1R	13+97.92									
MH-2L	26+25.16	B-2	1196	N32.84880	W116.80827	10/7/2008	15.5	Fill / Residaual Soil	15	Insitu Temp Testing in soil (Depths of 5 and 10 feet) Thermal Resistivity Testing
MH-2R	26+88.82									
MH-3L	42+89.31	B-3	1247	N32.84563	W116.80437	10/7/2008	15	Fill / Kgr	6	Insitu Temp Testing in soil (Depths at 5 feet) Thermal Resistivity Testing
MH-3R	44+00.00									
MH-4L	60+10.56	B-4	1350	N32.84348	W116.79998	10/7/2008	16.5	Fill	NA	Insitu Temp Testing in soil (Depths of 5 and 10 feet) Thermal Resistivity Testing
MH-4R	60+42.69									
MH-5L	79+15.01	B-5	1453	N32.84161	W116.79493	10/13/2008	14.5	Residual soil / Kgr	5	
MH-5R	78+21.06									
MH-6L	94+81.70	B-6	1532	N32.83971	W116.78950	10/9/2008	15.3	Fill / Kgr	5	Insitu Temp Testing in soil (Depths at 5 feet) Thermal Resistivity Testing
MH-6R	96+50.00									
MH-7L	111+42.89	B-7	1601	N32.83870	W116.78408	10/7/2008	12.3	Fill / Kgr	12	
MH-7R	114+50.00									
MH-8L	129+08.80	B-8	1674	N32.83788	W116.77946	10/9/2008	21.5	Fill / Residaual Soil	NA	Insitu Temp Testing in soil (Depths of 5, 10, and 15 feet) Thermal Resistivity Testing
MH-8R	132+09.99									
MH-9L	144+52.39	B-9	1759	N32.83737	W116.77402	10/9/2008	15	Fill / Residual soil / Kgr	5	
MH-9R	148+00.01									
MH-10L	160+30.60	B-10	1821	N32.83593	W116.76900	10/14/2008	18.3	Fill / Kgr	5	Insitu Temp Testing in soil (Depths of 5 feet) Thermal Resistivity Testing
MH-10R	162+75.27									
MH-11L	177+66.09	B-11	1862	N32.83533	W116.76315	10/10/2008	16.5	Fill / Kgr	16	
MH-11R	179+25.78									
MH-12L	192+79.27	B-12	1927	N32.83481	W116.75835	10/10/2008	15.5	Fill / Kgr	5	Insitu Temp Testing in soil (Depths at 5 feet) Thermal Resistivity Testing
MH-12R	196+86.06									
MH-13L	209+25.01	B-13	2000	N32.83457	W116.75283	10/9/2008	15.5	Fill / Residual soil / Kgr	10	
MH-13R	212+10.81									

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MH-14L	226+78.16	B-14	2054	N32.83408	W116.74706	10/10/2008	15.3	Fill / Residual soil / Kgr	5	Thermal Resistivity Testing
MH-14R	227+75.18									
MH-15L	240+94.48	B-15	2017	N32.83373	W116.74276	10/9/2008	16	Residual soil / Kgr	5.5	
MH-15R	244+00.83									
MH-16L	257+80.01	B-16	2029	N32.83301	W116.73747	10/13/2008	15.5	Residual soil / Kgr	5	Insitu Temp Testing in soil (Depths at 5 feet) Thermal Resistivity Testing
MH-16R	260+00.83									
MH-17L	273+08.09	B-17	2154	N32.83289	W116.73207	10/10/2008	16	Residual soil / Kgr	5.5	Insitu Temp Testing in soil (Depths at 5 feet) Thermal Resistivity Testing
MH-17R	275+12.43									
MH-18L	290+48.93	B-18	2188	N32.83358	W116.72693	10/13/2008	16	Fill / Kgr	5	Insitu Temp Testing in soil (Depths at 5 feet) Thermal Resistivity Testing
MH-18R	294+26.09									
MH-19L	309+09.90	B-19	2220	N32.83324	W116.72132	10/14/2008	10	Fill / Residual soil / Kgr	5	
MH-19R	313+29.83									
MH-20L	328+41.73	B-20	2311	N32.83044	W116.71885	5/14/2009	20.2	Residual soil / Kgr	2	Thermal Resistivity Testing
MH-20R	328+89.68									
I-8 Crossing (Boring Pit)	22+23.18	I8-1	1225	N32.84990	W116.80885	12/1/2008	34	Fill / Residual soil / Kgr	1.5	Insitu Temp Testing in soil (Depths at 5 feet)
	21+93.91									
I-8 Crossing (Center)	21+18.46	I8-2	1228	N32.85015	W116.80857	12/2/2008	35.5	Fill / Residual soil / Kgr	31	Insitu Temp Testing in soil (Depths at 5 feet) Thermal Resistivity Testing
	20+85.82									
I-8 Crossing (Receiving Pit)	20+13.73	I8-3	1231	N32.85046	W116.80831	12/2/2008	26.4	Fill	NA	Insitu Temp Testing in soil (Depths at 5 feet) Thermal Resistivity Testing
	19+77.72									

Notes:

1 - Coordinates in Lat/Lon decimal degrees - WGS 84 datum

TABLE 2
SUMMARY OF SEISMIC REFRACTION SURVEYs
Sunrise Powerlink Project - 230 kV Underground
Alpine, California

Refraction Survey Number	Stationing[1]	Refraction Survey[2] End Points		Survey Line Direction	Velocity Layer	Approximate Depth Range[3] (feet bgs)	Seismic Velocity Range (Feet per Second)	Excavatability Assessment[4]	Maximum Anticipated Cut Depth[5] (feet bgs)
		Latitude	Longitude						
SL-1	7+50	N32.85246	W116.80706	Fwd	1	0 - 8	750 - 1210	rippable	14
				(N40W)	2	8 - 16	2970 - 3060	rippable	
					3	>16	3650 - 3950	rippable	
	6+30	N32.85165	W116.80683	Rev	1	0 - 10	1060 - 1180	rippable	
				(S40E)	2	10 - 14	2630 - 2660	rippable	
					3	>14	3780 - 4000	rippable	
SL-2	14+10	N32.85165	W116.80764	Fwd	1	0 - 6	910 - 960	rippable	7
				(S10W)	2	6 - 21	2220 - 2670	rippable	
					3	>21	4030	rippable	
	15+20	N32.85135	W116.80768	Rev	1	0 - 4	740 - 1120	rippable	
				(N10E)	2	4 - 13	2180 - 2720	rippable	
					3	>13	3770 - 3940	rippable	
SL-3	16+55	N32.85100	W116.80769	Fwd	1	0 - 7	1110	rippable	7
				(S5W)	2	7 - 18	2540 - 2800	rippable	
					3	>18	4020	rippable	
	17+65	N32.85068	W116.80772	Rev	1	0 - 5	1060 - 1100	rippable	
				(N5E)	2	>5	2960 - 3030	rippable	
SL-4	48+35	N32.84453	W116.80354	Fwd	1	0 - 2	2910	rippable	7
				(N50W)	2	2 - 6	4370	rippable	
					3	6 - 13	6480	marginal	
					4	>13	10060 - 13350	non-rippable	
	47+20	N32.84472	W116.80382	Rev	1	0 - 3	2830 - 3420	rippable	
				(S50E)	2	3 - 31	6880 - 8400	non-rippable	
					3	>31	35750	non-rippable	
SL-5	62+80	N32.84316	W116.79910	Fwd	1	0 - 2	1230 - 1450	rippable	7
				(S65E)	2	2 - 17	3020 - 4300	rippable	
					3	>17	6440 - 8310	non-rippable	
	63+49	N32.84307	W116.79878	Rev	1	0 - 3	1770 - 2430	rippable	
				(N65W)	2	3 - 13	3970	rippable	
					3	13 - 19	4330 - 5610	marginal	
					4	>19	6130 - 6660	non-rippable	
SL-6	69+10	N32.84251	W116.79723	Fwd	1	0 - 4	1280 - 1500	rippable	7
				(S65E)	2	4 - 9	4090 - 4500	rippable	
					3	9 - 15	5840	marginal	
					4	>15	12640	non-rippable	
	70+20	N32.84240	W116.79693	Rev	1	0 - 4	2090	rippable	
				(N65W)	2	4 - 8	3170 - 4000	rippable	
					3	8 - 32	7060	non-rippable	
					4	>32	15930 - 17860	non-rippable	

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		Latitude	Longitude						
SL-7	80+80	N32.84121	W116.79379	Fwd	1	0 - 6	2410 - 3030	rippable	12
				(N65W)	2	6 - 15	5530 - 6230	marginal	
					3	>15	11640 - 12330	non-rippable	
	79+68	N32.84132	W116.79414	Rev	1	0 - 2	1480	rippable	
				(S65E)	2	2 - 8	4380 - 6980	marginal	
					3	>8	14050 - 14720	non-rippable	
SL-8	120+60	N32.83808	W116.78155	Fwd	1	0 - 8	2450 - 2650	rippable	7
				(N70W)	2	>8	7380 - 8900	non-rippable	
	119+40	N32.83817	W116.78185	Rev	1	0 - 4	2050 - 2160	rippable	
				(S70E)	2	>4	7680 - 7720	non-rippable	
SL-9	159+60	N32.83601	W116.76909	Fwd	1	0 - 3	1020 - 1220	rippable	12
				(S70E)	2	3 - 12	2030 - 2640	rippable	
					3	>12	6030 - 6790	non-rippable	
	160+65	N32.83591	W116.76872	Rev	1	0 - 6	1850 - 2310	rippable	
				(N70W)	2	6 - 29	6740 - 9310	non-rippable	
					3	>29	17750	non-rippable	
SL-10	223+45	N32.83429	W116.74850	Fwd	1	0 -3	1490 - 2820	rippable	7
				(S75E)	2	3 - 5	6000 - 8010	non-rippable	
					3	>5	8810 - 22870	non-rippable	
	224+55	N32.83423	W116.74815	Rev	1	0 - 2	1400 - 2740	rippable	
				(N75W)	2	2 - 4	6360 - 7630	non-rippable	
					3	>4	11830	non-rippable	
SL-11	246+10	N32.83336	W116.74117	Fwd	1	0 - 7	1010 - 1700	rippable	7
				(S85E)	2	>7	2900 - 5010	marginal	
	247+20	N32.83331	W116.74081	Rev	1	0 - 2	1150 - 1690	rippable	
				(N85W)	2	>2	3140 - 6200	marginal	
SL-12	270+07	N32.83327	W116.73344	Fwd	1	0 - 2	950 - 990	rippable	7
				(N80E)	2	2 - 9	2510 - 3080	rippable	
					3	9 - 20	3510 - 4740	rippable	
					4	>20	5660	marginal	
	271+19	N32.83333	W116.73312	Rev	1	0 - 4	1350 - 3800	rippable	
				(S80W)	2	4 - 18	5030 - 5820	marginal	
					3	>18	10010 - 11580	non-rippable	
SL-13	278+95	N32.83268	W116.73072	Fwd	1	0 - 1	2430	rippable	12
				(S85W)	2	1 - 12	4110 - 5560	marginal	
					3	>12	6620 - 8080	non-rippable	
	277+90	N32.83265	W116.73109	Rev	1	0 - 1	1810 - 2270	rippable	
				(N85E)	2	1 - 11	3840 - 5540	marginal	
					3	>11	6510 - 11490	non-rippable	

TABLE 2
SUMMARY OF SEISMIC REFRACTION SURVEYs
Sunrise Powerlink Project - 230 kV Underground
Alpine, California

Refraction Survey Number	Stationing[1]	Refraction Survey[2] End Points		Survey Line Direction	Velocity Layer	Approximate Depth Range[3] (feet bgs)	Seismic Velocity Range (Feet per Second)	Excavatability Assessment[4]	Maximum Anticipated Cut Depth[5] (feet bgs)
		Latitude	Longitude						
SL-14	309+64	N32.83329	W116.72103	Fwd	1	0 - 2	2210 - 5430	rippable	14
				(N85E)	2	2 - 14	7570	non-rippable	
					3	>14	12560 - 12920	non-rippable	
	310+76	N32.83335	W116.72069	Rev	1	0 - 2	4660	marginal	
				(S85W)	2	2 - 8	6900	non-rippable	
					3	>8	10260 - 12740	non-rippable	
SL-15	322+40	N32.83213	W116.71889	Fwd	1	0 - 3	1010 - 2330	rippable	7
				(S5E)	2	3 - 23	3130 - 3190	rippable	
					3	>23	4990	marginal	
	323+50	N32.83184	W116.71892	Rev	1	0 - 6	1410 - 1720	rippable	
				(N5W)	2	6 - 15	2480 - 3110	rippable	
					3	>15	3900 -4480	rippable	
SL-16	329+20	N32.83030	W116.71893	Fwd	1	0 - 5	1250 - 1380	rippable	13
				(N20E)	2	5 - 17	2650 - 3420	rippable	
					3	> 17	4380	rippable	
	328+10	N32.83057	W116.71881	Rev	1	0 - 5	1040 - 1680	rippable	
				(S20W)	2	5 - 25	2750 - 3500	rippable	
					3	>25	4780 - 6240	marginal	
SL-17	Riser Pole	N32.82888	W116.71909	Fwd	1	0 - 6	970 - 1280	rippable	14
				(E-W)	2	6 - 12	2180 - 2590	rippable	
					3	12 - 47	3040 - 3680	rippable	
					4	>47	6860	non-rippable	
	Riser Pole	N32.82888	W116.71945	Rev	1	0 - 5	1140 - 1270	rippable	
				(W-E)	2	>5	2710 - 3220	non-rippable	

Notes:
1 - Approximate project stationing based on "Interstate 8 Alternate Plan and Profile-Left" dated 5/22/09 design sheets
2 - Surveyed end point of refraction survey lines coordinates in Lat/Lon decimal degree WGS 84 datum. Data collected in field
3 - Calculated depth of seismic refractor based on P-wave first arrival times using Snells Law
4 - Excavatability assessment based on correlations between seismic wave velocities and rippability using a Caterpillar 245 excavator (Stift, 1990)
5 - Maxiumum anticipated cut based on 100% design represented in "Interstate 8 Alternate Plan and Profile-Left" dated 5/22/09.

TABLE 3
SUMMARY OF INSITU TEMPERATURE TESTING
Sunrise Powerlink Project - 230 kV Underground
Alpine, California

Structure ID	Boring ID	Insitu Temp Depth[1] (feet bgs)	Insitu Temp (deg C)[2]	Insitu Temp (deg F)[2]	Geologic Unit	Subsurface Material	Sample ID	Comments
CP-West	CP-1	5.0 to 6.0	25.0	77	Residual Soil	silty medium to fine sand with trace subround gravel.	CP-1-1	
MH-1	B-1	5.0 to 6.0	21.1	70	Granitic rock	Medium to fine grained, completely weathered, very weatk rock	B-1-1	
MH-2	B-2	5.0 to 6.0	28.9	84	Fill	silty fine to medium sand with trace gravel	B-2-2	
		10.0 to 11.0	25.6	78	Residual Soil	clayey fine sand with trace coars sand	B-2-3	
MH-3	B-3	5.0 to 6.0	35.6	96	Granitic rock	medium to coarse grained, completely weathered, weak rock	B-3-1	Abnormally high temp may be result of high ambient air temperature
MH-4	B-4	5.0 to 6.0	28.9	84	Fill	silty fine sand with trace fine gravels	B-4-1	
		10.0 to 11.0	31.1	88	Fill	silty fine sand with clay and trace gravel	B-4-2	
MH-6	B-6	5.0 to 6.0	44.4	112	Granitic rock	coarse grained, completely weathered, very weak rock	B-6-1B	Abnormally high temp may be result of heat transfer from drilling
MH-8	B-8	5.0 to 6.0	31.1	88	Fill	fine to medium graind sand with trace coarse sand and gravels	B-8-1B	
		10.0 to 11.0	24.4	76	Fill	fine to medium graind sand with trace coarse sand and gravels	B-8-2B	
		15.0 to 16.0	21.7	71	Residual Soil	silty to clayey fine sand	B-8-3B	
MH-10	B-10	5.0 to 6.0	33.3	92	Granitic rock	coarse grained, completely weathered,extremely weak rock	B-10-1B	Abnormally high temp may be result of high ambient air temperature
MH-12	B-12	5.0 to 6.0	37.8	100	Granitic rock	coarse grained, completely weathered, extremely weak to weak rock	B-12-1B	Abnormally high temp may be result of heat transfer from drilling
MH-16	B-16	5.0 to 6.0	30.0	86	Dioritic rock	fine to medium grained, highly to moderately weathered, weak rock	B-16-1A	
MH-17	B-17	5.0 to 6.0	38.9	102	Granitic rock	fine to medium grained, completely weathered, very weak to extremely weak rock	B-17-1B	Abnormally high temp may be result of heat transfer from drilling
MH-18	B-18	5.0 to 6.0	30.0	86	Granitic rock	medium grained, completely weathered, extremely weak rock 2/1), highly organic silty medium to fine sand and poorly graded	B-18-1A	
I-8 Crossing	I8-1	5.0 to 6.0	31.7	89	Granitic rock	coarse grained, highly weathered, very weak to weak rock.	I8-1-1	
	I8-2	5.0 to 6.0	30.0	86	Fill	granite derived, poorly graded medium to fine granied sand with gravel	I8-2-1	
	I8-3	5.0 to 6.0	23.3	74	Fill	poorly graded medium to very fine sand with clay and gravel	I8-3-1	

Notes:

1: Approximate depth interval of insitu material tested

2: Insitu temperature of subsurface material after 30 minutes of recording in open borehole.

TABLE 4
SUMMARY OF GEOTECHNICAL LABORATORY TESTING
Sunrise Powerlink Project - 230 kV Underground
Alpine, California

Exploration Location	Depth (feet bgs)	Sample Number	Moisture Content[2] (%)	Dry Density[2] (pcf)	Laboratory Compaction		Grain Size Analyses[1]		Unconfined Compressive Strength (psi)	R-value	Corrosivity[4]			
					Moisture Content[3] (%)	Maximum Density[3] (pcf)	Gravel (%)	Passing #200 sieve (%)			pH	Resistivity (ohm-cm)	Sulfate %	Chloride %
B-1	5.5-5.8	B-1-1	10.2											
B-1	10.5-10.9	B-1-2					0	32						
B-1	15.0-15.3	B-1-3	6.5											
B-2	0.0-5.0	B-2-1			6.5	138.0	4	16		78	7.0	6,143	<0.001	0.003
B-2	6.0-6.5	B-2-2	7.0	109.0								121 / 222[5]		
B-2	11.0-11.5	B-2-3	9.6	93.2			0	48						
B-3	6.0-6.5	B-3-1	3.3	123.2										
B-4	6.0-6.5	B-4-1	7.0	109.0								96 / 197[5]		
B-4	11.0-11.5	B-4-2	8.2	103.0										
B-5	5.0-6.0	B-5-2	1.7				19	11						
B-6	6.0-6.5	B-6-1A	4.0	123.0								137 / 179[5]		
B-7	0.0-5.0	B-7-1			7.0	137.0	3	16		76	7.6	5,265	<0.001	0.002
B-8	6.0-6.5	B-8-1A	9.4	108.0										
B-8	6.0-6.5	B-8-1B	10.0	118.0								78 / 134[5]		
B-8	11.0-11.5	B-8-2B	9.0	109.0								69 / 171[5]		
B-8	15.5-16.0	B-8-3A	15.4	109.5			1	38						
B-10	5.0-5.5	B-10-1A	11.8	112.4										
B-10	11.25-12.0	B-10-1	0.1						1,114					
B-10	14.0-14.75	B-10-2	0.1						13,374					
B-11	5.0-6.0	B-11-2	20.9				1	25						
B-12	5.5-6.0	B-12-1A	14.4	106.5										
B-12	6.0-6.5	B-12-1B	16.0	110.0								71 / 186[5]		
B-13	5.0-6.0	B-13-2	11.5				0	35						
B-14	0.0-5.0	B-14-1			8.0	133.0	0	40		12	8.4	1,823	0.001	0.002
B-14	5.0-5.5	B-14-2	3.7	129.1										
B-16	6.0-6.5	B-16-1B	7.8	119.1										
B-17	5.0-5.5	B-17-1A	8.9	97.0			3	30						
B-17	5.5-6.0	B-17-1B	11.0	113.0								89 / 168[5]		
B-18	5.5-6.0	B-18-1A	11.0	106.0								144 / 245[5]		
B-18	6.0-6.5	B-18-1B	13.7	114.7										
B-19	0.0-5.0	B-19-1			7.0	137.0	5	28		59	8.3	2,801	0.006	0.002

TABLE 4
SUMMARY OF GEOTECHNICAL LABORATORY TESTING
Sunrise Powerlink Project - 230 kV Underground
Alpine, California

Exploration Location	Depth (feet bgs)	Sample Number	Moisture Content[2] (%)	Dry Density[2] (pcf)	Laboratory Compaction		Grain Size Analyses[1]		Unconfined Compressive Strength (psi)	R-value	Corrosivity[4]			
					Moisture Content[3] (%)	Maximum Density[3] (pcf)	Gravel (%)	Passing #200 sieve (%)			pH	Resistivity (ohm-cm)	Sulfate %	Chloride %
CP-1	5.0-5.5	CP-1-1	7.7											
CP-1	10.5-11.0	CP-1-4					0	19						
CP-1	14.0-14.75	CP-1-3	5.5											
CP-1	46.0-46.5	CP-1-2	2.8						306					
CP-2	13.5-14.0	CP-2-2	2.5						190					
CP-2	29.0-29.5	CP-2-3	8.5						15					
CP-2	36.0-36.5	CP-2-4	14.9						30					
I8-1	26.5-27.25	I8-1-1	2.4						354					
I8-1	32.5-33.0	I8-1-2	1.2						447					
I8-2	10.5-11.0	I8-2-2A	6.9	116.0			4	13						
I8-2	21.0-21.5	I8-2-6	21.8	104.7										
I8-2	31.0-31.5	I8-2-5	8.7	115.2										
I8-3	5.5-6.0	I8-3-1A	10.1	107.6										
I8-3	15.5-16.0	I8-3-3A	3.5	128.0										
I8-3	26.0-26.5	I8-3-5	12.0	119.0			1	21						

Notes:

[1] Analysis performed in general accordance with ASTM D 422-63 (02)

[2] Analysis performed in general accordance with ASTM D 2937-04

[3] Analysis performed in general accordance with ASTM 1557-02

[4] Analysis performed in general accordance with California Test Method 643

[5] First reported value represents analyses performed at as-received moisture content. Second value represents analyses performed at dry condition.

TABLE 5
SUMMARY OF THERMAL RESISTIVITY TESTING
Sunrise Powerlink Project - 230 kV Underground
Alpine, California

Sample ID	Sample Depth (feet bgs)	Test Date	Sample Weight (g)	Moisture Content (%)	Thermal Conductivity (w/mK)	Thermal Resistivity (cmC/w)	Sample Temperature (deg C)	Insitu Temperature (deg C)	Notes
B-2-3	11.0 to 11.5	10/8/2008	746.3	10.5	0.915	109.3	23.24	26	
		10/8/2008	745.3	10.3	0.699	143.0	22.02		
		10/20/2008	745.3	10.3	0.743	134.6	20.94		
		10/22/2008	740.3	9.6	0.843	118.7	20.16		
		10/27/2008	675.6	0	0.426	234.8	23.15		
B-3-1	6.0 to 6.5	10/8/2008	928.8	5.0	0.760	131.7	23.04	36	
		10/8/2008	928.8	5.0	0.688	145.4	21.92		
		10/20/2008	927.8	4.9	0.614	163.0	21.21		
		10/22/2008	925.8	4.7	0.613	163.3	20.18		
		10/27/2008	884.6	0	0.221	453.1	22.65		
B-4-2	11.0 to 11.5	10/8/2008	821.2	9.6	0.710	140.8	22.20	31	
		10/8/2008	822.2	9.7	0.594	168.4	21.63		
		10/20/2008	821.2	9.6	0.578	173.1	21.23		
		10/22/2008	814.2	8.7	0.429	233.2	19.79		
		10/27/2008	749.2	0	0.263	379.8	22.71		
B-8-1A	5.5 to 6.0	10/10/2008	875.3	11.5	0.678	147.4	22.20	31	
		10/20/2008	875.3	11.5	0.593	168.6	21.17		
		10/22/2008	867.3	10.5	0.345	289.9	19.58		
		10/27/2008	784.8	0	0.164	609.0	22.85		
B-8-3A	15.5 to 16.0	10/10/2008	932.0	17.0	1.177	85.0	22.02		
		10/20/2008	928.0	16.5	1.139	87.8	20.86		
		10/22/2008	920.0	15.5	0.722	138.5	19.59		
		10/27/2008	796.3	0	0.155	645.6	22.98		
B-10-1A	5.0 to 5.5	10/15/2008	926.1	13.9	1.680	59.5	21.11	33	
		10/20/2008	925.1	13.8	1.018	98.2	20.80		
		10/22/2008	918.1	12.9	1.556	64.3	19.51		
		10/27/2008	813.2	0	0.396	252.4	23.15		
B-12-1A	5.5 to 6.0	10/15/2008	897.6	17.8	5.622	17.8	21.43	38	
		10/20/2008	896.6	17.6	0.828	120.8	20.99		
		10/22/2008	886.6	16.3	0.880	113.6	19.68		
		10/27/2008	762.2	0	0.488	204.9	23.35		
B-14-2	5.0 to 5.5	10/15/2008	973.0	5.9	1.110	90.1	21.30		
		10/20/2008	972.0	5.8	1.045	95.7	21.22		
		10/22/2008	967.0	5.3	0.890	112.4	20.09		
		10/27/2008	918.7	0	0.269	372.2	23.00		
B-16-1B	6.0 to 6.5	10/15/2008	959.9	11.1	4.330	23.1	22.14	30	
		10/20/2008	958.9	10.9	1.628	61.4	21.47		
		10/22/2008	955.9	10.6	5.538	18.1	20.28		
		10/27/2008	864.4	0	0.055	1806.0	24.04		6cm sensor used
B-17-1A	5.0 to 5.5	10/15/2008	760.0	15.2	0.914	109.4	21.90	39	
		10/20/2008	759.0	15.0	0.604	165.5	21.42		
		10/22/2008	754.0	14.3	0.512	195.4	20.27		
		10/27/2008	659.8	0	0.067	1498.0	23.00		6cm sensor used
B-18-1B	6.0 to 6.5	10/15/2008	969.1	16.0	1.494	66.9	21.32	30	
		10/20/2008	969.1	16.0	1.668	60.0	21.32		
		10/22/2008	957.1	14.6	1.598	62.6	19.61		
		10/27/2008	835.2	0	1.164	85.9	23.62		

NOTE:

Tests performed by Geosyntec with a KD2 Pro Thermal Properties Analyzer using a 10cm sensor unless noted otherwise.

TABLE 6
RECOMMENDED MFAD DESIGN PARAMETERS
Sunrise Powerlink Project - 230 kV Underground
Alpine, California

Depth (feet)	Material Type	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)	E_{pmt} (ksi)	Shear Strength Reduction Factor, α
Western Riser Pole						
0 to 6	Residual Soil (SM/SP)	120	32	50	1.5	1.0
6 to 15	Tonalite (Augered)	135	35	0	6	1.0
> 15	Tonalite (Cored)	140	40	0	13	1.0
Eastern Riser Pole						
0 to 5	Residual Soil (SM/SP)	120	32	50	1.5	1.0
5 to 10	Tonalite (Augered)	135	35	0	4	1.0
> 10	Tonalite (Cored)	140	40	0	9	1.0

Note: The top 1-foot of soil should not be used in design.

E_{pmt} = Modulus of deformation as would be determined from a pressuremeter test.

α = Shear strength reduction factor

TABLE 7
OSHA MATERIALS CLASSIFICATION FOR SHORED EXCAVATIONS
Sunrise Powerlink Project - 230 kV Underground
Alpine, California

Material Type	OSHA Classification(1)	Temporary Slope Inclination (horizontal:vertical)	Lateral Earth Pressures(2)		
			Active Case(3) pcf (kg/m3)	At-rest Case(4) psf (kg/m2)	Passive Resistance pcf (kg/m3)
Fill/Residual Soil	C	1.5 : 1	37 (600)	24H (120H)	350 (5,600)
Colluvium	C	1.5 : 1	33 (530)	22H (110H)	400 (6,400)
Granitic Rock (moderately to completely weathered)	C	1.5 : 1	33 (530)	22H (110H)	400 (6,400)
Granitic Rock (fresh to moderately weathered)	A	0.75 : 1	28 (450)	18H (90H)	450 (7,200)

Notes:

1 - Classifications are for planning purposes and require field verification during construction

2 - Values assume a level backfill and no hydrostatic pressure

3 - Equivalent fluid weight

4 - Uniform horizontal pressure

5 - H represents the height of retained earth

FIGURES

Site Location
Sunrise Powerlink Project
230 kV Underground

Alpine, California

Geosyntec
consultants

San Diego

May 2009

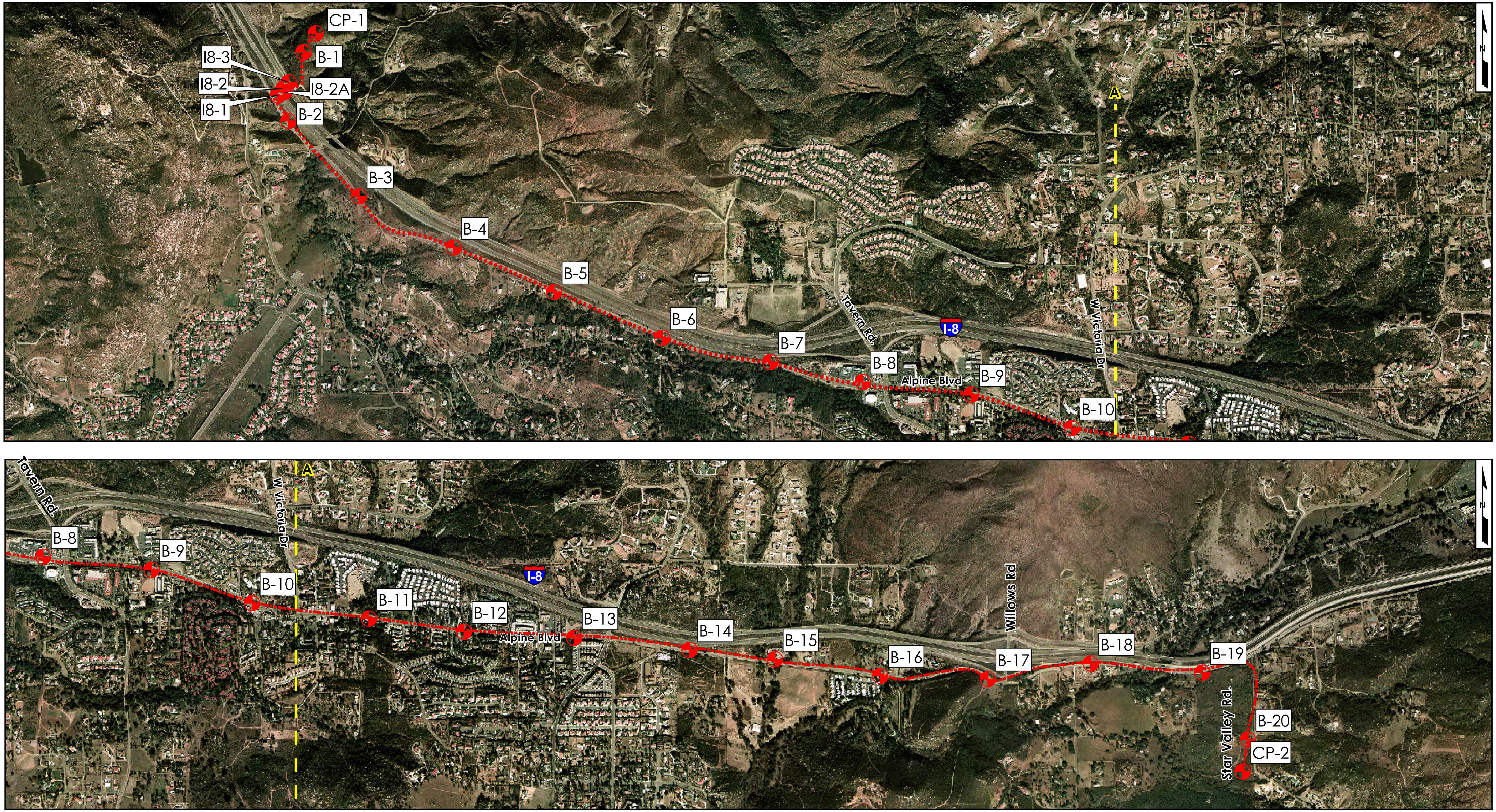
Figure

1

Legend

🟥 Proposed Underground Alignment

P:\GIS\SC0368_SDGE\Alpine\SiteLocationNov08.mxd; JLarson;SC0368-14-02



1,500 750 0 1,500 Feet

Legend

● Boring

Proposed Underground Alignment

Match Line

January 2006 Image

Site Plan And Exploration Location
Sunrise Powerlink Project
230 kV Underground
Alpine, California

Geosyntec consultants

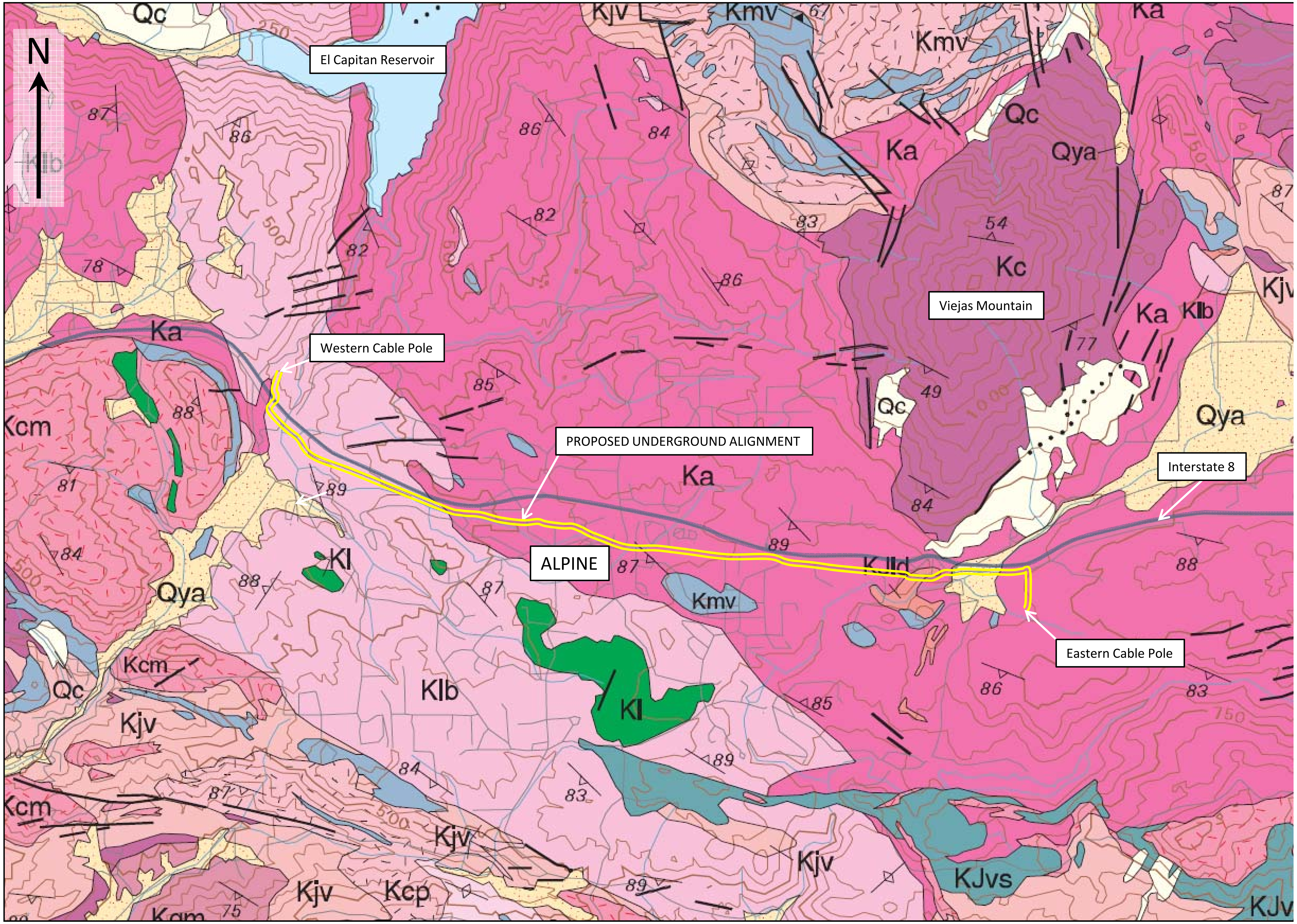
San Diego

June 2009

Figure

2

P:\GIS\SC0368_SDGE\Task14_Sunrise\SunriseSitePlanAndExplorations.mxd;JLarson;SC0368-16-05



DESCRIPTION OF MAP UNITS

Qya	Young Alluvium
Qc	Colluvium
Kl	Lusardi Formation (Late Cretaceous)
Klb	Tonalite of Las Bancas (Early Cretaceous)
Kc	Cuyamaca Gabbro (Early Cretaceous)
Kcm	Corte Madera Monzogranite (Early Cretaceous)
Kcp	Chiquito Peak Monzogranite (Early Cretaceous)
Kjv	Japatul Valley Tonalite (Early Cretaceous)
Ka	Tonalite of Alpine (Early Cretaceous)
KJld	Leucocratic dikes (Late Cretaceous and Late Jurassic)
Kmv	Metavolcanic rocks(Early Cretaceous)
KJvs	Metavolcanic and metasedimentary rocks (Cretaceous and Jurassic)

Strike and dip of bedding

⊕ Horizontal

20 Inclined

Strike and dip of foliation, primary igneous

50 Inclined

Vertical

SCALE

1.0 0.5 0 1.0 2.0 Miles

Contact—Solid where accuracy of location ranges from well located to approximately located; dashed where very poorly located or inferred. Color change without a contact shown is a scratch boundary

70

Fault—Solid where accurately located, dashed where approximately located, dotted where concealed. Arrow and number indicate direction and amount of dip.

Anticline—Solid where accurately located, dashed where approximately located, dotted where concealed.

Syncline—Solid where accurately located, dotted where concealed, dashed where inferred.

Reference: Todd, V.R., 2004. "Preliminary Geologic Map of the El Cajon 30' x 60' Quadrangle, Southern California", California Geological Survey Open-File Report 2004-1361, Southern California Areal Mapping Project, version 1.0. Original map scale 1:100,000.

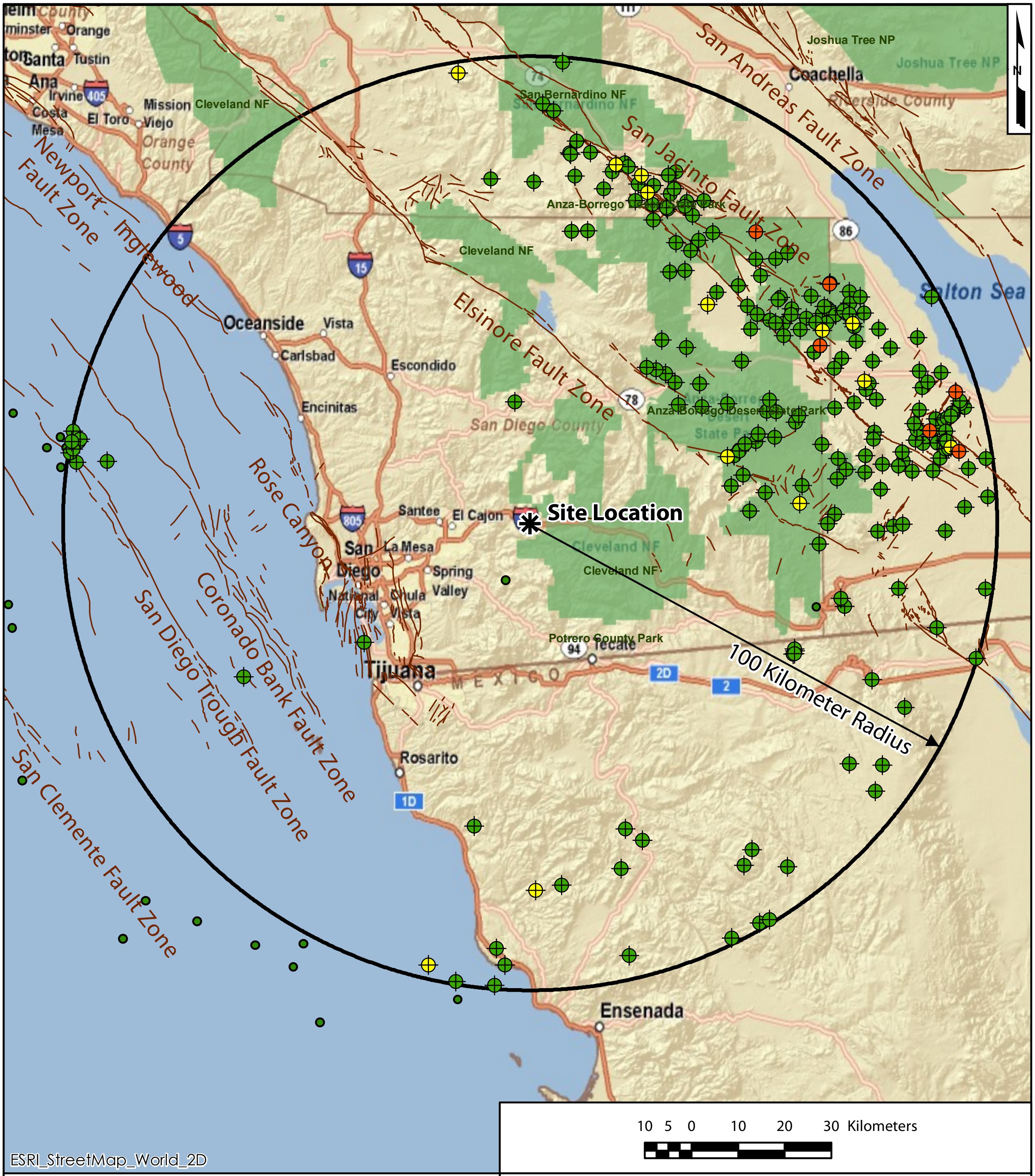
Regional Geologic Map
Sunrise Powerlink Project
230kV Underground – Alpine, California

Geosyntec consultants

DATE: May 2009

PROJECT NO. SC0368-16-05

Figure 3



Legend

Reported Earthquake Magnitudes 1932 - 2008

- 🟩 4.0 - 4.99
- 🟨 5.0 - 5.99
- 🟥 6.0 - 6.6
- ― Fault

Data Source: Southern California Earthquake Data Center

Image Source: ArcOnline NGS_Topo_US_2D

Regional Fault and Epicenter Map
Sunrise Powerlink Project
230 kV Underground

Alpine, California

Geosyntec consultants

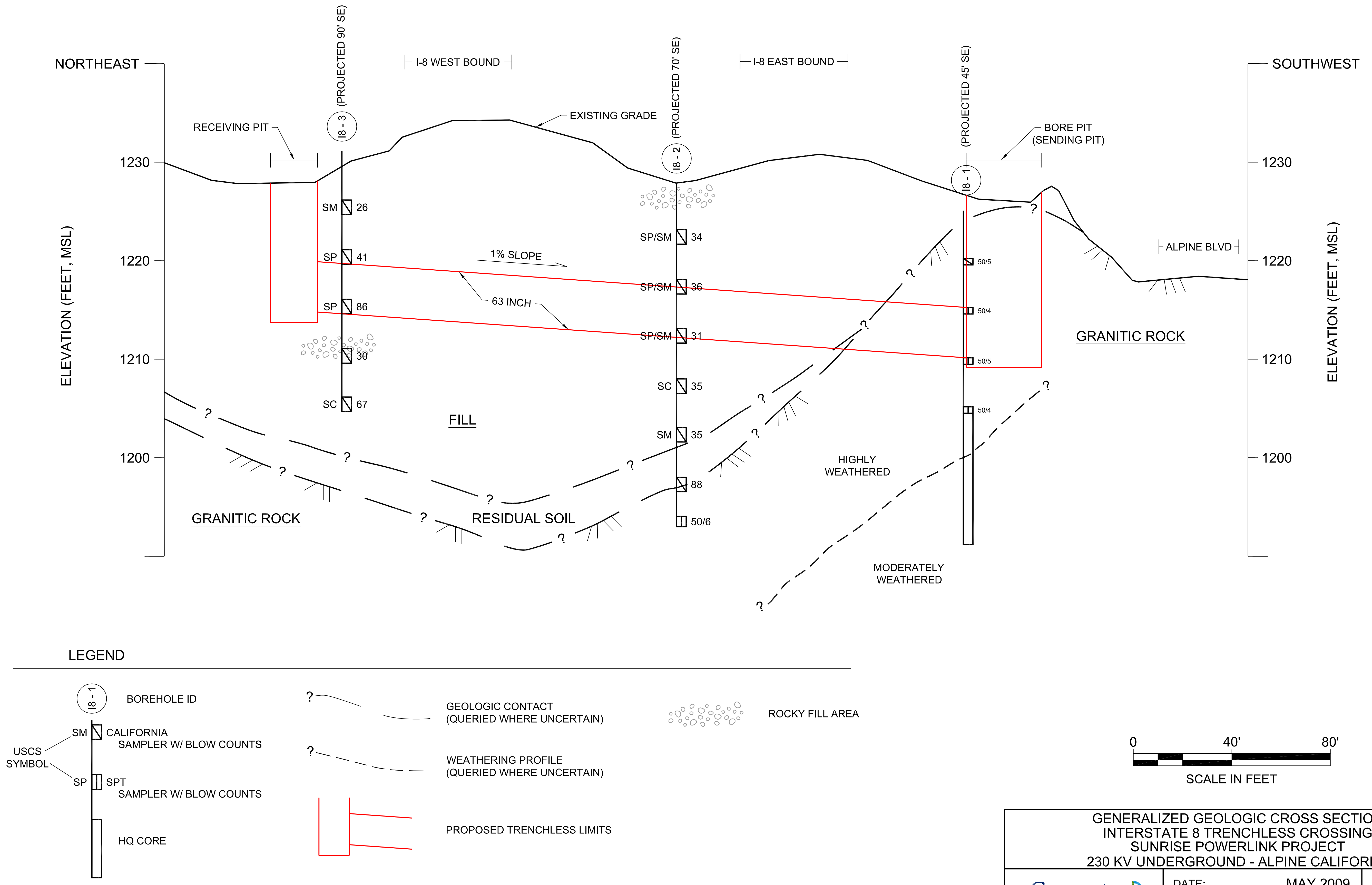
San Diego

May 2009

Figure

4

P:\GIS\SC0368_SDGEAlpine_Seismic.mxd;Jlarso;May2009



GENERALIZED GEOLOGIC CROSS SECTION
INTERSTATE 8 TRENCHLESS CROSSING
SUNRISE POWERLINK PROJECT
230 KV UNDERGROUND - ALPINE CALIFORNIA

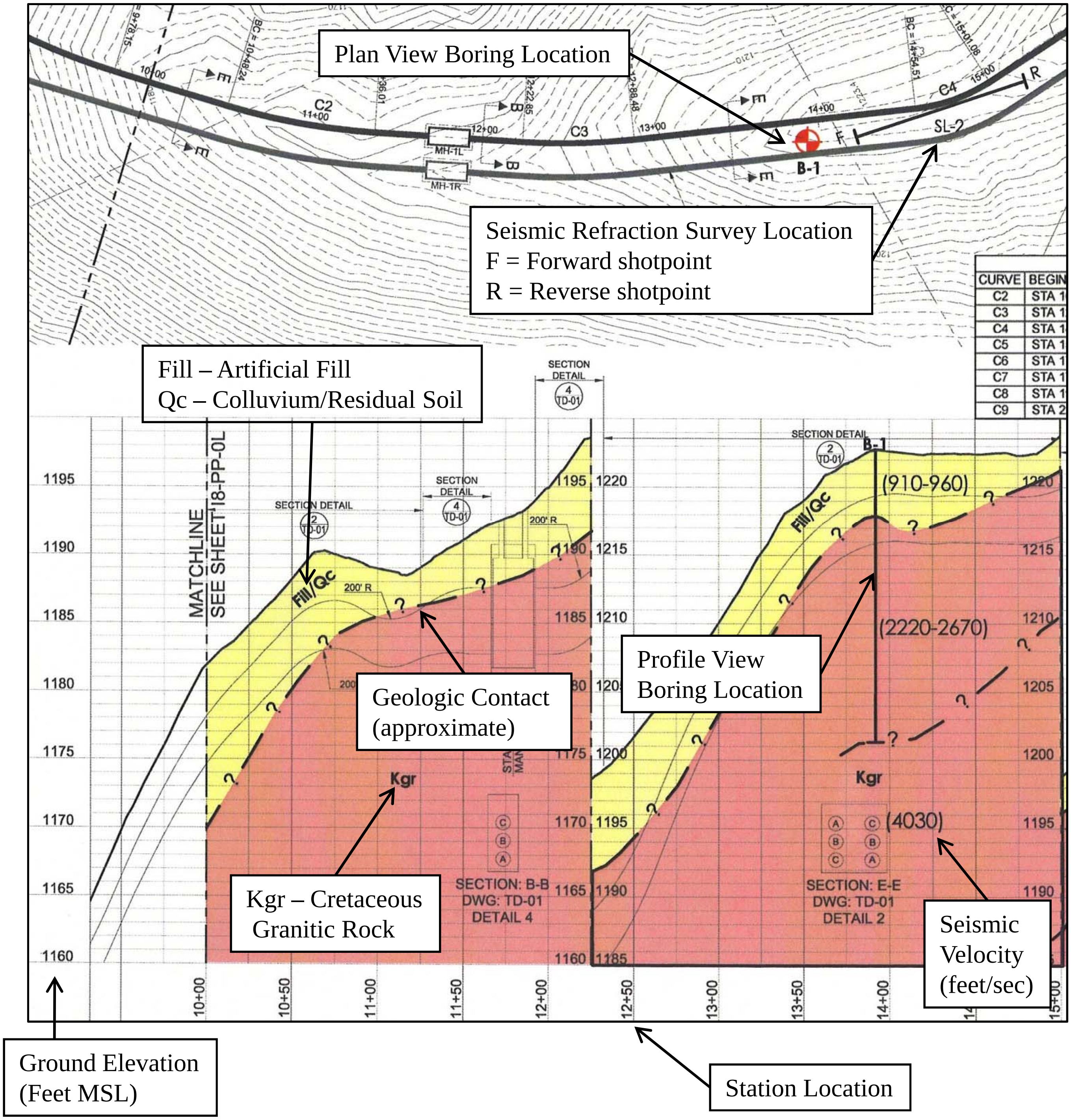
Geosyntec consultants

DATE:	MAY 2009	FIGURE 5
PROJECT NO.	SC0368-16-05	

P:\PRJ\SDCadd\CADD\SC0368 SDG&E\SC0368_Figures 5_ Generalized Geologic Cross Section.dwg

APPENDIX A

Geologic Profiles



Plan View Boring Location

Seismic Refraction Survey Location
F = Forward shotpoint
R = Reverse shotpoint

Fill – Artificial Fill
Qc – Colluvium/Residual Soil

Geologic Contact
(approximate)

Profile View
Boring Location

Kgr – Cretaceous
Granitic Rock

Seismic
Velocity
(feet/sec)

Ground Elevation
(Feet MSL)

Station Location

Note: Interpreted geologic profiles presented along Left (Northern) alignment. Subsurface interpretation may vary along Right (Southern) alignment. Base plan and profile from 100 percent design drawings dated May 22, 2009.

KEY – GEOLOGIC PROFILES

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants	DATE: JUNE 2009	FIGURE
	PROJECT NO. SC0368	A-1

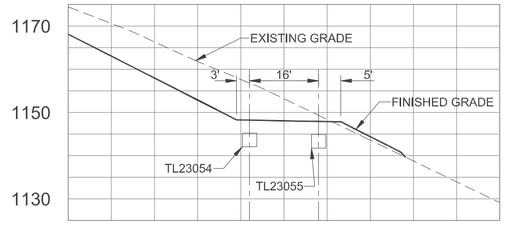
230KV XLPE UG CABLE

MANHOLE NO. OR CABLE TERMINATION		CONDUCTOR SIZE	CIRCUIT LENGTH IN FEET
FROM	TO		
TOP A PHASE RISER STRUCTURE	MH 1L	4000 kcmil	894 (R to MH + 140)
MH 1L	MH 2L	4000 kcmil	1201
MH 2L	MH 3L	4000 kcmil	1664
MH 3L	MH 4L	4000 kcmil	1721
MH 4L	MH 5L	4000 kcmil	1904
MH 5L	MH 6L	4000 kcmil	1567
MH 6L	MH 7L	4000 kcmil	1661
MH 7L	MH 8L	4000 kcmil	1766
MH 8L	MH 9L	4000 kcmil	1544
MH 9L	MH 10L	4000 kcmil	1578
MH 10L	MH 11L	4000 kcmil	1735
MH 11L	MH 12L	4000 kcmil	1513
MH 12L	MH 13L	4000 kcmil	1646
MH 13L	MH 14L	4000 kcmil	1753
MH 14L	MH 15L	4000 kcmil	1416
MH 15L	MH 16L	4000 kcmil	1686
MH 16L	MH 17L	4000 kcmil	1528
MH 17L	MH 18L	4000 kcmil	1741
MH 18L	MH 19L	4000 kcmil	1861
MH 19L	MH 20L	4000 kcmil	1932
MH 20L	TOP A PHASE RISER STRUCTURE	4000 kcmil	771 (MH to R + 140)
TOTAL CIRCUIT LENGTH			33,082

NOTE:
1. FINISHED GRADE BY OTHERS.

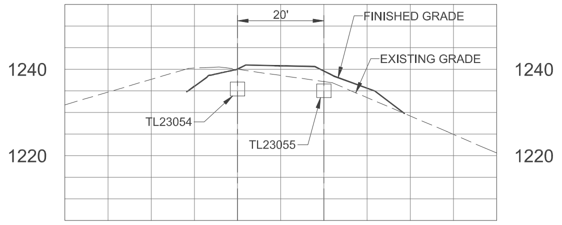
CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C1	STA 7+39.51	STA 7+95.31	55.80	15d59'3"	200	28.08
C2	STA 8+66.13	STA 12+29.08	362.95	74d0'18"	281	211.77

STATION 9+80±



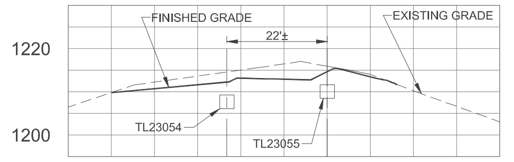
CROSS SECTION A-A
(SEE ABOVE)
SCALE: 1"=20'

STATION 16+60±

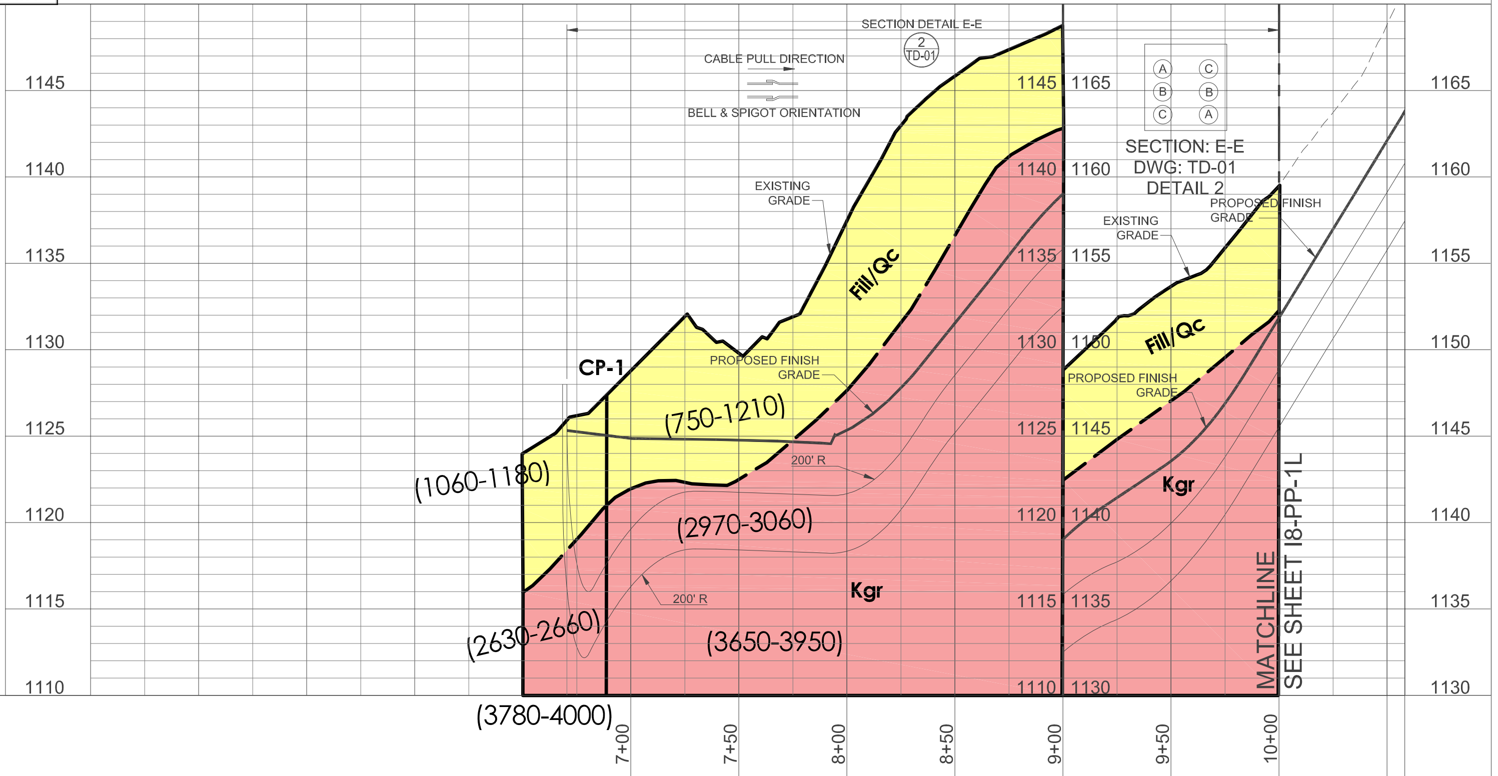


CROSS SECTION C-C
(SEE I8-PP-1L)
SCALE: 1"=20'

STATION 13+25±



CROSS SECTION B-B
(SEE I8-PP-1L)
SCALE: 1"=20'



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/15/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

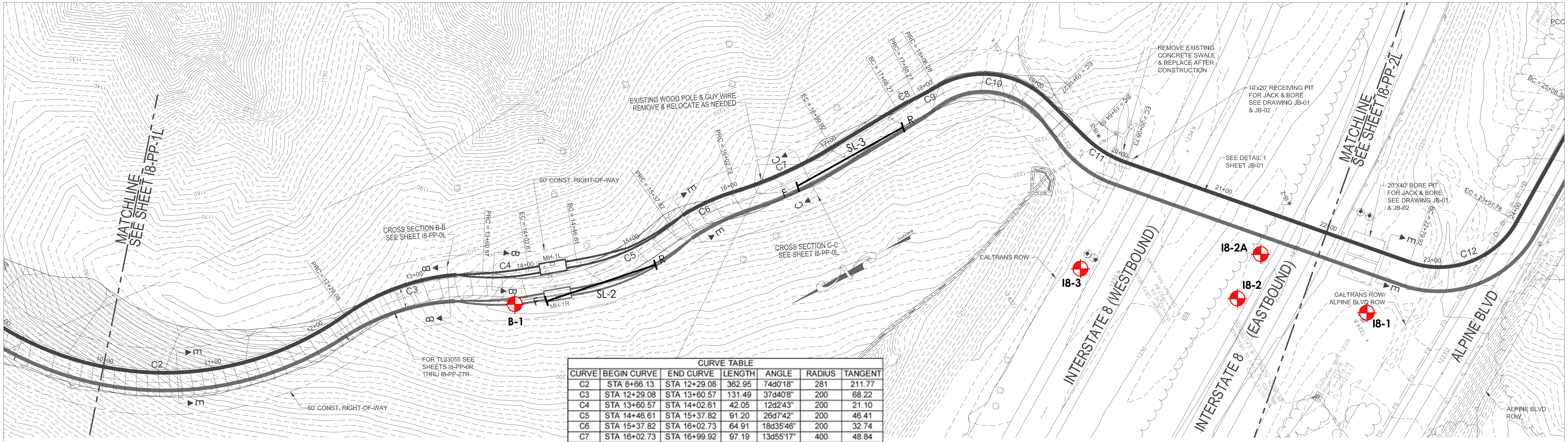
0 5'
1"=5'
VERTICAL SCALE

SDG&E
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

PLAN AND PROFILE
TL23054

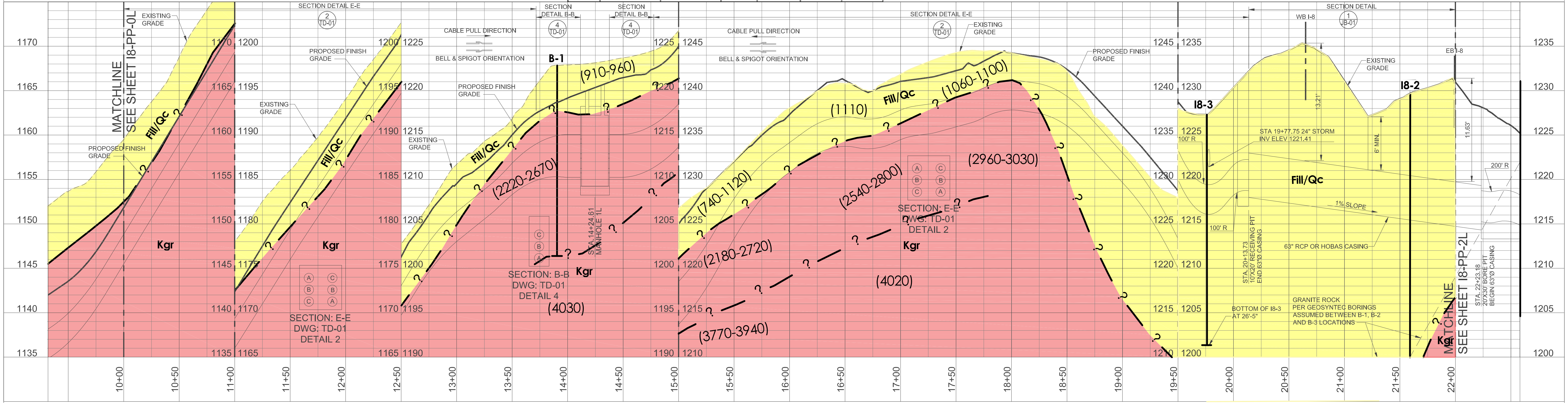
INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 6+70.45 TO STA 10+00

SHEET: 1 - 28
I8-PP-0L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C2	STA 8+66.13	STA 12+29.08	362.95	74d0'18"	281	211.77
C3	STA 12+29.08	STA 13+60.57	131.49	37d40'8"	200	68.22
C4	STA 13+60.57	STA 14+02.61	42.05	12d2'43"	200	21.10
C5	STA 14+46.61	STA 15+37.82	91.20	26d7'42"	200	46.41
C6	STA 15+37.82	STA 16+02.73	64.91	18d35'46"	200	32.74
C7	STA 16+02.73	STA 16+99.92	97.19	13d55'17"	400	48.84
C8	STA 17+68.27	STA 17+88.27	20.01	5d43'55"	200	10.01
C9	STA 17+88.27	STA 18+08.28	20.01	5d43'55"	200	10.01
C10	STA 18+08.28	STA 19+18.27	109.99	75d55'30"	83	64.76
C11	STA 19+64.53	STA 20+08.73	44.20	25d19'36"	100	22.47

NOTE:
1. FINISHED GRADE BY OTHERS.



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NOT TO BE USED
FOR CONSTRUCTION

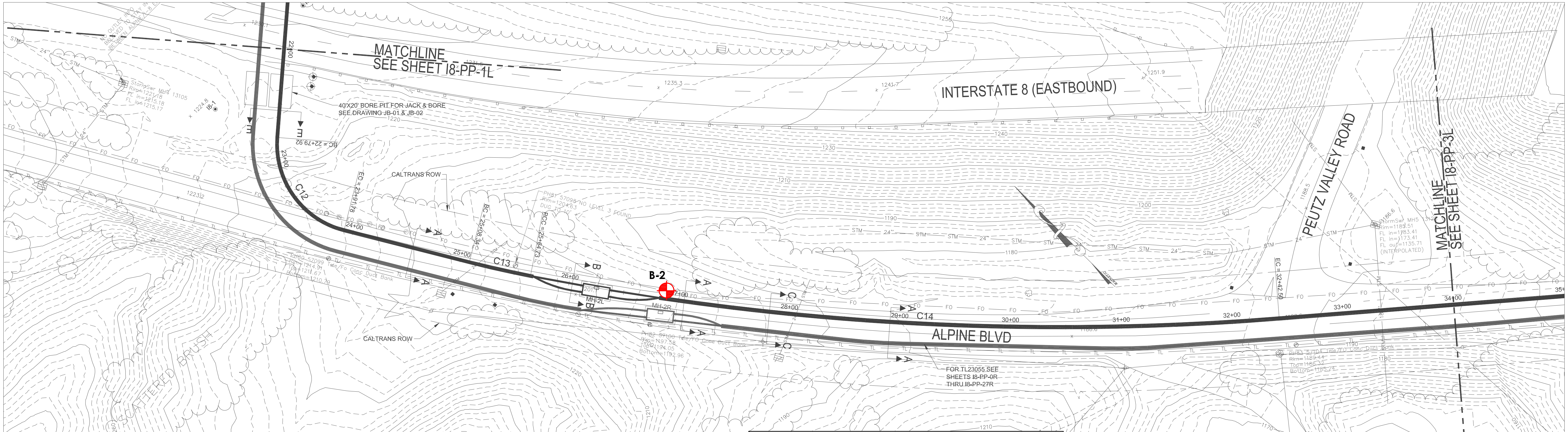
REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/15/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

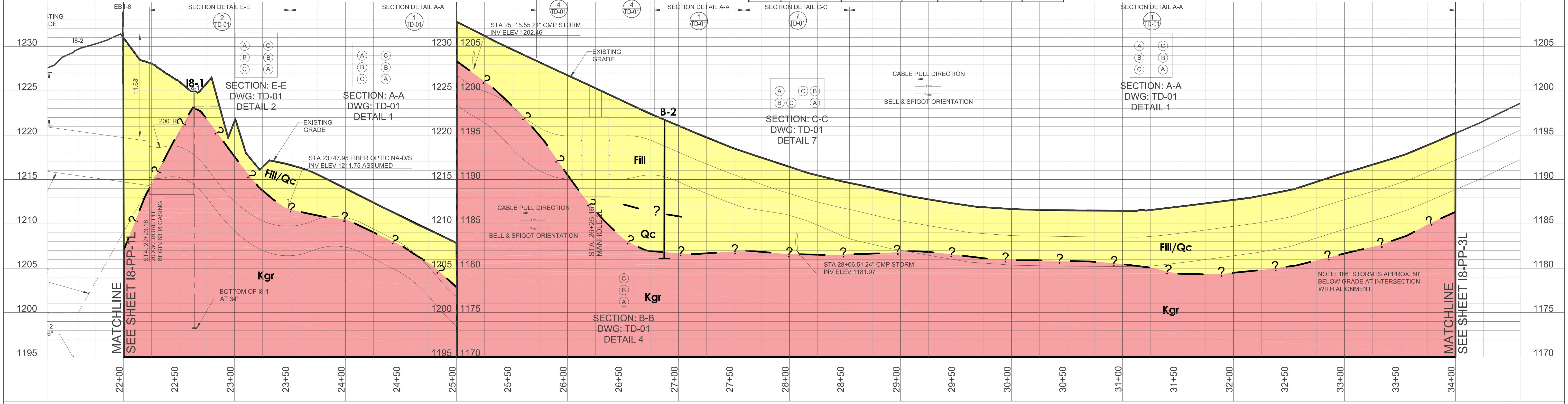
0 40' 1"=40' HORIZONTAL SCALE
0 5' 1"=5' VERTICAL SCALE

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 10+00 TO STA 22+00
SHEET: 2 - 28
I8-PP-1L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C12	STA 22+79.92	STA 23+91.78	111.85	80d6'36"	80	67.26
C13	STA 25+08.34	STA 25+64.73	56.39	3d13'52"	1000	28.20
C14	STA 25+64.73	STA 32+42.50	677.76	15d31'59"	2500	340.97



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SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

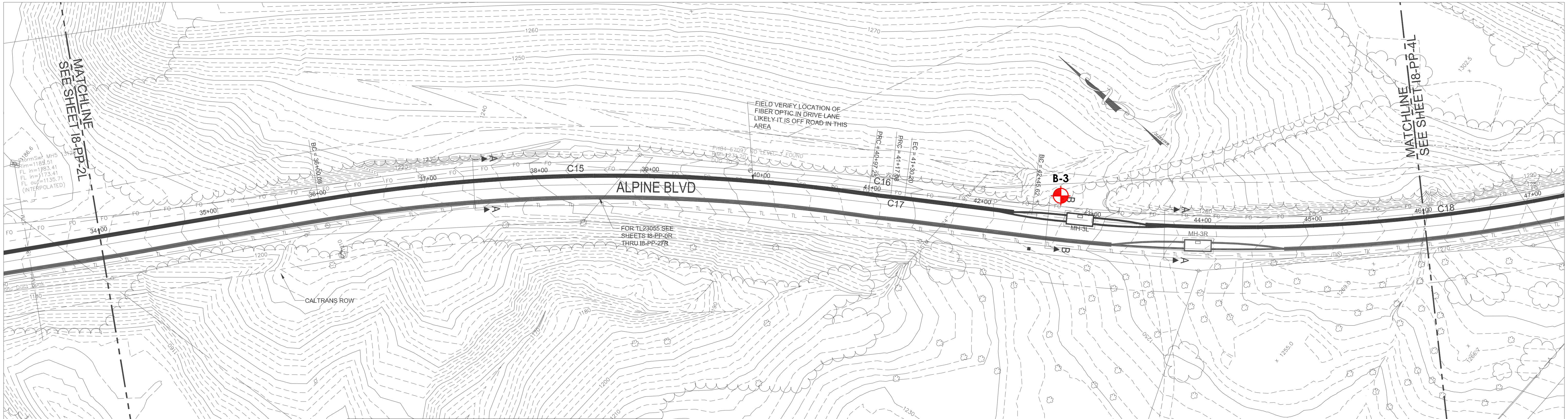
0 40'
1"=40'
HORIZONTAL SCALE
0 5'
1"=5'
VERTICAL SCALE

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

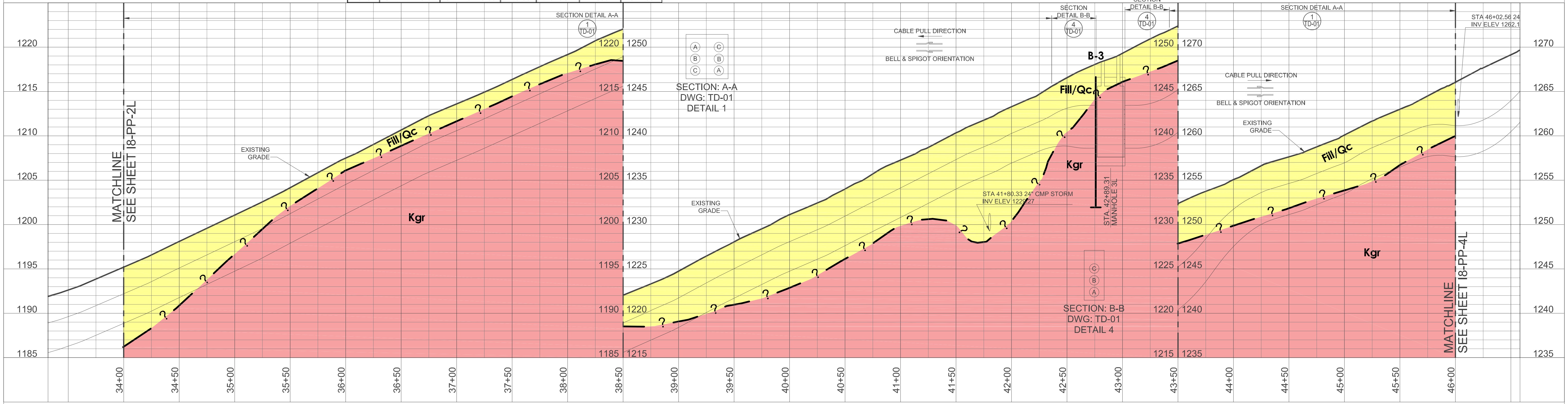
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 22+00 TO STA 34+00

SHEET: 3 - 28
I8-PP-2L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C15	STA 36+00.08	STA 40+97.25	497.17	17d48'13"	1600	250.60
C16	STA 40+97.25	STA 41+17.68	20.43	2d55'36"	400	10.22
C17	STA 41+17.68	STA 41+30.20	12.52	1d47'34"	400	6.26
C18	STA 42+45.62	STA 49+73.65	728.03	27d48'31"	1500	371.33



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FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

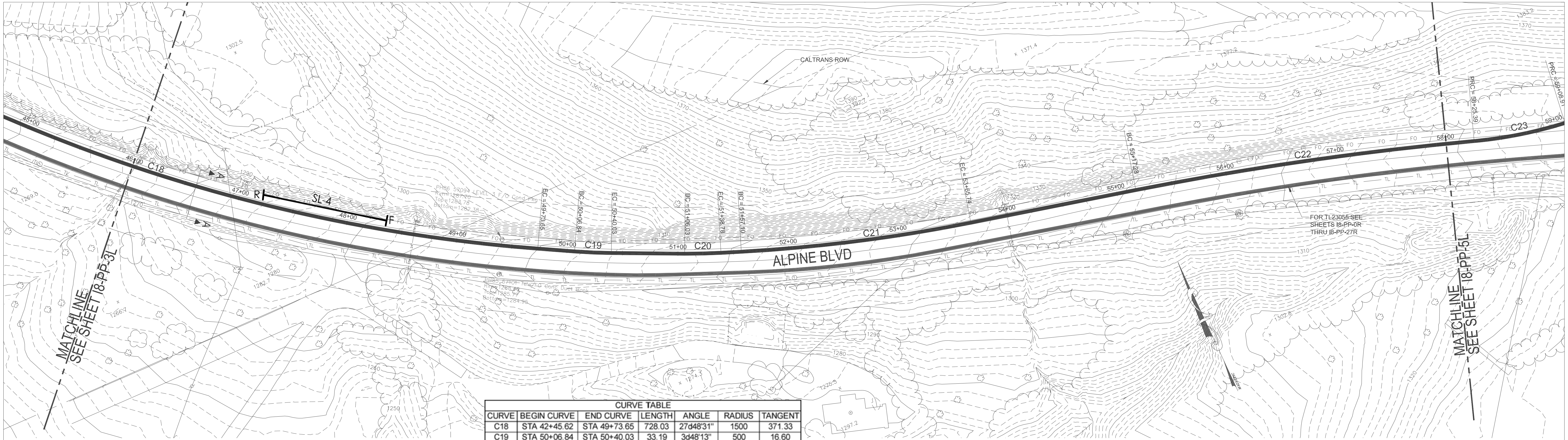
0 5'
1"=5'
VERTICAL SCALE

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

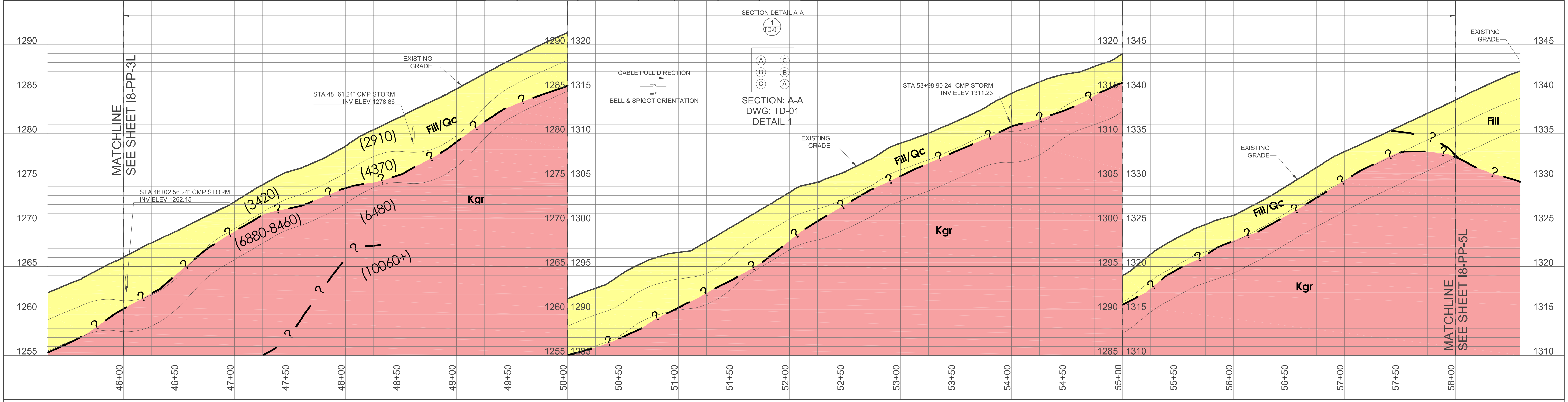
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 34+00 TO STA 46+00

SHEET: 4 - 28
I8-PP-3L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C18	STA 42+45.62	STA 49+73.65	728.03	27d48'31"	1500	371.33
C19	STA 50+06.84	STA 50+40.03	33.19	3d48'13"	500	16.60
C20	STA 51+06.03	STA 51+38.78	32.75	3d45'10"	500	16.38
C21	STA 51+57.10	STA 53+65.74	208.64	7d58'10"	1500	104.49
C22	STA 55+17.28	STA 58+25.39	308.11	5d53'4"	3000	154.19
C23	STA 58+25.39	STA 59+08.91	83.52	11d57'50"	400	41.91



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SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL “RIGHT” (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
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REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

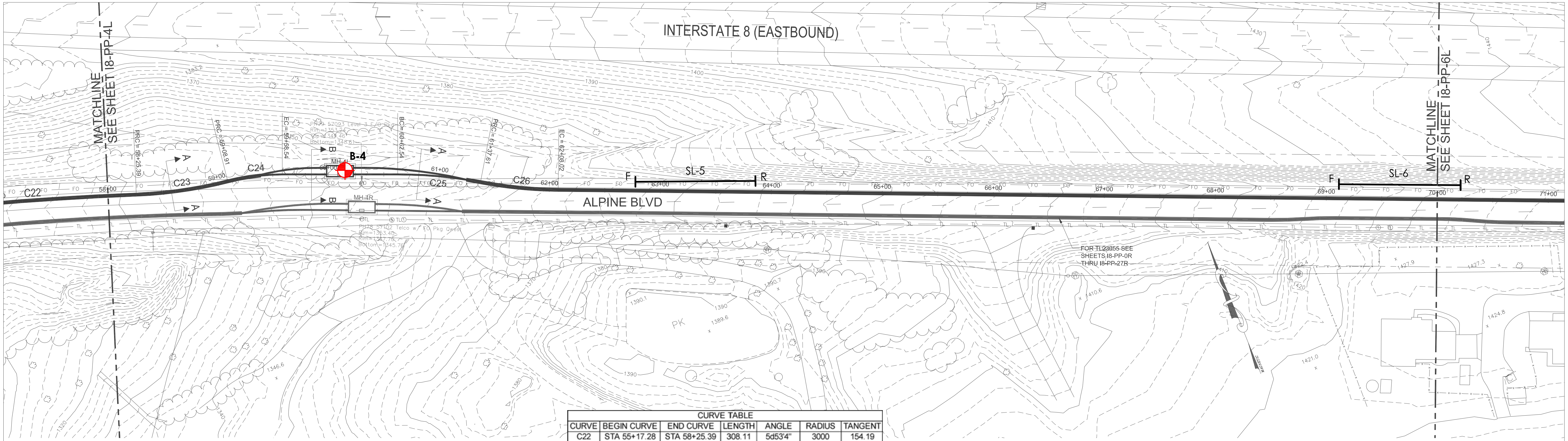
0 5'
1"=5'
VERTICAL SCALE

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

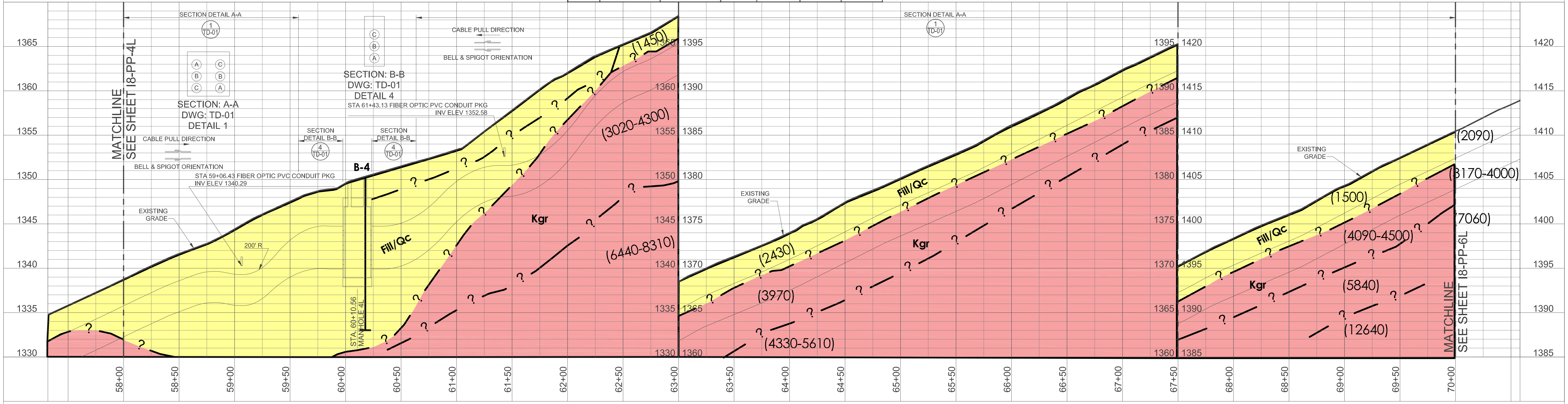
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 46+00 TO STA 58+00

SHEET: 5 - 28
I8-PP-4L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C22	STA 55+17.28	STA 58+25.39	308.11	5d53'4"	3000	154.19
C23	STA 58+25.39	STA 59+08.91	83.52	11d57'50"	400	41.91
C24	STA 59+08.91	STA 59+58.54	49.63	14d13'3"	200	24.94
C25	STA 60+62.54	STA 61+37.61	75.06	10d45'7"	400	37.64
C26	STA 61+37.61	STA 62+08.02	70.41	10d5'10"	400	35.30



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SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL “RIGHT” (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

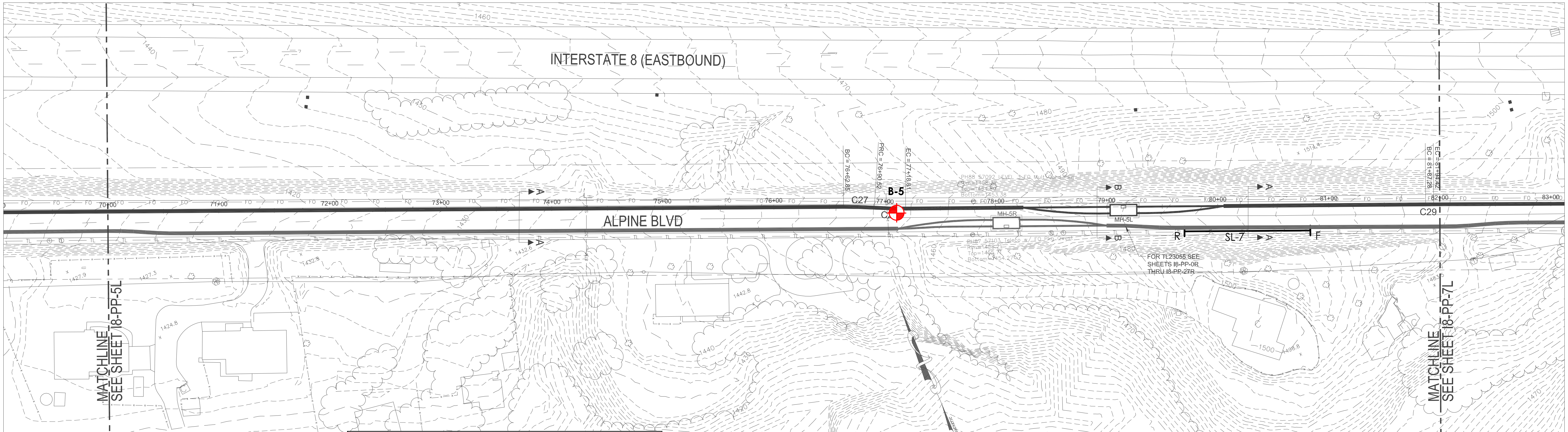
0 5'
1"=5'
VERTICAL SCALE

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

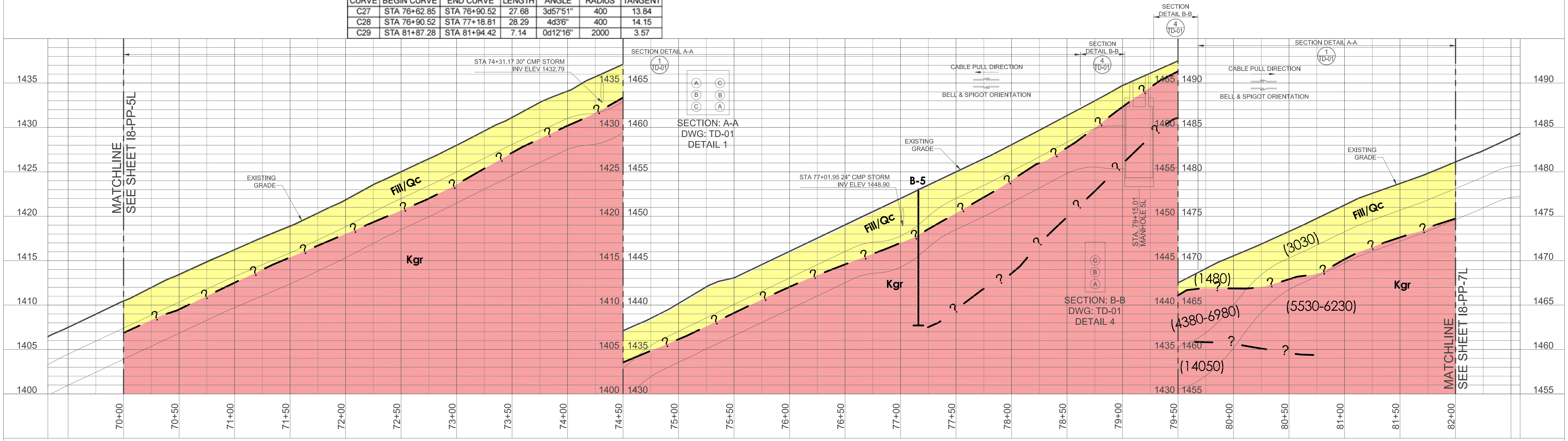
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 58+00 TO STA 70+00

SHEET: 6 - 28
I8-PP-5L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C27	STA 76+62.85	STA 76+90.52	27.68	3d57'51"	400	13.84
C28	STA 76+90.52	STA 77+18.81	28.29	4d3'6"	400	14.15
C29	STA 81+87.28	STA 81+94.42	7.14	0d12'16"	2000	3.57



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NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

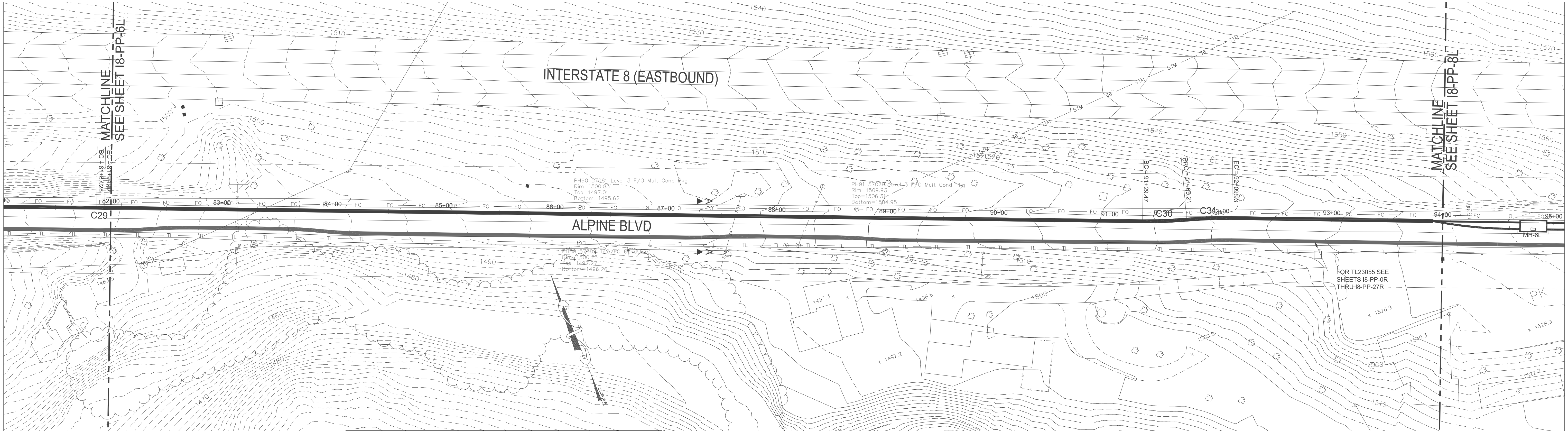
0 40' 1"=40' HORIZONTAL SCALE
0 5' 1"=5' VERTICAL SCALE

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

PLAN AND PROFILE
TL23054

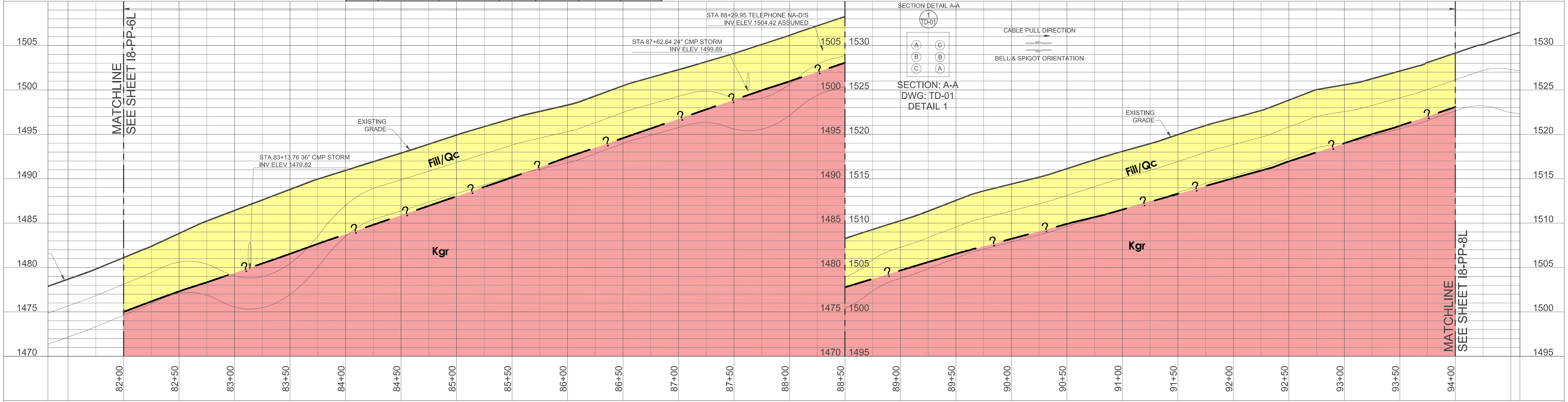
INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 70+00 TO STA 82+00

SHEET: 7 - 28 I8-PP-6L



CURVE TABLE

CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C29	STA 81+87.28	STA 81+94.42	7.14	0d12'16"	2000	3.57
C30	STA 91+29.47	STA 91+69.21	39.74	5d41'32"	400	19.89
C31	STA 91+69.21	STA 92+09.93	40.72	5d49'57"	400	20.38



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT.
SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND
PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

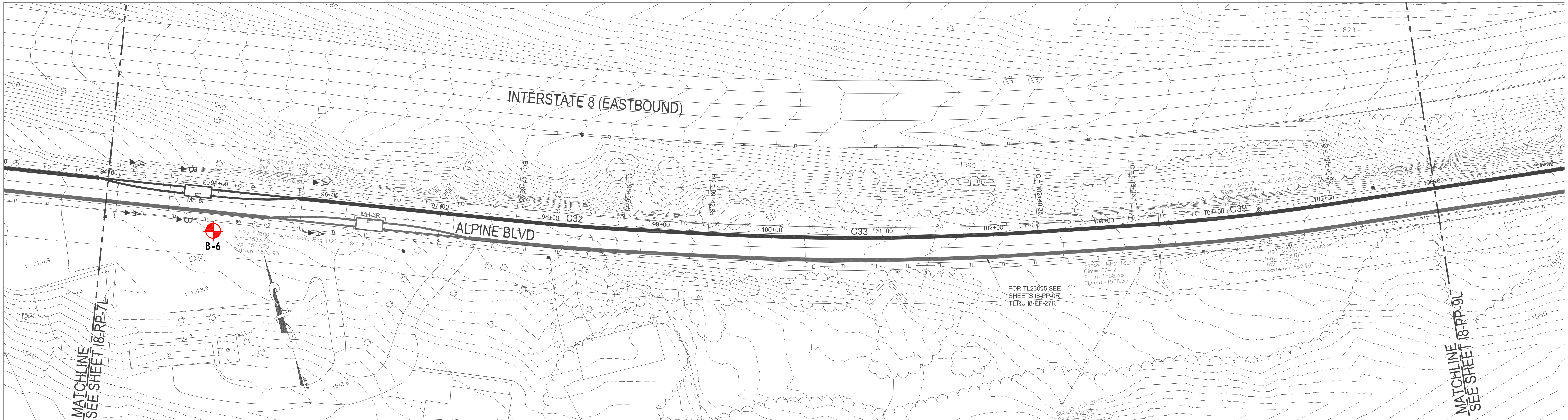
0 40'
1"=40'
HORIZONTAL SCALE
0 5'
1"=5'
VERTICAL SCALE

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

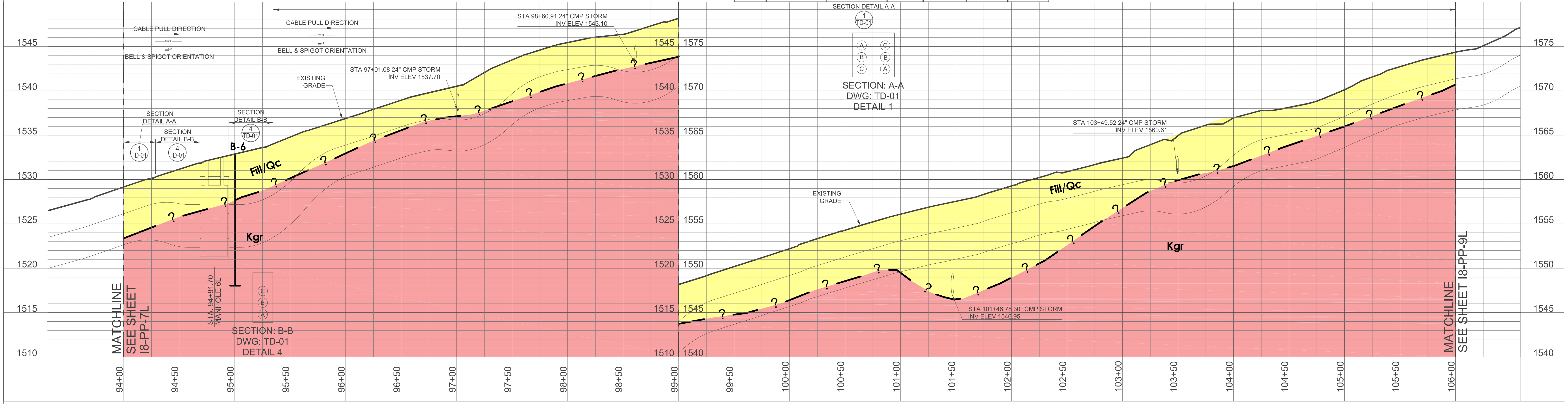
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 82+00 TO STA 94+00

SHEET: 8 - 28
I8-PP-7L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C32	STA 97+69.35	STA 98+66.58	97.23	2d47'8"	2000	48.63
C33	STA 100+84.42	STA 102+40.38	297.44	6d52'18"	2480	148.90
C34-C38 REMOVED FROM ALIGNMENT						
C39	STA 103+26.15	STA 105+05.92	179.77	4d54'18"	2100	89.94



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
				BLACK & VEATCH CORPORATION				SDG&E	

C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
				BLACK & VEATCH CORPORATION				SDG&E	

0 40' 1"=40' HORIZONTAL SCALE

0 5' 1"=5' VERTICAL SCALE

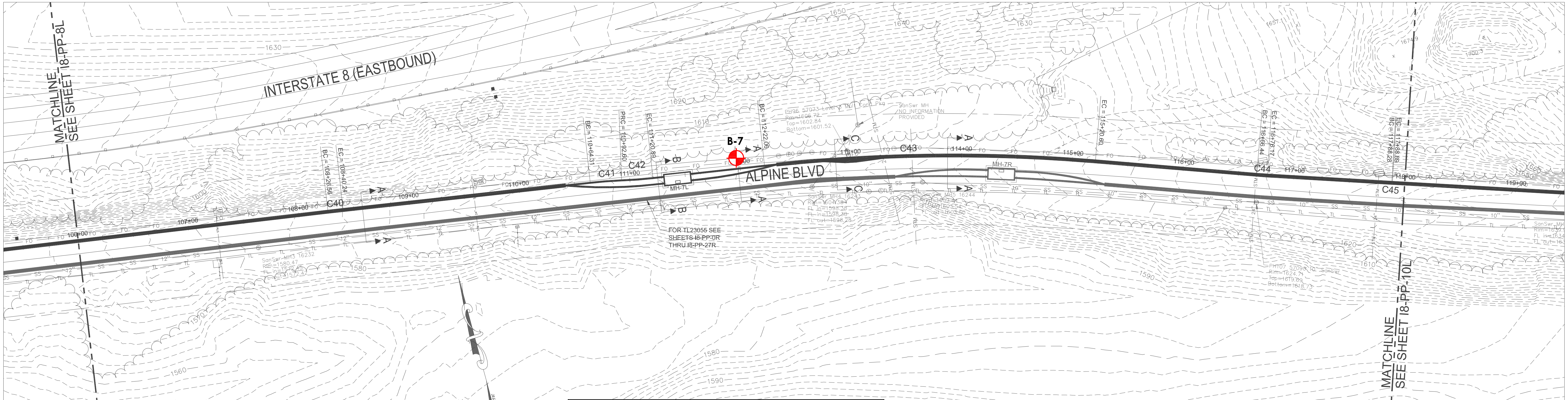
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

PLAN AND PROFILE
TL23054

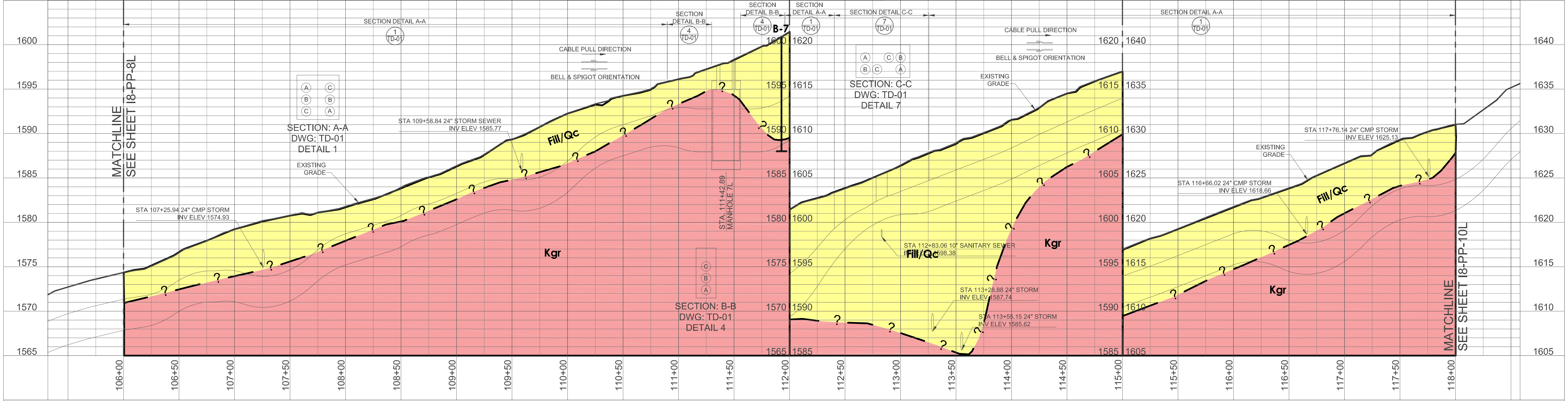
INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 94+00 TO STA 106+00

SHEET: 9 - 28

I8-PP-8L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C40	STA 108+26.56	STA 108+40.24	13.68	0d23'31"	2000	6.84
C41	STA 110+64.31	STA 110+92.60	28.29	4d3'8"	400	14.15
C42	STA 110+92.60	STA 111+20.89	28.29	4d3'8"	400	14.15
C43	STA 112+22.06	STA 115+20.60	298.54	11d2'8"	1550	149.73
C44	STA 116+66.44	STA 116+76.17	9.73	1d23'36"	400	4.86
C45	STA 117+88.28	STA 117+88.89	0.61	0d5'14"	400	0.30



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG “LEFT” (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL “RIGHT” (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

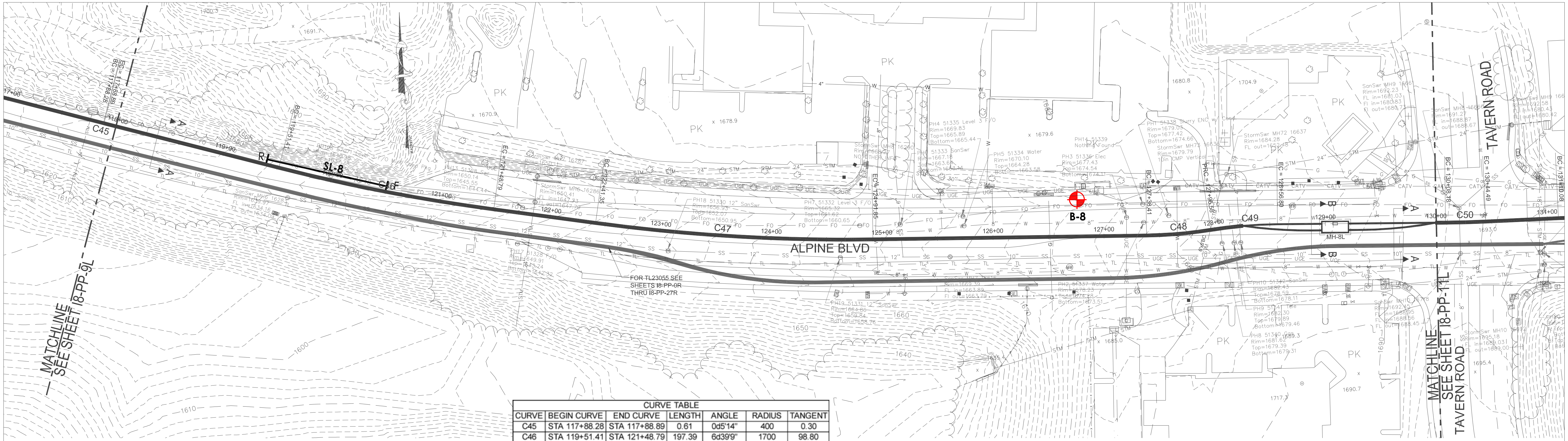
0 5'
1"=5'
VERTICAL SCALE

SDG&E
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

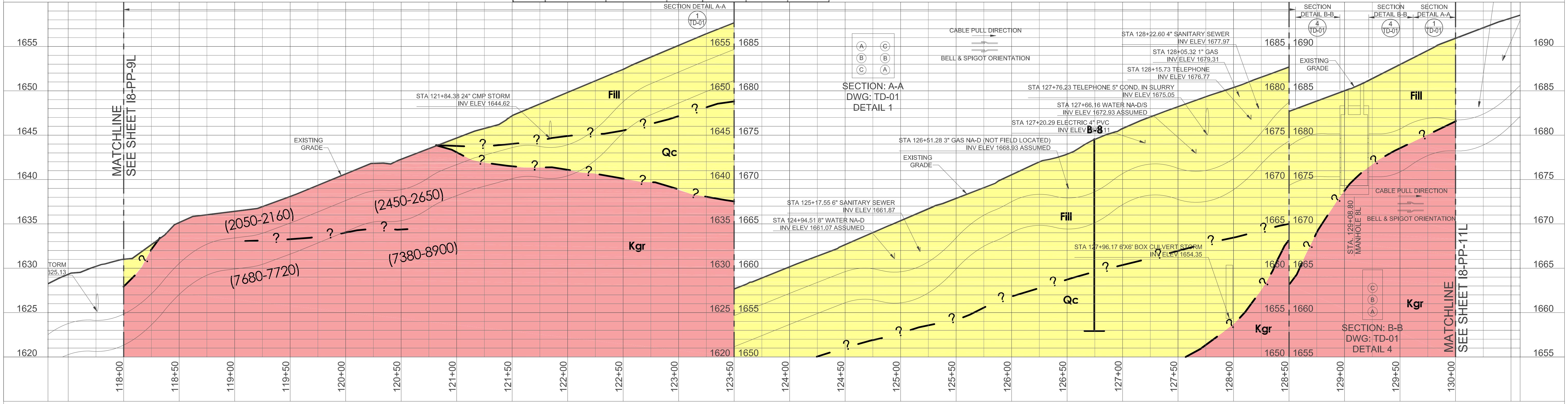
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 106+00 TO STA 118+00

SHEET: 10 - 28
I8-PP-9L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C45	STA 117+88.28	STA 117+88.89	0.61	0d5'14"	400	0.30
C46	STA 119+51.41	STA 121+48.79	197.39	6d39'9"	1700	98.80
C47	STA 122+41.35	STA 124+91.85	250.50	8d26'34"	1700	125.48
C48	STA 127+38.41	STA 127+96.58	58.17	8d19'56"	400	29.14
C49	STA 127+96.58	STA 128+56.80	60.22	8d37'34"	400	30.17
C50	STA 130+08.18	STA 130+44.49	36.32	2d4'51"	1000	18.16



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG “LEFT” (NORTHERN) ALIGNMENT.
SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL “RIGHT” (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
				BLACK & VEATCH CORPORATION				SDG&E	

C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

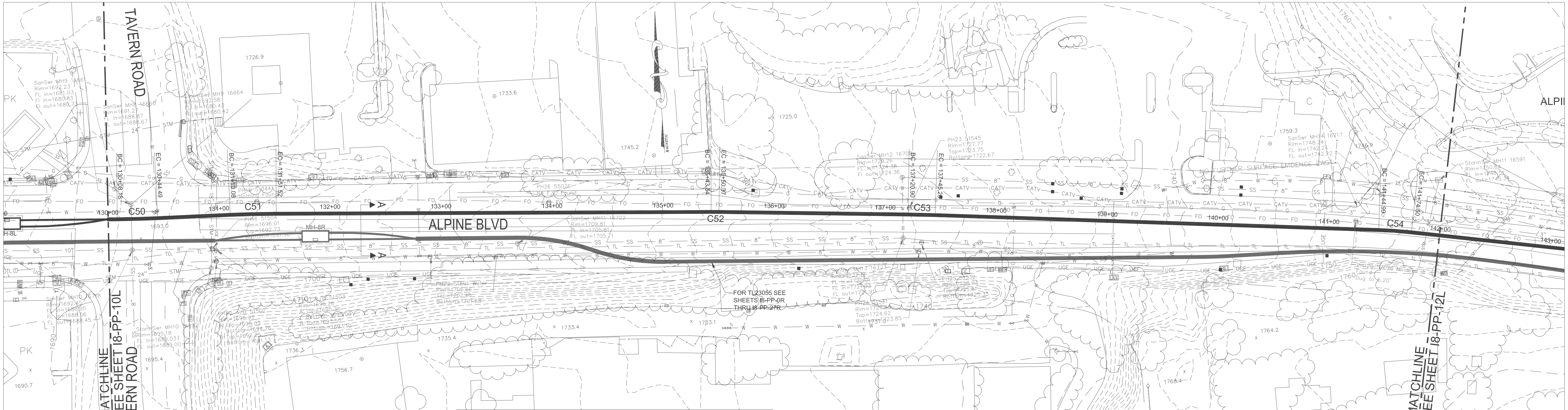
0 5'
1"=5'
VERTICAL SCALE

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

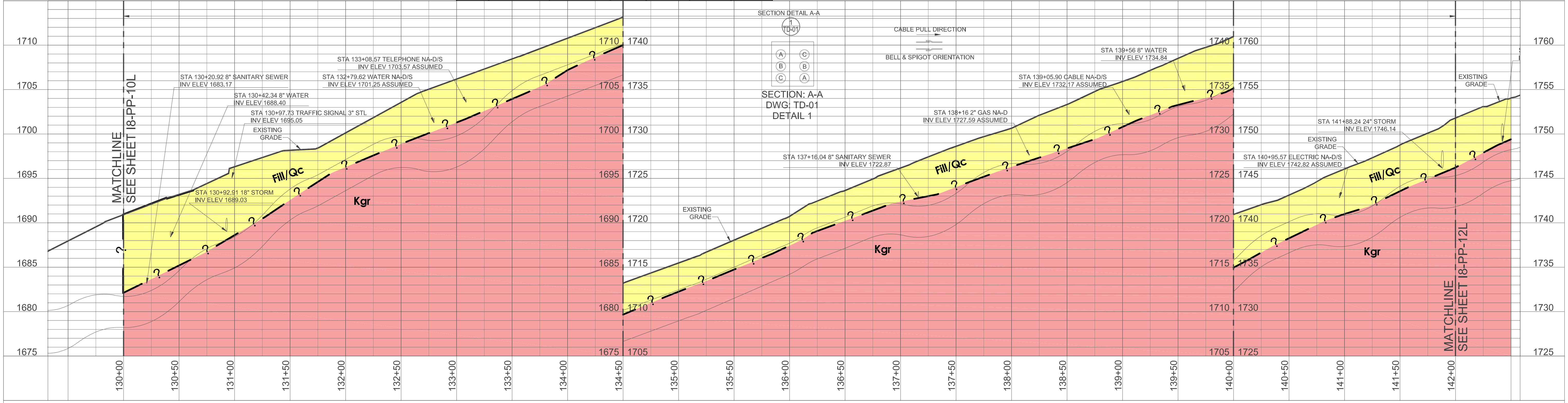
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 118+00 TO STA 130+00

SHEET: 11 - 28
I8-PP-10L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C50	STA 130+08.18	STA 130+44.49	36.32	2d4'51"	1000	18.16
C51	STA 131+10.08	STA 131+51.52	41.44	2d22'28"	1000	20.72
C52	STA 135+43.34	STA 135+50.37	7.04	1d0'29"	400	3.52
C53	STA 137+20.90	STA 137+45.20	24.30	1d9'37"	1200	12.15
C54	STA 141+44.99	STA 141+74.50	29.51	4d13'39"	400	14.76



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG “LEFT” (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL “RIGHT” (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

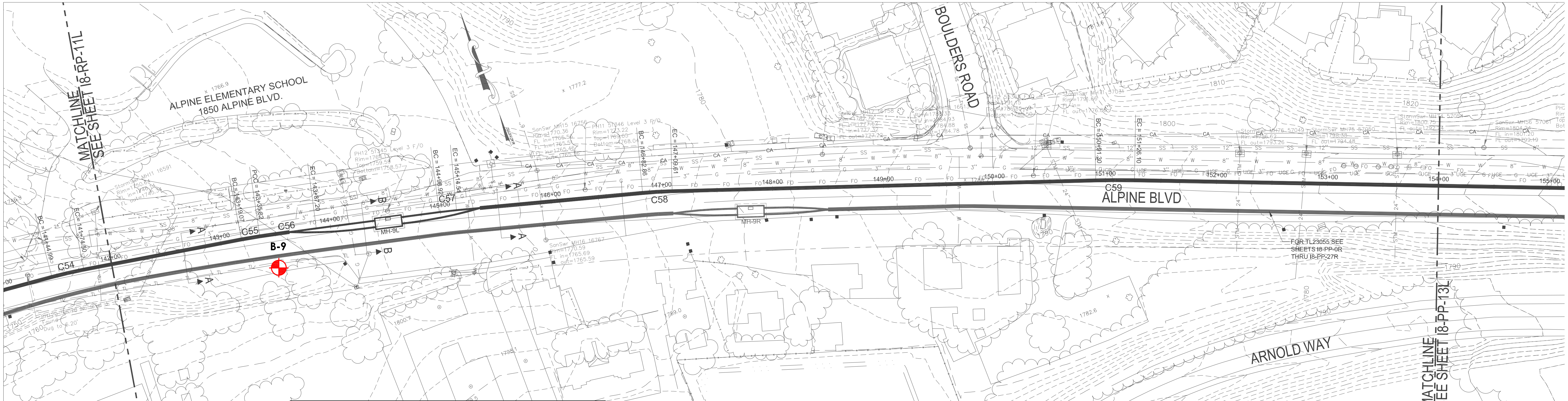
0 5'
1"=5'
VERTICAL SCALE

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

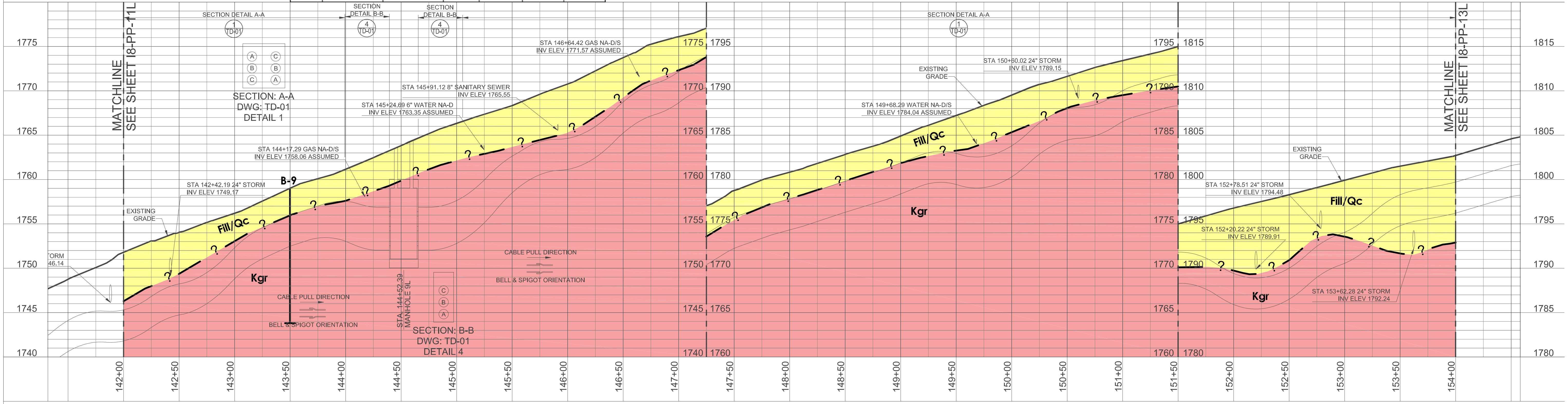
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 130+00 TO STA 142+00

SHEET: 12 - 28
I8-PP-11L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C54	STA 141+44.99	STA 141+74.50	29.51	4d13'39"	400	14.76
C55	STA 143+19.07	STA 143+35.82	16.75	2d23'56"	400	8.37
C56	STA 143+35.82	STA 143+87.20	51.38	0d55'12"	3200	25.69
C57	STA 144+98.92	STA 145+14.51	15.59	2d13'59"	400	7.80
C58	STA 146+82.86	STA 147+09.61	26.75	3d49'54"	400	13.38
C59	STA 150+91.30	STA 151+26.10	34.80	2d29'32"	800	17.40



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT.
SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

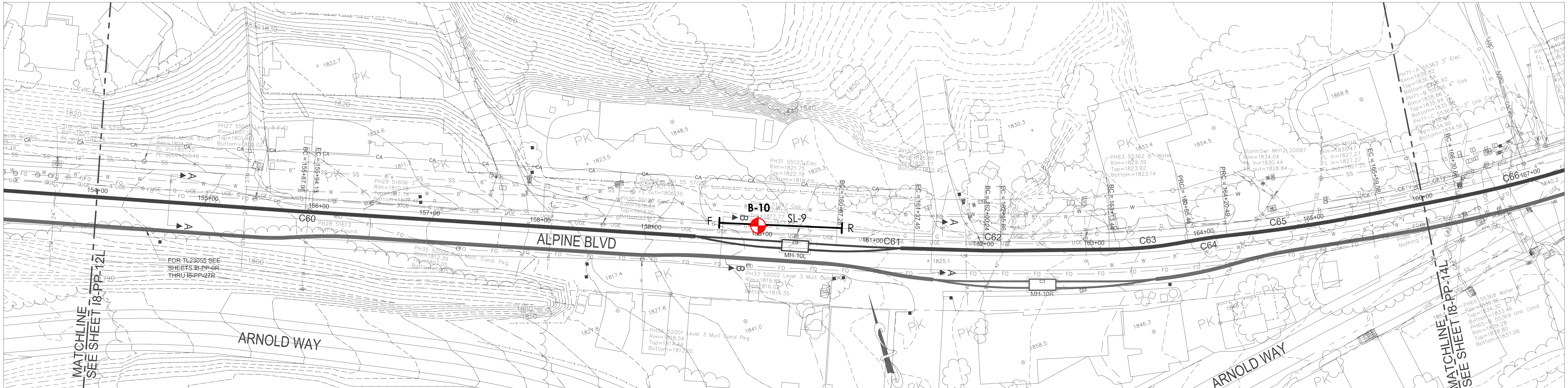
REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		

BLACK & VEATCH CORPORATION | SDG&E

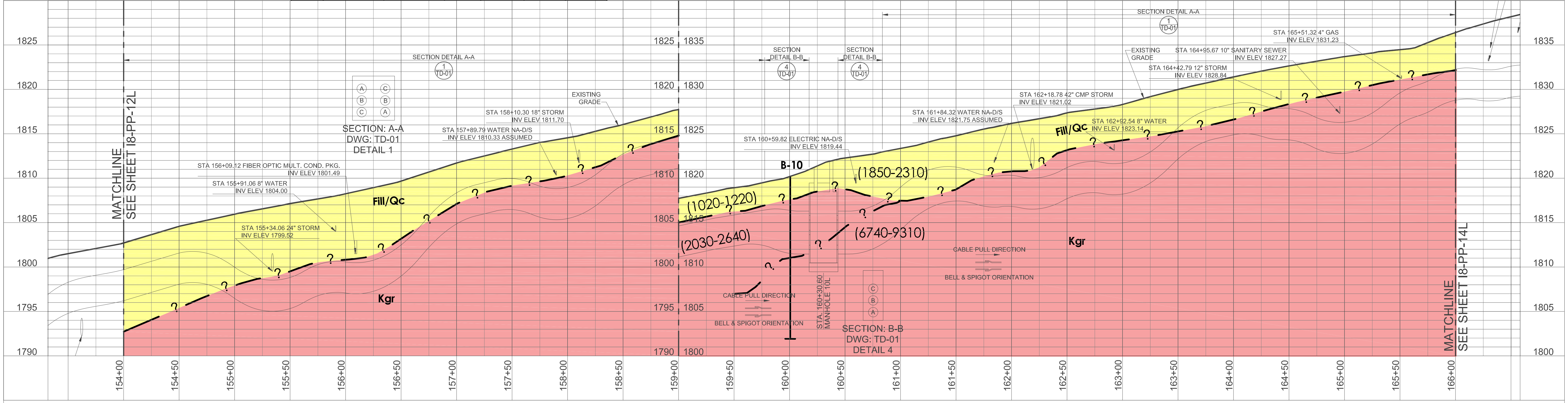
0 40' 1"=40' HORIZONTAL SCALE
0 5' 1"=5' VERTICAL SCALE

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 142+00 TO STA 154+00
SHEET: 13 - 28
I8-PP-12L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C60	STA 155+87.98	STA 155+94.13	6.15	0d26'27"	800	3.08
C61	STA 160+67.28	STA 161+37.45	70.16	2d0'36"	2000	35.09
C62	STA 162+00.24	STA 162+15.86	15.61	2d14'10"	400	7.81
C63	STA 163+13.44	STA 163+85.46	72.02	10d18'59"	400	36.11
C64	STA 163+85.46	STA 164+20.49	35.02	5d1'0"	400	17.52
C65	STA 164+20.49	STA 165+59.38	138.89	5d18'19"	1500	69.50
C66	STA 166+30.66	STA 167+52.31	121.65	6d58'12"	1000	60.90



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT.
SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

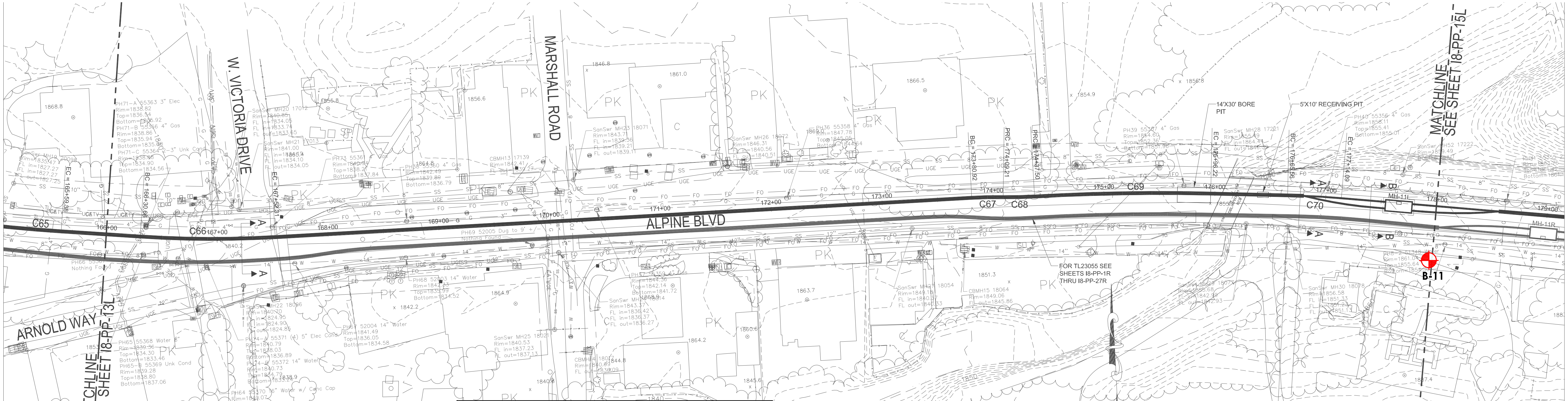
0 5'
1"=5'
VERTICAL SCALE

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

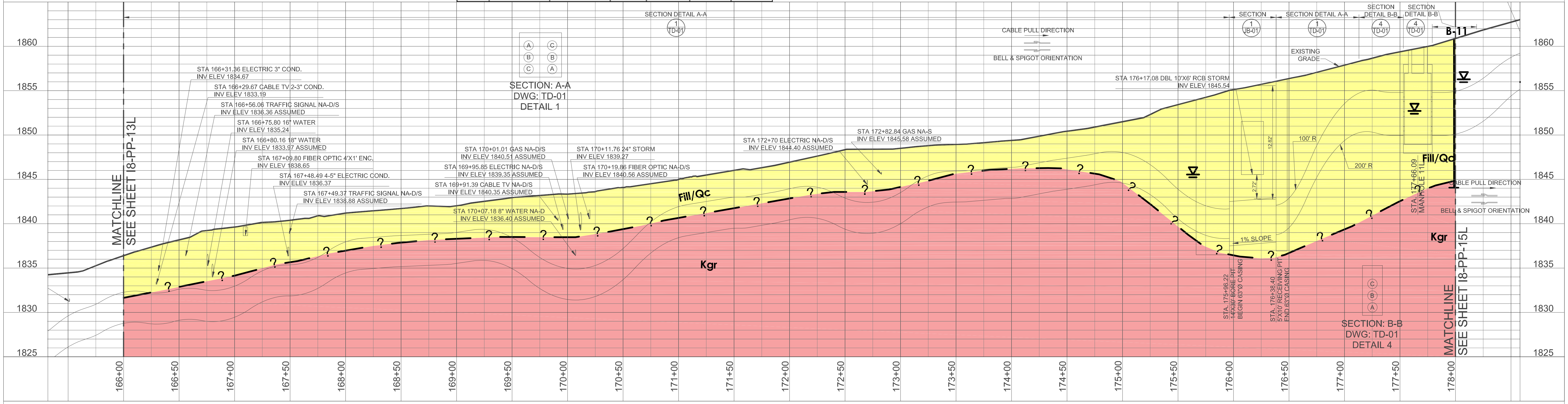
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 154+00 TO STA 166+00

SHEET: 14 - 28
I8-PP-13L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C65	STA 164+20.49	STA 165+59.38	138.89	5d18'19"	1500	69.50
C66	STA 166+30.66	STA 167+52.31	121.65	6d58'12"	1000	60.90
C67	STA 173+80.92	STA 174+09.21	28.29	4d3'8"	400	14.15
C68	STA 174+09.21	STA 174+37.50	28.29	4d3'8"	400	14.15
C69	STA 174+37.50	STA 175+96.22	158.73	4d33'6"	1998	79.41
C70	STA 176+65.56	STA 177+14.09	48.53	3d28'32"	800	24.27



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT.
SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

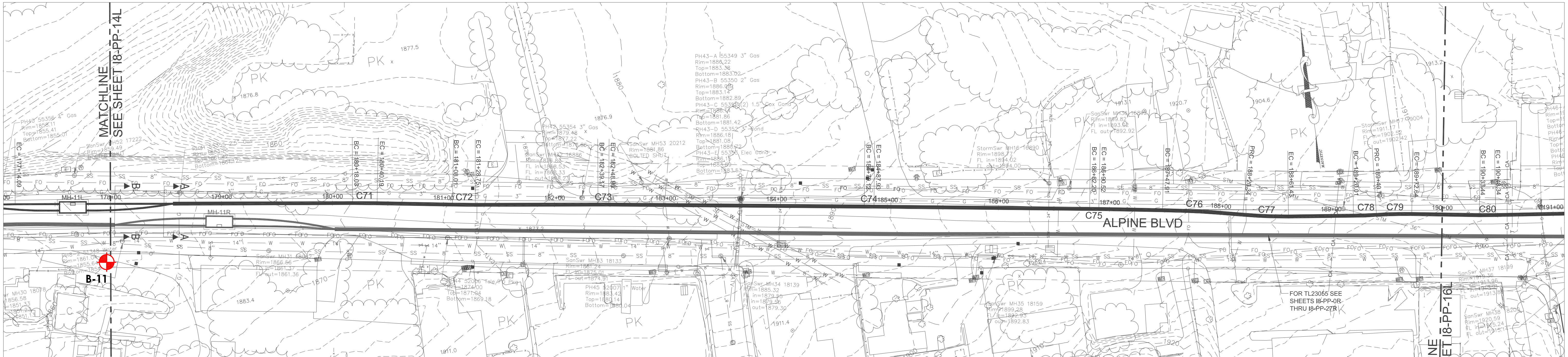
0 40' 1"=40' HORIZONTAL SCALE
0 5' 1"=5' VERTICAL SCALE

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

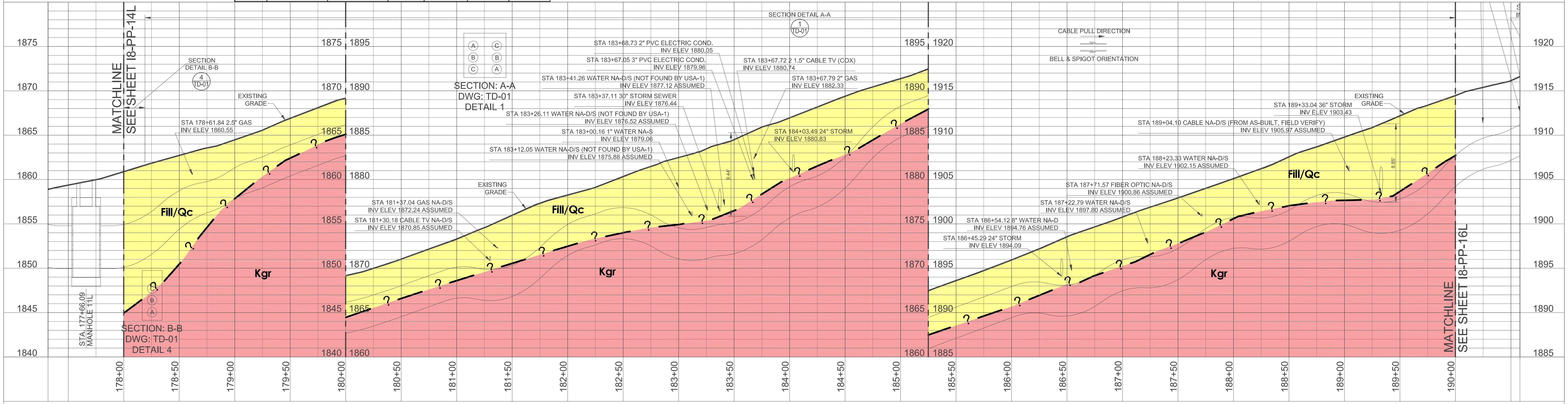
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 166+00 TO STA 178+00

SHEET: 15 - 28 I8-PP-14L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C70	STA 176+65.56	STA 177+14.09	48.53	3d28'32"	800	24.27
C71	STA 180+18.03	STA 180+40.19	22.16	1d16'12"	1000	11.08
C72	STA 181+08.01	STA 181+28.75	20.73	1d11'16"	1000	10.37
C73	STA 182+39.17	STA 182+48.80	9.63	0d33'5"	1000	4.81
C75	STA 186+82.20	STA 186+90.52	8.32	0d28'36"	1000	4.16
C76	STA 187+47.91	STA 188+20.34	72.43	4d9'0"	1000	36.23
C77	STA 188+20.34	STA 188+61.43	41.09	5d53'9"	400	20.56
C78	STA 189+20.01	STA 189+40.79	20.78	2d58'36"	400	10.39
C79	STA 189+40.79	STA 189+72.64	31.86	4d33'48"	400	15.94
C80	STA 190+33.44	STA 190+48.34	14.90	2d8'5"	400	7.45



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG “LEFT” (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL “RIGHT” (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

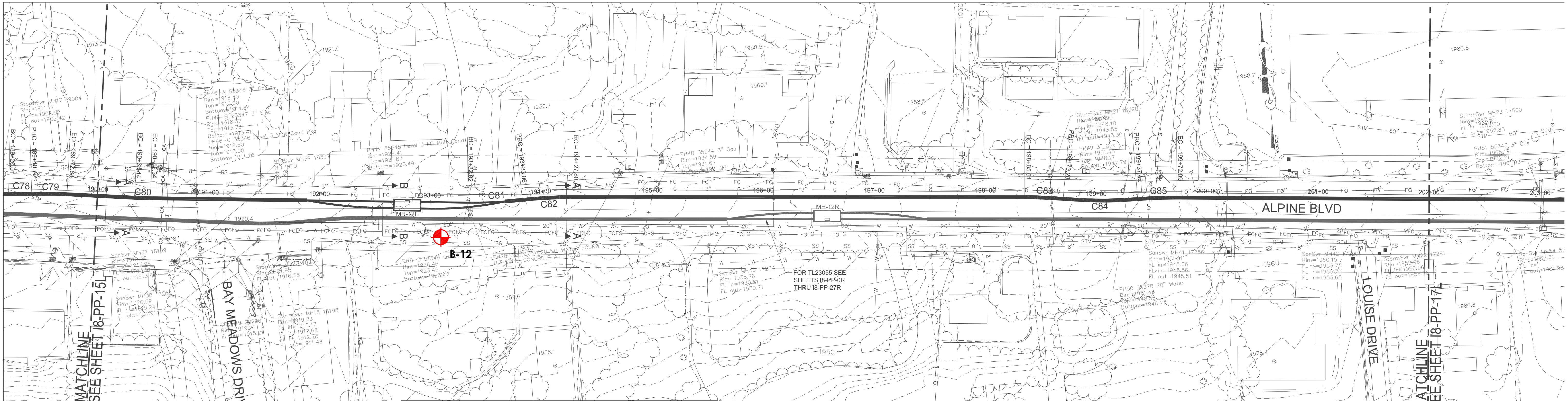
0 5'
1"=5'
VERTICAL SCALE

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

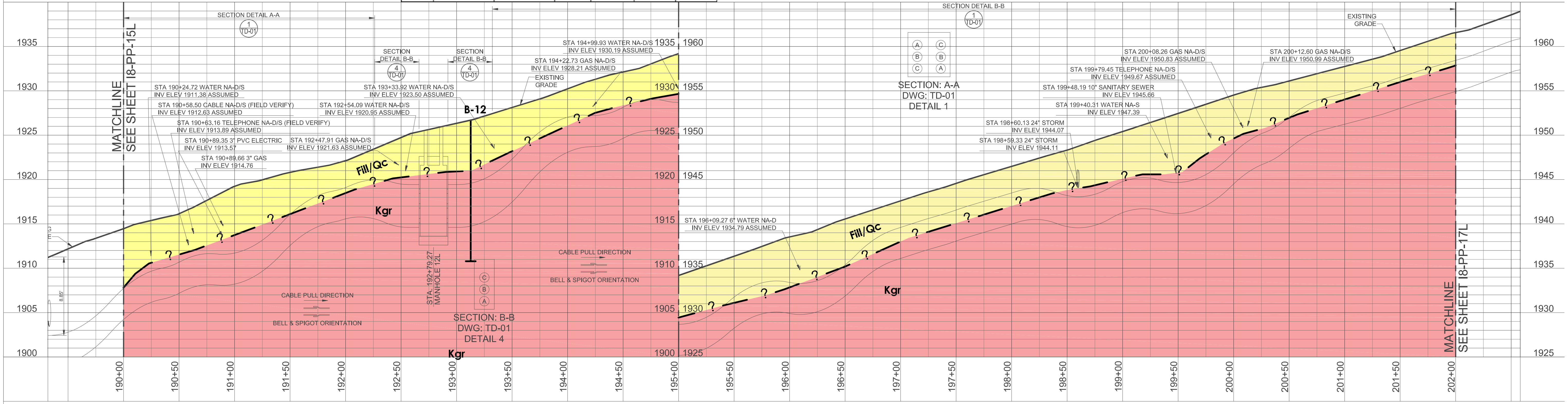
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 178+00 TO STA 190+00

SHEET: 16 - 28
I8-PP-15L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C80	STA 190+33.44	STA 190+48.34	14.90	2d8'5"	400	7.45
C81	STA 193+32.82	STA 193+83.06	50.24	7d11'48"	400	25.15
C82	STA 193+83.06	STA 194+27.80	44.75	6d24'35"	400	22.40
C83	STA 198+35.61	STA 198+70.28	34.67	4d57'58"	400	17.35
C84	STA 198+70.28	STA 199+37.42	67.14	9d37'2"	400	33.65
C85	STA 199+37.42	STA 199+72.09	34.67	4d57'58"	400	17.35



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40' 1"=40' HORIZONTAL SCALE

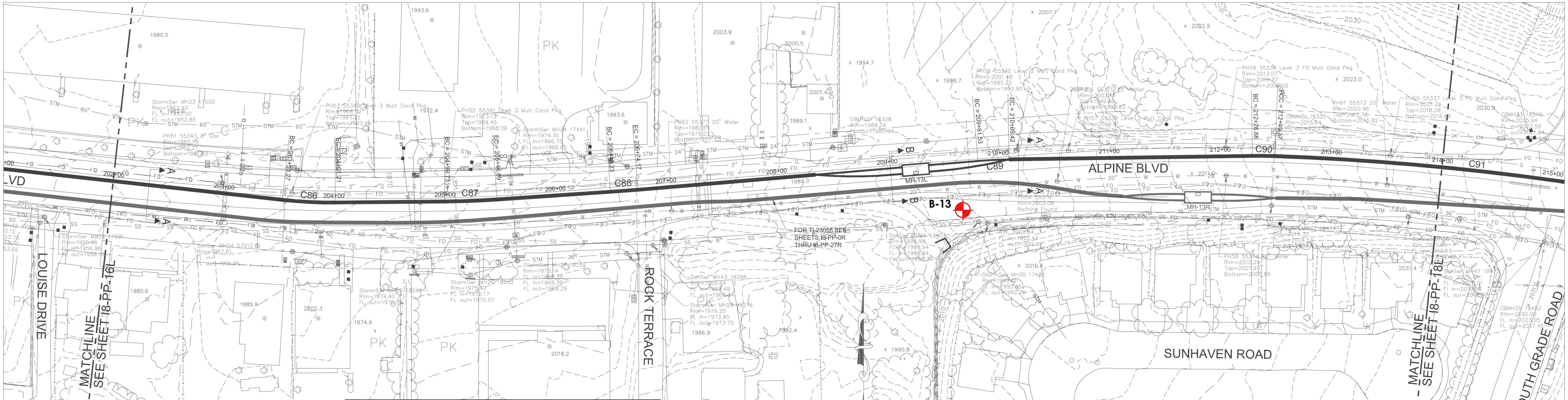
0 5' 1"=5' VERTICAL SCALE

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

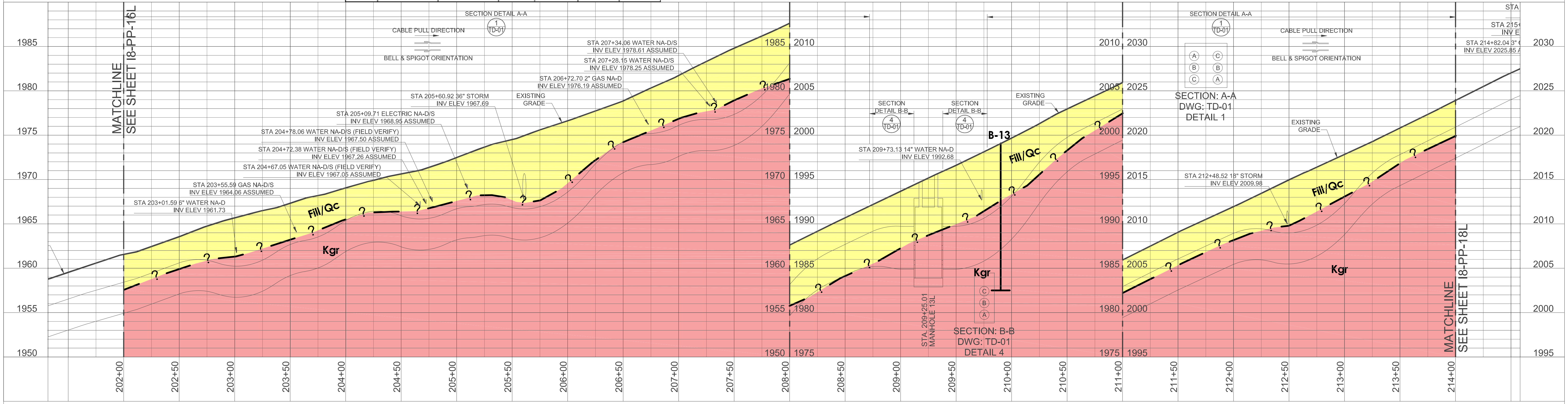
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 190+00 TO STA 202+00

SHEET: 17 - 28 I8-PP-16L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C86	STA 203+53.27	STA 204+01.21	47.94	6d52'3"	400	24.00
C87	STA 204+99.73	STA 205+46.69	46.96	3d21'47"	800	23.49
C88	STA 206+49.23	STA 206+74.17	24.95	1d25'45"	1000	12.47
C89	STA 209+81.53	STA 210+09.42	27.89	3d59'41"	400	13.95
C90	STA 212+28.88	STA 212+49.37	20.49	2d56'5"	400	10.25
C91	STA 212+49.37	STA 216+13.39	364.02	8d20'34"	2500	182.33



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

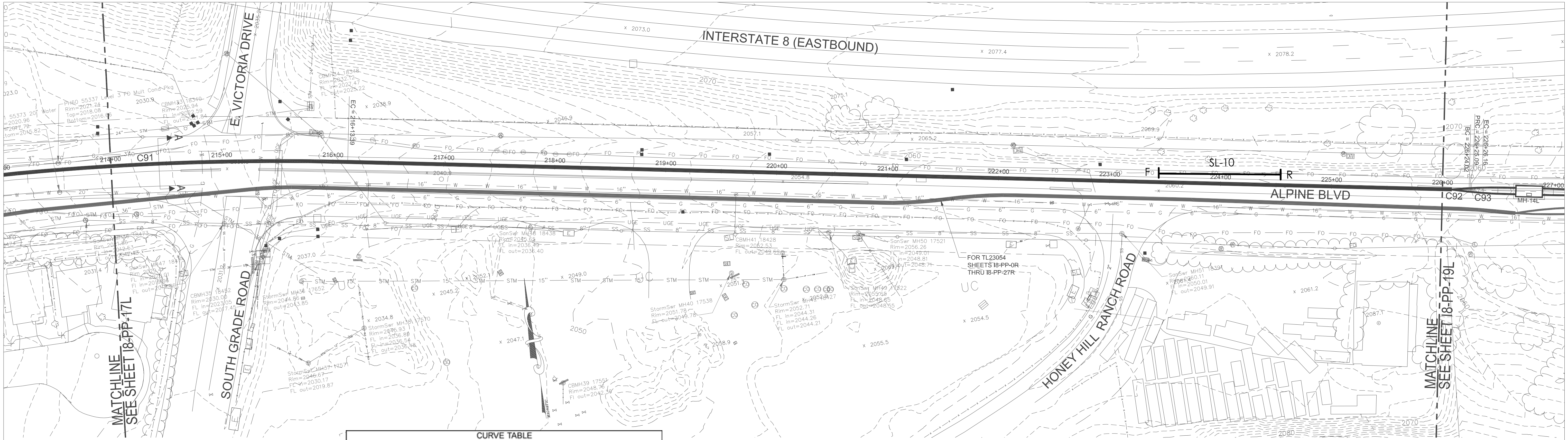
0 5'
1"=5'
VERTICAL SCALE

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

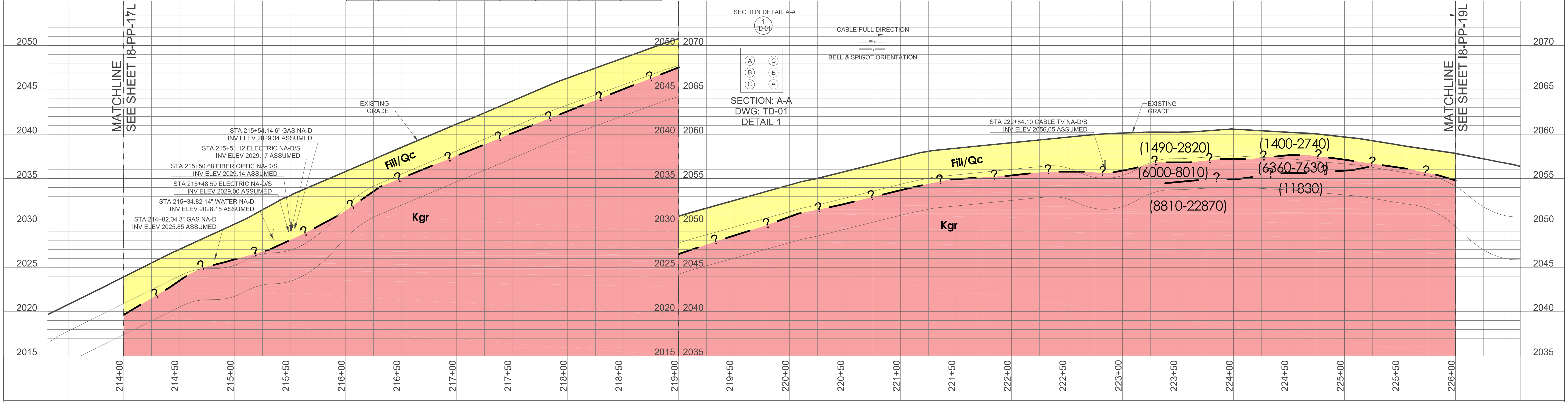
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 202+00 TO STA 214+00

SHEET: 18 - 28
I8-PP-17L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C91	STA 212+49.37	STA 216+13.39	364.02	8d20'34"	2500	182.33
C92	STA 226+24.02	STA 226+25.09	1.07	0d9'12"	400	0.54
C93	STA 226+25.09	STA 226+26.16	1.07	0d9'12"	400	0.54



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
HORIZONTAL SCALE
1"=40'

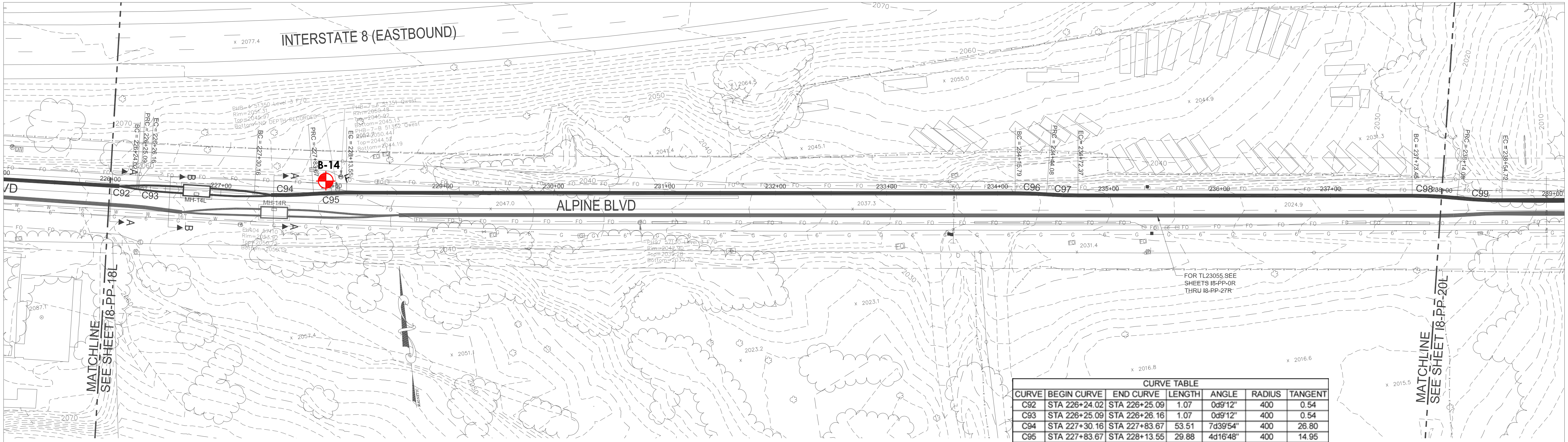
0 5'
VERTICAL SCALE
1"=5'

SDG&E
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

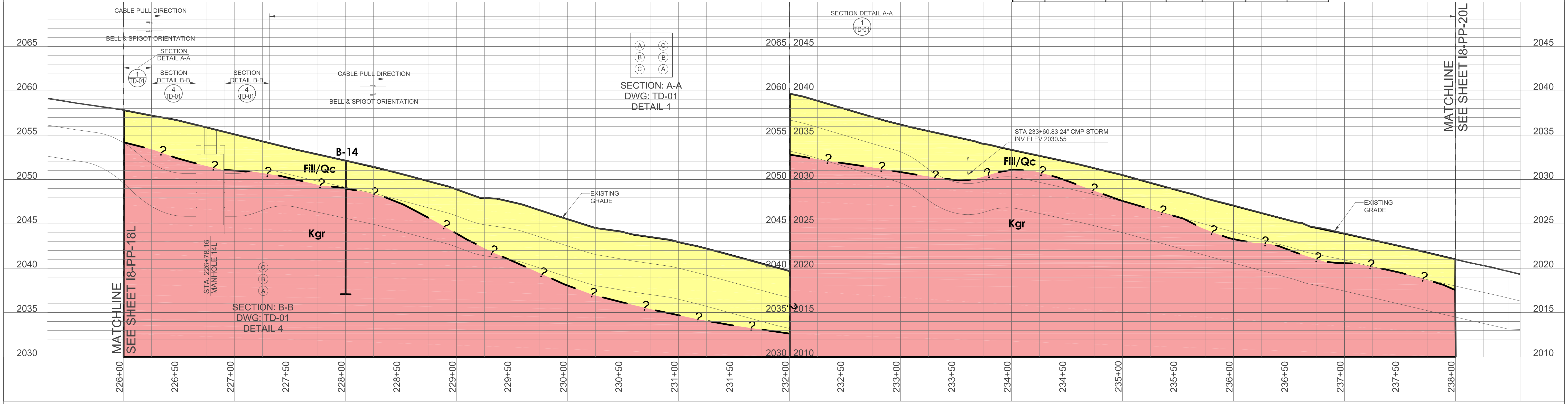
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 214+00 TO STA 226+00

SHEET: 19 - 28
I8-PP-18L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C92	STA 226+24.02	STA 226+25.09	1.07	0d9'12"	400	0.54
C93	STA 226+25.09	STA 226+26.16	1.07	0d9'12"	400	0.54
C94	STA 227+30.16	STA 227+83.67	53.51	7d39'54"	400	26.80
C95	STA 227+83.67	STA 228+13.55	29.88	4d16'48"	400	14.95
C96	STA 234+15.79	STA 234+44.08	28.29	4d3'8"	400	14.15
C97	STA 234+44.08	STA 234+72.37	28.29	4d3'8"	400	14.15
C98	STA 237+73.45	STA 238+14.08	40.64	5d49'15"	400	20.34
C99	STA 238+14.08	STA 238+54.72	40.64	5d49'15"	400	20.34



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

0 5'
1"=5'
VERTICAL SCALE

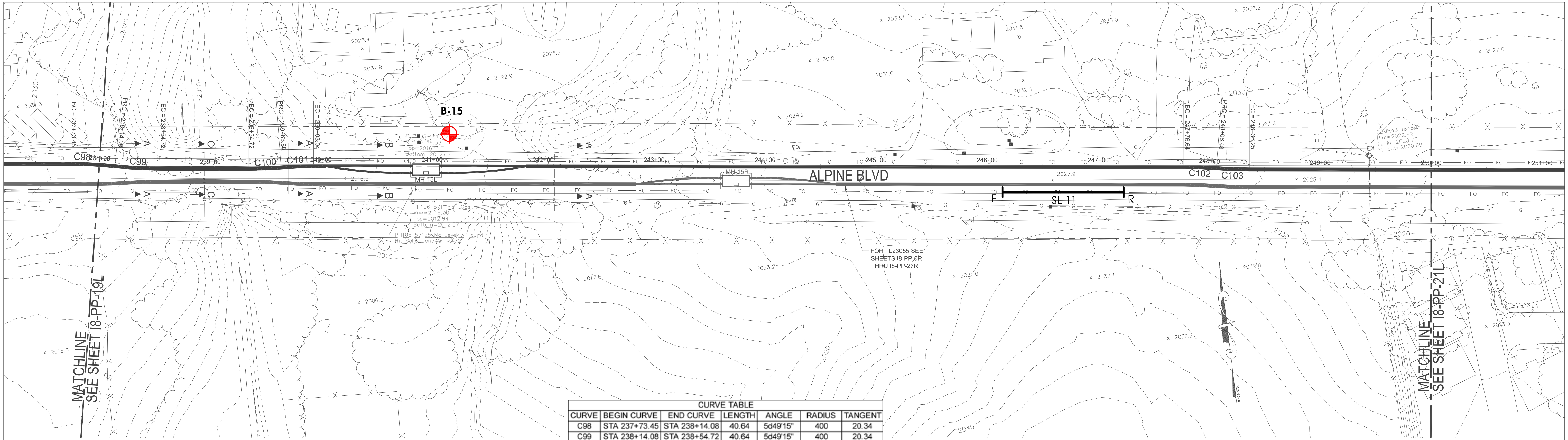
SDG&E

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

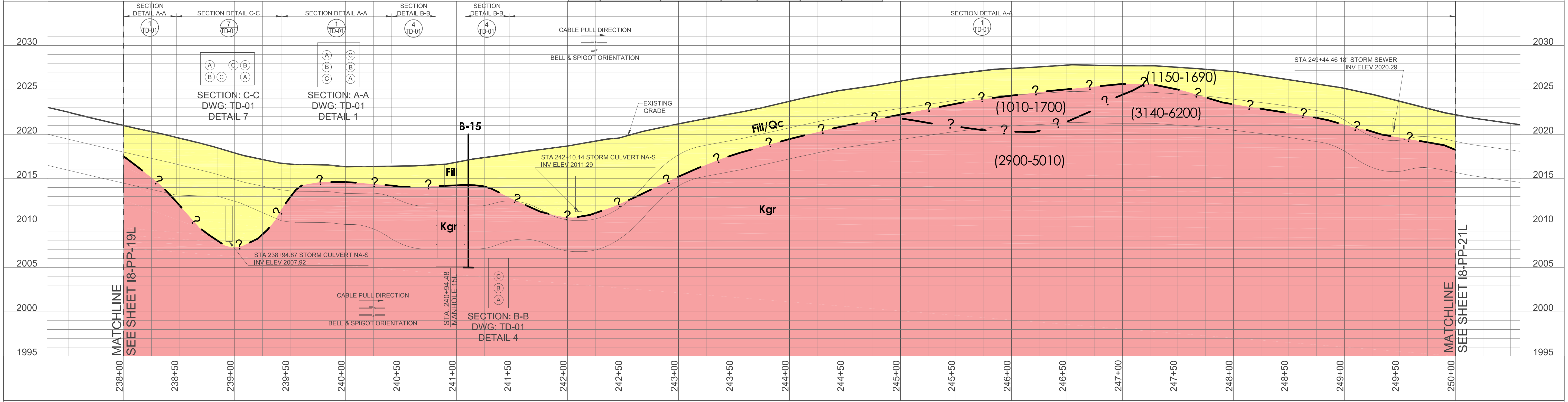
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 226+00 TO STA 238+00

SHEET: 20 - 28
I8-PP-19L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C98	STA 237+73.45	STA 238+14.08	40.64	5d49'15"	400	20.34
C99	STA 238+14.08	STA 238+54.72	40.64	5d49'15"	400	20.34
C100	STA 239+34.72	STA 239+63.88	29.16	4d10'37"	400	14.59
C101	STA 239+63.88	STA 239+93.04	29.16	4d10'37"	400	14.59
C102	STA 247+76.64	STA 248+06.48	29.84	4d16'28"	400	14.93
C103	STA 248+06.48	STA 248+36.25	29.77	4d15'51"	400	14.89



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

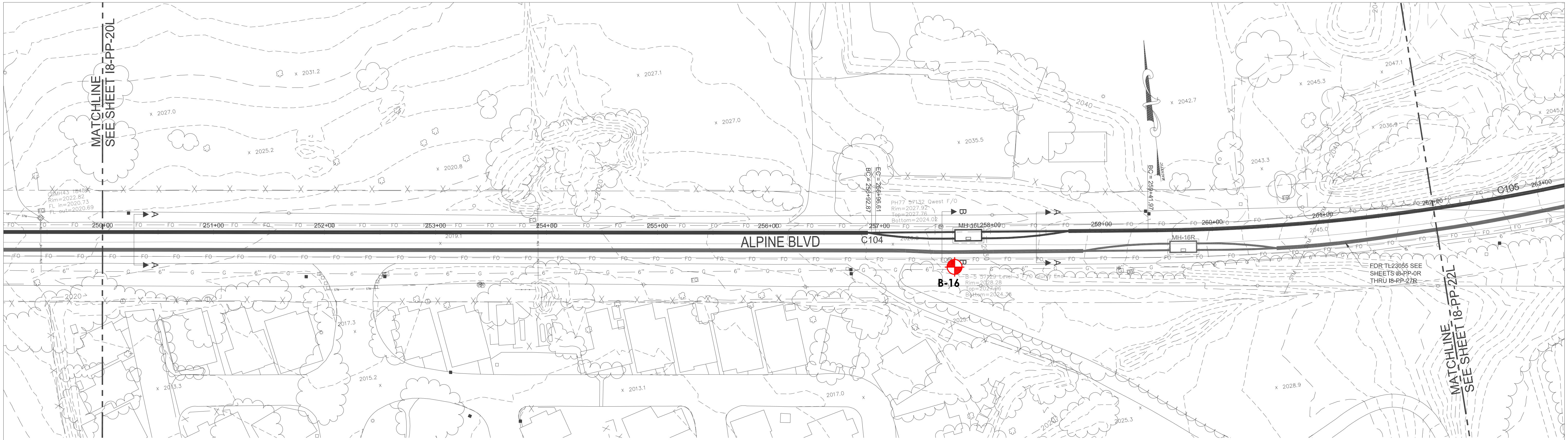
0 5'
1"=5'
VERTICAL SCALE

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

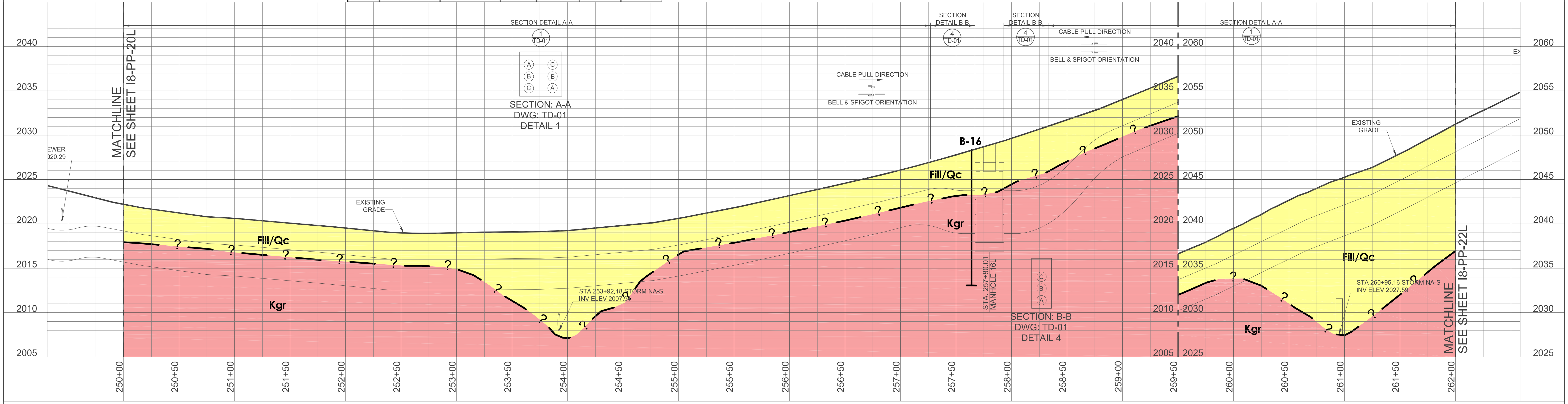
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 238+00 TO STA 250+00

SHEET: 21 - 28
I8-PP-20L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C104	STA 256+92.87	STA 256+96.61	3.74	0d32'11"	400	1.87
C105	STA 259+41.97	STA 265+98.51	656.55	19d47'55"	1900	331.58



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT.
SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
				BLACK & VEATCH CORPORATION				SDG&E	

C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

0 5'
1"=5'
VERTICAL SCALE

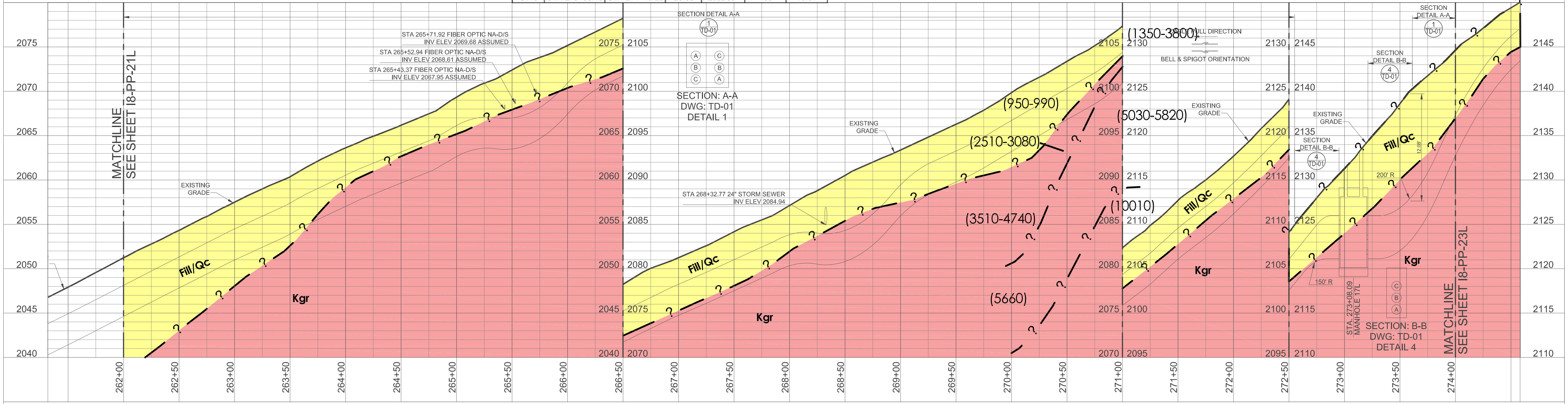
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 250+00 TO STA 262+00

SHEET: 22 - 28 | I8-PP-21L

CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C105	STA 259+41.97	STA 265+98.51	656.55	19d47'55"	1900	331.58
C106	STA 269+68.23	STA 270+86.62	118.39	13d34'1"	500	59.48
C107	STA 270+86.62	STA 271+39.97	53.35	7d38'30"	400	26.71
C108	STA 272+00.01	STA 272+66.46	66.45	19d2'10"	200	33.53
C109	STA 273+50.46	STA 273+98.15	47.69	13d39'47"	200	23.96
C110	STA 273+98.15	STA 274+18.23	20.08	2d52'35"	400	10.04



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG “LEFT” (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL “RIGHT” (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

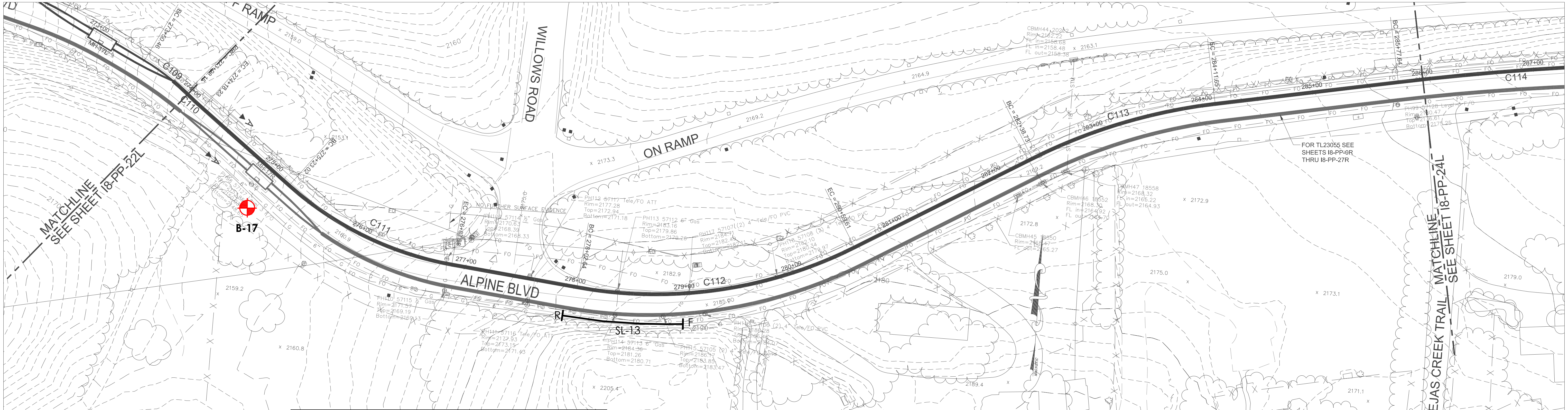
0 5'
1"=5'
VERTICAL SCALE

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

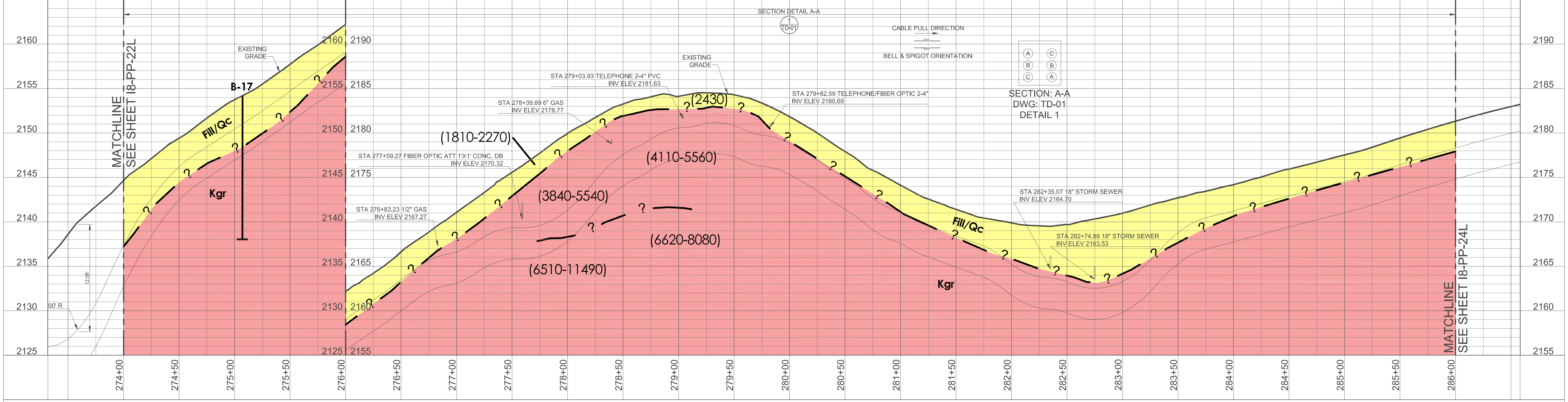
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 262+00 TO STA 274+00

SHEET: 23 - 28
I8-PP-22L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C110	STA 273+98.15	STA 274+18.23	20.08	2d52'35"	400	10.04
C111	STA 275+23.02	STA 276+87.98	164.96	31d30'17"	300	84.62
C112	STA 278+02.54	STA 280+59.61	257.07	36d49'20"	400	133.15
C113	STA 282+38.73	STA 284+11.65	172.92	19d48'55"	500	87.33
C114	STA 285+77.64	STA 287+90.61	212.97	4d52'51"	2500	106.55



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG “LEFT” (NORTHERN) ALIGNMENT.
SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL “RIGHT” (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

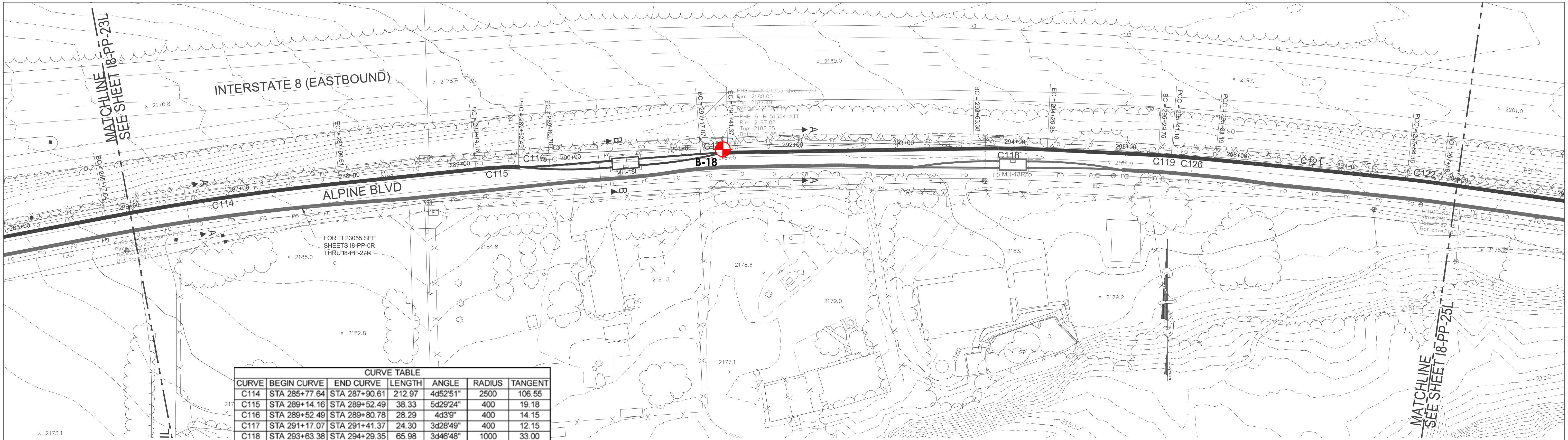
0 40' 1"=40' HORIZONTAL SCALE
0 5' 1"=5' VERTICAL SCALE

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

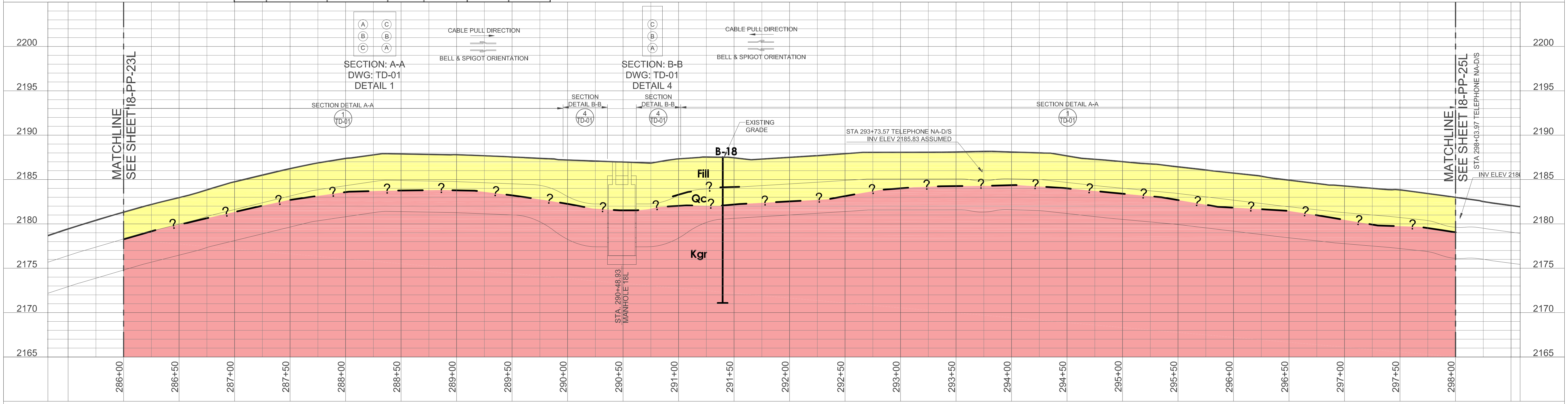
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 274+00 TO STA 286+00

SHEET: 24 - 28
I8-PP-23L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C114	STA 285+77.64	STA 287+90.61	212.97	4d52'51"	2500	106.55
C115	STA 289+14.16	STA 289+52.49	38.33	5d29'24"	400	19.18
C116	STA 289+52.49	STA 289+80.78	28.29	4d3'9"	400	14.15
C117	STA 291+17.07	STA 291+41.37	24.30	3d28'49"	400	12.15
C118	STA 293+63.38	STA 294+29.35	65.98	3d46'48"	1000	33.00
C119	STA 295+29.75	STA 295+41.18	11.43	1d38'16"	400	5.72
C120	STA 295+41.18	STA 295+81.19	40.01	1d3'35"	2163.17	20.00
C121	STA 295+81.19	STA 297+54.36	173.17	0d37'57"	15689.73	86.59
C122	STA 297+54.36	STA 297+86.00	31.63	1d48'45"	1000	15.82



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG “LEFT” (NORTHERN) ALIGNMENT.
SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL “RIGHT” (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

0 5'
1"=5'
VERTICAL SCALE

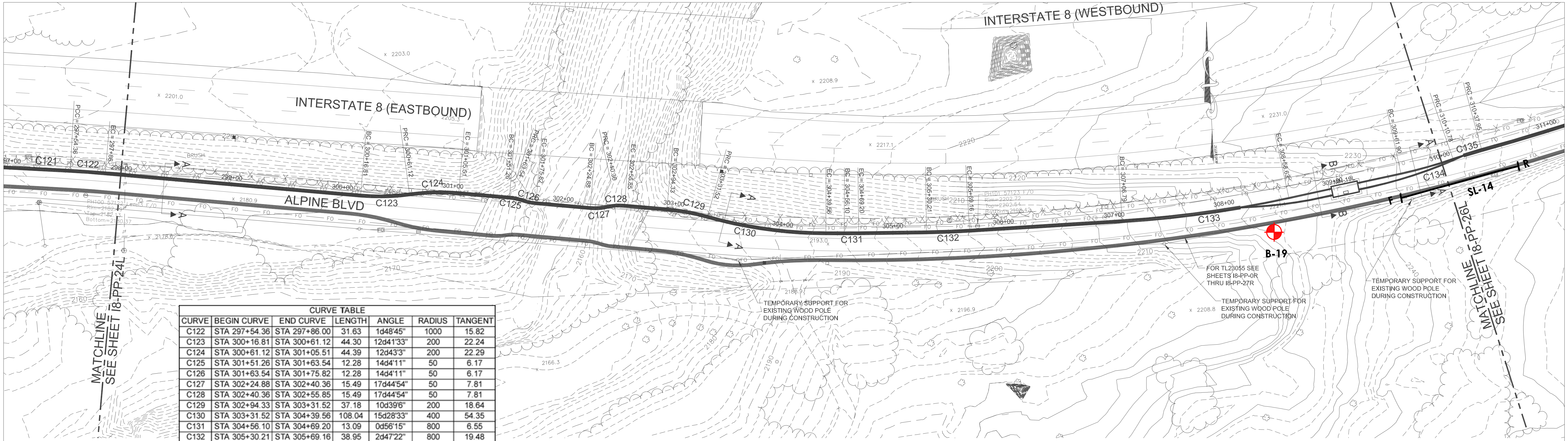
SDGE

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

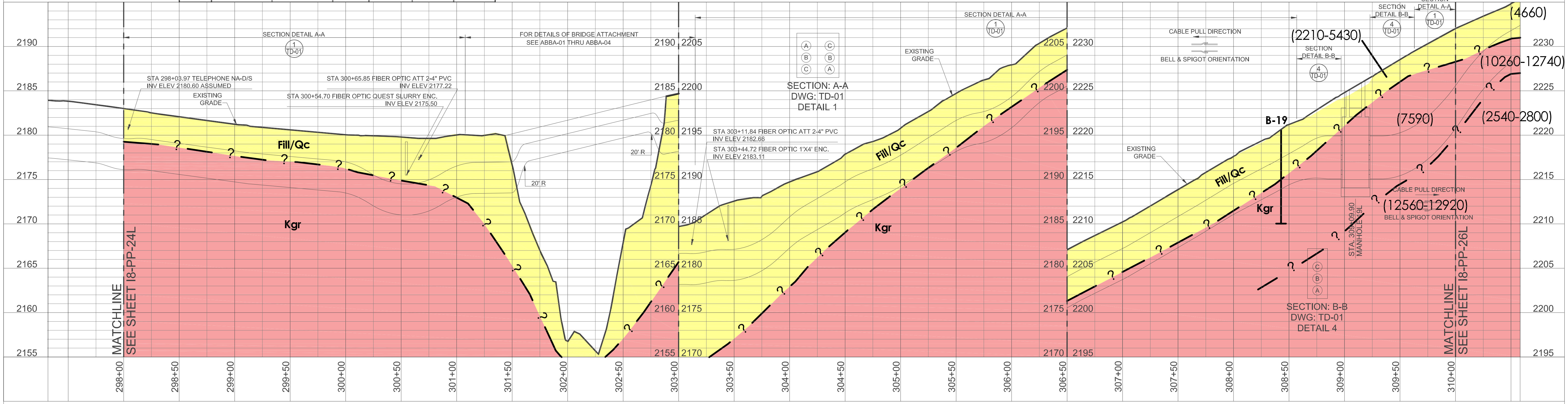
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 286+00 TO STA 298+00

SHEET: 25 - 28
I8-PP-24L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C122	STA 297+54.36	STA 297+86.00	31.63	1d48'45"	1000	15.82
C123	STA 300+16.81	STA 300+61.12	44.30	12d41'33"	200	22.24
C124	STA 300+61.12	STA 301+05.51	44.39	12d43'3"	200	22.29
C125	STA 301+51.26	STA 301+63.54	12.28	14d4'11"	50	6.17
C126	STA 301+63.54	STA 301+75.82	12.28	14d4'11"	50	6.17
C127	STA 302+24.88	STA 302+40.36	15.49	17d44'54"	50	7.81
C128	STA 302+40.36	STA 302+55.85	15.49	17d44'54"	50	7.81
C129	STA 302+94.33	STA 303+31.52	37.18	10d39'6"	200	18.64
C130	STA 303+31.52	STA 304+39.56	108.04	15d28'33"	400	54.35
C131	STA 304+56.10	STA 304+69.20	13.09	0d56'15"	800	6.55
C132	STA 305+30.21	STA 305+69.16	38.95	2d47'22"	800	19.48
C133	STA 307+06.79	STA 308+58.63	151.84	8d42'0"	1000	76.07
C134	STA 309+61.90	STA 310+10.78	48.88	7d0'4"	400	24.47
C135	STA 310+10.78	STA 310+37.95	27.17	3d53'31"	400	13.59
C136	STA 310+37.95	STA 315+46.87	508.93	14d34'47"	2000	255.85



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

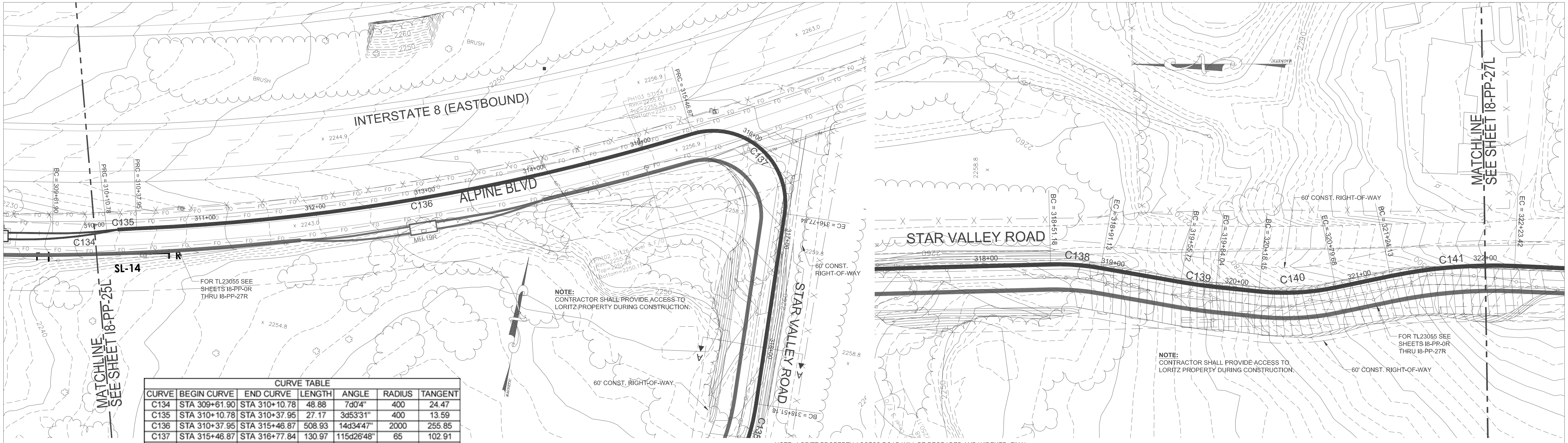
REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		

BLACK & VEATCH CORPORATION SDG&E

0 40'
1"=40'
HORIZONTAL SCALE
0 5'
1"=5'
VERTICAL SCALE

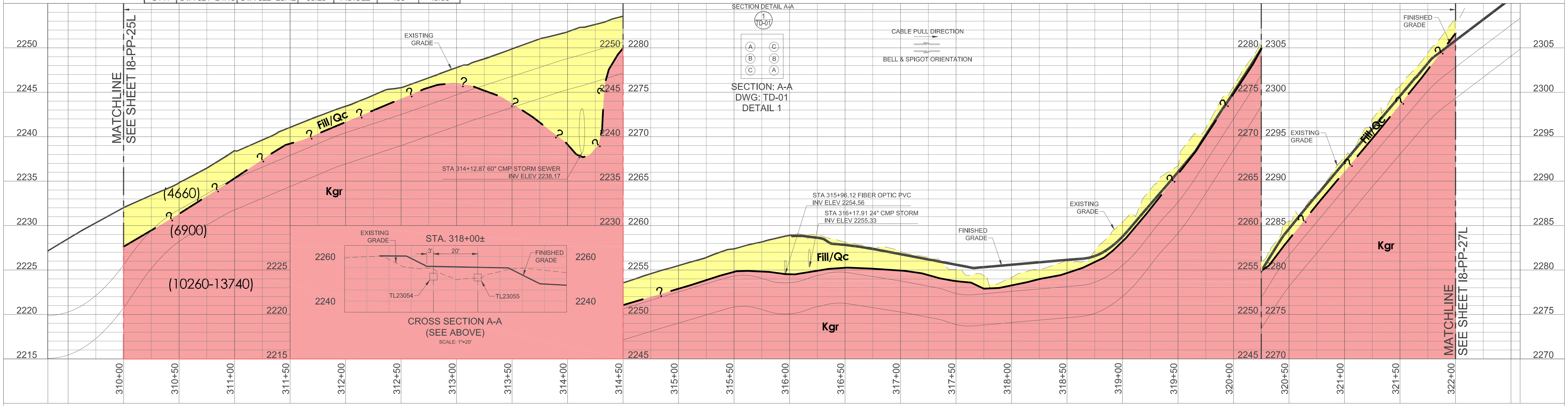
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING
PLAN AND PROFILE
TL23054

INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 298+00 TO STA 310+00
SHEET: 26 - 28
I8-PP-25L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C134	STA 309+61.90	STA 310+10.78	48.88	7d0'4"	400	24.47
C135	STA 310+10.78	STA 310+37.95	27.17	3d53'31"	400	13.59
C136	STA 310+37.95	STA 315+46.87	508.93	14d34'47"	2000	255.85
C137	STA 315+46.87	STA 316+77.84	130.97	115d26'48"	65	102.91
C138	STA 318+51.18	STA 318+91.13	39.95	11d26'43"	200	20.04
C139	STA 319+55.72	STA 319+84.04	28.32	4d3'22"	400	14.16
C140	STA 320+18.15	STA 320+79.68	61.54	17d37'44"	200	31.01
C141	STA 321+24.13	STA 322+23.42	99.29	14d13'22"	400	49.90

NOTE: LORITZ PROPERTY ACCESS ROAD WILL BE REGRADED AND WIDENED. FINAL ALIGNMENT AND PROFILE WILL BE REVISED AFTER ACCESS ROAD DESIGN IS COMPLETE.



NOTE: INTERPRETED GEOLOGIC PROFILES PRESENTED ALONG "LEFT" (NORTHERN) ALIGNMENT. SUBSURFACE CONDITIONS MY VARY ALONG PARALLEL "RIGHT" (SOUTHERN) ALIGNMENT. BASE PLAN AND PROFILE DRAWING FROM 100 PERCENT DESIGN DRAWINGS DATED MAY 22, 2009.

NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40'
1"=40'
HORIZONTAL SCALE

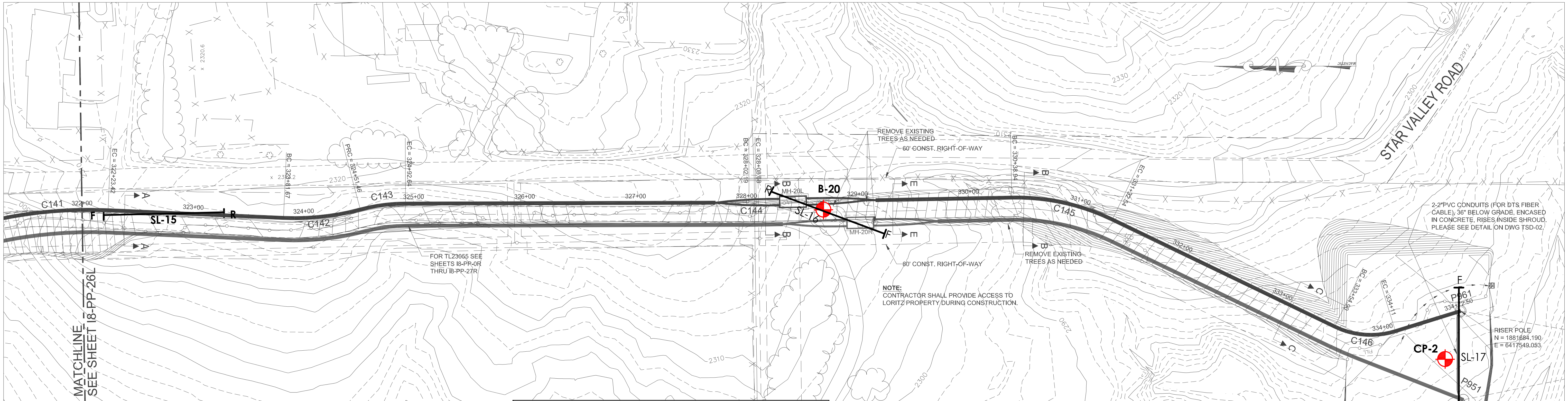
0 5'
1"=5'
VERTICAL SCALE

SDGE
SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

PLAN AND PROFILE
TL23054

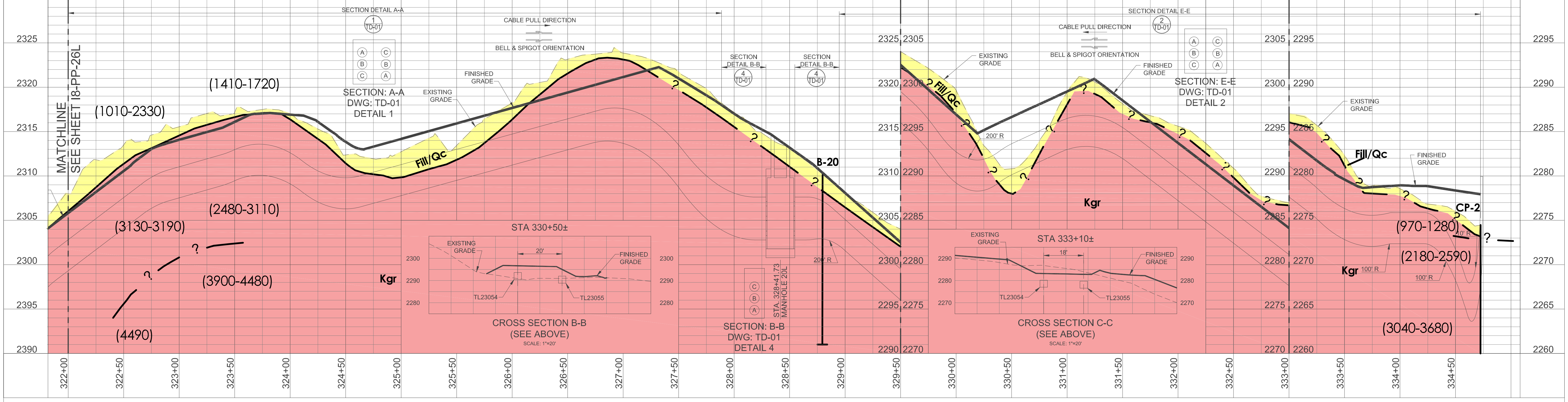
INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 310+00 TO STA 322+00

SHEET: 27 - 28 I8-PP-26L



CURVE TABLE						
CURVE	BEGIN CURVE	END CURVE	LENGTH	ANGLE	RADIUS	TANGENT
C141	STA 321+24.13	STA 322+23.42	99.29	14d13'22"	400	49.90
C142	STA 323+81.67	STA 324+51.46	69.79	17d23'9"	230	35.17
C143	STA 324+51.46	STA 324+92.64	41.18	14d44'42"	160	20.70
C144	STA 328+02.19	STA 328+08.68	6.49	0d57'11"	390	3.24
C145	STA 330+38.94	STA 331+32.54	93.60	26d48'47"	200	47.67
C146	STA 333+54.90	STA 334+11.00	56.10	42d51'36"	75	29.44

NOTE:
1. FINISHED GRADE BY OTHERS.



NOT TO BE USED
FOR CONSTRUCTION

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
D	04138	7008400	100% COMPLETE ISSUE	WJB	JL	-	5/22/09		
				BLACK & VEATCH CORPORATION				SDG&E	

REV	BUDGET	CONST ORDER	CHANGE	DRAWN	CHK'D	APPV'D	DATE	APPV'D	DATE
C	04138	7008400	90% COMPLETE ISSUE - REVISED PER CLIENT COMMENTS	WJB	JL	-	3/03/09		
B	04138	7008400	90% COMPLETE ISSUE	WJB	JL	-	2/17/09		
A	04138	7008400	PRELIMINARY CLIENT REVIEW ISSUE	WJB	JL	-	8/07/08		
				BLACK & VEATCH CORPORATION				SDG&E	

0 40' 1"=40' HORIZONTAL SCALE

0 5' 1"=5' VERTICAL SCALE

SAN DIEGO GAS & ELECTRIC
TRANSMISSION ENGINEERING

PLAN AND PROFILE
TL23054

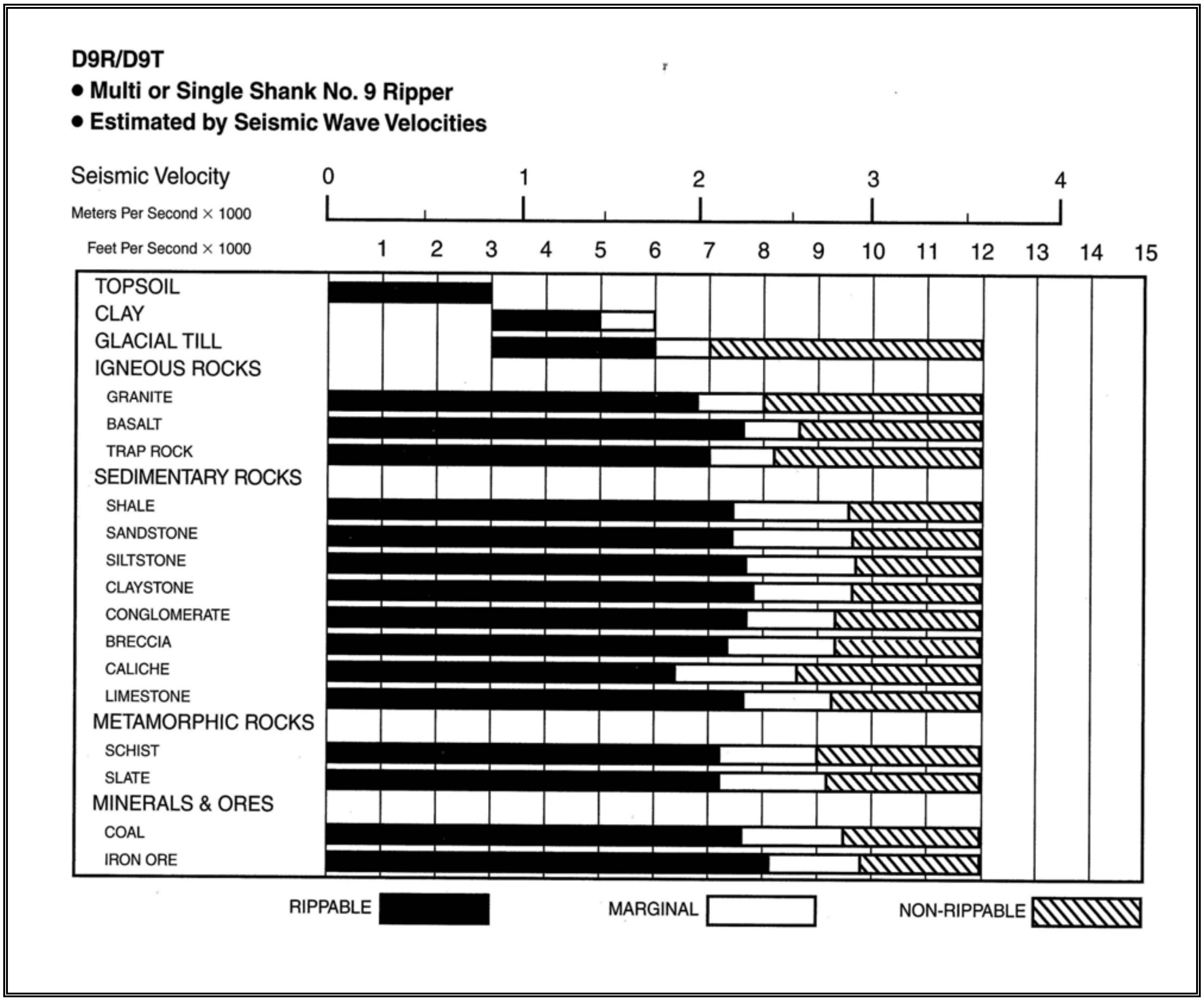
INTERSTATE 8 ALTERNATE
TL23054 - UNDERGROUND 230kV
STA 322+00 TO STA 334+72.50

SHEET: 28 - 28
I8-PP-27L

APPENDIX B

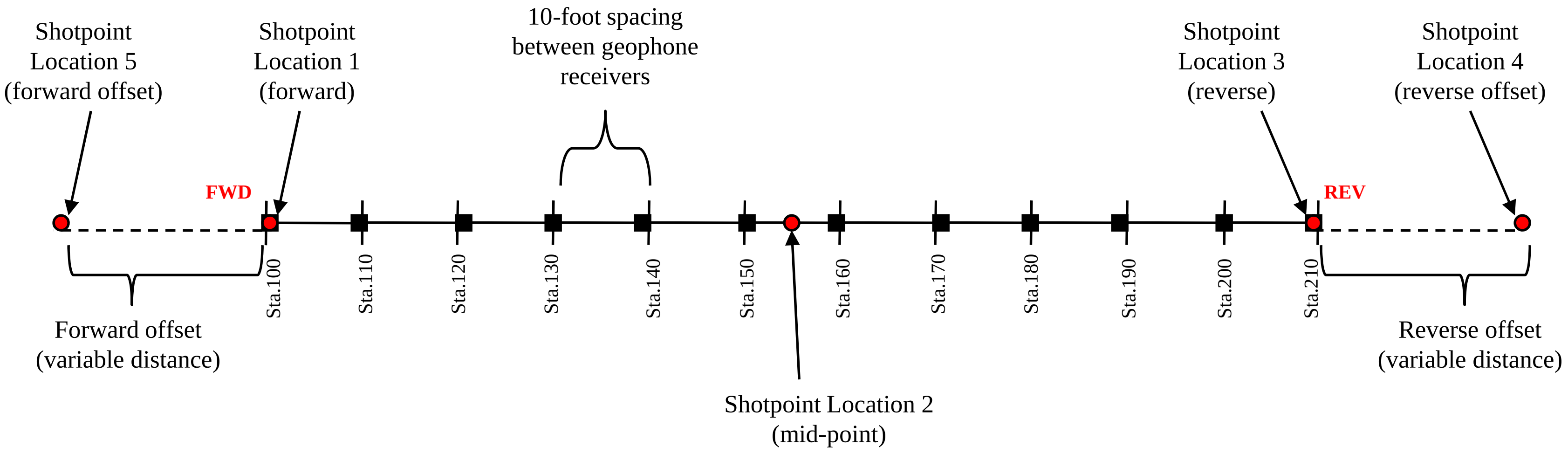
Seismic Refraction Travel Time Plots

TABLE B-1
SEISMIC VELOCITY AND RIPPABILITY CORRELATION
Sunrise Powerlink Project - 230 kV Underground
Alpine, California



Excavatability assessment based on correlations between seismic wave velocities and rippability of various materials using a Single Shank No. 9 ripper on a D9N dozer (Caterpillar, 2006)

PLAN VIEW OF TYPICAL 12 CHANNEL SEISMIC SURVEY CONFIGURATION



├── Seismic line survey

- - - Offset distance

■ Geophone Receiver

● Shotpoint (location of seismic source)

LEGEND - SEISMIC REFRACTION FIELD SURVEY

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

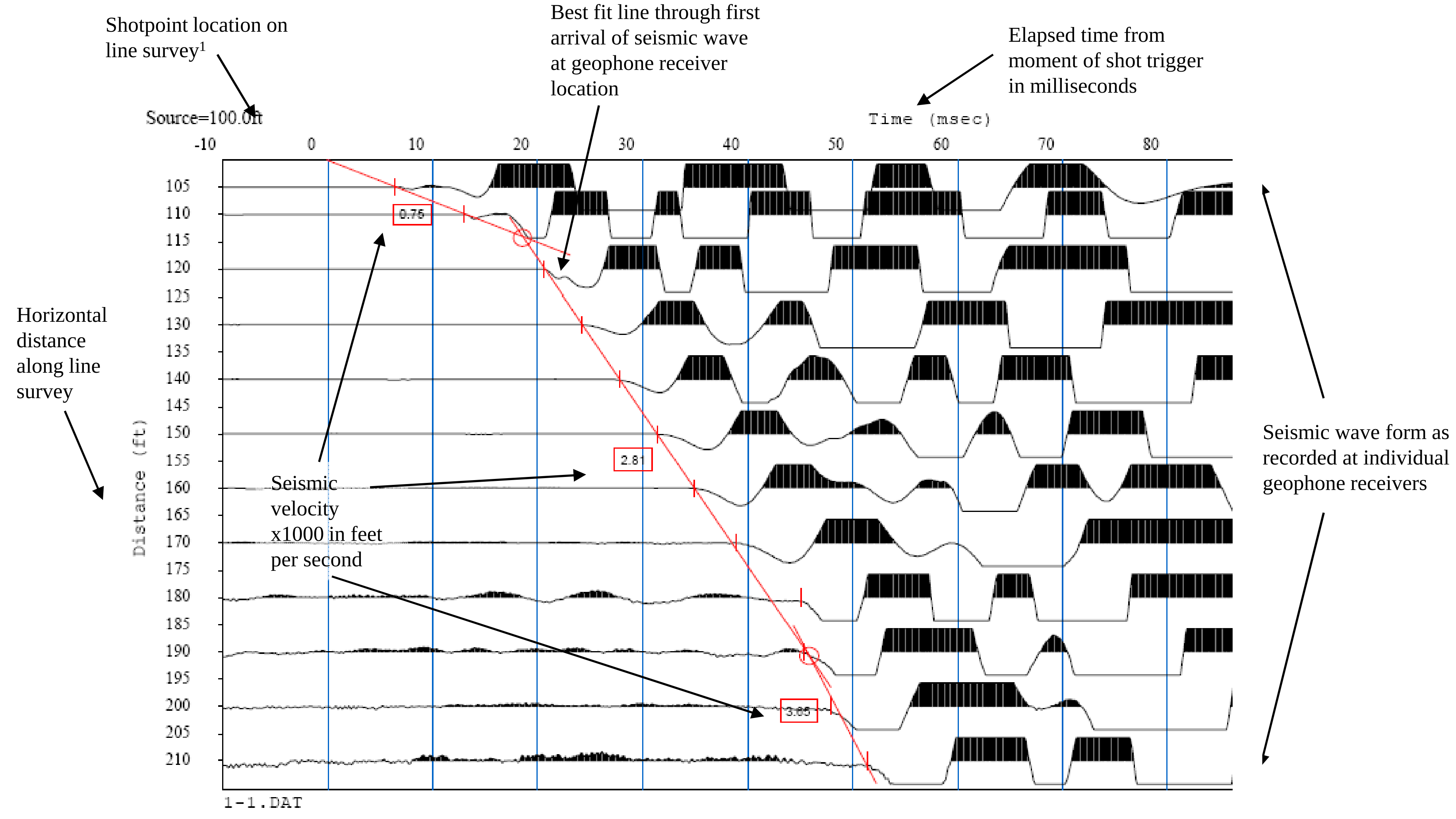
Geosyntec consultants

DATE: MAY 2009

PROJECT NO. SC0368

FIGURE

B-1



Shotpoint location on line survey[1]

Best fit line through first arrival of seismic wave at geophone receiver location

Elapsed time from moment of shot trigger in milliseconds

Horizontal distance along line survey

Seismic velocity x1000 in feet per second

Seismic wave form as recorded at individual geophone receivers

Seismic line (1)
Shotpoint location[2] (1)

Notes:

1: Forward end of line survey as shown in example at station 100 ft. See plan view of typical seismic survey configuration.

2: Shotpoint (1) corresponds with forward location (sta.100), shotpoint (2) corresponds with midpoint location (sta. 155), shotpoint (3) corresponds with reverse location (sta. 210), shotpoint (4) corresponds with reverse end offset location, shotpoint (5) corresponds with forward end offset location.

KEY – SEISMIC REFRACTION TRAVEL TIME PLOTS

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants

DATE: MAY 2009

PROJECT NO. SC0368

FIGURE

B-2

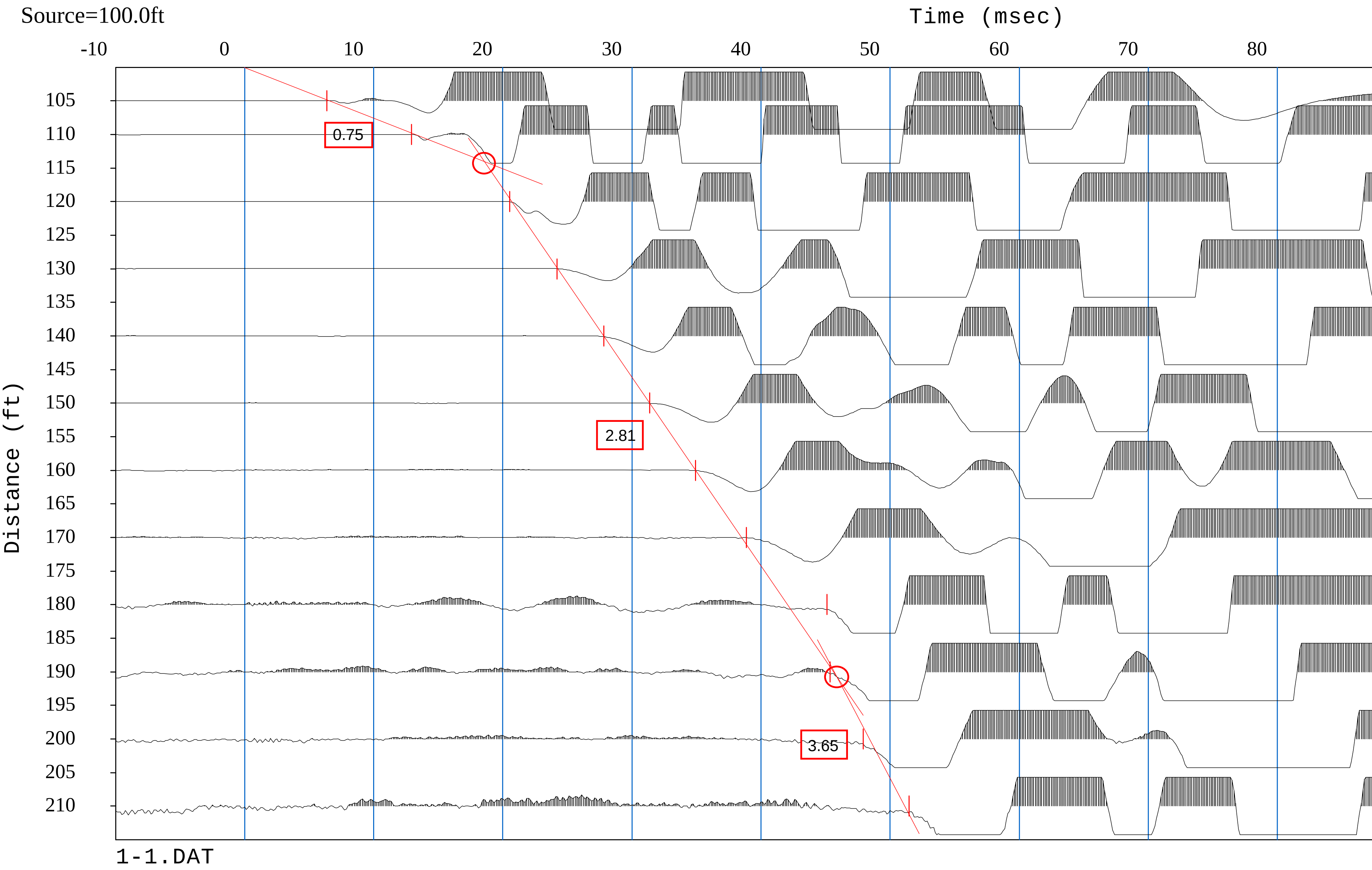
SEISMIC LINE 1

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	B-3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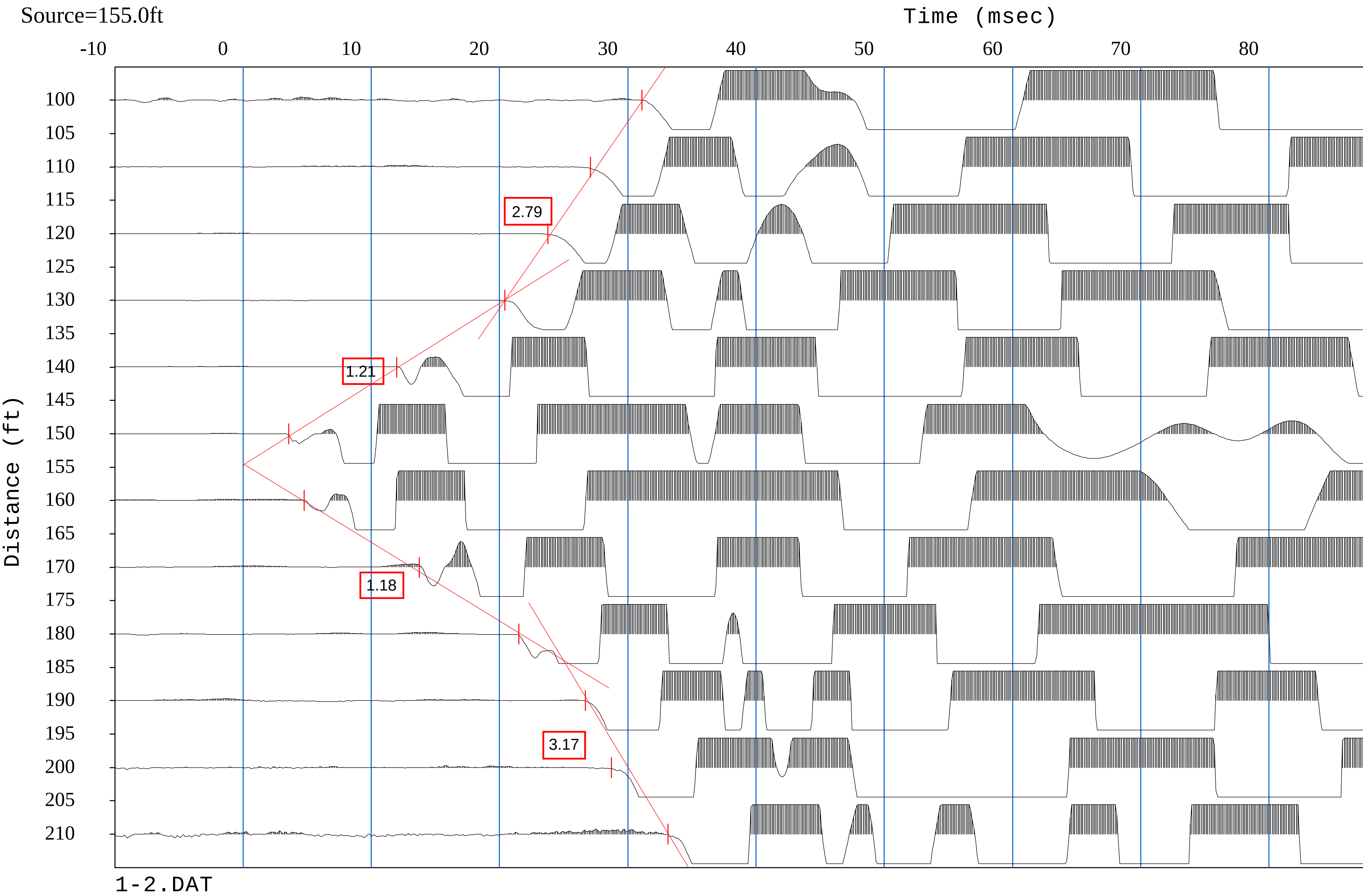
0
10
20
30
40
50
60
70
80
Distance (ft)
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
0.75
2.81
3.65
1-1.DAT



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Time (msec)
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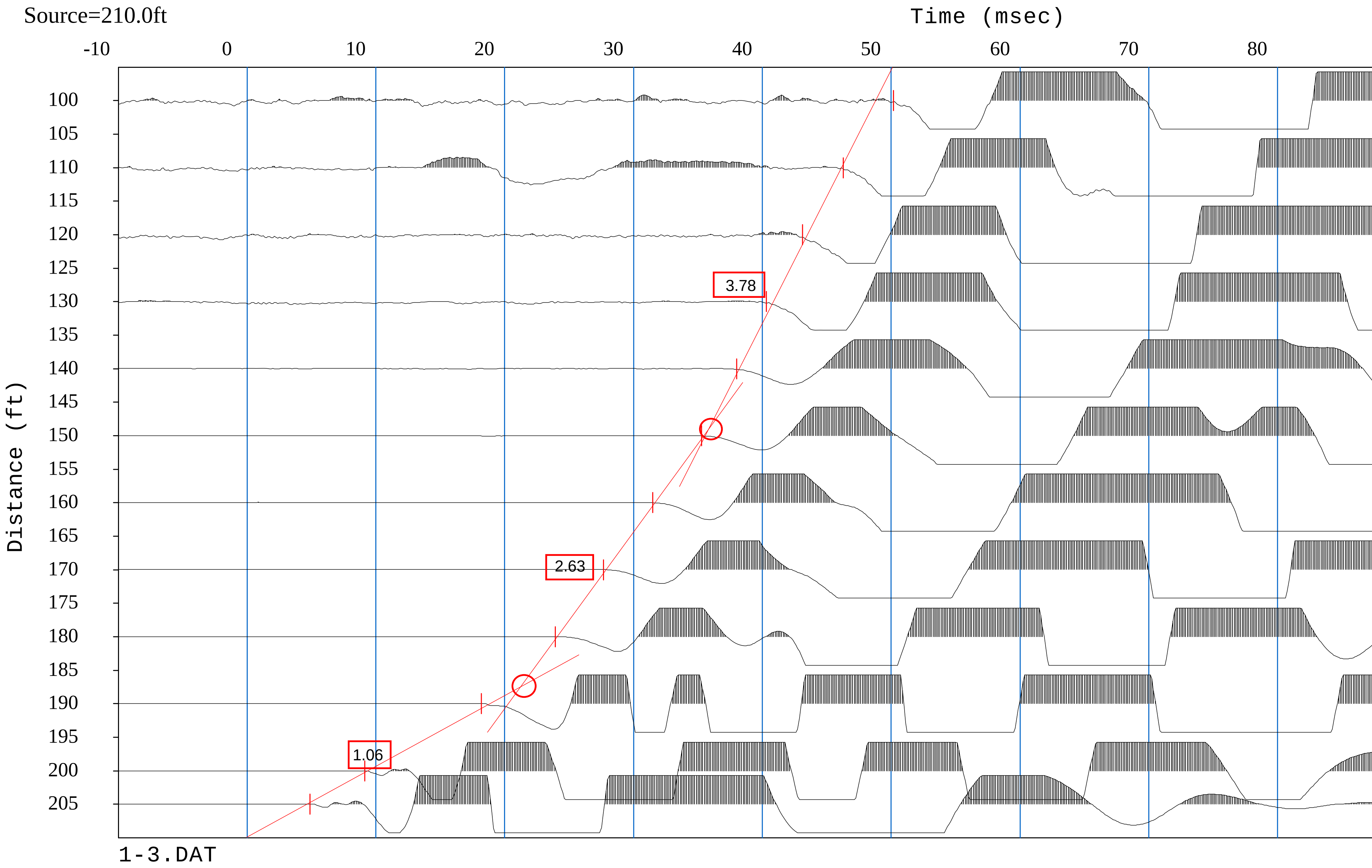
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
2.79
1.21
1.18
3.17
1-2.DAT



Source=210.0ft
Time (msec)
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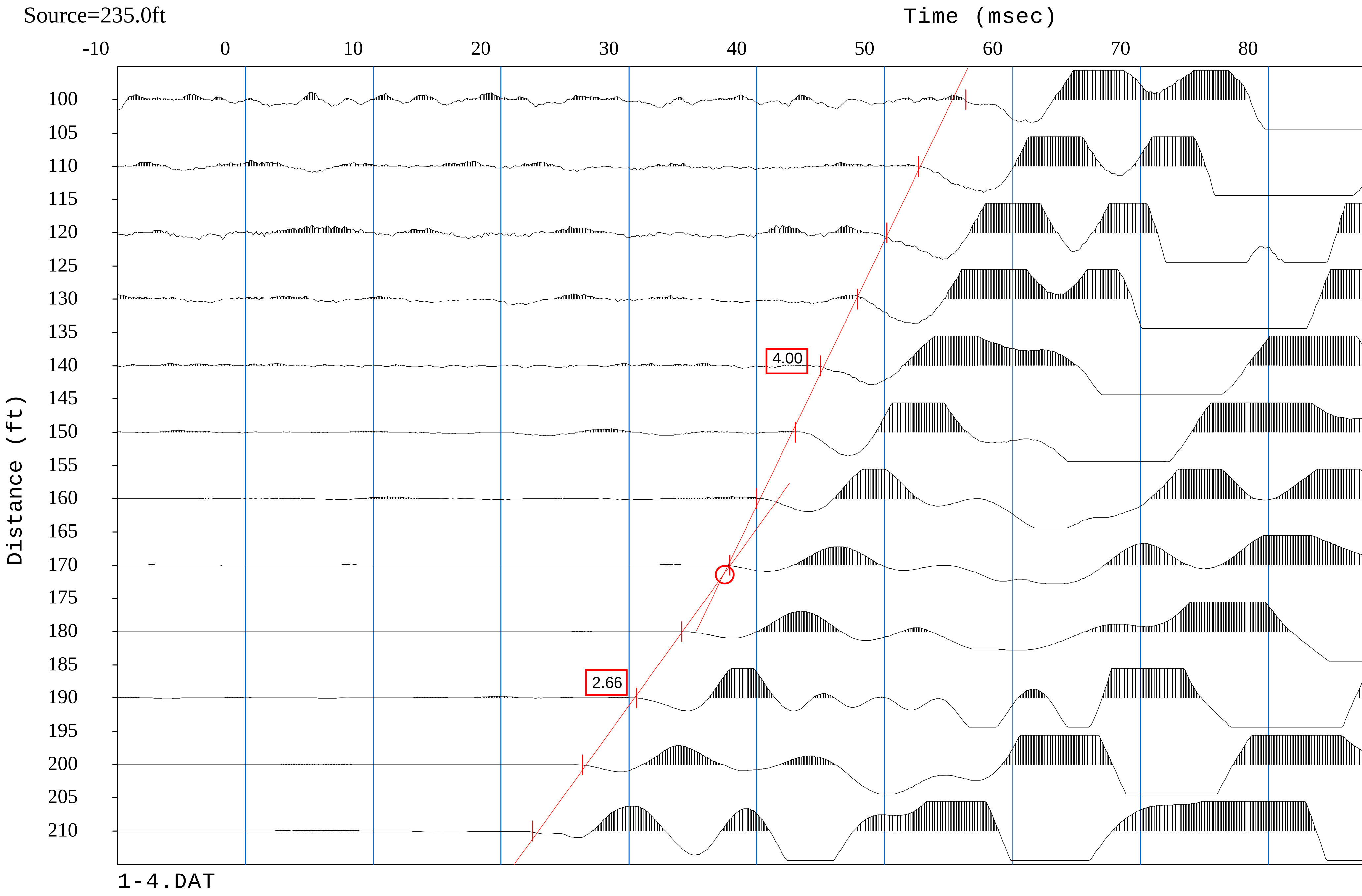
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
3.78
2.63
1.06
1-3.DAT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20
30
40
50
60
70
80
Distance (ft)
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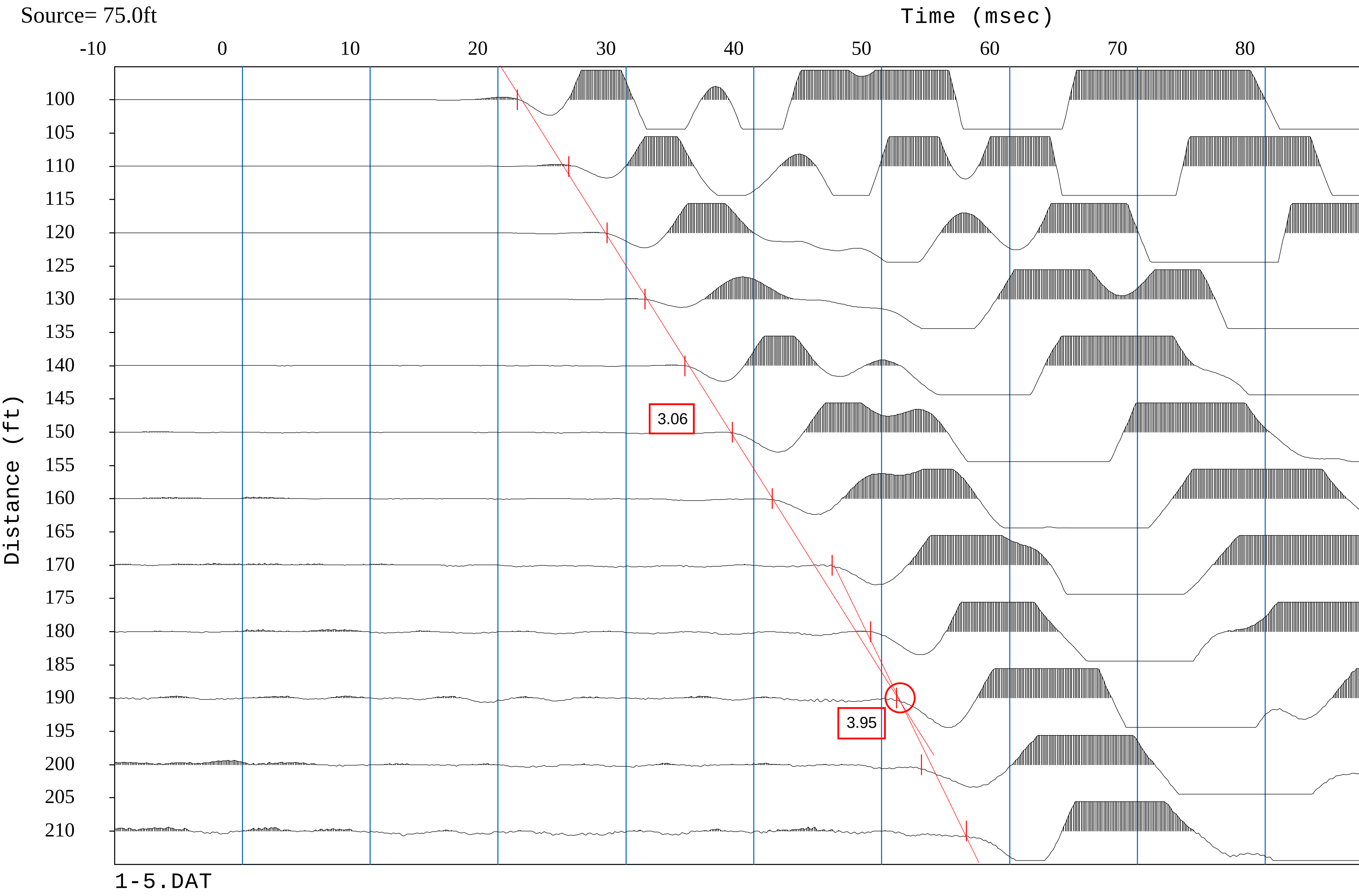
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
4.00
2.66
1-4.DAT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Distance (ft)
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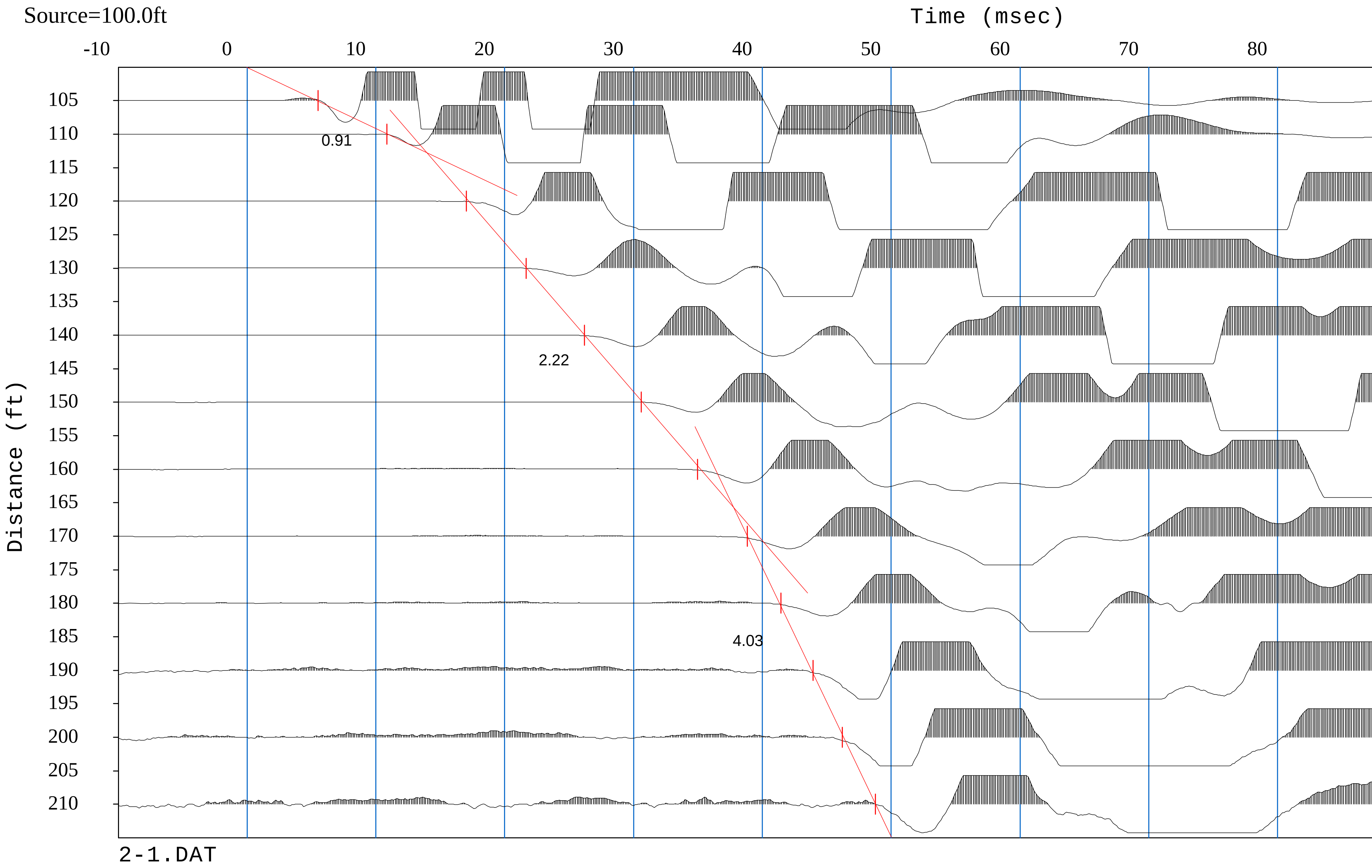
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
3.06
3.95
1-5.DAT

SEISMIC LINE 2

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	B-4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20
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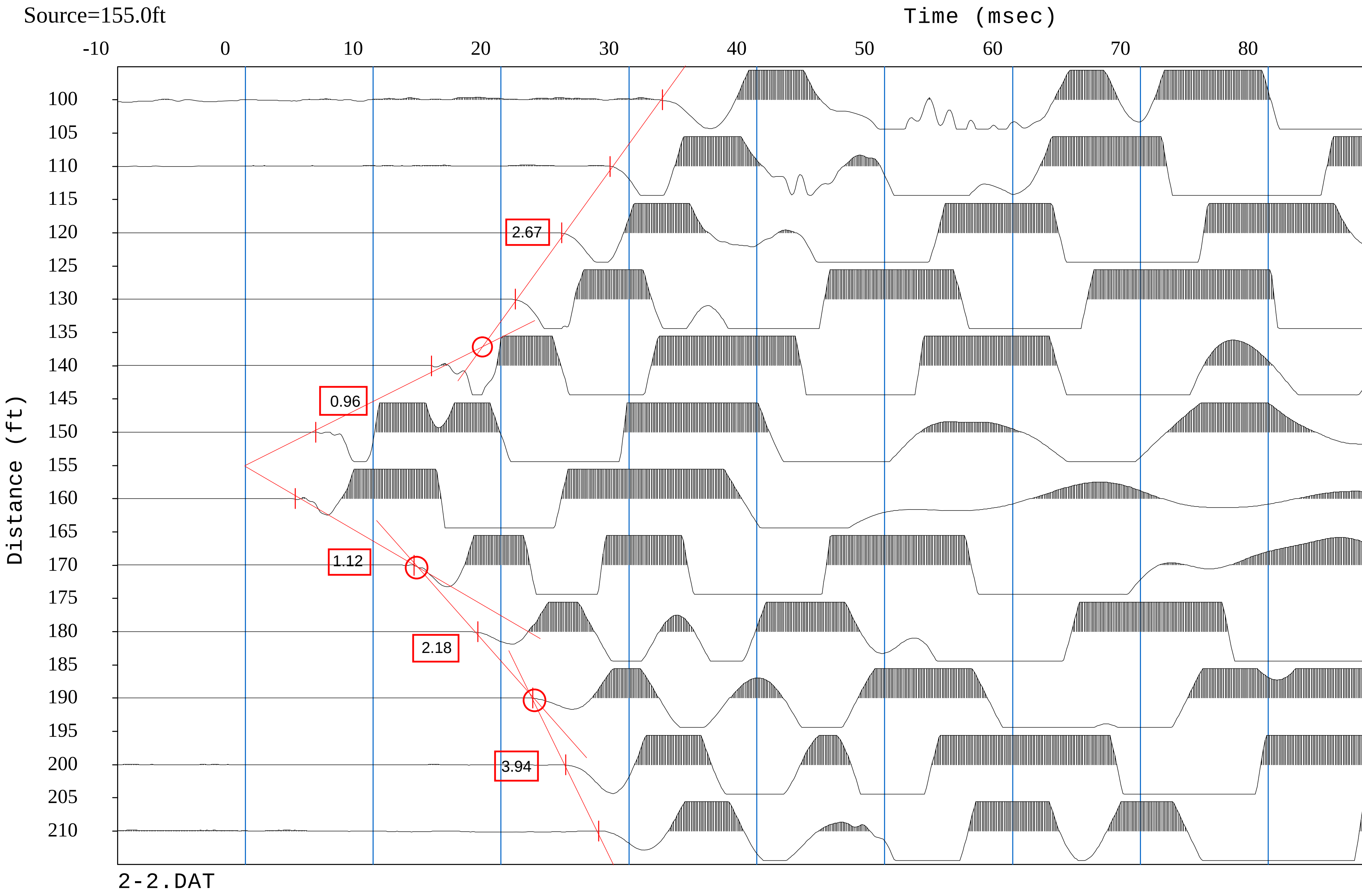
60
70
80
Distance (ft)
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
0.91
2.22
4.03
2-1.DAT



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Time (msec)
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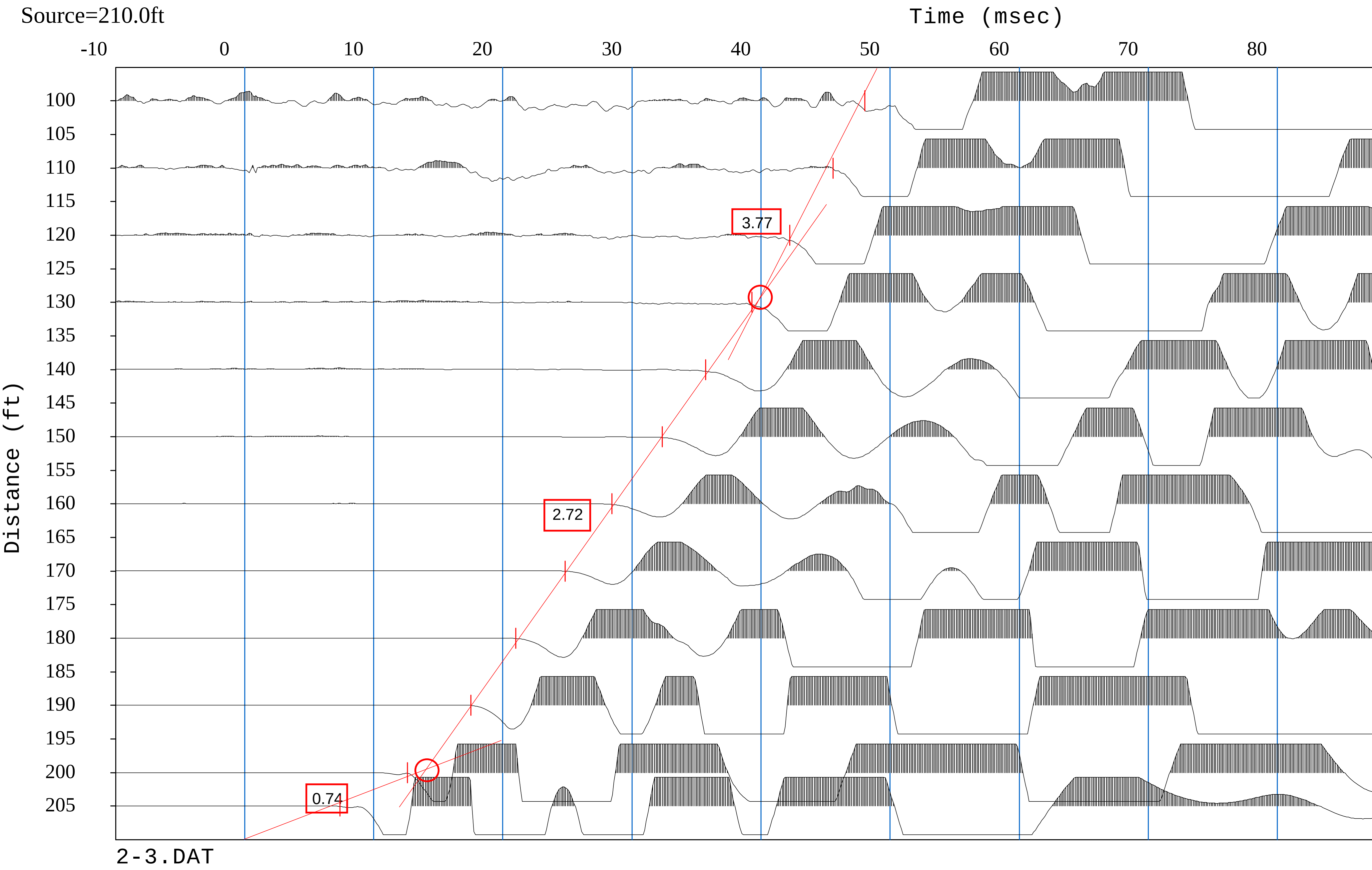
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
2.67
0.96
1.12
2.18
3.94
2-2.DAT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40
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60
70
80
Distance (ft)
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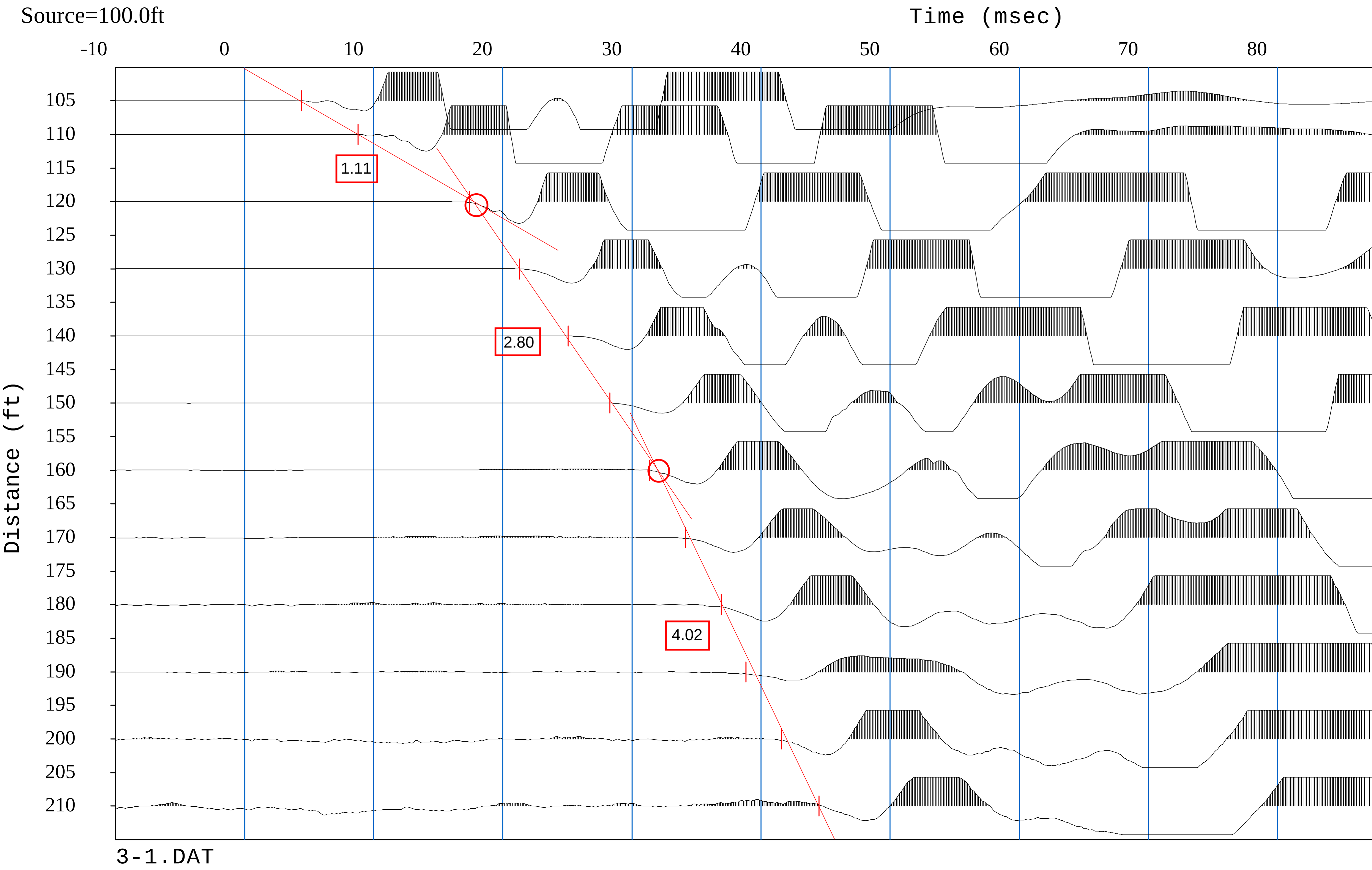
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
3.77
2.72
0.74
2-3.DAT

SEISMIC LINE 3

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	B-5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60
70
80
Distance (ft)
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110
115
120
125
130
135
140
145
150
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175
180
185
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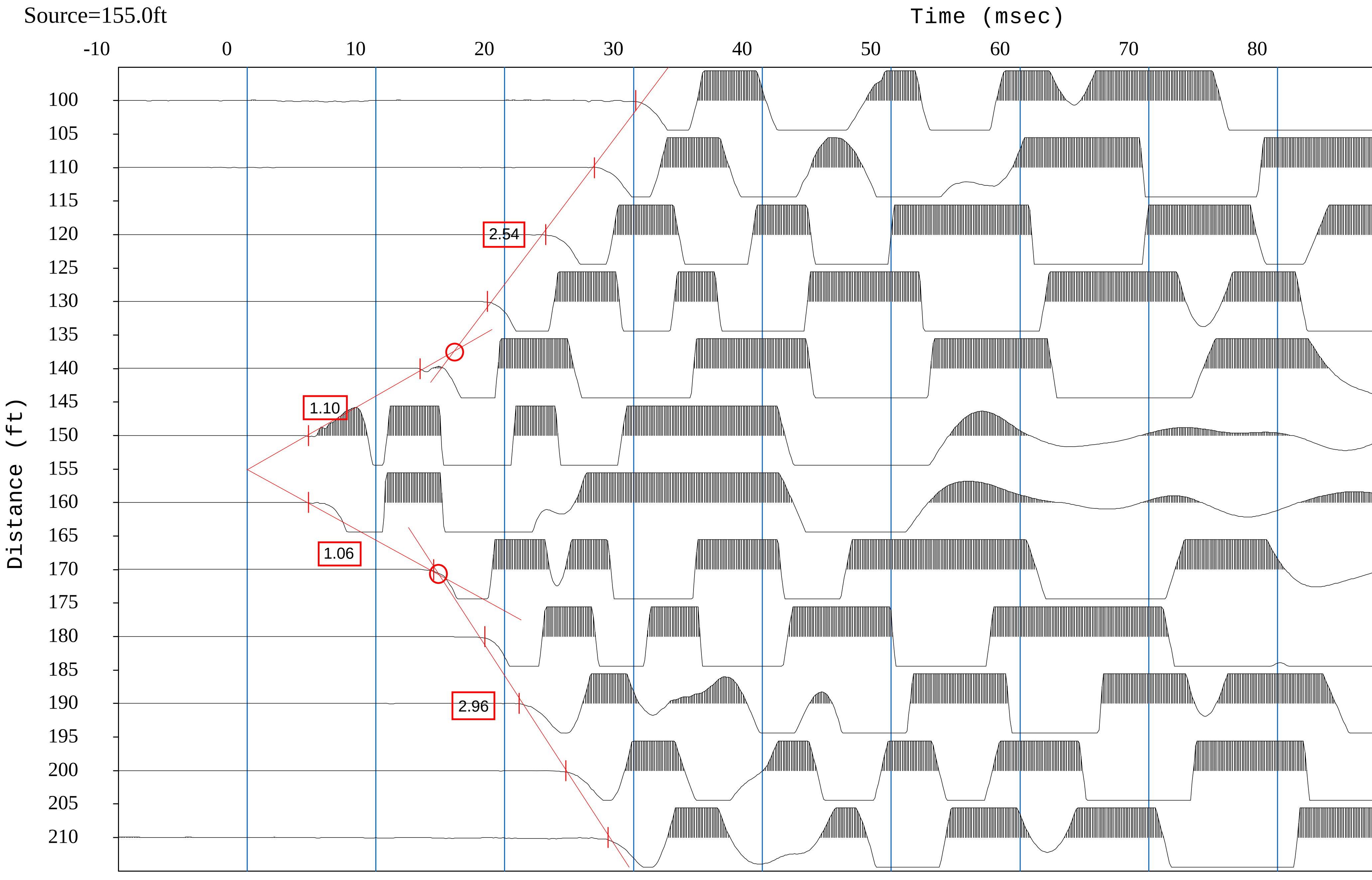
195
200
205
210
1.11
2.80
4.02
3-1.DAT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Distance (ft)
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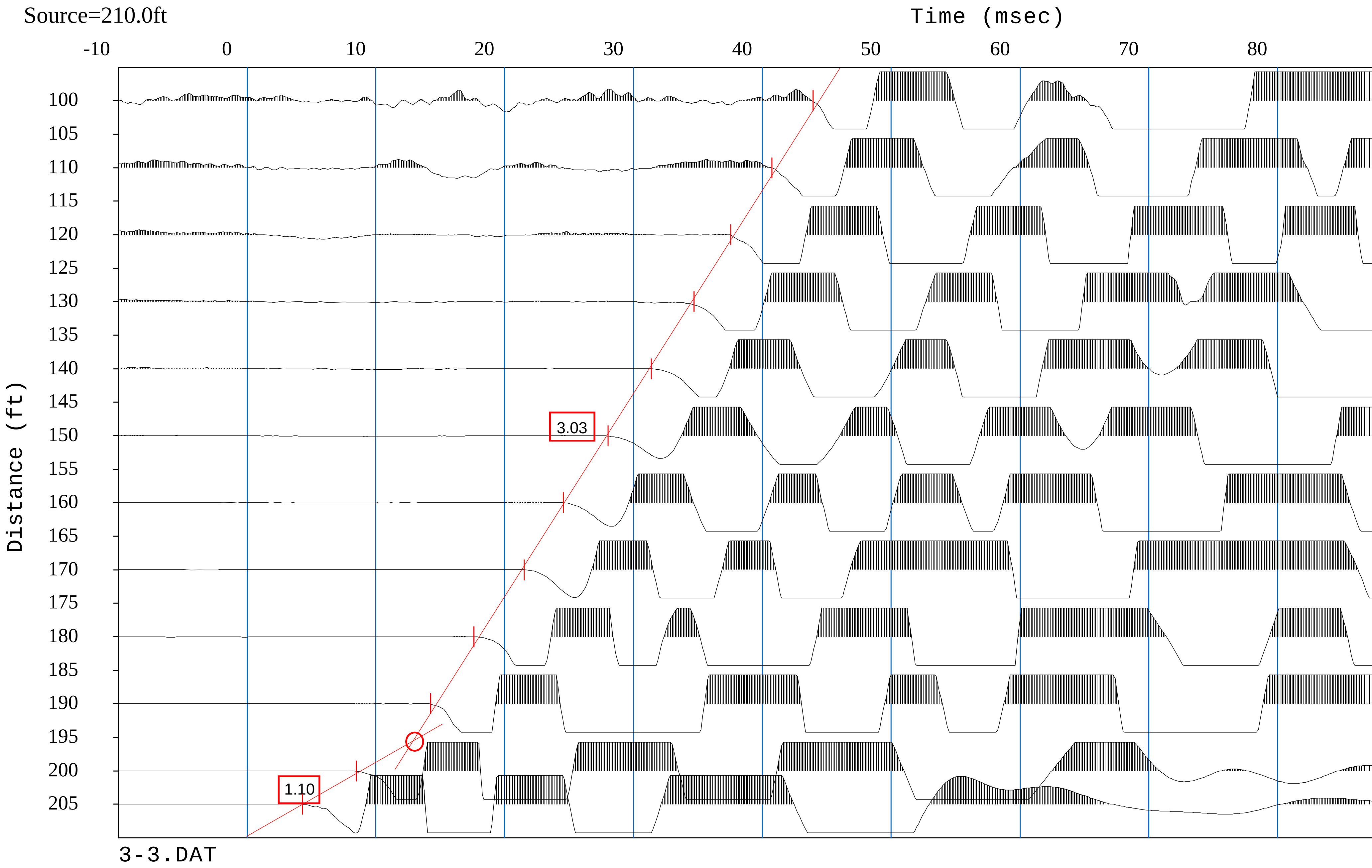
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
2.54
1.10
1.06
2.96

3-2.DAT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Distance (ft)
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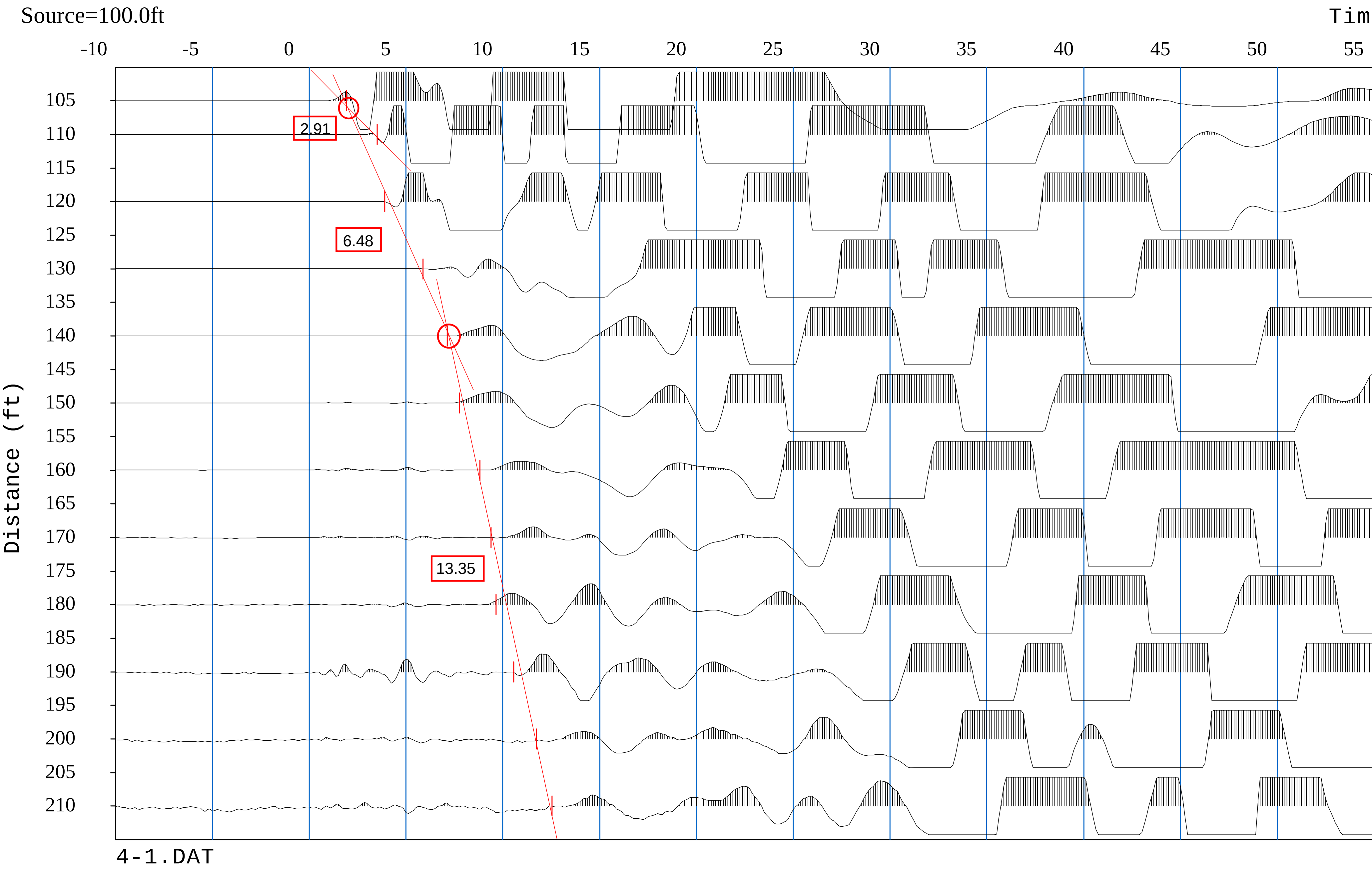
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
3.03
1.10
3-3.DAT

SEISMIC LINE 4

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	B-6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25
30
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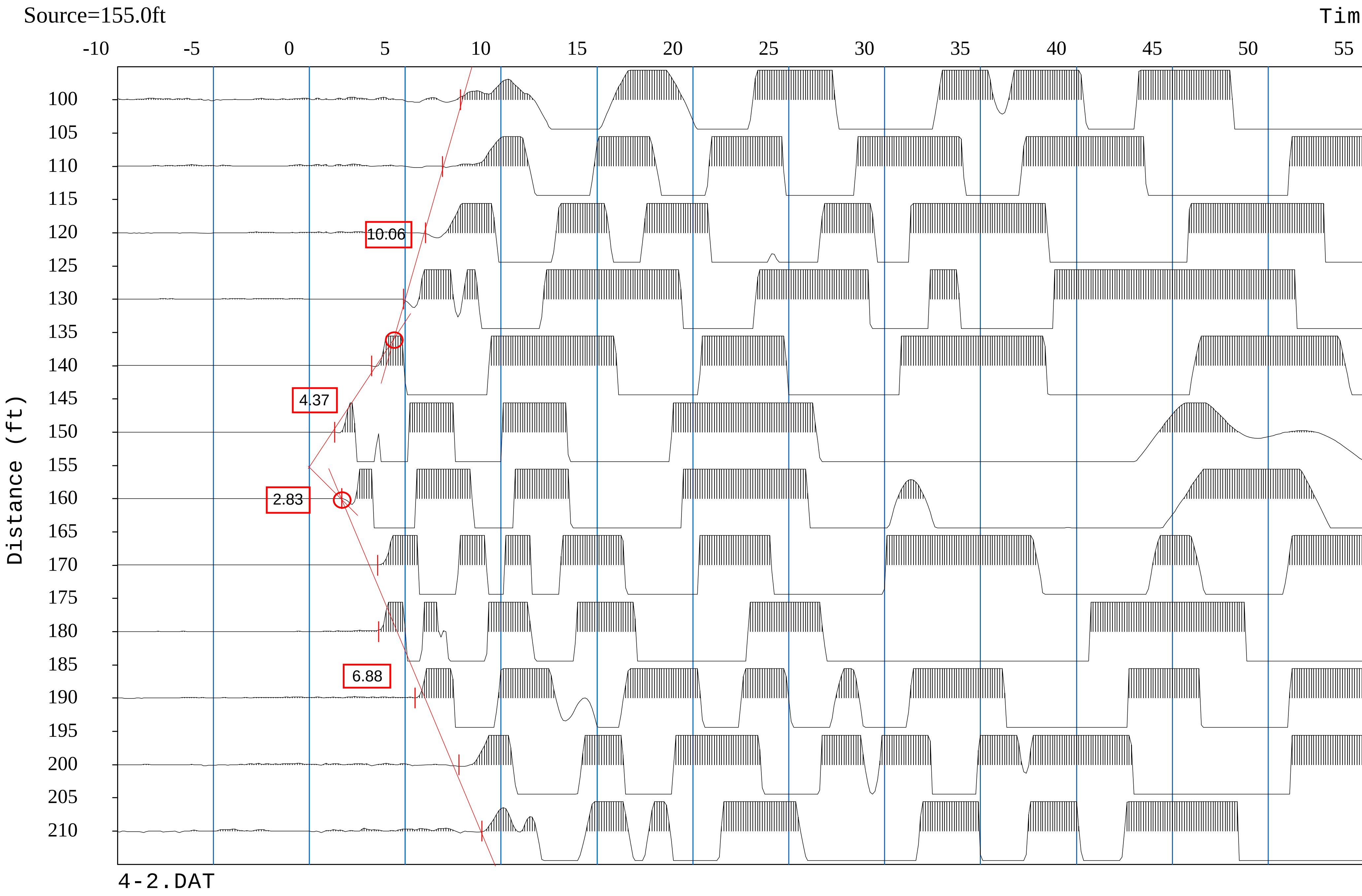
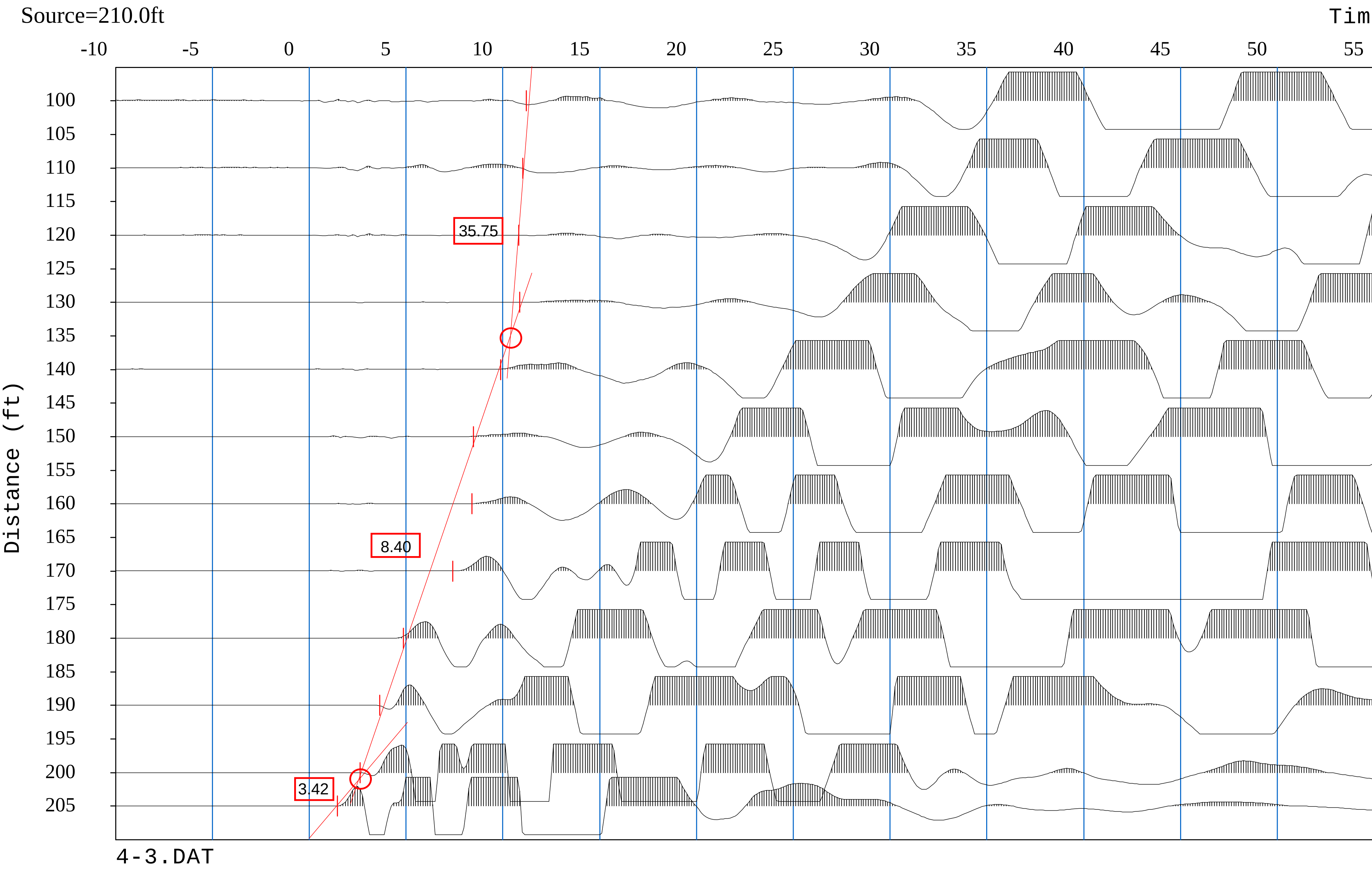
40
45
50
55
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
Distance (ft)
2.91
6.48
13.35
4-1.DAT

Source=155.0ft

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15
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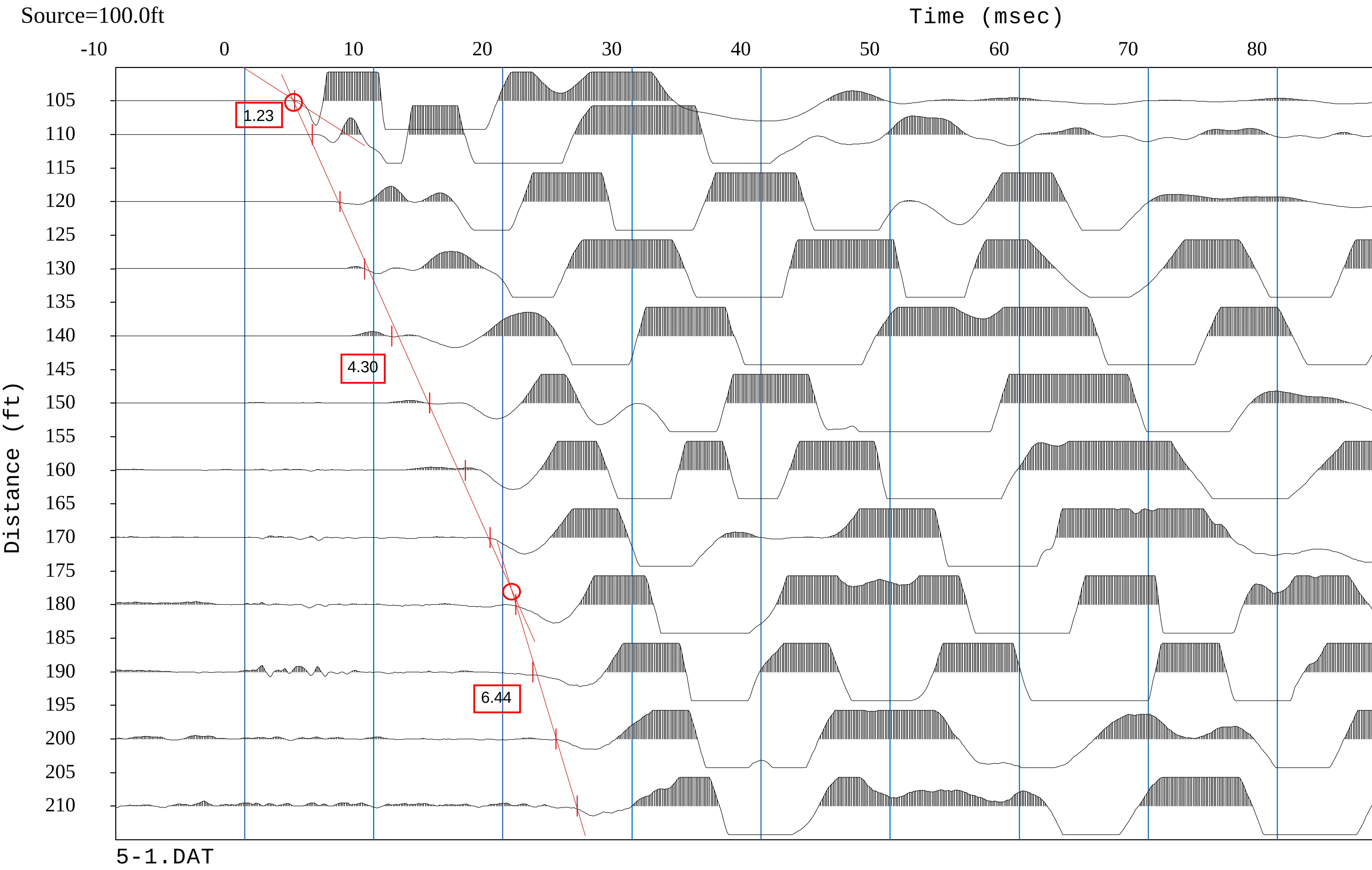
55
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
Distance (ft)
35.75
8.40
3.42
4-3.DAT

SEISMIC LINE 5

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	B-7



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Time (msec)
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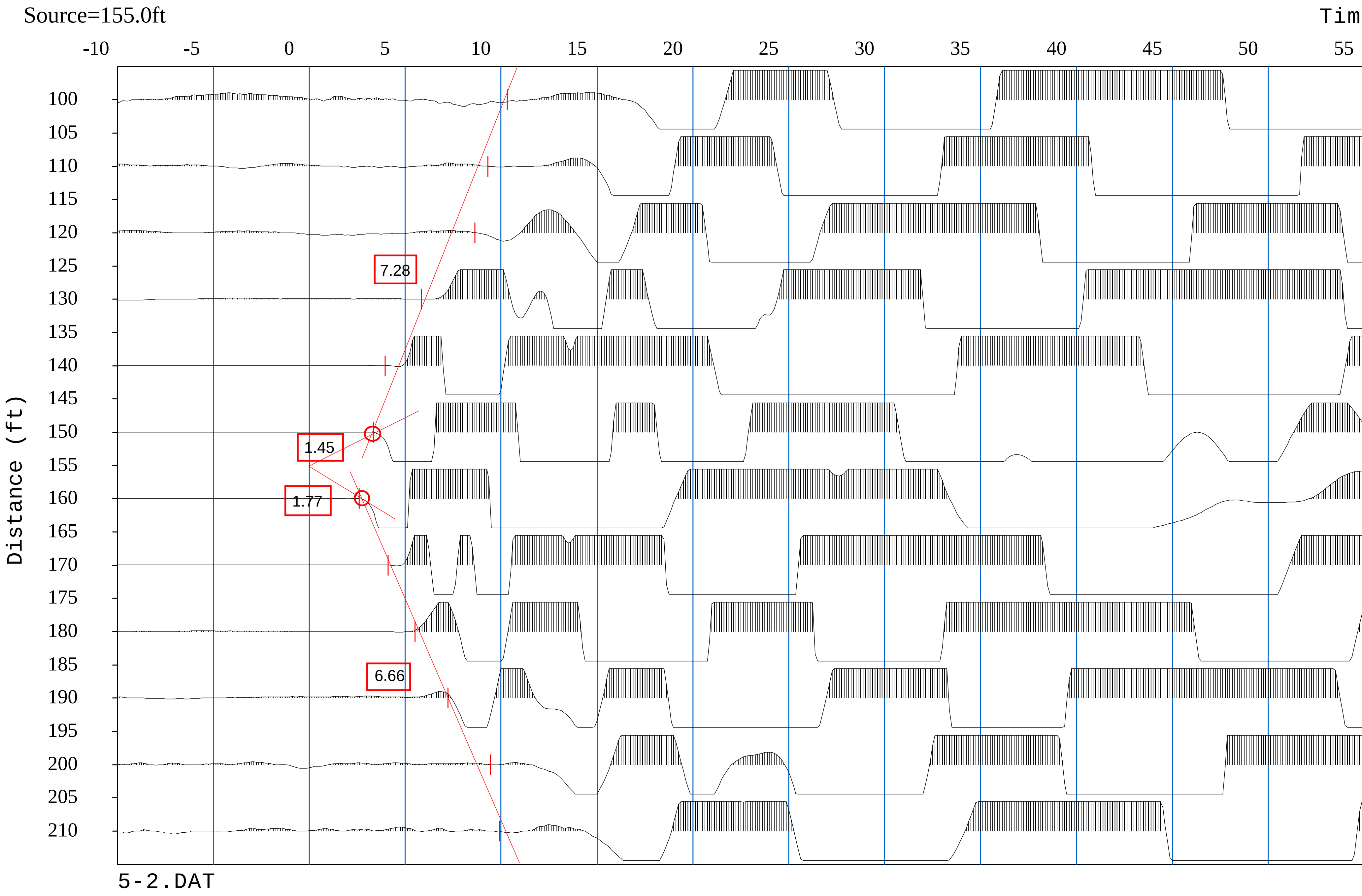
10
20
30
40
50
60
70
80
Distance (ft)
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
1.23
4.30
6.44
5-1.DAT



Source=155.0ft
Tim
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
Distance (ft)
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110
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120
125
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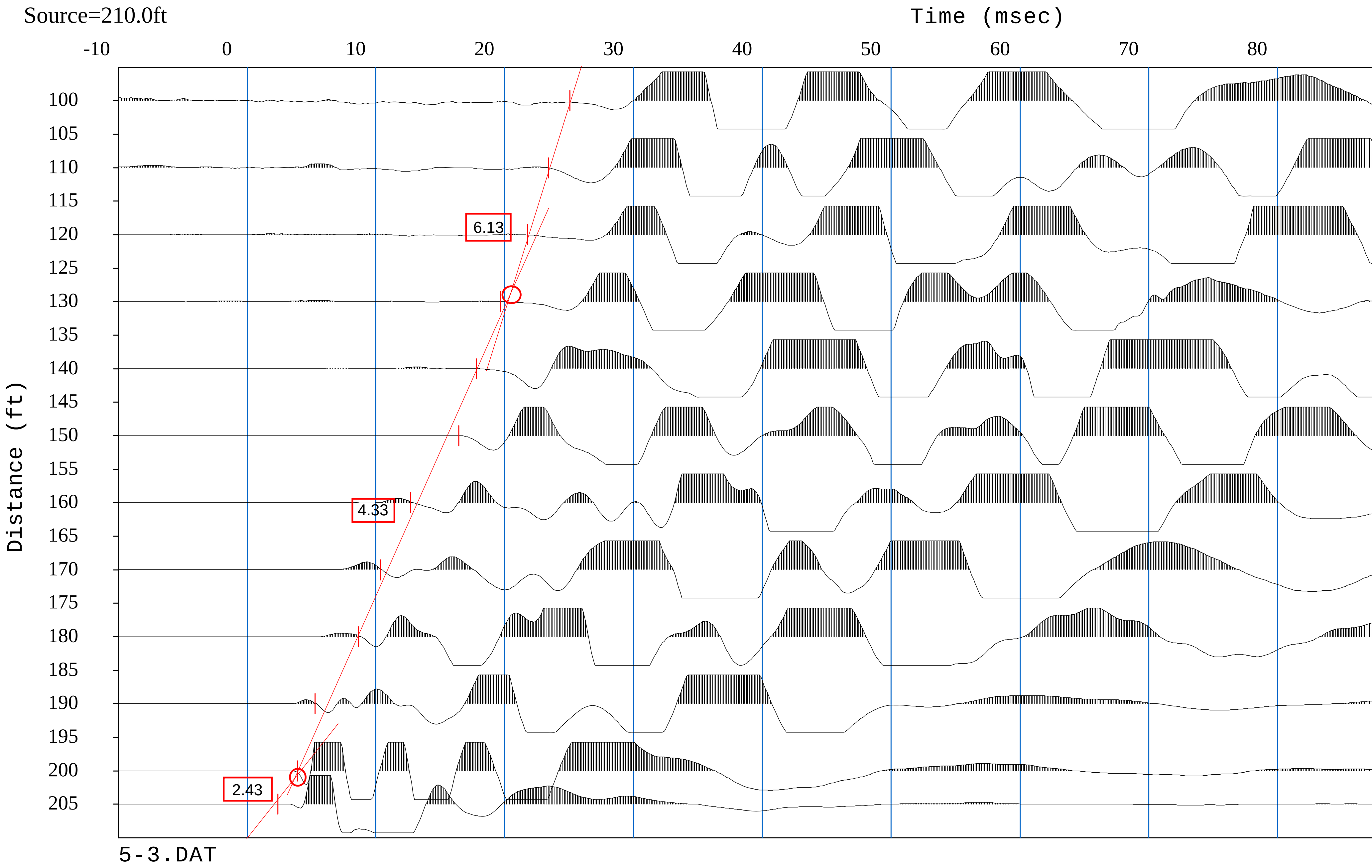
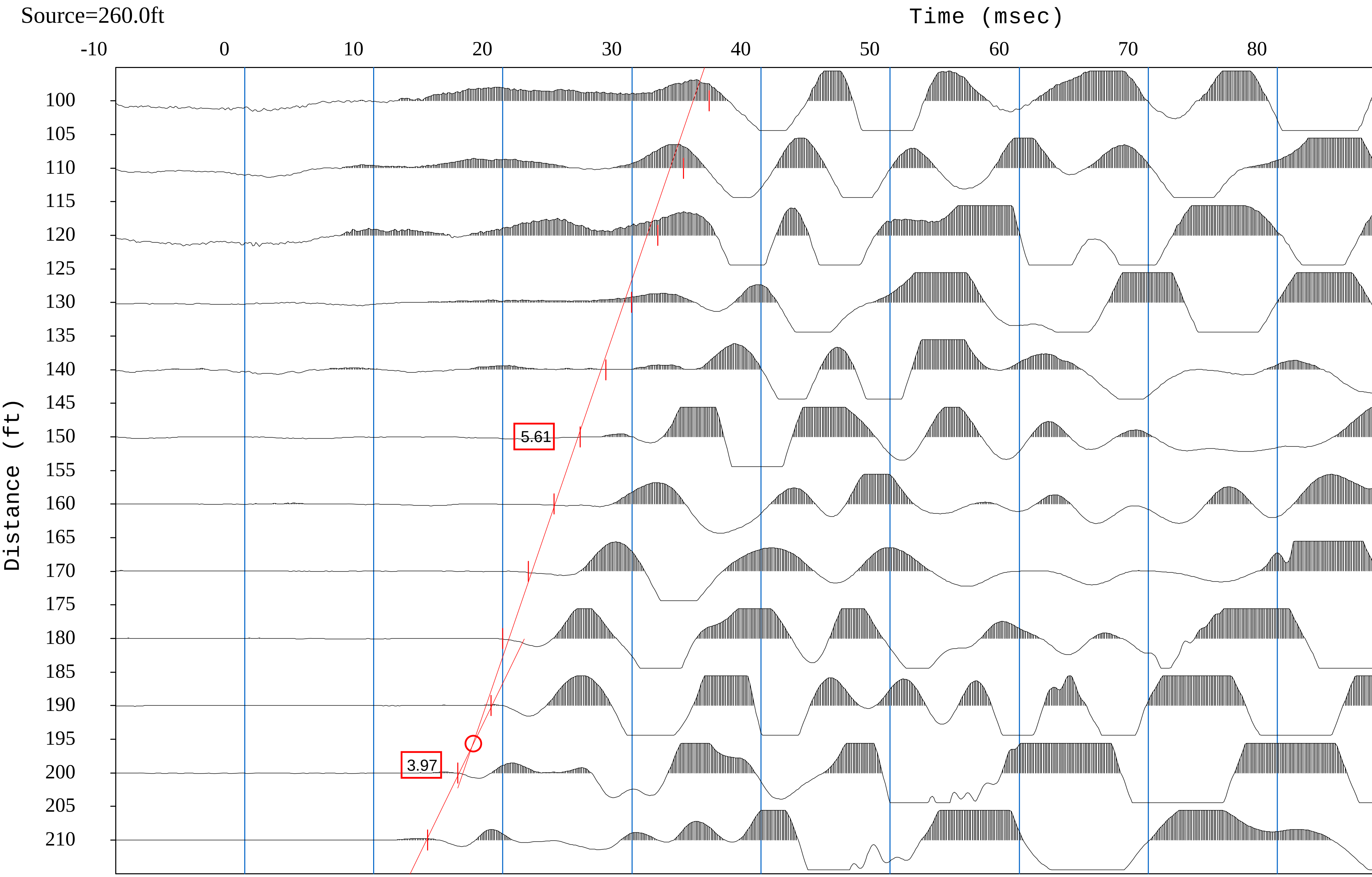
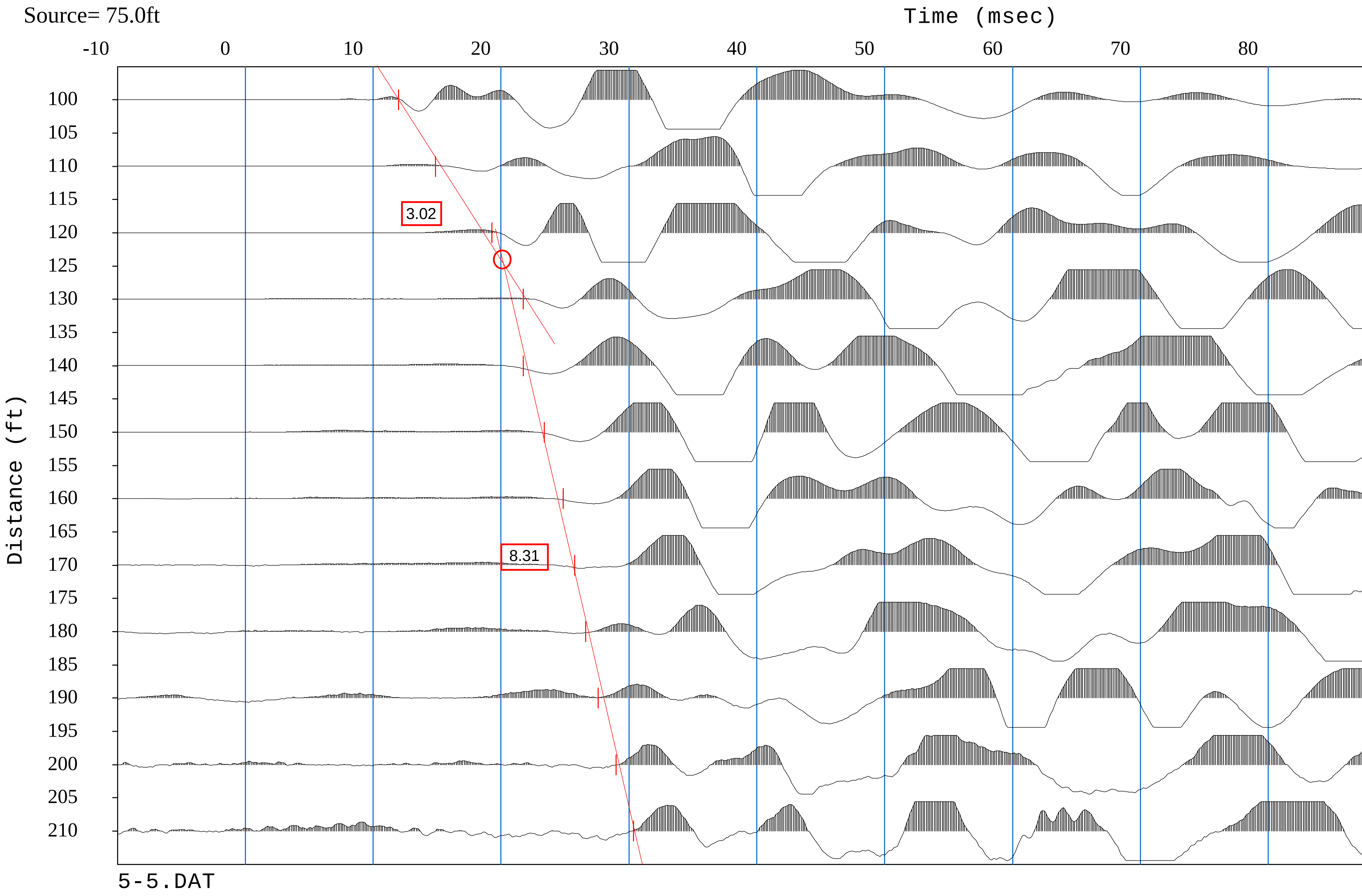
150
155
160
165
170
175
180
185
190
195
200
205
210
7.28
1.45
1.77
6.66
5-2.DAT


Source=210.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
6.13
4.33
2.43
5-3.DAT


Source=260.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
5.61
3.97

5-4.DAT


Source= 75.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
3.02
8.31
5-5.DAT

SEISMIC LINE 6

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

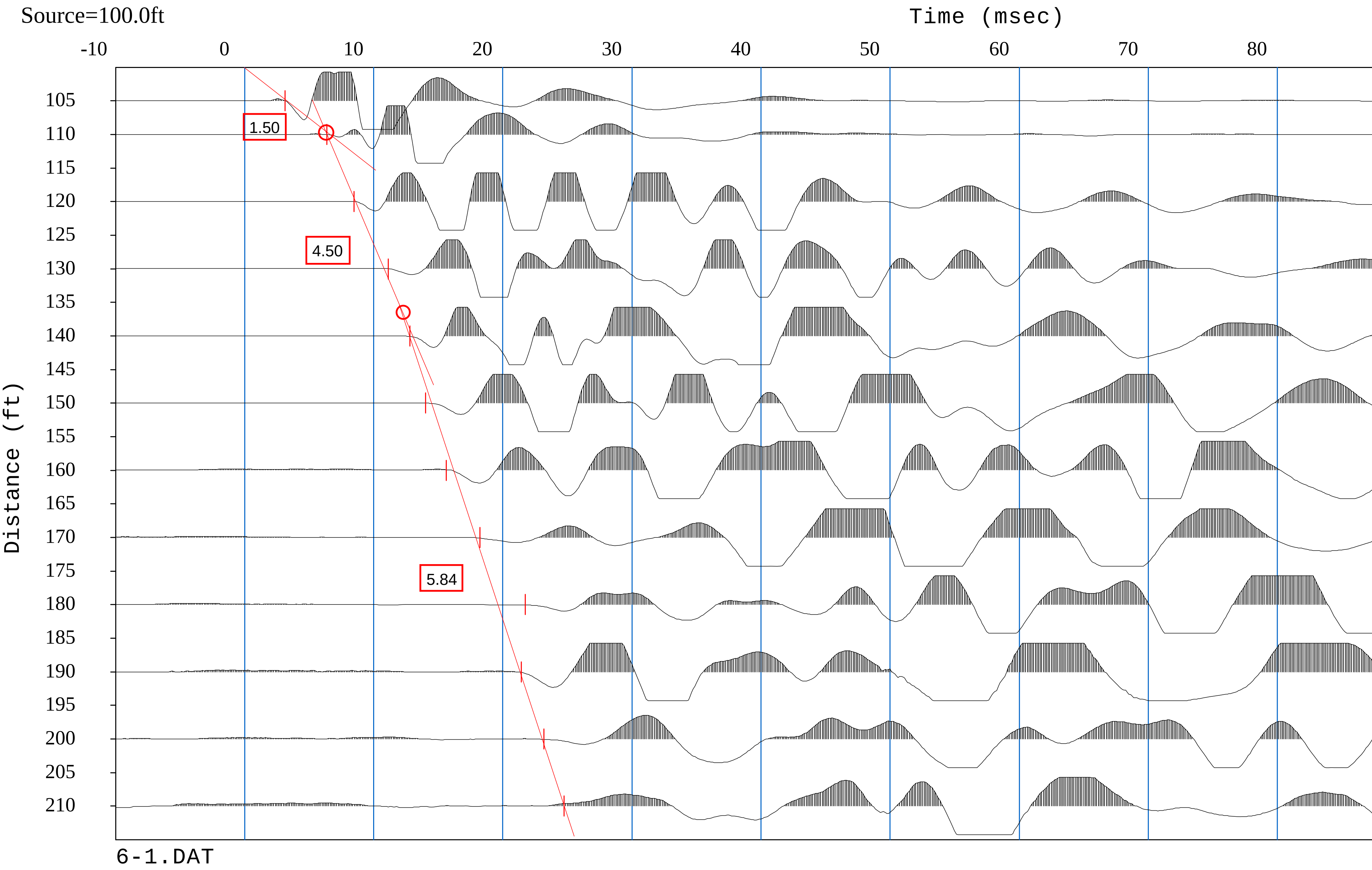
Geosyntec consultants

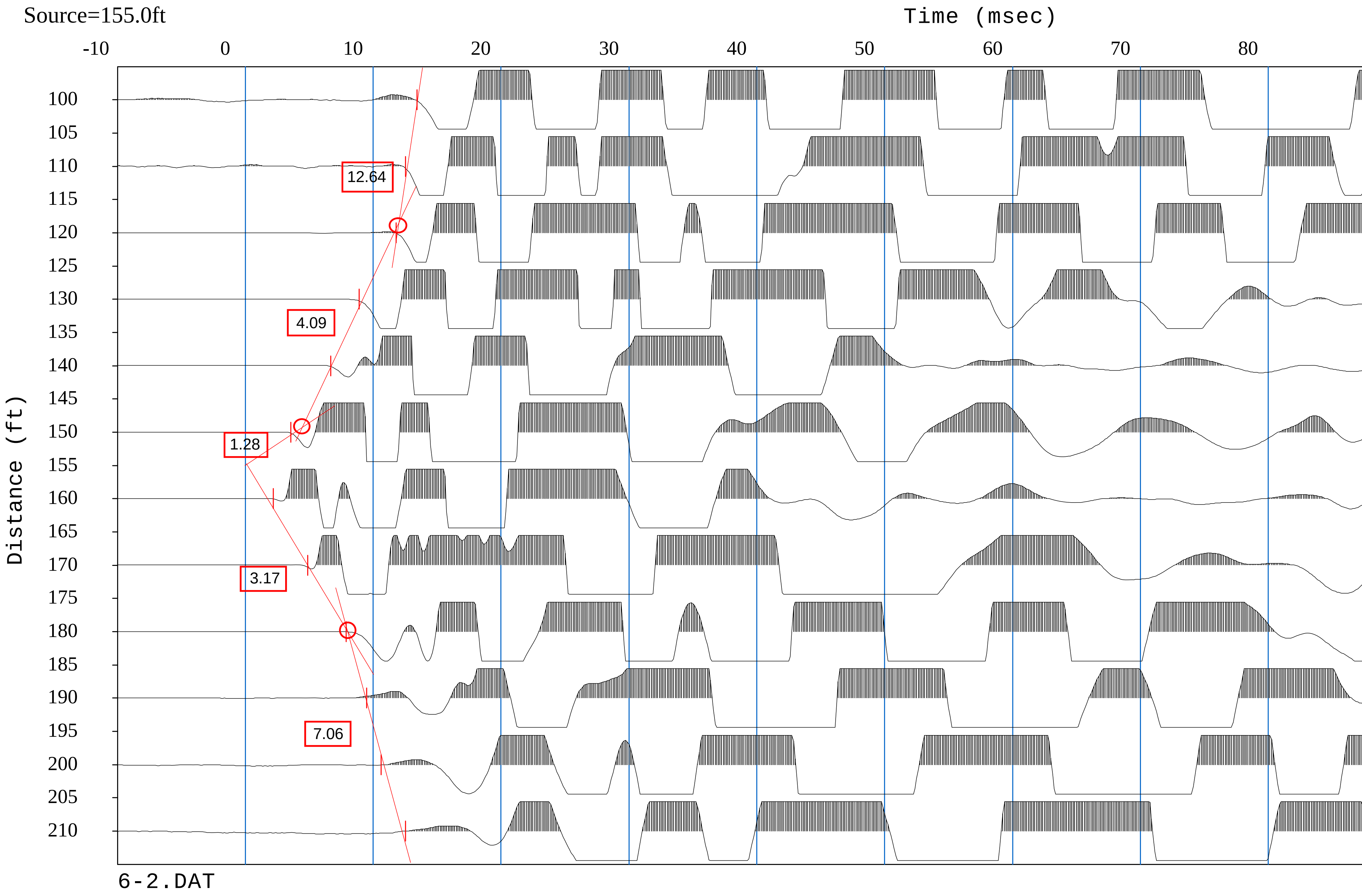
DATE: MAY 2009

PROJECT NO. SC0368

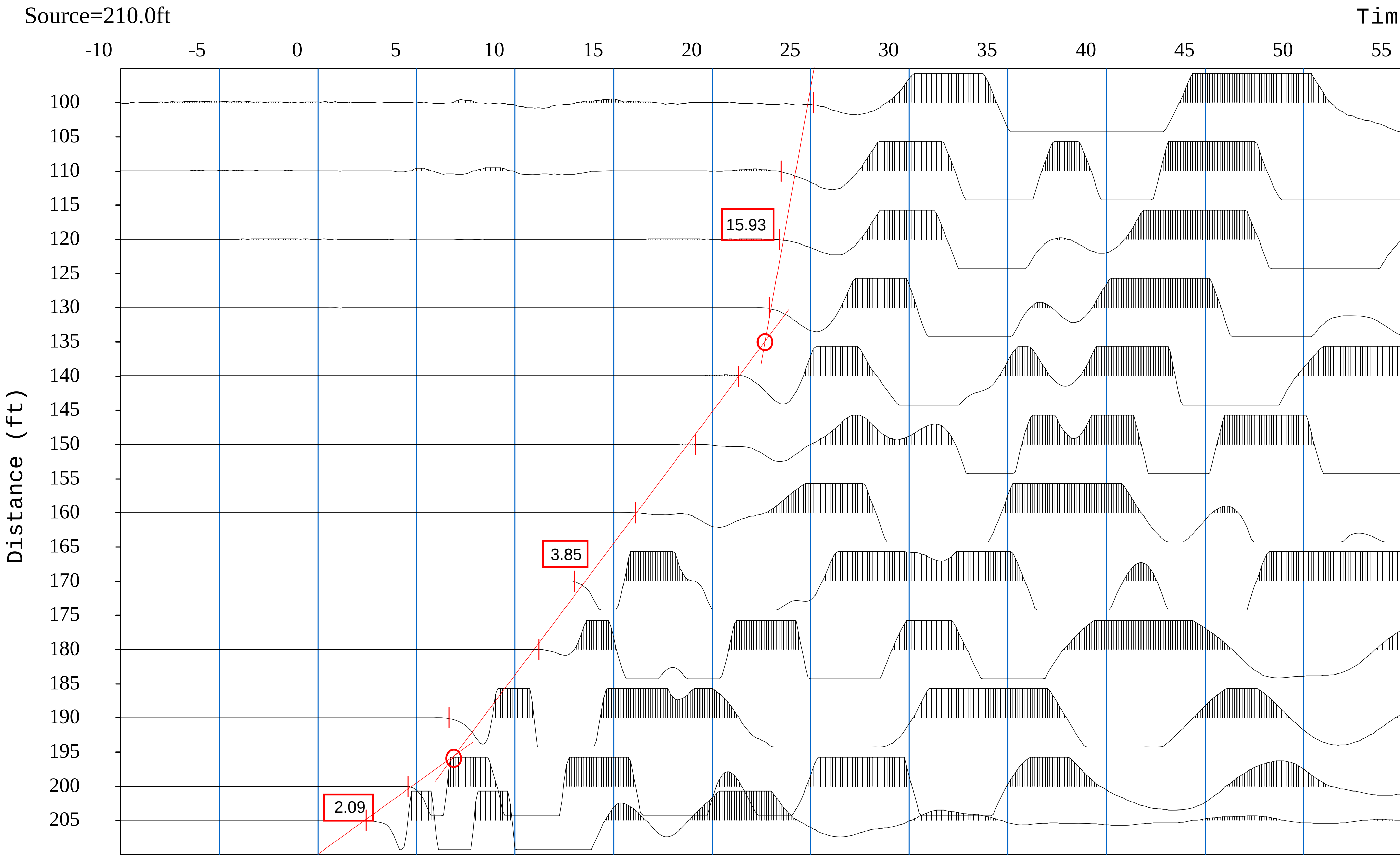
FIGURE

B-8

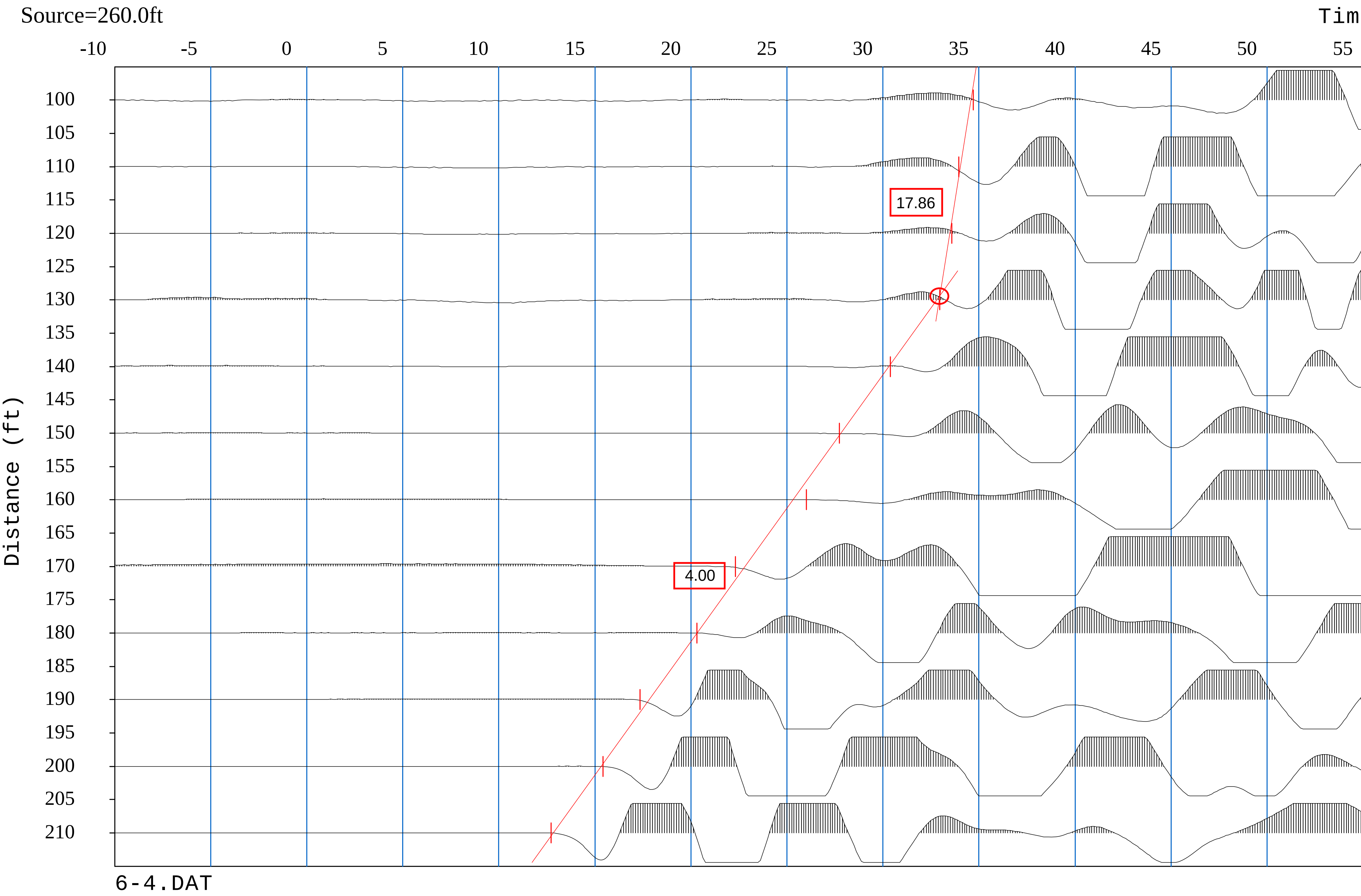

Source=100.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
1.50
4.50
5.84
6-1.DAT


Source=155.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
12.64
4.09
1.28
3.17
7.06
6-2.DAT

Source=210.0ft



6-3.DAT



Source=260.0ft
Tim
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
Distance (ft)
17.86
4.00
6-4.DAT

SEISMIC LINE 7

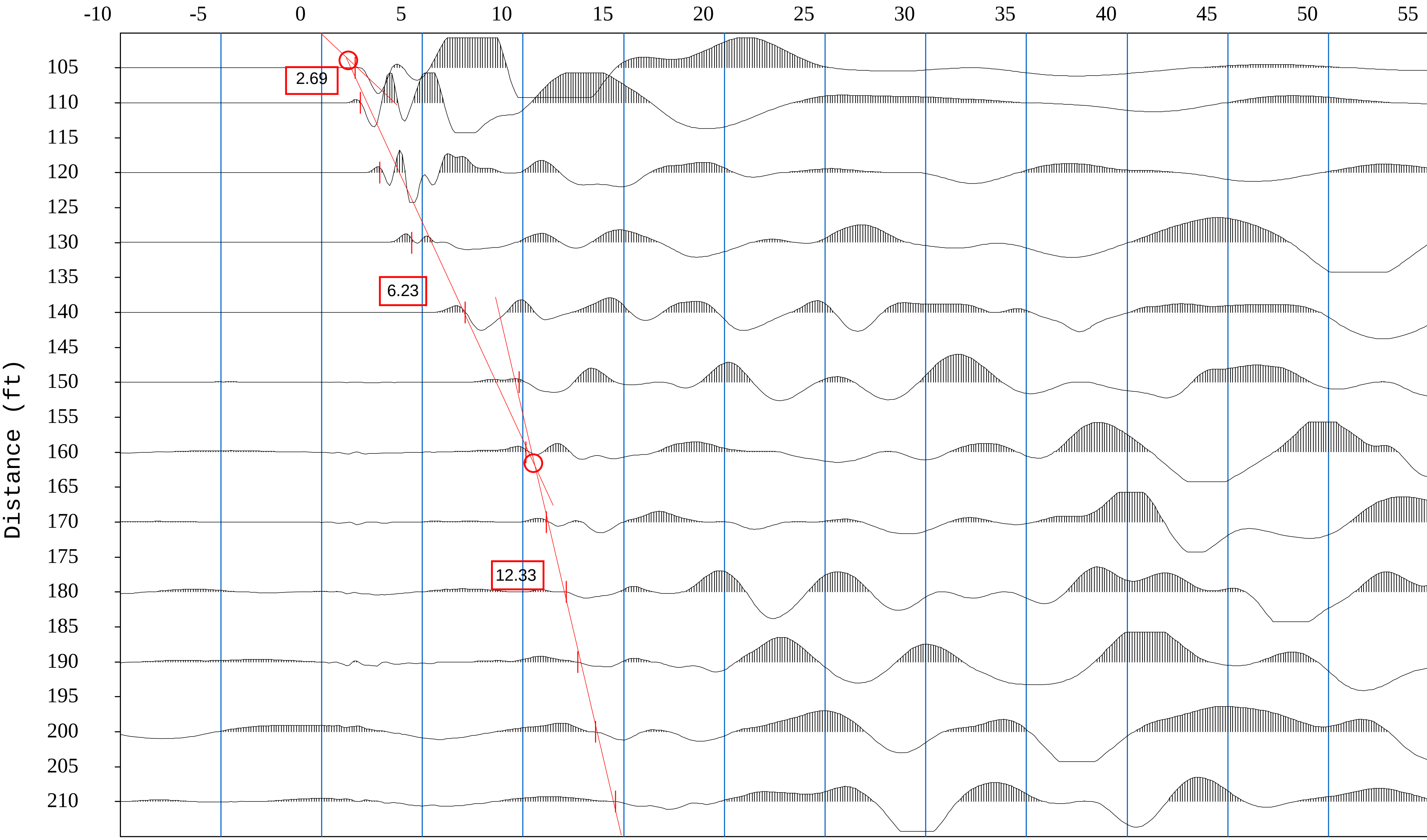
SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

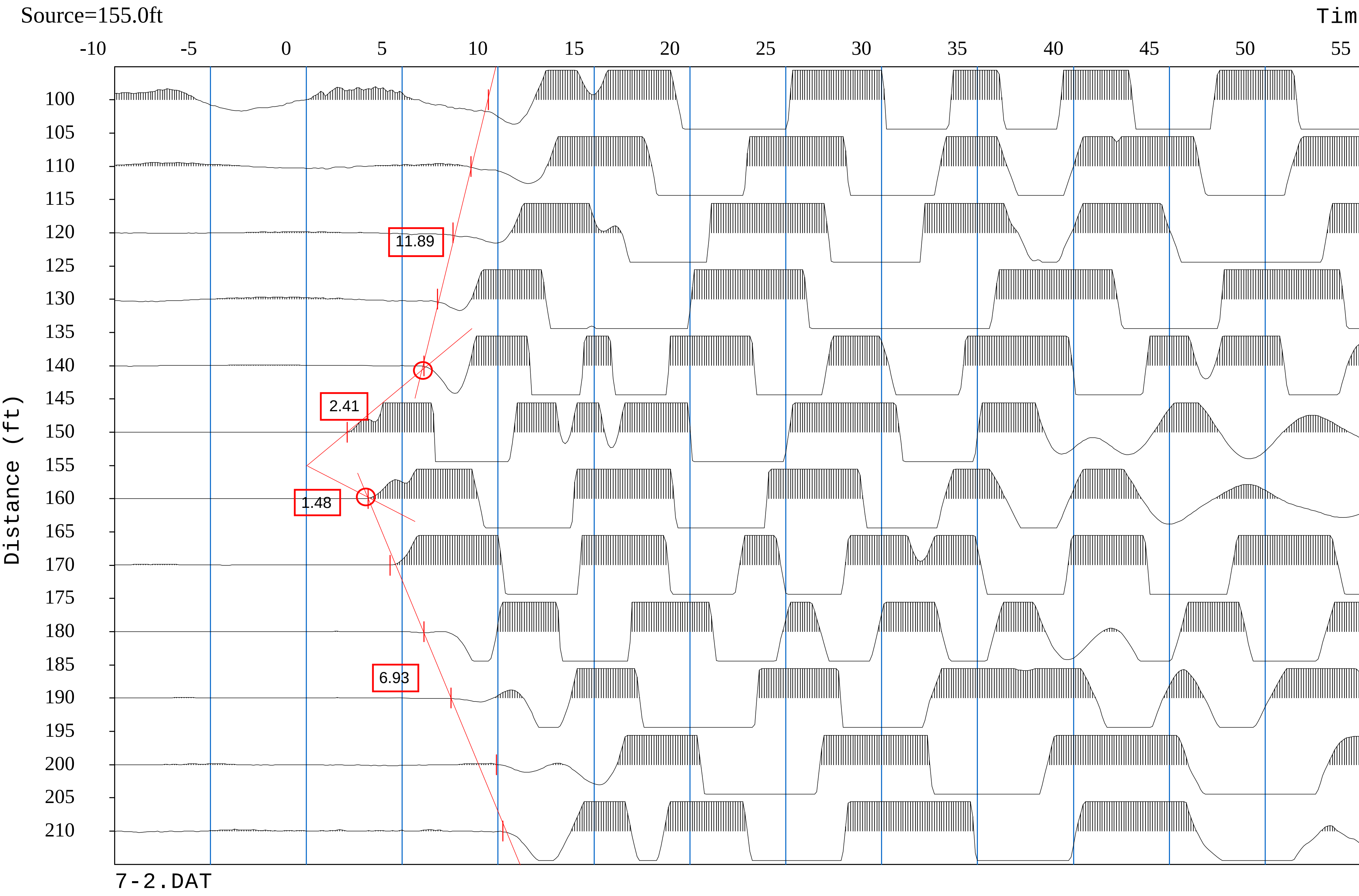
Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	B-9

Source=100.0ft

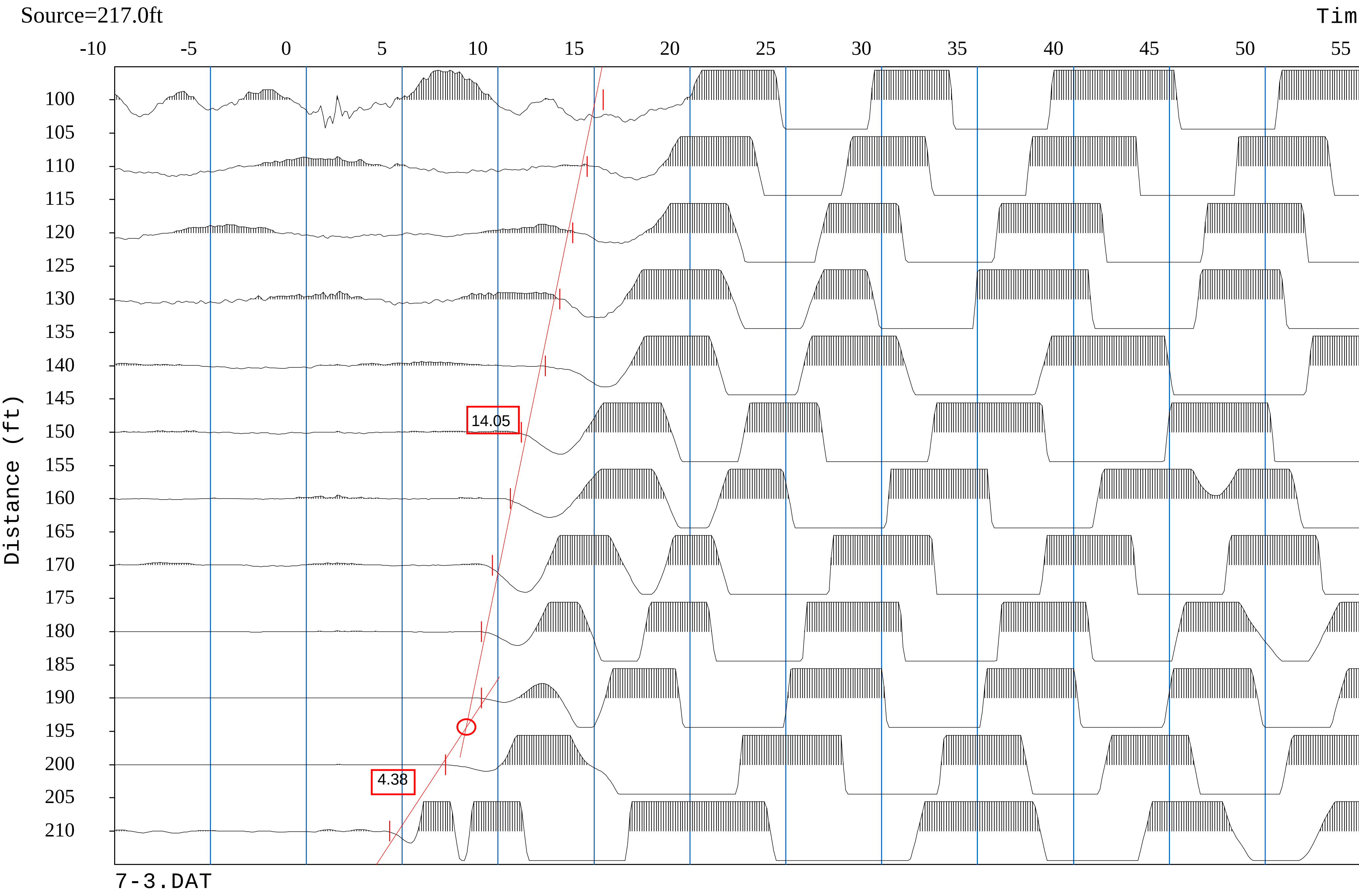
Tim

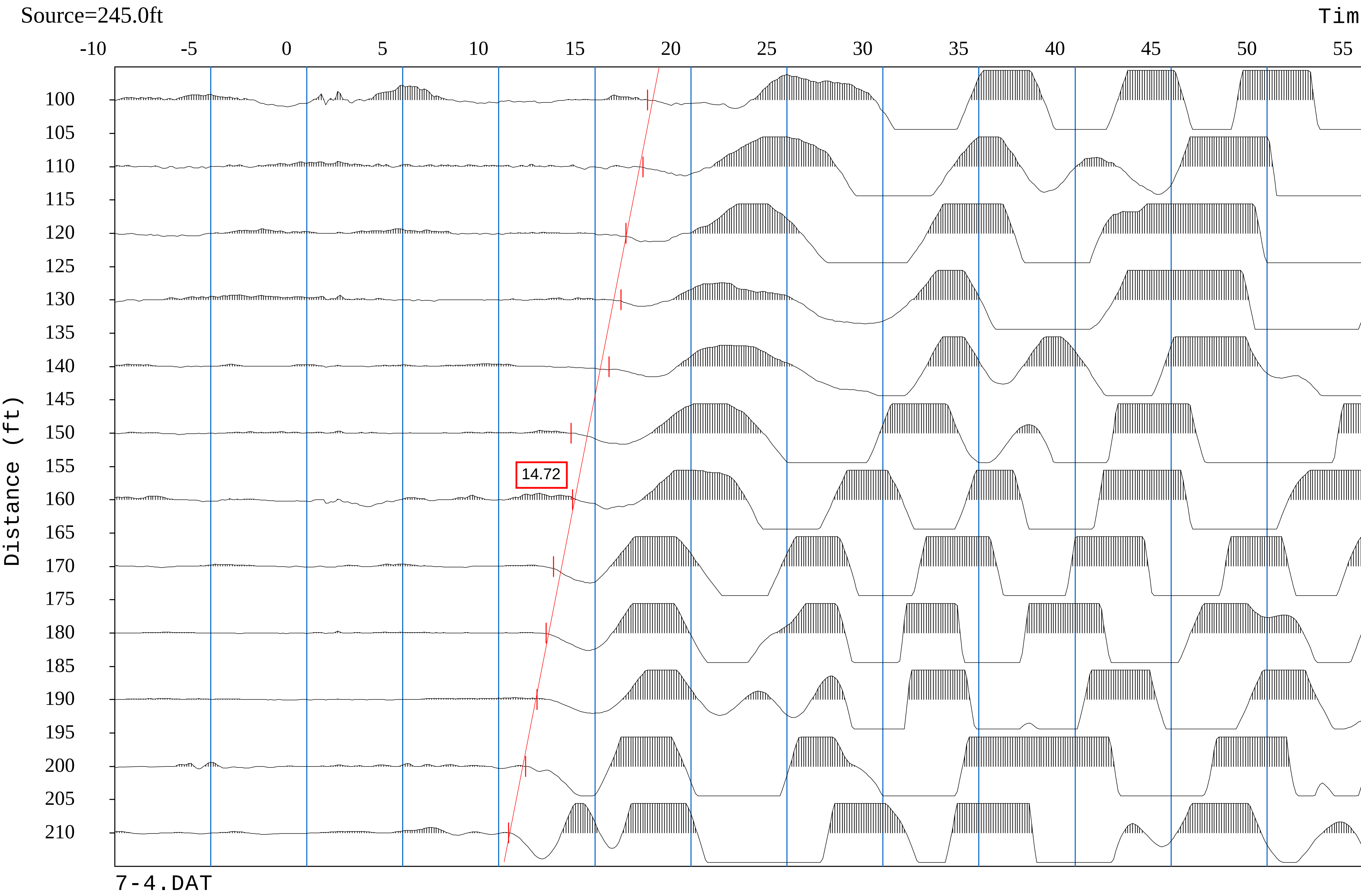


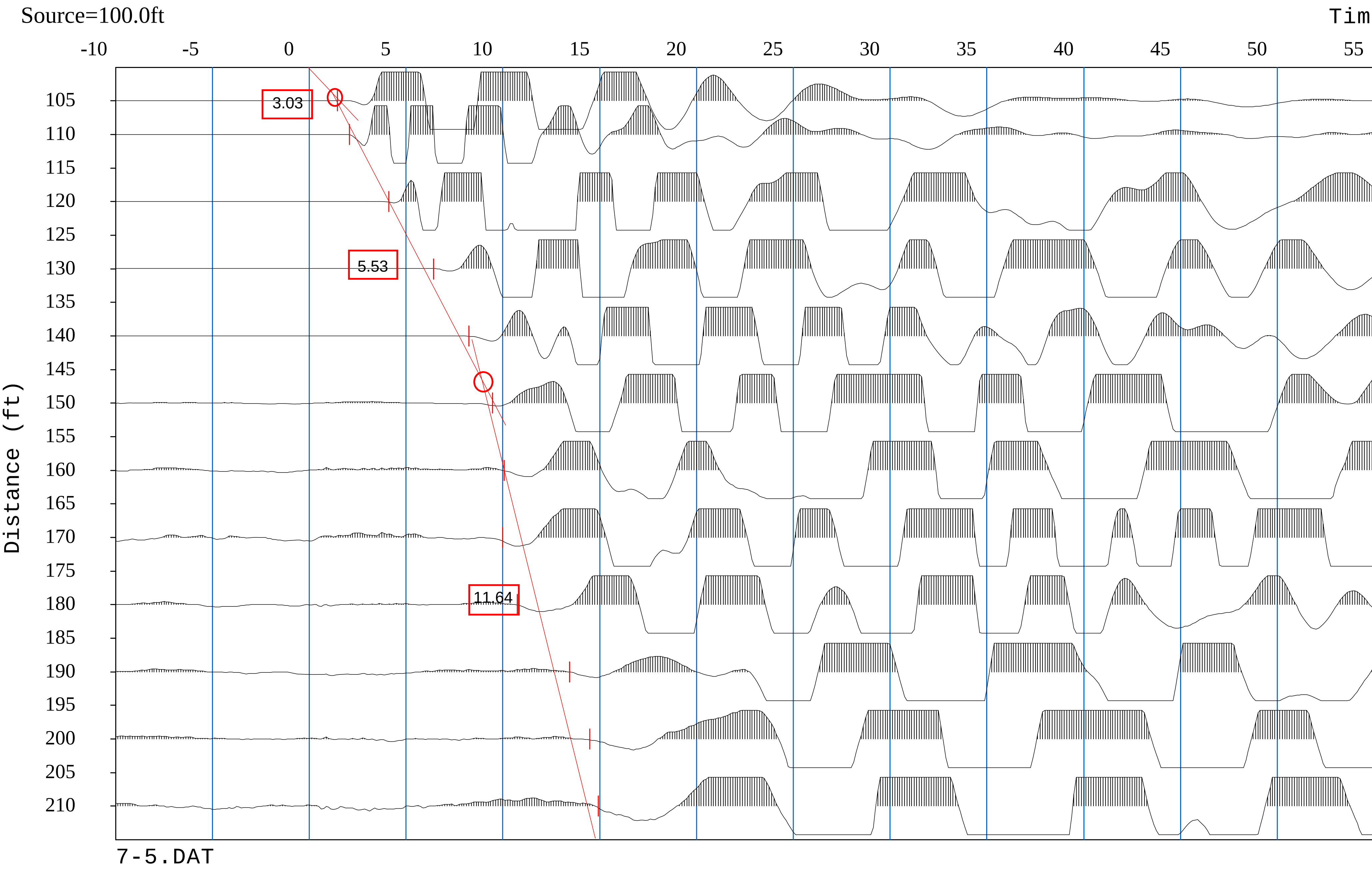
7-1.DAT



Source=155.0ft
Tim
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
Distance (ft)
11.89
2.41
1.48
6.93
7-2.DAT


Source=217.0ft
Tim
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
14.05
4.38
7-3.DAT


Source=245.0ft
Tim
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
14.72
7-4.DAT


Source=100.0ft
Tim
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
Distance (ft)
3.03
5.53
11.64
7-5.DAT

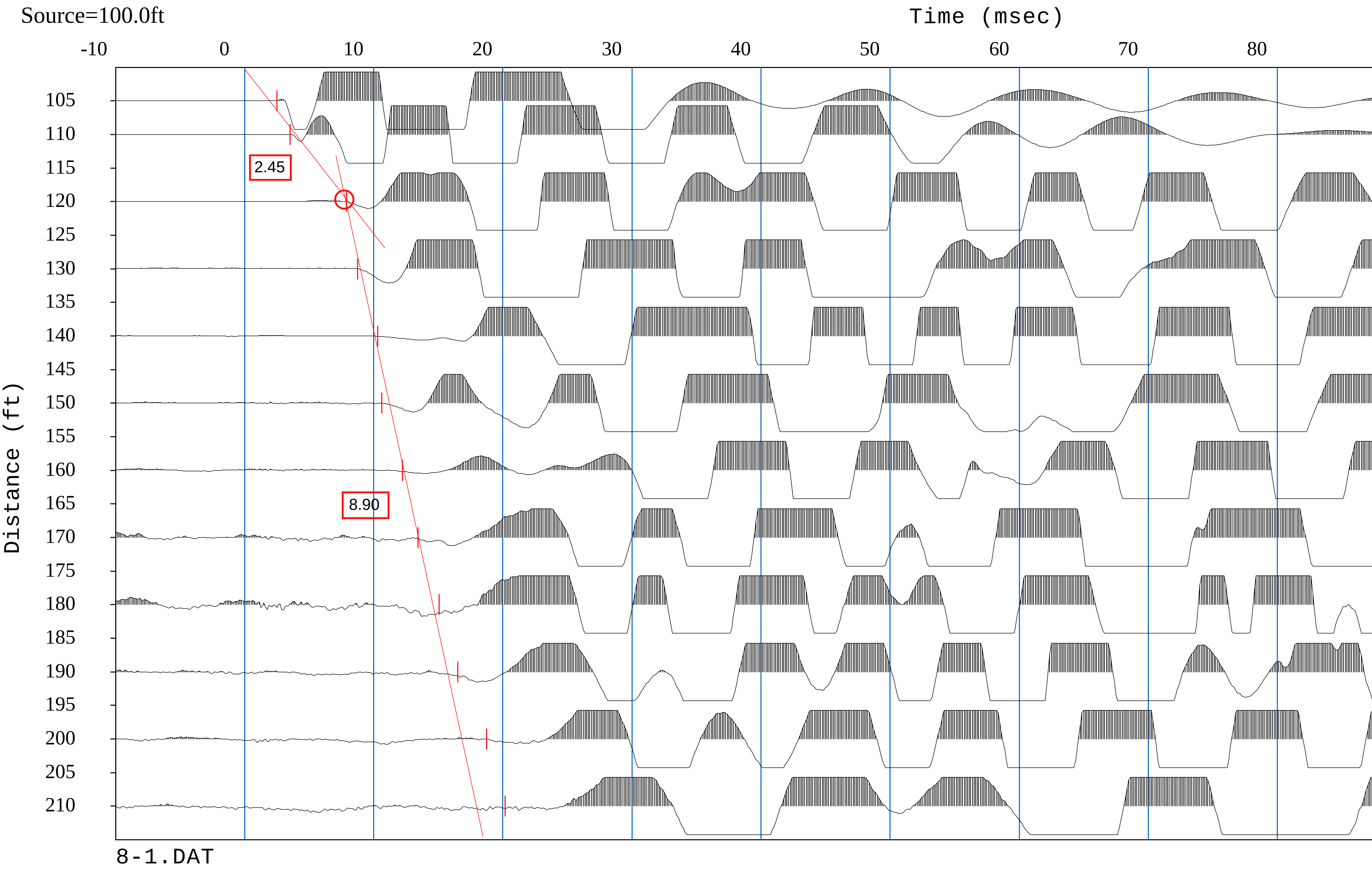
SEISMIC LINE 8

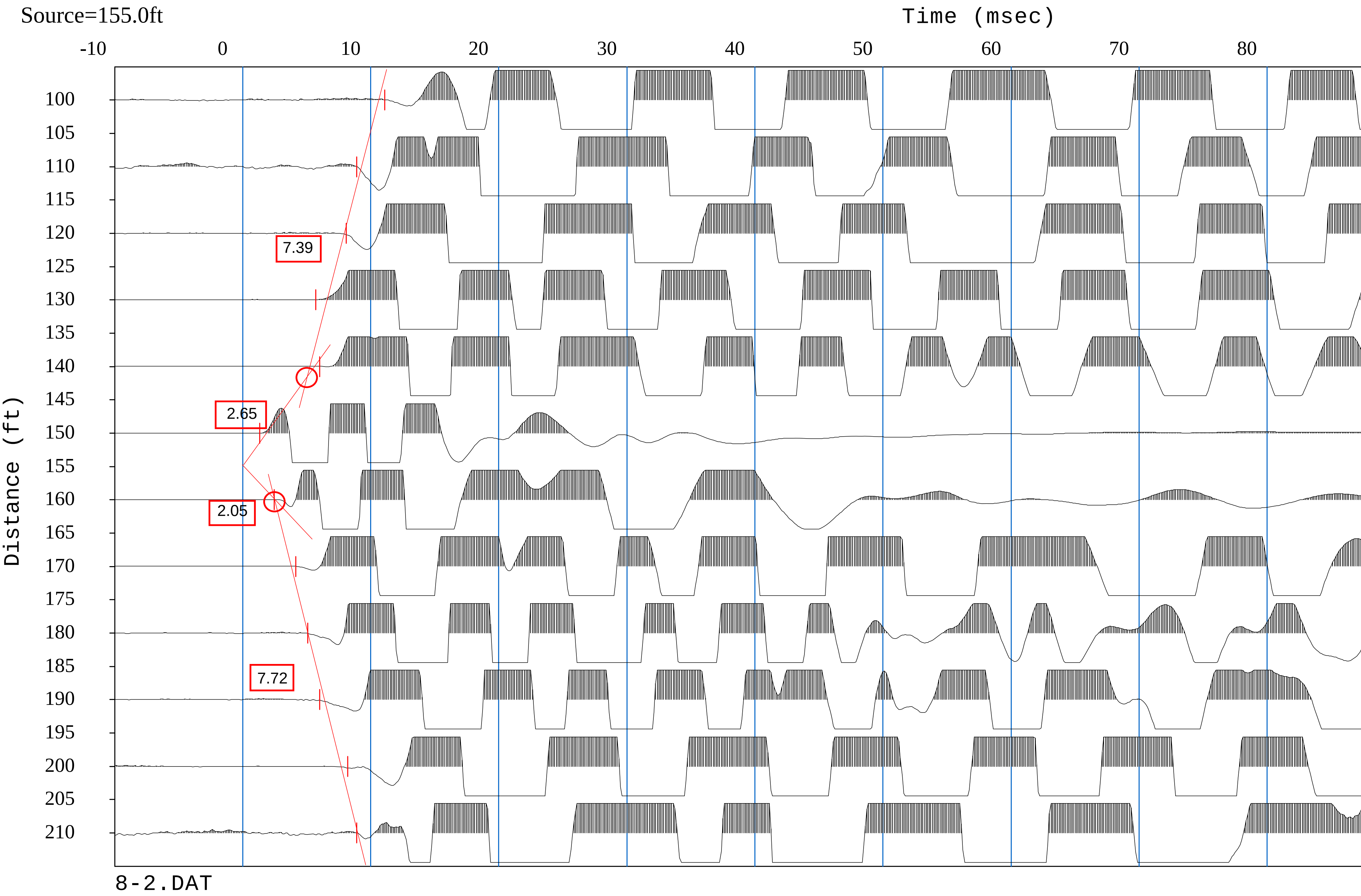
SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

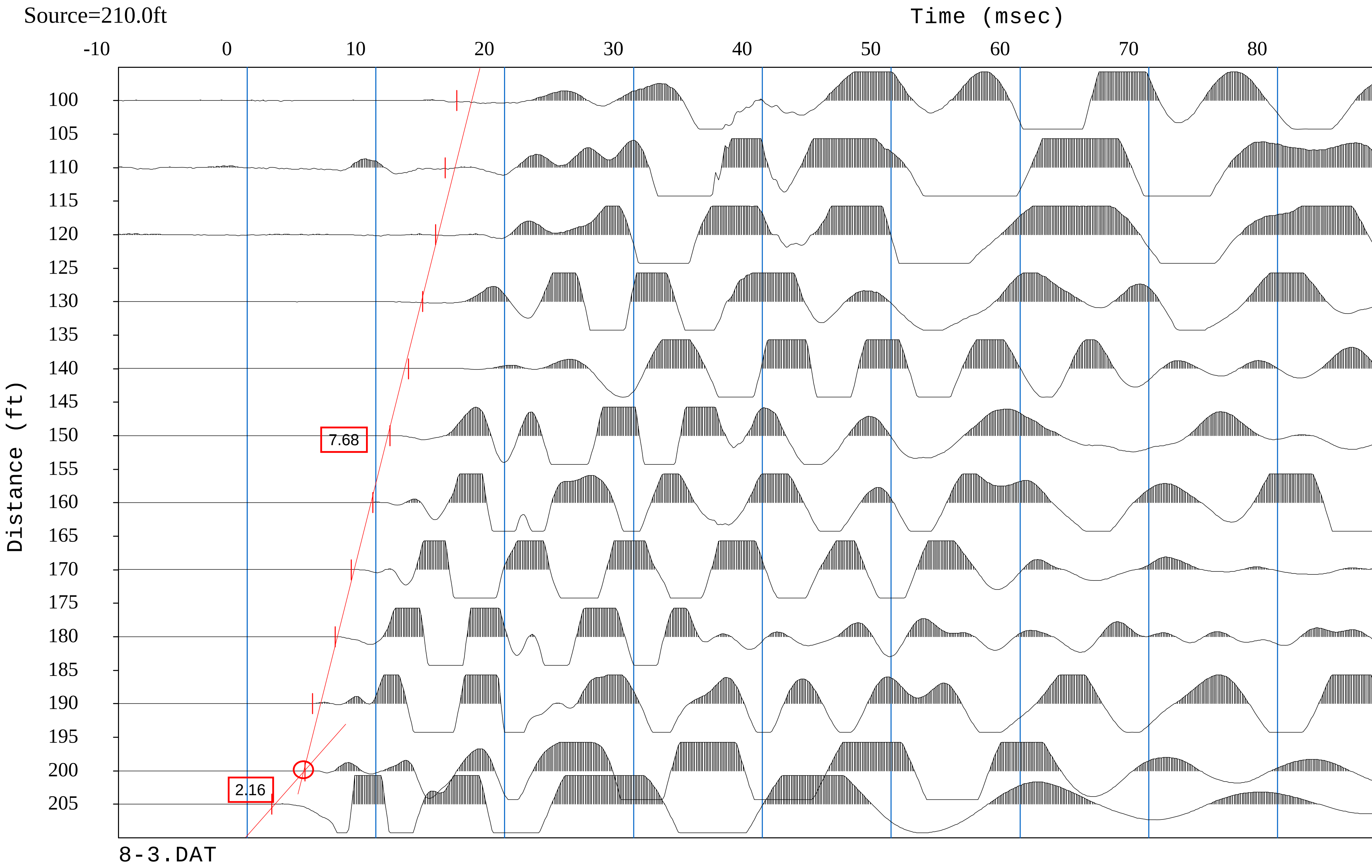
Geosyntec consultants

DATE: MAY 2009	FIGURE
PROJECT NO. SC0368	B-10

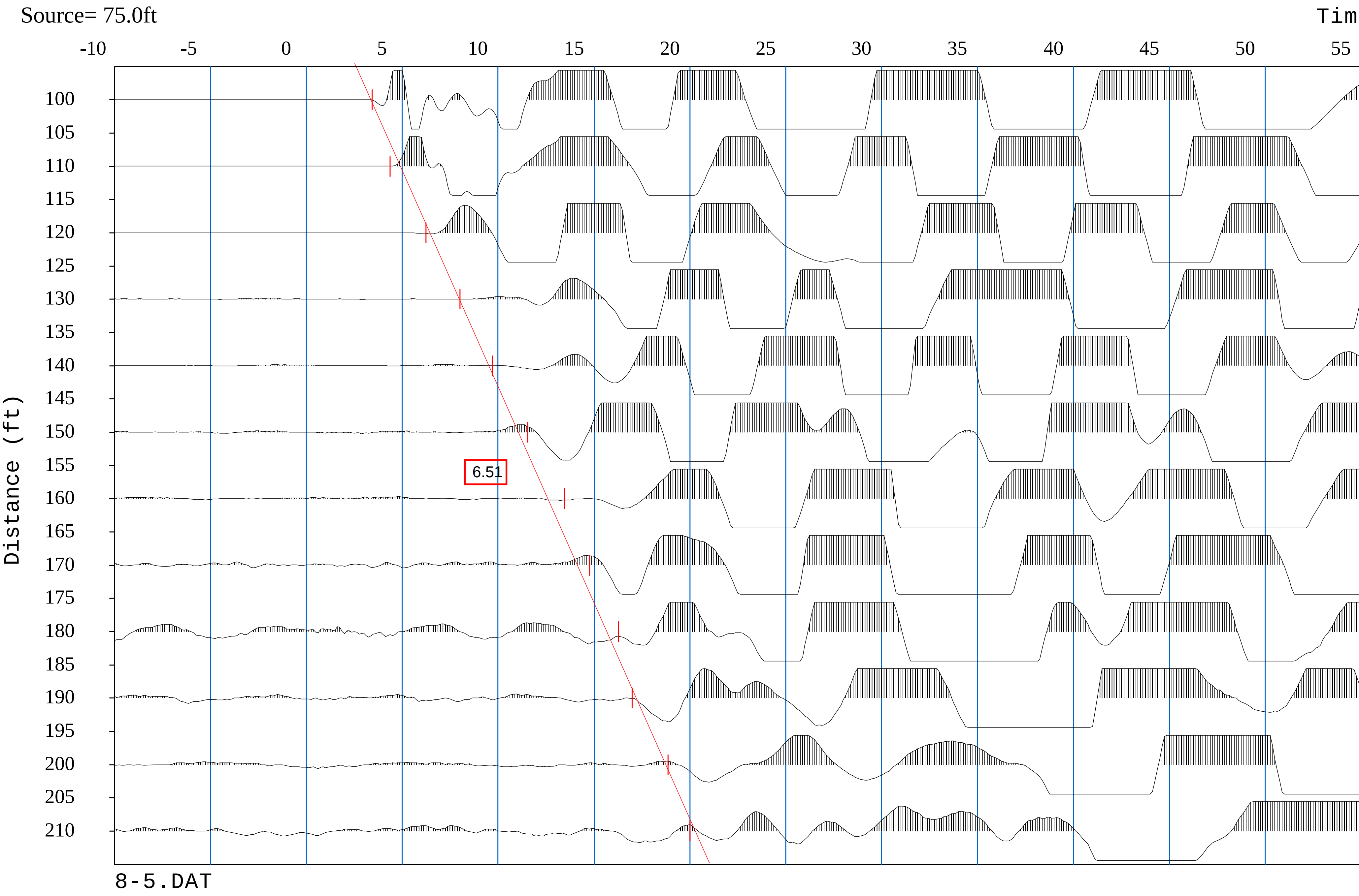

Source=100.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
2.45
8.90
8-1.DAT



Source=155.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
7.39
2.65
2.05
7.72
8-2.DAT



Source=210.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
7.68
2.16
8-3.DAT

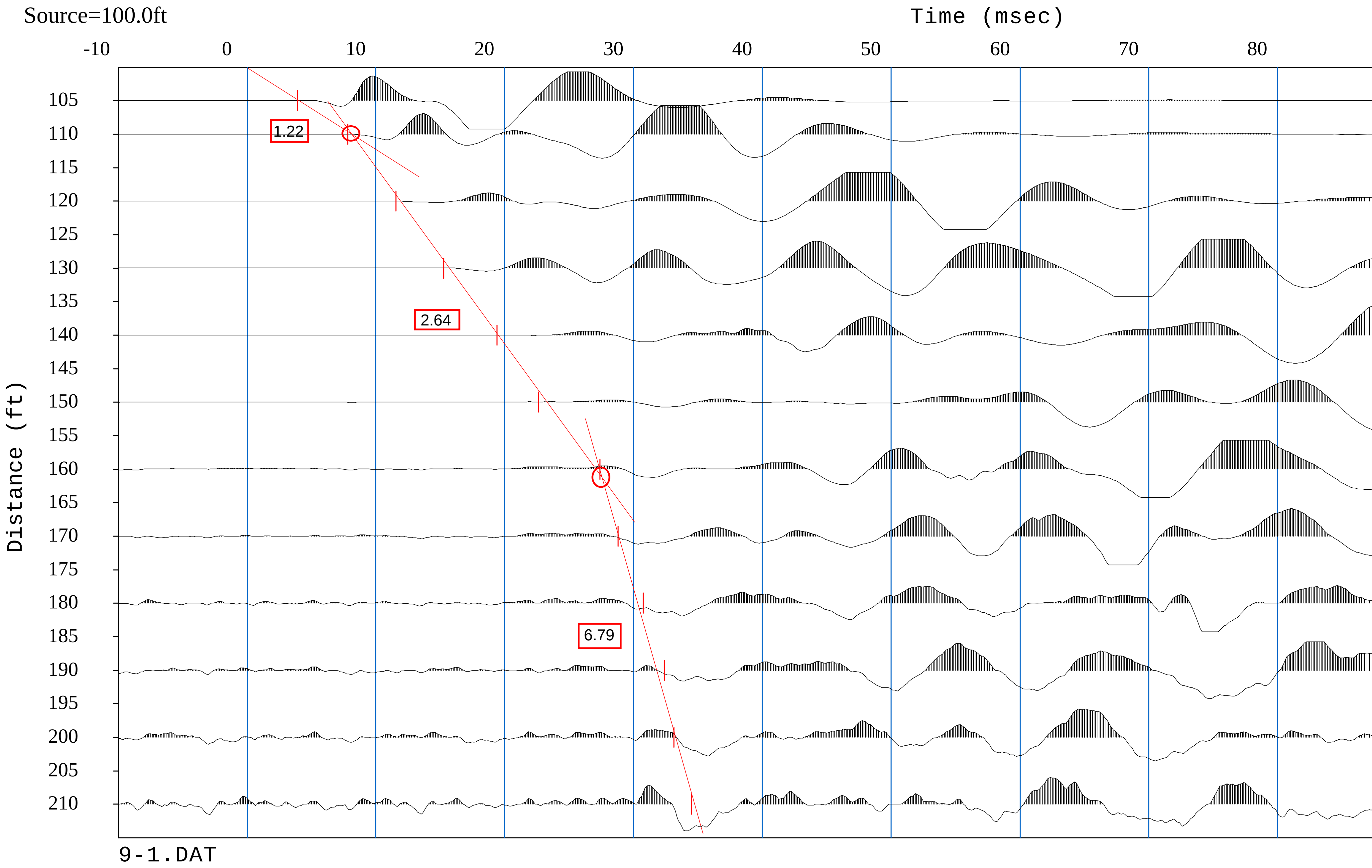

Source= 75.0ft
Tim
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
6.51
8-5.DAT

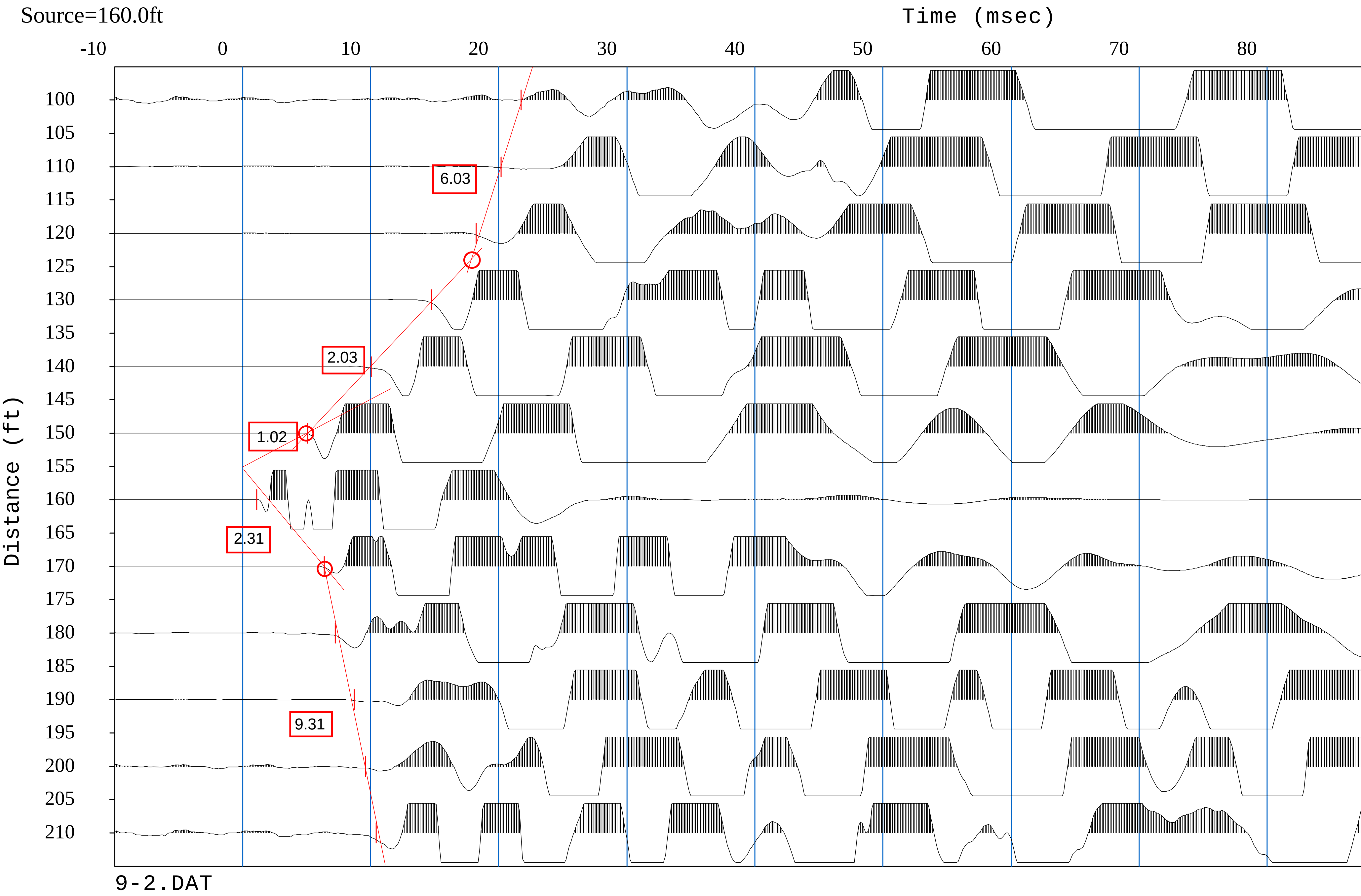
SEISMIC LINE 9

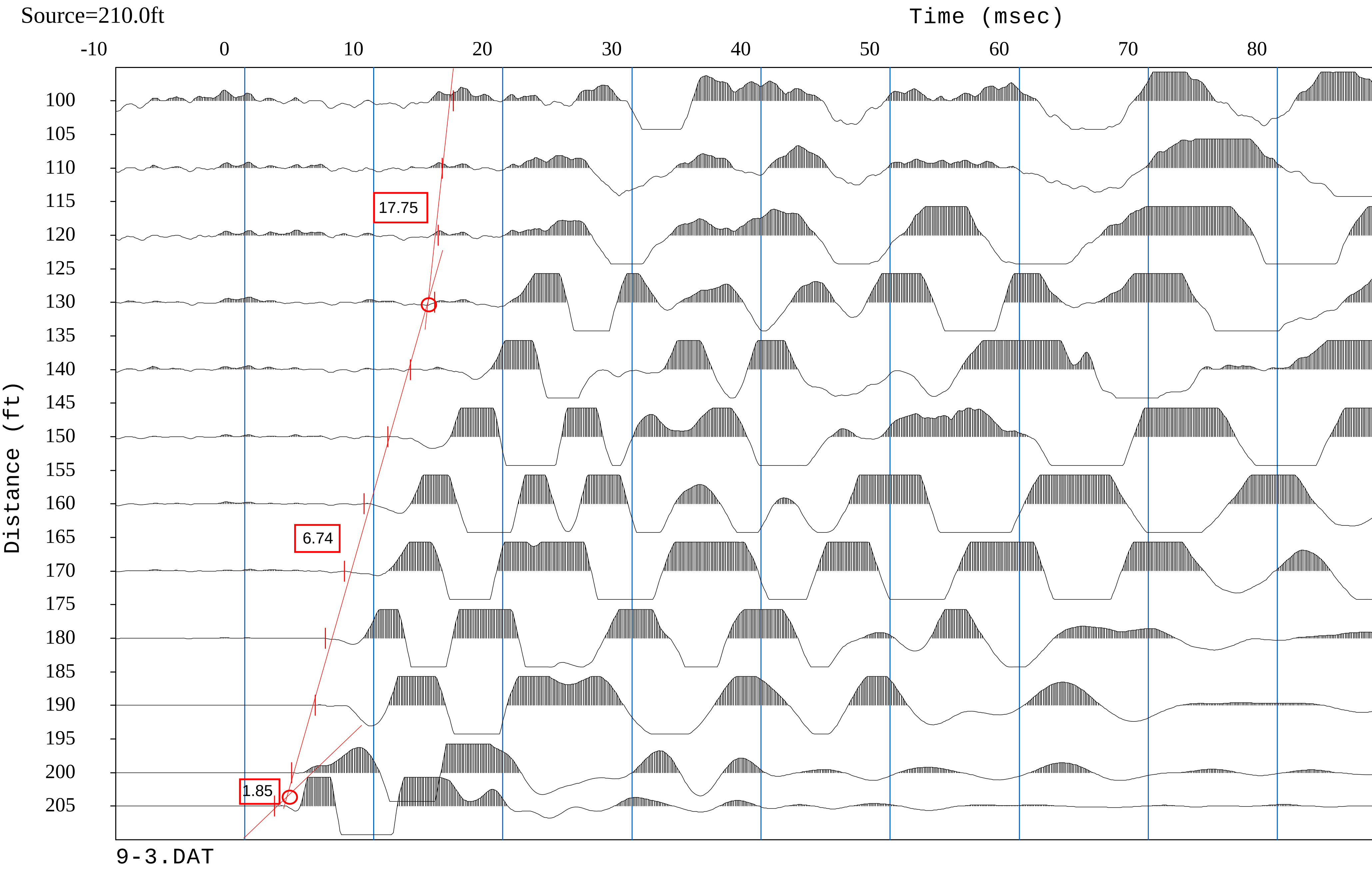
SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	B-11


Source=100.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
1.22
2.64
6.79
9-1.DAT


Source=160.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
6.03
2.03
1.02
2.31
9.31
9-2.DAT

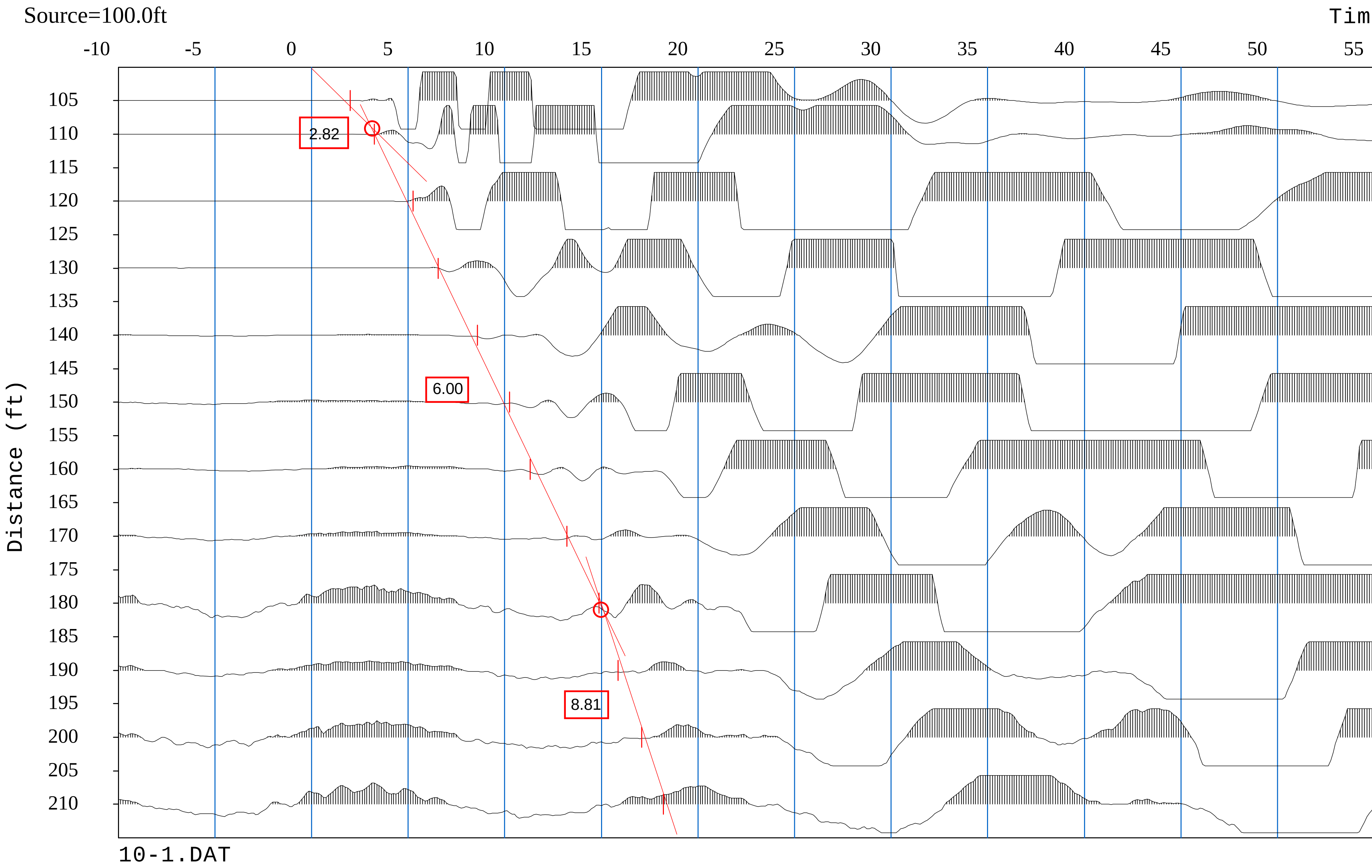

Source=210.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
17.75
6.74
1.85
9-3.DAT

SEISMIC LINE 10

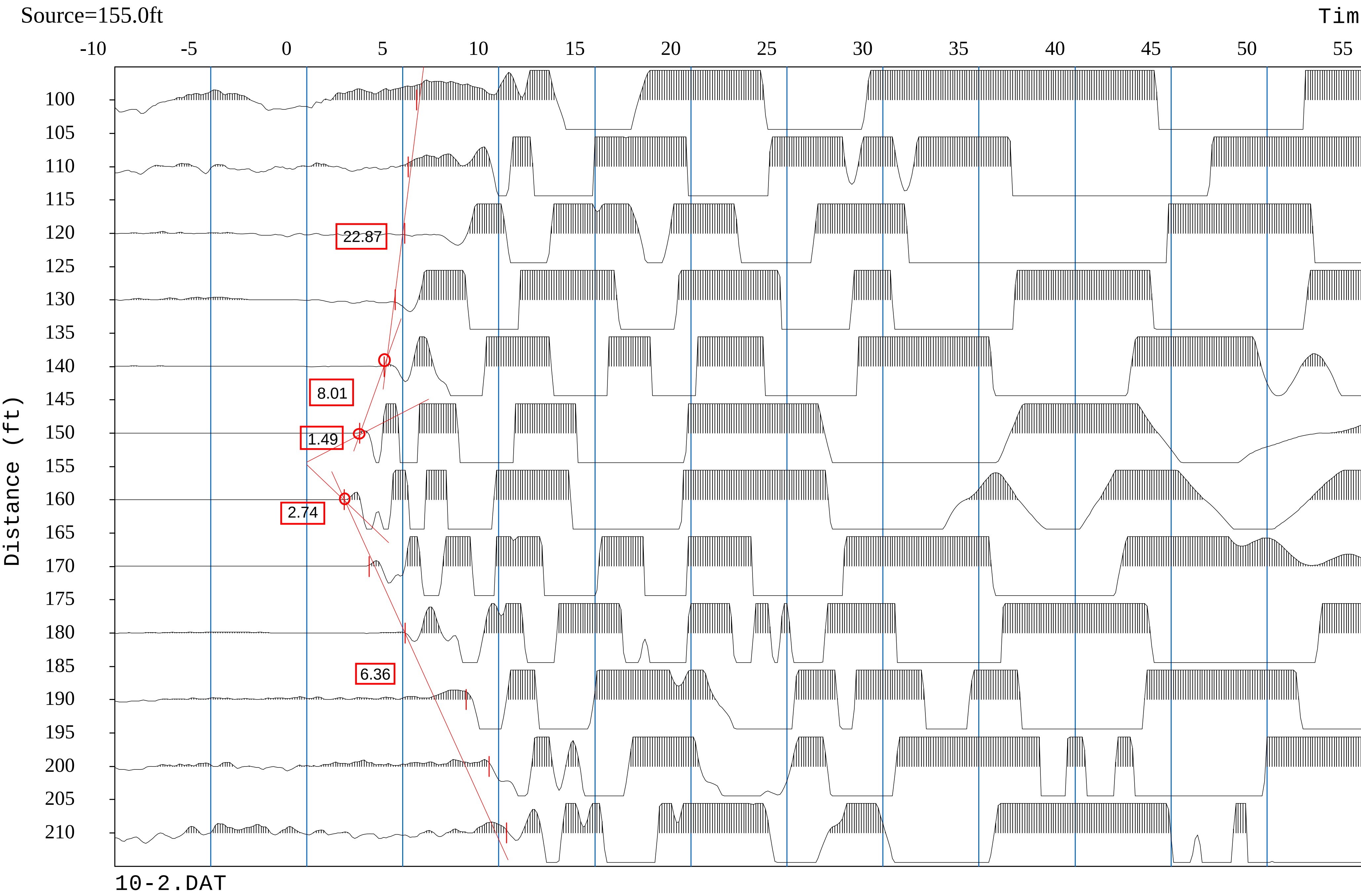
SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

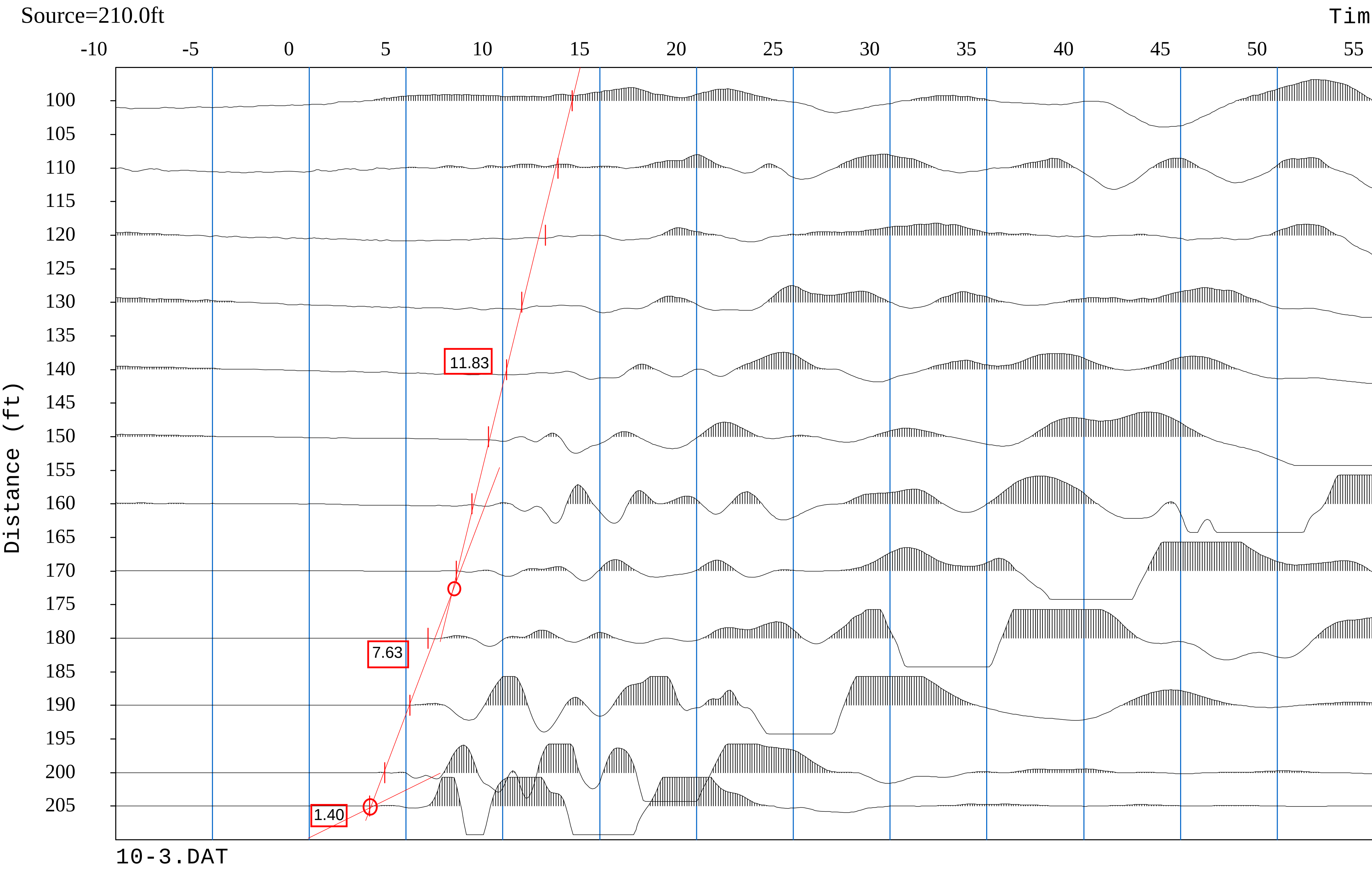
ALPINE, CALIFORNIA

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	B-12

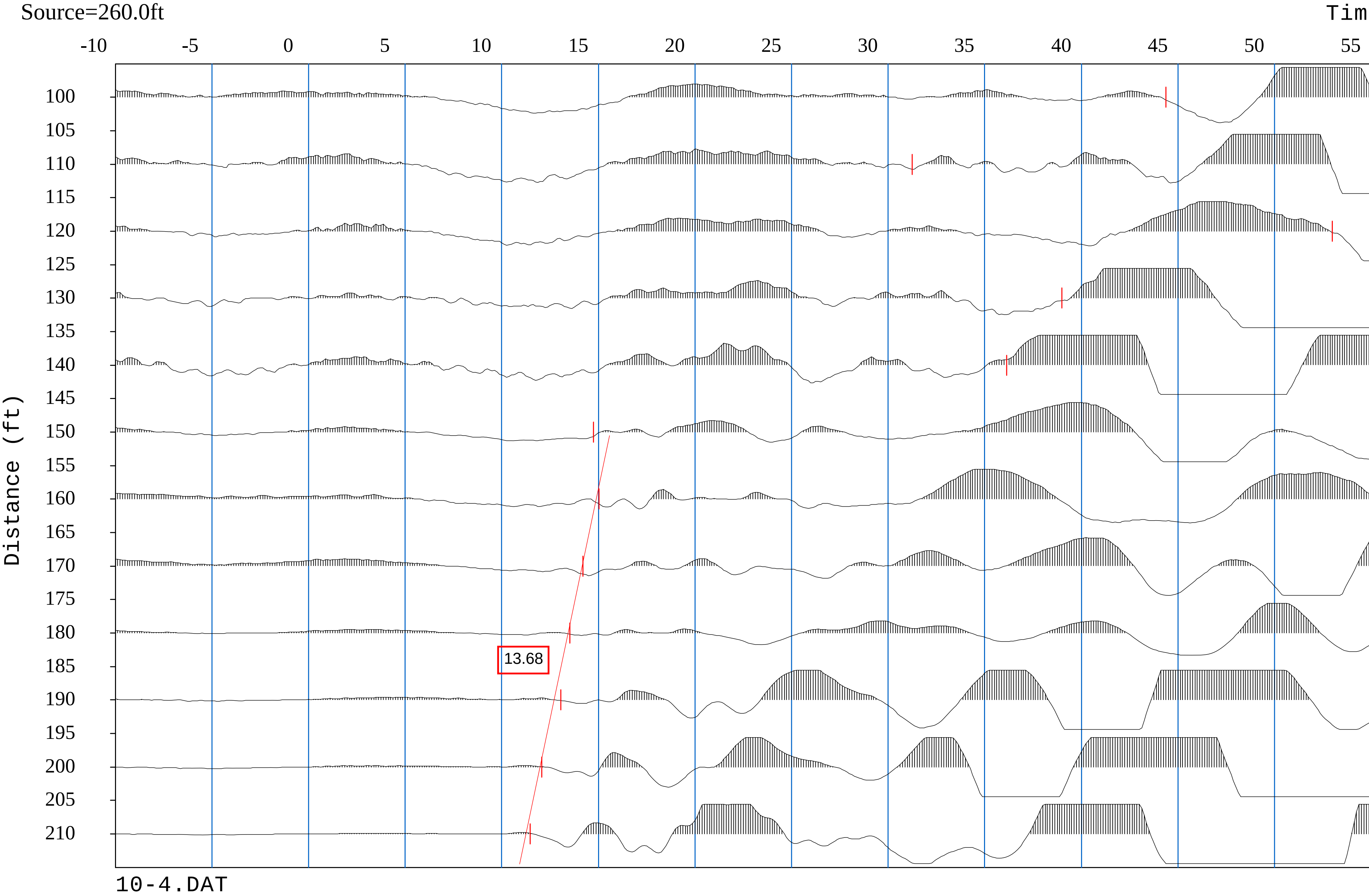


Source=100.0ft
Tim
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
Distance (ft)
2.82
6.00
8.81
10-1.DAT


Source=155.0ft
Tim
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
22.87
8.01
1.49
2.74
6.36
10-2.DAT



Source=210.0ft
Tim
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
11.83
7.63
1.40
10-3.DAT


Source=260.0ft
Tim
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
13.68
10-4.DAT

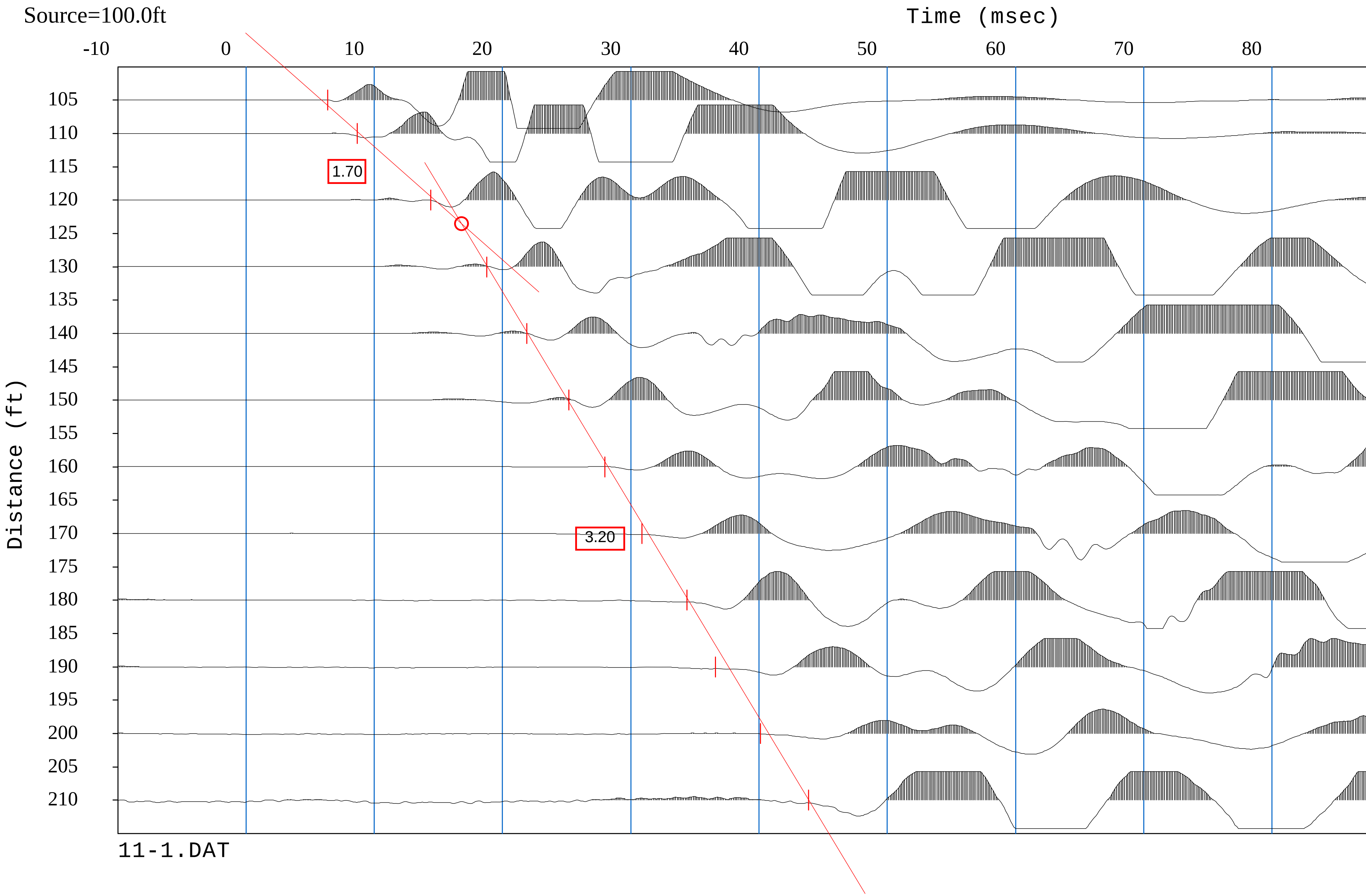
SEISMIC LINE 11

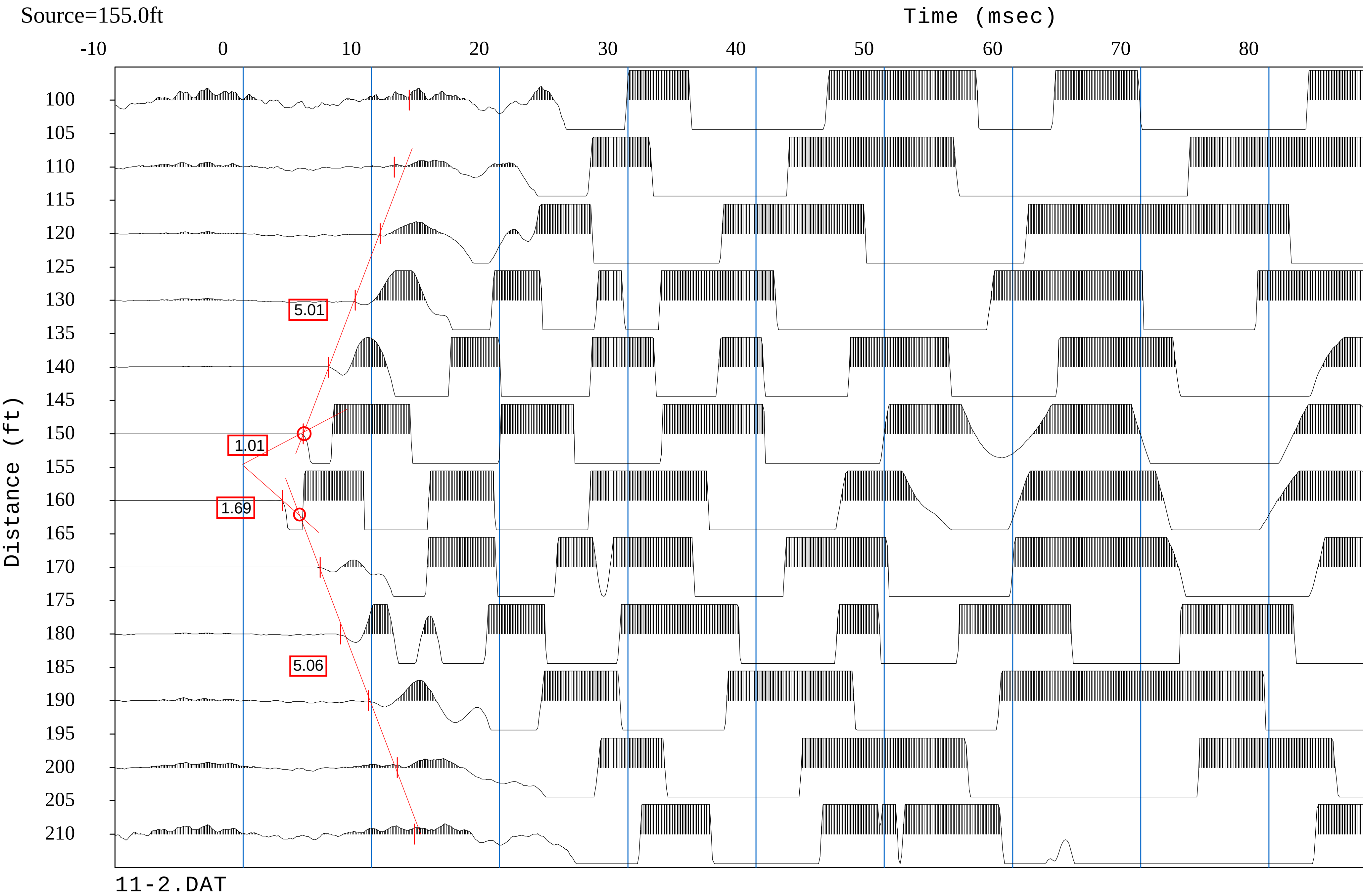
SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

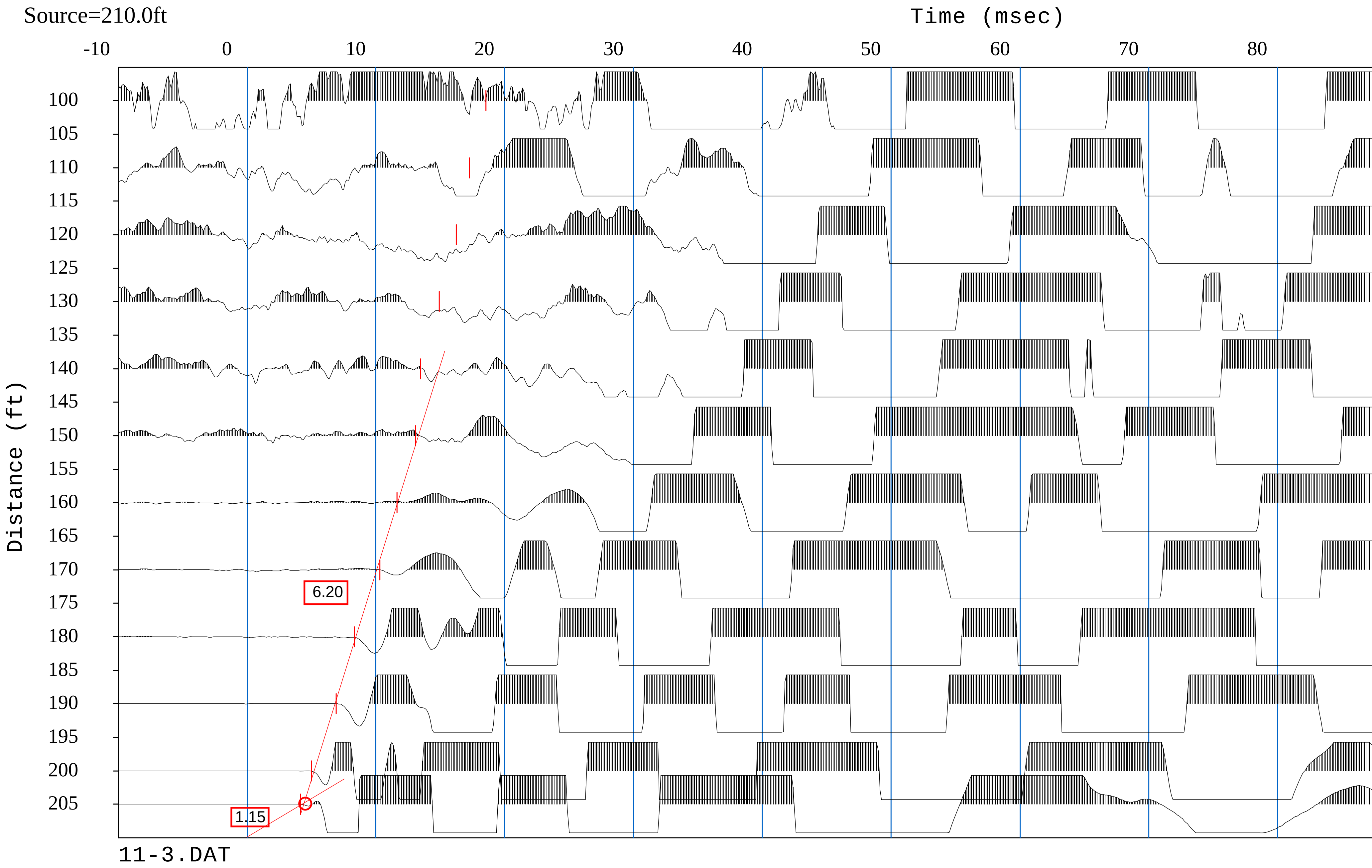
ALPINE, CALIFORNIA

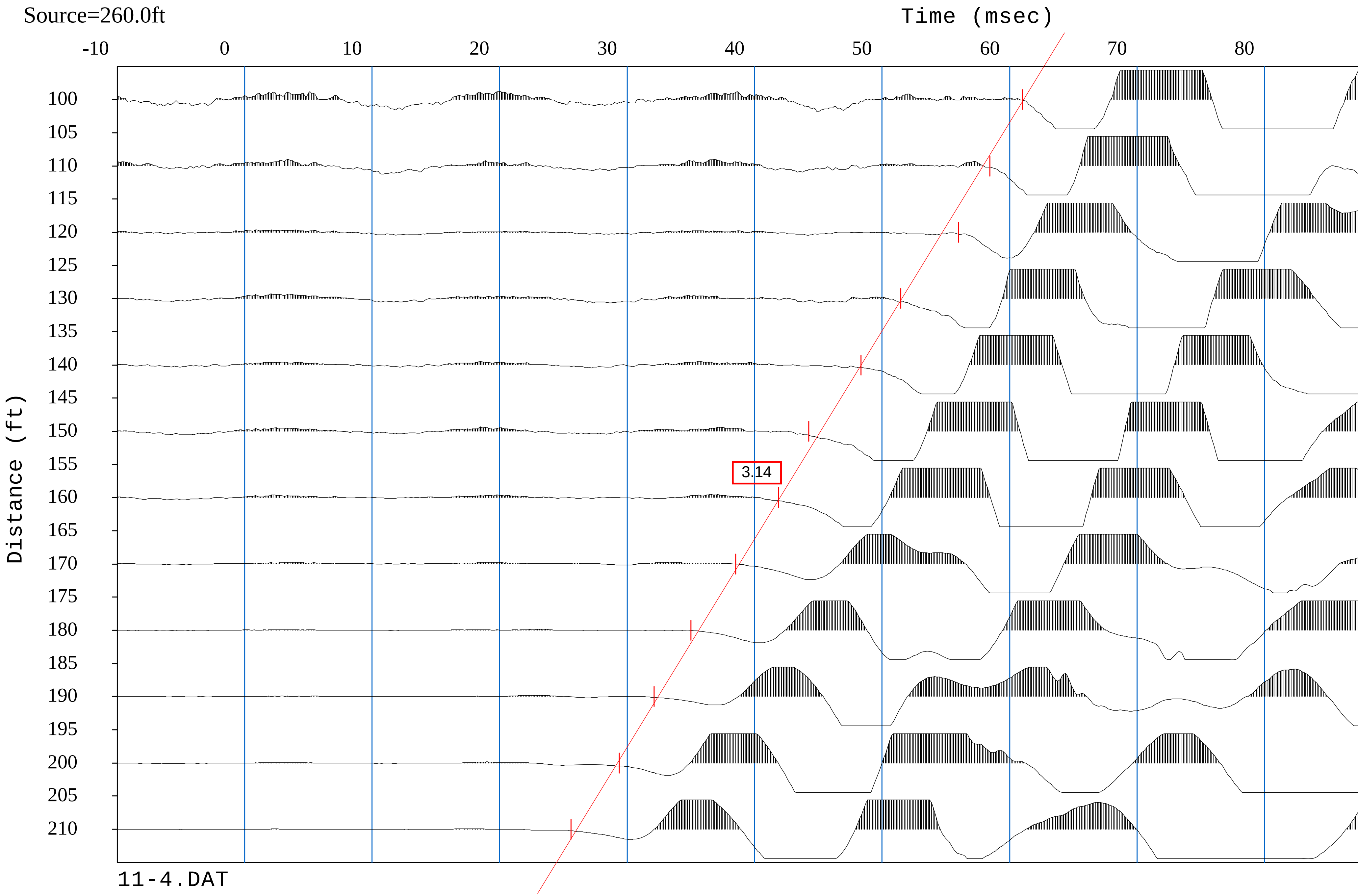
Geosyntec consultants

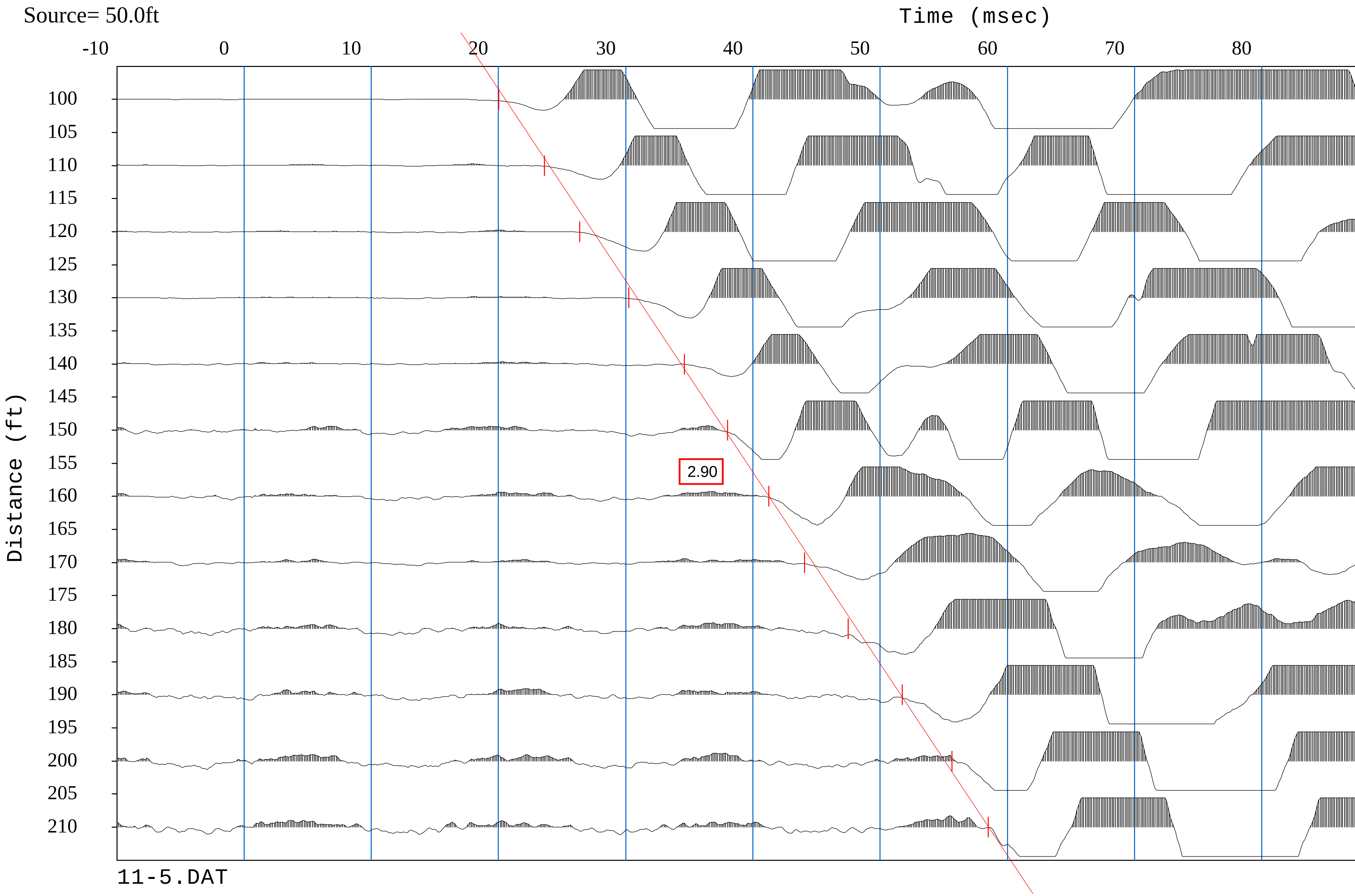
DATE: MAY 2009	FIGURE	
PROJECT NO. SC0368	B-13	


Source=100.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
1.70
3.20
11-1.DAT


Source=155.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
5.01
1.01
1.69
5.06
11-2.DAT


Source=210.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
6.20
1.15
11-3.DAT


Source=260.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
3.14
11-4.DAT



Source= 50.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
2.90
11-5.DAT

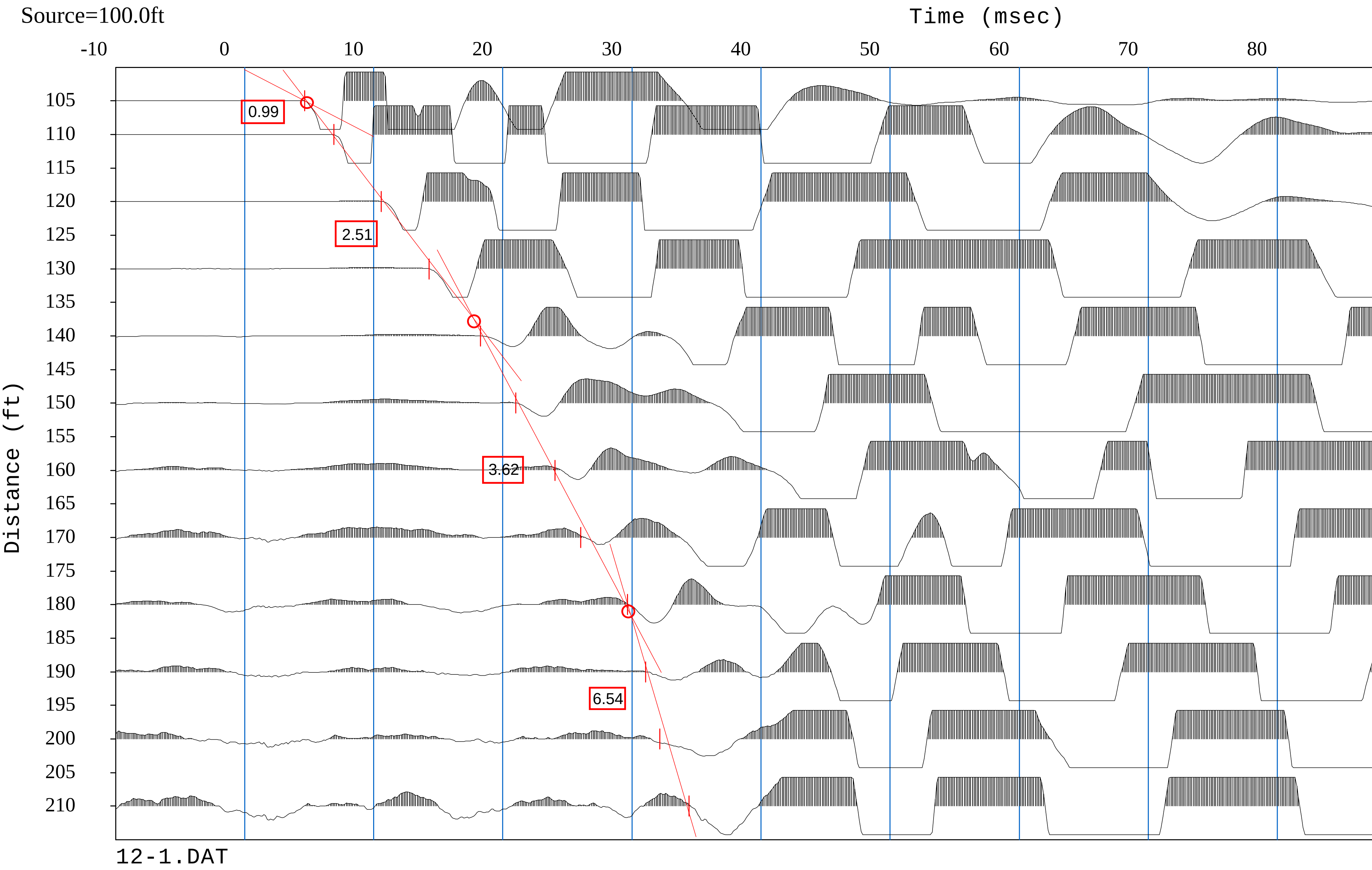
SEISMIC LINE 12

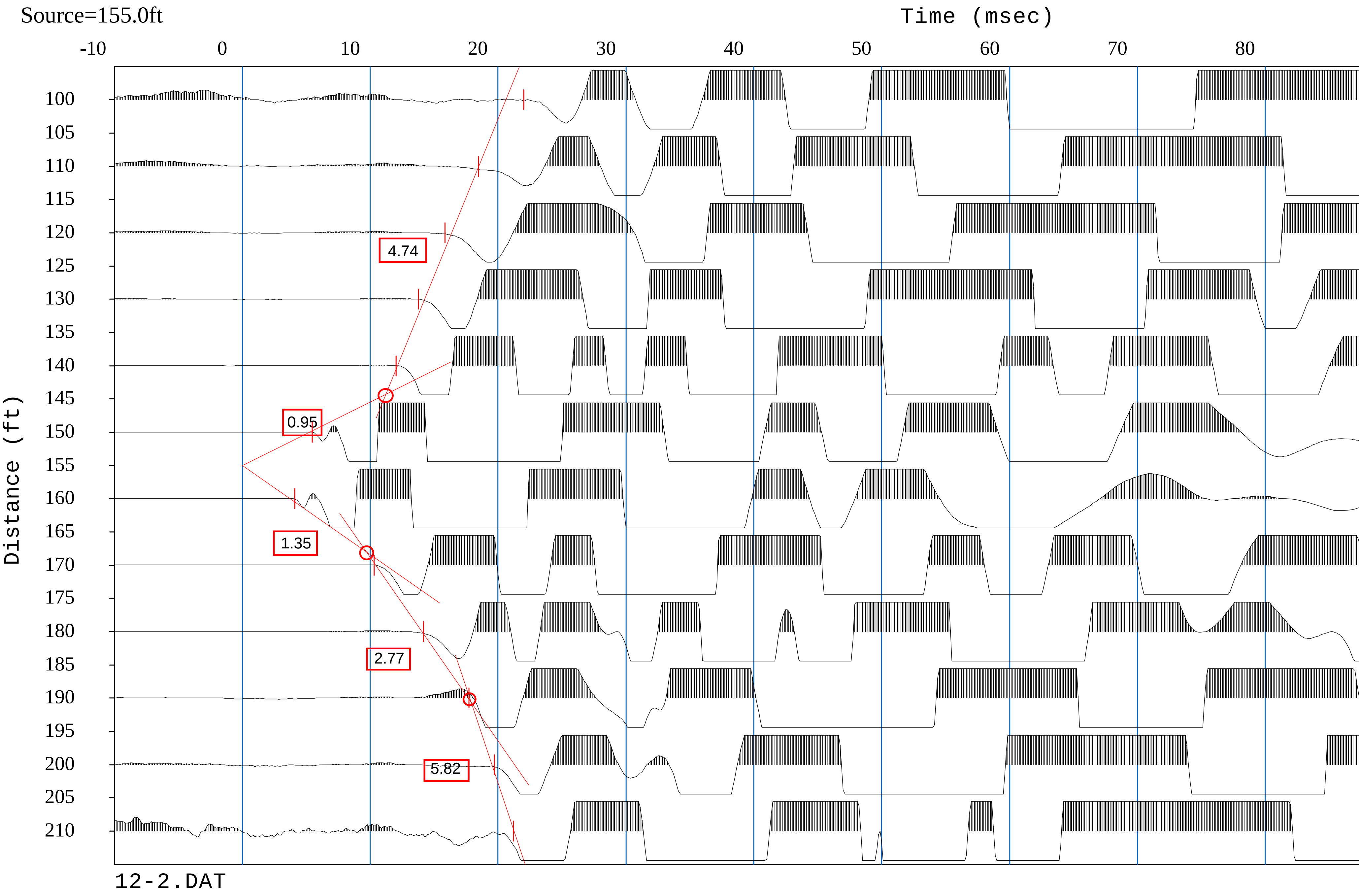
SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

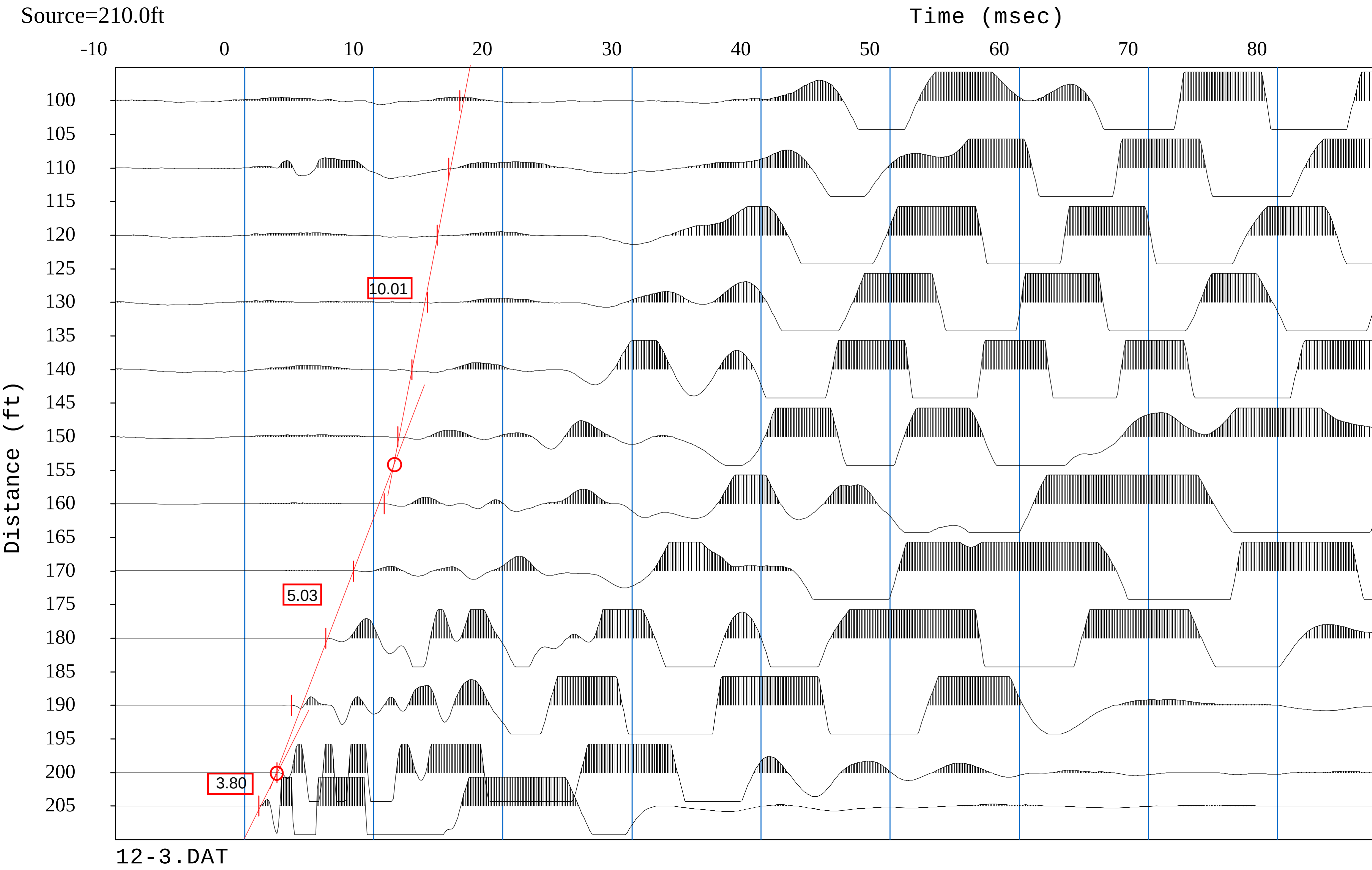
ALPINE, CALIFORNIA

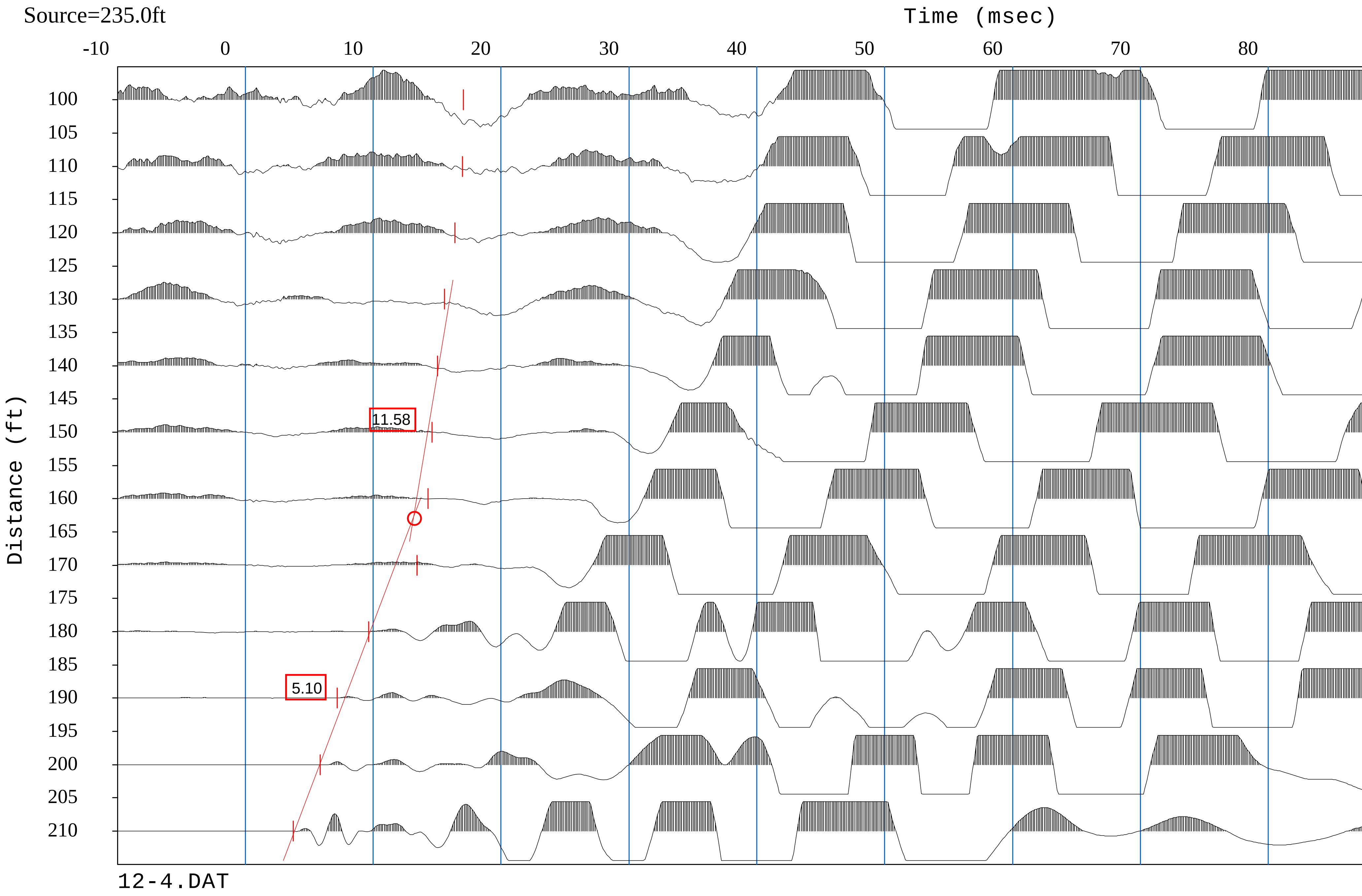
Geosyntec consultants

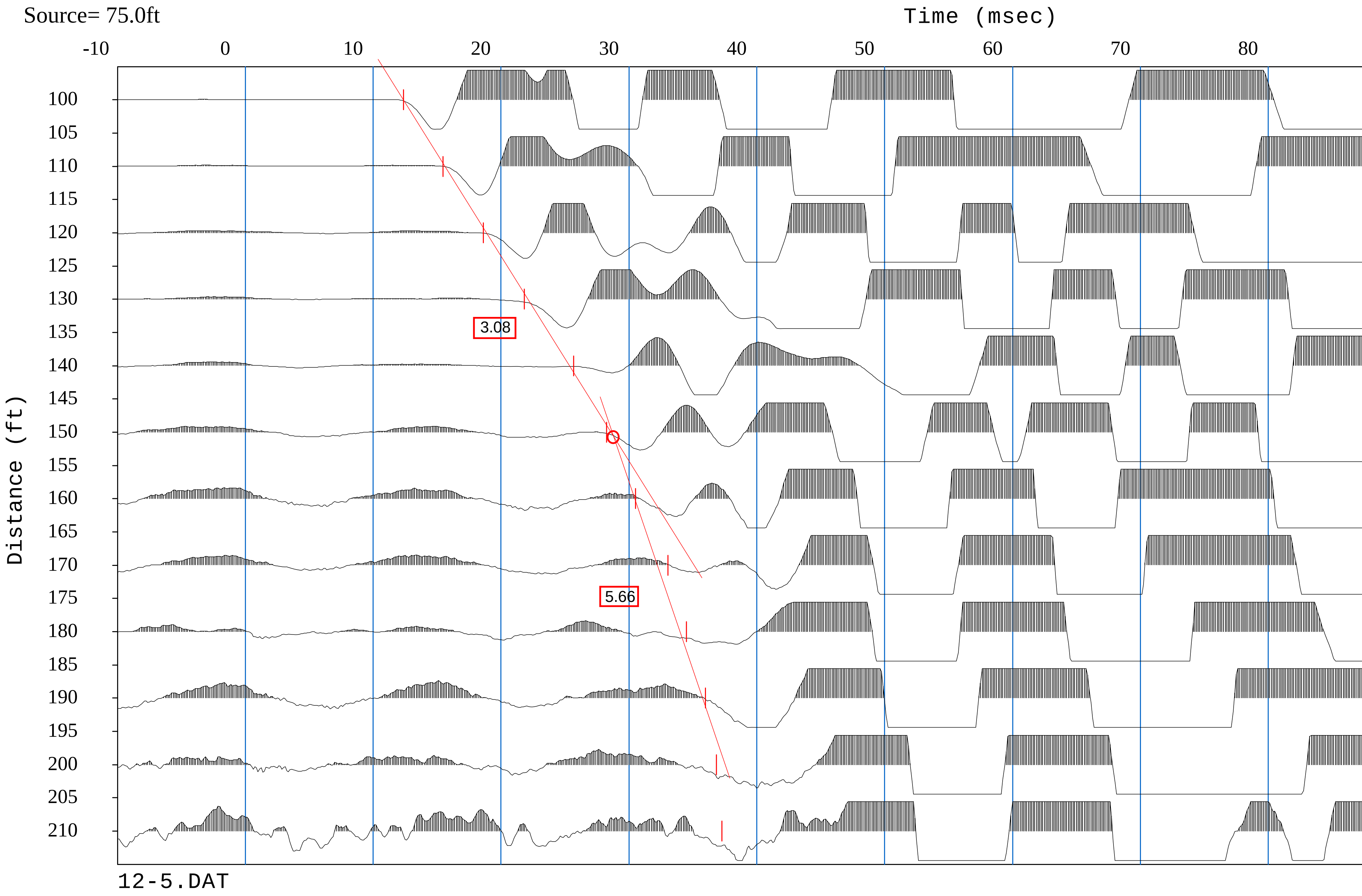
DATE: MAY 2009	FIGURE
PROJECT NO. SC0368	B-14


Source=100.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
0.99
2.51
3.62
6.54
12-1.DAT


Source=155.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
4.74
0.95
1.35
2.77
5.82
12-2.DAT


Source=210.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
10.01
5.03
3.80
12-3.DAT


Source=235.0ft
Time (msec)
-10
0
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
11.58
5.10
12-4.DAT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10
20
30
40
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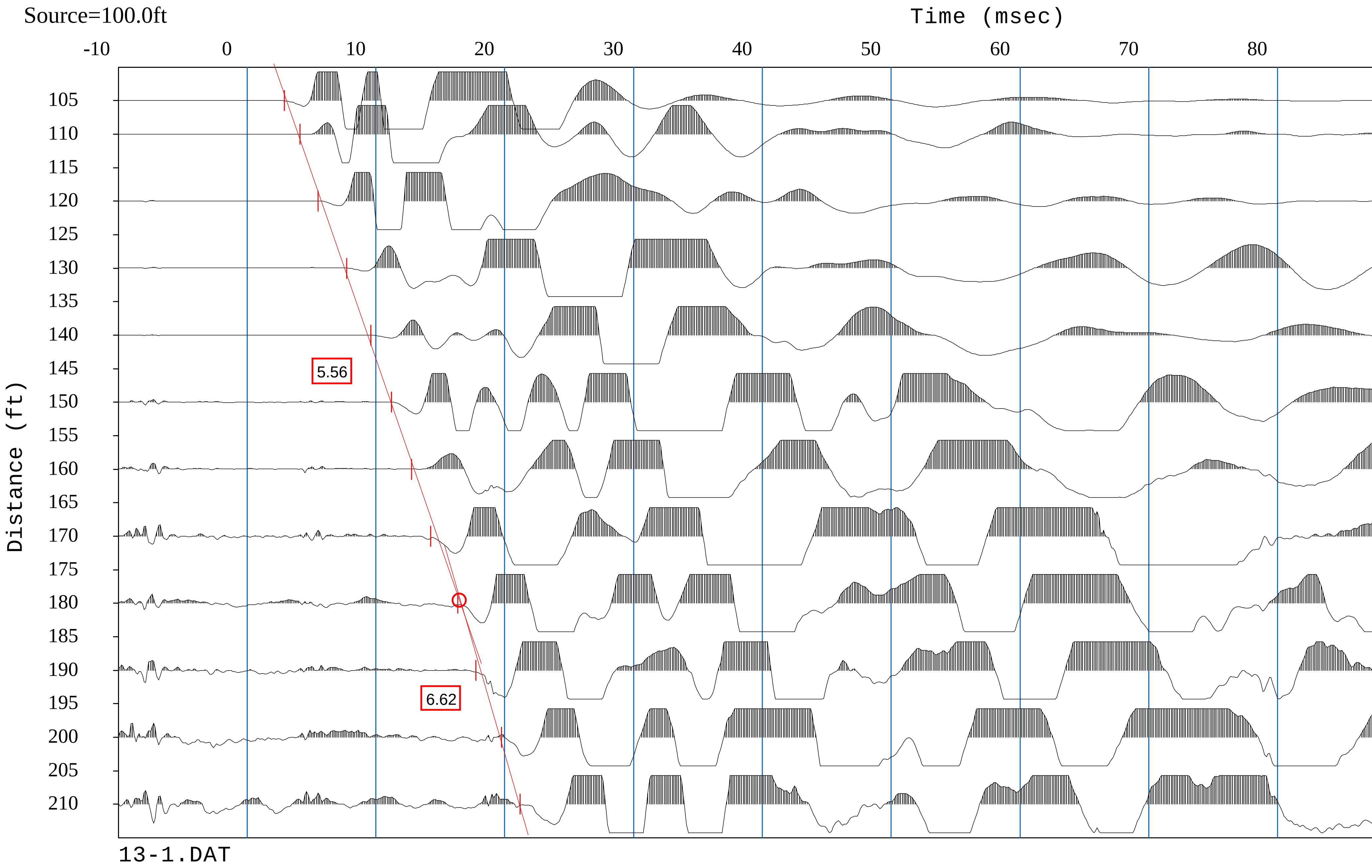
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
3.08
5.66
12-5.DAT

SEISMIC LINE 13

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	B-15



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Time (msec)
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60
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80
Distance (ft)
105
110
115
120
125
130
135
140
145
150
155
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165
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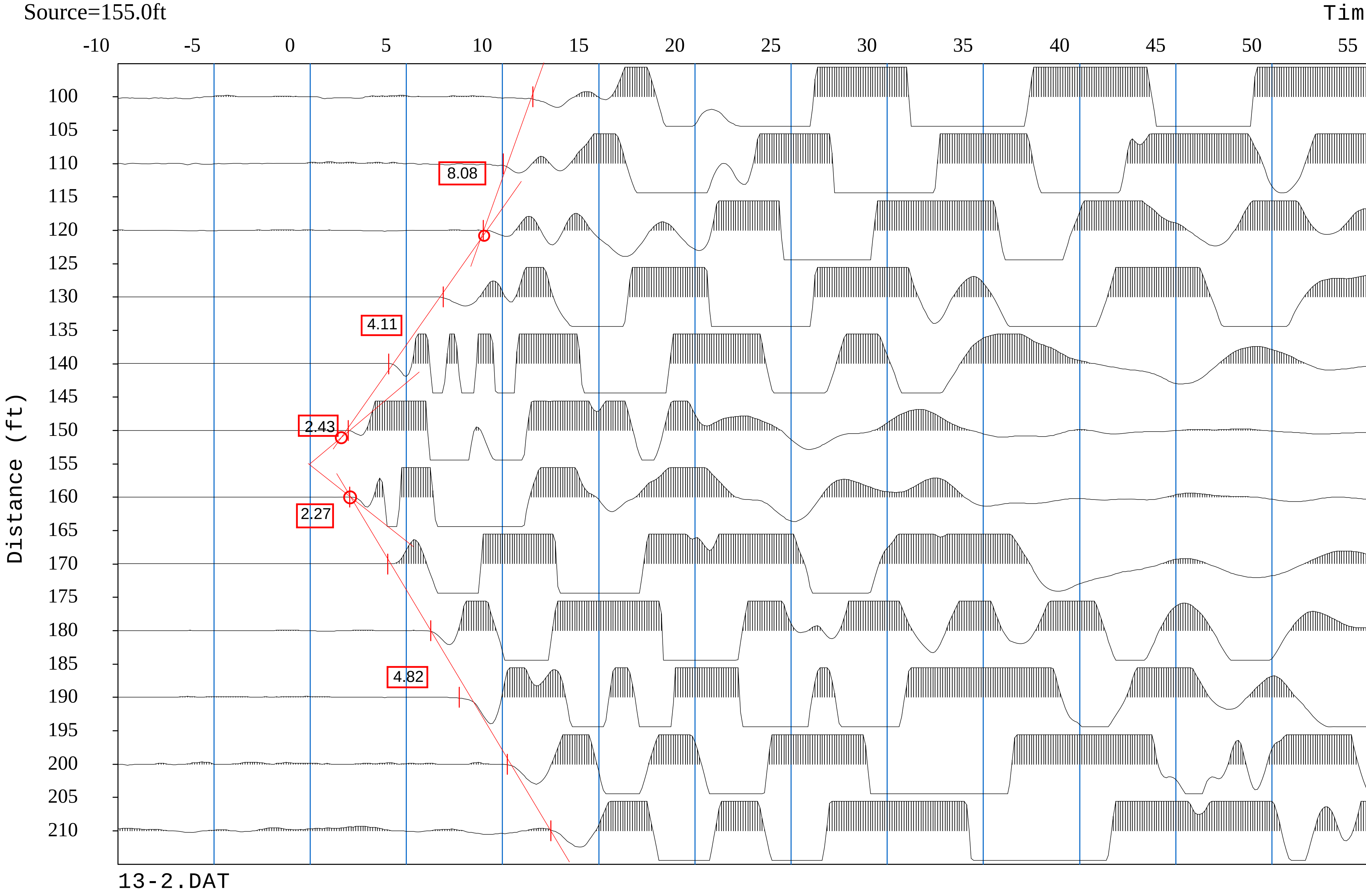
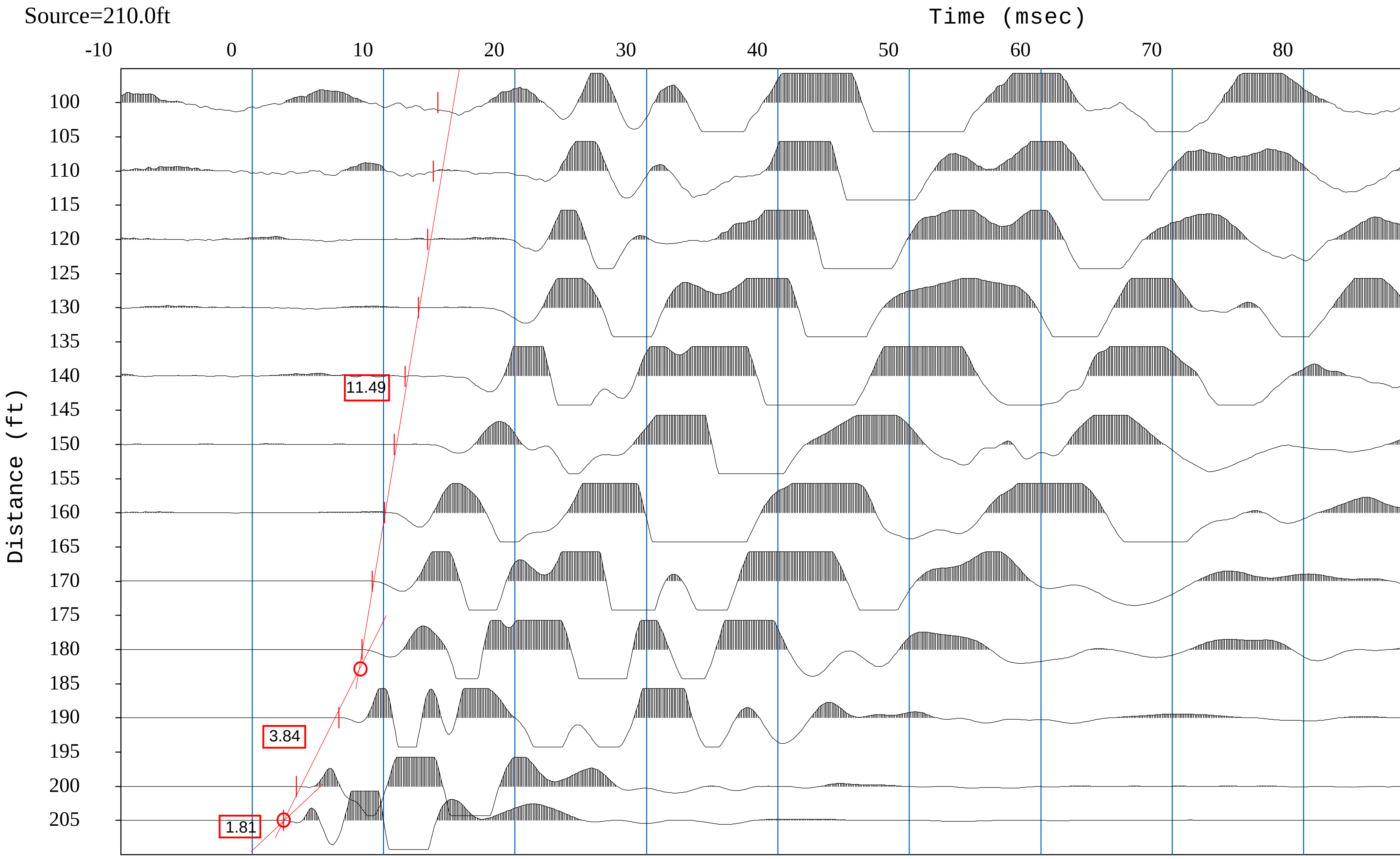
175
180
185
190
195
200
205
210
5.56
6.62
13-1.DAT

Source=155.0ft

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Distance (ft)
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110
115
120
125
130
135
140
145
150
155
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165
170
175
180
185
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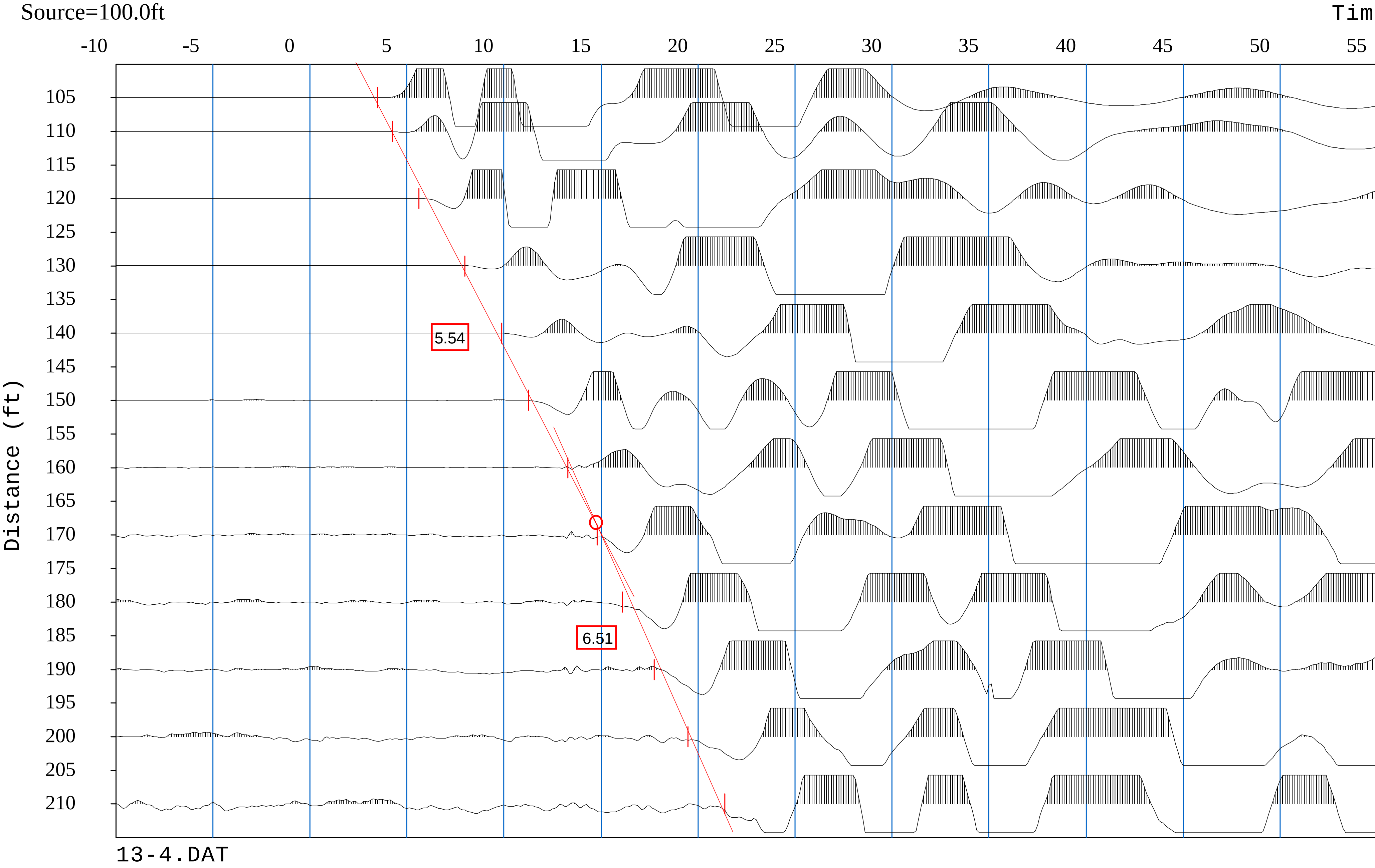
200
205
11.49
3.84
1.81

13-3.DAT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Distance (ft)
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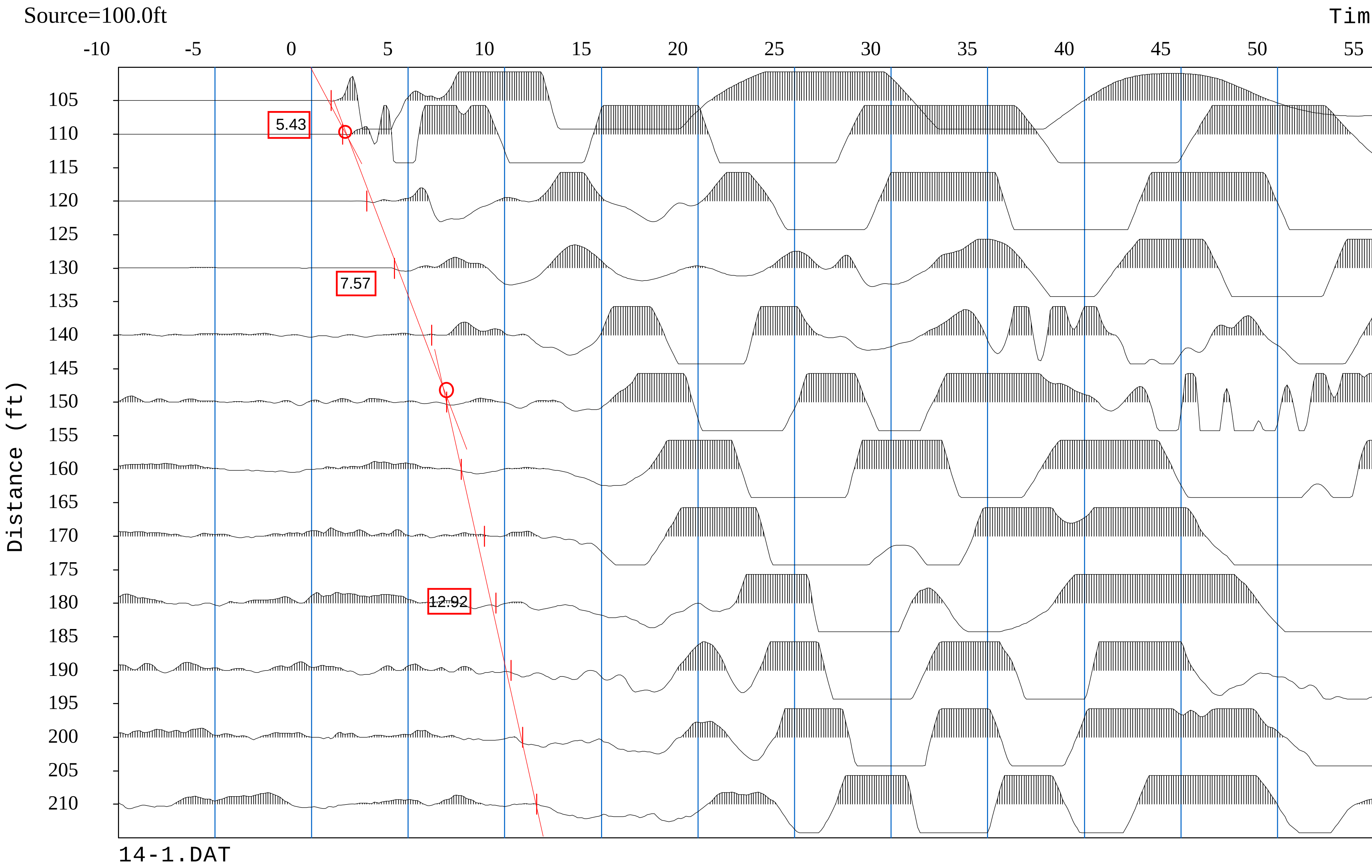
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
5.54
6.51
13-4.DAT

SEISMIC LINE 14

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	B-16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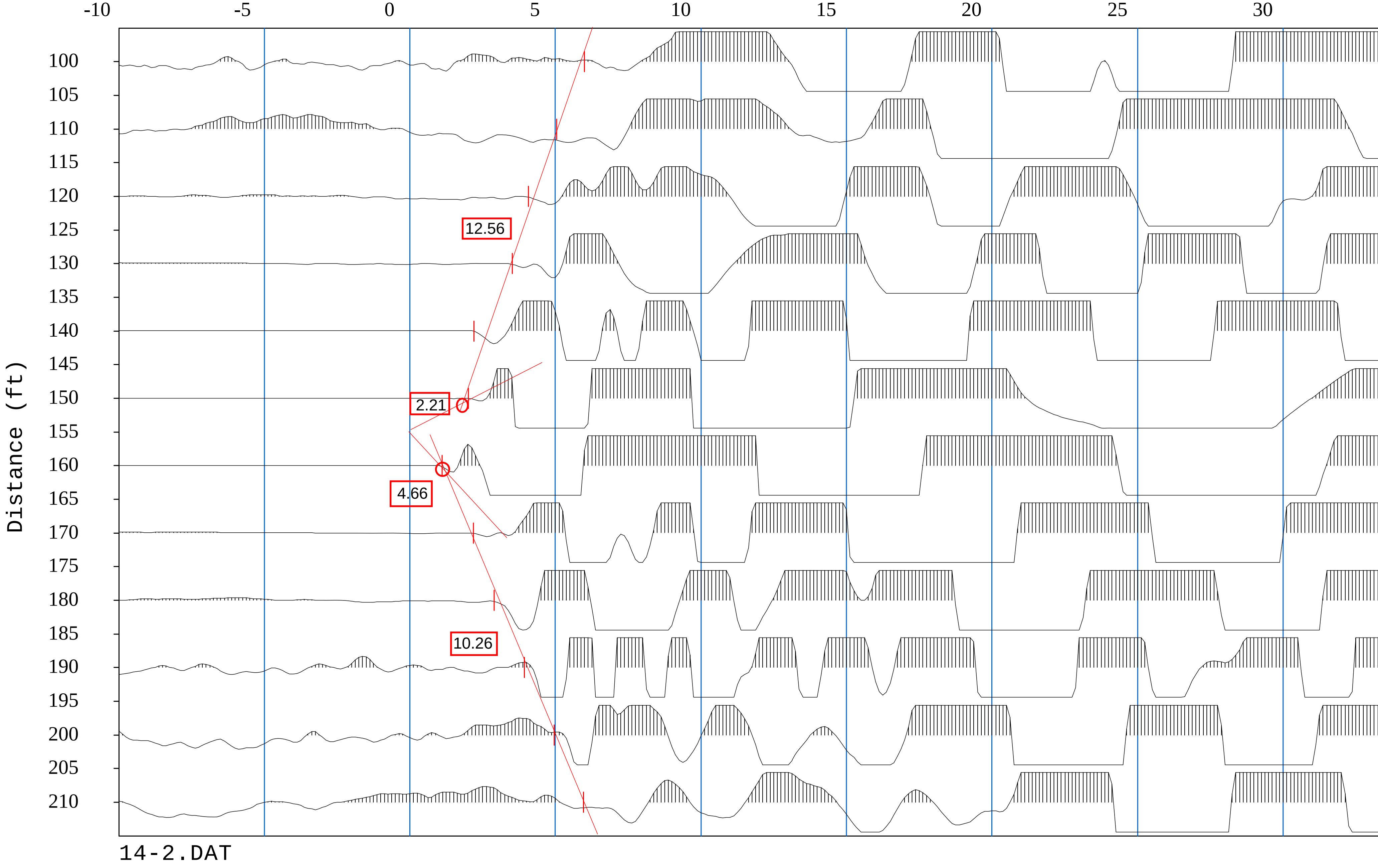
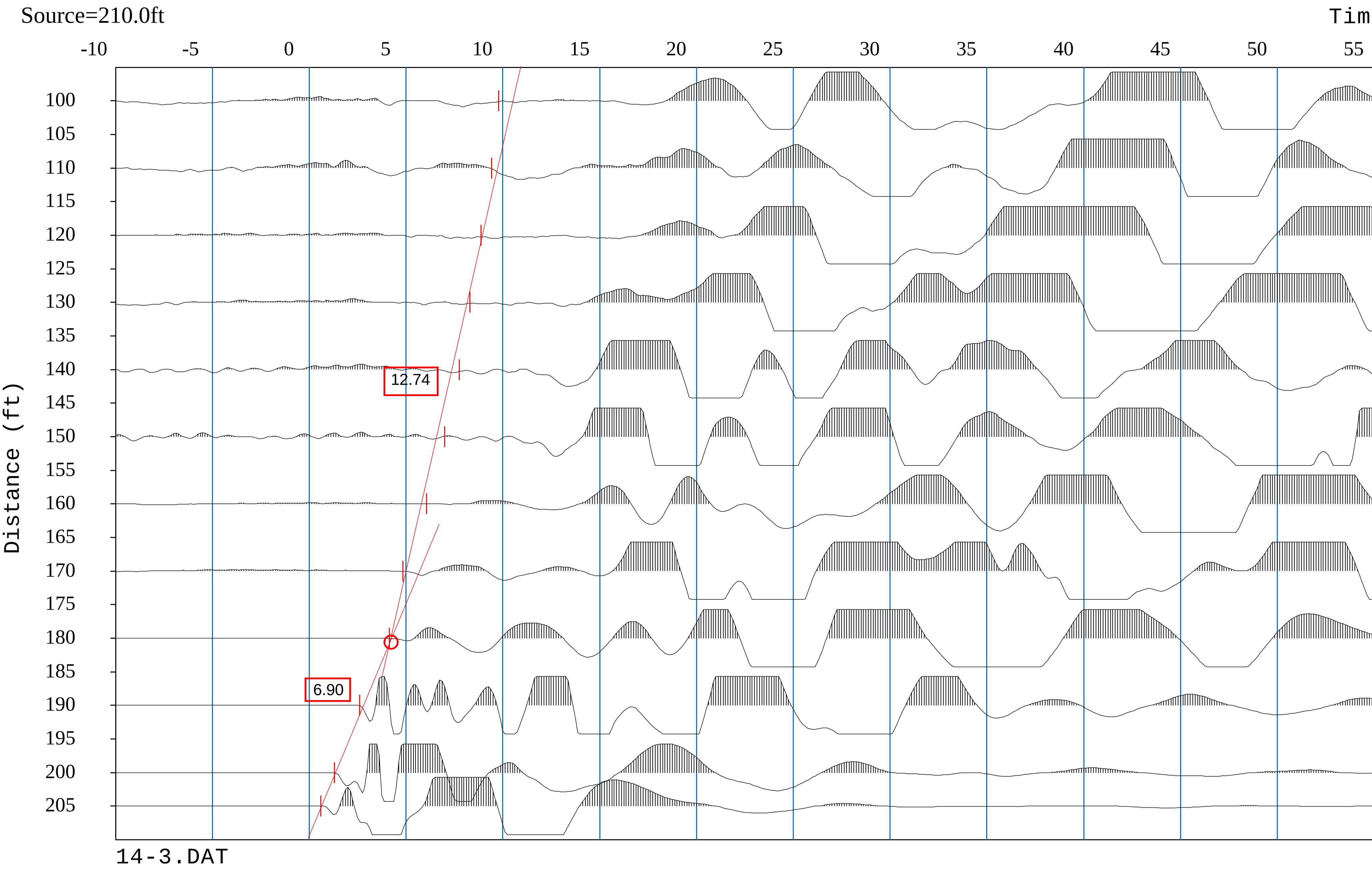
-5
0
5
10
15
20
25
30
35
40
45
50
55
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
Distance (ft)
5.43
7.57
12.92
14-1.DAT

Source=155.0ft

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Tim
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
12.74
6.90
14-3.DAT

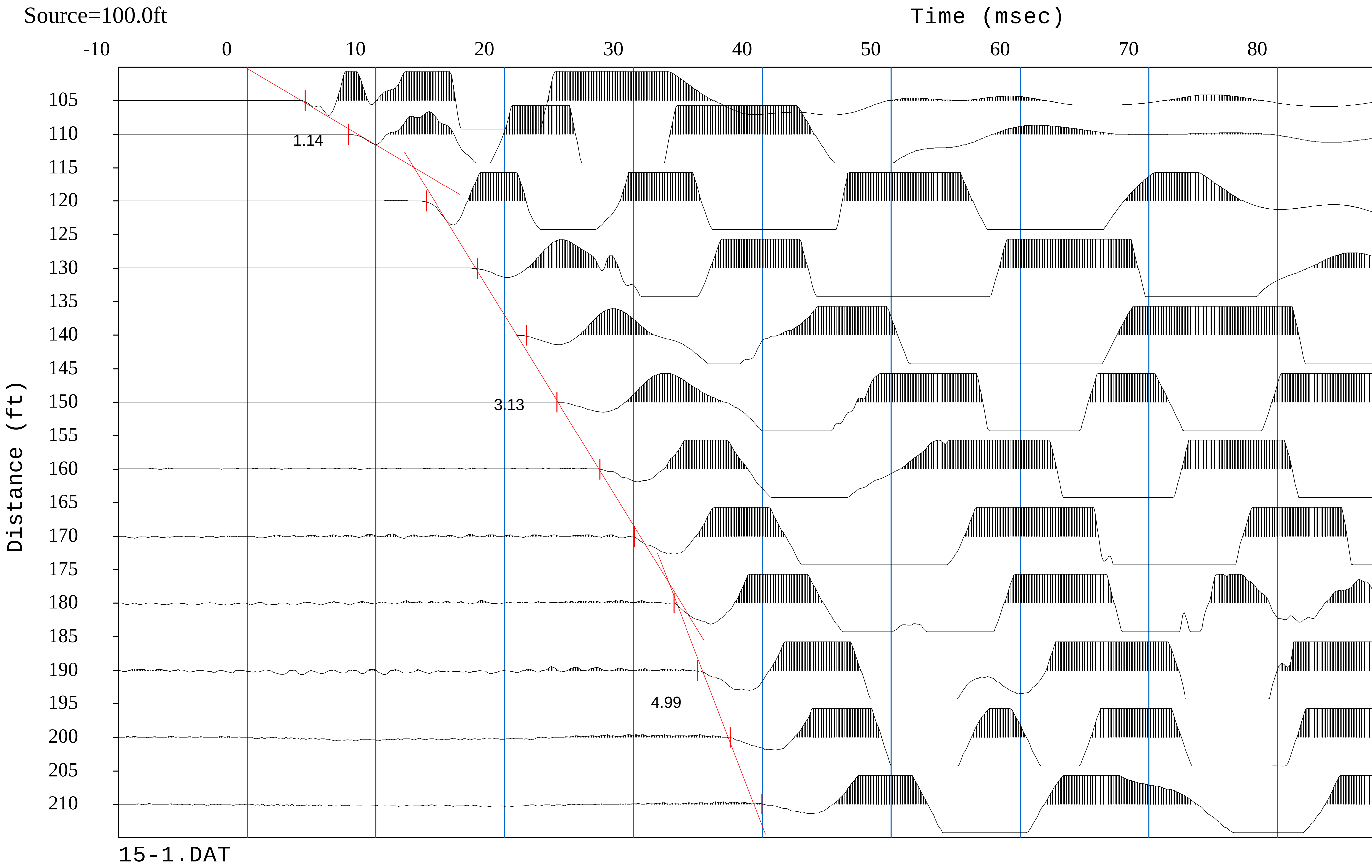
SEISMIC LINE 15

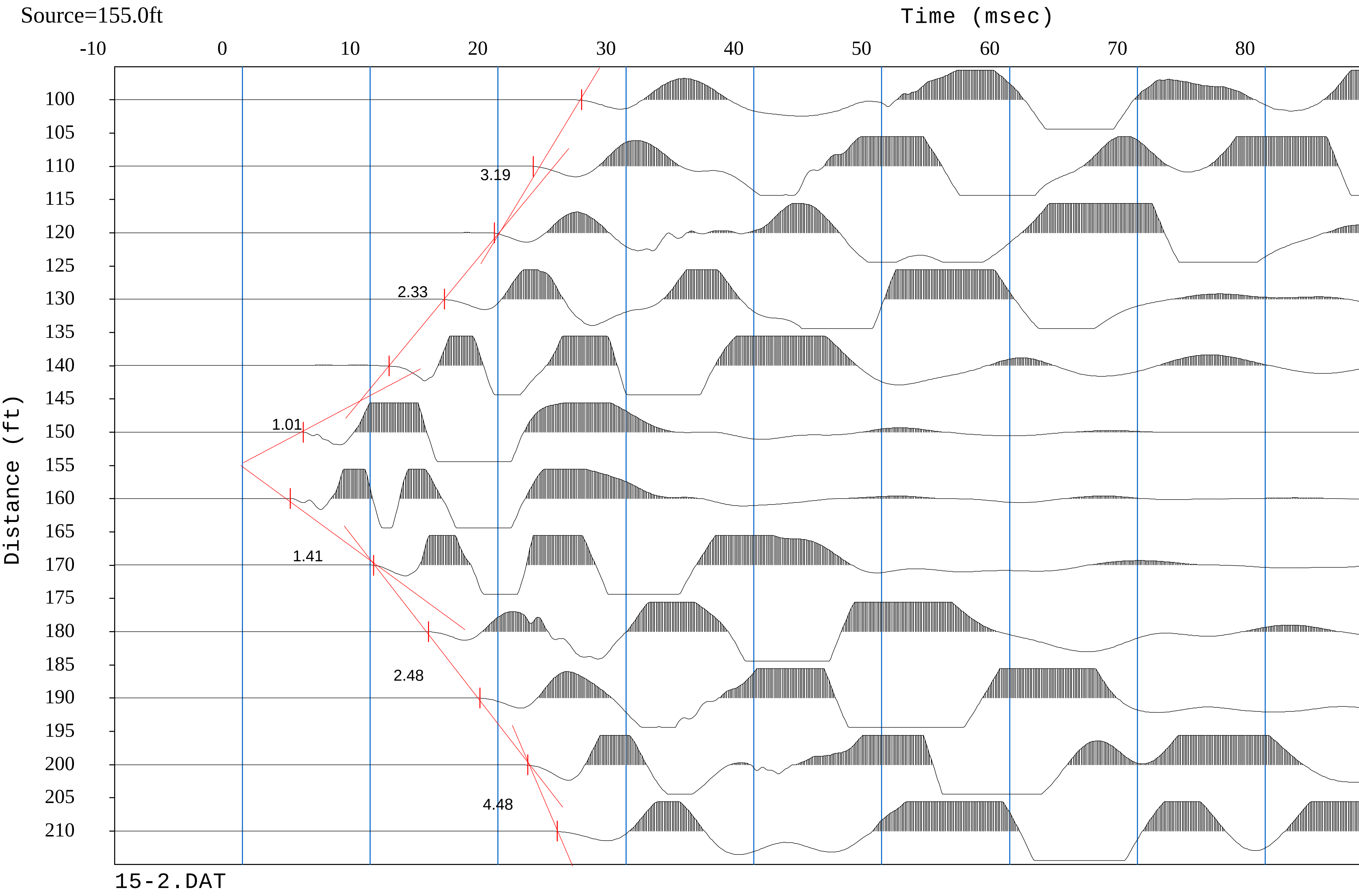
SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	B-17

Source=100.0ft

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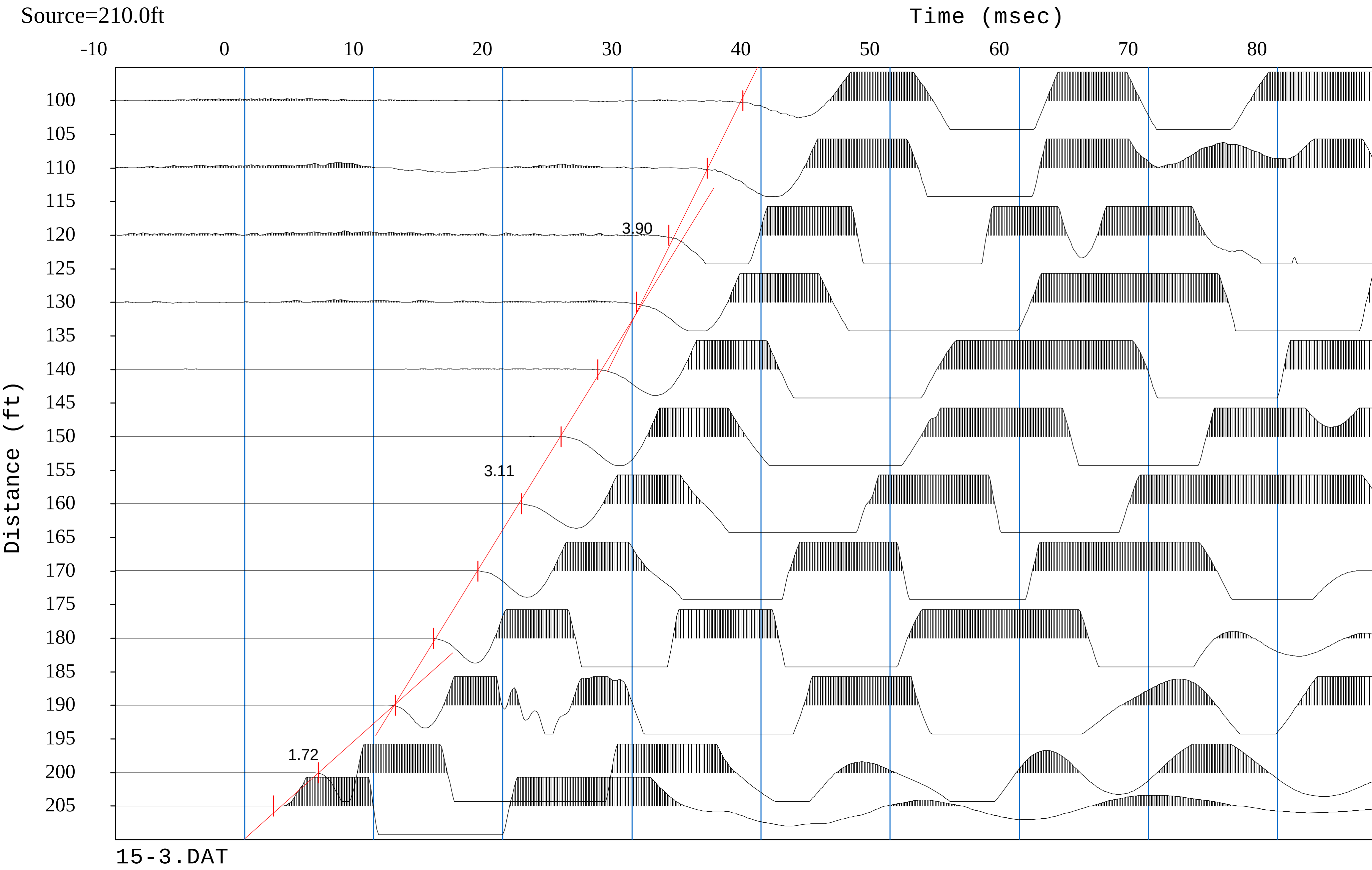
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
3.19
2.33
1.01
1.41
2.48
4.48
15-2.DAT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Time (msec)
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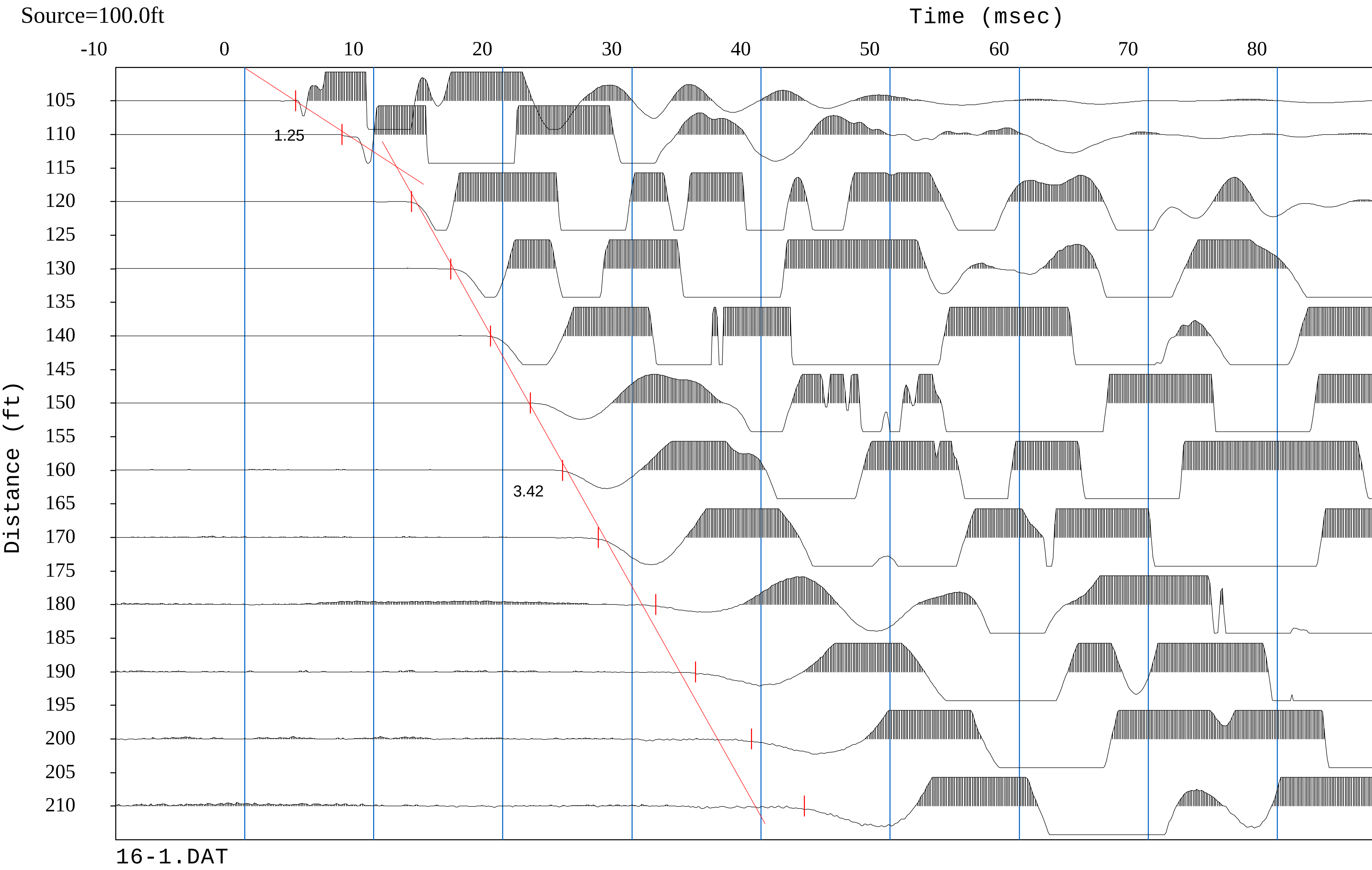
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
3.90
3.11
1.72
15-3.DAT

SEISMIC LINE 16

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	B-18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Time (msec)
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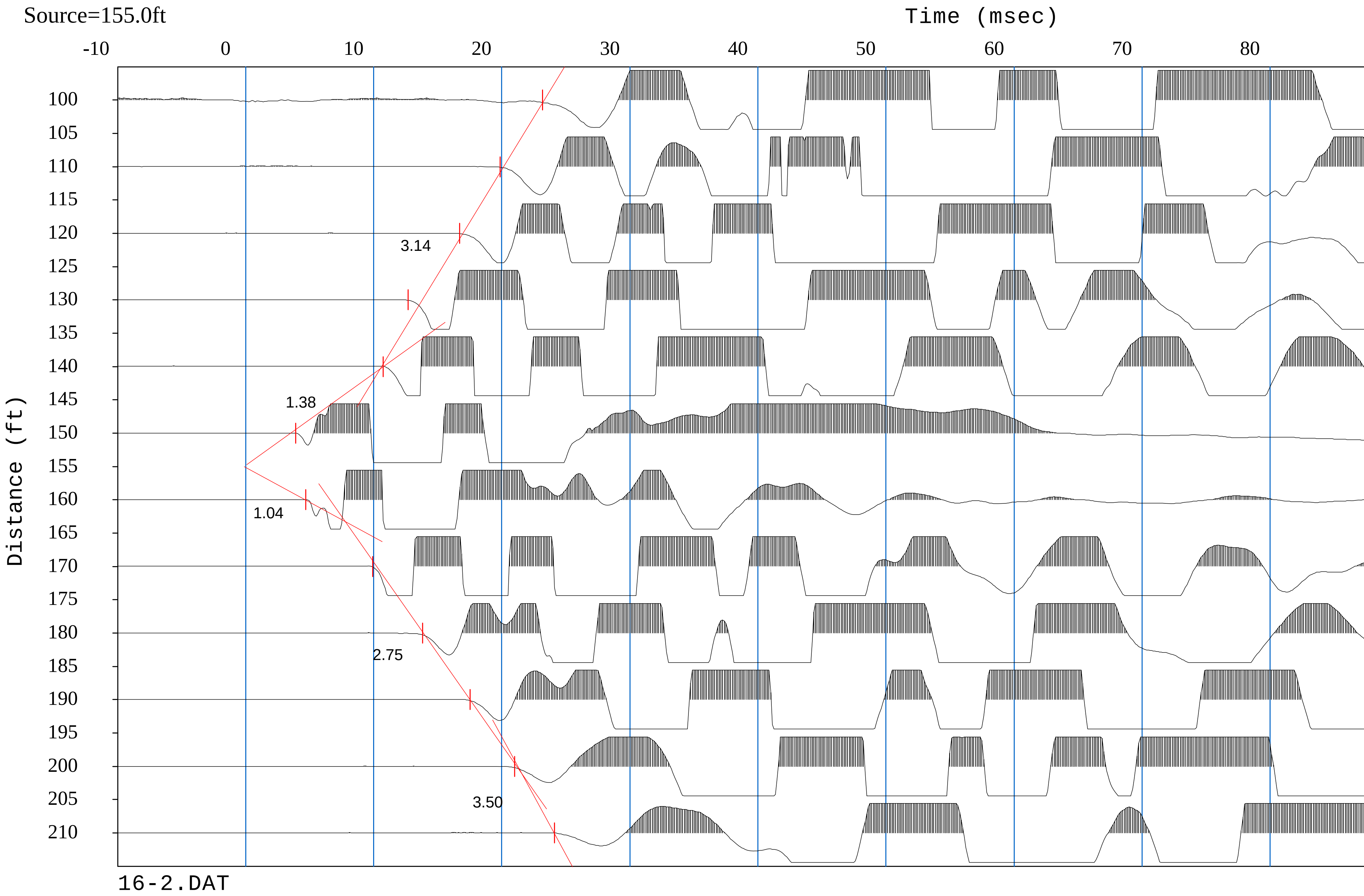
10
20
30
40
50
60
70
80
Distance (ft)
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
1.25
3.42
16-1.DAT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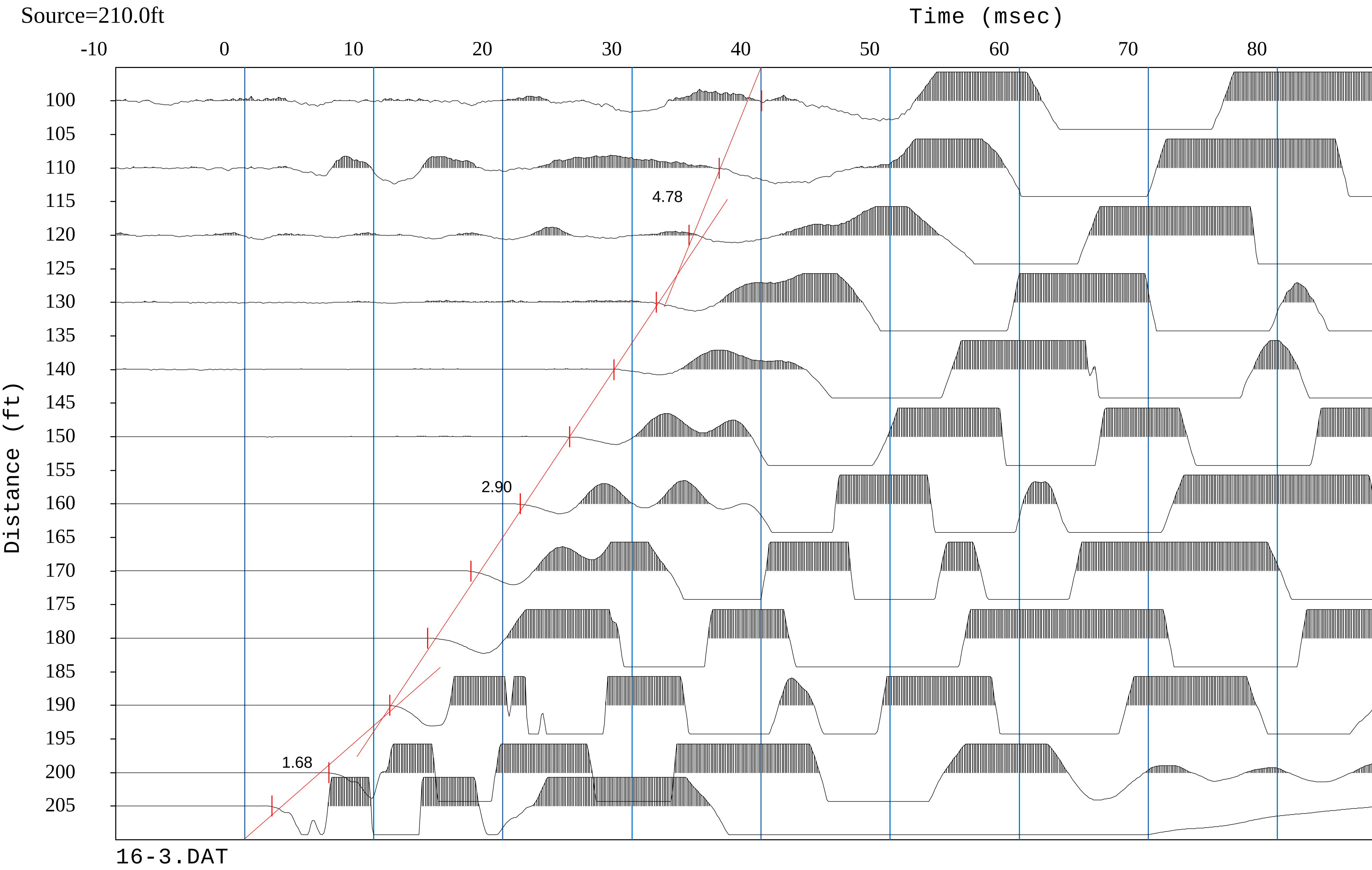
10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
3.14
1.38
1.04
2.75
3.50
16-2.DAT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20
30
40
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60
70
80
Distance (ft)
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105
110
115
120
125
130
135
140
145
150
155
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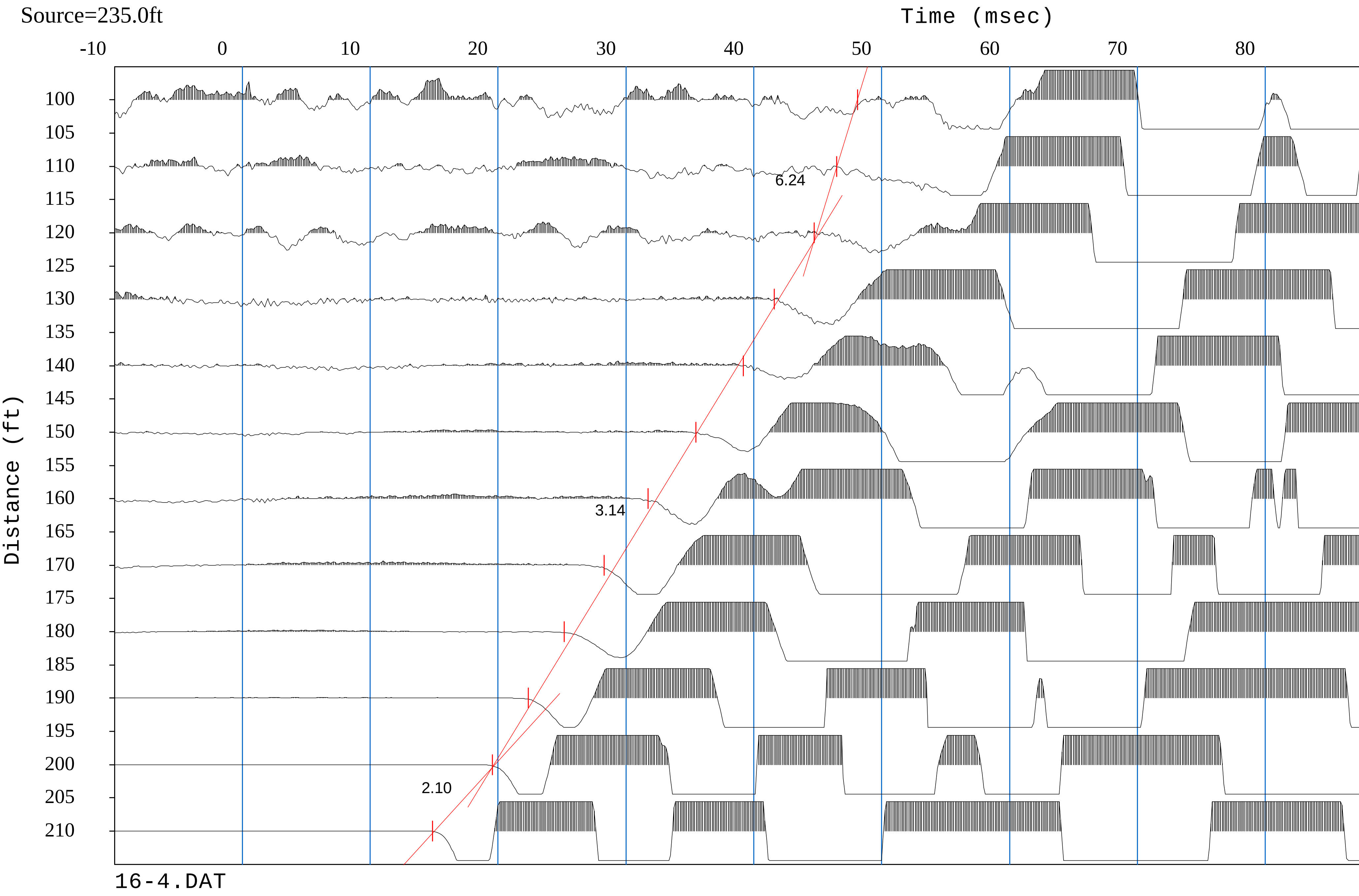
165
170
175
180
185
190
195
200
205
4.78
2.90
1.68
16-3.DAT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Distance (ft)
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110
115
120
125
130
135
140
145
150
155
160
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175
180
185
190
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200
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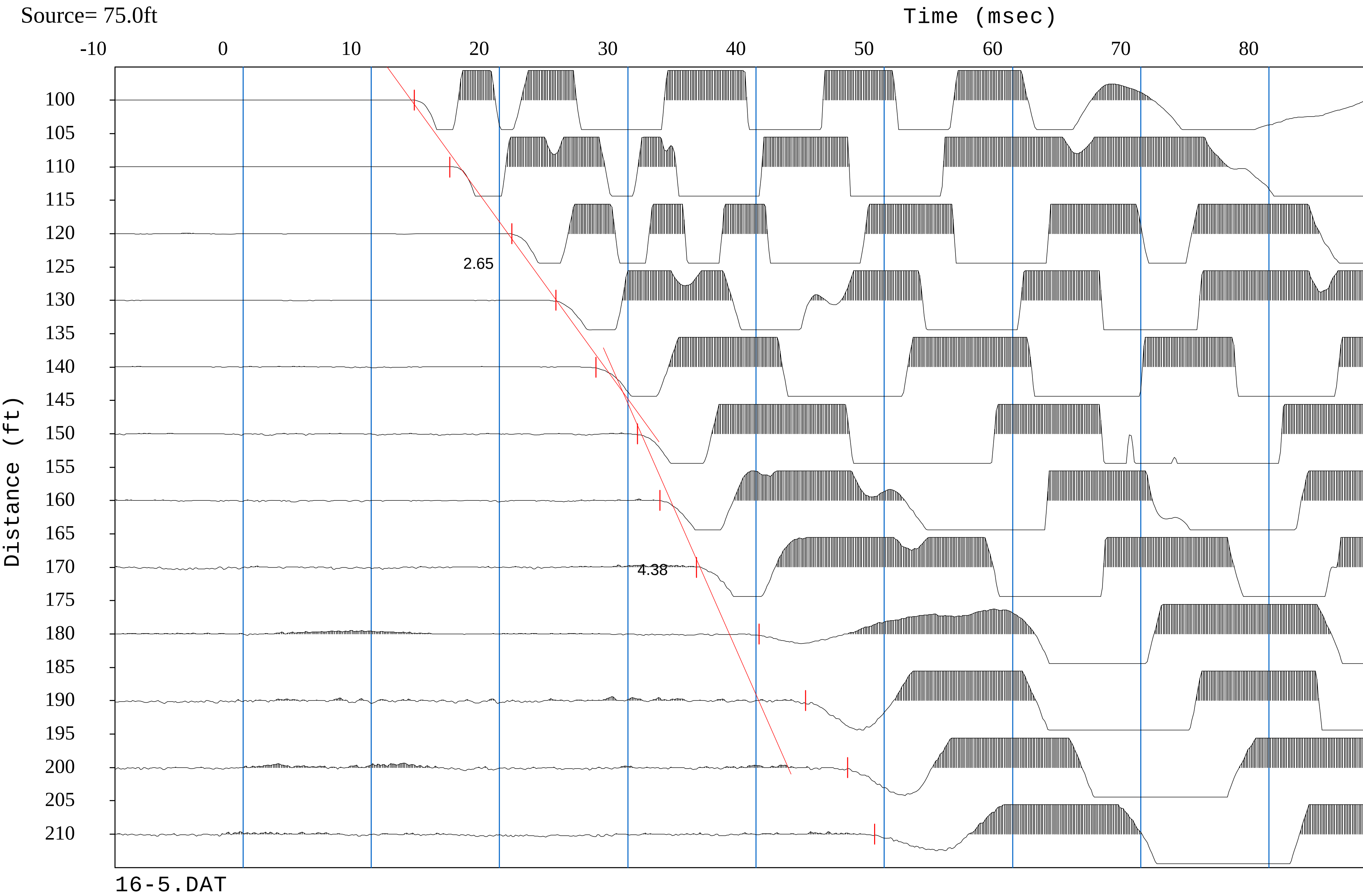
210
6.24
3.14
2.10
16-4.DAT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30
40
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60
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80
Distance (ft)
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105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
2.65
4.38
16-5.DAT

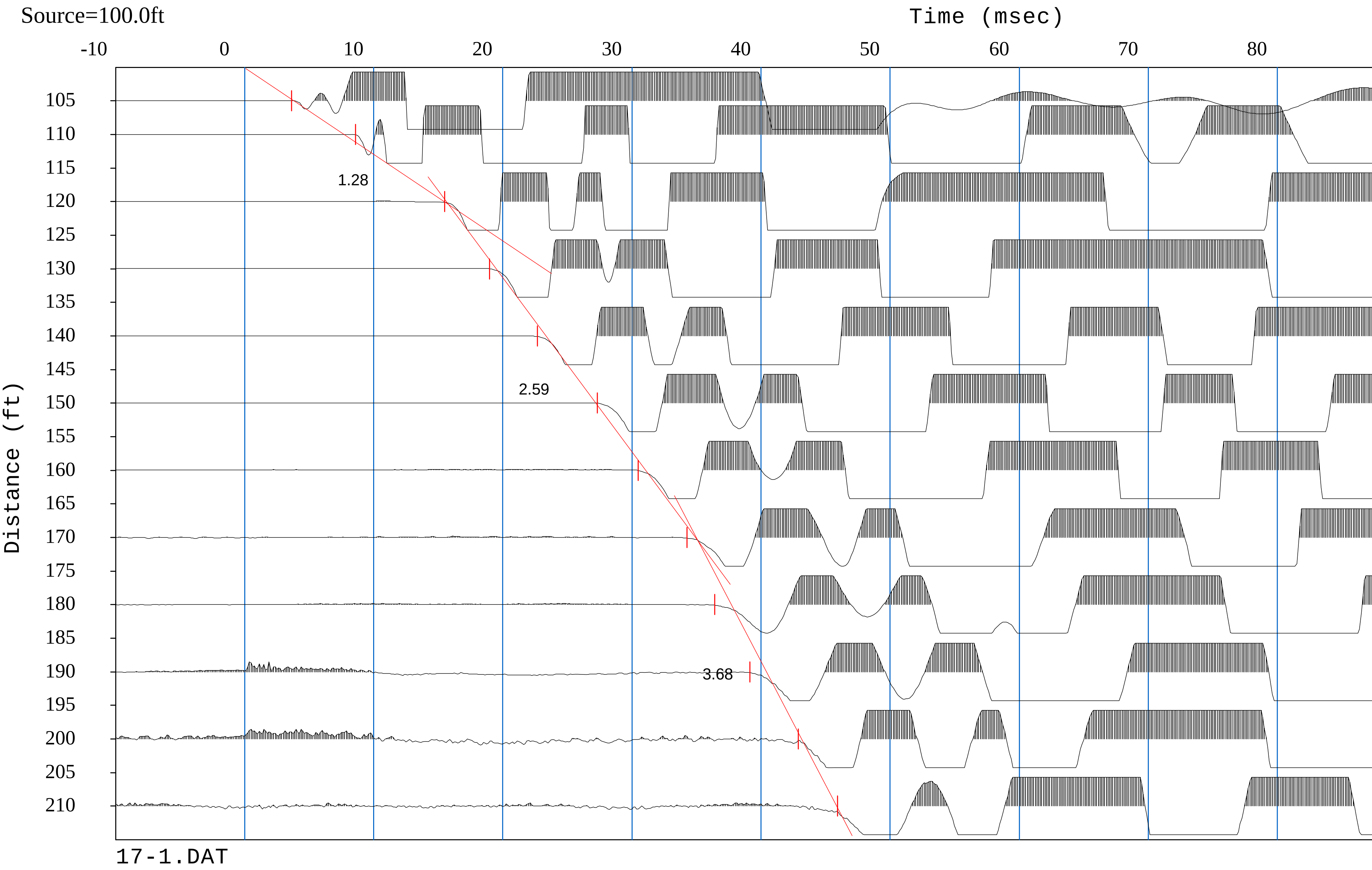
SEISMIC LINE 17

SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND

ALPINE, CALIFORNIA

Geosyntec consultants

DATE: MAY 2009	FIGURE
PROJECT NO. SC0368	B-19


Source=100.0ft
Time (msec)
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10
20
30
40
50
60
70
80
Distance (ft)
105
110
115
120
125
130
135
140
145
150
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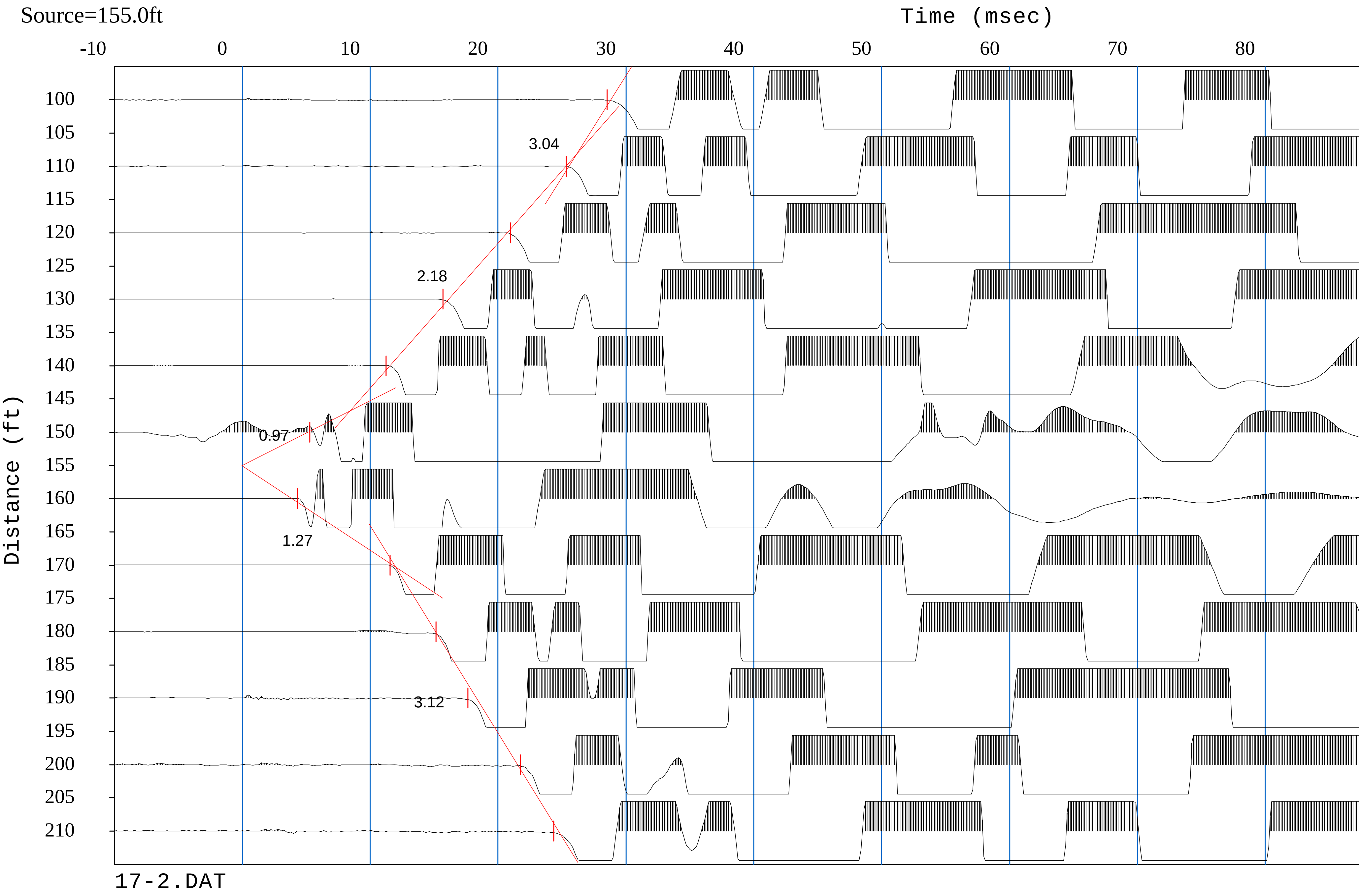
210
1.28
2.59
3.68
17-1.DAT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60
70
80
Distance (ft)
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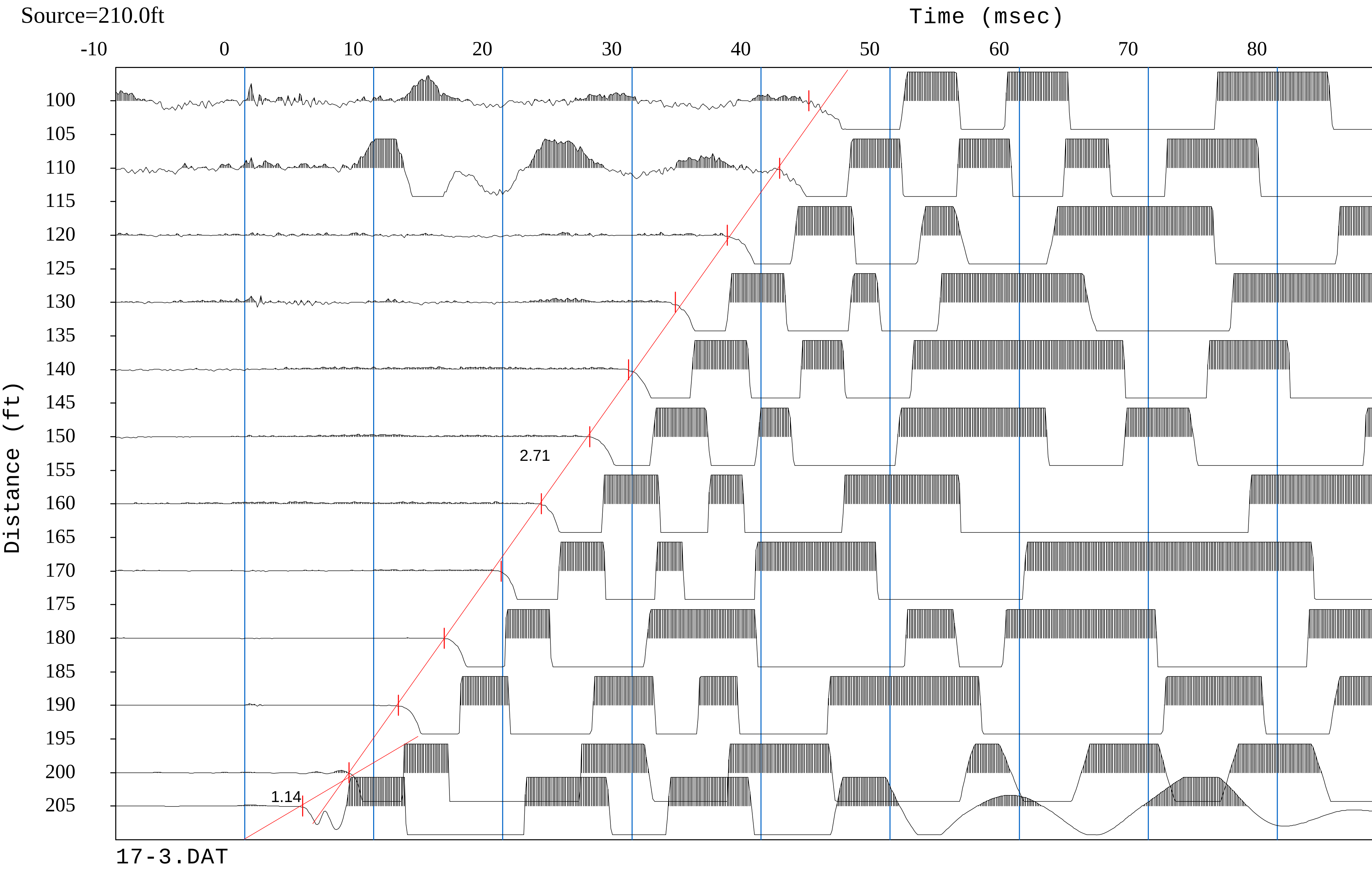
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
3.04
2.18
0.97
1.27
3.12
17-2.DAT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Time (msec)
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Distance (ft)
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110
115
120
125
130
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140
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200
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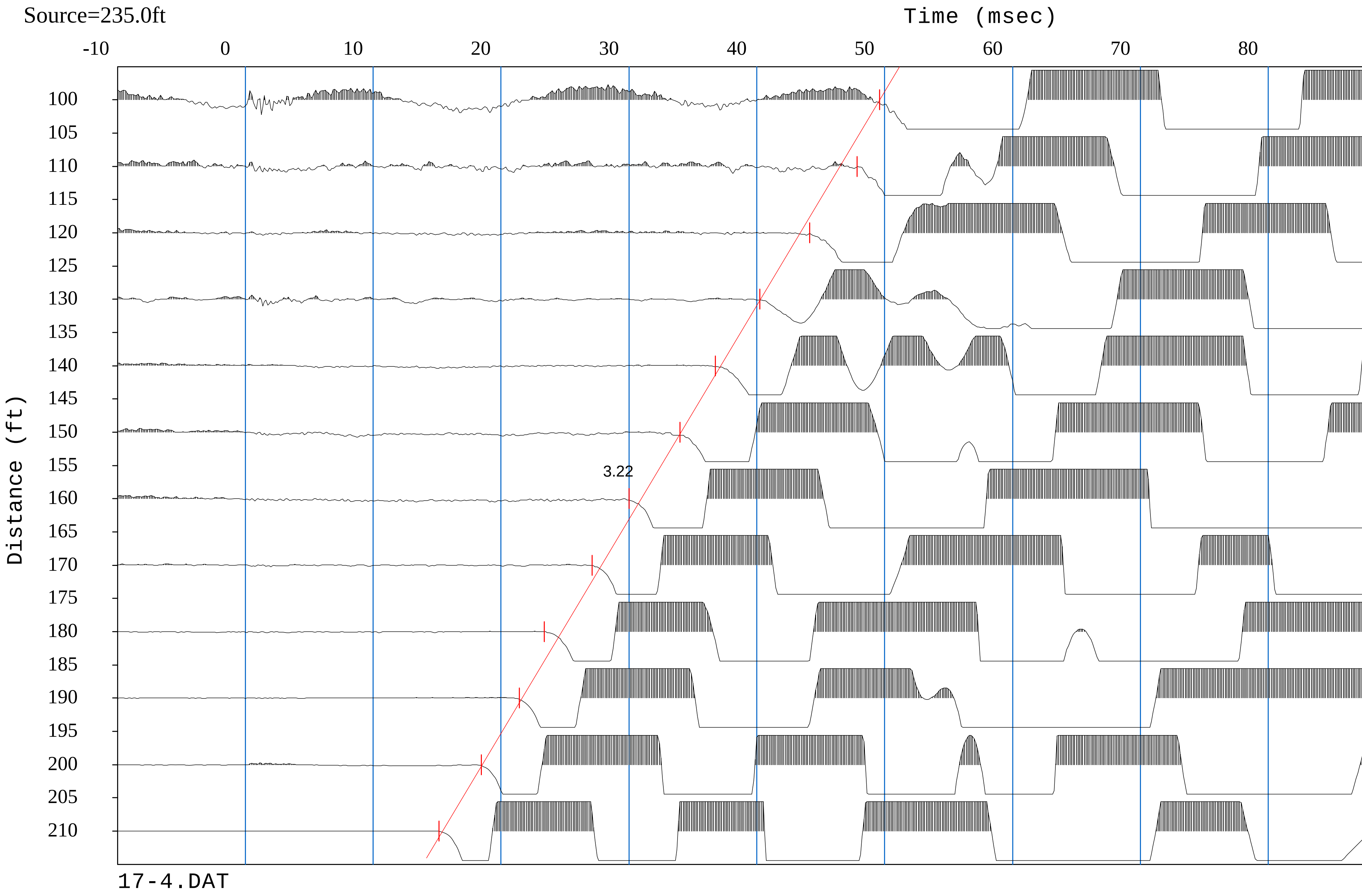
1.14
17-3.DAT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Time (msec)
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10
20
30
40
50
60
70
80
Distance (ft)
100
105
110
115
120
125
130
135
140
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160
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175
180
185
190
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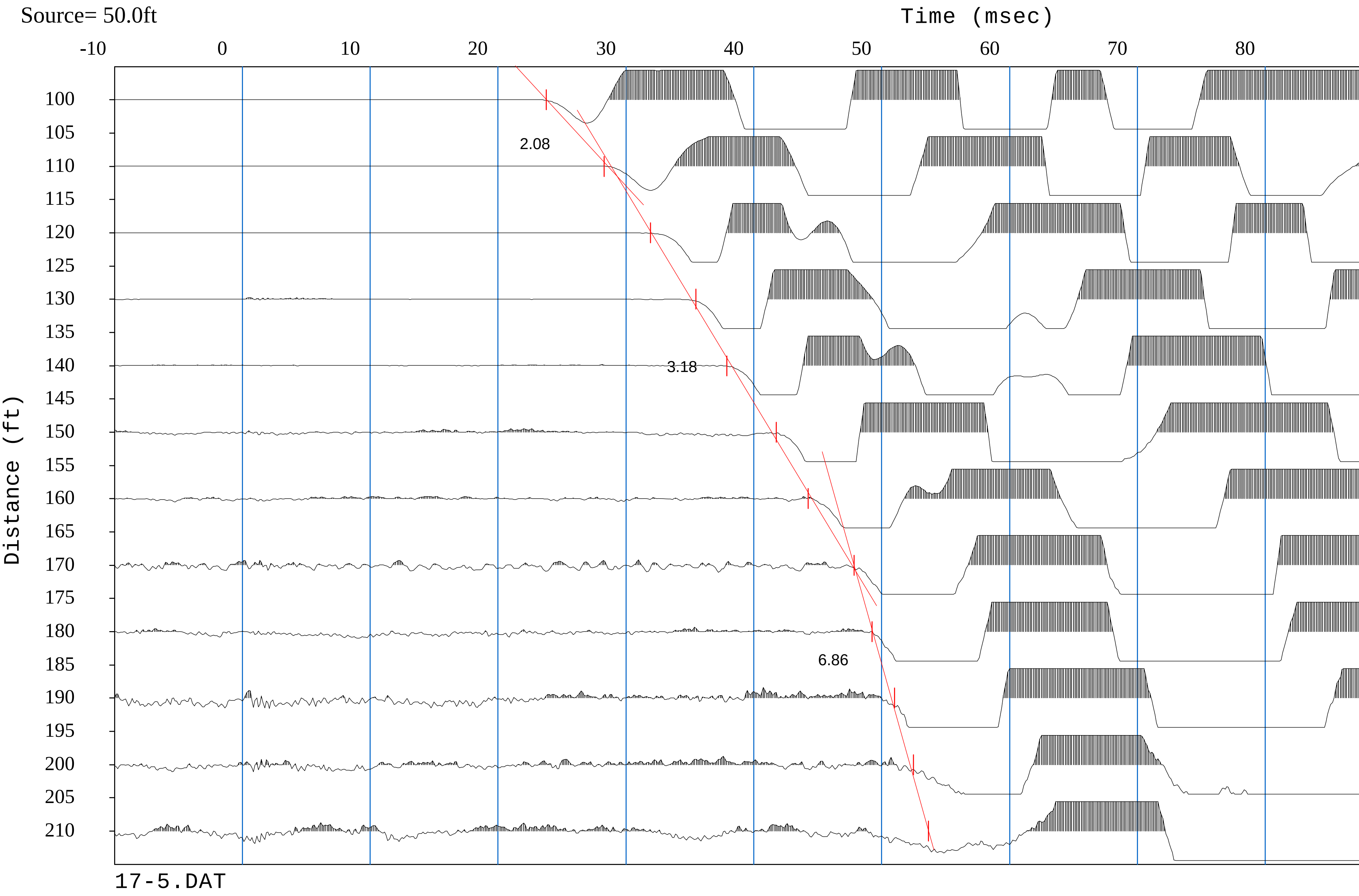
3.22
17-4.DAT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30
40
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60
70
80
Distance (ft)
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105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
2.08
3.18
6.86
17-5.DAT

APPENDIX C

Logs of Field Explorations

Geosyntec consultants
10875 Rancho Bernardo Rd, Suite 200
San Diego, CA 92127
Tel: (858) 674-6559
Fax: (858) 674-6586

PROJECT Sunrise Powerlink Project 230kV Underground
PROJECT LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

KEY SHEET - CLASSIFICATIONS AND SYMBOLS

GS FORM:
KEY 09/99

EMPIRICAL CORRELATIONS WITH STANDARD PENETRATION RESISTANCE N VALUES *

FINE GRAINED SOILS

N VALUE * (BLOWS/FT)	CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS/SQ FT)
0 - 2	VERY SOFT	<0.25
3 - 4	SOFT	0.25 - 0.50
5 - 8	FIRM	0.50 - 1.00
9 - 15	STIFF	1.00 - 2.00
16 - 30	VERY STIFF	2.00 - 4.00
31 - 50	HARD	>4.00
>50	VERY HARD	

COARSE GRAINED SOILS

N VALUE * (BLOWS/FT)	RELATIVE DENSITY
0 - 4	VERY LOOSE
5 - 10	LOOSE
11 - 30	MEDIUM DENSE
31 - 50	DENSE
>50	VERY DENSE

* ASTM D 1586; NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2 IN. O.D., 1.4 IN. I.D. SAMPLER ONE FOOT.

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

MAJOR DIVISIONS			SYMBOLS		DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL COARSER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO.4 SIEVE	CLEAN GRAVELS LITTLE OR NO FINES	▨	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			▨	GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES APPRECIABLE AMOUNT OF FINES	▨	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			▨	GC	CLAYEY GRAVELS, GRAVEL -SAND-CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO.4 SIEVE	CLEAN SANDS LITTLE OR NO FINES	▨	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			▨	SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES APPRECIABLE AMOUNT OF FINES	▨	SM	SILTY SANDS, SAND-SILT MIXTURES
			▨	SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL FINER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▨	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			▨	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			▨	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	▨	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILT
			▨	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			▨	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			▨	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENT

NOTE: DUAL SYMBOLS USED FOR BORDERLINE CLASSIFICATIONS

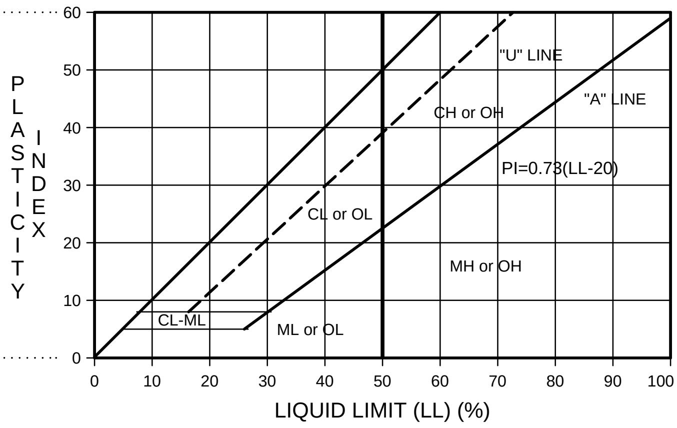
PARTICLE SIZE IDENTIFICATION

BOULDERS	>300 mm
COBBLES	75 - 300 mm
GRAVEL: COARSE	19.0 - 75 mm
GRAVEL: FINE	4.75 - 19 mm
SAND: COARSE	2.00 - 4.75 mm
SAND: MEDIUM	0.425 - 2.00 mm
SAND: FINE	0.075 - 0.425 mm
SILT	0.075 - 0.002 mm
CLAY	<0.002 mm

WELL GRADED - HAVING WIDE RANGE OF GRAIN SIZES AND APPRECIABLE AMOUNTS OF ALL INTERMEDIATE PARTICLE SIZES

POORLY GRADED - PREDOMINANTLY ONE GRAIN SIZE, OR HAVING A RANGE OF SIZES WITH SOME INTERMEDIATE SIZES MISSING

PLASTICITY CHART



OTHER MATERIAL SYMBOLS

▤	Siltstone	⁘	Sand
▦	Sandstone	▥	Silt
▤	Siltstone/Claystone	▥	Silty Sand
▤	Claystone	▤	Evaporite
▤	Shale	▩	Artificial Fill
▦	Siltstone/Sandstone	▩	Debris Fill
▦	Conglomerate	■	Asphalt
▨	Granitic	▦	Concrete

WELL SYMBOLS

■	HYDRATED BENTONITE CHIPS
▨	BENTONITE CEMENT GROUT
⁘	FILTER PACK
▥	CONCRETE
▦	NATIVE/ SLOUGH
<	CENTRAL- IZER

SAMPLER AND OTHER SYMBOLS

⁘	BULK SAMPLE
☒	SPLIT SPOON
◢	STANDARD PENETRATION TEST
▮	SHELBY TUBE
☰	CALIFORNIA SAMPLE
☒	CORE

∇ Water Level at Time Drilling, or as Shown

▼ Static Water Level

MSL: Mean Sea Level

AGS: Above Ground Surface

BGS: Below Ground Surface

BTOC: Below Top of Casing

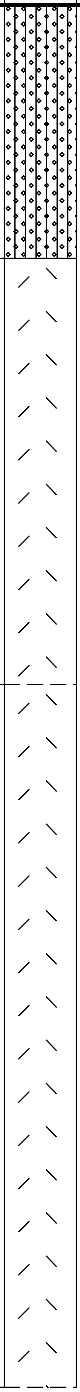
HSA: Hollow Stem Auger

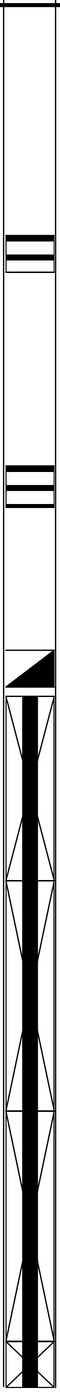
Geosyntec consultants
10875 Rancho Bernardo Rd, Suite 200
San Diego, CA 92127
Tel: (858) 674-6559
Fax: (858) 674-6586

GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING CP-1 **SHEET** 1 **OF** 2
START DATE Mar 4, 09 **ELEVATION** 1131.0 FT. MSL
FINISH DATE Mar 5, 09
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16





DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING	TIME	COMMENTS
	Residual Soil: Loose, moist, dark yellowish brown (10YR 4/4), silty medium to fine sand (SM) with trace subround gravel.								13:55	Hollow-stem auger 0-14.75'
1	@1' becomes olive brown (2.5Y 4/4), silty fine sand with trace subround gravel.		1130							
2			1129							
3			1128							
4			1127							
5			1126			40/ 50/4"			14:00	Insitu temperature test, T=77 degrees F.
6	**Granitic Rock (Tonalite):** Light gray (N7) to moderate yellowish orange (10YR 6/6), coarse to fine grained, completely weathered, very weak rock.		1125							
7			1124							
8			1123							
9			1122							
10	Becomes highly to completely weathered.		1121			22/ 50/5"			14:42	
11			1120						14:45	
12			1119							
13			1118							
14			1117			26/ 50/3"			15:05	
15	**Granitic Rock (Tonalite):** Dusky yellowish brown (10YR 2/2) to light gray (N7), coarse to medium grained, highly to completely weathered, extremely weak rock.		1116				95		15:08	Switch to coring 14.75-49.0' RQD: 8 Runtime 7 min.
16			1115							
17			1114							
18			1113							
19	No Recovery from 19 to 24 ft.		1112				0		15:37 15:45	
20			1111							RQD: 0 Runtime 7 min.
21			1110							
22			1109							
23			1108							
24			1107				94		15:52	
25	**Granitic Rock (Tonalite):** Light gray (N7), coarse grained, moderately weathered, very weak rock, joints 40 degrees, narrow, clay filled, wavy.		1106						15:57	RQD: 87 Runtime 10 min.
26			1105							
27			1104							
28			1103							
29			1102				64		16:07 16:13	
30			1101							

CONTRACTOR Tri-County Drilling **LATITUDE** 32.85252
EQUIPMENT Dietrich 120 **LONGITUDE** 116.80694
DRILL MTHD Hollow Stem Auger / Coring **ANGLE** Vertical
DIAMETER 10" / 4" **BEARING** ------
LOGGER D. Baumwirt **REVIEWER** A. Greene **PRINTED** May 13, 09

REMARKS: Western Cable Pole.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING CP-1 **SHEET** 2 **OF** 2
START DATE Mar 4, 09 **ELEVATION** 1131.0 FT. MSL
FINISH DATE Mar 5, 09
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES PID READING	TIME	COMMENTS
	Granitic Rock (Tonalite): Light gray (N7) with orange mottling, coarse grained, highly weathered, extremely weak rock, joints 35 degrees, narrow, with spotty clay and pyrite infilling, wavy.									RQD: 51 Runtime 9 min.
31			1100							
32			1099							
33			1098							
34			1097				84		16:22 16:29	
35	Becomes medium gray (N5), coarse grained, moderately to highly weathered, extremely weak rock, joints 30 degrees.		1096							RQD: 38 Runtime 8 min.
36			1095							
37			1094							
38	Becomes jointed 90 degrees, tight, iron filled, wavy.		1093							
39			1092				90		16:37 16:41	
40	Becomes jointed 15 degrees, wide with spotty clay infilling, irregular.		1091							RQD: 53 Runtime 10 min.
41			1090							
42			1089							
43			1088							
44	**Granitic Rock (Tonalite):** Medium gray (N5), coarse grained, moderately to highly weathered, medium strong to very weak rock, joints 40 degrees, narrow, with spotty iron infilling, wavy.		1087				92		16:51 16:55	
45			1086							RQD: 86 Runtime 9 min.
46			1085							
47			1084							
48			1083							
49	Bottom of boring at 49' bgs Boring backfilled with grout to surface.		1082						17:04	

CONTRACTOR Tri-County Drilling **LATITUDE** 32.85252
EQUIPMENT Dietrich 120 **LONGITUDE** 116.80694
DRILL MTHD Hollow Stem Auger / Coring **ANGLE** Vertical
DIAMETER 10" / 4" **BEARING** ------
LOGGER D. Baumwirt **REVIEWER** A. Greene **PRINTED** May 13, 09

REMARKS: Western Cable Pole.

COORDINATE SYSTEM:

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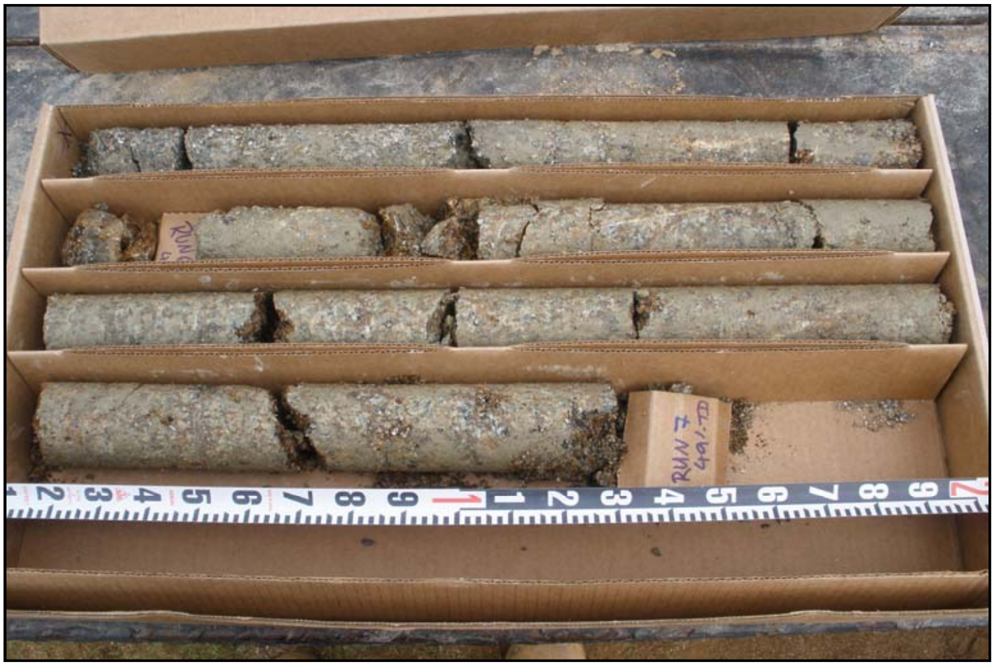
Boring CP-1, Depth Interval 14.75 to 30.0 ft bgs (Elevation 1116.75 to 1101 feet MSL)

Boring CP-1, Depth Interval 30.0 to 42.0 ft bgs (Elevation 1101 to 1089 feet MSL)

CORE PHOTOGRAPHS
BORING CP-1
SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND
ALPINE, CALIFORNIA

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	C-1



Boring CP-1, Depth Interval 42.0 to 49.0 ft bgs (Elevation 1089 to 1082 feet MSL)

CORE PHOTOGRAPHS
BORING CP-1
SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND
ALPINE, CALIFORNIA

Geosyntec consultants

DATE: MAY 2009

PROJECT NO. SC0368

FIGURE

C-1

Geosyntec consultants

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GS FORM:
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BOREHOLE RECORD

BORING CP-2 **SHEET** 1 **OF** 2
START DATE May 14, 09 **ELEVATION** 2274.0 FT. MSL
FINISH DATE May 15, 09
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES PID READING	TIME	COMMENTS
	Residual Soil: Medium dense, moist, olive brown (2.5 YR 4/4), fine to coarse silty sand (SM).								13:25	
1	**Granitic Rock (Tonalite):** Yellowish brown to very dark gray (10YR 5/6 - 3/1), fine to coarse grained, completely to highly weathered, extremely to very weak rock.		2273							
2			2272							
3			2271							
4			2270							
5			2269						13:34	
	Granitic Rock (Tonalite): Dark yellowish brown to very dark gray (10YR 4/6 - 3/1), highly to moderately weathered, very weak to weak rock. Moderately fractured with moderately wide, planar joints 50-70 degrees, with clay infilling and moderate fracture spacing.			CP-2-1 (5'-5.5')		50/5"	33	n/a	13:45	
6			2268							
7			2267							
8			2266							
9			2265							
10			2264						13:50	
						50/4"	22		14:40	Switch to HQ core at 10.0 ft.
11			2263							
12			2262	R1			100			RQD=13
13			2261						14:50 15:05	
14			2260							
15			2259							
16			2258	R2			100			RQD=36
17	@ 16' Becomes dark yellowish brown to very dark gray (2.5YR 5/6 - 3/1), with narrow to moderately wide, wavy joints 55-75 degrees, containing clay and iron infilling, and moderate fracture spacing.		2257							
18	@ 18' Becomes completely weathered, extremely weak rock, with abundant vertical and near vertical healed fractures, 50-90 degrees.		2256						15:17 15:25	
19			2255							
20			2254	R3			85			RQD=0
21			2253							
22			2252							
23	@ 23' Becomes massive		2251						15:37 15:50	
24			2250	R4			50			RQD=0
25			2249							
26			2248							
27			2247						16:05 5/14/09	
28			2246						08:40 5/15/09	
29			2245							
30			2244							

CONTRACTOR Tri-County Drilling **LATITUDE** 32.82891
EQUIPMENT Dietrich 120 **LONGITUDE** 116.71928
DRILL MTHD Hollow Stem Auger / Coring **ANGLE** Vertical
DIAMETER 8" HSA / 4" HQ core **BEARING** ------
LOGGER R. Gray **REVIEWER** A. Greene **PRINTED** May 21, 09

REMARKS: Eastern Cable Pole.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING CP-2 **SHEET** 2 **OF** 2
START DATE May 14, 09 **ELEVATION** 2274.0 FT. MSL
FINISH DATE May 15, 09
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
31	**Granitic Rock (Leucocratic Tonalite):** Dark yellowish brown to pale yellow (10YR 5/6 - 2.5 YR 2/4), fine to coarse grained, completely weathered, extremely weak rock. Highly fractured with very narrow to moderately wide, planar to irregular joints 45-90 degrees with clay and iron infilling, surface stain and filled, close to moderate fracture spacing.		2243	R5			100			RQD=0
32			2242							
33			2241						09:00 09:08	
34			2240							
35			2239	R6			88			RQD=0
36	Sheared zone @ 35.5' becomes predominantly clay to completely weathered rock.		2238							
37			2237							@ 36.5' Color change in drill fluids.
38			2236						09:29 09:30	
39			2235	R7			46			RQD=0
40	**Granitic Rock (Tonalite):** Dark yellowish brown to very dark gray (10YR 4/6 - 3/1), completely weathered, extremely weak rock. Contains moderately wide to narrow, wavy to planar joints 55-60 degrees with clay and iron infilling, close fracture spacing.		2234							
41			2233							
42			2232							
43			2231						09:40 09:53	
44			2230							
45			2229							
46			2228	R8			100			RQD=0
47			2227							
48			2226						10:06 10:15	
49			2225							
50			2224	R9			100			RQD=0
51	From 50.2'-50.6' becomes weak rock with localized healed fractures and joints 60-70 degrees.		2223							
52			2222							
53			2221						10:29	
	Bottom of boring at 53' bgs Boring backfilled with bentonite grout									

CONTRACTOR Tri-County Drilling
EQUIPMENT Dietrich 120
DRILL MTHD Hollow Stem Auger / Coring
DIAMETER 8" HSA / 4" HQ core
LOGGER R. Gray **REVIEWER** A. Greene **PRINTED** May 21, 09

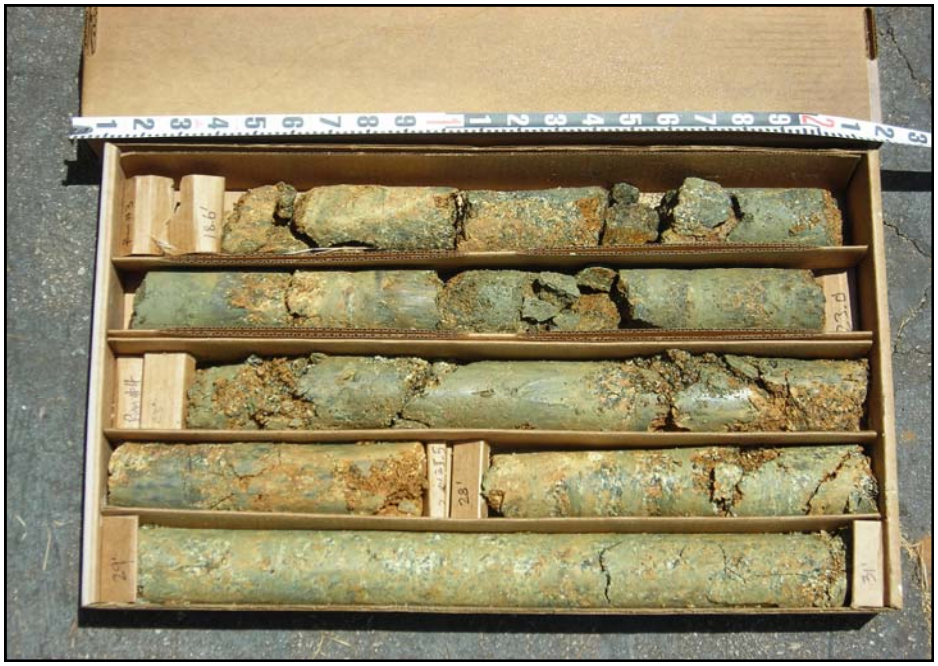
LATITUDE 32.82891
LONGITUDE 116.71928
ANGLE Vertical
BEARING ------

REMARKS: Eastern Cable Pole.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Boring CP-2, Depth Interval 10.5 to 18.6 ft bgs (Elevation 2263.5 to 2255.4 feet MSL)



Boring CP-2, Depth Interval 18.6 to 31.0 ft bgs (Elevation 2255.4 to 2243 feet MSL)

CORE PHOTOGRAPHS **BORING CP-2** **SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND** **ALPINE, CALIFORNIA**		
Geosyntec consultants	DATE: MAY 2009 PROJECT NO. SC0368	FIGURE C-2

Boring CP-2, Depth Interval 31.0 to 44.2 ft bgs (Elevation 2243 to 2229.8 feet MSL)

Boring CP-2, Depth Interval 44.2 to 53.0 ft bgs (Elevation 2229.8 to 2221 feet MSL)

CORE PHOTOGRAPHS
BORING CP-2
SUNRISE POWERLINK PROJECT - 230 KV UNDERGROUND
ALPINE, CALIFORNIA

Geosyntec consultants	DATE: MAY 2009	FIGURE
	PROJECT NO. SC0368	C-2

Geosyntec consultants

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GS FORM:
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BOREHOLE RECORD

BORING B-1
SHEET 1 **OF** 1
START DATE Mar 4, 09
ELEVATION 1222.0 FT. MSL
FINISH DATE Mar 4, 09
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES PID READING	TIME	COMMENTS
	Residual Soil: Loose, moist, dark yellowish brown (10YR 4/4), silty medium to fine sand (SM) with trace subround gravel.								9:32	
1	@ 1' becomes olive brown (2.5Y 4/4), silty fine sand.		1221							
2			1220							
3			1219							
4	**Granitic Rock (Tonalite):** Light gray (N7), medium to fine grained, completely weathered, very weak rock.		1218							
5			1217	B-1-1		22/ 50/4"			9:40	Insitu temperature test, T=70 degrees F.
6			1216							
7			1215							
8			1214							
9			1213							
10	Becomes moderate yellowish brown (10YR 4/4).		1212	B-1-2		20/ 50/5"			10:25	
11			1211						10:28	
12			1210							
13			1209							
14			1208							
15			1207	B-1-3		50/5"			10:38	Poor recovery with Cal Sampler. Retried with SPT Sampler: Poor recovery.
16			1206						10:41	
17			1205							
18			1204							
19			1203							
20			1202	B-1-4		50/5"			10:55	
	Bottom of boring at 20.5' bgs Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.								10:57	

CONTRACTOR Tri-County Drilling
EQUIPMENT Dietrich 120
DRILL MTHD Hollow Stem Auger
DIAMETER 10"
LOGGER D. Baumwirt **REVIEWER** A. Greene

LATITUDE 32.85178
LONGITUDE 116.80755
ANGLE Vertical
BEARING ------
PRINTED May 12, 09

REMARKS: MH-1

COORDINATE SYSTEM:

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GS FORM:
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BOREHOLE RECORD

BORING **B-2** **SHEET 1 OF 1**
START DATE Oct 7, 08 **ELEVATION 1196.0 FT. MSL**
FINISH DATE Oct 7, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING	TIME	COMMENTS
	Fill: Moist, dark brown (7.5YR 3/2), silty fine to medium sand (SM) with coarse sand and trace angular fine gravel.			B-2-1						
1			1195							
2			1194							
3			1193							
4			1192							
5			1191							
	Becomes brown (10YR 4/3), no fine gravel.								10:10	Insitu temperature test, T=84 degrees F (28.9 degrees C).
6			1190							
				B-2-2		16/17/14	100			
7			1189							
8			1188							
9			1187							
10			1186							
				B-2-3		6/7/13	100		10:45	Insitu temperature test, T=78 degrees F (25.6 degrees C).
	Residual Soil: Medium dense, moist, dark yellow brown (10YR 4/6), clayey fine sand with trace coarse sand [SC].									
11			1185							
12			1184							
13			1183							
14			1182							
15			1181							
				B-2-4		40/50/2"	44		10:50	
	Granitic Rock (Tonalite): Moderate brown to moderate yellowish brown, coarse grained, completely weathered, weak rock.								10:56	

Bottom of boring at 15' 8" bgs
Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR **Tri-County Drilling**
EQUIPMENT **CME-75**
DRILL MTHD **Hollow Stem Auger**
DIAMETER **8"**
LOGGER **R. Gray** **REVIEWER** **A. Greene**

LATITUDE **32.84880**
LONGITUDE **116.80827**
ANGLE **Vertical**
BEARING **------**
PRINTED **May 12, 09**

REMARKS: MH-2

COORDINATE SYSTEM:

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GS FORM:
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BOREHOLE RECORD

BORING B-3 **SHEET** 1 **OF** 1
START DATE Oct 7, 08 **ELEVATION** 1247.0 FT. MSL
FINISH DATE Oct 7, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES PID READING	TIME	COMMENTS
	2" Asphalt over Class II base.								10:46	
1	**Residual Soil:** Medium dense, moist, dark yellow brown (10YR 4/4), silty fine sand (SM) with trace sub-angular fine gravel.		1246							
2			1245							
3			1244							
4			1243							
5			1242	B-3-1		15/24/39	100		12:20	Insitu temperature test, T=96 degrees F (35.6 degrees C).
6	**Granitic Rock (Tonalite):** Dark yellow brown (10YR 4/2) to dusky yellowish brown (10YR 2/2), medium to coarse grained, completely weathered, weak rock.		1241							
7			1240							
8			1239							
9			1238							
10	No recovery 3" slough.		1237	B-3-2		50/3"	17		12:33	No density changes noted by driller.
11			1236							
12			1235							
13			1234							
14			1233							
15			1232	B-3-3		50/2"	11		12:35	No density changes noted by driller.

Bottom of boring at 15' 2" bgs
Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR Tri-County Drilling
EQUIPMENT CME-75
DRILL MTHD Hollow Stem Auger
DIAMETER 8"
LOGGER R. Gray **REVIEWER** A. Greene **PRINTED** May 12, 09
LATITUDE 32.84563
LONGITUDE 116.80437
ANGLE Vertical
BEARING ------

REMARKS: MH-3

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING B-4 **SHEET** 1 **OF** 1
START DATE Oct 7, 08 **ELEVATION** 1350.0 FT. MSL
FINISH DATE Oct 7, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
	Fill: Moist, dark reddish brown (5YR 3/4), silty fine sand (SM), micaceous and non-plastic.	▨							13:20	
1		▨	1349							
2		▨	1348							
3		▨	1347							
4		▨	1346							
5		▨	1345	B-4-1	▤	10/10/10	100		13:52	Insitu temperature test, T=84 degrees F (28.9 degrees C).
6	Becomes brown (7.5YR 4/4) with trace angular fine gravel.	▨	1344							
7		▨	1343							
8		▨	1342							
9	Moist, dark brown (7.5YR 3/3), silty fine sand (SM) with clay and trace gravel.	▨	1341							
10		▨	1340	B-4-2	▤	8/7/6	100		14:32	Insitu temperature test, T=88 degrees F (31.1 degrees C).
11		▨	1339							
12		▨	1338							
13	Increasing clay content.	▨	1337							
14	Moist dark brown (7.5YR 3/4), clayey fine sand (SC) with few fine granitic gravels. Micaceous.	▨	1336							
15		▨	1335	B-4-3	◣	9/11/15	100		14:39	
16		▨	1334							

Bottom of boring at 16' 6" bgs
Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR Tri-County Drilling **LATITUDE** 32.84348
EQUIPMENT CME-75 **LONGITUDE** 116.79998
DRILL MTHD Hollow Stem Auger **ANGLE** Vertical
DIAMETER 8" **BEARING** ------
LOGGER R. Gray **REVIEWER** A. Greene **PRINTED** May 12, 09

REMARKS: MH-4

COORDINATE SYSTEM:

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GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-5 **SHEET** 1 **OF** 1
START DATE Oct 13, 08 **ELEVATION** 1453.0 FT. MSL
FINISH DATE Oct 13, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
	3" Asphalt over 6" concrete			B-5-1					10:47	
1	**Residual Soil:** Medium dense, moist, dark brown (10YR 3/3), silty fine sand [SM], non-plastic and micaceous.		1452							
2			1451							
3			1450							
4			1449							
5	**Granitic Rock (Tonalite):** Medium gray (N5) to dark yellowish orange (10YR 6/6), medium grained, completely to slightly weathered, very weak to strong rock.		1448	B-5-2		12/14/21	67			Baggie sample.
6			1447							
7			1446							
8			1445							Becomes harder to drill.
9			1444							
10	Becomes very strong rock. Only small fragments of rock slough collected.		1443	B-5-3		50/3"	17			No sample collected due to low recovery.
11			1442							
12			1441							
13			1440							
14			1439							
15	Bottom of boring at 15' 2" bgs Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.		1438	B-5-4		50/2"	11		11:18	Becomes very hard to drill.

CONTRACTOR Tri-County Drilling
EQUIPMENT CME-75
DRILL MTHD Hollow Stem Auger
DIAMETER 8"
LOGGER R. Gray **REVIEWER** A.Greene **PRINTED** May 12, 09

LATITUDE 32.84161
LONGITUDE 116.79493
ANGLE Vertical
BEARING ------

REMARKS: MH-5

COORDINATE SYSTEM:

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING B-6 **SHEET** 1 **OF** 1
START DATE Oct 9, 08 **ELEVATION** 1532.0 FT. MSL
FINISH DATE Oct 9, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
	6" Asphalt.								12:00	
1	**Fill:** Moist, dark yellow brown (10YR 4/4), silty fine to medium sand (SM), non-plastic and micaceous.		1531							
2			1530							
3			1529							
4			1528							
5			1527							
	Granitic Rock (Tonalite): Dark yellowish brown (10YR 4/2) to light brown (5YR 5/6), coarse grained, completely weathered, very weak rock.			B-6-1		30/50/3"	44		12:35	Insitu temperature test, T=112 degrees F (44.4 degrees C). B-6-1A: (5.5' - 6') B-6-1B: (6' - 6.5')
6			1526							
7			1525							
8			1524							
9			1523							
10			1522							
	Becomes dark yellowish brown (10YR 4/2) to moderate brown (5YR 4/4), coarse grained, completely to moderately weathered, weak rock.			B-6-2		31/50/3"	44		12:56	
11			1521							
12			1520							
13			1519							
14			1518							
15			1517							
	Bottom of boring at 15' 3" bgs Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.			B-6-3		50/3"	0		13:00	

CONTRACTOR Tri-County Drilling
EQUIPMENT CME-75
DRILL MTHD Hollow Stem Auger
DIAMETER 8"
LOGGER R. Gray **REVIEWER** A. Greene

LATITUDE 32.83971
LONGITUDE 116.78950
ANGLE Vertical
BEARING ------
PRINTED May 12, 09

REMARKS: MH-6

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING **B-7** **SHEET 1 OF 1**
START DATE **Oct 7, 08** **ELEVATION 1601.0 FT. MSL**
FINISH DATE **Oct 7, 08**
PROJECT **Sunrise Powerlink Project 230kV Underground**
LOCATION **Alpine, CA**
PROJECT NUMBER **SC0368-16**

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES PID READING	TIME	COMMENTS
	Fill: Moist, brown (10YR 4/3), silty fine to medium sand (SM) with fine to medium gravel and trace angular coarse sand.			B-7-1					15:12	
1			1600							
2			1599							
3			1598							
4			1597							
5	Becomes moist, olive brown (2.5Y 4/2).		1596	B-7-2		3/4/12	100		15:22	Baggie sample.
6			1595							
7			1594							
8	Moist, dark brown (10YR 3/3), silty sand (SM) with fine to medium gravel.		1593							Drilling becomes easier.
9			1592							
10			1591	B-7-3		3/3/5	100		15:25	
11			1590							
12	**Granitic Rock (Tonalite):** Medium to dark gray (N4 to N5), medium grained, slightly to moderately weathered, strong rock.		1589							Becomes very hard to drill.

Bottom of boring at 12' 3" bgs
Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR	**Tri-County Drilling**	**LATITUDE**	**32.83870**
EQUIPMENT	**CME-75**	**LONGITUDE**	**116.78408**
DRILL MTHD	**Hollow Stem Auger**	**ANGLE**	**Vertical**
DIAMETER	**8"**	**BEARING**	**------**
LOGGER	**R. Gray**	**REVIEWER**	**A. Greene**
PRINTED	**May 12, 09**		

REMARKS: MH-7

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants

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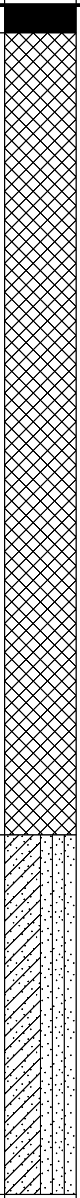
GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING B-8 **SHEET** 1 **OF** 1
START DATE Oct 9, 08 **ELEVATION** 1674.0 FT. MSL
FINISH DATE Oct 9, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16



DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
	6" Asphalt.								8:51	
1	**Fill:** Moist, dark brown (7.5YR 3/2), silty fine to medium sand (SM) with trace coarse sand.		1673							
2			1672							
3			1671							
4			1670							
5	Increase in sub-angular gravel.		1669	B-8-1		4/5/9	100		9:30	Insitu temperature test, T=88 degrees F (31.1 degrees C). B-8-1A: (5.5' - 6') B-8-1B: (6' - 6.5')
6			1668							
7			1667							
8			1666							
9			1665							
10	Gravels become more angular.		1664	B-8-2		5/4/3	44		10:08	Insitu temperature test, T=76 degrees F (24.4 degrees C). B-8-2A: (10.5' - 11') B-8-2B: (11' - 11.5')
11			1663							
12			1662							
13			1661							
14			1660							
15	**Residual Soil:** Loose, wet, very dark brown (7.5YR 2.5/3), silty to clayey fine sand [SM/SC].		1659	B-8-3		1/1/5	100			Groundwater seep. Insitu temperature test, T=71 degrees F (21.7 degrees C). B-8-3A: (15.5' - 16'), sample saturated. B-8-3B: (16' - 16.5'), sample saturated. Drilling became slightly tougher.
16			1658							
17			1657							
18			1656							
19			1655							
20	Becomes very dark grayish brown (10YR 3/2), with trace coarse sand and subrounded fine gravel.		1654	B-8-4		8/10/12	100			
21			1653							
	Bottom of boring at 21' 6" bgs Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.								10:26	

CONTRACTOR Tri-County Drilling
EQUIPMENT CME-75
DRILL MTHD Hollow Stem Auger
DIAMETER 8"
LOGGER R. Gray **REVIEWER** A. Greene

LATITUDE 32.83788
LONGITUDE 116.77946
ANGLE Vertical
BEARING ------
PRINTED May 12, 09

REMARKS: MH-8

COORDINATE SYSTEM:

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING B-9 **SHEET** 1 **OF** 1
START DATE Oct 9, 08 **ELEVATION** 1759.0 FT. MSL
FINISH DATE Oct 9, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
	Fill: Moist, dark brown (7.5YR 3/4), silty fine grained sand (SM).			B-9-1					11:10	
1			1758							
2			1757							
3	**Granitic Rock (Tonalite):** Dark yellowish brown (10YR 4/2) to dusky brown (5YR 2/2), coarse grained, completely weathered, extremely weak rock.		1756							
4			1755							
5			1754	B-9-2		6/6/8	100			
6			1753							
7			1752							
8			1751							
9			1750							
10	Becomes dark greenish gray (5GY 4/1) to moderate brown (5YR 3/4) (oxidation), coarse grained, completely weathered, weak rock.		1749	B-9-3		1/4/18	67			
11			1748							
12			1747							
13			1746							
14			1745							
15	1" recovered rock flour and granitic fragments. Medium light gray (N6) to medium gray (N5), highly weathered, weak rock.		1744	B-9-4		50/1"	0		11:27	No sample collected.

Bottom of boring at 15' 1" bgs
Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR Tri-County Drilling
EQUIPMENT CME-75
DRILL MTHD Hollow Stem Auger
DIAMETER 8"
LOGGER R. Gray **REVIEWER** A. Greene **PRINTED** May 12, 09

LATITUDE 32.83737
LONGITUDE 116.77402
ANGLE Vertical
BEARING ------

REMARKS: MH-9

COORDINATE SYSTEM:

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BORING LOG NO WELL (ALEX) NO SIG SC0368-14.GPJ GEOSNTEC.GDT 5/12/09

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GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-10 **SHEET** 1 **OF** 1
START DATE Oct 10, 08 **ELEVATION** 1821.0 FT. MSL
FINISH DATE Oct 14, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES PID READING	TIME	COMMENTS
	6" Asphalt								11:35	Hand auger to 3.5' bgs.
1	**Residual Soil:** Medium dense, moist, dark brown (7.5YR 3/2), silty fine gravel with fine sand [GM]. Contains decomposed granitic subrounded to angular gravel.		1820							
2			1819							
3	**Granitic Rock (Tonalite):** Dark yellowish brown (10YR 4/2) to light brown (5YR 6/4), coarse grained, completely to highly weathered, very weak rock.		1818							
4			1817							Hollow stem auger 3.5' - 11'
5	Becomes completely weathered, extremely weak rock.		1816	B-10-1		14/44/50/2"	100		12:19	Insitu temperature test, T=92 degrees F (33.3 degrees C). B-10-1A: (5' - 5.5') B-10-1B: (5.5' - 6')
6			1815							
7			1814							
8			1813							
9	**Granitic Rock (Tonalite):** Becomes medium light gray (N9) to medium dark gray (N4), coarse grained, fresh rock (slightly weathered at fractures), strong, slightly fractured. Joints 15 to 45 degrees, very narrow, trace iron oxide surface staining, planar to stepped, moderately wide spacing.		1812							Drilling encounters competent rock.
10			1811							
11			1810				100		11:12	Refusal with HSA on 10 Oct. 2008 at 11', resume drilling with HQ coring on 14 Oct. 2008. RQD=89
12			1809							
13			1808							
14			1807							
15			1806				100		11:41 12:04	
16			1805							
17			1804							RQD=100
18			1803							
	Bottom of boring at 18' 3" bgs Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.								12:36	

CONTRACTOR Tri-County Drilling **LATITUDE** 32.83593
EQUIPMENT CME-75 **LONGITUDE** 116.76900
DRILL MTHD Hollow Stem Auger / Coring **ANGLE** Vertical
DIAMETER 8" / 4" **BEARING** ------
LOGGER R. Gray **REVIEWER** A. Greene **PRINTED** May 12, 09

REMARKS: MH-10

COORDINATE SYSTEM:

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING **B-11** **SHEET 1 OF 1**
START DATE **Oct 10, 08** **ELEVATION 1862.0 FT. MSL**
FINISH DATE **Oct 10, 08**
PROJECT **Sunrise Powerlink Project 230kV Underground**
LOCATION **Alpine, CA**
PROJECT NUMBER **SC0368-16**

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING	TIME	COMMENTS
	6" Asphalt			B-11-1					8:59	
1	**Fill:** Moist, very dark brown (7.5YR 2.5/2), silty fine sand (SM) with trace coarse sand. Micaceous.		1861							
2			1860							
3			1859							
4			1858							∇
5			1857	B-11-2		1/2/1	100			
6	Becomes wet, very dark gray (7.5 YR 3/1), silty fine to medium sand with trace sub-rounded fine gravel.		1856							Baggie, sample saturated.
7			1855							
8			1854							
9	Dark grayish brown (10YR 4/2), poorly graded, fine to coarse sand with silt (SP-SM), medium to rapid dilatancy. Micaceous.		1853							
10			1852	B-11-3		3/5/8	100			Baggie, sampler dripping.
11			1851							
12			1850							
13			1849							Drilling becomes more difficult.
14			1848							
15			1847	B-11-4		9/24/35	100		9:16	Baggie.
16	**Granitic Rock (Tonalite):** Greenish black (5G 2/1) to light brown (5YR 5/6), coarse grained, completely weathered, extremely weak rock.		1846						9:16	

Bottom of boring at 16' 6" bgs
Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR **Tri-County Drilling**
EQUIPMENT **CME-75**
DRILL MTHD **Hollow Stem Auger**
DIAMETER **8"**
LOGGER **R. Gray** **REVIEWER** **A. Greene**
LATITUDE **32.83533**
LONGITUDE **116.76315**
ANGLE **Vertical**
BEARING **------**
PRINTED **May 12, 09**

REMARKS: MH-11

COORDINATE SYSTEM:

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BOREHOLE RECORD

BORING B-12 **SHEET** 1 **OF** 1
START DATE Oct 10, 08 **ELEVATION** 1927.0 FT. MSL
FINISH DATE Oct 10, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES PID READING	TIME	COMMENTS
	6" Asphalt	■							10:06	
1	**Fill:** Moist, very dark gray (10YR 3/1), fine sandy lean clay (CL).	▩	1926							
2		▩	1925							
3		▩	1924							
4		▩	1923							
	Residual Soil: Medium stiff, moist, dark yellowish brown (10YR 4/4), medium to coarse sandy clay [CL].	▨								
5		▨	1922							
	Granitic Rock (Tonalite): Yellowish orange (10YR 6/6) to dusky yellowish brown (10YR 2/2), coarse grained, completely weathered , extremely weak to weak rock. Becomes dusky yellowish brown (10YR 2/2) to moderate brown (5YR 3/4) completely weathered weak rock.	/ \		B-12-1	▤	20/26/37	100		10:37	Insitu temperature test, T=100 degrees F (37.8 degrees C). B-12-1A: (5.5' - 6') B-12-1B: (6' - 6.5')
6		/ \	1921							
7		/ \	1920							
8		/ \	1919							
9		/ \	1918							
10		/ \	1917							
	Becomes dusky yellowish brown (10YR 2/2) to dark yellowish brown (10YR 4/4).	/ \		B-12-2	◢	32/50/4"	67		10:52	Sampler wet. Baggie sample.
11		/ \	1916							
12		/ \	1915							
13		/ \	1914							
14		/ \	1913							
15		/ \	1912							
				B-12-3	◢	50/6"	33			Sampler wet.
	Bottom of boring at 15' 6" bgs Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.								11:00	

CONTRACTOR Tri-County Drilling
EQUIPMENT CME-75
DRILL MTHD Hollow Stem Auger
DIAMETER 8"
LOGGER R. Gray **REVIEWER** A. Greene

LATITUDE 32.83481
LONGITUDE 116.75835
ANGLE Vertical
BEARING ------
PRINTED May 12, 09

REMARKS: MH-12

COORDINATE SYSTEM:

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING B-13 **SHEET** 1 **OF** 1
START DATE Oct 9, 08 **ELEVATION** 2000.0 FT. MSL
FINISH DATE Oct 9, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING	TIME	COMMENTS
	4" Asphalt			B-13-1						
1	**Fill:** Moist, very dark grayish brown (10YR 3/2), silty to clayey fine sand (SM/SC) with trace sub-rounded coarse grained sand and angular fine gravel.		1999							
2			1998							
3			1997							
4			1996							
5	**Granitic Rock (Tonalite):** Dark brown (7.5YR 3/3), medium grained completely weathered, extremely weak rock.		1995	B-13-2		4/3/4	100		13:48	Baggie sample.
6			1994							
7			1993							
8			1992							
9			1991							
10	Pale yellowish brown (10YR 6/2) to light olive gray (5Y 6/1), coarse grained, completely weathered, extremely weak rock.		1990	B-13-3		13/22/31	100		14:03	Baggie sample.
11			1989							
12			1988							
13			1987							
14			1986							
15	Becomes moderate yellowish brown (10YR 5/4) to olive black (5YR 2/1), coarse grained, completely weathered, weak rock.		1985	B-13-4		50/5"	28		14:12	Baggie sample.

Bottom of boring at 15' 5" bgs
Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR Tri-County Drilling
EQUIPMENT CME-75
DRILL MTHD Hollow Stem Auger
DIAMETER 8"
LOGGER R. Gray **REVIEWER** A. Greene **PRINTED** May 12, 09

LATITUDE 32.83457
LONGITUDE 116.75283
ANGLE Vertical
BEARING ------

REMARKS: MH-13

COORDINATE SYSTEM:

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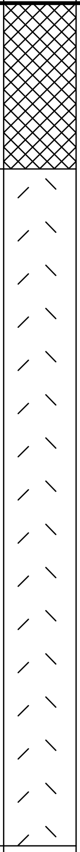
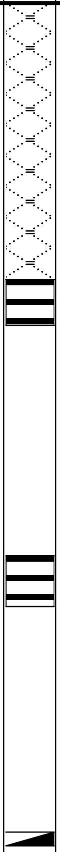
BOREHOLE RECORD

BORING B-14 **SHEET** 1 **OF** 1
START DATE Oct 10, 08 **ELEVATION** 2054.0 FT. MSL
FINISH DATE Oct 10, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16





DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING	TIME	COMMENTS
	Fill: Moist, olive brown (2.5Y 4/4), clayey fine sand (SC), contains some mica.			B-14-1					13:30	Hand auger to 5' to clear utilities.
1			2053							
2			2052							
3	**Granitic Rock (Tonalite):** Pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), coarse grained, completely weathered, extremely weak rock.		2051							
4			2050							
5	Becomes greenish black (5GY 2/1) to grayish orange (10YR 7/4), coarse grained, completely weathered, very weak rock.		2049	B-14-2		44/50/4"	67			
6			2048							
7			2047							
8			2046							
9			2045							
10	Becomes very weak to weak rock.		2044	B-14-3		23/50/5"	61		14:03	
11			2043							
12			2042							
13			2041							
14			2040							
15	Becomes medium gray (N5) to dark greenish gray (5GY 4/1), strong rock.		2039	B-14-4		50/3"	17		14:10	No sample collected.

Bottom of boring at 15' 3" bgs
Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR Tri-County Drilling **LATITUDE** 32.83408
EQUIPMENT CME-75 **LONGITUDE** 116.74706
DRILL MTHD Hollow Stem Auger **ANGLE** Vertical
DIAMETER 8" **BEARING** ------
LOGGER R. Gray **REVIEWER** A. Greene **PRINTED** May 12, 09

REMARKS: MH-14

COORDINATE SYSTEM:

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING **B-15** **SHEET 1 OF 1**
START DATE Oct 9, 08 **ELEVATION 2017.0 FT. MSL**
FINISH DATE Oct 9, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
	Residual Soil: Medium dense, moist, dark brown (7.5YR 3/4), fine sandy lean clay [CL].	▨							14:55	
1		▨	2016							
2		▨	2015							
3		▨	2014							
4		▨	2013							
5		▨	2012	B-15-1	◢	8/7/7	100			
	Granitic Rock (Tonalite): Moderately yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), coarse grained, completely weathered, extremely weak rock.	⟋ ⟍								
6		⟋ ⟍	2011							
7		⟋ ⟍	2010							
8		⟋ ⟍	2009							
9		⟋ ⟍	2008							
10		⟋ ⟍	2007	B-15-2	◢	32/50/2"	44		14:58	
	Becomes medium dark gray (N4) to moderate brown (5YR 3/4), coarse grained, completely weathered, very weak rock.	⟋ ⟍								
11		⟋ ⟍	2006							
12		⟋ ⟍	2005							
13		⟋ ⟍	2004							
14		⟋ ⟍	2003							
15		⟋ ⟍	2002	B-15-3	◢	29/50/4"	35			
16	Becomes medium dark gray (N4) to brownish black (5YR 2/1), coarse grained, completely to highly weathered weak rock.		2001							

Bottom of boring at 15' 10" bgs
Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR	**Tri-County Drilling**	**LATITUDE**	**32.83373**
EQUIPMENT	**CME-75**	**LONGITUDE**	**116.74276**
DRILL MTHD	**Hollow Stem Auger**	**ANGLE**	**Vertical**
DIAMETER	**8"**	**BEARING**	**------**
LOGGER	**R. Gray**	**REVIEWER**	**A. Greene**
PRINTED	**May 12, 09**		

REMARKS: MH-15

COORDINATE SYSTEM:

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GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-16 **SHEET** 1 **OF** 1
START DATE Oct 13, 08 **ELEVATION** 2029.0 FT. MSL
FINISH DATE Oct 13, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
	4" Asphalt								12:37	
1	**Residual Soil:** Dense, moist, dark brown (7.5YR 3/2), silty fine to medium sand [SM], with trace fine angular gravel.		2028							
2			2027							
3			2026							
4			2025							
5	**Granitic Rock (Tonalite):** Moderate brown (5YR 4/4) to dark yellowish orange (10YR 6/6), fine to medium grained, highly to moderately weathered, weak to medium strong rock.		2024	B-16-1		15/24/38	100		13:13	Insitu temperature test, T=86 degrees F (30.0 degrees C). B-16-1A: (5.5' - 6') B-16-1B: (6' - 6.5')
6			2023							
7			2022							
8			2021							
9			2020							
10	Becomes pale yellowish brown (10YR 6/2) to dark yellowish orange (10YR 6/6), medium grained, moderately weathered, medium strong to strong rock.		2019	B-16-2		50/6"	33			
11			2018							
12			2017							
13			2016							
14			2015							
15	Becomes medium dark gray (N4) to moderate yellowish brown (10YR 5/4), medium grained, medium strong to strong rock.		2014	B-16-3		50/5"	28		13:35	

Bottom of boring at 15' 5" bgs
Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR Tri-County Drilling
EQUIPMENT CME-75
DRILL MTHD Hollow Stem Auger
DIAMETER 8"
LOGGER R. Gray **REVIEWER** A. Greene
LATITUDE 32.83301
LONGITUDE 116.73747
ANGLE Vertical
BEARING ------
PRINTED May 12, 09

REMARKS: MH-16

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants
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San Diego, CA 92127
Tel: (858) 674-6559
Fax: (858) 674-6586

GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-17 **SHEET** 1 **OF** 1
START DATE Oct 10, 08 **ELEVATION** 2154.0 FT. MSL
FINISH DATE Oct 10, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
	Residual Soil: Very stiff, moist, strong brown (7.5YR 4/6), lean clay with fine sand [CL], medium to low plasticity.								14:48	
1			2153							
2			2152							
3			2151							
4			2150							
5	Becomes silty fine to medium sand.		2149	B-17-1		50/2"	67			Insitu temperature test, T=102 degrees F (38.9 degrees C). B-17-1A: (5' - 5.5') B-17-1B: (5.5' - 6')
	Granitic Rock (Tonalite): Dark yellowish orange (10YR 6/6) to moderate yellowish brown (10YR 5/4), fine to medium grained, completely weathered, very weak to extremely weak rock.									
6			2148							
7			2147							
8			2146							
9			2145							
10	Becomes greenish black (5G 2/1) to light brown (5YR 6/4).		2144	B-17-2		17/39/50/5"	100			Baggie sample.
11			2143							
12			2142							
13			2141							
14			2140							
15	Becomes dark yellowish orange (10YR 6/6) to light gray (N7), medium grained, completely to highly weathered, extremely weak to very weak rock.		2139	B-17-3		22/50/5"	67			Baggie sample.
									15:36	

Bottom of boring at 15' 11" bgs
Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR Tri-County Drilling **LATITUDE** 32.83289
EQUIPMENT CME-75 **LONGITUDE** 116.73207
DRILL MTHD Hollow Stem Auger **ANGLE** Vertical
DIAMETER 8" **BEARING** ------
LOGGER R. Gray **REVIEWER** A. Greene **PRINTED** May 12, 09

REMARKS: MH-17

COORDINATE SYSTEM:

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GS FORM: BORE 1/99

BOREHOLE RECORD

BORING B-18 **SHEET** 1 **OF** 1
START DATE Oct 13, 08 **ELEVATION** 2188.0 FT. MSL
FINISH DATE Oct 13, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING	TIME	COMMENTS
	6" Asphalt and Class II base.	■							14:10	Hand augered to 4' prior to drilling.
1	**Fill:** Moist, brown (10YR 4/3) silty fine to medium sand (SM) with trace coarse sand.	▩	2187							
2		▩	2186							
3		▩	2185							
4	**Residual Soil:** Very stiff, moist, dark reddish brown (5YR 3/2), fine sandy lean clay [CL], contains trace mica.	▨	2184							
5		▨	2183							
	Granitic Rock (Tonalite): Dark yellowish orange (10YR 6/6) to moderate brown (5YR 4/4), medium grained, completely weathered, extremely weak rock.	⸝ ⸜		B-18-1	▤	4/12/21	100		15:31	Insitu temperature test, T=86 degrees F (30.0 degrees C). B-18-1A: (5.5' - 6') B-18-1B: (6' - 6.5')
6		⸝ ⸜	2182							
7		⸝ ⸜	2181							
8		⸝ ⸜	2180							
9		⸝ ⸜	2179							
10	Becomes dark yellowish brown (10YR 4/2) to pale yellowish brown (10YR 6/2), medium grained, completely to highly weathered, weak rock.	⸝ ⸜	2178	B-18-2	▤	42/50/1"	32			
11		⸝ ⸜	2177							
12		⸝ ⸜	2176							
13		⸝ ⸜	2175							
14		⸝ ⸜	2174							
15		⸝ ⸜	2173	B-18-3	◢	3/5/50/5"	94			
16		⸝ ⸜	2172							
	Bottom of boring at 16' 5" bgs Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.								15:50	

CONTRACTOR Tri-County Drilling **LATITUDE** 32.83358
EQUIPMENT CME-75 **LONGITUDE** 116.72693
DRILL MTHD Hollow Stem Auger **ANGLE** Vertical
DIAMETER 8" **BEARING** ------
LOGGER R. Gray **REVIEWER** A. Greene **PRINTED** May 12, 09

REMARKS: MH-18

COORDINATE SYSTEM:

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING **B-19** **SHEET 1 OF 1**
START DATE **Oct 14, 08** **ELEVATION 2220.0 FT. MSL**
FINISH DATE **Oct 14, 08**
PROJECT **Sunrise Powerlink Project 230kV Underground**
LOCATION **Alpine, CA**
PROJECT NUMBER **SC0368-16**

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
	Fill: Moist, grayish brown (10YR 5/2), silty to clayey fine to coarse sand (SM/SC) with trace fine angular gravel.			B-19-1					9:05	
1			2219							
2			2218							
3			2217							
4			2216							
5	**Granitic Rock (Tonalite):** Dark yellowish brown (10YR 4/2) to dark yellowish orange (10YR 6/6), coarse grained, completely weathered, very weak to weak rock. Becomes dark yellowish orange (10YR 6/6) to greenish black (5G 2/1), coarse grained, highly to moderately weathered, weak rock.		2215	B-19-2		4/8/13	100			
6			2214							
7			2213							
8			2212							
9			2211	B-19-3		50/4"	22			No sample collected.
10	Becomes greenish black (5G 2/1) to moderately brown (5YR 3/4), completely weathered, very weak rock.		2210						9:30	Refusal at 10' bgs.

Bottom of boring at 10' bgs
Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR **Tri-County Drilling** **LATITUDE** **32.83324**
EQUIPMENT **CME-75** **LONGITUDE** **116.72132**
DRILL MTHD **Hollow Stem Auger** **ANGLE** **Vertical**
DIAMETER **8"** **BEARING** **------**
LOGGER **R. Gray** **REVIEWER** **A. Greene** **PRINTED** **May 12, 09**

REMARKS: MH-19

COORDINATE SYSTEM:
SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING B-20 **SHEET** 1 **OF** 1
START DATE May 14, 09 **ELEVATION** 2311.0 FT. MSL
FINISH DATE May 14, 09
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES PID READING	TIME	COMMENTS
	Residual Soil: Dense to medium dense, moist, strong brown (7.5YR 4/6), fine grained silty sand (SM).								10:25	
1			2310							
2	**Granitic Rock (Tonalite):** Light olive brown to grayish brown (2.5Y 5/4 - 2.5 Y 5/2), fine to coarse grained, completely weathered, extremely weak rock.		2309							
3			2308							
4			2307							
5			2306	B-20-1 (5.0'-5.5')	▭	50/5"	33		10:33 11:27	
6			2305							
7			2304	B-20-2 (7.0')	☒					
8			2303							
9	**Granitic Rock (Tonalite):** Brownish yellow to very dark gray (10YR 6/6 - 10YR 3/1), coarse grained, highly weathered, extremely weak to very weak rock.		2302							
10			2301	B-20-3 (10.0'-10.5')	▭	50/5.5"	33		11:31 11:41	
11			2300							
12			2299							
13			2298							
14			2297							
15			2296	B-20-4 (15.0'-16.5')	◣	12/20/49	83		11:46	
16			2295						11:54	
17			2294							
18	@ 18' Becomes less weathered, weak rock.		2293							Slow drilling at 18' bgs.
19			2292							
20	Bottom of boring at 20' 2" bgs Boring backfilled with native soil cuttings		2291	B-20-5 (20.0'-20.17')	◣	50/2"	11		12:01	

CONTRACTOR Tri-County Drilling
EQUIPMENT Dietrich 120
DRILL MTHD Hollow Stem Auger
DIAMETER 8"
LOGGER R. Gray **REVIEWER** A. Greene

LATITUDE 32.83044
LONGITUDE 116.71885
ANGLE Vertical
BEARING ------
PRINTED May 21, 09

REMARKS: MH-20

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING I8-1 **SHEET** 1 **OF** 2
START DATE Dec 1, 08 **ELEVATION** 1225.0 FT. MSL
FINISH DATE Dec 1, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING	TIME	COMMENTS
	Fill: Moist, brown (10YR 4/3), poorly graded coarse to fine sand with silt (SP-SM) and trace ~1/4" sub-rounded gravel.								8:40	Hollow-stem auger 0-20'.
1	Becomes very dense, moist, light olive brown (2.5 Y 5/3), silty coarse to medium sand with trace gravel.		1224							
2	**Granitic Rock (Tonalite):** Dark greenish gray (5GY 4/1) to olive gray (5Y 3/2), coarse grained, highly weathered, very weak to weak rock.		1223							
3			1222							
4			1221							
5			1220	I8-1-1		50/5"	100		8:45	Insitu temperature test, T=89 degrees F.
6			1219							
7			1218							
8			1217							
9			1216							
10			1215	I8-1-2		50/4"	50		9:45	Sample retained.
11			1214							
12			1213							
13			1212							
14			1211							
15			1210	I8-1-3		50/5"	0		9:54	
16			1209							
17			1208							
18			1207							
19			1206							
20			1205	I8-1-4		50+	0 50		10:09	Switch to HQ coring. Sample retained.
21			1204							
22	Becomes highly to moderately weathered, weak to medium strong rock, moderately to highly fractured.		1203						10:55	RQD: 15 Run time: 10 min
23			1202							
24			1201				80		11:05	
25			1200						11:17	

CONTRACTOR Tri-County Drilling
EQUIPMENT CME-75
DRILL MTHD Hollow Stem Auger / Coring
DIAMETER 8" HSA / 4" HQ core
LOGGER D. Baumwirt **REVIEWER** A. Greene

LATITUDE 32.84990
LONGITUDE 116.80885
ANGLE Vertical
BEARING ------
PRINTED May 12, 09

REMARKS: Southern shoulder of I-8 eastbound.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING I8-1 **SHEET** 2 **OF** 2
START DATE Dec 1, 08 **ELEVATION** 1225.0 FT. MSL
FINISH DATE Dec 1, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
26	Slight increase in strength, becomes highly to moderately fractured with joint sets at 50 degrees, narrow, spotty, infilled with: iron, sand and pyrite. Wavy surface.		1199							RQD: 20 Run time: 11 min
27			1198							
28	Joints 70 degrees, narrow, spotty, infilled with: iron, sand, and pyrite. Wavy surface.		1197							
29			1196				100		11:28 11:37	
30			1195							
31	Joints 45 degrees, narrow, spotty, infilled with: iron, sand, and pyrite. Wavy surface.		1194							RQD: 34 Run time: 11 min
32			1193							
33	Joints 75 degrees, moderately wide, spotty, infilled with: iron and pyrite. Wavy surface.		1192							
34			1191						11:48	

Bottom of boring at 34' bgs

Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.

CONTRACTOR Tri-County Drilling **LATITUDE** 32.84990
EQUIPMENT CME-75 **LONGITUDE** 116.80885
DRILL MTHD Hollow Stem Auger / Coring **ANGLE** Vertical
DIAMETER 8" HSA / 4" HQ core **BEARING** ------
LOGGER D. Baumwirt **REVIEWER** A. Greene **PRINTED** May 12, 09

REMARKS: Southern shoulder of I-8 eastbound.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

Geosyntec consultants
10875 Rancho Bernardo Rd, Suite 200
San Diego, CA 92127
Tel: (858) 674-6559
Fax: (858) 674-6586

GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING I8-2 **SHEET** 1 **OF** 2
START DATE Dec 2, 08 **ELEVATION** 1228.0 FT. MSL
FINISH DATE Dec 2, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOW COUNTS	SAMPLES % RECOVERY	SAMPLES PID READING	TIME	COMMENTS
	Fill: Moist, brown (10YR 4/3), poorly graded medium to fine sand (SP) with 1/4" to 1" sub-angular gravel and trace sub-angular cobbles.	▩							9:35	Hollow-stem auger to total depth.
1			1227							
2			1226							
3			1225							
4			1224							
5	Moist, dark grayish brown (10YR 4/2), granite derived, medium to fine sand with silt (SP/SM) and trace 1/4" sub-angular gravel.		1223	I8-2-1	▤	10/14/20	100		9:37	Insitu temperature test, T=86 degrees F. Retained 2 tubes: I8-2-1A I8-2-1B
6			1222							
7			1221						10:22	
8			1220							
9			1219							
10			1218	I8-2-2	▤	9/15/21	100			Retained 2 tubes: I8-2-2A I8-2-2B
11			1217						10:35	
12			1216						10:39	
13			1215							
14			1214							
15			1213	I8-2-3	▤	13/13/18	100			Retained 2 tubes: I8-2-3A I8-2-3B
16			1212							
17			1211						10:48	
18			1210							
19			1209							
20	Becomes interbedded with dense, moist, dark yellowish brown (10YR 4/4), clayey fine sand with trace gravel and black (10YR 2/1), organic-rich, poorly graded, medium to fine grained sand with trace organic debris.		1208	I8-2-4	▤	12/20/15	100			
21			1207							
22			1206						10:57	
23			1205							
24			1204							
25			1203							

CONTRACTOR Tri-County Drilling **LATITUDE** 32.85015
EQUIPMENT CME-75 **LONGITUDE** 116.80857
DRILL MTHD Hollow Stem Auger **ANGLE** Vertical
DIAMETER 8" **BEARING** ------
LOGGER D. Baumwirt **REVIEWER** A. Greene **PRINTED** May 13, 09

REMARKS: Eastbound I-8 median.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING I8-2 **SHEET** 2 **OF** 2
START DATE Dec 2, 08 **ELEVATION** 1228.0 FT. MSL
FINISH DATE Dec 2, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
	Contains chunks of weathered granite in a matrix of black (10YR 2/1), poorly graded medium to fine grained sand.			I8-2-5		10/17/18	100			
26			1202							
27	**Residual Soil:** Very dense, moist, dark greenish gray (5GY 4/1), silty fine sand (SM) with fine gravels and organic (wood) debris [SM].		1201						11:13	
28			1200							
29			1199							
30			1198	I8-2-6		23/38/50+			11:30	
31	**Granitic Rock (Tonalite):** Dark yellowish brown (10YR 4/2), medium grained, highly weathered, very weak rock.		1197						11:40	
32			1196							
33			1195							
34			1194							
35			1193	I8-2-7		50+			11:54	
	Bottom of boring at 35' 6" bgs Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.								11:58	

CONTRACTOR Tri-County Drilling **LATITUDE** 32.85015
EQUIPMENT CME-75 **LONGITUDE** 116.80857
DRILL MTHD Hollow Stem Auger **ANGLE** Vertical
DIAMETER 8" **BEARING** ------
LOGGER D. Baumwirt **REVIEWER** A. Greene **PRINTED** May 13, 09

REMARKS: Eastbound I-8 median.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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GS FORM:
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BOREHOLE RECORD

BORING I8-3 **SHEET** 1 **OF** 1
START DATE Dec 2, 08 **ELEVATION** 1231.0 FT. MSL
FINISH DATE Dec 2, 08
PROJECT Sunrise Powerlink Project 230kV Underground
LOCATION Alpine, CA
PROJECT NUMBER SC0368-16

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES					TIME	COMMENTS
				NUMBER	TYPE	BLOW COUNTS	% RECOVERY	PID READING		
1	**Fill:** Moist, dark yellowish brown (10YR 3/4), poorly graded medium to very fine sand with clay (SP-SC) and <1/4" sub-round gravel.	▨	1230						13:10	
2		▨	1229							
3		▨	1228							
4		▨	1227							
5	Contains interbedded with medium dense, moist, black (10YR 2/1), highly organic silty medium to fine sand and poorly graded medium to very fine sand with clay and trace gravel.	▨	1226	I8-3-1	▤	8/11/15	100		13:13	Insitu temperature test, T=74 degrees F. Equilibrium from 13:13 - 13:38, measure from 18:38 - 13:43. Retained 2 tubes: I8-3-1A I8-3-1B
6		▨	1225							
7		▨	1224							
8		▨	1223							
9		▨	1222							
10	Moist, dark yellowish brown (10YR 3/4), granite-derived, poorly graded, medium to fine sand (SP-SC) with trace clay and <1/4" sub-rounded gravel.	▨	1221	I8-3-2	▤	15/20/21	100		13:59	Retained 2 tubes: I8-3-2A I8-3-2B
11		▨	1220							
12		▨	1219							
13		▨	1218							
14	Moist, very dark grayish brown (10YR 3/2), granite-derived, poorly graded medium to fine sand (SP) with some 1" sub-angular gravel and abundant mica.	▨	1217							
15		▨	1216	I8-3-3	▤	17/40/46	100		14:13	Retained 2 tubes: I8-3-3A I8-3-3B
16		▨	1215							
17	@17' Refusal with auger, stepped off 5' west.	▨	1214							
18		▨	1213							
19		▨	1212							
20	3" granite cobble encountered.	▨	1211	I8-3-4	▤	5/11/19	100		14:53	Retained 2 tubes: I8-3-4A I8-3-4B
21		▨	1210							
22		▨	1209							
23		▨	1208							
24		▨	1207							
25	Becomes moist, dark yellowish brown (10YR 4/4), granite derived, medium to fine grained sand with silt and inclusions of highly weathered granite.	▨	1206	I8-3-5	▤	17/32/35	100		15:00	
26		▨	1205							
	Bottom of boring at 26" 5" bgs Boring backfilled with native soil cuttings with surface completion of hydrated bentonite, asphalt, or concrete.									

CONTRACTOR Tri-County Drilling
EQUIPMENT CME-75
DRILL MTHD Hollow Stem Auger
DIAMETER 8"
LOGGER D. Baumwirt **REVIEWER** A. Greene **PRINTED** May 13, 09

LATITUDE 32.85046
LONGITUDE 116.80831
ANGLE Vertical
BEARING ------

REMARKS: Northern shoulder of westbound I-8.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

APPENDIX D

Geotechnical Laboratory Testing

Geosyntec, Consultants
Sunrise Powerlink, Alpine Route - Job No. SC0368-14-03

March 25, 2009
GF12709

Soil Density and Moisture Content

Lab No.	6898	6900	6901	6903		
Boring No.	B-1	B-1	CP-1	CP-1		
Depth, ft.	5.5' - 5.8'	15.0' - 15.3'	5.0' - 5.5'	14.0' - 14.75'		
Moisture Content, %	10.2	6.5	7.7	5.5		
Dry Density, pcf	N/A	N/A	N/A	N/A		

Lab No.						
Boring No.						
Depth, ft.						
Moisture Content, %						
Dry Density, pcf						

eviewed by:
John Inlow, Lab Manager

Soil Density and Moisture Content

Lab No.	6588	6589	6590	6593	6594	6595
Boring No.	B-2-3	B-3-1	B-4-2	B-8-1A	B-8-3A	B-10-1A
Depth, ft.	11.0' - 11.5'	6.0' - 6.5'	11.0' - 11.5'	6.0' - 6.5'	15.5' - 16.0'	5.0' - 5.5'
Moisture Content, %	9.6	3.3	8.2	9.4	15.4	11.8
Dry Density, pcf	93.2	123.2	103.0	108.0	109.5	112.4

Lab No.	6619	6622	6623	6624	6625	
Boring No.	B-12-1A	B-14-2	B-16-1B	B-17-1A	B-18-1B	
Depth, ft.	5.5' - 6.0'	5.0' - 5.5'	6.0' - 6.5'	5.0' - 5.5'	6.0' - 6.5'	
Moisture Content, %	14.4	3.7	7.8	8.9	13.7	
Dry Density, pcf	106.5	129.1	119.1	97.0	114.7	

eviewed by:
John Inlow, Lab Manager

Geosyntec, Consultants
Sunrise Powerlink, I-8 Alt - Job No. SC0368-14-03

December 16, 2008
GF12709

Soil Density and Moisture Content

Lab No.	6709	6710	6711	6712	6713	6714
Boring No.	I8-2-2A	I8-2-4	I8-2-6	I8-3-1A	I8-3-3A	I8-3-5
Depth, ft.	10.5' - 11.0'	21.0' - 21.5'	31.0' - 31.5'	5.5' - 6.0'	15.5' - 16.0'	26.0' - 26.5'
Moisture Content, %	6.9	21.8	8.7	10.1	3.5	12.0
Dry Density, pcf	116.0	104.7	115.2	107.6	128.0	119.0

Lab No.						
Boring No.						
Depth, ft.						
Moisture Content, %						
Dry Density, pcf						

eviewed by:
John Inlow, Lab Manager

In-Situ Moisture Content of Rock / Soil

ASTM D2216

Date Sampled:	10/8/2008	By:	Client
Date Submitted:	10/20/2008	By:	Client
Sample Location:	Various (See below)		

Test Results

Lab No.	Location	In-Situ Moisture Content, %
6591	B-5-2 @ 5.0' - 6.0'	**1.7**
6596	B-11-2 @ 5.0' - 6.0'	**20.9**
6620	B-13-2 @ 5.0' - 6.0'	**11.5**

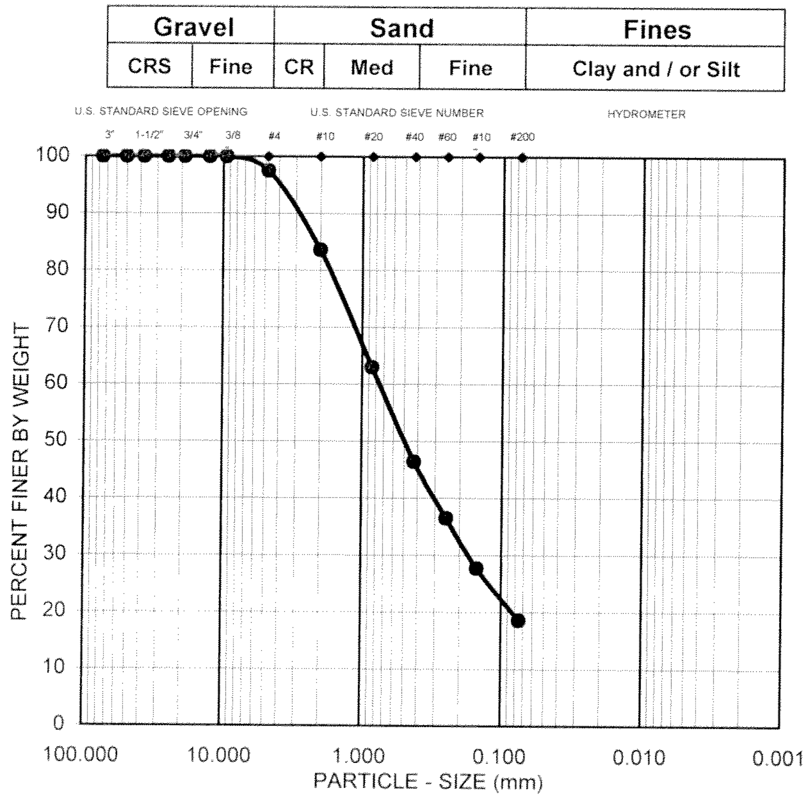
Reviewed by:

John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No. 6902
Date Sampled: 3/9/2009 By: Client
Date Submitted: 3/11/2009 By: Client
Sample Location: CP-1 @ 10.5' - 11.0'
Sample Description: Silty sand



Sieve Size	% Passing	Specification		X = Out of Spec
		Low	High	
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	100			
3/8"	100			
#4	97			
#10	84			
#20	63			
#40	46			
#60	36			
#100	28			
#200	19			

Plasticity Index			

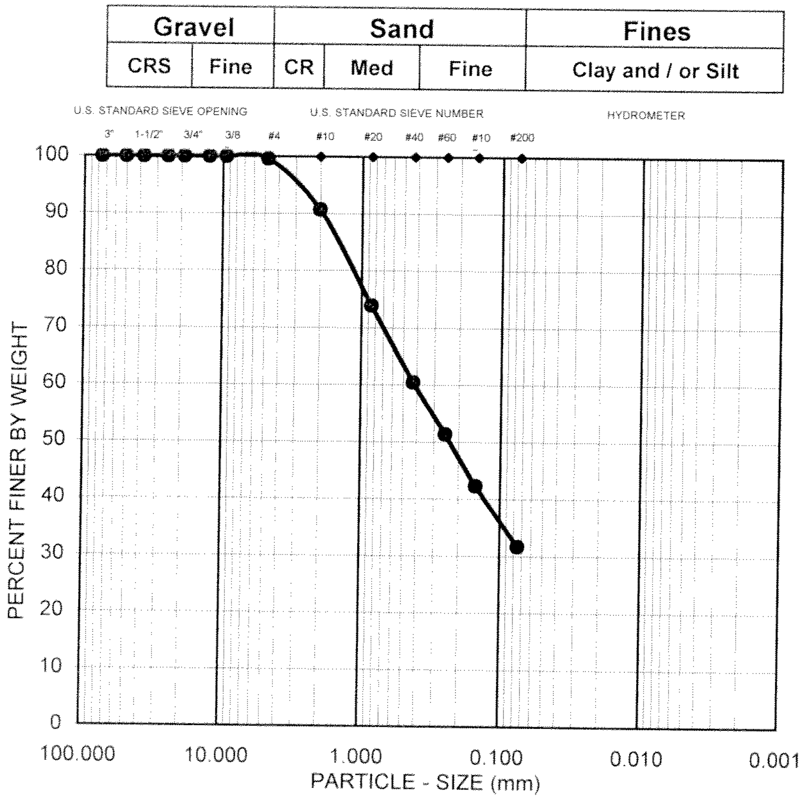
Reviewed by:

John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No.	6899		
Date Sampled:	3/9/2009	By:	Client
Date Submitted:	3/11/2009	By:	Client
Sample Location:	B-1 @ 10.5' - 10.9'		
Sample Description:	Clayey sand		



Sieve Size	% Passing	Specification		X = Out of Spec
		Low	High	
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	100			
3/8"	100			
#4	100			
#10	91			
#20	74			
#40	60			
#60	51			
#100	42			
#200	32			

Plasticity Index			

Reviewed by:

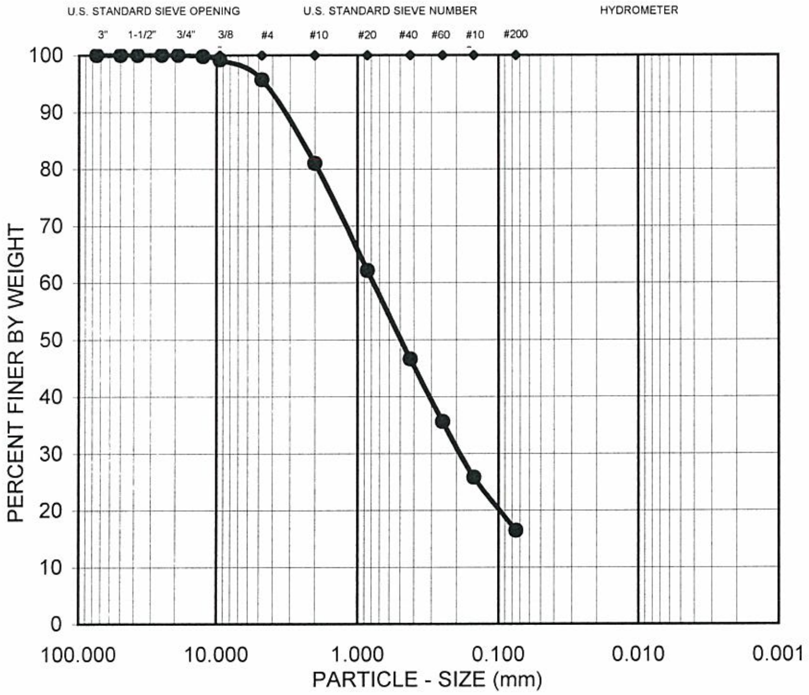
John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No. 6587
Date Sampled: 10/8/2008 By: Client
Date Submitted: 10/20/2008 By: Client
Sample Location: B-2-1 @ 0' - 5.0'
Sample Description: Silty sand

Gravel		Sand			Fines
CRS	Fine	CR	Med	Fine	Clay and / or Silt



Sieve Size	% Passing	Specification Low	Specification High	X = Out of Spec
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	100			
3/8"	99			
#4	96			
#10	81			
#20	62			
#40	47			
#60	36			
#100	26			
#200	16			

Plasticity Index			

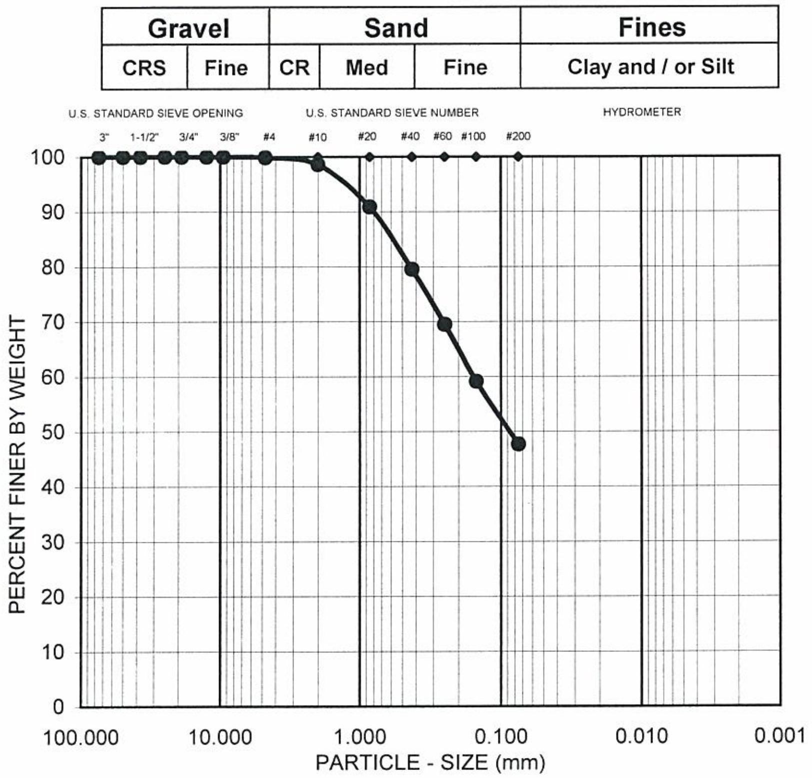
Reviewed by:

John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No.	6588		
Date Sampled:	10/8/2008	By:	Client
Date Submitted:	10/20/2008	By:	Client
Sample Location:	B-2-3 @ 11.0' - 11.5'		
Sample Description:	Clayey sand		



	Specification			
Sieve Size	% Passing	Low	High	X = Out of Spec
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	100			
3/8"	100			
#4	100			
#10	99			
#20	91			
#40	80			
#60	69			
#100	59			
#200	48			

Plasticity Index	N/A		

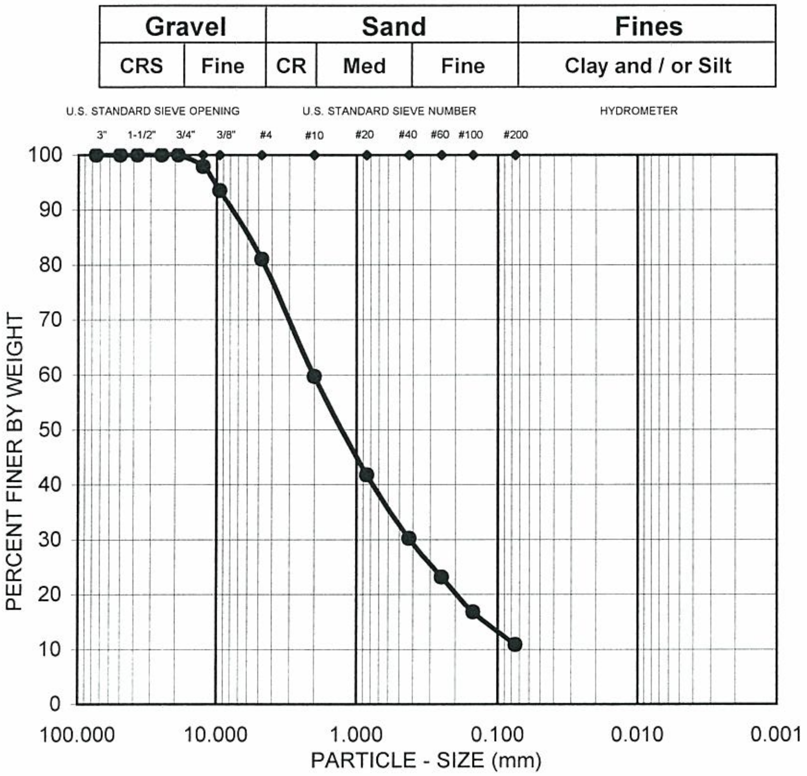
Reviewed by:

John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No.	6591		
Date Sampled:	10/8/2008	By:	Client
Date Submitted:	10/20/2008	By:	Client
Sample Location:	B-5-2 @ 5.0' - 6.0'		
Sample Description:	Silty sand		



Sieve Size	% Passing	Specification		X = Out of Spec
		Low	High	
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	98			
3/8"	94			
#4	81			
#10	60			
#20	42			
#40	30			
#60	23			
#100	17			
#200	10.8			

Plasticity Index	N/A		

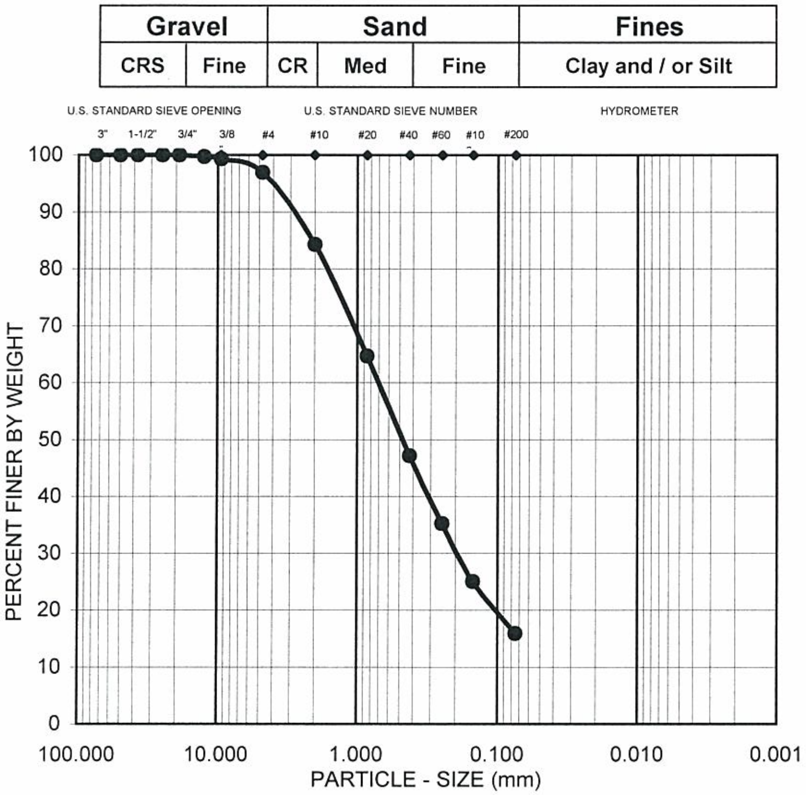
Reviewed by:

John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No.	6592		
Date Sampled:	10/8/2008	By:	Client
Date Submitted:	10/20/2008	By:	Client
Sample Location:	B-7-1 @ 0' - 5.0'		
Sample Description:	Silty sand		



Sieve Size	% Passing	Specification		X = Out of Spec
		Low	High	
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	100			
3/8"	99			
#4	97			
#10	84			
#20	65			
#40	47			
#60	35			
#100	25			
#200	16			

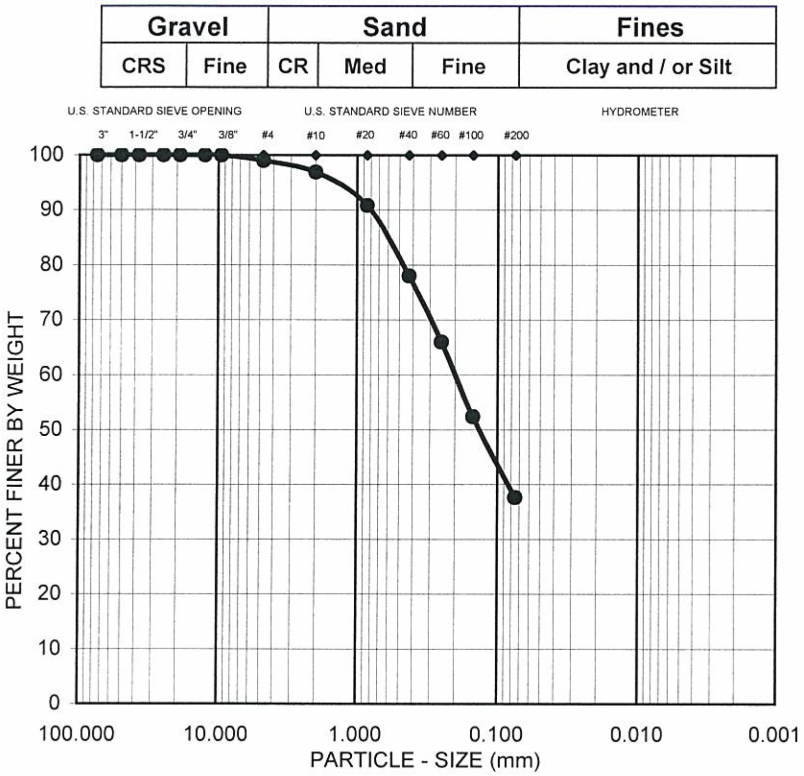
Plasticity Index			

Reviewed by: John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No. 6594
Date Sampled: 10/8/2008 By: Client
Date Submitted: 10/20/2008 By: Client
Sample Location: B-8-3A @ 15.5' - 16.0'
Sample Description: Silty, clayey sand



Sieve Size	% Passing	Specification		X = Out of Spec
		Low	High	
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	100			
3/8"	100			
#4	99			
#10	97			
#20	91			
#40	78			
#60	66			
#100	52			
#200	38			

Plasticity Index	N/A		

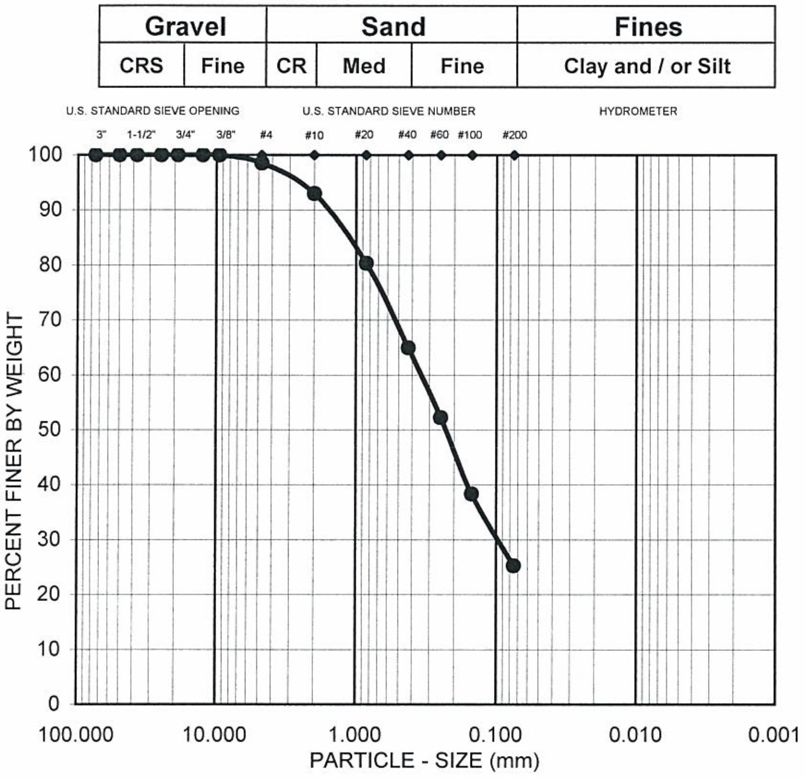
Reviewed by:

John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No. 6596
Date Sampled: 10/8/2008 By: Client
Date Submitted: 10/20/2008 By: Client
Sample Location: B-11-2 @ 5.0' - 6.0'
Sample Description: Silty sand



Sieve Size	% Passing	Specification Low	Specification High	X = Out of Spec
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	100			
3/8"	100			
#4	99			
#10	93			
#20	80			
#40	65			
#60	52			
#100	38			
#200	25			

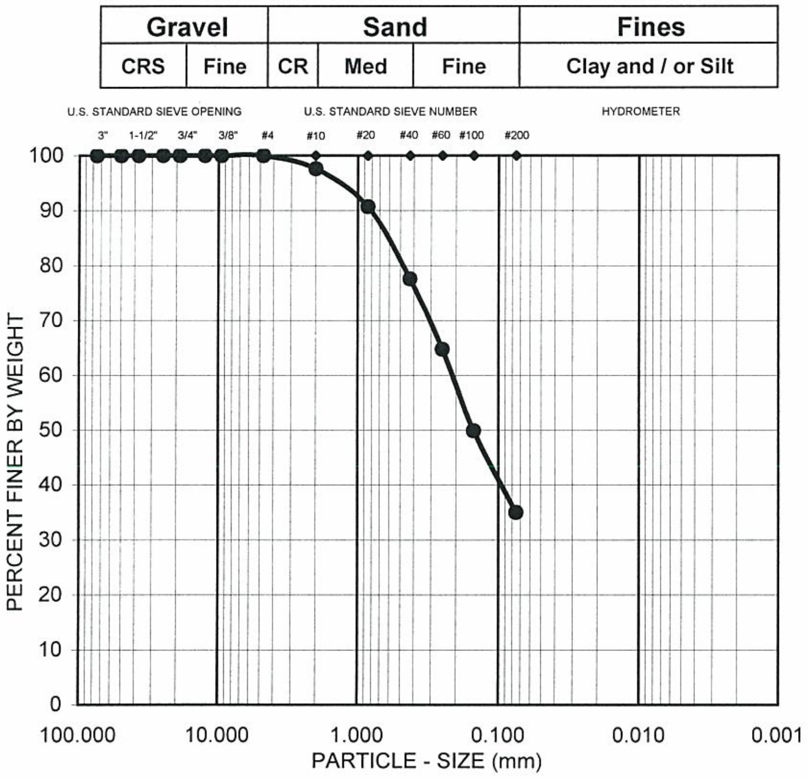
Plasticity Index	N/A		

Reviewed by:
John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No. 6620
Date Sampled: 10/8/2008 By: Client
Date Submitted: 10/20/2008 By: Client
Sample Location: B-13-2 @ 5.0' - 6.0'
Sample Description: Silty, clayey sand



	Specification			
Sieve Size	% Passing	Low	High	X = Out of Spec
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	100			
3/8"	100			
#4	100			
#10	98			
#20	91			
#40	78			
#60	65			
#100	50			
#200	35			

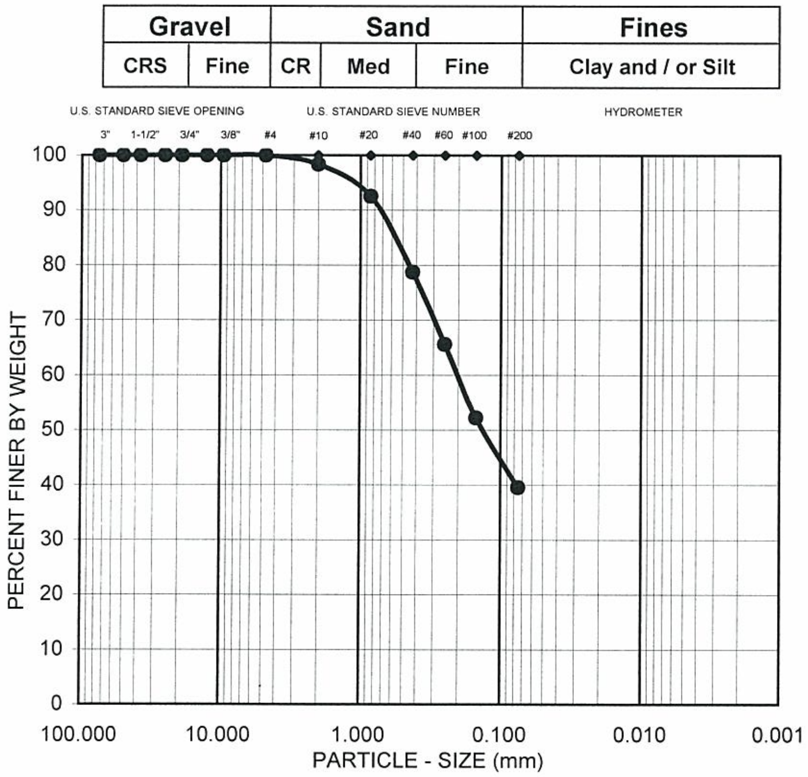
Plasticity Index	N/A		

Reviewed by:
John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No. 6621
Date Sampled: 10/8/2008 By: Client
Date Submitted: 10/20/2008 By: Client
Sample Location: B-14-1 @ 0' - 5.0'
Sample Description: Clayey sand



Sieve Size	Specification % Passing	Low	High	X = Out of Spec
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	100			
3/8"	100			
#4	100			
#10	98			
#20	93			
#40	79			
#60	66			
#100	52			
#200	40			

Plasticity Index	N/A		

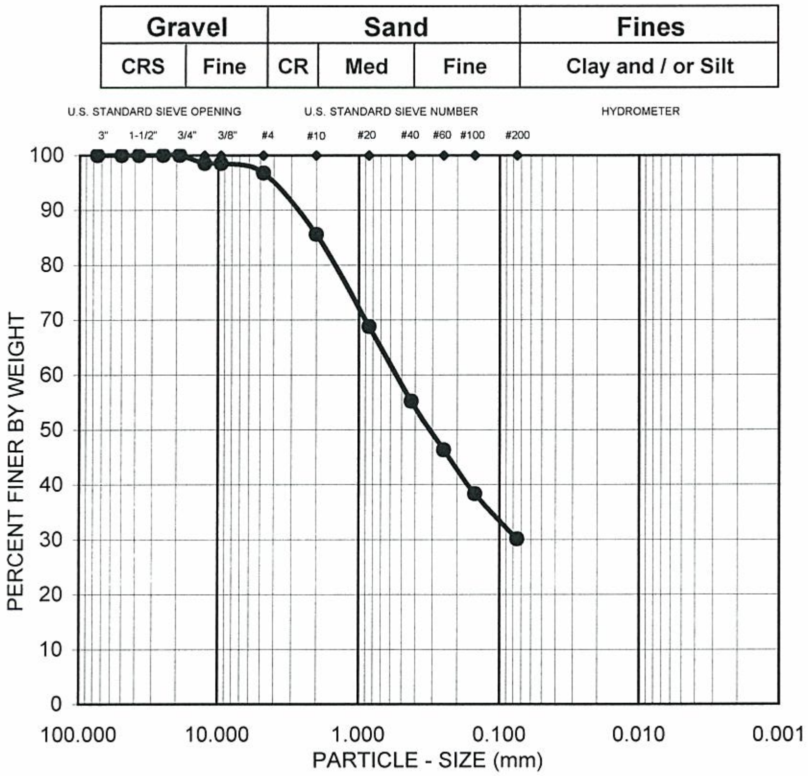
Reviewed by:

John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No. 6624
Date Sampled: 10/8/2008 By: Client
Date Submitted: 10/20/2008 By: Client
Sample Location: B-17-1A @ 5.0' - 5.5'
Sample Description: Silty sand



		Specification		
Sieve Size	% Passing	Low	High	X = Out of Spec
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	99			
3/8"	99			
#4	97			
#10	86			
#20	69			
#40	55			
#60	46			
#100	38			
#200	30			

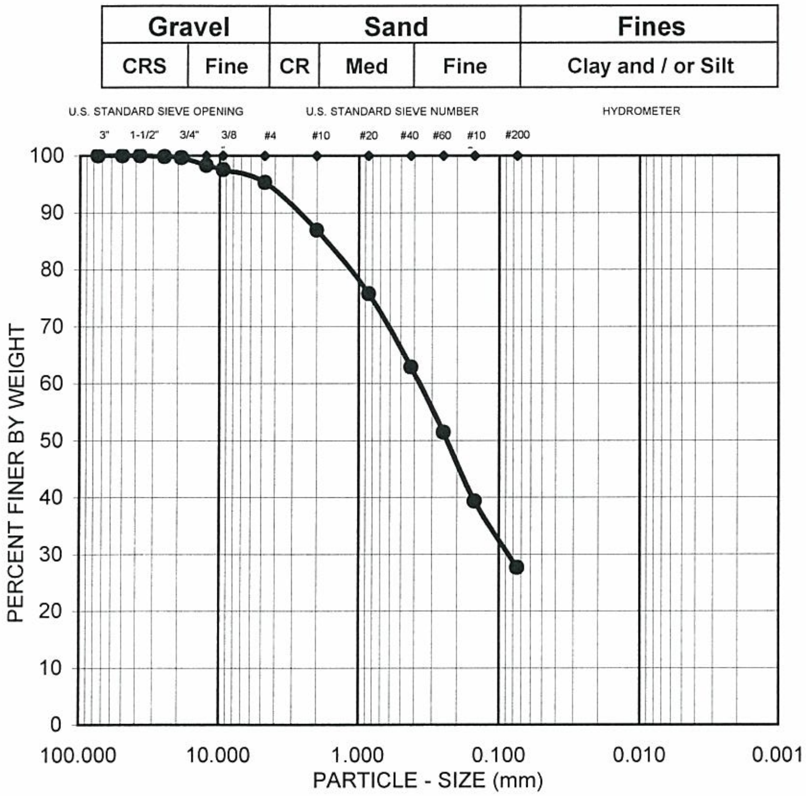
Plasticity Index	N/A		

Reviewed by:
John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No. 6626
Date Sampled: 10/8/2008 By: Client
Date Submitted: 10/20/2008 By: Client
Sample Location: B-19-1 @ 0' - 5.0'
Sample Description: Silty, clayey sand



Sieve Size	% Passing	Specification		X = Out of Spec
		Low	High	
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	98			
3/8"	98			
#4	95			
#10	87			
#20	76			
#40	63			
#60	51			
#100	39			
#200	28			

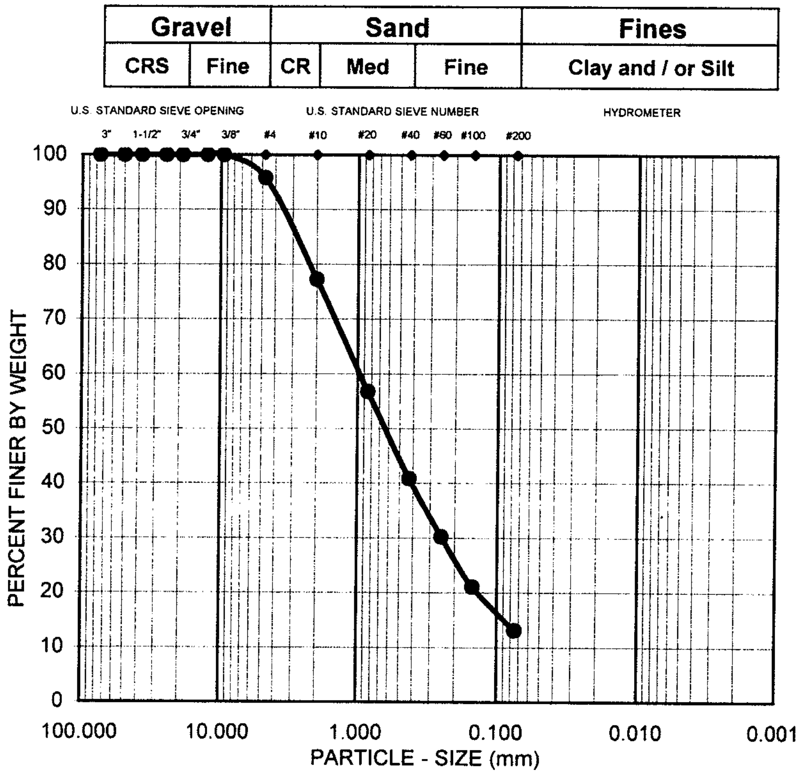
Plasticity Index			

Reviewed by:
John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No.	6709		
Date Sampled:	12/1/2008	By:	Client
Date Submitted:	12/10/2008	By:	Client
Sample Location:	I8-2-2A @ 10.5' - 11.0'		
Sample Description:	Silty sand		



Sieve Size	% Passing	Specification Low	Specification High	X = Out of Spec
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	100			
3/8"	100			
#4	96			
#10	77			
#20	57			
#40	41			
#60	30			
#100	21			
#200	13			

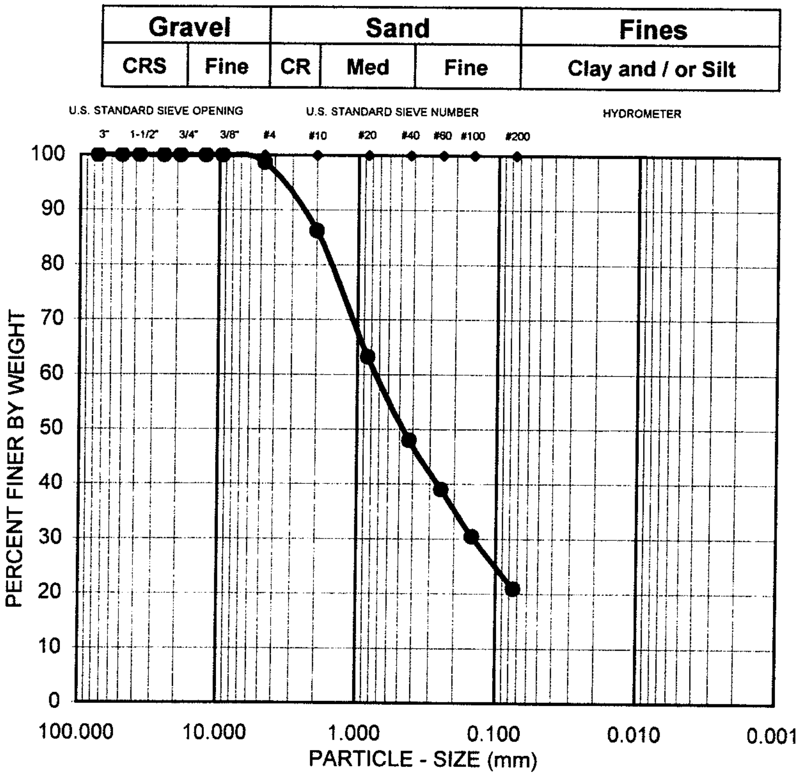
Plasticity Index	N/A		

Reviewed by:
John Inlow, Lab Manager

Sieve Analysis

(ASTM C422)

G Force Lab No. 6714
Date Sampled: 12/1/2008 By: Client
Date Submitted: 12/10/2008 By: Client
Sample Location: I8-3-5 @ 26.0' - 26.5'
Sample Description: Silty sand



Sieve Size	% Passing	Specification Low	Specification High	X = Out of Spec
3"	100			
2"	100			
1-1/2"	100			
1"	100			
3/4"	100			
1/2"	100			
3/8"	100			
#4	99			
#10	86			
#20	63			
#40	48			
#60	39			
#100	30			
#200	21			

Plasticity Index	N/A		

Reviewed by:
John Inlow, Lab Manager

URS Corporation **November 7, 2008**
Sunrise Powerlink, Alpine Route - Job No. SC0368-14-03 **GF12709**

LABORATORY COMPACTION CURVE

G Force Lab No.:	**6587**		
Sample Location:	**B-2-1**	Depth, ft.:	**0' - 5.0'**
Soil Description:	**Brown silty medium to fine sand**		
Source of Soil:	**Not submitted**		

Test Designation: **ASTM D1557** Method **A**

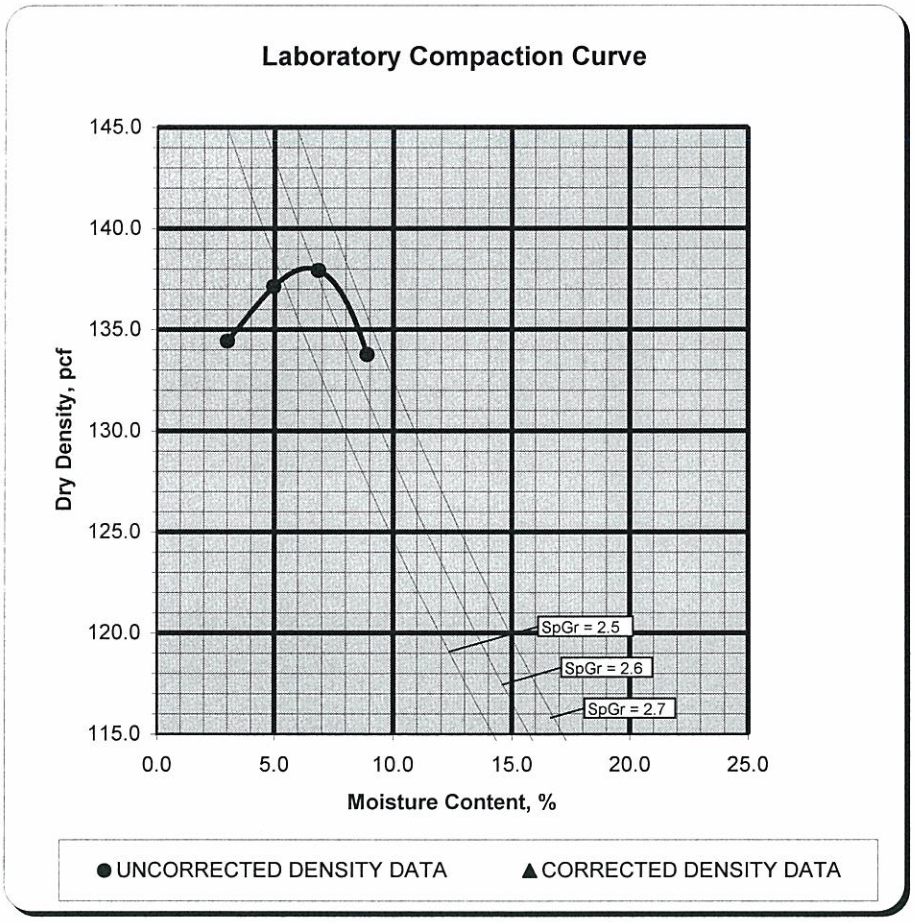
% +3/4" **0** % +3/8" **1** % +#4 **4**

Oversize Correction Applied? **No**

Method of Sample Preparation: **Wet**

Type of Rammer Used: **Manual**

M/D Curve No. 1



Test Results

Maximum Density, pcf	**138.0**
Optimum Moisture, %	**6.5**

Oversize Corrected Results

Maximum Density, pcf	
Optimum Moisture, %	

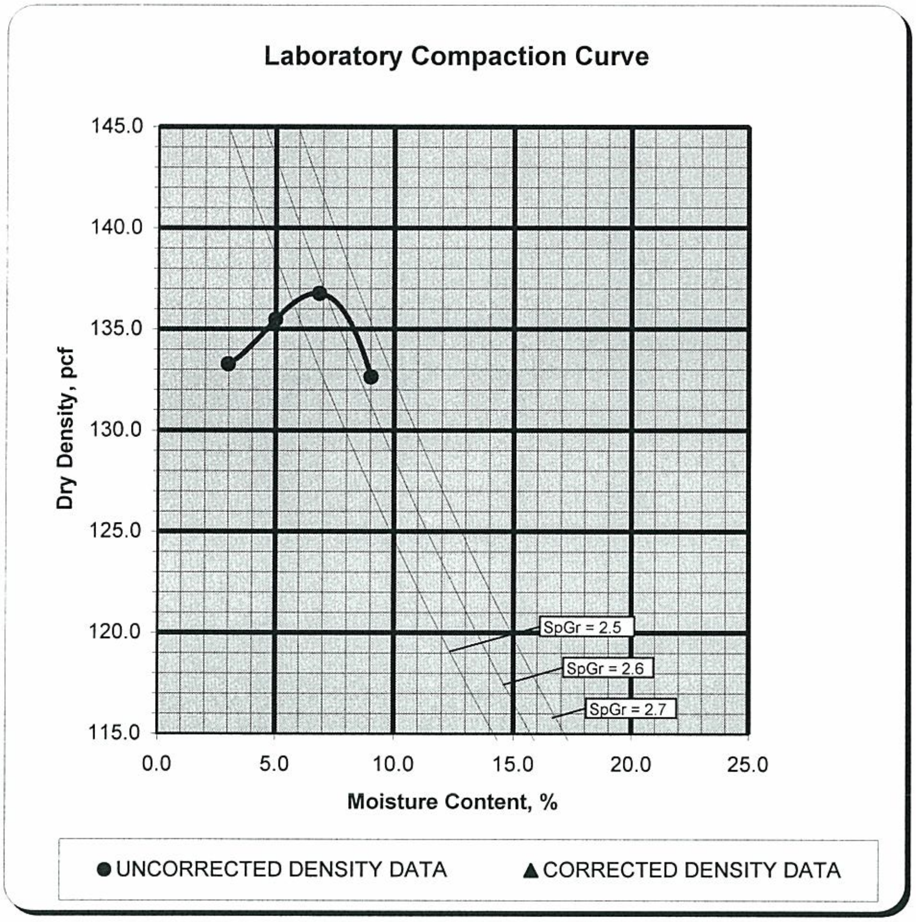
Reviewed by: John Inlow, Lab Manager

LABORATORY COMPACTION CURVE

G Force Lab No.: **6592**
Sample Location: **B-7-1** Depth, ft.: **0' - 5.0'**
Soil Description: **Brown silty medium to fine sand**
Source of Soil: **Not submitted**

Test Designation: **ASTM D1557** Method **A**
% +3/4" **0** % +3/8" **1** % +#4 **3**
Oversize Correction Applied? **No**
Method of Sample Preparation: **Wet**
Type of Rammer Used: **Manual**

M/D Curve No. 2



Test Results

Maximum Density, pcf	**137.0**
Optimum Moisture, %	**7.0**

Oversize Corrected Results

Maximum Density, pcf	
Optimum Moisture, %	

Reviewed by:
John Inlow, Lab Manager

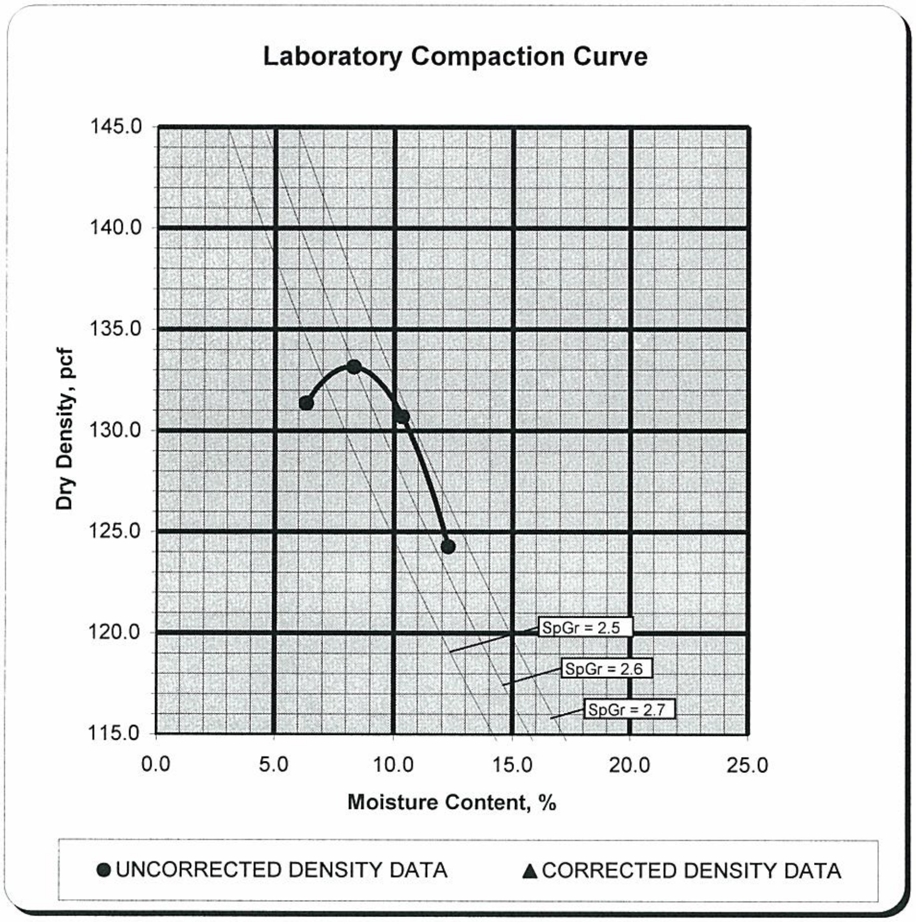
URS Corporation **November 7, 2008**
Sunrise Powerlink, Alpine Route - Job No. SC0368-14-03 **GF12709**

LABORATORY COMPACTION CURVE

G Force Lab No.: **6621**
Sample Location: **B-14-1** Depth, ft.: **0' - 5.0'**
Soil Description: **Brown clayey fine sand**
Source of Soil: **Not submitted**

Test Designation: **ASTM D1557** Method **A**
% +3/4" **0** % +3/8" **0** % +#4 **0**
Oversize Correction Applied? **No**
Method of Sample Preparation: **Wet**
Type of Rammer Used: **Manual**

M/D Curve No. 3



Test Results

Maximum Density, pcf	**133.0**
Optimum Moisture, %	**8.0**

Oversize Corrected Results

Maximum Density, pcf	
Optimum Moisture, %	

Reviewed by:
John Inlow, Lab Manager

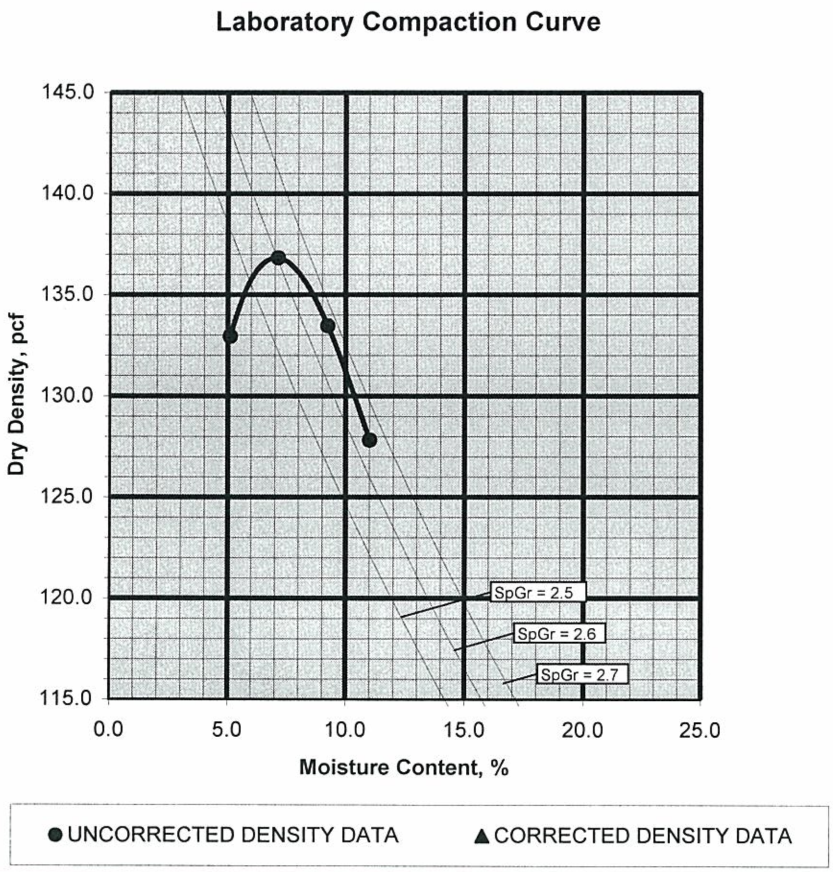
URS Corporation **November 7, 2008**
Sunrise Powerlink, Alpine Route - Job No. SC0368-14-03 **GF12709**

LABORATORY COMPACTION CURVE

G Force Lab No.: **6626**
Sample Location: **B-19-1** Depth, ft.: **0' - 5.0'**
Soil Description: **Brown silty, clayey fine sand**
Source of Soil: **Not submitted**

Test Designation: **ASTM D1557** Method **A**
% +3/4" **0** % +3/8" **2** % +#4 **5**
Oversize Correction Applied? **No**
Method of Sample Preparation: **Wet**
Type of Rammer Used: **Manual**

M/D Curve No. 4



Test Results

Maximum Density, pcf	**137.0**
Optimum Moisture, %	**7.0**

Oversize Corrected Results

Maximum Density, pcf	
Optimum Moisture, %	

Reviewed by:
John Inlow, Lab Manager

UNCONFINED COMPRESSIVE STRENGTH

SIERRA TESTING LABORATORIES, INC.
GEOTECHNICAL AND MATERIALS TESTING SERVICES

Project Name: Sunrise Power Link
Project No.: 09-142
Report Date: April 2, 2009

Client: Geosyntec Consultants

Material Type: Core
Date Cast: n/a
Date Tested: 4/2/09
Age, Days: n/a

Depth: 46-46.5

Test Method: ASTM D4832, D1633, D2938
Moisture Condition At Testing: Ambient

Test Results

Sample ID.	Sample Location	Diameter, in.	Height, in.	Wet Unit Weight, pcf	Dry Unit Weight, pcf	Moisture Content, %	Unconfined Compressive Strength, psi
CP-1-2		2.40	4.7	139.4	135.6	2.8	306

UNCONFINED COMPRESSIVE STRENGTH

SIERRA TESTING LABORATORIES, INC.
GEOTECHNICAL AND MATERIALS TESTING SERVICES

Project Name: Sunrise Powerlink
Project No.: 09-168
Report Date: May 26, 2009

Client: Geosyntec Consultants

Material Type: core
Date Cast: n/a
Date Tested: 5/26/09
Age, Days: n/a

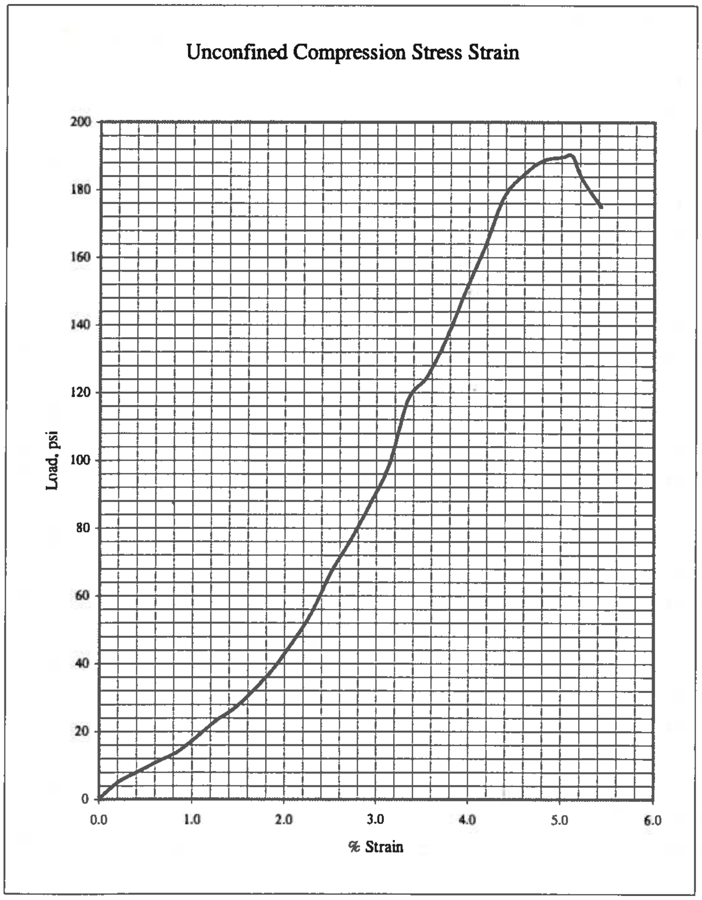
Depth: 13.5-14

Test Method: ASTM D4832, D1633, D7012

Moisture Condition At Testing: Ambient

Test Results

Sample ID.	Sample Location	Diameter, in.	Height, in.	Wet Unit Weight, pcf	Dry Unit Weight, pcf	Moisture Content, %	Unconfined Compressive Strength, psi
CP-2-2		2.38	4.8	148.8	145.1	2.5	190



UNCONFINED COMPRESSIVE STRENGTH

SIERRA TESTING LABORATORIES, INC.
GEOTECHNICAL AND MATERIALS TESTING SERVICES

Project Name: Sunrise Powerlink

Project No.: 09-168

Report Date: May 26, 2009

Client: Geosyntec Consultants

Material Type: core

Date Cast: n/a

Date Tested: 5/26/09

Age, Days: n/a

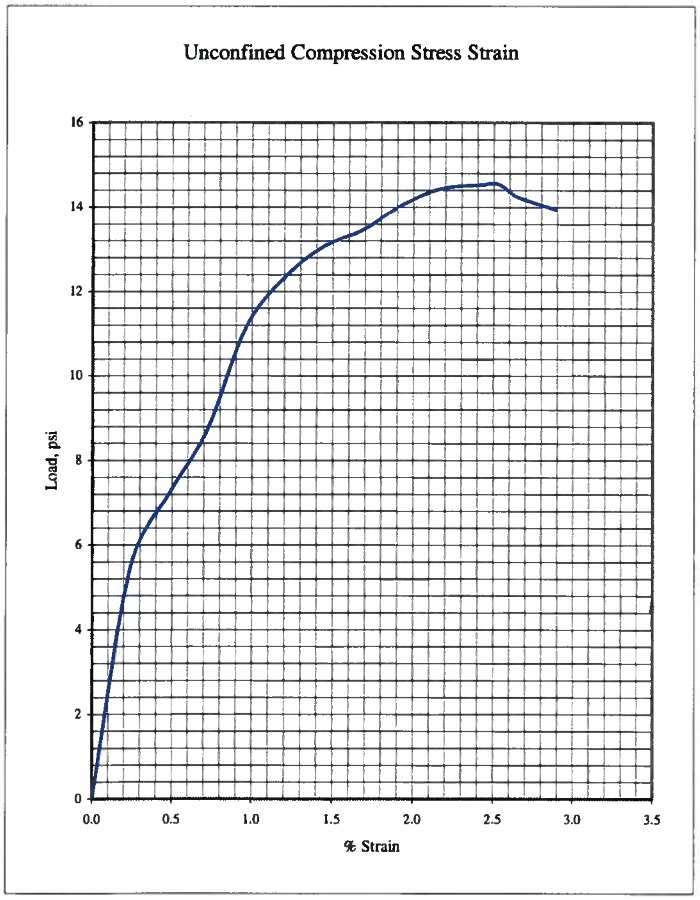
Depth: 29-29.5

Test Method: ASTM D4832, D1633, D7012

Moisture Condition At Testing: Ambient

Test Results

Sample ID.	Sample Location	Diameter, in.	Height, in.	Wet Unit Weight, pcf	Dry Unit Weight, pcf	Moisture Content, %	Unconfined Compressive Strength, psi
CP-2-3		2.43	4.2	140.1	129.1	8.5	15



UNCONFINED COMPRESSIVE STRENGTH

SIERRA TESTING LABORATORIES, INC.
GEOTECHNICAL AND MATERIALS TESTING SERVICES

Project Name: Sunrise Powerlink
Project No.: 09-168
Report Date: May 26, 2009

Client: Geosyntec Consultants

Material Type: core
Date Cast: n/a
Date Tested: 5/26/09
Age, Days: n/a

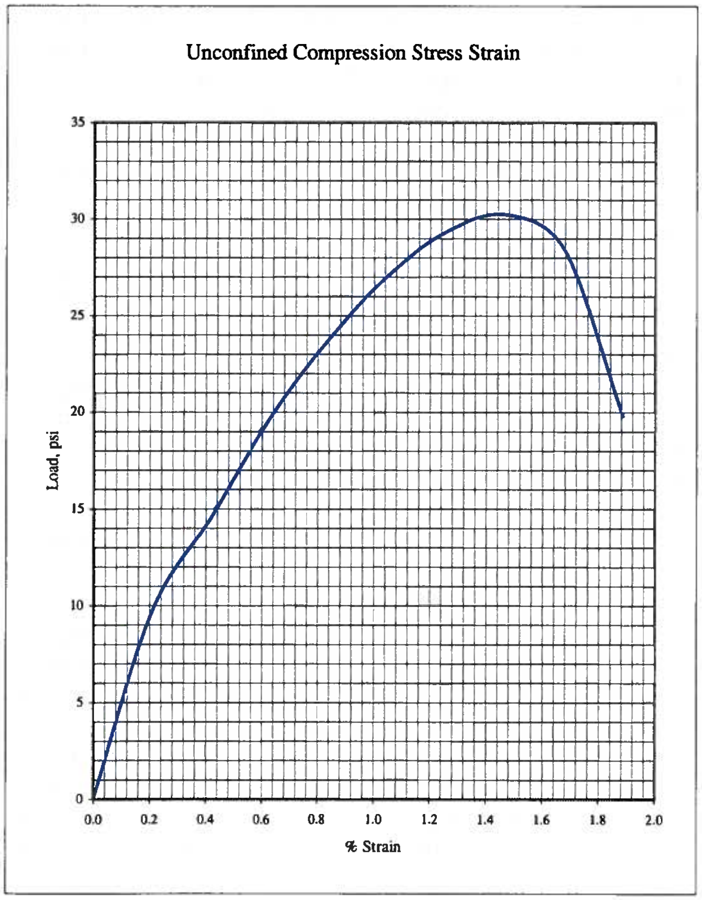
Depth: 36-36.5

Test Method: ASTM D4832, D1633, D7012

Moisture Condition At Testing: Ambient

Test Results

Sample ID.	Sample Location	Diameter, in.	Height, in.	Wet Unit Weight, pcf	Dry Unit Weight, pcf	Moisture Content, %	Unconfined Compressive Strength, psi
CP-2-4		2.37	4.8	131.1	114.1	14.9	30



UNCONFINED COMPRESSIVE STRENGTH

SIERRA TESTING LABORATORIES, INC.
GEOTECHNICAL AND MATERIALS TESTING SERVICES

Project Name: Sunrise Power Link
Project No.: 09-142
Report Date: April 2, 2009

Client: Geosyntec Consultants

Material Type: Core
Date Cast: n/a
Date Tested: 4/2/09
Age, Days: n/a

Depth: 26.5-27.25

Test Method: ASTM D4832, D1633, D2938
Moisture Condition At Testing: Ambient

Test Results

Sample ID.	Sample Location	Diameter, in.	Height, in.	Wet Unit Weight, pcf	Dry Unit Weight, pcf	Moisture Content, %	Unconfined Compressive Strength, psi
I8-1-1		2.40	4.5	154.9	151.3	2.4	354

Before

After

UNCONFINED COMPRESSIVE STRENGTH

SIERRA TESTING LABORATORIES, INC.
GEOTECHNICAL AND MATERIALS TESTING SERVICES

Project Name: Sunrise Power Link
Project No.: 09-142
Report Date: April 2, 2009

Client: Geosyntec Consultants

Material Type: Core
Date Cast: n/a
Date Tested: 4/2/09
Age, Days: n/a

Depth: 32.5-33.0

Test Method: ASTM D4832, D1633, D2938

Moisture Condition At Testing: Ambient

Test Results

Sample ID.	Sample Location	Diameter, in.	Height, in.	Wet Unit Weight, pcf	Dry Unit Weight, pcf	Moisture Content, %	Unconfined Compressive Strength, psi
I8-1-2		2.38	4.4	155.2	153.3	1.2	447

Before

After

UNCONFINED COMPRESSIVE STRENGTH

SIERRA TESTING LABORATORIES, INC.
GEOTECHNICAL AND MATERIALS TESTING SERVICES

Project Name: Sunrise Power Link
Project No.: 09-142
Report Date: April 2, 2009

Client: Geosyntec Consultants

Material Type: Core
Date Cast: n/a
Date Tested: 4/2/09
Age, Days: n/a

Depth: 11.25-12.0

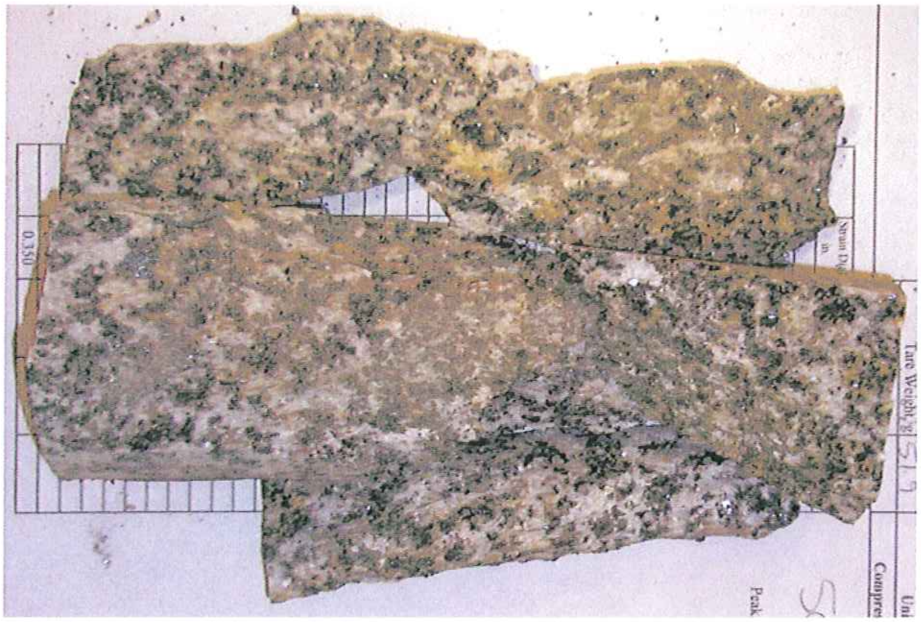
Test Method: ASTM D4832, D1633, D2938

Moisture Condition At Testing: Ambient

Test Results

Sample ID.	Sample Location	Diameter, in.	Height, in.	Wet Unit Weight, pcf	Dry Unit Weight, pcf	Moisture Content, %	Unconfined Compressive Strength, psi
B-10-1		2.40	4.5	168.2	168.1	0.1	1114

Before



After

UNCONFINED COMPRESSIVE STRENGTH

SIERRA TESTING LABORATORIES, INC.
GEOTECHNICAL AND MATERIALS TESTING SERVICES

Project Name: Sunrise Power Link
Project No.: 09-142
Report Date: April 8, 2009

Client: Geosyntec Consultants

Material Type: Core
Date Cast: n/a
Date Tested: 4/8/09
Age, Days: n/a

Depth: 14-14.75

Test Method: ASTM D4832, D1633, D2938

Moisture Condition At Testing: Ambient

Test Results

Sample ID.	Sample Location	Diameter, in.	Height, in.	Wet Unit Weight, pcf	Dry Unit Weight, pcf	Moisture Content, %	Unconfined Compressive Strength, psi
B-10-2		2.40	4.7	171.2	171.0	0.1	13374

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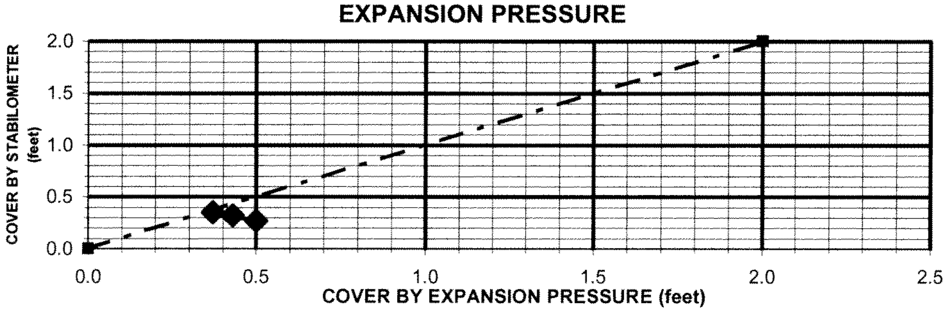
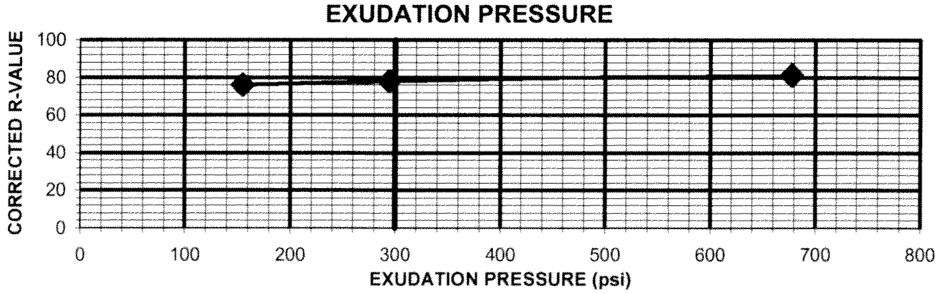
ENVIRONMENTAL

R-VALUE TEST REPORT

DEM PROJECT NO.	**10125-1008039.000**	DATE RECEIVED	**11/5/2008**
CLIENT	**G Force**	LAB NUMBER	**1230**
CLIENT REFERENCE	**GF12709, G Force lab # 6587**	REPORT DATE	**11/20/2008**
CLIENT'S PROJECT OR WORK ORDER NUMBER	**Sunrise Powerlink, Alpine Route**		
SAMPLE LOCATION	**B-2-1 @ 0-5'**		
SAMPLE DESCRIPTION	**Black Silty Sand (SM)**		
SOURCE OF MATERIAL	**n/a**		
SAMPLED BY	**Client**		

LABORATORY TEST DATA	1	2	3
Compactor Pressure (psi)	350	350	350
Moisture at Compaction (%)	8.5	8.0	7.6
Compacted Dry Density (pcf)	132.1	133.7	133.6
Cover Thickness by Expansion Pressure (feet)	0.37	0.43	0.50
Cover Thickness by Stabilometer (feet)	0.35	0.32	0.27
Exudation Pressure (psi)	155	294	678
R-Value (corrected)	76	78	81





ASSUMED TRAFFIC INDEX	4.5
R-VALUE BY EXUDATION	78
R-VALUE BY EXPANSION	-
R-VALUE AT EQUILIBRIUM	**78**

ENGINEER: FRANK N. MELO, EIT

Frank N. Melo

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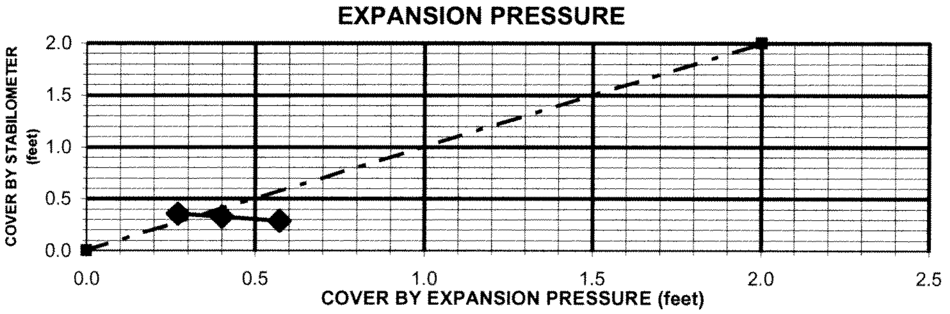
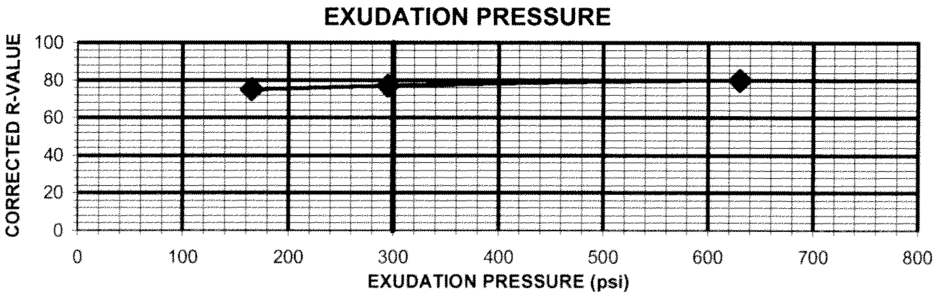
ENGINEERING AND
ENVIRONMENTAL

R-VALUE TEST REPORT

DEM PROJECT NO.	**10125-1008039.000**	DATE RECEIVED	11/5/2008
CLIENT	**G Force**	LAB NUMBER	1231
CLIENT REFERENCE	**GF12709, G Force lab # 6592**	REPORT DATE	11/20/2008
CLIENT'S PROJECT OR WORK ORDER NUMBER	**Sunrise Powerlink, Alpine Route**		
SAMPLE LOCATION	**B-7-1 @ 0-5'**		
SAMPLE DESCRIPTION	**Very Dark Gray Silty Sand (SM)**		
SOURCE OF MATERIAL	**n/a**		
SAMPLED BY	**Client**		

LABORATORY TEST DATA	1	2	3
Compactor Pressure (psi)	350	350	350
Moisture at Compaction (%)	8.6	8.2	7.8
Compacted Dry Density (pcf)	131.5	132.7	132.3
Cover Thickness by Expansion Pressure (feet)	0.27	0.40	0.57
Cover Thickness by Stabilometer (feet)	0.36	0.33	0.29
Exudation Pressure (psi)	165	295	630
R-Value (corrected)	75	77	80





ASSUMED TRAFFIC INDEX	4.5
R-VALUE BY EXUDATION	77
R-VALUE BY EXPANSION	76
R-VALUE AT EQUILIBRIUM	76

ENGINEER: FRANK N. MELO, EIT

Frank N. Melo

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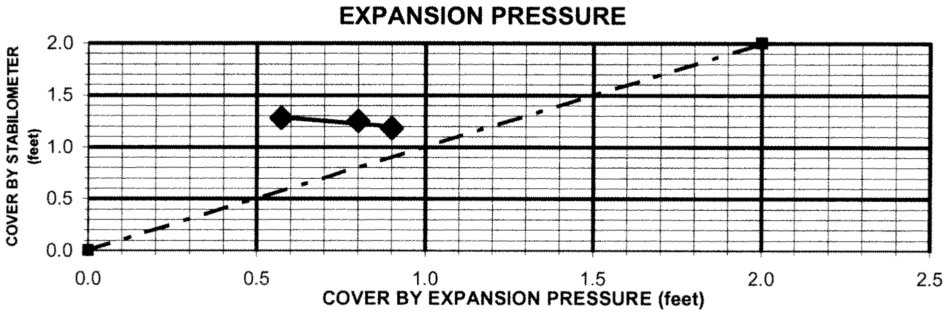
ENGINEERING AND
ENVIRONMENTAL

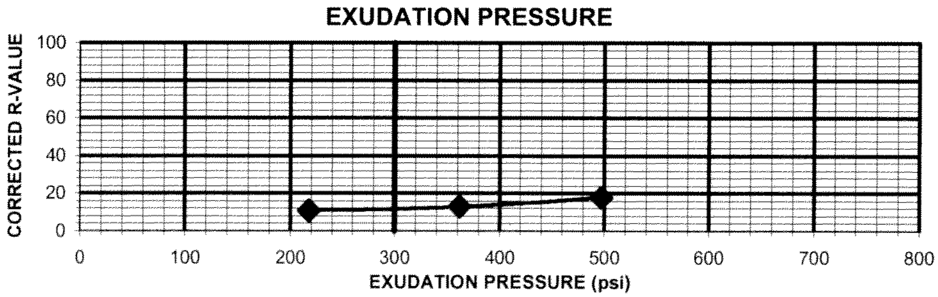
R-VALUE TEST REPORT

DEM PROJECT NO.	**10125-1008039.000**
CLIENT	**G Force**
CLIENT REFERENCE	**GF12709, G Force lab # 6621**
CLIENT'S PROJECT OR WORK ORDER NUMBER	**Sunrise Powerlink, Alpine Route**
SAMPLE LOCATION	**B-14-1 @ 0-5'**
SAMPLE DESCRIPTION	**Olive Brown Sandy Silt (ML)**
SOURCE OF MATERIAL	**n/a**
SAMPLED BY	**Client**

DATE RECEIVED	**11/5/2008**
LAB NUMBER	**1232**
REPORT DATE	**11/20/2008**

LABORATORY TEST DATA	**1**	**2**	**3**
Compactor Pressure (psi)	240	100	210
Moisture at Compaction (%)	11.4	12.2	13.1
Compacted Dry Density (pcf)	130.2	127.3	124.8
Cover Thickness by Expansion Pressure (feet)	0.90	0.80	0.57
Cover Thickness by Stabilometer (feet)	1.18	1.25	1.28
Exudation Pressure (psi)	497	362	218
R-Value (corrected)	18	13	11





ASSUMED TRAFFIC INDEX	4.5
R-VALUE BY EXUDATION	12
R-VALUE BY EXPANSION	-
R-VALUE AT EQUILIBRIUM	**12**

ENGINEER: FRANK N. MELO, EIT

Frank N. Melo

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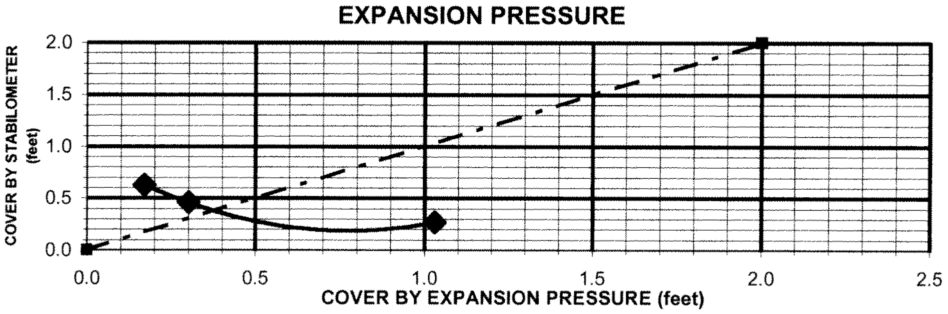
ENVIRONMENTAL

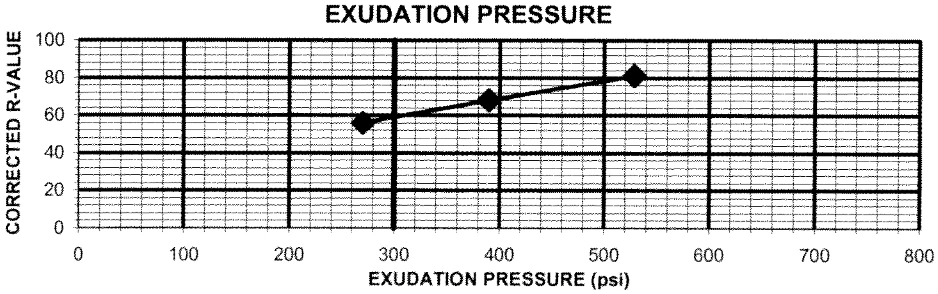
R-VALUE TEST REPORT

DEM PROJECT NO.	**10125-1008039.000**
CLIENT	**G Force**
CLIENT REFERENCE	**GF12709, G Force lab # 6626**
CLIENT'S PROJECT OR WORK ORDER NUMBER	**Sunrise Powerlink, Alpine Route**
SAMPLE LOCATION	**B-19-1 @ 0-5'**
SAMPLE DESCRIPTION	**Very Dark Grayish Brown Silty Sand (SM)**
SOURCE OF MATERIAL	**n/a**
SAMPLED BY	**Client**

DATE RECEIVED	**11/5/2008**
LAB NUMBER	**1233**
REPORT DATE	**11/20/2008**

LABORATORY TEST DATA	**1**	**2**	**3**
Compactor Pressure (psi)	350	350	350
Moisture at Compaction (%)	8.9	9.3	9.8
Compacted Dry Density (pcf)	132.1	132.8	132.7
Cover Thickness by Expansion Pressure (feet)	1.03	0.30	0.17
Cover Thickness by Stabilometer (feet)	0.27	0.46	0.63
Exudation Pressure (psi)	529	390	270
R-Value (corrected)	81	68	56





ASSUMED TRAFFIC INDEX	4.5
R-VALUE BY EXUDATION	59
R-VALUE BY EXPANSION	71
R-VALUE AT EQUILIBRIUM	**59**

ENGINEER: FRANK N. MELO, EIT

Frank N. Melo

Corrosivity of Soils

(California Test Method 643)

G Force Lab No. 6587
Date Sampled: 10/8/2008 By: Client
Date Submitted: 10/20/2008 By: Client
Sample Location: B-2-1 @ 0' - 5.0'
Sample Description: Silty medium to fine sand

pH	7.0
Minimum Resistivity, ohm-cm	6143
Sulfate Content, %	Less than 0.001
Chloride Content, %	0.003

Reviewed by:
John Inlow, Lab Manager

Corrosivity of Soils

(California Test Method 643)

G Force Lab No. 6592
Date Sampled: 10/8/2008 By: Client
Date Submitted: 10/20/2008 By: Client
Sample Location: B-7-1 @ 0' - 5.0'
Sample Description: Silty medium to fine sand

pH	7.6
Minimum Resistivity, ohm-cm	5265
Sulfate Content, %	Less than 0.001
Chloride Content, %	0.002

Reviewed by: ______________________
John Inlow, Lab Manager

Geosyntec Consultants
Sunrise Powerlink, Alpine Route - Job No. SC0368-14-03

November 7, 2008
GF12709

Corrosivity of Soils

(California Test Method 643)

G Force Lab No. 6621
Date Sampled: 10/8/2008 By: Client
Date Submitted: 10/20/2008 By: Client
Sample Location: B-14-1 @ 0' - 5.0'
Sample Description: Clayey fine sand

pH	8.4
Minimum Resistivity, ohm-cm	1823
Sulfate Content, %	0.001
Chloride Content, %	0.002

Reviewed by:
John Inlow, Lab Manager

Geosyntec Consultants
Sunrise Powerlink, Alpine Route - Job No. SC0368-14-03

November 7, 2008
GF12709

Corrosivity of Soils

(California Test Method 643)

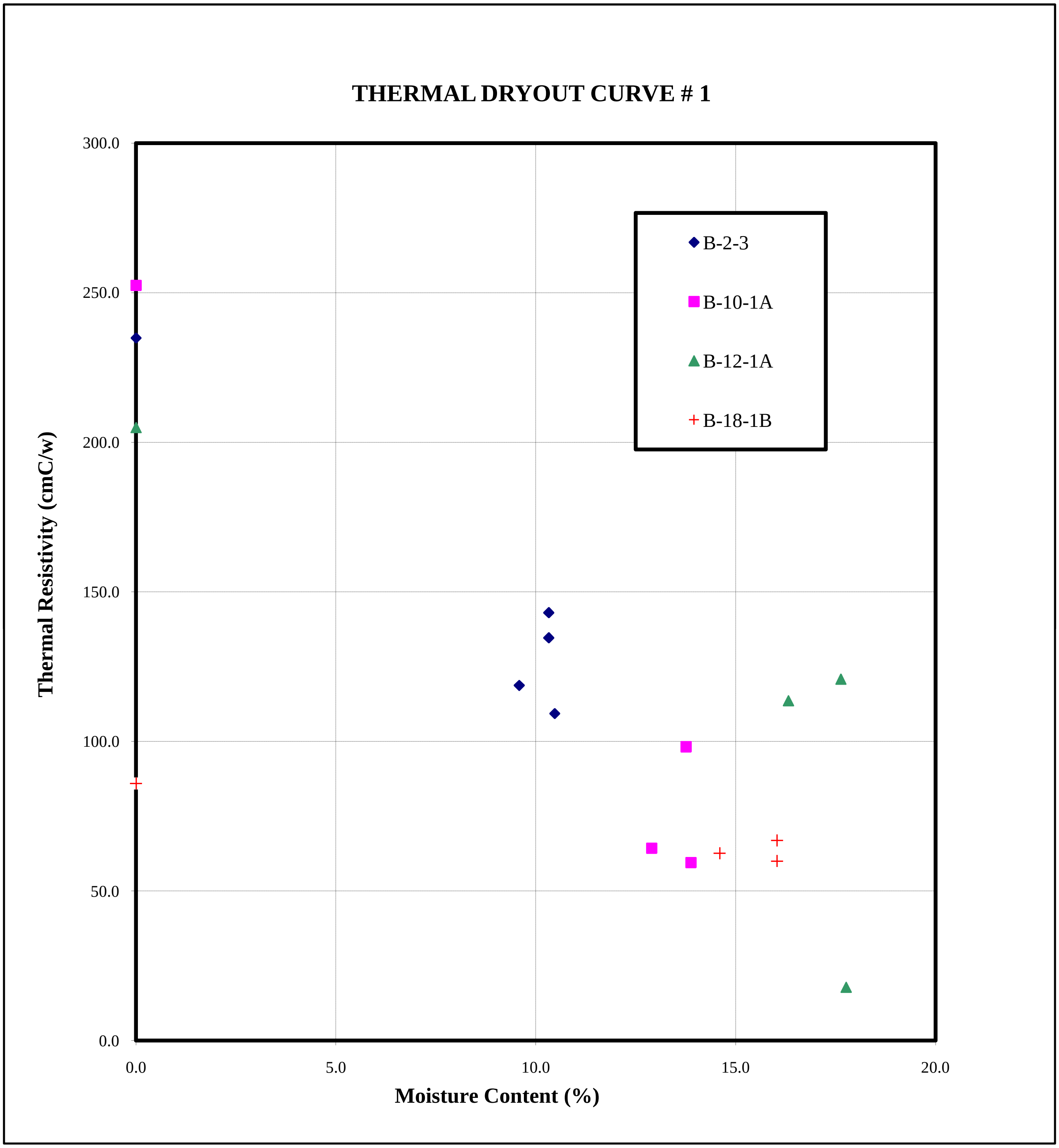
G Force Lab No. 6626
Date Sampled: 10/8/2008 By: Client
Date Submitted: 10/20/2008 By: Client
Sample Location: B-19-1 @ 0' - 5.0'
Sample Description: Silty,clayey fine sand

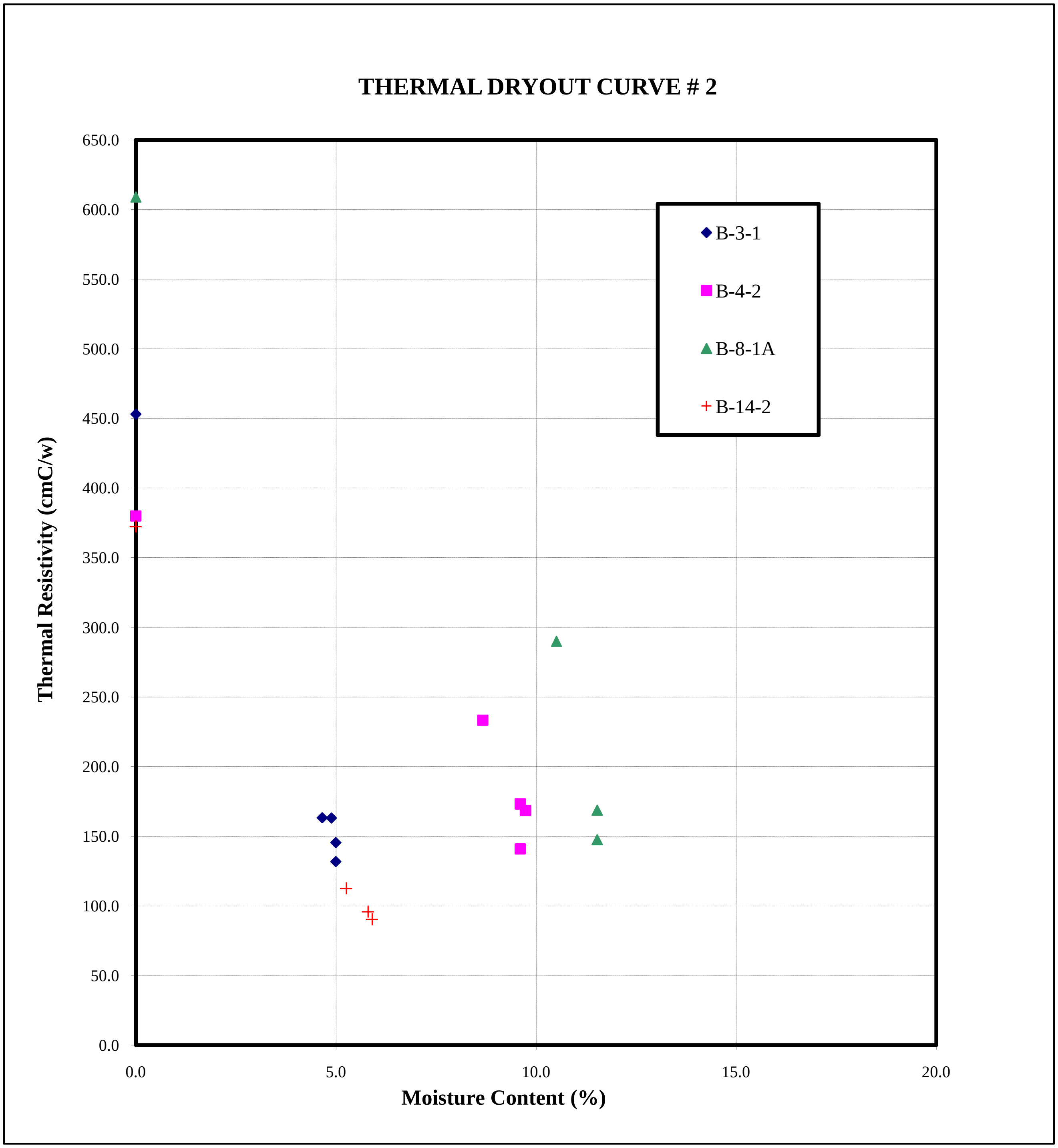
pH	8.3
Minimum Resistivity, ohm-cm	2801
Sulfate Content, %	0.006
Chloride Content, %	0.002

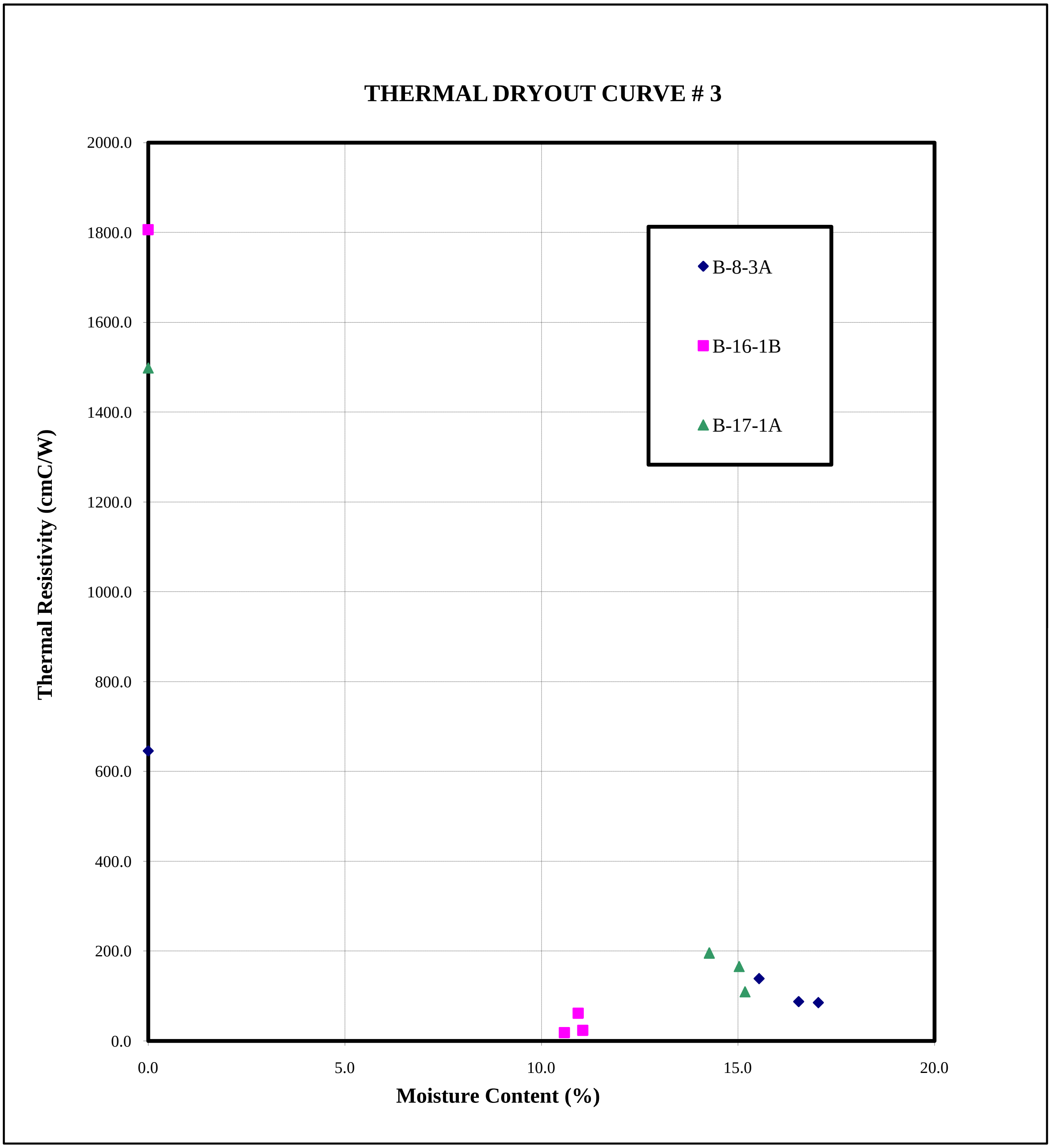
Reviewed by: ______________________
John Inlow, Lab Manager

APPENDIX E

Thermal Resistivity Testing


THERMAL DRYOUT CURVE # 1
Thermal Resistivity (cmC/w)
Moisture Content (%)
300.0
250.0
200.0
150.0
100.0
50.0
0.0
0.0
5.0
10.0
15.0
20.0
◆ B-2-3
■ B-10-1A
▲ B-12-1A
+ B-18-1B


THERMAL DRYOUT CURVE # 2
Thermal Resistivity (cmC/w)
650.0
600.0
550.0
500.0
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
0.0
5.0
10.0
15.0
20.0
Moisture Content (%)
B-3-1
B-4-2
B-8-1A
B-14-2


THERMAL DRYOUT CURVE # 3
2000.0
1800.0
1600.0
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
Thermal Resistivity (cmC/W)
0.0
5.0
10.0
15.0
20.0
Moisture Content (%)
◆ B-8-3A
■ B-16-1B
▲ B-17-1A

GEOTHERM INC.

email: geotherm@geotherm.net

P.O. Box: 742
Aurora, Ontario
CANADA
L4G 4J9
Tel: 905-727-6448
Fax: 905-727-4325

March 22, 2009

Black & Veatch Corporation
11401 Lamar Avenue
Overland Park, KS 66211
Attn: Forest (Lei) Rong, P.E., P. Eng.

Re: Thermal Analysis of Native Soil Samples
Sunrise Powerlink Project, San Diego, CA

We are pleased to submit this test report of thermal dryout characterization conducted on the eight (8) native soil samples from the referenced project. These were taken in brass ring liners of California sampler.

Test Procedure and Equipment: A laboratory type thermal probe was installed central and vertical in each sample. A series of thermal resistivity measurements were made in stages, with moisture contents ranging from the "as received" to the totally dry condition. The tests were conducted in accordance with IEEE standard-442. The results are tabulated below and the thermal dryout curves are given in **Figures 1 & 2.**

Sample ID, Description, Moisture Content, Dry Density and Thermal Resistivity

Location	Sample Date	Depth (ft)	Visual Description	Thermal Resistivity (°C-cm/W)		M/C (%)	Dry Density (pcf)
				Wet	Dry		
B-2-2	10/7/08	6 to 6.5	Brown silty sand	121	222	7	109
B-4-1	10/7/08	6 to 6.5	Red/Brown clayey sandy silt	96	197	7	109
B-6-1A	10/9/08	6 to 6.5	Mottled gray brown silty sand (weathered stone?)	137	179	4	123
B-8-1B	??	6 to 6.5	Red/Brown clayey sandy silt (weathered stone?)	78	154	10	118

Location	Sample Date	Depth (ft)	Visual Description	Thermal Resistivity (°C-cm/W)		M/C (%)	Dry Density (pcf)
				Wet	Dry		
B-8-2B	10/9/08	11 to 11.5	Brown weathered rock	69	171	9	109
B-12-1B	10/10/08	6 to 6.5	Mottled brown weathered rock	71	186	16	110
B-17-1B	10/10/08	5.5 to 6	Brown gravelly sand	89	168	11	113
B-18-1A	10/13/08	5.5 to 6	Brown clayey sandy silt (fill?)	144	245	11	106

<u>Comments:</u> **The following are the revised comments based on our discussions during the conference call and the additional information you provided.**

Cable Installation and Effective Resistivity: We understand the cables are to be installed in concrete duct-bank that will be overlaid with a Fluidized Thermal Backfill (FTB) envelope extending close to the surface. We assumed the **dry** thermal resistivity of the concrete and FTB to be no higher than **70 C-cm/W and 100 C-cm/W** respectively. In this case, the drying of the native soil (trench wall), and its influence on the cable rating will be minimal. As a result, the 'effective thermal resistivity' (duct-bank, FTB and native soil) will be less **100 C-cm/W.** This can be verified by an ampacity program; taking into account the thermal resistivity of various components and its thickness.

Native Soil: Although the thermal resistivity of the native soil samples from 2 locations was measured to be ~**140 C-cm/W,** we believe the in-situ values at these locations may be no higher than ~**100 C-cm/W.** This comment is based on the soil description, moisture content, density, SPT blow-counts and some evidence of soil disturbance as a result of sampling and shipping. The soil disturbance (reduction in density) influences the dry thermal resistivity significantly. For example: if the difference in the thermal resistivity of the soil in moist condition is 10 units (C-cm/W), the difference in dry condition will be more than 50 units. **Since we did not have any in-situ thermal resistivity values, we could not 'adjust' the dryout curves for such samples.**

Ambient Temperature: The values of the ambient temperatures reported by others are relatively higher than expected. This could be the result of the heat generated by the soil drilling process; especially for drier and dense soils. The technique and instrumentation used for these measurements could also be a factor. For the earth ambient temperature at a depth of ~10-ft below grade (even under asphalt cover) should not be higher than 20 C. **This can have been verified by conducting in-situ thermal resistivity measurements.**

Jack & Bore Crossings: We understand the diameter of these borings is ~60-inches. This is quite large and thus the heat-flux experienced by the native soil at these crossings will be very low; minimizing the possibility of soil drying. This is based on the assumption that the casing is filled with low a grout or filler of low thermal resistivity.

Backfill (grouting) of Jack & Bore Casing: We understand **HOBAS** pipe is to be used to line these crossings and to contain the cable conduits. Based on the drawing of such crossings, we suggest the annular space around the cable conduits and other components in the casing be filled with a grout of low thermal resistivity. This will mitigate the potential 'hot-spot'.

We will be pleased to design a grout best suited for these crossings; taking into consideration the thermal, strength and flow requirements. The component materials will be sourced from local ready-mix concrete suppliers.

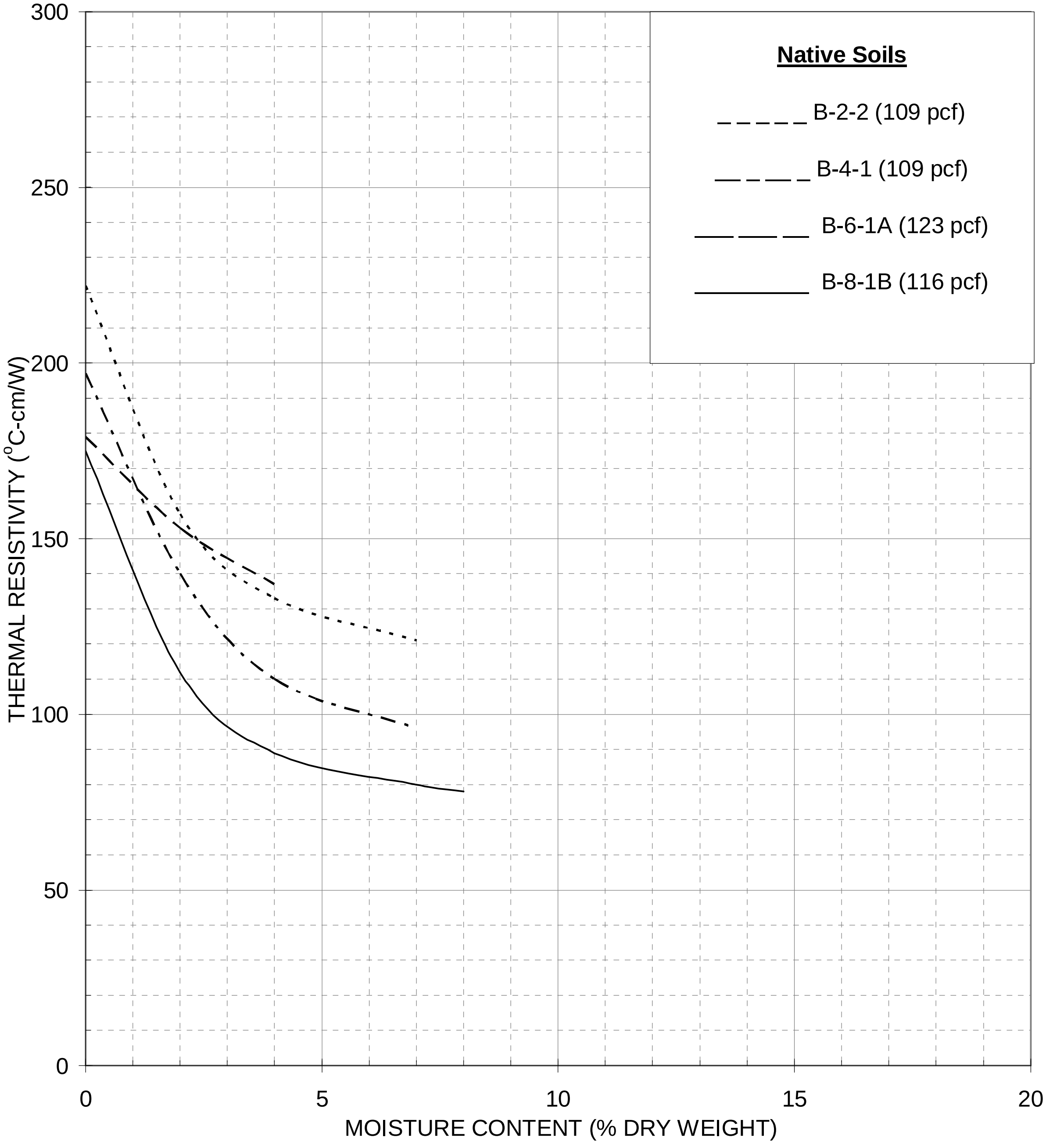
Please contact us if you have any questions, wish to discuss any part of this report or if we can be of further assistance.

Yours truly
Geotherm Inc.

Deepak Parmar
President

GEOTHERM INC.

THERMAL DRYOUT CURVES



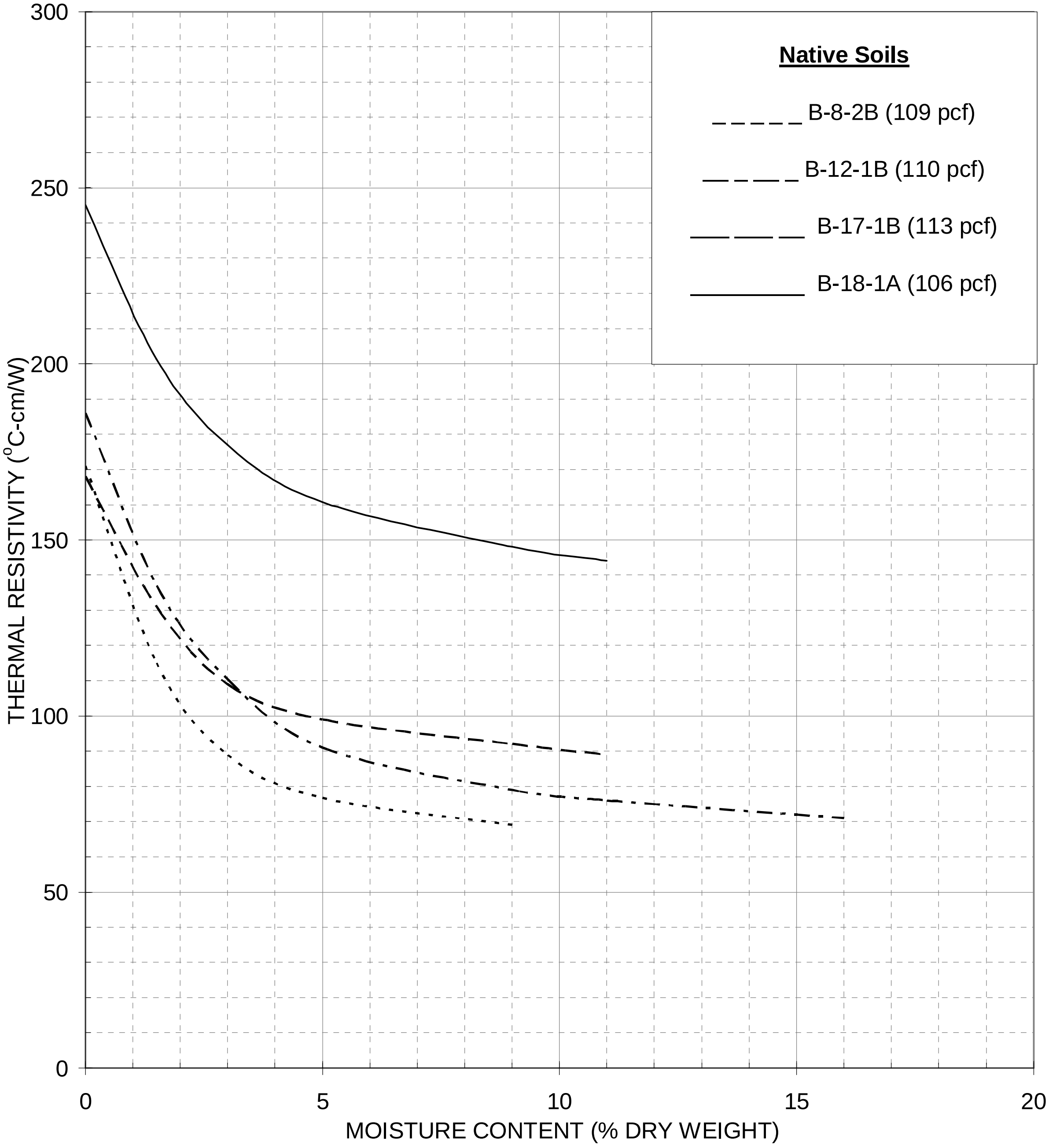
Black & Veatch Construction

Thermal Analysis of Native Soils

Sunrise Powerlink Project, San Diego, CA.

November 2008 **Figure 1**

THERMAL DRYOUT CURVES



Black & Veatch Construction

Thermal Analysis of Native Soils

Sunrise Powerlink Project, San Diego, CA.

November 2008

Figure 2

GeothermUSA

http://www.geotherm.net

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Dublin, CA 94568
Tel: 925-999-9232
Fax: 925-999-8837
info@geothermusa.com

November 7, 2008

Black & Veatch Corporation
11401 Lamar Avenue
Overland Park, KS 66211
Attn: Forest (Lei) Rong, P.E., P. Eng.

Re: Thermal Analysis of Native Soil Samples
Sunrise Powerlink Project, San Diego, CA

We are pleased to submit this test report of thermal dryout characterization conducted on the eight (8) native soil samples from the referenced project. These were taken in brass ring liners of California sampler. Since these are undisturbed tube samples, the moisture content and density would be representative of the field conditions (in-situ).

Test Procedure and Equipment:

A laboratory type thermal probe was installed central and vertical in each sample. A series of thermal resistivity measurements were made in stages, with moisture contents ranging from the "***as received***" to the totally dry condition. The tests were conducted in accordance with IEEE standard-442; using our Thermal Property Analyzer Model TPA2000. The thermal dryout curves are given in ***Figures 1 & 2.***

Sample ID, Description, Moisture Content, Dry Density and Thermal Resistivity:

Location	Sample Date	Depth (ft)	Visual Description	Thermal Resistivity (°C-cm/W)		M/C (%) (in-situ)	In-situ Dry Density (pcf)
				As Received	Dry (0%)		
B-2-2	10/7/08	6 to 6.5	Brown silty sand	121	222	7	109
B-4-1	10/7/08	6 to 6.5	Red/Brown clayey sandy silt	96	197	7	109
B-6-1A	10/9/08	6 to 6.5	Mottled gray brown silty sand (weathered stone?)	137	179	4	123

Location	Sample Date	Depth (ft)	Visual Description	Thermal Resistivity (°C-cm/W)		M/C (%) (in-situ)	In-situ Dry Density (pcf)
				As Received	Dry (0%)		
B-8-1B	10/9/08	6 to 6.5	Red/Brown clayey sandy silt (weathered stone?)	78	175	8	116
B-8-2B	10/9/08	11 to 11.5	Brown weathered rock	69	171	9	109
B-12-1B	10/10/08	6 to 6.5	Mottled brown weathered rock	71	186	16	110
B-17-1B	10/10/08	5.5 to 6	Brown gravelly sand	89	168	11	113
B-18-1A	10/13/08	5.5 to 6	Brown clayey sandy silt (fill?)	144	245	11	106

Comments: For all practical purpose, in-situ thermal resistivity of ~**150 C-cm/W** will apply. This is based on the relatively high values at locations B-2, B-6 and B-18. For other locations, a value of **~ 100 C-cm/W** will apply.

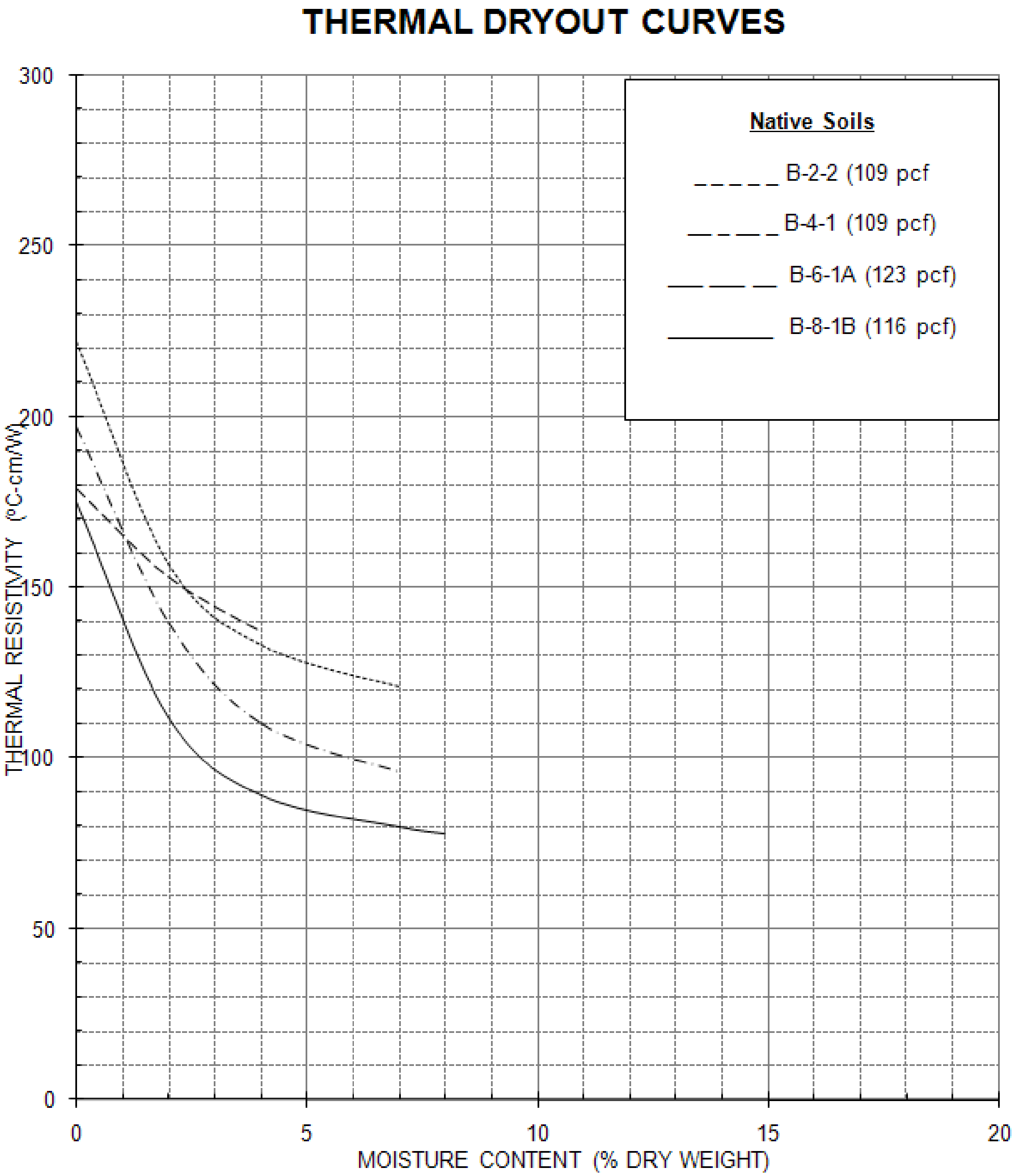
Cable Trench Backfill: If the cables are installed in a concrete ductbank, the native soil can be used as a backfill above the ductbank provided it is installed at dry density of not less than 115 pcf or 95% of standard Proctor density.

Please contact us if you have any questions, wish to discuss any part of this report or if we can be of further assistance.

Geotherm USA

Nimesh Patel

Please Note: All samples will be disposed of after 15 days from date of report



Black & Veatch Construction

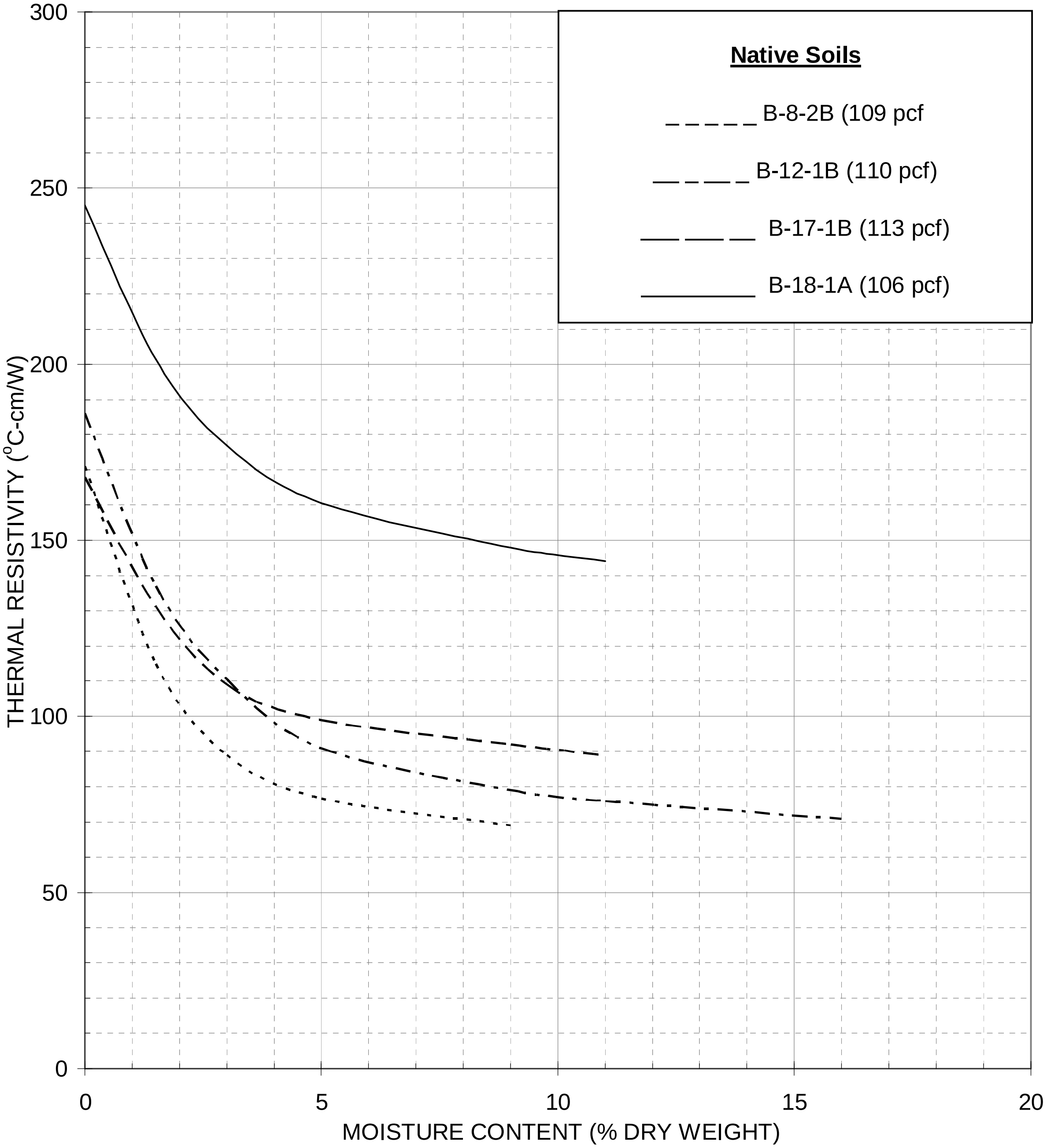
Thermal Analysis of Native Soil Samples

Sunrise Powerlink Project, San Diego, CA

November 2008

Figure 1

THERMAL DRYOUT CURVES



Black & Veatch Construction

Thermal Analysis of Native Soil Samples

Sunrise Powerlink Project, San Diego, CA

November 2008 **Figure 2**

GeothermUSA

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December 23, 2008

Black & Veatch Corporation
11401 Lamar Avenue
Overland Park, KS 66211
Attn: Forest (Lei) Rong, P.E., P. Eng.

Re: Thermal Analysis of Native Soil Samples
Sunrise Powerlink Project, San Diego, CA

We are pleased to submit this test report of thermal dryout characterization conducted on the three (3) native soil samples from the referenced project. These were undisturbed tube samples taken on December 2, 2008, in nominal 2 ½" stainless steel liners of California sampler and are believed to be at the field (in-situ) moisture content and density.

Test Procedure and Equipment: A laboratory type thermal probe was installed central and vertical in each sample. A series of thermal resistivity measurements were made in stages, with moisture contents ranging from the "***as received***" to the totally dry condition. The tests were conducted in accordance with IEEE standard-442; using our Thermal Property Analyzer Model TPA2000. The results are tabulated below and the thermal dryout curves are given in ***Figure 1.***

Sample ID, Description, Moisture Content, Dry Density and Thermal Resistivity:

Location	Sample Date	Depth (ft)	Visual Description	Thermal Resistivity (°C-cm/W)		In-situ M/C (%)	In-situ Dry Density (pcf)
				As rcvd	Dry (0%)		
I8-2-2B	12/2/08	11	Dark gray-brown fine-medium sand some gravel	138	272	5.3	122
I8-3-2B	12/2/08	11	Dark yellow-brown fine-medium sand some gravel	95	190	12.3	116
I8-3-3B	12/2/08	16	Dark gray-brown fine-medium sand some gravel	95	205	4.1	125

Comments:

For all practical purpose, in-situ thermal resistivity of **140 C-cm/W** can be used for the soil at location I8-2 and **95 C-cm/W** for location I8-3 respectively.

Cable Trench Backfill:

If the cables are installed in a concrete ductbank, the native soil can be used as the backfill above the ductbank provided it is installed at dry density of not less than 95% of standard Proctor density.

Please contact us if you have any questions, wish to discuss any part of this report or if we can be of further assistance.

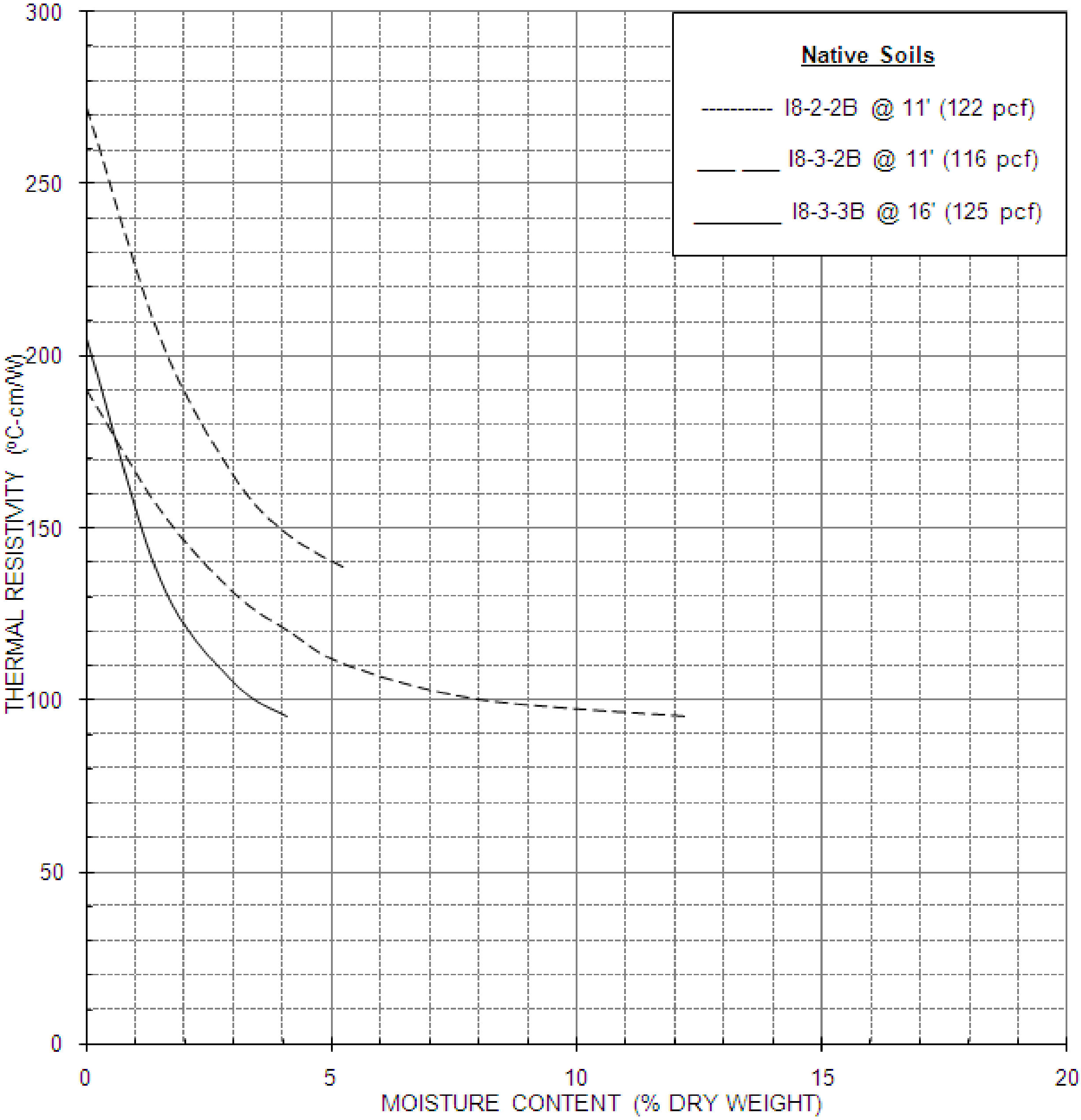
Geotherm USA

NPatel

Nimesh Patel

Please Note: All samples will be disposed of after 15 days from date of report

THERMAL DRYOUT CURVES



Black & Veatch Construction

Thermal Analysis of Native Soil Samples

Sunrise Powerlink Project, San Diego, CA

December 2008

Figure 1

GeothermUSA

http://www.geotherm.net

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June 2, 2009

Black & Veatch Corporation
11401 Lamar Avenue
Overland Park, KS 66211
Attn: Forest (Lei) Rong, P.E., P. Eng.

Re: Thermal Analysis of Native Soil Samples
Sunrise Powerlink Project, San Diego, CA

We are pleased to submit this test report of thermal dryout characterization conducted on the two (2) native soil samples from the referenced project. These were undisturbed tube samples taken on May 14, 2009, in nominal 2½" diameter stainless steel liners of California sampler and are believed to be at the field (in-situ) moisture content and density.

Test Procedure and Equipment: A laboratory type thermal probe was installed central and vertical in each sample. A series of thermal resistivity measurements were made in stages, with moisture contents ranging from the "***as received***" to the totally dry condition. The tests were conducted in accordance with IEEE standard-442; using our Thermal Property Analyzer Model TPA2000. The results are tabulated below and the thermal dryout curves are given in ***Figure 1.***

Sample ID, Description, Moisture Content, Dry Density and Thermal Resistivity

Location	Sample Date	Depth (ft)	Visual Description	Thermal Resistivity (°C-cm/W)		In-situ M/C (%)	In-situ Dry Density (pcf)
				As rcvd	Dry (0%)		
B-20	5/14/09	5' – 5.5'	Gray silty sand	135	299	4.3	101
B-20	5/14/09	10' – 10.5	Gray-brown silty sand (coarse @ 10.5')	120	271	4.3	108

Comments:

We understand that the driller's B/H logs indicate that these samples have been disturbed somewhat. We agree with this statement based on the soil description and the measured dry density. Non-cohesive soils (granular, sand, silt) are prone to become loose (less dense) as result of vibration and pounding when split-spoon or California sampler is driven by drop-hammer technique. Undisturbed tube samples are normally collected when cohesive clayey soils are encountered and the tube sampler is 'pushed' and not 'driven'.

We would estimate in-situ dry density of these samples to be not less than 110 pcf (~95% of the standard Proctor density). At this density, the in-situ thermal resistivity at 4.3% moisture content would be no higher than less then **100 C-cm/W**. This could have been confirmed if in-situ thermal resistivity measurements were made.

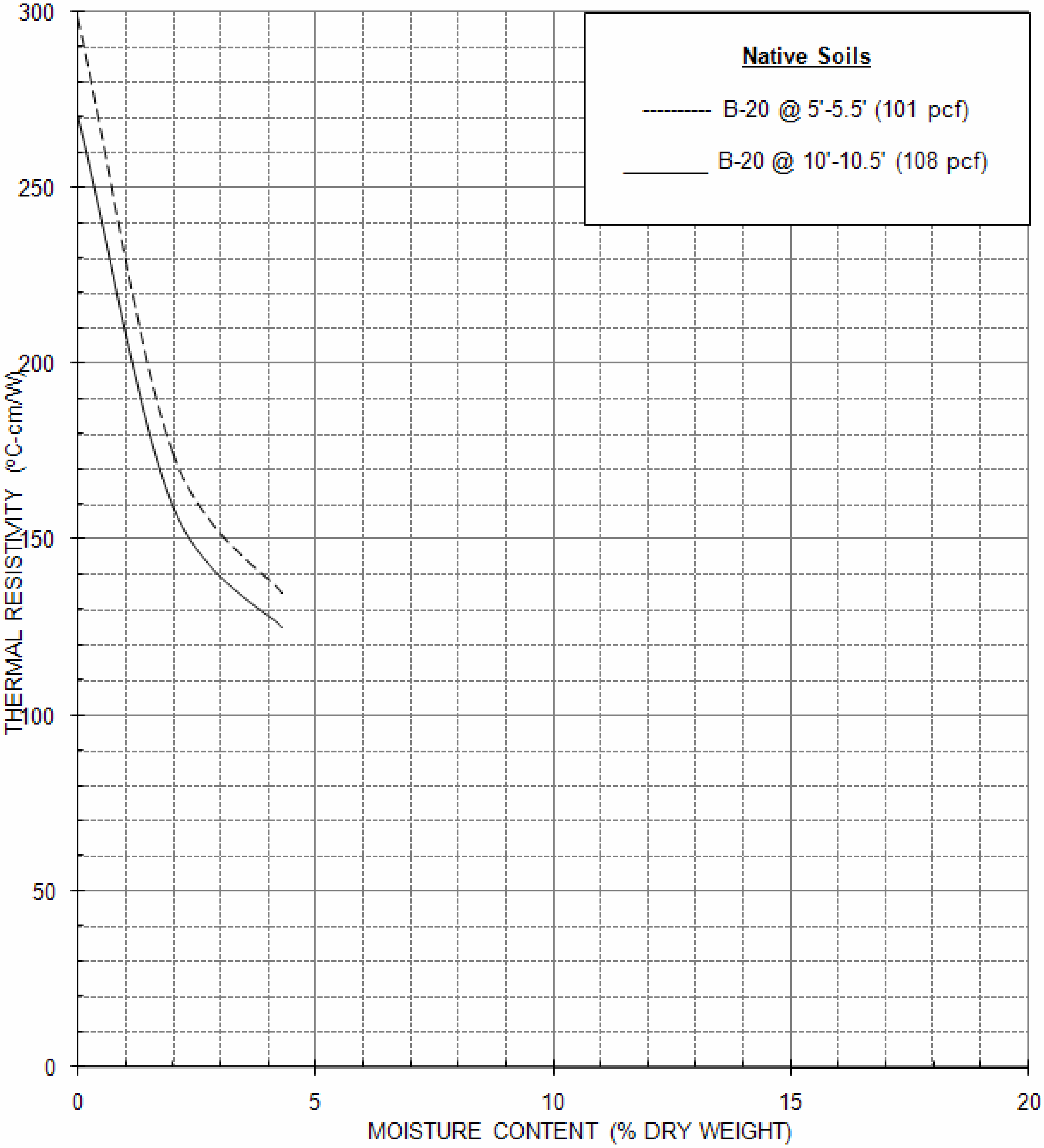
Please contact us if you have any questions, wish to discuss any part of this report or if we can be of further assistance.

Geotherm USA

Nimesh Patel

Please Note: All samples will be disposed of after 15 days from date of report

THERMAL DRYOUT CURVES



Black & Veatch Construction

Thermal Analysis of Native Soil Samples

Sunrise Powerlink Project, San Diego, CA

June 2009 **Figure 1**