DRAFT REPORT – REVISION 3

GEOTECHNICAL AND GEOLOGIC HAZARDS INVESTIGATION SUNRISE POWERLINK PROJECT SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

PREPARED FOR:

SAN DIEGO GAS & ELECTRIC COMPANY

URS PROJECT NO. 27669030.00004

REVISED MARCH 22, 2010 (REV. 3)

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Prepared for

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URS Project No. 27669030.00004

Revised March 22, 2010 (Rev. 3)

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Revised March 22, 2010 (Rev. 3)

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Subject: Geotechnical and Geologic Hazards Investigation
Sunrise Powerlink Project
San Diego and Imperial Counties, California
URS Project No. 27669030.00004

Dear Ms. Frisbie:

URS Corporation Americas (URS) is pleased to present this revised Draft Report (Revision 3) for the Geotechnical and Geologic Hazards Investigation in support of the proposed Sunrise Powerlink project. This Draft Report – Revision 3 supersedes the October 16, 2009 Draft Report (Rev. 2). Our work is intended to assist the San Diego Gas & Electric Company (SDG&E) and their consultants with project planning and design and specifically to provide geotechnical design information to assist with the engineering design of the transmission line structure foundations.

The results of our investigation indicate that the project is not impacted by geotechnical issues or geologic hazards that cannot be mitigated by proper design and construction procedures. If you have any questions regarding this report, please contact us.

Sincerely,

URS CORPORATION

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ASTM	American Society for Testing and Materials
bgs	below ground surface
BMcD	Burns & McDonnell Engineering
CGS	California Geological Survey
CPT	cone penetration tests
CUFAD	Compression Uplift Foundation Analysis and Design
dia.	diameter
E_{pmt}	Pressuremeter modulus
EPRI	Electric Power Research Institute
FHWA	Federal Highway Administration
fps	feet per second
g	Gravity or gravitational acceleration
GPS	Global Positioning System
kips	Kilopounds
ksi	kips per square inch
kV	Kilovolts
MFAD	Moment Foundation Analysis and Design
Misc.	miscellaneous
M_L	Richter or local magnitude
mm/yr	millimeters/year
MSG	Mountain Springs Grade
Mw	Moment Magnitude
pcf	pounds per cubic foot
PGA	peak ground acceleration
psf	pounds per square foot
Rev.	Revision
SCEC	Southern California Earthquake Center
SDG&E	San Diego Gas & Electric
Str.	Structure
SWPL	Southwest Powerlink 500 kV Transmission Line
URS	URS Corporation Americas
USCS	Unified Soil Classification System
USGS	United States Geological Survey
V&A	V&A Engineering
Vp	Primary-wave Velocity
WCC	Woodward Clyde Consultants
WGCEP	Working Group on California Earthquake Probabilities

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The Sunrise Powerlink (SRPL) is a proposed transmission line project extending from the Sycamore Canyon Substation on Miramar MCAS eastward to the Imperial Valley Substation in the southwestern portion of the Imperial Valley. It is comprised of a 500 kV Extra High Voltage transmission line from the Imperial Valley Substation to a proposed Suncrest Substation in Alpine and a 230 kV Extra High Voltage transmission interconnect from the Suncrest Substation to the Sycamore Canyon Substation. The route is approximately 118 miles in length and will include on the order of 420 to 430 structures including steel lattice towers and steel poles. The project has been subdivided into 14 sections from west to east; 4A, 5, 6, 7, 8A, 8B, 8C, 8D, 8E, 9A, 9B, 9C, 10A, and 10B. Section 6 is an underground alignment and is not a part of this study.

This geotechnical and geologic hazards investigation was prepared to support the design and planning of the project and specifically to provide geotechnical information to assist with the engineering design of the transmission line structure foundations. In addition, this report evaluates geologic hazards and provides recommendations to mitigate impacts relative to geology, mineral resources, and soils. Mitigation Measures and Applicant Proposed Measures are outlined in the Mitigation Monitoring, Compliance, and Reporting Program prepared by the California Public Utilities Commission and Bureau of Land Management dated November 10, 2009. The following paragraphs list the Mitigation Measures and call out the elements of the Geotechnical and Geologic Hazards Investigation that address that concern, where applicable.

G-2a: Protect desert pavement. Desert pavement is not addressed in this geotechnical document. Environmental consultants have provided mapping of desert pavement areas. The basic mitigation calls for the use of temporary mats to protect the desert pavement from damage or disturbance from construction vehicles.

G-3a: Conduct geotechnical studies for soils to assess characteristics and aid in appropriate foundation design. This report presents the design level studies and includes evaluations of corrosive soils (Section 6.6 and Appendix D) and expansive and collapsible soils (Section 6.5). No problematic soils of significant extent are anticipated at structure locations relative to the deep foundations planned for transmission line structures.

G-4a: Reduce effects of groundshaking. Groundshaking is described in Section 4 and conclusions regarding the shaking hazard are presented in Section 6.2. SDG&E has established that seismic loads generate forces on transmission line structures that are substantially less than forces resulting from extreme wind loading events. As a result, SDG&E recommends that transmission line structures be designed for the wind loading case and that seismic loads are not required for design of the Sunrise Powerlink structures or foundations.

G-4b: Conduct geotechnical investigations for liquefaction. Liquefaction hazards as they pertain to limited areas of the project alignment are described in Section 4.3. Section 6.3 presents discussions and recommendations regarding liquefaction. Based on the available information, no liquefaction hazard mitigations have been recommended. To verify this recommendation, site specific borings are planned at the structures with the greatest potential for liquefaction. The areas where potentially young geologic alluvial materials may be encountered in a saturated state include: Round Potrero Valley (8C: P-54); Jacumba Valley (9C: P239-1, P240, P242); the desert wash crossings in Section 10B (P285 to P291, P323-1, P234, P330-1) and the ancient lake bed near the Imperial Valley Substation (10C: P361, P362-1

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and P363-1). A geotechnical drilling program will be initiated at the outset of the construction phase that will include borings in the areas identified. Foundation designs will be modified if the boring program finds liquefaction hazards or subsurface conditions that warrant mitigation.

G-5a: Minimize project structures within active fault zones. Fault crossings are described in Section 4.1, which includes a description of the active Elsinore fault and two possible fault crossings of potentially active faults. Section 6.1 presents the discussions, conclusions, and recommendations associated with these possible fault rupture hazards.

The Elsinore fault is located between Structures P303-2 and P304-2 based on published and unpublished mapping and on the geomorphic analyses and field reconnaissance performed for this study. Mitigation of fault rupture hazard includes construction of dead-end structures on either side of the fault crossing and preconstruction fault trenching to verify the absence of secondary fault traces crossing the structure footprints.

Potentially active faults project toward structure P257 in Section 9C ("Jacume" fault) and toward structures P335 and P340 in Section 10B (Yuha Wells fault). The fault rupture hazard in these areas is considered to be low, but confirmation during the final geotechnical investigation stage is warranted. Fault trenching investigations will be performed prior to construction in the above mentioned areas to confirm the absence of faults at the tower site locations.

G-6a: Conduct geotechnical surveys for landslides and protect against slope instability. Landslides and potential slope instability, including areas of rock fall hazards, are discussed in Section 4.4. Based on our investigations, no active or recent landslides are present along the alignment, although ancient landslides have been mapped along portions of the route in Section 4A. Structure P20 is the only structure located within a possible ancient landslide.

Rock fall hazards of varying degree have been evaluated in three general areas along the project route including Section 5 (P47 to P49), Section 9B (P147) and the In Koh Pah and Mountain Springs Grade areas in Sections 9C and 10A. Evaluations of the landslide and rock fall hazards are based on site reconnaissance and terrain analysis and are presented in Section 6.4. Recommendations for mitigation include: 1) subsurface investigations to further evaluate the landslide hazard in the P20 area and 2) construction surveys to identify and mitigate possible rock fall hazards by dislodging or stabilizing identified rocks and boulders. Some mitigation of rock fall hazard has already been performed in the design phase field surveys and tower siting studies that avoided siting structures in areas of elevated rock fall hazard to the degree possible.

G-9a: Coordinate with quarry operations. Mineral resources and associated mitigations are not address in this geotechnical study. Evaluations of mineral resources along the alignment are presented in the Final EIR/EIS and include mitigations necessary for Section 10B and the structures in and near the quarry located near the Coyote Mountains and the mouth of Fossil Canyon.

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SECTION 1 INTRODUCTION

1.1 BACKGROUND AND PROJECT DESCRIPTION

The Sunrise Powerlink Project is a proposed 230/500 kilovolt (kV) transmission line that extends from the San Diego Gas & Electric (SDG&E) Company Sycamore Canyon Substation in San Diego County eastward to the SDG&E Imperial Valley Substation in Imperial County. Figure 1 presents a vicinity map that shows the project alignment.

The western portion of the project is a 230 kV transmission line beginning at Sycamore Canyon Substation and extending to the proposed Suncrest Substation located east of Alpine and south of Interstate 8 in the Bell Bluff area. From the Suncrest Substation, a 500 kV transmission line extends eastward, crossing Interstate 8 twice between the Suncrest Substation and the Jacumba area, crossing it again in the Mountain Springs Grade (MSG) area, and crossing again in the Plaster City area. The eastern terminus of the project is the Imperial Valley Substation.

The overhead transmission line alignment has been divided into 13 sections for references purposes. The section designations provided to URS are from west to east; 4A, 5, 7, 8A, 8B, 8C, 8D, 8E, 9A, 9B, 9C, 10A, and 10B. Section 6 is a proposed underground alignment and is not a part of this study. Table 1 presents a summary of the section and structure information based on the structures list dated February 23, 2010. The transmission line includes multiple types of structures, including strain, tangent, angle, and dead end towers and steel monopoles. The structure designation of "-1" or subsequent numbers indicates that during the planning and early design phase, a structure has been moved from an initial location or that the structure type has changed. The structure numbering is unique within the 230 and 500 kV portions of the alignment; however, the numbering system starts over at the beginning of the 500 kV line.

Two major re-routes are under consideration including the MSG/Visual Re-route in Section 9C and the Sugarloaf Re-route in Sections 10A and 10B. Recommendations for both the original alignment and these considered re-routes are presented in this report.

Two existing SDG&E transmission lines overlap portions of the proposed Sunrise alignment. The western end of the proposed project (Section 4A) parallels the western end of the existing Sycamore-Creelman Transmission Line. In addition, from the Jacumba area eastward, the proposed project generally parallels the existing 500 kV Southwest Powerlink Transmission Line (SWPL) to the Imperial Valley Substation (part of Section 9C, Section 10A, and 10B).

1.2 PURPOSE AND SCOPE OF SERVICES

The purpose of this investigation was for URS Corporation Americas (URS) to provide geotechnical design information and geologic hazard evaluations to assist SDG&E and their consultants with project planning and engineering design of transmission line structure foundations. SDG&E has retained Burns & McDonnell Engineering (BMcD) as the project foundation designer. The scope of our work included analyzing terrain based on interpretations of available imagery, reviewing published geologic information, reviewing previous URS geotechnical investigations, reviewing construction information

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from SDG&E files, reviewing previous URS geologic evaluations for the proposed project, carrying out site reconnaissance, performing seismic refraction traverses, engaging a subconsultant to complete electrical resistivity surveys, and preparing this report. No geotechnical subsurface explorations were performed for this investigation.

1.3 AVAILABLE INFORMATION

Available information was reviewed to develop the discussions, conclusions and recommendations presented in this report. The information reviewed included aerial imagery, topographic maps, published geologic maps, previous URS geotechnical investigations, available foundation construction records from the existing adjacent transmission line, and previous URS geologic evaluations for the proposed project. Detailed references for the information reviewed are presented in Section 8.

1.3.1 Geologic Maps and Aerial Imagery

Published geologic maps and aerial imagery were used to evaluate the geologic units anticipated at the proposed tower sites. Geologic mapping compiled by Kennedy and Tan (2005) was the primary geologic reference for the western and central portions of the alignment, and the geologic strip maps from the SWPL geotechnical investigations were used as reference for the eastern portion of the alignment. Geologic strip maps for the alignment are presented on the Site Plan and Generalized Geologic Maps (Figures 2a through 2z). These figures also show the considered MSG/Visual and Sugarloaf Re-routes. Figure 3 presents a Key to Geologic Maps. Table 2 summarizes the mapped geology at each of the structure sites by section. Aerial imagery reviewed included digital information from Google Earth Pro and historic stereographic aerial photographs.

1.3.2 Previous Geotechnical Investigations

Previous geotechnical investigations were performed by URS and others for the existing and proposed SDG&E transmission lines and substations, as well as other projects, along the proposed alignment. These were reviewed as part of the current investigation. The locations of seismic refraction traverses and borings performed as part of the previous geotechnical investigations for the existing transmission lines are presented on Figures 2a through 2z. Relevant information from these transmission line investigations are presented in Appendix A for the Sycamore-Creelman Transmission Line and in Appendix B for the SWPL Transmission Line. We have also considered information from previous URS geotechnical investigations including those performed for the Imperial Valley Substation, the proposed East County Substation and the proposed Suncrest Substation.

The MSG portion of the Sunrise Powerlink project was evaluated in a June 30, 2009 geotechnical and geologic hazards investigation (URS, 2009a). That information is incorporated and updated in this report.

1.3.2.1 Sycamore-Creelman Transmission Line

URS (as Woodward-Clyde Consultants [WCC]) performed a geotechnical investigation in 1993 for the Sycamore-Creelman Transmission Line that extends from the Sycamore Canyon Substation to the Creelman Substation. The geotechnical investigation was summarized in a July 23, 1993 report (WCC,

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1993) and consisted of geologic reconnaissance, seismic refraction traverses and geotechnical borings. Information from the applicable seismic refraction traverses is summarized in Table A-1 in Appendix A.

1.3.2.2 SWPL Transmission Line

Geotechnical investigations performed by URS (as WCC) for the SWPL Transmission Line in 1980, 1981, and 1982 provided information regarding subsurface conditions and foundation design recommendations (WCC 1980, 1981, and 1982). The SWPL extends from the Miguel Substation to the Imperial Valley Substation. The geotechnical investigations performed for the SPWL project included geologic reconnaissance, seismic refraction traverses, and borings. Information from the applicable borings and seismic refraction traverses is summarized in Table B-1 in Appendix B.

1.3.2.3 Suncrest Substation

URS performed a geotechnical investigation for the proposed Suncrest Substation located between Section 7 and 8A. A final geotechnical report was issued on December 21, 2009 (URS, 2009c). The investigation at the substation site included seismic refraction traverses, electrical resistivity surveys, geotechnical borings with rock coring, insitu testing, and geotechnical soil and rock laboratory testing.

1.3.2.4 Imperial Valley Substation

URS performed a geotechnical investigation for the improvements to the Imperial Valley Substation as presented in a June 10, 2009 report (URS, 2009b). This investigation at the existing substation included geotechnical borings, insitu testing, geotechnical laboratory testing and a summary of previous geotechnical investigations for the substation.

1.3.2.5 East County Substation

URS performed a preliminary geotechnical investigation for the proposed East County Substation located adjacent to the proposed transmission line route, just west of MSG. The investigation was summarized in an Interim Geotechnical Investigation, dated June 10, 2008 (URS, 2008). URS performed another phase of geotechnical investigation and submitted a draft geotechnical investigation report to BETA Engineering, dated January 15, 2010 (URS, 2009g). The investigations at the substation site included seismic refraction and electrical resistivity surveys, geotechnical borings, test pits, installation of a groundwater monitoring well, and geotechnical laboratory testing.

1.3.2.6 Sycamore Canyon Substation

Structures P1, P2 and P3 were originally included in Section 4A but are currently included as part of planned modifications to the Sycamore Canyon Substation. Geotechnical recommendations for those structures (poles) were developed by URS and were presented in a letter dated September 10, 2009 (URS, 2009f). The recommendations are based on the original geotechnical investigation performed by URS (as WCC) for the substation in 1992 (WCC, 1992).

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1.3.2.7 Imperial Valley Solar

URS performed a geotechnical investigation for the proposed Imperial Valley Solar (formerly Solar Two) power plant in Imperial Valley. The report is dated January 8, 2009 (URS, 2009h). The proposed transmission line is adjacent to the proposed solar power plant northeast of the Imperial Valley Substation and north of Interstate 8. Subsurface information from that project, primarily groundwater data, was used in the preparation of this report.

1.3.3 SWPL Foundation Construction Records

SDG&E provided construction records from the SWPL tower foundations. The records indicate the depth and diameter of each of the tower foundations and a general description of the subsurface conditions encountered. Information from the applicable foundation construction records is summarized in Table B-1 and copies of the pertinent construction records are presented in Appendix B.

1.3.4 Sunrise Powerlink Geologic Hazards Report

URS prepared a preliminary geologic hazards evaluation report for the proposed Sunrise Powerlink project and issued a draft report on February 3, 2009 (URS, 2009d). This evaluation indicated that the project is not impacted by geologic hazards that cannot be mitigated by appropriate design and construction. The report addressed the potential geologic hazards impacting the project in detail, including: fault crossings, seismic shaking, liquefaction and seismic settlement, landslides, rockfalls, and debris flows. Abbreviated summaries of this geologic hazard information are presented in this report, but the user is referred to the February 3, 2009 report for the more detailed evaluation.

1.3.5 Scour Evaluation

URS performed a hydrology and hydraulic analysis for the transmission line alignment. Results from these analyses are used to estimate scour and are presented under separate cover in the URS report titled "DRAFT Scour Analysis, Sunrise Powerlink Project, San Diego and Imperial Counties, California," dated December 28, 2009, Revision 1 (URS, 2009e).

1.3.6 Sunrise Powerlink Section 6 Geotechnical Investigation

A geotechnical investigation was performed by Geosyntec for the underground portion of the Sunrise Powerlink project. This investigation, dated June 18, 2009, was performed in the Alpine area (Section 6) and included field investigations consisting of seismic refraction traverses, backhoe test pits and geotechnical borings. The report provided conclusions and recommendations for design of the underground project that included foundation design recommendations for the cable monopoles located at each end of Section 6.

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SECTION 2 GEOTECHNICAL INVESTIGATION

The geotechnical investigation included performing field reconnaissance, seismic refraction traverses and electrical resistivity surveys at the structure sites.

2.1 FIELD RECONNAISSANCE

The majority of the proposed structure sites have been reviewed in the field by a URS engineering geologist. These reviews were often performed as part of the engineering walkdown process in which site suitability was evaluated from various perspectives, including; transmission engineering, construction, environmental impacts, geologic hazards, and geotechnical considerations. In other instances, site reviews were performed when the seismic refraction traverses were conducted. Preliminary interpretations of geologic conditions were based on the observed surface exposures.

2.2 SEISMIC REFRACTION TRAVERSES

Seismic refraction traverses were performed under the direction of a registered professional geophysicist from URS using a 24-channel seismograph. A total of 270 seismic refraction traverses were performed between December 18, 2008 and October 1, 2009. The traverses were generally 230 feet long and centered at the middle of the structure location. Details of the seismic refraction methodology are presented in Appendix C. The locations of the traverses are presented on Figure 2a through 2z.

The seismic refraction data was used to assess the approximate depth and seismic velocity of the subsurface layers and their variability within the proposed site for foundation design and construction purposes. The results of the seismic refraction traverses are summarized in Table 3 and in Figures 6a through 6m for the original alignment. The interpreted seismic velocity profiles for MSG/Visual and Sugarloaf Re-routes are presented in Figure 6n. Detailed graphical results are presented in Appendix C on Figures C-1 through C-270. The seismic refraction data collected, including interpreted time-distance plots, are archived in our files and available upon request.

2.3 ELECTRICAL RESISTIVITY SURVEYS

Electrical resistivity surveys were performed at selected locations along the transmission line alignment between January 15 and October 1, 2009 by V&A Engineering (V&A). Forty-four arrays were performed at the locations indicated on Figure 2a through 2z. The results of the surveys and a discussion of the electrical resistivity survey methodology are presented in Appendix D.

2.4 ADDITIONAL GEOTECHNICAL INVESTIGATION

Additional geotechnical investigation will be performed prior to or during the early phases of construction to confirm that the recommendations presented in this report are appropriate and revise foundation recommendations as necessary. This investigation could not be performed during the design phase due to access and environmental constraints. Investigation activities to evaluate subsurface conditions are planned to include additional seismic refractions surveys at locations not accessed as part of this

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investigation, geotechnical borings and cone penetration tests (CPT), and fault trenching to confirm that the proposed structures are not constructed over active earthquake faults.

Geotechnical borings (including rock coring as needed) will be performed at locations selected by considering the structure type, geology and geologic hazards, access, spacing of explorations, and presence of previous geotechnical data. Where subsurface conditions and access permit (only in limited locations), CPTs will be advanced in lieu of borings to provide a cost and time savings. Additional borings will be performed near the abutment locations for replacement of a private bridge in Alpine, California off Peutz Valley Road and for a transmission line monopole. Downhole seismic velocity surveys will be performed in some of the borings to provide additional subsurface data, and geotechnical laboratory testing will be performed on samples from the borings.

It is planned to perform fault trenching at four locations along the transmission line route. The fault trenches would be constructed adjacent to structures P303 and P304 where the route crosses the projection of the Elsinore fault zone. Additional trenches will be performed at structures P257, P335, and P340 to address possible fault hazards associated with the Jacume and Yuha Wells faults. The trenches are expected to be on the order of 60 to 80 feet in length, 30 inches wide, and 5 to 10 feet deep.

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SECTION 3 SITE AND GEOLOGIC CONDITIONS

Our knowledge of the site and geologic conditions has been developed from site reconnaissance, review of published and unpublished geology and geologic hazards information, previous geotechnical investigations and construction records, seismic refraction traverses, and electrical resistivity surveys. No geotechnical subsurface explorations have been performed to date for this investigation due to access and environmental restrictions.

3.1 PHYSIOGRAPHIC AND GEOLOGIC SETTING

The Sunrise Powerlink extends through two physiographic provinces, the Peninsular Ranges and the Colorado Desert. The transmission line alignment begins at the Sycamore Canyon Substation located in the northeastern portion of the Miramar Marine Corps Air Station in the west-central portion of the Peninsular Ranges physiographic province. The alignment extends across the mountain range and drops into the Salton Trough, a subprovince of the Colorado Desert physiographic province. The transition between the mountainous Peninsular Ranges and the desert setting of the Salton Trough occurs abruptly along a steep, rocky escarpment. The transmission line makes that transition in an area known as MSG. These three distinct physiographic zones and their geologic settings are described below.

3.1.1 Peninsular Ranges Batholith of Southern California

The western and central portions of the Sunrise Powerlink (Sections 4A through 9C) cross the Peninsular Ranges. The Peninsular Ranges are an elongated, northwest trending belt of crystalline rock approximately 500 miles long extending from the San Jacinto Mountains south into Baja California (Kimbrough *et al.*, 2001). The Peninsular Ranges are comprised of Jurassic metamorphic rocks and Cretaceous granitic and gabbroic intrusive bodies (plutons) of plutonic rocks. The core of the Peninsular Ranges is composed of a series of these plutons collectively referred to as a batholith. During the Cretaceous period, these batholithic rocks intruded older granitic, metasedimentary, and metavolcanic rock at great depths below the earth's surface. These older rocks are remnants of an ancient continental shelf and volcanic arc setting, and were metamorphosed by the heat and pressure created by the intruding batholithic bodies (Todd *et al.*, 2003 and Grove *et al.*, 2003). The older rock is present throughout the Ranges as widespread and variably sized zones metamorphosed rocks in juxtaposition to the Cretaceous plutonic rocks.

These Cretaceous mountain building events were followed by millions of years of erosion resulting in the removal of kilometers of material which has exposed the core of the batholithic rocks and remnants of the older metamorphic rocks. Uplift, tilting and erosion of the westernmost margin of the batholith in the Late Cretaceous formed low relief topography west of the mountains. Subsequently during the Eocene epoch, marine and nonmarine strata were widely deposited across the erosion surface of the batholith resulting in the San Diego embayment and terraced hilly terrain (Todd *et al.*, 2003). Late Tertiary period tectonic forces developed a series of strike-slip faults that are collectively referred to as the San Andreas Fault System that define the transform boundary between the Pacific Plate and the North American Plate. Uplift and westward tilting of the Peninsular Ranges continues into the Quaternary period.

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3.1.2 Mountain Springs Grade

The MSG area incorporates portions of Sunrise Powerlink Sections 9C and 10A and extends from the northeastern edge of O'Neill Valley along a notch cut by Boulder Creek eastward across a steeply descending mountain front. This mountain front is characterized by extensive boulder outcrops of granitic rock and deeply incised drainages including Boulder Creek and Myer Creek.

The MSG area represents a steeply descending transition from the Peninsular Ranges physiographic province to the Colorado Desert physiographic province. The majority of this transmission line segment is underlain by granitic rock of the Peninsular Range batholith. However, there are minor occurrences of metamorphic rock and some Tertiary volcanic rocks and various Quaternary alluvial or colluvial deposits.

3.1.3 Salton Trough

Section 10B and a portion of Section 10A of the proposed Sunrise Powerlink lie within the western portion of the Colorado Desert (locally known as the Anza-Borrego Desert) physiographic province and specifically, the Salton Trough subprovince. The Salton Trough is a distinct geomorphic element formed by tectonic forces resulting in a structural depression that includes elevations below sea level. It is bounded to the north by the Coachella Valley, the Gulf of California to the south and by mountain ranges to the east and west. The Salton Trough is a structural basin filled of marine and clastic fluvial sediments up to 15,000 feet in thickness (Dibblee, 1954) overlaying the basement rock. The Salton Trough has filled with sediment eroded from the surrounding mountains and Colorado River deposits and has been inundated by sea level changes and the Colorado River. Ancient Lake Cahuilla ancient in the Salton Trough during the last 1,000 years and evaporated completely nearly 300 years ago (Sieh, 1986). The transmission line alignment is near the eastern shoreline of the ancient Lake Cahuilla within the Yuha Desert basin south of Interstate 8. The lowest portion of the Salton Trough is currently occupied by the Salton Sea, a man-made inland lake with no natural outlet.

3.2 GEOLOGIC CONDITIONS

As described above, the proposed Sunrise Powerlink traverses varied terrain and diverse geologic conditions. The geologic units encountered along the alignment consist of Mesozoic metamorphic rocks, granitic rocks of the Peninsular Ranges batholith of southern California, and Tertiary and Quaternary sedimentary rocks, with localized Tertiary volcanic rocks in the Jacumba area. The sedimentary rocks consist of nonmarine (some marine in Imperial Valley), fluvial, lacustrine, and volcaniclastic strata. The sedimentary strata unconformably overlie the metamorphic and batholithic rocks, and are basin-fill deposits in Imperial Valley.

The bedrock geologic units and surficial deposits present along the alignment are briefly described below from youngest to oldest relative geologic age. The approximate aerial extent of the soil/rock zones are shown on Figures 2a through 2z. A key to geologic maps is presented on Figure 3.

3.2.1 Quaternary Lake Beds (Ql)

Lacustrine (lake bed) deposits of ancient Lake Cahuilla are mapped at the eastern end of the project near the Imperial Valley Substation. The lake bed deposits are generally composed of unconsolidated sand and

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gravel deposited along the ancient shoreline, grading toward the basin (eastward) into silty and clayey deposits. These deposits are among the youngest and weakest geologic units encountered along the project alignment.

3.2.2 Alluvium, Older Alluvium and Possible Ancient Landslides (Qal, Qt/f, and Qls?)

Alluvial deposits are present locally in drainages throughout the project alignment. However, the most significant deposits of unconsolidated Quaternary alluvium are found in the larger inter-montane valleys such as Jacumba Valley (Section 9C); broad expanses of alluvium also underlie much of the Imperial Valley (Section 10B). In Imperial Valley below the 50 foot elevation contour, much of the alluvium is fine sediment from lake bed deposits of Ancient Lake Cahuilla and overlies the Palm Spring Formation. The alluvium consists mostly of unconsolidated layers and lenses of porous silty sand, sandy clay, and clayey to sandy silt with gravels and cobbles.

Older alluvial deposits are also present along the alignment. The older alluvial deposits typically underlie the younger alluvial deposits within most alluvial valleys and may be encountered during foundation excavation. The older deposits are similar in composition to the younger alluvium but generally exhibit greater strength and may be slightly or even moderately cemented locally.

The composition and strength of these older alluvial materials are variable depending on the local parent sources, geologic age and mode of deposition. The older alluvium includes terrace, fan and talus deposits. The composition of the older alluvium or talus can vary greatly. Talus deposits typically contain granitic cobbles and boulders in a silty sand matrix. Clayey sand or sandy clay matrix material may be encountered locally, especially in areas where sources are mafic, volcanic, or metamorphic rocks. Coarse-grained alluvial fan deposits that contain very large clastic material may be encountered near the mountain fronts. These mountain front alluvial deposits are referred to as fanglomerates, and are generally indurated. Fanglomerates are encountered along the slopes of El Capitan Mountain, north of the San Diego River Valley in Section 5.

Large boulders that result from exfoliation and differential weathering processes are also present at the ground surface throughout much of the area underlain by granitic terrain. Material from rocky outcrops in steep terrain is subject to some down slope movement; thus, some of the rock at the surface has been transported short distances by gravity.

Possible ancient landslides are present along and near the alignment in Section 4A as discussed in Section 4.4. Only Structure P-20 is underlain by possible ancient landslide deposits. The proposed structure placement and associated pad and access road grading in this area is very minor and does not impact the slope stability of these deposits.

3.2.3 Palm Spring Formation (QTpsa, QTpsp)

The Pliocene Palm Spring Formation is composed primarily of light gray sandstone and reddish gray claystone. It is restricted to the Imperial Valley portion of the alignment and is present along the southeastern flanks of the Coyote Mountains. The Palm Spring Formation is underlain by the Imperial Formation, and is overlain by a thin surficial cover of either sand or gravel. Locally, the formational beds are overlain by about 3 to 5 feet of weakly cemented pediment gravels; these areas are denoted by the

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map symbol "pp." In most other areas, the Palm Spring Formation is covered by either alluvial sand (denoted by map symbol "ap") or lacustrine sand (shown by map symbol "alp").

3.2.4 Imperial Formation (Ti, Tip)

The Pliocene Imperial Formation is also found only in the Imperial Valley and outcrops of tilted beds form the badlands topography near the Coyote Mountains. This unit consists primarily of yellow and gray claystone with sandstone interbeds and cemented oyster shell reefs. The Imperial Formation is exposed along the southern flanks of the Coyote Mountains where it is nearly continuously covered by pediment gravels. Localized exposures of the Imperial Formation reveal friable claystone and resistant fossiliferous beds. Typically, the gravel cover is estimated to be less than 3 to 5 feet thick.

3.2.5 Split Mountain Formation (Tsm)

The Miocene Split Mountain Formation is encountered along a small portion of the alignment near the Section 10A and Section 10B transition at the base of the MSG. This formation consists of nonmarine conglomerate and sandstone, composed of weakly cemented gravelly coarse sand and crystalline rock fragments of the Peninsular Ranges batholith.

3.2.6 Alverson Andesite (Tal)

This unit is composed of andesite, basalt flows and interbedded andesitic tuffs. Mapped exposures are limited to the southern flanks of the Coyote Mountains near the alignment.

3.2.7 Jacumba Volcanics (Tj)

In the Jacumba area, many of the mesas adjacent to the alignment are capped by Miocene basalt flows, and a number of small peaks represent relict volcanic vents or cones. Large outcrops of volcanic rock are mapped along Section 9C within the Jacumba area as part of the Jacumba Volcanics geologic unit. This unit contains basalt and andesite flows, breccias, and pyroclastic rocks, as scattered cinder cones.

3.2.8 Anza Formation (Ta)

This formation consists of Miocene nonmarine sandstone and coarse conglomerate. This is a minor unit relative to the transmission line geology and is present only in the eastern portion of the alignment. Locally, this unit is thin and capped by the Jacumba Volcanics.

3.2.9 Poway Group - Pomerado and Stadium Conglomerate (Tp, Tmv, Tst)

Eocene sedimentary deposits of the Poway Group are present along the western end of the alignment. The Poway Group is comprised of conglomerate, nonmarine sandstone, and brackish water claystone and is subdivided into Pomerado Conglomerate, Mission Valley Formation, and Stadium Conglomerate, from youngest to oldest, respectively. The Pomerado Conglomerate and Stadium Conglomerate formations are prevalent along the alignment in Section 4A, and a relatively thick sequence overlies bedrock in Section 5 from towers P35 to P42. These two units are lithologically similar and are composed of nonmarine massive cobble conglomerate, coarse-grained sandstone matrix that is indurated with some sandstone

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interbedded tongues. The gravels, cobbles and rare boulders consist predominantly of rounded weakly metamorphosed volcanic and volcaniclastic rocks with lesser quartzite and granitic rock.

3.2.10 Crystalline Rocks of the Peninsular Ranges Batholith of Southern California (Kgr, Ka, Klb, Kjv, Kcm, Kc, Kmgp, Kgm, Klp, Jcr, KJld, Kih)

A major portion of the transmission line alignment crosses the Peninsular Ranges of Southern California. The Peninsular Ranges are comprised of extensive granitic rock, where tonalite and granodiorite are the most abundant single rock types, although the composition ranges from gabbro to granite. The undivided granitic rock unit (Kgr) is a generalized map unit consisting of tonalite and granodiorite mapped along the alignment in Section 5. Several early Cretaceous rock units including tonalite of Alpine (Ka), tonalite of Las Bancas (Klb), the more resistant granitic rocks of the Corte Madera Monzogranite (Kcm), and localized large plutons and small bodies of gabbroic rocks (i.e., dark colored mafic and ultramafic rocks that have high contents of iron- and magnesium-bearing minerals) mapped as Cuyamaca Gabbro (Kc) are prevalent in Sections 5, 7, 8A, and 8B.

The Cuyamaca Gabbro weathers into more clayey soil and is generally more deeply weathered than the lighter colored granodiorites and tonalites. Areas underlain by Cuyamaca Gabbro generally develop a more gentle rolling topographic expression than the other granitic rock types.

Cretaceous granitic rocks of the Granite Mountain tonalite (Kgm) and the La Posta tonalite (Klp) dominate the geology along the alignment in Sections 8C through 9B, and east of Jacumba in Section 9C and Section 10A. For shallow excavations and foundation design in crystalline granitic rock, the degree of weathering and fracturing, rather than granitic rock composition has a more significant effect on rock quality and engineering properties.

3.2.11 Metavolcanic Rocks (Kmv, Ksp)

The Cretaceous metavolcanic rocks unit (Kmv) is mapped along the mountain slopes of Highway 67, in the San Diego River Valley area (Section 5) and surrounding mountains and becomes more localized in the Alpine area and areas south of Japatul Valley. These rocks consist of metamorphosed volcanic rock of varied original rock type including tuffs, tuff-breccias and volcanic flow rocks. The Santiago Peak Volcanics (Ksp) are also Cretaceous metavolcanic rocks. This unit is common in western San Diego County but is only locally encountered along the Sunrise Powerlink alignment as mapped in the Moreno Valley area of Section 5.

3.2.12 Metamorphic Rocks (JTRm, KJvs, Jsp, MzPzm)

A series of metamorphic rocks assigned to four map units are present along the alignment between the proposed Suncrest Substation and MSG. The mapped rock units include the Jurassic and Triassic metasedimentary and metavolcanic rocks (JTRm), and the Jurassic and Cretaceous metasedimentary and metavolcanic rocks (KJvs). Migmatic schist and gneiss of Stephenson Peak (Jsp) is mapped northwest of Jacumba in Section 9C.

A small body of older metamorphic rocks mapped as Rocks of Jacumba Mountains (MzPzm) is present in the central portion of the MSG (Section 10A). These are primarily metasedimentary rocks consisting of

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interlayered quartzite, meta-sandstone, schist, and phyllite. Smaller bodies and inclusions of metamorphic rocks are present locally near the margins within the La Posta plutonic rocks.

3.3 TECTONIC SETTING

The current tectonic setting of southern California is controlled by its location within the plate boundary zone between the Pacific and North American Plates. The Pacific Plate, which includes the San Diego and western Imperial Valley area, is traveling northwest relative to the North American Plate at a rate of about 50 millimeters per year (mm/yr) (deMets *et al.,* 1994). Most of this plate motion is accommodated on a series of strike-slip fault zones that constitute the San Andreas Fault System, which includes the San Andreas, San Jacinto, Elsinore fault zones. This crustal interaction of predominantly dextral (right-slip) faults spans from the Salton Trough across the Peninsular Ranges, and extends west approximately 60 miles offshore into the Continental Borderland Province.

Over geologic time, uplift and tilting of the Peninsular Ranges followed by erosion have resulted in the relatively modest mountainous terrain seen today. Episodic Miocene volcanism developed in parts of the eastern margins of the Peninsular Ranges resulting in localized lava flows and a variety of volcanic deposits, including those traversed by the alignment in the Jacumba area. This period of volcanic upheaval also resulted in some faulting and fracturing of the older crystalline rocks in the Jacumba area. Later, the rifting of the Gulf of California (Todd *et al.,* 2003) resulted in marine and nonmarine deposits in the Salton Trough, including the Imperial and Palm Springs Formations in Section 10B.

Figure 4 presents a Fault and Peak Ground Acceleration Map and Figure 5 presents a Regional Earthquake Epicenter Map.

3.3.1 San Andreas Fault System

The San Andreas Fault System is the main component of the transform boundary between the Pacific and North American Plates in California. The San Andreas fault zone is the easternmost and largest of the faults in the San Andreas Fault System.

In southern California, the San Andreas Fault System comprises a suite of northwest-striking, sub-parallel, right-lateral strike-slip faults that occupy a 200 kilometer wide swath straddling the coast of southern California. Cumulatively, these faults, which occur both on- and offshore, carry about two-thirds of the total relative plate motion. The primary onshore faults include the San Andreas, San Jacinto, Imperial, and Elsinore faults (Figure 4). The Newport-Inglewood and Rose Canyon fault zones are located west of the aforementioned faults and have both onshore and offshore components.

The Elsinore fault zone is the only known active fault zone in proximity to the alignment. The project alignment crosses the southern end of the fault near the Coyote Mountains.

3.3.1.1 Elsinore Fault Zone

The Elsinore fault is a 250 kilometer long right-lateral strike-slip fault that is a significant part of the San Andreas Fault System. It strikes northwest and runs west of the Salton Trough near the Mexican border, to Corona, California where it branches into the Whittier and Chino faults. The central part comprises

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several segments, separated by step-overs, which include, from north to south, Glen Ivy, Temecula, Julian, and Coyote Mountain segments. The southern end of the Coyote Mountain segment crosses the alignment between Structures P303 and P304. The Laguna Salada fault is considered the southern extension of the Elsinore fault into Mexico. The two faults do not connect directly based on current mapping. There is a broad zone in the Yuha Basin area where no distinct, mapped active faults are located as shown on Figure 4.

A Richter or local magnitude (M_L) 6 earthquake in 1910 occurred on the northern end of the Elsinore fault, and its Mexican extension, the Laguna Salada fault, had an estimated moment magnitude (M_w) 7 earthquake in 1892 (SCEC, 2008 and Petersen and Wesnousky, 1994).

The slip rate on the Elsinore fault is estimated at about 3 to 5 mm/yr (Pinault and Rockwell, 1984; Rockwell and Pinault, 1986) and the slip rate on the Coyote Mountain segment has a Holocene slip rate of about 3 mm/yr (WGCEP, 2008). The Laguna Salada fault has a right-lateral slip-rate of 2 to 3 mm/yr, with a similar component of dip-slip motion (Mueller and Rockwell, 1995).

3.3.1.2 Yuha Wells and Jacume Faults

The Yuha Wells fault and the informally named Jacume fault east of the Jacumba area are relatively minor geologic structures located in the western portion of Salton Trough and eastern portion of the Peninsular Ranges, respectively. Both faults appear to be northeasterly striking left lateral faults that are considered secondary features that may accommodate stresses developed between the major northwesterly striking faults.

The Yuha Wells fault consists of a complex zone of short, branching and stepping strands generally located between the northern terminus of the Laguna Salada fault and the southern end of the Elsinore fault (Rockwell, *et al.*, 1990). Two possible strands of this fault are mapped to the southwest of project alignment and project into the alignment between Structures P335 and P336 and between Structures P340 and 341. There is little published information on this fault.

Similarly, the Jacume fault is a short series of stepping fault traces that appears to be associated with a moderate level of microseismicity and no evidence of recent surface rupture.

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SECTION 4 GEOLOGIC HAZARDS

This section addresses potential geologic hazards along the transmission line alignment. The primary geologic hazard is strong ground motion from a seismic event centered on one of several nearby or more distant active faults. A summary of the evaluations of major faults crossings, seismic shaking, liquefaction and seismic settlement, landslides, rockfalls and slope stability along the alignment are discussed below. For a more detailed review, the reader is referred to the Preliminary Geologic Hazards Evaluation for the Sunrise Powerlink project (URS, 2009d).

4.1 FAULT CROSSINGS

The proposed Sunrise Powerlink crosses a strand of the Elsinore fault near the fault zone's mapped southern terminus. The Elsinore fault zone is classified as an Alquist Priolo Earthquake Fault over much of its length. The transmission line fault crossing area is not mapped as an Earthquake fault zone because of it location near the end of the fault zone and the uncertainty as to whether the fault is active in this location. Based on our review of existing mapping, our field reconnaissance and analysis of digital imagery, we locate the fault crossing approximately mid-span between Structures P303 and P304 as shown on Figure 2w.

The proposed transmission line crosses two faults considered potentially active based on available information, the Jacume fault and the Yuha Wells fault. The Jacume fault is mapped to the south of the project alignment in Section 9C. It is not evident as a through-going fault in the project alignment area. The fault is mappable to the south and projects just to the east of Structure 257 as shown on Figure 2t. The fault is not evident in the older fan deposits in the area of the alignment. There is no evidence of Holocene surface faulting along the Jacume fault and the potential for moderate or large displacement surface rupture of the Jacume fault is judged to be very low.

The Yuha Wells fault is not well expressed in the site area and is not considered a significant fault rupture hazard to the proposed transmission line. Two minor fault strands that may be part of Yuha Wells fault have been mapped near the project alignment as shown on Figures 2x and 2y.

4.2 SEISMIC SHAKING

Figure 4 is a generalized shaking hazard map presenting peak horizontal ground acceleration (PGA) as a percentage of the acceleration of gravity (g). The hazard levels depicted represent the PGA associated with a 10 percent probability of being exceeded in 50 years (return period of 495 years) for bedrock conditions. The map is derived from seismic hazard curves calculated on a grid of sites across the southwestern United States that describe the frequency of exceeding a set of ground motions within delineated fault sources. The ground motions relate the source characteristics of the earthquake and propagation path of seismic waves through the ground at a particular site or vicinity. The predicted ground motion is typically quantified in terms of a median value (*i.e.*, a function of magnitude, distance, type of faulting, the geologic or subsurface characteristics, and other factors) and a probability density function of PGA (Peterson *et al.*, 2008).

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4.3 LIQUEFACTION AND SEISMIC SETTLEMENT

Liquefaction and seismic settlement are secondary effects associated with seismic shaking. Liquefaction is a phenomenon in which loose to medium dense, saturated, granular materials undergo matrix rearrangement, develop high pore water pressure, and lose shear strength because of cyclic ground vibrations induced by earthquakes. This rearrangement and strength loss is followed by a reduction in bulk volume of the liquefied soils. The effects of liquefaction can include the loss of bearing capacity below foundations, settlement in level ground, and instability in areas of sloping ground (also known as lateral spreading). Liquefaction is generally considered to occur within 50 feet of the ground surface and is often limited to depths of 30 feet or less when evaluating more significant deformations.

Overall, the project exposure to liquefaction and seismic settlement hazards is considered very low for the majority of the project alignment. In the western and central portions of the project (Sections 4 through 8) there are no structures located in alluvial areas that have a significant potential for shallow water and loose to medium dense soils. The potential exposure to liquefaction increases somewhat in the eastern portion of the alignment. Relatively shallow water may be encountered in the alluvial crossing of the Jacumba Valley in Section 9B and in the desert wash crossing in Sections 10A and 10B. Previous borings encountered medium dense materials in the alluvium of Jacumba Valley and dense and very dense materials in the Palm Canyon Wash and the Coyote Creek Wash in Sections 10A and 10B, respectively.

Seismic settlement results from the densification of granular soils during earthquake-induced shaking in dry or partially saturated soils. The potential for seismic settlement is present in younger alluvial deposits along the alignment and most significant in Jacumba Valley and in the Imperial Valley. Previous investigations show that these materials generally become medium dense or dense at relatively shallow depths. These conditions suggest that seismic settlement should not be a significant hazard for the project. The proposed subsurface boring program planned for the initial phase of construction will evaluate liquefaction and seismic settlement conditions.

4.4 LANDSLIDES, DEBRIS FLOWS, AND ROCK FALLS

Landslides are a significant geologic hazard in southern California. Within San Diego County, the areas of greatest landslide hazard are generally located in the coastal plain area where layered sedimentary deposits contain inherently weak layers that may be exposed by natural erosion or grading activities. When unfavorable geologic and topographic conditions coincide, landsliding may result.

The majority of the Sunrise Powerlink alignment is underlain by crystalline rocks with minor alluvial deposits and a minor occurrence of sedimentary and layered volcanic rocks in the Jacumba area. Landslides are possible, but relatively rare in the crystalline rock setting. Based on our field reviews and terrain analysis of the alignment, no active or recent landslides are present in or adjacent to the transmission line. There are possible ancient landslides mapped in Section 4A as shown on Figure 2A. Structure P20 is located on a possible ancient landslide. This feature is characterized by subdued geomorphology suggestive of an ancient feature. No movement has occurred in this area during the 16 year period since the Sycamore-Creelman transmission line was constructed, and a monopole was constructed within the limits of the suspected landslide. This location will be drilled as part of the planned

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geotechnical investigation. This boring will assess the presence or absence of a landslide in this location and provide an evaluation of landslide hazard and propose mitigations, if warranted.

In addition to landslides, areas of intense erosion, debris flows and soil slips occur in areas of sloping terrain. Areas of intense erosion or recent debris flows or soil slips are evidenced by fresh scarps and slopes barren of vegetation. The site selection process and specifically the field walkdown efforts sited structures so that areas of recent erosion or soil movement were avoided.

Rock falls occur in areas with bold rock outcrops and steep natural slopes. Additionally, jointed rock may undergo rock falls if construction slopes were to undercut a rock slope or if subjected to seismic shaking. In general, the rock fall hazard is greatest in areas with slope inclinations in excess of 60 degrees from horizontal. Extensive boulder outcrops and steep slopes are encountered locally along the alignment in various locations. Rock falls have occurred in some of these general areas during the geologic past. Based on our preliminary review of the structure sites, there are no structures located within zones characterized as having a high risk of rock fall hazard and no large, precarious boulders that pose a significant risk to the proposed structure sites have been identified. In general, most of the structure sites are located near the upper reaches of slopes or minor ridges. Areas of large precarious boulders have not been identified above these proposed structures.

4.5 EXPANSIVE AND COLLAPSIBLE SOILS

Changes in moisture can cause shrinkage and expansion of clayey, fine-grained soils. Collapse can occur in dry soils that have unstable soil structure due to decomposition or irrigation processes, typically with a skeletal structure that is weakly cemented by clays or soluble salts. Increases in moisture content can cause the interparticle cementation to reduce, causing changes in volume (collapse), especially when loaded.

The soil conditions observed at the ground surface and in the applicable previous borings generally indicate coarse-grained soils in the western and central portions of the alignment. In addition, the coarse-grained surficial soils are underlain by weathered rock in these areas. The coarse-grained soils and weathered rock in the western and central portion of the transmission alignment are unlikely to have significant expansion or collapse potential. However, the eastern portion of the alignment (the Salton Trough geologic setting) includes fine-grained lake deposits and young, dry alluvial deposits. In general, these potentially deleterious soil conditions, if present, are shallow phenomena and are not anticipated to affect the deep foundations associated with transmission line structures. The boring program planned for the initial phase of construction will provide subsurface information to corroborate that evaluation.

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SECTION 5 FOUNDATION RECOMMENDATIONS

The tower foundation recommendations presented in this report are based on information provided to us, review of available information, empirical correlations, limited geotechnical investigation, engineering and geologic analyses, and professional judgment. The characteristics of the subsurface materials are based on the site and geologic conditions described in Section 3, the results of geotechnical investigations, and the construction records for the existing SWPL transmission line. We have previously provided preliminary design recommendations for the MSG area (URS, 2009a). For continuity that information is included here.

We understand that the proposed transmission line will be constructed using primarily towers but that multiple monopoles are planned. The tower foundations will consist of four, cast-in-place drilled piers or micropile foundations, or one large cast-in-place drilled pier or micropiles for steel monopoles. These foundations will be subject to high downward and upward loads, overturning moments, and lateral forces. This report provides drilled pier foundation design information for each site. However, we understand that micropiles will be considered for sites where shallow rock is present, particularly in the MSG area and in areas where helicopter access is required. Recommendations for micropiles are not included in this report. Steel monopoles are currently planned near the Sycamore Canyon Substation, on either end of the underground Section 6, and specific locations in Section 7.

The transmission line foundations will be installed in a variety of geologic materials ranging from alluvial deposits to hard rock. Most of the transmission line will encounter variably weathered rock, and predominantly granitic rock, that is highly fractured. In our opinion, these materials should provide suitable foundation conditions for the new structures. Other conditions that influence the design of the foundations include the inclination of adjacent slopes and the depth of relatively disturbed or weak materials such as residual soils, alluvium and slopewash. The Site Plan and Generalized Geologic Maps presented on Figures 2a through 2z indicate the primary geologic units observed and mapped along the transmission line alignment.

5.1 FOUNDATION EXCAVATION

To evaluate excavation augerability, we have considered the seismic refraction information at the proposed structure sites and previous boring information where available. Further, we have reviewed foundation construction records from the SWPL transmission line. The results of our seismic refraction traverses are presented in Table 3 and Figures 6a through 6n present our interpretative seismic velocity profiles. Appendix A presents the Sycamore-Creelman seismic data and Appendix B presents the SWPL data. The locations of the traverses are presented on the Site Plan and Generalized Geologic Maps (Figures 2a through 2z).

5.1.1 Excavation Characteristics

Drilled shafts are expected to be relatively easy to excavate to design depths within alluvial deposits and completely weathered rock. Caving of the drilled holes was noted during the SWPL foundation excavations and is likely in the alluvial and slopewash areas. Caving may be exacerbated where perched groundwater is present. In the majority of the proposed alignment, there could be several feet of surficial

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material that could slough back into the excavated hole. Such materials should be cased or sloped back to a stable inclination or cased during construction.

In general, due to the weathering profile of the rock, we anticipate that many locations along the alignment can be drilled using conventional large-diameter auger type drill rigs. However, in many other areas of the proposed alignment, we anticipate that the excavations will encounter fractured rock and that rock excavation methods or large-diameter rock coring equipment may be more suited for the proposed excavations. Boulders and cemented zones which could hinder the drilling may be present randomly. If boulders or cemented zones are encountered during drilling, the oversized material may have to be jack hammered or blasted and removed.

Drilling characteristics in granitic rock terrain depends largely on the degree and depth of weathering within the rock mass. Much of the alignment will be located within metasedimentary and granitic rock overlain by a variable thickness of weathered materials. In many cases, this decomposed layer is deeper than the potential foundation depths. However, massive boulders of widely variable decomposition are frequently located at the surface and throughout the subsurface within the otherwise decomposed granitic rock mass. The presence or absence of boulders at a structure site is expected to be a primary factor in whether or not the foundations can be augered. Because of shallow rock and the variable nature of subsurface materials, auger drilling in rock is expected to be difficult and, in many cases, auger refusal should be expected for rock excavation estimating purposes. Evaluations of augerability are discussed below.

In rock areas that indicate refusal to drilling conditions, it may be required to use controlled blasting techniques, core drilling, rock breakers, or to utilize rock bolted or anchored foundations. Blasting should be performed by an experienced and qualified blasting engineer/contractor familiar with local conditions and foundation excavation requirements. All blasting should be performed to minimize overbreakage in the foundation zone. It should be anticipated that blasting will produce excavations with irregular sidewall conditions.

5.1.2 Excavation Augerability

For excavation augerability, we have considered the surface conditions, rock type, and seismic refraction data obtained at the structure site. In a general way, the summaries of seismic refraction traverses provide insight into the subsurface conditions along the proposed alignment. Higher p-wave (compressive wave) velocities generally indicate more competent materials with higher rock mass strengths. The generally accepted range for depth accuracy from these surveys is plus or minus 20 percent.

For excavation augerability, we have compared the seismic refraction data obtained at the structure locations with published correlations of seismic refraction data versus actual pier drilling conditions that were developed during construction of SDG&E's SWPL transmission line (Wight and Schug, 1985). Our evaluation also considered augerability tests performed for the Sycamore Canyon Substation. The anticipated excavation conditions are summarized in Table 3 and in Appendix C.

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In general Wight and Schug (1985) define the augerability for a Watson 3000 drill rig as follows:

Easy to Moderate:	A 3-foot-diameter hole can be excavated to a 15-foot depth in less than one hour using standard digging teeth or possibly carbide bullet teeth. Rock fragments up to 10 inches in maximum dimension may be encountered but will not cause significant delay.
Difficult:	A similar sized hole could be excavated using carbide bullet teeth, but greater operator skill is required. The hole can generally be completed within four hours. Some rock excavation may be required.
Refusal:	No progress is generally made without the assistance of blasting, rock coring or use of more powerful drilling equipment. Significant excavation time is required to complete the hole. Rock excavation methods are anticipated for this situation.

5.2 DRILLED PIER FOUNDATION DESIGN

We understand that the drilled pier foundations for towers and monopoles will be designed using the Electric Power Research Institute (EPRI) computer program *Moment Foundation Analysis and Design* (MFAD) for lateral capacity and methodology presented in the Federal Highway Administration (FHWA) Drilled Shaft design Manual (FHWA, 1999) for axial capacity. The design soil parameters required include:

- Soil Layer Depths
- Groundwater Depth
- Total Unit Weight
- Friction Angle
- Cohesion
- Shear Strength
- In-Situ Horizontal Stress Coefficient
- Operative/In-Situ Horizontal Stress Ratio
- Ratio of Interface to Soil Friction Angle
- Pressuremeter Modulus
- Shear Strength Reduction Factor

Estimates of these parameters were developed based on the results of the previous geotechnical investigations and construction records, engineering evaluation and analysis, empirical correlation, literature research, and professional judgment. URS should continue to review the foundation design for compatibility with the assumptions used to develop the design parameters. In addition, we recommend that the foundation designer verify the foundation designs using independent analysis and evaluate the values of displacement required to mobilize tip resistance.

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5.2.1 Soil Layer Depths

Average stratigraphic subsurface profiles at the proposed structure locations were developed based on the seismic refraction traverses, borings, and existing foundation construction records from the SWPL structure sites. These generalized subsurface profiles are presented on the Interpretive Seismic Velocity Profiles illustrated in Figure 6a through 6n.

5.2.2 Groundwater Depth

Groundwater is typically below the depth of foundations along the transmission line alignment. However, groundwater may be present in washes and other low-lying areas. Limited groundwater information from previous projects is available along the alignment. From this limited information, we have estimated groundwater conditions along portions of the alignment and at specific structure locations. A summary of estimated groundwater depths to be used for foundation design is presented in Table 4. In addition, the design groundwater depths are presented on Figures 6a through 6n.

5.2.3 Soil Parameters

Seven soil and rock design parameter sets were developed for the tower structures along the entire transmission line for ranges of seismic velocity using correlations, indirect theoretical elastic methods, and engineering judgment. These foundation design parameters for soil and rock, presented in Table 5, are based on our understanding of the geologic setting and subsurface conditions. These design parameters are intended only for use in the MFAD computer program or BMcD spreadsheet foundation evaluations and may not reflect actual strength values.

5.2.4 Foundation Design Coefficients

Two horizontal stress coefficients are used in drilled pier foundation design: 1) the horizontal stress coefficient which converts vertical to horizontal effective stress; and 2) the operative/in-situ horizontal stress ratio. These stress coefficients are calculated in accordance with EPRI computer program Compression Uplift Foundation Analysis and Design (CUFAD) Advisor for typical subsurface conditions. If all requirements noted are not met, the foundation designer should use the specific CUFAD Advisor to select the appropriate value.

We recommend horizontal stress coefficients of 0.60, 0.70, and 1.00, corresponding to the lower, moderate or higher relative density/strength of the soil or rock. Specific values of the recommended horizontal stress coefficient are presented in Table 5 for each design parameter set.

We anticipate that the typical drilled pier construction conditions for the project will include; dry excavations, no casing, medium dense to very dense soils, concrete slump of greater than 5 inches, and foundation excavations being left open for greater than 12 hours. For these conditions we recommend operative/insitu horizontal stress coefficients of 0.85, 0.90, and 0.95, corresponding to the lower, moderate or higher relative density/strength of the soil or rock. Structure sites with construction and subsurface conditions that do not meet these criteria should be evaluated individually.

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Specific values of the operative/insitu horizontal stress ratio are presented in Table 5 for the various design parameter sets. The minimum value of the operative/insitu horizontal stress coefficient should be used for layered systems with multiple recommended values.

We recommend an interface-to-soil friction angle coefficient of 1.0 for the anticipated construction conditions of straight sided drilled shafts constructed by cast-in-place concrete with no casing. Foundations constructed with casing should be designed with an interface-to-soil friction angle of 0.9.

5.2.5 Discount of Surficial Materials

We recommend that some depth of surface material be discounted in all foundation design analyses. The SDG&E design practice is to discount a minimum of 2 feet. This discount is based on the presumption that the weathered near surface materials inherently have lower strengths with an associated higher uncertainty as evidenced by slower seismic velocities. Correspondingly, these materials also have a higher potential for erosion or disturbance. The recommended depth of surficial material discounting is two feet for surficial velocities less than 2,000 feet per second (fps) and one foot for surficial velocities less than 3,000 fps. These recommended discount depths do not account for discount depth (or reduction in resistance) due to descending ground adjacent to the tower foundations. We recommend that the foundation design also take into account potential future erosion, scour and ground sloping conditions. BMcD has increased the discount depth for the variables recommended above, which they termed "neglect".

5.2.6 Foundation Design Groups

The tower sites were categorized into fourteen similar foundation design groups designated A through N as presented in Table 6 and on Figure 7. The foundation design groups take into account similar subsurface profiles and material strengths as interpreted from the available information. Engineering and geologic judgment was used to categorize each site. Typically, where a subsurface profile did not closely match a foundation design group a similar foundation design group was assigned. In some cases, a layer with seismic velocity values close to the next highest design parameter set were observed and the next closest, slightly less conservative foundation design group was selected. A summary of the interpreted foundation design groups by section and structure type are presented in Table 7 and Table 8, respectively.

5.2.7 Custom Designs for Monopoles

The majority of the transmission line structures will be towers supported on four drilled pier foundations. However, a few structures may be steel monopoles supported on a single drilled pier foundation. Monopole foundations were considered for selected structures in Sections 4A and 7 of the transmission line alignment. The monopole sites are designated P6-1, P7, P8-2, P9-1, P10, P11 and P12-1 in Section 4A and P98 and P99-1 in Section 7.

Custom design recommendations were developed for the monopole locations because the monopole design process and criteria were originally different than for towers. Further, site specific subsurface information was available from previous projects at many of the monopole locations and it was possible to develop custom subsurface profiles at each location. These profiles and the custom soil parameters are

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presented in Table 9. The recommendations in Table 9 may also be used for the design of tower foundations at these locations if needed.

Geotechnical design recommendations have also been provided by URS and others for pole sites along the alignment other than those listed above, including:

- Structures P1, P2 and P3 in the Sycamore Canyon Substation. MFAD recommendations were presented to SDG&E in a letter dated September 10, 2009 (URS, 2009f). Design of these poles was performed as part of modifications to the Sycamore Canyon Substation.
- P87-1 and P88-1 in Section 5 and P95-1 and P96-1 in Section 7. MFAD recommendations were presented in the Geosyntec geotechnical investigation (Geosyntec, 2009) as part of the under ground alignment.

5.3 FOUNDATION DESIGN METHODOLOGY

The foundations were designed using the recommendations outlined above. The design methodology developed by BMcD was presented in a series of their memoranda dated February 10, 2010, a summary of which is presented below.

- An initial MFAD analysis was performed using an assumed drilled pier diameter. The diameter was increased by 0.5 feet until the lateral criteria for the project were satisfied.
- The minimum diameter satisfying the lateral requirement was evaluated using FHWA methodology to estimate embedment lengths required to meet the axial capacity demand.
- The controlling pile configuration obtained from above was reevaluated using MFAD to check lateral capacity, the deflection/rotation criteria, and to provide information for the structural design. The design included varying combinations of reveal (stick-up above ground surface) and neglect (discount depth), and also included groundwater depths, loads on particular structure types and monopoles.

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SECTION 6 DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

This section presents a discussion of the general impacts to project as a result of geologic hazards discussions, conclusions and recommendations regarding geologic and seismic hazards.

6.1 FAULTING CROSSINGS

The Sunrise Powerlink project crosses the Elsinore fault zone in Section 10B between Structures P303-2 and P304-2. The proposed structures are not located on the fault and are not at direct risk from fault rupture damage. However, displacement of the ground surface along the fault line between the two structures could represent a hazard to the integrity of the transmission line. Based on the crossing orientation, right slip fault movement would put the transmission line in tension following the lateral displacements anticipated during a ground rupturing event on the Elsinore fault. The transmission line crosses the fault approximately 25 degrees from perpendicular in a clockwise orientation.

Maximum displacements for the Elsinore fault in this area southeast of the Coyote Mountains are anticipated to be on the order of 3 to 5 feet for a primary strand of the fault based on the fault's recurrence interval. The anticipated fault displacements for this crossing are likely to be less because the surface expression of the fault in this area is diminishing and the fault is near its mapped terminus. This diminished surface expression suggests that the potential for large displacement ground rupture is reduced in the project area relative to other strands of the Elsinore fault. For fault crossing design considerations, we recommend a maximum fault displacement of 5 feet and a design displacement of 3 feet and the fault crossing orientation mentioned above.

The other two faults located near the transmission line are the Jacume and Yuha Wells faults. These are not well documented faults and are not currently considered active faults by the State of California. They are not considered significant ground rupture hazards relative to the proposed transmission line project.

The fault rupture hazards associated with the active and potentially active faults will be further evaluated with fault trenching studies. These studies are intended to verify the absence of fault rupture hazard at the structure sites.

6.2 SEISMIC SHAKING

Seismic shaking levels and the subsequent geologic hazard varies across the alignment. However, review of applicable codes, standards, and published works by SDG&E indicate that seismic forces do not govern over wind forces, and are normally not considered for transmission structure and foundation designs. Preparation of simplified calculations by SDG&E conclude that tower forces resulting from seismic loads will be substantially less than the forces generated by extreme wind loading events on the structures. As a result, SDG&E recommends that seismic loads are not required for design of the Sunrise Powerlink structures or foundations.

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6.3 LIQUEFACTION AND SEISMIC SETTLEMENT

Based on the available information, we have not recommended any liquefaction related mitigations for foundation design. The absence of significant liquefaction hazards will be confirmed by a geotechnical investigation program to be performed during the initial phase of construction. Foundation designs will be modified if the investigation suggests liquefaction mitigations are needed.

6.4 LANDSLIDES, DEBRIS FLOWS, AND ROCK FALLS

Based on our field review, landslides and debris flows are not a significant hazard to the proposed structure locations, with the possible exception of Structure P20 in Section 4A. Additional evaluations of this site will be performed during geotechnical field investigations including a large-diameter boring at structure P20.

The rock fall hazard is considered low or nonexistent for most of the structures along the proposed transmission line. However, given the locally steep slopes and bold rock outcrops, some potential for rock falls exists. One possible rock fall hazard zone is located along the upper reaches of Boulder Creek in the In Koh Pah area above MSG. The upper portions of the northwesterly facing slopes of Carries Mountain has a very steep, rock face that over geologic time, has shed some large boulders that have accumulated along the toe of the slope. Structures P256 and P257 are located downslope from this area where rock falls have occurred in the geologic past. However, given the distance away from the rock fall source and the distance away from the toe of the slope the potential for large damaging rock falls to reach either Structure 256 or 257 is considered low. This same scenario is present locally along Section 5 where the alignment traverses the lower slopes of the mountain front on the north side of the San Diego River and the slopes south of El Capitan Reservoir.

Additionally, some low to moderate rock fall hazard has been identified at Structures P265, P266 and P269. The setting for these three areas is rather different than the In Koh Pah area. In these areas, smaller locally steep slopes above the structures have some potential for rock fall in closer proximity to the structures. These areas do not have the potential to generate rock of any significant size relative to the structural integrity of proposed structures and are characterized by a natural fracture pattern in the rock that results in relatively small boulders and cobbles on the slope face.

Outside of MSG, there are some areas of low rock fall hazard and a few with a moderate potential that have been identified during site reconnaissance and include Section 5 (P47 to P49), Section 8A (P19) and Section 9B (P147). In general, these sites should be reviewed prior to the start of ground disturbance to determine if rocks present upslope present a hazard, and to mitigate the hazard if present.

The potential for any significant damage to the structures in these locations as a result of rock fall is considered low. Methods to mitigate rock fall of hazard include; evaluating the rocks upslope of the tower site and identifying which rocks need to be mitigated, safely dislodging loose rock to a downslope location, breaking down large rock into smaller fragments that can be safely moved, or stabilizing potentially loose rock in place.

Additionally, care must be taken in areas of proposed cut slopes to account for rocks near the upslope edge of the excavation and to dislodge them or stabilize them prior to excavating or blasting. After

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grading plans for structure sites and access roads are finalized and prior to start of grading, rock fall surveys should be performed upslope of these areas to evaluate rock fall hazard and provide guidance on which rocks need to be moved, broken up, or stabilized.

6.5 EXPANSIVE AND COLLAPSIBLE SOILS

Based on our field review, expansion and collapse potential is not a significant hazard to the structure locations. The site materials are not generally susceptible, and drainage design should direct water away from foundations.

6.6 CORROSION

Based on the electrical resistivity surveys performed for this investigation, (Appendix D), the anticipated general degree of corrosivity is considered to be mild to negligible. Similarly, we anticipate that sulfate attack to concrete should be negligible.

6.7 SCOUR

Scour is not considered a significant hazard for most of the project alignment. Structure sites were specifically located to avoid drainages and the associated scour potential. The larger drainages in the western and central portion of the project are spanned, including; San Vicente Creek, the San Diego River, the Sweetwater River, Wilson Creek, Cottonwood Creek, Potrero Creek, Hauser Creek, La Posta Creek, Walker Canyon, Boulder Creek and Myer Creek.

In the desert setting of Section 10A and 10B, the broad desert washes are crossed in such a way that structures are located outside of the active channels. However, some scour potential exists in this braided wash environment. Specifically, the general area around Palm Canyon Wash (Structures P292 through P300) and Coyote Wash (Structures P323 and P324) has some potential during peak floods if channel courses change.

The reader is referred to our draft scour report dated December 28, 2009 for site-specific scour evaluations and recommendations (URS, 2009e).

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SECTION 7 UNCERTAINTIES AND LIMITATIONS

The recommendations made herein are based on the assumption that subsurface conditions do not deviate appreciably from those found during our field review, and during the previous and current geotechnical investigations. We recommend that URS continue to review the foundation plans to verify that the intent of the recommendations presented herein has been properly interpreted and incorporated into the contract documents. We further recommend that 1) borings or CPTs are performed at heavily loaded structures, where a potential for liquefaction exists, or other geotechnically significant locations and 2) that all foundation excavations be observed by a qualified engineer or geologist, to further evaluate if site conditions are as anticipated, or to provide revised recommendations, if necessary.

Geotechnical engineering and the geologic sciences are characterized by uncertainty. Professional judgments presented herein are based partly on our understanding of the proposed construction, and partly on our general experience. Our engineering work and judgments rendered meet current professional standards; we do not guarantee the performance of the project in any respect.

Final design details for the proposed project are under development. The recommendations presented in this report are intended to assist SDG&E and their subconsultants in the project planning and design. The professional judgments and interpretations presented in this report are based on our current knowledge of the proposed project, our interpretations of the subsurface conditions in the project area, and our understanding of the geologic and tectonic setting of the project. This knowledge is based on the information provided to us, published literature, previous studies, and our investigation referenced in this report.

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Table 1
Section and Structure Information
Sunrise Powerlink Project

Section Designation	Structure Numbers	Number of Structures					
		Strain	Angle	Dead End	Tangent	Misc.	Total
Proposed Transmission Line Alignment							
4A	P6-1 through P31-2	4	0	3	11	7	25
5	P32-2 through P88-1	9	9	18	21	0	57
7	P98-1 through P109-1	0	1	4	4	2	11
8A	P1-3 through P42	0	0	24	17	0	41
8B	P43-1 through P47-2	0	0	4	0	0	4
8C	P48 through P67	0	1	4	11	0	16
8D	P68 through P89-1	0	0	11	12	0	23
8E	P90-1 through P119-2	0	9	10	13	0	32
9A	P120-4 through P140	0	6	6	10	0	22
9B	P141 through P215	0	6	13	39	0	58
9C	P217-1 through P269-1	0	9	14	29	0	52
10A	P270-2 through P281	0	3	3	6	0	12
10B	P290 through P363-1	0	7	8	59	0	74
Total	P13-2 through P363-1	13	51	122	232	9	427
Proposed MSG/Visual Transmission Line Re-route							
9C	P217-1 through P269-1	0	7	17	31	0	55
Proposed Sugarloaf Transmission Line Re-route							
10A	P270-2 through P281	0	3	3	6	0	12
10B	P282 through P363-1	0	7	10	57	0	74

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Table 2
Structure Site Geology
Sunrise Powerlink Project

Geologic Unit	Number of Structure Sites														
	230 kV Line			500 kV Line											Percent of Structure Sites
	Section 4A	Section 5	Section 7	Section 8A	Section 8B	Section 8C	Section 8D	Section 8E	Section 9A	Section 9B	Section 9C	Section 10A	Section 10B	Total	
Proposed Original Transmission Alignment															
Sediments of ancient Lake Cahuilla (Ql)													3	3	0.01
Alluvium (Qal)						2	1	1			4		15	23	5.4
Older alluvial deposits, including terraces and alluvial fans (Qt/f)		5		2						3	6		3	19	4.4
Possible Ancient Landslide (Qls)	1													1	0.2
Palm Spring Formation (QTps, Qtpsa, QTpsp)													41	41	9.6
Imperial Formation (Ti, Tip)													9	9	2.1
Split Mountain Formation (Tsm)													3	3	0.01
Jacumba Volcanics (Tj)											6	2		8	1.9
Anza Formation (Ta)											1			1	0.2
Pomerado Conglomerate (Tp)	16	7												23	5.4
Stadium Conglomerate (Tst)	2													2	0.01
Indian Hill Granodiorite of Parrish and Others (Kih)											2			2	0.5
Tonalite of La Posta (Klp)						6	6	31	13	49	22	9		136	31.8
Tonalite of Las Bancas (Klb)		9								1				10	2.3
Cuyamaca Gabbro (Kc)		1		4					1					6	1.4
Tonalite of Granite Mountain (Kgm)									6					6	1.4

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Table 2
Structure Site Geology
Sunrise Powerlink Project
(Continued)

Geologic Unit	Number of Structure Sites														
	230 kV Line			500 kV Line											Percent of Structure Sites
	Section 4A	Section 5	Section 7	Section 8A	Section 8B	Section 8C	Section 8D	Section 8E	Section 9A	Section 9B	Section 9C	Section 10A	Section 10B	Total	
Tonalite of Granite Mountain, Unit 1 (Kgm1, Kgm2, Kgm3)						2	16							18	4.0
Corte Madera Monzogranite (Kcm)				16	4	6								26	4.2
Japatul Valley Tonalite (Kjv)				15										15	3.5
Tonalite of Alpine (Ka)		11	8											19	4.4
Granitoid Rocks (Kgr)	3	14												17	4.0
Santiago Peak Volcanics (Ksp)		1												1	0.2
Metavolcanic Rocks (Kmv)	3	9		2										14	3.3
Leucocratic Dikes (KJld)										1				1	0.2
Metavolcanic and Metasedimentary Rocks (KJvs)				2										2	0.5
Migmatitic schist and gneiss of Stephenson Peak (Jsp)											11			11	2.6
Metasedimentary and Metavolcanic Rocks (JTRm)			3						2	4				9	2.1
Rocks of Jacumba Mountain (MzPzm)												1		1	0.2
Total	25	57	11	41	4	16	23	32	22	58	52	12	74	427	100

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Table 2
Structure Site Geology
Sunrise Powerlink Project
(Continued)

Geologic Unit	Number of Structure Sites														
	230 kV Line			500 kV Line											Percent of Structure Sites
	Section 4A	Section 5	Section 7	Section 8A	Section 8B	Section 8C	Section 8D	Section 8E	Section 9A	Section 9B	Section 9C	Section 10A	Section 10B	Total	
Proposed MSG/Visual Transmission Line Re-route															
Alluvium (Qal)											5				
Olderalluvial deposits, including terraces and alluvial fans (Qt/f)											7				
Jacumba Volcanics (Tj)											6				
Anza Formation (Ta)											1				
Indian Hill Granodiorite of Parrish and Others (Kih)											2				
Tonalite of La Posta (Klp)											23				
Migmatitic schist and gneiss of Stephenson Peak (Jsp)											11				
Total											55				

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Table 2
Structure Site Geology
Sunrise Powerlink Project
(Continued)

Geologic Unit	Number of Structure Sites														
	230 kV Line			500 kV Line											Percent of Structure Sites
	Section 4A	Section 5	Section 7	Section 8A	Section 8B	Section 8C	Section 8D	Section 8E	Section 9A	Section 9B	Section 9C	Section 10A	Section 10B	Total	
Proposed Sugarloaf Transmission Line Re-route															
Sediments of ancient Lake Cahuilla (Ql)													3		
Alluvium (Qal)													17		
Older alluvial deposits, including terraces and alluvial fans (Qt/f)													4		
Palm Spring Formation (QTps, Qtpsa, QTpsp)													41		
Imperial Formation (Ti, Tip)													9		
Split Mountain Formation (Tsm)													0		
Jacumba Volcanics (Tj)												1			
Tonalite of La Posta (Klp)												9			
Rocks of Jacumba Mountain (MzPzm)												1			
Total												12	74		

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Table 3
Summary of Seismic Refraction Traverses
Sunrise Powerlink Project

Section	Structure Designation[a]	Structure Type[b]/Status	Geologic Unit	Seismic Refraction Information			Augerability[d] (Watson 3000)	Seismic Refraction Coordinates Center	
				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
4A	P20	Strain	Qls	RS4-P20	0-2	1,100	e-m	1920860	6334900
					2-12	2,200	e-m		
					12+	3,400	e-m		
	P23	Dead End	Tp	RS4-P23	0-2	1,100	e-m	1923120	6335930
					2-12	2,900	e-m		
					12+	4,400	e-m		
	P25-2	Tangent	Kgr	RS4-P25-2	0-2	1,100	e-m	1923070	6338380
					2-24	3,700	d		
					24+	11,700	r		
	P28-1	Tangent	Kmv	RS4-P28-1	0-1.5	1,100	e-m	1923010	6341430
					1.5-18	3,700	e-m		
					18+	12,500	r		
	P29-1	Tangent	Kmv	RS4-P29-1	0-3	1,100	e-m	1922990	6342560
					3-16	3,600	e-m		
					16+	8,500	r		
	P31-2	Dead End	Kmv	RS4-P31-1	0-2	1,100	e-m	1922970	6343480
					2-14	2,650	e-m		
					14+	8,850	r		
5	P32-1	Relocated Structure; P32-2 Supercedes	Kmv	RS5-P32-1	0-3	1,100	e-m	1922950	6344470
					3-13	3,550	e-m		
					13+	7,950	r		
	P32-2	Tangent	Kmv	RS5-P32-2	0-3	1,100	e-m	1922320	6343860
					3-12	3,350	d		
					12+	7,750	r		
	P33-2	Tangent	Kmv	RS5-P33	0-3	1,100	e-m	1921450	6345030
					3-20	4,050	d		
					20+	10,300	r		
	P35-2	Angle	Tp	RS5-P35-1	0-2	1,100	e-m	1918280	6346240
					2-11	5,400	d		
					11+	12,200	r		
	P36-1	Tangent	Tp	RS5-P36-1	0-2	1,100	e-m	1917540	6346770
					2-9	3,350	e-m		
					9+	4,400	e-m		
	P37-2	Tangent	Tp	RS5-P37-1	0-2	1,100	e-m	1915300	6348340
					2-7	3,550	e-m		
					7+	4,800	e-m		
	P39	Angle	Tp	RS5-P39	0-1.5	1,100	e-m	1914610	6348830
					1.5-8	3,950	e-m		
					8+	5,450	d		
	P40-2	Tangent	Tp	RS5-P40-1	0-1.5	1,100	e-m	1913400	6350030
					1.5-7	3,400	e-m		
					7+	5,150	d		
	P42-1	Dead End	Tp	RS5-P42-1	0-1	1,100	e-m	1912080	6351340
					1-7	3,250	e-m		
					7+	5,150	d		
	P43-1	Dead End	Kgr	RS5-P43-1	0-2	1,100	e-m	1910500	6352900
					2-8	3,400	e-m		
					8+	7,700	r		
	P44-1	Dead End	Ksp	RS5-P44-1	0-2	1,100	e-m	1909060	6354930
					2-12	3,500	d		
					12+	8,800	r		
	P45-1	Dead End	Kgr	RS5-P45-1	0-2	1,100	e-m	1907010	6356380
					2-14	2,350	e-m		
					14+	5,650	r		
	P47-2	Dead End	Kgr	RS5-P47-2	0-3	1,100	e-m	1904030	6358180
					3-17	3,350	e-m		
					17+	6,550	r		
	P48-2	Strain	Kgr	RS5-P48-2	0-3	1,100	e-m	1902840	6358710
					3-15	4,300	d		
					15+	9,050	r		

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Table 3
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Section	Structure Designation[a]	Structure Type[b]/Status	Geologic Unit	Seismic Refraction Information			Augerability[d] (Watson 3000)	Seismic Refraction Coordinates Center	
				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
5 (cont'd)	P49-1	Dead End	Kgr	RS5-P49-1	0-3	1,100	e-m	1902530	6359130
					3-20	2,850	e-m		
					20+	9,550	r		
	P50-1	Strain	Kgr	RS5-P50-1	0-3	1,100	e-m	1902640	6360010
					3-20	3,800	d		
					20+	16,350	r		
	P51-2	Angle	Kgr	RS5-P51-1	0-3	1,100	e-m	1902910	6361620
					3-25	2,750	e-m		
					25+	4,600	r		
	P52	Angle	Kgr	RS5-P52	0-2	1,100	e-m	1903150	6362650
					2-11	2,900	e-m		
					11+	5,350	r		
	P54-1	Angle	Kgr	RS5-P54-1	0-2.5	1,100	e-m	1903110	6365230
					2.5-19	3,200	e-m		
					19+	5,950	r		
	P56-1	Tangent	Kgr	RS5-P56-1	0-2	1,100	e-m	1903870	6367780
					2-20	3,250	e-m		
					20+	9,000	r		
	P57	Tangent	Kmv	RS5-P57	0-2	1,100	e-m	1904220	6368940
					2-29	4,350	d		
					29+	9,850	r		
	P58-1	Tangent	Kmv	RS5-P58	0-2	1,100	e-m	1904560	6370080
					2-26	2,850	e-m		
					26+	7,200	r		
	P59	Dead End	Kmv	RS5-P59	0-3	1,100	e-m	1904970	6371450
					3-15	4,550	d		
					15+	14,900	r		
	P60	Dead End	Ka	RS5-P60	0-2.5	1,100	e-m	1905640	6372110
					2.5-15	3,300	e-m		
					15+	5,750	r		
	P62-2	Dead End	Klb	RS5-P62	0-3	1,100	e-m	1906030	6374910
					3-15	3,350	e-m		
					15+	4,800	e-m		
	P63-3	Tangent	Kc	RS5-P63-1	0-3	1,100	e-m	1906600	6376890
					3-26	3,000	e-m		
					26+	5,900	r		
	P64-2	Strain	Qt/f	RS5-P64-2	0-2.5	1,100	e-m	1906930	6378040
					2.5-15	3,350	e-m		
					15+	5,400	d		
	P65-1	Tangent	Qt/f	RS5-P65-1	0-2	1,100	e-m	1906630	6379360
					2-10	2,600	e-m		
					10+	3,850	e-m		
	P66-2	Dead End	Qt/f	RS5-P66-1	0-2	1,100	e-m	1906210	6381240
					2-12	2,650	e-m		
					12+	4,450	e-m		
	P67-3	Dead End	Kmv	RS5-P67-1	0-3	1,100	e-m	1905920	6382520
					3-12	2,700	e-m		
					12+	4,600	d		
	P68-1	Tangent	Kmv	RS5-P68-1	0-2	1,100	e-m	1904730	6384240
					2-15	2,450	e-m		
					15+	4,300	d		
	P69-2	Tangent	Qt/f	RS5-P69-1	0-2	1,100	e-m	1903450	6386090
					2-11	2,950	e-m		
					11+	5,450	d		
	P70-3	Dead End	Qt/f	RS5-P70-1	0-2.5	1,100	e-m	1902550	6387380
					2.5-30	4,250	e-m		
					30+	5,950	d		
	P71	Strain	Klb	RS5-P71	0-4	1,100	e-m	1901180	6389360
					4-22	3,600	d		
					22+	13,050	r		

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				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
5 (cont'd)	P72-2	Tangent	Klb	RS5-P72-2	0-3.5	1,100	e-m	1901050	6389880
					3.5-23	3,300	e-m		
					23+	8,400	r		
	P73-2	Angle	Klb	RS5-P73-1	0-4	1,100	e-m	1900840	6390700
					4-16	2,400	e-m		
					16+	4,500	r		
	P74-2	Strain	Klb	RS5-P74-2	0-4	1,100	e-m	1900310	6391980
					4-22	3,000	e-m		
					22+	5,550	r		
	P75-1	Dead End	Ka	RS5-P75	0-5	1,100	e-m	1899810	6393360
					5-27	2,400	e-m		
					27+	4,350	d		
	P77	Angle	Ka	RS5-P77	0-4	1,100	e-m	1898390	6393620
					4-23	2,600	e-m		
					23+	5,250	r		
	P80-1	Angle	Ka	RS5-P80-1	0-4	1,100	e-m	1896160	6393400
					4-16	2,400	e-m		
					16+	4,000	d		
	P81-1	Strain	Ka	RS5P81-1	0-3	1,100	e-m	1895230	6393040
					3-20	1,400	e-m		
					20+	6,250	r		
	P83	Strain	Ka	RS5-P83	0-6	1,100	e-m	1893320	6392780
					6-32	2,300	e-m		
					32+	4,700	r		
	P85-1	Angle	Klb	RS5-P85-1	0-4	1,100	e-m	1891890	6391460
					4-14	2,000	e-m		
					14+	5,900	r		
	P86	Dead End	Klb	RS5-P86	0-5	1,100	e-m	1891210	6391100
					5-16	2,450	e-m		
					16+	4,600	r		
	P88-1	Riser Pole	Klb	RS5-CP2	0-5	1,100	e-m	1890630	6390780
					5-18	2,050	e-m		
					18+	3,950	d		
7	P97-1	Deleted Structure	Ka	RS7-P97-1	0-4	1,100	e-m	1881530	6417510
					4-24	2,250	e-m		
					24+	5,500	r		
	P99	Relocated Structure; P99-1 Supercedes	Ka	RS7-P99	0-3	1,100	e-m	1880060	6417500
					3-10	2,950	e-m		
					10+	4,300	d		
	P99-2	Strain Pole	Ka	RS7-P99-1	0-3	1,100	e-m	1879670	6417500
					3-16	3,500	d		
					16+	11,500	r		
	P100	Relocated Structure; P100-1 Supercedes	Ka	RS7-P100	0-4	1,100	e-m	1879460	6417880
					4-22	2,950	e-m		
					22+	11,700	r		
	P100-1	Dead End	Ka	RS7-P100-1	0-3	1,100	e-m	1878750	6418190
					3-16	3,100	e-m		
					16+	10,850	r		
	P101-1	Dead End	Ka	RS7-P101-1	0-3	1,100	e-m	1878380	6419110
					3-17	3,050	e-m		
					17+	6,700	r		
	P102-1	Deleted Structure	Ka	RS7-P102-1	0-2	1,100	e-m	1878580	6419740
					2-13	2,450	e-m		
					13+	7,850	r		
	P103-2	Tangent	Ka	RS7-P103-1	0-2	1,100	e-m	1877400	6422250
					2-11	3,000	e-m		
					11+	8,200	r		
	P105-1	Tangent	Ka	RS7-P105	0-2	1,100	e-m	1876270	6424630
					2-12	2,600	e-m		
					12+	9,350	r		
	P106-1	Dead End	Ka	RS7-P106	0-3	1,100	e-m	1875700	6425830
					3-19	2,350	e-m		
					19+	9,200	r		

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				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
7 (cont'd)	P107	Tangent	JTRm	RS7-P107	0-2	1,100	e-m	1875630	6427580
					2-18	3,100	e-m		
					18+	5,950	r		
	P108	Angle	JTRm	RS7-P108	0-5	1,100	e-m	1875610	6428030
					5-29	2,700	e-m		
					29+	8,450	r		
	P109-1	Dead End	JTRm	RS7-P109	0-4	1,100	e-m	1875410	6428550
					4-23	3,000	e-m		
					23+	9,450	r		
8A	P1-3	Dead End	KJvs	RS8-P1	0-4	1,100	e-m	1872900	6428270
					4-26	3,850	e-m		
					26+	6,850	r		
	P2-3	Dead End	KJvs	RS8-P2-1	0-3	1,100	e-m	1871640	6427610
					3-15	2,200	e-m		
					15+	4,800	d		
	P4-3	Tangent	Kjv	RS8-P4-2	0-5	1,100	e-m	1868400	6425930
					5-23	2,850	e-m		
					23+	6,600	r		
	P5-2	Dead End	Kjv	RS8-P5-1	0-3	1,100	e-m	1866740	6425070
					3-18	2,650	e-m		
					18+	4,750	d		
	P7-1	Dead End	Kjv	RS8-P7-1	0-2	1,100	e-m	1864330	6422770
					2-17	1,550	e-m		
					17+	6,200	r		
	P9-1	Dead End	Kjv	RS8-P9	0-4	1,100	e-m	1864120	6418980
					4-30	4,150	d		
					30+	5,600	r		
	P10-2	Dead End	Kjv	RS8-P10	0-2	1,100	e-m	1862740	6419120
					2-11	1,450	e-m		
					11+	5,000	r		
	P11-3	Tangent	Kmv	Rs8-P11-2	0-2	1,100	e-m	1861710	6420140
					2-23	3,150	e-m		
					23+	7,700	r		
	P12-3	Dead End	Kmv	RS8-P12	0-3	1,100	e-m	1861150	6420740
					3-15	3,500	e-m		
					15+	6,950	r		
	P14-1	Dead End	Kcm	RS8-P14-1	0-1	1,100	e-m	1856570	6420470
					1-10	3,750	d		
					10+	9,000	r		
	P17	Dead End	Kcm	RS8-P17	0-2	1,100	e-m	1852050	6420210
					2-21	3,900	d		
					21+	13,700	r		
	P18	Dead End	Kcm	RS8-P18	0-3	1,100	e-m	1850980	6420790
					3-17	2,700	e-m		
					17+	9,100	r		
	P20-2	Dead End	Kcm	RS8-P20-1	0-2	1,100	e-m	1849280	6421730
					2-21	3,750	d		
					21+	9,850	r		
	P22-1	Dead End	Kc	RS8-P22	0-2	1,100	e-m	1847200	6422880
					2-9	1,500	e-m		
					9+	3,050	e-m		
	P23-1	Relocated Structure; P23-2 Supercedes	Kjv	RS8-P23-1	0-2	1,100	e-m	1845260	6422490
					2-10	1,600	e-m		
					10+	3,650	d		
	P23-2	Dead End	Kjv	RS8-P23-2	0-3	1,100	e-m	1846460	6423290
					3-18	2,800	d		
					18+	8,850	r		

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Section	Structure Designation[a]	Structure Type[b]/Status	Geologic Unit	Seismic Refraction Information			Augerability[d] (Watson 3000)	Seismic Refraction Coordinates Center	
				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
8A (cont'd)	P24-1	Dead End	Kjv	RS8-P24-1	0-4	1,100	e-m	1844910	6423360
					4-15	2,200	e-m		
					15+	4,000	d		
	P25-2	Tangent	Kjv	RS8-P25-1	0-5	1,100	e-m	1842010	6421820
					5-35	3,200	e-m		
					35+	4,750	d		
	P26	Relocated Structure; P26-1 Supercedes	Kc	RS8-P26	0-3	1,100	e-m	1840010	6421420
					3-12	2,350	e-m		
					12+	3,300	e-m		
	P26-1	Tangent	Qt/f	RS8-P26-1	0-4	1,100	e-m	1841690	6423510
					4-15	2,250	e-m		
					15+	3,100	e-m		
	P27	Relocated Structure; P27-1 Supercedes	Kc	RS8-P27	0-2	1,100	e-m	1838460	6421100
					2-15	1,750	e-m		
					15+	2,850	e-m		
	P27-1	Dead End	Qt/f	RS8-P27-1	0-3	1,100	e-m	1840130	6423580
					3-13	2,650	e-m		
					13+	3,550	e-m		
	P28	Relocated Structure; P28-3 Supercedes	Qt/f	RS8-P28	0-4	1,100	e-m	1837150	6420730
					4-20	1,800	e-m		
					20+	3,450	e-m		
	P28-3	Tangent	Kc	RS8-P28-3	0-3	1,100	e-m	1838580	6423660
					3-14	2,750	e-m		
					14+	4,250	d		
	P30-2	Tangent	Kjv	RS8-P30	0-4	1,100	e-m	1833880	6419790
					4-22	2,050	e-m		
					22+	9,350	r		
	P31	Relocated Structure; P31-1 Supercedes	Kc	RS8-P31	0-2	1,100	e-m	1832760	6419470
					2-8	1,900	e-m		
					8+	4,150	d		
	P31-1	Tangent	Kjv	RS8-P31-1	0-4	1,100	e-m	1858000	6423790
					4-17	2,600	e-m		
					17+	6,550	r		
	P32-1	Dead End	Kjv	RS8-P32-1	0-3	1,100	e-m	1833040	6424010
					3-16	2,750	e-m		
					16+	3,950	d		
	P33	Relocated Structure; P33-1 Supercedes	Kc	RS8-P33	0-2	1,100	e-m	1829890	6419990
					2-10	1,750	e-m		
					10+	2,200	e-m		
	P33-1	Dead End	Kcm	RS8-P33-1	0-3	1,100	e-m	1830830	6424180
					3-17	3,200	e-m		
					17+	8,800	r		
	P34-1	Tangent	Kcm	RS8-P34	0-2	1,100	e-m	1829370	6421360
					2-15	2,800	e-m		
					15+	4,350	d		
	P35	Relocated Structure; P35-1 Supercedes	Kcm	RS8-P35	0-2	1,100	e-m	1828540	6423560
					2-20	1,850	e-m		
					20+	6,600	r		
	P35-1	Dead End	Kcm	RS8-P35-1	0-3	1,100	e-m	1828940	6424330
					3-31	3,050	e-m		
					31+	13,600	r		
	P36-1	Dead End	Kcm	RS8-P36	0-4	1,100	e-m	1827300	6424810
					4-25	2,400	e-m		
					25+	6,650	r		
	P37-2	Tangent	Kcm	RS8-P37-1	0-2	1,100	e-m	1826110	6424740
					2-14	1,800	e-m		
					14+	5,450	r		
	P39-1	Dead End	Kcm	RS8-P39	0-2	1,100	e-m	1823040	6424550
					2-23	4,100	d		
					23+	12,000	r		
	P41	Tangent	Kc	RS8-P41	0-2	1,100	e-m	1820720	6426030
					2-8	1,700	e-m		
					8+	2,550	e-m		
	P42	Dead End	Kc	RS8-P42	0-2	1,100	e-m	1820060	6426460
					2-10	2,400	e-m		
					10+	4,550	r		

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Section	Structure Designation[a]	Structure Type[b]/Status	Geologic Unit	Seismic Refraction Information			Augerability[d] (Watson 3000)	Seismic Refraction Coordinates Center	
				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
8B	P43-1	Dead End	Kcm	RS8-P43-1	0-3	1,100	e-m	1819980	6431600
					3-20	2,700	e-m		
					20+	10,000	r		
	P44	Dead End	Kcm	RS8-P44	0-3	1,100	e-m	1819940	6434310
					3-27	2,350	e-m		
					27+	7,100	r		
	P45-1	Dead End	Kcm	RS8-P45	0-2	1,100	e-m	1819920	6435890
					2-14	3,000	e-m		
					14+	6,300	r		
	P47-2	Dead End	Kcm	RS8-P47	0-5	1,100	e-m	1819890	6437970
					5-30	3,600	d		
					30+	7,700	r		
8C	P49	Tangent	Kcm	RS8-P49	0-2	1,100	e-m	1819700	6440720
					2-20	2,300	e-m		
					20+	9,950	r		
	P50	Tangent	Kcm	RS8-P50	0-2	1,100	e-m	1819600	6442180
					2-14	1,900	e-m		
					14+	9,850	r		
	P51-1	Tangent	Kcm	RS8-P51	0-2	1,100	e-m	1819500	6443670
					2-13	2,000	e-m		
					13+	12,000	r		
	P53-1	Relocated Structure; P53-2 Supercedes	Kcm	RS8-P53-1	0-1	1,100	e-m	1819290	6446650
					1-19	2,150	e-m		
					19+	9,650	r		
	P53-2	Tangent	Kcm	RS8-P53-2	0-2	1,100	e-m	1819280	6446800
					2-15	6,000	r		
					15+	14,300	r		
	P54	Angle	Qal	RS8-P54	0-3	1,100	e-m	1819170	6448520
					3-20	2,150	e-m		
					20+	19,600	r		
	57-1	Tangent	Kgm3	RS8-P57-1	0-2	1,100	e-m	1818420	6452060
					2-13	1,750	e-m		
					13+	8,450	r		
	P58	Relocated Structure; See P58-2	Klp	RS8-P58	0-2	1,100	e-m	1818140	6452960
					2-17	2,150	e-m		
					17+	9,150	r		
	P58-2	Dead End	Klp	RS8-P58-2	0-3	1,100	e-m	1818210	6453050
					3-17	2,850	e-m		
					17+	11,000	r		
	P61	Deleted Structure	Klp	RS8-P61	0-3	1,100	e-m	1817860	6453250
					3-18	4,400	r		
					18+	13,300	r		
	P62A-1	Dead End	Klp	RS8-P62-1	0-1	1,100	e-m	1817860	6453730
					1-10	4,450	r		
					10+	9,850	r		
	P63	Tangent	Klp	RS8-P63	0-3	1,100	e-m	1817860	6455290
					3-18	3,150	e-m		
					18+	7,800	r		
	P65-1	Tangent	Klp	RS8-P65-1	0-3	1,100	e-m	1817860	6458790
					3-13	3,000	e-m		
					13+	8,850	r		
	P66	Tangent	Qal	RS8-P66	0-4	1,100	e-m	1817870	6461090
					4-21	3,200	e-m		
					21+	8,900	r		
	P67	Dead End	Klp	RS8-P67	0-5	1,100	e-m	1817870	6462300
					5-25	4,650	r		
					25+	13,550	r		

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Table 3
Summary of Seismic Refraction Traverses
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Section	Structure Designation[a]	Structure Type[b]/Status	Geologic Unit	Seismic Refraction Information			Augerability[d] (Watson 3000)	Seismic Refraction Coordinates Center	
				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
8D	P68	Tangent	Klp	RS8-P68	0-2	1,100	e-m	1818570	6462850
					2-15	2,000	e-m		
					15+	8,500	r		
	P69	Dead End	Klp	RS8-PCTA69	0-4	1,100	e-m	1819270	6463400
					4-10	3,750	d		
					10+	17,200	r		
	P71	Original Alignment Data Superceded	Klp	RS8-P71	0-4	1,100	e-m	1817340	6468300
					4-14	2,400	e-m		
					14+	8,400	r		
	P72	Original Alignment Data Superceded	Kgm3	RS8-P72	0-4	1,100	e-m	1817150	6469520
					4-18	1,850	e-m		
					18+	13,200	r		
	P73	Original Alignment Data Superceded	Kgm3	RS8-P73	0-3	1,100	e-m	1817410	6470670
					3-18	3,000	e-m		
					18+	9,950	r		
	P71	Tangent	Klp	RS8-PCTA71	0-2	1,100	e-m	1819270	6465350
					2-17	3,050	e-m		
					17+	15,750	r		
	P72	Tangent	Klp	RS8-PCTA72	0-3	1,100	e-m	1819270	6466420
					3-16	2,700	e-m		
					16+	8,150	r		
	P75-2	Tangent	Kgm3	RS8-PCTA75	0-3	1,100	e-m	1819260	6470240
					3-16	4,350	d		
					16+	16,250	r		
	P76-2	Tangent	Kgm2	RS8-PCTA76	0-3	1,100	e-m	1819250	6472090
					3-20	1,700	e-m		
					20+	9,300	r		
	P77	Tangent	Kgm2	RS8-PCTA77	0-5	1,100	e-m	1819250	6474100
					5-25	2,850	e-m		
					25+	6,150	r		
	P78	Tangent	Qal	RS8-PCTA78	0-6	1,100	e-m	1819240	6475730
					6-40	3,150	e-m		
					40+	17,400	r		
	P78A	Tangent	Kgm2	RS8-PCTA78-1	0-4	1,100	e-m	1819240	6477230
					4-19	2,150	e-m		
					19+	7,600	r		
	P79	Dead End	Kgm2	RS8-P79	0-2	1,100	e-m	1819240	6478310
					2-18	1,550	e-m		
					18+	6,150	r		
	P80	Dead End	Kgm2	RS8-P80	0-3	1,100	e-m	1820010	6479370
					3-24	2,000	e-m		
					24+	6,750	r		
	P83	Dead End	Kgm1	RS8-P83	0-5	1,100	e-m	1819990	6483110
					5-20	2,600	e-m		
					20+	6,150	r		
	P84	Dead End	Kgm1	RS8-P84	0-3	1,100	e-m	1820940	6484050
					3-35	2,100	e-m		
					35+	10,750	r		
	P85-2	Tangent	Kgm1	RS8-P85	0-5	1,100	e-m	1820940	6484670
					5-32	1,900	e-m		
					32+	4,350	e-m		
	P86-1	Dead End	Kgm1	RS8-P86	0-4.5	1,100	e-m	1820930	6486480
					4.5-27	2,450	e-m		
					27+	11,400	r		
	P87-1	Tangent	Kgm1	RS8-P87-1	0-4	1,100	e-m	1820370	6486880
					4-25	2,600	e-m		
					25+	7,250	r		
	P88-2	Tangent	Kgm1	RS8-P88	0-3	1,100	e-m	1819210	6487680
					3-20	1,700	e-m		
					20+	9,200	r		
	P89-1	Dead End	Kgm1	RS8-P89-1	0-4.5	1,100	e-m	1818490	6488240
					4.5-24	1,950	e-m		
					24+	7,050	r		

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Table 3
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Section	Structure Designation[a]	Structure Type[b]/Status	Geologic Unit	Seismic Refraction Information			Augerability[d] (Watson 3000)	Seismic Refraction Coordinates Center	
				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
8E	P90-1	Tangent	Qal	RS8-P90	0-6	1,100	e-m	1818480	6489220
					6-30	2,300	e-m		
					30+	6,650	d		
	P91	Dead End	Klp	RS8-P91	0-3	1,100	e-m	1818480	6490230
					3-14	2,200	e-m		
					14+	5,800	r		
	P93	Angle	Klp	RS8-P93	0-2	1,100	e-m	1819900	6491090
					2-16	1,800	e-m		
					16+	5,450	r		
	P95	Angle	Klp	RS8-P95	0-3	1,100	e-m	1822150	6492150
					3-17	2,000	e-m		
					17+	3,700	d		
	P96	Tangent	Klp	RS8-P96	0-3	1,100	e-m	1823110	6492640
					3-18	1,800	e-m		
					18+	5,550	r		
	P98-1	Tangent	Klp	RS8-P98	0-3	1,100	e-m	1825600	6493910
					3-14	1,700	e-m		
					14+	3,950	d		
	P99-2	Dead End	Klp	RS8-P99	0-3	1,100	e-m	1826870	6494560
					3-15	1,950	e-m		
					15+	4,100	d		
	P100	Deleted Structure	Klp	RS8-P100	0-2	1,100	e-m	1827560	6494910
					2-25	1,350	e-m		
					25+	7,150	r		
	P102	Relocated Structure; P102-2 Supercedes	Klp	RS8-P102	0-2	1,100	e-m	1829610	6495970
					2-16	1,300	e-m		
					16+	5,250	r		
	P102-3	Angle	Klp	RS8-P102-2	0-4	1,100	e-m	1829569	6496509
					4-26	3,150	e-m		
					26+	10,550	r		
	P103-2	Dead End	Klp	RS8-P103	0-2	1,100	e-m	1830765	6496560
					2-12	2,050	e-m		
					12+	4,450	r		
	P103A	Dead End	Klp	RS8-P103A	0-3	1,100	e-m	1831433	6497287
					3-26	2,900	e-m		
					26+	7,800	r		
	P106-3	Dead End	Klp	RS8-P106-3	0-4	1,100	e-m	1834326	6497435
					4-20	3,050	e-m		
					20+	7,250	r		
	P107-3	Tangent	Klp	RS8-P107	0-4	1,100	e-m	1835415	6498177
					4-19	1,900	e-m		
					19+	5,050	r		
	P108-2	Dead End	Klp	RS8-P108	0-2.5	1,100	e-m	1836400	6499060
					2.5-13	2,050	e-m		
					13+	5,000	r		
	P110-2	Tangent	Klp	RS8-P110	0-2	1,100	e-m	1836580	6501510
					2-13	1,900	e-m		
					13+	5,150	r		
	P112-3	Dead End	Klp	RS8-P112	0-4	1,100	e-m	1836750	6503840
					4-15	1,950	e-m		
					15+	3,800	d		
	P113-4	Dead End	Klp	RS8-P113	0-2	1,100	e-m	1837320	6504840
					2-15	2,000	e-m		
					15+	5,400	r		
	P114	Relocated Structure; P114-1 Supercedes	Klp	RS8-P114	0-6	1,100	e-m	1838150	6506290
					6-21	1,650	e-m		
					21+	3,550	d		
	P114-2	Dead End	Klp	RS8-P114-1	0-5	1,100	e-m	1838380	6505780
					5-16	2,350	e-m		
					16+	3,800	d		
	P115-1	Dead End	Klp	RS8-P115	0-9	1,100	e-m	1839210	6506470
					9-28	2,350	e-m		
					28+	5,900	r		
	P116	Relocated Structure; 116-1 Supercedes	Klp	RS8-P116	0-3	1,100	e-m	1840260	6506650
					3-17	1,600	e-m		
					17+	4,150	d		

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Section	Structure Designation[a]	Structure Type[b]/Status	Geologic Unit	Seismic Refraction Information			Augerability[d] (Watson 3000)	Seismic Refraction Coordinates Center	
				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
8E (cont'd)	P116-1	Angle	Klp	RS8-P116-1	0-3	1,100	e-m	1840460	6505720
					3-17	2,300	e-m		
					17+	5,250	r		
	P117-2	Tangent	Klp	RS8-P117	0-5	1,100	e-m	1841260	6506390
					5-34	1,750	e-m		
					34+	8,100	r		
	P118-2	Dead End	Klp	RS8-P118	0-7	1,100	e-m	1842120	6506160
					7-26	2,700	e-m		
					26+	4,200	d		
	P119-2	Dead End	Klp	RS8-P119	0-5	1,100	e-m	1843050	6505920
					5-20	3,450	e-m		
					20+	6,500	r		
9A	P120-4	Dead End	Klp	RS8-P120-1	0-3	1,100	e-m	1844460	6505550
					3-16	1,800	e-m		
					16+	6,200	r		
	P121-3	Dead End	Klp	RS8-P121	0-1	1,100	e-m	1845590	6505940
					1-9	1,950	e-m		
					9+	5,650	r		
	P122	Relocated Structure; P122-1 Supercedes	Klp	RS8-P122	0-5	1,100	e-m	1846500	6506110
					5-21	2,300	e-m		
					21+	6,450	r		
	P122-1	Dead End	Klp	RS8-P122-2	0-4	1,100	e-m	1846890	6506460
					4-19	3,050	e-m		
					19+	13,000	r		
	P123-1	Tangent	Klp	RS8-P123-1	0-2	1,100	e-m	1847300	6506820
					2-12	1,800	e-m		
					12+	7,350	r		
	P125	Tangent	Klp	RS8-P125	0-3	1,100	e-m	1848810	6508170
					3-13	1,750	e-m		
					13+	2,850	e-m		
	P126-1	Tangent	Klp	RS8-P126	0-4	1,100	e-m	1849670	6508920
					4-14	1,950	e-m		
					14+	4,200	d		
	P127	Angle	Klp	RS8-P127	0-6	1,100	e-m	1850560	6509720
					6-15	2,850	e-m		
					15+	3,750	d		
	P129	Dead End	Klp	RS8-P129	0-3	1,100	e-m	1853500	6511000
					3-22	2,150	e-m		
					22+	6,050	r		
	P130-1	Dead End	Klp	RS8-P130	0-3	1,100	e-m	1854790	6512280
					3-14	1,800	e-m		
					14+	4,600	r		
	P131	Angle	Kgm	RS8-P131	0-5	1,100	e-m	1856450	6512810
					5-26	3,050	e-m		
					26+	7,150	r		
	P132-2	Dead End	Kgm	RS8-P132-2	0-3	1,100	e-m	1858210	6513210
					3-16	1,700	e-m		
					16+	4,300	r		
	P135	Angle	Kgm	RS8-P135	0-3	1,100	e-m	1860420	6515240
					3-15	1,650	e-m		
					15+	4,350	d		
	P137	Tangent	Kgm	RS8-P137	0-4	1,100	e-m	1862180	6516050
					4-17	1,850	e-m		
					17+	4,900	r		
	P138-2	Tangent	Kc	RS8-P138	0-5	1,100	e-m	1863520	6516620
					5-29	2,250	e-m		
					29+	5,450	r		
	P139-1	Tangent	JTRm	RS8-P139	0-4	1,100	e-m	1864980	6517230
					4-17	2,450	e-m		
					17+	6,600	r		
	P140	Tangent	JTRm	RS8-P140	0-2	1,100	e-m	1865870	6517610
					2-21	1,500	e-m		
					21+	8,900	r		

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Section	Structure Designation[a]	Structure Type[b]/Status	Geologic Unit	Seismic Refraction Information			Augerability[d] (Watson 3000)	Seismic Refraction Coordinates Center	
				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
9B	P141	Dead End	Qt/f	RS8-P141	0-8	1,100	e-m	1866660	6517940
					8-40	2,850	e-m		
					40+	8,200	r		
	P142-1	Tangent	Klb	RS8-P142-1	0-5	1,100	e-m	1866680	6519240
					5-21	2,450	e-m		
					21+	6,200	r		
	P143-1	Dead End	JTRm	RS8-P143-1	0-3	1,100	e-m	1866700	6521070
					3-19	2,350	e-m		
					19+	7,350	r		
	P144	Dead End	JTRm	RS8-P144	0-5	1,100	e-m	1866720	6522630
					5-32	3,500	e-m		
					32+	9,800	r		
	P145	Tangent	JTRm	RS8-P145	0-4	1,100	e-m	1866730	6523940
					4-22.5	2,900	e-m		
					22.5+	8,800	r		
	P146	Dead End	JTRm	RS8-P146	0-2.5	1,100	e-m	1866750	6525530
					2.5-27	3,150	e-m		
					27+	10,550	r		
	P149-1	Dead End	KJld	RS8-P149	0-2	1,100	e-m	1866550	6529290
					2-15	2,000	e-m		
					15+	7,800	r		
	P150	Tangent	Qt/f	RS8-P150	0-2	1,100	e-m	1866510	6530130
					2-18	2,650	e-m		
					18+	5,150	d		
	P151	Tangent	Qt/f	RS8-P151	0-3	1,100	e-m	1866430	6531680
					3-13	1,950	e-m		
					13+	4,600	e-m		
	P152-2	Tangent	Klp	RS8-P152-1	0-4	1,100	e-m	1866360	6533050
					4-14	2,750	e-m		
					14+	5,750	r		
	P170	Dead End	Klp	RS8-P170	0-3	1,100	e-m	1866310	6534000
					3-19	2,350	e-m		
					19+	6,350	r		
	P172	Tangent	Klp	RS8-P172	0-2	1,100	e-m	1865070	6536050
					2-13	1,550	e-m		
					13+	2,850	e-m		
	P173-1	Tangent	Klp	RS8-P173	0-3	1,100	e-m	1864480	6537040
					3-16	2,100	e-m		
					16+	4,200	d		
	P174	Tangent	Klp	RS8-P174	0-2	1,100	e-m	1863840	6538090
					2-12	1,550	e-m		
					12+	3,600	d		
	P175	Tangent	Klp	RS8-P175	0-3	1,100	e-m	1863190	6539180
					3-10	1,600	e-m		
					10+	3,050	e-m		
	P176	Tangent	Klp	RS8-P176	0-3	1,100	e-m	1862450	6540400
					3-13	1,600	e-m		
					13+	3,900	d		
	P178	Tangent	Klp	RS8-P178	0-6	1,100	e-m	1861100	6542650
					6-42	2,650	e-m		
					42+	9,450	r		
	P179	Tangent	Klp	RS8-P179	0-4	1,100	e-m	1860330	6543920
					4-16	2,050	e-m		
					16+	3,850	d		
	P182	Tangent	Klp	RS8-P182-1	0-3	1,100	e-m	1858260	6547340
					3-18	2,300	e-m		
					18+	5,000	r		
	P183	Tangent	Klp	RS8-P183	0-6	1,100	e-m	1857620	6548410
					6-24.5	3,050	e-m		
					24.5+	9,250	r		
	P184-1	Tangent	Klp	RS8-P184-1	0-2	1,100	e-m	1856830	6549710
					2-20	2,500	e-m		
					20+	10,700	r		
	P185-1	Tangent	Klp	RS8-P185-1	0-2	1,100	e-m	1856160	6550820
					2-16.5	3,850	d		
					16.5+	13,150	r		
	P187-2	Dead End	Klp	RS8-P187-1	0-3	1,100	e-m	1854770	6553130
					3-20	2,250	e-m		
					20+	10,100	r		

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Section	Structure Designation[a]	Structure Type[b]/Status	Geologic Unit	Seismic Refraction Information			Augerability[d] (Watson 3000)	Seismic Refraction Coordinates Center	
				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
9B (cont'd)	P189-3	Tangent	Klp	RS8-P189-2	0-3	1,100	e-m	1852230	6553930
					3-15.5	4,100	d		
					15.5+	12,000	r		
	P190-2	Tangent	Klp	RS9-P190	0-3	1,100	e-m	1851070	6554290
					3-12	3,350	e-m		
					12+	7,150	r		
	P191-1	Tangent	Klp	RS9-P191-1	0-3	1,100	e-m	1849830	6554670
					3-16	2,200	e-m		
					16+	7,350	r		
	P193-1	Tangent	Klp	RS9-P193-1	0-4	1,100	e-m	1847260	6555480
					4-15	3,000	e-m		
					15+	7,650	r		
	P194-2	Tangent	Klp	RS9-P194-1	0-2	1,100	e-m	1846080	6555850
					2-16	3,950	d		
					16+	8,900	r		
	P195-1	Tangent	Klp	RS9-P195-1	0-3	1,100	e-m	1845050	6556170
					3-18	2,900	e-m		
					18+	15,750	r		
	P196-1	Dead End	Klp	RS9-P196	0-2	1,100	e-m	1843840	6556550
					2-13	2,550	e-m		
					13+	5,350	r		
	P198	Relocated Structure; P198-3 Supercedes	Klp	RS9-P198	0-3	1,100	e-m	1842880	6558380
					3-10	1,700	e-m		
					10+	7,800	r		
	P198-3	Dead End	Klp	RS9-P198-2	0-5	1,100	e-m	1842770	6558200
					5-29	2,000	e-m		
					29+	8,300	r		
	P200-3	Dead End	Klp	RS9-P200	0-2	1,100	e-m	1840230	6559390
					2-15	2,400	e-m		
					15+	14,850	r		
	P202-3	Tangent	Klp	RS9-P202	0-1	1,100	e-m	1837580	6559330
					1-9	1,350	e-m		
					9+	4,650	r		
	P203-3	Tangent	Klp	RS9-P203	0-4	1,100	e-m	1836260	6559300
					4-30	2,650	e-m		
					30+	8,050	r		
	P204-3	Tangent	Klp	RS9-P204	0-3	1,100	e-m	1834930	6559270
					3-23	2,450	e-m		
					23+	7,600	r		
	P205-2	Angle	Klp	RS9-P205	0-2	1,100	e-m	1833620	6559240
					2-13	2,050	e-m		
					13+	5,950	r		
	P206-1	Angle	Klp	RS9-P206	0-4	1,100	e-m	1832610	6558780
					4-18	2,600	e-m		
					18+	4,450	r		
	P208	Tangent	Klp	RS9-P208	0-5	1,100	e-m	1830200	6558740
					5-18	2,600	e-m		
					18+	10,000	r		
	P209-1	Tangent	Klp	RS9-P209	0-3	1,100	e-m	1828930	6558720
					3-23	3,700	e-m		
					23+	8,900	r		
	P210	Dead End	Klp	RS9-P210	0-4	1,100	e-m	1827580	6558700
					4-15	3,300	e-m		
					15+	5,100	r		
	P211	Dead End	Klp	RS9-P211	0-4	1,100	e-m	1826630	6559260
					4-22	2,700	e-m		
					22+	6,800	r		
	P213	Angle	Klp	RS9-P213	0-3	1,100	e-m	1825410	6559250
					3-20	3,200	e-m		
					20+	6,400	r		
	P215	Dead End	Klp	RS9-P215	0-2	1,100	e-m	1823130	6558730
					2-12	3,000	e-m		
					12+	5,900	r		

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Table 3
Summary of Seismic Refraction Traverses
Sunrise Powerlink Project

Section	Structure Designation[a]	Structure Type[b]/Status	Geologic Unit	Seismic Refraction Information			Augerability[d] (Watson 3000)	Seismic Refraction Coordinates Center	
				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
9C	P218-1	Tangent	Klp	RS9-P218	0-2	1,100	e-m	1822170	6561570
					2-16	3,100	e-m		
					16+	6,100	r		
	P219	Relocated Structure; P219-1 Supercedes	Klp	RS9-P219	0-3	1,100	e-m	1821420	6561760
					3-17	2,900	e-m		
					17+	5,900	r		
	P219-1	Dead End	Klp	RS9-P219-1	0-3	1,100	e-m	1821910	6562370
					3-15	2,800	e-m		
					15+	6,700	r		
	P220	Relocated Structure; P220-1 Supercedes	Klp	RS9-P220	0-3	1,100	e-m	1820420	6562930
					3-16.5	2,300	e-m		
					16.5+	5,600	r		
	P220-1	Dead End	Klp	RS9-P220-1	0-3	1,100	e-m	1820310	6562750
					3-23	2,500	e-m		
					23+	9,300	r		
	P221-2	Tangent	Klp	RS9-P221	0-3	1,100	e-m	1819500	6564030
					3-32	3,400	e-m		
					32+	13,600	r		
	P221A	Dead End	Kih	RS9-P221A	0-2	1,100	e-m	1818940	6564960
					2-11	4,700	r		
					11+	9,900	r		
	P223-1	Dead End	Kih	RS9-P223	0-1	1,100	e-m	1818360	6565940
					1-11	3,600	d		
					11+	7,000	r		
	P224-1	Dead End	Jsp	RS9-P224-1	0-2.5	1,100	e-m	1816780	6567090
					2.5-14	2,900	e-m		
					14+	7,700	r		
	P226-1	Tangent	Jsp	RS9-P226	0-3	1,100	e-m	1815060	6568850
					3-16	2,900	e-m		
					16+	9,400	r		
	P228	Tangent	Jsp	RS9-P228	0-2	1,100	e-m	1813020	6570880
					2-16	2,900	e-m		
					16+	8,500	r		
	P229-1	Dead End	Jsp	RS9-P229	0-3	1,100	e-m	1812260	6571650
					3-15	3,550	e-m		
					15+	6,150	r		
	P231-1	Tangent	Jsp	RS9-P231	0-3	1,100	e-m	1810400	6573560
					3-18	3,900	e-m		
					18+	9,850	r		
	P232	Relocated Structure; P232-1 Supercedes	Jsp	RS9-P232	0-2	1,100	e-m	1809310	6574680
					2-10	2,550	e-m		
					10+	3,700	e-m		
	P232-1	Tangent	Jsp	RS9-P232-1	0-2	1,100	e-m	1811220	6575130
					2-17	3,250	e-m		
					17+	7,800	r		
	P234-1	Tangent	Qt/f	RS9-P234	0-4	1,100	e-m	1809180	6576770
					4-14	2,150	e-m		
					14+	3,650	e-m		
	P235-1	Tangent	Ta	RS9-P235	0-4	1,100	e-m	1809110	6577920
					4-21	1,300	e-m		
					21+	2,900	e-m		
	P236-1	Angle	Tj	RS9-P236-1	0-2	1,100	e-m	1809830	6579790
					2-14	2,600	e-m		
					14+	7,050	r		
	P238-1	Tangent	Tj	RS9-P238	0-1	1,100	e-m	1808860	6581960
					1-7	2,850	e-m		
					7+	5,800	r		
	P239-1	Angle	Qal	RS9-P239	0-20	1,000	e-m	1809050	6583780
					20+	4,500	e-m		
	P242	Angle	Qal	RS9-P242	0-3	1,100	e-m	1809360	6586780
					3-28	1,250	e-m		
					28+	4,950	e-m		
	P243	Tangent	Qt/f	RS9-P243	0-5	1,100	e-m	1809370	6588250
					5-27	2,100	e-m		
					27+	3,900	e-m		

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Table 3
Summary of Seismic Refraction Traverses
Sunrise Powerlink Project

Section	Structure Designation[a]	Structure Type[b]/Status	Geologic Unit	Seismic Refraction Information			Augerability[d] (Watson 3000)	Seismic Refraction Coordinates Center	
				Seismic Refraction Designation[c]	Generalized Subsurface Profile (feet)	Average P-Wave Velocity (fps)		Northing	**Easting**
9C (Cont'd)	P245-1	Tangent	Klp	RS9-P245	0-3	1,100	e-m	1809400	6591180
					3-25	2,400	e-m		
					25+	5,800	r		
	P246	Tangent	Klp	RS9-P246	0-2	1,100	e-m	1809410	6592590
					2-11	2,300	e-m		
					11+	8,100	r		
	P248	Tangent	Klp	RS9-P248-1	0-2	1,100	e-m	1809440	6595250
					2-11	3,500	d		
					11+	10,100	r		
	P250	Tangent	Klp	RS9-P250	0-3	1,100	e-m	1809460	6597760
					3-17	2,400	e-m		
					17+	4,600	r		
10B	P290	Dead End	Tsm	RS9-P290	0 - 0.5	1,100	e-m	1845620	6623810
					0.5 - 9	1,300	e-m		
					9+	1,900	e-m		
	P292-1	Tangent	Tsm	RS9-P292	0-3	1,100	e-m	1848580	6625320
					3-14	1,500	e-m		
					14+	2,300	e-m		
	P297	Tangent	Qal	RS9-P297	0-4	1,100	e-m	1855360	6628770
					4-17	1,650	e-m		
					17+	2,550	e-m		
	P301	Dead End	Qt/f	RS9-P301	0-2	1,100	e-m	1861460	6631870
					2-19	1,500	e-m		
					19+	2,600	e-m		
	P304-2	Tangent	Tip	RS9-P304	0-5	1,100	e-m	1862530	6636400
					5-24	2,250	e-m		
					24+	7,500	r		
	P307-1	Tangent	Tip	RS9-P307-1	0-3	1,100	e-m	1863620	6640990
					3-20	1,700	e-m		
					20+	4,450	e-m		
	P315-1	Tangent	QTps	RS9-P315-1	0-1.5	1,100	e-m	1866190	6651830
					1.5-26	1,700	e-m		
					26+	3,000	e-m		
	P319	Angle	QTpsp	RS9-P319-1	0-2	1,100	e-m	1867500	6657330
					2-16	1,600	e-m		
					16+	4,400	e-m		
	P322-1	Tangent	QTpsp	RS9-P322-1	0-3	1,100	e-m	1867880	6662170
					3-23	1,650	e-m		
					23+	4,300	e-m		
	P324	Angle	Qal	RS9-P324	0-1.5	1,100	e-m	1868080	6664850
					1.5-28	2,050	e-m		
					28+	6,350	d		
	P330-1	Dead End	Qal	RS9-P330	0-1	1,100	e-m	1867650	6675250
					1-17	1,400	e-m		
					17+	3,000	e-m		
	P333	Angle	QTpsa	RS9-P333	0-2	1,100	e-m	1864990	6679240
					2-18	1,600	e-m		
					18+	3,250	e-m		
	P358	Tangent	QTpsa	RS9-P358	0-2	1,100	e-m	1844950	6717460
					2-37	1,200	e-m		
					37+	5,150	d		
	P361	Angle	Ql	RS9-P361	0-3	1,100	e-m	1842490	6722170
					3-43	1,300	e-m		
					43+	5,450	d		
	P363-1	Dead End	Ql	RS9-P363	0-4	1,100	e-m	1840680	6725020
					4-42	1,800	e-m		
					42+	5,650	d		

Notes:

a. Structure designation corresponds to staking sheets provided by Burns & McDonnell on February 23, 2010.

b. Seismic refraction traverse performed at previous sites are noted as 'Deleted or Relocated Structure' and are included for reference.

c. Seismic refraction designation corresponds to the structure designation determined at the time of field work.

d. Please refer to Appendix C for Augeribility Characteristics details; e-m = easy to moderate; d = difficult; r = refusal.

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Table 4
Design Groundwater Depths
Sunrise Powerlink Project

Section	Structure Designation	Estimated Groundwater Depth Below Grade (feet)
8C	P54-1	20
8D	P78	40
8E	P90-1	40
10B	P282-P330-1	40
10B	P331-P347	50
10B	P348	45
10B	P349	44
10B	P350	44
10B	P351	43
10B	P352	42
10B	P353	42
10B	P354	41
10B	P355	40
10B	P356	40
10B	P357	39
10B	P358	38
10B	P359	38
10B	P360	37
10B	P361	36
10B	P362-1	36
10B	P363-1	35

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Table 5
Tower Foundation Design Parameters
Sunrise Powerlink Project

Design Parameter Set	Compression Wave Velocity, Vp (fps)	Total Unit Weight, γ (pcf)	Friction Angle, ϕ (degrees)	Cohesion, C (psf)	Shear Strength Reduction Factor / Adhesion, α [b] (psf)	Horizontal Stress Coefficient, K_o [c]	Operative / Insitu Horizontal Stress Ratio, K/K_o [d]	Ratio of Interface to Soil Friction Angle [e]	Discount Depth (feet)	E_{pmt} (ksi) [g]
Soil / Sedimentary Deposits / Weathered Granitic and Metamorphic Rock										
1	1,000-2,000	120	33	0	1.00	0.60	0.85	1.0	2	1.5
2	2,000-3,000	125	35	250	1.00				1	2.5
3	3,000-4,000	130	37	500	1.00	0.70	0.90		0	4
4	4,000-5,000	135	39	1,000	0.75				0	8
Moderately and Slightly Weathered Granitic and Metamorphic Rock										
5	5,000-6,000	145	45	1,500	0.57	1.00	0.95	1.0	Not Applicable	15
6	6,000-7,000	155	47	2,000	0.48					25
7	>7,000	165	49	4,000	0.35					50

Notes:
a. These soil/rock parameters are intended for input for the MFAD computer program or FHWA methodology calculations and may not reflect actual strengths.
b. Adhesion calculated on the following formula: If cohesion< 684 psf then adhesion is equal to 1.0. If cohesion is > 684 psf then adhesion is equal to 0.21+ (540/cohesion).
c. In-situ Horizontal Stress Coefficient may be used at the top and bottom of each layer.
d. Operative/Insitu Horizontal Stress ratio for: 1) excavation open more than 12 hours, 2) concrete slump less than 5 inches, and 3) dry excavation conditions with no casing.
e. The ratio of interface to soil friction angle provided for typical straight drilled shafts constructed with cast in place concrete.
f. The discount depth should be considered the minimum neglect to be used in design.
g. Modulus of deformation as would be determined from a pressuremeter test.

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Table 6
Foundation Design Groups
Sunrise Powerlink Project

Foundation Design Group	Generalized Subsurface Profile Depth (feet)	Design Parameter Set
A	0 to 30	1
B	0 to 15	1
	15 to 30	2
C	0 to 6	1
	6 to 30	2
D	0 to 2	1
	2 to 13	2
	13 to 30	4
E	0 to 2	1
	2 to 16	2
	16 to 30	5
F	0 to 5	1
	5 to 16	2
	16 to 30	7
G	0 to 4	1
	4 to 24	2
	24 to 30	7
H	0 to 5	1
	5 to 15	3
	15 to 30	4
I	0 to 8	1
	8 to 25	3
	25 to 30	5
J	0 to 4	1
	4 to 17	3
	17 to 30	5
K	0 to 3	1
	3 to 15	3
	15 to 30	7
L	0 to 2	1
	2 to 26	3
	26 to 30	7
M	0 to 8	1
	8 to 20	4
	20 to 30	5
N	0 to 5	2
	5 to 30	5

Notes:
a. A graphical representation of the foundation design groups is presented in Figure 7.
b. Design parameter sets presented in Table 5.

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Table 7
Interpreted Foundation Design Group by Section
Sunrise Powerlink Project

Foundation Design Group	Number of Structure Sites														
	230 kV Line			500 kV Line											Percent of Tower Sites
	Section 4A	Section 5	Section 7	Section 8A	Section 8B	Section 8C	Section 8D	Section 8E	Section 9A	Section 9B	Section 9C	Section 10A	Section 10B	Total	
A											4		30	34	8.1
B		1							1	2			18	21	5.0
C		8	1	5			3	3	1	6	5		17	50	12.0
D	1	11		6				9	10	7	5		3	52	12.5
E		2		7			2	12	3	6	3			35	8.4
F			3	2		7	3		1	11	2			29	7.0
G				2	2	4	7		2	11	1		1	30	7.2
H	4	3									11	12		30	7.2
I		1		2	1		2			1	1			8	1.9
J		11	1	3	1			1		3	6			26	6.2
K	3	12	3	6		3	6			6	11			50	12.0
L	3	3	1	7		1		7	2	4				28	6.7
M	1	4		1		1			2	1	1		5	16	3.8
N	6										2			8	1.9
Total	25	57	11	41	4	16	23	32	22	58	52	12	74	418	100

Notes:
a. Data provided for original alignment only.
b. Does not include custom foundation designs for monopoles.

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Table 8
Interpreted Foundation Design Group by Tower Type
Sunrise Powerlink Project

Foundation Design Group	TOWER TYPE															Total
	230 kV Line					500 kV Line										
	CXPT	CXTL	CXTA	CXRS	CXSD	EXLT	EXMT	EXHT	EXTT	EXLA	EXMA	EXHA	EXLD	EXMD	EXHD	
A	0	0	0	0	0	1	28	0	0	3	0	1	2	0	1	35
B	0	0	0	1	0	0	16	0	0	2	0	0	2	1	0	21
C	4	0	3	1	1	0	28	0	0	0	3	0	2	3	2	48
D	1	1	3	1	6	0	22	1	2	2	3	3	3	1	4	53
E	0	0	1	0	1	0	11	3	0	2	3	2	2	6	4	35
F	2	0	0	0	1	3	14	0	3	1	0	0	3	5	0	29
G	0	0	0	0	0	3	9	3	0	0	3	0	7	5	3	30
H	3	2	0	0	2	0	8	1	0	3	2	0	3	0	6	30
I	0	0	0	1	0	0	4	0	0	0	0	0	1	0	1	7
J	5	0	2	2	5	0	5	0	0	0	0	0	5	3	2	29
K	3	3	1	3	7	3	17	5	1	2	1	0	1	1	4	49
L	4	0	0	2	1	0	5	1	0	2	2	0	2	4	5	28
M	5	0	0	0	0	0	8	0	0	0	0	0	1	1	1	16
N	2	1	0	2	1	0	2	0	0	0	0	0	0	0	0	8
Total	29	7	10	13	25	10	177	14	6	17	17	6	34	30	33	418

Key to 230 kV Tower Types:

CXPT= Tangent
CXTL= Long Span Tangent
CXTA= Angle
CXRS= Strain
CXSD= Dead End

Key to 500 kV Tower Types:

EXLT= Light Tangent
EXMT= Medium Tangent
EXHT= Heavy Tangent
EXTT= Transposition
EXLA= Light Angle
EXMA= Medium Angle
EXHA= Heavy Angle
EXLD= Light Dead End
EXMD= Medium Dead End
EXHD= Heavy Dead End

Totals:

500kV Line: 334
230kV Line: 84

Grand: 418
Design Cases: 110

Notes:
Data provided for original alignment only.
Does not include custom foundation designs for monopoles.

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Table 9
Monopole Foundation Design Parameters
Sunrise Powerlink Project

Section	Pole Designation	Soil/Rock Description	Depth Below Grade (feet)	Total Unit Weight, γ (pcf)	Friction Angle, ϕ (degrees)	Cohesion, C (psf)	Shear Strength Reduction Factor / Adhesion, α [b], (psf)	Horizontal Stress Coefficient, K_o [c]	Operative / Insitu Horizontal Stress Ratio, K/K_o [d]	Ratio of Interface to Soil Friction Angle [e]	Discount Depth (feet)	Epmt (ksi) [g]
4A	P7 and P8-2	Surficial Soil	0 to 8	125	34	100	1.00	0.60	0.85	1.0	2	1.5
		Conglomerate	8 to 40	135	39	500		0.70	0.90			3
	P6-1, P11 and P12-1	Surficial Soil	0 to 5	125	35	250	1.00	0.60	0.85	1.0	1	1.5
		Conglomerate	5 to 40	135	39	500		0.70	0.90			3
	P9-1 and P10	Surficial Soil	0 to 5	125	35	250	1.00	0.60	0.85	1.0	1	1.5
		Conglomerate	5 to 20	135	39	500		0.70	0.90			3
			20 to 40	145	45	1,000	0.75	1.00	0.95			5
7	P98	Surficial Soil	0 to 5	120	33	0	1.00	0.60	0.85	1.0	2	1.5
		Completely Weathered Rock	5 to 15	125	35	250						4
		Highly to Moderately Weathered Rock	15 to 40	135	39	1,000	0.75	0.70	0.90			10
	P99-1	Surficial Soil	0 to 3	120	33	0	1.00	0.60	0.85	1.0	2	1.5
		Highly Weathered Rock	3 to 15	130	37	500		0.70	0.90			5
		Moderately to Slightly Weathered Rock	15 to 40	155	47	2,000	0.48	1.00	0.95			20

Notes:

a. These soil/rock parameters are intended for input for the MFAD computer program or FHWA methodology calculations and may not reflect actual strengths.
b. Adhesion calculated on the following formula: If cohesion< 684 psf then adhesion is equal to 1.0. If cohesion is > 684 psf then adhesion is equal to 0.21+ (540/cohesion).
c. In-situ Horizontal Stress Coefficient may be used at the top and bottom of each layer.
d. Operative/Insitu Horizontal Stress ratio for: 1) excavation open more than 12 hours, 2) concrete slump less than 5 inches, and 3) dry excavation conditions with no casing.
e. The ratio of interface to soil friction angle provided for typical straight drilled shafts constructed with cast in place concrete.
f. The discount depth should be considered the minimum neglect to be used in design.
g. Modulus of deformation as would be determined from a pressuremeter test.

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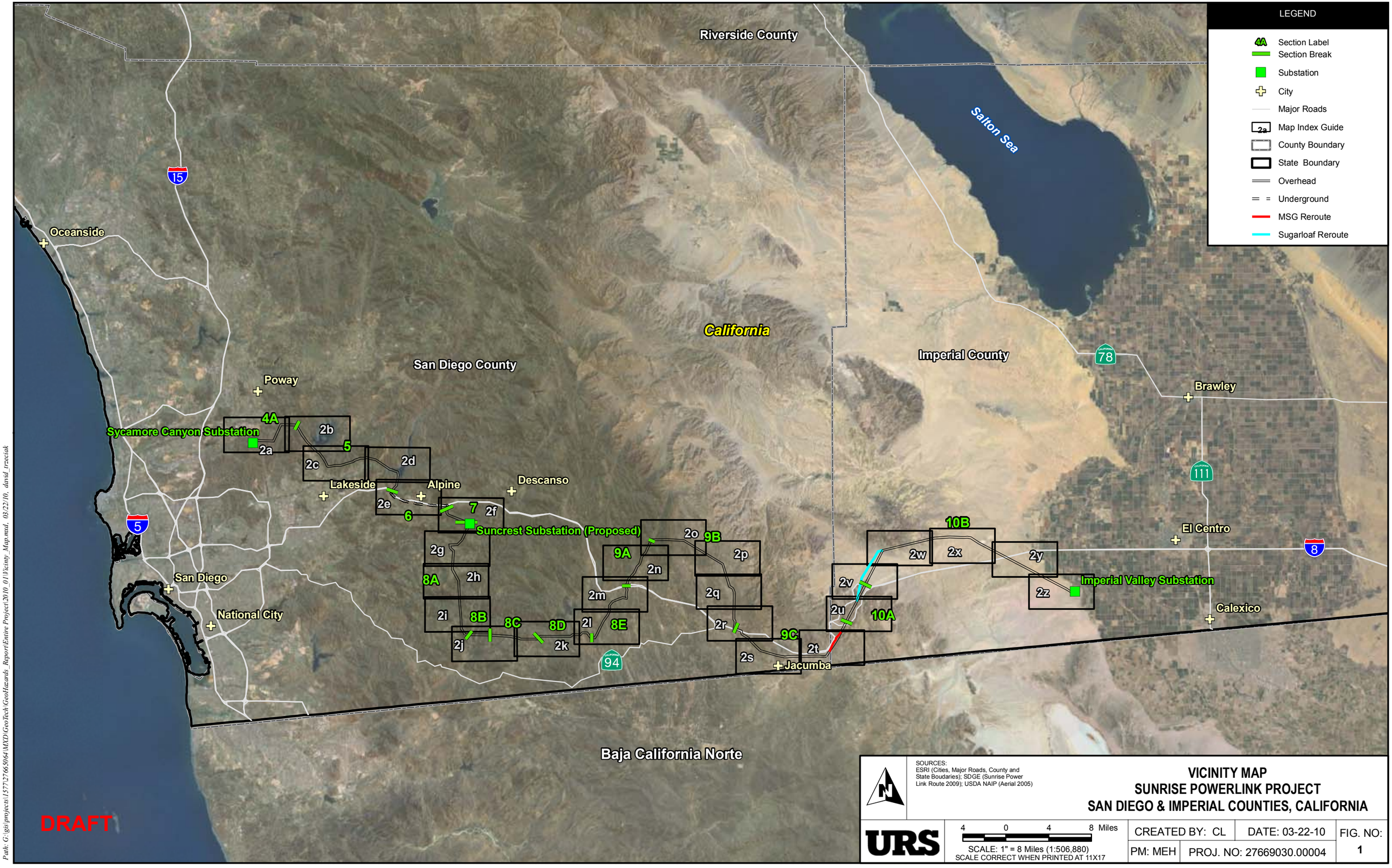

SOURCES:
ESRI (Cities, Major Roads, County and State Boudaries); SDGE (Sunrise Power Link Route 2009); USDA NAIP (Aerial 2005)

VICINITY MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

4 0 4 8 Miles

SCALE: 1" = 8 Miles (1:506,880)
SCALE CORRECT WHEN PRINTED AT 11X17

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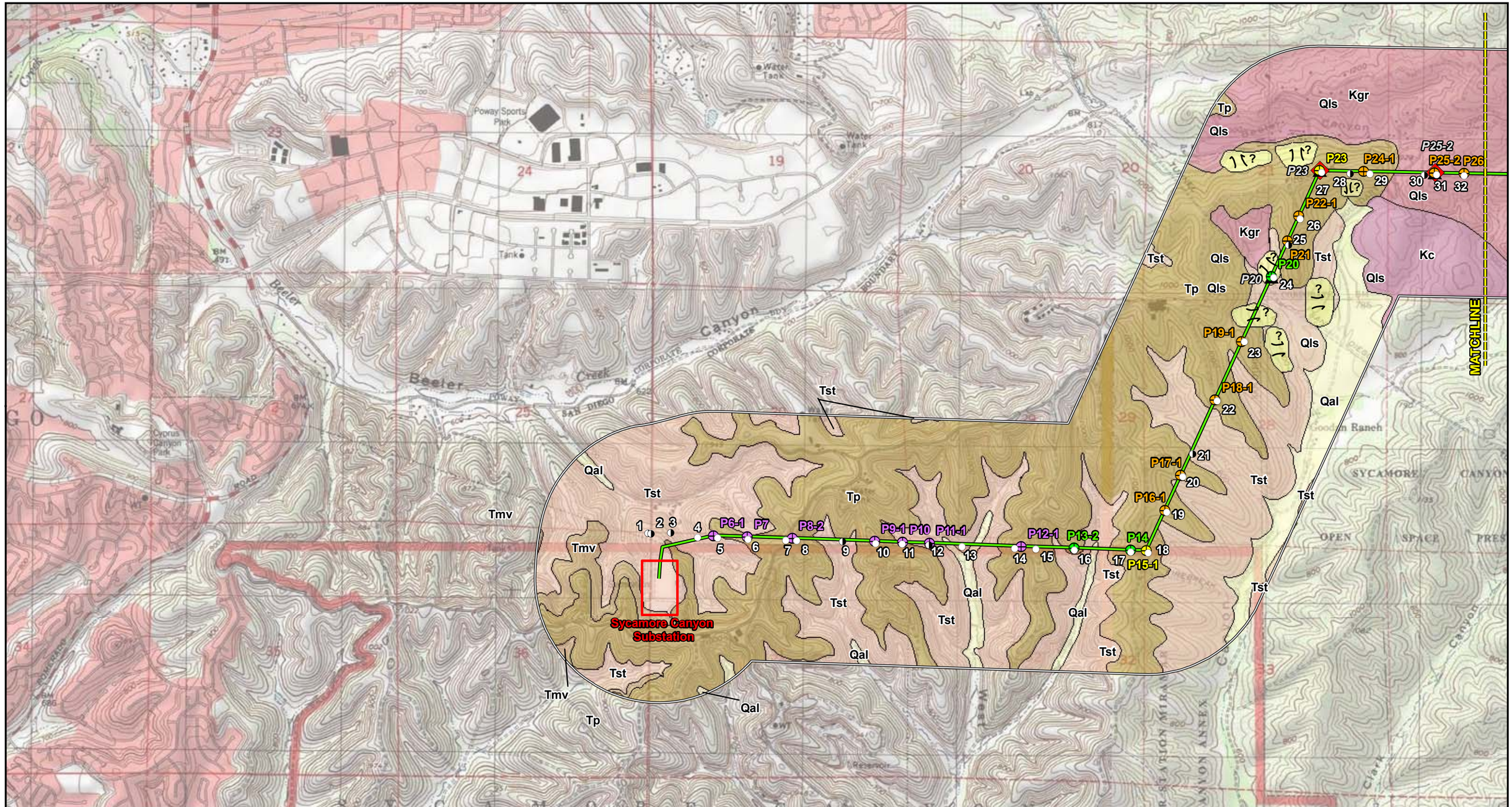

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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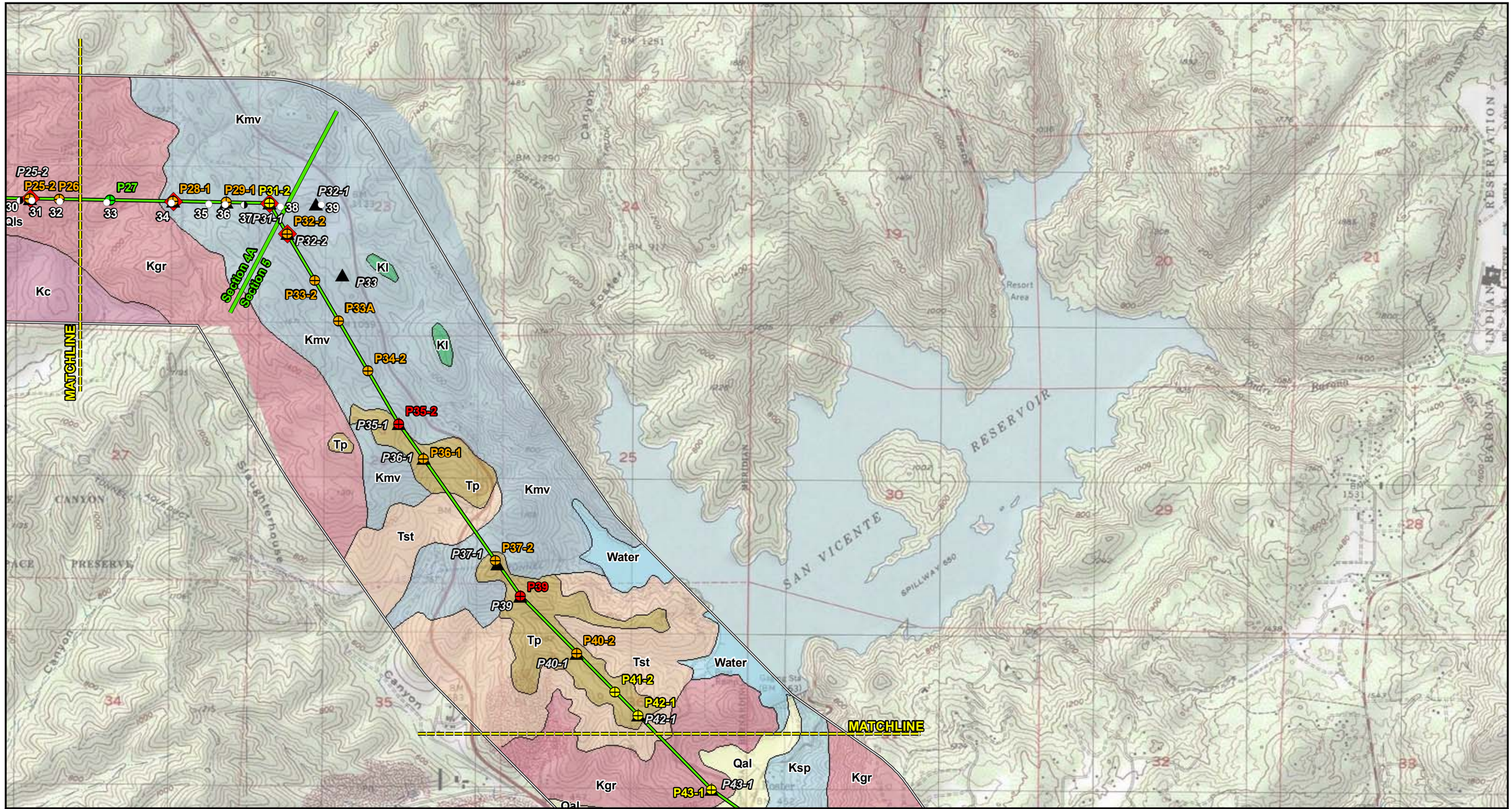

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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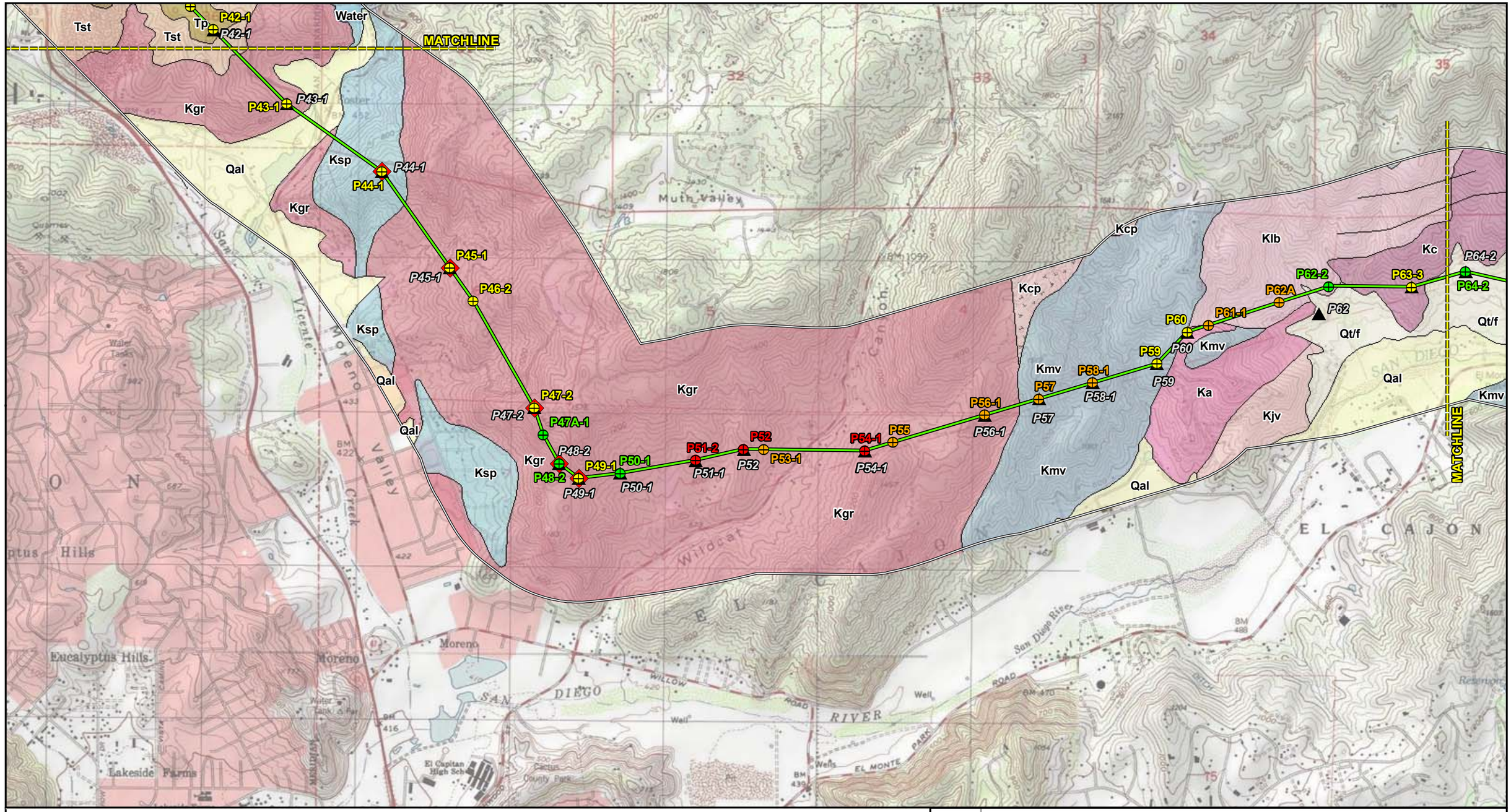

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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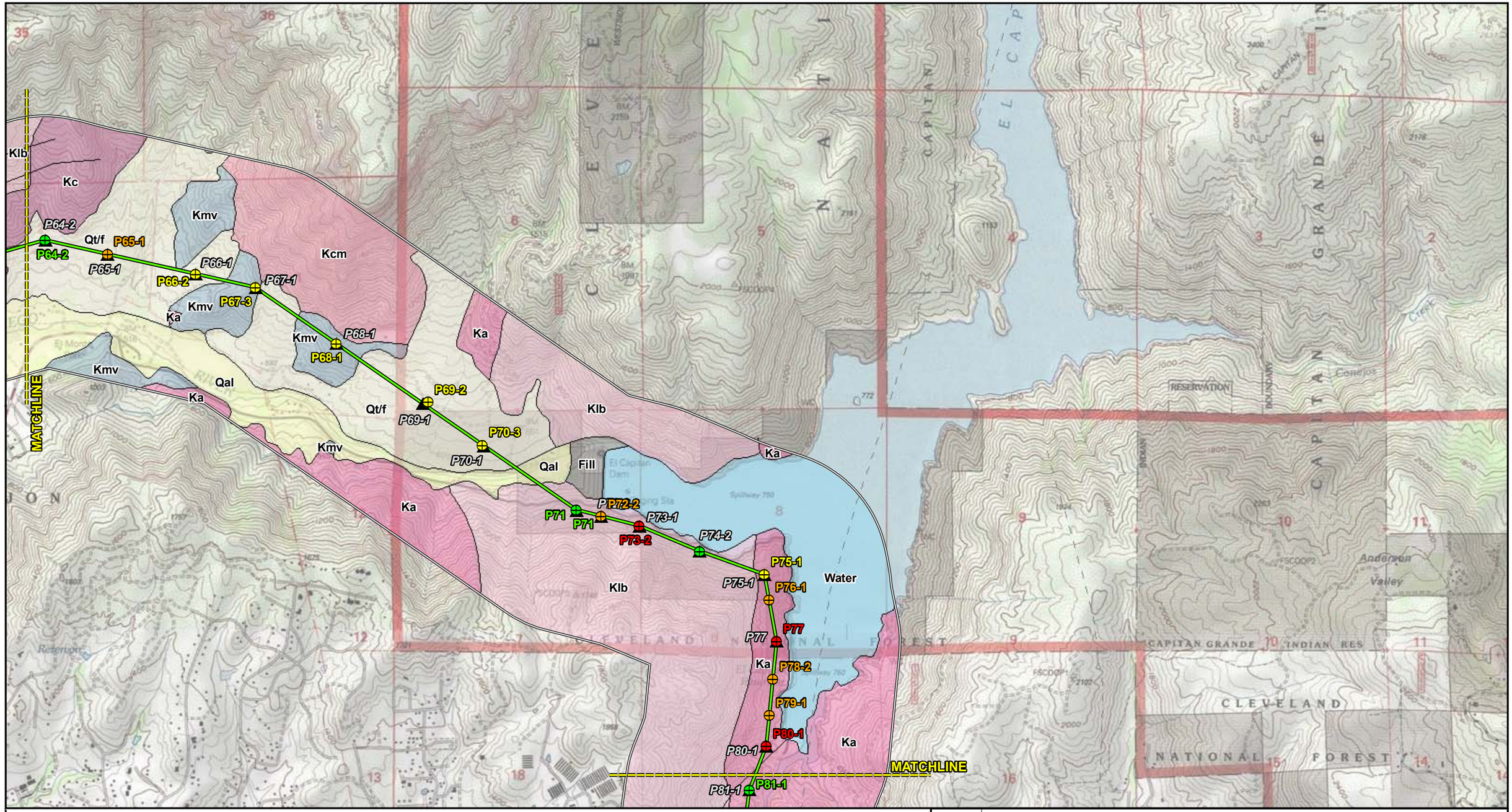

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

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SCALE CORRECT WHEN PRINTED AT 11X17

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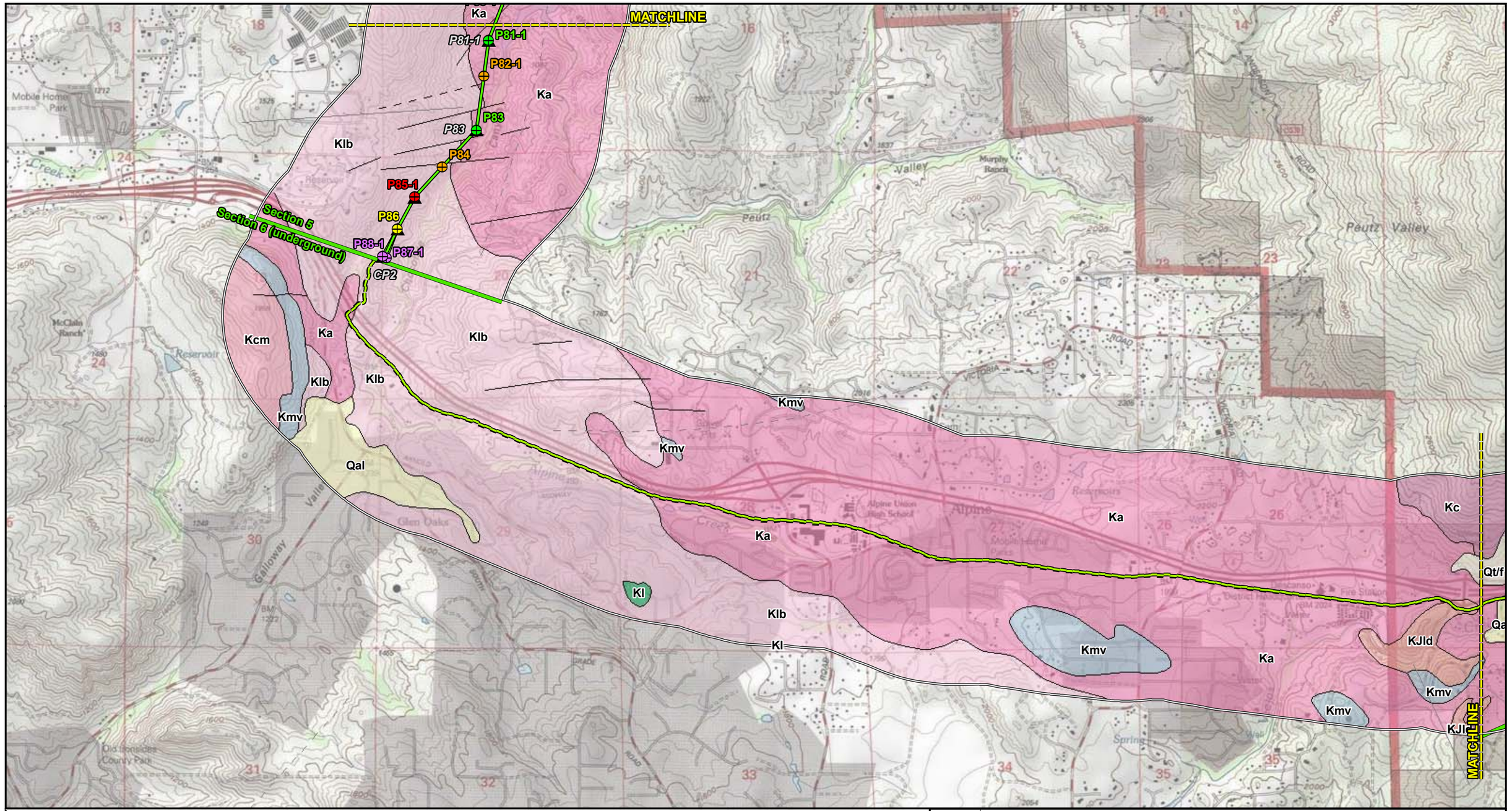

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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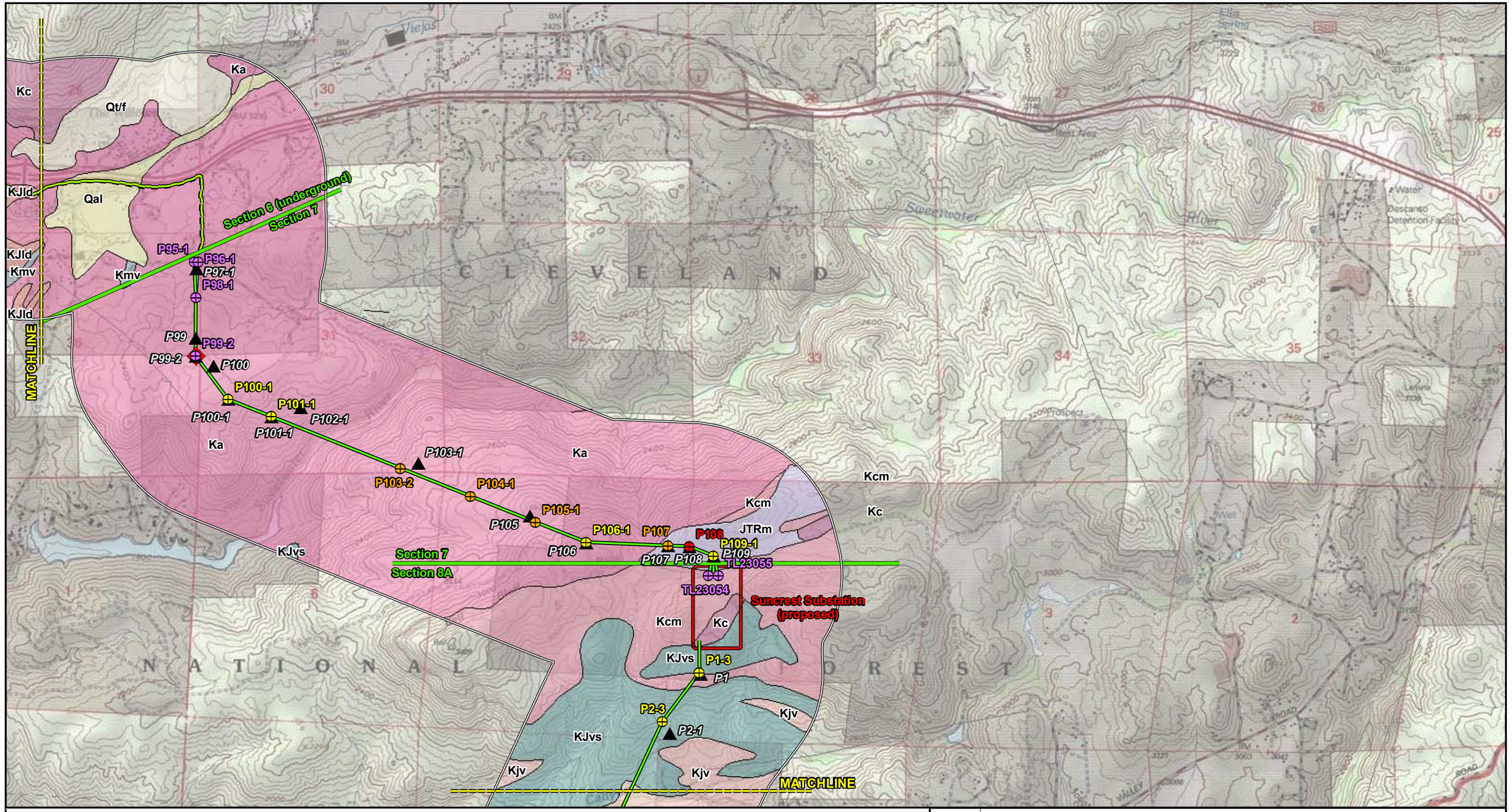

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet

SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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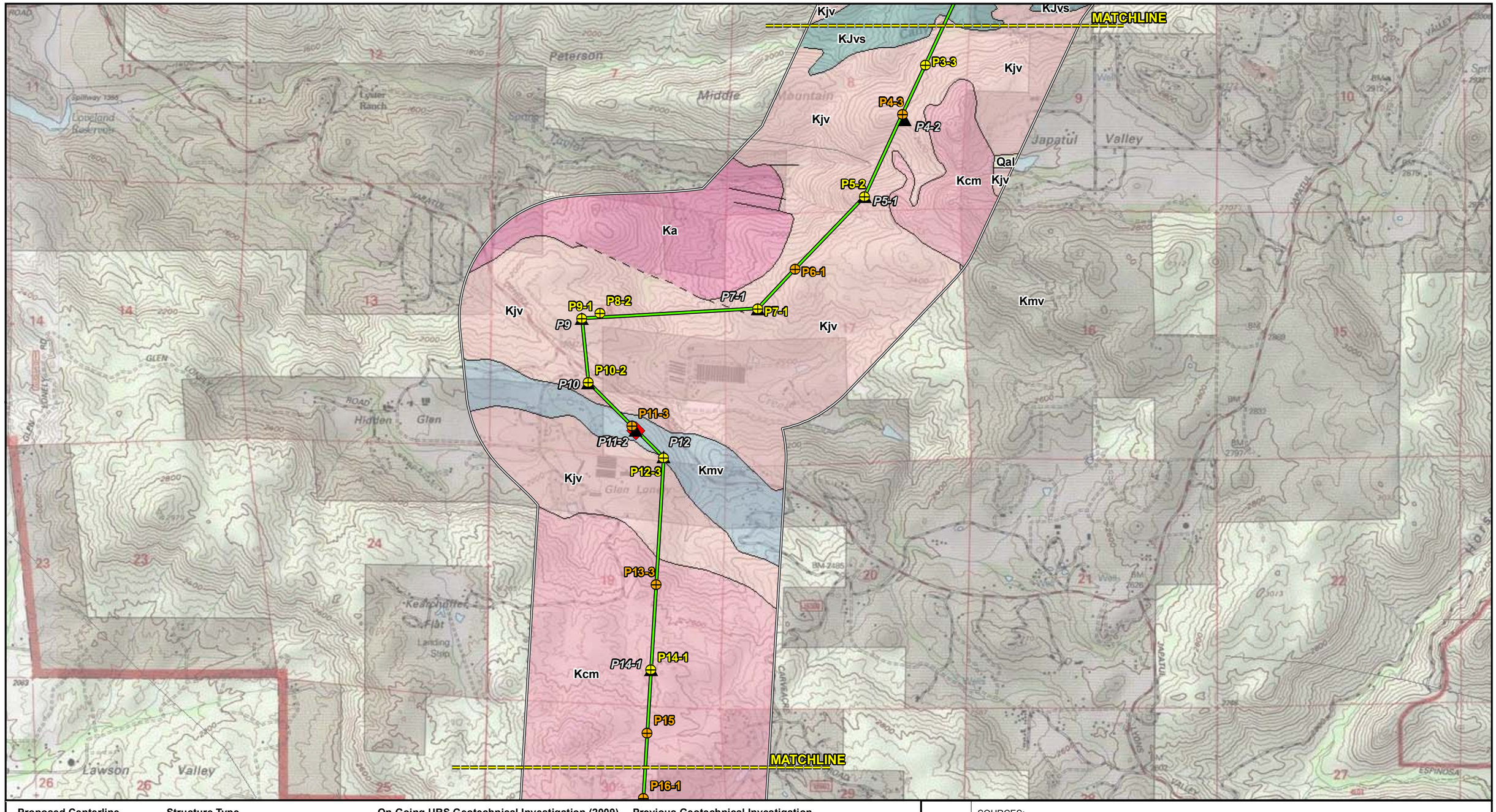

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet

SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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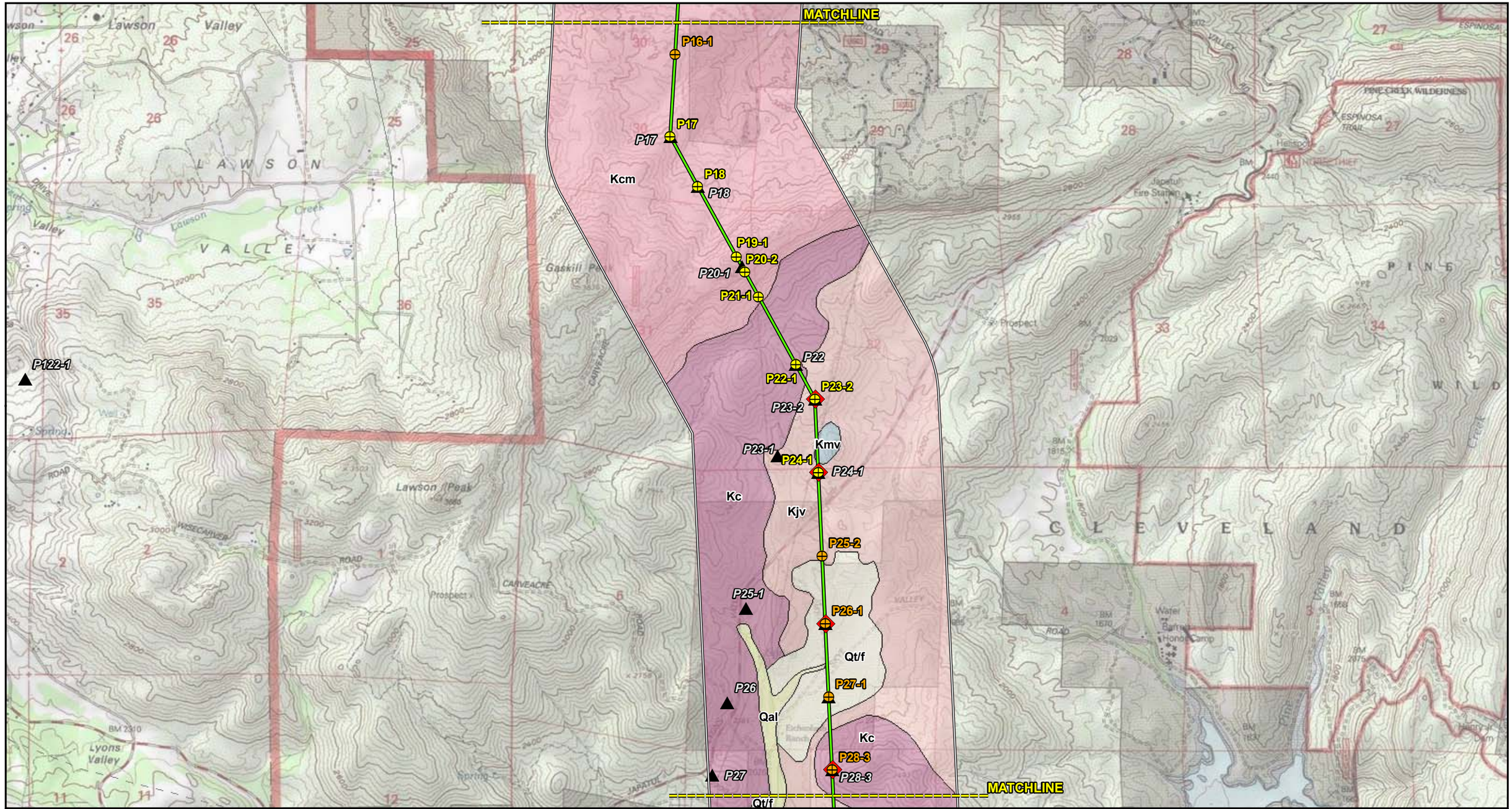

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet

SCALE: 1" = 2000' (1:24,000)
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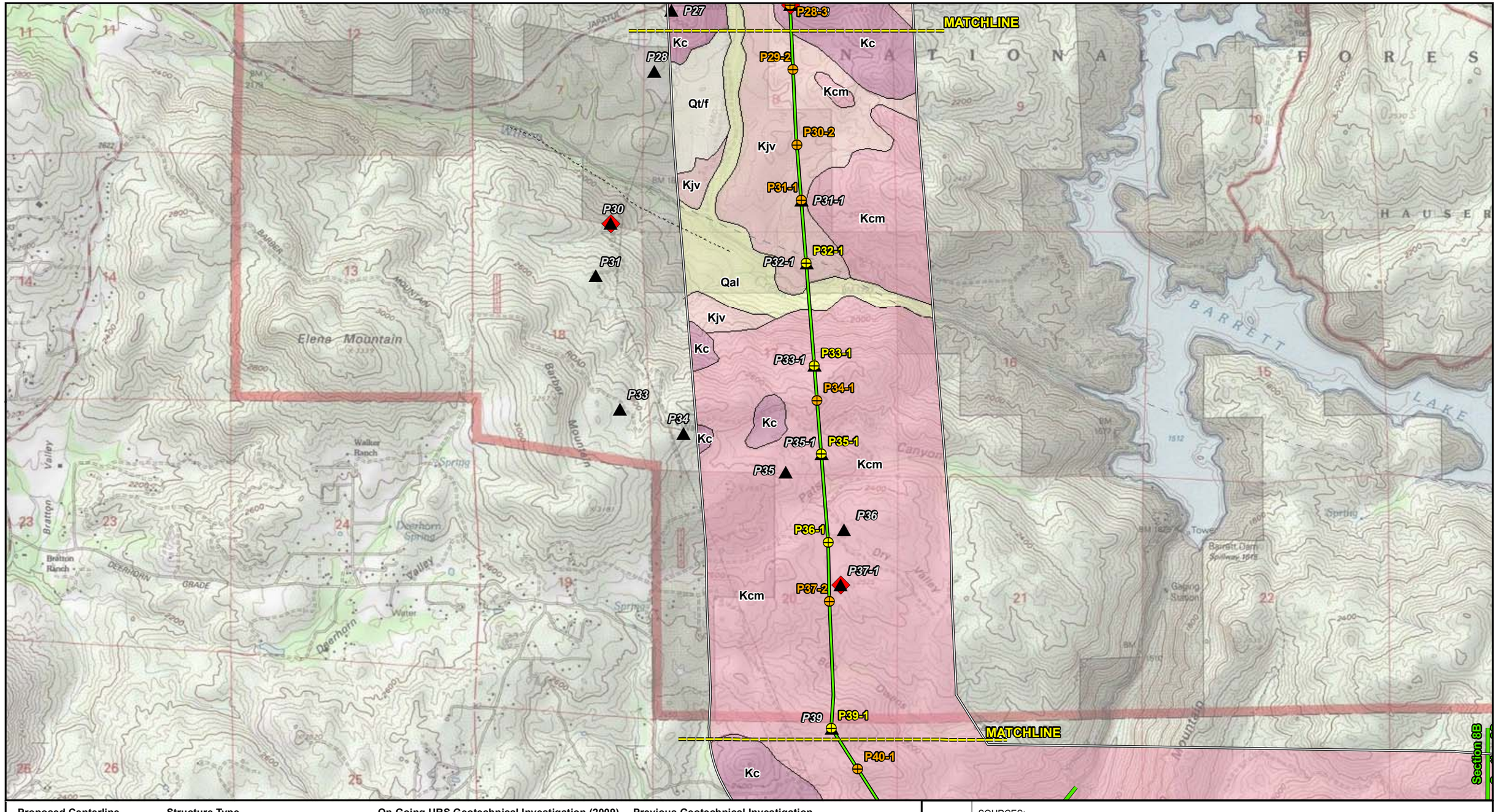

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

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SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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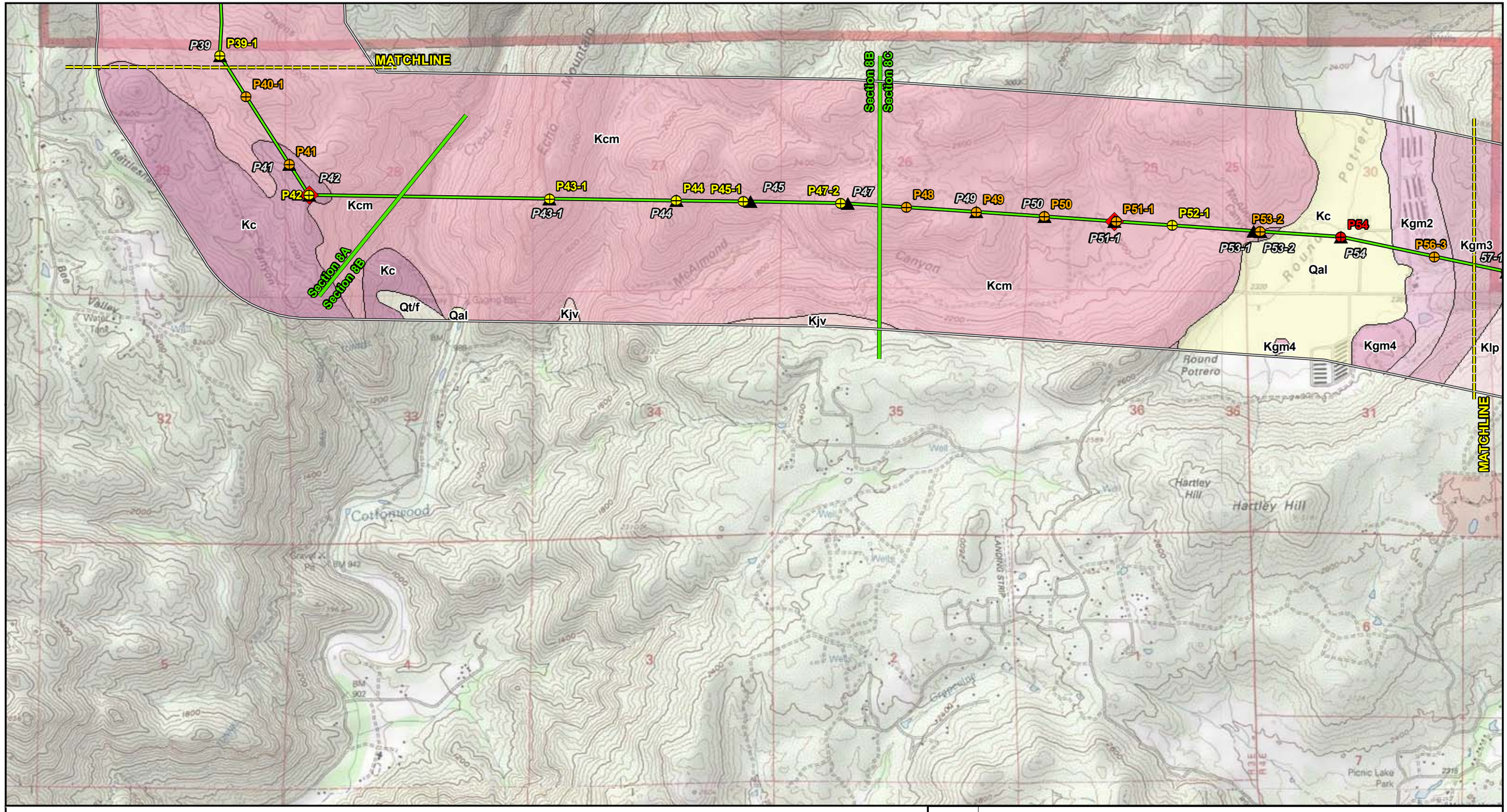

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

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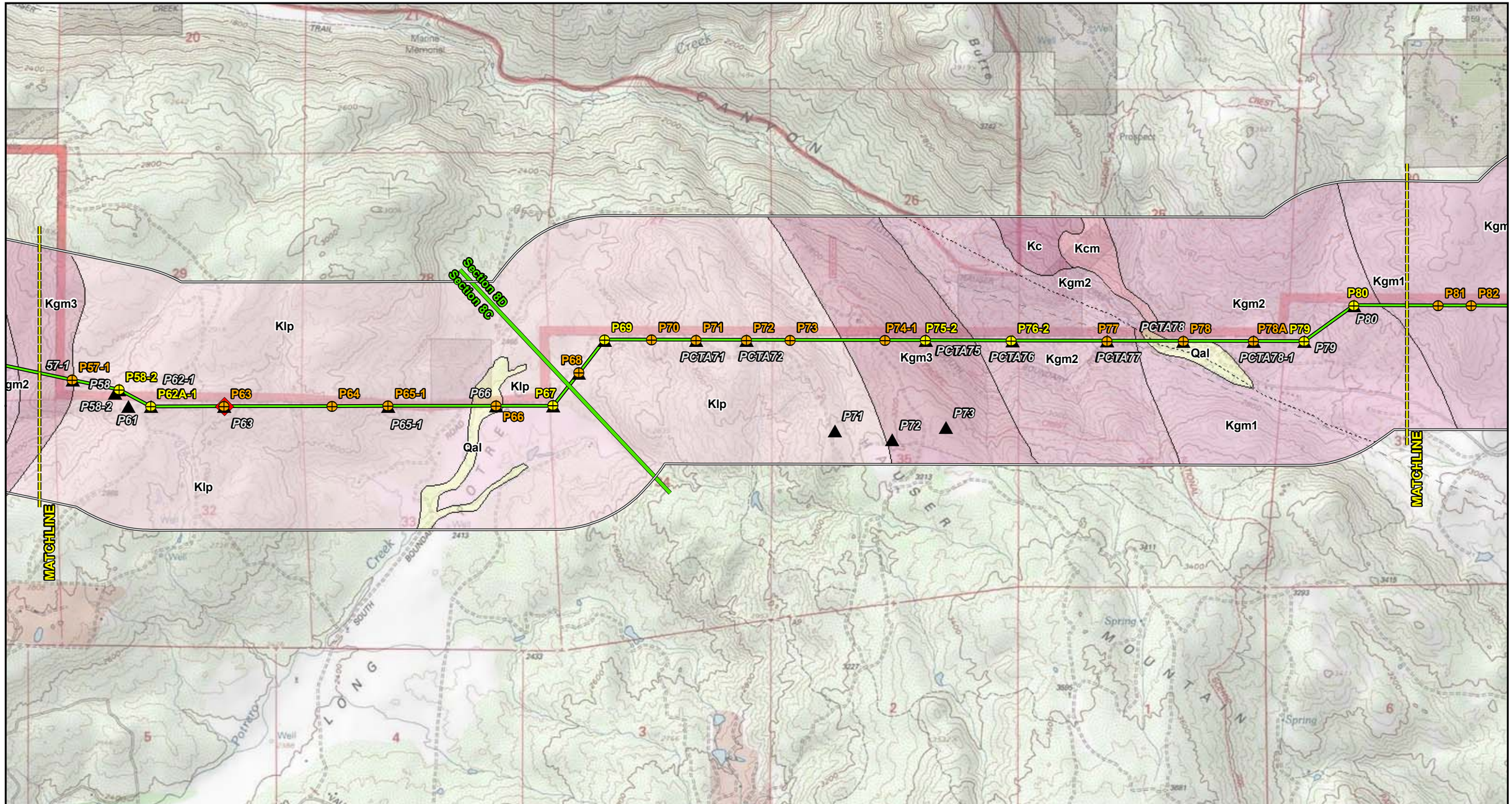

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet

SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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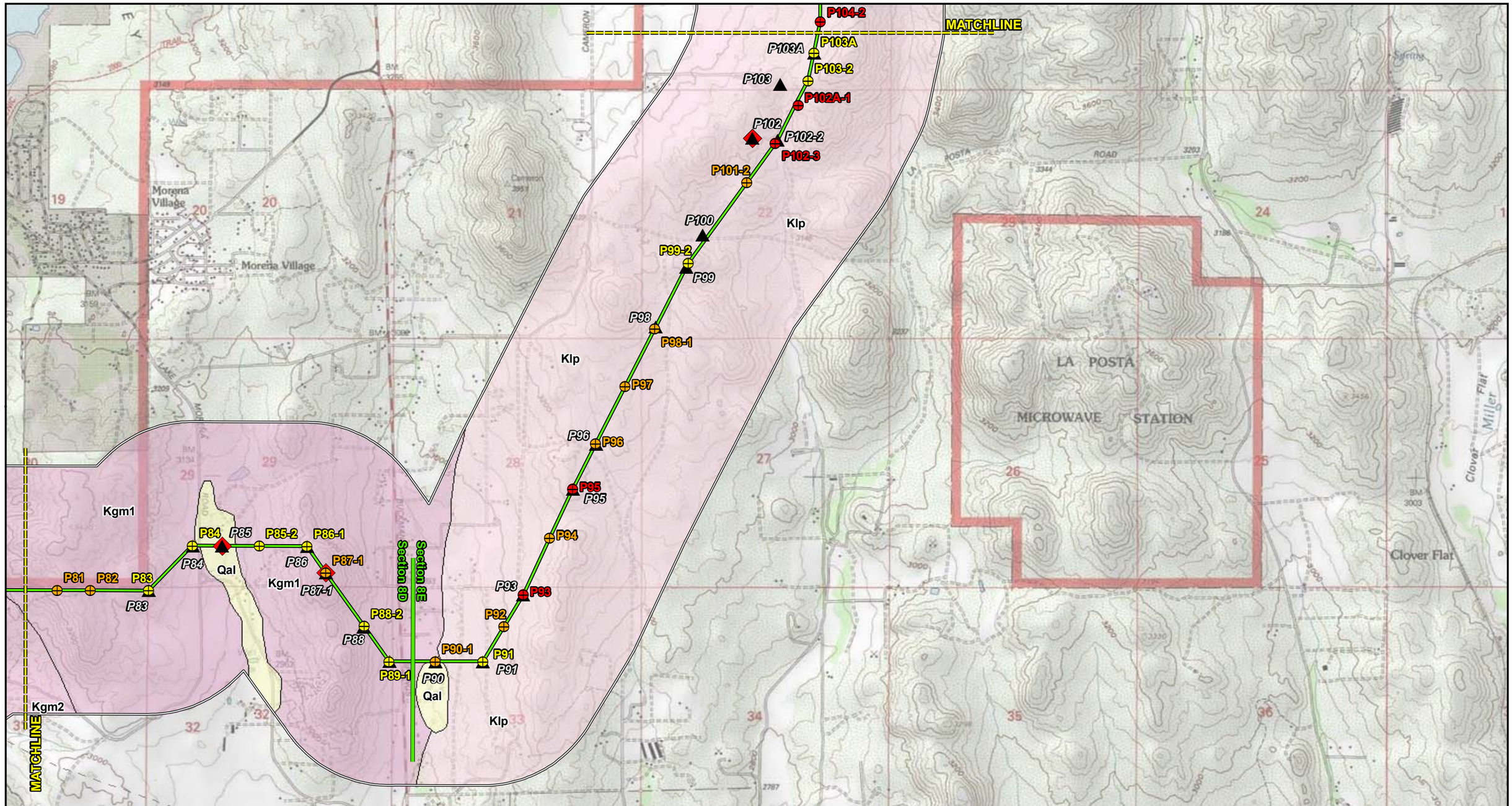

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

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- Tangent
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On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet

SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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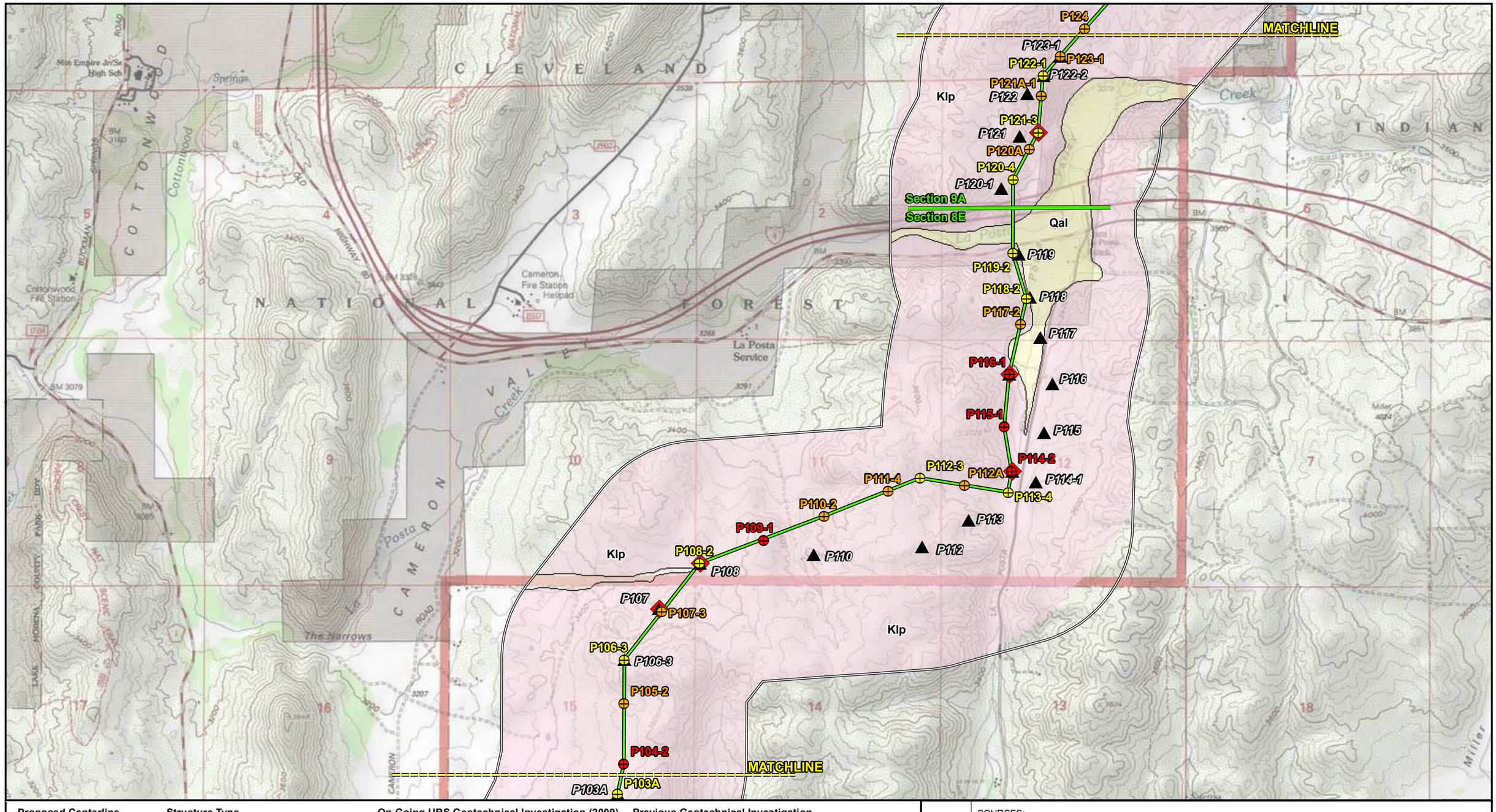

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

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- Tangent
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- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
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Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
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- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

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SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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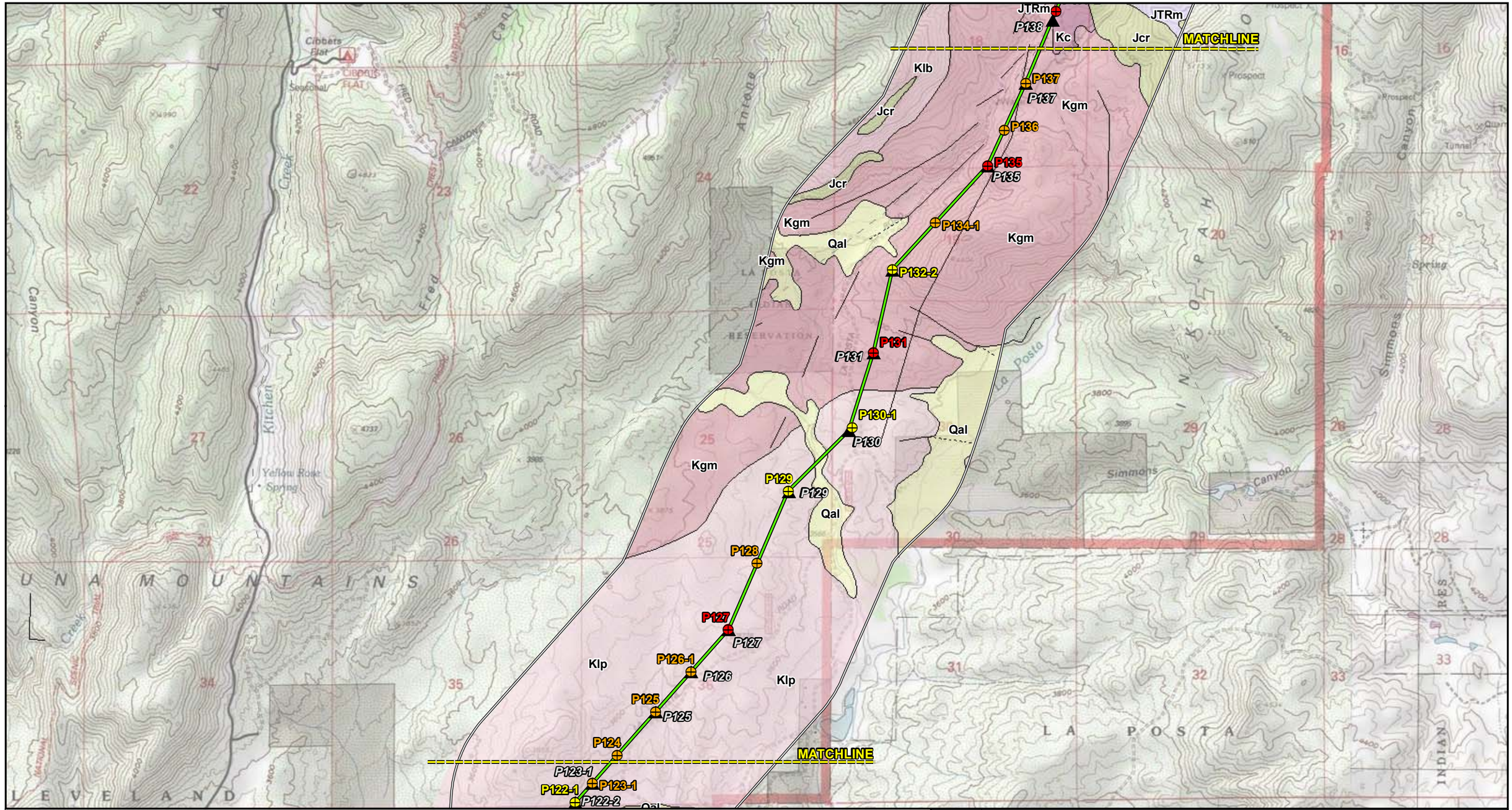

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
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On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
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- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
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- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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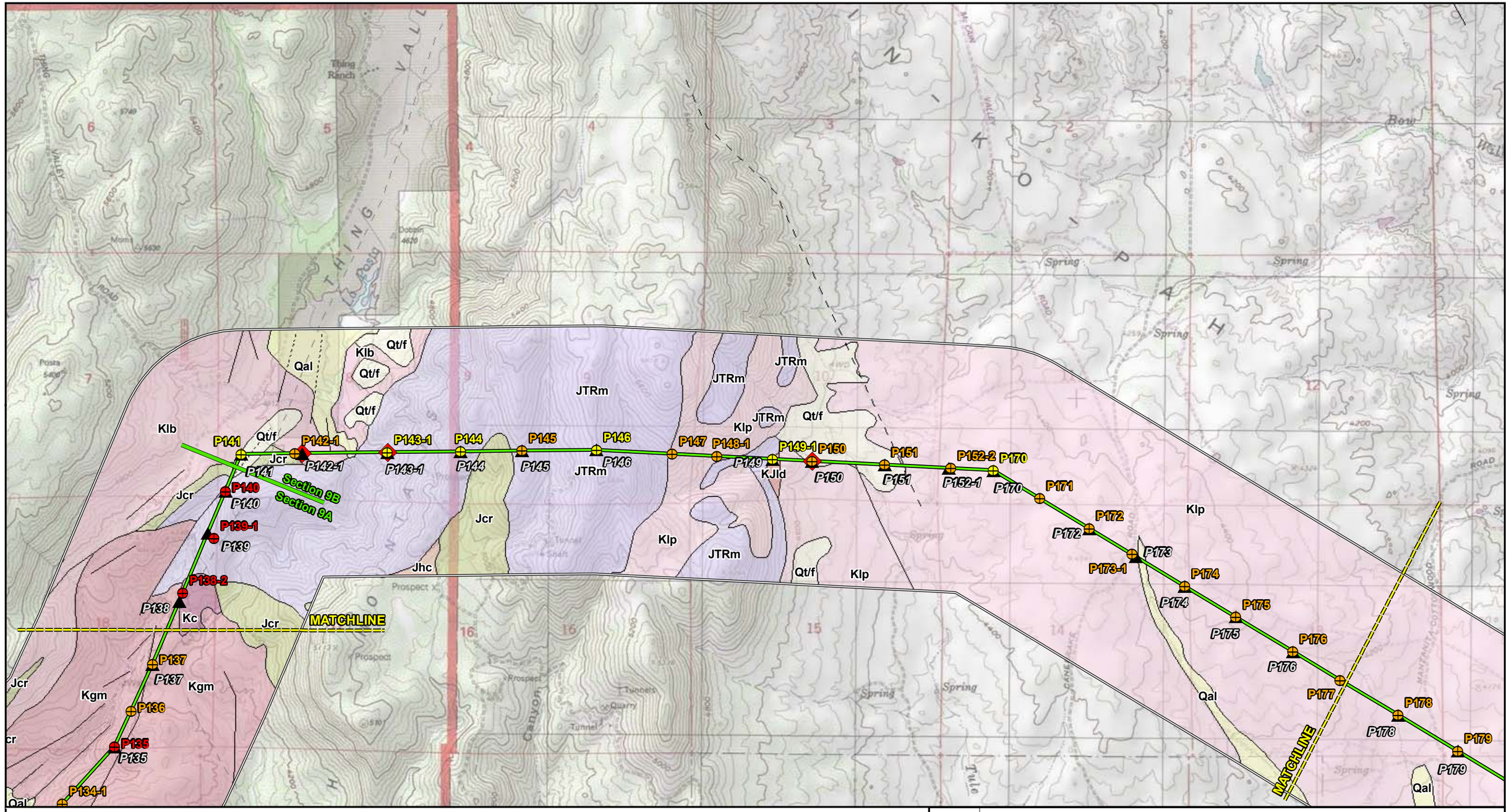

Proposed Centerline

- Original Overhead Alignment
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- MSG Re-Route

Structure Type

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On-Going URS Geotechnical Investigation (2009)

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- Existing Sycamore-Creelman TL Structure
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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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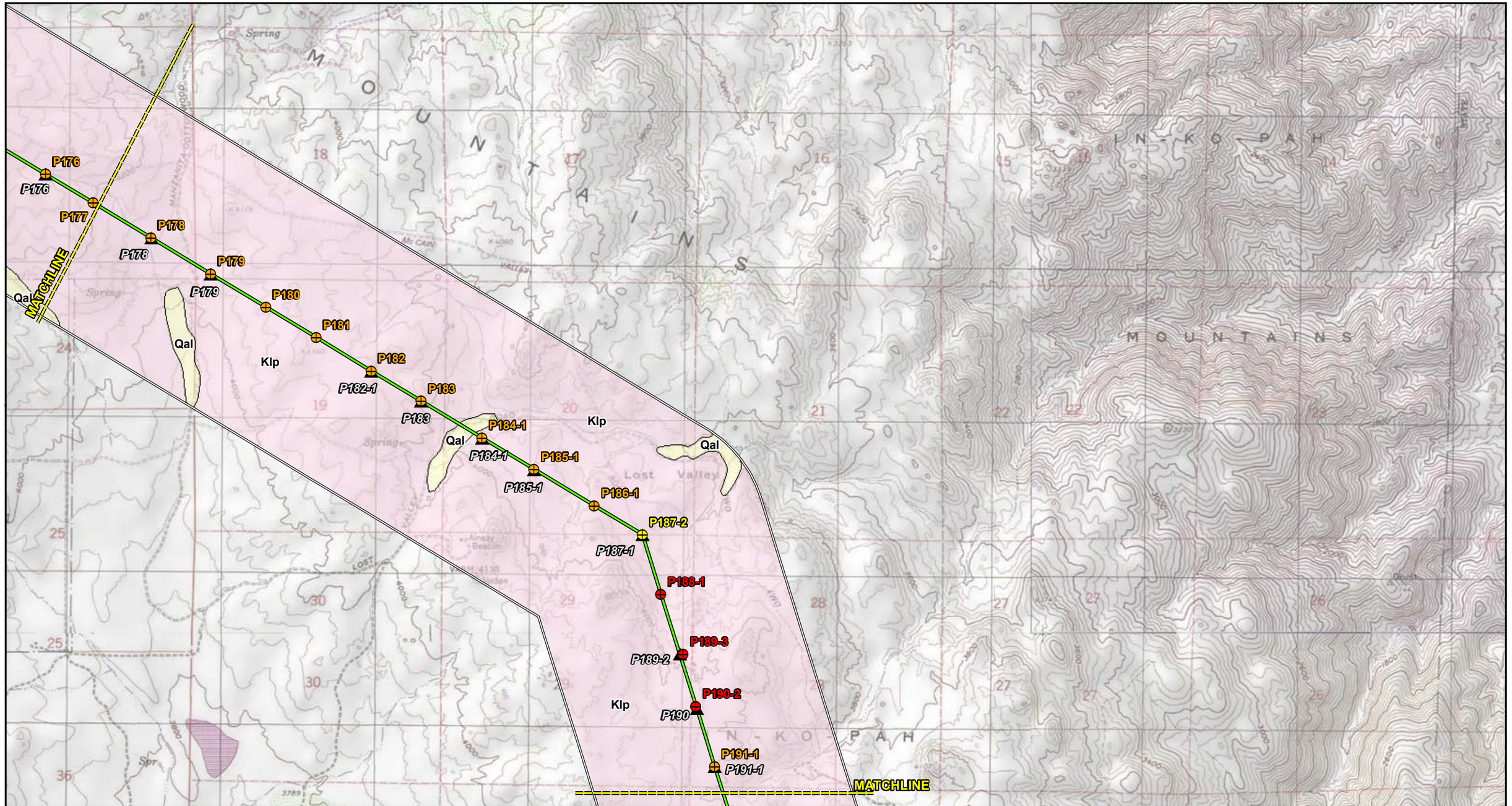

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

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On-Going URS Geotechnical Investigation (2009)

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- Existing Sycamore-Creelman TL Structure
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- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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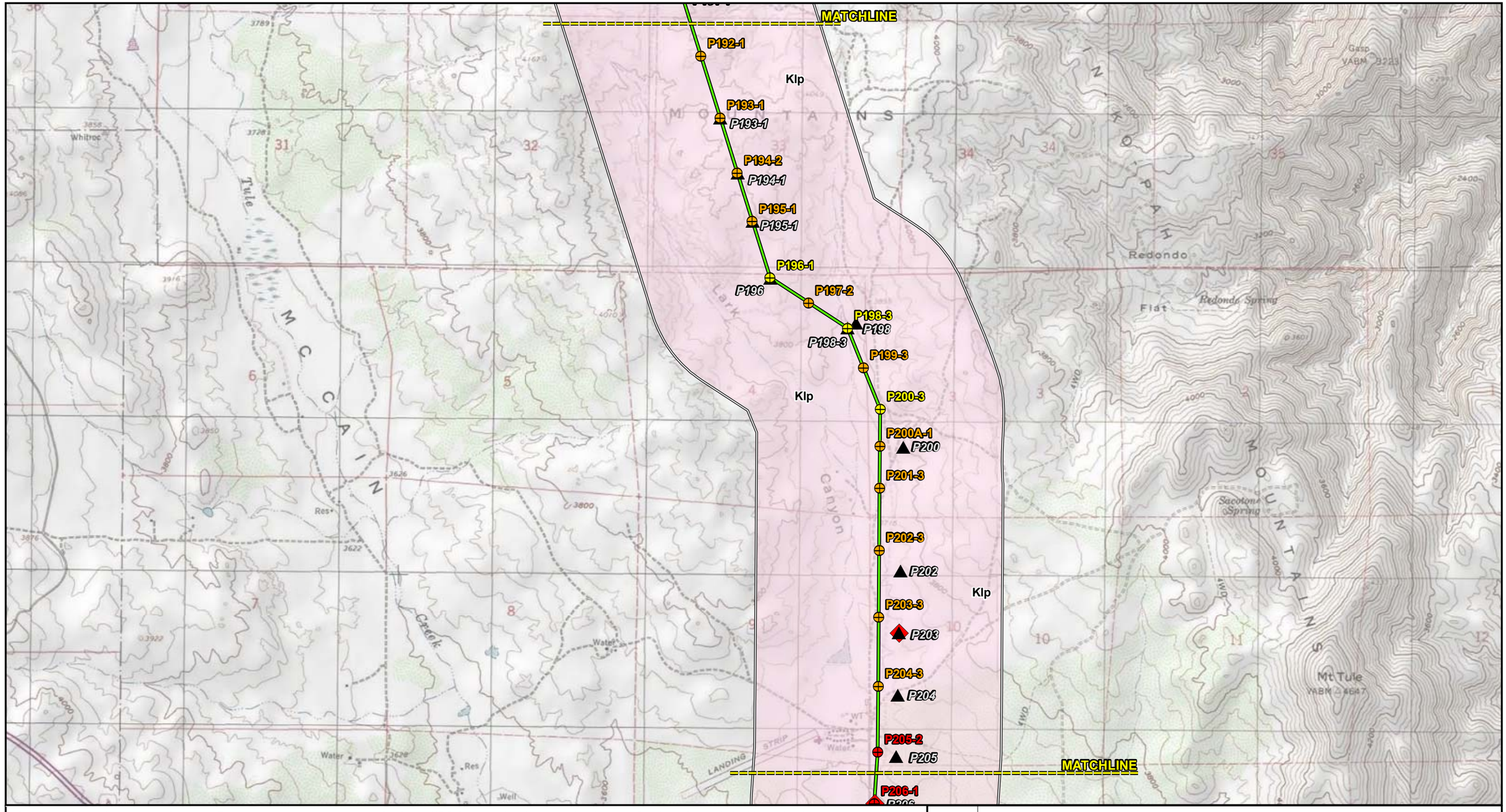

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
- Electrical Resistivity Test Location

Previous Geotechnical Investigation

- Existing Sycamore-Creelman TL Structure
- Existing Sycamore-Creelman TL Structure with Seismic Line
- Existing SWPL TL Structure
- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

DRAFT

SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CL	DATE: 03-22-10	FIG. NO: 2q
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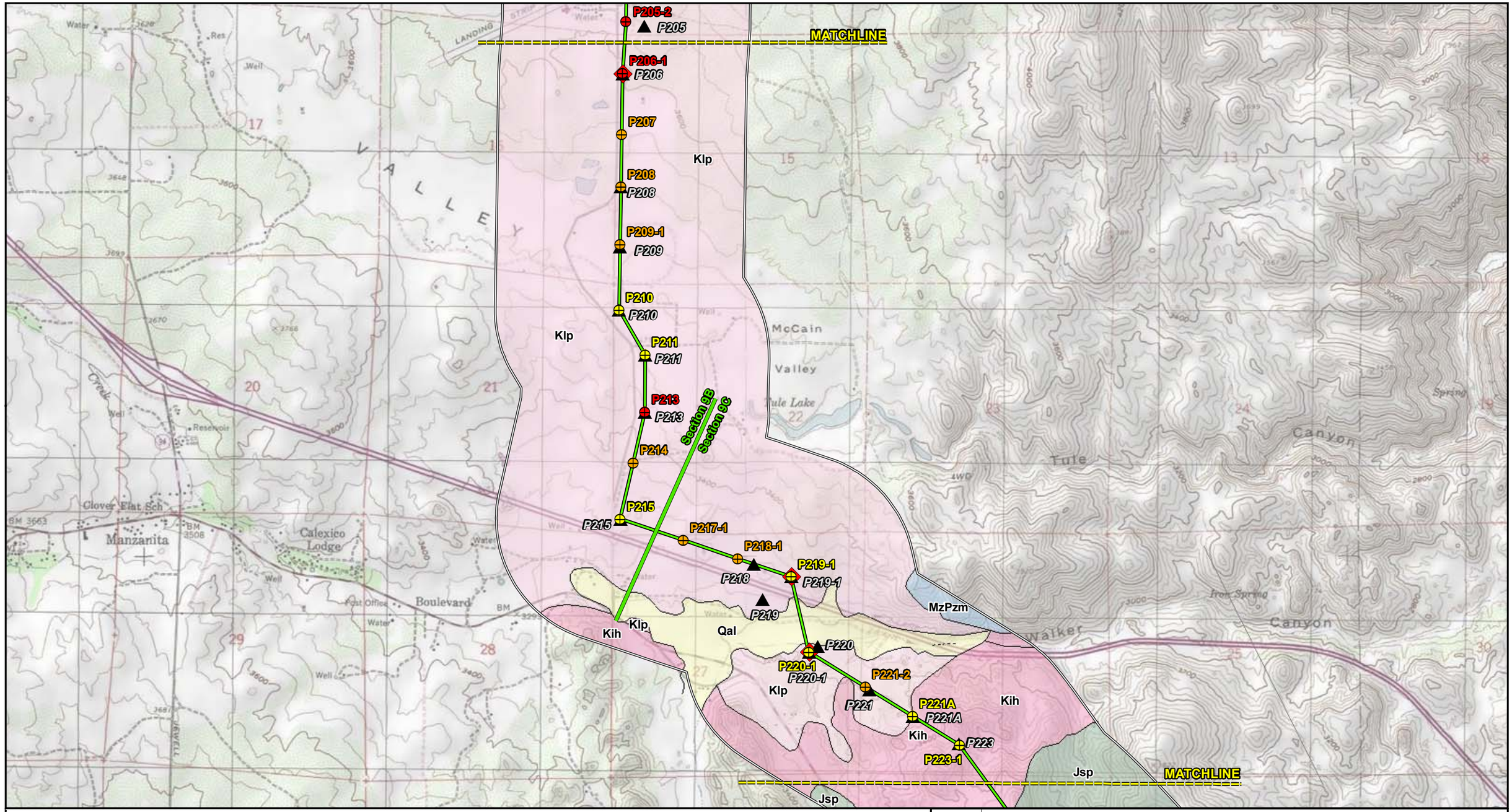

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
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- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet

SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CL	DATE: 03-22-10	FIG. NO: 2r
PM: MEH	PROJ. NO: 27669030.00004	

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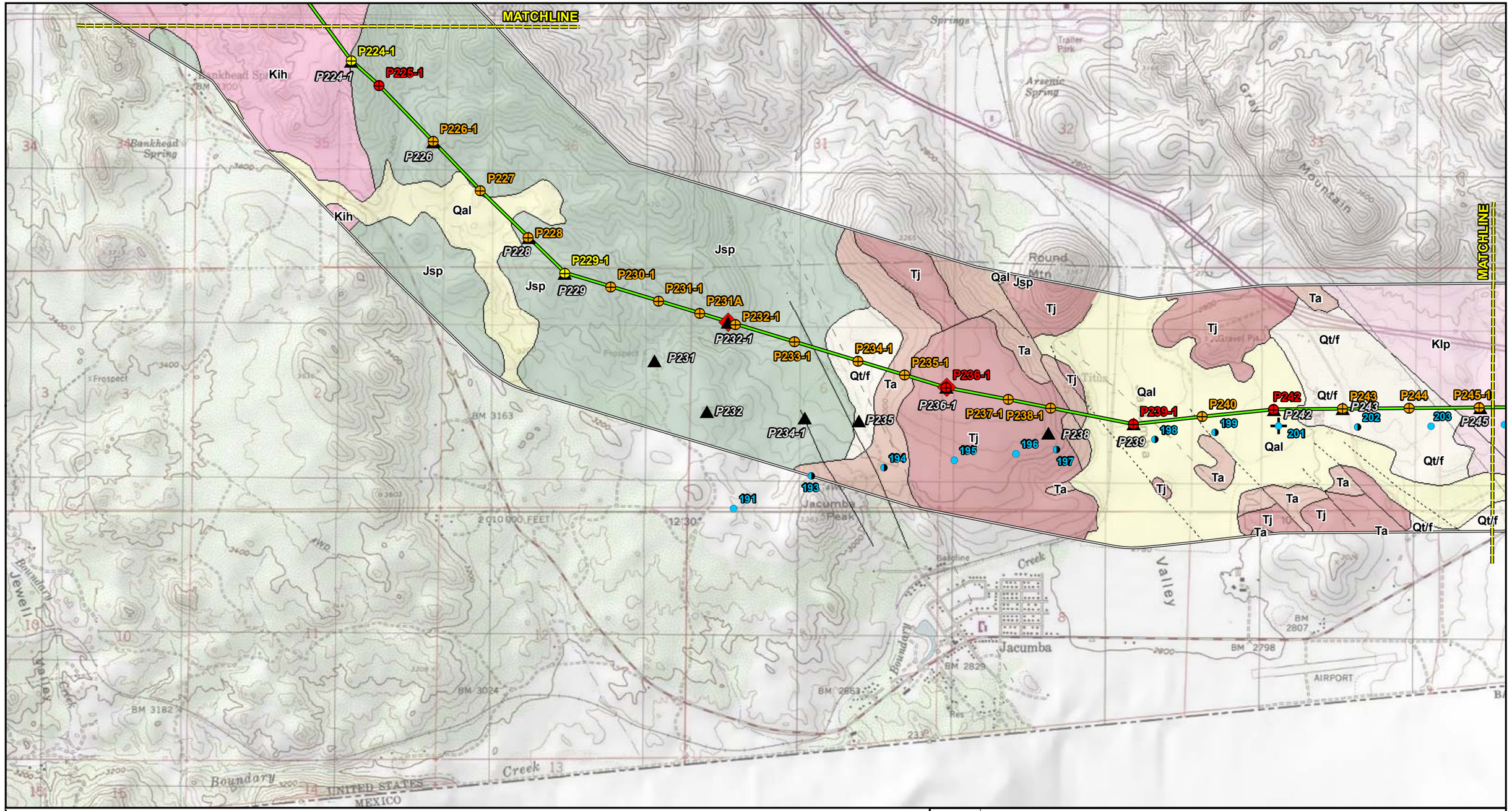

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
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- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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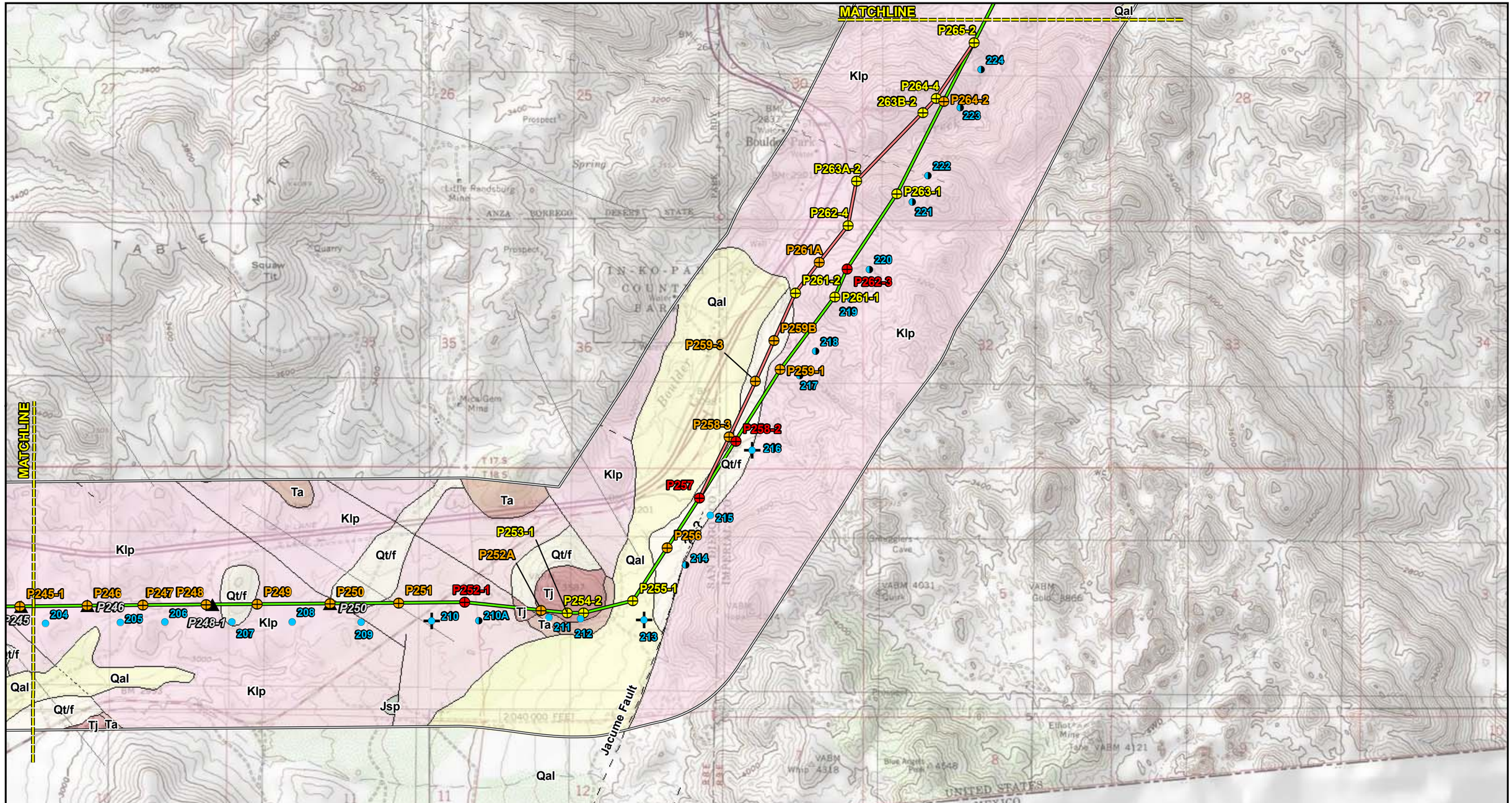

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
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- MSG Re-Route

Structure Type

- Angle
- Dead End
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- Tangent
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On-Going URS Geotechnical Investigation (2009)

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- Existing SWPL Tower with Seismic Line
- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet

SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CL	DATE: 03-22-10	FIG. NO: 2t
PM: MEH	PROJ. NO: 27669030.00004	

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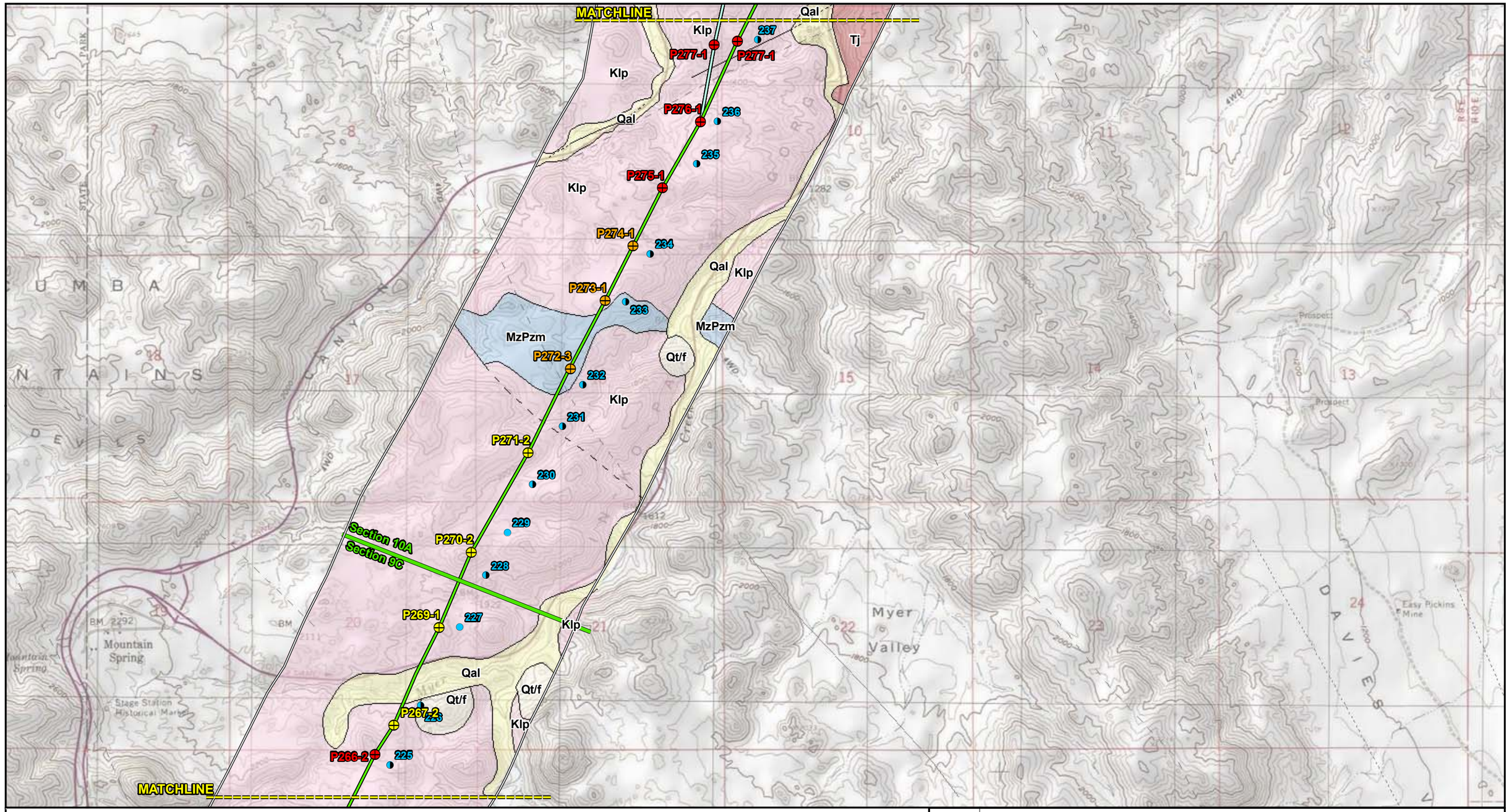

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
- Sugarloaf Re-Route
- MSG Re-Route

Structure Type

- Angle
- Dead End
- Strain
- Tangent
- Miscellaneous
- P14 Structure Designation

On-Going URS Geotechnical Investigation (2009)

- Seismic Refraction Test Location
- P20 Seismic Refraction Test Designation
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- Existing SWPL Tower with Seismic Line
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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CL	DATE: 03-22-10	FIG. NO: 2u
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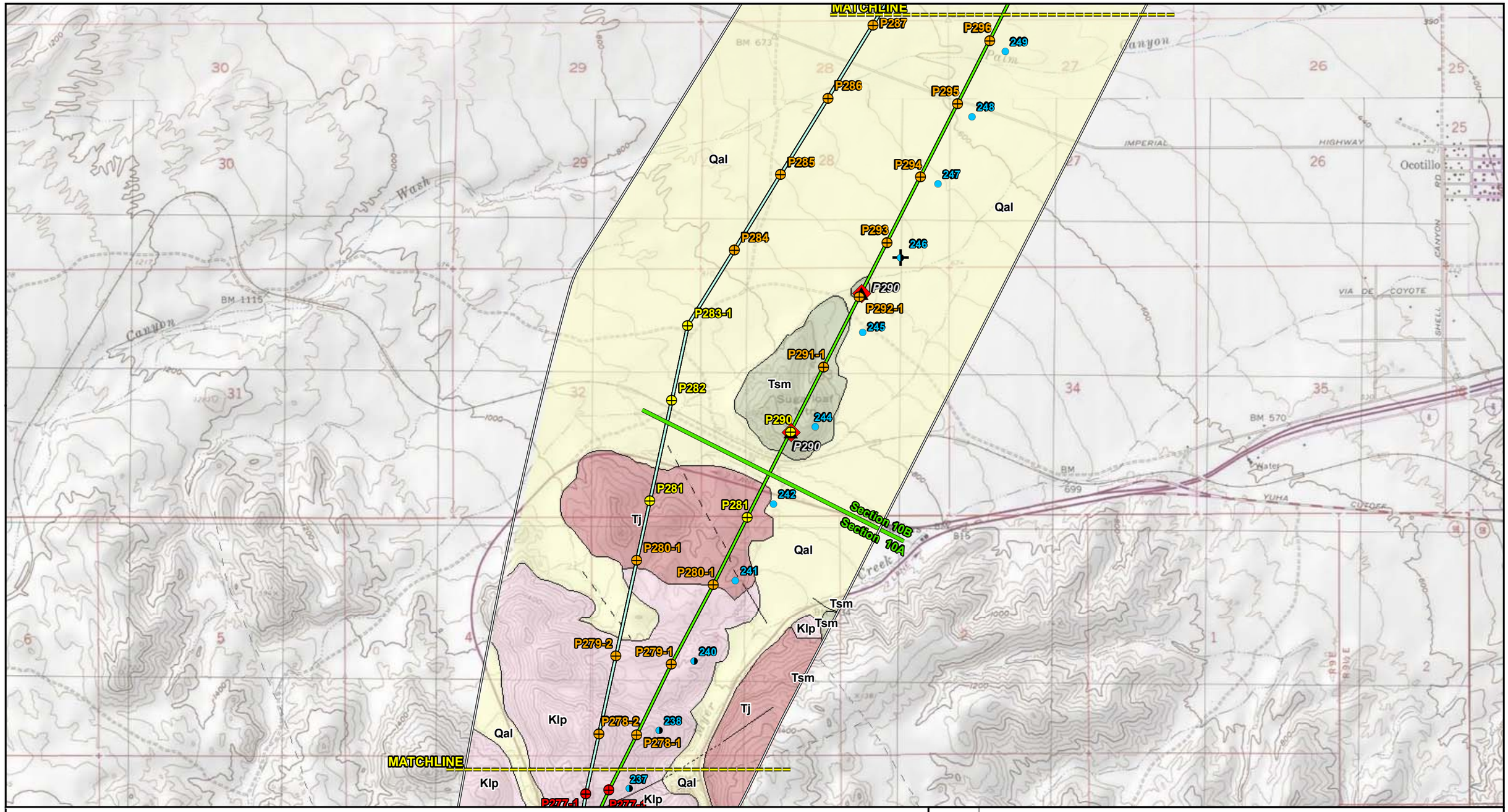

Proposed Centerline

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- Underground Alignment
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- MSG Re-Route

Structure Type

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet

SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CL	DATE: 03-22-10	FIG. NO: 2v
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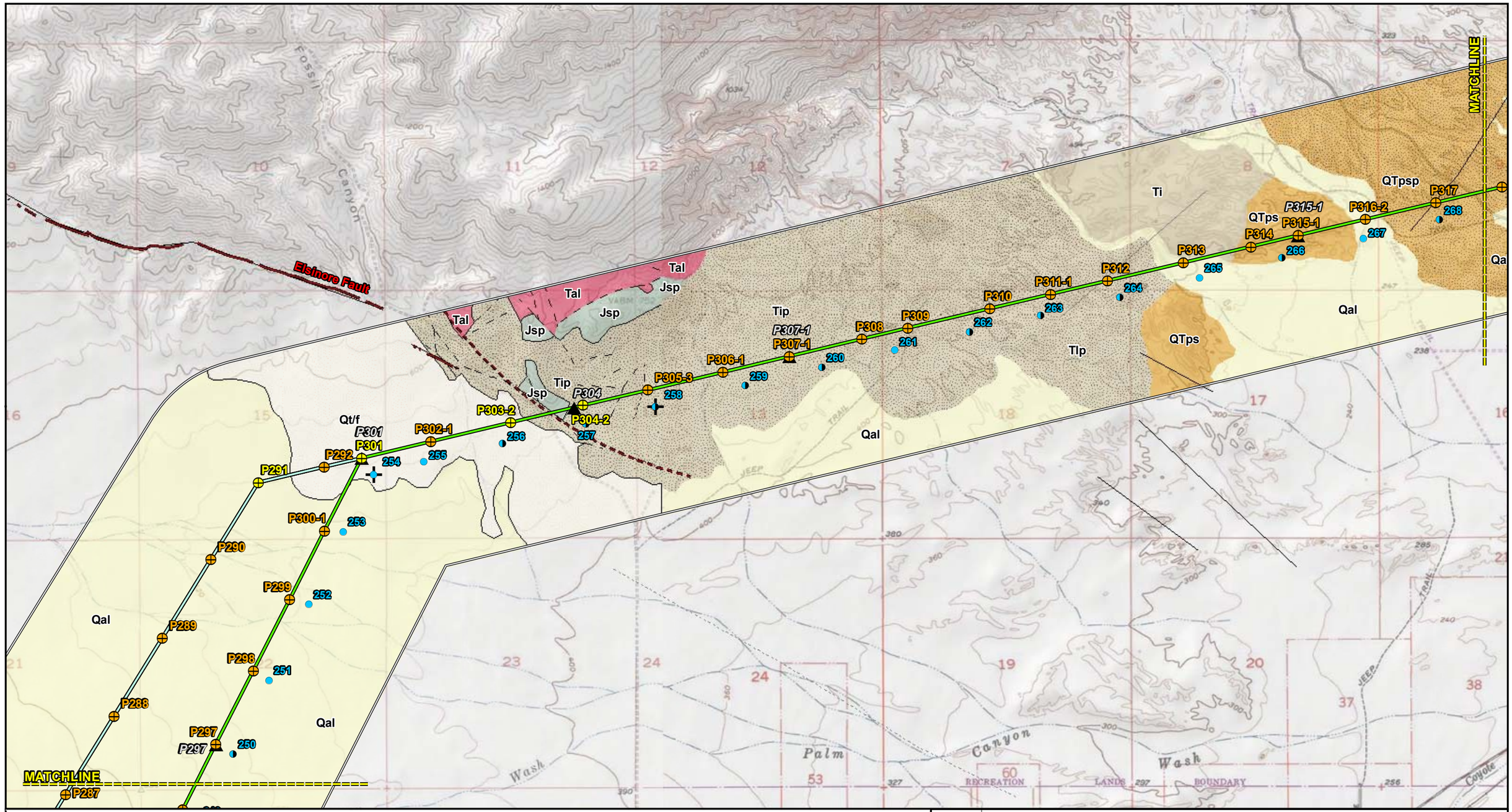

Proposed Centerline

- Original Overhead Alignment
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- MSG Re-Route

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CL	DATE: 03-22-10	FIG. NO: 2w
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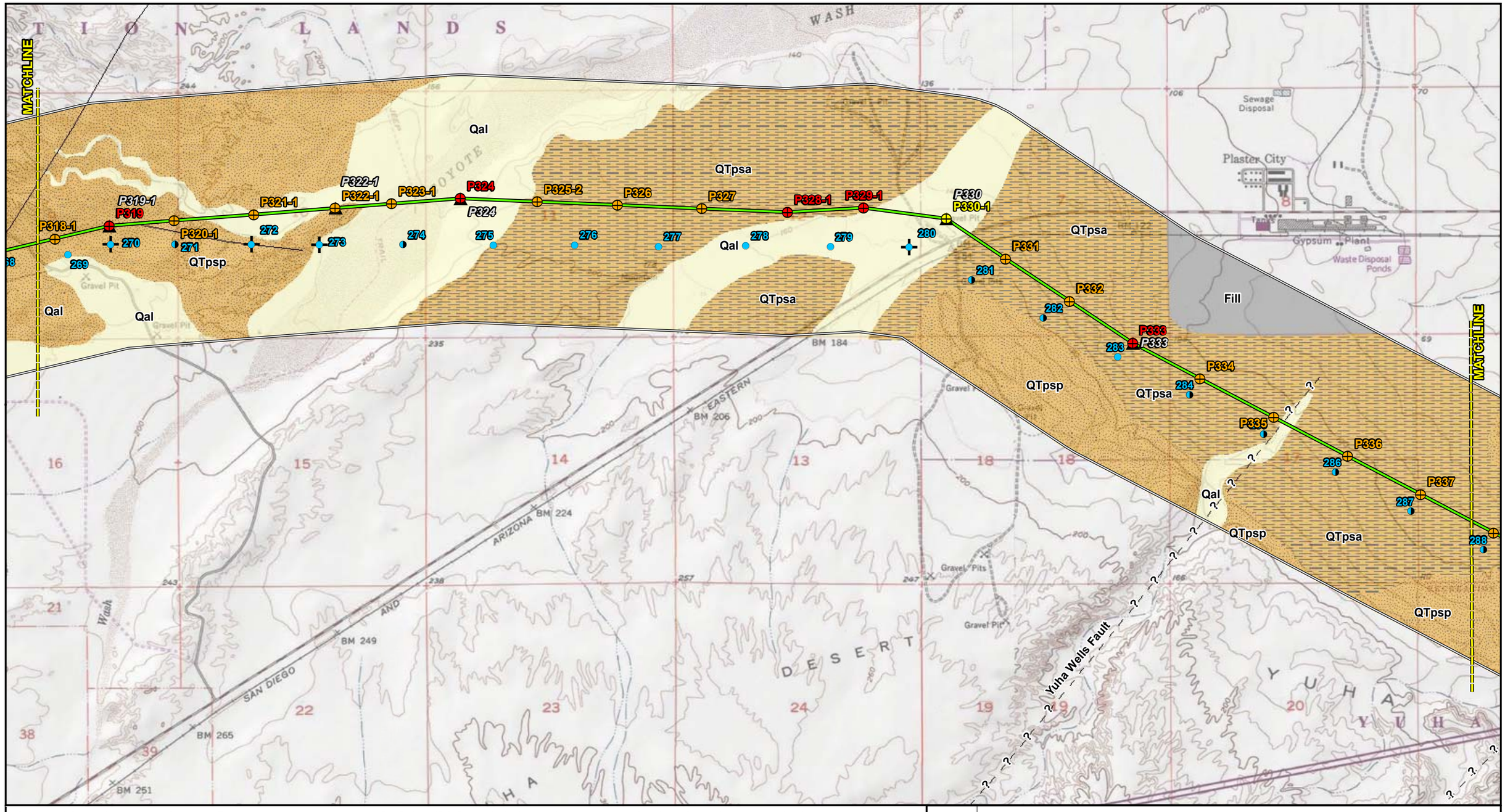

Proposed Centerline

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet

SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

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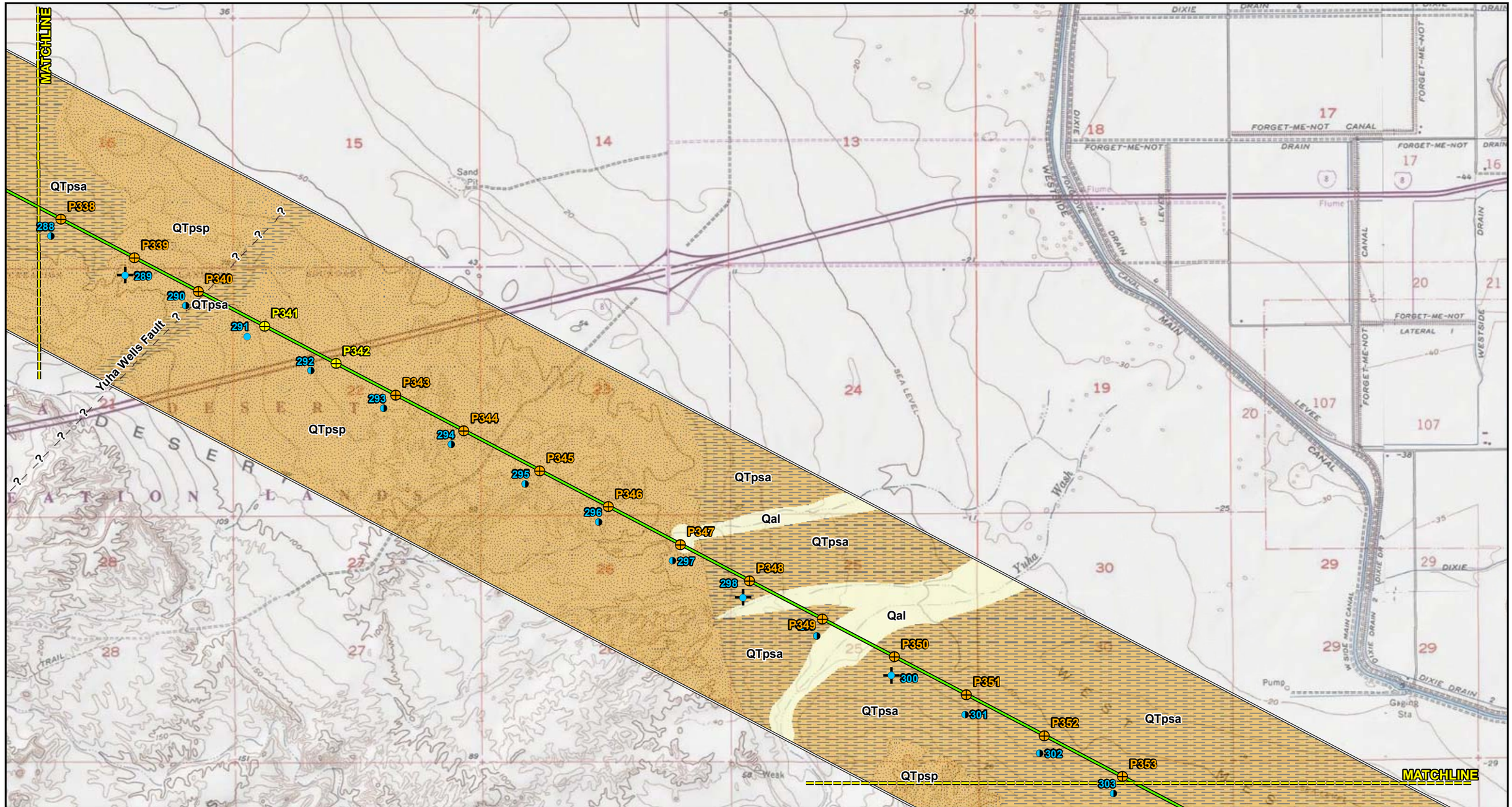

Proposed Centerline

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DRAFT

SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CL	DATE: 03-22-10	FIG. NO: 2y
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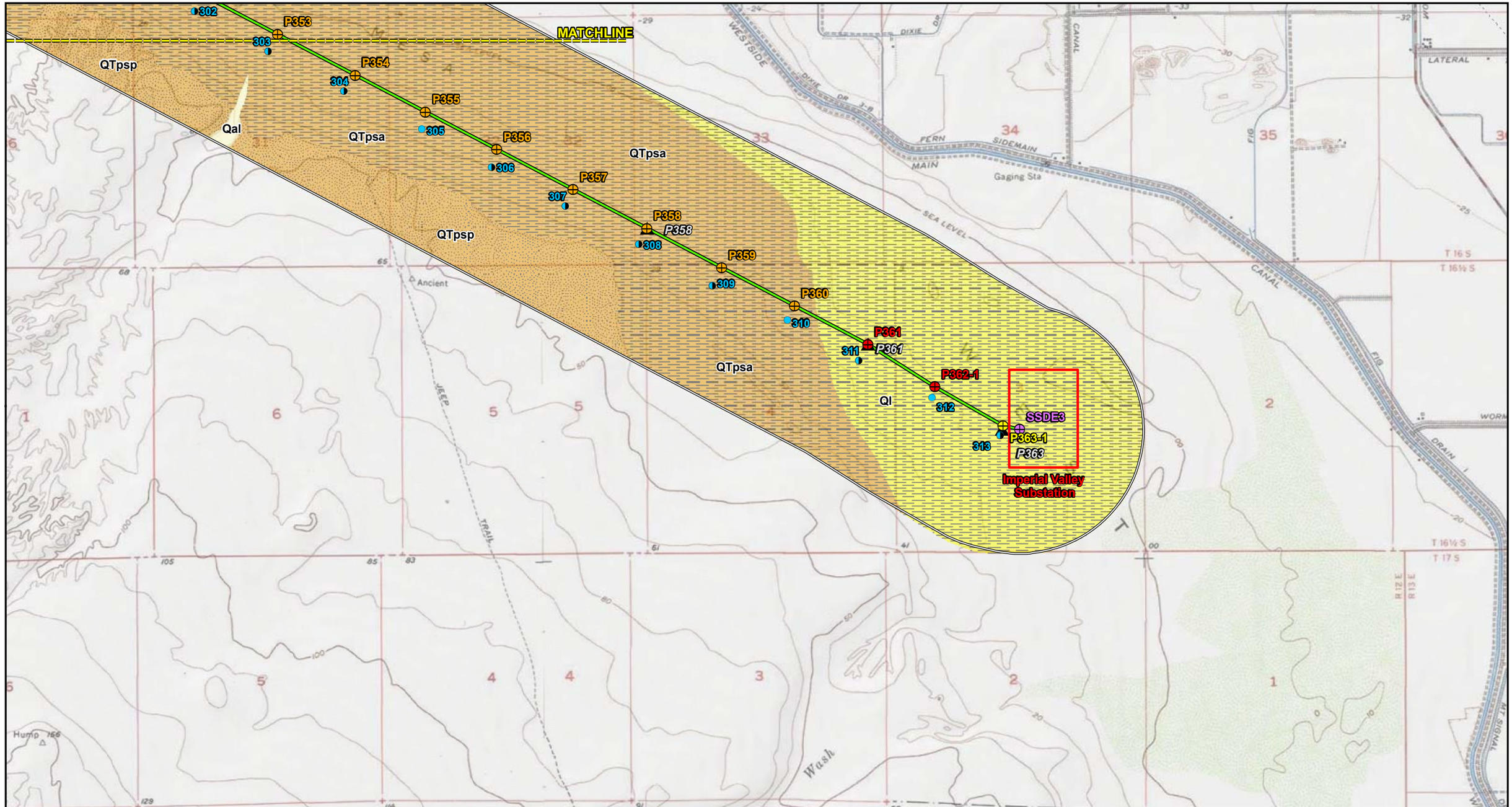

Proposed Centerline

- Original Overhead Alignment
- Underground Alignment
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Structure Type

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- Strain
- Tangent
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- Existing SWPL Tower with Boring

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SOURCES:
See Figure 3

For Geologic Symbol Index See Fig 3

SITE PLAN AND GENERALIZED GEOLOGIC MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

1000 0 1000 2000 Feet
SCALE: 1" = 2000' (1:24,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CL	DATE: 03-22-10	FIG. NO: 2z
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- Fill
- Ql, Sediments of ancient Lake Cahuilla
- Qal, Alluvium
- Qls, Possible Ancient Landslide Deposits
- Qt/f, Older alluvial deposits, including terraces and alluvial fans
- QTps, Palm Spring Formation
- QTpsa, Palm Spring Formation overlain by alluvium
- QTpsp, Palm Spring Formation overlain by pediment gravels
- Ti, Imperial Formation
- Tip, Imperial Formation overlain by pediment gravels
- Tsm, Split Mountain Formation
- Tal, Alverson Andesite
- Tj, Jacumba Volcanics
- Ta, Anza Formation
- Tp, Pomerado Conglomerate
- Tst, Stadium Conglomerate
- Kl, Lusardi Formation
- Kih, Indian Hill granodiorite of Parrish and others
- Klp, Tonalite of La Posta
- Klb, Tonalite of Las Bancas
- Kc, Cuyamaca Gabbro
- Kgm, Tonalite of Granite Mountain
- Kgm4, Tonalite of Granite Mountain, Unit 4
- Kgm3, Tonalite of Granite Mountain, Unit 3
- Kgm2, Tonalite of Granite Mountain, Unit 2
- Kgm1, Tonalite of Granite Mountain, Unit 1
- Kmgp, Monzogranite of Mother Grundy Peak
- Kcm, Corte Madera Monzogranite
- Kcp, Chiquito Peak Monzogranite
- Kjv, Japatul Valley Tonalite
- Ka, Tonalite of Alpine
- Kgr, Granitoid rocks
- Ksp, Santiago Peak Volcanics
- Kmv, Metavolcanic rocks and metagranitic rocks
- KJld, Leucocratic dikes
- KJvs, Metavolcanic and metasedimentary rocks
- Jcr, Granodiorite of Cuyamaca Reservoir
- Jsp, Migmatitic schist and gneiss of Stephenson Peak
- JTRm, Metasedimentary and metavolcanic rocks
- MzPzm, Rocks of Jacumba Mountains

Alquist Priolo (Earthquake Fault Zone) Faults

- Accurately Located Fault Trace
- Approximately Located Fault Trace
- Inferred Fault Trace
- Concealed Fault Trace

Quaternary Faults

- Accurately Located Fault Trace
- Approximately Located Fault Trace
- Concealed Fault Trace

Pre-Quaternary Faults

- Accurately Located Fault Trace
- Approximately Located Fault Trace
- Concealed Fault Trace

Geologic Contact

- Approximately Located Geologic Contact

Approximate location of possible ancient landslide
Arrows denote direction of possible movement

Sources:

1) Modified from *Geologic Map of the San Diego 30x60 Quadrangle, California.* Michael P. Kennedy and Siang S. Tan. California Department of Conservation, California Geologic Survey. 2005.
2) Modified from *Preliminary Geologic Map of the El Cajon 30x60 Quadrangle, Southern, California.* V.R Todd. U.S Geologic Survey, OFR 2004-1361.
3) Modified from *Preliminary Geologic Map of the Imperial County , California. Paul K. Morton. 1966*
4) Alquist Priolo (EFZ) faults- Modified from California Geological Survey CD-ROM 2001-05 (2002), Official Map of Alquist-Priolo Earthquake Fault Zones. Various quads, various dates.
5) Quaternary/Pre-Quaternary Fault Data - *Digital Database of Fault from the Fault Activity Map of California and Adjacent Areas.* Charles W. Jennings. California Department of Conservation, California Geologic Survey. 2000.
6) Existing Structures- Located off Digital Globe Aerial . URS Corporation. 2008
7) Proposed Structures - SDG&E. September 30, October 8, 12 and 15, 2009
8) Freeways/Interstates – ESRI.

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GEOLOGIC LEGEND AND SOURCES
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS	CREATED BY: CL	DATE: 03-22-10	FIG. NO:
	PM: MEH	PROJ. NO: 27669030.00004	3

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LEGEND

- 4a Section Label
- Section Break
- City
- Substation

Proposed Centerline

- Overhead
- Underground
- MSG Reroute
- Sugarloaf Reroute
- County Boundary

Alquist Priolo (EFZ) Faults

- Accurately Located Fault Trace
- Approximately Located Fault Trace
- Inferred Fault Trace
- Concealed Fault Trace

Quaternary Faults

- Accurately Located Fault Trace
- Approximately Located Fault Trace
- Concealed Fault Trace

Pre-Quaternary Faults

- Accurately Located Fault Trace
- Approximately Located Fault Trace
- Concealed Fault Trace

PEAK GROUND ACCELERATION (PGA) IN PERCENT

- 15-20
- 20-25
- 25-30
- 30-40
- 40-60
- 60-80
- 80-100

PGA associated with 10% probability of exceedance in 50 years

Riverside County
San Diego County
Imperial County
Baja California Norte
Poway
Lakeside
Alpine
Descanso
San Diego
National City
Jacumba
Brawley
El Centro
Calexico
Sycamore Canyon Substation
Suncrest Substation (Proposed)
Imperial Valley Substation
4A
5
6
7
8A
8B
8C
8D
8E
9A
9B
9C
10A
10B
Rose Canyon Fault Zone
La Nacion Fault Zone
San Diego Trough Fault Zone
Coronado Banks Fault Zone
ATEV Fault Zone
Elsinore Fault Zone
San Jacinto Fault Zone
San Andreas Fault Zone
Elmore Ranch Fault
Superstition Hills Fault
Superstition Mountain Fault
Brawley Fault Zone
Imperial Fault
Yuha Wells Fault
Laguna Salada Fault
Jacume Fault
20
25
30
40
60
80

DRAFT

SOURCES:
California Department of Conservation, California Geological Survey (Fault data 2000, AP (EFZ) Fault data 2002); Platts, McGraw- Hill Companies (Substations 2007); ESRI (County boundaries, Cities); SDGE (Sunrise Power Link Route 2009); USGS (PGA data 2008); USDA NAIP (Aerial 2005).

FAULT AND PEAK GROUND ACCELERATION MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

4 0 4 8 Miles

SCALE: 1" = 8 Miles (1:506,880)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CL	DATE: 03-22-10	FIG. NO:
PM: MEH	PROJ. NO: 27669030.00004	4

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San Bernardino
Twentynine Palms
San Bernardino County
Anaheim
Palm Springs
Lake Elsinore
Orange County
Irvine
Riverside County
Oceanside
Poway
San Diego County
Imperial County
Brawley
Sycamore Canyon Substation
4A
5
Lakeside
Alpine
6
7
Suncrest Substation (Proposed)
9B
10B
El Centro
9A
8A
San Diego
Imperial Valley Substation
National City
Calexico
8E
9C
10A
Arizona
Yuma County
8B
8C
8D
Baja California Norte
Sonora

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LEGEND

- 4A Section Label
- Section Break
- Substation

Proposed Centerline

- Overhead
- Underground
- MSG Reroute
- Sugarloaf Reroute
- City
- County Boundary
- State Boundary

Earthquake Epicenters

Magnitude

- 2.1 - 4.0
- 4.1 - 5.0
- 5.1 - 6.0
- 6.1- 7.0
- 7.1 - 8.0

Alquist Priolo (EFZ) Faults

- Accurately Located Fault Trace
- Approximately Located Fault Trace
- Inferred Fault Trace
- Concealed Fault Trace

Quaternary Faults

- Accurately Located Fault Trace
- Approximately Located Fault Trace
- Concealed Fault Trace

Pre-Quaternary Faults

- Accurately Located Fault Trace
- Approximately Located Fault Trace
- Concealed Fault Trace

SOURCES:
California Department of Conservation, California Geological Survey
(Fault data 2000, AP (EFZ) Fault data 2002)
ESRI (Cities, Major Roads, County and State Boudaries)
Platts, McGraw- Hill Companies (Substations 2007)
ESRI (County boundaries, Cities)
SDGE (Sunrise Power Link Route 2009)
DOCGS, SCEDE, URS (Earthquake Epicenters 2008)

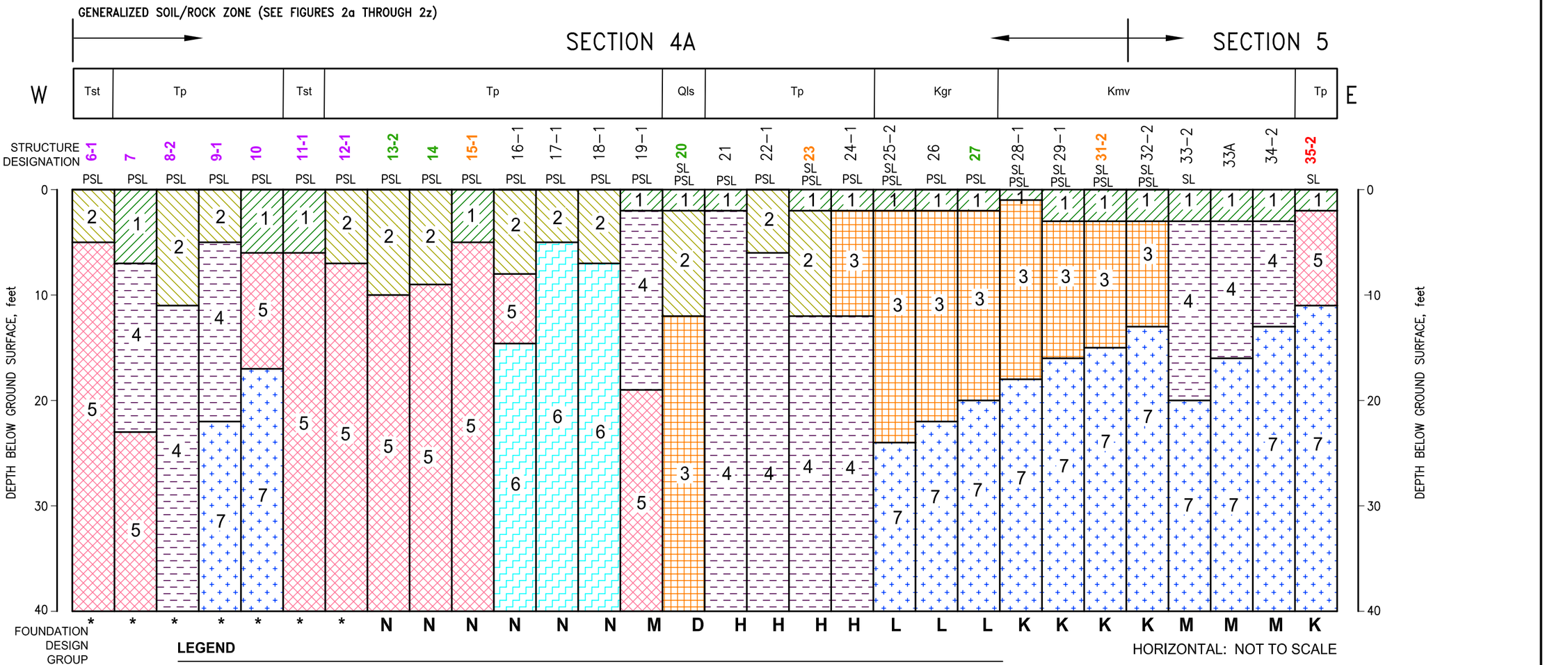
REGIONAL EARTHQUAKE EPICENTER MAP
SUNRISE POWERLINK PROJECT
SAN DIEGO & IMPERIAL COUNTIES, CALIFORNIA

URS

5 0 5 10 15 Miles
SCALE: 1" = 15 Miles (1:950,400)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: CL	DATE: 03-22-10	FIG. NO:
PM: MEH	PROJ. NO: 27669030.00004	5

Path: G:\gis\projects\1577\27669030\4\MXD\GeoTech GeoHazards_Report\Entire Project\2010_01\Seismicity.mxd, 03/22/10, david_trzeciak



LEGEND

APPARENT P-WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
- 4,000 ≤ Vp < 5,000
- 5,000 ≤ Vp < 6,000
- 6,000 ≤ Vp < 7,000
- 7,000 ≤ Vp

1	INDICATES DESIGN PARAMETER SET (SEE TABLE 5)
A	INDICATES FOUNDATION DESIGN GROUP (SEE FIGURE 7)
SL	DENOTES SEISMIC LINE PERFORMED FOR CURRENT INVESTIGATION
PSL	DENOTES SEISMIC LINE PERFORMED FOR PREVIOUS PROJECT
PB	DENOTES BORING PERFORMED FOR PREVIOUS PROJECT
▼	DESIGN GROUNDWATER
GREEN	DESIGNATES STRAIN TOWER
RED	DESIGNATES ANGLE TOWER
ORANGE	DESIGNATES DEAD END TOWER
BLACK	DESIGNATES TANGENT TOWER
PURPLE	DESIGNATES MISCELLANEOUS STRUCTURE
*	CUSTOM FOUNDATION DESIGN PARAMETERS (SEE TABLE 9)

HORIZONTAL: NOT TO SCALE

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

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INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6a
	PM: MEH	PROJ. NO: 27669030.00004	

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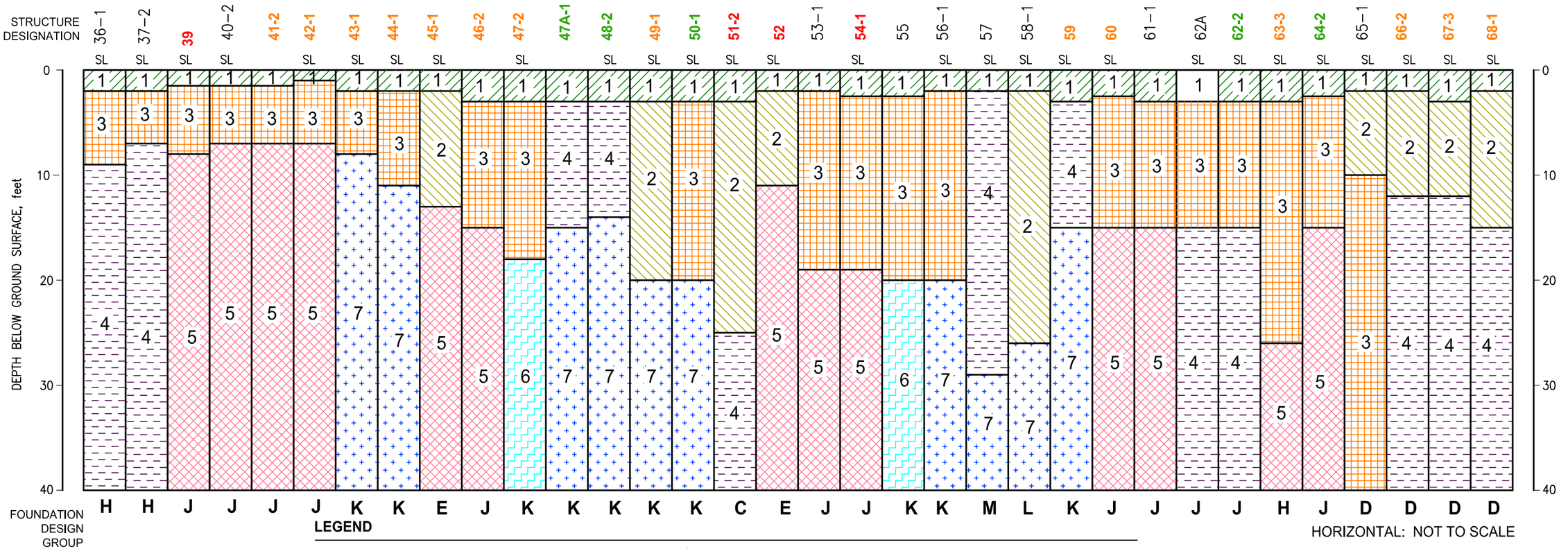
GENERALIZED SOIL/ROCK ZONE (SEE FIGURES 2a THROUGH 2z)

SECTION 5 (Cont'd)

W — Tp | Kgr | Ksp | Kgr | Kmv | Ka | Klb | Kc | Qt/f | Kmv — E



HORIZONTAL: NOT TO SCALE

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

LEGEND

APPARENT P-WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
- 4,000 ≤ Vp < 5,000
- 5,000 ≤ Vp < 6,000
- 6,000 ≤ Vp < 7,000
- 7,000 ≤ Vp

1	INDICATES DESIGN PARAMETER SET (SEE TABLE 5)
A	INDICATES FOUNDATION DESIGN GROUP (SEE FIGURE 7)
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PSL	DENOTES SEISMIC LINE PERFORMED FOR PREVIOUS PROJECT
PB	DENOTES BORING PERFORMED FOR PREVIOUS PROJECT
▼	DESIGN GROUNDWATER
GREEN	DESIGNATES STRAIN TOWER
RED	DESIGNATES ANGLE TOWER
ORANGE	DESIGNATES DEAD END TOWER
BLACK	DESIGNATES TANGENT TOWER
PURPLE	DESIGNATES MISCELLANEOUS STRUCTURE
*	CUSTOM FOUNDATION DESIGN PARAMETERS (SEE TABLE 9)

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INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6b
	PM: MEH	PROJ. NO: 27669030.00004	

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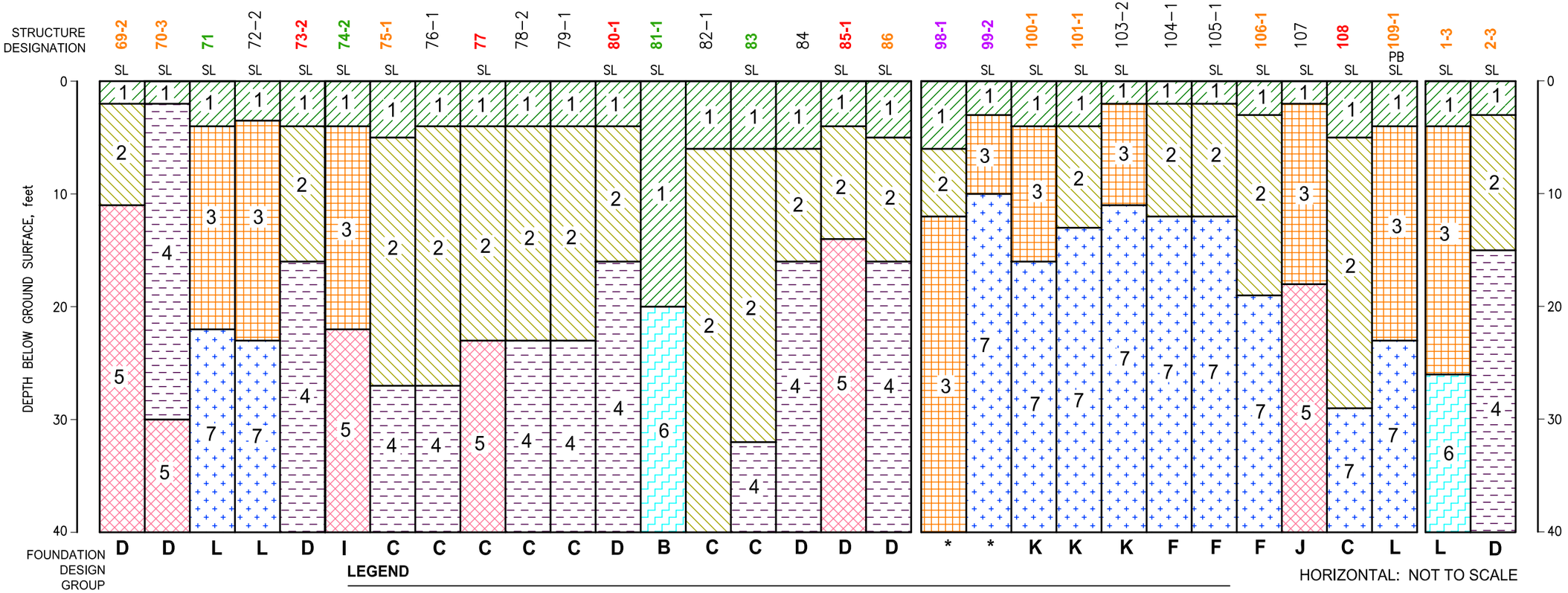
GENERALIZED SOIL/ROCK ZONE (SEE FIGURES 2a THROUGH 2z)

SECTION 5 (Cont'd) | SECTION 6 UNDERGROUND AND ADJOINING CABLE POLES | SECTION 7 | SUNCREST SUBSTATION | SECTION 8A

W — Qt/f | Klb | Ka | Klb | Ka | JTRm | KJvs — E



LEGEND

APPARENT P–WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
- 4,000 ≤ Vp < 5,000
- 5,000 ≤ Vp < 6,000
- 6,000 ≤ Vp < 7,000
- 7,000 ≤ Vp

1	INDICATES DESIGN PARAMETER SET (SEE TABLE 5)
A	INDICATES FOUNDATION DESIGN GROUP (SEE FIGURE 7)
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PSL	DENOTES SEISMIC LINE PERFORMED FOR PREVIOUS PROJECT
PB	DENOTES BORING PERFORMED FOR PREVIOUS PROJECT
▼	DESIGN GROUNDWATER
GREEN	DESIGNATES STRAIN TOWER
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BLACK	DESIGNATES TANGENT TOWER
PURPLE	DESIGNATES MISCELLANEOUS STRUCTURE
*	CUSTOM FOUNDATION DESIGN PARAMETERS (SEE TABLE 9)

HORIZONTAL: NOT TO SCALE

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

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INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6c
	PM: MEH	PROJ. NO: 27669030.00004	

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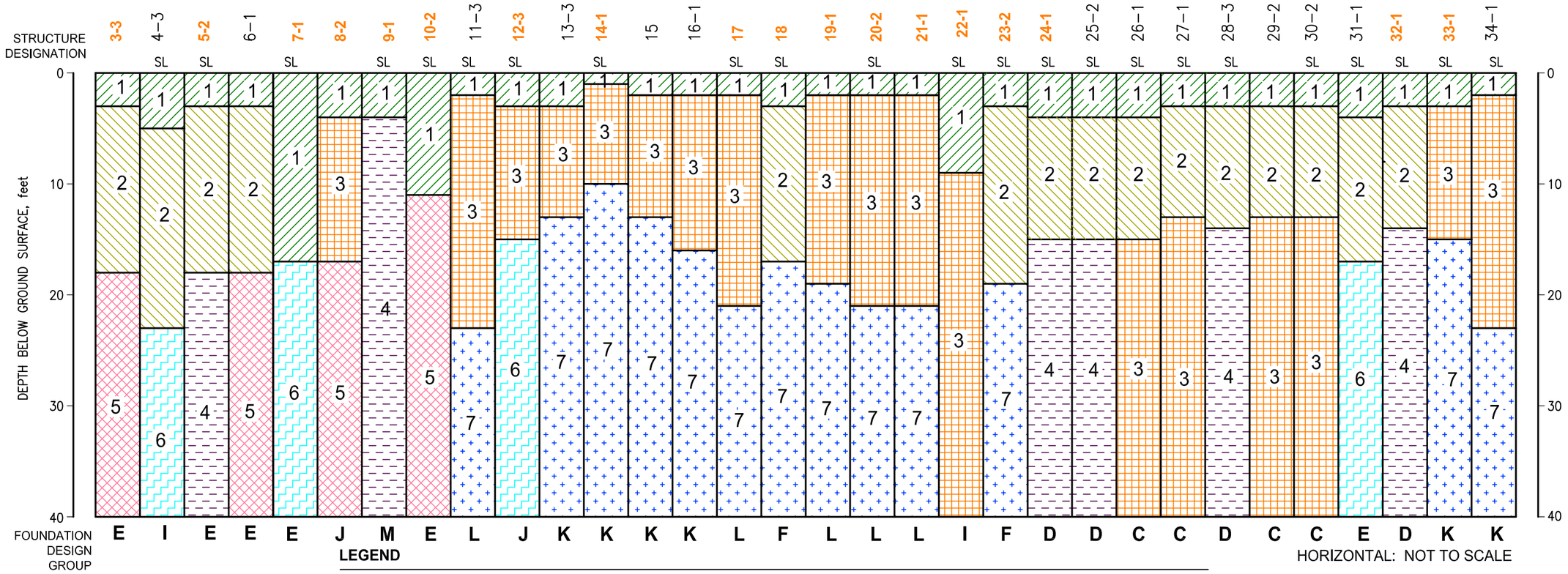
GENERALIZED SOIL/ROCK ZONE (SEE FIGURES 2a THROUGH 2z)

SECTION 8A

W — Kjv | Kmv | Kcm | Kc | Kjv | Qtf | Kc | Kjv | Kcm — E



HORIZONTAL: NOT TO SCALE

LEGEND

APPARENT P-WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
- 4,000 ≤ Vp < 5,000
- 5,000 ≤ Vp < 6,000
- 6,000 ≤ Vp < 7,000
- 7,000 ≤ Vp

1	INDICATES DESIGN PARAMETER SET (SEE TABLE 5)
A	INDICATES FOUNDATION DESIGN GROUP (SEE FIGURE 7)
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PSL	DENOTES SEISMIC LINE PERFORMED FOR PREVIOUS PROJECT
PB	DENOTES BORING PERFORMED FOR PREVIOUS PROJECT
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GREEN	DESIGNATES STRAIN TOWER
RED	DESIGNATES ANGLE TOWER
ORANGE	DESIGNATES DEAD END TOWER
BLACK	DESIGNATES TANGENT TOWER
PURPLE	DESIGNATES MISCELLANEOUS STRUCTURE
*	CUSTOM FOUNDATION DESIGN PARAMETERS (SEE TABLE 9)

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

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INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6d
	PM: MEH	PROJ. NO: 27669030.00004	

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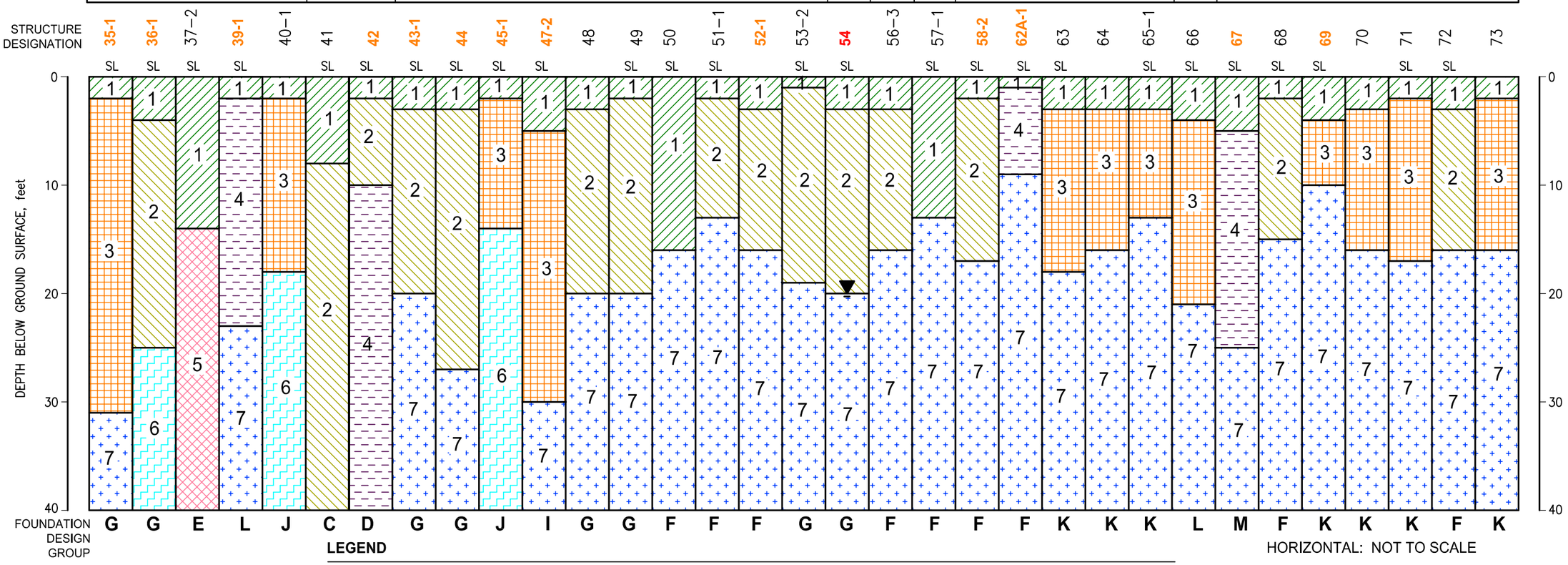
GENERALIZED SOIL/ROCK ZONE (SEE FIGURES 2a THROUGH 2z)

SECTION 8A (Cont'd) ← | SECTION 8B → | SECTION 8C ← → SECTION 8D

W — Kcm | Kc | Kcm | Qal | Kgm2 | Kgm3 | Klp | Qal | Klp — E



LEGEND

APPARENT P-WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
- 4,000 ≤ Vp < 5,000
- 5,000 ≤ Vp < 6,000
- 6,000 ≤ Vp < 7,000
- 7,000 ≤ Vp

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PURPLE	DESIGNATES MISCELLANEOUS STRUCTURE
*	CUSTOM FOUNDATION DESIGN PARAMETERS (SEE TABLE 9)

HORIZONTAL: NOT TO SCALE

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

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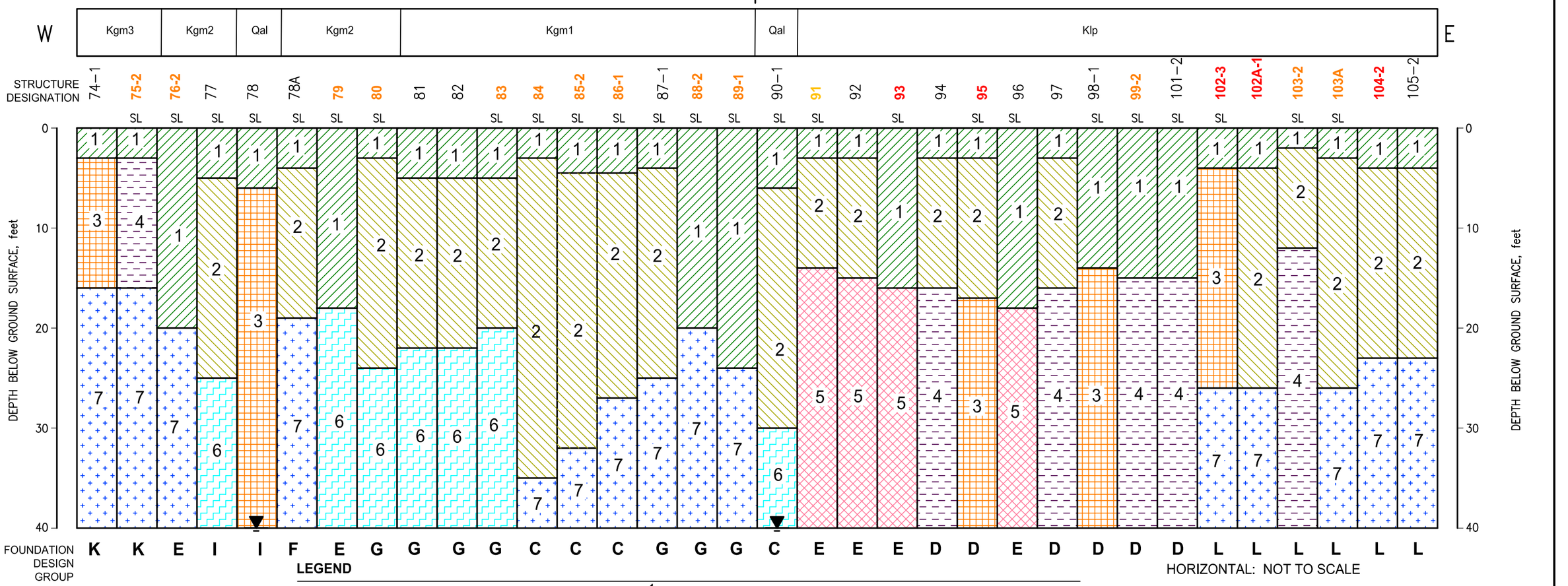
INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6e
	PM: MEH	PROJ. NO: 27669030.00004	

GENERALIZED SOIL/ROCK ZONE (SEE FIGURES 2a THROUGH 2z)

SECTION 8D (Cont'd)

SECTION 8E



LEGEND

APPARENT P–WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
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- 5,000 ≤ Vp < 6,000
- 6,000 ≤ Vp < 7,000
- 7,000 ≤ Vp

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PB	DENOTES BORING PERFORMED FOR PREVIOUS PROJECT
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BLACK	DESIGNATES TANGENT TOWER
PURPLE	DESIGNATES MISCELLANEOUS STRUCTURE
*	CUSTOM FOUNDATION DESIGN PARAMETERS (SEE TABLE 9)

HORIZONTAL: NOT TO SCALE

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

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INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6f
	PM: MEH	PROJ. NO: 27669030.00004	

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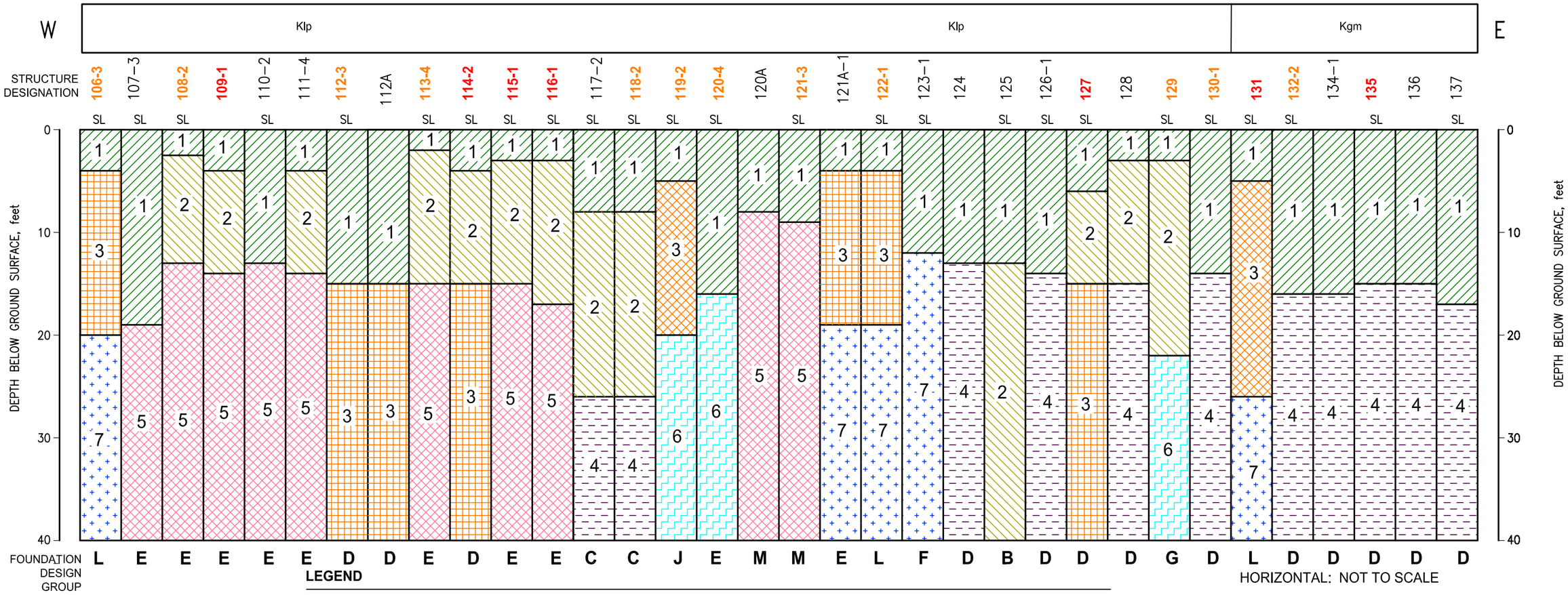
GENERALIZED SOIL/ROCK ZONE (SEE FIGURES 2a THROUGH 2z)

SECTION 8E (Cont'd)

SECTION 9A



HORIZONTAL: NOT TO SCALE

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

LEGEND

APPARENT P-WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
- 4,000 ≤ Vp < 5,000
- 5,000 ≤ Vp < 6,000
- 6,000 ≤ Vp < 7,000
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PB	DENOTES BORING PERFORMED FOR PREVIOUS PROJECT
	DESIGN GROUNDWATER
GREEN	DESIGNATES STRAIN TOWER
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PURPLE	DESIGNATES MISCELLANEOUS STRUCTURE
*	CUSTOM FOUNDATION DESIGN PARAMETERS (SEE TABLE 9)

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INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6g
	PM: MEH	PROJ. NO: 27669030.00004	

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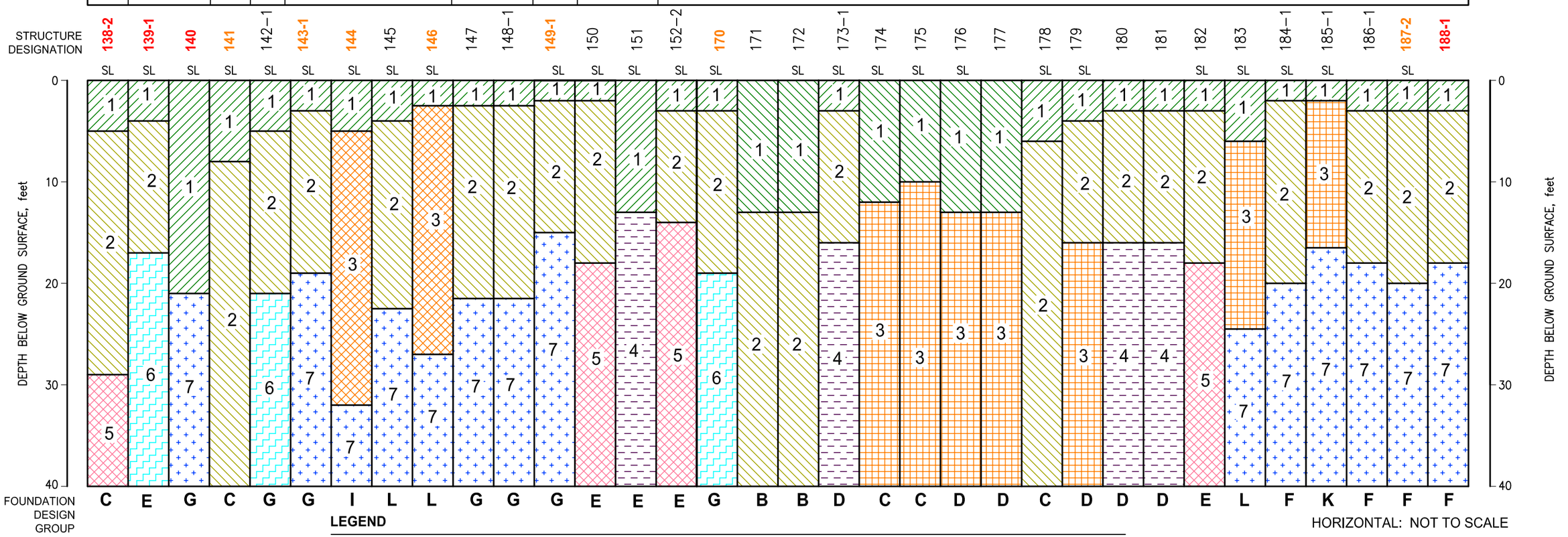
GENERALIZED SOIL/ROCK ZONE (SEE FIGURES 2a THROUGH 2z)

9A (Cont'd)

SECTION 9B

W — E

Kc	JTRm	Qt/f	Klb	JTRm	Klp	Kjld	Qt/f	Klp



LEGEND

APPARENT P-WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
- 4,000 ≤ Vp < 5,000
- 5,000 ≤ Vp < 6,000
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*	CUSTOM FOUNDATION DESIGN PARAMETERS (SEE TABLE 9)

HORIZONTAL: NOT TO SCALE

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

DRAFT

INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6h
	PM: MEH	PROJ. NO: 27669030.00004	

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GENERALIZED SOIL/ROCK ZONE (SEE FIGURES 2a THROUGH 2z)

SECTION 9B (Cont'd)

SECTION 9C

W

Klp | Kih | Jsp

E

STRUCTURE DESIGNATION

189-3 | 190-2 | 191-1 | 192-1 | 193-1 | 194-2 | 195-1 | 196-1 | 197-2 | 198-3 | 199-3 | 200-3 | 200A-1 | 201-3 | 202-3 | 203-3 | 204-3 | 205-2 | 206-1 | 207 | 208 | 209-1 | 210 | 211 | 213 | 214 | 215 | 217-1 | 218-1 | 219-1 | 220-1 | 221-2 | 221A | 223-1 | 224-1

SL

DEPTH BELOW GROUND SURFACE, feet

0 | 10 | 20 | 30 | 40

FOUNDATION DESIGN GROUP

K K F F K K K E G C G F F F M C G E D F F L J G G J J J J J G I J K K

HORIZONTAL: NOT TO SCALE

LEGEND

APPARENT P-WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
- 4,000 ≤ Vp < 5,000
- 5,000 ≤ Vp < 6,000
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*	CUSTOM FOUNDATION DESIGN PARAMETERS (SEE TABLE 9)

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

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INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS | CHECKED BY: PB | DATE: 03/22/10 | FIG. NO: 6i
PM: MEH | PROJ. NO: 27669030.00004

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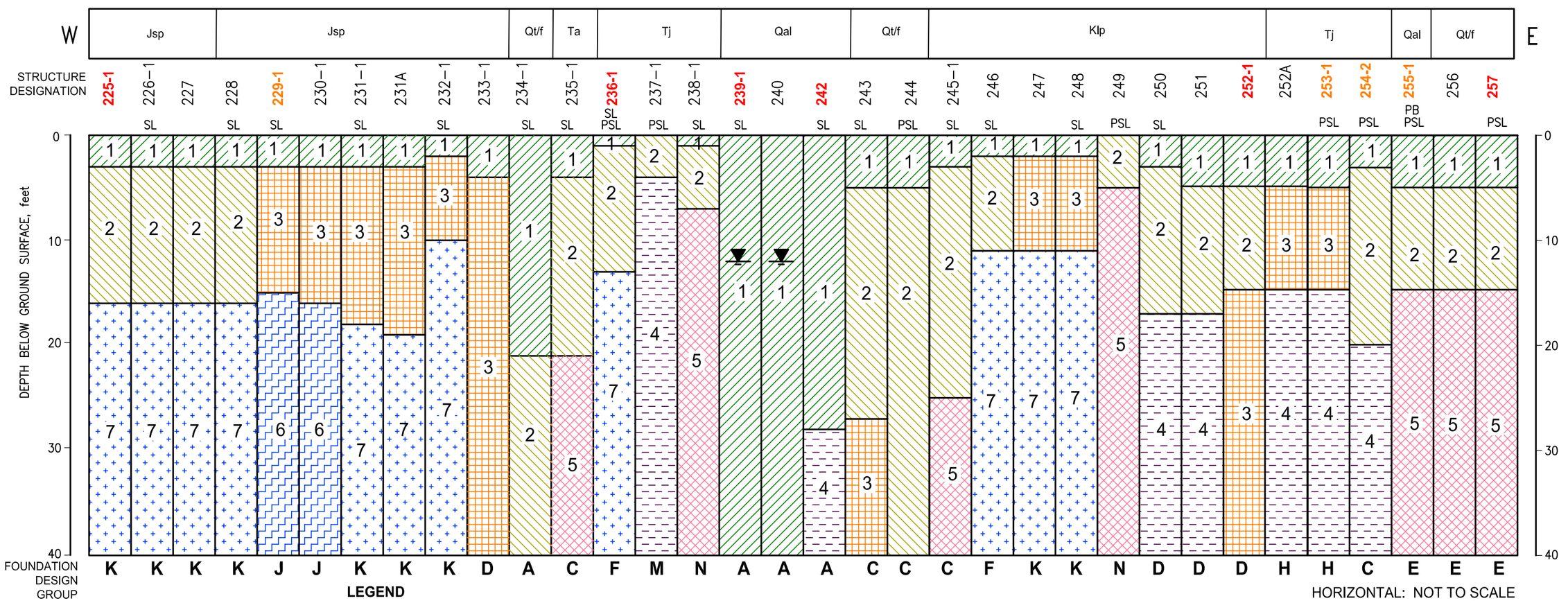
GENERALIZED SOIL/ROCK ZONE (SEE FIGURES 2a THROUGH 2z)

SECTION 9C (Cont'd)



HORIZONTAL: NOT TO SCALE

LEGEND

APPARENT P-WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
- 4,000 ≤ Vp < 5,000
- 5,000 ≤ Vp < 6,000
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DRAFT

INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6j
	PM: MEH	PROJ. NO: 27669030.00004	

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GENERALIZED SOIL/ROCK ZONE (SEE FIGURES 2a THROUGH 2z)

SECTION 9C (Cont'd) | SECTION 10A | SECTION 10B

W — E

Qt/f	Klp	MzPzm	Klp	Tj	Tsm	Qal

STRUCTURE DESIGNATION	258-2	259-1	261-1	262-3	263-1	264-2	265-2	266-2	267-3	269-1	270-2	271-2	272-3	273-1	274-1	275-1	276-1	277-1	278-1	279-1	280-1	281	290	291-1	292-1	293	294	295	296	297	298	299	300-1
	PB PSL									PSL	PSL												SL	PSL	SL	PSL	PSL	PSL	PSL	SL	PSL	PSL	PSL
FOUNDATION DESIGN GROUP	D	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	A	A	B	A	A	A	A	B	A	A	A

DEPTH BELOW GROUND SURFACE, feet (0, 10, 20, 30, 40)

HORIZONTAL: NOT TO SCALE

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

LEGEND

APPARENT P-WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
- 4,000 ≤ Vp < 5,000
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DRAFT

INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6k
	PM: MEH	PROJ. NO: 27669030.00004	

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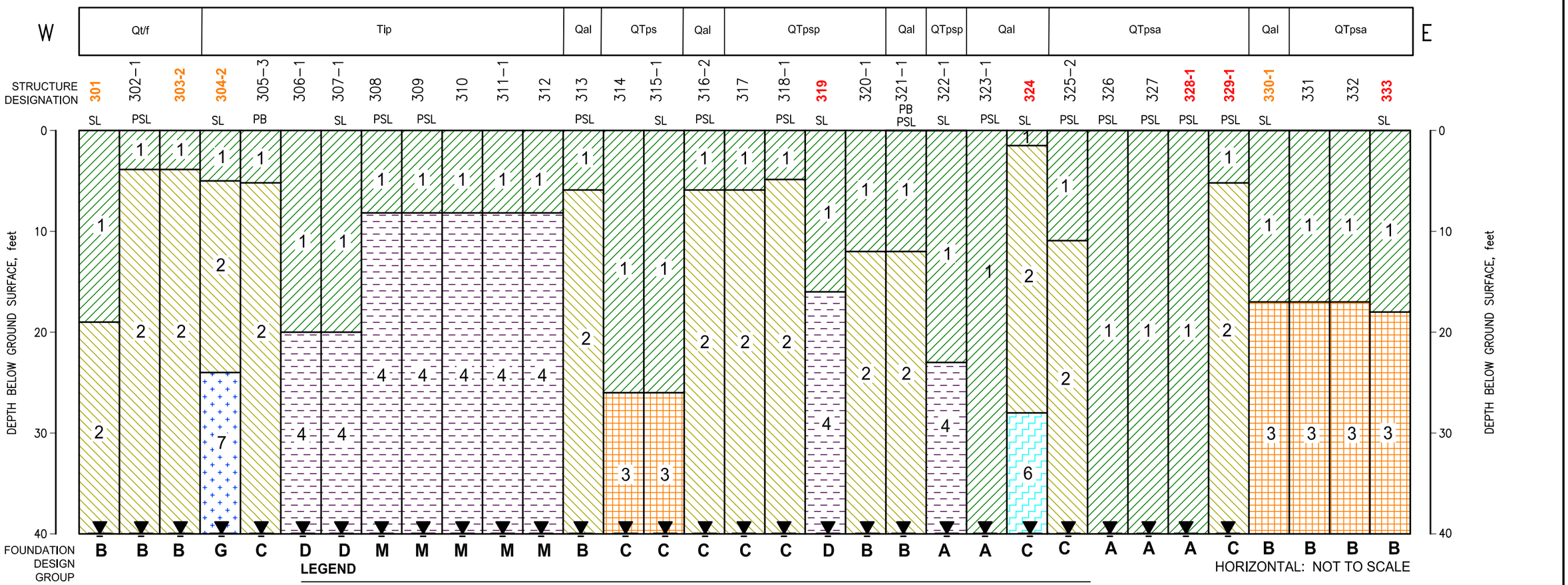
GENERALIZED SOIL/ROCK ZONE (SEE FIGURES 2a THROUGH 2z)

← SECTION 10B (Cont'd) →



LEGEND

APPARENT P-WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
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GREEN	DESIGNATES STRAIN TOWER
RED	DESIGNATES ANGLE TOWER
ORANGE	DESIGNATES DEAD END TOWER
BLACK	DESIGNATES TANGENT TOWER
PURPLE	DESIGNATES MISCELLANEOUS STRUCTURE
*	CUSTOM FOUNDATION DESIGN PARAMETERS (SEE TABLE 9)

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

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INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6I
	PM: MEH	PROJ. NO: 27669030.00004	

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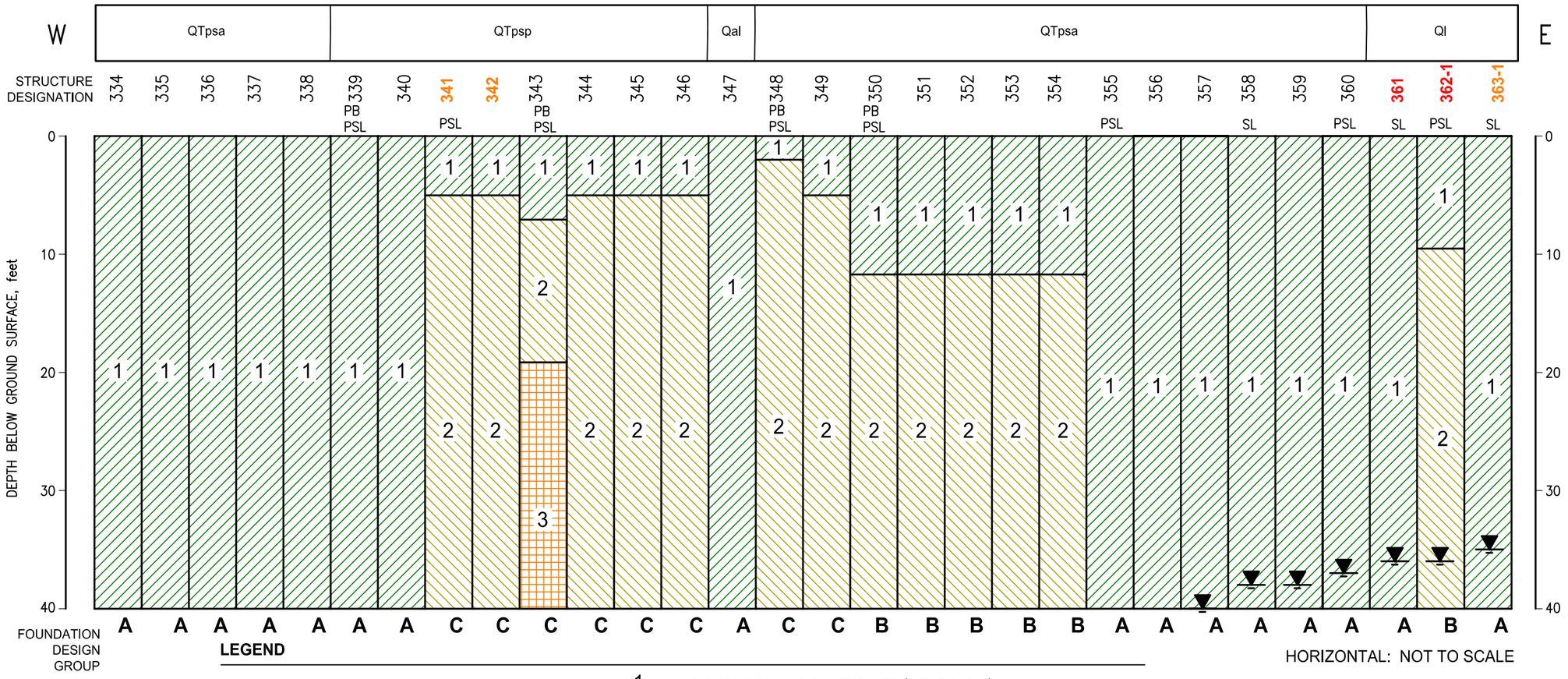
GENERALIZED SOIL/ROCK ZONE (SEE FIGURES 2a THROUGH 2z)

SECTION 10B (Cont'd)



HORIZONTAL: NOT TO SCALE

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

LEGEND

APPARENT P–WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
- 4,000 ≤ Vp < 5,000
- 5,000 ≤ Vp < 6,000
- 6,000 ≤ Vp < 7,000
- 7,000 ≤ Vp

1	INDICATES DESIGN PARAMETER SET (SEE TABLE 5)
A	INDICATES FOUNDATION DESIGN GROUP (SEE FIGURE 7)
SL	DENOTES SEISMIC LINE PERFORMED FOR CURRENT INVESTIGATION
PSL	DENOTES SEISMIC LINE PERFORMED FOR PREVIOUS PROJECT
PB	DENOTES BORING PERFORMED FOR PREVIOUS PROJECT
▼	DESIGN GROUNDWATER
GREEN	DESIGNATES STRAIN TOWER
RED	DESIGNATES ANGLE TOWER
ORANGE	DESIGNATES DEAD END TOWER
BLACK	DESIGNATES TANGENT TOWER
PURPLE	DESIGNATES MISCELLANEOUS STRUCTURE
*	CUSTOM FOUNDATION DESIGN PARAMETERS (SEE TABLE 9)

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INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6m
	PM: MEH	PROJ. NO: 27669030.00004	

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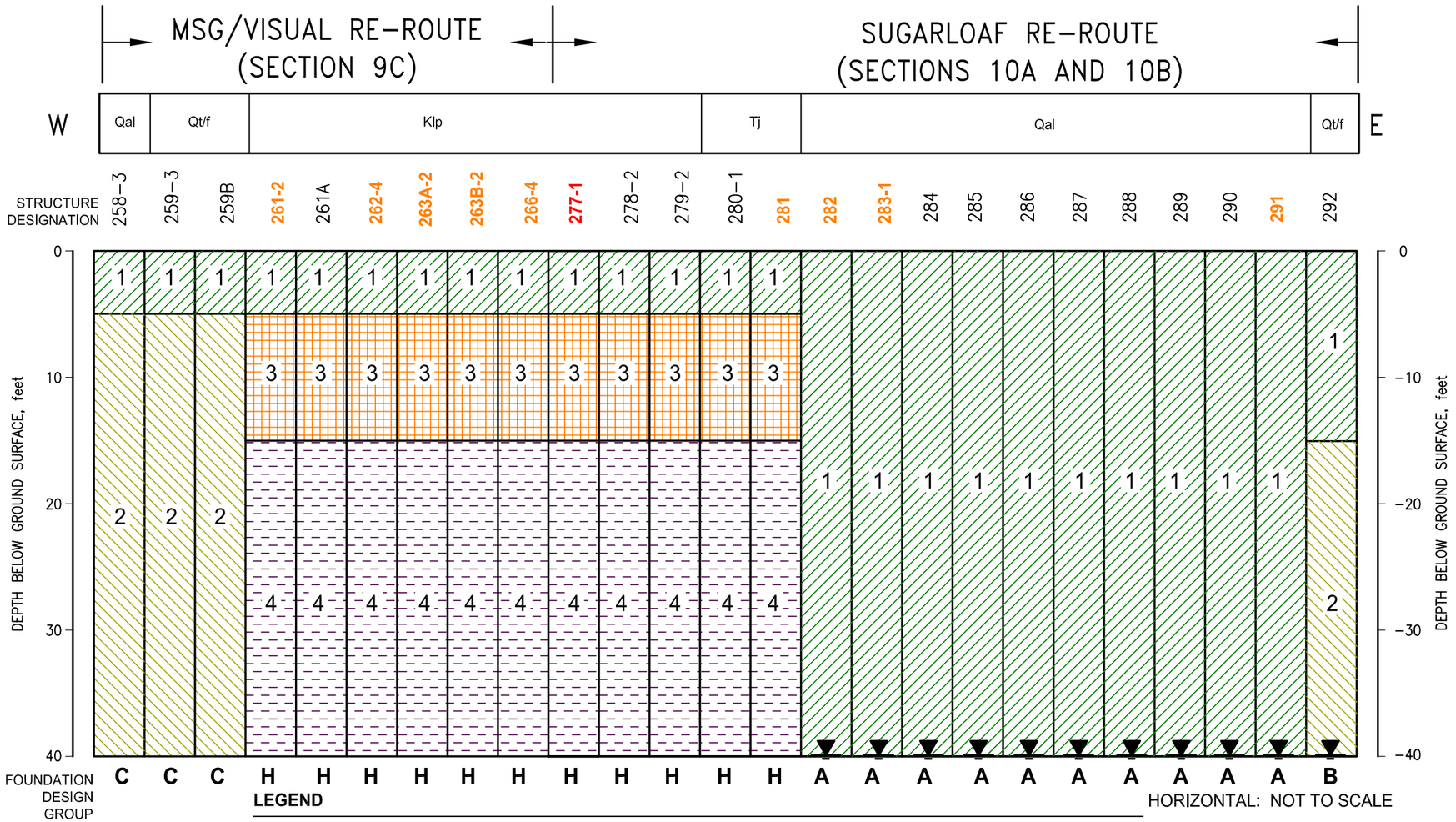

LEGEND

APPARENT P-WAVE VELOCITY (Vp), feet per second

- 1,000 ≤ Vp < 2,000
- 2,000 ≤ Vp < 3,000
- 3,000 ≤ Vp < 4,000
- 4,000 ≤ Vp < 5,000
- 5,000 ≤ Vp < 6,000
- 6,000 ≤ Vp < 7,000
- 7,000 ≤ Vp

1	INDICATES DESIGN PARAMETER SET (SEE TABLE 5)
A	INDICATES FOUNDATION DESIGN GROUP (SEE FIGURE 7)
SL	DENOTES SEISMIC LINE PERFORMED FOR CURRENT INVESTIGATION
PSL	DENOTES SEISMIC LINE PERFORMED FOR PREVIOUS PROJECT
PB	DENOTES BORING PERFORMED FOR PREVIOUS PROJECT
▼	DESIGN GROUNDWATER
GREEN	DESIGNATES STRAIN TOWER
RED	DESIGNATES ANGLE TOWER
ORANGE	DESIGNATES DEAD END TOWER
BLACK	DESIGNATES TANGENT TOWER
PURPLE	DESIGNATES MISCELLANEOUS STRUCTURE
*	CUSTOM FOUNDATION DESIGN PARAMETERS (SEE TABLE 9)

HORIZONTAL: NOT TO SCALE

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

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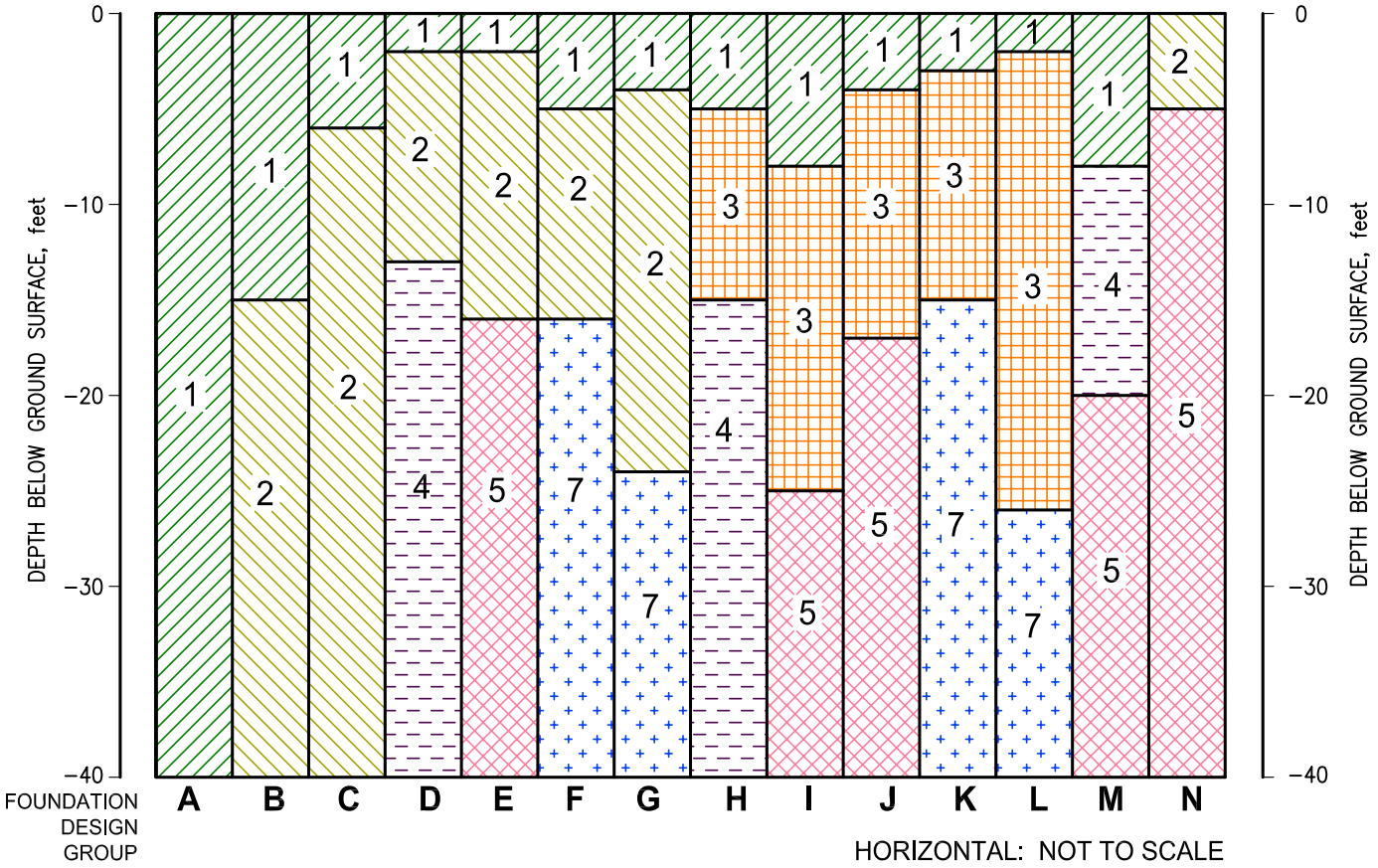
INTERPRETIVE SEISMIC VELOCITY PROFILES
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS	CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 6n
	PM: MEH	PROJ. NO: 27669030.00004	



LEGEND

APPARENT P–WAVE VELOCITY (Vp), feet per second

	1,000 ≤ Vp < 2,000
	2,000 ≤ Vp < 3,000
	3,000 ≤ Vp < 4,000
	4,000 ≤ Vp < 5,000
	5,000 ≤ Vp < 6,000
	6,000 ≤ Vp < 7,000
	7,000 ≤ Vp
1	INDICATES DESIGN PARAMETER SET (SEE TABLE 5)
A	INDICATES FOUNDATION DESIGN GROUP

NOTE: BOTTOM LAYER MAY BE EXTENTED TO 50 FEET, WHERE REQUIRED

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KEY TO FOUNDATION DESIGN GROUPS
SUNRISE POWERLINK PROJECT
SAN DIEGO AND IMPERIAL COUNTIES, CALIFORNIA

URS

CHECKED BY: PB	DATE: 03/22/10	FIG. NO: 7
PM: MEH	PROJ. NO: 27669030.00004	

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This appendix presents seismic refraction traverse data performed for the geotechnical investigation for the Sycamore-Creelman Transmission Line (WCC, 1993) that parallels the project alignment in Section 4A. A summary of the seismic information for the Sycamore-Creelman poles adjacent to the proposed Sunrise Powerlink structures is presented in Table A-1.

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Table A-1
Summary of Sycamore-Creelman Geotechnical Information
Sunrise Powerlink Project

Proposed Structure Designation [a]	Closest Existing Sycamore-Creelman Structure	Geologic Unit [b]	Seismic Refraction			
			Forward		Reverse	
			Profile [d] (feet)	Average P-Wave Velocity (feet/sec)	Profile [d] (feet)	Average P-Wave Velocity (feet/sec)
P3	3	Tst	0 to 6	1800	0 to 3	1300
			6 to 18	4500	3 to 15	4500
			18+	5500	15+	5500
P6-1	4	Tst	0 to 5	2000	0 to 7	2750
			5 to 20	5200	7 to 17	5000
			20+	5500	17+	5500
P7	5	Tp	0 to 6	1750	0 to 8	1400
			6 to 29	3750	8 to 17	5000
			29+	5500	17+	5500
P8-2	6	Tp	0 to 15	3000	0 to 6	2500
			15 to 23	5000	6 to 22	4300
			23+	5500	22+	5500
P8-2	7	Tp	0 to 5	1500	0 to 4	2000
			5+	5500	4 to 23	4000
					23+	5500
P9-1	9	Tp	0 to 6	2400	0 to 3	2100
			6 to 27	4700	3 to 17	4000
			27+	10000	17+	7500
P10	10	Tp	0 to 6	1950	0 to 5	1550
			6 to 10	5400	5 to 23	4900
			10+	5500	23+	30000
P11-1	12	Tst	0 to 5	1700	0 to 6	1800
			5+	5750	6+	6000
P12-1	13	Tp	0 to 6	2250	0 to 7	2350
			6 to 18	4750	7 to 13	5250
			18+	5500	13+	5500
P12-1	14	Tp	0 to 4	1950	0 to 4	2000
			4 to 19	4500	4 to 22	4100
			19+	5500	22+	5500
P13-2	15	Tp	0 to 11	3000	0 to 10	3100
			11 to 16	5250	10 to 14	5300
			16+	5500	14+	5500
P14	16	Tp	0 to 10	2800	0 to 8	2950
			10 to 19	5000	8 to 12	5350
			19+	5500	12+	5500

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Table A-1
Summary of Sycamore-Creelman Geotechnical Information
Sunrise Powerlink Project

Proposed Structure Designation [a]	Closest Existing Sycamore-Creelman Structure	Geologic Unit [b]	Seismic Refraction			
			Forward		Reverse	
			Profile [d] (feet)	Average P-Wave Velocity (feet/sec)	Profile [d] (feet)	Average P-Wave Velocity (feet/sec)
P15-1	17	Tp	0 to 4	1600	0 to 5	1400
			4 to 15	4950	5 to 7	5450
			15+	5500	7+	5500
P16-1	18	Tp	0 to 10	2600	0 to 5	2650
			10+	6500	5 to 15	5000
					25+	5500
P17-1	19	Tp	0 to 3	1500	0 to 4	2400
			3+	6000	4+	6200
P18-1	21	Tp	0 to 8	2500	0 to 6	2400
			8+	6500	6+	6000
P19-1	22	Tp	0 to 1	2250	0 to 2	1300
			1 to 21	4000	2 to 16	4700
			21+	5500	16+	5500
P19-1	23	Tp	0 to 1	1500	0 to 6	1650
			1 to 28	2950	6 to 27	3750
			28+	5500	27+	5500
P20	24	Tst	0 to 4	1000	0 to 10	1300
			4 to 23	4000	10 to 32	3500
			23+	5500	32+	5500
P21	25	Tp	0 to 4	2400	0 to 2	1650
			4 to 17	4700	2 to 17	4500
			17+	5500	17+	5500
P22-1	26	Tp	0 to 4	3100	0 to 8	3750
			4 to 17	4700	8+	6000
			17+	5500		
P23	27	Tp	0 to 6	3750	0 to 1	2000
			6 to 15	5100	1 to 12	5000
			15+	5500	12+	5500
P24-1	29	Tp	0 to 6	2800	0 to 9	2900
			6 to 21	4500	9 to 16	5200
			21+	5500	16+	5500
P25-2	31	Kgr	0 to 3	1500	0 to 26	3250
			3 to 11	3250	26+	25000
			11+	6000		
P26	32	Kgr	0 to 2	1300	0 to 1	1300
			2 to 14	2900	1 to 6	2600
			14 to 22	5000	6 to 25	4000

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Table A-1
Summary of Sycamore-Creelman Geotechnical Information
Sunrise Powerlink Project

Proposed Structure Designation [a]	Closest Existing Sycamore-Creelman Structure	Geologic Unit [b]	Seismic Refraction			
			Forward		Reverse	
			Profile [d] (feet)	Average P-Wave Velocity (feet/sec)	Profile [d] (feet)	Average P-Wave Velocity (feet/sec)
			22+	5500	25+	5500
P27	33	Kgr	0 to 5	1400	0 to 4	1500
			5 to 24	4800	4 to 32	3750
			24+	8000	32+	20000
P28-1	34	Kmv	0 to 4	1300	0 to 4	1400
			4 to 16	2900	4 to 18	3300
			16+	7000	18+	6000
P29-1	36	Kmv	0 to 4	1750	0 to 5	2000
			4 to 12	5250	5 to 21	6600
			12+	11000	21+	15000
P31-2	38	Kmv	0 to 5	1250	0 to 6	1250
			5 to 29	4000	6 to 32	4000
			29+	10000	32+	10000
P32-2	39	Kmv	0 to 5	1250	0 to 4	1350
			5 to 15	4500	4 to 30	4000
			15+	7000	30+	10000

Notes:

a. Proposed structure designation provided by SDG&E dated July 10, 2009.

b. Site Plan and Generalized Geologic Maps are presented as Figures 2a through 2z. A Key to Geologic Maps is presented as Figure 3.

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This appendix presents copies of the boring and seismic refraction traverse data performed for the geotechnical investigation for a portion of the SWPL Transmission Line (WCC, 1980, 1981, and 1982), which parallels the project alignment in Sections 9C, 10A and 10B. This appendix also presents copies of the foundation excavation records for the applicable SWPL structures provided by SDG&E. A summary of the boring, seismic, and foundation construction information adjacent to the proposed Sunrise Powerlink structures is presented in Table B-1.

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Table B-1
Summary of SWPL Geotechnical Information
Sunrise Powerlink Project

Proposed Structure Designation [a]	Closest Existing Structure	Geologic Unit [b]	Previous Boring Information			Seismic Refraction		As-Built Design Information			
			Profile (feet)	USCS Symbol	SPT Blowcount [c]	Profile [d] (feet)	Average P-Wave Velocity (fps)	Shaft Diameter (inches)	Belled Shaft Diameter (inches)	Average Foundation Depth (feet)	Notes
238-1	197	Tj				0 to 6	1,200	54	NA	15.0	Actual dia. 59-64 inches. Fractured Rock reported 2-6 feet bgs and Rock at 13 feet bgs. Blasting required Str. A and B.
						6 to 13	4,400				
						13 to 30	5,000				
239-1	198	Qal				0-3	2,300	60	108	18.0	Actual dia. 67 inches. Possible perched water
						3-20	4,900				
						20-30	11,500				
240	199	Qal				0 to 30	1,200	42	78	19.4	Some cobbles in all Str.
242	201	Qal	0 to 7	SM	12, 8	0 to 30	1,150	60	NA	22.8	Actual dia 60-66 inches. Cobbles.
			7 to 20	SM-SP	21, 14						
243	202	Qt/f						42	78	18.0	
244	203	Qt/f				0 to 5	1,200	36	78	18.0	
						5 to 30	2,600				
245-1	204	Klp				0 to 5	1,400	54	NA	13.3	Rock reported 2.5-8 feet bgs in 3 Str. Blasting required Str. B.
						5 to 15	3,500				
						15 to 30	6,000				
247	205	Klp				0 to 5	2,800	42	78	17.5	Cobbles reported in all Str. Rock reported at 14 feet bgs in Str. B.
						5 to 15	4,000				
						15 to 30	5,000				
248	206	Klp				0 to 5	4,200	42	78	11.6	Actual dia 44-46 inches. Rock reported 4-6 feet bgs in Str. A and Str. D.
						5 to 10	7,000				
						10 to 30	11,000				

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Table B-1
Summary of SWPL Geotechnical Information
Sunrise Powerlink Project
(Continued)

Proposed Structure Designation [a]	Closest Existing Structure	Geologic Unit [b]	Previous Boring Information			Seismic Refraction		As-Built Design Information			
			Profile (feet)	USCS Symbol	SPT Blowcount [c]	Profile [d] (feet)	Average P-Wave Velocity (fps)	Shaft Diameter (inches)	Belled Shaft Diameter (inches)	Average Foundation Depth (feet)	Notes
249	207	Klp/Qt/f				0 to 4	3,500	36	72	13.3	Actual dia 38-43 inches. Rock reported at 4-6 feet bgs in Str. B and C. Note the structures are in different geologic units
						4 to 30	6,500				
250	208	Klp				0 to 5	3,200	36	NA	15.2	Rock reported at 2-5 feet bgs in all Str.
						5 to 15	5,500				
						15 to 30	9,000				
251	209	Klp				0 to 5	1,000	42	78	18.6	Cementation at 2-4 feet bgs in all Str.
						5 to 10	2,000				
						10 to 30	2,500				
252-1	210	Klp	0 to 1	SP		0 to 4	1,250	42	78	19.3	Cementation and cobbles at 6-9 feet bgs in all Str.
			1 to 12	ML	47, 40/3"	4 to 10	2,500				
			12 to 12.5	GP		10 to 30	3,200				
			12.5 to 23	ML							
253-1	211	Tj				0 to 5	2,100	42	78	19.0	Rock reported at 1-6 feet bgs.
						5 to 15	3,200				
						15 to 30	4,500				
254-2	212	Tj				0 to 3	1,000	54	NA	14.8	Actual dia 55-56 inches. Some cobbles in all Str. and boulders in Str. D.
						3 to 20	2,200				
						20 to 30	4,200				

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Table B-1
Summary of SWPL Geotechnical Information
Sunrise Powerlink Project
(Continued)

Proposed Structure Designation [a]	Closest Existing Structure	Geologic Unit [b]	Previous Boring Information			Seismic Refraction		As-Built Design Information			
			Profile (feet)	USCS Symbol	SPT Blowcount [c]	Profile [d] (feet)	Average P-Wave Velocity (fps)	Shaft Diameter (inches)	Belled Shaft Diameter (inches)	Average Foundation Depth (feet)	Notes
255-1	213	Qal	0 to 11	SP	21	0 to 5	1,500	72	114	28.6	Actual dia 77-80 inches. Some cobbles in all Str.
			11 to 11.5	GP		5 to 15	2,500				
			11.5 to 20	SP		15 to 30	5,000				
256	214	Qal						42, 48	78, 84	13.5	Actual dia 44-60 inches. Cementation. Rock reported at 7.5 feet bgs in Str. D.
257	215	Qal				0 to 5	1,750	54	NA	13.0	Cobbles encountered in both Str. Boulders encountered at 3 feet bgs in Str C. A and B - no drilling information.
						5 to 18	3,500				
						18 to 30	5,250				
258-2	216	Qal	0 to 4	SM	8, 8	0 to 5	1,300	42	78	11.3	Rock reported at 2 feet bgs in Str. A and D, and 4 feet bgs in Str. C.
			4 to 10	SM	40/3"	5 to 10	2,500				
						10 to 30	3,750				
259-1	217	Klp						54	NA	13.5	Rock encountered 4-10 feet bgs in Str. A, C, and D
261-1	219	Klp						54	NA	11.8	Rock encountered 1-5 feet bgs in all Str.
262-3	220	Klp						54	NA	13.1	Rock encountered 2-6 feet bgs in all Str.
263-1	221	Klp						54	NA	14.3	Rock encountered at surface in all Str.

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Table B-1
Summary of SWPL Geotechnical Information
Sunrise Powerlink Project
(Continued)

Proposed Structure Designation [a]	Closest Existing Structure	Geologic Unit [b]	Previous Boring Information			Seismic Refraction		As-Built Design Information			
			Profile (feet)	USCS Symbol	SPT Blowcount [c]	Profile [d] (feet)	Average P-Wave Velocity (fps)	Shaft Diameter (inches)	Belled Shaft Diameter (inches)	Average Foundation Depth (feet)	Notes
264-2	223	Klp						60	102	17.2	Rock encountered at surface in all Str.
265-2	224	Klp						42	NA	6.1	Rock encountered at surface in Str. B and D
266-2	225	Klp						30	NA	10.0	Actual dia 32 inches. Rock encountered 3 feet bgs in Str. A and 8 feet bgs in Str. D.
269-1	227	Klp				0 to 4	1,500	54	NA	13.5	Fractured rock encountered at the surface in Str. A and B, and at 5 feet bgs in Str. D.
						4 to 16	3,750				
						16 to 30	7,500				
P270-2	229	Klp				0 to 4	1,200	30	NA	10.0	Rock reported 1.5-3 feet bgs in all Str.
						4 to 10	3,000				
						10 to 23	4,000				
						23 to 30	4,500				
P271-2	230	Klp						42	NA	7.8	Rock anchor Str. A, Rock reported at 2-3 feet bgs in Str. B, C, and D

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Table B-1
Summary of SWPL Geotechnical Information
Sunrise Powerlink Project
(Continued)

Proposed Structure Designation [a]	Closest Existing Structure	Geologic Unit [b]	Previous Boring Information			Seismic Refraction		As-Built Design Information			
			Profile (feet)	USCS Symbol	SPT Blowcount [c]	Profile [d] (feet)	Average P-Wave Velocity (fps)	Shaft Diameter (inches)	Belled Shaft Diameter (inches)	Average Foundation Depth (feet)	Notes
P272-3	232	MzPzm/Klp						42	NA	8.2	Fractured Rock reported 4-6 feet bgs in all Str. Note the structures are in different geologic units
P273-1	233	MzPzm/Klp						36	NA	8.1	Boulders encountered in all Str. Rock encountered 5 feet bgs in Str. A. Blasting required. Note the structures are in different geologic units.
P274-1	234	Klp						42	NA	9.3	Rock reported 3.5-5 feet bgs in Str. A and C. Rock anchor Str. B and D.
P275-1	235	Klp						30	NA	10.0	Rock encountered at surface in Str. A and at 3-4 feet bgs for Str. C and D
P276-1	236	Klp						30	NA	10.0	Rock reported 1-3 feet bgs in Str. A, C and D.
P277-1	237	Klp						30	NA	10.0	Boulders encountered at 1-3 feet bgs in all Str.
P278-1	238	Klp						36	NA	10.5	Rock reported 7-9 feet bgs in Str. A and B, and at the ground surface in Str. C and D.

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Table B-1
Summary of SWPL Geotechnical Information
Sunrise Powerlink Project
(Continued)

Proposed Structure Designation [a]	Closest Existing Structure	Geologic Unit [b]	Previous Boring Information			Seismic Refraction		As-Built Design Information			
			Profile (feet)	USCS Symbol	SPT Blowcount [c]	Profile [d] (feet)	Average P-Wave Velocity (fps)	Shaft Diameter (inches)	Belled Shaft Diameter (inches)	Average Foundation Depth (feet)	Notes
P279-1	240	Klp						54	NA	13.0	Rock encountered 3-6 feet BGS in Str. A and B and at surface in Str. C and D. Rock anchors in Str. C and D.
P280-1	241	Tj/Tsm				0 to 5	1,900	42	78	18.0	Rock reported 15 feet bgs in Str. A. Cobbles from ground surface in all Str. Note the structures are in different geologic units.
						5 to 28	3,000				
						28 to 30	5,000				
P281	242	Tsm/Qal				0 to 20	1,300	42	78	18.5	Note the structures are in different geologic units.
						20 to 30	4,000				
290	244	Tsm				0 to 18	1,250	60	NA	23.0	Rock reported 7.5-12 feet bgs in all Str. Note the structures are in different geologic units.
						18 to 30	2,000				
300-1	253	Qal				0 to 5	1,200	42	NA	16.1	Some cobbles in Str. B, C, and D.
						5 to 10	1,500				
						10 to 30	1,900				
301	254	Qt/f	0 to 5	SM-SP	49	0 to 5	1,250	90	NA	32.5	Rock reported 27-29 feet bgs in Str. A and B.
			5 to 30	SM-SP	80	5 to 30	1,900				
302-1	255	Qt/f				0 to 4	1,375	42	NA	15.6	Some cobbles and gravels in all Str.
						4 to 30	2,000				
303-2	256	Qt/f						42	72	15.9	Additional shaft below bell.

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Table B-1
Summary of SWPL Geotechnical Information
Sunrise Powerlink Project
(Continued)

Proposed Structure Designation [a]	Closest Existing Structure	Geologic Unit [b]	Previous Boring Information			Seismic Refraction		As-Built Design Information			
			Profile (feet)	USCS Symbol	SPT Blowcount [c]	Profile [d] (feet)	Average P-Wave Velocity (fps)	Shaft Diameter (inches)	Belled Shaft Diameter (inches)	Average Foundation Depth (feet)	Notes
304-2	257	Ti						36	NA	9.3	Actual dia 4 feet at top of Str. D.
305-3	258	Qt/f	0 to 5	SM-ML	5, 8			36	NA	10.7	Actual dia 36-60 inches.
			5 to 15	CL-CH	60, 44/1"						
306-1	259	Tip						36	NA	9.3	Actual dia 36-48 inches.
307-1	260	Tip						36	NA	9.5	
309	261	Tip				0 to 8	1,600	36	NA	10.5	Cemented oyster/coral bed in upper 6-9 feet bgs in all Str.
						8 to 30	6,150				
310	262	Tip						36	NA	9.4	
311-1	263	Tip						36	NA	9.3	Actual dia 36-48 inches.
312	264	Tip						36	NA	16.3	
313	265	Qal				0 to 6	1,300	48	NA	16.4	Actual dia 48-60 inches. Some gravels and cobbles in all Str.
						6 to 30	2,000				
315-1	266	QTps						36	NA	9.5	Actual dia 36-60 inches.
316-2	267	QTpsp				0 to 6	1,350	36	NA	13.3	Actual dia 36-44 inches. Some gravels and cobbles in all Str.
						6 to 30	2,250				
317	268	QTpsp						36	NA	9.4	Actual dia 36-42 inches. Some gravels in all Str. and some cobbles in Str. D.

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Table B-1
Summary of SWPL Geotechnical Information
Sunrise Powerlink Project
(Continued)

Proposed Structure Designation [a]	Closest Existing Structure	Geologic Unit [b]	Previous Boring Information			Seismic Refraction		As-Built Design Information			
			Profile (feet)	USCS Symbol	SPT Blowcount [c]	Profile [d] (feet)	Average P-Wave Velocity (fps)	Shaft Diameter (inches)	Belled Shaft Diameter (inches)	Average Foundation Depth (feet)	Notes
318-1	269	QTpsp				0 to 5	1,500	36	NA	15.4	Actual dia 36-42 inches. Some gravels and cobbles in all Str.
						5 to 30	2,500				
319	270	QTpsp	0 to 3	CH	40/1"	0 to 25	1,430	60	NA	16.4	Actual dia 60-90 inches.
			3 to 14	SM	40/1"	25 to 30	4,000				
320-1	271	QTpsp						36	NA	9.2	Actual dia 36-48 inches. Some gravels in all Str.
321-1	272	Qal/QTpsps	0 to 1	CL		0 to 12	1,600	36	NA	10.1	Some gravels in Str. B, C, and D. Note the structures are in different geologic units.
			1 to 22	CL-CH	54, 56/6", 40/2", 40/1", 16/0"	12 to 30	2,600				
322-1	273	Qal/QTpsps	0 to 3	SP	20	0 to 15	1,400	42	NA	15.4	Caving reported in upper 4 feet Str. C. Actual dia 42-66 inches. Note the structures are in different geologic units.
			3 to 27	SM	38, 78, 40/1"	15 to 30	2,350				
323-1	274	Qal				0 to 9	1,200	42	NA	15.4	Some gravels in all Str.
						9 to 30	1,900				
325-2	275	QTpsa				0 to 2	1,500	42	NA	15.8	Caving reported near surface. Actual dia 42-54 inches. Some gravels in Str. B and D.
						2 to 11	1,900				
						11 to 30	2,300				
326	276	QTpsa				0 to 30	1,600	36	NA	9.2	Some gravels in all Str.
327	277	QTpsa				0 to 30	1,875	36	NA	9.2	Some gravels in all Str.

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Table B-1
Summary of SWPL Geotechnical Information
Sunrise Powerlink Project
(Continued)

Proposed Structure Designation [a]	Closest Existing Structure	Geologic Unit [b]	Previous Boring Information			Seismic Refraction		As-Built Design Information			
			Profile (feet)	USCS Symbol	SPT Blowcount [c]	Profile [d] (feet)	Average P-Wave Velocity (fps)	Shaft Diameter (inches)	Belled Shaft Diameter (inches)	Average Foundation Depth (feet)	Notes
328-1	278	QTpsa				0 to 30	1,850	42	NA	15.4	Some gravels in all Str. Note the structures are in different geologic units.
329-1	279	Qal				0 to 5	1,350	36	NA	9.3	Some gravels in all Str. Note the structures are in different geologic units.
						5 to 13	2,250				
						13 to 30	2,850				
330-1	280	Qal	0 to 5	SM-SP	26	0 to 5	1,525	72	NA	27.4	Some cobbles and gravels in all Str.
			5 to 16	SM-SP	74, 99	5 to 16	2,400				
			16 to 30	SM-SP	16/0"	16 to 30	3,800				
331	281	QTpsa						54	NA	14.1	Some gravels in all Str.
332	282	QTpsa						36	NA	9.5	Actual dia 36-42 inches. Some gravels in all Str.
333	283	QTpsa				0 to 26	1,800	36	NA	9.3	Actual dia 38 inches. Cementation
						26 to 30	5,000				
334	284	QTpsa						36	NA	9.4	Some gravels in all Str.
335	285	QTpsa						36	NA	10.4	Some gravels in all Str.
336	286	QTpsa						36	NA	9.2	Some gravels in all Str. Some caving in Str. D
337	287	QTpsa						36	NA	9.1	Some gravels in all Str.
338	288	QTpsa						36	NA	9.3	Some gravels in all Str.

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Table B-1
Summary of SWPL Geotechnical Information
Sunrise Powerlink Project
(Continued)

Proposed Structure Designation [a]	Closest Existing Structure	Geologic Unit [b]	Previous Boring Information			Seismic Refraction		As-Built Design Information			
			Profile (feet)	USCS Symbol	SPT Blowcount [c]	Profile [d] (feet)	Average P-Wave Velocity (fps)	Shaft Diameter (inches)	Belled Shaft Diameter (inches)	Average Foundation Depth (feet)	Notes
339	289	QTpsp	0 to 11	CL-CH	22, 25	0 to 6	1,500	36	NA	10.2	Cementation
			11 to 22	SM	80/5.5", 80/5", 48/2"	6 to 30	1,675				
340	290	QTpsp/ QTpsa						36	NA	9.6	Some gravels in all Str. Note the structures are in different geologic units.
341	291	QTpsp				0 to 5	1,750	54	NA	14.3	Cementation
						5 to 30	2,300				
342	292	QTpsp						54	NA	14.8	Rock reported at 13 feet bgs in Str B.
343	293	QTpsp	0 to 2	SM-ML		0 to 7	1,250	36	NA	9.7	Rock reported at 4.5 feet bgs in Str. B. Caving near surface in Str. B and Actual dia 54 inches. Cementation
			2 to 13	SM	50	7 to 19	2,650				
			13 to 22	CL-CH	40/3", 40/2", 48/1"	19 to 30	3,275				
344	294	QTpsp						36	NA	9.2	
345	295	QTpsp						36	NA	9.2	Some gravels in all Str.
346	296	QTpsp						36	NA	9.2	Actual dia 36-48 inches. Caving. Some gravels in all Str.
347	297	Qal						36	NA	9.3	Some gravels in all Str. Note the structures are in different geologic units.

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Table B-1
Summary of SWPL Geotechnical Information
Sunrise Powerlink Project
(Continued)

Proposed Structure Designation [a]	Closest Existing Structure	Geologic Unit [b]	Previous Boring Information			Seismic Refraction		As-Built Design Information			
			Profile (feet)	USCS Symbol	SPT Blowcount [c]	Profile [d] (feet)	Average P-Wave Velocity (fps)	Shaft Diameter (inches)	Belled Shaft Diameter (inches)	Average Foundation Depth (feet)	Notes
348	298	QTpsa	0 to 2	SM-SP		0 to 2	1,800	36	NA	9.3	Some gravels in all Str.
			2 to 18	SM	58, 60/6"	2 to 30	2,200				
349	299	QTpsa						36	NA	9.2	Some gravels in all Str.
350	300	QTpsa	0 to 3.5	CL-CH	84	0 to 4	1,600	36	NA	9.2	Some gravels in all Str.
			3.5 to 16	SM-SC	98, 52	4 to 12	1,900				
			16 to 27	SM	40/3", 40/3", 40/2"	12 to 30	2,300				
351	301	QTpsa						36	NA	9.3	Some gravels in all Str.
352	302	QTpsa						36	NA	9.2	Some gravels in all Str.
353	303	QTpsa						36	NA	9.3	Some gravels in all Str.
354	304	QTpsa						36	NA	9.5	Actual dia 36-60 inches. Some gravels in all Str.
355	305	QTpsa				0 to 28	1,950	36	NA	9.5	Actual dia 36-60 inches. Caving. Some gravels in Str. B.
						28 to 30	5,000				
356	306	QTpsa						36	NA	9.3	Actual dia 36-48 inches.
357	307	QTpsa						36	NA	9.6	Actual dia 36-48 inches. Caving
358	308	QTpsa						36	NA	9.6	Actual dia 36-60 inches. Sloughing
359	309	QTpsa						42	NA	15.6	Actual dia 42-48 inches. Sloughing/caving

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Table B-1
Summary of SWPL Geotechnical Information
Sunrise Powerlink Project
(Continued)

Proposed Structure Designation [a]	Closest Existing Structure	Geologic Unit [b]	Previous Boring Information			Seismic Refraction		As-Built Design Information			
			Profile (feet)	USCS Symbol	SPT Blowcount [c]	Profile [d] (feet)	Average P-Wave Velocity (fps)	Shaft Diameter (inches)	Belled Shaft Diameter (inches)	Average Foundation Depth (feet)	Notes
360	310	QTpsa				0 to 2	1,500	42	NA	15.4	Some gravels and cobbles in Str. D.
						2 to 25	1,675				
						25 to 30	5,000				
361	311	Ql						60	NA	22.4	
362-1	312	Ql				0 to 9	1,300	60	NA	22.9	Sloughing/caving
						9 to 30	2,200				
363-1	313	Ql						90	NA	32.3	Sloughing

Notes:
a. Proposed structure designation corresponds to the structures list dated February 23, 2010.
b. Site Plan and Generalized Geologic Maps are presented as Figures 2a through 2z. A Key to Geologic Maps is presented as Figure 3.
c. SPT blowcount is calculated as 80 percent of the modified California blowcount for the last 12 inches of driving.
d. Interpretive Seismic Velocity Profiles presented in Figures 6a through 6n.

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LEGEND:

Alluvium and thick residual soils

Unnamed boulder conglomerate

Otay formation

Otay formation – conglomerate

Jacumba volcanics

Table Mountain formation

Intrusive rocks of the Southern California Batholith

Intrusive rocks of the Southern California Batholith – deeply weathered and chemically decomposed

Santiago Peak Volcanics – Metavolcanics

Santiago Peak Volcanics – Metasedimentary

Julian schist

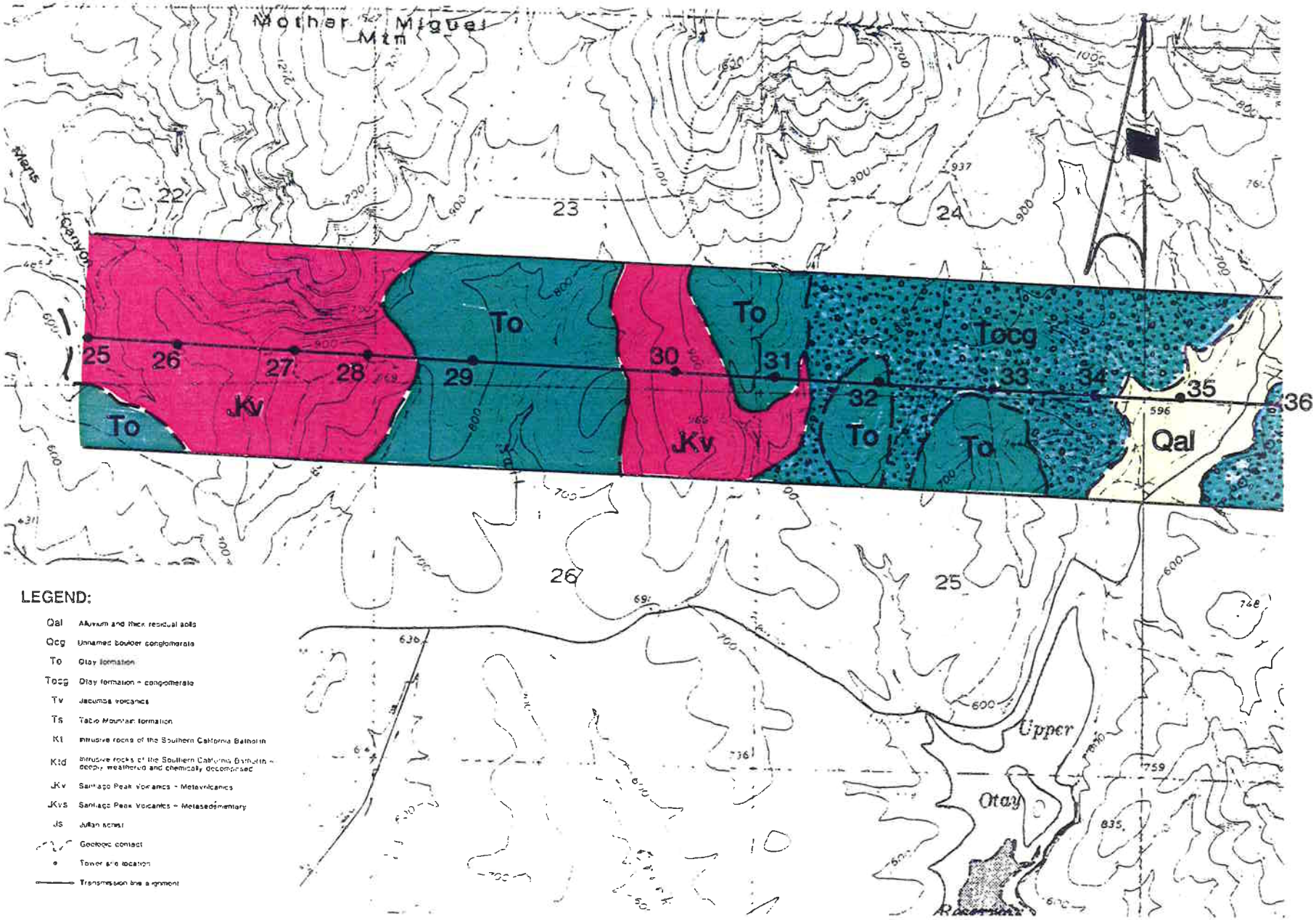
Geologic contact

Tower site location

Transmission Line alignment

LEGEND SOIL / ROCK ZONE MAP MIGUEL - IMPERIAL VALLEY 500 KV LINE				
DRAWN BY: mrk	CHECKED BY: [illegible]	PROJECT NO: 59125S-TST1	DATE: 1-29-80	FIGURE NO: 3.1

WOODWARD-CLYDE CONSULTANTS



LEGEND:

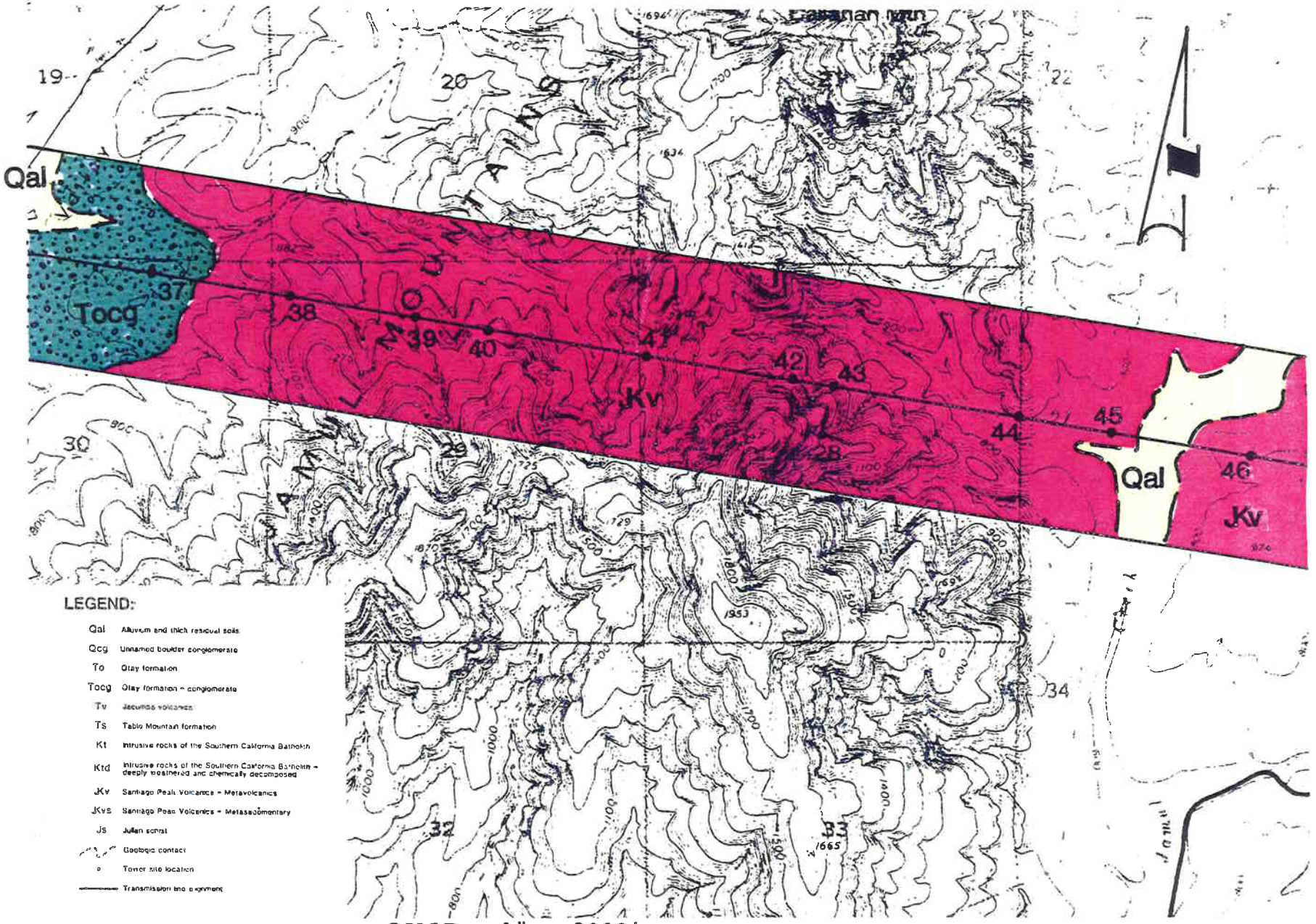
Qal	Alluvium and thick residual soils
Qcg	Unnamed boulder conglomerate
To	Otay formation
Tocg	Otay formation - conglomerate
Tv	Jacumba volcanics
Ts	Table Mountain formation
Kt	Intrusive rocks of the Southern California Batholith
Ktd	Intrusive rocks of the Southern California Batholith - deeply weathered and chemically decomposed
JKv	Santiago Peak Volcanics - Metavolcanics
JKvs	Santiago Peak Volcanics - Metasedimentary
JS	Julian schist
	Geologic contact
	Tower site location
	Transmission line alignment

SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP
MIGUEL - IMPERIAL VALLEY 500 KV LINE

DRAWN BY: mrk	CHECKED BY:	PROJECT NO: 59125S-TST1	DATE: 1-29-80	FIGURE NO: 3.2

WOODWARD CLYDE CONSULTANTS



SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP
MIGUEL - IMPERIAL VALLEY 500 KV LINE

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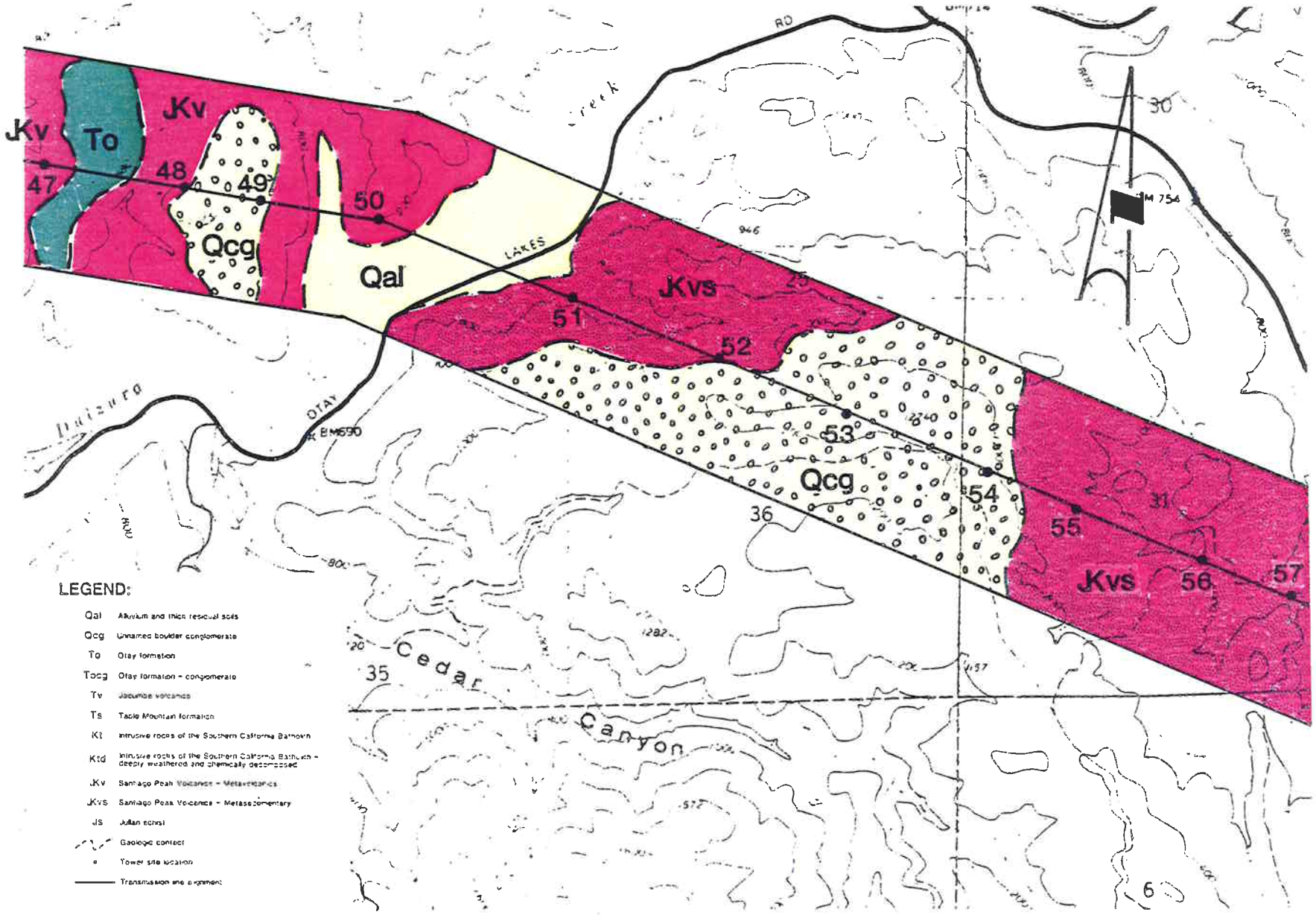
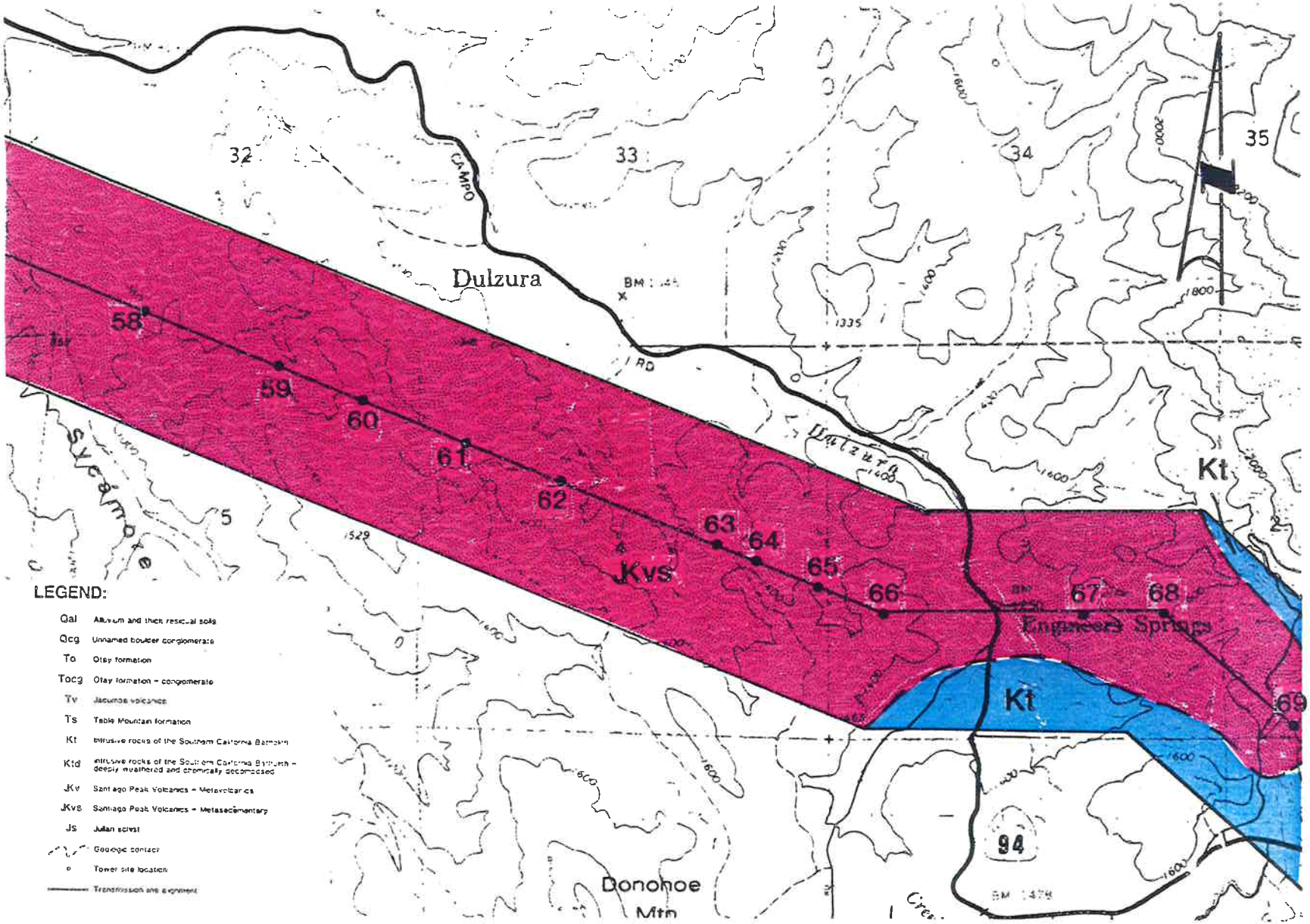


SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP
MIGUEL - IMPERIAL VALLEY 500 KV LINE

DRAWN BY: mrk	CHECKED BY:	PROJECT NO: 59125S-TST1	DATE: 1-29-80	FIGURE NO: 3.4



SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP MIGUEL - IMPERIAL VALLEY 500 KV LINE				
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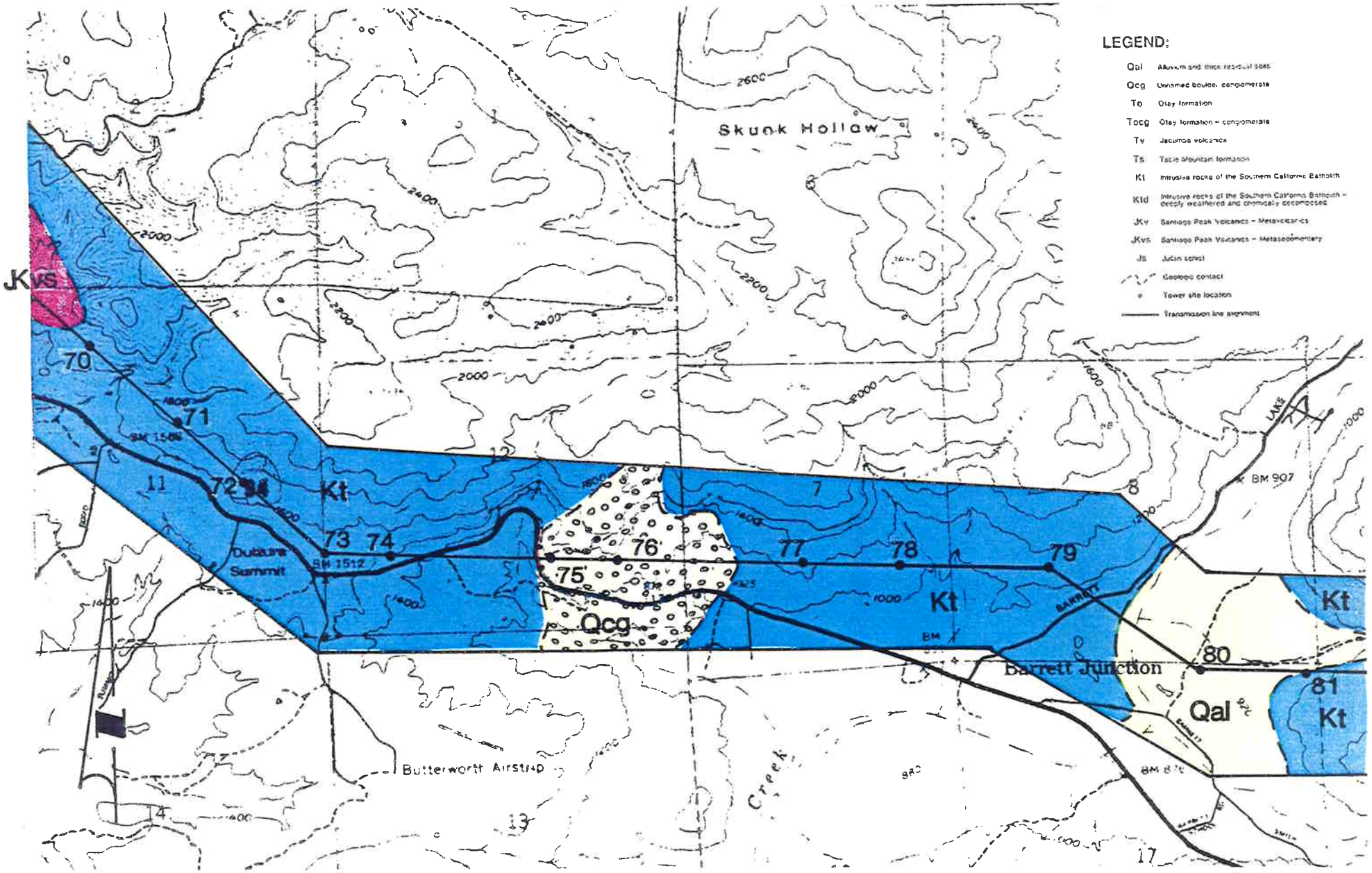
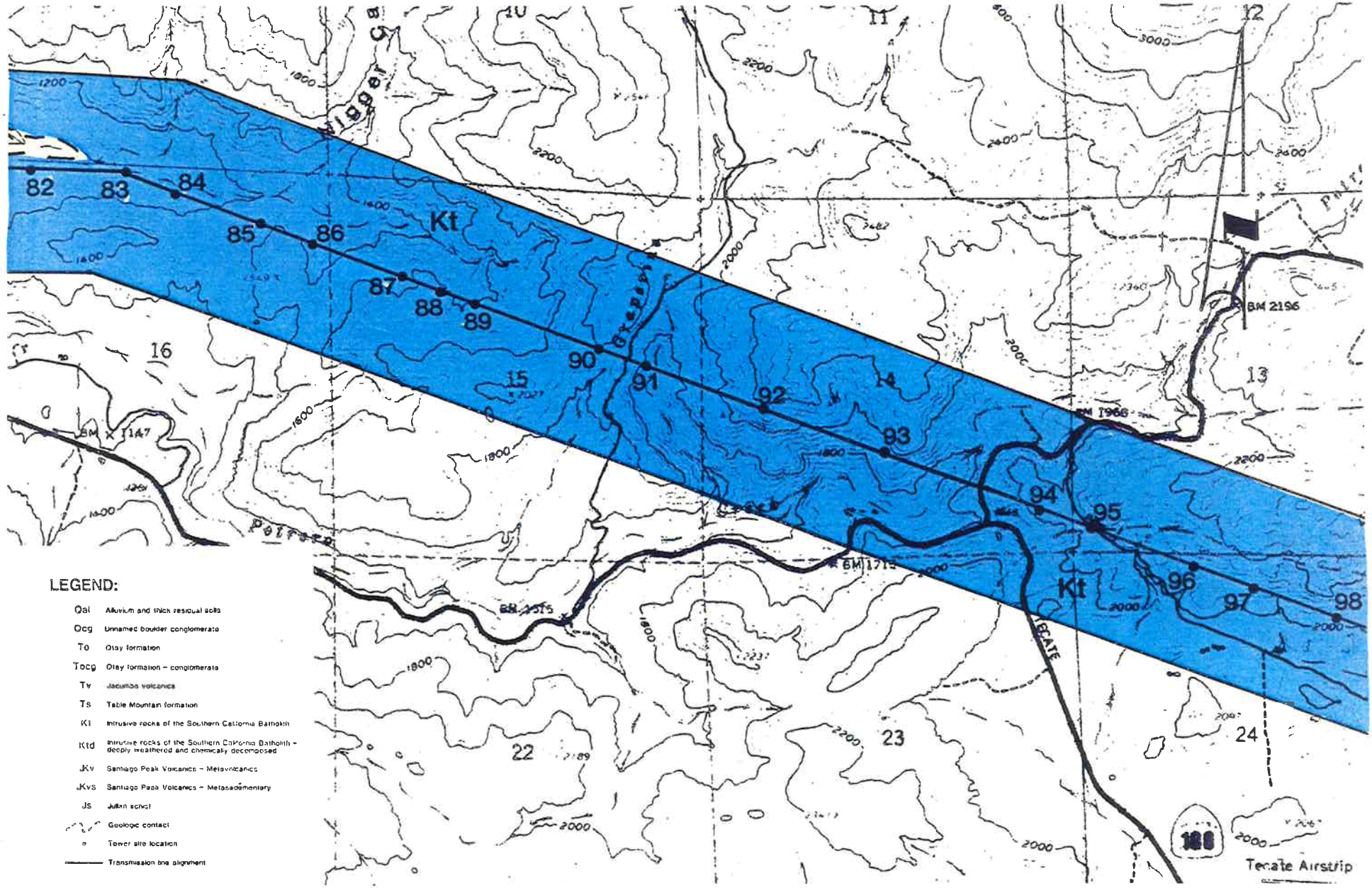


SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP
MIGUEL - IMPERIAL VALLEY 500 KV LINE

DRAWN BY: mrk	CHECKED BY:	PROJECT NO: 59125S-TST1	DATE: 1-29-80	FIGURE NO: 3.6

WOODWARD-CLYDE CONSULTANTS

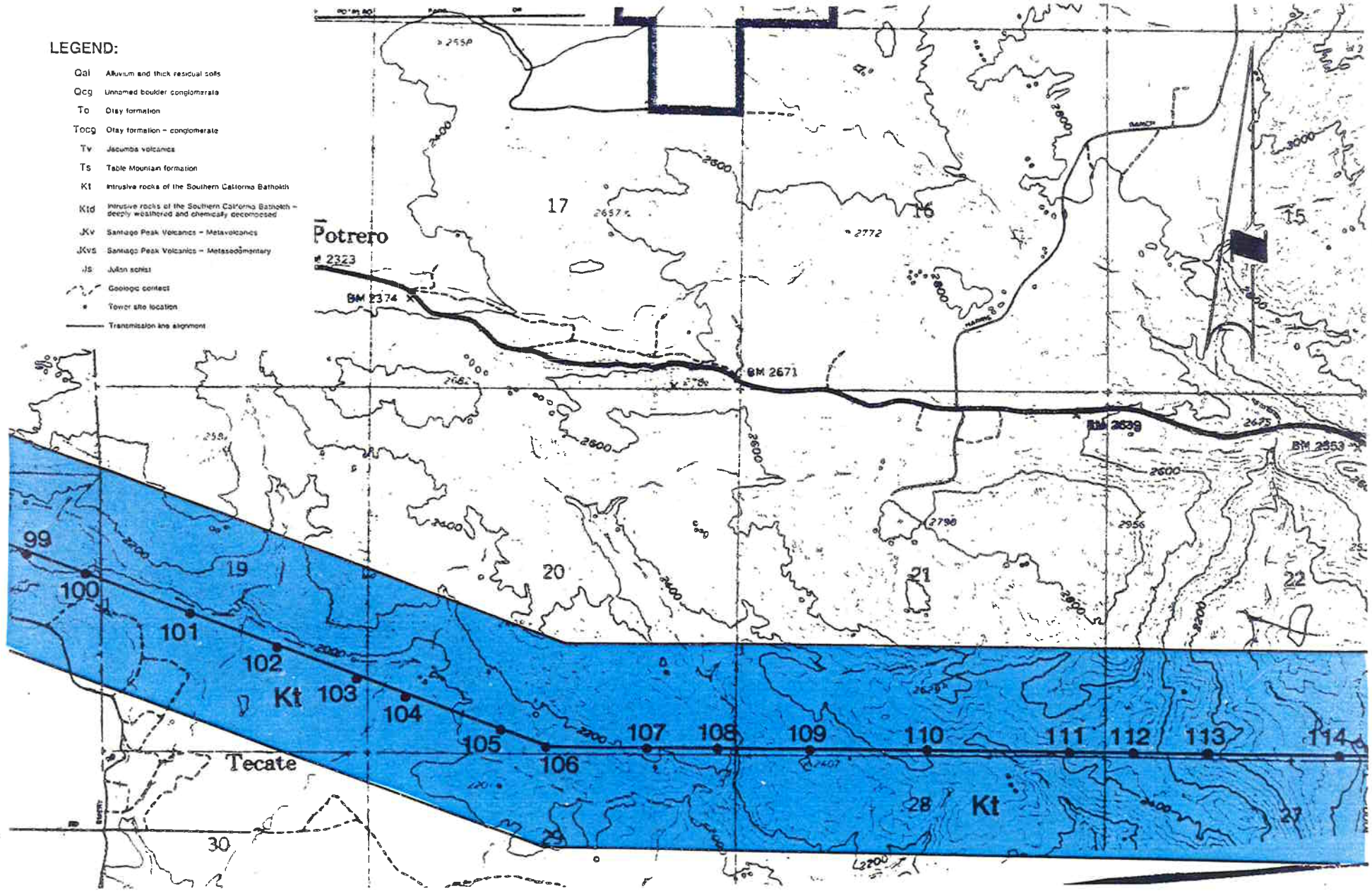


SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP
MIGUEL - IMPERIAL VALLEY 500 KV LINE

DRAWN BY: mrk	CHECKED BY:	PROJECT NO: 59125S-TST1	DATE: 1-29-80	FIGURE NO: 3.7

WOODWARD-CLYDE CONSULTANTS



SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP
MIGUEL - IMPERIAL VALLEY 500 KV LINE

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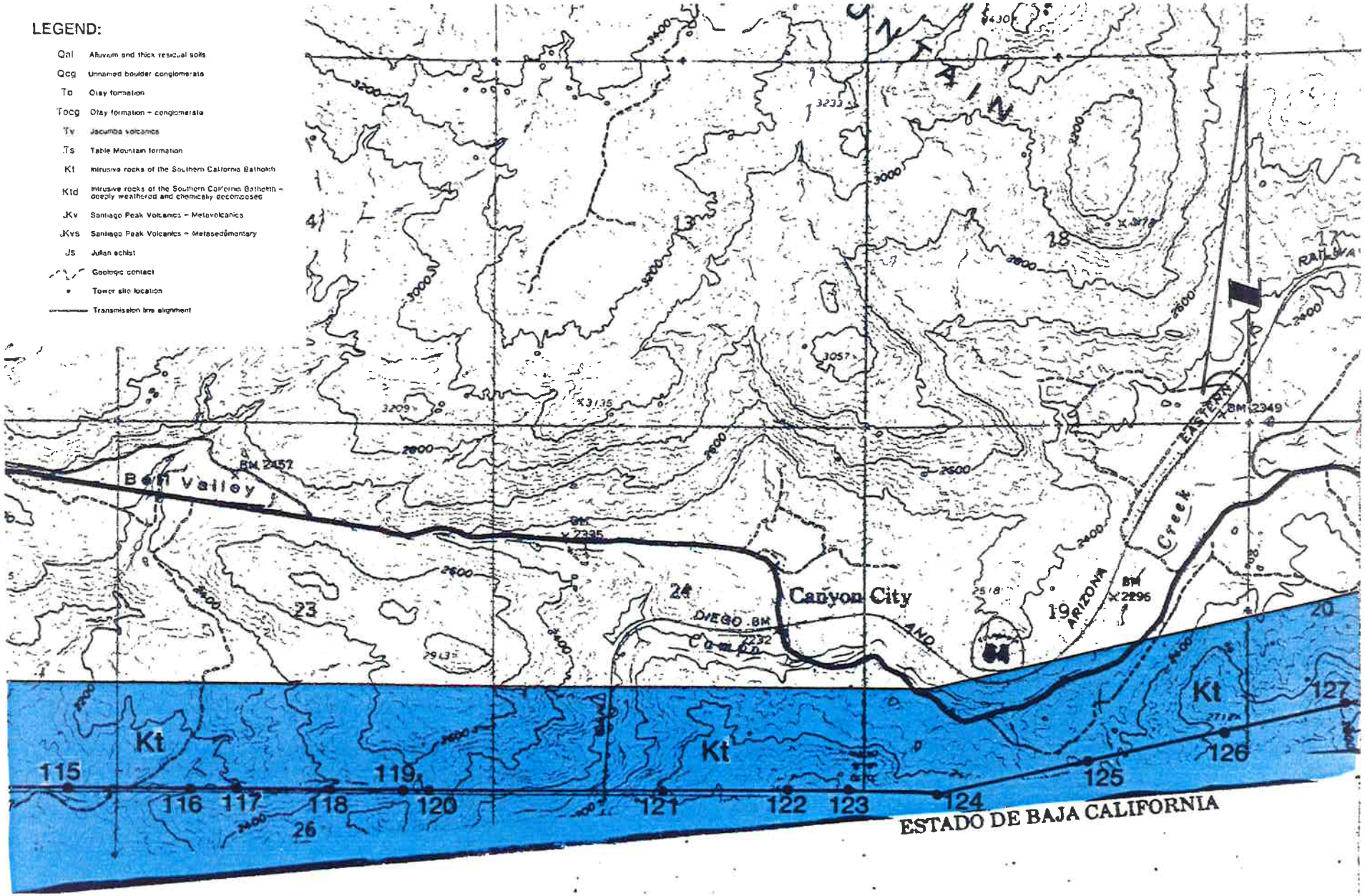
WOODWARD-CLYDE CONSULTANTS

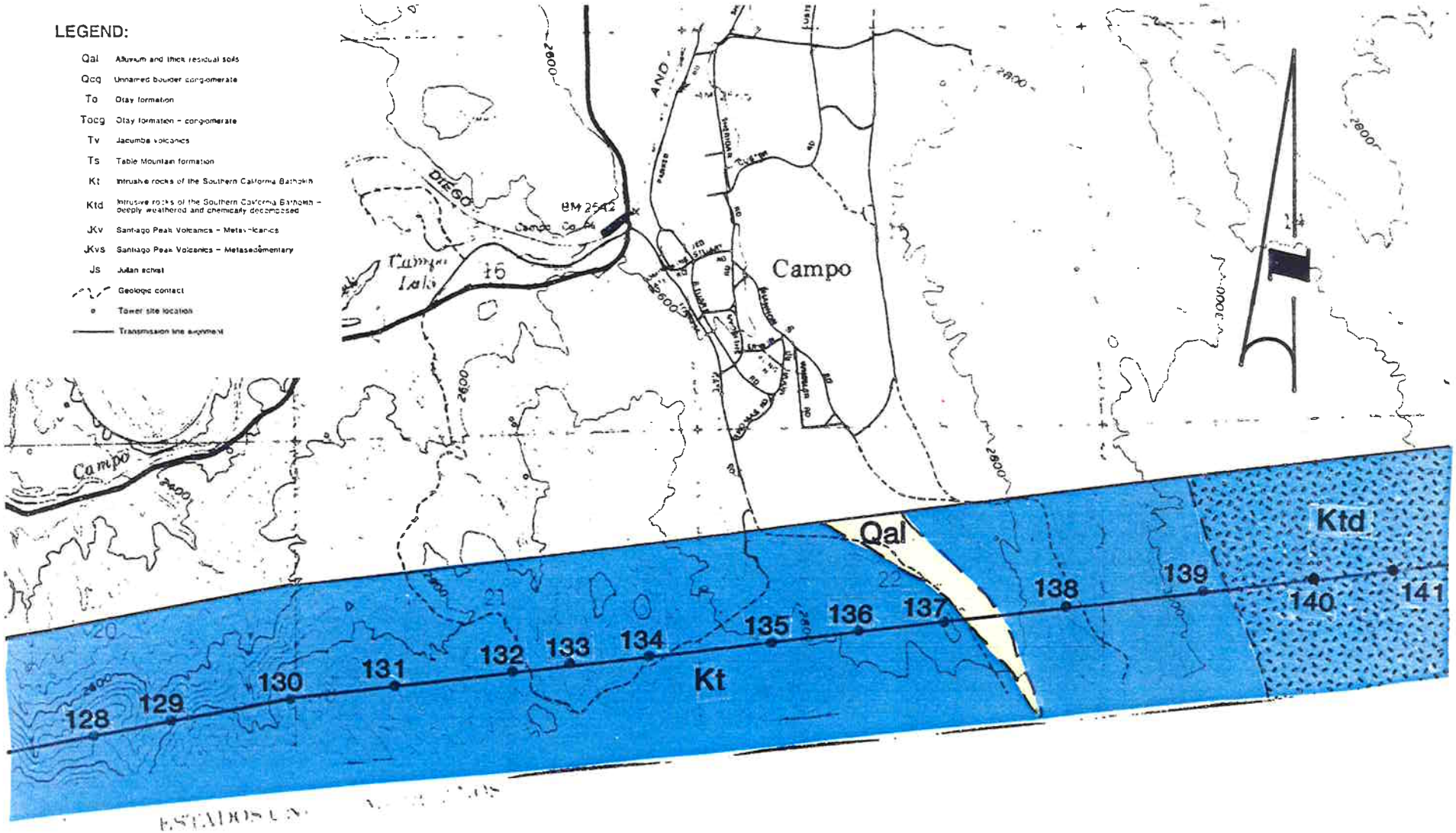


SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP
MIGUEL - IMPERIAL VALLEY 500 KV LINE

DRAWN BY: mrk	CHECKED BY:	PROJECT NO: 59125S-TST1	DATE: 1-29-80	FIGURE NO: 3.9

WOODWARD-CLYDE CONSULTANTS



SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP MIGUEL - IMPERIAL VALLEY 500 KV LINE				
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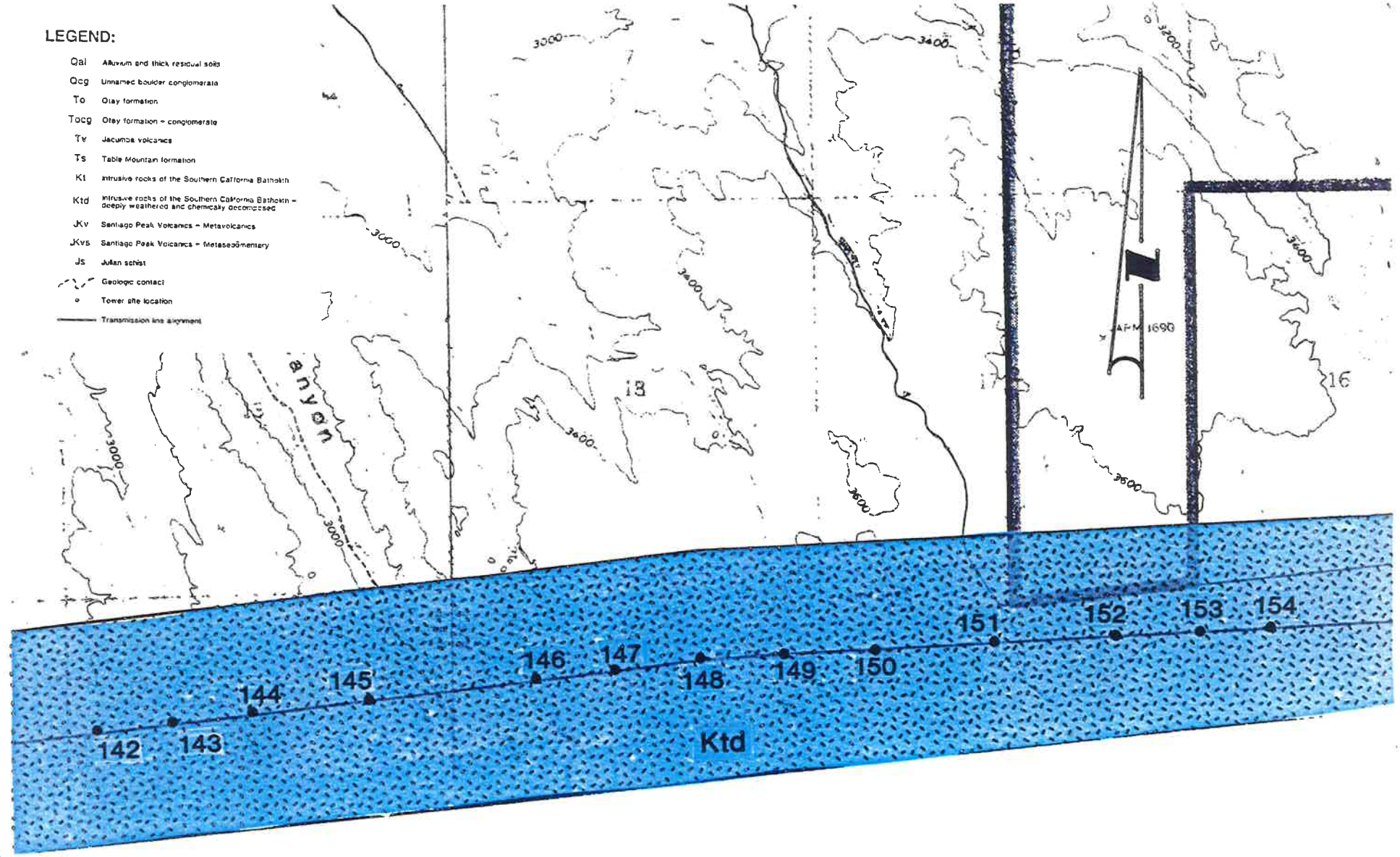
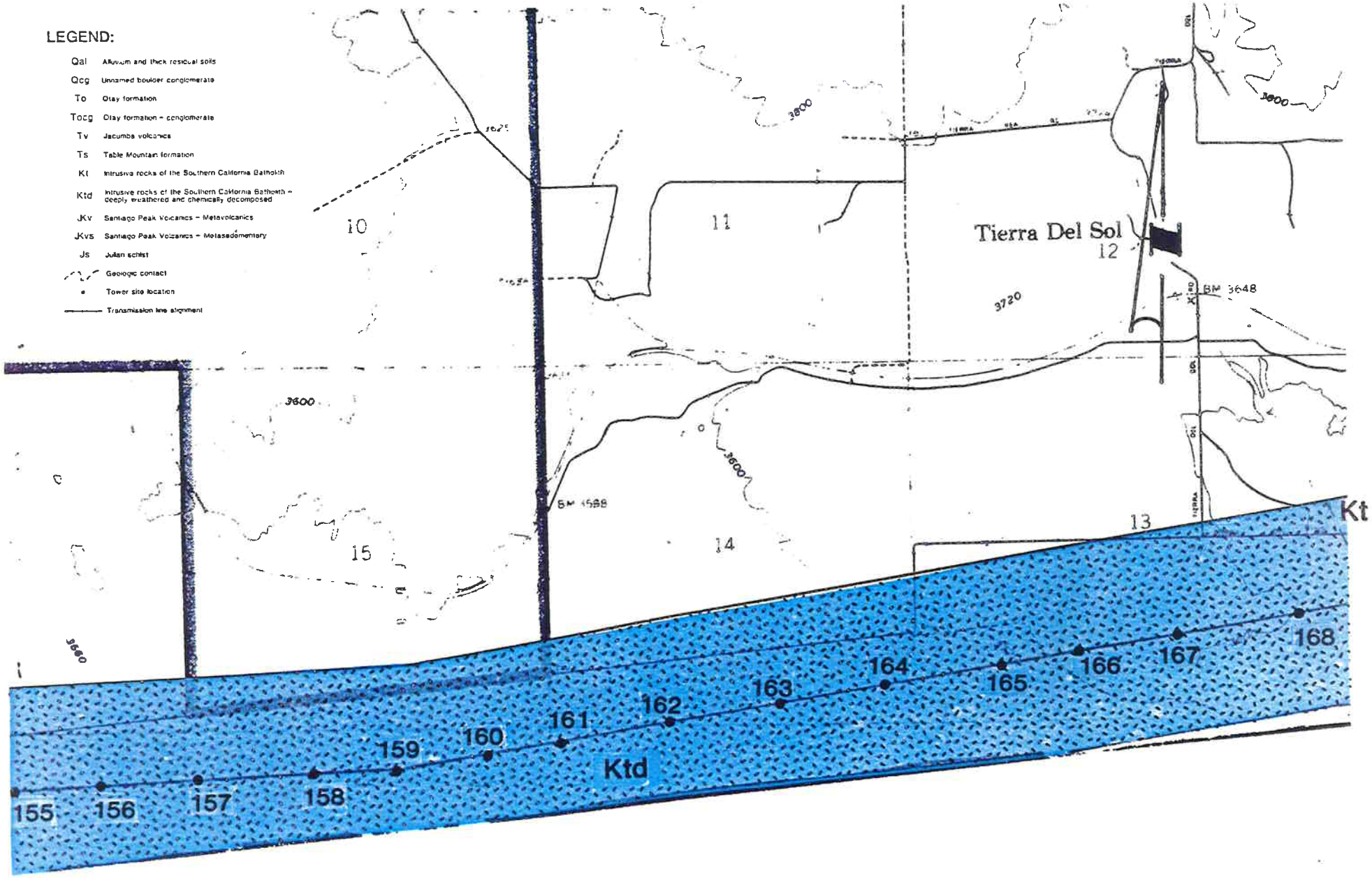


SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP
MIGUEL - IMPERIAL VALLEY 500 KV LINE

DRAWN BY: mrk	CHECKED BY:	PROJECT NO: 59125S-TST1	DATE: 1-29-80	FIGURE NO: 3.11

WOODWARD-CLYDE CONSULTANTS

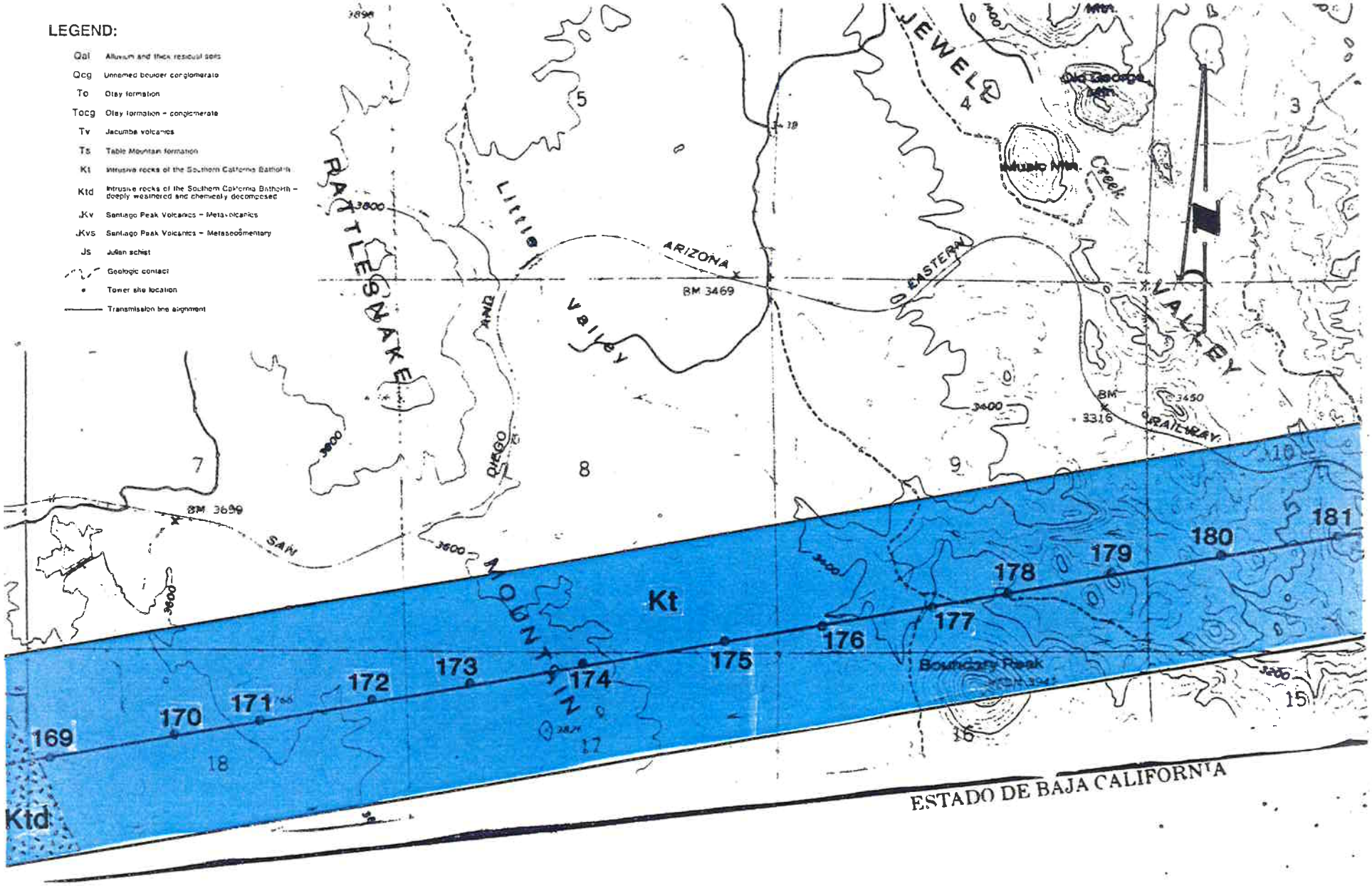


SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP
MIGUEL - IMPERIAL VALLEY 500 KV LINE

DRAWN BY: mrk	CHECKED BY:	PROJECT NO: 59125S-TST1	DATE: 1-29-80	FIGURE NO: 3.12

WOODWARD CLYDE CONSULTANTS

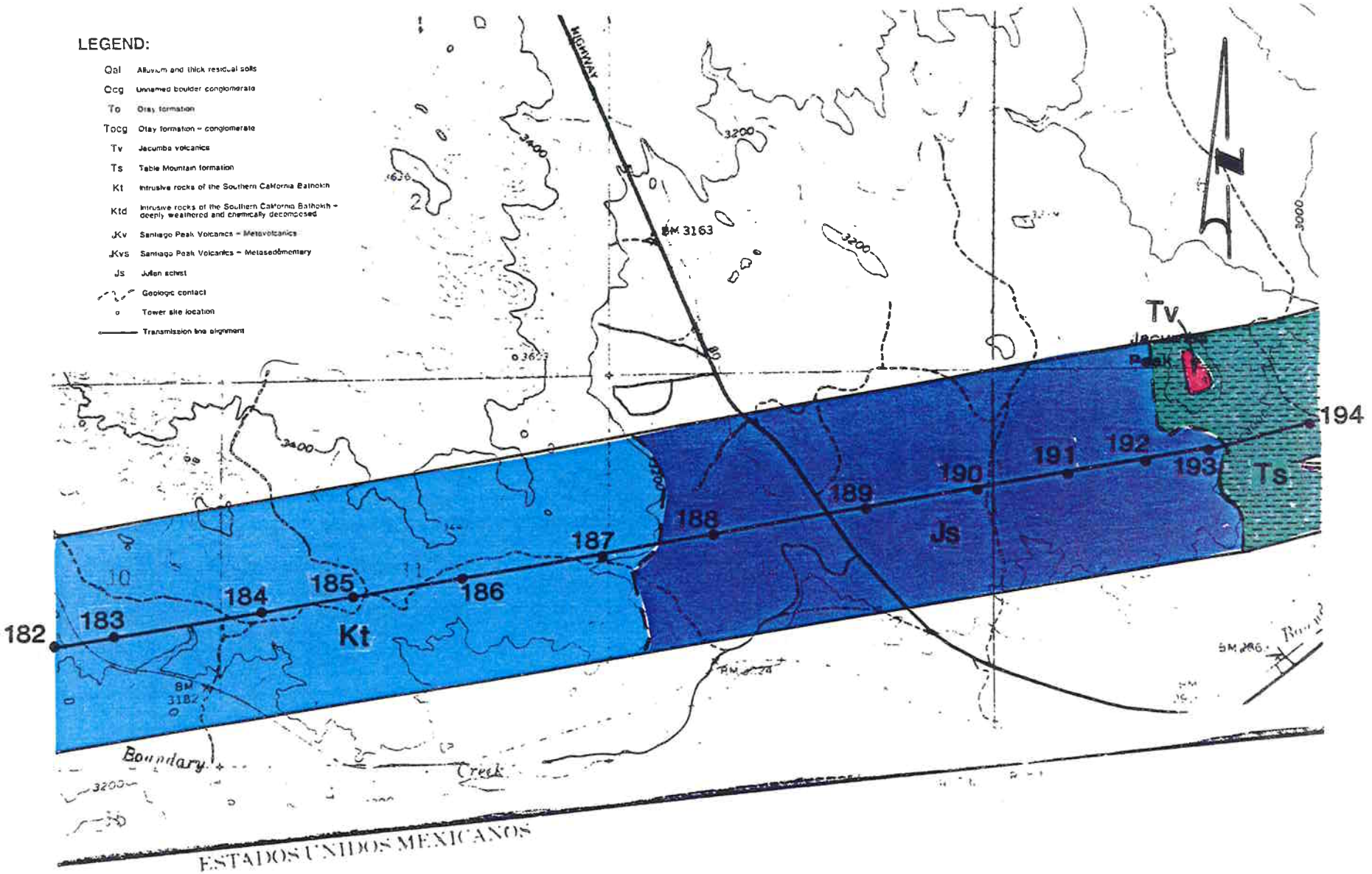


SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP
MIGUEL - IMPERIAL VALLEY 500 KV LINE

DRAWN BY: mrk	CHECKED BY:	PROJECT NO: 59125S-TST1	DATE: 1-29-80	FIGURE NO: 3.13

WOODWARD CLYDE CONSULTANTS

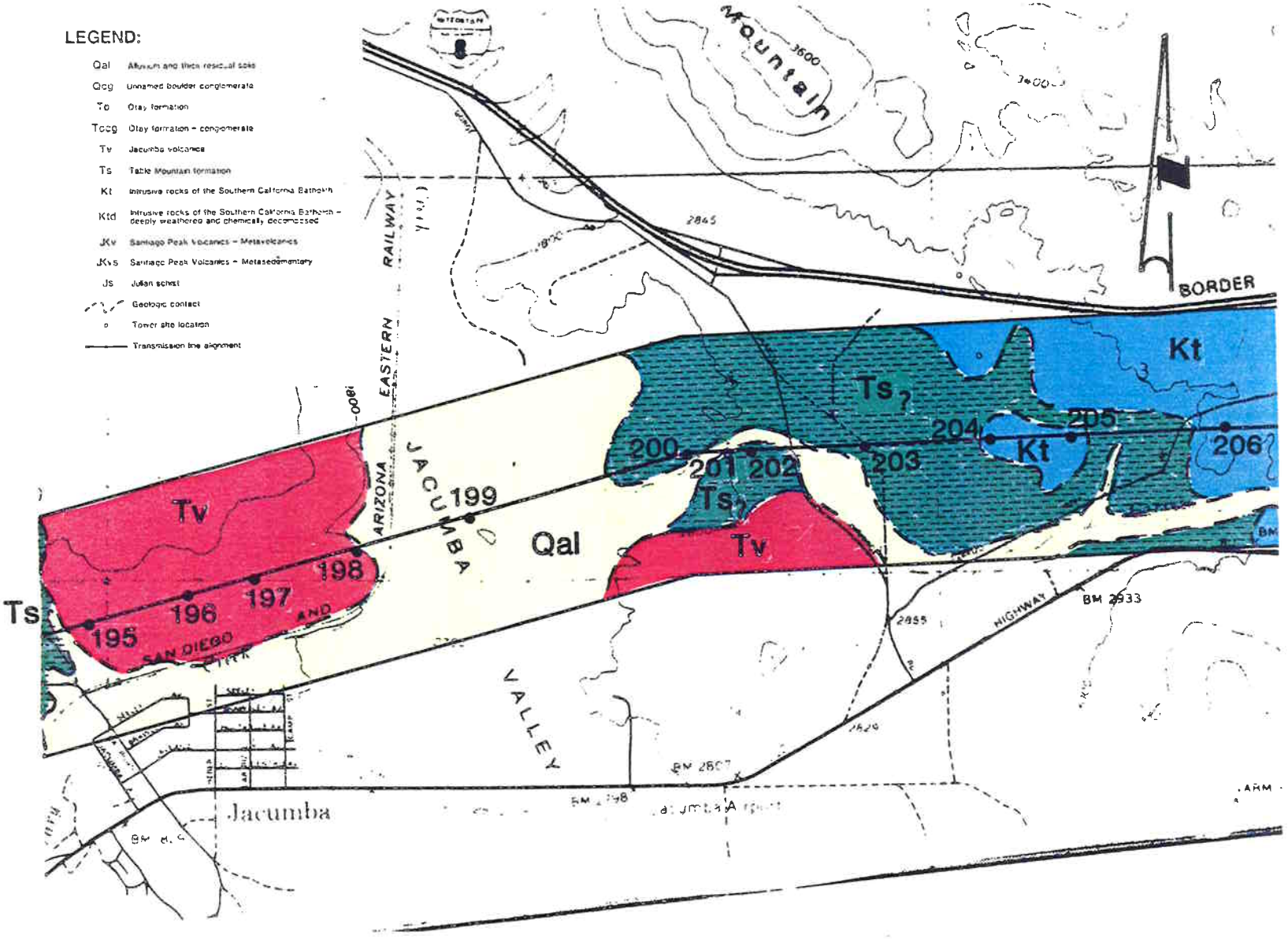


SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP
MIGUEL - IMPERIAL VALLEY 500 KV LINE

DRAWN BY: mrk	CHECKED BY:	PROJECT NO: 59125S-TST1	DATE: 1-29-80	FIGURE NO: 3.14

WOODWARD-CLYDE CONSULTANTS



SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP MIGUEL - IMPERIAL VALLEY 500 KV LINE				
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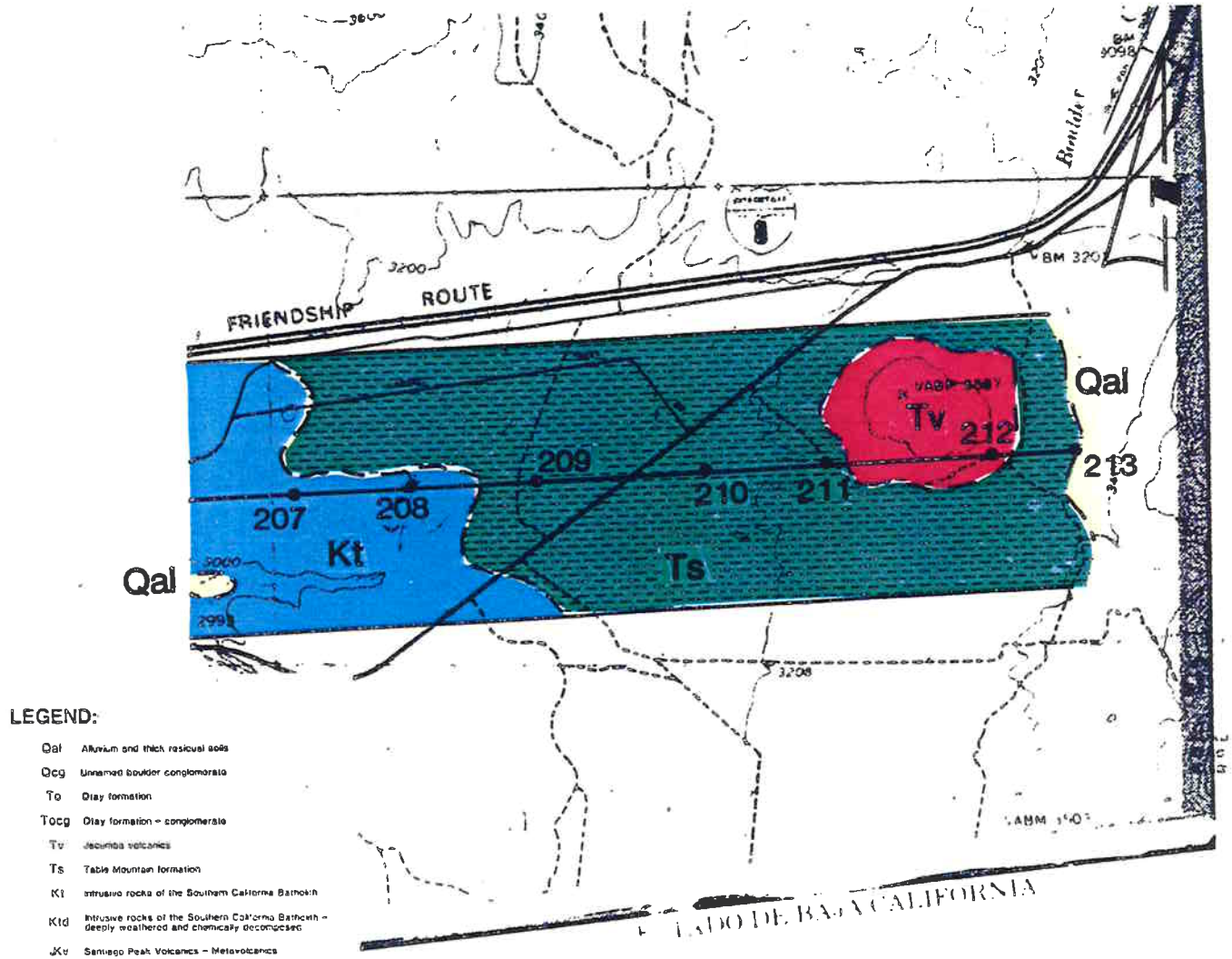
WOODWARD-CLYDE CONSULTANTS



LEGEND:

Qal	Alluvium and thick residual soils
Qcg	Unnamed boulder conglomerate
To	Otay formation
Tocg	Otay formation – conglomerate
Tv	Jacumba volcanics
Ts	Table Mountain formation
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Ktd	Intrusive rocks of the Southern California Batholith – deeply weathered and chemically decomposed
JKv	Santiago Peak Volcanics – Metavolcanics
JKvs	Santiago Peak Volcanics – Metasedimentary
Js	Julian schist
	Geologic contact
	Tower site location
	Transmission line alignment

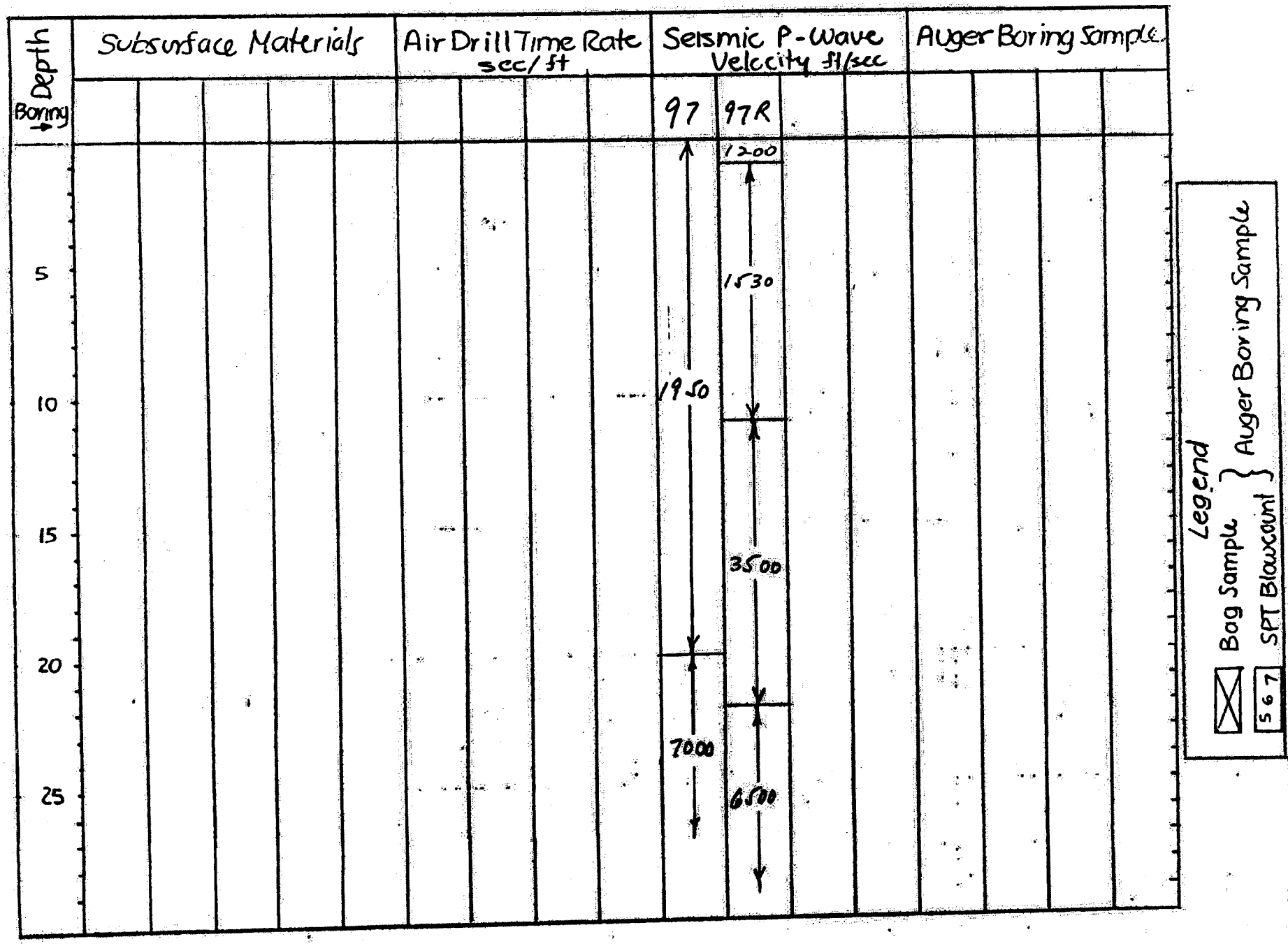
SCALE: 1" = 2000'

SOIL / ROCK ZONE MAP
MIGUEL - IMPERIAL VALLEY 500 KV LINE

DRAWN BY: mrk	CHECKED BY:	PROJECT NO: 59125S-TST1	DATE: 1-29-80	FIGURE NO: 3.16

WOODWARD-CLYDE CONSULTANTS

SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 193



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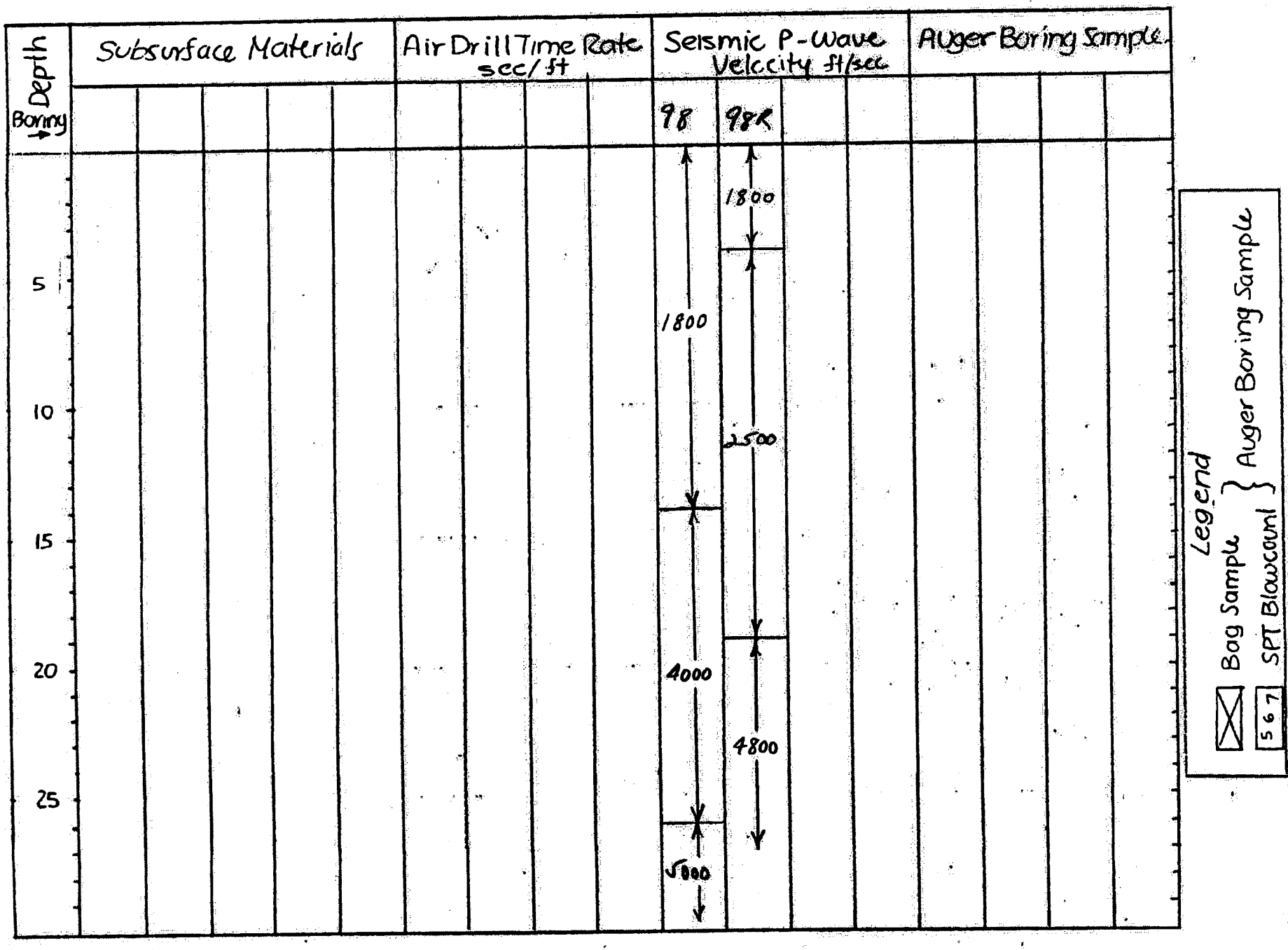
SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 194



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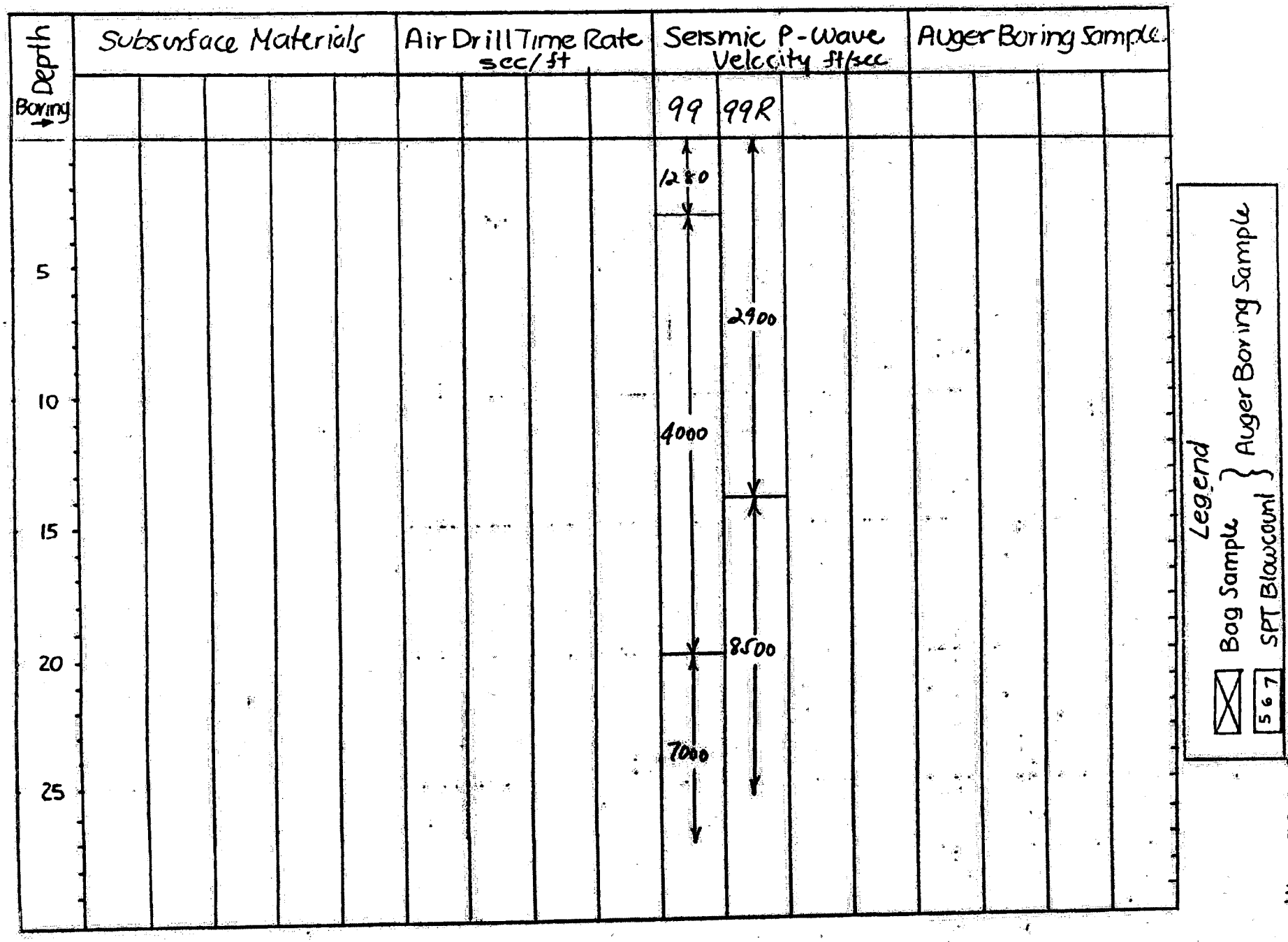

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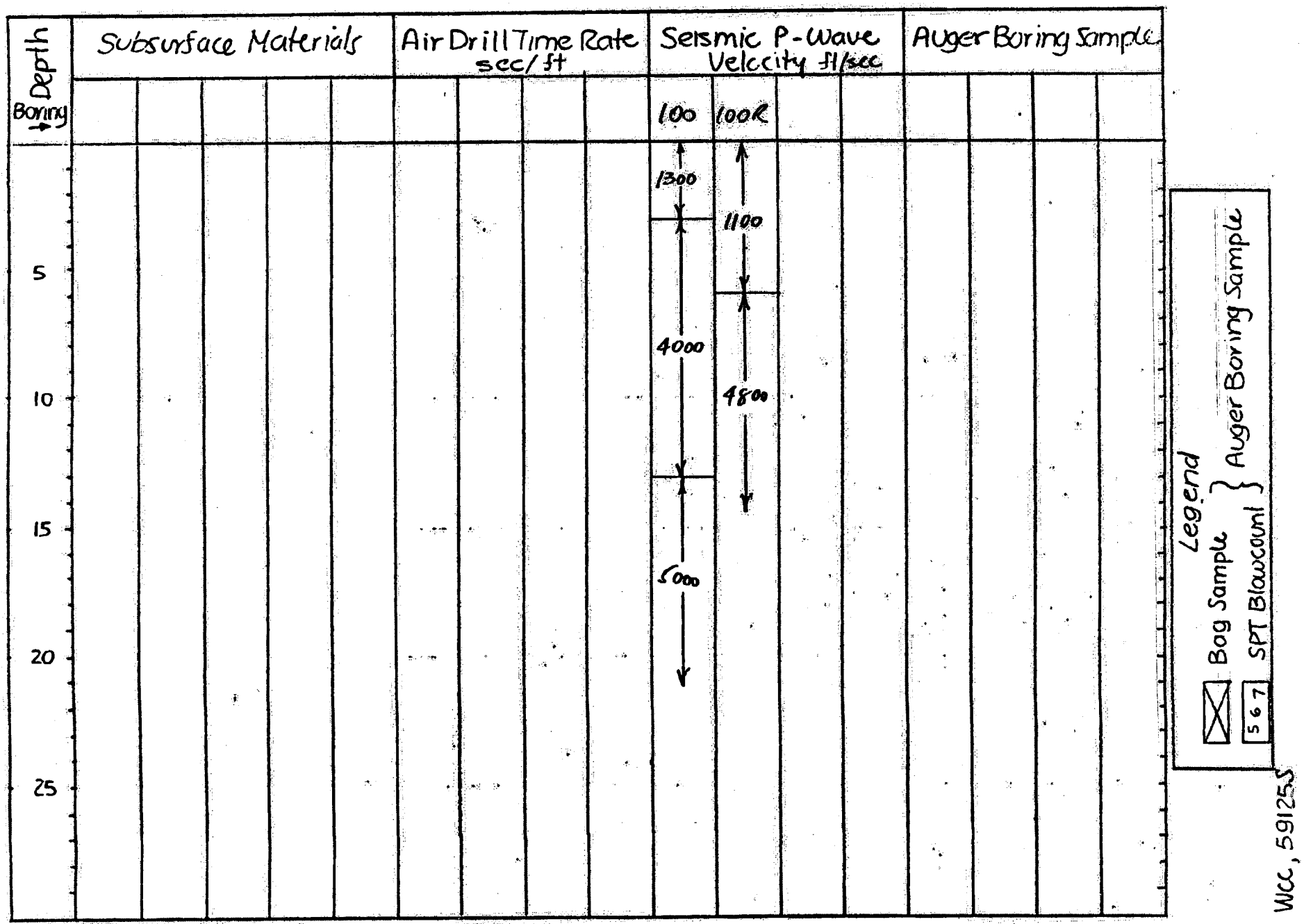
SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 197



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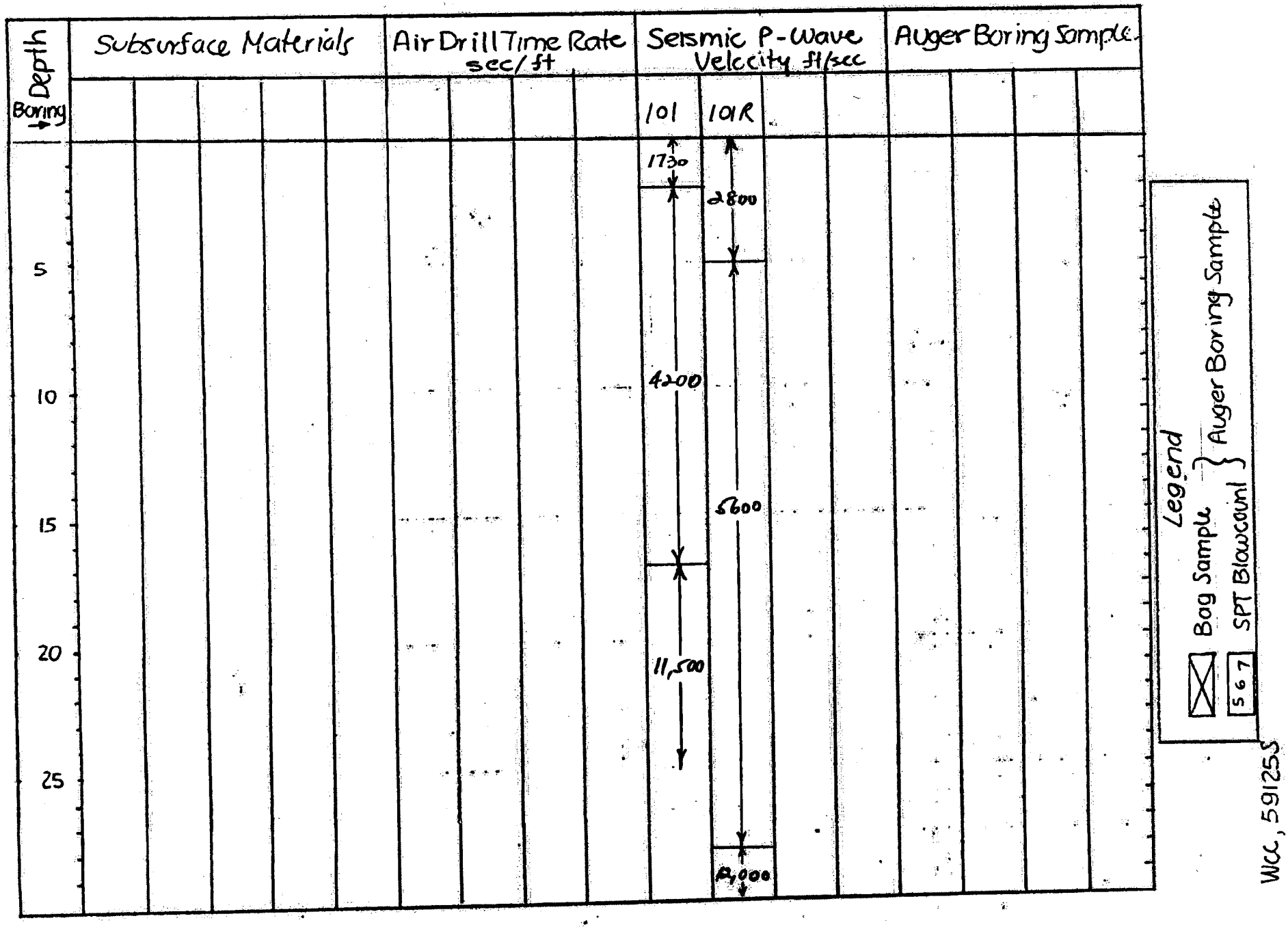

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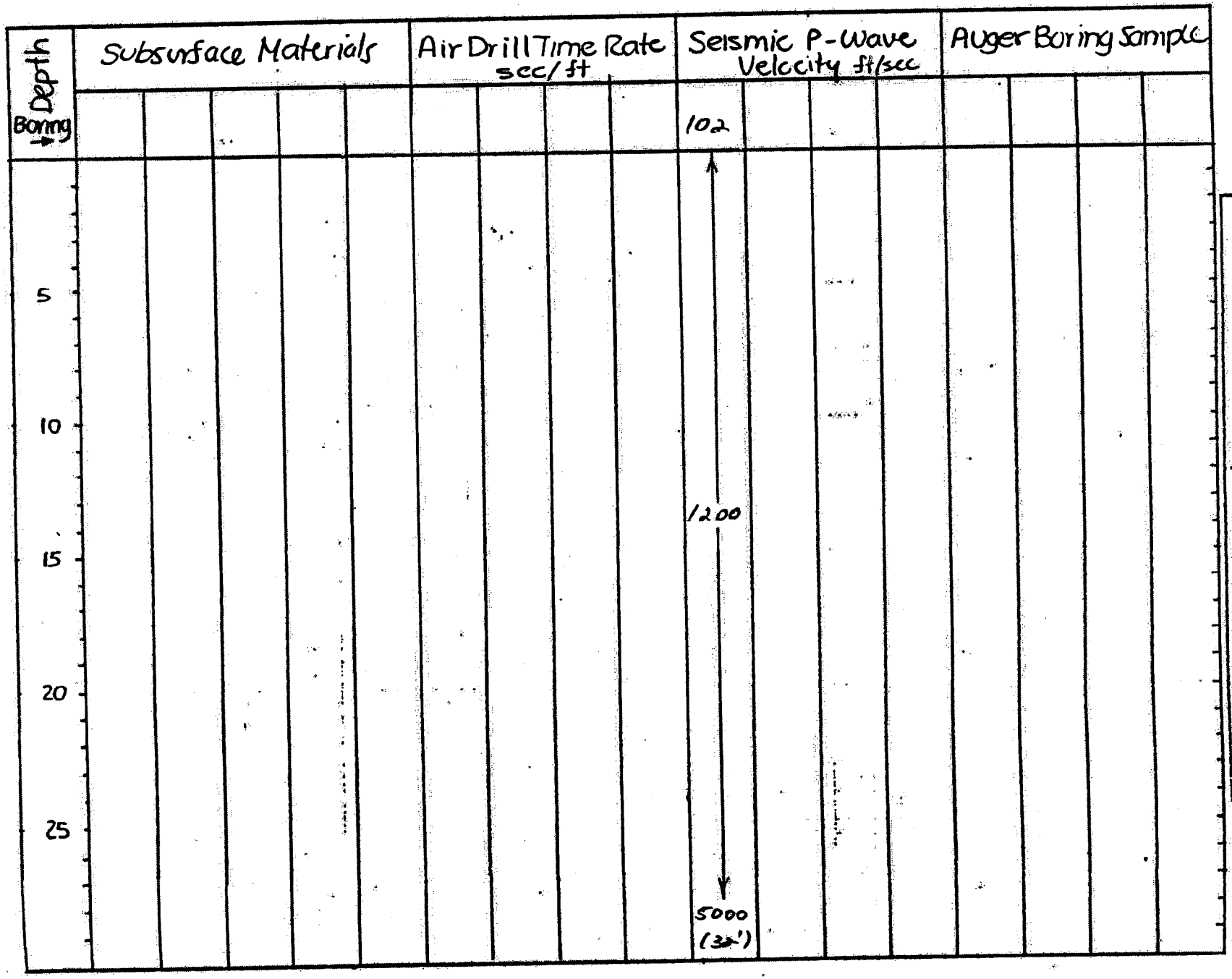
SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 199



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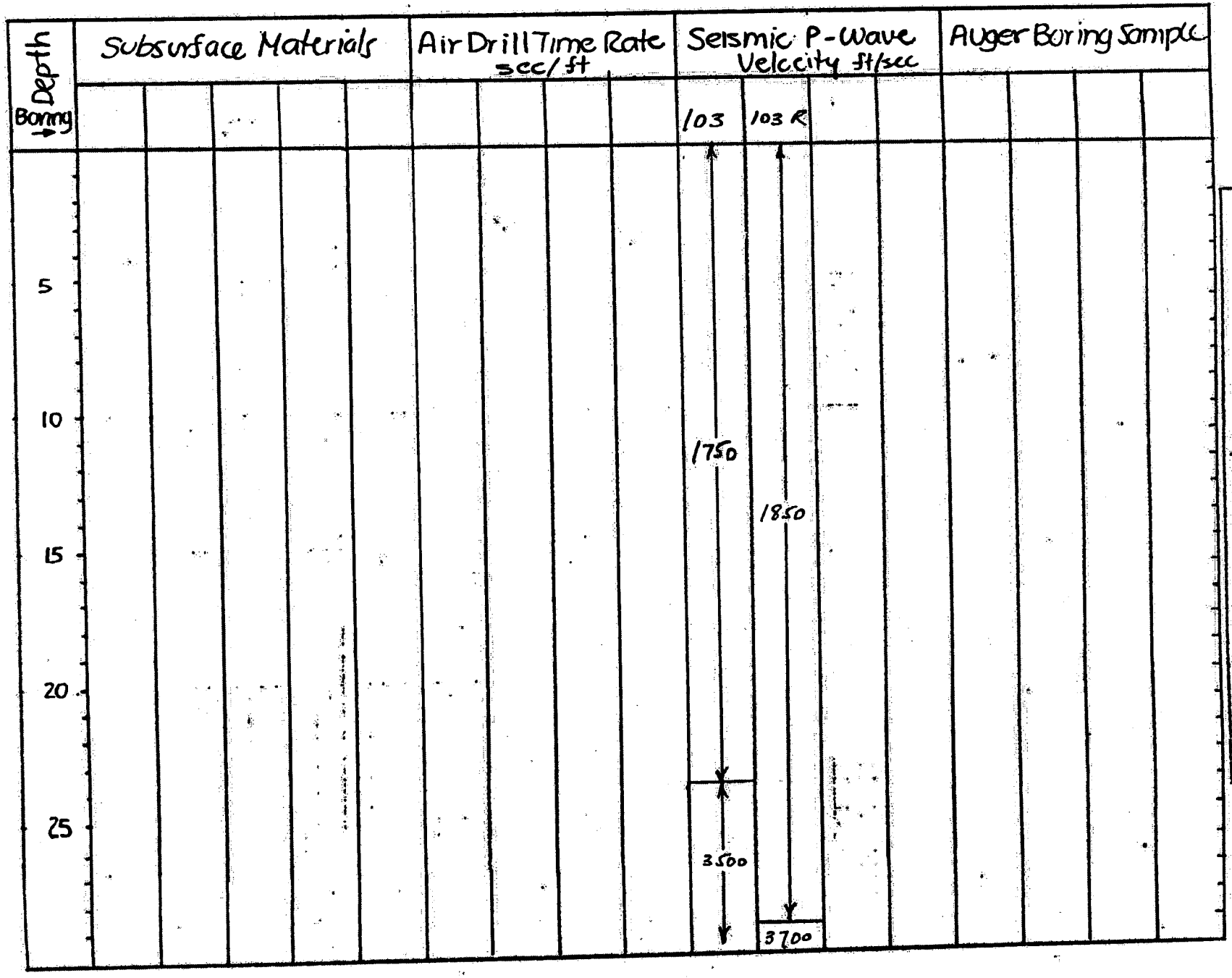
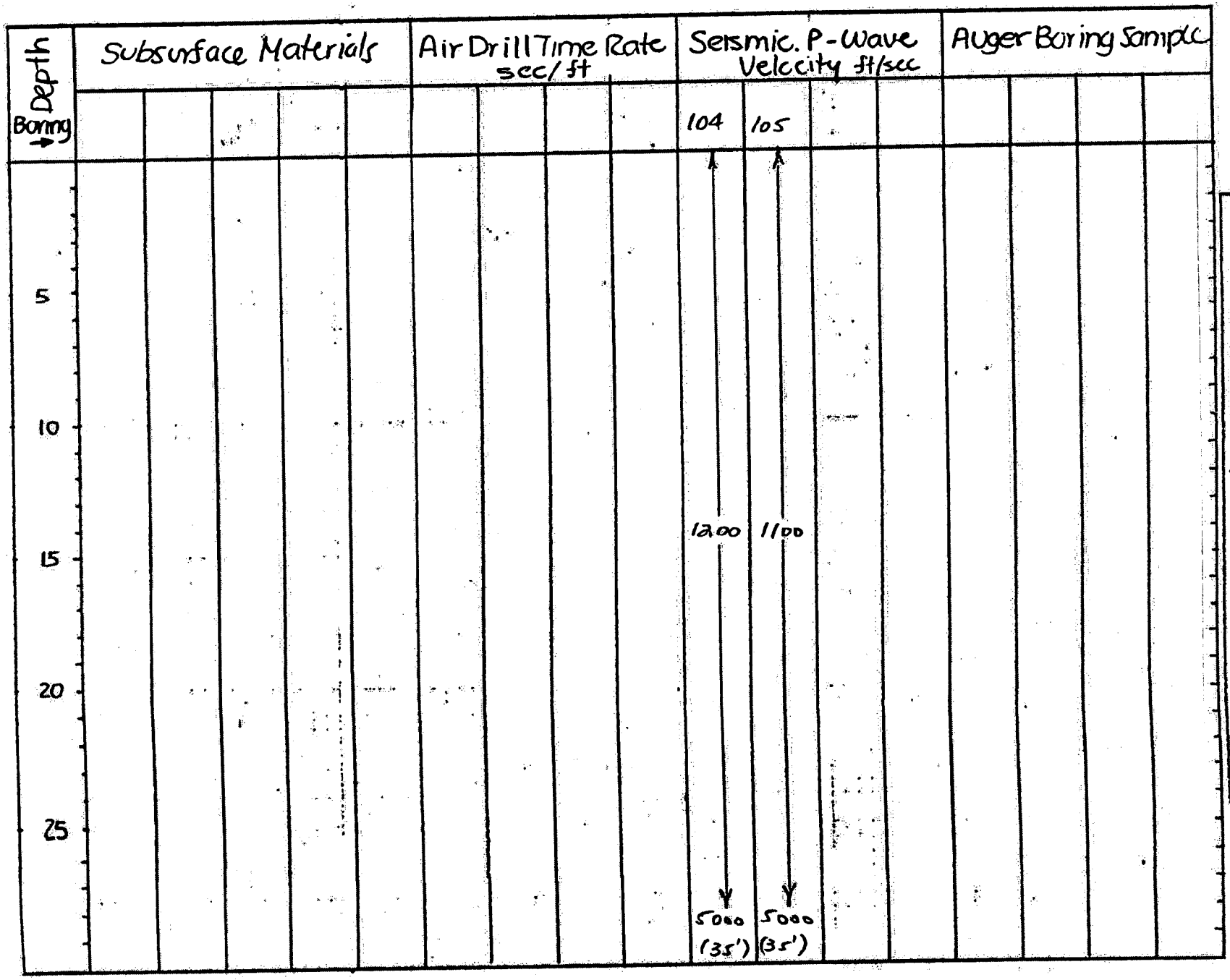
SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 200



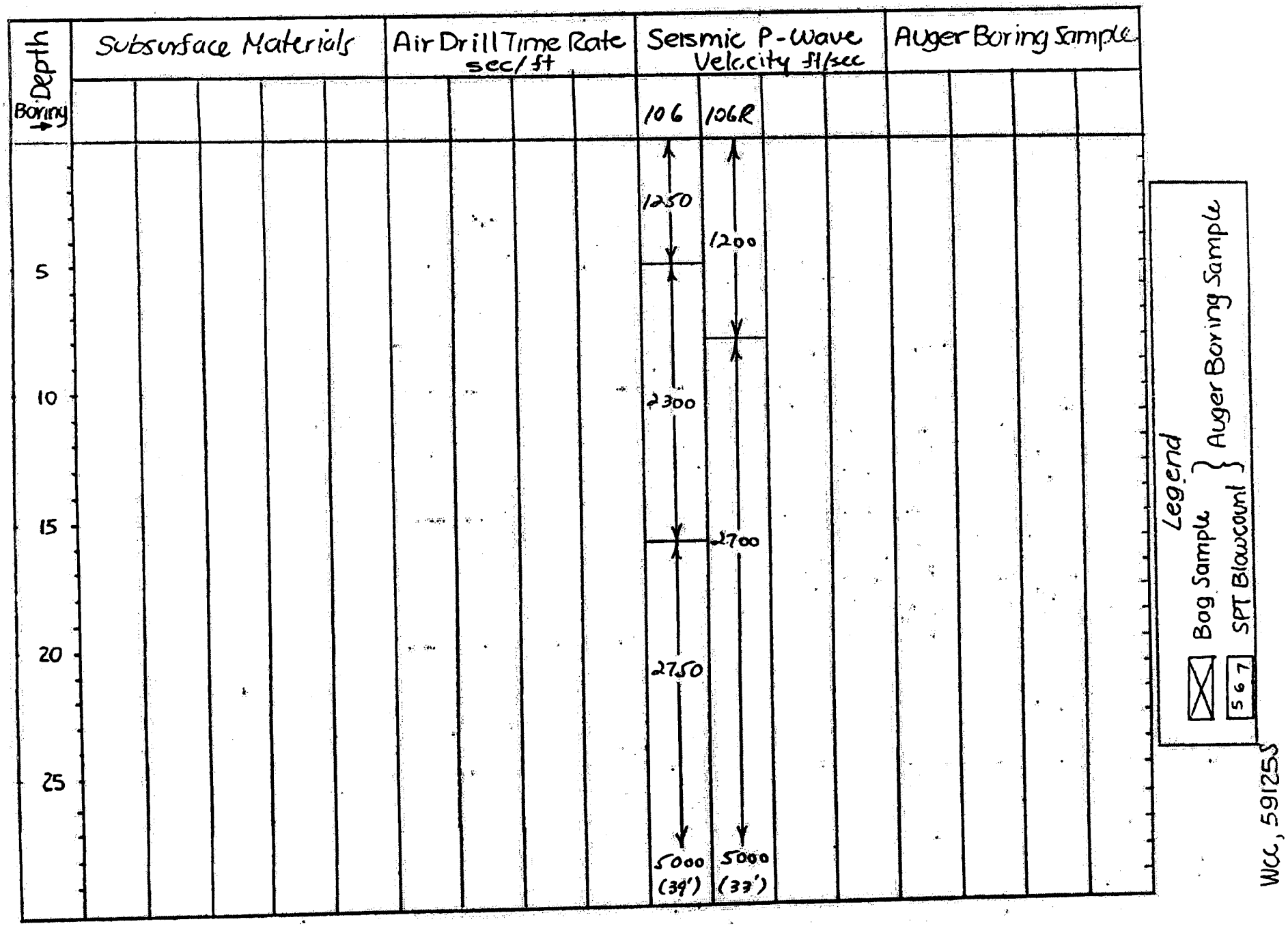
WCC, 591253

SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 201

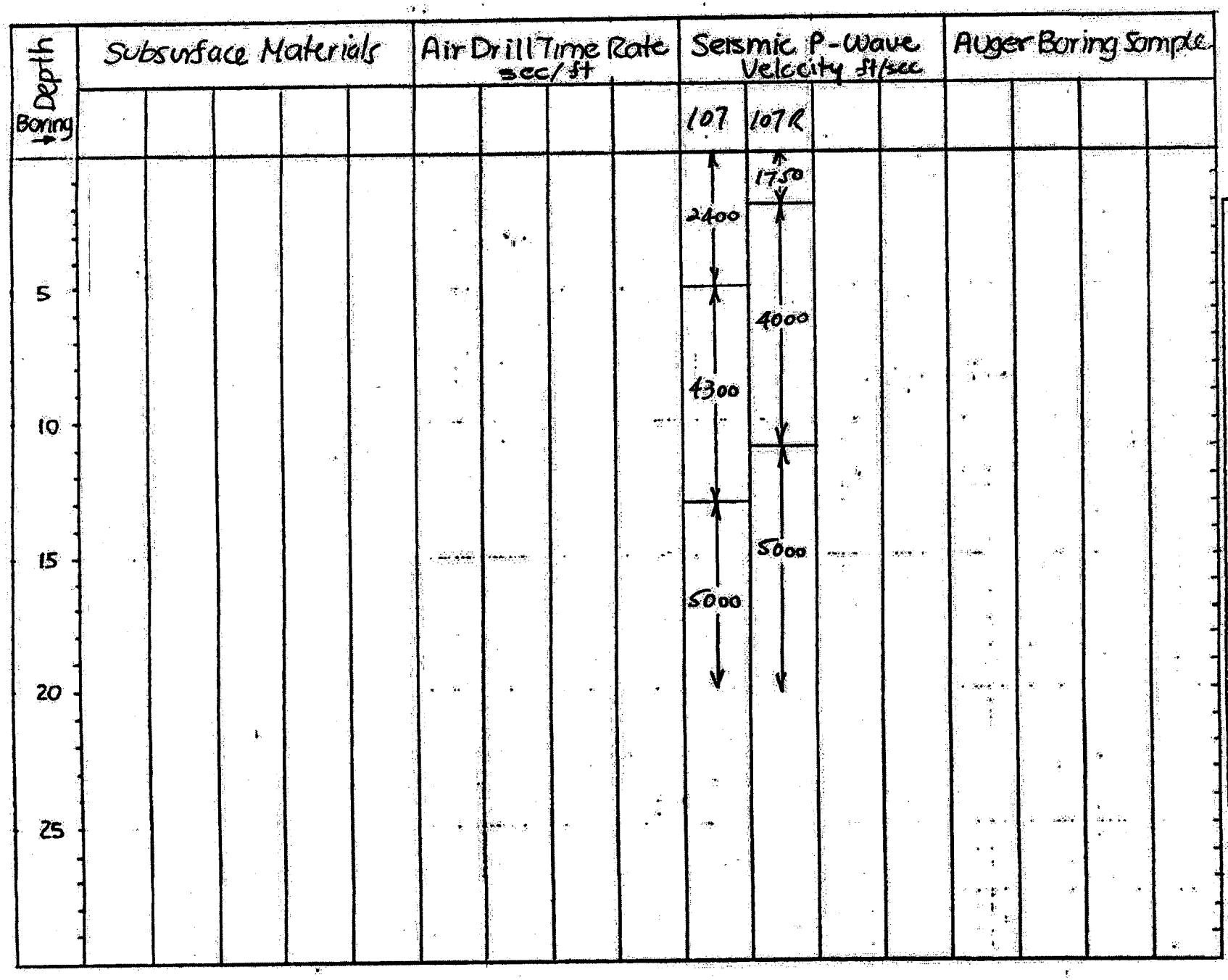


WCC, 591253

SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 203

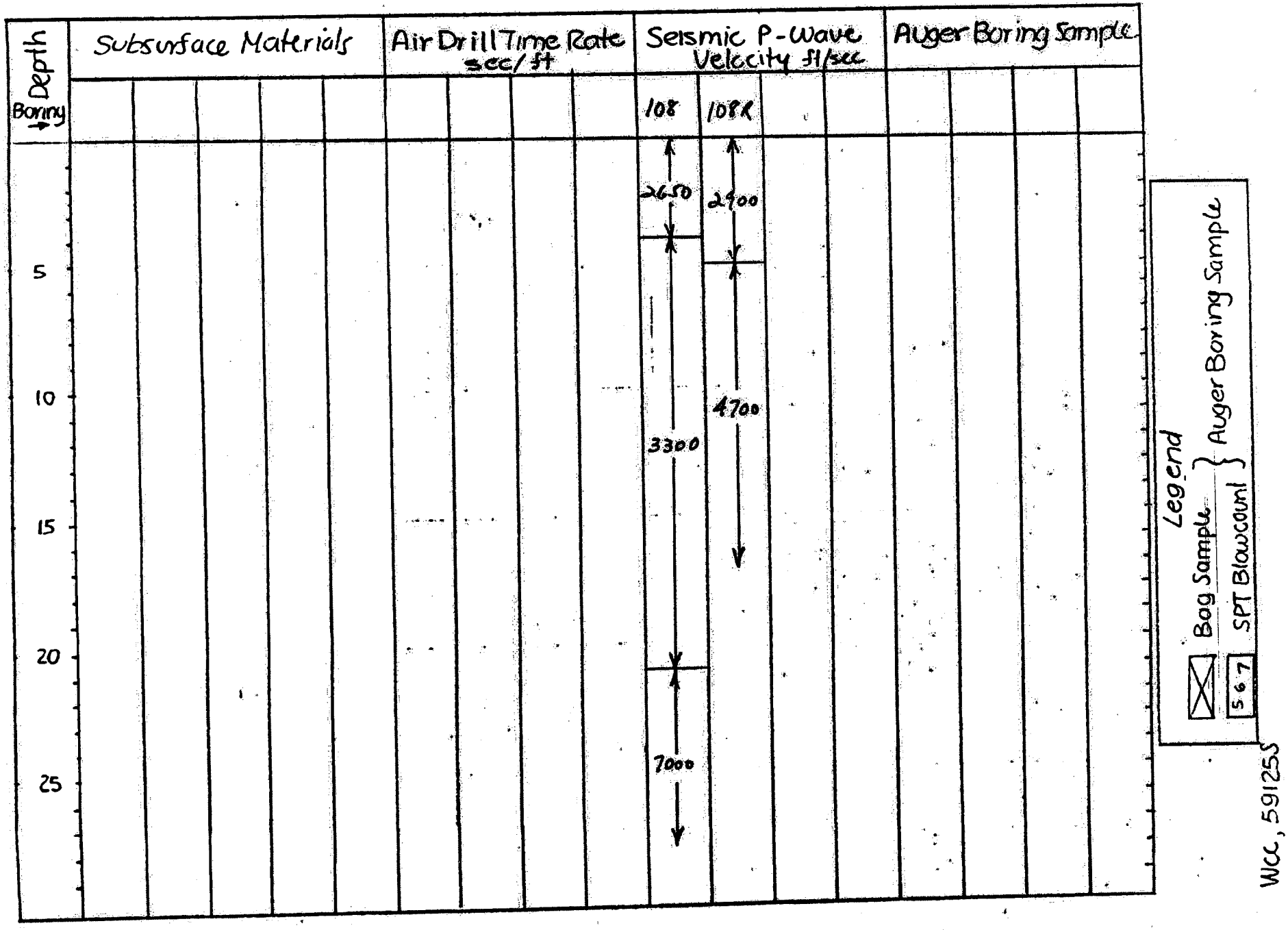


SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 204



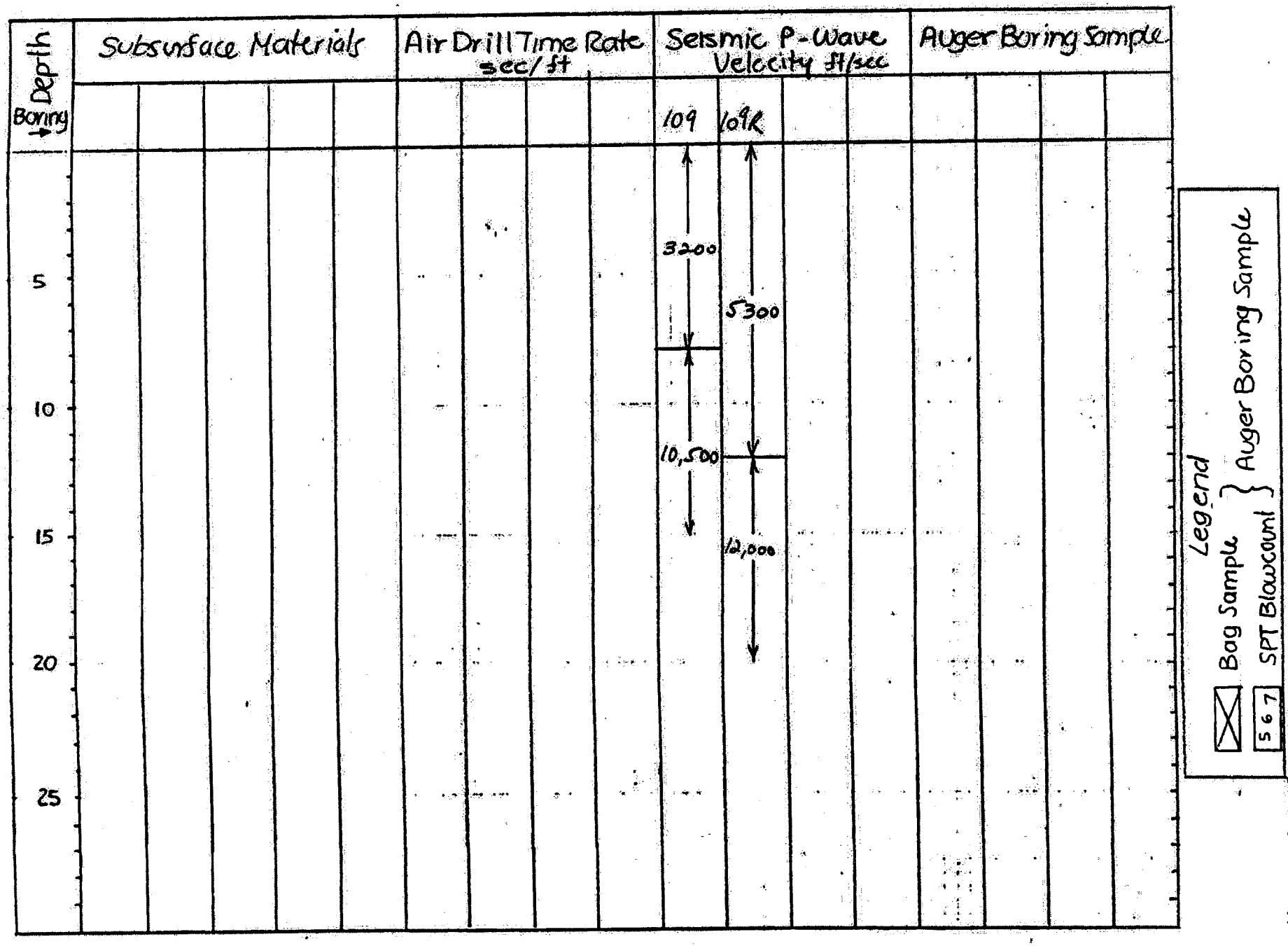
WCC, 591255

SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 205



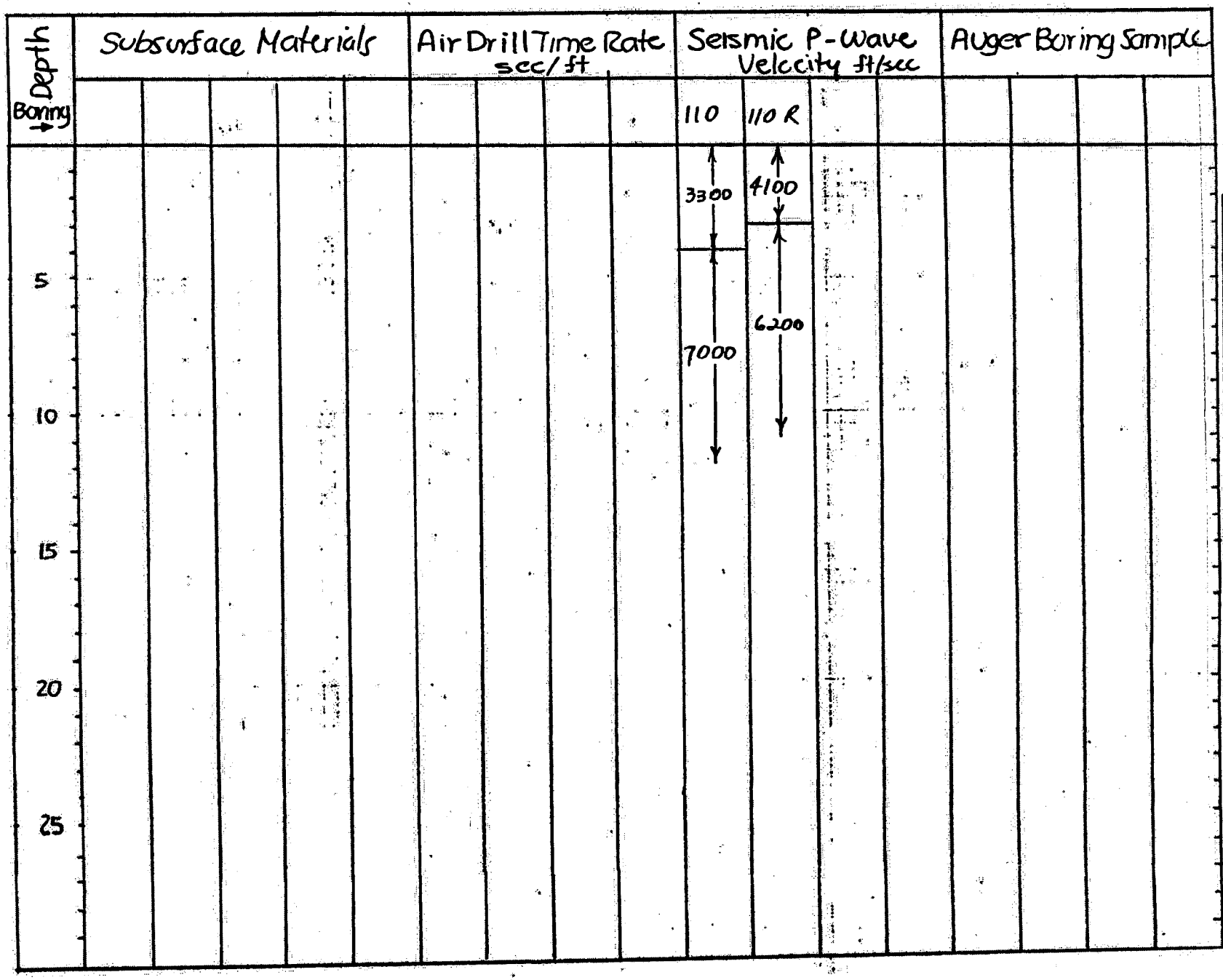
WCC, 591255

SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 206



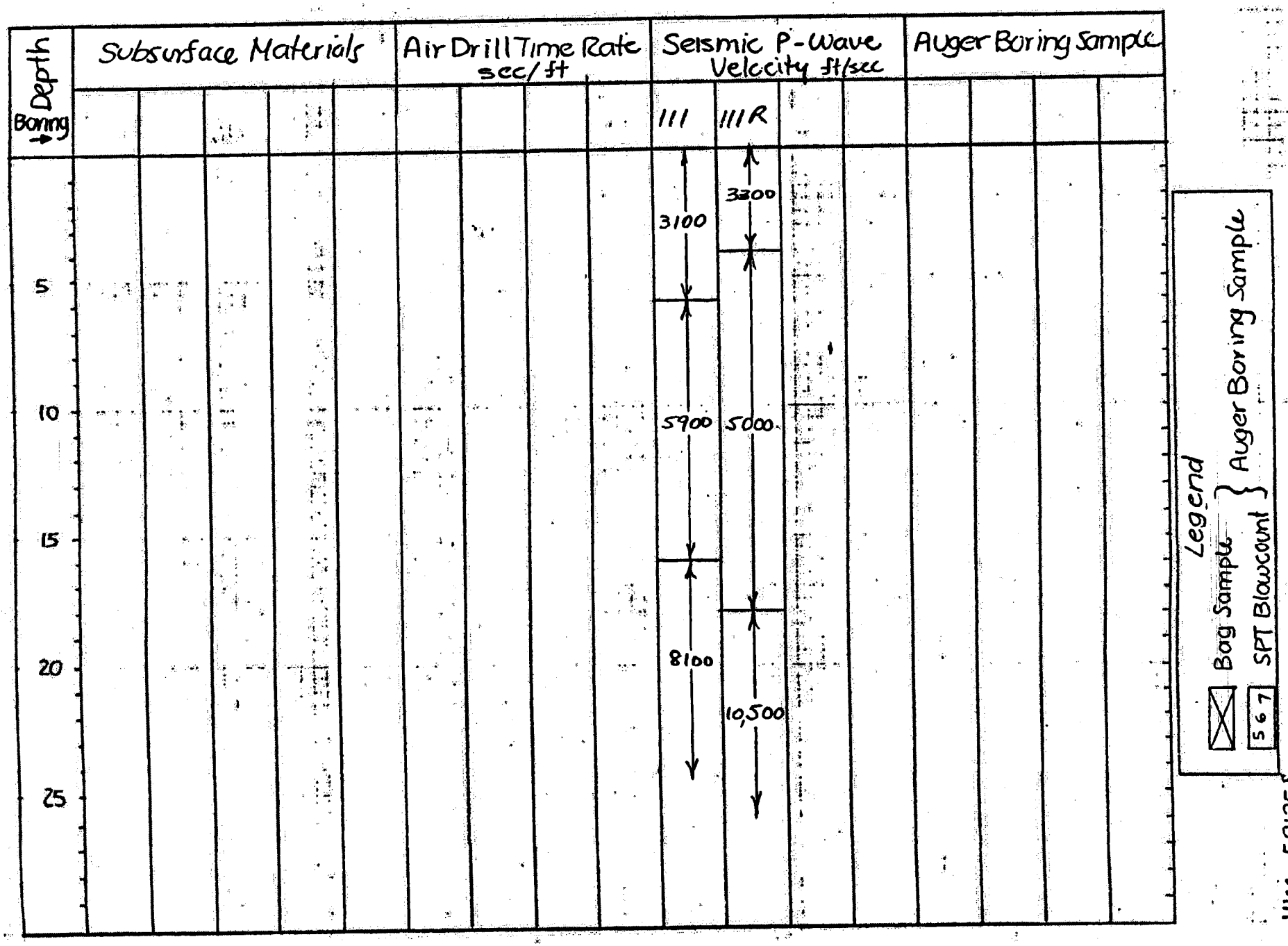
WCC, 59125

SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 207



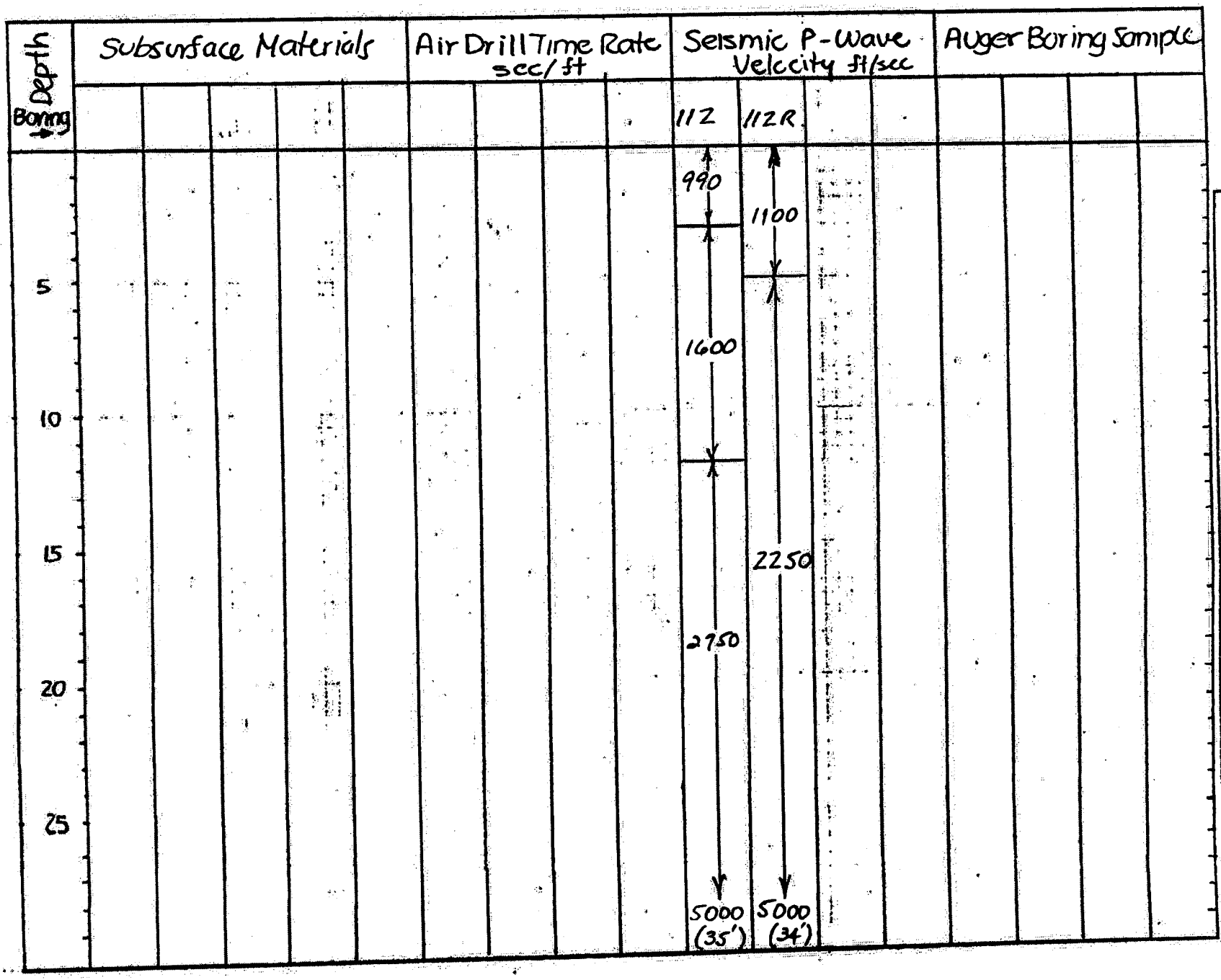
WCC, 59125

SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 208



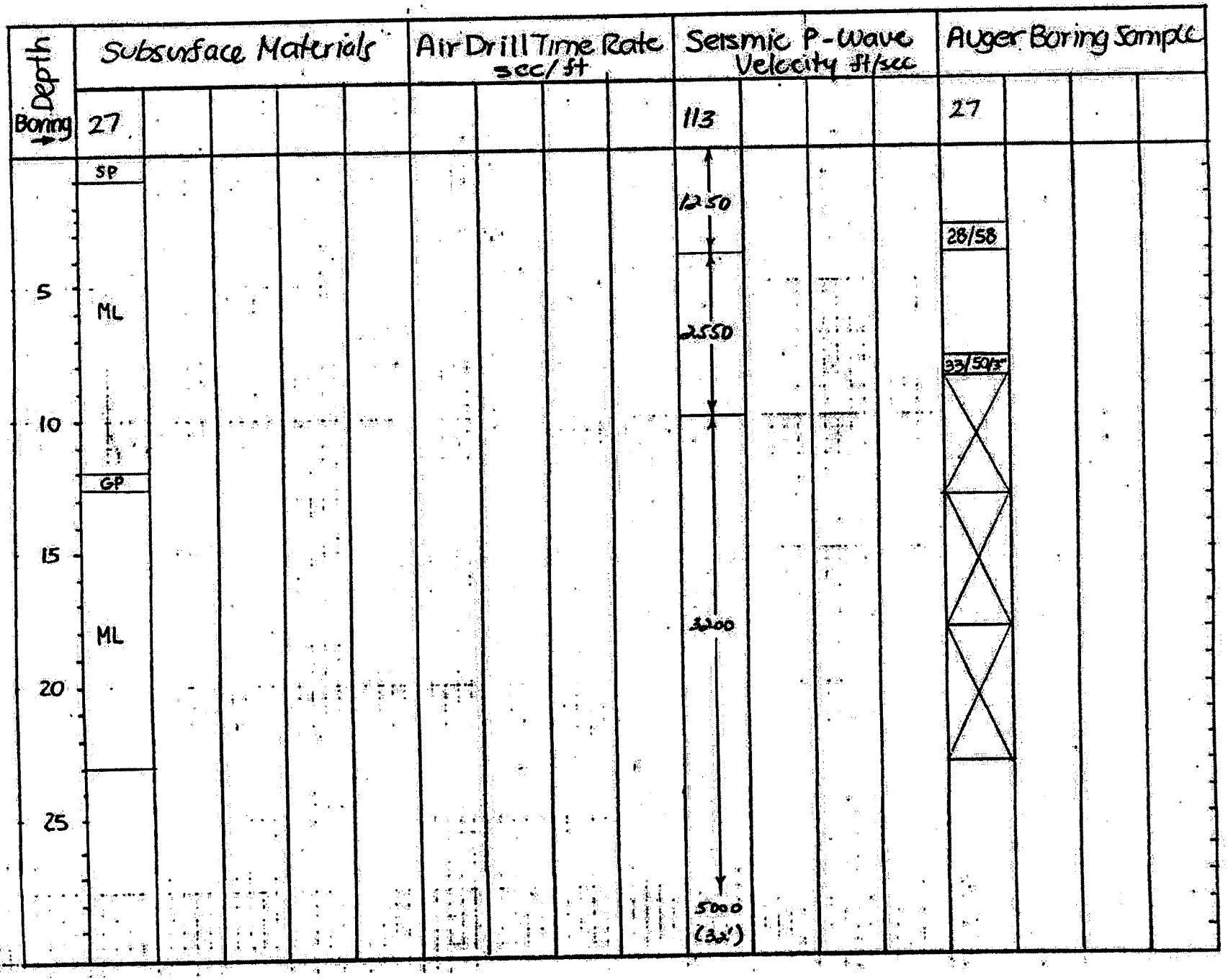
WCC, 59125

SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 209



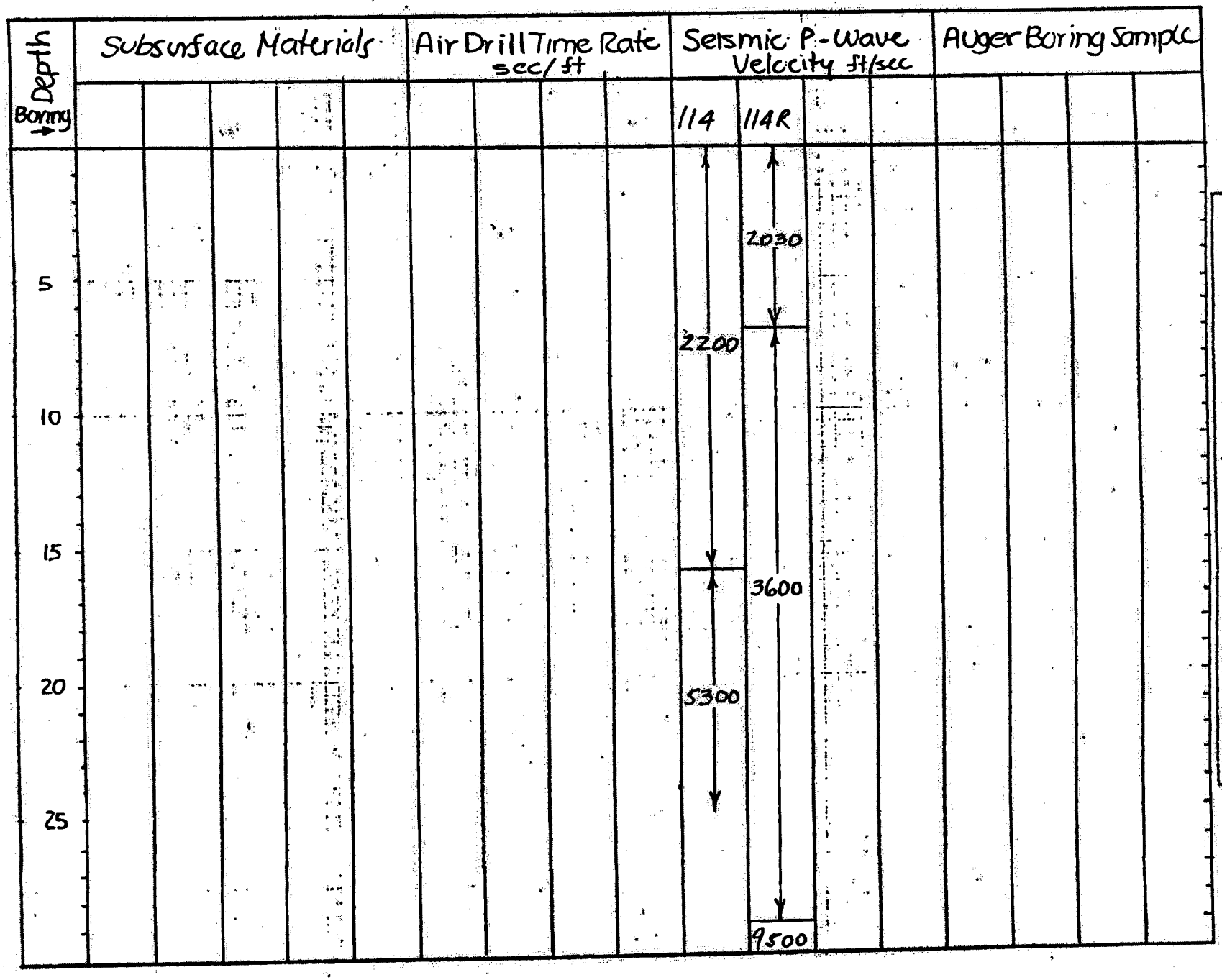
WCC, 591255

SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 210



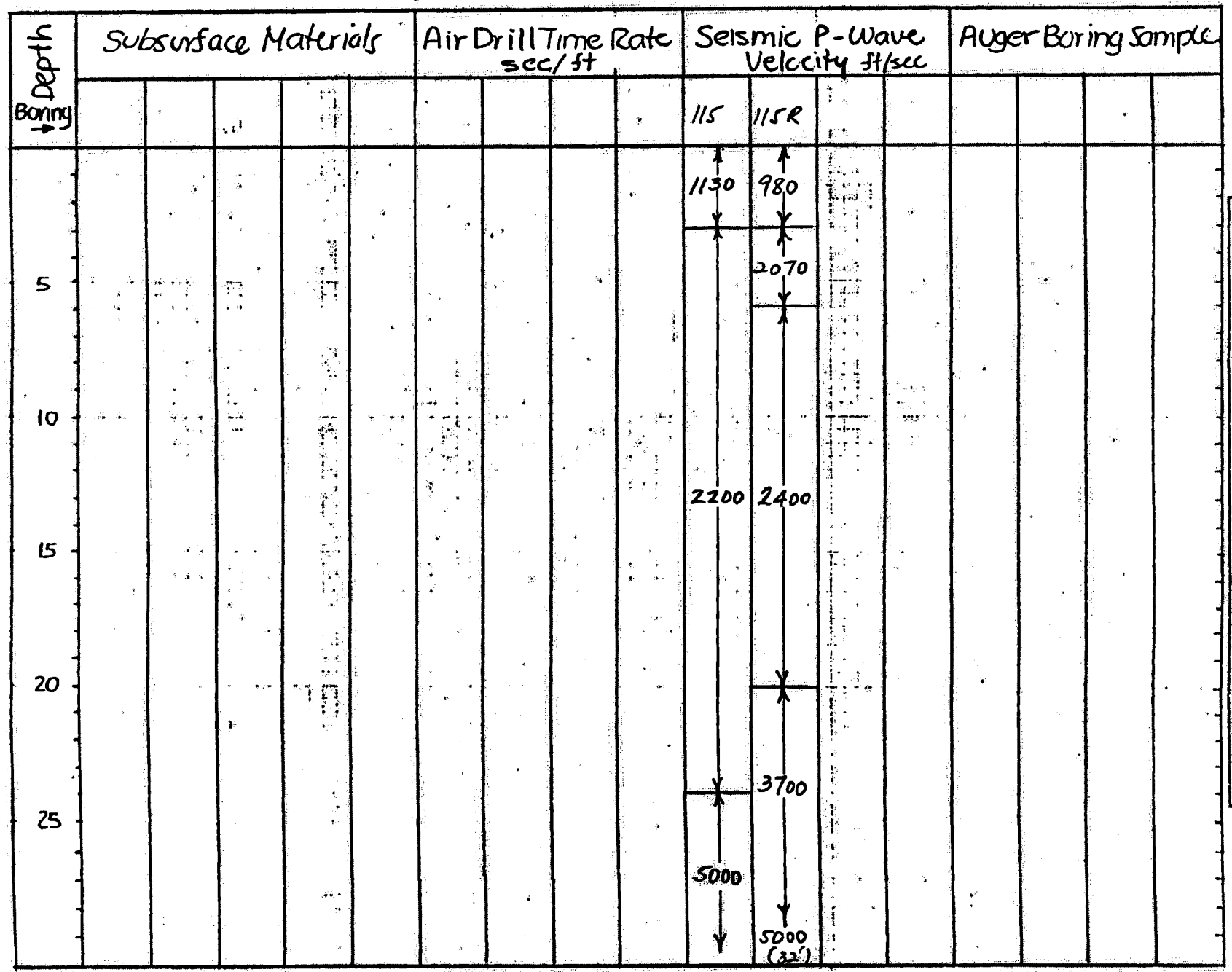
WCC, 591255

SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 211



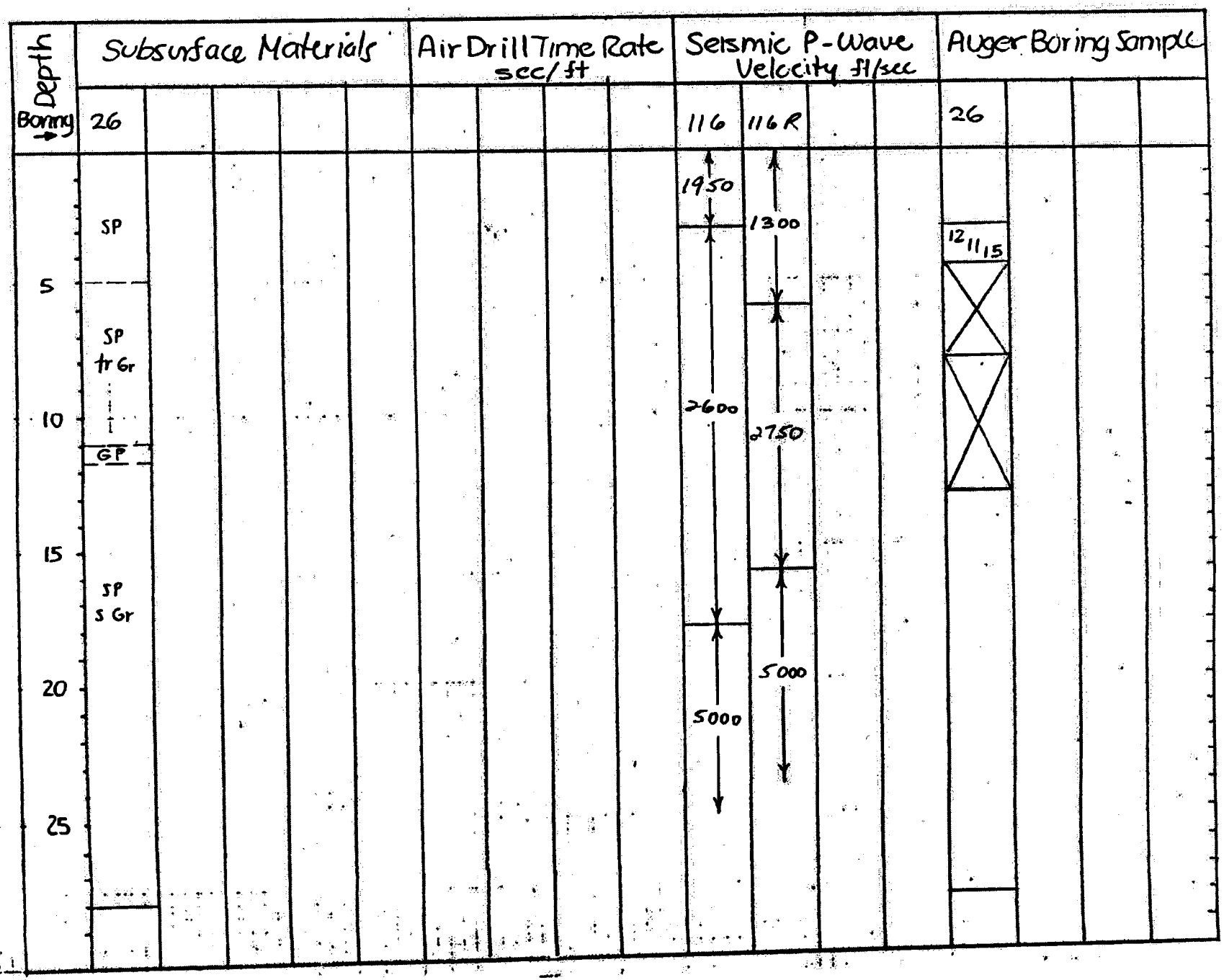
WCC, 59125S

SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 2/2



WCC, 59125S

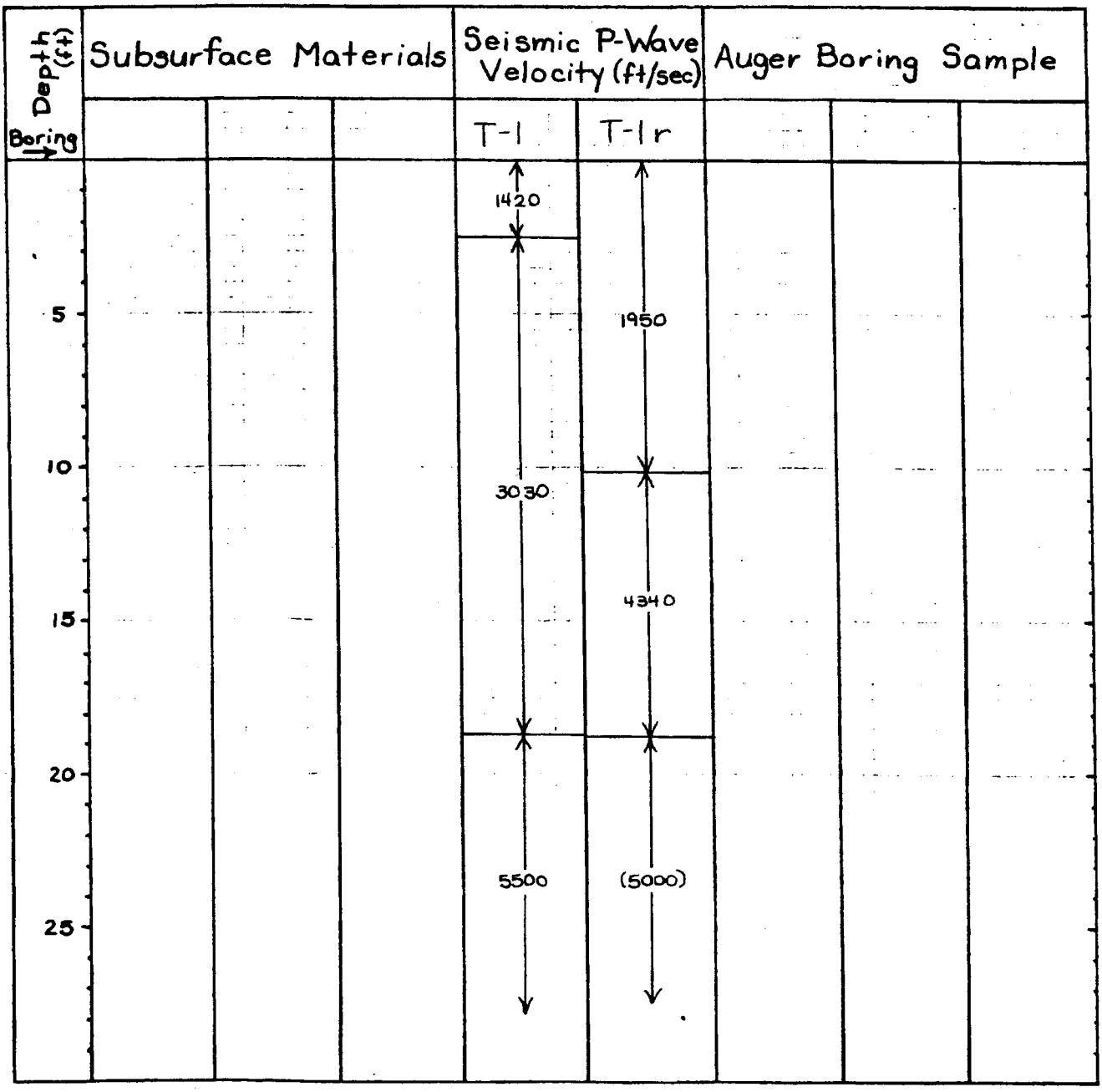
SUBSURFACE INVESTIGATION SUMMARY - TOWER SITE 213



WCC, 59125S

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 215



LEGEND:

Bag Sample

5 6 7 Mod.CA Blowcount

} Auger Boring Sample

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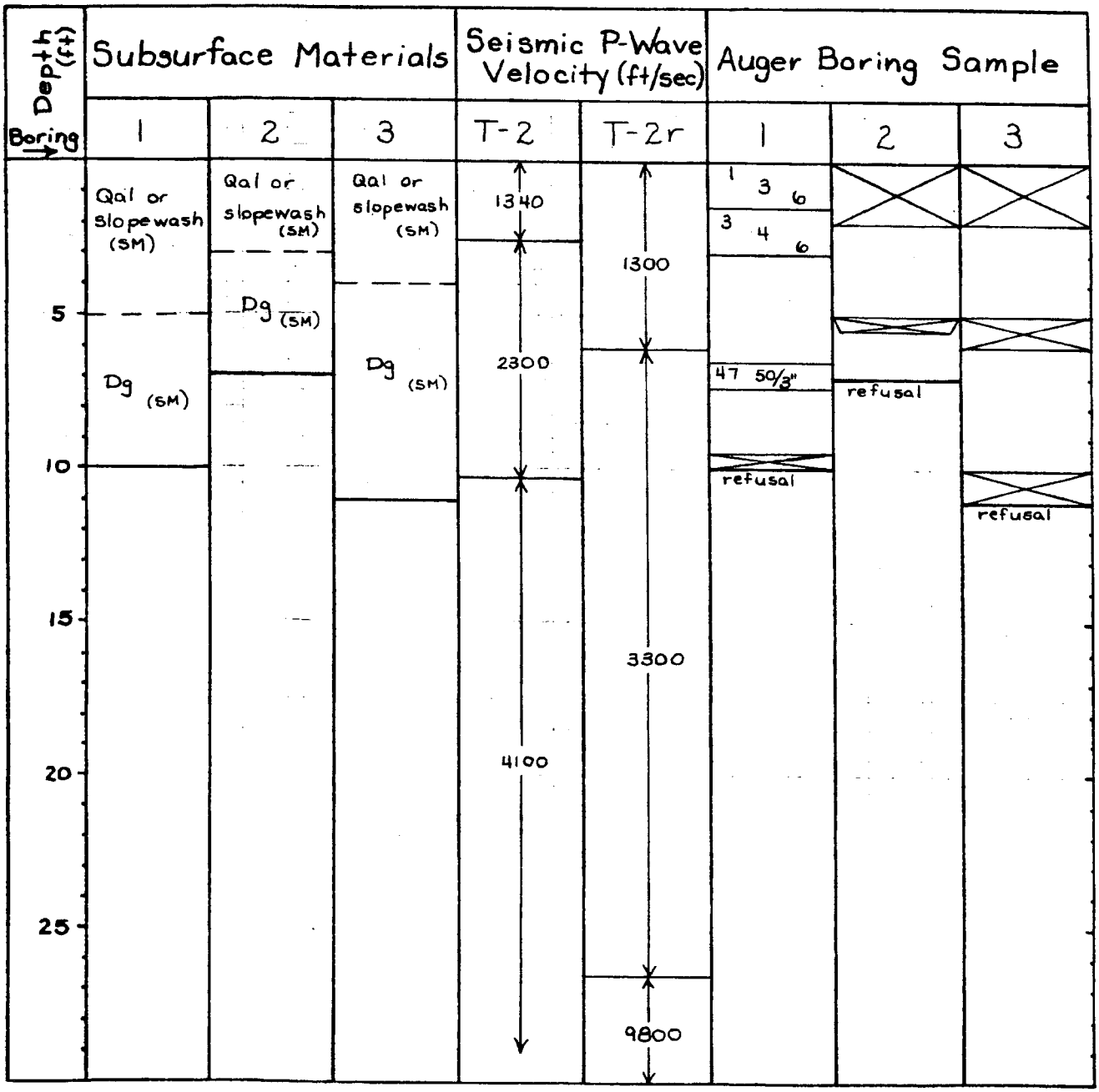
SUBSURFACE INVESTIGATION SUMMARY

Tower Site 216-1



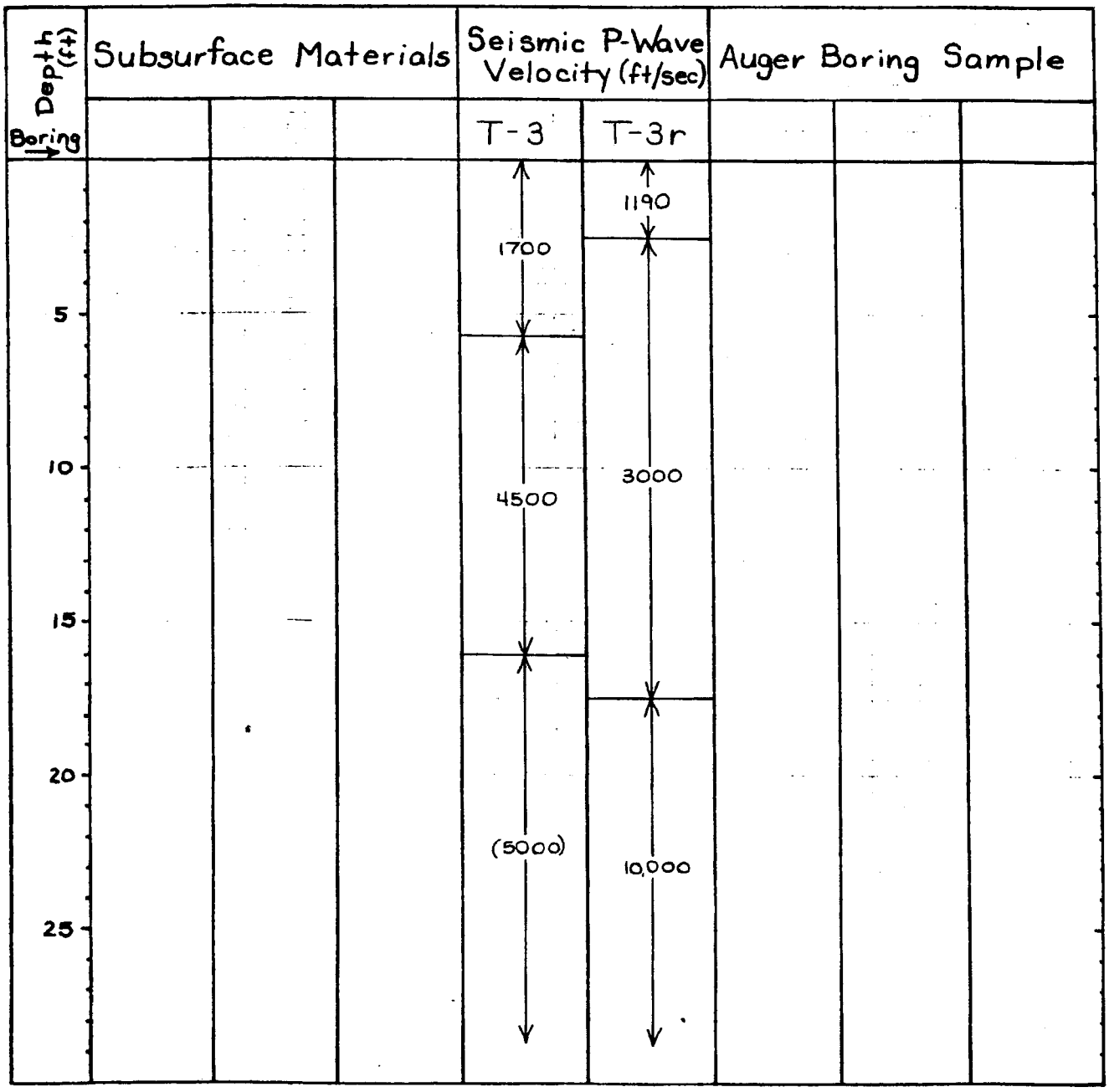
LEGEND:

- Bag Sample
- 5 6 7 Mod.CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 227



LEGEND:

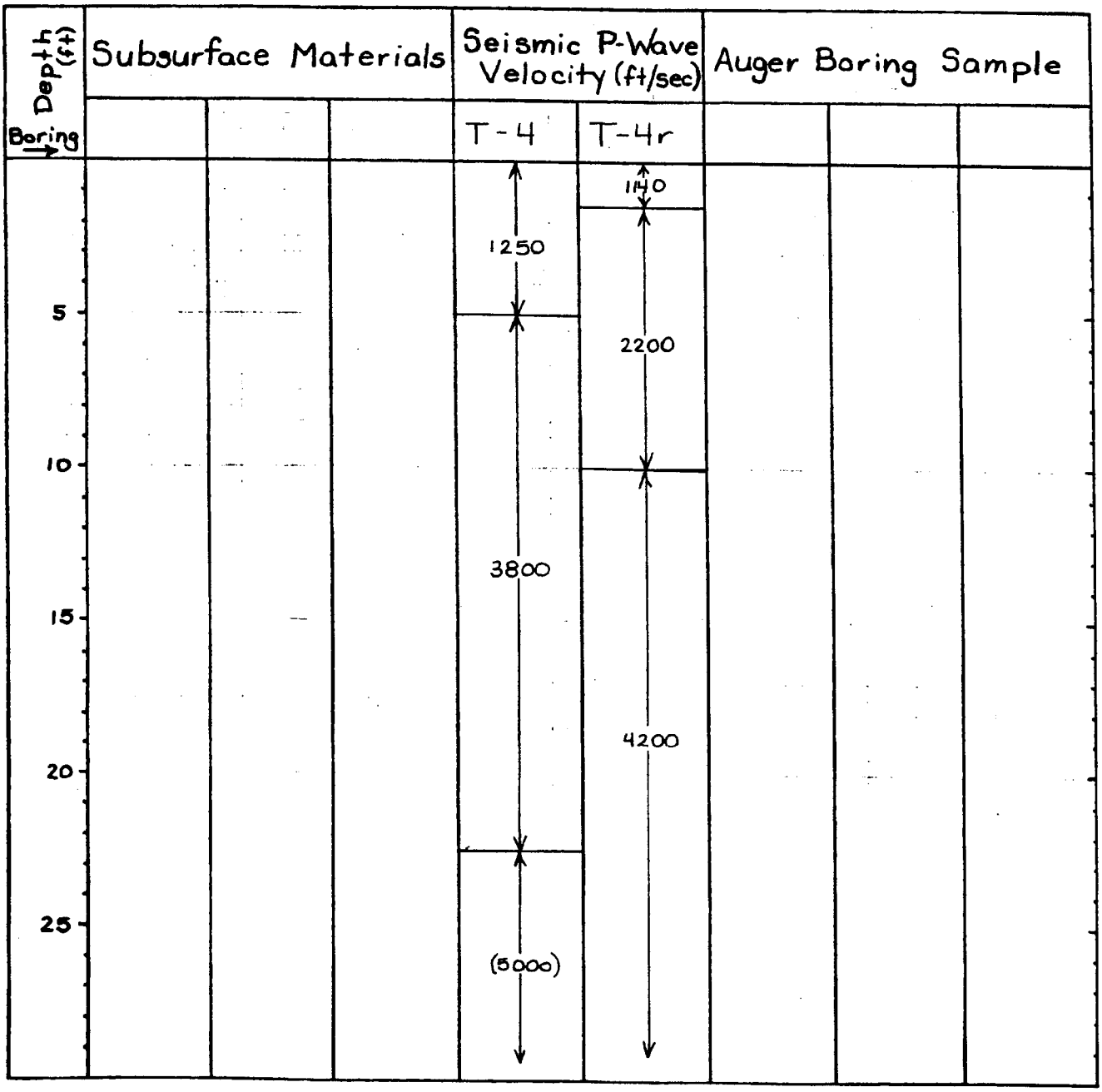
Bag Sample

5 6 7 Mod CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 229



LEGEND:

- Bag Sample
- 5 6 7 Mod.CA Blowcount

} Auger Boring Sample

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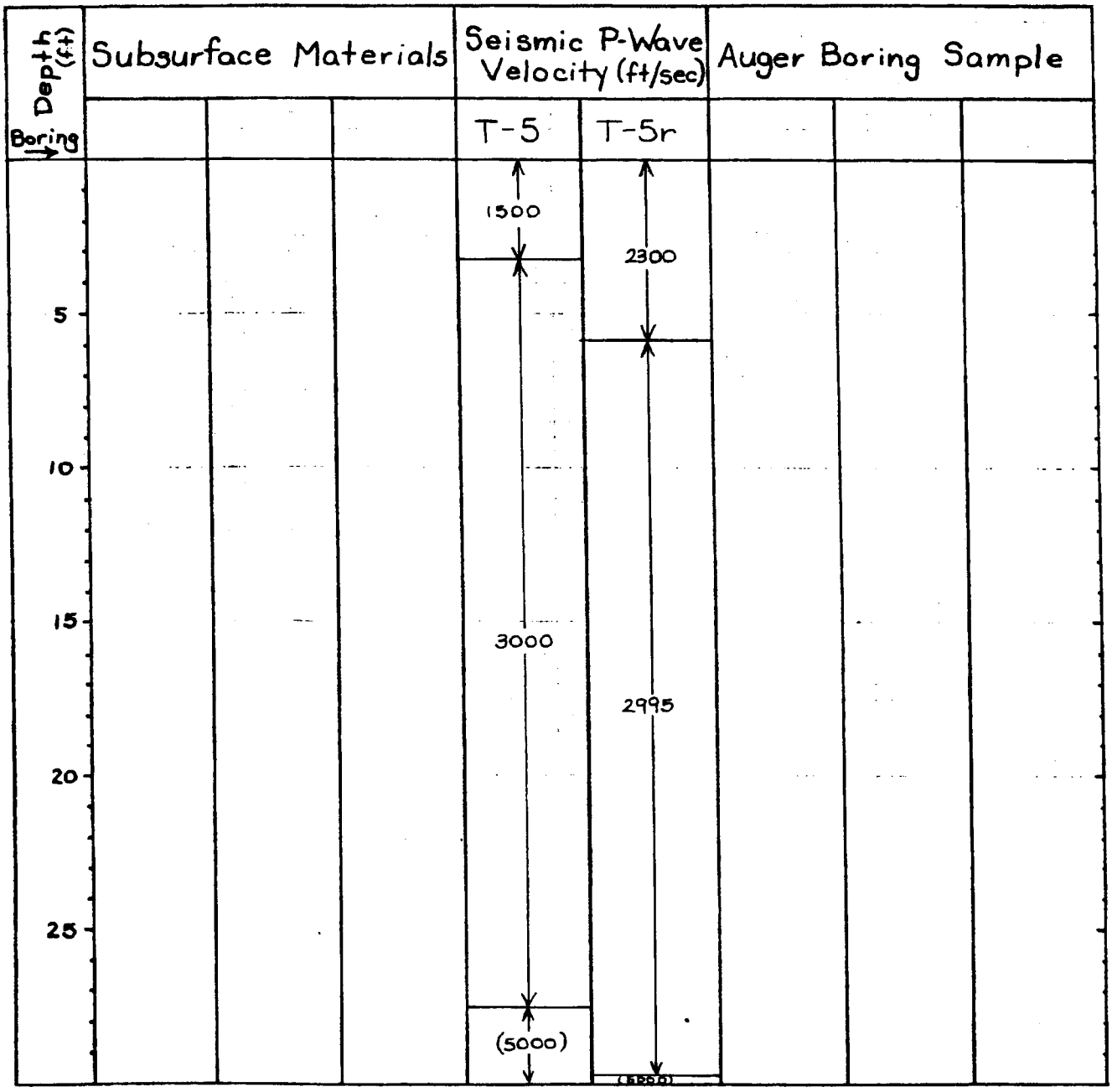
SUBSURFACE INVESTIGATION SUMMARY

Tower Site 241-1



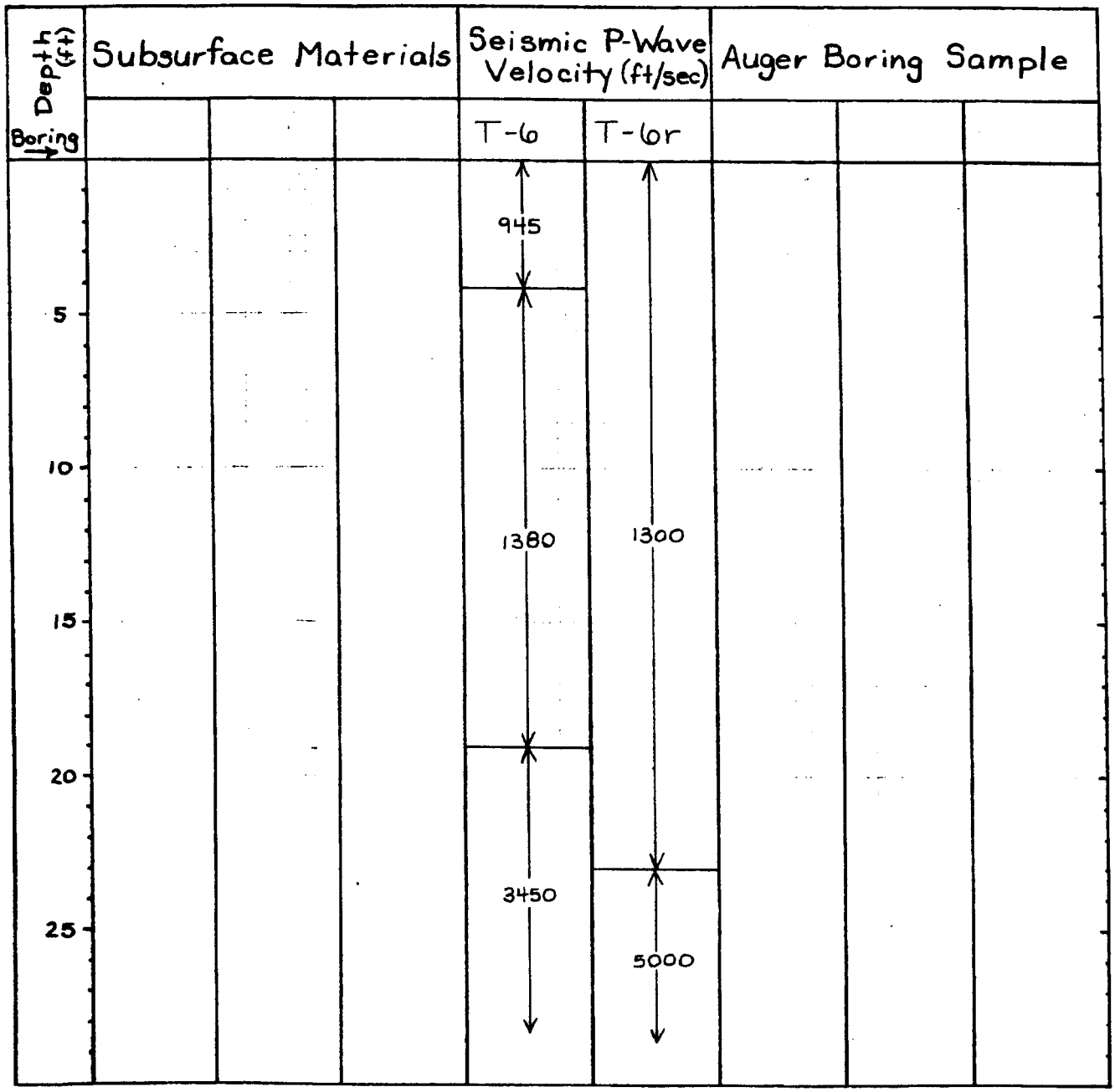
LEGEND:

- Bag Sample
- 5 6 7 Mod.CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 242-2



LEGEND:

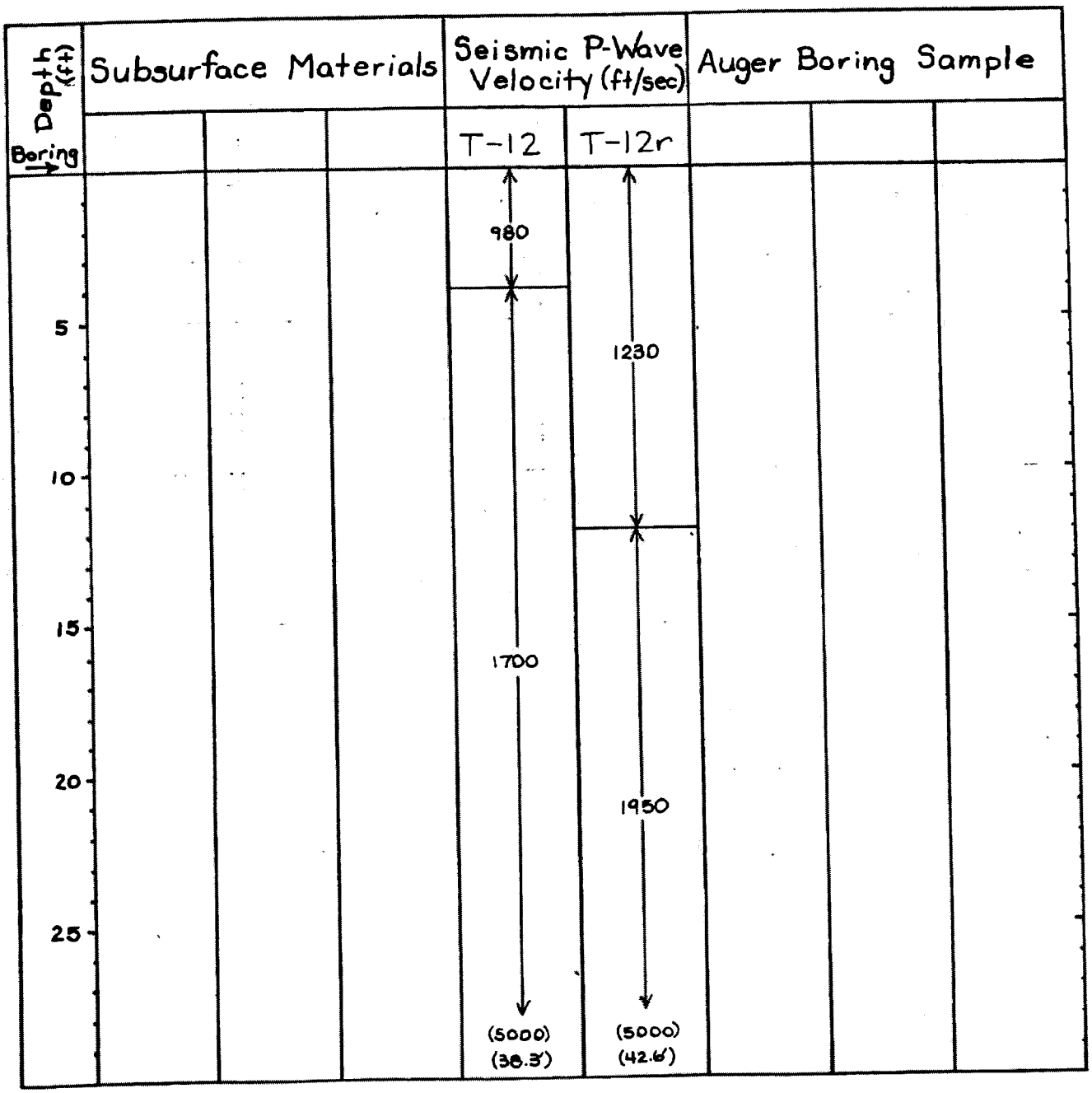
Bag Sample

5 6 7 Mod.CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 251



LEGEND:

- Bag Sample
- 5 6 7 Mod.CA Blowcount

} Auger Boring Sample

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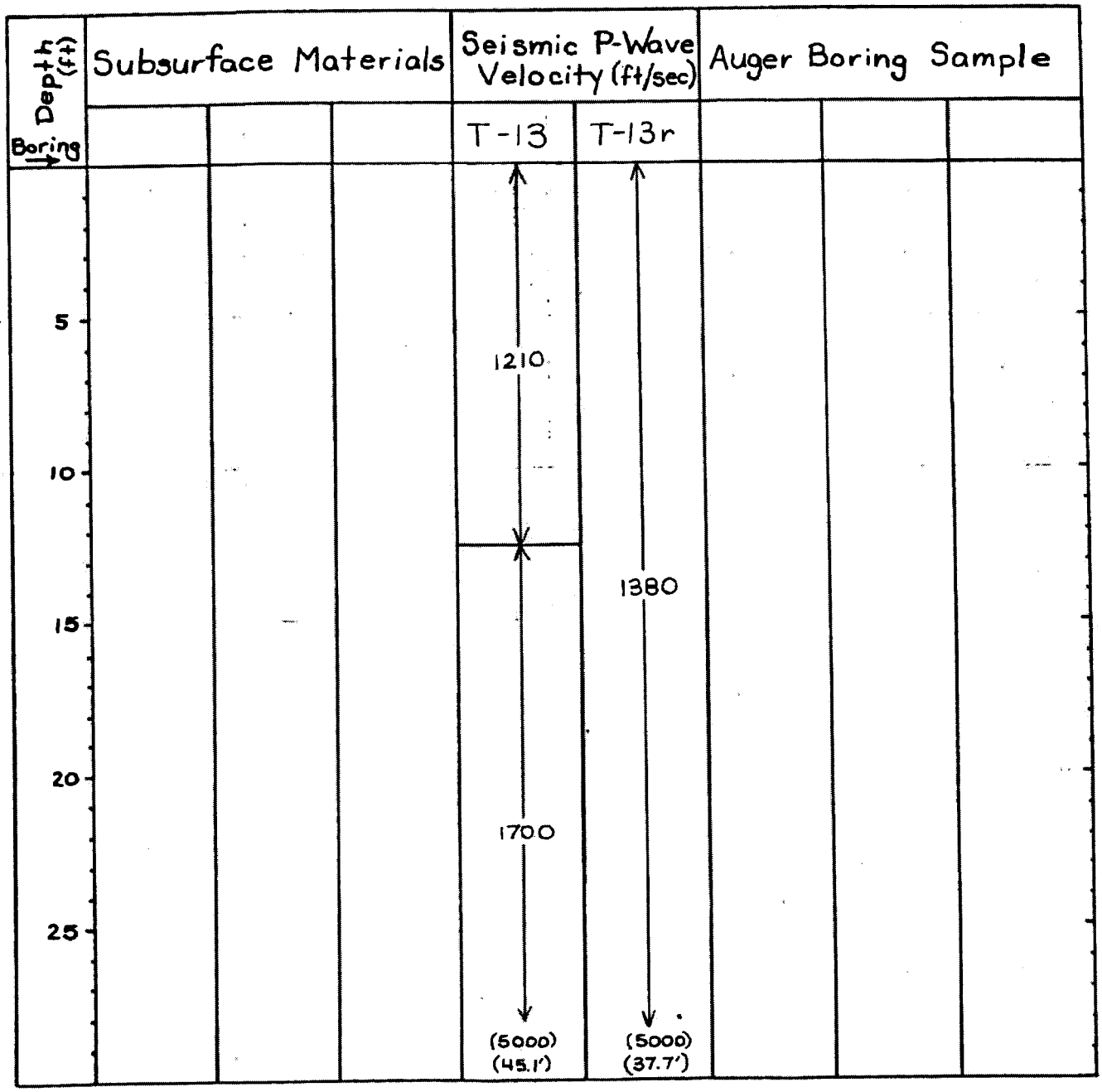
WCC, 591251

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 252



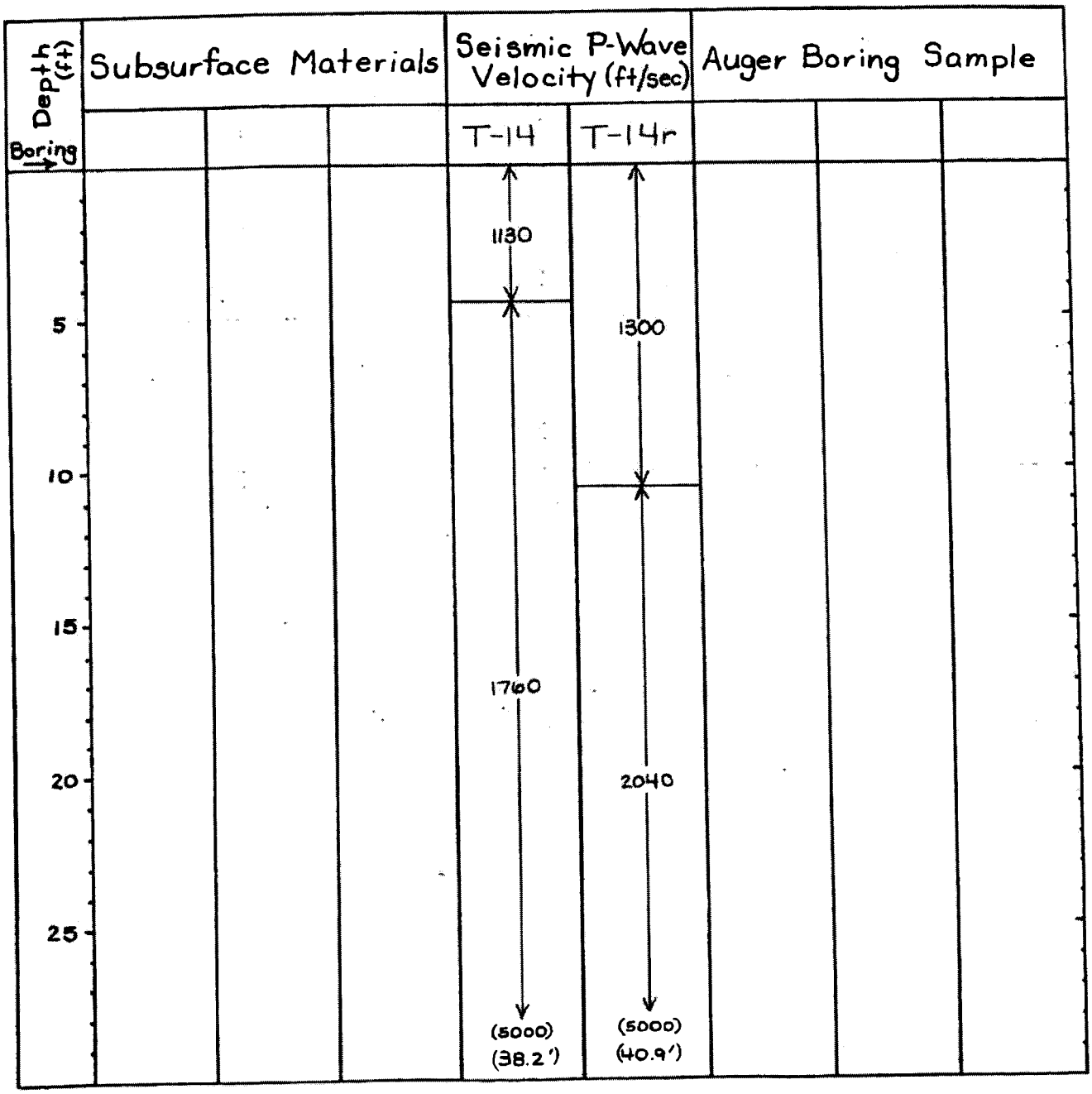
LEGEND:

- Bag Sample
- 5 6 7 Mod.CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 253



LEGEND:

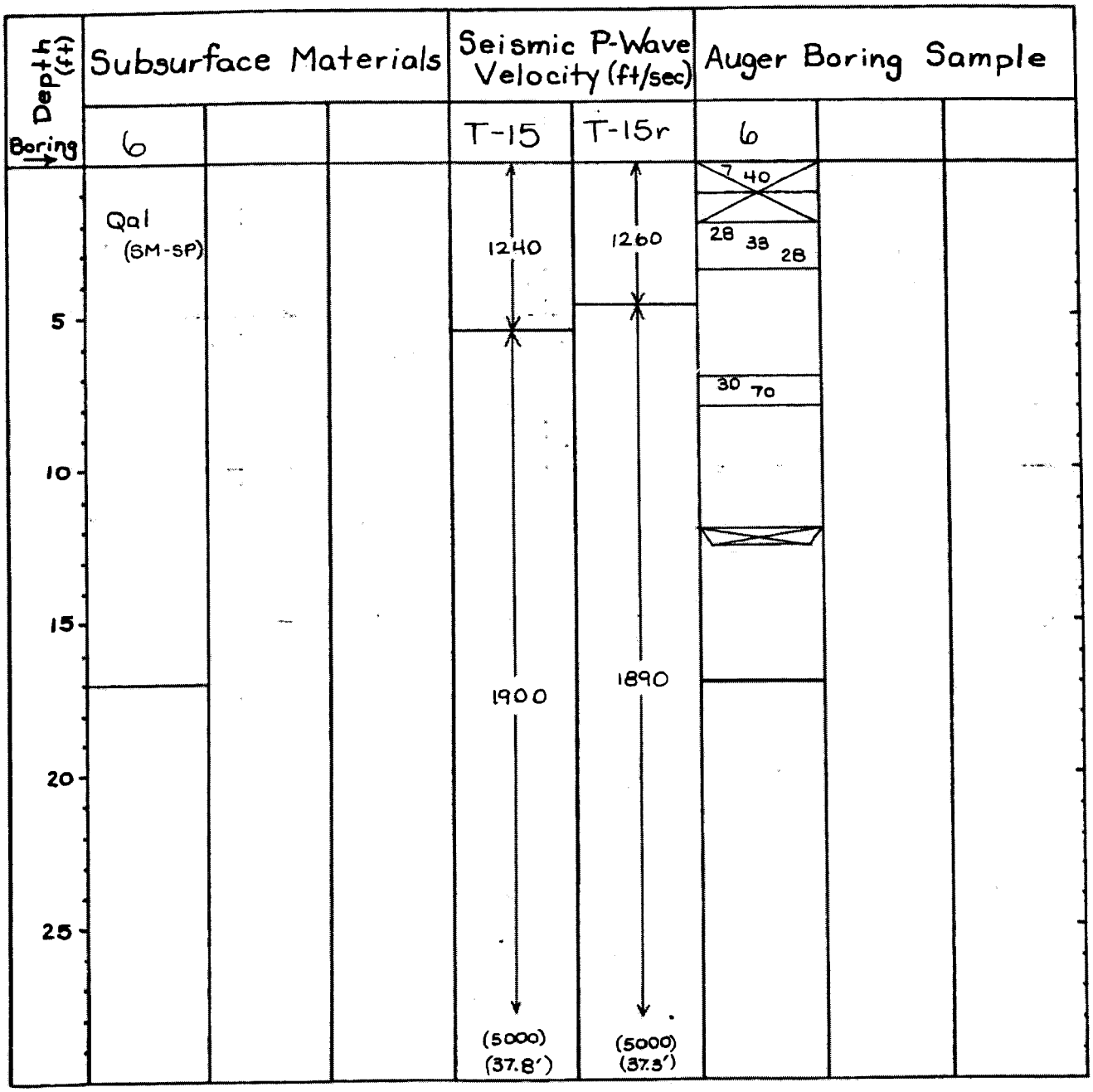
Bag Sample

5 6 7 Mod.CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 254



LEGEND:

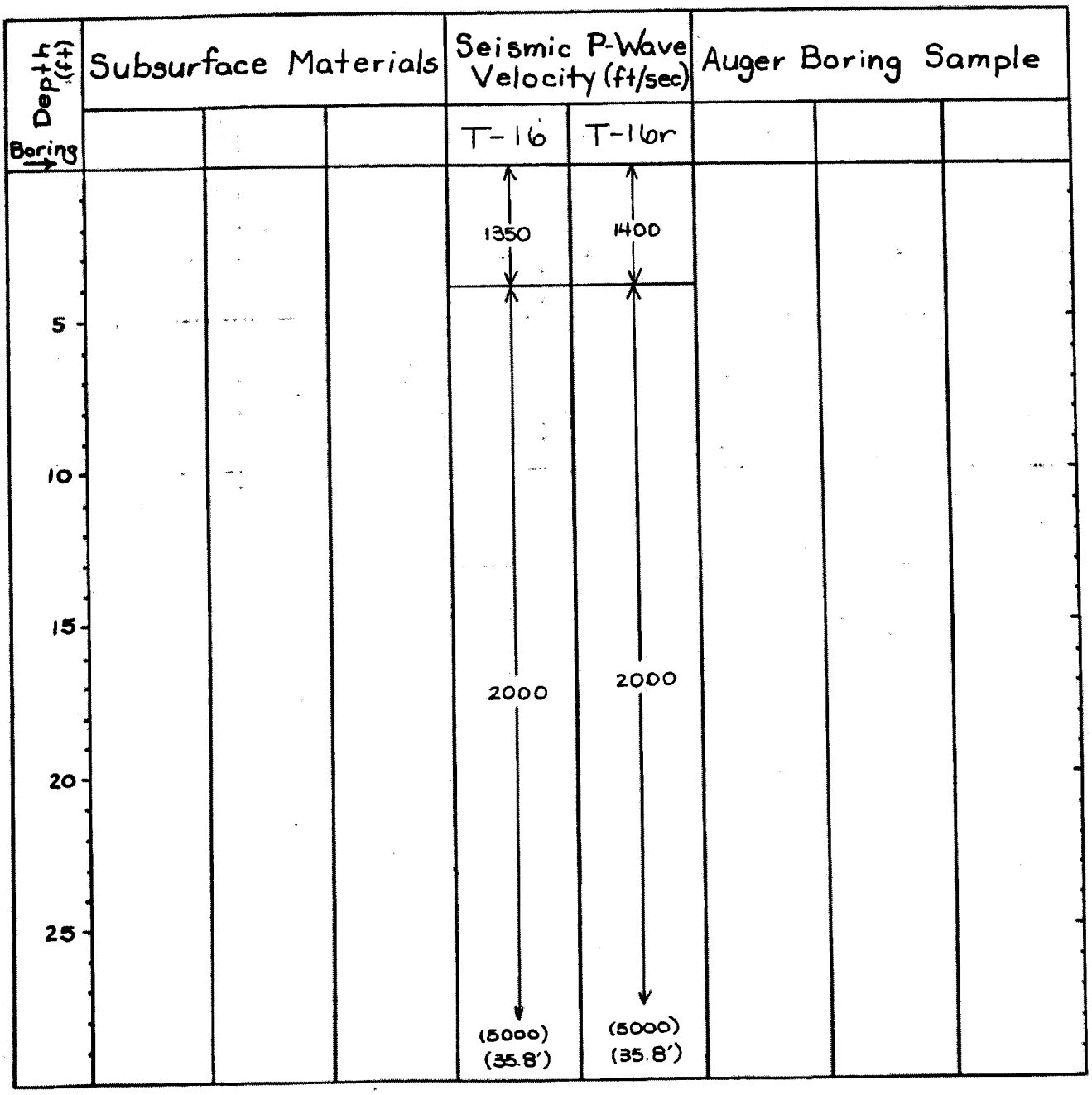
Bag Sample

5 6 7 Mod.CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 255



LEGEND:

- Bag Sample
- 5 6 7 Mod.CA Blowcount

} Auger Boring Sample

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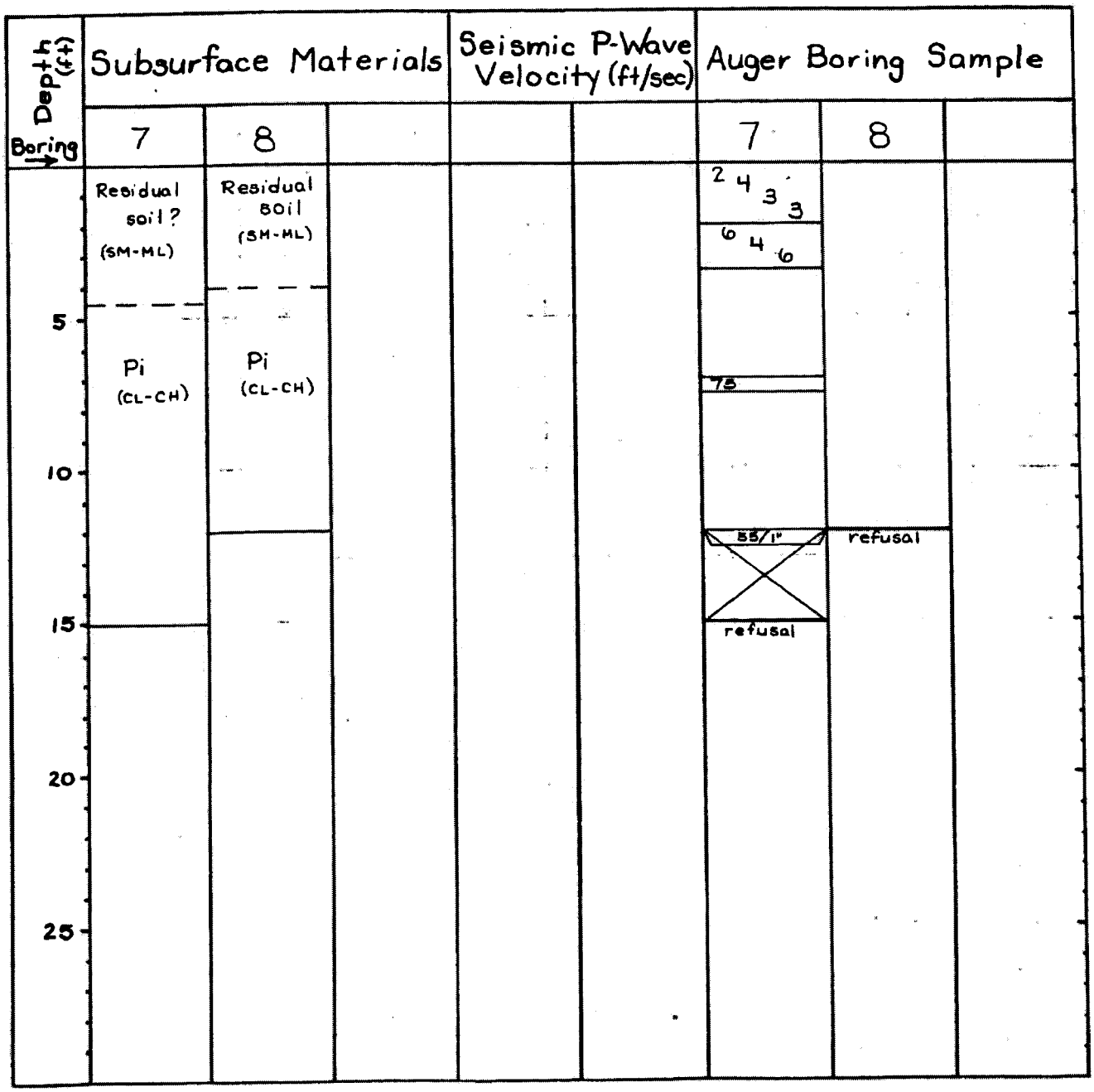
SUBSURFACE INVESTIGATION SUMMARY

Tower Site 258



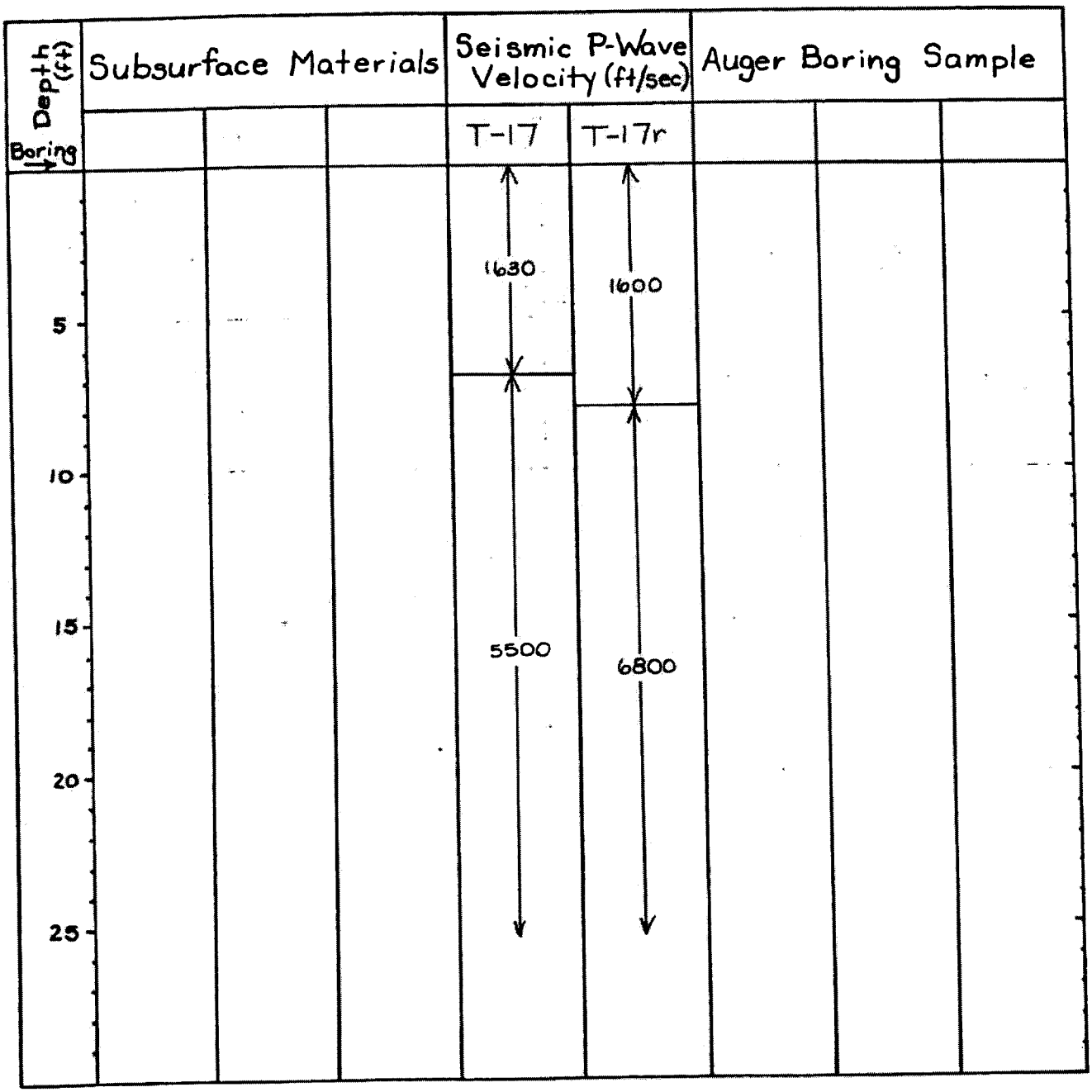
LEGEND:

- Bag Sample
- 5 6 7 Mod.CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 261



LEGEND:

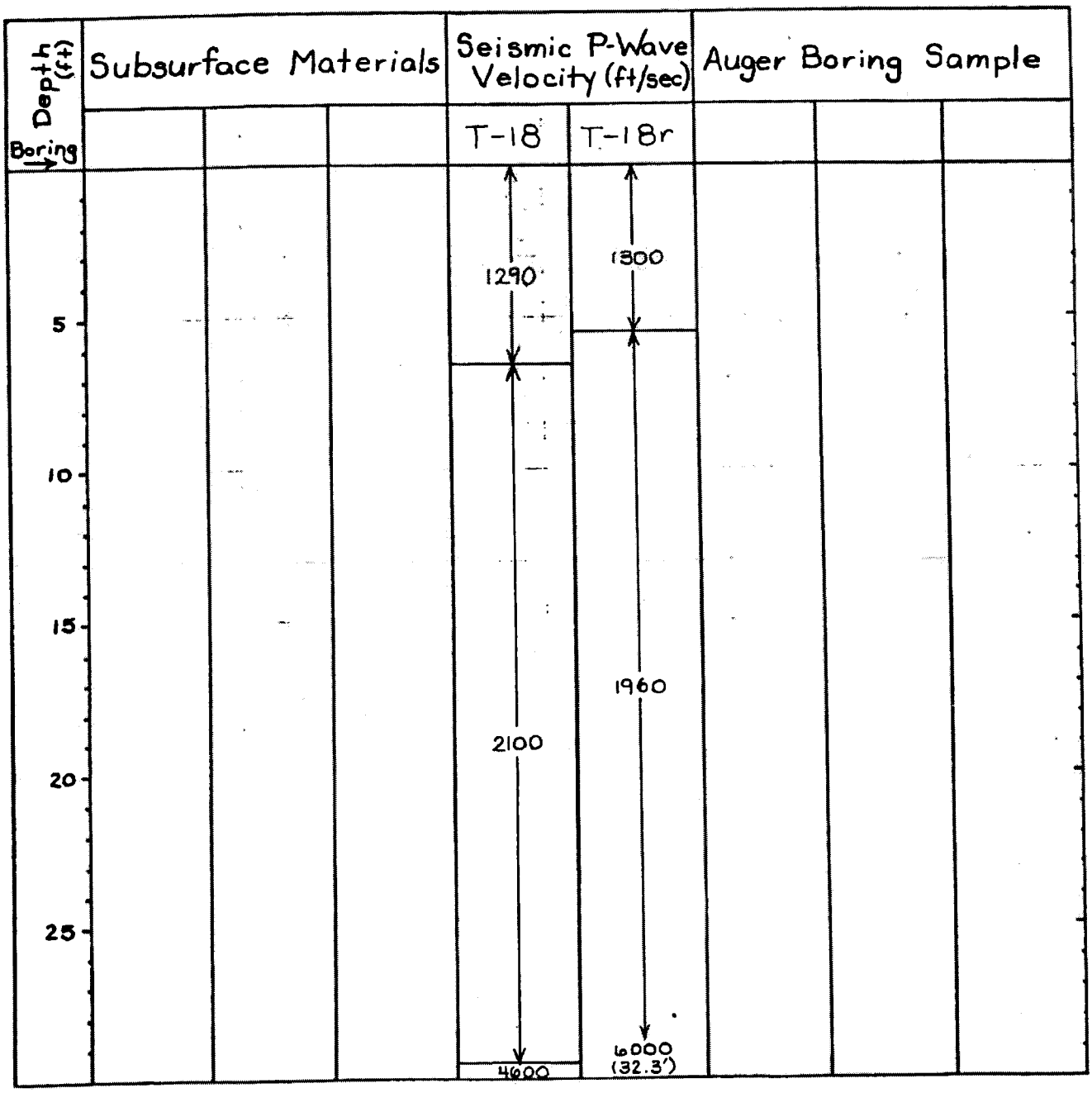
Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 265



LEGEND:

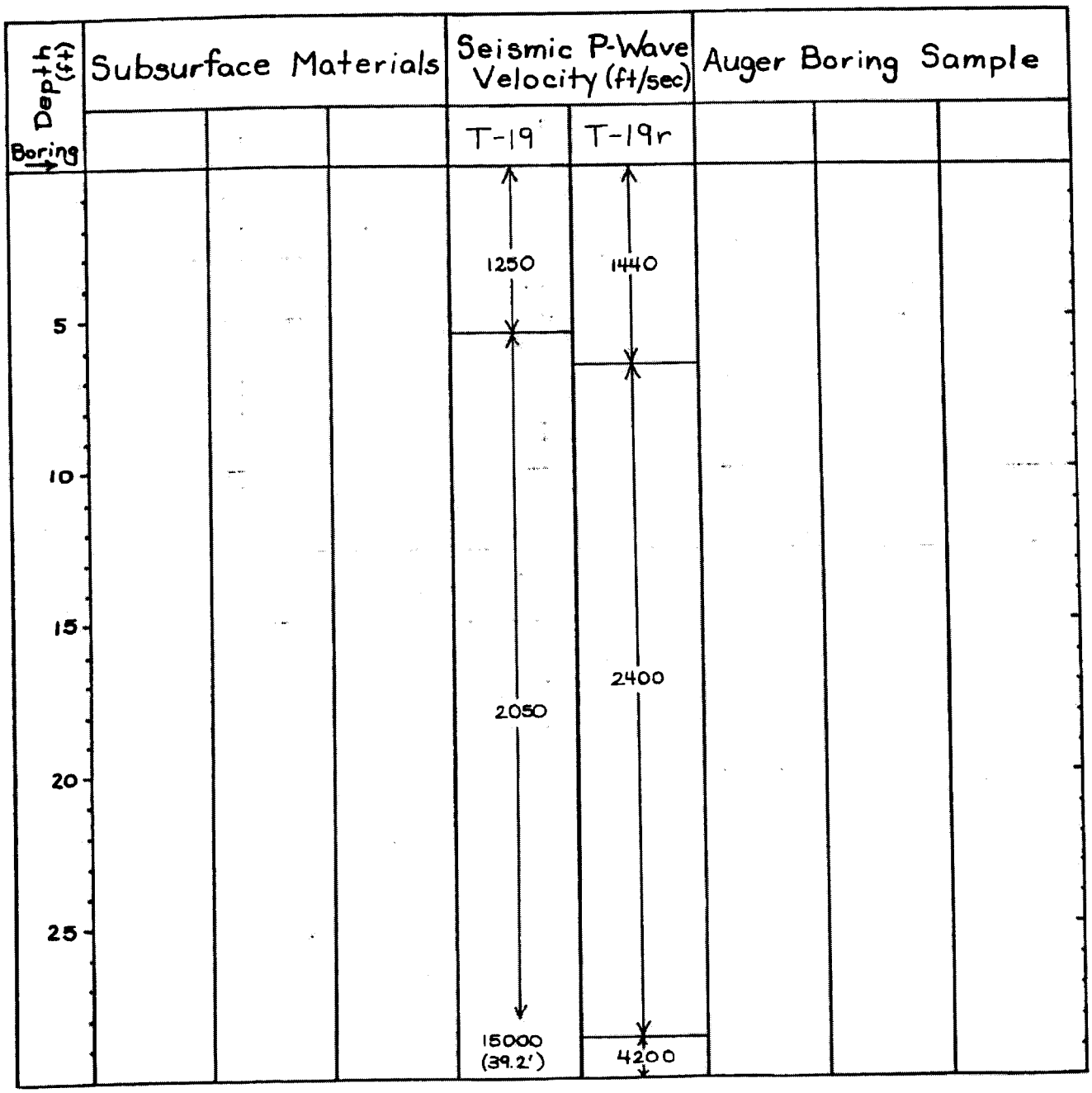
Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 267



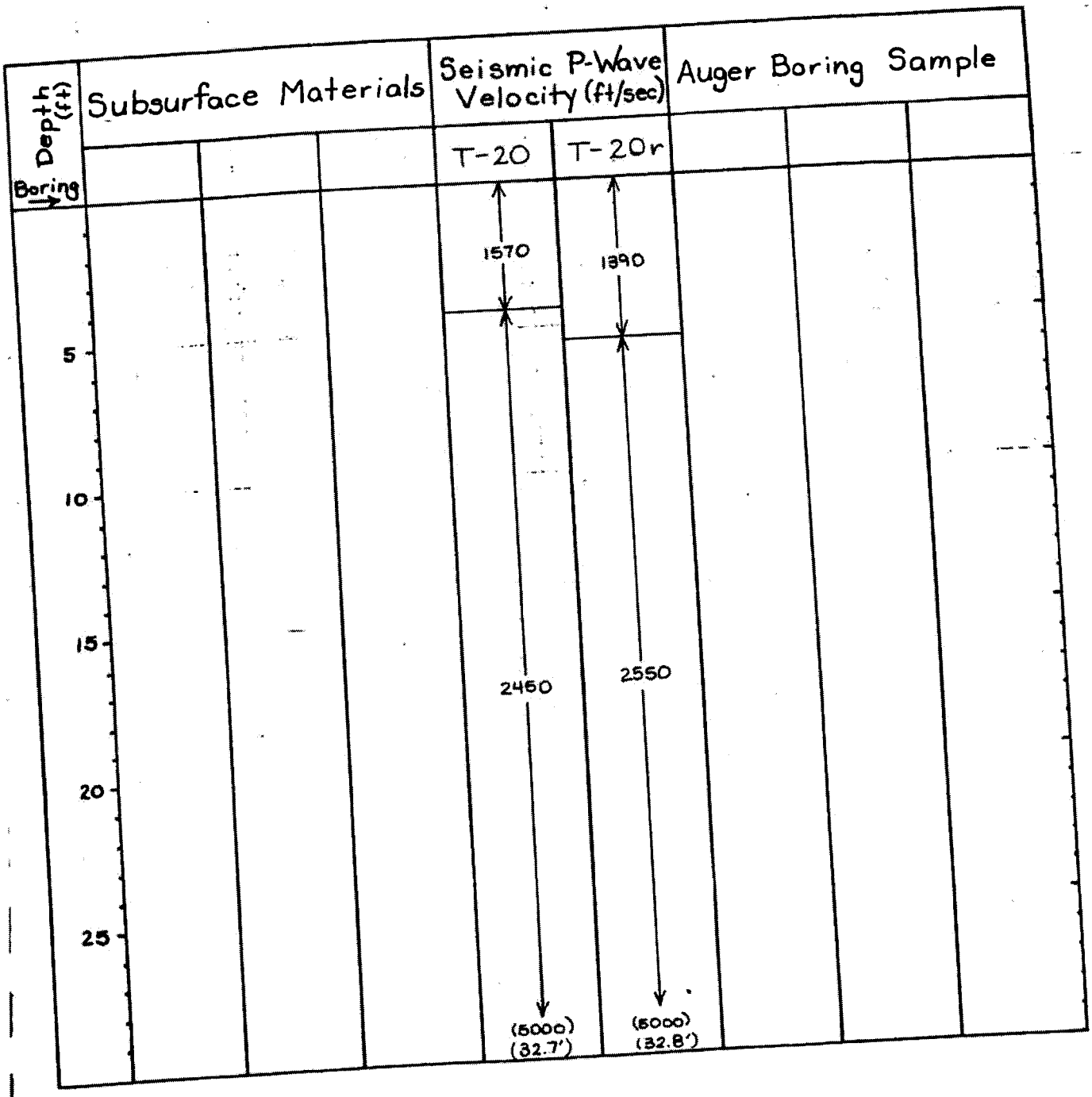
LEGEND:

- Bag Sample
- 5 6 7 Mod.CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 269



LEGEND:

- Bag Sample
- 5 6 7 Mod.CA Blowcount

} Auger Boring Sample

WCC, 591251

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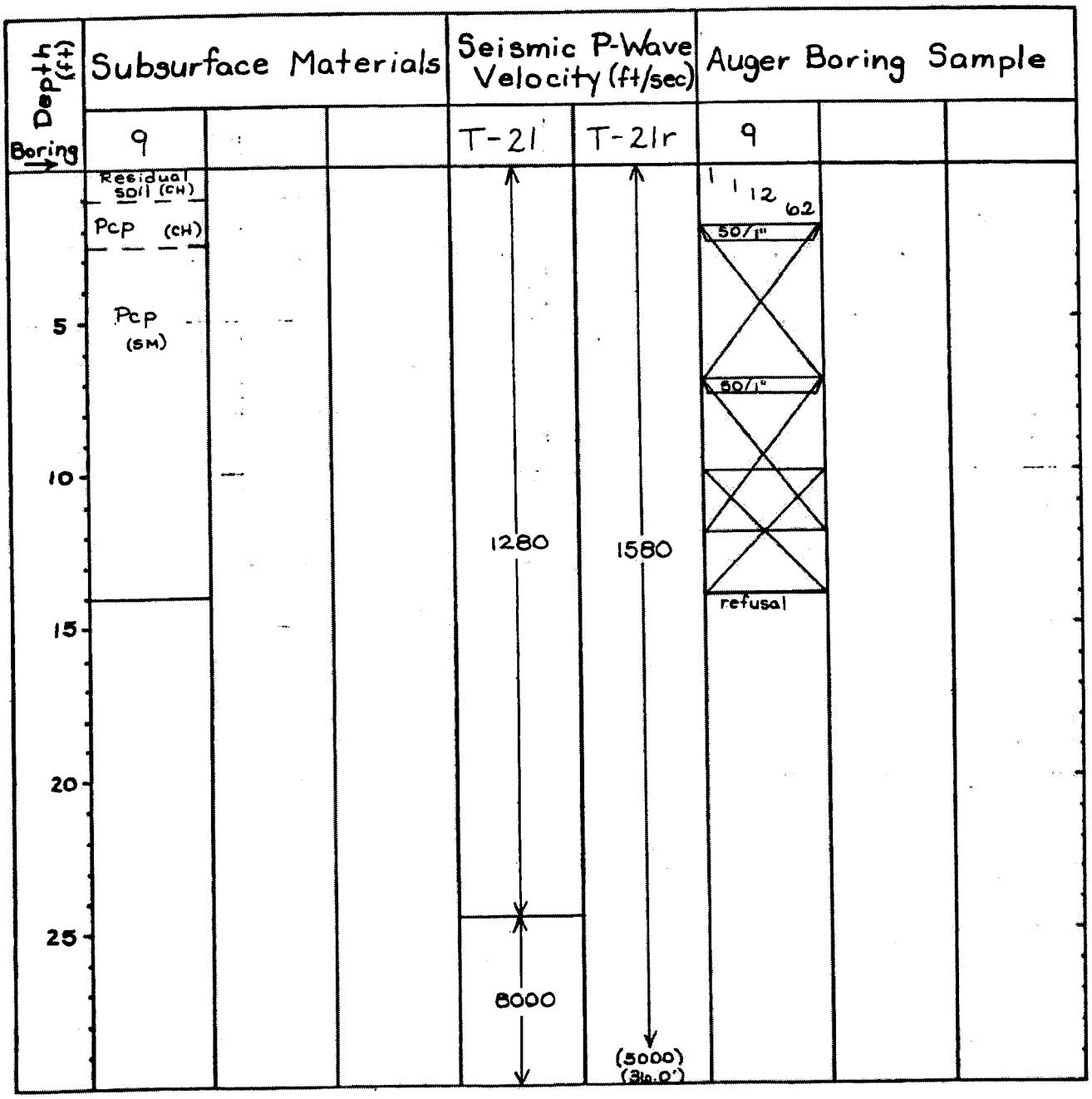
SUBSURFACE INVESTIGATION SUMMARY

Tower Site 270



LEGEND:

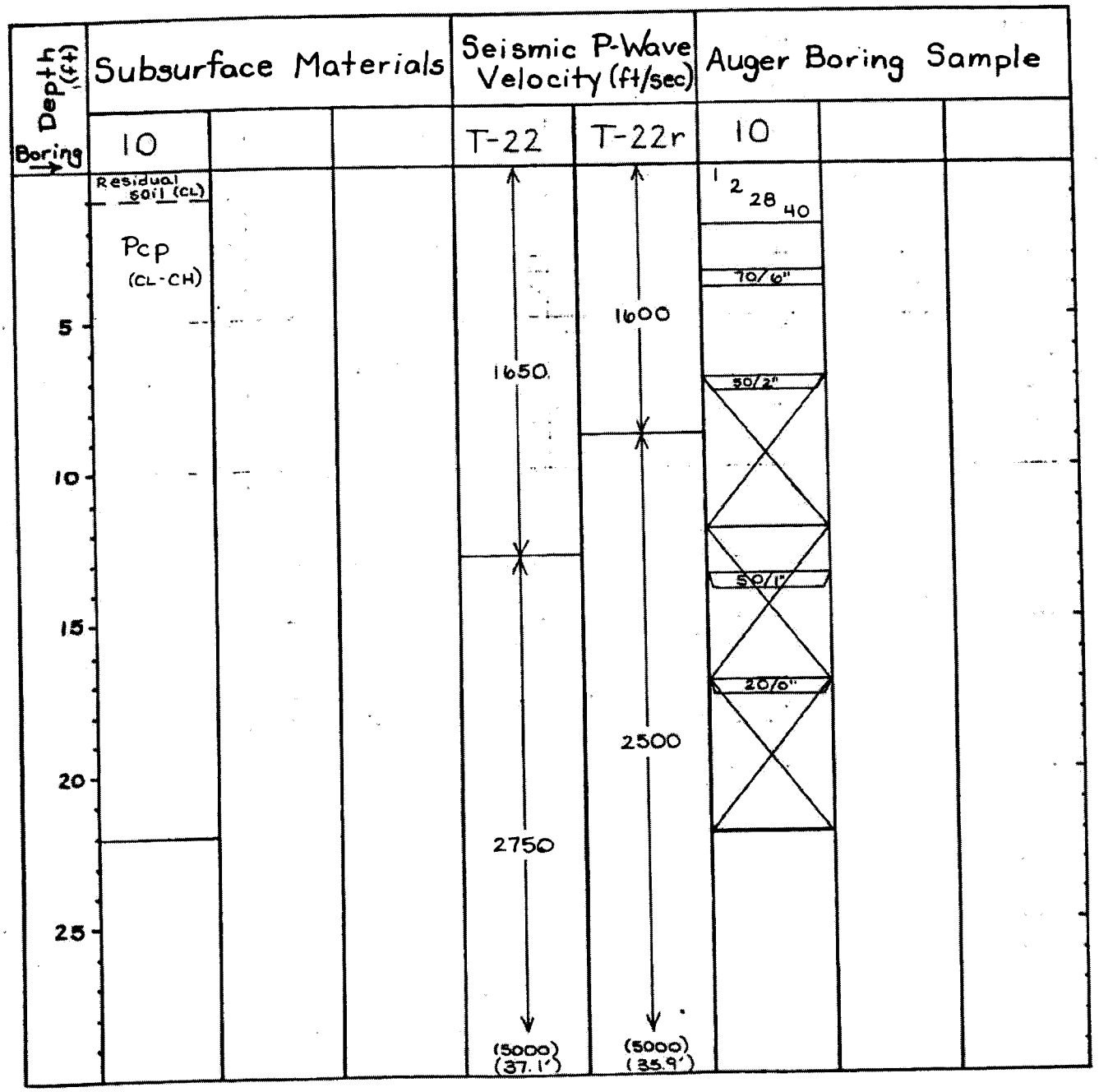
Bag Sample

5 6 7 Mod.CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 272



LEGEND:

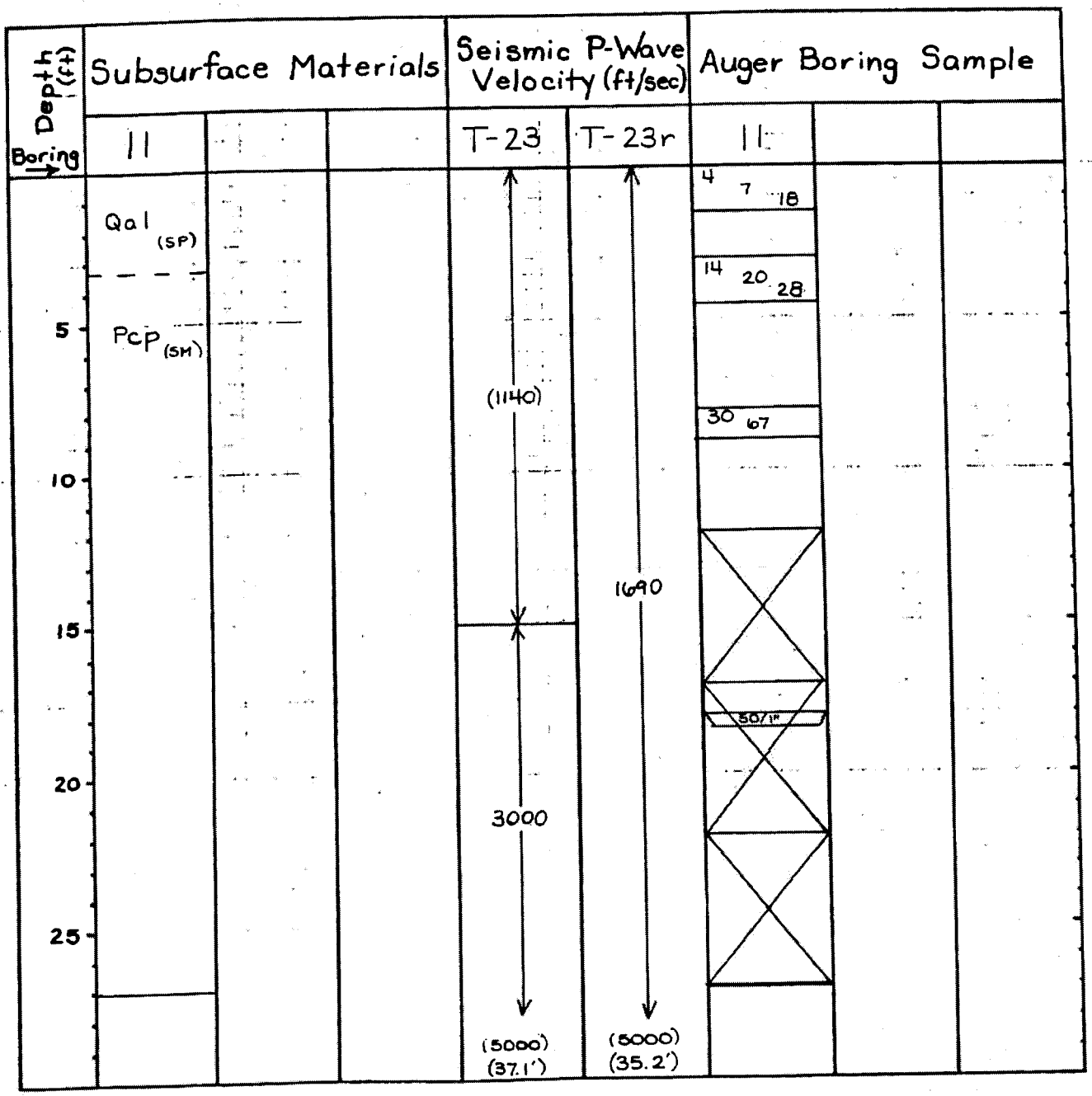
Bag Sample

5 6 7 Mod.CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 273



LEGEND:

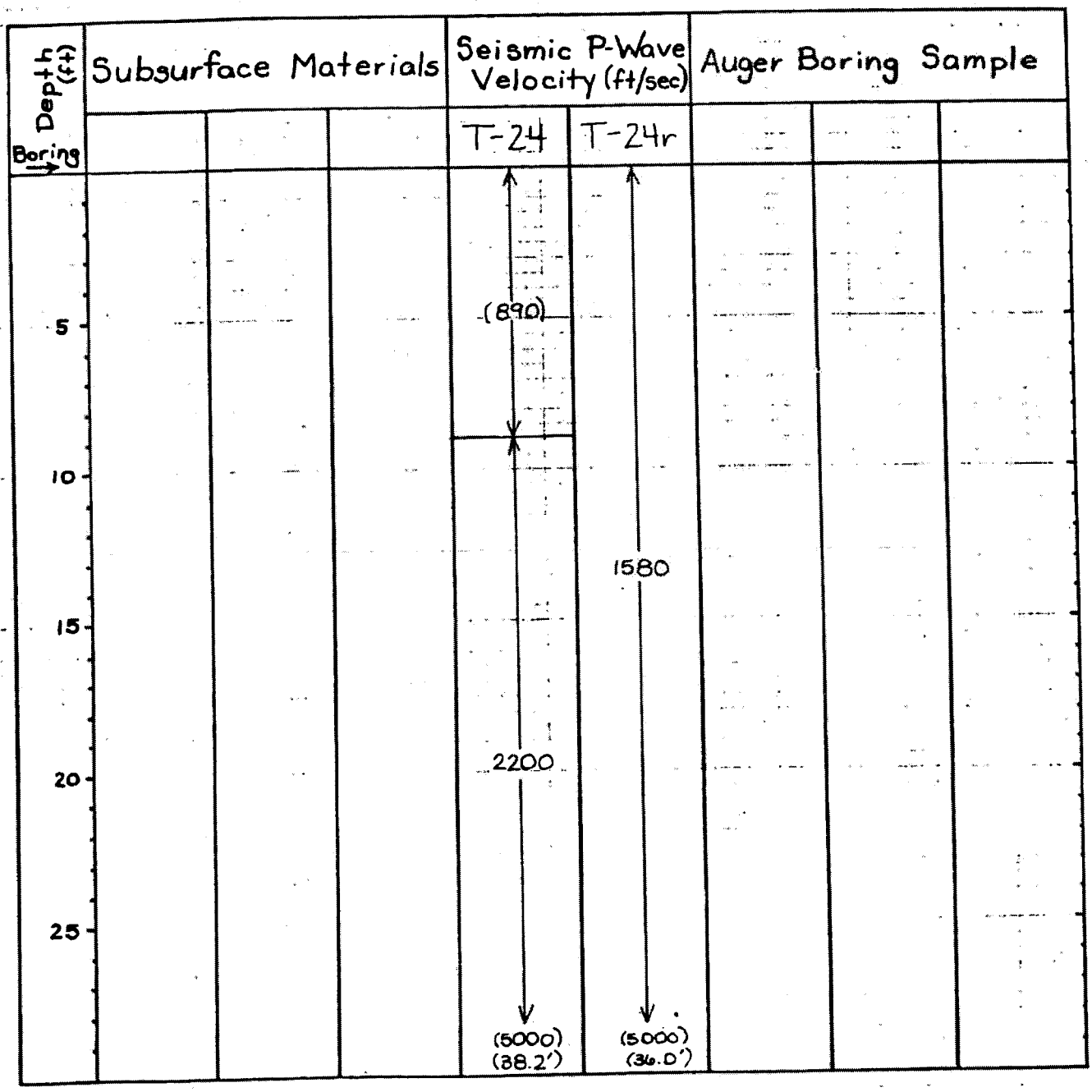
Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 274



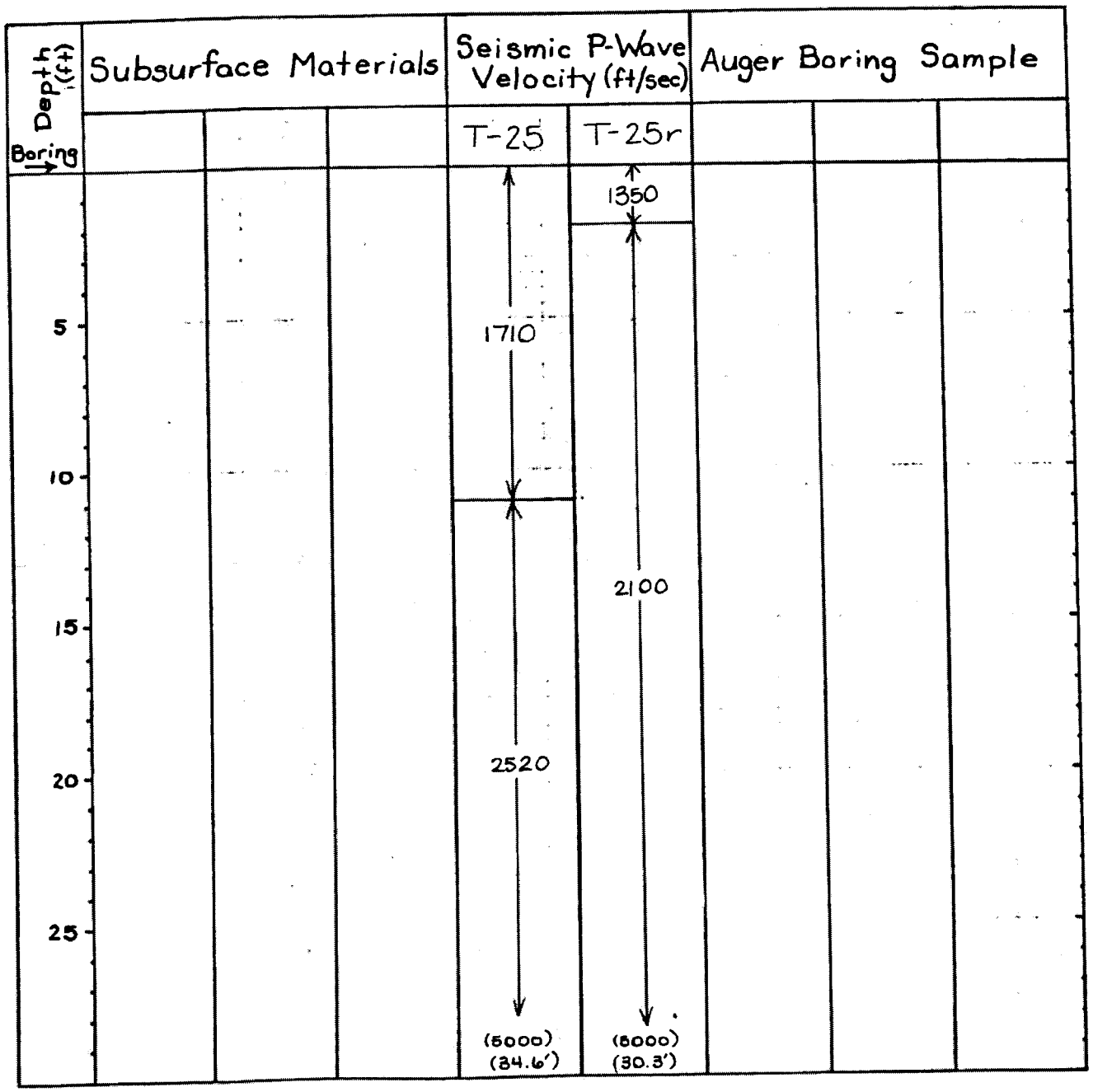
LEGEND:

- Bag Sample
- 5 6 7 — Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 275



LEGEND:

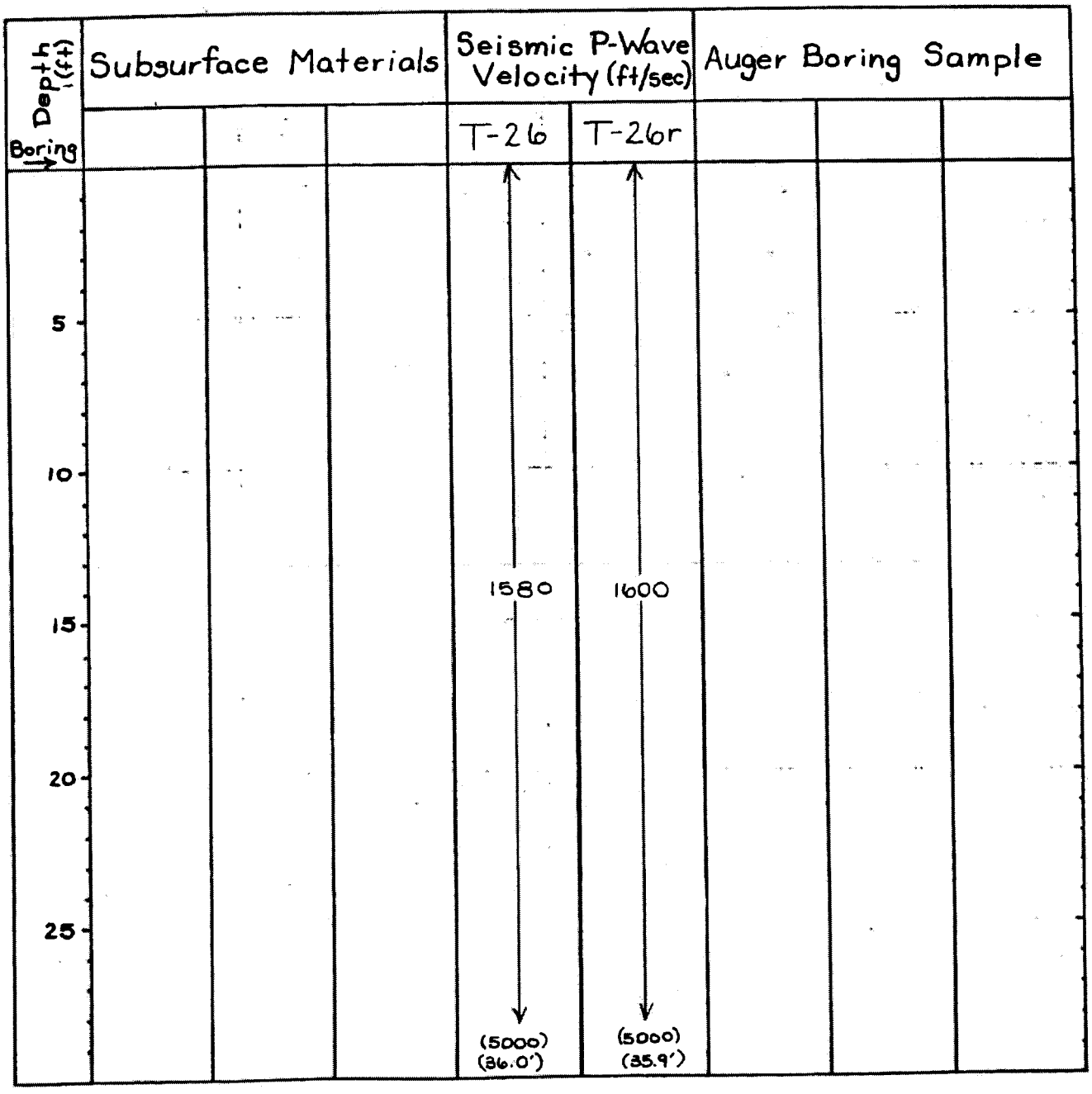
Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 276



LEGEND:

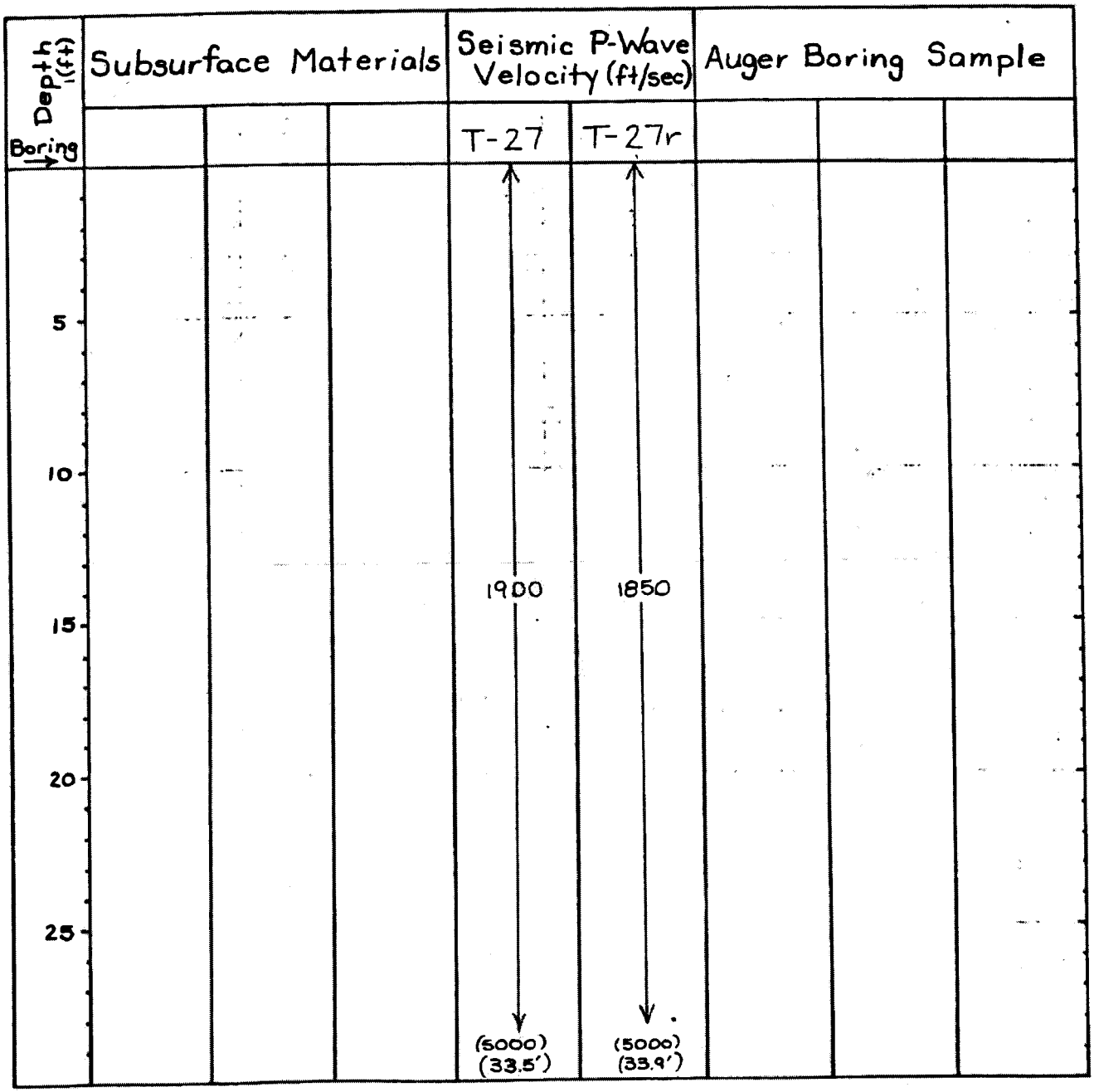
Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 277



LEGEND:

Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

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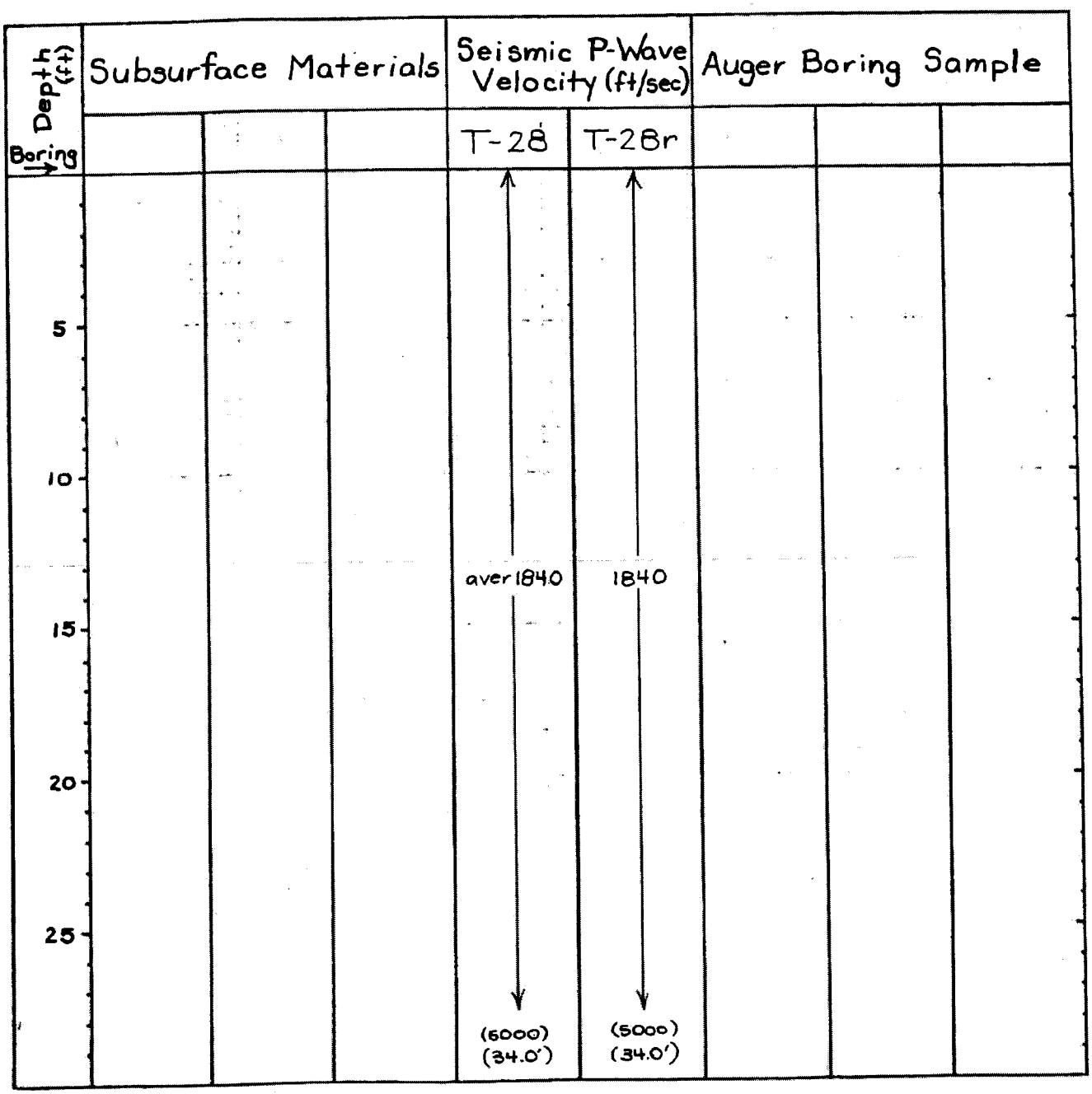
SUBSURFACE INVESTIGATION SUMMARY

Tower Site 278



LEGEND:

Bag Sample

5 6 7 Mod. CA Blowcount

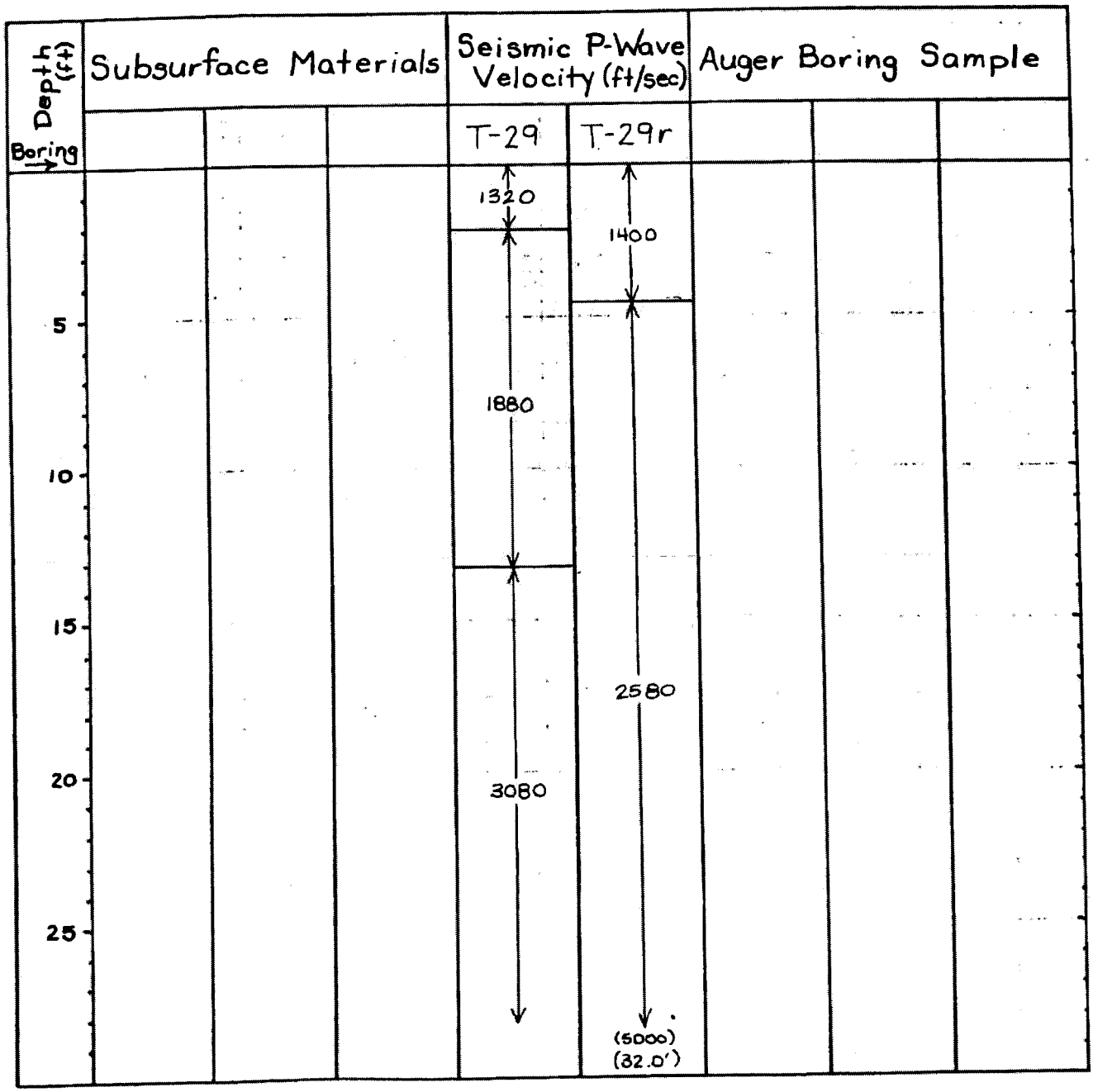
} Auger Boring Sample

NTED ON CLEARPRINT 1000 H

WCC. 591251

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 279



LEGEND:

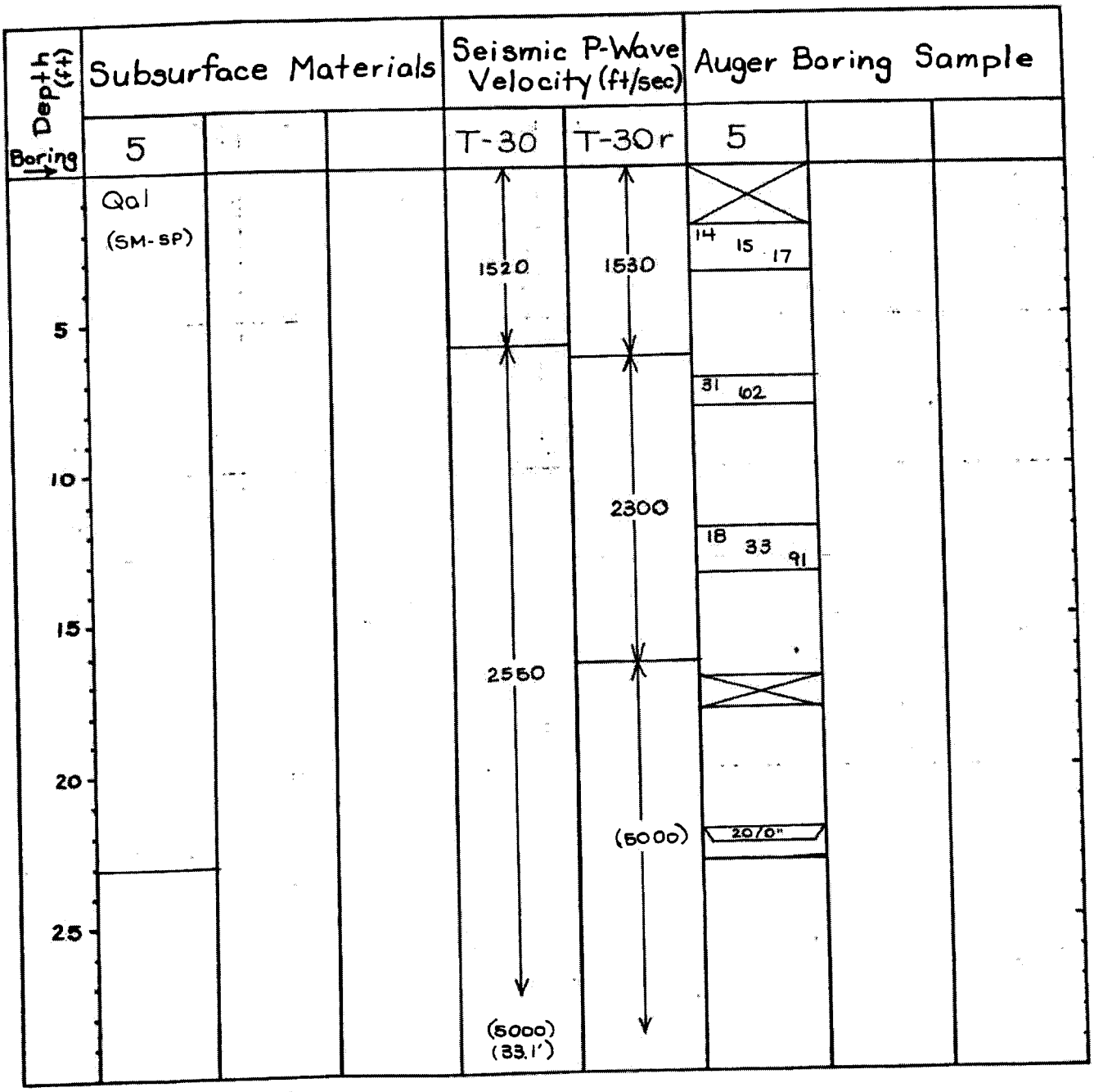
Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 280



LEGEND:

- Bag Sample
- 5 6 7 Mod. CA Blowcount

} Auger Boring Sample

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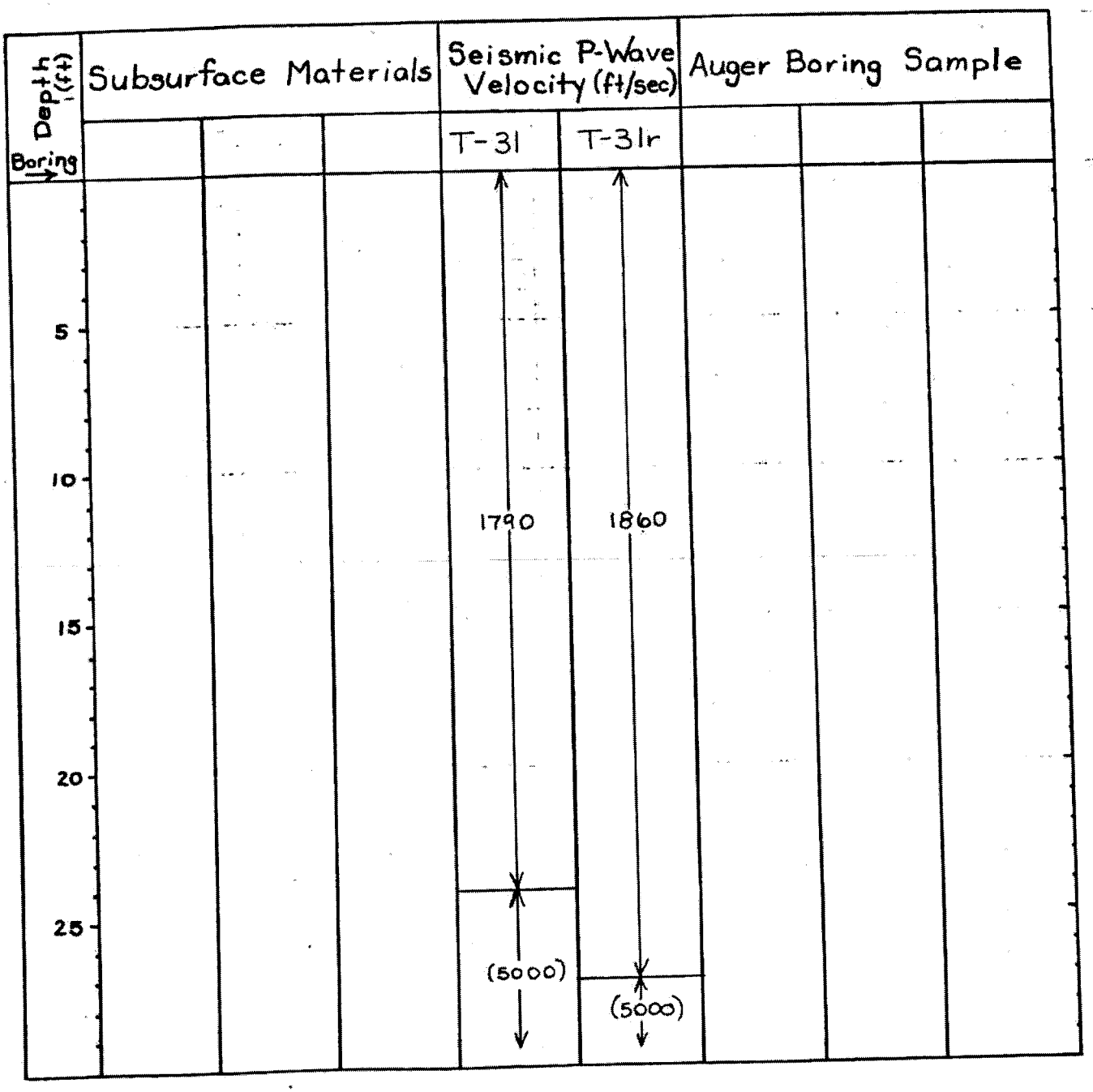
SUBSURFACE INVESTIGATION SUMMARY

near
Tower Site 283-1



LEGEND:

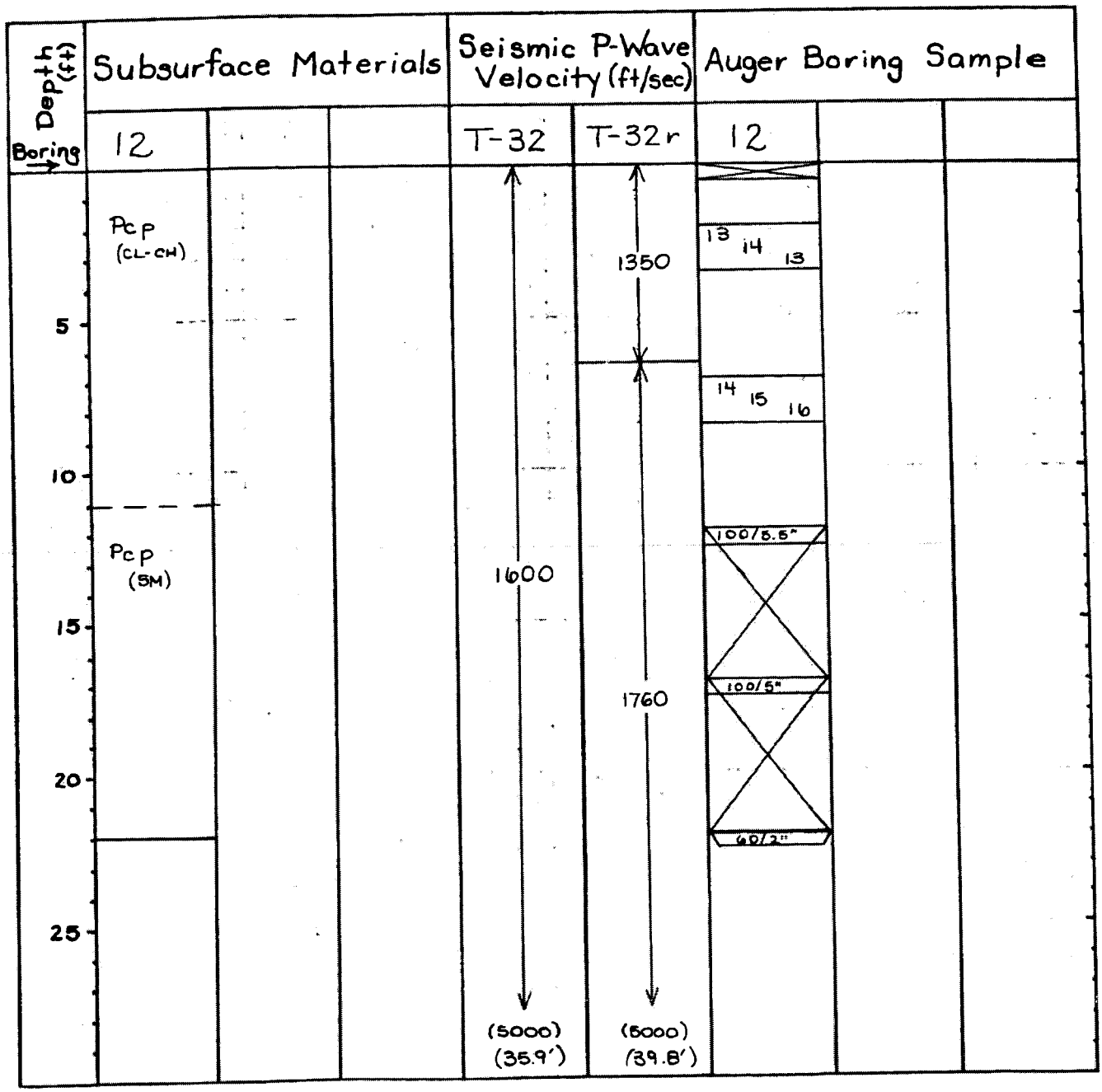
Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site near 289-1



LEGEND:

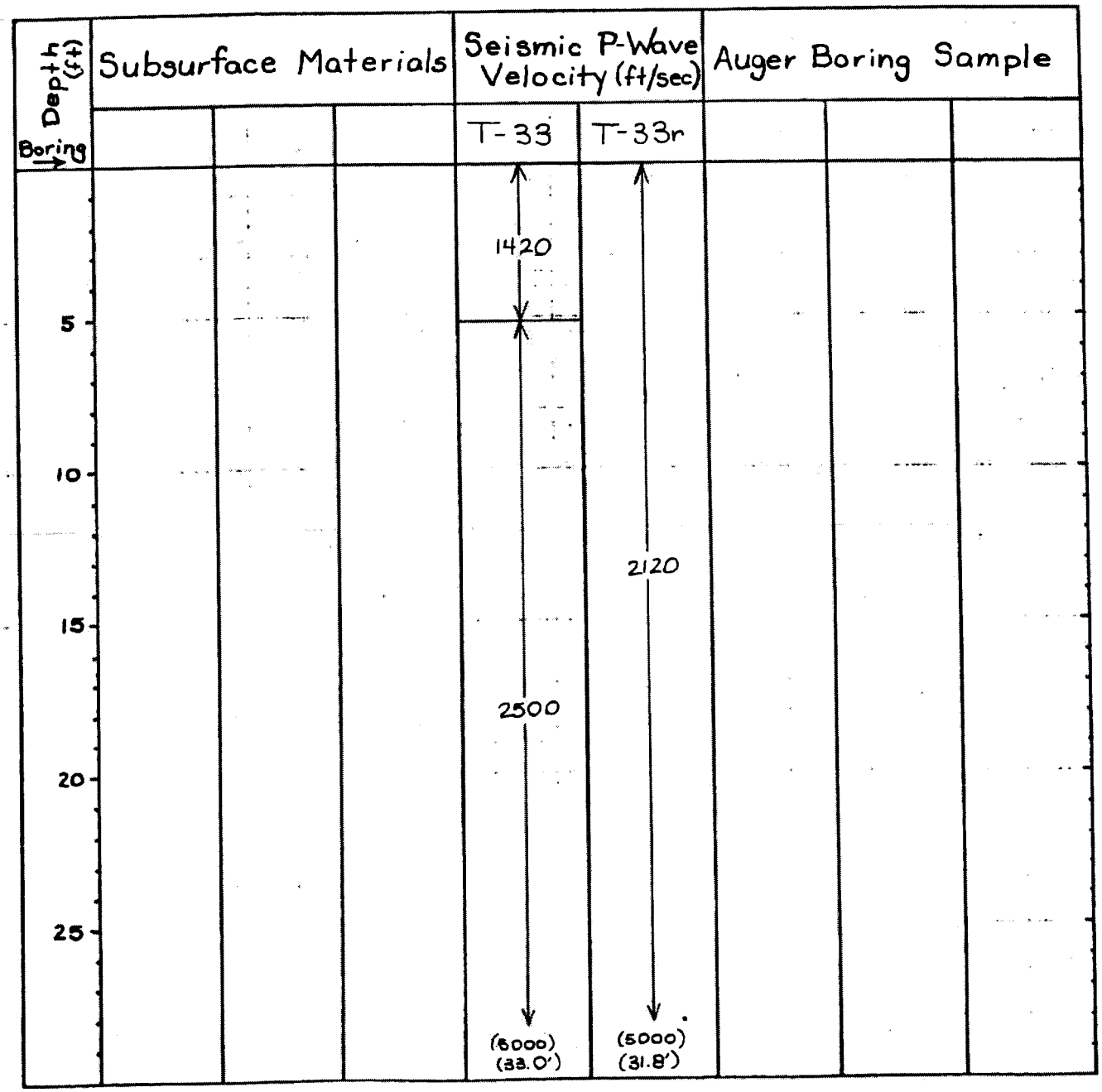
Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site near 291-1



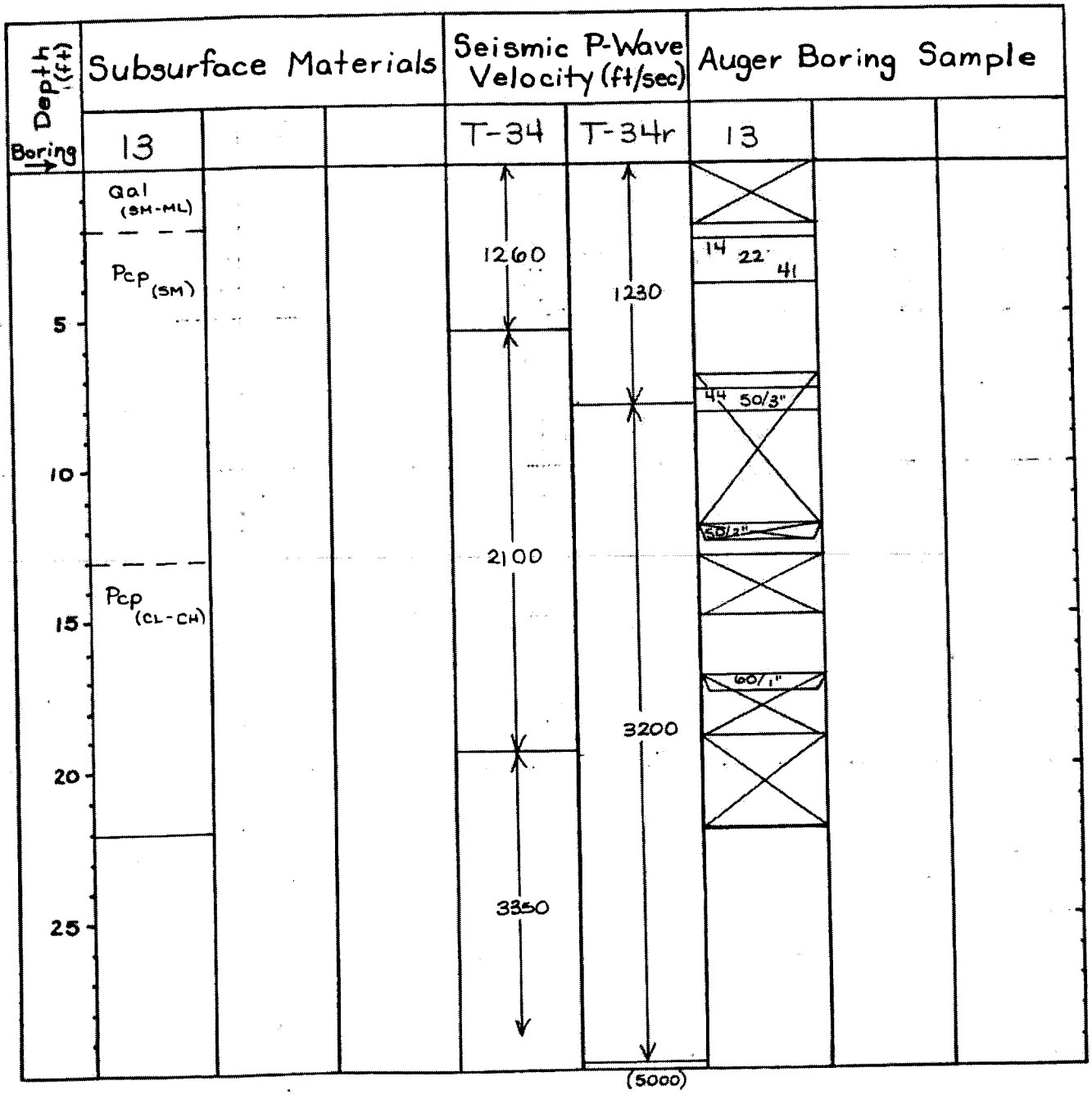
LEGEND:

- Bag Sample
- 5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

between
Tower Site 293-1/294-1



LEGEND:

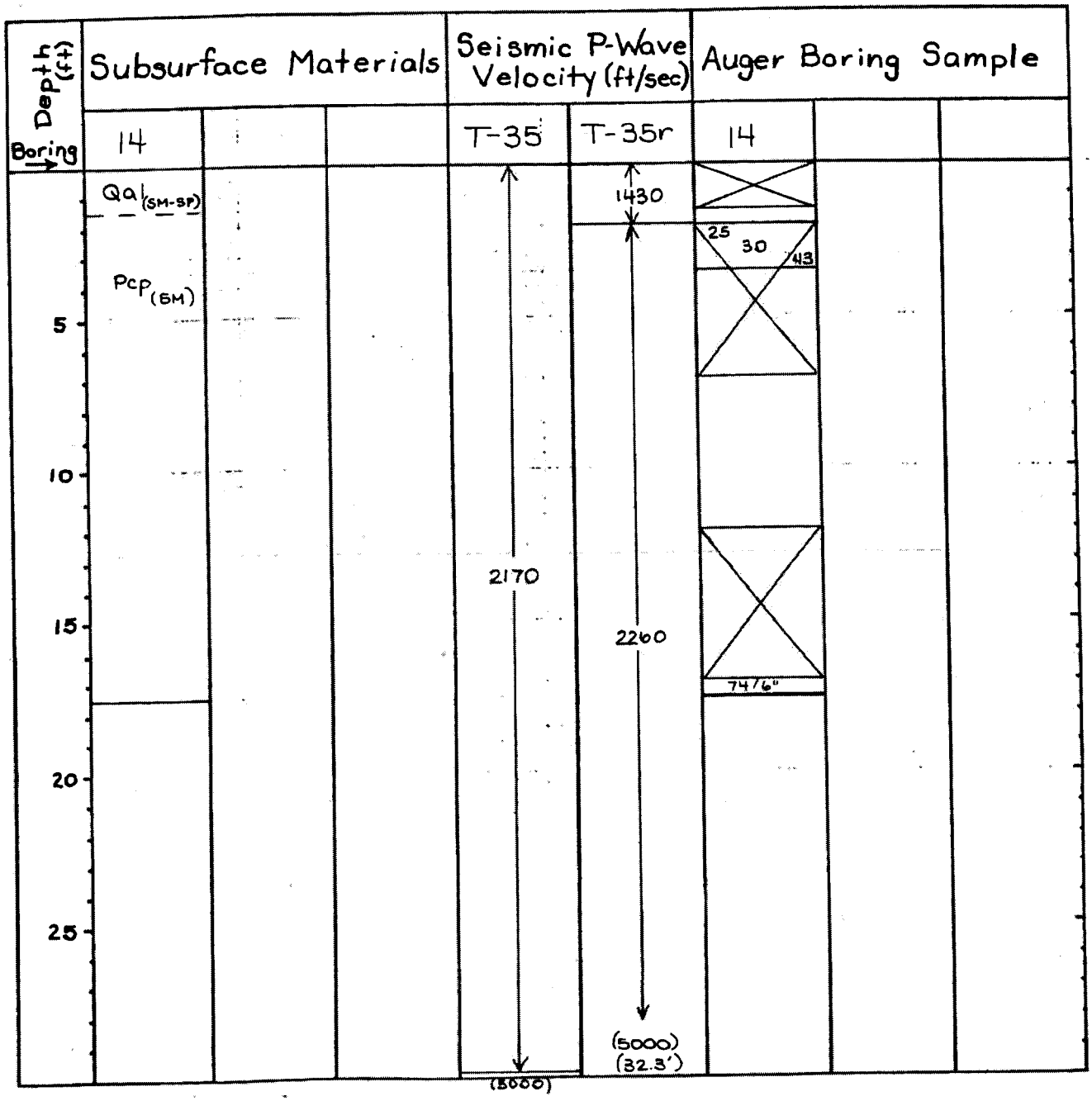
Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site near 298-1



LEGEND:

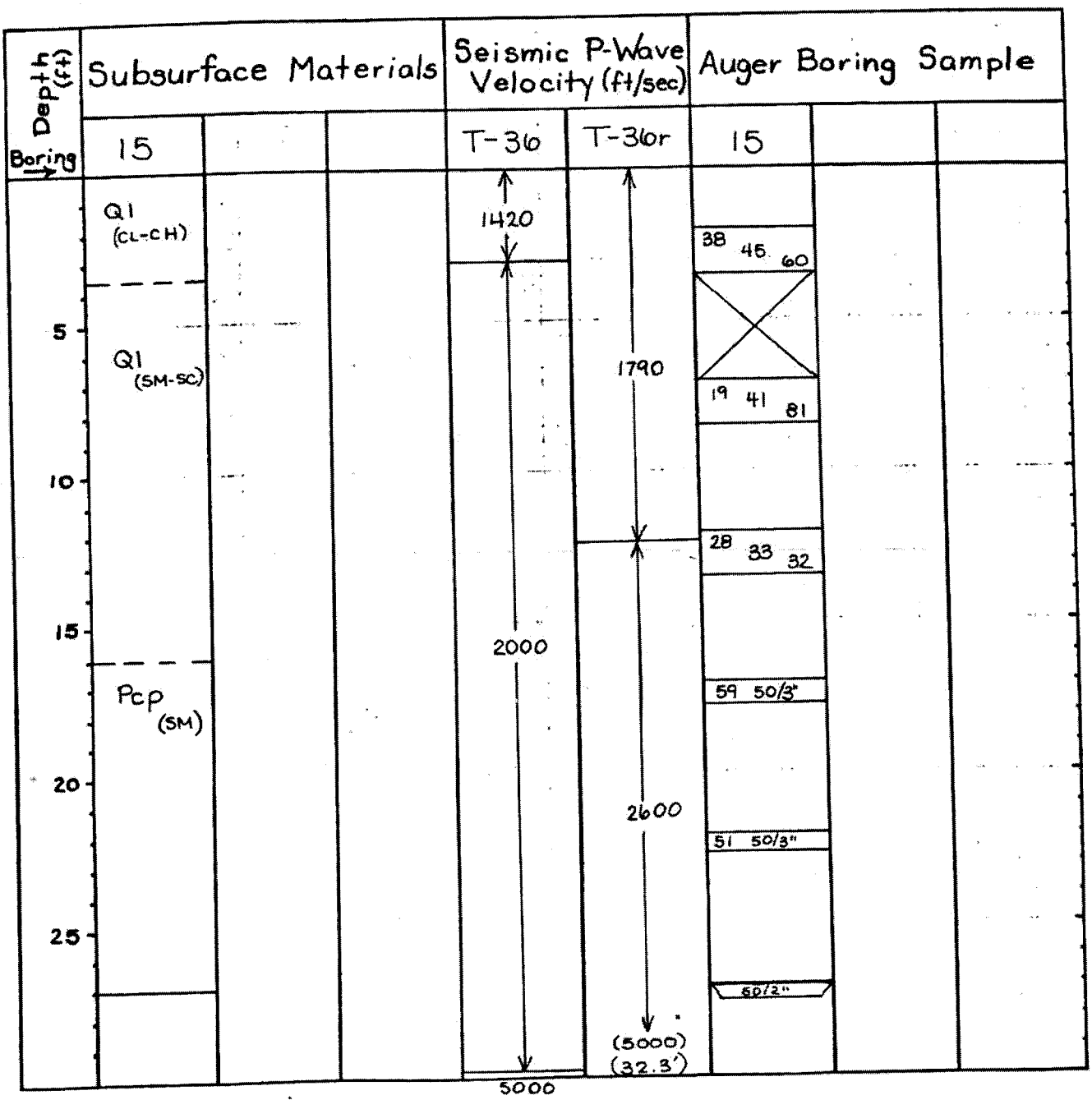
Bag Sample

5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site near 300-1



LEGEND:

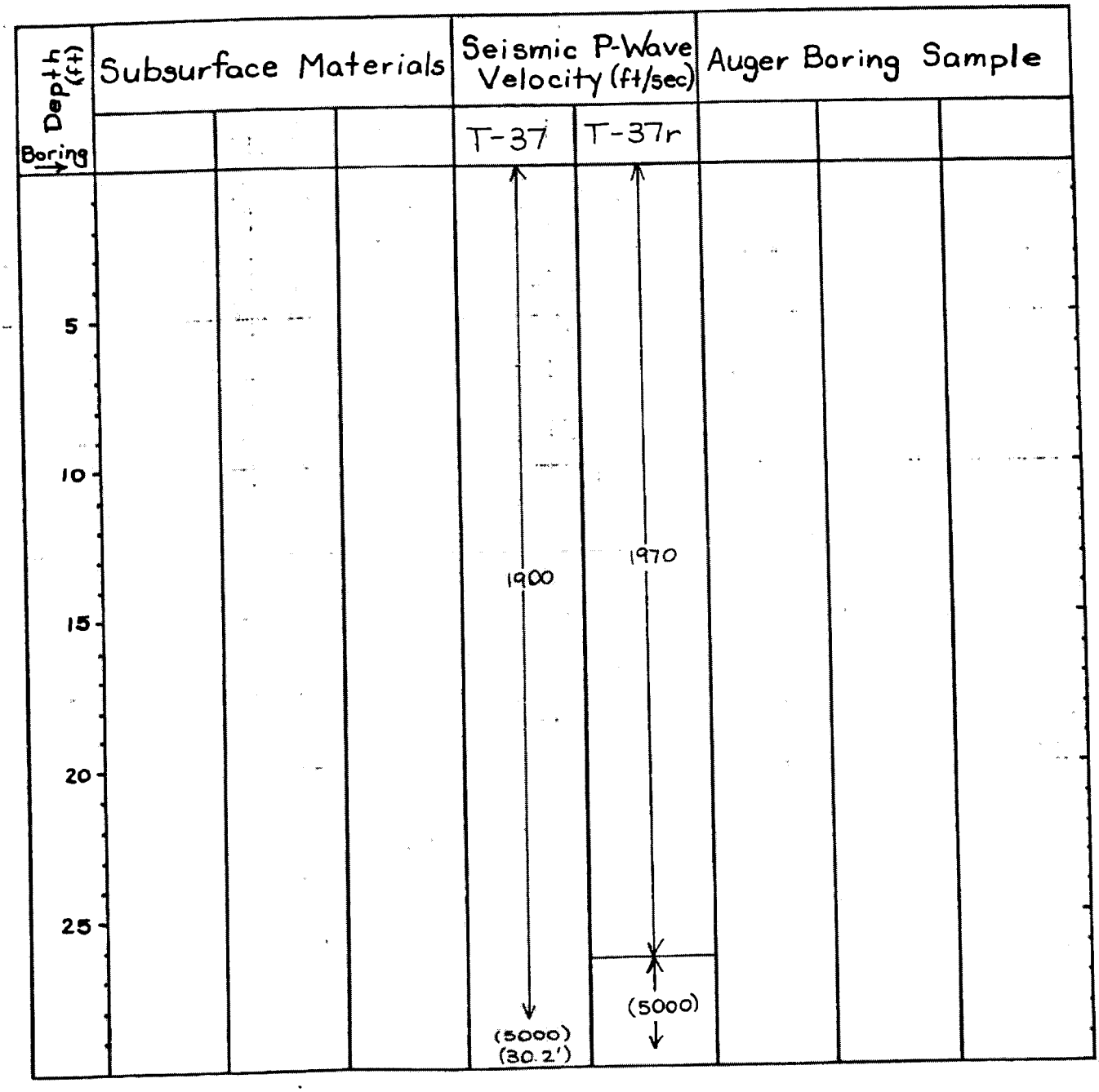
- Bag Sample
- 5 6 7 Mod. CA Blowcount

} Auger Boring Sample

WCC. 591251

SUBSURFACE INVESTIGATION SUMMARY

near
Tower Site 305-1



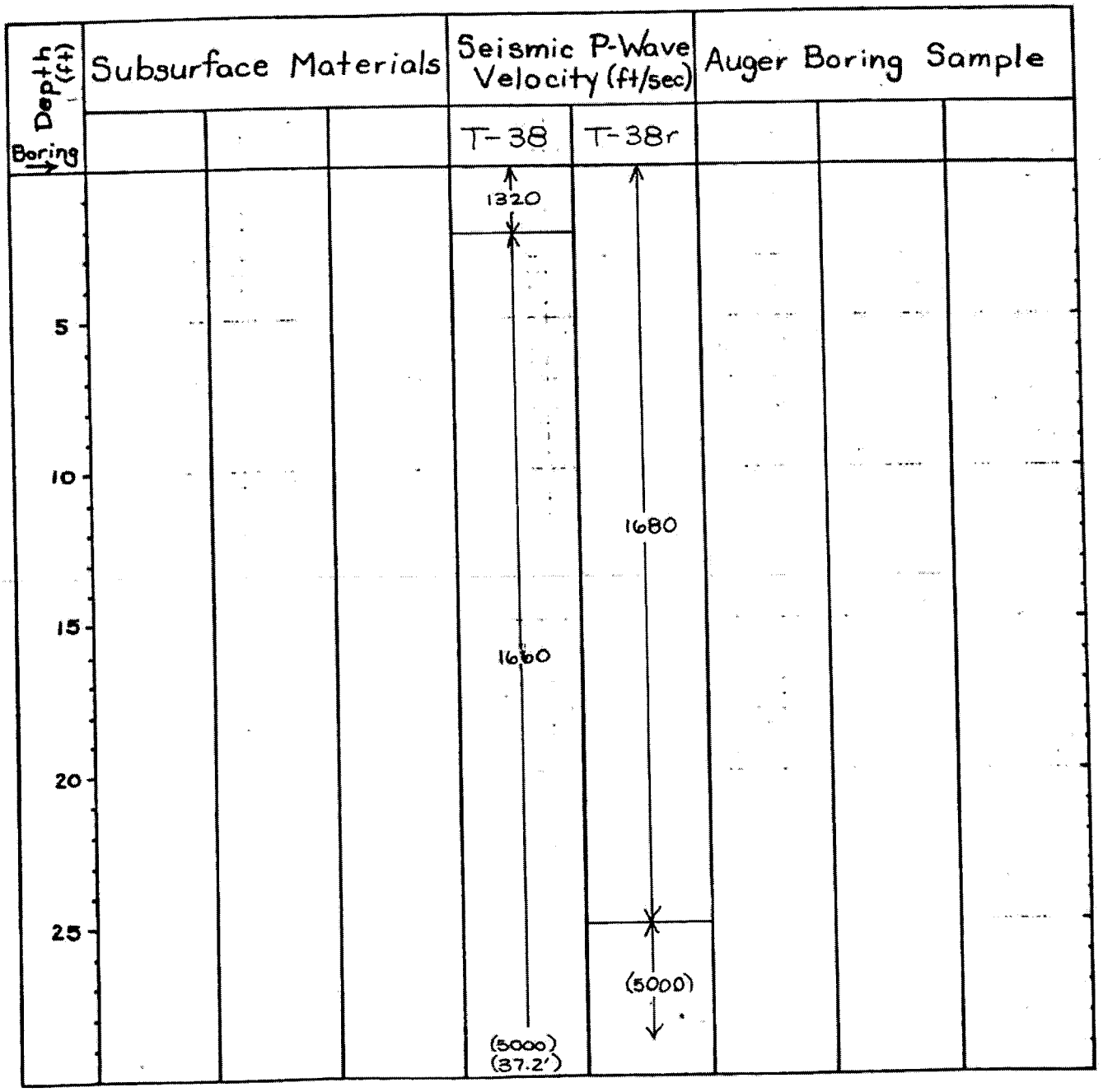
LEGEND:

- Bag Sample
- 5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site near 310-1



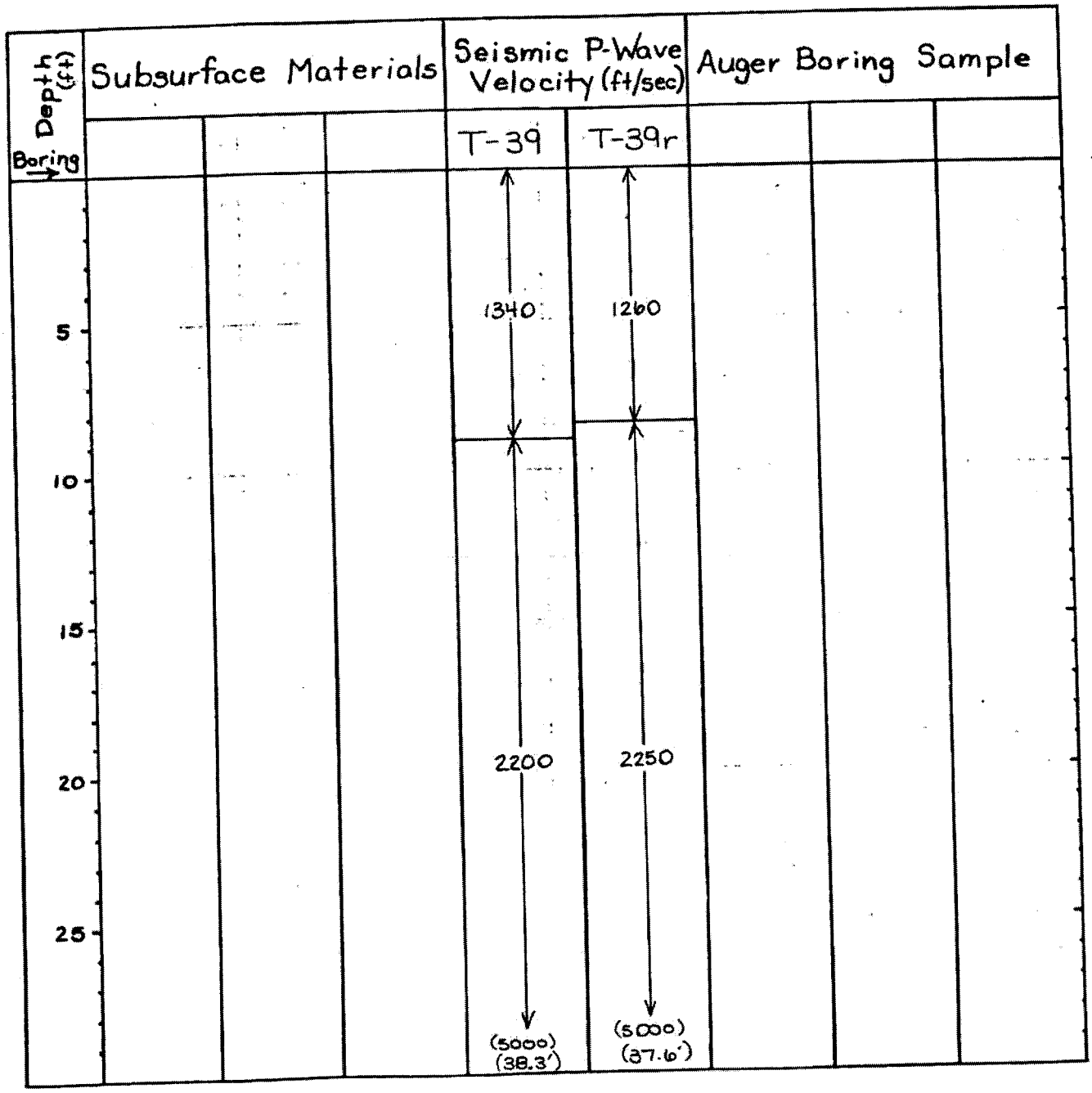
LEGEND:

- Bag Sample
- 5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 312-1



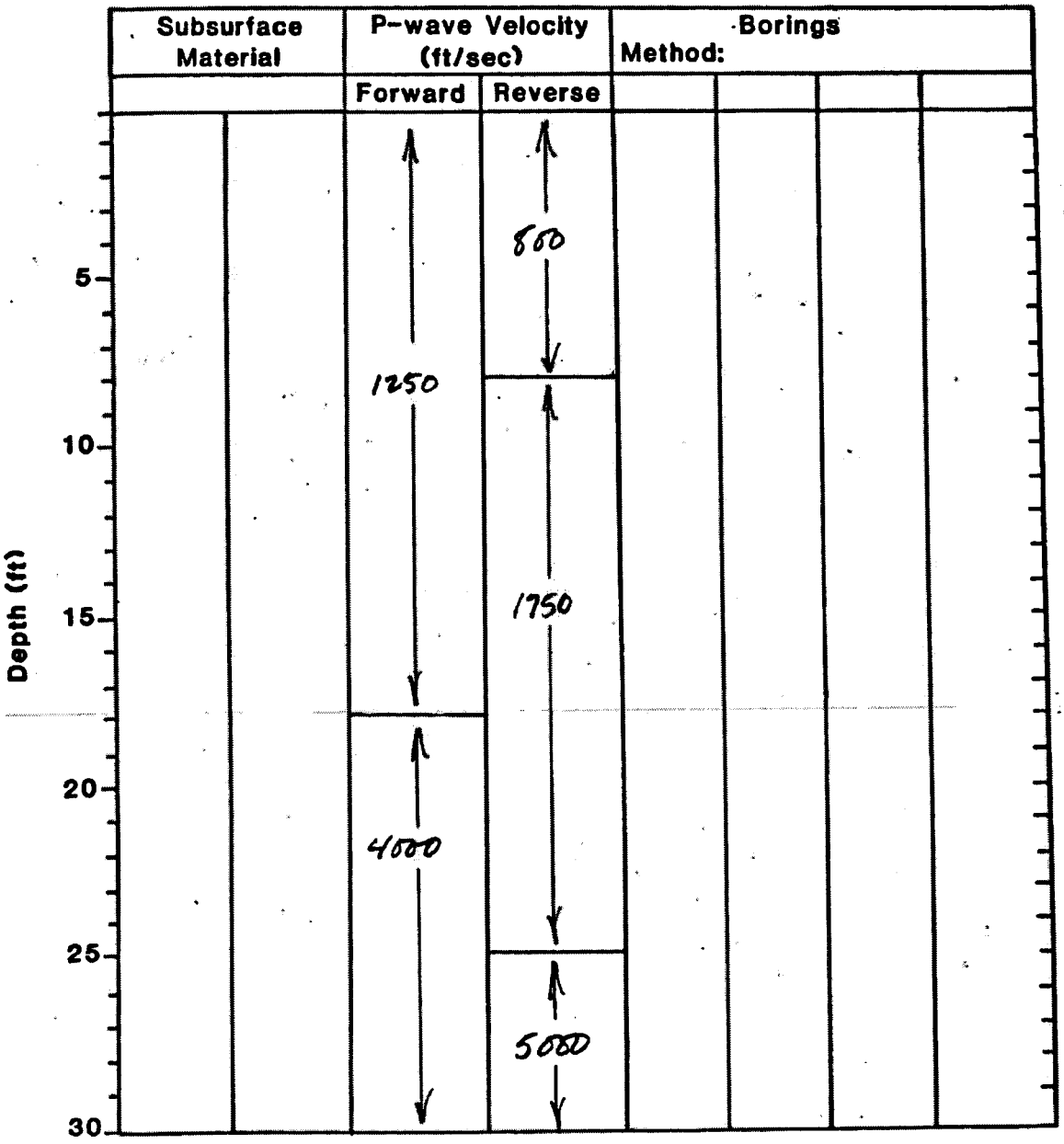
LEGEND:

- Bag Sample
- 5 6 7 Mod. CA Blowcount

} Auger Boring Sample

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 195-1



LEGEND:

Bag Sample

5 6 7 Mod. CA Drive Sample

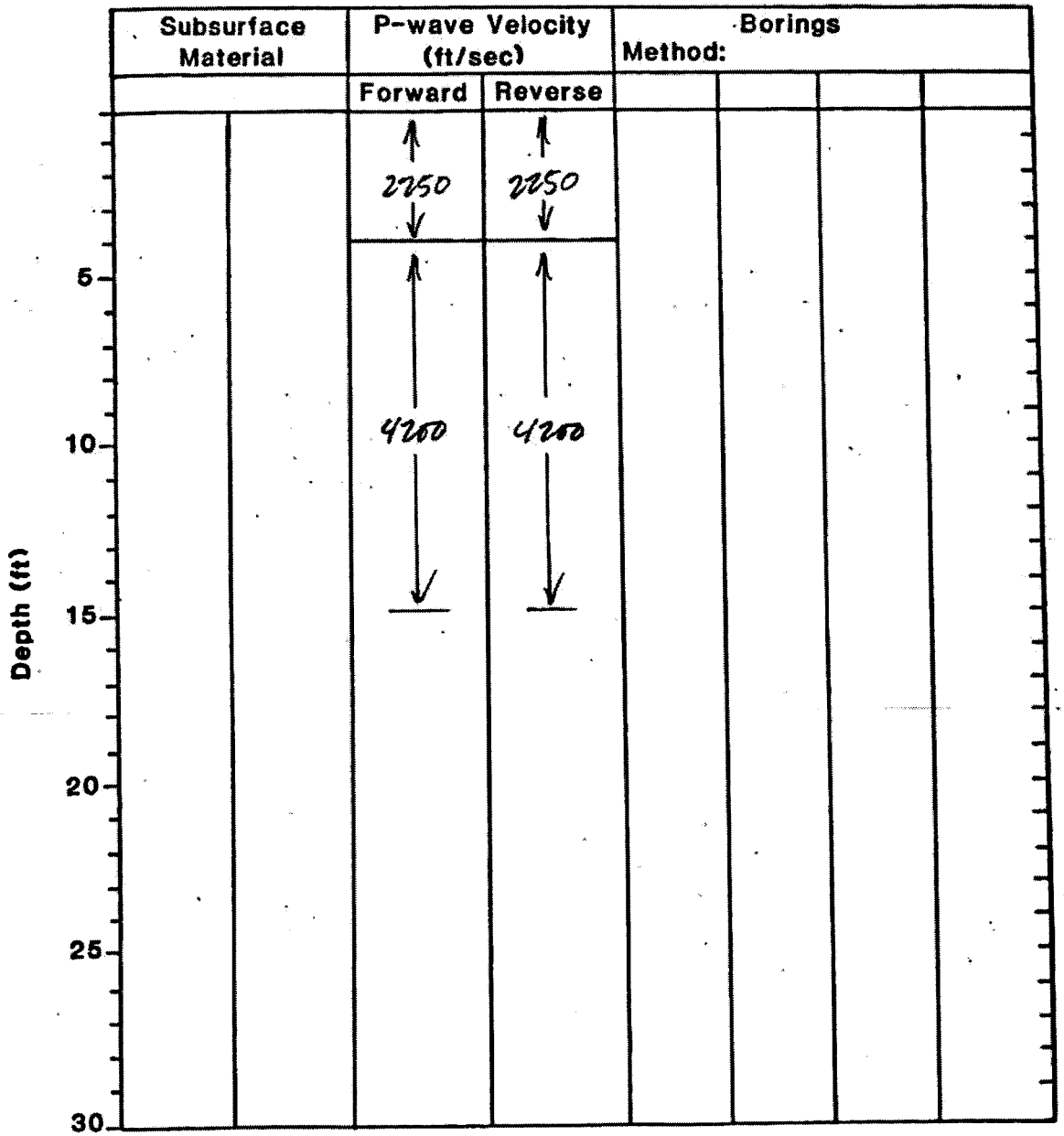
} Auger Boring Sample

JOB NO: 591253

Woodward-Clyde Consultants

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 196-3



LEGEND:

Bag Sample

5 6 7 Mod. CA Drive Sample

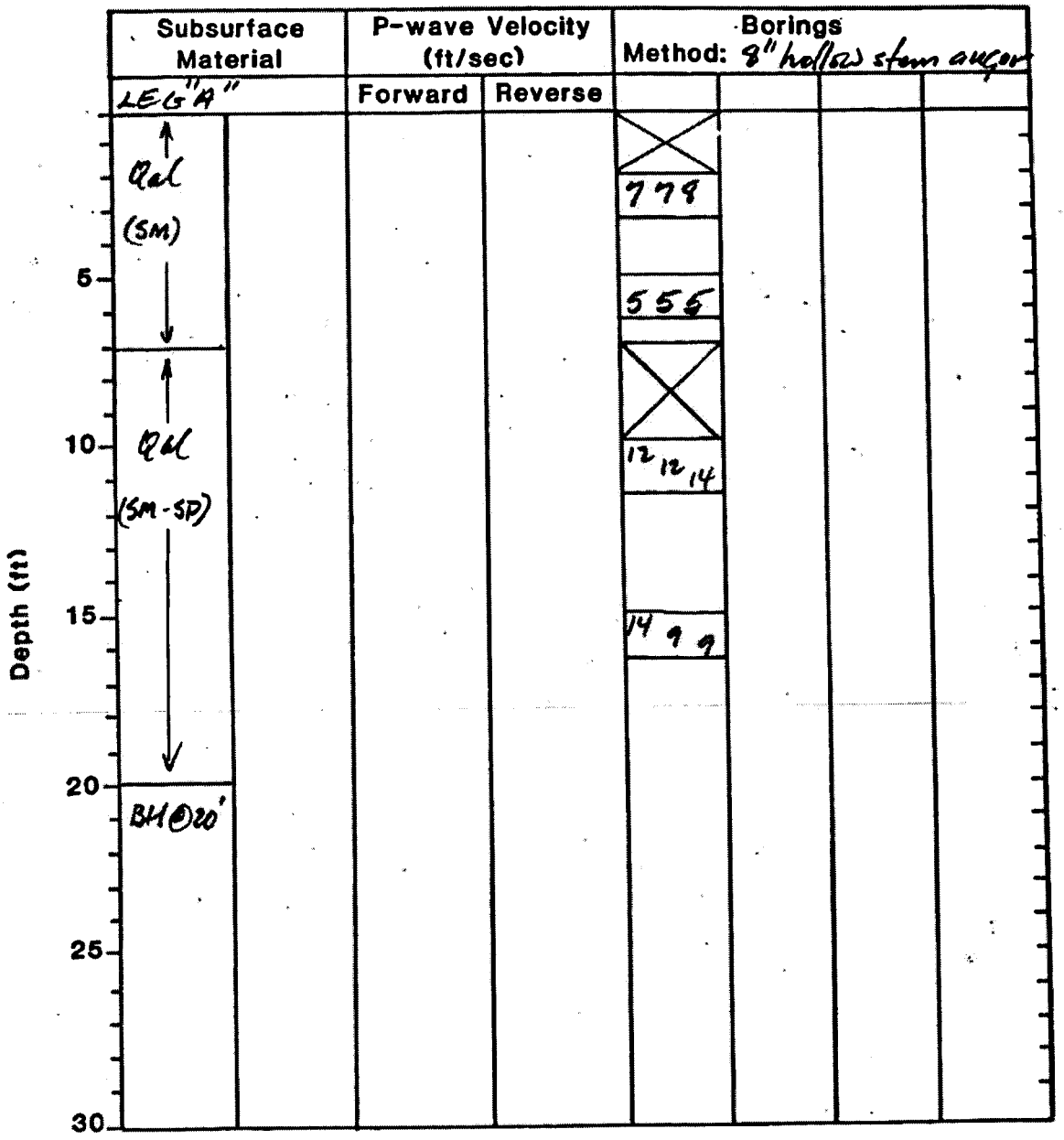
} Auger Boring Sample

JOB NO: 591253

Woodward-Clyde Consultants

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 201



LEGEND:

Bag Sample

5 6 7 Mod. CA Drive Sample

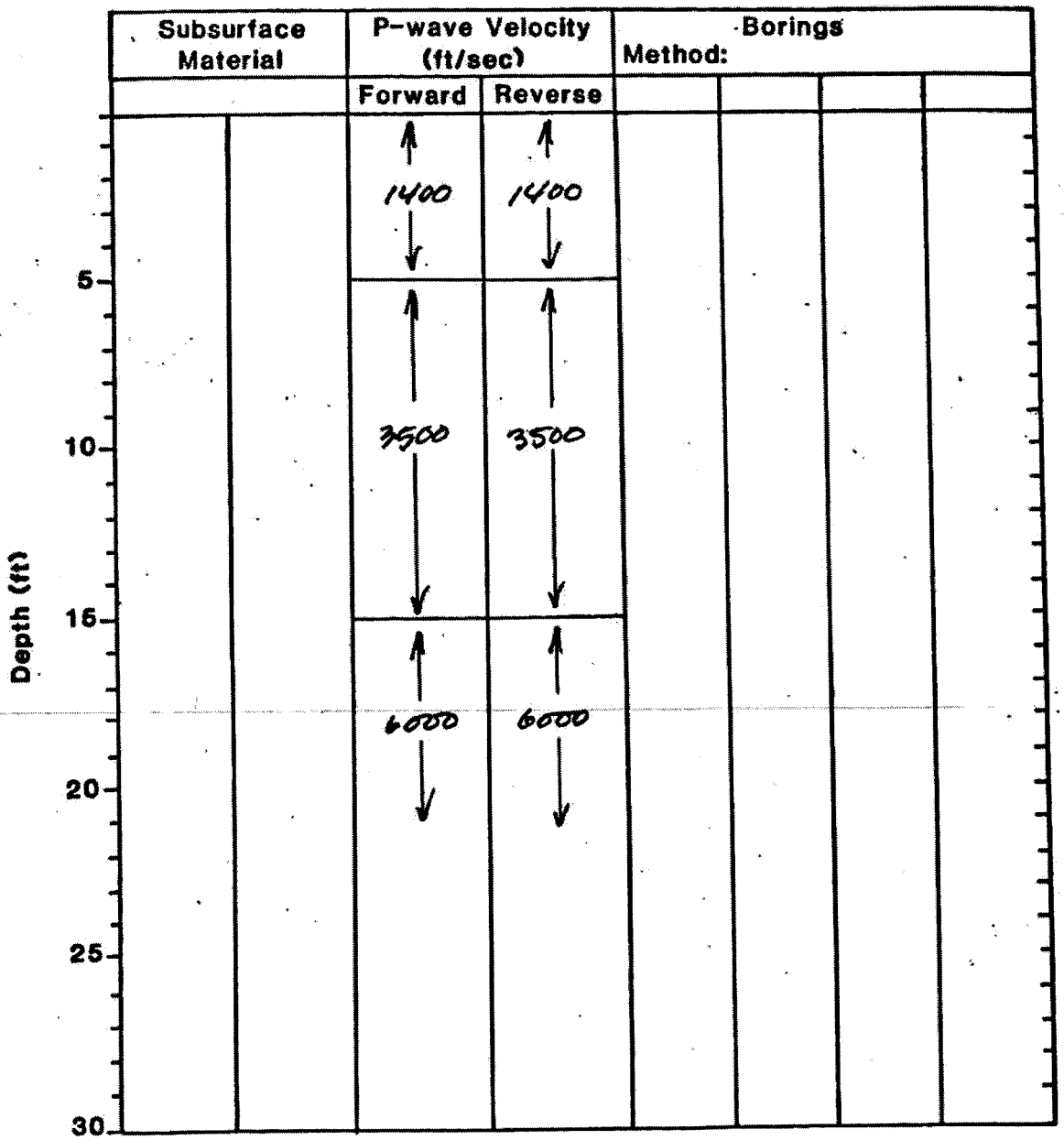
} Auger Boring Sample

JOB NO: 59125 3

Woodward-Clyde Consultants

SUBSURFACE INVESTIGATION SUMMARY

Tower Site 804-2



LEGEND:

Bag Sample

5 6 7 Mod. CA Drive Sample

} Auger Boring Sample

JOB NO: 591253

Woodward-Clyde Consultants

FOUNDATION BORING REPORT

Str. No. (193)

LEMCO ENGINEERS, INC.

RECEIVED MAR 2, 1983 LEMCO JAMUL

(02A)

PROJECT TITLE 500 KV. Mig - F.V. SUBSTATION NO. 558970

CONTRACTOR COMMON WEALTH (OWL) TEMPERATURE 50's WEATHER CLOUDY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY ____ LEVEL ____

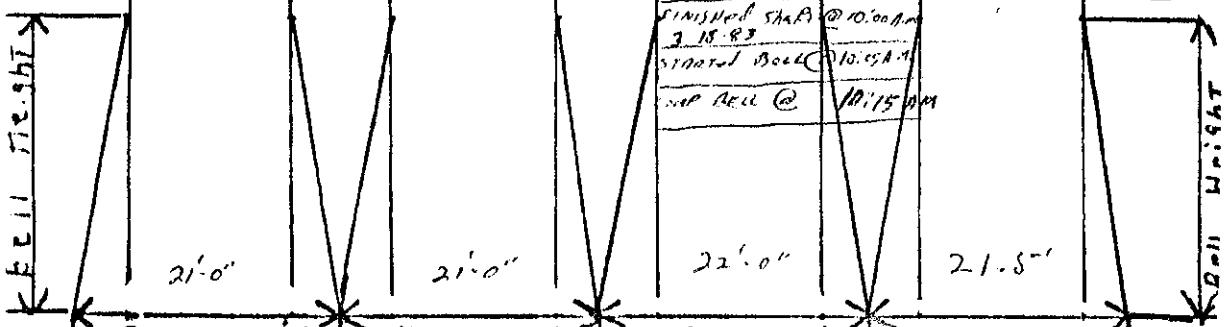
WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) ____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): D6B1 60"/21' D6B1 60"/21' D6B1 60"/21' D6B1 60"/21'

STR. A 8'0" BELL STR. B 8'0" BELL STR. C 8'0" BELL STR. D 8'0" BELL

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.	68" Ø	Ft.	68" Ø	Ft.	68" Ø	Ft.	
STARTED 3-17-83 12:30 P.M.	3	STARTED 3-17-83 2:15 PM	3	STARTED 3-18-83 7:00 A.M.	3	STARTED 3-18-83 11:00 AM	3
CLAY MIXED WITH COBBLES	0' CL 2' CO	CLAY	0' 2' CL	STARTED 7:30 A.M. 3-18-83		CLAY	0' CL 3'
@ 2' - SANDY TEXT., BROWN IN COLOR CLAY STILL PRESENT FEW COBBLES	2' CL 5' SA 5' CO	CLAY, COBBLES	2' CL 4' CO	STARTED 9:15 A.M. 3-18-83		CLAY, SAND AND SMALL COBBLES	3' CL 5' SA 6' CO
@ 5' - COBBLES, SAND MIXED WITH BROWN SAND SLIGHTLY LIGHTER IN COLOR	5' CO 21' SA GR	SAND	4' SA 5' SA	CLAY	0' 2' CL	SAND MIXED WITH SMALL TO MED. SIZE COBBLES	6' SA. CO 15'
FINISHED SHAFT @ 1:20 P.M. 3-17-83		SAND, COBBLES SAND MED. BROWN IN COLOR	5' SA CO 10'	CLAY, SAND AND FEW COBBLES	2' CL SA CO 4'	SAND WITH MEDIUM TO LARGE Cobbles	15' 21.5'
STARTED BELL @ 1:40 P.M.		LARGE COBBLES MIXED WITH VERY LIGHT COLORED SAND	10' 19'	@ 4' HITTING ALMOST ALL SAND, FEW COBBLES	4' SA 9'		
COMP. BELL @ 1:58 P.M.		SAND	19' SA 21'	@ 8' HITTING LARGE COBBLES SAND GETTING LIGHT IN COLOR	8' CO SA 15'	FINISHED SHAFT AT 12:10 PM	
		FINISHED SHAFT @ 2:58 P.M.		@ 15' MOSTLY SAND VERY LIGHT IN COLOR FEW COBBLES, SMALL IN SIZE	15' SA CO 21'	STARTED BELL AT 12:45 PM	
		STARTED BELL @ 3:05 P.M.		FINISHED SHAFT 3-18-83 @ 10:00 A.M.		FINISHED BELL AT 1:05 PM	
		COMP. BELL @ 3:30 P.M.		STARTED BELL @ 10:05 A.M.			
				COMP BELL @ 10:15 A.M.			



Dia. of Bell 96 IN. Bell Dia. 96 IN. Bell Dia 96 IN. Bell Dia. 96 IN.

Bell Height 30 IN. Bell Height 32 IN. Bell Height 32 IN. Bell Height 32 IN.

L.F. Rock — L.F. Rock — L.F. Rock — L.F. Rock —

REMARKS:

B-58 = 4

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

✓ AMD 3/25/83

References LOMS. 3-21-83

Str. No. 193

Sta. No. 2565 + 61.86

Str. Type EHA

CONT. REPR. C. E. [illegible]

LEMCO REPR. Charles W. Harris

DATE 3-17-83

RECEIVED
MAR 29 1983
LEMCO JAMUL

FOUNDATION BORING REPORT

LEMCO ENGINEERS, INC.

Str. No. 194 (22A)

PROJECT TITLE 500 KV G-J.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMONWEALTH (CWL) TEMPERATURE Cool± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ✓ CULTIVATED ____ OTHER (DESCRIPTION) ____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DBB3L 3.5'/18.0' DBB3L 3.5'/18.0' DBB3L 3.5'/18.0' DBB3L 3.5'/18.0'

STR. A 6.5' BELL | STR. B 6.5' BELL | STR. C 6.5' BELL | STR. D 6.5' BELL

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. 3.22.83.	3.8'ϕ	3.23.83 Ft. 2.55 PM.	3.7'ϕ	9.15 A.M. Ft. 3.23.83.	43"ϕ	12.45 PM Ft. 3.23.83	3.7'ϕ
DK. BROWN SURFACE SOIL/CLAY SOME GR.	CL. GR.	DK. BROWN SURFACE SOIL/CLAY		DK. BROWN SURFACE SOIL/CLAY SOME GR. & CO. 10"ϕ	CL. CO. GR.	DK. BROWN SURFACE SOIL & GR.	CL. GR.
1FT. FIRM & SLIGHTLY CEM. SAND STONE. REDDISH IN COLOR. SOME D.G. CEMENTED	SA. D.G.	1FT. FIRM & SLIGHTLY CEMENTED SAND/D.G. REDDISH/BROWN IN COLOR. SOME CO. 8"-12"ϕ		1FT. FIRM & SLIGHTLY CEM. SAND STONE. REDDISH IN COLOR SOME D.G.	SA. SA.	1FT. REDSAND & CLAY SOME CEMENT IN CHUNKS	SA. CL.
6FT. MATERIAL VERY WHITE. AUGER BREAKS TO FINE SAND SOME GR. AND CEMENTING	GR.	9FT. SAND IS MORE YELLOW STILL FIRM. AUGER BRING MATERIAL TO SAND SOME CEMENTING		8FT. MATERIAL VERY WHITE. AUGER BREAKS IT TO SAND. SOME SMOOTH CO. 8"-10"ϕ	SA. CO.	4FT. BROWN/WHITE COLOR. SOME SMALL CO. 4"-6"ϕ. VERY FIRM W/ SOME CEMENTING AUGER BREAKS MATERIAL TO SAND.	SA.
SHAFT COMPL. 3.28.83 BELL COMPL. 3.28.83		SHAFT COMPL. 3.10 PM. 3.23.83.		SHAFT COMPL. 9.45 A.M. BELL COMPL. 10.30 A.M. 3.23.83.		SHAFT COMPL. 12.55 A.M. BELL COMPL. 1.30 PM. 3.23.83.	

Bell Height

19.2' | 18.0' | 18.2' | 19.5'

Bell Height

Dia. of Bell 78 IN. | Bell Dia. 78' IN. | Bell Dia 78 in. | Bell Dia. 78 in.

Bell Height 48 in. | Bell Height 48 in. | Bell Height 48 in. | Bell Height 48 in.

L.F. Rock | L.F. Rock | L.F. Rock | L.F. Rock

REMARKS: WATSON 7000 DRILL RIG

Sag Item B-55 = 4

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

✓ AMD 3/29/83

References DMS 3-29-83

CONT. REPR. A. J. Blevins

LEMCO REPR. Christopher Shafer (JR)

Str. No. 194

Sta. No. 2580+81.98

Str. Type EMT

DATE 3.28.83

FOUNDATION BORING REPORT

Str. No. 195 (02A)

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 KV. M.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (CAL) TEMPERATURE 50°± WEATHER Cloudy Light Rain

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY ___ LEVEL X

LEMCO-JAMUL WOODS/ORCHARD ___ CULTIVATED ___ OTHER (DESCRIPTION) ___

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF (YES) NO

FDN. TYPE (SPEC.): CBBL 3.5'/12' 6.5'ØB | CBBL 3.5'/12' 6.5'ØB | CBBL 3.5'/12' 6.5'ØB | CBBL 3.5'/12' 6.5'Ø

STR. A		STR. B		STR. C		STR. D (3.5/13')	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
3-14-83 Ft. 8:26 AM.	42"Ø	3-14-83 Ft. 10:55 A.M	42"Ø	3-14-83 Ft. 1:30 P.M.	42"Ø	3-14-83 Ft. 10:10 AM.	42"Ø
0'-3' WET CLAY W/ SAND	CL SA	0-7.6' Clay W/SAND Top Bell 7.6'	42"Ø	0-8.5' CLAY W/SAND & Some Cobbles 1" to 3"Ø	CL SA CO	0'-4.8' WET CLAY W/SAND Some Rock 12" ZM Ø	CL SA RO
3'-8.2' DRY LT BROWN CLAY W/SAND Top of Bell 8.2'	CL SA 42"Ø	7.6-12.4' Clay W/SAND Bottom Bell 12.4'	78"Ø	Top Bell 8.5'	42"Ø	3.8-4.8' 1 Rock 4.8 10:48 AM Stopped 3-14-83	DM 1493
8.2-12.5' DRY LT BROWN CLAY W/SAND Bottom Bell 12:5	CL SA 78"Ø	3-14-83 12:30 P.M		CLAY W/SAND Some Cobbles 8.5-13' Bottom Bell 13'	CL SA CO 78"Ø	4-6-83 10:40 A.M.	
3-14-83 9:39 AM				3-14-83 2:52 P.M.		BOULDERS 28"-30"Ø SOME SMALLER 12"-14"Ø 4.8'-6.8'	BO
						6.8' SMALL BOULDERS 4"-12"Ø MIXED W/ CLAY & SAND	BO CL SA
						12' HIT ROCK VERY SLOW 9:58 ANDERSEN 4-7-83 10:34 A.M. STARTED COMPLETED SHAFT @ 10:50 am.	RO STOPPED
Bell Height 12.5'		12.4'		13.0'		13.4'	Bell Height
Dia. of Bell 78"Ø IN.		Bell Dia. 78" IN.		Bell Dia 78" IN.		Bell Dia. - IN.	
Bell Height 4.3'		Bell Height 4.7'		Bell Height 4.5'		Bell Height - IN.	
L.F. Rock NA		L.F. Rock NA		L.F. Rock NA		L.F. Rock 4	

REMARKS: Dug w/ WATSON 2000

LEG "D" BELLED @ 10.5' DUE TO ROCK COULD NOT BELL DUE TO ROCK EXPOSED WHILE BELLING. E.C.O. # NOW SAYS TO DRILL TO 13' W/O BELL.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

4-8-83

References ECO # 55F 266 "D" ONLY
AND 4/11/83

Str. No. 195

Sta. No. 2596+27.03

Str. Type EMT

CONT. REPR. ___

LEMCO REPR. Charles W. Hansen DATE 4-7-83

FOUNDATION BORING REPORT

Str. No. 196

LEMCO ENGINEERS, INC.

OZA

PROJECT TITLE 500 KV. M.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMONWEALTH (OWL) TEMPERATURE _____ WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ✓ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT BRUSH

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): CBA2 4.5'/14.0' CBA2 4.5'/14.0' CBA2 4.5'/14.0' CBA2 4.5'/14.0'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
4.4.83 Ft. 2.05 PM	5.3'ϕ	4.5.83 Ft. 8.47 AM.	5.5'ϕ	4.6.83 Ft. 7.40 A.M.	5.6'ϕ	4.4.83 Ft. 1.37 PM.	5.3'ϕ
LOOSE FR. 1"-6"ϕ & SURFACE SOIL	FR	LOOSE FR. 1"-8"ϕ SOME DARK BROWN SURFACE SOIL	FR	LOOSE FR. 1"-8"ϕ. SOME DARK BROWN SURFACE SOIL.	FR	LOOSE FR. 1"-8"ϕ SOME SOIL MIXED.	FR.
7FT. HIT VERY BEIGE FR. SLOW DRILLING	FR	5FT. HIT VERY HARD & BEIGE FR. SLOW DRILLING	FR.	3FT. HIT VERY HARD FR. SEEMS TO BE IN CEMENTED LAYERS. SLOW DRILLING.	FR.	6FT. HIT MORE BEIGE FR. SLOW DRILLING. OPERATOR CHISELED AT LAYER	FR.
SHAFT COMPL. 8.27 AM. 4.5.83.	Depth	SHAFT COMPL. 11.34 AH. 4.5.83.	Depth	10FT. AUGER UNABLE TO BREAK THRU. HAS TO BE BLASTED	RO. RO.	SHAFT COMPL. 4.17 PM. 4.5.83.	
				4.7.83 SHAFT COMPL.			

Bell Height

Bell Height

14.2' 14.0' 14.0' 14.25'

I.B. of Bell — IN.	Bell Dia. — IN.	Bell Dia — IN.	Bell Dia. — IN.
Bell Height — IN.	Bell Height — IN.	Bell Height — IN.	Bell Height — IN.
L.F. Rock 7	L.F. Rock 9	L.F. Rock 11	L.F. Rock 8 L.F.

REMARKS: WATSON 3000 "A", "B", "C", WATSON 2000 "D"

LEG "B" - ON LOW SIDE OF HOLE A LAYER OF ROCK IS EXPOSED

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References V AHD 4/14/83

CONT. REPR. _____

LEMCO REPR. _____

Str. No. 196

Sta. No. 2609+35.0

Str. Type EMT

DATE 4.5.83

WMS 4-8-83

RECEIVED
APR 08 1983
LEMCO-JAMUL

FOUNDATION BORING REPORT

Str. No. 197 (02A)

LEMCO ENGINEERS, INC.

APR 06 19[illegible] PROJECT TITLE 500 KV. Mic - F.V. SUBSTATION W.O. NO. 5583970

LEMCO-JAMUL CONTRACTOR COMMON WEALTH (CWL) TEMPERATURE 60's± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ✓ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT BRUSH

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): CCA2 4.5'/15.0' CCA2 4.5'/15.0' CCA2 4.5'/15.0' CCA2 4.5'/15.0'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
3.15.83 Ft.	5.3'ϕ	2. Ft. 4.[illegible].83 1.05PM.	5.3'ϕ	4.4.83 Ft. 11.30 AM.	4.9'ϕ	4.4.83 Ft. 8.90 A.M.	5.0'ϕ
DARK BROWN SURFACE SOIL W/. FRAGMENTS OF ROCK 1"-4"ϕ SOME CO. 5"-18"ϕ	GR. CL. SI.	DARK BROWN SURFACE SOIL W/. FRAGMENT OF ROCK 1"-3"ϕ	GR. CL.	DARK BROWN SURFACE SOIL W/. FRAGMENTS OF ROCK 1"-3"ϕ SOME CO. 8"ϕ	CO. GR. CO.	DARK BROWN SURFACE SOIL W/. FRAGMENTS OF ROCK 1"-6"ϕ 1 OR 2 SURFACE BOULDERS	BO. GR. CL.
3FT. HIT ROCK HAS TRACES OF YELLOW/ WHITE SILT AND CLAY LAYERED IN SIDE.	SI. FR. CL. FR.	1FT. SOME MASSIVE BOULDERS 24"-36"ϕ. MATERIAL LOOKS VOLCANIC IN ORIGIN WITH TRACES OF WHITISH/ YELLOW SILT. AUGERS TO CHUNKS 4"-8"ϕ	CL. (1.F.) SI.	6FT. HIT ROCK. FRACTURED WHEN AUGERED. HAS TRACES OF SILT & CLAY. CHUNKS 8" W/. GR. 1"-4"ϕ VERY SLOW DRILLING	FR. GR. FR.	1FT. CLAY W/. HEAVILY FRAG. ROCK 1"-3"ϕ APPEARS ANGULAR. AUGERS SLOW.	BR. CL. GR.
SHAFT COMPL. 2.10PM/4.5.83		2FT. SLOW DRILLING HIT ROCK THAT FRACTURES SAME COMPOSITION AS ABOVE. WHEN AUGER BREAKS TO CHUNKS, MATERIAL SEEMS TO HAVE HIGH CLAY CONTENT.	SI. FRO. CL.	SHAFT COMPL. 2.10/4.4.83.		6FT. YELLOW SILTY MATERIAL MIXING. HIGH F.R. CONTENT	FR. CL. SI.
		SHAFT COMPL. 4.30PM/4.5.83				9FT. GREY/ BURGUNDY COLORED MATERIAL. SOME CO. 8"-10"ϕ LOOKS VOLCANIC IN ORIGIN	CO. FR. SI.
						13FT. HIT VOLCANIC ROCK. APPEARS FRACTURED WHEN AUGERED.	RO.
						SHAFT. COMPL. 11.15AM./4.4.83.	

Bell Height — Bell Width

15.0' 15.0' 15.0' 15.0'

Dia. of Bell 0 IN.	Bell Dia. 0 IN.	Bell Dia 0 IN.	Bell Dia. 0 IN.
Bell Height 0 IN.	Bell Height 0 IN.	Bell Height 0 IN.	Bell Height 0 IN.
L.F. Rock 12	L.F. Rock 14	L.F. Rock 9	L.F. Rock 9

REMARKS: * LEG "B" AS OPERATOR DRILLED ROCK, LAYERS OF CLAY AND SILT WERE FOUND SANDWICHED BETWEEN. THIS HOLDS TRUE FOR REMAINING STR. LEGS. - HOLES "A", "B" WERE BLASTED THEN CLEAN TO DEPTH, "C" & "D" AUGERED - WATSON 3000 + BULLET AUGER + BULLET REAMER.

DMS 4-5-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AND 4/20/83

CONT. REPR. [signature]

LEMCO REPR. [signature]

Str. No. 197

Sta. No. 2618+23.52

Str. Type EHT

DATE 4.5.83

FOUNDATION BORING REPORT

Str. No. 198

LEMCO ENGINEERS, INC.

024

PROJECT TITLE 500 KV. M.G - I.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (CWL) TEMPERATURE _____ WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL ✓

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) MESA

RECEIVED RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

MAY 23 1983 FDN. TYPE (SPEC.): DCA1 5.0'/22.0'

LEMCO-JAMUL

* STR. A		* STR. B		* STR. C		* STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. 8.30 AM. 5.18.83	5.6'ϕ	Ft. 1.15 AM. 5.18.83.	5.6'ϕ	10.30AM Ft. 5.18.83	5.6'ϕ	2.30PM Ft. 5.18.83	5.6'ϕ
VERY FINE/ SILTY SURFACE SOIL. DARK BROWN COLOR.	SI. CL.	VERY FINE SILTY SURFACE SOIL. DARK BROWN IN COLOR.	SI. CL.	VERY FINE SILTY SURFACE SOIL. DARK BROWN IN COLOR.	SI. CL.	VERY FINE SILTY SURFACE SOIL. DARK BROWN IN COLOR.	SI. CL.
2 FT. CLAY SHEAR IN SHAFT. VERY DAMP. LARGE COHESIVE GLOBS WITH SAND POCKETS. 12FT (PERCHED?) WATER TABLE.	SA. SI. CL. ▽	1 FT. CLAY SHEAR ON SHAFT WALL. VERY DAMP. LARGE COHESIVE GLOBS WITH SAND POCKETS. 12 FT. (PERCHED?) WATER TABLE.	SA. SI. CL. ▽	1FT. CLAY SHEARING ON SHAFT WALL. VERY DAMP. LARGE COHESIVE GLOBS WITH SAND POCKETS. 12FT. (PERCHED?) WATER TABLE.	SA. SI. CL. ▽	1FT. CLAY SHEARING ON SHAFT WALL. VERY DAMP. LARGE COHESIVE GLOBS WITH SAND POCKETS. 12 FT. (PERCHED?) WATER TABLE.	SA. SI. CL. ▽
14FT. VERY SILTY/ SANDY & UNSTABLE. REDESIGNED TO 5.5'ϕ X 18.0' DEEP. PLACE BELL AT 16.0FT & CONTINUE TO DEPTH.	SA. CL. SI.	13FT. SILTY/SAND. VERY UNSTABLE STILL HIGH CLAY CONTENT REDESIGNED TO 5.5'ϕ X 18.0' DEEP. PLACE BELL @16.0FT AND CONTINUE TO DEPTH.	SA. CL. SI.	13FT. SILTY/SAND VERY UNSTABLE STILL HIGH CLAY CONTENT. SHAFT REDESIGN TO 5.5'ϕ X 18.0' DEEP PLACE BELL @16.0FT AND CONTINUE TO DEPTH.	SA. SI. CL.	14 FT. SILTY/SAND. VERY UNSTABLE STILL HIGH CLAY CONTENT. SHAFT REDESIGN TO 5.5'ϕ X 18.0' DEEP. PLACE BELL @ 16.0' AND CONTINUE TO DEPTH.	SA. SI. CL.
SHAFT & BELL COMPL. 10.00AM/5.18.83		SHAFT COMPL. 2.00PM/5.18.83		SHAFT COMPL. 11.00AM./5.18.83		SHAFT COMPL. 3.45 PM/5.18.83	

Depth

Depth

Depth

Depth

18.0'

Bell Dia 108 in. Bell Dia 108 in. Bell Dia 108 in. Bell Dia 108 in.

Bell Height 72 in. Bell Height 72 in. Bell Height 72 in. Bell Height 72 in.

L.F. Rock L.F. Rock L.F. Rock

REMARKS: WATSAN NEED.

WATER TABLE IS AT 12.00 FT DEPTH AND IS PROBABLY AT THIS LEVEL YEAR ROUND. BOTTOM OF SHAFT APPEARED VERY WET LIKE WHEN TAMPED WITH AUGER.

RECEIVED

MAY 20 1983

LEMCO-MIGUEL

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References VANN 5/25/83

Str. No. 198

CONT. REPR. _____ Sta. No. 26038+90.00

LEMCO REPR. _____ Str. Type ELF

DATE 5.18.83

FOUNDATION BORING REPORT **RECEIVED** Str. No 199

LEMCO ENGINEERS, INC. MAR 10 1983

PROJECT TITLE 500 K.V. M.G - I.V. SUBSTATION W.O. No. 5583970

CONTRACTOR COMMON WEALTH (CWA) TEMPERATURE LEMCO-JAMIL WEATHER

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY X LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) ____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DBBI 3.5/18' 6.5' | DBBI 3.5/18' 6.5' | DBBI 3.5/18' 6.5' | DBBI 3.5/18' 6.5'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
3-9-83 1150 PM Ft.	42"ϕ	3-9-83 2:15 PM Ft.	42"ϕ	3-9-83 1120 AM Ft.	42"ϕ	3-9-83 1230 AM Ft.	42"ϕ
CLAY W/SAND ½"-1½" COBBLES 0'-5'	CL SA CO	DK. BROWN CLAY W/SAND ½"-1½" COBBLES 0'-3'	CL SA CO	CLAY W/SAND ½"-2" COBBLES 0-9'	CL SA CO	SAND W/LT. BROWN CLAY 0-2'	SA CL
CLAY W/SMALL COBBLES & LITTLE SAND 5'-17.8'	CL CO SA	LT. BROWN CLAY W/SAND & SMALL COBBLES 3'-16.3'	CL SA CO	CLAY LT. BROWN W/SMALL COBBLES & LITTLE SAND 9'-18'	CL CO SA	LT. BROWN CLAY W/SMALL COBBLES & LITTLE SAND EASY DRILLING 2'-17.4'	CL CO SA 42"ϕ
TOP BELL 17.8'	42"ϕ	16.3' TOP BELL	42"ϕ	TOP BELL	42"ϕ	LT. BROWN CLAY SMALL COBBLES LITTLE SAND EASY DRILLING 17.4'-19.4'	CL CO SA 78"ϕ
17.8'-19.9' CLAY W/SMALL COBBLES & LITTLE SAND	CL CO SA	16.3'-18.3' CLAY W/SMALL COBBLES & LITTLE SAND	CL CO SA	18'-20' CLAY LT. BROWN W/SMALL COBBLES & LITTLE SAND	CL CO SA	19.4'	78" ϕ
19.9'	78"ϕ	18.3'	78"ϕ	20' BOTTOM BELL 3-9-83 1140 PM	78"ϕ	1:15 AM 3-9-83	
3-9-83 2110 P.M.		3-9-83 2135 P.M.					

Depth

Bell Height

Bell Height

DIA. OF BELL 78" IN. | BELL DIA. 78" IN. | BELL DIA 78" IN. | BELL DIA 78" IN.

BELL HEIGHT 26" IN. | BELL HEIGHT 29" IN. | BELL HEIGHT 24" IN. | BELL HEIGHT 24" IN.

L.F. ROCK NA | L.F. ROCK NA | L.F. ROCK NA | L.F. ROCK NA

REMARKS: DUG W/WATSON 2000

3-10-83 ✓ PHD 3/11/83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ____

Str. No. 199

Sta. No. 2652+00

CONT. REPR. T. C. Goode Str. Type EMT

LEMCO REPR. Richard L. Gordon DATE 3-9-83.

FOUNDATION BORING REPORT **RECEIVED** Str. No 201

LEMCO ENGINEERS, INC. MAR 11 1983

PROJECT TITLE 500 K.V. M.G - F.V. SUBSTATION W.O. NO. 5583970 02A

CONTRACTOR COMMONWEALTH (COWL) TEMPERATURE LEMCO-JAMUL WEATHER

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL X

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): DEAL 5/22' DEAL 5/22' DEAL 5/22' DEAL 5/22'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
3-10-83 7:15 AM Ft.	60" ϕ	3-9-83 3:10 PM Ft.	60" ϕ	3-10-83 7:45 A.M Ft.	60" ϕ	3-10-83 8:05 AM Ft.	60" ϕ
Silt & Sand 0'-4'	SI SA	Silt & Sand 0'-4'	SI SA	0-1' Silt & Sand	SI SA	0-1' Silt & Sand	SI SA
4'-5'	72" ϕ	4'-11' Silt & Sand w/ Large Cobble 3'-10' Large Cobbles	SI SA CO	1'-4' Silt & Sand	66" ϕ SI SA	1'-7.5' Silt & Sand	SI SA 66" ϕ
5'-22.8' Sand w/ some cobbles Loose Good Drilling	SA CO 66" ϕ	11'-15' Silt & Sand	SI SA	4'-10' Sand w/ Little Silt some cobbles	SA SI CO 66" ϕ	7.5'-9.5' Sand w/ Silt some cobbles Loose Good Drilling	SA SI CO 66" ϕ
Sand w/ some Cobbles 22.8'	SA CO 66 ϕ	Stopped @ 15' 3-9-83 3:30 PM.	60" ϕ	10'-15' Sand w/ Little Silt & Some Cobbles	SA SI CO 66" ϕ	9.5'-10.5'	72" ϕ
3-10-83 7:40 AM		3-10-83 7:00 AM	60" ϕ	15'-23' Sand & Silt some cobbles Loose Good Drilling	SA SI CO.	10.5'-23' Sand & Silt some cobble	SA SI CO 66" ϕ
		15'-22.5' Sand [redacted]	SA [redacted]	8:00 AM 3-10-83 23'	66" ϕ	23' 3-10-83 8:20 A.M.	66" ϕ
		7:10 A.M 3-10-83 22.5'	60" ϕ				
22.8'	66" ϕ	22.5'	60" ϕ	23.0'	66" ϕ	23.0'	66" ϕ

Bell Height — Bell Height

IN. of Bell	IN.	Bell Dia.	IN.	Bell Dia	IN.	Bell Dia.	IN.
Bell Height	IN.	Bell Height	IN.	Bell Height	IN.	Bell Height	IN.
L.F. Rock		L.F. Rock		L.F. Rock		L.F. Rock	

REMARKS: Dug w/ WATSON 2000
NO PROBLEMS

WMS 3-11-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AND 3/11/83

CONT. REPR. [signature]

LEMCO REPR. Sheldon D. Anderson

Str. No. 201
Sta. No. 2663199.22
Str. Type ELA
DATE 3-10-83

FOUNDATION BORING REPORT RECEIVED Str. No. 202

LEMCO ENGINEERS, INC. MAR 1 1983

PROJECT TITLE SWPL MIGUEL-IV W.O. NO. LEMCO-JAMUL

CONTRACTOR COMMONWEALTH (OWL) TEMPERATURE 55± WEATHER PARTLY CLOUDY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): STR. A 3.5/18'-6.5' STR. B 3.5/18'-6.5' STR. C 3.5/18-6.5' STR. D 3.5/18-6.5

STR. A Description	STR. A Sketch	STR. B Description	STR. B Sketch	STR. C Description	STR. C Sketch	STR. D Description	STR. D Sketch
Ft. 0-4 SAND w/SILT 4-18' SAND	Depth 42" 78"	Ft. 0-4 SAND w/SILT 4-18' SAND	Depth 42" 78"	Ft. 0-2 SAND w/SILT 2-18 SAND	Depth 42" 78"	0-2 Ft. SAND w/SILT 2-18 SAND	Depth 42" 78"

REMARKS: B-55-4

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

DMS

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMD 3/10/83

Str. No. 202

Sta. No. 2681+50

Str. Type EMT

LEMCO REPR. [signature] DATE 2-28-83

RECEIVED

FEB 28 1983

LEMCO ENGINEERS, INC.

FOUNDATION BORING REPORT

Str. No. 203

PROJECT TITLE SWPL Miguel-IV W.O. NO. LEMCO-IAMUL

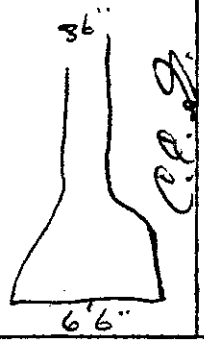
CONTRACTOR Commonwealth TEMPERATURE 40°± WEATHER Cloudy

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL X

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): 18.0 42" 78" | 18' 42" 78" | 18' 42" 78" | 18' 42" 78"

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. 0-18' SAND @ 9.5' started sluffing when putting in Bell		Ft. 0'-18' SAND		0-18 Ft. Sand w/clay		Ft. 0-18' SAND @ 10' started Sluffing when putting in Bell	

Depth

REMARKS: _____

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References AWS 3/02/83 2-23-83

LEMCO REPR. _____

Str. No. 203
Sta. No. 2697+35
Str. Type EMT
DATE 2-25-83

FOUNDATION BORING REPORT

Str. No. 204 (02A)

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 K.V. M.G - E.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (CAWL) TEMPERATURE 50s± WEATHER P/C.

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ✓ HILLY ✓ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): ABA1 4.5'/13.0' ABA1 4.5'/13.0' ABA1 4.5'/13.0' ABA1 4.5'/13.0'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		10.45 AM Ft. 3.14.83	
LIGHT GREY D.G. AUGERS WELL	D.G.	LIGHT GREY D.G. SEEMS VERY FIRM.	D.G.	LIGHT GREY D.G. AUGERS SLOWLY. SEEMS VERY FIRM	D.G.	LIGHT GREY D.G AUGERS TO A WELL GRADED GR.	D.G.
4FT. D.G. AUGERS SLOWER	D.G.	2.5 FT. HIT ROCK	RO.	8FT. HIT ROCK.	RO	10 FT. D.G. SEEMS TO BE MUCH FIRMER AUGERS SLOWER	D.G. D.G.
8FT. HIT ROCK	RO.	SHAFT COMPL. 4.1.83		SHAFT COMPL. 3.16.83.		SHAFT COMPL 2:30 PM. 3.14.83.	
SHAFT COMPL 3.16.83							

Depth

Bell Height

13.0' 14.0' 13.0' 13.0'

Dia. of Bell — IN. Bell Dia. — IN. Bell Dia — IN. Bell Dia — IN.

Bell Height — IN. Bell Height — IN. Bell Height — IN. Bell Height — IN.

L.F. Rock 5.0' L.F. Rock 10.5 L.F. Rock 5.0 L.F. Rock

REMARKS: LEGS "A" & "C" - DRILLED W/. WATSON 3000

LEG "D" DRILLED W/. WATSON 2000

LEG "B" - BLASTED TO DEPTH AND CLEANED W/. WATSON 3000

DMS 4-5-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel

CO - Cobbles BO - Boulders F.R. - Fractured Rock

RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s) — AMD 4/05/83

References FCO 40 F

Str. No. 204

Sta. No. 2712+65.0

Str. Type EHT

CONT. REPR. _____

LEMCO REPR. _____

DATE 4.1.83.

FOUNDATION BORING REPORT

RECEIVED

MAR 2 1983

Str. No. 205

LEMCO ENGINEERS, INC.

PROJECT TITLE SVPL MIGUEL-N W.O. NO.

CONTRACTOR COMMONWEALTH (CVL) TEMPERATURE JAN 45± WEATHER P/C

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) ____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES N

FDN. TYPE (SPEC.): DCB1 3.5' / 18.0' 6.5' BELL (STR. A); DCB1 3.5' / 18.0' 6.5' BELL (STR. B); DCB1 3.5' / 18.0' 6.5' BELL (STR. C); DCB1 3.5' / 18.0' 6.5' BELL (STR. D)

STR. A Description	Sketch	STR. B Description	Sketch	STR. C Description	Sketch	STR. D Description	Sketch
Ft. 0-1' MED. SAND W/. SURFACE SOIL/CLAY 2' LIT MED SAND W/. GR & SMALL CO. 8' D.G. HOLE COMPL 2.28.83		Ft. SOIL MED. SAND W/. CLAY. SOME GR. 6' HIT CEMENTED D.G. SM. CO. 7' SOME SM. BO. W/. MED CO. 14' HIT ROCK 18' OUT/ROCK HOLE COMPL 2.28.83 TOTAL PAY ROCK 4.0 L.F. OF 42" DIAM. ROCK		Ft. SOIL W/. MED. SAND & CLAY 2' SAND W/. GR. SOME MED/SM. CO. 16' LITTLE REDDISH TINT TO SAND. HOLE COMPL 2.29.83		Ft. SOIL W/. MED SAND & CLAY SOME GR. 2' SAND W/. GR. & SM. CO. HOLE COMPL 2.28.83	
Depth 15.3'	6.5'	Depth 19.0'	6.5'	Depth 18.1'	6.5'	Depth 18.4'	6.5'

DMS

REMARKS: NOTE: BELL LEG "B" PLACED ON TOP OF ROCK AS PER F.C.O 26F PAY ITEM - 4 L.F. OF 42" DIAM ROCK / LEG "B" / 14 FT BELOW SURFACE. LEG "A" SHORTENED TO 15 FT AS PER F.C.O. 27F

WATSON 3000

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMD 3/04/83

Str. No. 205

Sta. No. 2728+80

Str. Type EHT

LEMCO PERS

FOUNDATION BORING REPORT **RECEIVED** Str. No. 206

LEMCO ENGINEERS, INC. MAR 14 1983

PROJECT TITLE 500 K.V. M.G - F.V. SUBSTATION W.O. NO. 5583970 LEMCO-JAMUL

CONTRACTOR COMMONWEALTH (OWL) TEMPERATURE 60's WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ✓ HILLY ✓ LEVEL ✓

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) ____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): ACBI 3.5'/11.0' ACBI 3.5'/11.0' ACBI 3.5'/11.0' ACBI 3.5'/11.0'

STR. A 6.5' BELL STR. B 6.5' BELL STR. C 6.5' BELL STR. D 6.5' BELL

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
1.15PM Ft. 3.10.83	3.7'ϕ	9.15AM Ft. 3.10.83	3.7'ϕ	11.AM Ft. 3.10.83	3.7'ϕ	7.30AM Ft. 3.11.83	3.8'ϕ
D.G. STRONGLY CEMENTED. TOUGH DRILLING. CHUNKS 6" - 9" ϕ REDDISH BROWN IN COLOR.	D.G. GR. SI.	D.G. BROWN COLORED W/ SMALL AMOUNT OF SILT. HEAVILY WEATHERED. GR. 1"-2" ϕ	D.G. GR. SI.	D.G. BROWN. HEAVILY WEATHERED GR. 1"-2" ϕ	D.G. GR.	D.G. LOOSE BROWN. HEAVILY WEATHERED CHUNKS 2" - 4" ϕ	D.G. SI.
1FT. HIT ROCK 7FT OUT/ROCK	RO.	6FT. CHANGES TO YELLOW COLOR. SOME CEMENTING IN CHUNKS 2"-4"ϕ	D.G.	7FT. CHANGES TO YELLOW/ GREEN COLOR SOME CEMENTING.	D.G.	3FT. D.G. IS FIRMER YELLOW/ GREEN COLOR. DRILLING SLOWER.	D.G.
7FT. D.G. CEMENTED. AUGERING EASIER.	D.G.	10FT. MORE GR, [redacted] MORE FIRMER MATERIAL.	D.G.	9.5 FT. MATERIAL BECOMING MORE DENSE.	D.G.	4FT. HIT ROCK 10FT OUT/ROCK	RO.
SHAFT COMPL. 2.15PM/3.10.83. BELL COMPL. 2.00/3.10.83		SHAFT COMPL. 9.25AM./3.10.83 BELL COMPL. 10.25AM/3.10.83		SHAFT COMPL. 11.10AM/3.10.83 BELL COMPL. 1.15PM/3.10.83		10FT. ROCK IS FRACTURED. BREAKS INTO CHUNKS HOLE COMPL. 9.20AM/3.11.83 BELL COMPL. 10.16AM/3.11.83	F.R.

Bell Height

11.5' 12.1' 11.0' 11.9'

Bell Height

* Dia. of Bell 78" IN. Bell Dia. 78" IN. Bell Dia 78" IN. Bell Dia. 78" IN.

Bell Height 48" IN. Bell Height 48" IN. Bell Height 62" IN. Bell Height 40" IN.

L.F. Rock 6' L.F. Rock L.F. Rock L.F. Rock 6' L.F Rock

REMARKS: WATSON 3000 (ROCK DRILLING - TUNGSTON CARBIDE BULLET BIT AUGER)

MMS 3-11-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ____ MMS 3/4/83 Str. No. 206

CONT. REPR. [signature] Sta. No. 2738+50

LEMCO REPR. [signature] Str. Type EHT

DATE 3.11.83

* Dimensions Within ( )

FOUNDATION BORING REPORT

Str. No. 207

RECEIVED

LEMCO ENGINEERS, INC.

MAR 4 1983

PROJECT TITLE 500 K.V. M.G - F.V. SUBSTATION JOB NO. 583970

CONTRACTOR COMMONWEALTH (OWL) TEMPERATURE _____ WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY LEMCO-JAMUL LEVEL _____

WOODS/ORCHARD ✓ CULTIVATED _____ OTHER (DESCRIPTION) DESERT BRUSH

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): ABB1 3.0'/11.0' ABB1 3.0'/11.0' ABB1 3.0'/11.0' ABB1 3.0'/11.0'

STR. A 6.0' BELL STR. B 6.0' BELL STR. C 6.0' BELL STR. D 6.0' BELL

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
9.39 AM Ft. 3.9.83	3.6'ϕ	Ft.	2.3'ϕ	1.42 PM. Ft. 3.9.83	3.3'ϕ	10.55 AM. Ft. 3.9.83.	3.2'ϕ
[redacted] SURFACE SOIL. SOME CO. 8"-10" ϕ	CO.	SURFACE SOIL W/. CLAY 1FT. D.G. YELLOW/ GREY. SOME CEMENTING IN CHUNKS 6"-8" ϕ	D.G.	SURFACE SOIL W/. CLAY D.G. GREEN/GRAY SOME LARGE GR. 1"-3" ϕ CO. 8"-11" ϕ	D.G.	SURFACE SOIL W/. CLAY Co. 8"-10" ϕ 1FT. D.G. YELLOW/GREY SOME GR. CEMENTING IN COBBLES 3"-12" ϕ	CO. CL. D.G. CO.
0.5FT. LIGHT GREY/ YELLOW D.G. STRONG CEMENTING	D.G.	6FT. HIT ROCK. SLOW DRILLING 11FT OUT/ROCK	RO.	4FT. HIT ROCK. 10FT. OUT/ROCK	RO.	8FT. D.G. IS WHITE/GREY COBBLES & CEMENTING SOME GR.	D.G. GR. CO.
6FT. HIT CO. 8"-10" ϕ MATERIAL CEMENTED. COLOR VERY WHITE GRAY SOME GR.	CO.	11FT FAIRLY WEATHERED D.G.	D.G.	10FT WEATHERED D.G. SOME CEMENTED CHUNKS.	D.G.	SHAFT COMPL. 11.03 AM. BELL COMPL. 11.30 AM 3.9.83	
9.54 AM. SHAFT. COMPL BELL COMPL 10.30 AM/3.9.83				SHAFT. COMPL 2.43 PM. 3.9.83 BELL COMPL. 7.45 AM. 3.10.83.			

FAT ROCK 5L.F. OF 36" DIAM. ROCK.

Bell Height

Bell Height

11.3' 14.6' 15.6' 11.8'

Dia. of Bell 72" IN. Bell Dia. 72" IN. Bell Dia 72" IN. Bell Dia 72" IN.

Bell Height 60" IN. Bell Height 55 IN. Bell Height 66 IN. Bell Height 56 IN.

F. Rock — L.F. Rock (5') L.F. Rock (0') L.F. Rock —

REMARKS: LEG "A" - LARGE CO. LOCKED IN BELL - 1FT ϕ

WATSON 3000

B-52 = 4'

B-99 = 11'

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel

CO - Cobbles BO - Boulders F.R. - Fractured Rock

RO - Rock W.T. - Water Table

NOTE: Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ DMS 3/11/83

CONT. REPR. _____

LEMCO REPR. _____

DMS 3-11-83

Str. No. 207

Sta. No. 2752+50

Str. Type EMT

DATE 3.10.83

FOUNDATION BORING REPORT RECEIVED Str. No. 208

LEMCO ENGINEERS, INC. MAR 16 1983 (02A)

PROJECT TITLE 500 K.V. M.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (OWL) TEMPERATURE LEMCO-JAMUL WEATHER CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ✓ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): ~~ABBI~~ ARAI ABBI 3.0'/15.0' STR. A NO BELL; ARAI ABBI 3.0'/15.0' STR. B NO BELL; ARAI ABBI 3.0'/15.0' STR. C NO BELL; ARAI ABBI 3.0'/15.0' STR. D NO BELL

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
0 Ft. SOIL w/CL 0.5' 0.5' FIRM D.G. 2.5 2.5' SOLID GRANITE 15.4' COMP. 3-14-83 9:15 AM	Depth RO.	9:40 START 0 Ft. SOIL w/CL 0.5' 0.5' FIRM D.G. 3.0' 3.0' SOLID GRANITE 15.2' COMP. 3-14-83 3:00 PM	Depth RO.	7:30 START 0 Ft. HIT SOIL w/ CLAY 0.5' HIT 0.5' FIRM D.G. 2.0' 2.0' SOLID GRANITE 15.2' COMP. 3-15-83 2:30 PM	Depth RO.	0 Ft. REDDISH BROWN SOIL w/ CLAY BINDER 0.5' 0.5' HIT FIRM D.G. YELLOW IN COLOR 5 FT 5 FT SOLID GRANITE GRAY IN COLOR 15.1 COMP. 3-14-83 TIME X 7:25 AM	Depth CL D.G. RO.

Bell Height	Bell Height	Bell Height	Bell Height
IN. of Bell	IN. Bell Dia.	IN. Bell Dia	IN. Bell Dia.
L.F. Rock 12.5'	L.F. Rock 12.0'	L.F. Rock 13.0'	L.F. Rock 10.0'

REMARKS: ANDERSON DRILL - USED SOIL AUGER W/ AIR DRILL

LEG 'A', 'B' & 'D' COMP ON 3-14-83 — LEG 'C' STARTED @ 3-15-83 7:30 AM COMPLETION 3-15-83 @ 2:30 PM

(02) Dims B-99 = 42.5'

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

✓ AMD 3/10/83

References CHANGE ORDER #3 6-1
" " #3 3-1-1

Str. No. 208
Sta. No. 226.5+40
Str. Type L/AT

CONT. REPR. _____ DATE 3-14-83

LEMCO REPR. _____

FOUNDATION BORING REPORT

RECEIVED
FEB 28 1983

Str. No. 209

LEMCO ENGINEERS, INC.

W.O. NO. _____

PROJECT TITLE SWPL MIGUEL - IV

CONTRACTOR COMMONWEALTH (OVL) TEMPERATURA MUL WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY ✓ LEVEL _____

WOODS/ORCHARD ✓ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DBB1 3.6'/18.0' STR. A 6.6' BELL; DBB1 3.6'/18.0' STR. B 6.6' BELL; DBB1 3.6'/18.0' STR. C 6.6' BELL; DBB1 3.6'/18.0' STR. D 6.6' BELL

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. FINE TO MED SAND. SOME GR. SOME CLAY. 2' HIT CEMENTED D.G. HOLE COMPL 2.25.83	Depth 18.1' / 6.6'	Ft. FINE TO MED. SANDY SOIL 2' HIT CEMENTED D.G. SOME SH. CO. HOLE COMPL 2.25.83	Depth 18.7' / 6.6'	Ft. FINE TO MED SANDY SOIL 4' HIT CEMENTED D.G. HOLE COMPL 2.25.83	Depth 19.0' / 6.6'	Ft. FINE TO MED. SAND SOIL 3' HIT CEMENTED D.G. HOLE COMPL. 2.25.83	Depth 18.6' / 6.6'

REMARKS: D.G. - DECOMPOSED GRANITE

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____ APD 3/02/83

2-25-83

LEMCO REPR. _____

Str. No. 209
Sta. No. 2780+00
Str. Type EMT
DATE 2.25.83

FOUNDATION BORING REPORT

RECEIVED
FEB 23 1983

Str. No. 210

LEMCO ENGINEERS, INC.

PROJECT TITLE SMPL MICHAEL - IV W.O. NO.

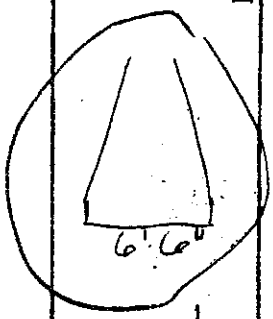
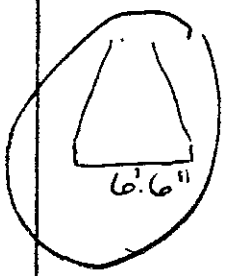
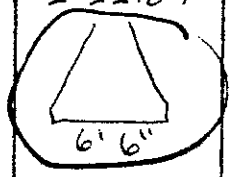
CONTRACTOR COMMONWEATH (OVL) TEMPERATURE AMU 60's+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DBB31 3.5' / 18.0' 6'6" BELL — STR. A; DBB31 3.5' / 18.0' 6'6" BELL — STR. B; DBB31 3.5' / 18.0' 6'6" BELL — STR. C; DBB31 3.5' / 18.0' 6'6" BELL — STR. D

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. MED. SANDY SOIL. SOME GR. 9' HIT FINE CEMENTED SAND. SOME SM. CO. HOLE COMP. 2.22.83 Depth 19.9'		Ft. MED. SANDY SOIL. SOME GR. 8' HIT FINE CEMENTED SAND. SOME SM. TO MED. CO. HOLE COMP. 2.22.83. Depth 19.7'		Ft. MED. SANDY SOIL. SOME GR. SOME CL. 8' HIT FINE CEMENTED SAND. SOME SM. TO MED. CO. HOLE COMP. 2.22.83 Depth 19.5'		Ft. MED. SANDY SOIL. SOME GR. SOME CL. 6' HIT SOME CEMENTED SAND. 8' HIT MED. GR. W/. FINE CEMENTED SAND. HOLE COMP. 2.22.83 Depth 19.3'	

REMARKS: ____

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ RMS 2/24/83 RMS 2-23-83

LEMCO REPR. ____

Str. No. 210
Sta. No. 2795+00
Str. Type EHT
DATE 2.22.83

Str. No. 210A

FOUNDATION BORING REPORT

RECEIVED
FEB 25 1983
LEMCO-JAMBE

LEMCO ENGINEERS, INC.

PROJECT TITLE SVPL MIGUELITO P.O. NO.

CONTRACTOR COMMONWEALTH (OVM) TEMPERATURE 60's± / 50's± WEATHER

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): STR. A DHB1 6'/26' 9.5' BELL; STR. B DHB1 6'/26' 9.5' BELL; STR. C DHB1 6'/26' 9.5' BELL; STR. D DHB1 6'/26' 9.5' BELL

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		Ft.	
FINE CLAY/ SANDY SOIL. SOME GR., W/. CEMENTED D.G.		FINE SANDY/CLAY SOIL, W/. GR. SOME CEMENTING.		FINE SANDY SOIL W/. CLAY, SOME GR.		FINE SANDY SOIL W/ CLAY, SOME GR.	
7' HIT ROCK		4' MORE DENSE, W/. CEMENTED D.G.		1' VERY DENSE, W/. CEMENTED D.G.		CEMENTED D.G.	
9' OUT/ROCK		HOLE COMPL 2.23.83		HOLE COMPL 2.23.83		6' HIT ROCK	
DENSE SOIL W/. CEMENTED D.G.						8' OUT/ROCK	
HOLE COMPL 2.24.83						HOLE COMPL 2.25.83	
TOTAL PAY ROCK 2.0 L.F. OF 72" DIAM.						TOTAL PAY ROCK 2.0 L.F. OF 72" DIAM	
Depth 27.8'	9.5'	Depth 26.8'	9.6"	Depth 27.0'	9.5'	Depth 27.0'	9.5'

REMARKS: D.G. - DECOMPOSED GRANITE

PAY ITEM: HIT 2.0 L.F. OF 72" DIAM. ROCK / LEG "A" / AT 7 FT. BELOW SURFACE.

PAY ITEM: HIT 2.0 L.F. OF 72" DIAM. ROCK / LEG "D" / AT 6' FT. BELOW SURFACE

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References Pay Item Bolts: 4'
B-Lda = 4
Dwg 2/26/82

LEMCO REPR. [signature]

DMB 2-25-83

Str. No. 210A
Sta. No. 2805+25
Str. Type ELD
DATE 2-24-83

FOUNDATION BORING REPORT RECEIVED Str. No. 211

LEMCO ENGINEERS, INC. MAR 2 1983

PROJECT TITLE SWPL MIGUEL-IV W.O. NO.

CONTRACTOR COMMONWEALTH (OVL) TEMPERATURE LEMCO - JAMUL ± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DBBL 3.5'/18.0' STR. A 6.5' BELL; DBBL 3.5'/18.0' STR. B 6.5' BELL; DBBL 3.5'/18.0' STR. C 6.5' BELL; DBBL 3.5'/18.0' STR. D 6.5' BELL

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. D.G. w/small CO 1'-15' Rock 15'-18' SAND w/ CL & CO 14' Rock C.E.I.	Depth 42" 6'6"	Ft. 0-6' CL w/SA & CO. 6'-7' Rock 7'-18' CL w/SA & CO. 1' Rock C.E.I.	Depth 42" 6'6"	Ft. 0-10' Rock Stopped 2-28-83 10'-18' SAND w/CL 10' of Rock C.E.I.	Depth 42" 6'6"	Ft. D.G. w/ SMALL CO. 4' HIT ROCK STOPPED 2.25.83 4'-10' Rock 10'-18' SAND w/CLAY & CO 18.4' 6' of Rock C.E.I.	Depth 42" 6'6"
19'6"		19'0"		19'0"			

REMARKS: Dug w/ WATSON 2000

DMS 2

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ Aug 3/04/83

Str. No. 211

Sta. No. 2816+17

Str. Type EMT

LEMCO REPR. Richard D. Davidson DATE 3-1-83 ✓

FOUNDATION BORING REPORT RECEIVED Str. No. 212

LEMCO ENGINEERS, INC. MAR 9 1983 024

PROJECT TITLE 500 K.V. M.G - F.V. SUBSTATION W.O. NO. 5583870

CONTRACTOR COMMON WEALTH (OWL) TEMPERATURE LEMCO JAMUL WEATHER SUNNY

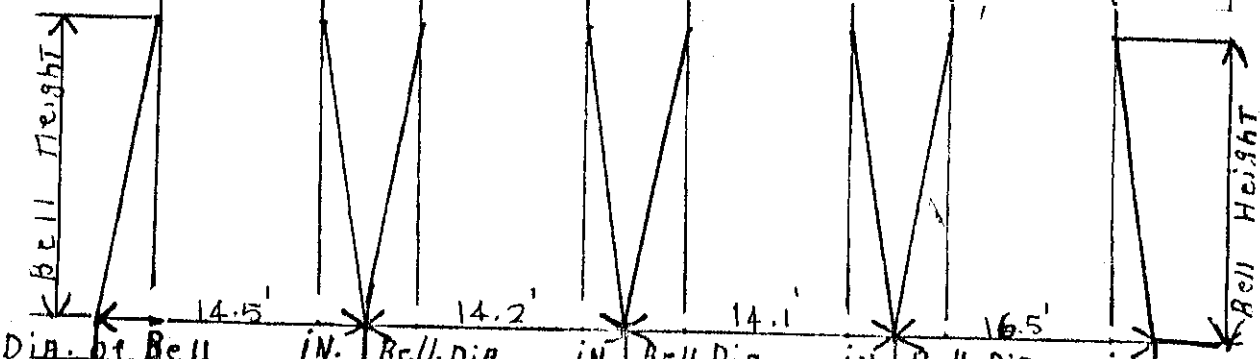
DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY ✓ LEVEL _____

WOODS/ORCHARD ✓ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): CBA2

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
3.7.83 Ft. 10.13AM	54"ϕ	3.7.83 9.30AM Ft.	54"ϕ	3.7.83 Ft. 10.33AM	54"ϕ	3.7.83 Ft. 10.58AM.	54"ϕ
SM. COBBLES SANDY/BROWN SOIL.	CO. SA. SOIL	FIRM DK SA/ BROWN SOIL	1' SOIL SA CL	DK. BROWN SANDY/SOIL SOME CLAY & FRACTURED ROCK.	SOIL CL. SA.	DK. BROWN SANDY SOIL	SOIL SA
SOME 6"-8" COBBLES. FIRM SAND DG. WITH CLAY	3' CO. SA. CL. DG.	FIRM SAND/ DG/CLAY. VERY DRY SOME SMALL GRAVEL.	SI SA CL DG GR.	FIRM SAND W/ CLAY, DG. & SM. GR. COBBLES 8"-10" ϕ REDDISH TINT IN D.G.	3' SA. DG. GR. CO. CL.	FRACT. ROCK 20" ϕ. SM. CO. 6"±ϕ SOME GR. FIRM SAND W/ CLAY & DG. REDDISH TINT. FAIRLY WET	2' BO. CO. SA. CL. DG. GR.
16"-18" CO. CAVED SOME SLUFFING	12' CO. SA. DG	4" - 6" COBBLES 13' 3.7.83 9.55AM.	CO. 55"ϕ	3.7.83 10.48AM.	56"ϕ	REG TINT MORE BEIGE	8'
3.7.83 10.21AM	56"ϕ					3.7.83 11.20AM	56"ϕ
Depth		Depth		Depth		Depth	



Dia. of Bell ___ in.	Bell Dia. ___ in.	Bell Dia ___ in.	Bell Dia. ___ in.
Bell Height ___ in.	Bell Height ___ in.	Bell Height ___ in.	Bell Height ___ in.
L.F. Rock	L.F. Rock	L.F. Rock	L.F. Rock

REMARKS: EQUIP. WATSON "2000"

HOLES VERY TIGHT / EASY DRILLING

DMR. 3-9-83 ✓ DMR 3/11/83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____

CONT. REPR. _____

LEMCO REPR. _____

Str. No. 212

Sta. No. 2826+90

Str. Type EHT

DATE 3.7.83 ✓

FOUNDATION BORING REPORT

LEMCO ENGINEERS, INC.

RECEIVED MAR 10 1983 LEMCO ENGINEERS

Str. No. 213

PROJECT TITLE 500 K.V. M.G - E.V. SUBSTATION JOB NO. 5583970

CONTRACTOR COMMON WEALTH (OWL) TEMPERATURE [illegible] WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ✓ CULTIVATED ____ OTHER (DESCRIPTION) ____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): STR. A DJBI 6.0'/27.0' 9.5' BELL; STR. B DJBI 6.0'/27.0' 9.5' BELL; STR. C DJBI 6.0'/27.0' 9.5' BELL; STR. D DJBI 6.0'/27.0' 9.5' BELL

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
8.15 AM Ft. 3.8.83	6.4'ϕ	10.30 AM Ft. 3.8.83	6.7'ϕ	1.05 PM Ft. 3.8.83	6.7'ϕ	9.10 AM Ft. 3.9.83	6.6'ϕ
DARK BROWN SANDY/CL. SOIL	SA. CL.	DARK BROWN SANDY/CL. SOIL	SA. CL.	DARK BROWN SANDY/CL. SOIL	SA.	DARK BROWN SANDY/CL. SOIL	CL. SA.
1FT. D.G. SOME CEMENTING. YELLOW/GREEN. SOME SMALL CO. 4"-8" ϕ. SOME CLAY & GR. EASY DRILLING	D.G. CO. GR.	2FT D.G. SOME CEMENTING YELLOW/DARK GREEN SOME GR & CLAY	SA. D.G. GR.	1FT D.G. SOME CEMENTING IN CHUNKS 4"-10" ϕ YELLOW/DARK GREEN MATERIAL SOME GR. AND SMALL COBBLES 2"-6" ϕ	D.G. GR. CO.	1FT D.G. CEMENTING IN CHUNKS 1FT ± ϕ. DARK BROWN/DARK GREEN IN COLOR.	SA. CL. D.G.
10FT. MORE SAND WITH D.G.	SA. D.G.	13 FT MED/COARSE SAND. DARK YELLOW STILL SOME D.G. THAT IS CEMENTING	SAND	15' SAND W/ D.G. MEDIUM TO COARSE GRAINS - SOME CEMENTING IN SMALL CHUNKS 1"-3" ϕ	SA. GR.	10 FT. UTILES SAND MIXING W/ D.G. SOME GR. 1"-2" ϕ SEEMS MOIST.	SA. D.G. GR.
13FT LOOSE COARSE/MED. SAND. SOME DAMPNESS.	SA.	21FT SAND APPEARS DRYER W/ STILL SOME CEMENTING. VERY COARSE TO SILTY.	SA. SI.	SOME GRANITE IN LOOSE CO. 6" ϕ SOME GR.	CO.	20' SAND IS SILTY TO COARSE. SOME CEMENTING SMALL GR. 1" ϕ	SA. GR.
20FT - MORE DRY SAND	SA.	SHAFT COMPL 11 AM - 3.8.83 BELL COMPL 12.45 PM 3.8.83.		23' COARSE TO SILTY SOME CEMENTING SOME GR.	SA.	7.50 AM 3.9.83 BELL COMPL. 8.45 AM. 3.9.83	
SHAFT DONE 9.15 - 3.8.83 BELL COMPL 11.00 - 3.8.83				SHAFT COMPL. 2.40 PM - 3.8.83. BELL COMPL 2.20 PM 3.8.83			

Bell Height 60" — 28.5' — 28.6' — 28.7' — 28.4' — Bell Height

in. of Bell 114" IN. Bell Dia. 114 in. Bell Dia 114 in. Bell Dia 114 in.

Bell Height 60" in. Bell Height 80" in. Bell Height 60 in. Bell Height 64 in.

L.F. Rock L.F. Rock L.F. Rock L.F. Rock

WATSON 3000

REMARKS: LEG "A" - BELL IS VERY CLEAN. LEG "B" - BELL CLEAN LEG "C" - BELL CLEAN LEG "D" - BELL CLEAN. SOIL TYPE IS COMPARABLE WITH SOIL TYPE "D" WITH EXCEPTION OF UPPER 10FT. WHICH IS A COMPACTED D.G.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel CO - Cobbles BO - Boulders F.R. - Fractured Rock RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMD 3/11/83

CONT. REPR. [signature]

LEMCO REPR. [signature]

AMD. 3-11-83

Str. No. 213

Sta. No. 2840+37.08

Str. Type EMD

DATE 3.9.83

FOUNDATION BORING REPORT **RECEIVED** Str. No. 214

LEMCO ENGINEERING, INC. MAR 18 1983 02A

PROJECT TITLE 500 K.V. M.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (OWL) TEMPERATURE LEMCO-HAMM WEATHER CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY X LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) BRUSH

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

	STR. A	STR. B	STR. C	STR. D
FDN. TYPE (SPEC.):	~~EMT~~ 42" / 13'	~~EMT~~ 42" / 13'	~~EMT~~ 42" / 13'	~~EMT~~ 48" / 13'
	78" ø @ 6.5' BELL	6.5' BELL		54" ø @ 13'

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
STARTED Ft. 3-16-83 11:15 AM	54" ø 3-16-83	SOME SURFACE SOIL Ft.	3.8' ø	SOME SURFACE SOIL Ft.	3.7' ø	STARTED 3-16-83 1:30 P.M. Ft.	60" ø
SANDY TEXT. MED-DARK IN COLOR MIXED WITH CO. SMALL AMOUNTS OF D.G. SAME TEXT THROUGH OUT SHAFT	0'-0" 0'-13'	D.G. VERY FIRM DARK YELLOW IN COLOR		D.G. VERY FIRM DARK YELLOW IN COLOR	SAME AS "B"	FR. CO. ANGL. ROCKS 0'-3'6"	CO
						3'6" SANDY TEXT MED BROWN IN COLOR	
FINISHED SHAFT @ 11:40 A.M. 3-16						WIT. ROCK @ 7'2" ø	CO
						LOOSE THROUGH CO MIXED WITH SAND D.G. MOSTLY SAND ALL THROUGH 0'-0" 13'-0"	
BELL STARTED @ 11:45 A.M.						FINISHED SHAFT @ 2:40 P.M. 3/16/83	
BELL FINISHED @ 12:05 P.M.						STARTED BELL @ 2:35 P.M. 3-16-83	
						FINISHED BELL @ 3:00 P.M. 3-16-83	

Depth

Bell Height

13'-4" 13.9' 13.8'

Bell Height

ANY ROCK 4' @ 05

in. of Bell 78 IN.	Bell Dia. 28 IN.	Bell Dia. 28 IN.	Bell Dia. 84 IN.
ell Height 30 IN.	Bell Height 48 IN.	Bell Height 48 IN.	Bell Height 36 IN.
F. Rock —	L.F. Rock	L.F. Rock	L.F. Rock 4'-0"

REMARKS: LEGS "B" & "C" DRILLED ON

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References 10MS 3-18-83 — AMD 3/21/83

Str. No. 214

Sta. No. 2554+87.70

CONT. REPR. C.E. George

Str. Type EMT

LEMCO REPR. Mark C. Stamm

DATE 3-16-83

FOUNDATION BORING REPORT

Str. No. 215

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 KV. M.G - F.V. SUBSTATION W.O. NO. 5583870

CONTRACTOR COMMON WEALTH (COWL) TEMPERATURE 60s± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ✓ HILLY _____ LEVEL _____

WOODS/ORCHARD ✓ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): ADA2 4.5'/13.0' ADA2 4.5'/13.0' ADA2 4.5'/13.0' ADA2 4.5'/13.0'

RECEIVED
APR 5 1983
LEMCO-JAMUL

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		3-11-83 2:40 AM Ft.	54" ϕ	Ft. 3-7-83 2:07 PM	77" X 100"
				0-3' GRAVEL D.G.	72" ϕ D.G.	SOME COBBLES 8"-16" ϕ, D.G. SOME GR., SLOW DRILLING	CO. BO. GR.
				3'-4' P.P. Rock	RO		
				4'- 6.7' D.G. STOPPED 3-11-83	3:20PM	3' HIT ROCK SLOW DRILLING MASSIVE BOULDERS TO 8'	STOPPED DRILLING @5:30-3-7-83
				STARTED 3/11/83 7:30 A.M.	72" ϕ		
				STARTED 6.7' E.R. COBBLES		STARTED 7:30 AM 3-8-83	
				BOULDERS THRU E.R. @ 7.7'	D.G. CO SA	STOPPED 9:45 AM 3-8-83	
				COBBLES, D.G. LIGHT IN COLOR MIXED WITH SAND 7'-7"-11'-6"	CO D.G.	STARTED 11 PM 3-11-83 STOPPED 2:30 P.M. 3-11-83.	
				SILTY SAND W/ FEW COBBLES 11'-0"-12'-0"	SI	STARTED 8 AM 10:00 3-16-83	
				12'-0" HIT HARD CEMENTED MIXED W/SAND F.R. SLOWED DRILLED @ 12'-6"	CO F.R.	SEE NEXT SHEET	
				FINISHED SHAFT @ 4:21 A.M. 3-11-83 PAY ROCK 2' @ 54" ϕ	F.R. 3/11/83		

Depth

Bell Height

in. of Bell	in.	Bell Dia.	in.	Bell Dia	in.	Bell Dia.	in.
Bell Height	in.	Bell Height	in.	Bell Height	in.	Bell Height	in.
F. Rock		L.F. Rock		L.F. Rock 2'		L.F. Rock	

REMARKS: 3-7-83 - STOPPED DRILLING @ SET DEPTH - TIME 5.30PM.

3-8-83 HAD TO Ream Hole 3-8', Bits Moved Off Of Quartz Rock

DMS 4-5-83

✓ AMD 4/6/83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____

Str. No. 215

Sta. No. 2866+80

Str. Type ET

CONT. REPR. Arthur Bloomberg DM

LEMCO REPR. Charles W. Hayes

DATE 4/4/83.

FOUNDATION BORING REPORT

Str. No. 216 OZA

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 K.V. M.G - F.V. SUBSTATION W.O. NO. 5593970

CONTRACTOR COMMONWEALTH (COWL) TEMPERATURE _____ WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

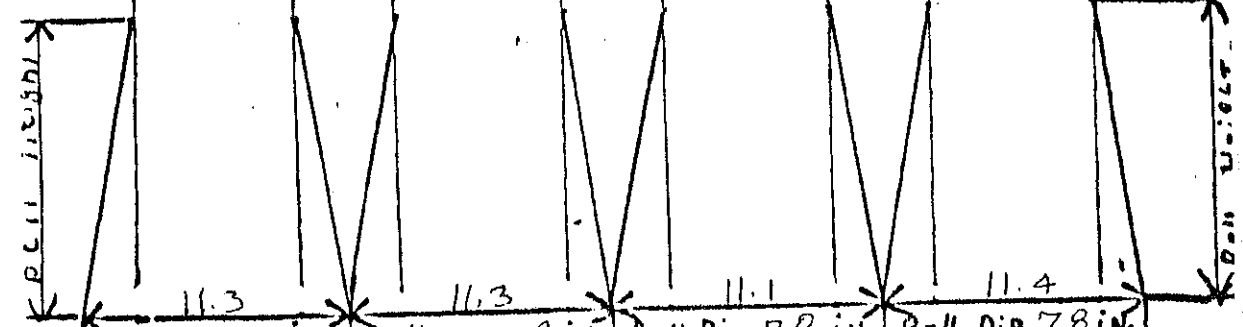
WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): STR. A ADBL 3.5 FT/11.0 FT 6.5 FT ØB; STR. B ADBL 3.5 FT/11 FT 6.5 FT ØB; STR. C ADBL 3.5 FT/11 FT 6.5 FT ØB; STR. D ADBL 3.5 FT/11 FT 6.5 FT ØB

RECEIVED
JUL 15 1983
LEMCO-JAMUL

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		Ft.	
D.G. VERY FIRM	D.G	D.G. MIXED WITH SMALL ROCKS	D.G.	0 FT D.G. 4 FT	D.G.	0 FT SOIL	SOIL
ROCK (2 FT)	RO			4 FT ROCK (2 L.F.)	RO	2 FT HIT ROCK (5 L.F.)	RO
7 FT BROKE THROUGH ROCK BACK INTO VERY FIRM D.G.	D.G.			7 FT BROKE THROUGH ROCK, BACK INTO D.G.	D.G.	7 FT BROKE THROUGH ROCK, D.G. MIXED WITH SOME ROCK	D.G.
Depth		Depth		Depth		Depth	



B. of Bell 78 IN. Bell Dia. 78 IN. Bell Dia 78 IN. Bell Dia 78 IN.

Bell Height 42 IN. Bell Height 42 IN. Bell Height 42 IN. Bell Height 42 IN.

L.F. Rock 3 L.F. Rock 0 L.F. Rock 3 L.F. Rock 5

REMARKS: ALL SHAFTS HAND DUG

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____ ✓ AMD 7/15/83

Str. No. 216

Sta. No. 2883+20

Str. Type ETT

DATE 7-13-83

CONT. REPR. _____

LEMCO REPR. _____

FOUNDATION BORING REPORT

Str. No. 217

LEMCO ENGINEERS, INC.

02A

PROJECT TITLE 500 K.V. Mic - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMONWEALTH (COWL) TEMPERATURE 90± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY X LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): 54"/13' ABA2 | 54"/13' ABA2 | 54"/13' ABA2 | 54"/4' ABA2

RECEIVED
AUG 4 1983
LEMCO-JAMUL

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.	54" ϕ	Ft.	54" ϕ	Ft.	54" ϕ	Ft.	54" ϕ
0 Ft DG		0 Ft DG		0 Ft DG		0 Ft DG	
				4 Ft		5 Ft	
10 Ft Rock	Depth RO	Depth	Depth	Rock	Depth RO	Rock	Depth RO
13.0 Ft		13 Ft		13 Ft		14 Ft	
13.3 Ft		13.3 Ft		13.1 Ft		14.1 Ft	

Drill Height

Drill Height

B. of Bell 0 IN. Bell Dia. 0 IN. Bell Dia 0 IN. Bell Dia 0 IN.

Bell Height 0 IN. Bell Height 0 IN. Bell Height 0 IN. Bell Height 0 IN.

E. Rock 3 Ft L.F. Rock 0 Ft L.F. Rock 9 Ft L.F. Rock 9 Ft

REMARKS: _____

RECEIVED
AUG 3 1983
LEMCO-MIGUEL

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table
Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AND 8/04/83

Str. No. 217

Sta. No. 2901+93

Str. Type EMT

CONT. REPR. T. David Crump

LEMCO REPR. Robert W. Lemert

DATE 7-29-83

FOUNDATION BORING REPORT

Str. No. 218

LEMCO ENGINEERS, INC.

024

PROJECT TITLE 500 KV. M.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (OWL) TEMPERATURE 90± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): 42"/13' ABB2 42"/13' ABB2 42"/13' ABB2 42"/13' ABB2

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.	42"ϕ	Ft.	42"ϕ	Ft.	42"ϕ	Ft.	42"ϕ
0 Ft		0 Ft		0 Ft		0 Ft	
Rock	RO	Rock	RO	Rock	RO	Rock	RO
9 Ft		9 Ft		10 Ft		10 Ft	
DA		DA		DA		DA	
13 Ft		13 Ft		13 Ft		13 Ft	
Depth		Depth		Depth		Depth	
Bell Height 36 in.		Bell Height 36 in.		Bell Height 36 in.		Bell Height 36 in.	
Bell Dia. 78 in.		Bell Dia. 78 in.		Bell Dia. 78 in.		Bell Dia. 78 in.	
L.F. Rock 10 Ft		L.F. Rock 9 Ft		L.F. Rock 10 Ft		L.F. Rock 10 Ft	

REMARKS: _____

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table
Note Drill Rate in Sketch Space if Rock Anchor(s)

RECEIVED
AUG 8 1983
LEMCO-MIGUEL

References ✓ AUD 8/09/83

Str. No. 218
Sta. No. 2908 +10
Str. Type EMT
DATE 8-9-83

CONT. REPR. _____

LEMCO REPR. _____

FOUNDATION BORING REPORT

Str. No. 219

LEMCO ENGINEERS, INC.

02A

PROJECT TITLE 500 KV. M.G - F.V. SUBSTATION W.O. NO. 5593970

CONTRACTOR COMMONWEALTH (CWL) TEMPERATURE 90± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): 54"/13' ABR3 54"/6' ABR3 54"/14' ABR3 54"/13' ABR3

RECEIVED

JUL 26 1983

LEMCO-JAMUE

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.	54"ϕ	Ft.	54"ϕ	Ft.	54"ϕ	Ft.	54"ϕ
DG & Rock 3FT	B	DG 1FT		DG 1 FT		DG & Rock 5FT	
FRACT Rock 13FT	RO	FRACT Rock 6FT	RO	LAYERED Rock 14FT	RO	FRACT Rock 13FT	RO
13.3 FT		6.2 FT		14.2 FT		13.5'	

Depth

Bell Height

B. of Bell IN. Bell Dia. IN. Bell Dia IN. Bell Dia IN.

Bell Height IN. Bell Height IN. Bell Height IN. Bell Height IN.

E. Rock 10 FT L.F. Rock 5FT L.F. Rock 13 FT L.F. Rock 8 FT

REMARKS:

RECEIVED

JUL 26 1983

LEMCO-MIGUEL

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References FCO 108E ✓ A/D 7/28/83 Str. No. 219

Sta. No. 2921+50

CONT. REPR. Doug Guy Str. Type EHT

LEMCO REPR. Robert W. Schmidt DATE 7-28-83

FOUNDATION BORING REPORT

Str. No. 220

LEMCO ENGINEERS, INC.

02A

PROJECT TITLE 500 KV. H.G - I.V. SUBSTATION W.O. NO. 5593970

CONTRACTOR COMMONWEALTH (CWL) TEMPERATURE 90± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): 54"/13' ABR1 54"/13' ABR1 54"/13' ABR1 54"/13 ABR1

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.	54"Φ	Ft.	54"Φ	Ft.	54"Φ	Ft.	54" Φ
0 FT DG & Rock		0 DG & Rock		0 DG & Rock		0 DG	
4 FT FRACT. Rock	Depth RO	2 FT FRACT Rock	Depth RO	1 FT FRACT. Rock	Depth RO	6 FT Rock	Depth RO
13 FT		13 FT		13 FT		13 FT	
13.1 FT		13.2 FT		13.0		13.2	

Bell Height

B. of Bell 0 IN. Bell Dia. IN. Bell Dia IN. Bell Dia IN.

Bell Height 0 IN. Bell Height IN. Bell Height IN. Bell Height IN.

E. Rock 9 FT L.F. Rock 11 FT L.F. Rock 9 FT L.F. Rock 7 FT

REMARKS:

RECEIVED

JUL 26 1983

LEMCO-MIGUEL

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel

CO - Cobbles BO - Boulders F.R. - Fractured Rock

RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References 9/0104-P ✓ AND 7/24/83

Str. No. 220

Sta. No. 2929+00

Str. Type EMT

CONT. REPR. Dave Cruz

LEMCO REPR. Robert W. Schmidt

DATE 7-28-83

FOUNDATION BORING REPORT

Str. No. 221 (02A)

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 KV. M.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (OWL) TEMPERATURE 90± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ___ HILLY ✓ LEVEL ___

WOODS/ORCHARD ___ CULTIVATED ___ OTHER (DESCRIPTION) ___

RECEIVED RIGHT-OF-WAY CLEARED YES NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES N

JUN 20 1983 FDN. TYPE (SPEC.): AEA2 54"/14' 54"/14' 54"/14' 54"/14'

LEMCO-JAMUL

	STR. A		STR. B		STR. C		STR. D	
	Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
	5-23 Ft.		5-23-83 Ft.		5-26-83 Ft.		5-26-83 Ft.	
	0'		0'		0		0	
	RO.	RO.	RO.	RO.	RO.	RO.	RO	RO
Depth	14.0'		14.0'		14.0'		14.0'	
Bell Height	Complete 6-7-83		Complete 6-10-83		Complete 6-14-83		Complete 6-16-83	
	14.4'		14.2'		14.2		14.5'	
	B. of Bell — in.		Bell Dia. — in.		Bell Dia — in.		Bell Dia. — in.	
	Bell Height — in.		Bell Height — in.		Bell Height — in.		Bell Height — in.	
	F. Rock 14.0		L.F. Rock 14.0		L.F. Rock 14.0		L.F. Rock 14.0	

REMARKS: HAND DUG HOLES
54" DIA. HOLES

RECEIVED

JUN 20 1983

LEMCO-MIGUEL

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table
Note Drill Rate in Sketch Space if Rock Anchor(s)

✓ AM 6/23/83

References ___

Str. No. 221

Sta. No. 2945+83.53

Str. Type ELA

CONT. REPR. David Cruz

LEMCO REPR. James J. Relph

DATE (6-17-83)

FOUNDATION BORING REPORT

Str. No. 222 024

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 KV. Mic - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMONWEALTH (OWL) TEMPERATURE 80± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RECEIVED RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

JUL 5 1983 FDN. TYPE (SPEC.): 54"/13' ABAZ 54"/14' ABAZ 54"/13' ABAZ 54"/13' ABAZ

LEMCO-JAMUL

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.	54" ϕ	Ft.	54" ϕ	Ft.	54" ϕ	Ft.	54" ϕ
0 FT D.G + Rock 6FT; Rock Depth 13FT	Ro	0FT DG 3FT; Rock 6FT; DG 8FT; Rock Depth 14FT	Ro	0FT D.G + Rock 4FT; Rock 8FT; D.G + Rock Depth 10FT; Rock 13FT	Ro	DG; Rock Depth	Ro
13.0'		14.0'		13 FT		13 FT	

Bell Height

B. of Bell ___ IN. Bell Dia. ___ IN. Bell Dia ___ IN. Bell Dia ___ IN.

Bell Height ___ IN. Bell Height ___ IN. Bell Height ___ IN. Bell Height ___ IN.

E. Rock (7FT) L.F. Rock (9FT) L.F. Rock (7FT) L.F. Rock (11FT)

REMARKS: _____

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

✓ pnA 7/09/83

References _____

Str. No. 222

Sta. No. 2953+20.41

CONT. REPR. David Ray

Str. Type EHT

LEMCO REPR. Robert W. Schmidt

DATE 6-30-83

LM 7/1/83

FOUNDATION BORING REPORT

Str. No. 223

LEMCO ENGINEERS, INC.

OCA

PROJECT TITLE 500 KV. M.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMONWEALTH (COWL) TEMPERATURE 90± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): 60"/17' AHBZ 60"/17' AHBZ 60"/17' AHBZ 60"/17' AHBZ

STR. A 102" BELL STR. B 102" Bell STR. C 102" Bell STR. D 102" Bell

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.	60"ϕ	Ft.	60"ϕ	Ft.	60"ϕ	Ft.	60"ϕ
0 FT FRACT. ROCK	RO	0 FT FRACT ROCK	RO	0 FT FRACT ROCK	RO	0 FT FRACT ROCK	RO
12 FT		12 FT		12 FT		13 FT	
13 FT DG W/ ROCKS		DG W/ ROCKS					
17 FT		17 FT		17 FT		17 FT	
17.1 FT		17.3 FT		17.1 FT		17.2 FT	

Depth

Drill Height

A. of Bell 102 IN. Bell Dia. 102 IN. Bell Dia 102 IN. Bell Dia. 102 IN.

Bell Height 48 IN. Bell Height 48 IN. Bell Height 48 IN. Bell Height 48 IN.

L.F. Rock 13 FT L.F. Rock 12 FT L.F. Rock 12 FT L.F. Rock 13 FT

REMARKS: _____

RECEIVED AUG 4 1983 LEMCO-JAMUL

RECEIVED AUG 3 1983 LEMCO-MIGUEL

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table
Drill Rate in Sketch Space if Rock Anchor(s)

References V P/D 8/04/83

CONT. REPR. Donald Hoop

LEMCO REPR. Robert W. Schmidt

Str. No. 223

Sta. No. 2968+56.99

Str. Type ELD

DATE 8-1-83

FOUNDATION BORING REPORT

Str. No. 224

LEMCO ENGINEERS, INC.

02A

PROJECT TITLE 500 KV. M.G - F.V. SUBSTATION W.O. NO. 5593970

CONTRACTOR COMMONWEALTH (OWL) TEMPERATURE _____ WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RECEIVED

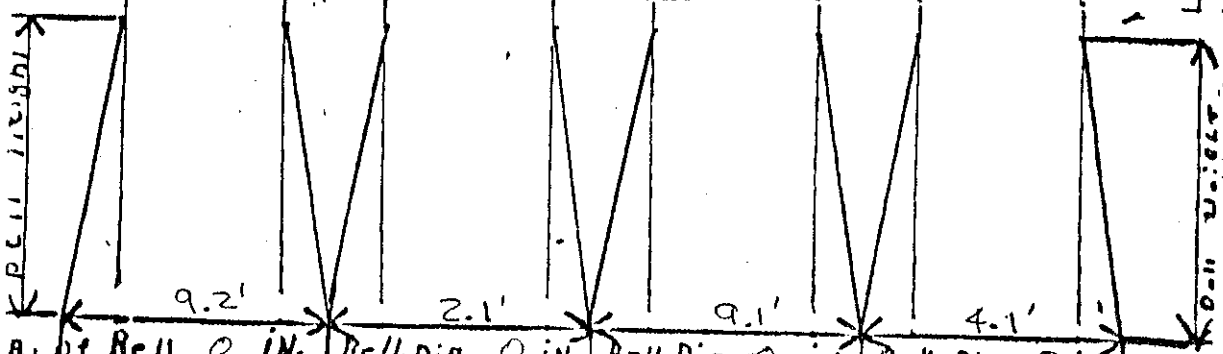
JUL 15 1983

LEMCO-JAMUL

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): AAR2 42"Φ/9' AAR2 42"Φ/2' AAR2 42"Φ/9' AAR2 42"Φ/4'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		Ft.	
0 FT D.G. VERY FIRM	D.G.	0 FT HIT ROCK	RO	0 FT D.G. VERY FIRM	D.G.	0 FT HIT ROCK	RO



A. Bell 0 IN. Bell Dia. 0 IN. Bell Dia 0 IN. Bell Dia 0 IN.

B. Height 0 IN. Bell Height 0 IN. Bell Height 0 IN. Bell Height 0 IN.

C. Rock 0 L.F. Rock 2 L.F. Rock 0 L.F. Rock 4

REMARKS: ALL SHAFTS HAND DUG

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____

Str. No. 224

Sta. No. 2928+13.99

Str. Type ELT

CONT. REPR. _____

LEMCO REPR. _____

DATE 7-13-83

FOUNDATION BORING REPORT

Str. No. 225

LEMCO ENGINEERS, INC.

02A

TITLE 500 KV. Mid-Y.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMONWEALTH (COWL) TEMPERATURE _____ WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

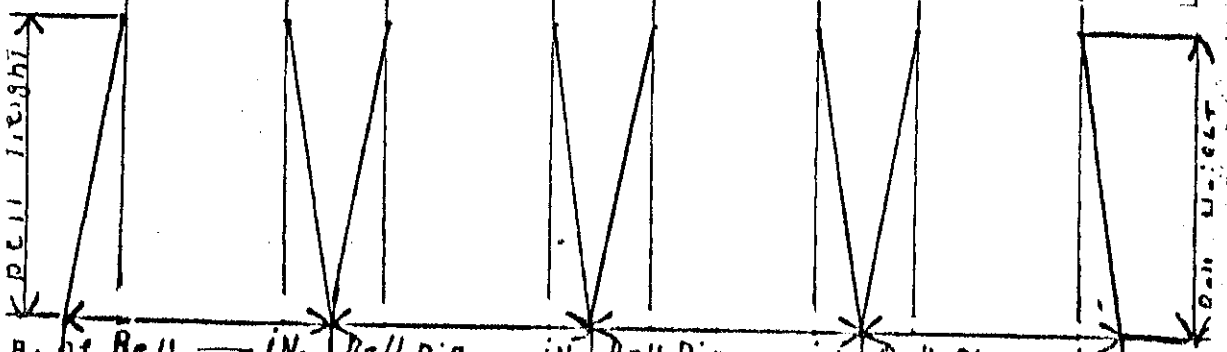
RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): AAA1 30" 10 STR. A | AAA1 30" 10 STR. B | AAA1 30" 10 STR. C | AAA1 30" 10 STR. D

LEMCO-JAMUL

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
5/14 32"ø Ft.	5/14	5/14 32"ø Ft.	5/14	5/14 32"ø Ft.	5/14	5/14 32"ø Ft.	5/14
3' of MEDIUM HARD D.G.	D.G.	4' of MEDIUM HARD D.G.	D.G.	10' of MEDIUM HARD D.G.	D.G.	8' of MEDIUM HARD D.G.	D.G.
7' of FRACTURED ROCK	F.R.	6' of FRACTURED ROCK	F.R.			2' of ROCK	
10' Complete 5/18/83		10' Complete 5/20/83		10' Complete 5/17/83		10' Complete 5/19/83	

Depth



A. of Bell ___ IN. Bell Dia. ___ IN. Bell Dia ___ IN. Bell Dia. ___ IN.

Bell Height ___ IN. Bell Height ___ IN. Bell Height ___ IN. Bell Height ___ IN.

F. Rock 7 F. Rock 6 F. Rock ___ F. Rock 2

REMARKS: Rock No Good For Rock Anchors

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References AHD 5/25/83

Str. No. 225

Sta. No. 2997+52

CONT. REPR. David Cruz

Str. Type ELT

LEMCO REPR. Ray Baightwell

DATE 5-23-83

FOUNDATION BORING REPORT

Str. No. 226 (62A)

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 KV. Mic - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMONWEALTH (CWL) TEMPERATURE 80± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): 5.5'/5' 5.5'/5' 5.5'/3' 5.5'/3'

RECEIVED JUN 24 1983 LEMCO-JAMUL

STR. A ACR1		STR. B ACR1		STR. C ACR1		STR. D ACR1	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
START 5/25/83 Ft.	66"ϕ	START 5/25/83 Ft.	66"ϕ	START 6/16/83 Ft.	66"ϕ	START 6/16/83 Ft.	66"ϕ
Rock	RO	Rock	RO	Rock	RO	Rock	RO
Depth	RO	Depth	RO	Depth		Depth	RO
FINISH 6/25/83		FINISH 6/6/83		FINISH 6/20/83		FINISH 6/21/83	
5.0'		5.0'		3.0'		5.0'	

Bell Height — Ball Height

DIA. of Bell 0 IN.	Bell Dia 0 IN.	Bell Dia 0 IN.	Bell Dia 0 IN.
Bell Height 0 IN.	Bell Height 0 IN.	Bell Height 0 IN.	Bell Height 0 IN.
L.F. Rock (5FT)	L.F. Rock (5FT)	L.F. Rock (3FT)	L.F. Rock (5FT)

REMARKS: DEPENDING ON HARDNESS OF ROCK, HOLES FOR ROCK ANCHOR WERE TAKING 5-7 MINUTES PER FOOT BY JACKHAMMER

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

RECEIVED JUN 23 1983 LEMCO-MIGUEL

References C/100P ✓ RMB 6/24/83

Str. No. 226

Sta. No. 3011+65

Str. Type EHT

CONT. REP'R. David Cass

LEMCO REP'R. Robert W. Schmidt

DATE 6-22-83

FOUNDATION BORING REPORT

Str. No. 227
024

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 K.V. Mic - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMONWEALTH (COWL) TEMPERATURE _____ WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): ACA2 54"/13' | ACA2 54"/13' | ACA2 54"/13' | ACA2 54"/13'

RECEIVED
MAY 23 1983
LEMCO-JAMUL

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
5-5-83 Ft.		5-5-83 Ft.		5-5-83 Ft.		5-5-83 Ft.	
FRACTURED Rock	Depth R.O.	FRACTURED Rock	Depth R.O.	MEDIUM Soft to HARD D.G.	Depth D.G.	Soft to HARD DG	D.G.
						5' Rock	R.O.
						2' HARD D.G.	Depth D.G.
						5.6' Rock	R.O.
Completed Shaft 5-18-83	Bell Height	Completed Shaft 5-17-83		Completed Shaft 5-11-83		Completed Shaft 5-11-83	Bell Height
13.4'		13.4'		13.6'		13.6'	
DIA. of Bell — IN.		Bell DIA. — IN.		Bell DIA — IN.		Bell DIA. — IN.	
Bell Height — IN.		Bell Height — IN.		Bell Height — IN.		Bell Height — IN.	
L.F. Rock 13'		L.F. Rock 13'		L.F. Rock —		L.F. Rock 3'	

REMARKS: HAND DUG HOLES

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table
Note Drill Rate in Sketch Space if Rock Anchor(s)

RECEIVED
MAY 20 1983
LEMCO-MIGUEL

References V AND 5/25/83

Str. No. 227

Sta. No. 3030+30

Str. Type EHT

CONT. REPR. David Cross

LEMCO REPR. Ray Brightwell

DATE (5-18-83)

FOUNDATION BORING REPORT

Str. No. 228

02A

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 K.V. M.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (CWL) TEMPERATURE _____ WEATHER _____

RECEIVED DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

MAY 11 1983 WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

LEMCO-JAMUEL RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

EQUIP. TYPE (SPEC.): AAA1 30" 10' STR. A | AAA1 30" 10' STR. B | AAA1 30" 10' STR. C | AAA1 30" 10' STR. D

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
5-4 Ft. Hard DG Blasted Rock 3'	30" ϕ DG 5-4	5-4 Ft. Soft to medium Hard D.G.	30" ϕ D.G.	5-4 Ft. Soft to medium Hard D.G.	30" ϕ D.G.	5-4 Ft. Soft to medium Hard DG.	30" ϕ D.G.
Hard D.G. 3' PAY Rock	Depth		Depth		Depth		Depth
Shaft Finished 5/9/83	Drill Height	Shaft Finished 5/6/83 DEPTH 10'.0		Shaft Finished 5/5/83 DEPTH 10'.1		Shaft Finished 5/6/83 DEPTH 10'.2	Drill Height
10'							
B. of Bell — IN. Bell Height — IN. L.F. Rock		Bell Dia. — IN. Bell Height — IN. 3 L.F. Rock		Bell Dia. — IN. Bell Height — IN. L.F. Rock		Bell Dia. — IN. Bell Height — IN. L.F. Rock	

REMARKS: All Four Holes were Hard D.G.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table
Note Drill Rate in Sketch Space if Rock Anchor(s)

RECEIVED
MAY 10 1983
LEMCO-MIGUEL

References ✓ Arms 5/16/83

Str. No. 228

Sta. No. 3042+74.42

Str. Type ELT

CONT. REPR. David Cruz

LEMCO REPR. Ray Brightwell

DATE From 5-4 To 5-9-83
5-9-83

FOUNDATION BORING REPORT

Str. No. 229'
02A

LEMCO ENGINEERS, INC.

RECEIVED
MAY 03 1983
LEMCO-JAMUL

PROJECT TITLE 500 K.V. M.G - I.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (CWL) TEMPERATURE _____ WEATHER _____

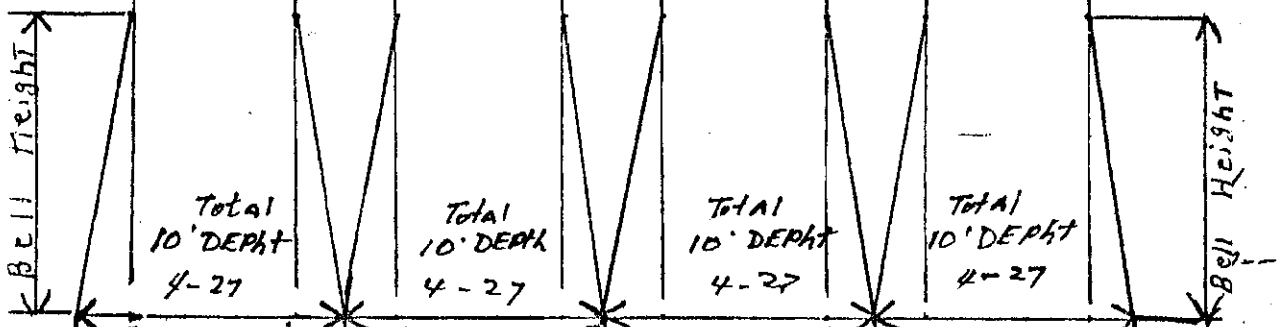
DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): ELT 30" 10' ELT 30" 10' ELT 30" 10' ELT 30" 10'

4/22/83 STR. A		4/22/83 STR. B		4/22/83 STR. C		4/22/83 STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Dirt & D.G. LARGE Boulders 2.5 Ft.	S.A. D.G. B.O.	Dirt & D.G. 1.5 Ft.	S.A. D.G.	Dirt & D.G. 3 Ft.	S.A. D.G.	Dirt & D.G. 3 Ft.	S.A. D.G.
D.G. AND HARD ROCK Depth	D.G. R.O.	D.G. AND HARD ROCK Depth	D.G. R.O.	D.G. AND HARD ROCK Depth	D.G. R.O.	D.G. AND HARD ROCK Depth	D.G. R.O.
Bottom 2' WAS PAY ROCK 7.5		LAST 3' WAS PAY ROCK 8.5		LAST 3' WAS PAY ROCK 7'		Bottom 3' WAS PAY ROCK 7'	
Bottom of hole		Bottom of hole		Bottom of hole		Bottom of hole	



Dia. of Bell — IN. Bell Dia. — IN. Bell Dia. — IN. Bell Dia. — IN.

Bell Height IN. Bell Height IN. Bell Height IN. Bell Height IN.

L.F. Rock 2' L.F. Rock 3' L.F. Rock 3' L.F. Rock 3'

REMARKS: PAY ROCK WAS IN Bottom of holes

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References V AND 5/10/83

CONT. REPR. David Cruz

LEMCO REPR. Ray Brightwell

Str. No. 229

Sta. No. 30052+95

Str. Type ELT

DATE 4-27-83

RECEIVED
APR 29 1983
LEMCO-MIGUEL

FOUNDATION BORING REPORT

Str. No. 230

LEMCO ENGINEERS, INC.

02A

PROJECT TITLE 500 KV. M.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMONWEALTH (COWL) TEMPERATURE _____ WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RECEIVED RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

MAY 25 1983 FDN. TYPE (SPEC.): AAR/ 42" 9' AAR/ 42" 9' AAR/ 42" 9' AAR/ 42" 9'

LEMCO-JAMUL

	STR. A		STR. B		STR. C		STR. D	
	Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
	4-27-83 Ft.	Ø 42"	4-27-83 Ft.	Ø 42"	4-27-83 Ft.	Ø 42"	4-27-83 Ft.	Ø 42"
0	4' Boulders & F Rock		2' Boulders & D.B.		2' Boulders & D6		3' Boulders & D6	
4	R/A		7' Fractured Rock		7' Rock & Fr. Rock		6' F. Rock	
9			9' DEEP		9' DEEP		9' DEEP.	
			Comp 5/17/83		Comp 5/20/83		Comp 5/17/83	

Depth

Bell Height

Bell Dia.

B. of Bell — IN. Bell Dia. — IN. Bell Dia — IN. Bell Dia — IN.

Bell Height — IN. Bell Height — IN. Bell Height — IN. Bell Height — IN.

F. Rock 4 J.F. Rock 7 J.F. Rock 7 J.F. Rock 6

REMARKS: _____

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References FCD 60F V and S/25/83 Str. No. 230

Sta. No. 306+55

Str. Type ELT

CONT. REPR. David Cass

LEMCO REPR. Ray Brightwell

DATE 5-20-83

FOUNDATION BORING REPORT

Str. No. 231

LEMCO ENGINEERS, INC.

02A

PROJECT TITLE 500 K.V. M.G - E.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (COWL) TEMPERATURE _____ WEATHER _____

RECEIVED

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

APR 25 1983 WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

LEMCO-JAMUL RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): ELT 42" 8' ELT 42" 8' ELT 42" 8' ELT R/A

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
0 Ft. Surface Sand and Soft D.G. with small Cobbles 4'	S.A. D.G. C.O.	0 Ft. Sand, D.G and small Cobbles 3'	S.A. D.G. C.O.	0 Ft. Soft D.G. Mixed with Sand 2½	D.G. S.A.	0 Ft. Sand D.G. 5½	S.A. D.G.
		Soft Rock 5'	R.O.	Seams in Hard Rock	R.O.	Rock	R.O.
Fractured Rock with Small Seams Depth 8'	R.O.	Hard Rock with Seams Depth 8'	R.O.	Depth 8'		Depth	
8' DEEP		8' DEEP		8' DEEP		16' DEPTH	

ROCK ANCHOR

Bell Height

Bell Height

IN. of Bell	IN.	Bell Dia.	IN.	Bell Dia	IN.	Bell Dia.	IN.
Bell Height	IN.	Bell Height	IN.	Bell Height	IN.	Bell Height	IN.
L.F. Rock 4'		L.F. Rock 3'		L.F. Rock 5.5'		L.F. Rock R/A	

REMARKS: ROCK ANCHORS INSTALLED ON 4-19-83 4 #11 BARS were INSTALLED @ BIDD=12.5' B62=1 B63=4

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel CO - Cobbles BO - Boulders F.R. - Fractured Rock RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

Dwg 4-2543

References FCO 64F ✓ Amd 4/27/83 Str. No. 231

Sta. No. 3076+30.46

CONT. REPR. Ronald Cuyo Str. Type ELT

LEMCO REPR. Ray Brightwell DATE 4-21-83

Str. No. 232

FOUNDATION BORING REPORT

(02A)

EIVED

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 KV. M.G - I.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMONWEALTH (COWL) TEMPERATURE _____ WEATHER _____

LMCO - JAMUL DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): CAAI 48" 8' | CAAI 48" 8' | CAAI 48" 8' | CAAI 48" 8'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. SAND AND SILT 6"	S.A. SI	Ft. SAND AND SILT 6"	SA SI	Ft. SAND AND SILT 6"	SA SI	Ft. DECOMPOSED GRANET	DECOMPOSED GRANET FR
DECOMPOSED GRANET WITH SEAMS SAND AND CLAY LIGHT BROWN IN COLOR AND FRACTURED ROCK 4'6"	DECOMPOSED GRANET SA CL FR	DECOMPOSED GRANET AND BOULDERS 4'6"	DECOMPOSED SAD GRANET B.O	FRACTURED ROCK DECOMPOSED GRANET BOULDERS WITH SEAMS SAND AND CLAY LIGHT BROWN IN COLOR 5'6"	F.R. DECOMPOSED GRANET BO SA CL	FRACTURED ROCK AND BOULDERS WITH SEAMS SAND AND CLAY LIGHT BROWN IN COLOR 4'	B.O SA CL
FRACTURED ROCK 2'	F.R	FRACTURED ROCK AND BOULDERS 3'	F.R BO	FRACTURED ROCK 2'	FR	FRACTURED ROCK AND BOULDERS 4'	FR BO
ROCK 1'	R.O.						
8'2" 4-7-83 1:00 P.M.		8'2" 4-6-83 4:00 P.M.		8'2" 4-8-83 2:00 P.M.		8'1" 4-7-83 5:00 P.M.	
B. of Bell Height	IN.	Bell Dia.	IN.	Bell Dia.	IN.	Bell Dia.	IN.
Bell Height	IN.	Bell Height	IN.	Bell Height	IN.	Bell Height	IN.
F. Rock 3'		F. Rock 3'		F. Rock 2		F. Rock 4'	

REMARKS: _____

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s) AMS 4/12/83

References Wms 4-11-83

Str. No. 232

Sta. No. 3008+35

Str. Type FLT

CONT. REPR. David Chung

LEMCO REPR. Grant Tinsley

DATE 4.6.83 TO 4.8.83

FOUNDATION BORING REPORT

Str. No 233 (02A)

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 KV. Mig - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (COM) TEMPERATURE _____ WEATHER _____

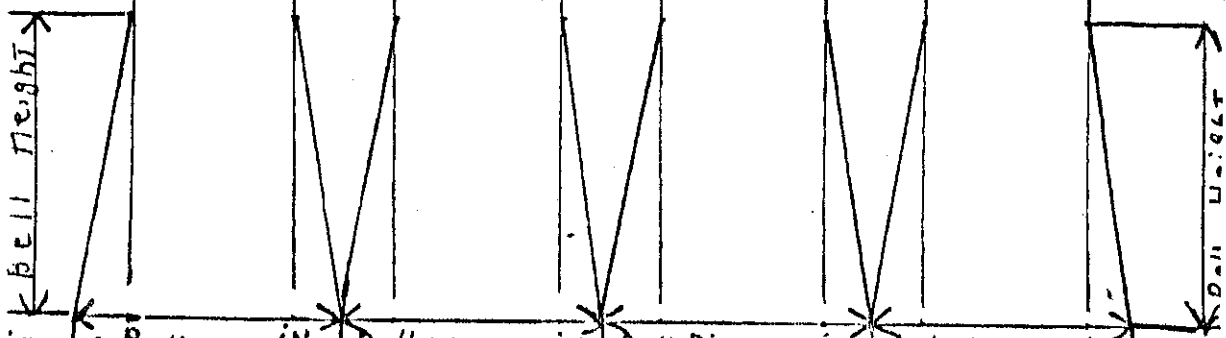
DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ✓ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): CAAI 36" 8' | CAAI 36" 8' | CAAI 36" 8' | CAAI 36" 8'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		Ft.	
6" SAND	S.A.	6" SAND	S.A.	6" SAND	S.A.	6" SAND	S.A.
SAND AND FRACTURED ROCK 4'6"	S.A. F.R.	DECOMPOSED GARNET AND BOULDERS WITH SEAMS SAND AND CLAY LIGHT BROWN IN COLOR. 7'6"	DECOMP OSED GARNET B.O C.A. C.L.	GARNET BOULDERS WITH SEAMS SAND CLAY LIGHT BROWN COLOR. AND FRACTURED ROCK 7'6"	B.O S.A. C.L F.R.	GARNET BOULDERS SEAMS SAND AND CLAY LIGHT BROWN IN COLOR 7'6"	B.O S.A C.L.
ROCK AND BOULDERS 3'	R.O. B.O						
8' Depth		8'3" Depth		8'1" Depth		8' Depth	
4-7-83 1:00 P.M.		4-6-83 3:30 P.M.		4-5-83 4:30 P.M.		4-8-83 2:30 P.M.	



in. of Bell	in.	Bell Dia.	in.	Bell Dia	in.	Bell Dia	in.
Bell Height	in.	Bell Height	in.	Bell Height	in.	Bell Height	in.
F. Rock 3'		L.F. Rock 1'		L.F. Rock 2'		L.F. Rock 3'6"	

REMARKS: B.C. 6" SAND 7'6" OF SOME HARD ROCK BOULDERS AND FRACTURED ROCK. A.L.E.C. BLASTED LAST 3'

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References WMS 4-11-83 ✓ PMD 4/12/83

CONT. REPR. David Cruz

LEMCO REPR. Robert Timmerman

Str. No. 233

Sta. No. 3108+3778

Str. Type E.L.T.

DATE 4-4-83 To 4-7-83

FOUNDATION BORING REPORT

Str. No. 234 (02A)

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 K.V. M.G - F.V. SUBSTATION W.O. NO. 5583870

CONTRACTOR COMMONWEALTH (OWL) TEMPERATURE _____ WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): AAA3 42" 9' AAA3 R/A AAA3 42" 9' AAA3 R/A

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. D.G. SAND FRA. ROCK SEEMS 5'	D.G. S.A. F.R.	Ft. D.G. FRA. ROCK SEEMS 4'	D.G. S.A. F.R.	Ft. SAND D.G. FRA. ROCK 3½	S.A. D.G. F.R.	Ft. SAND F. ROCK SEEMS 4'	S.A. F.R.
ROCK 9'	RO'	ROCK ANCHOR		RO' RO 9½'		ROCK ANCHOR	
DEPTH 9'	Depth	Depth 16'		DEPTH 9.5'	Depth	Depth 16'	

Bell Height

Bell Height

IA. of Bell	IN.	Bell Dia.	IN.	Bell Dia	IN.	Bell Dia.	IN.
ell Height	IN.	Bell Height	IN.	Bell Height	IN.	Bell Height	IN.
F. Rock 5' (FIVE)	L.F. Rock			L.F. Rock 6' (SIX)	L.F. Rock		

REMARKS: _____

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References VMS 4-20-83 ✓ AMD 4/27/83

CONT. REPR. David Cruz

LEMCO REPR. Ray Brightwell

Str. No. 234.

Sta. No. 3119+93.07

Str. Type ELT

DATE 4-19-83

FOUNDATION BORING REPORT

Str. No. 235 (02A)

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 KV. Mic - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (COWL) TEMPERATURE _____ WEATHER _____

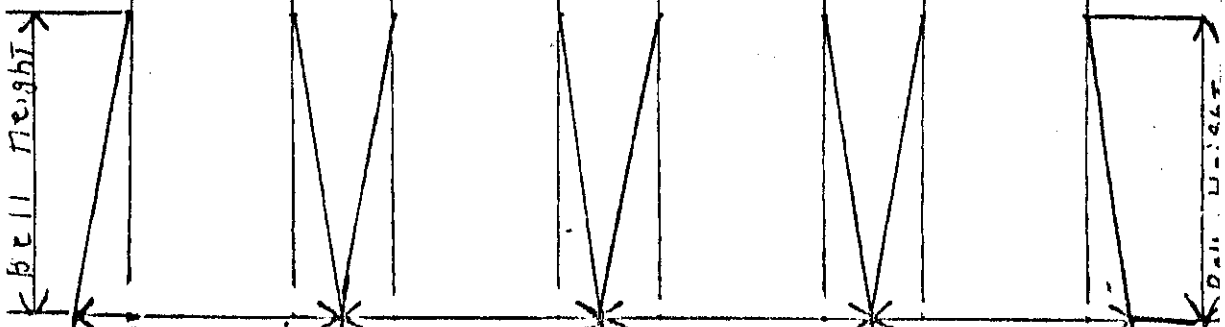
DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ← HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): AARI 30"/10' | AARI 30"/10' | AARI 30"/10' | AARI 30"/10'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. GRANET ROCK 2'	R.O	Ft. DECOMPOSED GRANET WITH SEAMS OF SAND AND CLAY MIXED LIGHT BR IN COLOR 3'	DECOMPOSED GRANET SA CL	Ft. 3' Decomp Rock	3' DG	Ft. DECOMPOSED GRANET 4'	DECOMPOSED GRANET
GRANET R.O. WITH SEAMS OF SAND AND CLAY MIXED LIGHT BROWN IN COLOR 8' 3"	B.O SA. C.L.	HARD BOULDERS 7'6"	B.O	R/O & Hard Boulders	R/O	HARD GRANET BOULDERS AND HARD ROCK 6' 3"	B.O R.O
Depth 10' 3"		Depth 10'6"		Depth 10' Depth 30" DIA		Depth 10' 3"	
3-30-83 2:00 P.M.		3-31-83 1:00 P.M.				4-4-83 1:00 P.M.	
30" dia. 10' DEPTH		30" dia 10' DEPTH				30" dia 10' DEPTH	



REMARKS: A. FIRST 2' ROCK 2' HARD BOULDERS. B. 2' DISABLE MATERIAL 6' HARD BOULDERS. D. 4' DISABLE MATERIAL 6' HARD ROCK.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

✓ AMD 4/19/83

References _____

Str. No. 235

Sta. No. 314+34.75

Str. Type ELT

CONT. REPR. David Cruz

LEMCO REPR. Ray Bright

DATE 4-12-83 Fa 4-15-83

FOUNDATION BORING REPORT

Str. No. 236 (02A)

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 K.V. M.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (COWL) TEMPERATURE _____ WEATHER _____

'83 DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

JAMUL WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): AAA2 30"/10'. AAA2 30"/10'. AAA2 30'/10'. AAA2 30/10.

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
D.G. Ft. Boulders 3	D.G. R.O.	Ft. BOULDERS R.O.		D.G. Ft. Soft Rock 1'0"	DG R.O.	DG Ft. Rock 2'0"	D.G. R.O.
Rock	R.O. B.O. =25	SOME SAND & CLAY MIXED FULL DEPTH OF SHA-FT.	S.A. C.L.	ROCK WITH SEAMS AND FRACTURED ROCK	R.O. F.R. SEENS	ROCK WITH SEAMS	R.O.
Depth 10'0"		Depth		Depth		Depth	
DEPTH 10'0"		DEPTH 10'6"		DEPTH 9'4"		DEPTH 10'2"	

Bell Height

Bell Height

in. of Bell in. Bell Dia. in. Bell Dia in. Bell Dia. in.

Bell Height in. Bell Height in. Bell Height in. Bell Height in.

L.F. Rock 7'(SEVEN) L.F. Rock 2(TWO) L.F. Rock 8(EIGHT) L.F. Rock 8(EIGHT)

REMARKS: B98=25.0' B61=1 B61a=1

/RHD 4/20/83 WMS 4-25-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References LEGS A B D FCO 59F Str. No. 236
LEG C FCO 49F & 62F Sta. No. 315/+33.12

CONT. REPR. David Cruz Str. Type ELT

LEMCO REPR. Ray Braghtwell DATE 4-19-83

12

FOUNDATION BORING REPORT

Str. No 237 (02A)

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 KV. H.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (COW) TEMPERATURE _____ WEATHER _____

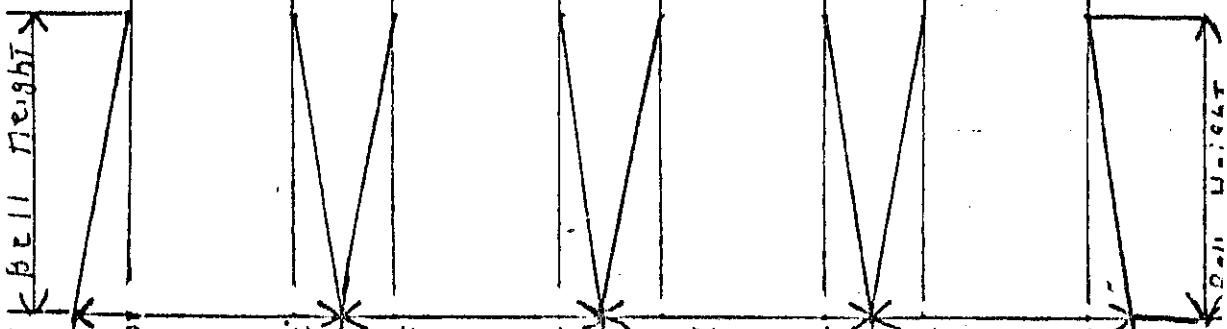
DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ✓ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): AAA2 30" dia. 10' DEPTH. AAA2 30"/10' AAA2 30"/10 AAA2 30"/10

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. DECOMPOSED GRANET AND GRANET BOULDERS WITH SAND AND CLAY SEAMS 9'	DECOMPOSED GRANET BO SA. CL.	Ft. DECOMPOSED GRANET AND GRANET BOULDERS 1'6"	DECOMPOSED GRANET B.O.	Ft. DECOMPOSED GRANET 2'	DECOMPOSED GRANET.	Ft. SAND 6"	SA
GRANET BOULDERS 9'2"	B.O	GRANET BOULDERS WITH SEAMS OF SAND AND CLAY. GRAY IN COLOR 8'10"	B.O SA. CL.	HARD GRANET BOULDERS 8' ↓	B.O.	DECOMPOSED GRANET. 2'6" ↓	DECOMPOSED GRANET.
10'2" Depth		Depth		Depth		HARD ROCK BOULDERS 7'3"	B.O
5:00 P.M. 4-4-83 30" dia. 10' DEPTH		1:00 P.M. 4-4-83 30" dia. 16' DEPTH		10' 3-29-83 1:00 P.M. 30" dia 10' DEPTH		10'3" Depth 3-22-83 2:00 P.M. 30" dia. 10' DEPTH.	



REMARKS: A. FIRST 1' BRAKEABLE. 6' HARD BOULDERS 3' VERRY HARD B.O. B. FIRST 1'6" BRAKEABLE. 8'6" HARD B.O. C. 2' BRAKABLE DECOMPOSED GRANET. 8' HARD B.O. D. 6" d.g. ABLE SAND 2'6" BRAKABLE DECOMPOSED GRANET. 7' HARD B.O.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

DMS 4-5-83

References VAND 4/20/83

Str. No. 237

Sta. No. 3120+65

Str. Type ELT

CONT. REPR. David Cm

LEMCO REPR. Grant Z

DATE 3-16-83 TO 4-4-83

FOUNDATION BORING REPORT

Str. No. 238

LEMCO ENGINEERS, INC.

02A

PROJECT TITLE 500 KV. M.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (CAWL) TEMPERATURE _____ WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RECEIVED
MAY 11 1983
LEMCO-JAMUL

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): AAA3 36/11 AAA3 36/11 AAA3 36/9 AAA3 36/11

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
3-15-83 Ft.	36"ϕ	3-15-83 Ft.	36"ϕ	3-15-83 Ft.	36'ϕ	3-15-83 Ft.	36'ϕ
9' of DECOMPOSED GRANET with LAYERS of SAND MIXED with CLAY	DG SA CL	7' of DECOMP. GRANET MIXED with SAND AND CLAY.	D.G. SA. CL	9' of HARD BLUE GRANET with SEAMS AND FRACT. ROCK	R.O. F.R. SEAMS	11' of HARD BLUE GRANET with FR. ROCK AND SEAMS	R.D. SEAMS
2' of HARD BLUE GRANET PAY ROCK		4' HARD BLUE GRANET PAY ROCK		Complete Hole is PAY ROCK		Complete Hole is PAY ROCK	
11.0' 3-22-83		11.0 3-29-83		FCO 74F 9.0' 4-29-83		11.0'	
Bell Height							Bell Height
Dia. of Bell IN.		Bell Dia. IN.		Bell Dia IN.		Bell Dia IN.	
Bell Height IN.		Bell Height IN.		Bell Height IN.		Bell Height IN.	
L.F. Rock 2.0		L.F. Rock 4.0		L.F. Rock 9.0		L.F. Rock 11.0	

REMARKS: _____

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

RECEIVED
MAY 10 1983
LEMCO-MIGUEL

References FCO 74F ✓ RMA 5/16/83

CONT. REPR. David Cary

LEMCO REPR. Ray Brightwell

Str. No. 238

Sta. No. 3183+49.10

Str. Type E11

DATE 4/15/83 4/29/83 5-9-83

FOUNDATION BORING REPORT

Str. No. 240

LEMCO ENGINEERS, INC.

024

PROJECT TITLE 500 K.V. H.G - I.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (CWL) TEMPERATURE _____ WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RECEIVED RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

MAY 25 1983 FDN. TYPE (SPEC.): ABR2 54"/13' ABR2 54"/13' ABR2 Rock Anchor ABR2 Rock Anchor

LEMCO-JAMUL

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
4-22 Ft.	56"Ø	4-22 Ft.	56"Ø	4-22 Ft.	56"Ø	4-22 Ft.	56"Ø
0-3' SOFT TO MEDIUM HARD D.G.	D.G.	0-6' SOFT TO MEDIUM D.G.	D.G.	0-5' ROCK	RO	0-6' ROCK	RO
3-5' HARD ROCK	RO						
5-9' MEDIUM HARD D.G.	D.G.	6-11' ROCK	RO	5.0' COMP 5-3-83		6.0' COMP. 5-11-83	
9-13 ROCK	RO	11-13' MEDIUM HARD D.G.	D.G.				
13' COMPLETE 4-28-83		13' COMP 4-28-83					

Depth

Bell Height

Bell Dia.

A. of Bell in. Bell Dia. in. Bell Dia in. Bell Dia. in.

Bell Height in. Bell Height in. Bell Height in. Bell Height in.

L.F. Rock 6' L.F. Rock 5' L.F. Rock 5' L.F. Rock 6'

REMARKS: PIER-1 PIER-2 PIER-3 & 4

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References FCO 72 F VOID 5/25/83 Str. No. 240
FCO 73 F Sta. No. 3201+20.44

CONT. REPR. David Cruz Str. Type EMT

LEMCO REPR. James J. Relph DATE 5-16-83

FOUNDATION BORING REPORT

Str. No. 240

LEMCO ENGINEERS, INC.

02A

VED

, 2 1983

PROJECT TITLE 500 K.V. M.G - F.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (COWL) TEMPERATURE _____ WEATHER _____

ICO-JAMBE DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS X HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): BBB1 42"/18' BBB1 42"/18' BMB1 42"/18' BBB1 42"/18'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
4/19 Ft. SA. & RO. Wit M 4" to 8" cobbles Comp 5/3		4/19 Ft. SA. RO. With 4" to 8" Cobbles Comp 5/3		4/19 Ft. SA. D.G. with 4" to 8" Cobbles Comp 5/3		4/19 Ft. SA. Small Cobbles 4" to 8" Comp 5/3	
ROCK 16							
Depth DEPTH 18'		Depth DEPTH 18'		Depth DEPTH 18'		Depth DEPTH 18'	

Bell Height

18' DEPTH

Bell Height

Dia. of Bell 78 IN. Bell Dia. 78 IN. Bell Dia. 78 IN. Bell Dia. 78 IN.

Bell Height 42" IN. Bell Height 42 IN. Bell Height 42 IN. Bell Height 42 IN.

L.F. Rock 1.0' L.F. Rock L.F. Rock L.F. Rock

REMARKS: Rock was just before Belling area on A Leg

RECEIVED

MAY 11 1983

LEMCO-MIGUEL

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s) ✓ AMD 5/16/83

References Field change order # 52F

Str. No. 241

Sta. No. 3220+45

Str. Type EMT

CONT. REPR. David Cruz

LEMCO REPR. Ray Brightwell

DATE 4/9 - 5-3-83.

FOUNDATION BORING REPORT

Str. No. 242
02A

LEMCO ENGINEERS, INC.

PROJECT TITLE 500 K.V. M.G - I.V. SUBSTATION W.O. NO. 5583970

CONTRACTOR COMMON WEALTH (OWL) TEMPERATURE _____ WEATHER _____

MAY 23 1983

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL X

LEMCO-JAMUL WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) SANDY

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DCBI 42" 18' STR. A | DCBI 42" 18' STR. B | DCBI 42" 18' STR. C | DCBI 42" 18' STR. D

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
4-29-83 Ft.	42"ϕ	4-29-83 Ft.	42"ϕ	4-29-83 Ft.	42"ϕ	4-29-83 Ft.	42"ϕ
SAND	SA SA Depth	SAND	SA SA Depth	SAND	SA SA Depth	SAND	SA SA Depth
Shaft & Bell Complete 5-11-83		Shaft & Bell Complete 5-6-83		Shaft & Bell Complete 5-18-83		Shaft & Bell Complete 5-10-83	
Bell Height 18.2'		18.6'		18.5'		18.6' Bell Height	
DIA. of Bell 78 IN. Bell Height 42 IN. L.F. Rock		Bell DIA. 78 IN. Bell Height 42 IN. L.F. Rock		Bell DIA 78 IN. Bell Height 42 IN. L.F. Rock		Bell DIA. 78 IN. Brll Height 42 IN. L.F. Rock	

REMARKS: HAND DUG HOLES

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table
Note Drill Rate in Sketch Space if Rock Anchor(s)

RECEIVED
MAY 26 1983
LEMCO-MIGUEL

References VAM 5/25/83

Str. No. 242
Sta. No. 3238+65
Str. Type EHT
DATE 5/18/83

CONT. REPR. David Cruz
LEMCO REPR. Ray Baightwell

FOUNDATION BORING REPORT

Str. No. 244

LEMCO ENGINEERS, INC. RECEIVED

PROJECT TITLE SVPL MIGUEL IV FEB 21 1983 W.O. NO.

CONTRACTOR COMMONWEALTH (CWL) TEMPERATURE 70s± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS LEMCO-JANNEY HILLY ✓ LEVEL

WOODS/ORCHARD CULTIVATED OTHER (DESCRIPTION)

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DCA1 5'/22' DCA1 5'/22' DCA1 5'/22' DCA1 5'/22'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
0-1' Ft. HIT 1 FOOT ROCK FINE TO COARSE SAND W/ CLAY BINDER. LARGE CO. TO SMALL CO. MED. GR. 10.5' HIT 1FT. ROCK. 14' LOOSE GRANULAR SAND HOLE COMPL. 2.18.83 TOTAL 21 L.F. OF PAY ROCK 23.0	Depth	Ft. LOOSE FINE TO COARSE SAND, SMALL TO MED. CO./LG. CO. SOME GR. 6.5' SOME CLAY BINDER 7.0' HIT ROCK 8.0' OUT/ROCK. 9.0 LOOSE GRANULAR SAND 13.0' HIT ROCK 17.0 OUT/ROCK. HOLE COMPL. 2.18.83 TOTAL 5 L.F. OF PAY ROCK 22.6	Depth	Ft. LOOSE, FINE TO COARSE SAND. SOME GR. SMALL/LG. CO. 9' SOME CLAY W/ SAND. 12' HIT ROCK 13' OUT/ROCK 18' HIT ROCK 19' OUT/ROCK HOLE COMPL 2.18.83 TOTAL 2 L.F. OF PAY ROCK 23.1	Depth	Ft. LOOSE, FINE TO COARSE SAND SOME GR. SMALL/LG. CO. SOME BO. 8' SOME COARSE SAND W/ CLAY BINDER 11' HIT ROCK 13' OUT/ROCK HOLE COMPL. 2.18.83. TOTAL 2 L.F. OF PAY ROCK 23.4	Depth

REMARKS: PAY ITEM: 2 L.F. OF 5' DIAM ROCK / LEG "A" / 1FT & 10.5FT BELOW SURFACE
5 L.F. OF 5' DIAM. ROCK / LEG "B" / 7FT & 13FT. BELOW SURFACE.
20 L.F. OF 5' DIAM ROCK / LEG "C" / 12FT & 18FT BELOW SURFACE
20 L.F. OF 5' DIAM ROCK / LEG "D" / 11FT BELOW SURFACE.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References (20) VMB 2/22/83 VMB 2-18-83

LEMCO REPR. Cindy Shifflett

Str. No. 244
Sta. No. 3257+85
Str. Type EHT
DATE 2-18-83

FOUNDATION BORING REPORT RECEIVED Str. No. 245

FEB 18 1983

LEMCO ENGINEERS, INC.

PROJECT TITLE SVPL MIGUEL IV LEMCO JAMUL W.O. NO.

CONTRACTOR COMMONWEATH (OVL) TEMPERATURE 70s± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL ✓

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): STR. A DAA1 3.5/45' STR. B DAA1 3.5/15' STR. C DAA1 3.5/15 STR. D DAA1 3.5'/15'

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. MED SAND W/ SOME CLAY SOME SMALL CO. & GR. 10' SAND GRAV/ HAS SOME COBBLES HOLE COMPL 2.17.83 Depth 15.6		Ft. MED. SAND W/. SOME CLAY. SOME SMALL CO & GR. 4' SAND GRANULAR 10' SOME SLOUGHING TO FORM SLIGHT BELL HOLE COMPL 2.17.83 Depth 15.4		Ft. MED. SAND W/. SOME CLAY. 6' SAND MORE GRAV. HOLE COMPL 2.17.83 Depth 15.6'		Ft. MED SAND W/. SOME CLAY 6' SAND MORE GRANULAR HOLE COMPL. 2.17.83 Depth 15.6'	

REMARKS:

WMS. 2-18-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table
Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AHD 2/18/83

(2)

Str. No. 245
Sta. No. 3280+10
Str. Type ELT

LEMCO REPR. DATE 2-17-83

FOUNDATION BORING REPORT RECEIVED Str. No. 246

LEMCO ENGINEERS, INC. FEB 18 1983

PROJECT TITLE SWPL MIGUEL-IV W.O. NO. LEMCO-JAMUL

CONTRACTOR COMMONWEATH (OWL) TEMPERATURE 70's WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): STR. A DAA1 4'/15' STR. B DAA1 4'/16' STR. C DAA1 4'/15' STR. D DAA1 4'/15'

STR. A Description	Sketch	STR. B Description	Sketch	STR. C Description	Sketch	STR. D Description	Sketch
Ft. FINE TO MED SAND. SOME SMALL GR & CO. 13' HIT CLAY BINDER IN SAND. HOLE COMP. 2-17-83. Depth 15.7'		Ft. FINE TO MED. SAND. SOME SMALL GR. & MED. CO. 5' HIT ROCK & LG. CO. CAVE SLOUGHING ON ALL SIDES 1' L.F. 12' HIT BINDER SOME CEMENTING IN SAND HOLE COMPL 2-17-83 Depth 16.8'	9' PLAN VIEW 4'7" DIAM SECTION 9'	Ft. FINE TO MED. SAND SOME SMALL GR. & CO. 15FT. SAND CEMENTING HOLE COMP. 2-17-83 Depth 15.8'		Ft. FINE TO MED. SAND. SOME GR. SOME CO. 14' HIT CLAY BINDER IN SAND HOLE COMP. 2-17-83 Depth 15.8'	

REMARKS: PAY ITEM: 1 L.F. OF 4' DIAM ROCK / LEG "B" - 5' BELOW SURFACE

NOTE: AT 5' DEPTH LEG "B" REGAINED NORMAL DIAM

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMD 2/18/83

Str. No. 246

Sta. No. 3297+82

Str. Type ELT

LEMCO REPR. _____ DATE 2-17-83

FOUNDATION BORING REPORT

RECEIVED

Str. No. 247

LEMCO ENGINEERS, INC.

FEB 18 1983

CT TITLE SVPL. MIGAEL - IV W.O. No.

IRACTOR COMMONWEALTH (OVL) TEMPERATURE 70°± WEATHER SUNNY

LEMCO JAMUL

ESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) _____

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): STR. A DAA1 4'/15' STR. B DAA1 4'/15' STR. C DAA1 4'/15' STR. D DAA1 4'/16'

STR. A Description	Sketch	STR. B Description	Sketch	STR. C Description	Sketch	STR. D Description	Sketch
Ft.		Ft.		Ft.		Ft.	
FINE TO MED. SAND SOME COBBLES		FINE TO MED. SAND. SOME BIG COBBLES		FINE TO MED. SAND. SOME MED COBBLES		FINE TO MED. SAND.	
12' HIT SAND W/. SOME CLAY BINDER		SOME SMALL GR. SHOWING		6' SOME SMALL GR. SHOWING.		HIT COBBLE AT 8' - CAUSED SLUFFING THAT BELL SHAPED HOLE FROM 10.0 TO SURFACE	
HOLE COMP. 2.16.83		13' HIT SAND W/. CLAY		10.5 HIT ROCK - CAUSED HOLE TO SLUFF AND BELL FROM 10.5' TO SURFACE		SOME BINDER AT 14'	
		HOLE COMP. 2.15.83		15' HIT CLAY BINDER IN SAND.		HOLE COMP. 2.16.83.	
				HOLE COMP 2.17.83			
15.8'		16.1'		16.0'		17.1'	

Depth

REMARKS: PAY ITEM: 1 LF OF 4' DIAM ROCK / LEG "C" - 10.5' BELOW SURFACE

NOTE: DIAM OF "C" - 5.5' DIAM TO 4 FT. DEPTH

6.5' DIAM FROM 4 FT DEPTH TO BOTTOM.

DIAM OF "D" - AVERAGE 5.5 DIAM

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel

CO - Cobbles BO - Boulders F.R. - Fractured Rock

RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMD 2/18/83 Wms - 2-18-83

LEMCO REPR. Carolyn Shuffler

Str. No. 247

Sta. No. 3315 + 48

Str. Type ELT

DATE 2.17.83

FOUNDATION BORING REPORT RECEIVED Str. No. 248

LEMCO ENGINEERS, INC. FEB 18 1983

PROJECT TITLE SWPL MIGUEL-N W.O. NO.

CONTRACTOR COMMONWEALTH (OWV) TEMPERATURE 40's-50's ± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL ✓

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DCA1 5.5'/24' DCA1 5.5'/22' DCA1 5.5'/22 DCA1 5.5'/22'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
0-8' Ft. FINE TO MED. SAND 9' HIT LOOSE DRY SAND 11' HIT SAND W/ SOME CLAY BINDER. 13' HIT LAYER OF LOOSE COURSE SAND TO REAL FINE SAND. SOME GR. HOLE COMPL. 2.16.83 25.3	Depth	Ft. FINE TO MED. SAND. SOME SMALL GR. 10' HIT SAND W/ CLAY BINDER. 14' HIT LOOSE COURSE SAND TO REAL FINE SAND. SOME GR. 19' SAND IS FINER HOLE COMPL 2.16.83 22.8'	Depth	Ft. FINE TO MED. SAND SOME SMALL GR. SOME MED COBBLES 9' HIT FINER TO COURSE SAND 10' SAND HAS BINDER 15' SAND MED TO REAL FINE HOLE COMPL. 2.16.83. 22.7'	Depth	Ft. FINE TO MED. SAND. MED. CO. SOME GR. HIT ROCK AT 5.0 FT 12' HIT SAND W/ SOME CLAY 15' HIT REAL FINE TO REAL COURSE SAND HOLE COMPL 2.17.83 23.0	Depth 1 ft. Rock

REMARKS: LEG "A" HIT LOOSE DRY SAND STOPPED DRILLING AT 9.0'/ 2.15.83

PAY ITEM: 1 L.F. OF 5.5' DIAM. ROCK/LEG "D" - 5.0 FT BELOW SURFACE.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AHD 2/18/83
DMS 2-19-93

LEMCO REPR. Charlton Shasta

Str. No. 248
Sta. No. 3331+67
Str. Type ELIT
DATE 2.17.83

FOUNDATION BORING REPORT RECEIVED Str. No. 249

LEMCO ENGINEERS, INC. FEB 16 1983

PROJECT TITLE 69KV - MIGUEL - IV W.O. NO.

CONTRACTOR COMMONWEALTH (OWL) TEMPERATURE LEMCO GAUGE WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL ✓

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DCA1 5'/24' DCA1 5'/24' DCA1 5'/24' DCA1 5'/24'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
FINE TO FT. COARSE SAND & GRAVEL.		FINE TO FT. COARSE SAND & GR.		FINE TO FT. COARSE SAND & GRAVEL		FINE TO FT. COARSE SAND & GRAVEL	
9' SLIGHT SLUFFING, SOME COBBLES SMALL/MED.		8' SLIGHT SLUFFING		7' SAND FINER		8' LARGER GRAVEL SOME SMALL COBBLES	
12' SAND BECOMING FINER		10' SMALL/ MED. COBBLES. MIXED W/. GR.		9' SMALL/MED. COBBLES		10' SOME LARGE COBBLES, SAND IS FINER	
HOLE COMPL. 2.15.83		13' VERY FINE/ DUSTY SAND W/. GR.		HOLE COMPL. 2.15.83		HOLE COMPL. 2.15.83	
Depth		HOLE COMPL. 2.15.83 Depth		Depth		Depth	
25.5'		25.8'		25.0'		25.0'	

REMARKS: HOLE "A" HELD AFTER DRILLING STOPPED. [redacted] SAND IS VERY DRY & GRANULAR & [redacted] VERY FINE TO VERY COARSE.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References (a) MMS 2-16-83 AHD 2/15/83

LEMCO REPR. [signature]

Str. No. 249
Sta. No. 3347+20
Str. Type ELT
DATE 2-15-83

FOUNDATION BORING REPORT RECEIVED Str. No. 250

LEMCO ENGINEERS, INC. FEB 16 1983

PROJECT TITLE SYPL MIGUEL-N W.O. NO.

CONTRACTOR COMMONWEALTH (OVL) TEMPERATURE LEMCO ENGINEERS WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ____ LEVEL ✓

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DAAI 4'/16' DAAI 4'/15' DAAI 4'/15' DAAI 4'/15'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
0-16 Ft. MED. TO COARSE SAND. SOME SMALL COBBLES 2.14.83 COMPL.		0-15' Ft. MED. TO COARSE SAND. SOME GRAVEL 2.14.83 COMPL.		0-15' Ft. MED. TO COARSE SAND. SLIGHT AMT. OF SLUFFING @ 10' SLIGHT AMT. OF CEMENTING IN LOWER SAND LAYERS HOLE COMPL. 2.15.83		0-15 Ft. MED. TO COARSE SAND SOME GRAVEL COMPL. 2.14.83	
Depth 16.9'		Depth 15.8'		Depth 15.7'		Depth 15.3'	

REMARKS:

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References (AL) Ltr 2-16-83
✓ AND 2/17/83

Str. No. 250
Sta. No. 3363+20
Str. Type ELT

LEMCO REPR. [signature] DATE 2.14.83 -

FOUNDATION BORING REPORT

RECEIVED
FEB 15 1983
LEMCO ENGINEERS, INC

Str. No. 251

PROJECT TITLE SWPL MIGUEL - IV W.O. NO.

CONTRACTOR COMMONWEALTH (OVL) TEMPERATURE LEMCO JAMH 60's ± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ____ LEVEL ✓

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DAA1 4'/15' | DAA1 4'/16' | DAA1 4'/15' | DAA1 4'/15'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
0-15' Ft. MED.-COARSE SAND SLIGHT AMT. SLUFFING @ 5.0' HOLE COMP. 2.14.83		0-16' Ft. MED TO COARSE SAND. SOME AGG. HOLE COMP. 2.14.83.		0-15' Ft. MED. TO COARSE SAND. SOME BOULDERS HOLE COMP. 2.14.83		0-15' Ft. MED. TO COARSE SAND. HOLE COMP. 2.14.83	
Depth 15.6'		Depth 16.1'		Depth 15.4'		Depth 15.3'	

REMARKS:

10MS - 2-15-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMD 2/12/83

Str. No. 251

Sta. No. 3380+55

Str. Type ELT

LEMCO REPR. [signature] DATE 2.14.83

Str. No. 252

FOUNDATION BORING REPORT

RECEIVED

FEB 15 1983

LEMCO ENGINEERS, INC.

PROJECT TITLE SYPL MIGUEL -IV Work Order No. _____

CONTRACTOR COMMONWEALTH(OVL) TEMPERATURE 40° ± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL ✓

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): STR. A DAA1 3.5'/15' STR. B DAA1 3.5'/15' STR. C DAA1 3.5'/15' STR. D DAA1 3.5'/15'

STR. A Description	STR. A Sketch	STR. B Description	STR. B Sketch	STR. C Description	STR. C Sketch	STR. D Description	STR. D Sketch
Ft. MED. TO COARSE SAND — MED. AGGR. — HOLE COMPL 2.14.83	Depth 15.4'	0-15' Ft. MED. TO COARSE SAND. MED. AGGREGATE. SOME SMALL COBBLES. HOLE COMPL 2.14.83	Depth 15.8'	0-15' Ft. MED. TO COARSE SAND. MED. AGGR. SMALL COBBLES HOLE COMPL. 2.14.83	Depth 15.7'	0-15' Ft. MED. TO COARSE SAND MED. AGGR. HOLE COMPL. 2.14.83	Depth 15.4'

REMARKS: WMS - 2-15-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMD 2/17/83

Str. No. 252

Sta. No. 3398+85

Str. Type ELT

DATE 2-14-83

FOUNDATION BORING REPORT RECEIVED Str. No. 253

LEMCO ENGINEERS, INC. FEB 15 1983

PROJECT TITLE SAN MIGUEL - IV W.O. NO.

CONTRACTOR COMMONWEALTH (OVL) TEMPERATURE LEMCO-JAMUL WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL ✓

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): STR. A: DAA1 3.5'/15' STR. B: DAA1 3.5'/15' STR. C: DAA1 3.5'/15' STR. D: DAA1 3.5'/15'

STR. A Description	STR. A Sketch	STR. B Description	STR. B Sketch	STR. C Description	STR. C Sketch	STR. D Description	STR. D Sketch
0-15' Ft. MED TO COARSE SAND W/. MED. AGGREGATE. HOLE COMPL 2.14.83.		0'-8' Ft. MED. TO COARSE SAND W/. MED. AGGREGATE 8'-13' SMALL COBBLES APPEARING HOLE COMP 2.11.83		0'-15' Ft. MED. TO COARSE SAND W/. MED AGGR SOME COBBLES HOLE COMPL. 2.11.83.		0-15' Ft. MED TO COARSE SAND W/. MED. AGGR. SOME COBBLES HOLE COMPL. 2.14.83	
Depth 15.6'		Depth 15.4		Depth 16.5'		Depth 16.7'	

REMARKS:

DMS - 2-16-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References AMD 2/17/83

Str. No. 253

Sta. No. 3416+35

Str. Type ELT

LEMCO REPR. Charles Shaw DATE 2.11.83

RECEIVED
FEB 10 1983

FOUNDATION BORING REPORT

Str. No. 254

LEMCO ENGINEERS, INC.

PROJECT TITLE SAN MIGUEL - IV LEMCO JOB NO. _____

CONTRACTOR COMMONWEALTH (OREGON) TEMPERATURE 60°± WEATHER HAZY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY ✓ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): DJA1 7.5'/M2' DJA1 7.5'/M2' DJA1 7.5'/M2' DJA1 7.5'/M2'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. COARSE SAND & GRAVEL SOME COBBLES HIT ROCK AT 29 FT. HOLE COMPLETED 2.8.83. FINAL DEPTH 32.4' Depth		Ft. COARSE SAND AND GRAVEL SOME COBBLES HIT ROCK @ ELEV. 27' HOLE COMPLETED 2.8.83 FINAL DEPTH (32.7') Depth		Ft. COARSE SAND AND GRAVEL SOME STONES HOLE COMPLETED 2-9-83 FINAL DEPTH (32'5") Depth		Ft. COARSE SAND AND GRAVEL SOME STONE HOLE COMPLETED 2-9-83 FINAL DEPTH (32'3") Depth	

Bay deletion B-108 = 2 ft. 2-10-83

PAY ITEM

REMARKS: -LEG "B" - 1 FOOT ROCK DEPTH AT ELEV. 27 FT. BELOW GRADE @ 1.15 PAY ITEM - LEG "A" - 1 FOOT ROCK DEPTH AT 29 FT. BELOW GRADE @ 1.15 OPEN AUGER

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMD 2/10/83

Str. No. _____
Sta. No. _____
Str. Type _____

FOUNDATION BORING REPORT RECEIVED Str. No. 255

LEMCO ENGINEERS, INC. FEB 09 1983

PROJECT TITLE SWPL - MIGUEL / IV W.O. NO.

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE LEMCO (AMBIENT) WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DAA1 3.5'/15' DAA1 3.5'/15' DAA1 3.5'/15' DAA1 3.5'/15'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. COURSE SAND W/. GRAVEL & MEDIUM COBBLES. HOLE COMPLETED 2.8.83 FINAL DEPTH 15.7' Depth 15.7'		Ft. COBBLE SAND W/. GRAVEL & MEDIUM COBBLES. HOLE COMPLETED 2.8.83. FINAL DEPTH 15.8' Depth 15.8'		Ft. COURSE SAND W/. GRAVEL & MEDIUM COBBLES. HOLE COMPLETED 2.8.83. FINAL DEPTH 15.5' Depth 15.5'		GRAVEL Ft. COURSE SILTY SAND W/. SMALL TO MED. COBBLES. HOLE COMPLETED 2.8.83 FINAL DEPTH 15.4 Depth 15.4'	

REMARKS: ANDERSON DRILLING WATSON 2000

WMS 2-9-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table
Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ PHD 2/12/83

Str. No. 255
Sta. No. 3441+28
Str. Type 116 ELT

FOUNDATION BORING REPORT RECEIVED Str. No. 256

LEMCO ENGINEERS, INC. JAN 31 1983

PROJECT TITLE SWPL MIGUEL - IV W.O. NO.

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE LEMCO-JAMUL WEATHER P.C.

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): DAAL 42"/15' DAAL 42"/15' DAAL 42"/15' DAAL 42"/15'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT SAND & CO, 0' TO 15' ϕ54" x 60' ON TOP ϕ44" @ BOTTOM SIDES STANDING WELL 8' TO Depth 16'0"		HIT Ft. SAND & CO, 0' TO 8' HIT SAND W/ LARGE CO, 8' TO 12' HIT SAND W/ CO, 12' TO 15' ϕ48" ON TOP ϕ6' BELL @ 9' TO 11' DEEP ϕ44"+ @ 12' TO 15' SIDES GOOD Depth 16'1"		Ft. HIT SAND W/ SMALL AMT, OF GR, & CO, 0' TO 2' HIT SAND W/ LARGE CO. 2' TO 12' HIT SAND W/ CO 12' TO 15' ϕ4.5' ON TOP ϕ6' BELL @ 9' TO 11' DEEP ϕ44" @ 12' TO BOT SIDES ROUGH BUT STANDING Depth 15'6"		Ft. HIT SAND & CO, 0' TO 15' ϕ44"+ SIDES STANDING GOOD BUT ROUGH Depth 15'8"	

REMARKS: ANDERSON DRILLING ~~WAS SOLE~~ 2000 HWY 20 ALL HOLES COVERED

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

RECEIVED FEB 1 1983 LEMCO-JAMUL

Note Drill Rate in Sketch Space if Rock Anchor(s)

References Wms. 1-31-83

LEMCO REPR. D. Morse

Str. No. 256
Sta. No. 3458+60
Str. Type ELT
DATE 1-28-83

FOUNDATION BORING REPORT RECEIVED Str. No. 257

LEMCO ENGINEERS, INC. JAN 31 1983

PROJECT TITLE SWPL MIGUEL-IV W.O. NO. LEMCO-JAMUL

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 60 WEATHER P.C.

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAAL 3'/9' EAAL 3'/9' EAAL 3'/9' EAAL 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. Depth SAME AS "B"		Ft. Depth HIT CLAY 0' TO 9' NO CAVING USED H2O TO CLEAN HOLE ϕ36"		Ft. Depth HIT SAND & CO. 0' TO 1' HIT CLAY 1' TO 9' NO CAVING USED H2O TO CLEAN HOLE ϕ36"		Ft. Depth SAME AS "B" BUT SIDES ROUGH ϕ4' ON TOP ϕ31" @ 4' DEEP TO BOT	
9'3"		9'2"		9'5"		9'3"	

REMARKS: ANDERSON DRILLING ~~WATSON~~ 2000 Hwy 76

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMS 1/31/83 RECEIVED

AMS 1-31-83 FEB 1983

LEMCO-JAMUL Str. 257
Sta. No. 3476+55
Str. Type ELT

LEMCO REPR. T.R. Morse DATE 1-28-83 ✓

FOUNDATION BORING REPORT RECEIVED Str. No. 258

LEMCO ENGINEERS, INC. JAN 31 1983

PROJECT TITLE SWPL MIGUEL - IV W.O. NO LEMCO-JAMUL

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 60°F WEATHER RAIN CLOUDY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): STR. A EAA2 3'/10' STR. B EAA2 3'/10' STR. C EAA2 3'/11' STR. D EAA2 3'/16'

Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT VERY BRITTLE CLAY THAT FRACTURES WHEN AUGERED 0' TO 5' HIT CLAY 5' TO 10' ϕ 5'@ TOP ϕ 36"@5' TO BOT. NO H_2O USED SIDES ROUGH 0' TO 5' Depth 10' 6"		Ft. HIT CLAY 0' TO 10' NO CAVING USED H_2O TO CLEAN HOLE ϕ 36"+ Depth 10' 6"		Ft. HIT CLAY NO CAVING USED H_2O TO CLEAN HOLE ϕ 48" X 42" ON TOP ϕ 36"@2' TO BOT. Depth 11' 3"		Ft. SAME AS "B" Depth 10' 3"	

REMARKS: ANDERSON DRILLING HWY 20
COMPLETED LEG "A" ON 1-27-83 HOLE COVERED
ANDERSON DRILLING ~~WATSON~~ HWY 20 ON 1-28-83
COMPLETED LEGS "B", "C", & "D" ON 1-28-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

RECEIVED FEB 1 1983 LEMCO-JAMUL

Note Drill Rate in Sketch Space if Rock Anchor(s) ✓AMD 1/31/83

References ~~WMS. 1-31-83~~

T.R. Morse

Str. No. 258
Sta. No. 349+78
Str. Type ELT
DATE 1-28-83 ✓

FOUNDATION BORING REPORT

Str. No 259

RECEIVED

LEMCO ENGINEERS, INC.

JAN 28 1983

PROJECT TITLE SWPL MIGUEL-IV W.O.

CONTRACTOR COMMONWEALTH/ANDERSON TEMPERATURE 60's WEATHER RAIN/CLOUDY

LEMCO-JAMUL

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY ✓ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAAL 3'/9' EAAL 3'/9' EAAL 3'/9' EAAL 3'/9

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT CLAY W/ GRAVEL & CO. 0' TO 4' HIT CLAY 4' TO 9' NO H2O USED ϕ 4'6" TOP ϕ 36" @ 4' DEEP TO BOT. Depth 9'4"		Ft. SAME AS "A" ϕ 36" Depth 9'3"		Ft. SAME AS "A" ϕ 36" Depth 9'4"		Ft. SAME AS "A" ϕ 36" x 48" TOP ϕ 36" @ 5' TO BOT. Depth 9'3"	

REMARKS: ANDERSON DRILLING HWY 78

ALL HOLES COVERED

WMS 1-28-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel

CO - Cobbles BO - Boulders F.R. - Fractured Rock

RO - Rock W.T. - Water Table ✓ AMD 1/24/83

Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____

Str. No. 259

Sta. No. 351+78

Str. Type ELT

LEMCO REPR. R.P. Morse DATE 1-27-83

FOUNDATION BORING REPORT

Str. No. 260

RECEIVED

JAN 28 1983

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL - IV W.O. NO.

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 45° WEATHER RAIN CLOUDY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. SAME AS "C" Depth 9'8"		Ft. SAME AS "C" Depth 9'5"		Ft. HIT SAND & CLAY 0'TO 6" HIT CLAY 6" TO 9' NO CAVING USED H_2O TO CLEAN HOLE Depth 9'5"		Ft. SAME AS "C" Depth 9'5"	

REMARKS: ANDERSON DRILLING HWY. 20

VMS. 1-28-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table ✓ AMD 1/24/83

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ____

Str. No. 260

Sta. No. 3528+24

Str. Type ELT

LEMCO REPR. T.P. Moore DATE 1-27-83

FOUNDATION BORING REPORT RECEIVED Str. No. STR. 261

LEMCO ENGINEERS, INC. FEB 14 1983

PROJECT TITLE SWPL MIGUEL IV W.O. NO. LEMCO-JAMUL

CONTRACTOR COMMONWEALTH (CWL) TEMPERATURE 105± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/10' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. 8' CEMENTED CORAL OYSTER BED 0-8 FT 8'-10 FT DENSE CLAY HOLE COMP 2.11.83	8.0' PAY Rock 11'7"	Ft. 9' CEMENTED CORAL/ OYSTER BED 0' TO 9' CLAY 9-10' HOLE COMP 2.11.83	9.0 PAY Rock 9'10"	Ft. 6.5' CEMENTED CORAL OYSTER BED 0' TO 6.5' CLAY 6.5' TO 10.5' HOLE COMPL 2.11.83	6.5' PAY Rock 10.5'	Ft. 6.0' HIT CEMENTED OYSTER/ CORAL BED 0' TO 6' HIT CLAY 6' TO 9' COMPL: 1.27.83	6.0 PAY Rock 10'

REMARKS: ANDERSON DRILLING HWY 20 LEG "D" / CARBIDE AUGER (WATSON 62) LEG "C", "B", "A" OS

PAY ITEM: LEG "A" 8.0 LINEAR FEET OF 36" DIAMETER ROCK / "B" 9.0 L.F. OF 36" DIAM. ROCK / "C" 6.5 L.F. OF 36" DIAM ROCK / "D" 6.0 L.F. OF 36" DIAM. ROCK.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AHD 2/14/83

~~WMB. 2-14-83~~

Str. No. 261

Sta. No. 354+18

Str. Type ~~SE~~ ELT

DATE 2-11-83 ✓

FOUNDATION BORING REPORT

RECEIVED JAN 28 1983

Str No. 262

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL-IV W.O. NO. LEMCO-JAMUE

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE [illegible] WEATHER CLOUDY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAAL 3'/9' EAAL 3'/9' EAAL 3'/9' EAAL 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT SAND W/ CO. 0' TO 1' HIT CLAY 1' TO 9' USE H2O TO CLEAN HOLE NO CAVING 9' 6"	Depth	Ft. HIT SA, W/ CO. 0' TO 1' HIT CLAY 1' TO 9' SIDE ROUGH BUT GOOD USE H2O TO CLEAN HOLE 9' 3"	Depth	Ft. SAME AS "A" 9' 3"	Depth	Ft. HIT SAME AS "B" 9' 5"	Depth

REMARKS: ANDERSON DRILLING HWY 20

ALL HOLES COVERED

1-28-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel

CO - Cobbles BO - Boulders F.R. - Fractured Rock

RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

✓ AMD 1/28/83

References ____

Str. No. 262

Sta. No. 350+57

Str. Type ELT

LEMCO REPR. D. Morse DATE 1-27-83

FOUNDATION BORING REPORT

Str. No 263

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL - IV W.O. NO. _____

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 68°± WEATHER CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY ✓ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT LOOSE CLAY 0' TO 1' — HIT BROKEN CLAY 1' TO 9' ϕ42" USED H2O TO CLEAN HOLE SIDES STANDING GOOD, BUT ROUGH Depth 9'4"		Ft. HIT CLAY (LOOSE) MIXED W/ SAND & GRAVEL 0' TO 1.5' — HIT BROKEN CLAY 1.5' TO 9' SIDES STANDING BUT ROUGH NO H2O USED TO CLEAN HOLE Depth 9'3"		Ft. HIT SAME AS "A" Depth 9'5"		Ft. HIT SAME AS "A" Depth 9'2"	

REMARKS: ANDERSON DRILLING HWY 20

1-20-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

✓ AMD 1/24/83

References _____

Str. No. 263

Sta. No. 357+25

Str. Type ELT

LEMCO REPR. D.P. Grossi DATE 1-20-83

elfin ?

FOUNDATION BORING REPORT RECEIVED Str. No. 264

LEMCO ENGINEERS, INC. FEB 15 1983

PROJECT TITLE SAN P.L. MIGUEL - I.V. W.O. NO.

CONTRACTOR COMMONWEALTH (OAK) TEMPERATURE LEMCO JAN'S WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): ~~EAA2~~ 3'/15' ~~EAA2~~ 3'/15' ~~EAA2~~ 3'/15' ~~EAA2~~ 3'/15'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. FINE TO MED. SAND. SOME SLUFFING. 0'-5' 5'-9' CLAY W/ SAND. 9-17' CLAY HOLE REMOVE HOLE COMPLETED 2.10.83. 16.8 FT Depth		Ft. FINE TO MED SAND. 0'-7' 7'-16' SAND W/ SOME CLAY HOLE COMPLETED 2.10.83 16.2 FT Depth		Ft. FINE TO MED. SAND 0'-5' CLAY BINDER W/ SAND 5' TO 15' HOLE COMP. 2.10.83. Depth		Ft. FINE TO MED. SAND SOME BINDER & SOME SLUFFING 0'-5' 5'-15' MED. TO FINE SAND HOLE COMPLETED 2.10.83 15.8 FT. Depth	
16.8 FT		16.2 FT.		16.3 FT.		15.8 FT.	

REMARKS: ANDERSON DRILLING WATSON 2000

DMS - 2-11-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMD 2/17/83

(2)

Str. No. 264
Sta. No. 3593+50
Str. Type E.L.T.

LEMCO REPR. Andy Shelton DATE 2.10.83.

FOUNDATION BORING REPORT

Str. No. 265

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL-IV W.O. NO.

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 50°F WEATHER CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): DAAL 4'/17' DAAL 4'/15' DAAL 4'/17' DAAL 4'/15'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT SAND & GRAVEL W/ COBBLES 0' TO 2' HIT FIRM SAND W/ SMALL GRAVEL 2' TO 10' HIT SAND-GRAVEL & QUARTZ BOULDERS 10' TO 11' HIT SAND-STONE 11' TO 17' Φ=52" 17'6"	Depth SAND-STONE	Ft. HIT SAND & GRAVEL & COBBLES 0' TO 4' HIT FINE SAND W/ SMALL GRAVEL 4' TO 13' HIT SAND STONE & ~~SCHIST~~ GRANITE BOULDER 13' TO 15' Φ=5' TO 15' DEEP Φ52" TO BOT. SIDES STANDING GOOD @ 5' TO BOT. 15'2"	Depth	Ft. HIT SAND & GRAVEL W/ REDDISH CLAY 0' TO 2' HIT SAND & GRAVEL W/ CLAY 2 TO 17' Φ=52" USED H2O TO CLEAN HOLE SIDES STANDING GOOD 17'4"	Depth	Ft. HIT SAND & GRAVEL W/ COBBLES 0' TO 6' HIT FINE-FIRM SAND W/ SMALL GRAVEL 6' TO 15' Φ=52" USED H2O TO CLEAN HOLE 15'2"	Depth

USED H2O TO CLEAN HOLE SIDES STANDING GOOD

REMARKS: ANDERSON DRILLING HWY. 20

1-20-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ____

Str. No. 265
Sta. No. 3611+00
Str. Type ELT
DATE 1-20-83

LEMCO REPR. T.P. Morse

FOUNDATION BORING REPORT

Str. No. 266

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL - IV W.O. NO.

CONTRACTOR COMMONWEALTH (ANDERSON?) TEMPERATURE 50° WEATHER CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAA1 3'/9' | EAA1 3'/9' | EAA1 3'/9' | EAA1 3'/9

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT SAND 0' TO ~~0'6"~~ 1' HIT CLAY ~~0'6"~~ TO 9' BROKEN CLAY SIDES CAVING & ROUGH Φ 5' TOP Φ 4' @ 2' DEEP Φ 4' TO BOT. USED H2O TO CLEAN HOLE 9'4"	Depth	Ft. HIT LOOSE CLAY 0' TO 1' HIT CLAY 1' TO 9' SIDES CAVING & ROUGH Φ 54" TO 2' Φ 42" @ 3' Φ 42" TO BOT. USED H2O TO CLEAN HOLE 9'8"	Depth	Ft. HIT LOOSE CLAY 0' TO 1' HIT CLAY 1' TO 9' BROKEN CLAY TO 7' SIDES CAVING & ROUGH Φ 5' TOP Φ 4' @ 4' DEEP Φ 42" 4' TO 7' Φ 38" 7' TO 9' 9'3"	Depth	Ft. HIT SAND & GRAVEL 0' TO 1' HIT SANDSTONE 1' TO 2' HIT CLAY 2' TO 9' Φ 42" SIDES ROUGH USED H2O TO CLEAN HOLE 9'3"	Depth

REMARKS: ANDERSON DRILLING HWY 20

1-20-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table ✓ AMS 1/24/83

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ____

Str. No. 266
Sta. No. 3629+28
Str. Type ELT
DATE 1-20-83

TO Manual

Str. No. 267

FOUNDATION BORING REPORT

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL-IV W.O. NO. _____

CONTRACTOR COMMONWEALTY (ANDERSON) TEMPERATURE 70°± WEATHER PC

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY ✓ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAA1 3'/9' | EAA1 3'/9' | EAA1 3'/9' | EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT SAND & GRAVEL W/ SOME COBBLES 0'TO 3' — 5'TO 13' CLAY USED H2O TO CLEAN HOLE — 44" ϕ 0' TO 5' — Depth — 13'4"		Ft. HIT SAND & GRAVEL W/ SOME COBBLES 0'TO 6.5' HIT CLAY 6.5'TO 13'5" — ϕ44" 0'TO 6.5' USED H2O TO CLEAN HOLE — Depth — 13'5"		Ft. HIT LOOSE GRAVEL & SAND W/COBBLES SOME CAVING 0'TO 7' — 7'TO 13' HIT CLAY ϕ 44" 0' TO 7' USED H2O TO CLEAN HOLE — Depth — 13'0"		Ft. HIT SAND & GRAVEL W/ COBBLES 0'TO 4' — 4'TO 13' HIT CLAY ϕ 42" 0'TO 4' USED H2O TO CLEAN HOLE — Depth — 13'2"	

REMARKS: ANDERSON DRILLING Hwy. 20

LEG "C" LOCATED ON SPOIL FROM TEST TRENCH NEAR-BY.

DEPTH OF LEGS CHANGED TO 13' BY JIM WIGHT SDGE REP.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel

CO - Cobbles BO - Boulders F.R. - Fractured Rock

RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References FIELD ~~NON-CONFORMANCE~~ Change Order REPORT

DAILY CONSTRUCTION REPORT

DMJ 1-20-83 ✓ AMD 1/24/83

Str. No. 267

Sta. No. 3646+95

Str. Type E LT

DATE 1-19-83

Str. No. 268

FOUNDATION BORING REPORT

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel - IV W.O. NO.

CONTRACTOR CommonWealth (Anderson) TEMPERATURE 70+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ____ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT SAND-STONE 0'TO 9' USED H_2O TO CLEAN HOLE SIDES STANDING GOOD Depth 36" ϕ 9'4"		Ft. HIT SAND & GRAVEL 0'TO 4' HIT SAND-STONE 4'TO 9' USED H_2O TO CLEAN HOLE SIDES HOLDING GOOD Depth 36" ϕ 9'4"		Ft. HIT SAND & GRAVEL 0'TO 5' HIT SAND-STONE W/GRAVEL 5'TO 9' USED H_2O TO CLEAN HOLE SIDES HOLDING GOOD Depth 36" ϕ 9'4"		Ft. HIT SAND & GRAVEL W/COBBLES 0'TO 5' HIT SAND-STONE W/GRAVEL 5'TO 9' USED H_2O TO CLEAN HOLE Depth 42" ϕ TO 5' 9'9"	

REMARKS: Anderson Drilling Hwy ~~30~~ 20

AMD 1-20-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table ✓ AMD 1/24/83

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ____

Str. No. 268
Sta. No. 3663+55
Str. Type ELT

LEMCO REPR. Ted Moore DATE 1/19/83

FOUNDATION BORING REPORT

Str. No. 269

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL-IV W.O. NO.

CONTRACTOR COMMONWEALTH (AHLBERSON) TEMPERATURE 60°F WEATHER PC.

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ✓ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAAL 3'/P5 EAAL 3'/P5 EAAL 3'/P5 EAAL 3'/P5

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
START Ft. 11:50 HIT SAND & GRAVEL W/ SOME LARGE COBBLES TO ~~24~~ 18" DIA 0' TO 8' 8' TO SANDSTONE USED H2O TO CLEAN HOLE Ø = 4' @ TOP 5' @ 3' 42" @ 4' 42" 4' TO 6' 15'6"	Depth	START Ft. 10:40 AM HIT SAND SAND & GRAVEL SOME COBBLES FIRST 5' USED H2O TO CLEAN HOLE SIDES GOOD ~~COMPLETED~~ ~~10:50 AM~~ HIT SAND-STONE @ 11' ~~9'3"~~ 11' 15'3"	Depth	START Ft. 10:55 HIT SAND & GRAVEL 0' TO 9' USED H2O TO CLEAN HOLE SIDES STANDING GOOD HIT CLAY ~~COMPLETED~~ @ 10' TO 15' 15'4" 42" DIA 0' TO 6'	Depth	START Ft. 11:20 AM HIT SAND & GRAVEL SOME COBBLES 0' TO 7' 7' TO 8' SANDSTONE CLAY 8' TO 13' SANDSTONE 13' TO 15' 42" DIA, 0' TO 6' USED H2O TO CLEAN HOLE 15'3"	Depth

REMARKS: HOLE DEPTH CHANGES MADE BY JIM WIGHT SDGE REP. TO 15' DEEP - ALL HOLES DRILLED WITH 36" BIT.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

DML 1-20-83
AMD 1/24/83

Note Drill Rate in Sketch Space if Rock Anchor(s)

References FIELD ~~WELD COUPON~~ CHANGE ORDER REPORT
DAILY CONSTRUCTION REPORT

Str. No. 269
Sta. No. 3680+0
Str. Type ELT
DATE 1-19-83

FOUNDATION BORING REPORT

RECEIVED JAN 25 1983 LEMCO ENGINEERS, INC.

Str. No. 270

PROJECT TITLE SWPL MIGUEL-IV W.O. NO.

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 50°± WEATHER P.C.

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY X LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EFA2 5'/16" EFA2 5'/16 EFA2 5'/16 EFA2 5'/16'

COMPLETED 1/21/83 STR. A		COMPLETED 1/21/83 STR. B		COMPLETED 1/21/83 STR. C		COMPLETED 1/19/83 STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT CLAY 0' TO 8' HIT SAND-STONE 8' TO 16' SIDES ROUGH 0' TO 8' Ø7.5' ON TOP Ø7' @ 5' DEEP Ø5'+ TO BOT, USED H_2O TO CLEAN HOLE 16'3"	Depth	Ft. HIT SAND 0' TO 1' HIT CLAY 1' TO 16' SIDES ROUGH Ø6.5' ON TOP Ø5' @ 4' DEEP TO BOT NO H_2O USES TO CLEAN HOLE 16'2"	Depth	START Ft. ~~10:15 AM~~ HIT CLAY REDDISH GRAY IN COLOR 0' TO 9' HIT SAND-STONE 9' TO 16' SIDES ROUGH 0' TO 9' Ø7' ON TOP Ø6' @ 2' TO 7' DEEP Ø5'+ @ 7' TO 16' DEEP USED H_2O TO CLEAN HOLE 16'3"	Depth	Ft. START 8:15 HIT SAND & CLAY (REDDISH-GRAY IN COLOR) 0' TO 2' SOME CAVING FIRST 2' CLAY HIT @ 2' TO 6' HIT SAND-STONE & CLAY @ 6' TO 7' HIT SAND-STONE 7' TO 16' SIDES GOOD BUT ROUGH USED H_2O TO CLEAN HOLE 16'7"	Depth COMPLETE @ 10:00 A.M.

REMARKS: ANDERSON DRILLING HWY-20 "D" LEG STARTED LEG "C" @ 10:15 STOPPED @ 10:20 AM MOVED TO STR. #269 WILL COMPLETE STR. #270 WITH WATSON (2000) DRILL RIG. LEGS "A", "B", "C" COMPLETED ON 1/21/83 - ALL HOLES COVERED.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References 1-24-83 ✓ AMS 1/25/83

LEMCO REPR. T.P. Ormsby

Str. No. 270
Sta. No. 3689+40.87
Str. Type EMA
DATE 1-24-83

FOUNDATION BORING REPORT

Str. No 271

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL-IV W.O. NO. _____

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 80+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. 0'-4 Hit Sand And Gravel 4'-9' Hit Clay And Gravel H_2O Used To Clean Hole Depth 9'-5"		Ft. Hit Clay And Gravel From 0'-1'. Hit Sandstone 1'-5'. Hit Clay And Gravel 5'-9'. Depth 9'-1"		Ft. Hit Sand & Gravel From 0'-2'. Hit Clay And Gravel 2'-9'. H_2O Used To Clean Hole From 0'-2' Hole Is Egg Shaped With Dia. Of 4'. Depth 9'-1"		Ft. Hit Sand And Gravel 0'-7' Hit Clay And Gravel 7'-9' Small Sluffing On Top H_2O Used To Clean Hole. Depth 9'-4"	

REMARKS: ANDERSON DRILLING HWY 20

WMS 1-19-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMD 1/20/83

Str. No. 271
Sta. No. 3703+20
Str. Type ELT
DATE 1/18/83 GK

FOUNDATION BORING REPORT Str. No. 272

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel - IV W.O. NO. _____

CONTRACTOR Commonwealth (Anderson) TEMPERATURE 80+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAAZ 3'/10' EAAZ 3'/10' EAAZ 30'/10' EAAZ 3'/10'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. 0'-7' Hit Clay & Gravel From 7'-10' Hit Sandstone Hole Firm H_2O Used To Clean Hole Depth 10'-2"		Ft. Hit Clay w/ Gravel Hole Firm H_2O Used To Clean Hole Depth 10'-0"		Ft. See Fdn "B" Depth 10'-0"		Ft. See Fdn "B" Depth 10'-3"	

REMARKS: Anderson Drilling Hwy 20

1-19-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References AMD 1/20/83

Str. No. 272
Sta. No. 3719 +60
Str. Type ELT
DATE 1/18/83

FOUNDATION BORING REPORT

Str. No. 273

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL - IV W.O. NO. _____

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 80+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DAA1 3.5/15' DAA1 3.5/15' DAA1 3.5/15' DAA1 3.5/15'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. SEE FDN "D". Depth 15'-9"		Ft. HIT SANDSTONE W/ TRACES OF CLAY SEAMS H2O USED TO CLEAN HOLE Depth 15'-0"		Ft. HIT SAND & GRAVEL 0'-2' HIT SANDSTONE 2'-4'. HIT CLAY 4'-10' HIT SANDSTONE 10'-15', HOLE BELLOWS FROM 0'-4' TO AN EGG SHAPED ~~OF~~ Depth DIA. OF 5.5'. 15'-0"		Ft. HIT SANDSTONE FROM 0'-15' HOLE FIRM NO CAVE-INS H2O USED TO CLEAN HOLE Depth 15'-9"	

REMARKS: ANDERSON DRILLING HWY 20

1-19-83 BMS

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMD 1/20/83

Str. No. 273
Sta. No. 3734+00
Str. Type ELT
DATE 1/18/83 OK

LEMCO REP. Robert W. Schmidt

FOUNDATION BORING REPORT Str. No. 274

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel IV W.O. NO. _____

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 70+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DAAI 3.5'/15' DAAI 3.5'/15' DAAI 3.5'/15' DAAI 3.5'/15'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. Hit Sand And Gravel Hole Firm No Cave Ins H2O Used To Clean Hole Depth 15'-3"		Ft. Hit Sand And Gravel 0'-6' Hit ~~Sand~~ Clay And Gravel 6'-13' Hit Sandstone 13'-15'. H2O Used To Clean Hole. Depth 15'-4"		Ft. 0'-8' Hit Sand & Gravel 8'-15' Hit Sandstone H2O Used To Clean Hole Depth 15'-6		Ft. 0'-6' Hit Sand & Gravel 6'-15 Hit Sandstone Hole Firm H2O Used To Clean Hole Depth 15'-3"	

REMARKS: ANDERSON DRILLING HWY 20

WMB 1-19-93

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AMD 1/20/83

Str. No. 274
Sta. No. 3752+05
Str. Type ELT
DATE 1/18/83 ok

FOUNDATION BORING REPORT

RECEIVED JAN 26 1983

Str. No. 275

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel-IV W.O. NO. LEMCO-JAMUL

CONTRACTOR CommonWealth (Anderson) TEMPERATURE 80+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/1' 3.5'/15' EAA1 3'/1' 3.5'/15' EAA1 3'/1' 3.5'/15' EAA1 3'/1' 3.5'/15'

STR. A		STR. B (6F)		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. 1/18/83 0'-6' Hit Very Loose Sand From 6'-15' Hit Sandstone Slight Caving At Top But Hole Looks Firm H2O Used To Clean Hole. Depth 1-24-83 15'11" 15'-6"		1/17/83 Ft. 0'-12' Sand & Gravel Very loose Encountered Soil Type E @ 12' Which Was Clay. Per Jim Wright This Hole Is No Depth 42"x15' 15'-2"		1/17/83 Ft. 0'-13' Very Loose Sand. Hole Bellows From 3' To 13'. Ave Dia Of This Hole Is 4' To 4½'. Some Sluffing In The Hole. Hit Clay Depth At 13' To 15' 1-24-83 15'11" 15'-5"		1/18/83 Ft. 0'-9' Auguered Very Loose Sand & Gravel. Hole Caving Real Bad. Stop Digging @ 9' 1-24-83 Hit Loose Sand & Gravel, Depth 0' To 11' Hit Firm Sand 11' To 15' Sand Wet From Soaking W/ H2O For 2 Days + 16.0'	Hole is 36" Shored 7'x7' on top 42" to 11', to bot. Completed 1-24-83

REMARKS: Anderson Drilling Hwy 20 (1-24-83 Cleaned out Hole "C", & "A" - Drilled Leg "D")

42" Dia

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____

LEMCO REPR. Robert W. Schmidt

✓ AMD 1/26/83

Str. No. 275
Sta. No. 377+50
Str. Type ELT
DATE 1/17/83 & 1-24-83

FOUNDATION BORING REPORT

Str. No. 276

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPR Miawei - IV W.O. NO. _____

CONTRACTOR Common Wealth (Anderson) TEMPERATURE 80+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
① Ft. Hit Sand And Gravel Hole Firm No Cave Ins H2O Used To Clean Hole Depth 9'-2"		② Ft. See Fdn "A" Depth 9'-2"		④ Ft. See Fdn "A". Depth 9'-1"		⑤ Ft. See Fdn "A". Depth 9'-1"	

REMARKS: Anderson Driving Hwy 20

1-18-83 10mg

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

✓ AMD 1/19/83

References _____

Str. No. 276

Sta. No. 3788+75

Str. Type ELT

LEMCO REPR. Robert W. Schmidt DATE 1/17/83

FOUNDATION BORING REPORT

Str. No. 277

RECEIVED

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL - IV W.O. NO. 15 160

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 70+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. START 11:20 FINISH 11:35 SAND & GRAVEL 0'-8' 8'-9 SANDSTONE HOLE FIRM NO CAVE INS H2O USED TO CLEAN HOLE Depth 9'-5"		Ft. START 11:00 FINISH 11:20 ALLUVIAN SAND W/ SMALL AMT. GRAVEL 0-5' CLAY & GRAVEL HOLE FIRM NO CAVE INS H2O USED TO CLEAN HOLE Depth 9'-2"		Ft. START 11:50 FINISH SEE FDN. "D" Depth 9'-1"		Ft. START 11:35 FINISH 11:50 ALLUVIAN SAND W/ SMALL AMT GRAVEL HOLE FIRM NO CAVE INS H2O USED TO CLEAN HOLE Depth 9'-2"	

REMARKS: ANDERSON DRILLING HWY 20

WMS - 1-19-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____

LEMCO ENGR. Robert M. L. Smith

AMD 1/19/83

Str. No. 277
Sta. No. 3806+75
Str. Type ELT
DATE 1/17/83

FOUNDATION BORING REPORT

Str. No 278

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel - IV W.O. NO.

CONTRACTOR Commonwealth (Anderson) TEMPERATURE 70+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ____ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DAAI 3.5'/15' DAAI 3.5'/15' DAAI 3.5'/15' DAAI 3.5'/15'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. Depth START 9:10 FINISH 9:30 HIT SAND & GRAVEL FROM 0'-11' HIT SILTY SAND AND COARSE GRAVEL 11'-15' HOLE FIRM NO CAVE IN H2O USED TO CLEAN HOLE. 15'-5"		Ft. Depth START 10:00 FINISH 10 30 HIT SAND & GRAVEL TO 11'. HIT SANDSTONE FROM 11'-15' H2O USED TO CLEAN HOLE 15'-2"		Ft. Depth START 9:30 FINISH 10:00 SAME AS FDN "A" SAME ELEV'S. 15'-9"		Ft. Depth START 8:50 FINISH 9:10 HIT SAND & GRAVEL SAND VERY FIRM & LIGHT GRAY HOLE FIRM NO CAVE IN H2O USED TO CLEAN HOLE 15'-6"	

REMARKS: Anderson Drilling Hwy 20

1-18-83 RMS

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

✓ RMS 1/19/83

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ____

Str. No. 278
Sta. No. 3825+50
Str. Type ELT
DATE 1/17/83

LEMCO REPR. Robert W. Schmitt

FOUNDATION BORING REPORT

Str. No. 279

RECEIVED

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL - IV W.O. NO.

CONTRACTOR (ANDERSON) COMMON WEALTH TEMPERATURE 80+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ____ LEVEL ____

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAAI 3'/9' | ~~EAAI~~ EAAI 3'/9' | EAAI 3'/9' | EAAI 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT SAND & GRAVEL HOLE FIRM NO CAVE INS H_2O USED TO CLEAN HOLE Depth 9'-4		Ft. SEE FDN "A" Depth 9'-2"		Ft. SEE FDN "A" Depth 9'-2"		Ft. SEE FDN "A" Depth 9'-4"	

REMARKS: ANDERSON DRILLING HWY 80

1-15-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References 9MO 1/18/83

Str. No. 279
Sta. No. 3843+55
Str. Type ELT
DATE 1/14/83

LEMCO REP.

RECEIVED Str. No. 280

JAN 26 19 83

FOUNDATION BORING REPORT

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL - IV W.O. NO. LEMCO JAN 4

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 55°± WEATHER CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ~~X~~ LEVEL X

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): DGAL 6'/27' DGAL 6'/27' DGAL 6'/27' DGAL 6'/27

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
START Ft. 10:50 HIT SAND W/ GRAVEL HIT 4" BAND OF SAND STONE @ 4' HIT COURSE SAND & GRAVEL W/ COBBLES 12' TO 14' HIT SAND STONE & SAND 14' TO 27' SIDES STANDING GOOD USED H_2O TO CLEAN HOLE 27'3"	Depth	START Ft. 12:05 HIT SAND & GRAVEL W/ COBBLES 0' TO 21' HIT SAND STONE & SAND 21' TO 27 COMPLETED @ 12:55 SIDES STANDING GOOD USED H_2O TO CLEAN HOLE ϕ 6'2" 27'4"	Depth	STARTED Ft. @ 1100 LOOSE SAND & GRAVEL 0' TO 4' HIT SAND-STONE & SAND W/ COBBLES 4' TO 20' HIT SAND-STONE 20' TO 27' SIDES STANDING GOOD USED H_2O TO CLEAN HOLE 27'5" ~~27~~ COMPLETE @ 1:55	Depth	START Ft. 1-24-83 7:40 COMPLETED @ 8:45 SAME AS LEG "C" 27'6"	Depth

ϕ 6'2" ±

FINISH @ 11:59

REMARKS: ANDERSON DRILLING W/ WATSON (2000)
ALL HOLES COVERED & MARKED W/ BARRICADES
LEG "B" DRILLED ON 1-24-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ____

Str. No. 280
Sta. No. 3860+27.14
Str. Type EHA
DATE 1-21-83

LEMCO REPR. T.P. Moss

✓ AMD 1/20/83

FOUNDATION BORING REPORT

Str. No. 281

LEMCO ENGINEERS, INC.

02A

PROJECT TITLE SWPL MIGUEL - IV W.O. NO. _____

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE _____ WEATHER _____

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): ECAI 4.5'/14' ECAI 4.5'/14' ECAI 4.5'/14' ECAI 4.5'/14'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. START 8.15 FINISH 8:45 HIT SAND & GRAVEL HOLE STANDS FIRM W/ NO CAVE INS H2O USED TO CLEAN HOLE Depth 14'-1" SAND - light gray		Ft. START 7:10 FINISH 7:35 HIT SAND ~~& HOSTER~~ GRAVEL. HOLE STAND FIRM, NO CAVE - INS H2O USED TO CLEAN OUT HOLE Depth 14'-2" SAND - light gray		Ft. START 7:35 FINISH 8:15 HIT SAND & GRAVEL. HOLE STAND FIRM & NO CAVE-INS H2O USED TO CLEAN HOLE. Depth 14'-0" SAND - light gray		Ft. START 8:45 FINISH 9:15 HIT SAND & GRAVEL. HOLE STANDS FIRM NO CAVE-INS H2O USED TO CLEAN HOLES Depth 14'-2" SAND - light gray	

REMARKS: ANDERSON DRILLING HWY 20

1-13-83 2 Yds

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____ AWD 1/20/83

Str. No. 281

Sta. No. 3875+42

Str. Type EHT

LEMCO REPR. _____ DATE _____

FOUNDATION BORING REPORT

Str. No. 282

LEMCO ENGINEERS, INC.

RECEIVED DEC 2 1 1982 (02A)

PROJECT TITLE M-IV 500 KV TL W.O. NO.

CONTRACTOR OWL TEMPERATURE 72°± WEATHER CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ____ LEVEL ✓

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAA1 36"/9' EAA1 36"/9' EAA1/36"/9' EAA1/36"/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		START Ft.	
STARTED 10:37		SAND & GRAVEL		BROWN SILT		10:50	
LOOSE SAND W/FINE GRAVEL		MOIST SAND WITH SMALL GRAVEL, HOLDS FIRM WALL		SAND WITH FINE GRAVEL		RED BROWN SILTY SAND	
SOME CAVING BETWEEN 5' & 6' DRILLER ADDED WATER		NO CAVING OBSERVED.		LIGHT GREEN BROWN SAND WITH SCATTERED GRAVEL.		LIGHT GREEN BROWN W/SOME GRAVEL.	
		DRILLER ADDED WATER TO ASSIST IN SAND REMOVAL		SEE LG. 'B'		COARSE DRY SAND NO COHESION	
6.0'		SOIL CAVES WHEN HELD				WATER ADDED TO ASSIST REMOVAL	
FINE SAND FIRM GOOD WALLS		COLOR 0' TO 6" BROWN SILTY SAND				CAVING 5' TO 9'	
COLOR: LIGHT BROWN		6" TO 9'-5" LIGHT GREEN BROWN SAND W/GRAVEL.					
9'3"		9'5"		9'-3"		COMPLETED 11:15	
φ 38"		φ 38"		φ 38"			
COMPLETED 10:50						10.0' TOP φ 38" BOTTOM φ = 42"±	

Depth

REMARKS: HEAVY RAIN IN AREA PRIOR TO ±

USED ANDERSON DRILL RIG HWY-20

SMALL AMOUNT OF WATER ADDED TO ASSIST IN SAND REMOVAL

NO SAND STONE ENCOUNTERED

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References

Str. No. 282

Sta. No. 3893+20

Str. Type ELT

DATE 12-20-82

FOUNDATION BORING REPORT

LEMCO ENGINEERS, INC.

Str. No. 283

RECEIVED DEC 2 1 1982 (024)

PROJECT TITLE M-IV 500 KV TL W.O. NO.

CONTRACTOR QWL TEMPERATURE 250 F WEATHER CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ____ LEVEL X

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAA I 36"/9' | EAA I 36"/9' | EAA I/36/9' | EAA I/36"/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		Ft.	
START 11:42		START 12:55		VERY FINE REDDISH BROWN SAND NO GRAVEL CAKES WHEN HELD, HOLDS GOOD WALL		START 11:50	
VERY FINE CLEAN SAND		FINE CLEAN SAND COLOR REDDISH BROWN				VERY FINE SAND	
	5'		4'		SAND 5'		5'
SLIGHTY CEMENTED SANDSTONE		LIGHT BROWN SLIGHTLY CEMENTED SANDSTONE		SLIGHTY CEMENTED SAND STONE FIRM DRILLING GOOD WALL COLOR LIGHT BROWN	SAND	CEMENTED SANDSTONE	
GOOD WALLS						GOOD CLEAN SIDEWALLS	
	9'4"		9'5"		9'3"		9'4"
COMPLETED 12:50	Ø 38"	COMPLETED 1:04	Ø 38"	COMPLETED 11:44	Ø 38"	COMPLETED 12:10	Ø 38'

REMARKS: HEAVY RAINS IN AREA 1 WEEK PRIOR ANDERSON DRILLING RIG HWY-20 DRILLER ADDED SMALL AMOUNT OF WATER TO ASSIST REMOVAL

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References

Str. No. 283

Sta. No. 3910+80

Str. Type ELT

DATE 12-20-82

FOUNDATION BORING REPORT

Str. No. 284

LEMCO ENGINEERS, INC. (024)

PROJECT TITLE S.W.P.L. Miguel - I.V. W.O. NO. _____

CONTRACTOR Commonwealth (Anderson) TEMPERATURE 70+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. Depth START 11:15AM FINISH 11:30AM AUGURED HOLE TO 9'-3". HIT SAND WITH SMALL TRACES OF GRAVEL SMALL CAVING BUT HOLE STANDING FIRM SAND HAS MOIST COLOR		Ft. Depth STARTED 10:30 & AUGURED THIS HOLE TO A DEPTH OF 9'-9" ENCOUNTERED SAND WITH TRACES OF FINE GRAVEL. HOLE HELD UP FINE WITH NO CAVING WATER USED TO CLEAN OUT HOLE. FINISHED AT 11:00AM SAND HAD MOIST COLOR		Ft. Depth START 11:00AM FINISH 11:15AM AUGURED HOLE TO 9'-2". ENCOUNTERED SAND WITH TRACES OF GRAVEL. USE WATER TO CLEAN OUT HOLE. SAND HAD MOIST COLOR HOLE STANDS FIRM.		Ft. Depth START 11:30 FINISH 11:50 AUGURED HOLE TO 9'-3" SAME SOIL AS REST. SAND HAS MOIST COLOR HOLE STAND FIRM	

REMARKS: Rmd. 1-12-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

✓ RMD 1/17/83

References _____

LEMCO REPR. Robert W. Schmitt

Str. No. 284
Sta. No. 3928+40
Str. Type ELT
DATE 1/10/83 ok

Rt
~~RMD~~
284 file

FOUNDATION BORING REPORT

Str. No. 285 (02A)

LEMCO ENGINEERS, INC.

PROJECT TITLE S.W.P.L. Miguel - IV W.O. NO. _____

CONTRACTOR Commonwealth (Anderson) TEMPERATURE 70+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAAI 3'/10' EAAI 3'/10' EAAI 3'/10' EAAI 3'/10'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. START 12:35 FINISH 1:00 ENCOUNTER SAND & GRAVEL W/ 3" SANDSTONE ~~LIMESTONE~~ AT 4' BELOW SURFACE H2O USED TO CLEAN OUT HOLE. 10'-6" Depth HOLE STANDS FIRM NO CAVING		Ft. START 12:20PM FINISH 12:35PM HIT SAND & GRAVEL. HOLE STANDS FIRM NO CAVE-INS SAND COLOR IS LIGHT GRAY WATER USED TO CLEAN OUT HOLE 10'-2" Depth NO CAVING HOLE STANDS FIRM		Ft. START 1:00 FINISH 1:15 ENCOUNTED MOSTLY GRAVEL W/ SAND SANS IS A light GRAY COLOR WATER USED TO CLEAN OUT HOLE. 10'-6" Depth NO CAVING HOLE STANDS FIRM		Ft. START 1:15 FINISH SAND AND GRAVEL SAND IS light GRAY IN COLOR NO CAVING 10-4" Depth HOLE STANDS FIRM	

REMARKS:

WMS 1-12-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s) OK/m

References NO INPUT Req. AND 1/14/83

Str. No. 285
Sta. No. 3946+15
Str. Type ELT

FOUNDATION BORING REPORT

Str. No. 286 (024)

LEMCO ENGINEERS, INC.

PROJECT TITLE S.W.P.L. MIGUEL - I.V. W.O. NO.

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 70+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. START 2:00 FINISH 2:10 HIT SAND & GRAVEL SAND IS light gray IN Color 9'-3" Depth HOLE STANDS FIRM - NO CAVE INS		START Ft. 1:30 FINISH 1:45 HIT SAND & GRAVEL Hole STANDS FIRM NO CAVE-INS SAND IS light gray & RED IN Color 9'-0" Depth		START Ft. 1:45 FINISH 2:00 HIT SAND & GRAVEL Hole STANDS FIRM W/NO CAVE-INS SAND Color IS light gray. 9'-1" Depth		Ft. START 2:10 FINISH 2:20 HIT SAND & GRAVEL FIRM Hole W/ Slight CAVE-IN TOP SAND IS light gray IN Color. 9'-2" Depth	

REMARKS: Ok's. 1-12-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References NO INPUT Req. RMD 1/14/83

Str. No. 286
Sta. No. 3963+80
Str. Type ELT

LEMCO REPR. Robert M. Schmitt DATE 1/10/83 OK

FOUNDATION BORING REPORT

Str. No. 287 (02A)

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL - IV W.O. NO.

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 70+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. START 2:50 FINISH 3:00 HIT SAND & GRAVEL SAND - light gray in Color, Hole STANDS FIRM W/ NO CAVE-INS. H_2O USED TO CLEAN Hole 9'-4" Depth		Ft. START 2:25 FINISH 2:35 HIT SAND, TRACE CLAY AND GRAVEL Hole STAND FIRM W/ NO CAVE INS light red in Color 9'-1" Depth H_2O USED TO CLEAN OUT Hole		Ft. START 2:35 FINISH 2:50 HIT SAND & GRAVEL Hole STANDS FIRM W/ ~~STAY~~ NO CAVE-INS SAND - GRAY IN Color 9'-0" Depth H_2O USED TO CLEAN Hole		Ft. START 3:00 FINISH 3:10 HIT SAND W/ TRACE OF GRAVEL. SAND - light gray in Color Hole S FIRM W/ NO CAVE-INS H_2O USED TO CLEAN Hole 9'-1" Depth	

REMARKS: DMS. 1-12-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References NO INPUT Req. DMS 1/12/83

Str. No. 287
Sta. No. 3981+50
Str. Type ELT

LEMCO REPR. Robert W. Schmidt DATE 1/10/83 ok

Str. No. 288
024

FOUNDATION BORING REPORT

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL - IV W.O. NO. _____

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 70+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. START 10:15 FINISH 10:30 HIT SAND & SMALL AMT. GRAVEL. HOLE FIRM & NO CAVE INS HIT WEATHERED SANDSTONE @ 4'-0" Depth 9'-4"		Ft. START 9:50 FINISH 10:00 HIT SAND & SMALL AMOUNT GRAVEL HOLE FIRM & NO CAVE-INS H2O USED TO CLEAN OUT HOLE Depth 9'-4"		Ft. START 10:00 FINISH 10:15 HIT SAND & SMALL AMT. OF GRAVEL HOLE FIRM W/ NO CAVE INS ~~H2O USED TO CLEAN HOLE~~ Depth 9'-4"		Ft. START 10:30 FINISH HIT SAND & SMALL AMT GRAVEL HOLE FIRM - NO CAVE INS Depth 9'-1"	

REMARKS: ANDERSON DRILLING HWY 20

1-13-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____

Str. No. 288
Sta. No. 3999+30
Str. Type ELT
DATE 1/11/83 ok

Robert M. Schmidt

FOUNDATION BORING REPORT

Str. No. 289

024

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel - IV W.O. NO. _____

CONTRACTOR Common Wealth (Anderson) TEMPERATURE 70+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA 3'/9' EAA 3/13' EAA 3/9' EAA 3/9

SDGE 1/10/83

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. START 11:35 FINISH 12:00 HIT CLAY AND ROCK STIFF TO HARD CLAY COLOR - light RED Depth 9'-1		Ft. START 10.50 FINISH 11:30 HIT SANDSTONE FORMATION. USE SAME BIT AS BEFORE TO DRILL HOLE. LIGHT GRAY IN COLOR Depth 13'-0"		Ft. START 11:30 FINISH 11:35 SLIGHTLY CEMENTED SANDSTONE LIGHT TAN BROWN COLOR AUGER AS CLEAN SAND SLIGHT ~~CAKED~~ MOIST CAKED WHEN HEATED Depth 9'-2"		Ft. START 12:30 FINISH 12:40 SLIGHTLY CEMETED SANDSTONE LIGHT TAN BROWN COLOR AUGURED AS CLEAN SAND Depth 9'-4"	

REMARKS: Anderson Drilling Hwy 20

1-13-83 DMS

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____

_____

_____

LEMCO REPR. Robert W. Schmidt

Str. No. 289

Sta. No. 4017+00

Str. Type ELT

DATE 1/11/83 RK

FOUNDATION BORING REPORT

Str. No. 290 024

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel - IV W.O. NO. _____

CONTRACTOR Common Wealth (Anderson) TEMPERATURE 70+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAAI 3'/9' EAAI 3'/9' EAAI 3'/9' EAAI 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. Depth START: 12:50 FINISH 1:00 HIT SAND W/ LITTLE GRAVEL SAND ~~light~~ GRAY IN COLOR HOLE FIRM NO CAVE INS 9'-8"		Ft. Depth START 1:00 FINISH 1:15 HIT SAND W/ LITTLE GRAVEL SAND-GRAY COLOR HOLE FIRM NO CAVE INS 9'-4"		Ft. Depth START 1:30 FINISH 1:45 SAME AS FDN "B" 9'-2"		Ft. Depth START 1:15 FINISH 1:30 SAME AS FDN "B" 10'-0"	

REMARKS: Anderson Drilling Hwy 20

1-13-83 WMS

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s) ok/w

References _____

Str. No. 290

Sta. No. 4031+60

Str. Type ELT

LEMCO REPR. Robert W. Schmitt DATE 1/11/83 OK

FOUNDATION BORING REPORT

Str. No. 291

LEMCO ENGINEERS, INC.

024

PROJECT TITLE SWPL MIGUEL - IV W.O. NO.

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 80+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): ECAI 4.5'/14' ECAI 4.5'/14' ECAI 4.5'/14' ECAI 4.5'/14'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. START 3:00 FINISH 3:20 SAME AS PIER "B" Depth 14'-2"		Ft. START 2:10 FINISH 2:30 SLIGHT CEMENT SANDSTONE LIGHT TAN BROWN COLOR AUGURED AS CLEAN SAND SLIGHT MOIST CAKE WHEN HELD Depth 14'-3"	Ft. START 2:30 FINISH 3:00 SAME AS PIER "B" Depth 14'-4"		Ft. START 3:20 FINISH 3:45 SAME AS PIER "B" Depth 14'-3"	

REMARKS: ANDERSON DRILLING HWY 20

1-13-83 2023

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s) Auger

References _____

Str. No. 291

Sta. No. 4046+15

Str. Type EHT

LEMCO REPR. Robert W. Schmitt DATE 1/11/83

FOUNDATION BORING REPORT (02A) Str. No. 292

LEMCO ENGINEERS, INC.

PROJECT TITLE MIGUEL - IV Sub 500KV W.O. NO. _____

CONTRACTOR COMMONWEALTH (OWL) TEMPERATURE 70± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES (NO)

FDN. TYPE (SPEC.): ECAI 4.5/14.0 ECAI 4.5/14.0 ECAI 4.5/14.0 ECAI 4.5/14.0

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. Depth START 11:05 FINISH 11:30 0'-4' DAMP SAND DARK BROWN 4'-14' SAND STONE HOLE STANDING FIRM, NO CAVE INS, H_2O TO CLEAN OUT HOLE 14'6"		Ft. Depth START 8:30 FINISH 10:35 0-4' DAMP SAND DARK BROWN 4-4.5 ~~SAND~~STONE CLAY 4.5-7.5 SANDSTONE SMALL GRAVEL 7.5-8.0 ~~SAND~~STONE CLAY 8.0 TO 13.0 SAND STONE 13.0 TO 14.0 ROCK HOLE STANDING FIRM, NO CAVE IN'S H_2O TO CLEAN OUT HOLE 15.0' 1.0' ROCK		Ft. Depth START 10:40 FINISH 11:00 0-4' DAMP SAND DARK BROWN 4-6 CLAYSTONE 6'-8' SAND & SANDSTONE 8-14 SANDSTONE HOLE STANDING FIRM, NO CAVE IN'S H_2O TO CLEAN OUT HOLE 14'6"		Ft. Depth START 11:35 FINISH 12:45 0-3' DAMP SAND DARK BROWN 3-4 CLAYSTONE 4-14 SAND STONE HOLE STANDING FIRM, NO CAVE INS H_2O TO CLEAN OUT HOLE 15.0'	

REMARKS: LEG "B" HIT ROCK AT 13.0', 12" AUGAR 1'/HR.

Ray Allen DMS 1-13-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

✓ AMD 1/10/83

References _____

Str. No. 292

Sta. No. 4061+55

Str. Type 107 EHT

LEMCO REPR. Leonard Rolph, Lemco Eng. DATE 1-12-82 OK

Revised 292 file

Str. No. 293

FOUNDATION BORING REPORT

LEMCO ENGINEERS, INC. (02A)

JAN 14 1983

PROJECT TITLE MIGUEL - IV Sub 500kV W.O. NO. _____

CONTRACTOR COMMONWEALTH (OWL) TEMPERATURE 80± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES (NO)

FDN. TYPE (SPEC.): EAA1 3/9 (STR. A) EAA1 3/9 (STR. B) EAA1 3/9 (STR. C) EAA1 3/9 (STR. D)

STR. A Description	Sketch	STR. B Description	Sketch	STR. C Description	Sketch	STR. D Description	Sketch
Ft. START 1:50 FINISH 2:20 0-4.5' SAND LIGHT BROWN 4.5-9' CLAYSTONE SANDSTONE 9.0 ROCK Depth HOLE WILL NEED SOME HAND CLEANING 9.0'		Ft. START 1:15 FINISH 1:45 0-4.5' LOOSE SAND 4.5-5.5 ROCK 5.5-7:00 SANDSTONE & SAND 7-9 CLAYSTONE Depth EXCESSIVE CAVING TOP 4.5' ≃ 6' DIA. 9'8" 1.0' ROCK		Ft. START 2:25 FINISH 2:40 0'-3' SAND 3-9 SANDSTONE NO CAVING H_2O USED TO CLEAN HOLE Depth 10'4"		Ft. START 2:45 FINISH 3:00 0'-3' SAND 3-9 LIGHT SANDSTONE Depth 9'6"	

REMARKS: 1 feet of PAY Rock LEG "B"

Ray Allen 1-14-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

Leroy Hallsted ✓ AMD 1/17/83

Route: AMD 293 file

References _____

Str. No. 293
Sta. No. 4079+00
Str. Type 116 ELT
DATE 1-12-83

LEMCO REPR. Ernest Relch

FOUNDATION BORING REPORT

Str. No. 294

RECEIVED

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel - IV W.O. NO.

CONTRACTOR Commonwealth (Anderson) TEMPERATURE 70+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		Ft.	
Sand From 0'-4' Sandstone 4'-9"		Sand From 0'-3' Sandstone From 3'-9'		Sand From 0'-2' & Sandstone From 2'-9'.		Sand From 0'-2' & Sandstone From 2'-9'	
9'-2" Depth		9'-0 Depth		9'-0" Depth		9'-5" Depth	

DMS 1-15-83

REMARKS: Anderson Drilling Hwy 20

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References AMD 1/18/83

Str. No. 294

Sta. No. 4095+25

Str. Type ELT

LEMCO REPR. Robert W. Schmitt DATE 1/13/82 ok

FOUNDATION BORING REPORT

Str. No. 295

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL - IV W.O. NO. JAN 15 1983

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 70+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA' 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. START 8:55 FINISH 9:10 SAND FROM 0'-1'-6" SAND & GRAVEL 1'-6" TO 9" SAND CAME OUT light gray H2O USED TO CLEAN Hole Depth 9'-3"		Ft. START 9:25 FINISH 9:40 SAND FROM 0'-1' SAND & GRAVEL 1'-9" SAND CAME OUT Light gray H2O USED TO CLEAN Hole Depth 9'-1"		Ft. START 9:15 FINISH 9:25 0'-2' SAND 2'-9' SAND & GRAVEL SAND CAME OUT Light gray. H2O USED TO CLEAN Hole. Depth 9'-1"		Ft. START 8:45 FINISH 8:55 SAND FROM 0'-1' SAND & GRAVEL ~~SAME~~ FROM 1'-9". ~~SAME~~ SAND CAME OUT A light gray H2O USED TO CLEAN Hole Depth 9'-2"	

REMARKS: ANDERSON HWY 20 1-15-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References AMD 1/18/83

Str. No. 295
Sta. No. 4/13 + 15
Str. Type ELT
DATE 1/13/83

FOUNDATION BORING REPORT

Str. No. 296

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel - IV W.O. NO. _____

CONTRACTOR Commonwealth (Anderson) TEMPERATURE 70+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. Depth START 10:10 FINISH 10:30 Hole Top Is Egg Shaped W/ Dia of 4'. Depth 2'-6" Sand & Gravel To Depth of 9'. H2O Used To Clean Out Hole 9'-2"		Ft. Depth START 9:45 FINISH 9:55 Sand From 0'-9" W/ Little Gravel Hole Stands Firm No Cave Ins. H2O Used To Clean Hole 9'-4"		Ft. Depth START 9:55 FINISH 10.10 SAME As "B" 9'-1"		Ft. Depth START 10:30 FINISH 10:50 Hit Clay And Gravel To 9'. Top 5' of Soil Bellows From 4'-To 3' Bottom 4' Is 3' ϕ. H2O Used To Clean Hole 9'-2"	

REMARKS: Anderson Drilling Hwy 20

10 mls 1-15-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References AMD 11/15/83

Str. No. ~~25~~ 296
Sta. No. 4130+75
Str. Type ELT
DATE 1/13/83

Robert W. Schmidt

FOUNDATION BORING REPORT

Str. No. 297

RECEIVED

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel - IV W.O. NO. JAN 16 1983

CONTRACTOR Commonwealth (Anderson) TEMPERATURE 70+ WEATHER Sunny LEMCO ENGINEERS

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'9' EAA1 3'9' EAA1 3'9' EAA1 3'9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. Depth START 11:15 FINISH 11:30 SEE "D" 9'-2"		Ft. Depth START 11:30 FINISH 11:45 HIT SAND FROM 0'-6' HIT ~~SAND~~ CLAY & GRAVEL 6'-9" H_2O USED TO CLEAN HOLE 9'-2"		Ft. Depth START 11:45 FINISH SEE "D" 9'-6"		Ft. Depth START 11:00 FINISH 11:15 HIT SAND & GRAVEL H_2O USED TO CLEAN HOLE. HOLE STANDS FIRM - NO CAVE INS 9'-3"	

REMARKS: ANDERSON DRILLING HWY 30

1-15-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References AMD 1/18/83

Str. No. 297
Sta. No. 4148+40
Str. Type ELT

LEMCO REPR. Robert W. Schmidt DATE 1/13/83

FOUNDATION BORING REPORT

Str. No. 298

RECEIVED JAN 16 1983

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel - IV W.O. NO. _____

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 80+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3/4' EAA1 3/4' EAA1 3/4' EAA1 3/4'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		Ft.	
START 1:20 FINISH 1:35 SEE FDN "B"		START 1:05 FINISH 1:20 HIT SAND & GRAVEL WALLS ARE FIRM W/ NO CAVE INS H_2O USED TO CLEAN HOLE		START 1:35 FINISH 1:45 SAME AS FDN "B"		START 1:45 FINISH 2:00 SAME AS FDN "B"	
Depth		Depth		Depth		Depth	
9'-6"		9'-0"		9'-2"		9'-5"	

REMARKS: ANDERSON DRILLING HWY 30

DMS 1-15-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References AMD 1/18/83

Str. No. 298

Sta. No. 4465+45

Str. Type ELT

LEMCO REPR. Robert W. Schmitt DATE 1/13/83 ok

FOUNDATION BORING REPORT

Str. No. 299

RECEIVED

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL - IV W.O. NO.

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 80± WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. START 2:45 FINISH 3:00 SAME AS FDN "B" Depth 9'-0"		Ft. START 2:15 FINISH 2:25 HIT SAND & GRAVEL WALLS FIRM NO CAVEINS H2O USED TO CLEAN HOL Depth 9'-3"		Ft. START 2:25 FINISH 2:45 SAME AS FDN "B" Depth 9'-1"		Ft. START 3:00 FINISH 3:15 SAME AS FDN "B" Depth 9'-3"	

REMARKS: ANDERSON HWY 20

1-15-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References AMD 1/18/83

Str. No. 299
Sta. No. 4183+05
Str. Type ELT
DATE 1/13/83

LEMCO REPR. Robert W. Smith

FOUNDATION BORING REPORT

Str. No. 300

RECEIVED

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel - IV W.O. NO. JAN 18 1983

CONTRACTOR Commonwealth (Anderson) TEMPERATURE 70+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		Ft.	
Clay And Gravel - Hole Firm No Cave Ins H2o Used To Clean Hole		0-2½' Clay 2½'-9" Sand And Gravel W/ Slight Clay H2o Used To Clean Hole		0-5' Clay 5'-9' Sand And Gravel W/ Clay		0'-7' Clay And Gravel 7'-9' Sand & Gravel	
Depth 9'-1"		Depth 9'-2"		Depth 9'-3"		Depth 9'-1"	

REMARKS: Anderson Drilling Hwy 20

WMB 1-15-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References RMD 1/18/83

LEMCO REPR. Robert W. Schmidt

Str. No. 300
Sta. No. 4201+13
Str. Type ELT
DATE 1/14/83 OK

FOUNDATION BORING REPORT

Str. No 301

RECEIVED

LEMCO ENGINEERS, INC.

JAN 18 1983

PROJECT TITLE SWPL Miguel - IV W.O. NO.

CONTRACTOR Common Wealth (Anderson) TEMPERATURE 70+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		Ft.	
0'-6' Clay And Gravel 6'-9' Sand And Gravel Hole Stands Firm No Cave Ins H2O Used To Clean Hole	Depth	0'-7' Clay And Gravel 7'-9' Sand And Gravel Hole Firm No Cave Ins H2O Used To Clean Hole	Depth	Same As Fdn "A"	Depth	Same As Fdn "B"	Depth
9'-5"		9'-2"		9'-1"		9'-7"	

REMARKS: Anderson Drilling Hwy 20

WMS 1-15-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space If Rock Anchor(s)

References Aims 1/18/83

Str. No. 301
Sta. No. 4218+90
Str. Type ELT
DATE 1/14/83

LEMCO REP. Robert M. Schmitt

FOUNDATION BORING REPORT

Str No. 302

RECEIVED JAN 18 1983

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel - IV W.O. NO. EMCO

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 80+ WEATHER SUNNY

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. CLAY AND GRAVEL HOLE FIRM NO CAVE-IN H2O USED TO CLEAN HOLE. Depth 9'-2"		Ft. SAME AS FDN. "A". Depth 9'-1"		Ft. SAME AS FDN. "A". Depth 9'-4"		Ft. SAME AS FDN "A" Depth 9'-3"	

REMARKS: ANDERSON DRILLING HWY 20

DMS 1-15-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References AMD 1/18/83

Str. No. 302
Sta. No. 4236+70
Str. Type ELT
DATE 1/14/83 AM

FOUNDATION BORING REPORT

Str. No. 303

RECEIVED JAN 18 1983

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL Miguel - IV W.O. NO.

CONTRACTOR Common Wealth (Anderson) TEMPERATURE 80+ WEATHER Sunny

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' EAA1 3'/9' EAA1 3'/9' EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. Same As Fdn "B" Depth 9'-2"		Ft. Hit Sand w/ Small Amt Gravel Hole Firm No Caving H2O Used To Clean Hole Depth 9'-4"		Ft. Same As Fdn "B" Depth 9'-4"		Ft. Same As Fdn "B" Depth 9'-5"	

REMARKS: Anderson Drilling Hwy 20

10MS 1-15-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References AMD 1/18/83

Str. No. 303

Sta. No. 4254+70

Str. Type ELT

LEMCO REPR. Robert W. Schmidt DATE 1/14/83 OK

FOUNDATION BORING REPORT

RECEIVED JAN 26 1983

Str. No. 304

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL - IV W.O. NO. LEMCO-JAMIL

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 65° WEATHER P.C

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL ✓

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAA I 3'/9' EAA I 3'/9' EAA I 3'/9' EAA I 3/9

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
START Ft. 1:22 HIT SAND & GRAVEL 0' TO 3' HIT CLAY 3' TO 9' Φ52" TOP TO 3' DEEP Φ36" - 3' TO BOT USED H_2O TO CLEAN HOLE FINISH 1:31 9'6"	Depth	START Ft. 1:10 HIT FINE SAND W/ SMALL AMT. OF GRAVEL 0' TO 3' HIT CLAY W/SMALL AMT. OF GRAVEL ~~SOME~~ 3' TO 9' SOME CAVING 0' TO 3' USED H_2O TO CLEAN HOLE FINISH 1:20 9'7"	Depth	START Ft. 1:47 HIT SAND (FINE) W/SMALL AMT. GRAVEL 0' TO 3' HIT CLAY & SAND 3' TO 9' Φ4'5" @ TOP Φ36" + @ 3' DEEP USED H_2O TO CLEAN HOLE FINISH 2:10 9'6"	Depth	START Ft. 1:32 HIT FINE SAND 0' TO 4' HIT CLAY 4' TO 8' HIT SAND & STONE 8' TO 9' Φ5' @ TOP Φ36" + @ 4' USED H_2O TO CLEAN HOLE FINISH 1:45 9'5"	Depth

REMARKS: ANDERSON DRILLING HWY 20

ALL HOLES COVERED

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel

CO - Cobbles BO - Boulders F.R. - Fractured Rock

RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

✓ AMD 1/26/83

References _____

Str. No. 304

Sta. No. 427+65

Str. Type ELT

DATE 1-24-83

FOUNDATION BORING REPORT RECEIVED Str. No. 305

LEMCO ENGINEERS, INC. JAN 26 1983

PROJECT TITLE SWPL MIGUEL - EV W.O. NO. LEMCO-IAMW

CONTRACTOR COMMONWEALTH (CAUDERSON) TEMPERATURE 65 WEATHER PC.

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL L

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAAL 3'/9' EAAL 3'/9 EAAL 3'/9' EAAL 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
START Ft. 2:55 HIT FINE SAND 0' TO 9' SLIGHT BELL @ 8' TO 9' ϕ @ TOP 4' TO 4'6" ϕ @ 5' 36" TO BOT. USED H2O TO CLEAN HOLE FINISH 3:20 9' 8"		START Ft. 2:25 HIT FINE SAND W/SMALL AMT. OF GR. 0' TO 3' HIT FINE SAND 3' TO 9' USED H2O TO CLEAN HOLE SIDES POOR ϕ 4'5" ON TOP ϕ 36" T 4/ TO BOT. 9' 5"		START Ft. 2:40 HIT SAND (FINE) NOT STANDING WELL 0' TO 9' ϕ 4'5" @ TOP ϕ 36" T @ 5' TO BUT USED H2O TO CLEAN HOLE FINISH 2:50 9' 6"		START Ft. 3:25 HIT FINE SAND 0' TO 9' ϕ 4' ON TOP ϕ 40" ON BOT. USED H2O TO CLEAN HOLE FINISH 3:35 9' 3"	

FINISH 2:35

REMARKS: ANDERSON DRILLING Hwy 20

ALL HOLES COVERED

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

AMD 1/26/83

References _____ 1-25-83

Str. No. 305

Sta. No. 4290+40

Str. Type ELT

LEMCO REP. _____ DATE 1-24-83

FOUNDATION BORING REPORT RECEIVED Str. No. 306

LEMCO ENGINEERS, INC. JAN 26 1983

PROJECT TITLE SWPL MIGUEL-IV. W.O. NO.

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE LEMCO SMITH WEATHER ☒ CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL V

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAAL 3'/9' EAAL 3'/9' EAAL 3'/9' EAAL 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT CLAY 0' TO 9' NO CAVING USED H_2O TO CLEAN HOLE Depth 9'3"		Ft. HIT SAND 0' TO 1' HIT CLAY 1' TO 9' NO CAVING USED H_2O TO CLEAN HOLE Depth 9'4"		Ft. HIT SAND 0' TO 6" HIT CLAY 6" TO ϕ36"X48" ON TOP ϕ36"+ 4' TO BOT. NO CAVING USED H_2O TO CLEAN HOLE Depth 9'2"	TO 4' DEEP	Ft. HIT CLAY 0' TO 9' NO CAVING USED H_2O TO CLEAN HOLE ϕ3' 3" ON TOP ϕ3' ON BOT Depth 9'5"	

REMARKS: ANDERSON DRILLING HWY. 20

ALL HOLES COVERED

AMS - 1-25-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

AMS 1/26/83

Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____

Str. No. 306

Sta. No. 4308+20

Str. Type ELT

LEMCO REPR. T.P. Mosl DATE 1-25-83

RECEIVED JAN 26 1983

FOUNDATION BORING REPORT

LEMCO ENGINEERS, INC.

Str. No. 302

PROJECT TITLE SWPL MIGUEL-IV LEMCO JAMUL NO.

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 65° WEATHER X CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS ____ HILLY ____ LEVEL L

WOODS/ORCHARD ____ CULTIVATED ____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): EAAL 3'/9' EAAL 3'/9' EAAL 3'/9' EAAL 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT FINE SILTY LOOSE SAND 0'TO 4' HIT FINE SAND 4' TO 9' ϕ 3'3" @ TOP ϕ 42" @ Depth DEEP ϕ 36"+ TO BOT USED H2O TO CLEAN HOLE. SIDES GOOD 10'0"		Ft. HIT CLAY 0' TO 1' HIT LOOSE SAND (FINE) 1' TO 4' HIT SAND W/ SMALL AMT. OF SANDSTONE 4' TO 9' BELL 2' TO 4' ϕ 48"+ ϕ 3'2" 4' TO BOT SIDES GOOD @ 4' TO BOT. USED H2O TO CLEAN HOLE Depth 9'5"		Ft. HIT LOOSE SAND & CLAY 0' TO 1' HIT LOOSE FINE SAND 1' TO 4' HIT SAND & ~~CLAY~~ SANDSTONE 6' TO 9' ϕ 3'4" @ TOP ϕ 3'3" @ BOT. Depth SIDES STANDING GOOD 4' TO 9' USED H2O TO CLEAN HOLE 9'5"		Ft. HIT SAND (LOOSE) 0' TO 4' HIT LOOSE SAND W/ SMALL AMT. OF SANDSTONE 4' TO 9' ϕ 42' @ TOP ϕ 3'2" @ Depth BOT. USED H2O TO CLEAN HOLE SIDES STANDING GOOD 9'6"	

REMARKS: ANDERSON DRILLING HWY 20

ALL HOLES COVERED

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel

CO - Cobbles BO - Boulders F.R. - ~~Fractured~~ Rock

RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References Wms - 1-25-83

AND 1/26/83

Str. No. 307

Sta. No. 4325+91

Str. Type ELT

DATE 1-25-83

FOUNDATION BORING REPORT

RECEIVED No. 308

LEMCO ENGINEERS, INC.

JAN 26 1983

PROJECT TITLE SWPL MIGUEL-IV W.O. NO. LEMCO-JAMUL

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 65° WEATHER CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL C

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): EAA1 3'/9' | EAA1 3'/9' | EAA1 3'/9' | EAA1 3'/9'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT LOOSE SAND 0'TO 9' ϕ 5' ON TOP HOLE IS EGG SHAPED 42" x 48" @ 4' TO BOT. USED H2O TO CLEAN HOLE SIDES NOT STANDING WELL 10.0'	Depth	Ft. HIT SAND (LOOSE) 0'TO 9' SIDES NOT STANDING WELL ϕ 5' ON TOP BELL @ 2 TO 4' 48 72" ϕ 36"+ @ 6' TO 9' USED H2O TO CLEAN HOLE 9'5"	Depth	Ft. HIT LOOSE SAND 0'TO 5' HIT LOOSE SAND W/ DENSELY COMPACTED SAND 5'TO 9' SIDES NOT STANDING WELL USED H2O TO CLEAN HOLE ϕ 4' @ TOP ϕ 3'2" @ BOT. 9'5"	Depth	Ft. HIT LOOSE SAND 0'TO 9' ϕ 4'5" ON TOP ϕ 4' @ 6' DEEP ϕ 3'4" @ BOT USED H2O TO CLEAN HOLE 9'5"	Depth

REMARKS: ANDERSON DRILLING HWY 80

Ims 1-25-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

1 AMD 1/24/83

References _____

Str. No. 308

Sta. No. 4343+65

Str. Type ELT

LEMCO REP. T.P. Owen DATE 1-25-83

FOUNDATION BORING REPORT

RECEIVED JAN 26 1983

Str. No. 309

LEMCO ENGINEERS, INC.

PROJECT TITLE SWPL MIGUEL-IV W.O. NO. LEMCO: JAMUL

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 66°± WEATHER CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL CLEAR

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): ~~EAAI~~ DAAI 3'/9'/42"/15' ~~EAAI~~ DAAI 3'/9'/42"/15' ~~EAAI~~ DAAI 3'/9'/42"/15' ~~EAAI~~ DAAI 3'/9'/42"/15'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT LOOSE SAND W/SMALL AMT. GR, 0'TO 8' COURSE LOOSE SAND CAVING 8'TO 10' HIT SAND 10'TO 13' HIT CLAY 13'TO 15' LARGE BELL @ 8'TO 10' DEEP ϕ46" TOP ϕ42" BOT	Depth	Ft. HIT LOOSE SAND W/SMALL AMT. OF GR, 0'TO 13' HIT CLAY 13'TO 15' BELL 8'TO 13' ϕ48" TOP ϕ42" BOT, SIDES GOOD 0'TO 8' & 13'TO 15' USED H2O TO CLEAN HOLE	Depth	Ft. HIT LOOSE SAND (LOOSE) 0'TO 12' HIT CLAY 12'TO 15' SIDES STANDING WELL ϕ48" @ TOP ϕ42" @ BOT USED H2O TO CLEAN HOLE	Depth	Ft. HIT LOOSE SAND 0'TO 8' LOOSE SAND (COURSE) 8'TO 10' CAVING HIT CLAY 10'TO 15' SIDES STANDING WELL ϕ4'X5' ON TOP ϕ42" BOT, USED H2O TO CLEAN HOLE	Depth
16'5"		15'1"		15'3"		15'5"	

REMARKS: ANDERSON DRILLING HWY. 20 ALL HOLES CHANGED TO 42" X 15' DEEP BY JIM WIGHT SDGAE REP. - ENCOUNTERED CLASS "D" TYPE SOIL @ THIS STR.

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

AMD 1/26/83

References MM8 1-25-83

Str. No. 309

Sta. No. 436+55

Str. Type ELT

LEMCO REPR. D.P. Mossi DATE 1-25-83

RECEIVED JAN 26 1983

FOUNDATION BORING REPORT

LEMCO ENGINEERS, INC.

Str. No. 310

PROJECT TITLE SWPL MIGUEL - IV LEMCO JAMUL NO.

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 65°F WEATHER CLEAR

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL L

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. (YES) NO

FDN. TYPE (SPEC.): DAAL 42"/15' DAAL 42"/15' DAAL 42"/15' DAAL 42"/15'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. HIT LOOSE COURSE SAND 0'TO 4' HIT CLAY 4'TO 15' SIDES STANDING WELL USED H_2O TO CLEAN HOLE ϕ 42" 15'5"	Depth	Ft. HIT LOOSE COURSE SAND 0'TO 5 HIT CLAY 5'TO 15' NO CAVING USED H_2O TO CLEAN HOLE ϕ 42" 15'5"	Depth	Ft. HIT LOOSE COURSE SAND 0'TO 4' HIT SAND STONE 4'TO 6' HIT CLAY 6'TO 15' NO CAVING USED H_2O TO CLEAN HOLE ϕ 42" 15'0"	Depth	Ft. HIT LOOSE COURSE SAND W/GR, & CO. 0'TO 4' HIT CLAY 4'TO 15' SIDES STANDING WELL USED H_2O TO CLEAN HOLE ϕ 42" 15'6"	Depth

REMARKS: ANDERSON DRILLING HWY. 70

STR. #310 LEGS "A" & "D" DRILLED ON 1-25-83

COMPLETED "B" & "C" ON 1-26-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References 1-26 AMD 1/28/83

Str. No. 310
Sta. No. 4379+60
Str. Type ELT
DATE 1-26-83

FOUNDATION BORING REPORT RECEIVED Str. No. 311

LEMCO ENGINEERS, INC. JAN 27 1983

PROJECT TITLE SWPL MIGUEL-IV W.O. NO. LEMCO-JAMUL

CONTRACTOR COMMONWEALTH (ANDERSON) TEMPERATURE 65 WEATHER P.C.

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL L

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DDAI 5'/22' DDAI 5'/22' DDAI 5'/22' DDAI 5'/22

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		Ft.	
HIT LOOSE SA, (COURSE) 0' TO 2'		HIT LOOSE SA, SAME AS "A"		HIT LOOSE SA. (COURSE) 0' TO 3		HIT LOOSE SA, (COURSE) 0' TO 2'	
HIT SANDSTONE BANDED W/ SMALL AMT, CLAY 2' TO 7'				HIT SANDSTONE W/SMALL AMT, OF CLAY 3' TO 8'		HIT SANDSTONE & CLAY 2' TO 9'	
HIT DENSE FINE SAND 7' TO 9'				HIT CLAY 8' TO 22'		HIT CLAY 9' TO 22'	
HIT CLAY 9' TO 22'				NO CAVING USED H_2O TO CLEAN HOLE		NO CAVING USED H_2O TO CLEAN HOLE	
NO CAVING USED H_2O TO CLEAN HOLE, Ø5'						Ø5'	
Depth 22'3"		Depth 22'5"		Depth 22'4"		Depth 22'6"	

REMARKS: ANDERSON DRILLING HWY. 20

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table
Note Drill Rate in Sketch Space if Rock Anchor(s)

References _____ Str. No. 311
_____ Sta. No. 439+75
_____ Str. Type ETT

LEMCO REPR. D. Most DATE 1-26-83

FOUNDATION BORING REPORT

RECEIVED
FEB 17 1983
LEMCO ENGINEERS, INC.

Str. No. 312

PROJECT TITLE SVRL MIGUEL-IV W.O. NO.

CONTRACTOR COMMONWEALTH (OVL) TOPOGRAPHY FLAT 50's ± WEATHER P.C.

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL ✓

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) DESERT

RIGHT-OF-WAY CLEARED (YES) NO STR. STAKED (YES) NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DDA1 5'/22' DDA1 5'/22' DDA1 5'/22' DDA1 5'/22'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft. FIRM COARSE SAND 11' TO 14' SOME SLUFFING 12' SOME CLAY BINDER HOLE COMPL 2.16.83 Depth 22.5'		0-8' Ft. LOOSE COURSE SAND W/. SOME GRAVEL 8'-14' SLUFFING AND CAVING 14' TO 22' SOME BINDER HOLE COMPL 1.28.83 Depth 23.5'		0-15' Ft. LOOSE COARSE SANDY W. GR. SLUFFING AND CAVING. 15' TO BOTTOM SOME BINDER APPEARING IN SAND HOLE COMPL 2.2.83 Depth 22.4'		0'-12' Ft. LOOSE COARSE SAND SOME GR. SLUFFING AND CAVING 12' SOME CLAY BINDER SLOUGHING IN SAND. HOLE COMPL. 2.2.83 Depth 23.0'	

REMARKS: COMPACTION & DENSITY TESTS TAKEN ON LEG "A" ON 2-16-83 AT 3.5' = 95.6% ; 5.5' = 92.6% ; 7.5' = 95.6%

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s) ✓ AMD 2/17/83

References (a) MMB 2-17-83

Str. No. 312
Sta. No. 4414+30
Str. Type ETT

Str. No 313

FOUNDATION BORING REPORT

LEMCO ENGINEERS, INC.

PROJECT TITLE MIGUEL - IV 500 KV W.O. NO. _____

CONTRACTOR COMMONWEALTH (OWL) TEMPERATURE 65± WEATHER F

DESCRIPTION OF SURROUNDING AREA: MOUNTAINOUS _____ HILLY _____ LEVEL _____

WOODS/ORCHARD _____ CULTIVATED _____ OTHER (DESCRIPTION) Desert

RIGHT-OF-WAY CLEARED YES NO STR. STAKED YES NO CONSTR. ROADS SATISF. YES NO

FDN. TYPE (SPEC.): DHA1 7.5'/31' DHA1 7.5'/31' DHA1 7.5'/31' DHA1 7.5'/31'

STR. A		STR. B		STR. C		STR. D	
Description	Sketch	Description	Sketch	Description	Sketch	Description	Sketch
Ft.		Ft.		Ft.		Ft.	
Loose SAND 0'-8'		Loose SAND 0' TO 9'		Loose SAND 0' To 6'		Loose SAND 0'-9'	
8' To 16' SANDSTONE		SANDSTONE AND CLAY LAYERS 9' TO 32.0'		SANDSTONE & CLAY LAYERS 6 TO 31'		SANDSTONE & CLAY LAYERS 9'-31'	
16'-31.0' SAND SOME SLUFFING		SOME SLUFFING SLIGHT BELL Between 16' & 26'		SLUFFING Between, 17' To 20		SLUFFING ON ONE SIDE 13' TO 21'	
Depth		Depth		Depth		Depth	
2-7-83		2-1-83		2-2-83		2-7-83	
31.4'		32.4'		32.9'		32.5'	

REMARKS: ANDERSON DRILL RIG WATSON 2000

WMS 2-8-83

SKETCH LEGEND: SA - Sand SI - Silt CL - Clay GR - Gravel
CO - Cobbles BO - Boulders F.R. - Fractured Rock
RO - Rock W.T. - Water Table

Note Drill Rate in Sketch Space if Rock Anchor(s)

References ✓ AOD 2/22/83

Str. No. 313
Sta. No. 4430+72.61
Str. Type ELD
DATE 2-7-83

DE

DRAFT

Geophysical measurements were obtained at selected locations using seismic refraction methods. The selected locations focused on heavily loaded structures such as strain, dead end and angle tower locations. Surveys were also performed at selected tangent structures to help evaluate geologic conditions within the various rock units. The seismic refraction surveys were performed to characterize the range of soil and rock depths and provide insight into excavation characteristics. Seismic refraction profiles were generally 230 feet long and were typically oriented parallel to the transmission alignment.

Profiles were generally obtained along either relatively level ground or along slope contours, allowing most of the data to be visually presented as if on flat ground. Profiles centered on small hilltops should be interpreted carefully, remembering that off-center data may reflect elevation changes as well as depth changes. Seismic profiles on steep side slopes reflect depths normal to the ground surface, which will be somewhat less than the vertical depths.

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 (geophones). Measurements were obtained using a Geometrics S24 seismograph with 24 geophones. The source consisted of multiple sledgehammer blows to a groundplate or rock. Geophones were normally spaced at 10 foot intervals with the 12^{th} and 13^{th} geophones sometimes being overlapped. Shotpoints were nominally placed at the ends and every six geophones along each profile, and typically offset 110 feet beyond each end. The ends of each profile were recorded using Global Positioning System (GPS). In general, the primary constraint on data quality was wind noise. The recording parameters were optimized to provide data for the upper twenty feet of materials, but generally penetrated at least double that depth.

The seismic travel times were plotted on time-distance graphs and interpreted using time-term methods (the generalized reciprocal method with the XY parameter set to zero). The resulting models represent the rock and soils depths and velocities which would account for the measured travel times. The models are non-unique but appear to be the most reasonable solutions based on the known geology. 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. The alignment crosses a variety of geological environments, so generalizations regarding the seismic data need to be addressed within the context of each environment.

The results of the seismic refraction traverses are presented on Figures C-1 through C-270 in this appendix. Table 3 summarizes an average seismic velocity profile interpreted profiles for each traverse Figures 6a through 6m show the interpreted seismic velocity profiles graphically for each traverse along the original transmission line alignment. Figure 6n shows the interpreted seismic velocity profiles for MSG/Visual and Sugarloaf Re-routes. The seismic refraction data collected, including interpreted time-distance plots, are archived in our files and available upon request.

DRAFT

Table C-1
Correlation of P-Wave Velocity with Augerability
Sunrise Powerlink Project

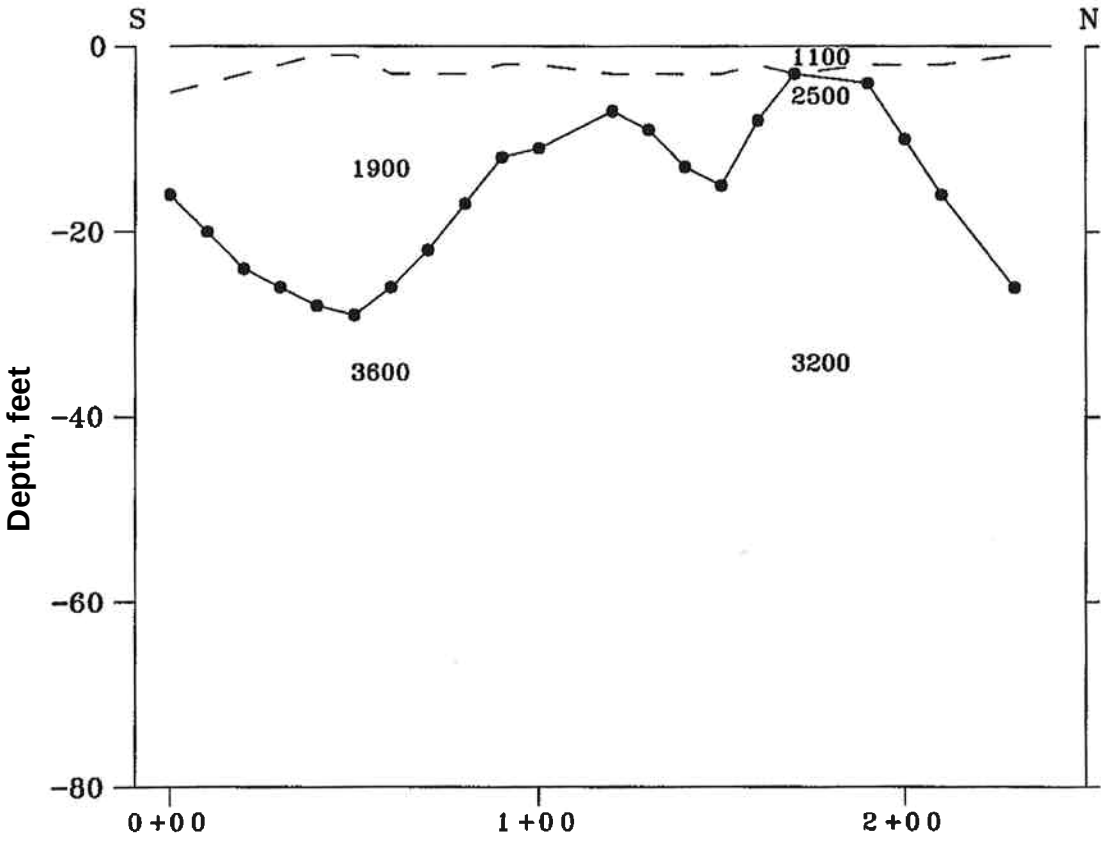
Rock Type	Augerability	Seismic Velocity (Watson 2000)	Seismic Velocity (Watson 3000)
Granitic Rock	easy to moderate [a]	< 3,000	< 3,500
	difficult [b]	3,000 to 3,500	3,500 to 4,400
	refusal	> 3,500	> 4,400
Metamorphic Rock	easy to moderate [a]	< 4,000	< 4,000
	difficult	4,000 to 4,500	4,000 to 5,000
	refusal	> 4,500	> 5,000
Conglomerate / Sedimentary Rock	easy to moderate [a]	< 4,500	< 5,000
	difficult	4,500 to 6,000	5,000 to 7,500
	refusal	> 6,000	> 7,500

Notes:

a. Augering may become more difficult if a large number of cobbles or boulders are encountered.

b. May require core barrel drilling or blasting.

DRAFT



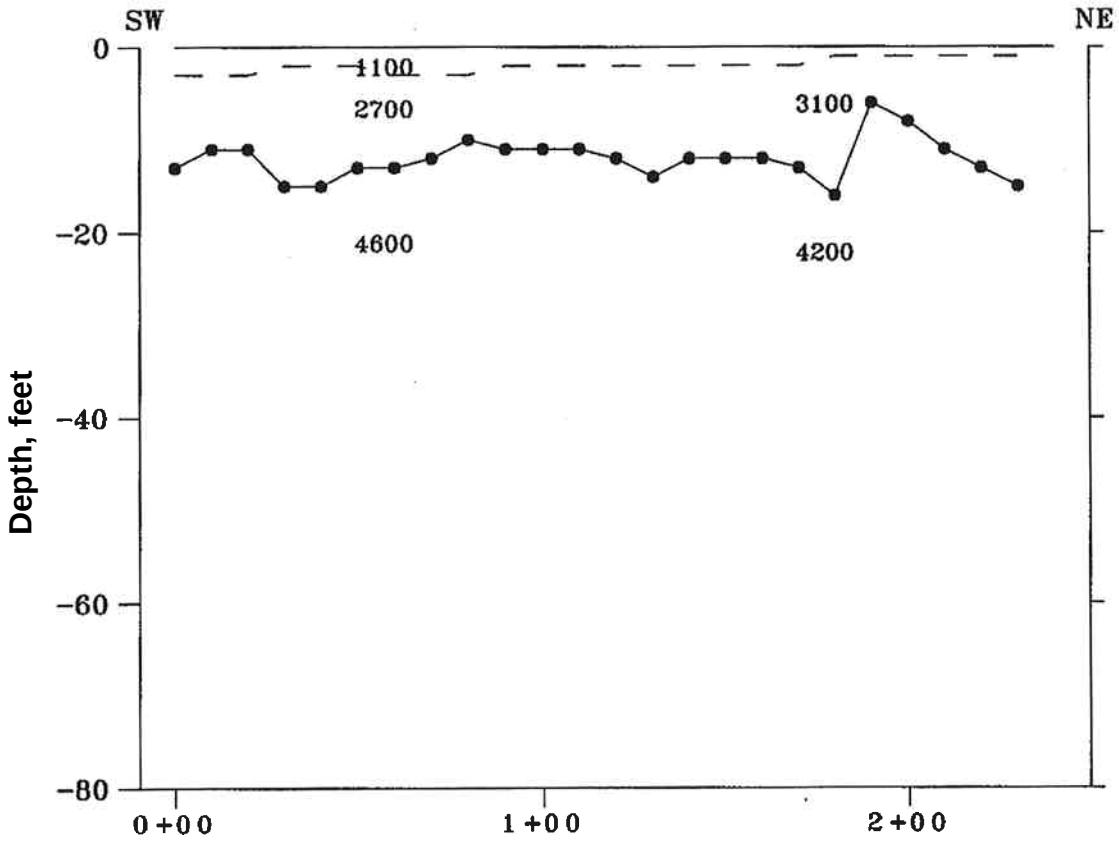
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS4-P20

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-1



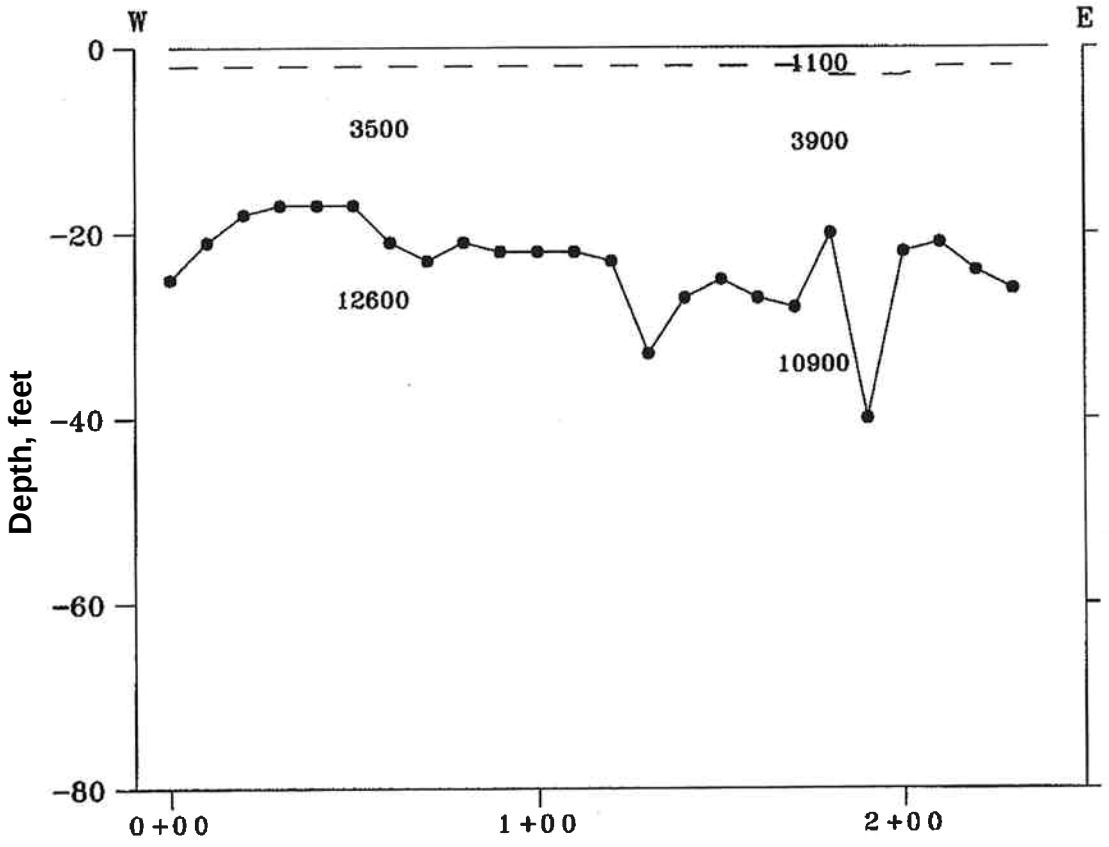
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS4-P23

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-2



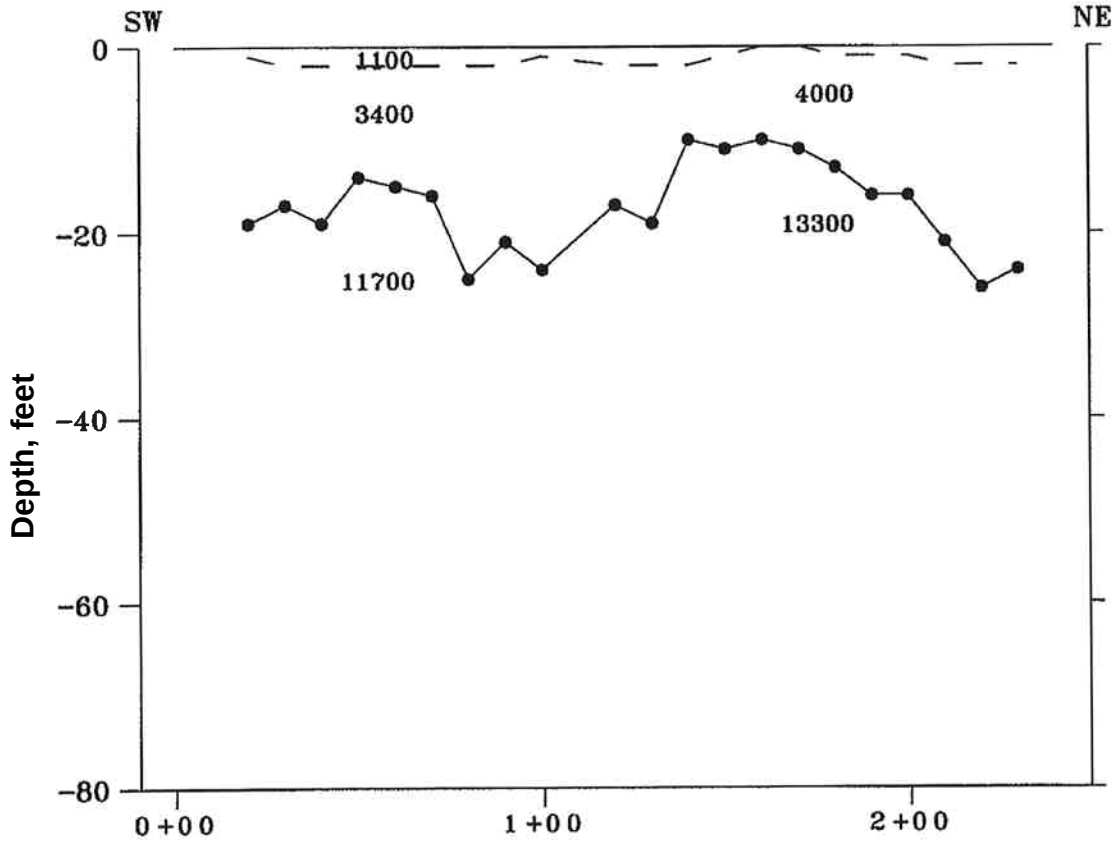
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS4-P25-2

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-3



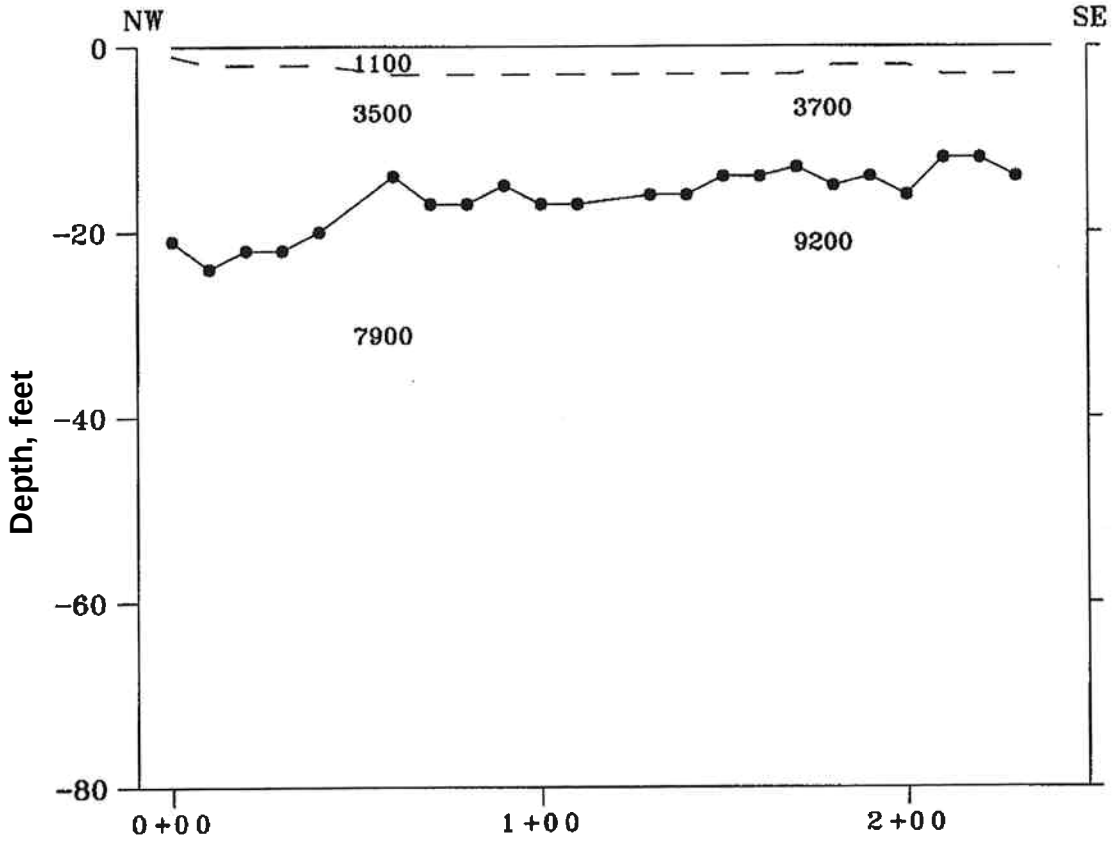
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS4-P28-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-4



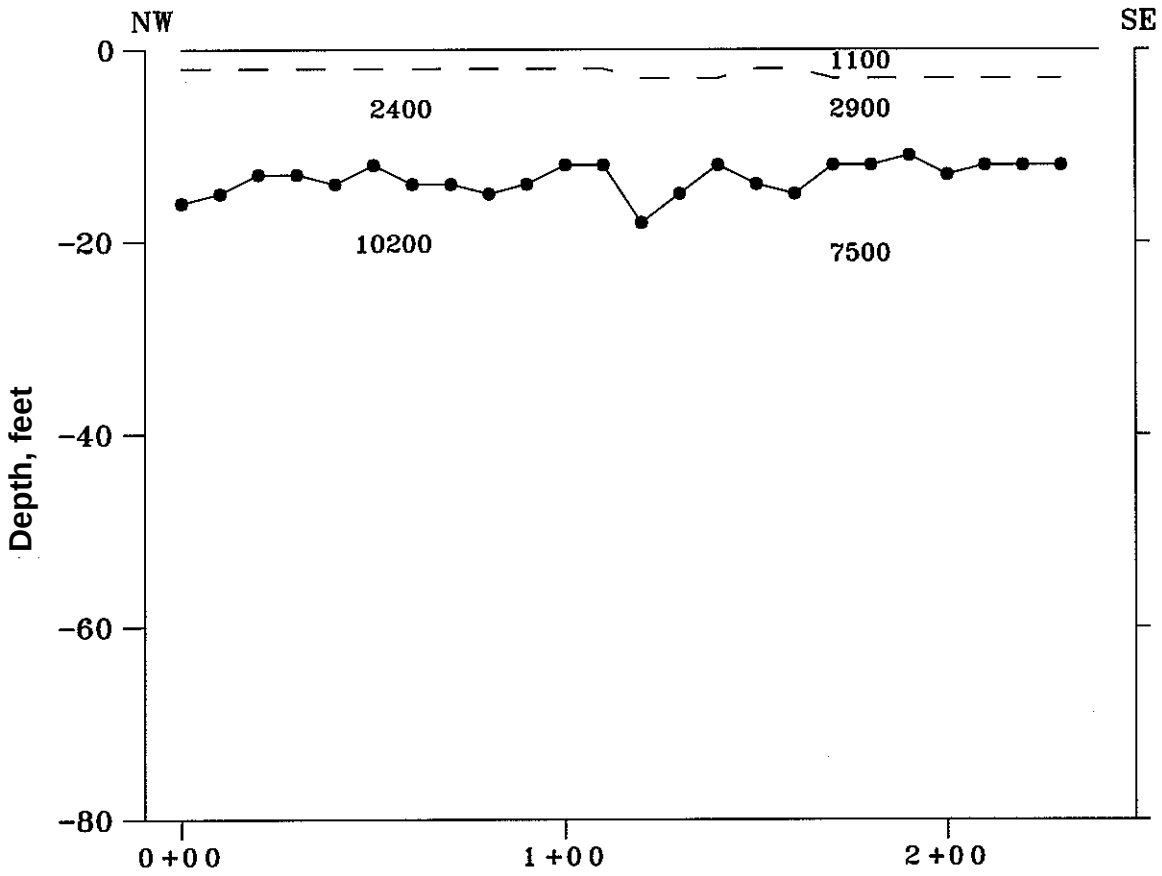
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS4-P29-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-5



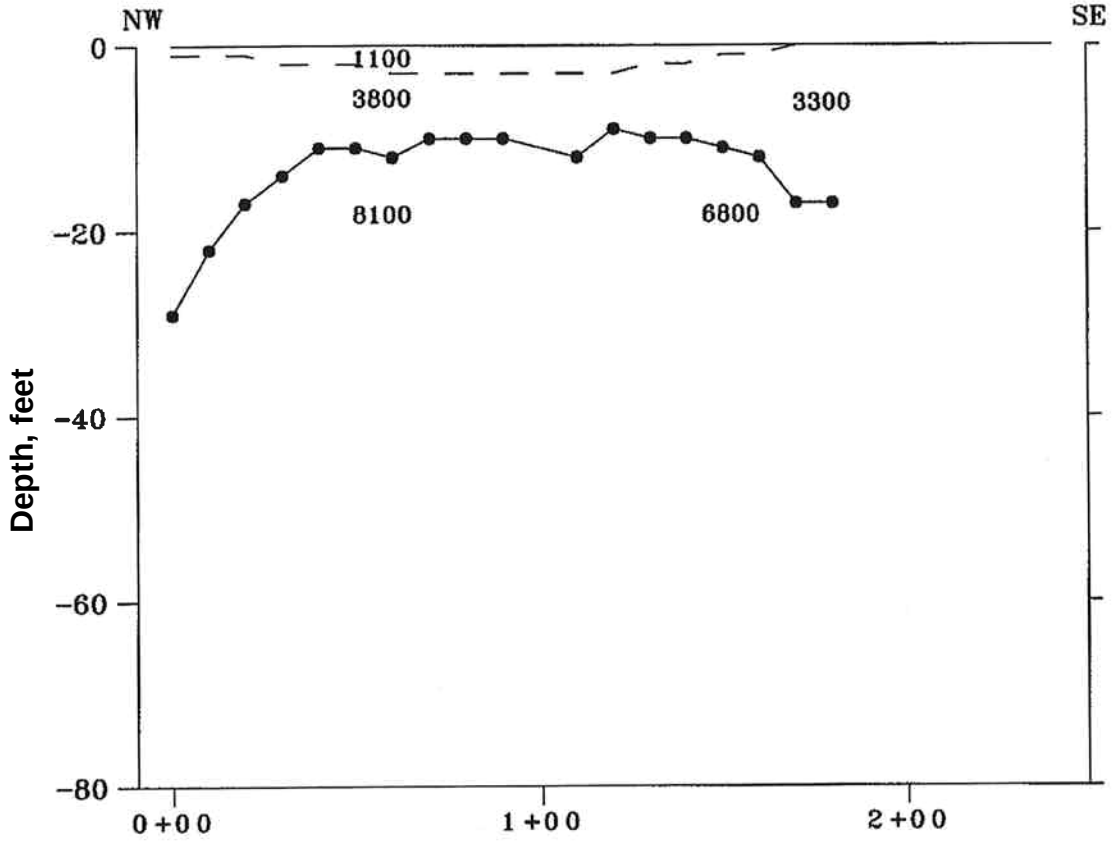
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS4-P31-1

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-6



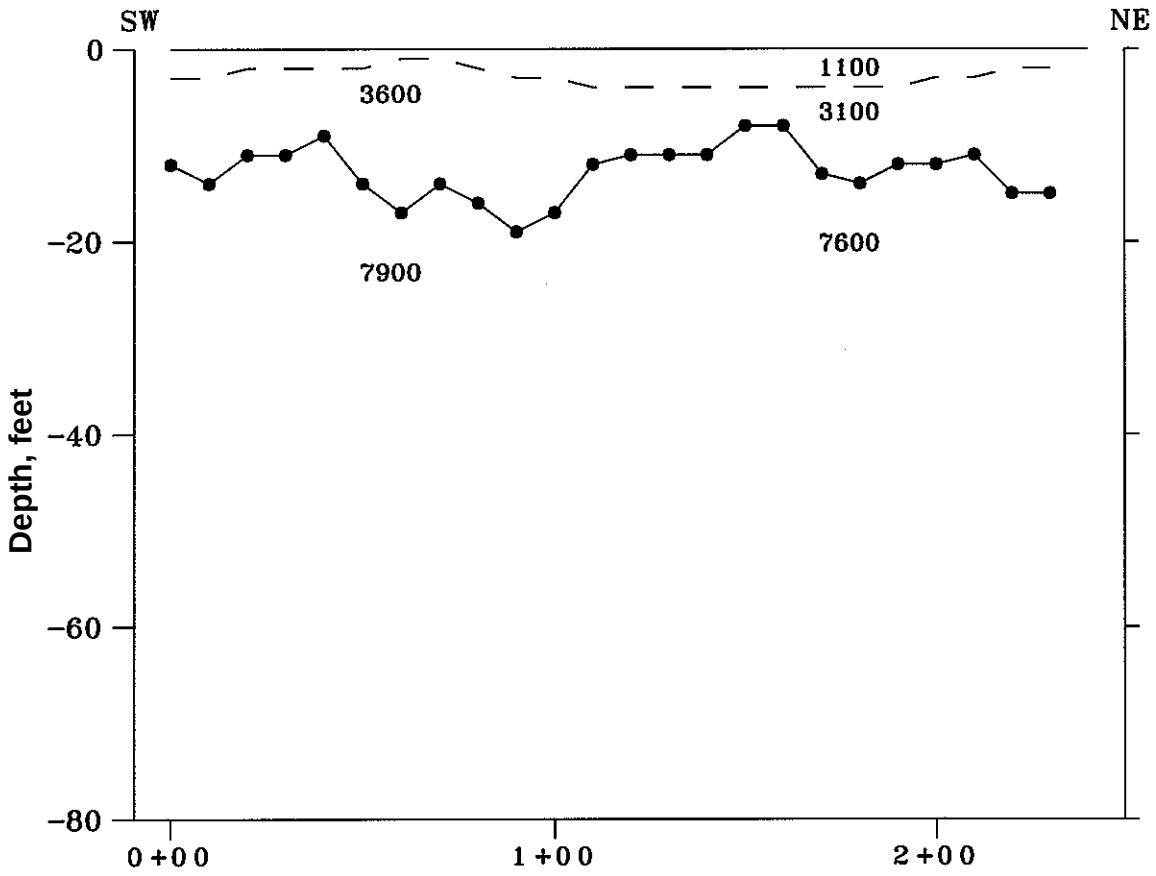
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P32-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-7



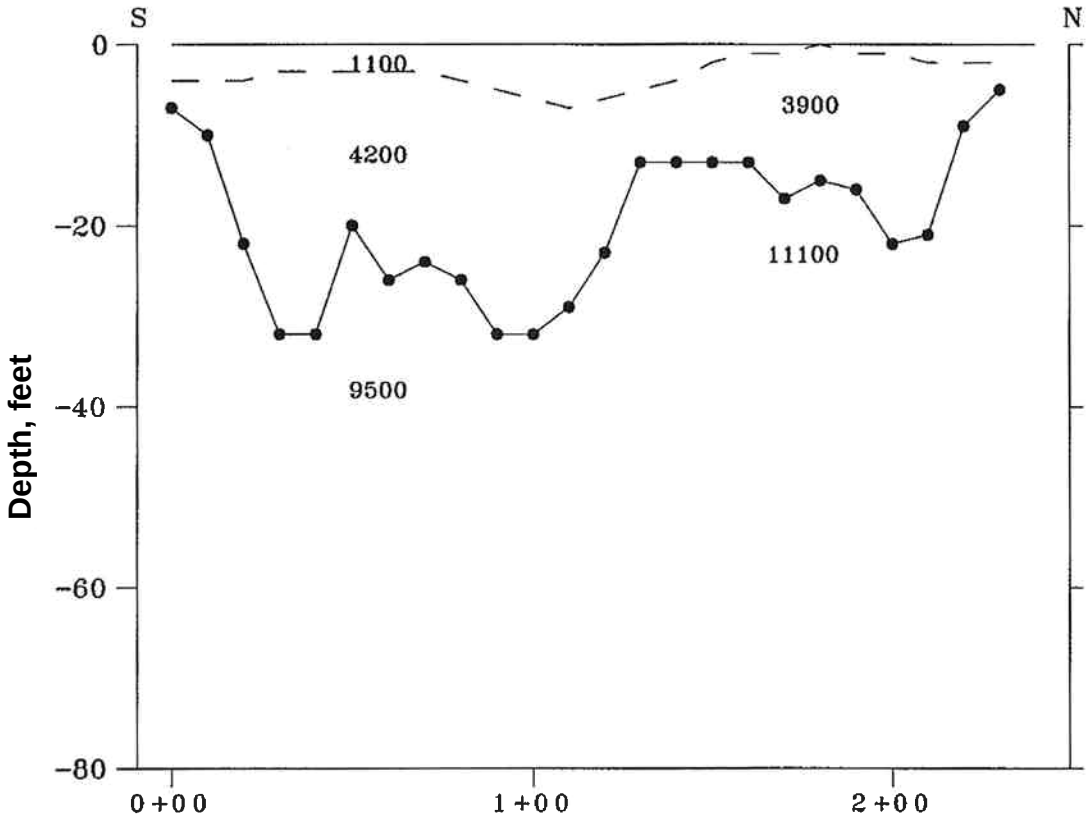
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P32-2

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-8



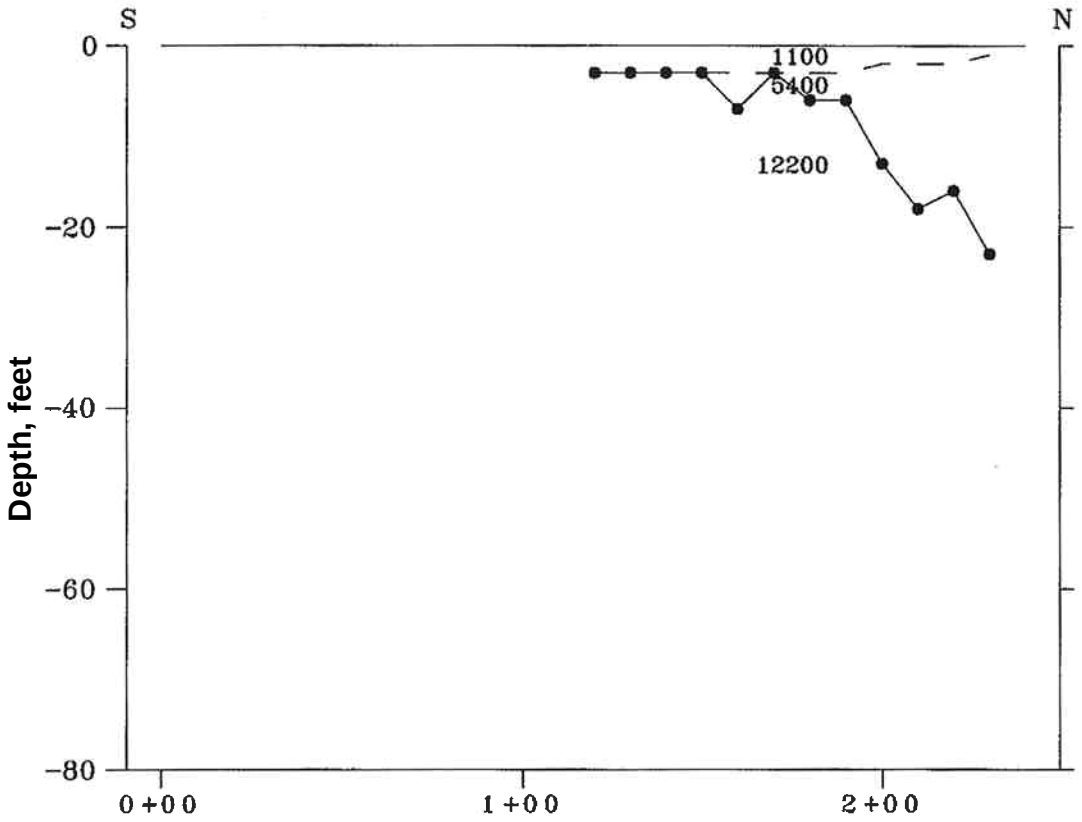
P-wave velocities in feet per second

1 in = 20 ft

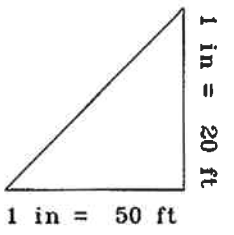
1 in = 50 ft

RS5-P33

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-9

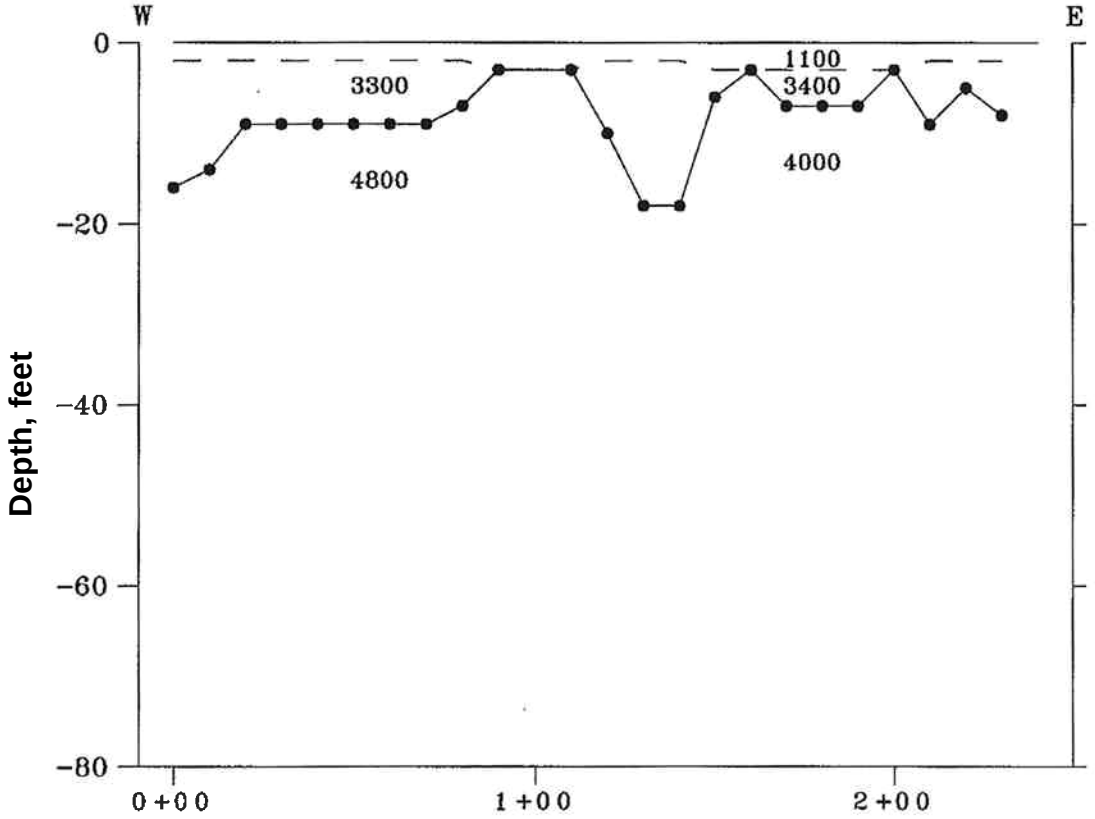


P-wave velocities in feet per second



RS5-P35-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-10



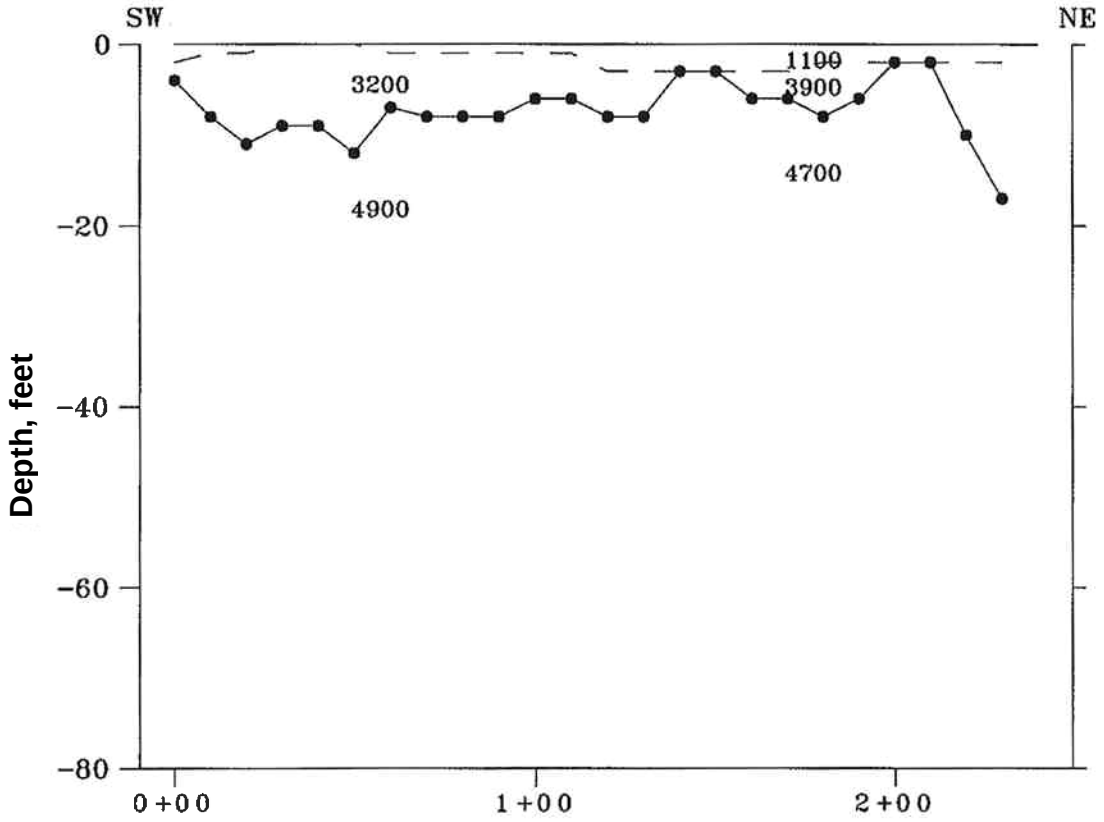
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P36-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-11



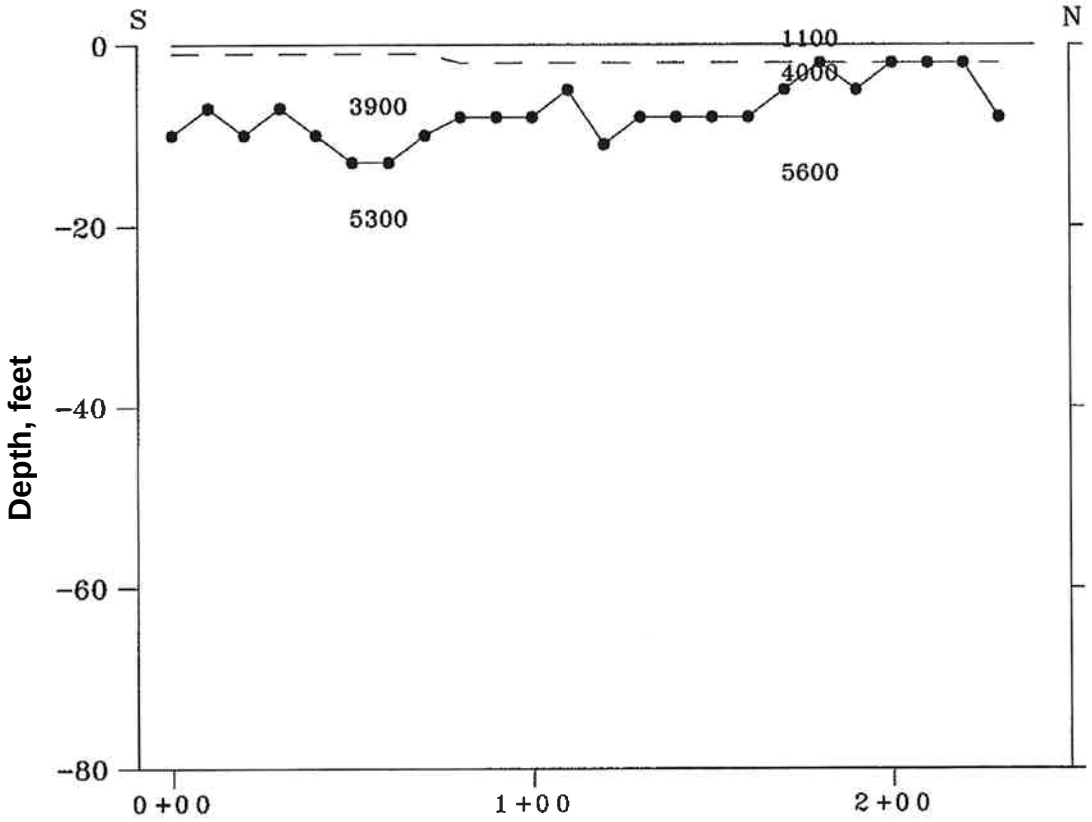
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P37-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-12



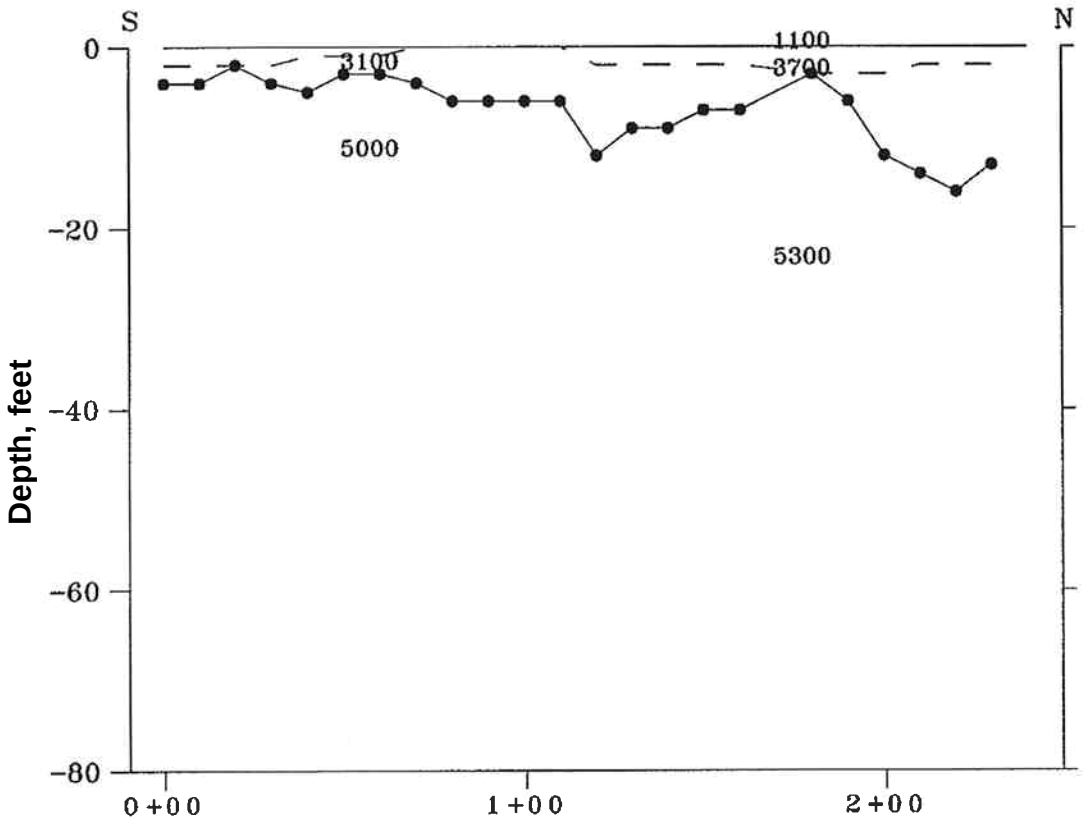
P-wave velocities in feet per second

1 in = 20 ft

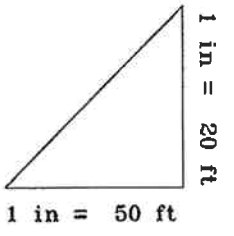
1 in = 50 ft

RS5-P39

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-13

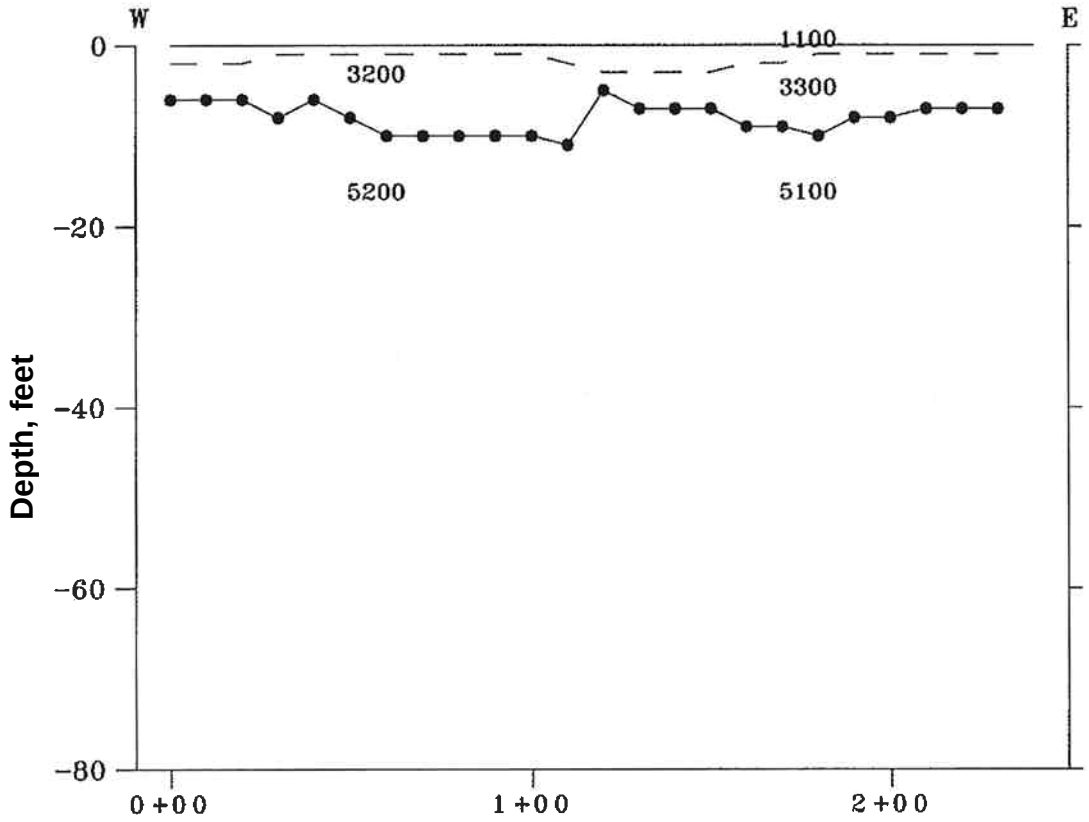


P-wave velocities in feet per second



RS5-P40-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-14



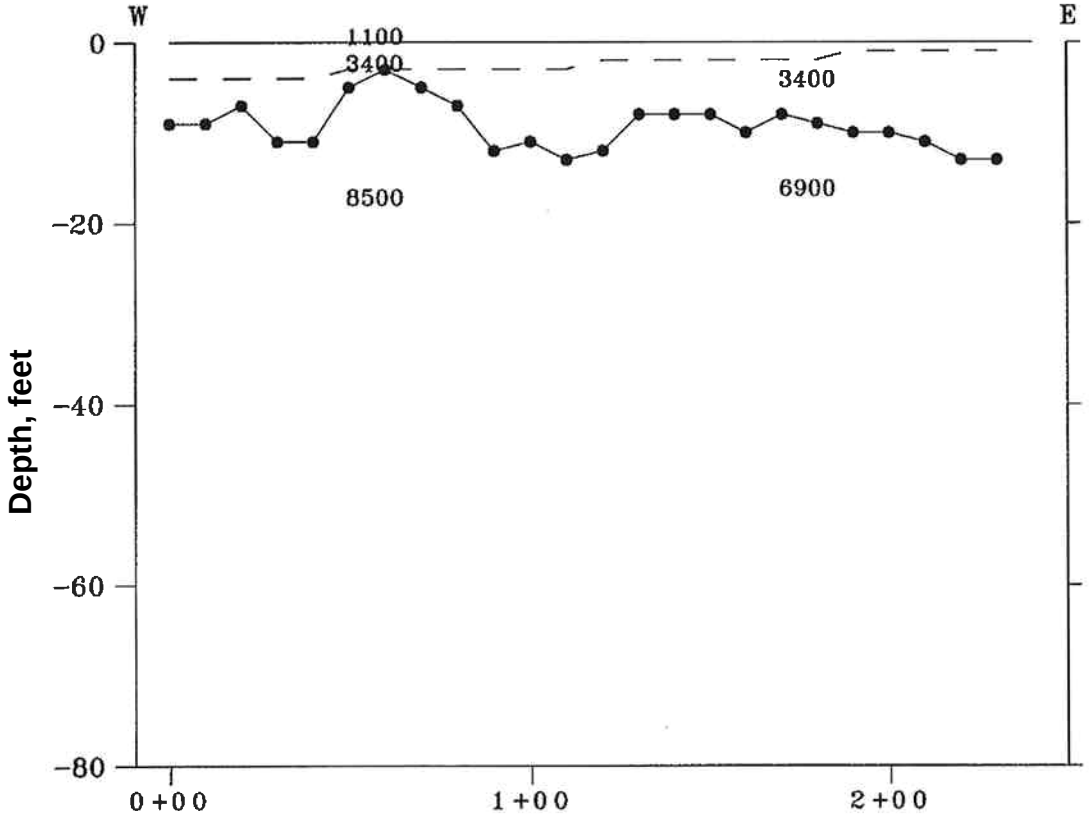
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P42-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-15



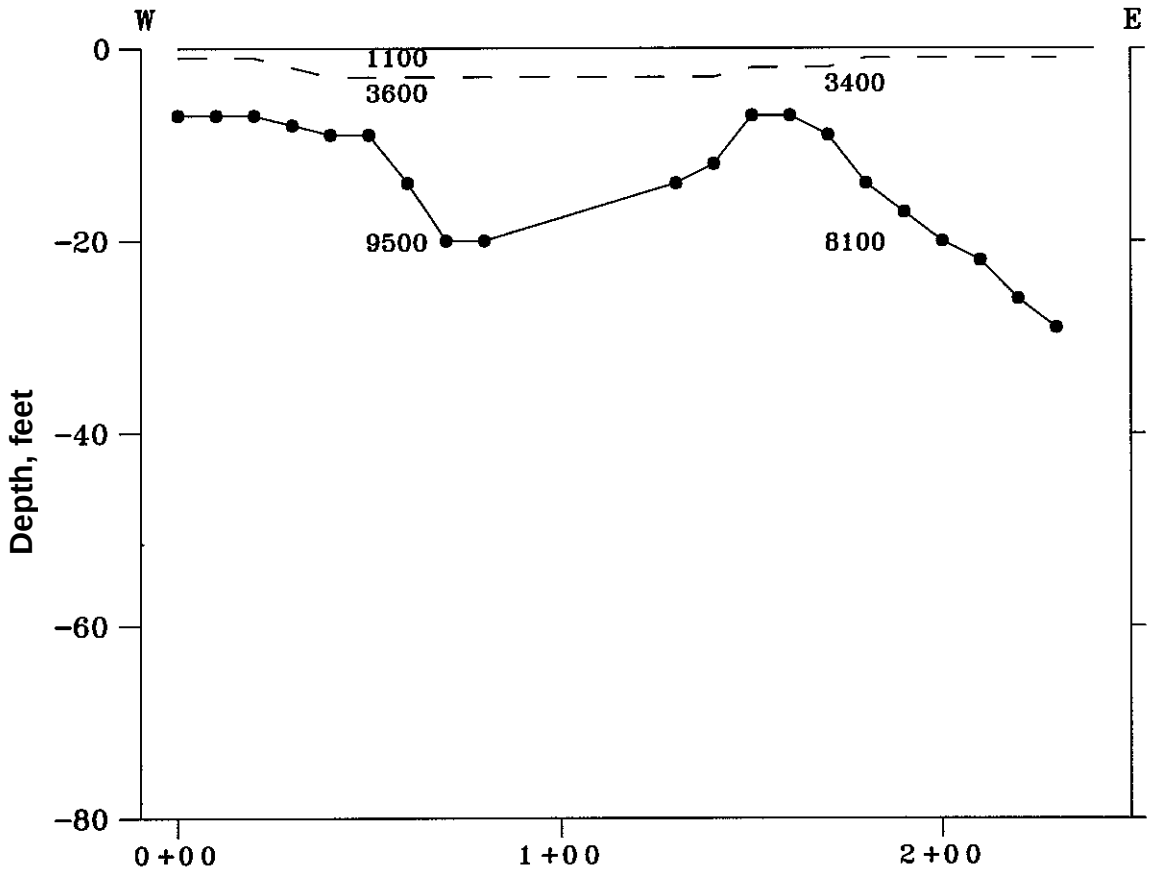
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P43-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-16



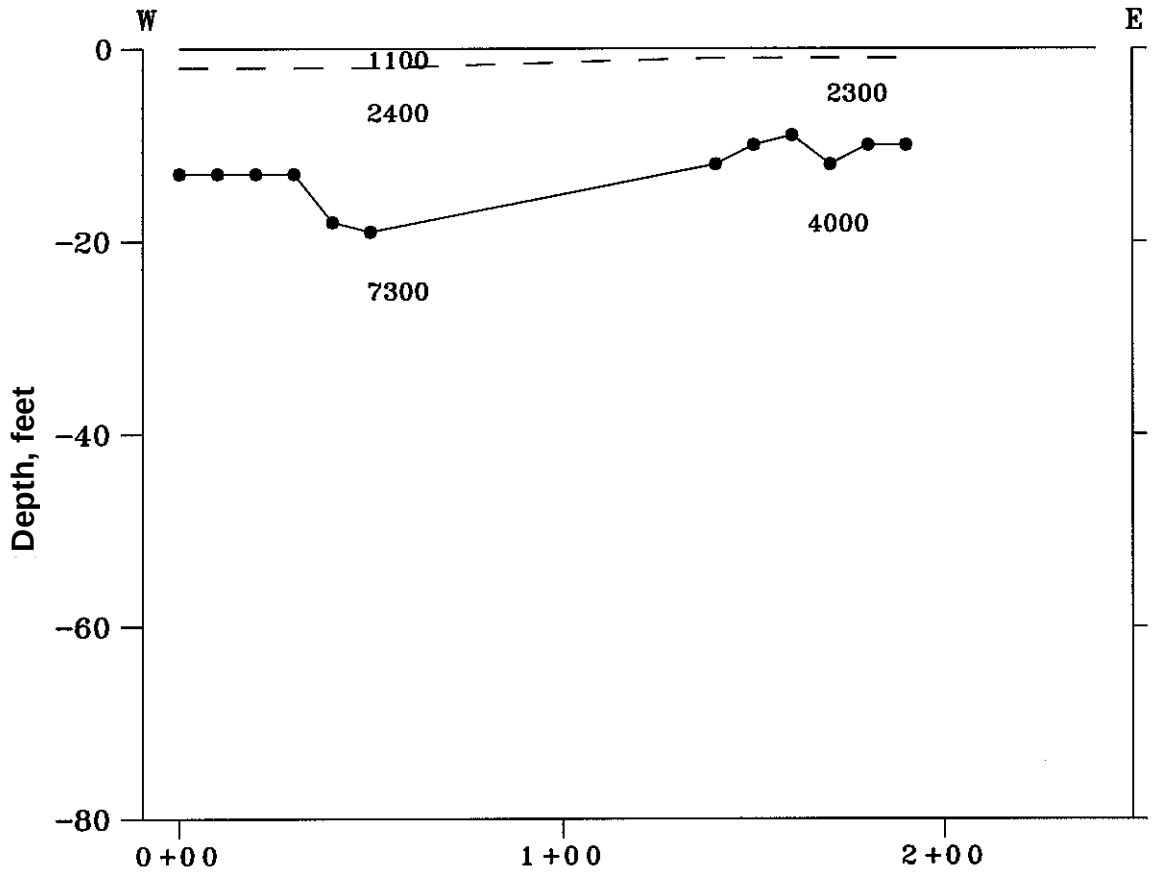
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P44-1

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-17



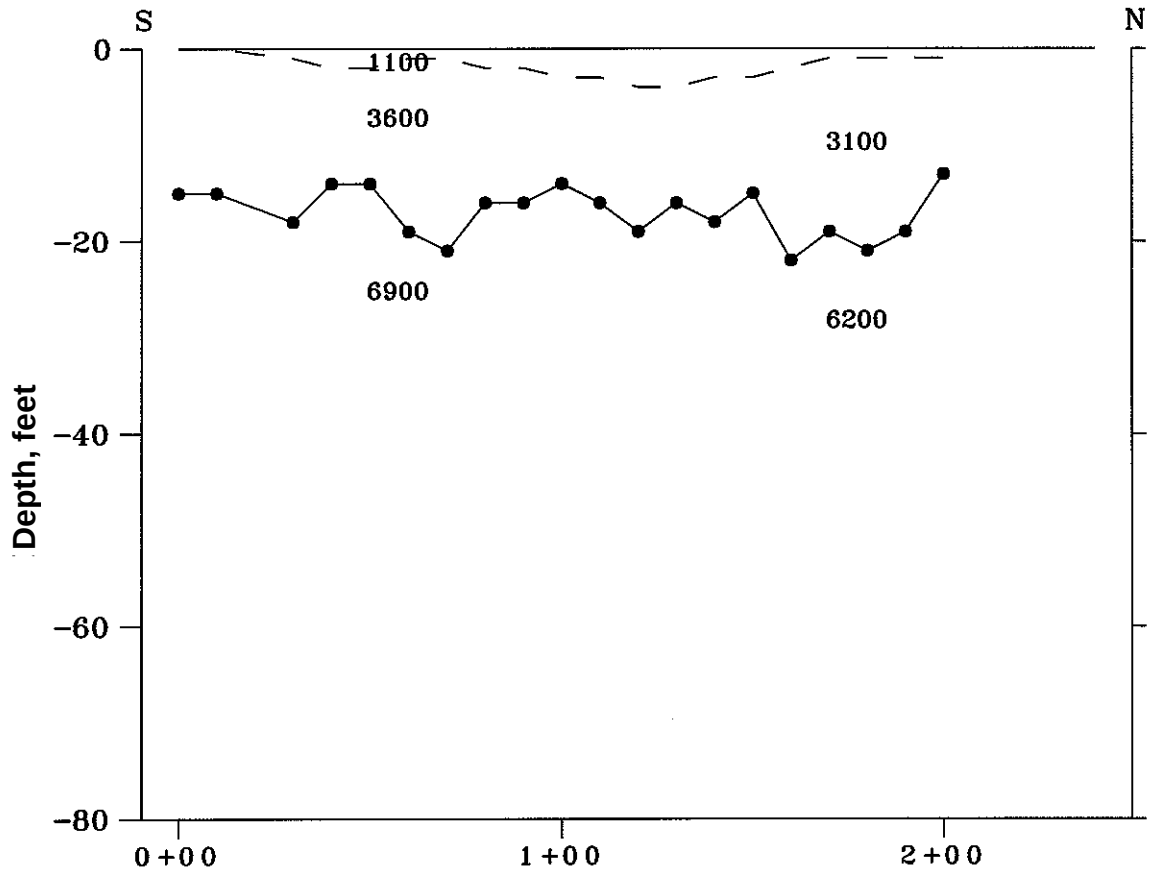
P-wave velocities in feet per second

1 in = 20 ft

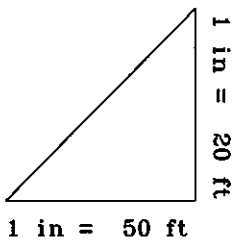
1 in = 50 ft

RS5-P45-1

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-18

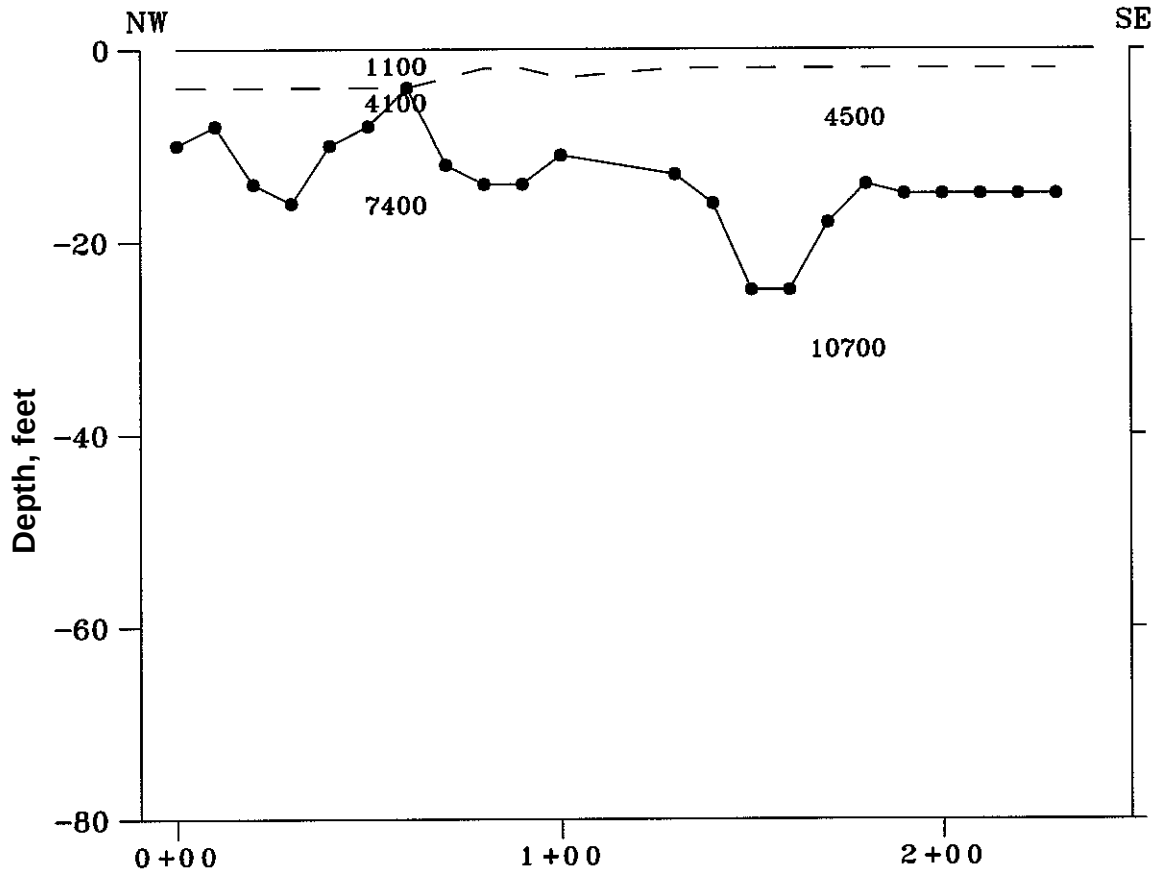


P-wave velocities in feet per second



RS5-P47-2

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-19



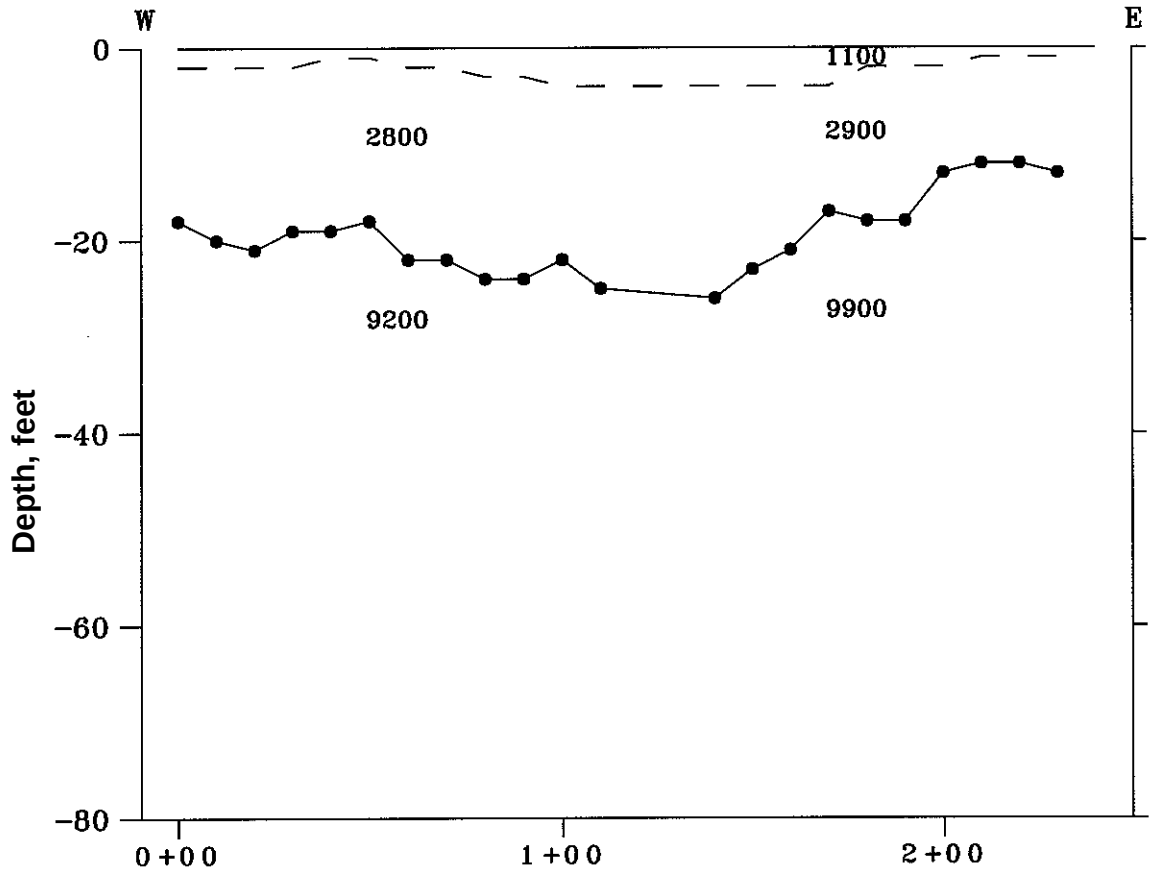
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P48-2

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-20



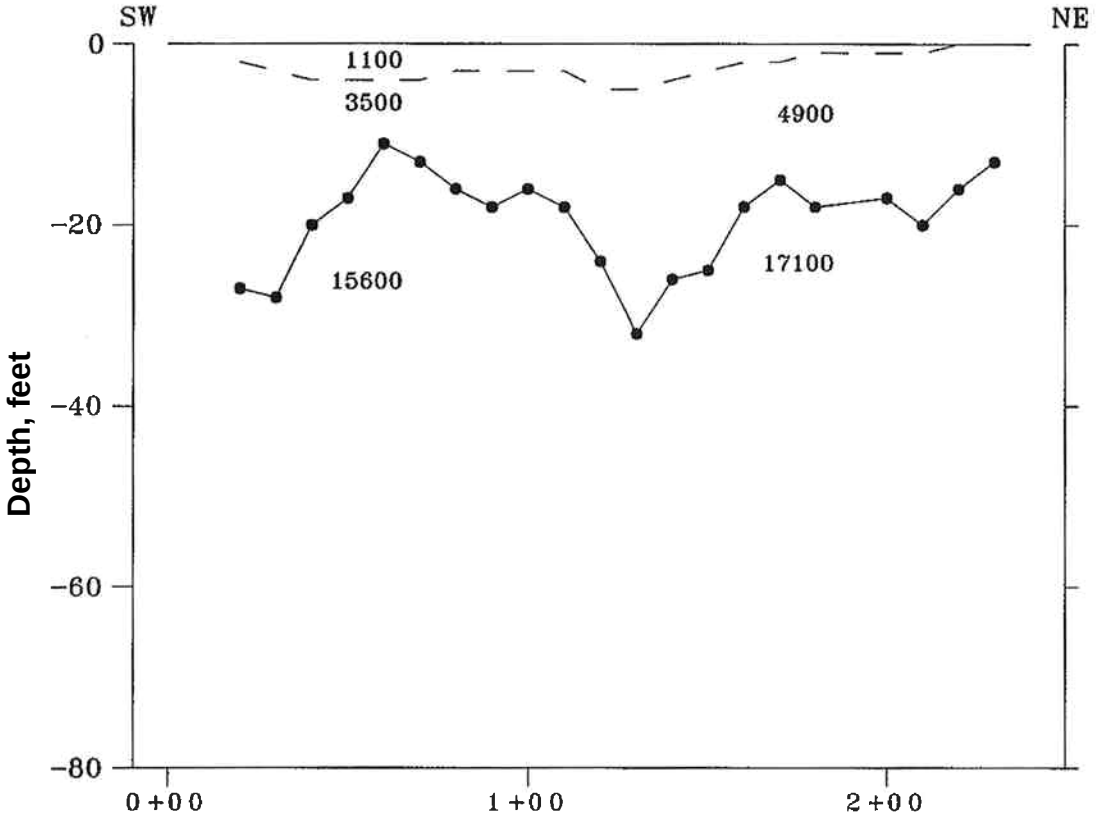
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P49-1

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-21



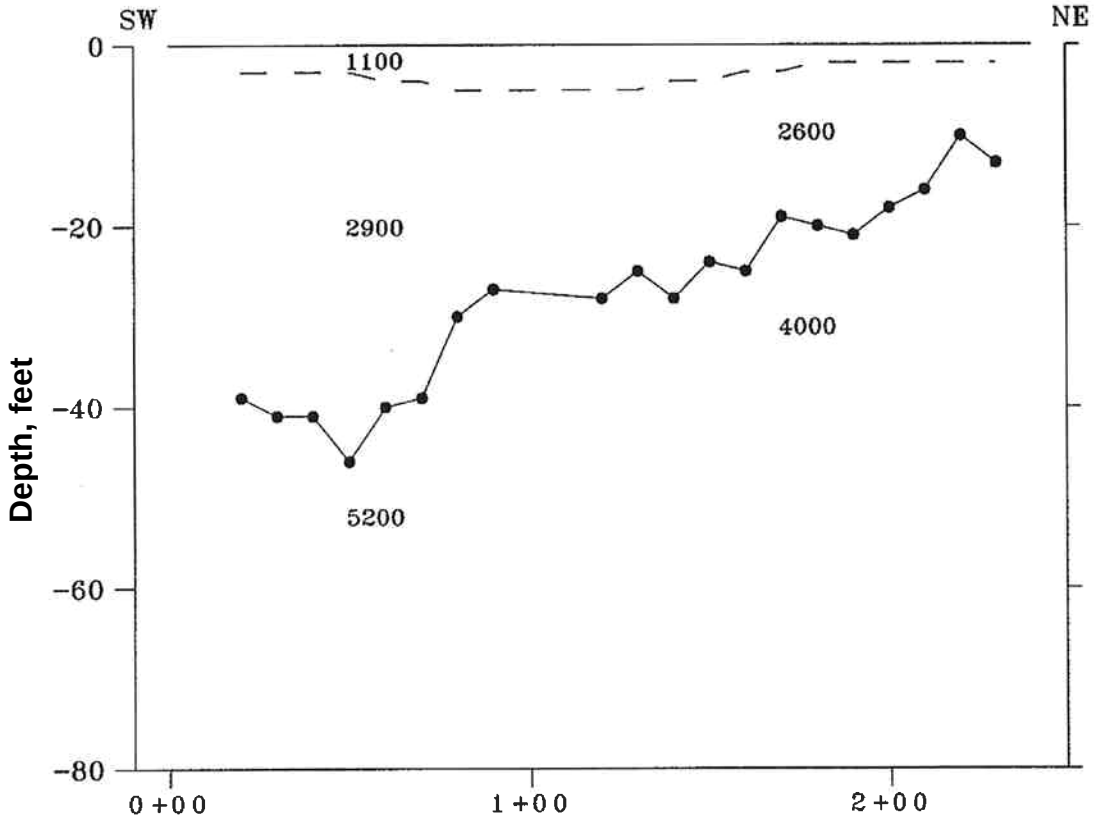
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P50-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-22



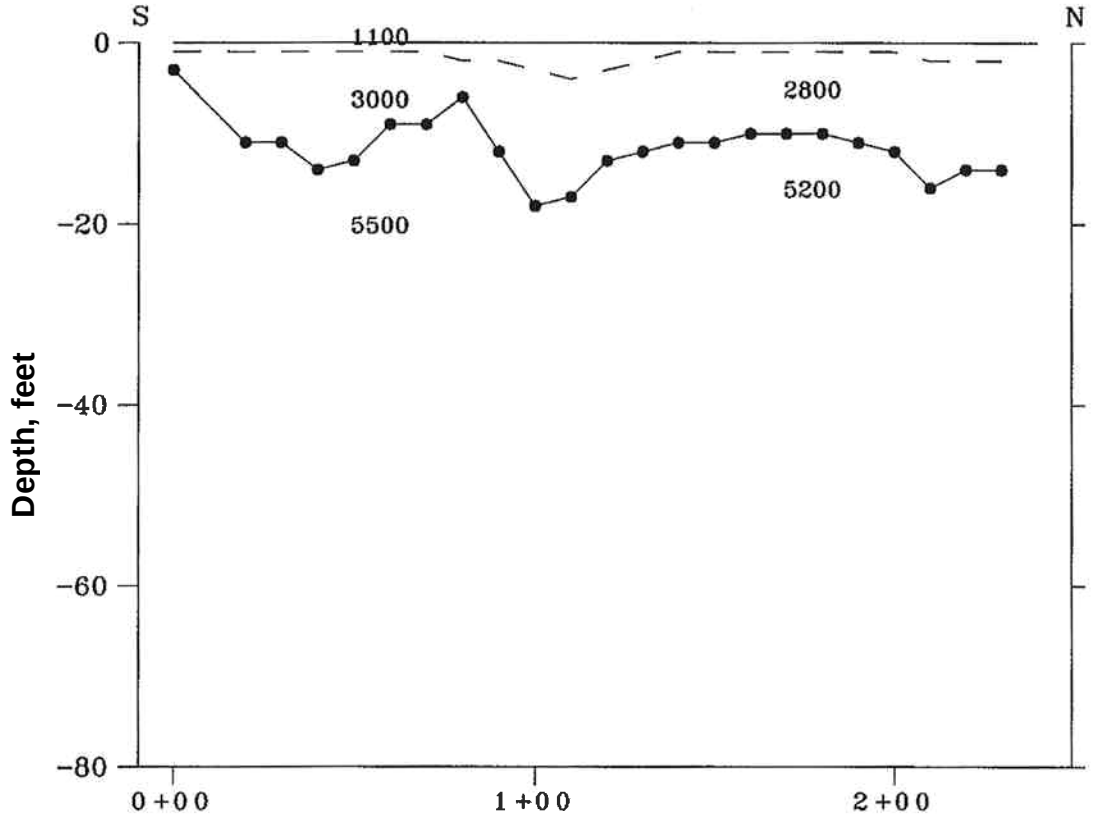
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P51-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-23



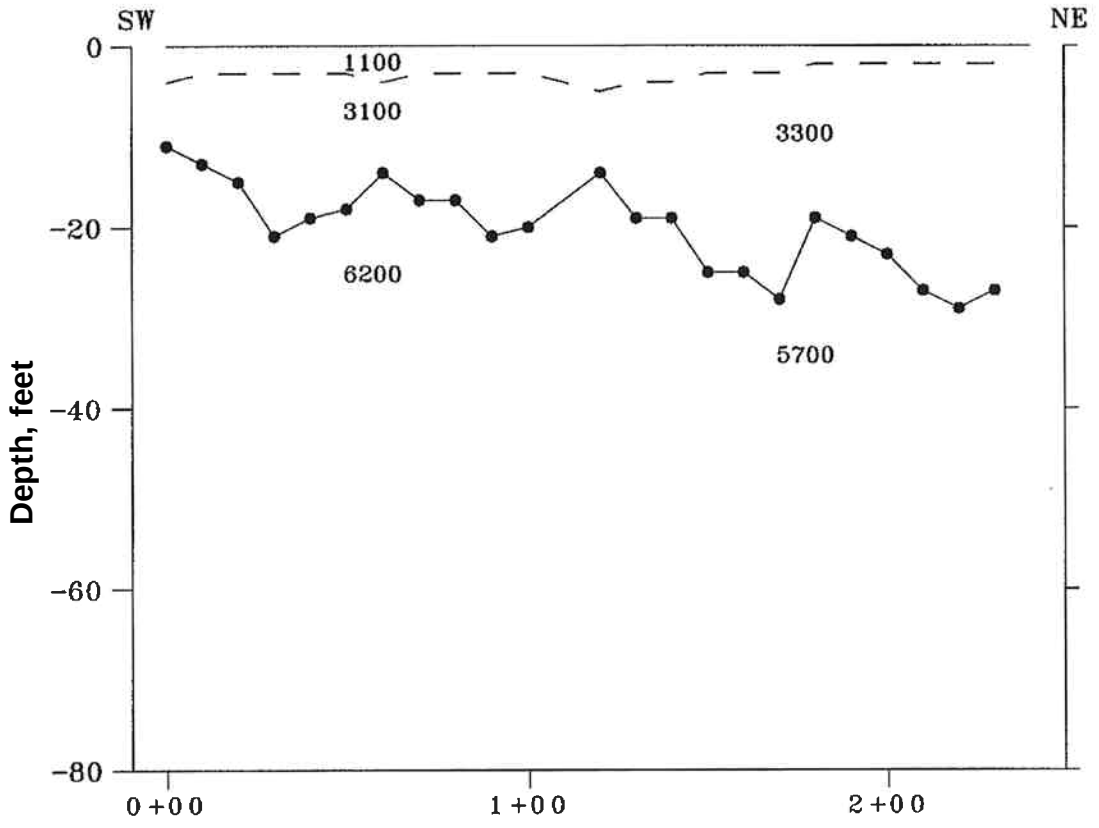
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P52

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-24



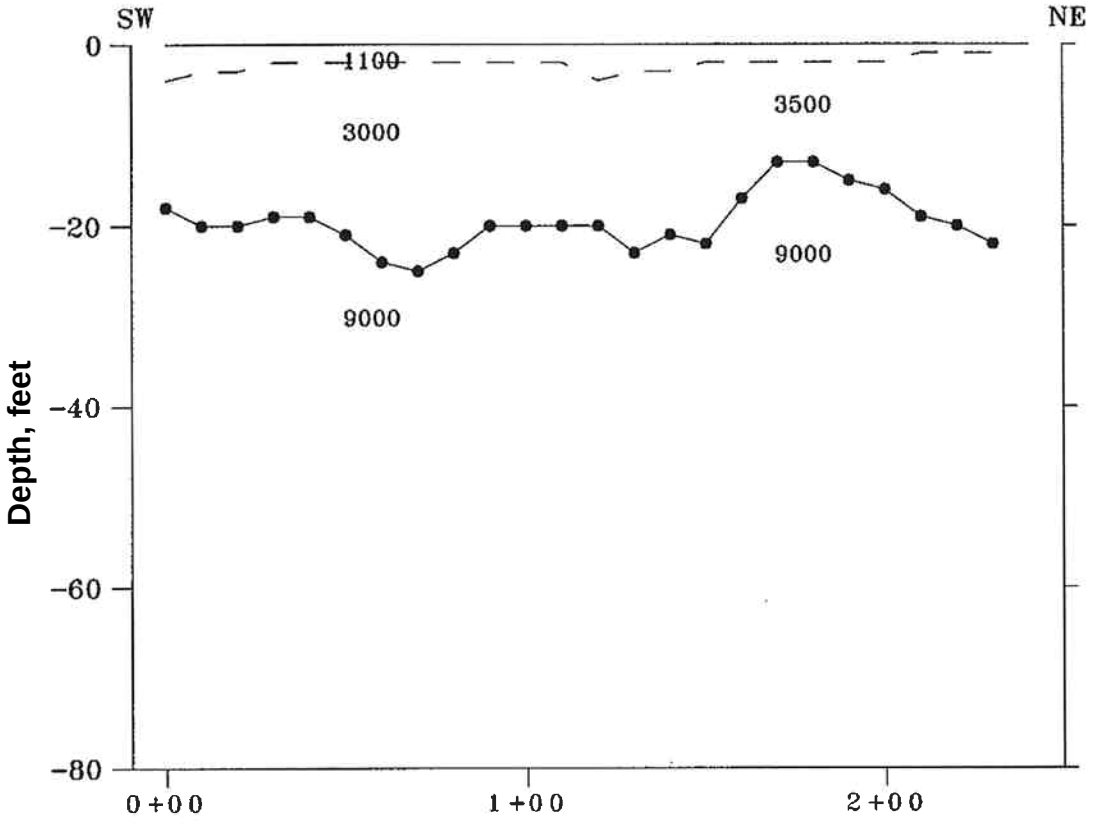
P-wave velocities in feet per second

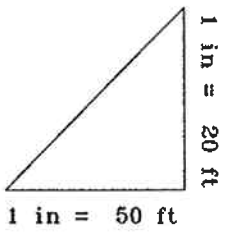
1 in = 20 ft

1 in = 50 ft

RS5-P54-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-25

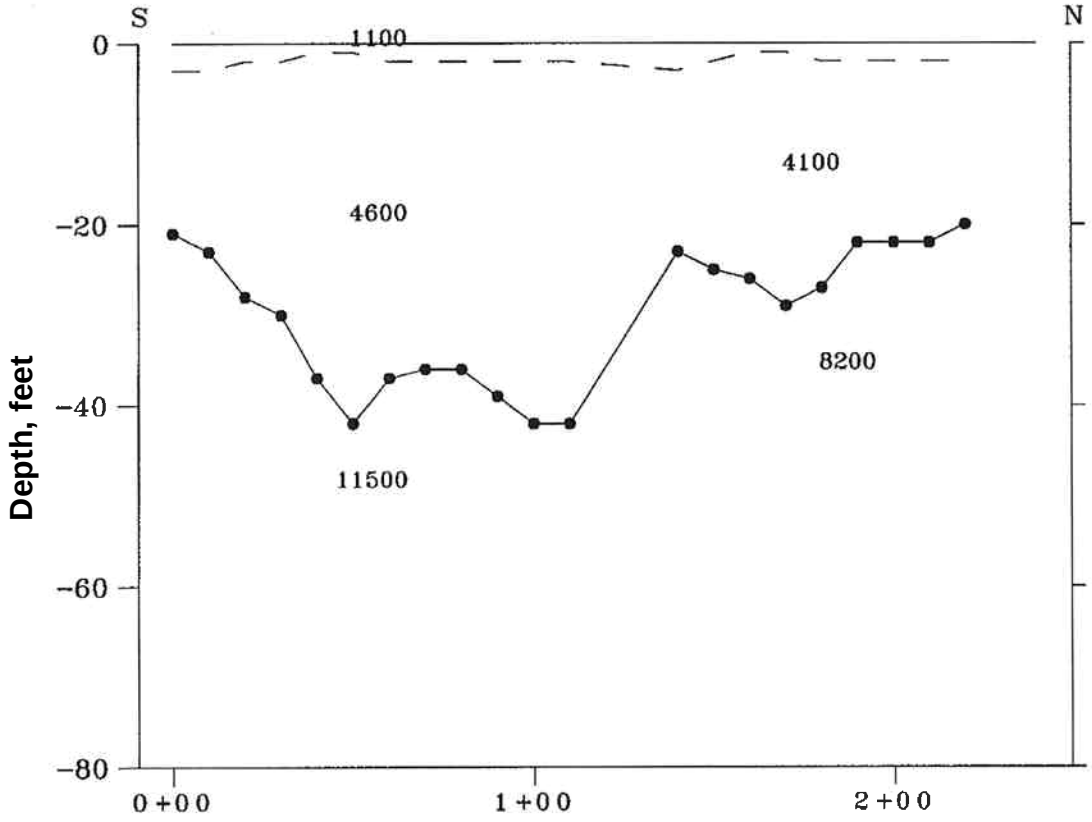




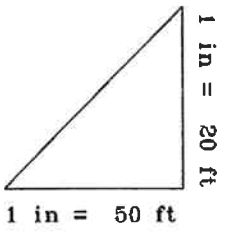
P-wave velocities in feet per second

RS5-P56-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-26

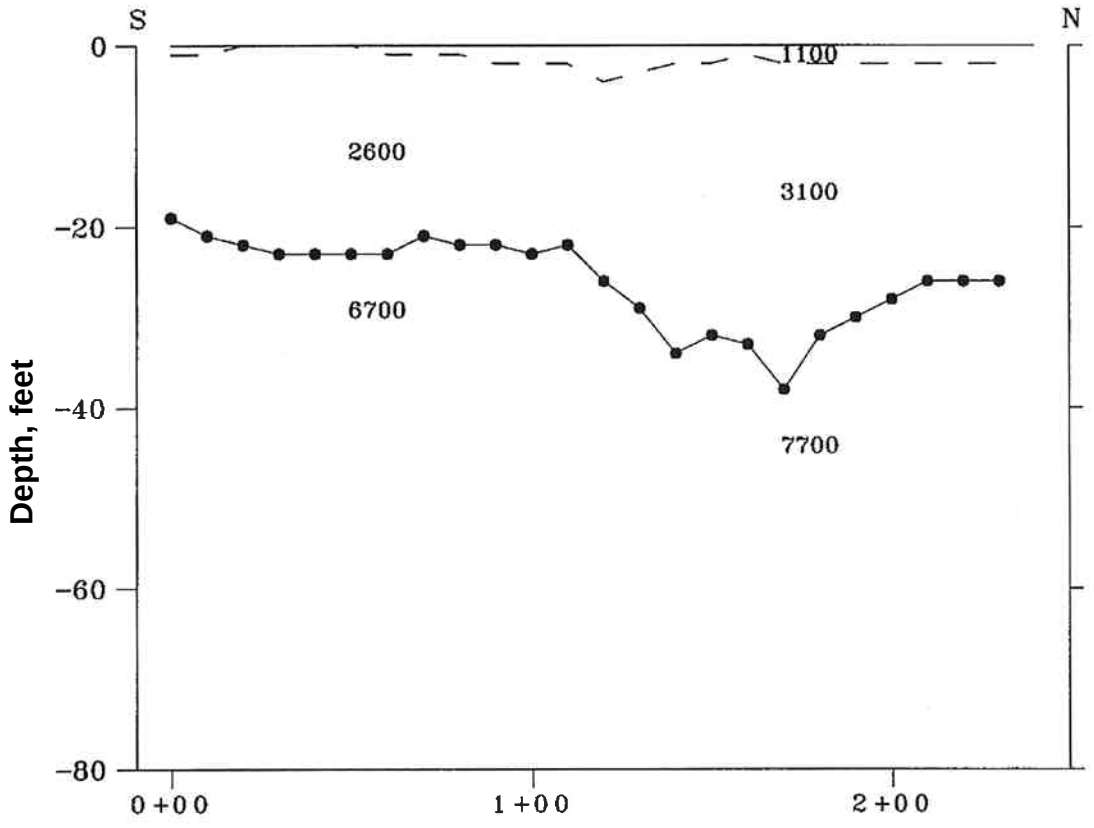


P-wave velocities in feet per second



RS5-P57

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-27



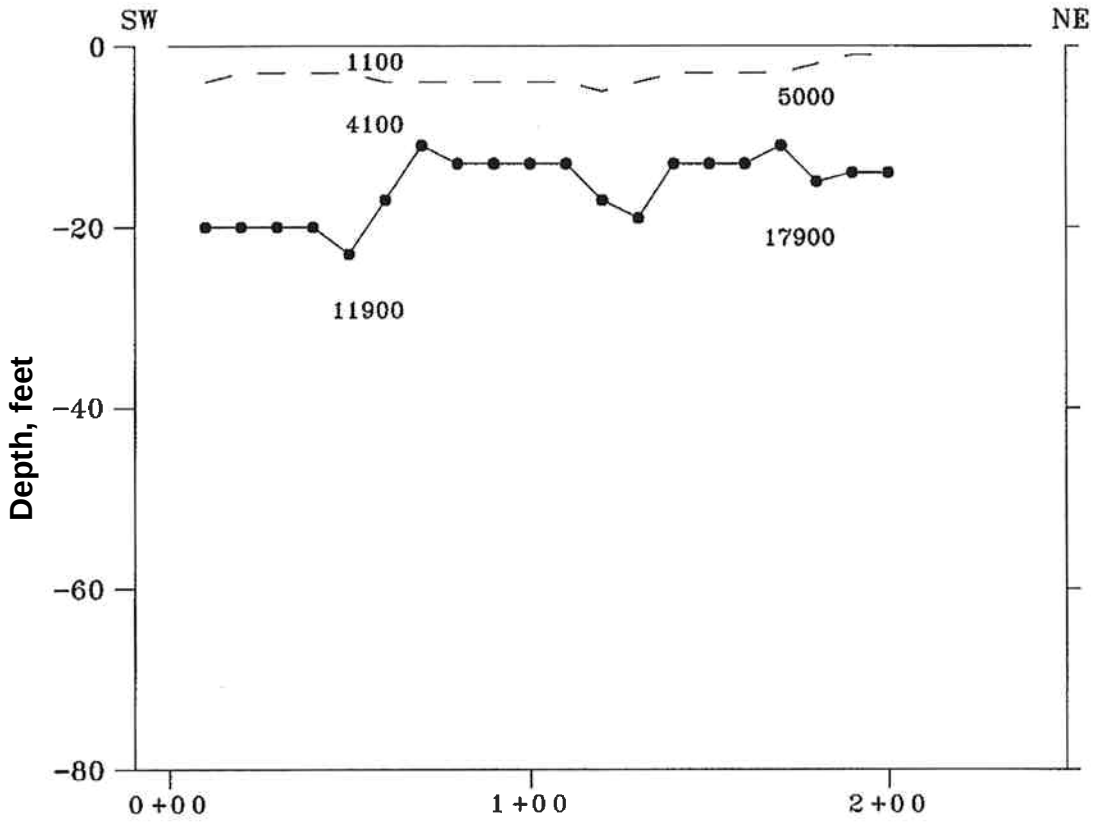
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P58

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-28



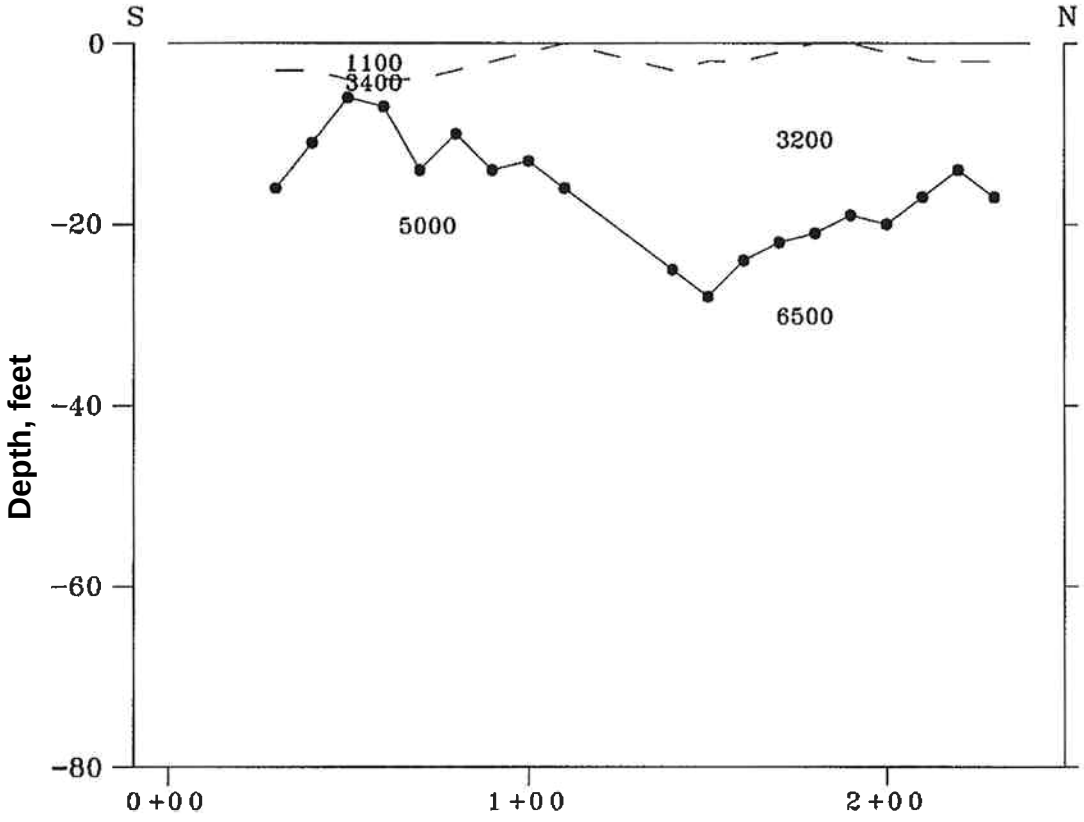
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P59

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-29



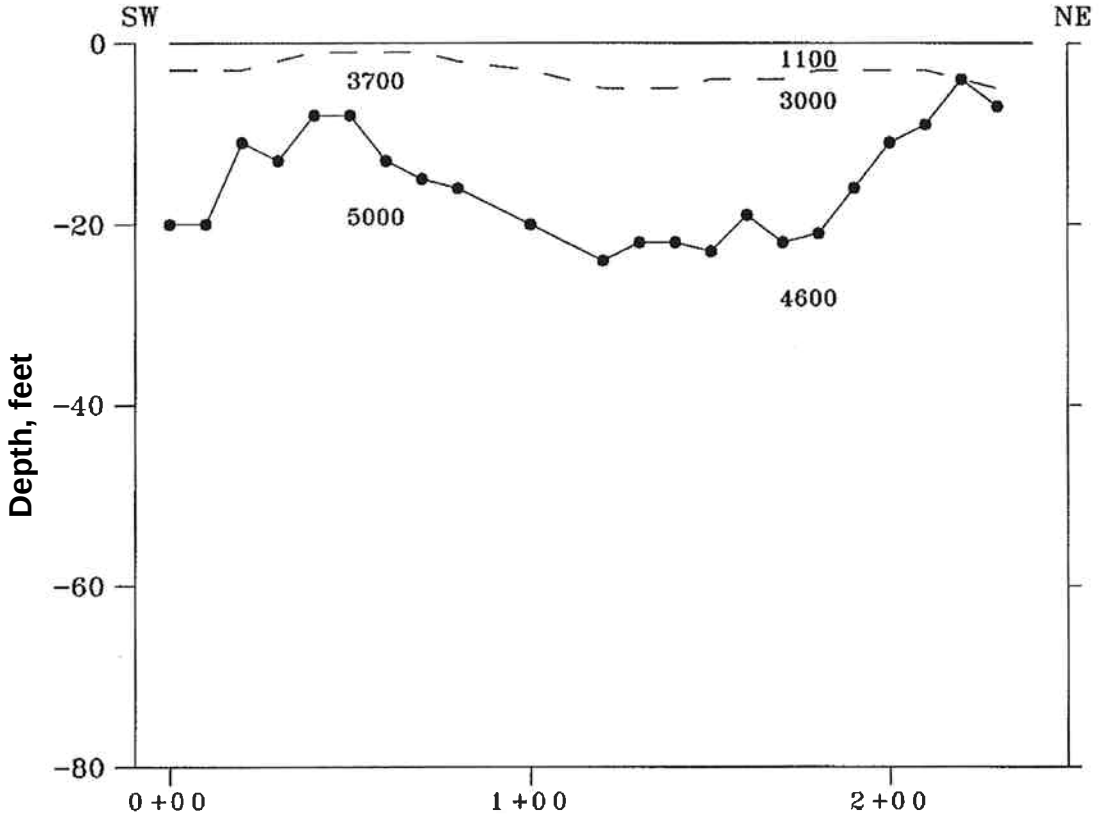
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P60

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-30



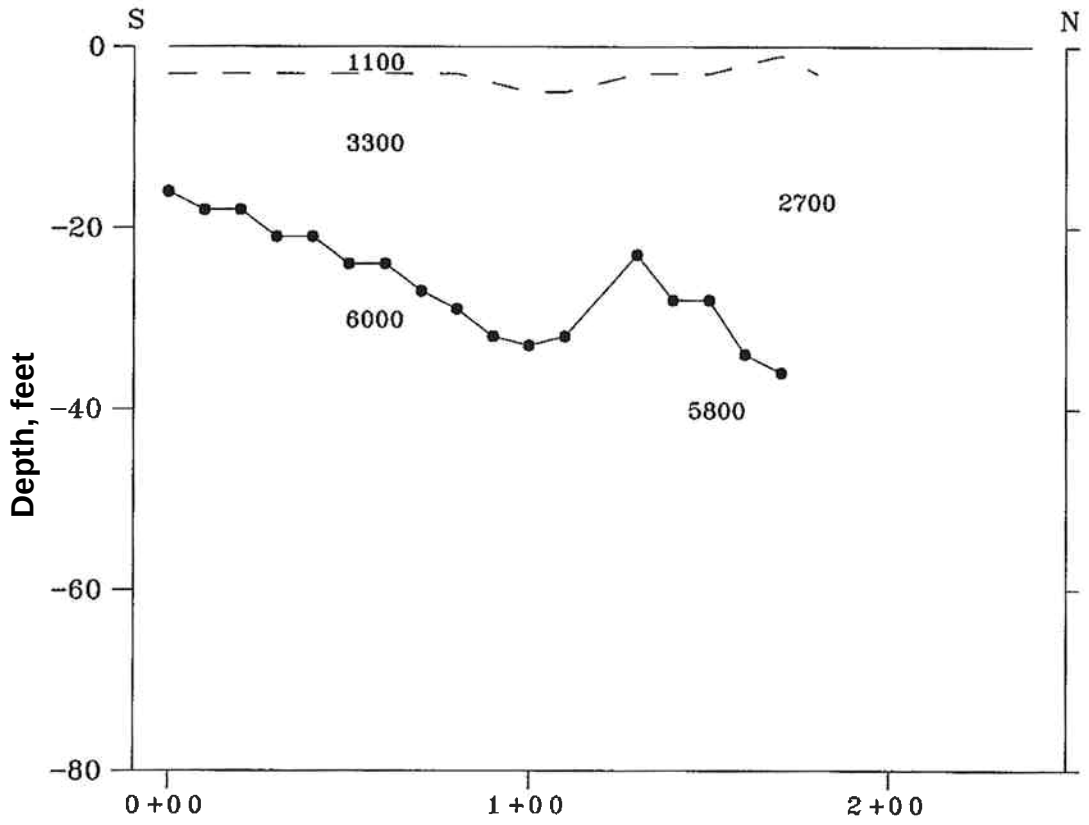
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P62

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-31



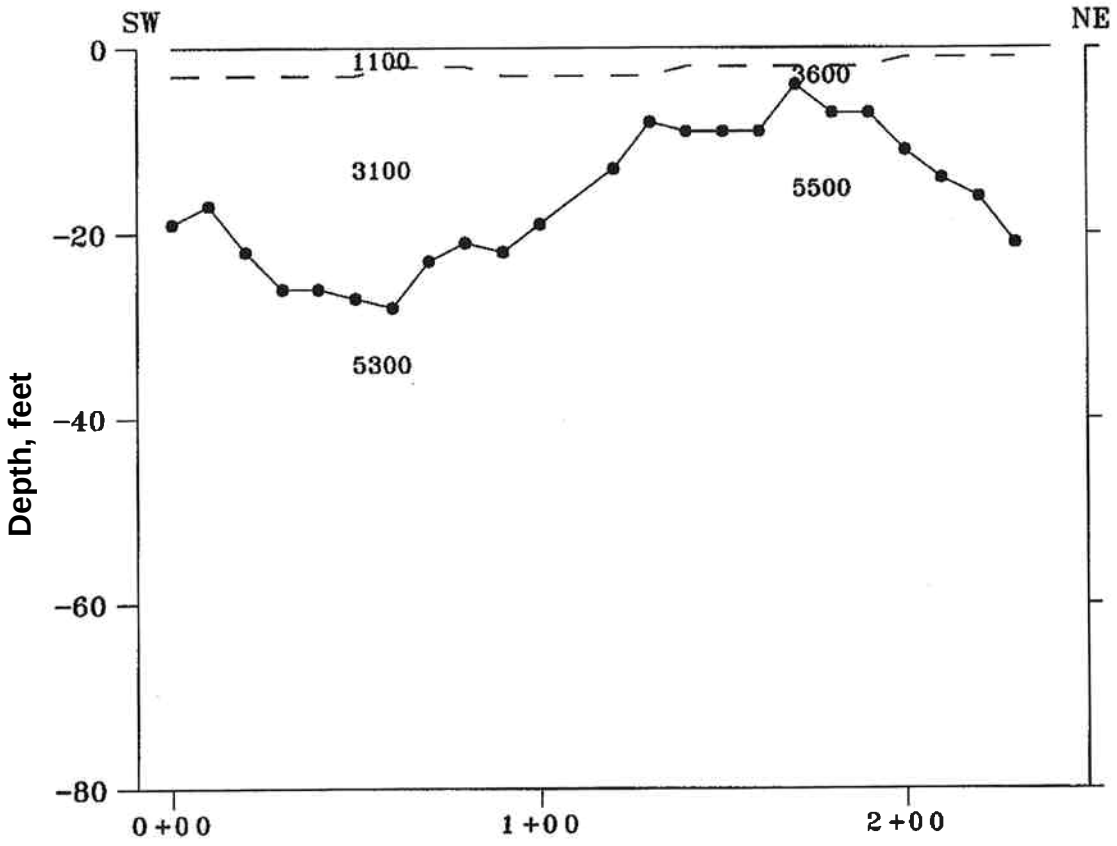
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P63-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-32



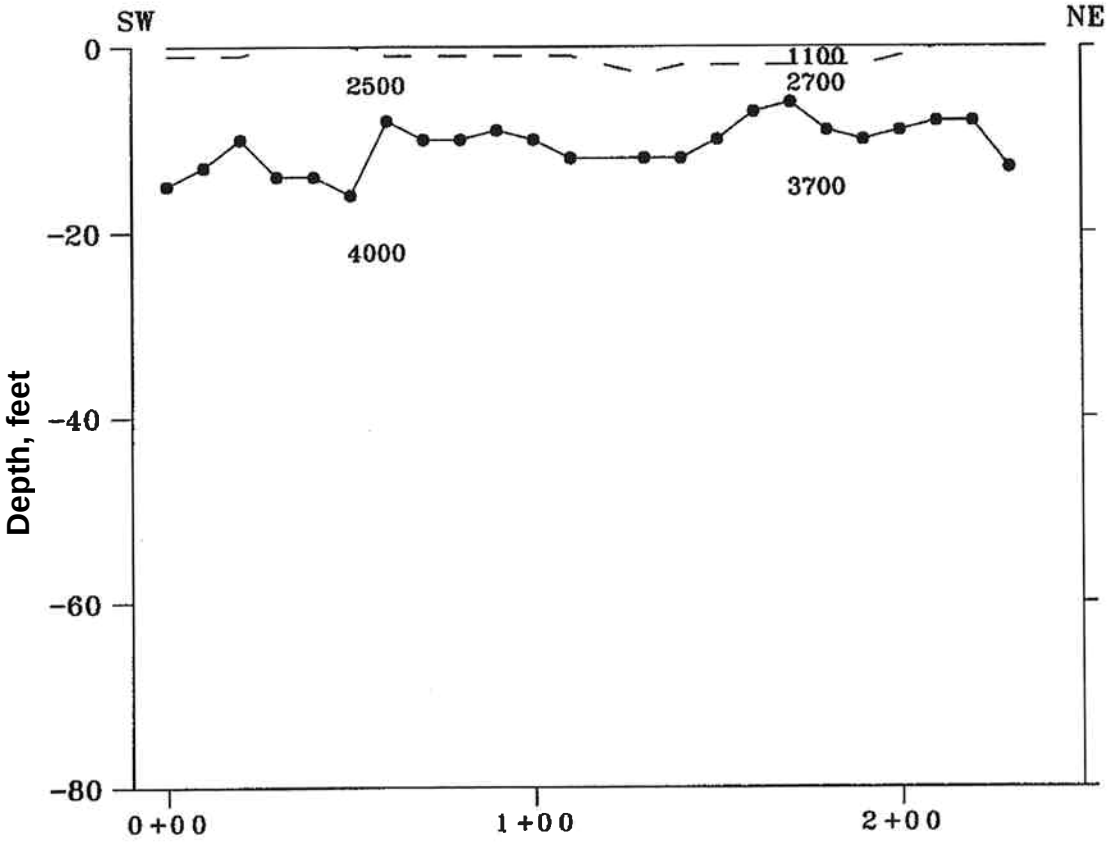
P-wave velocities in feet per second

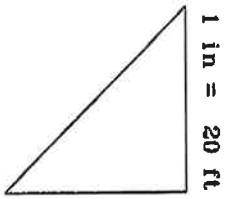
1 in = 20 ft

1 in = 50 ft

RS5-P64-2

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-33

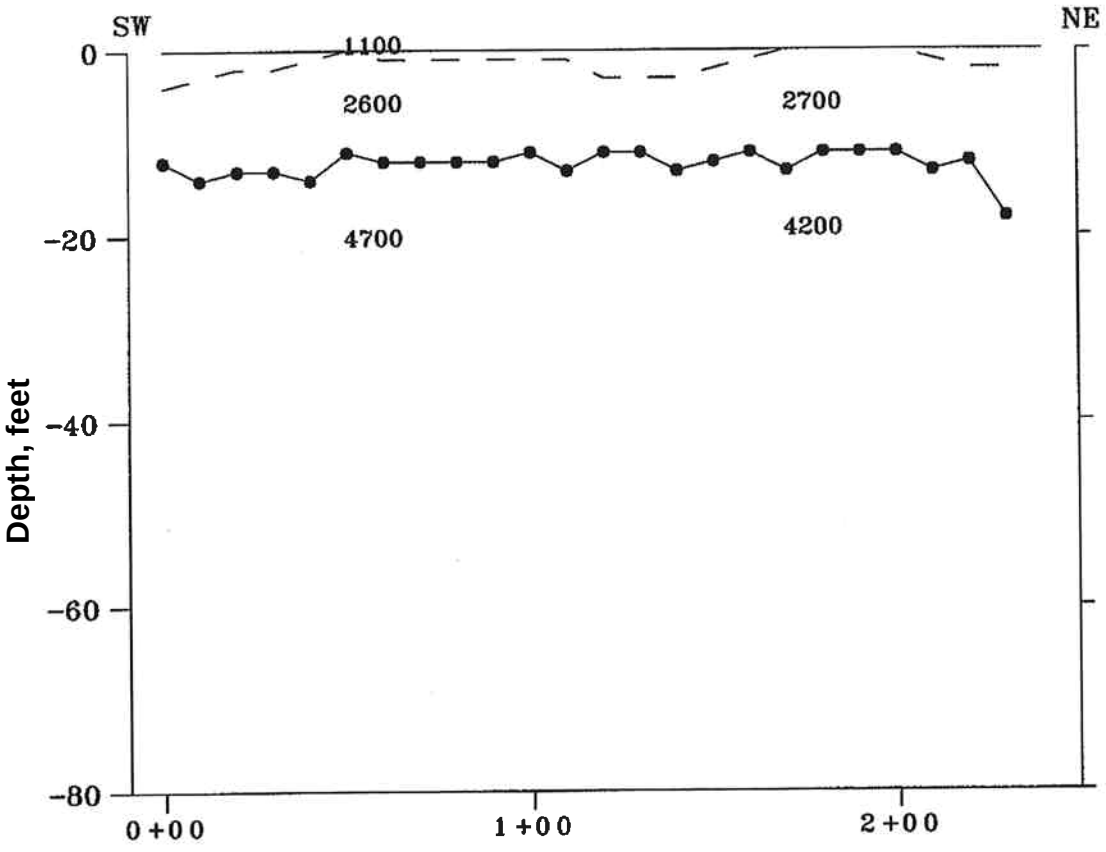




P-wave velocities in feet per second

RS5-P65-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-34



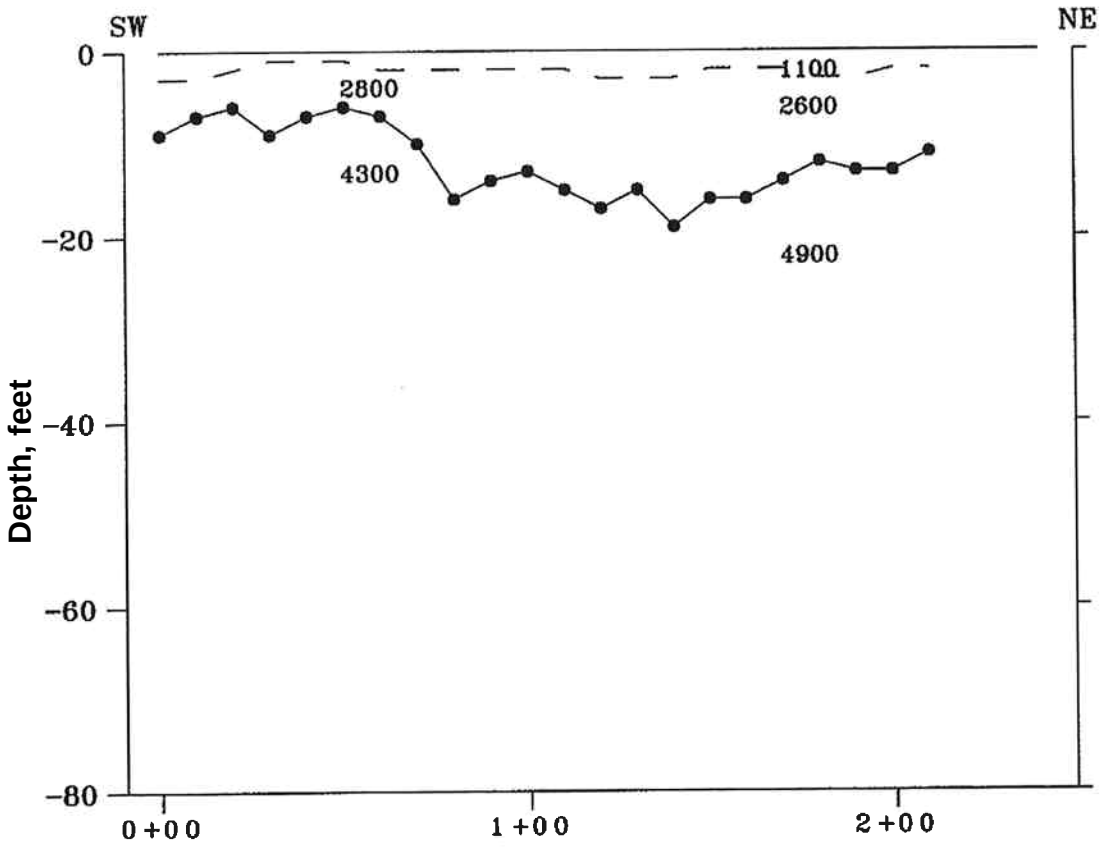
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P66-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-35



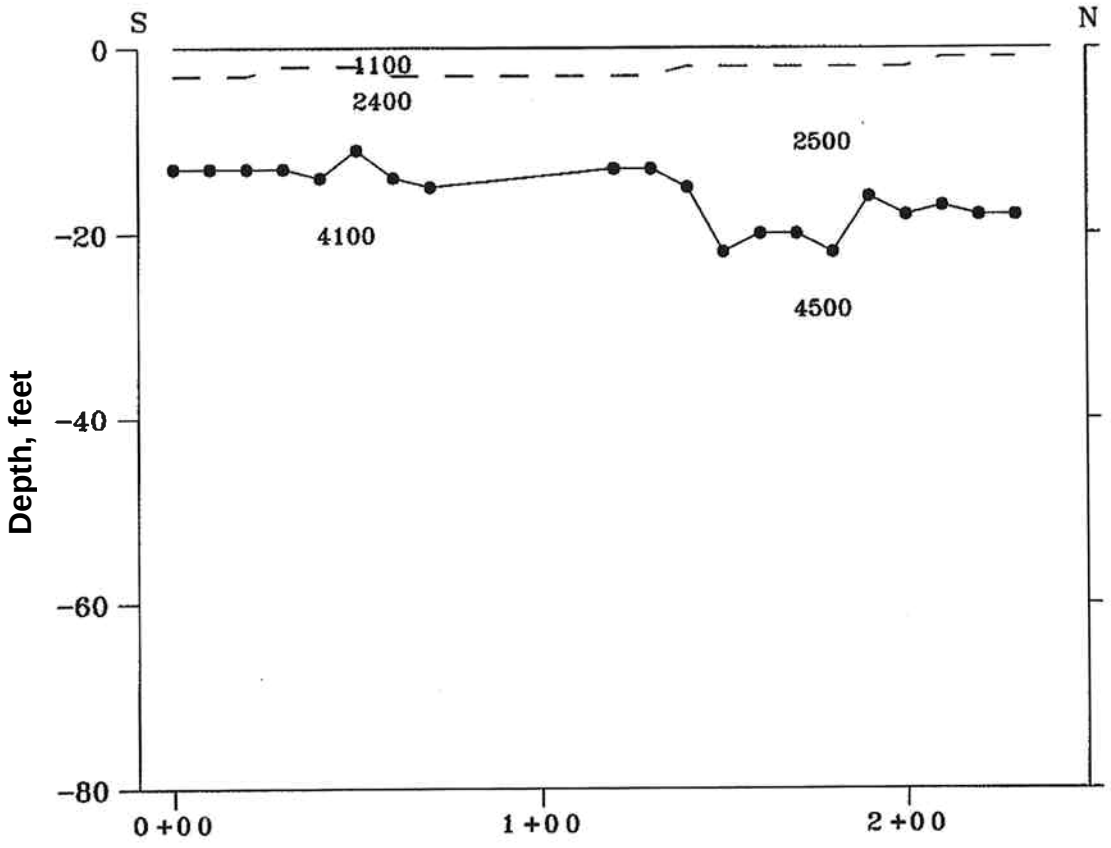
P-wave velocities in feet per second

1 in = 20 ft

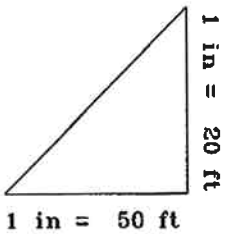
1 in = 50 ft

RS5-P67-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-36

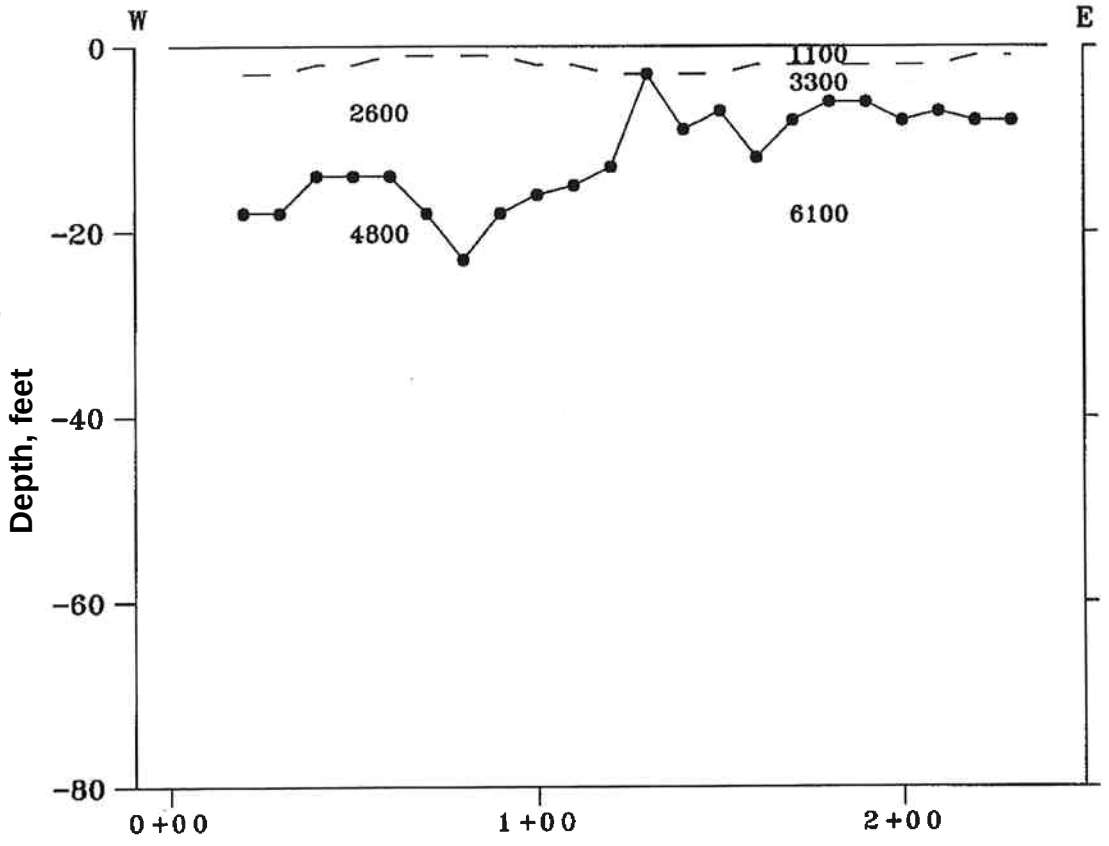


P-wave velocities in feet per second



RS5-P68-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-37



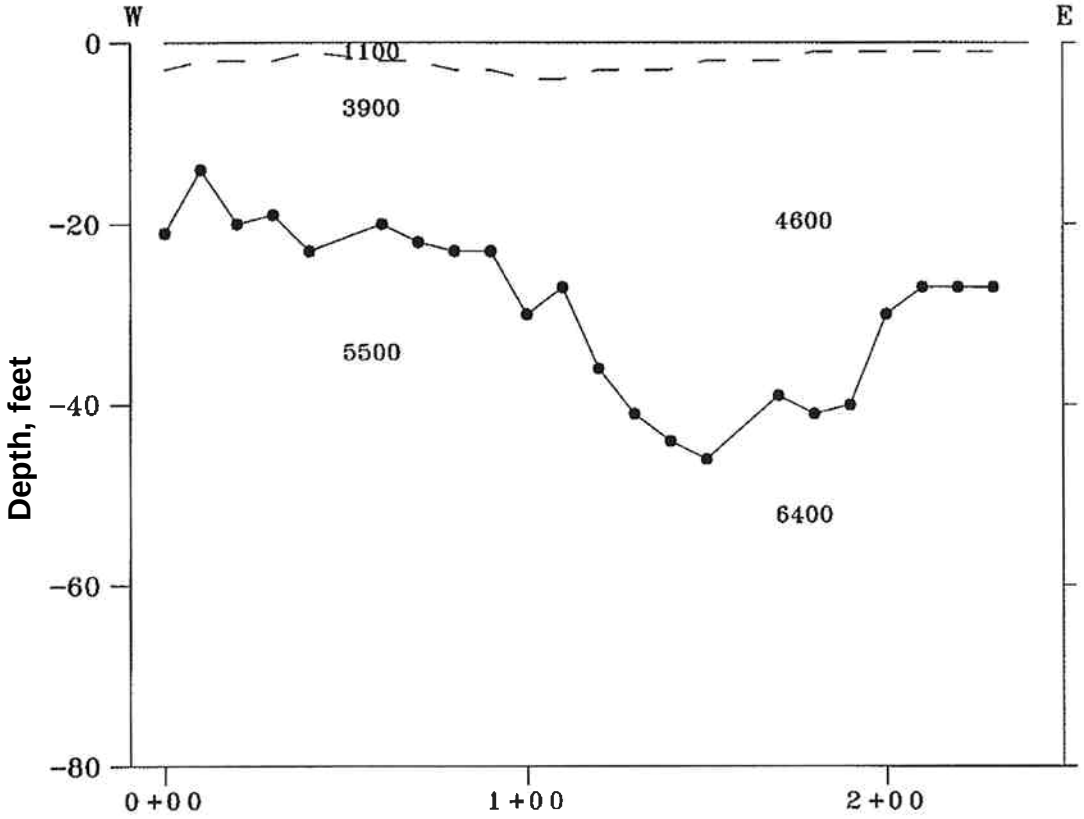
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P69-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-38



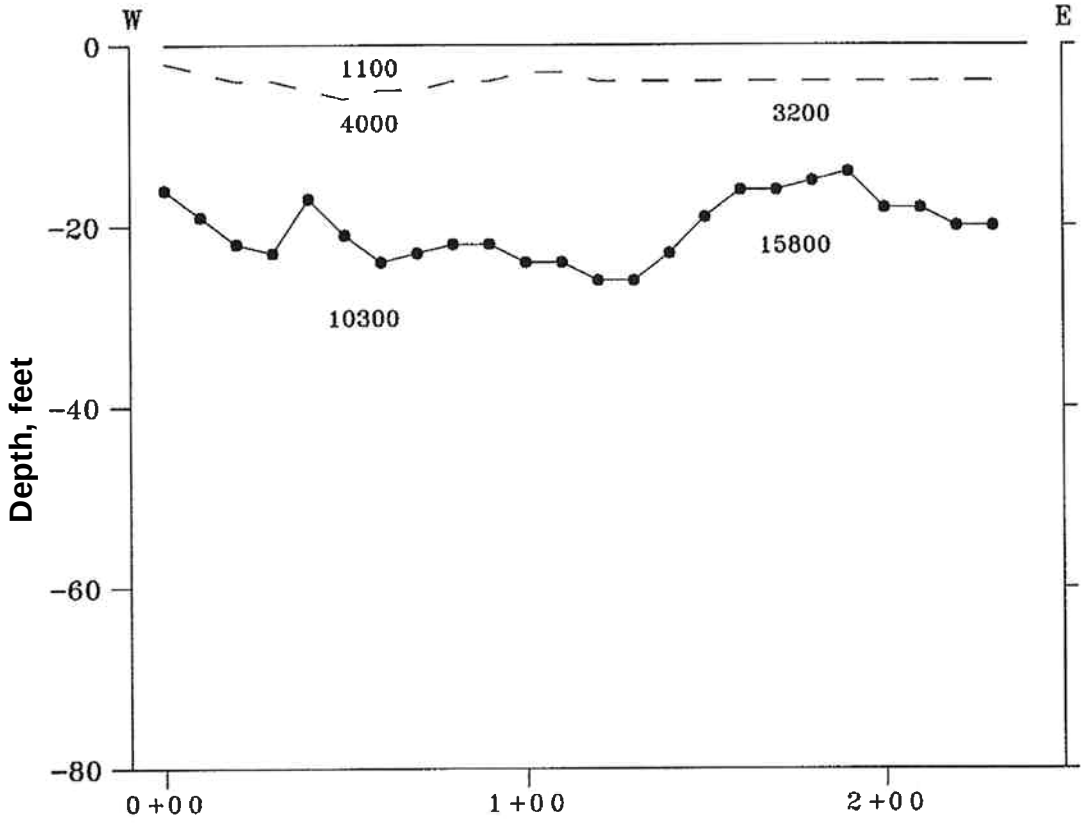
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P70-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-39



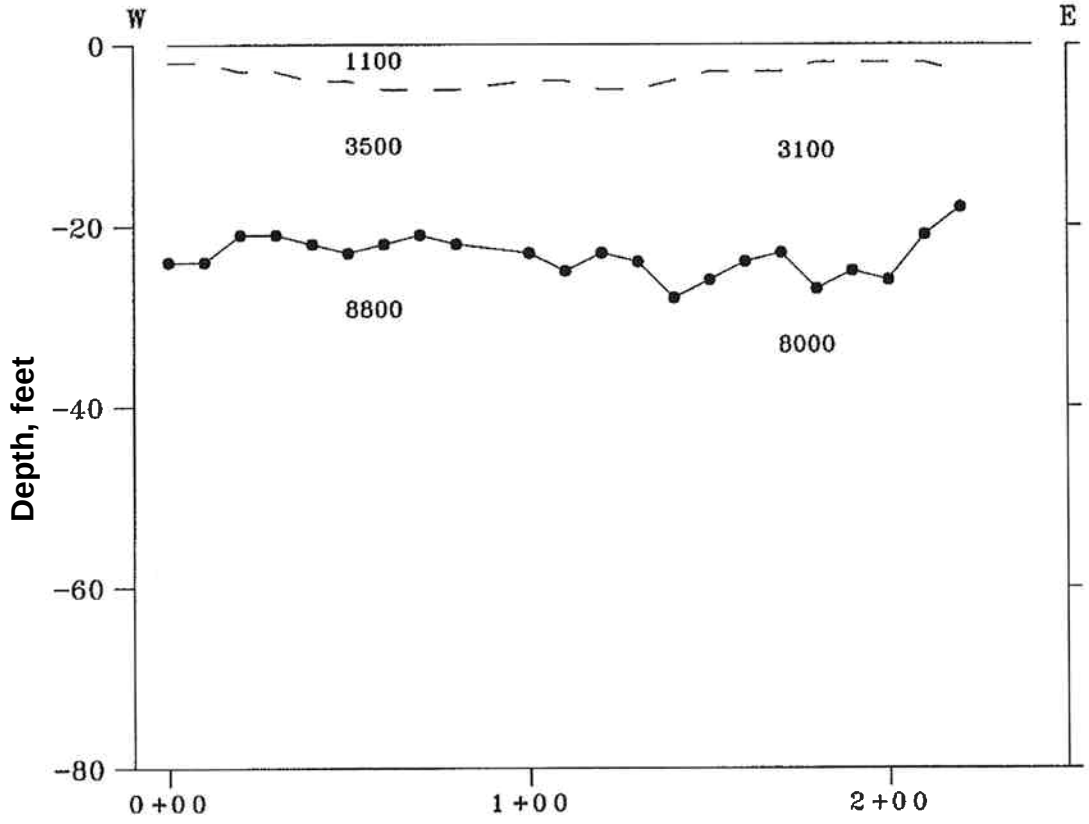
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P71

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-40



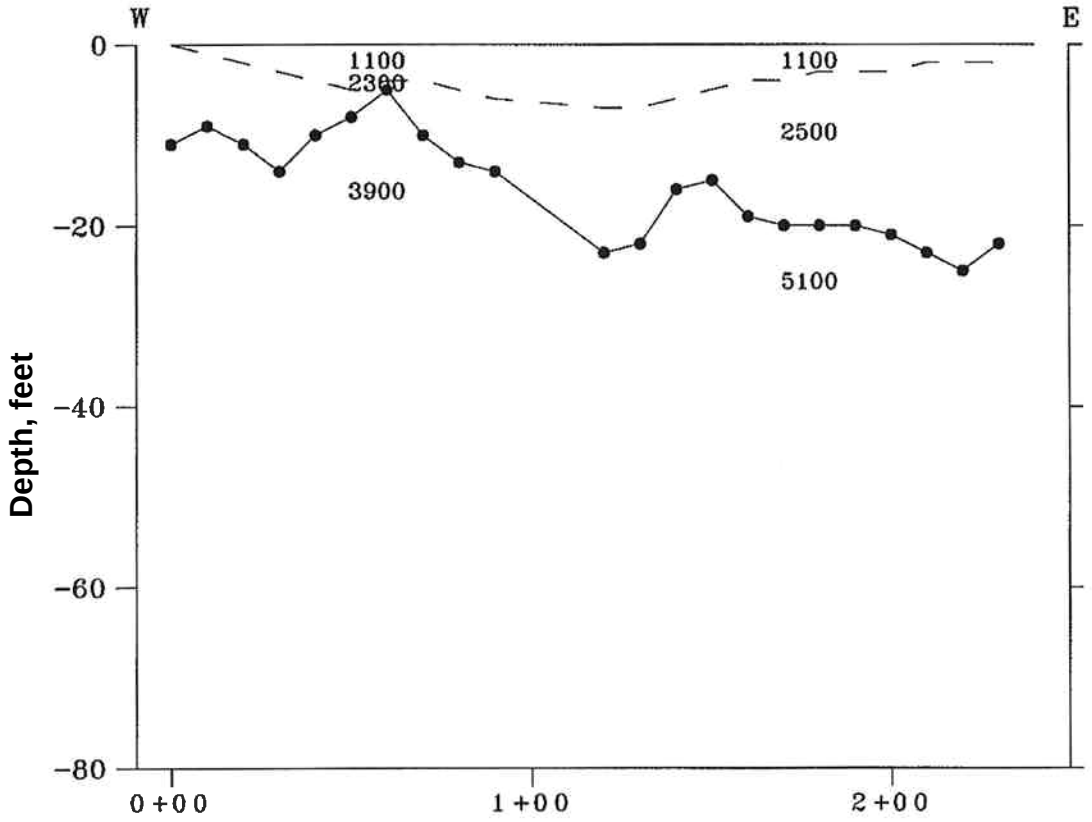
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P72-2

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-41



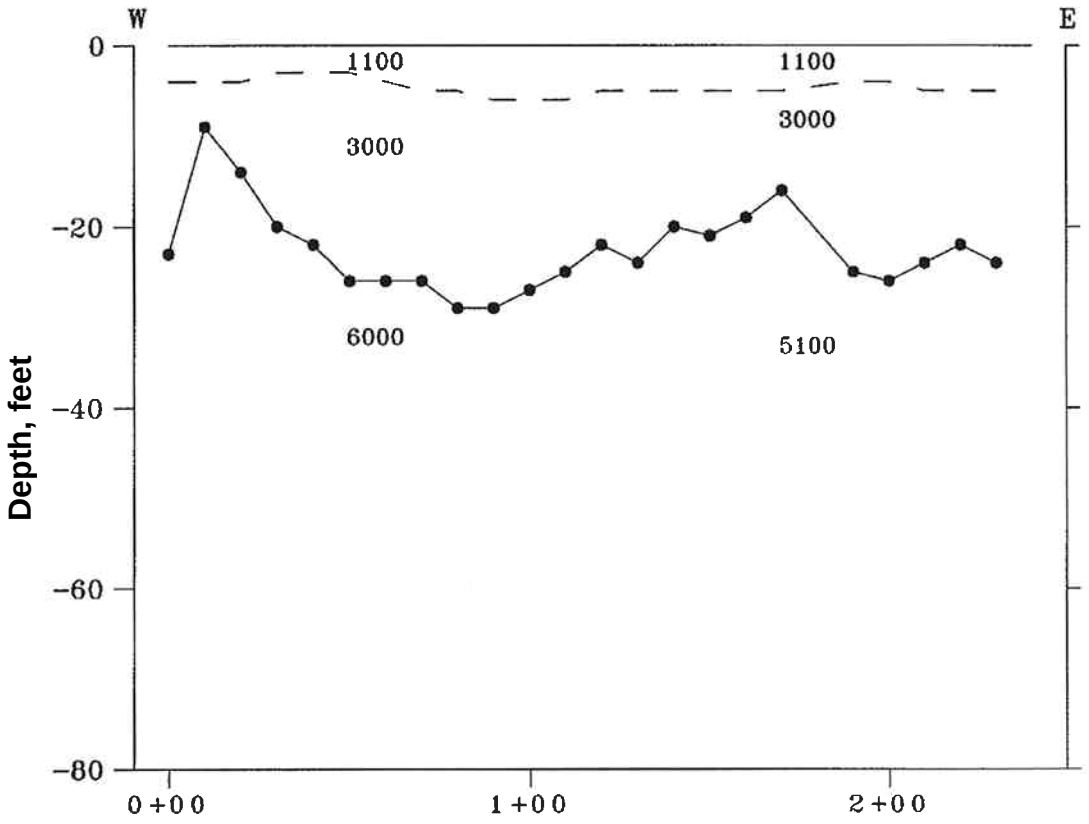
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P73-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-42



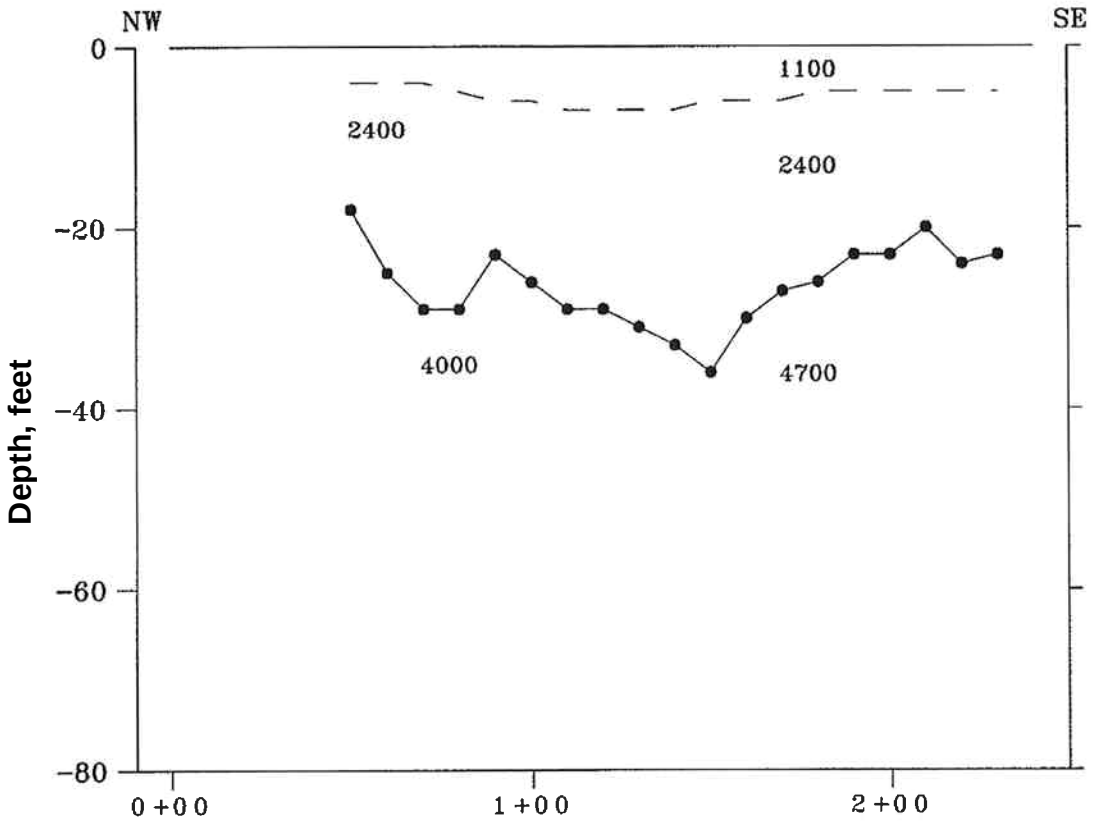
P-wave velocities in feet per second

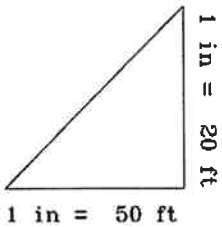
1 in = 20 ft

1 in = 50 ft

RS5-P74-2

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-43

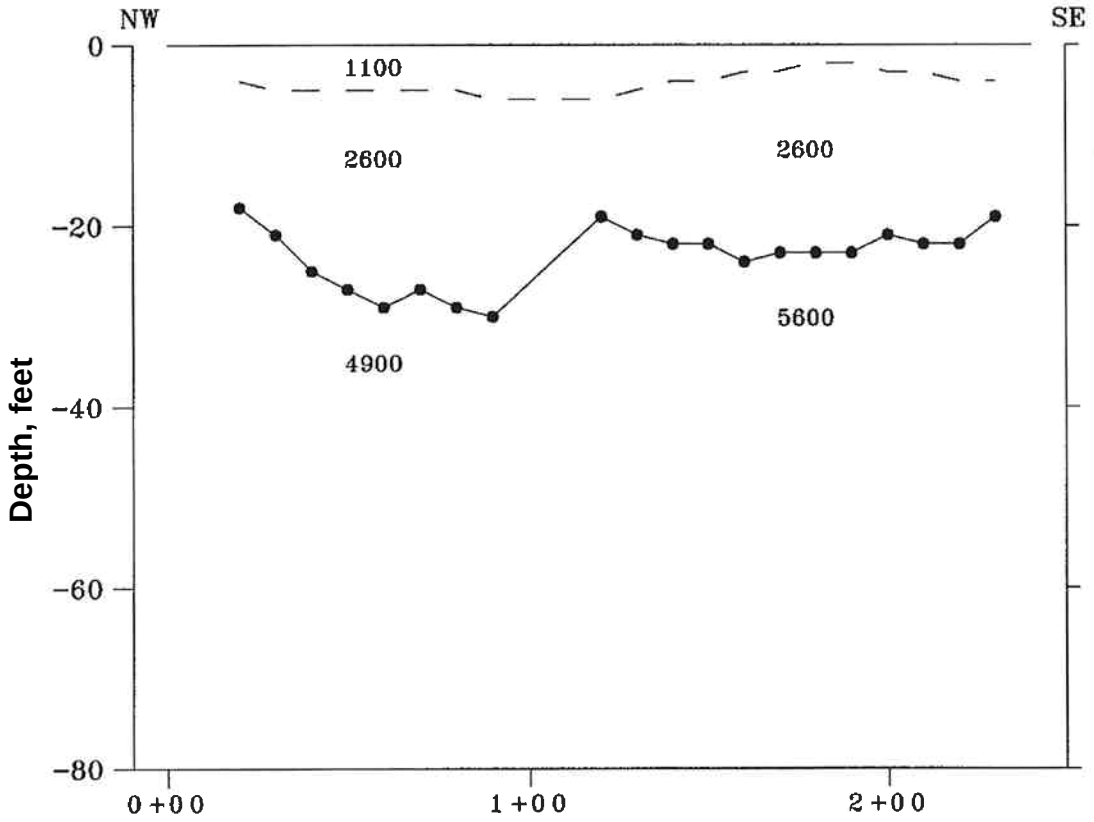




P-wave velocities in feet per second

RS5-P75

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-44



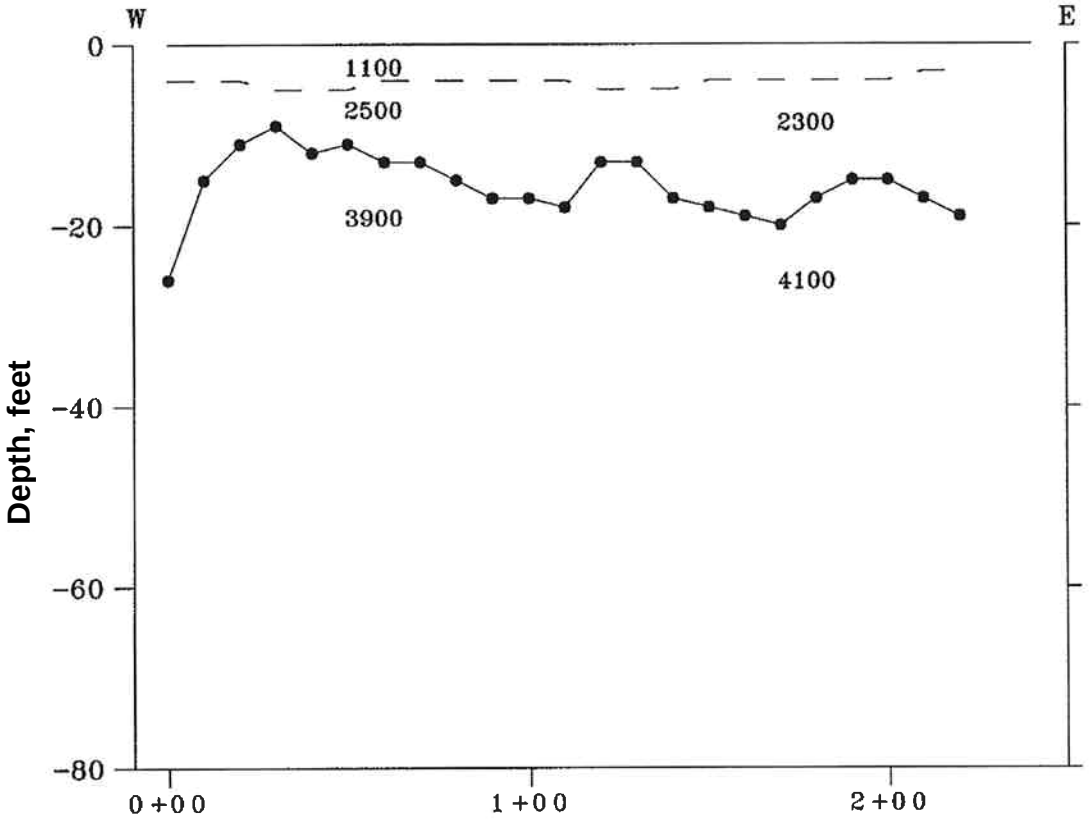
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P77

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-45



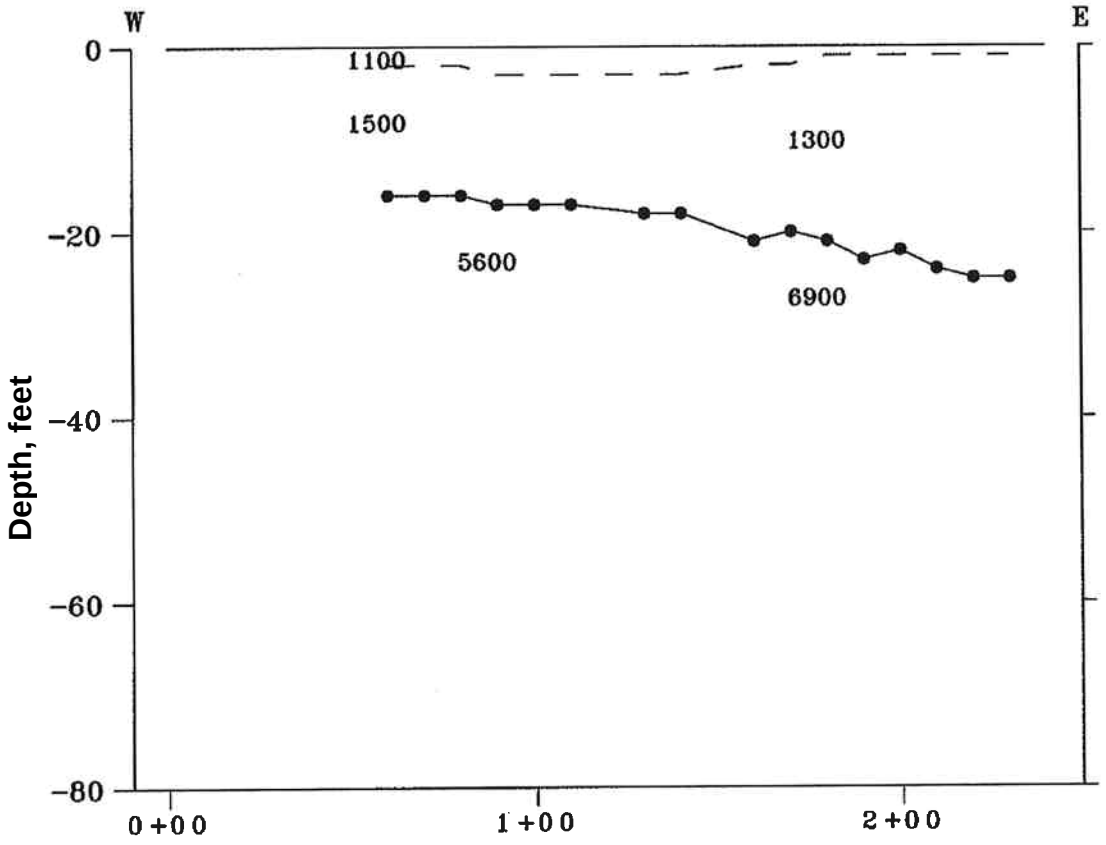
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P80-1

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-46



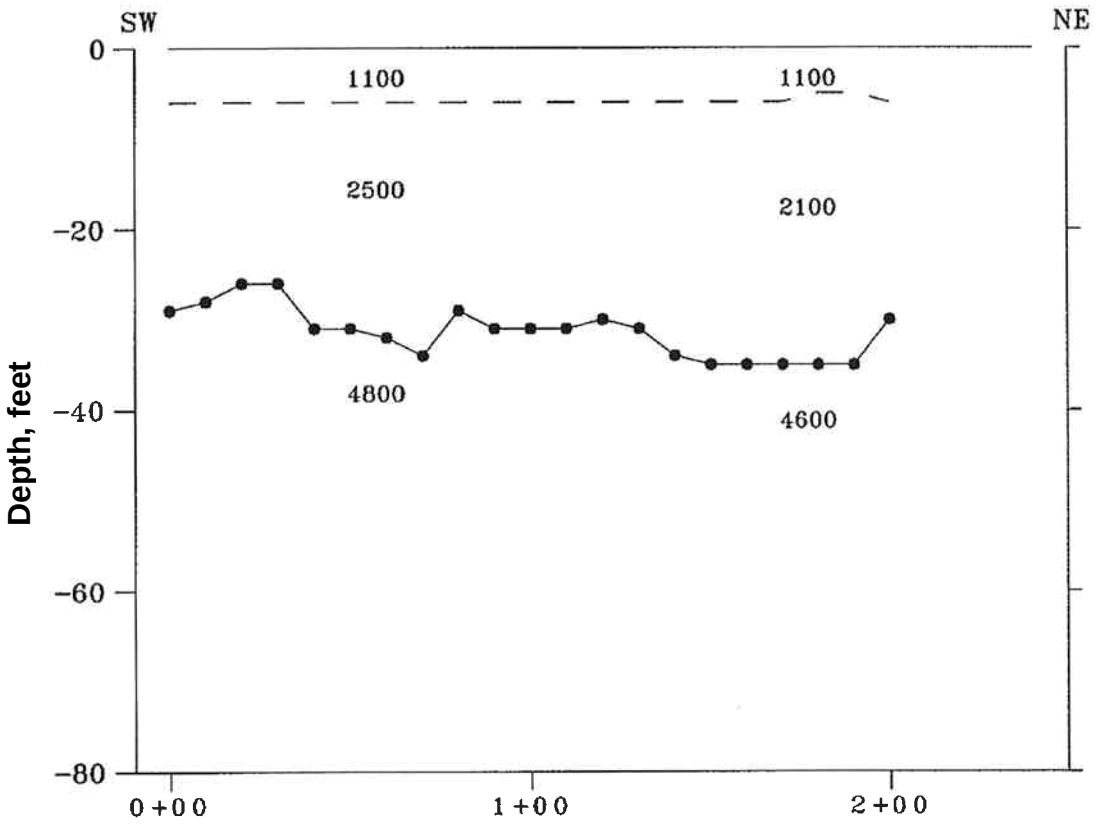
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P81-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-47



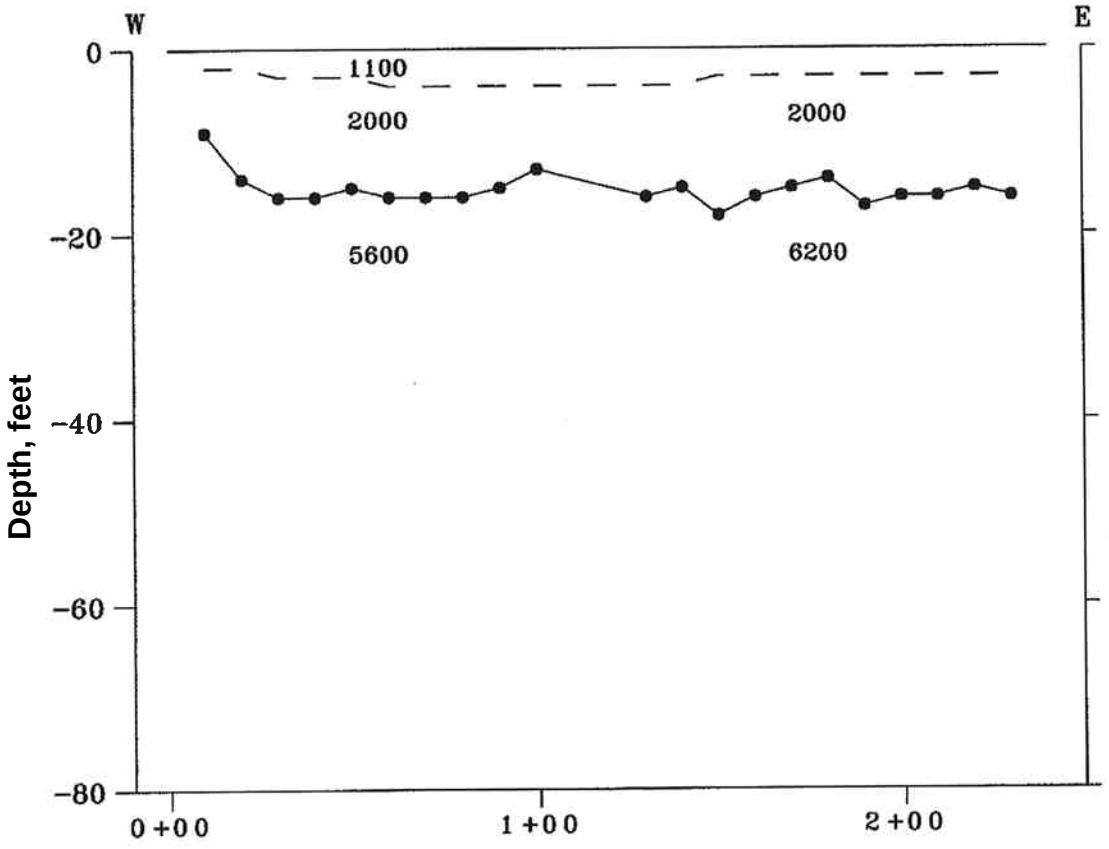
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P83

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-48



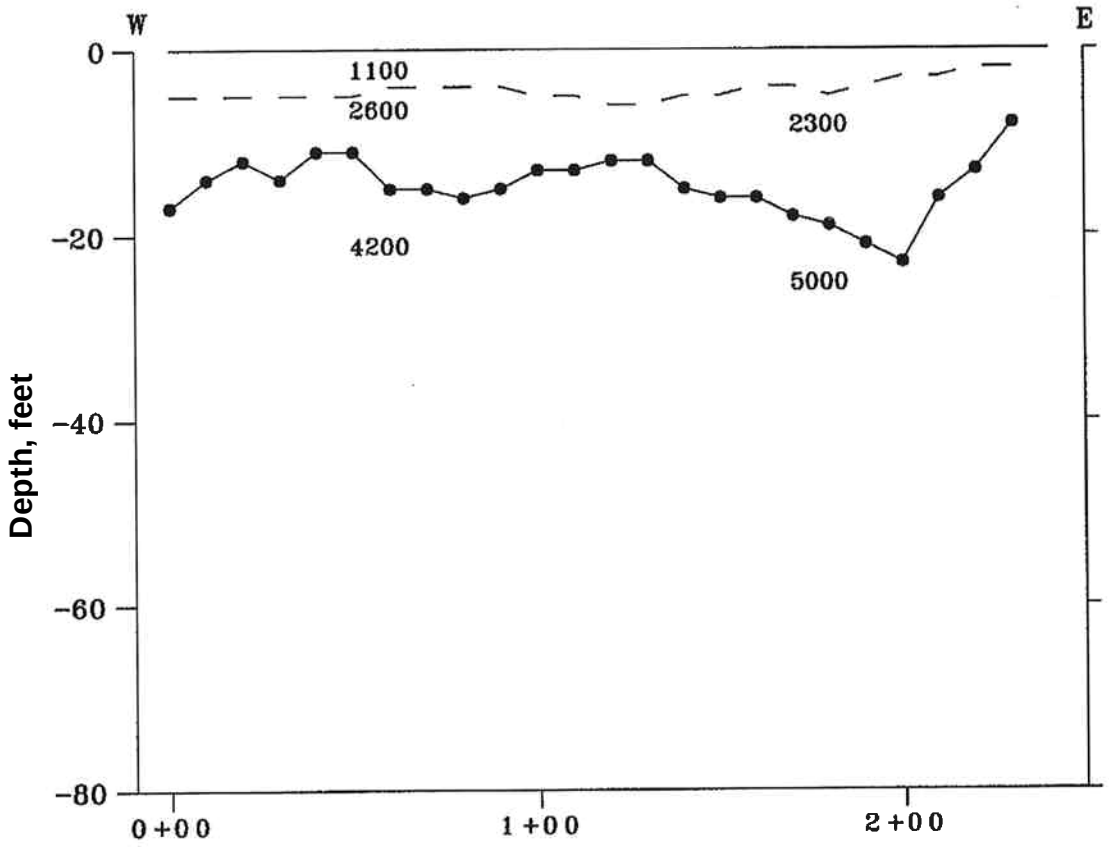
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P85-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-49



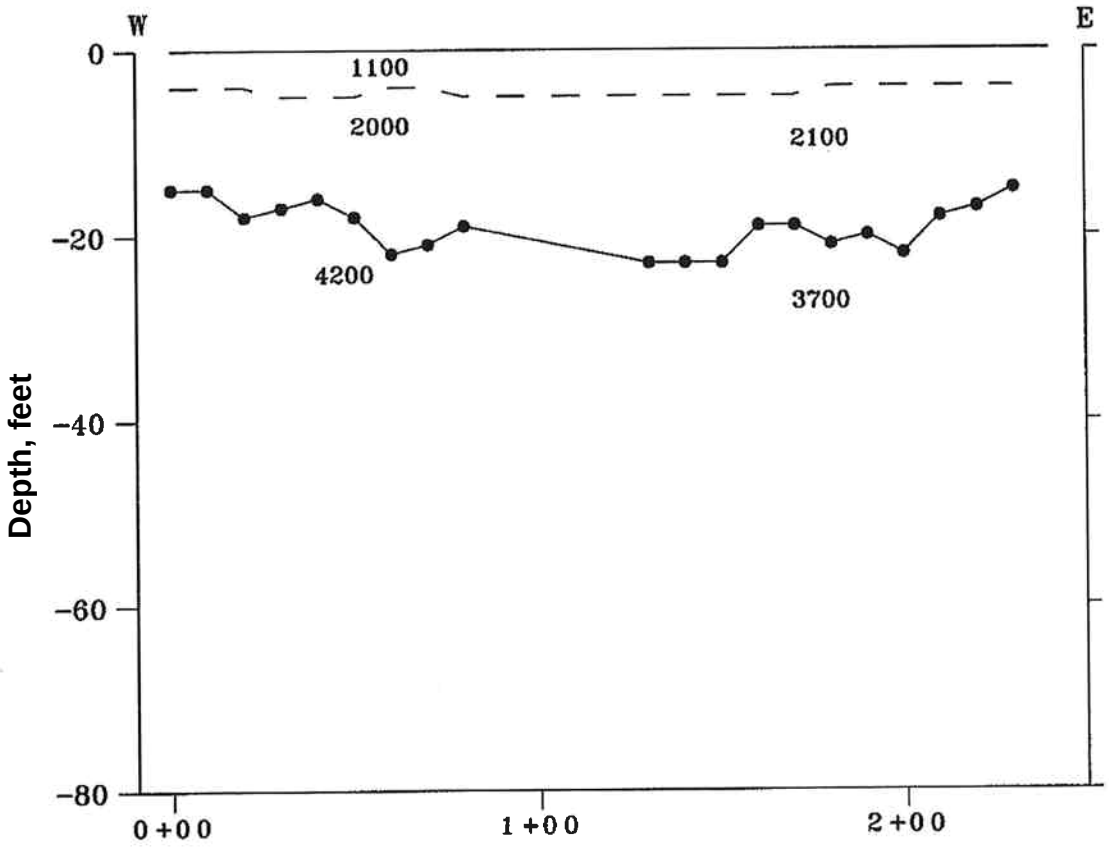
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-P86

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-50



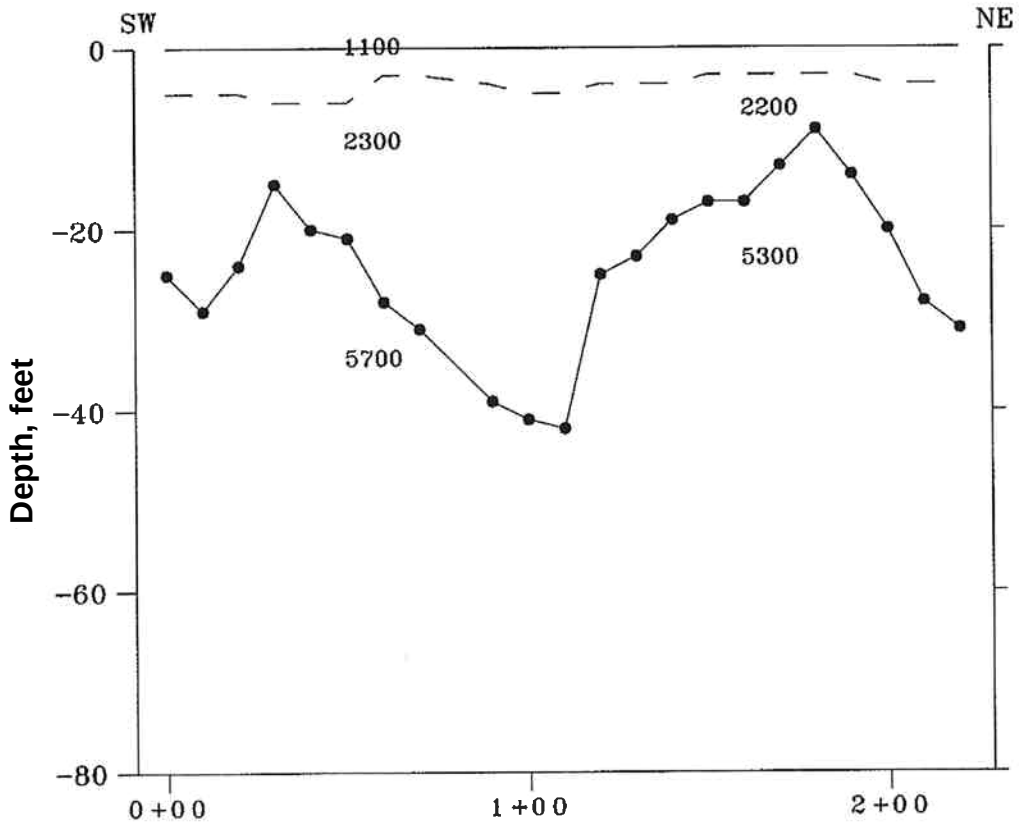
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS5-CP2

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-51



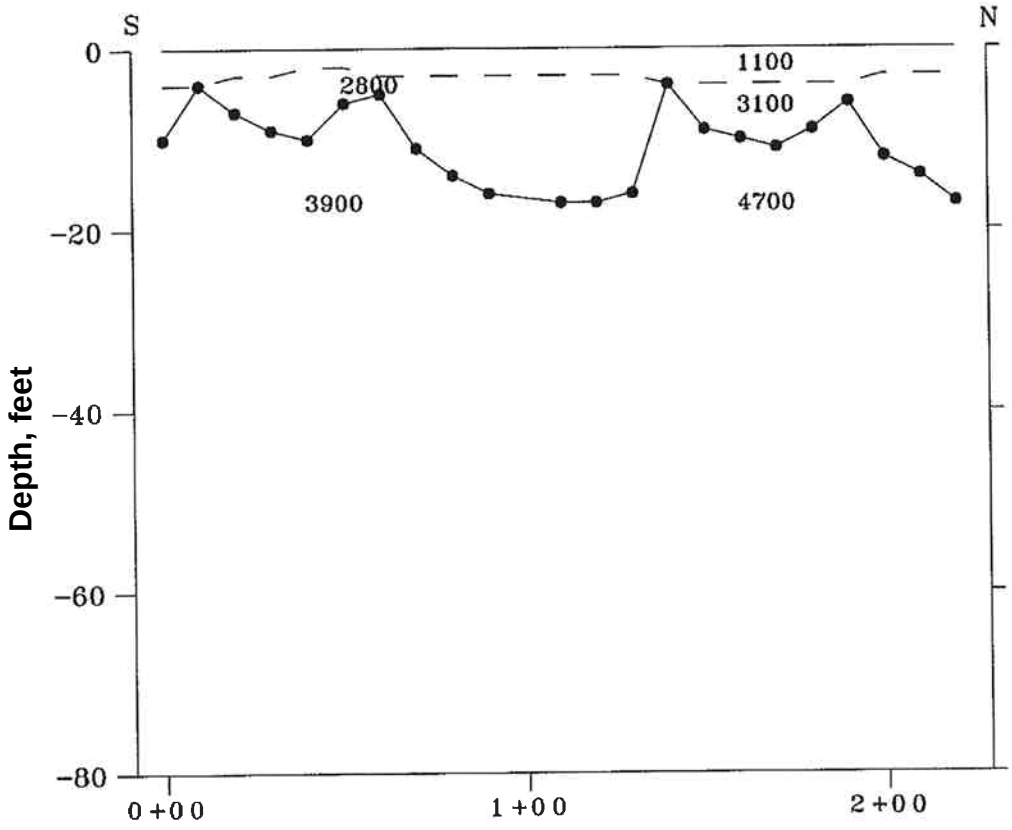
P-wave velocities in feet per second

1 in = 20 ft

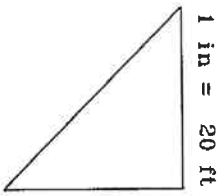
1 in = 50 ft

RS7-P97-1

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-52

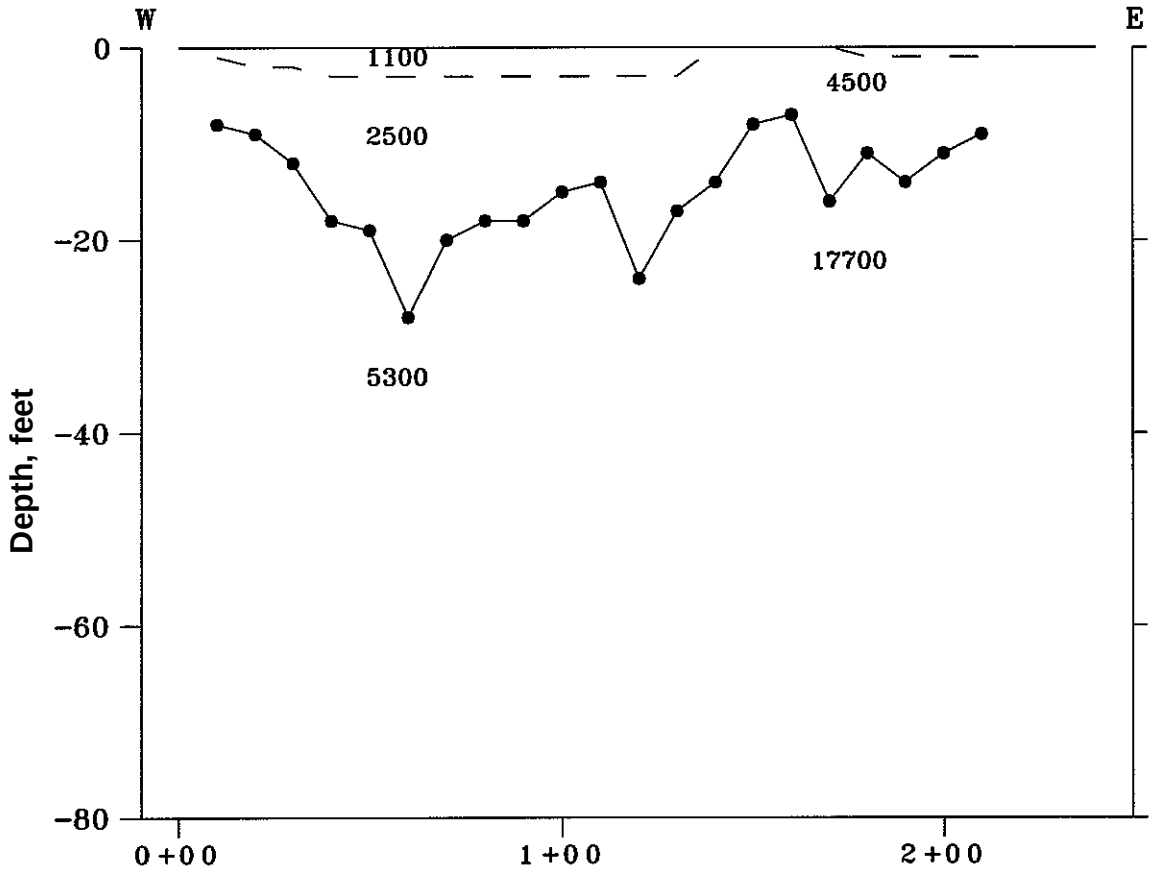


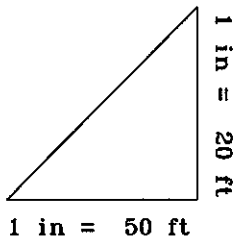
P-wave velocities in feet per second



RS7-P99

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-53

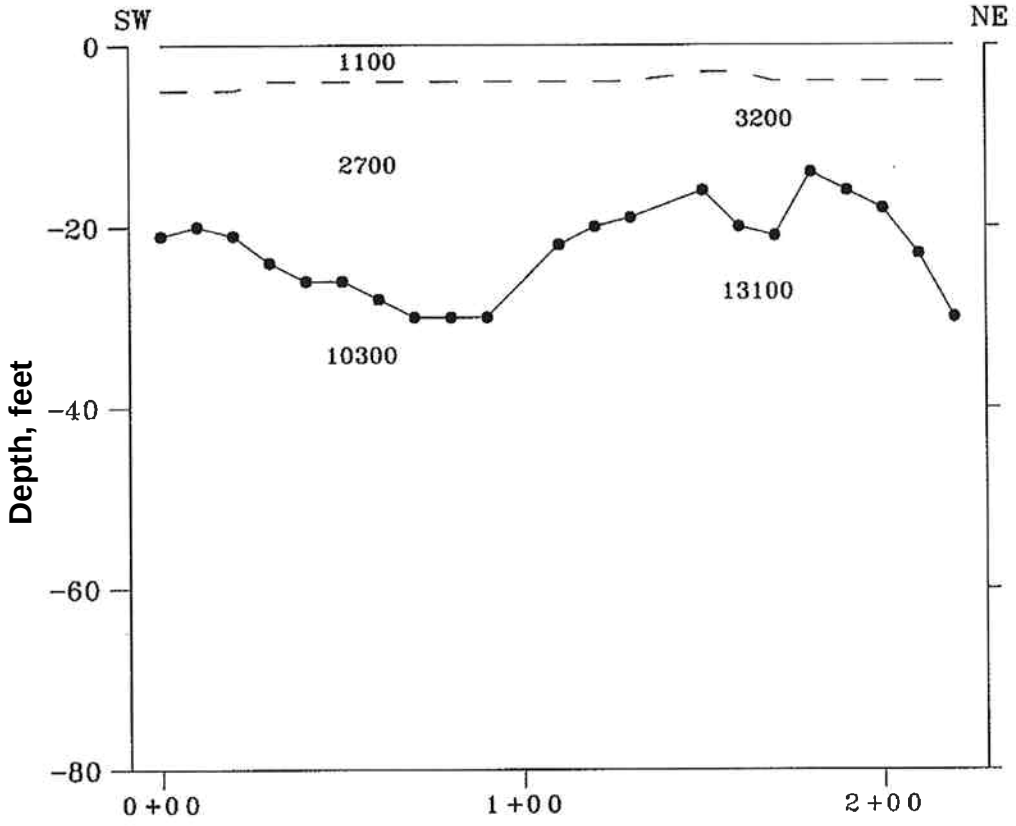




P-wave velocities in feet per second

RS7-P99-1

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-54



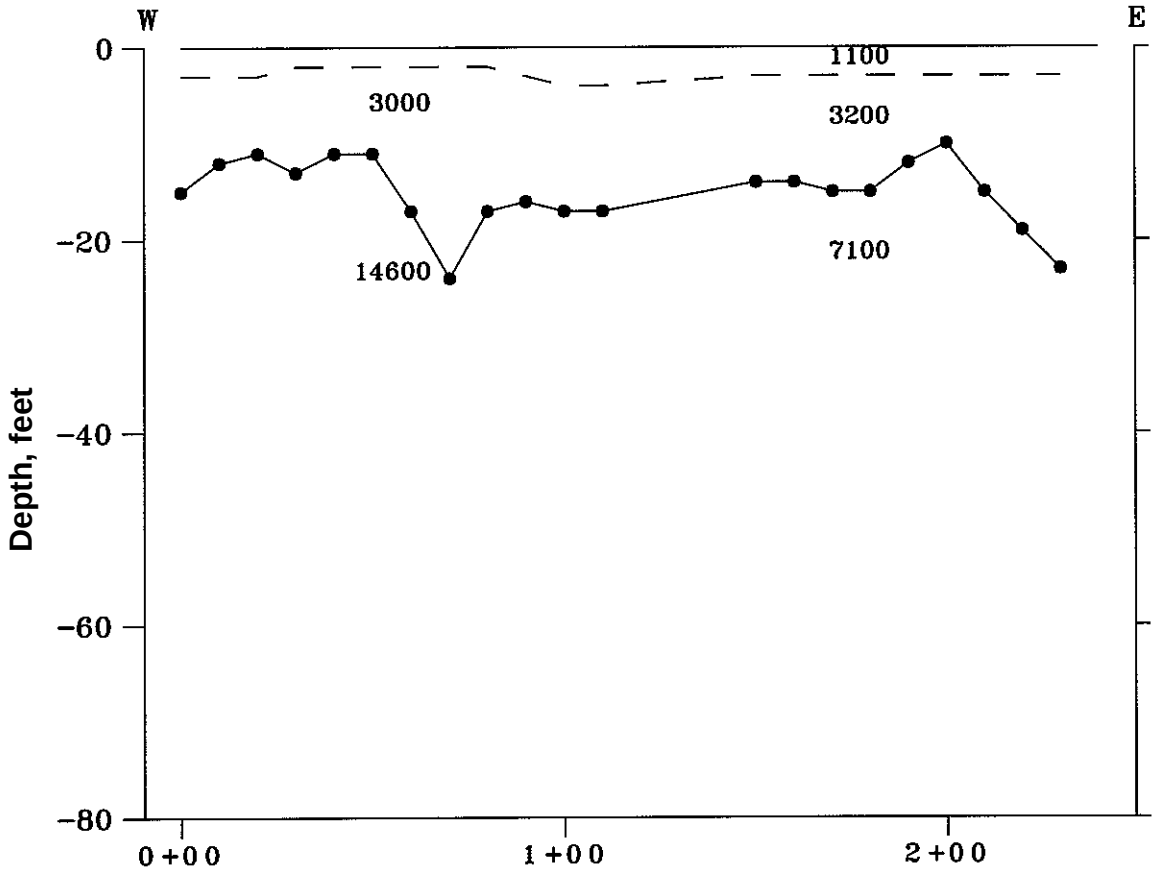
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS7-P100

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-55



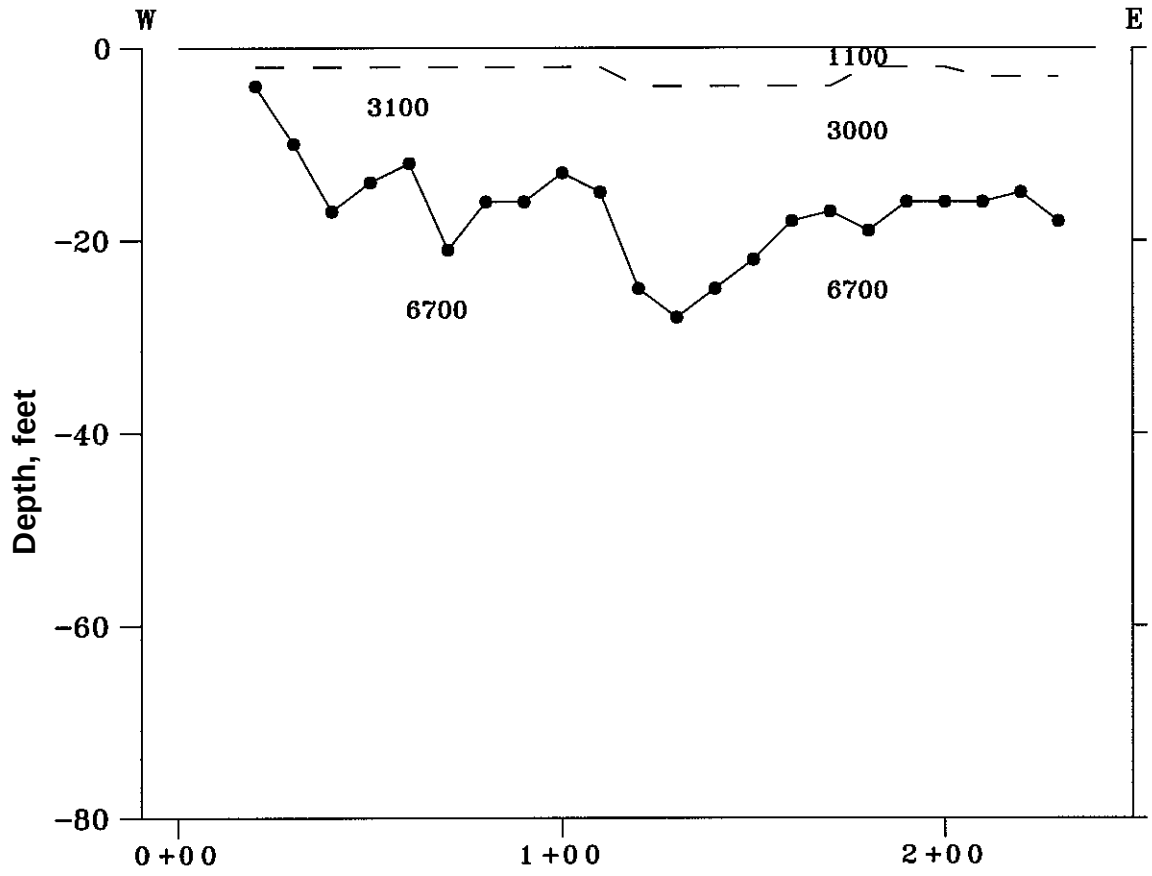
P-wave velocities in feet per second

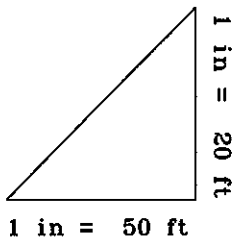
1 in = 20 ft

1 in = 50 ft

RS7-P100-1

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-56

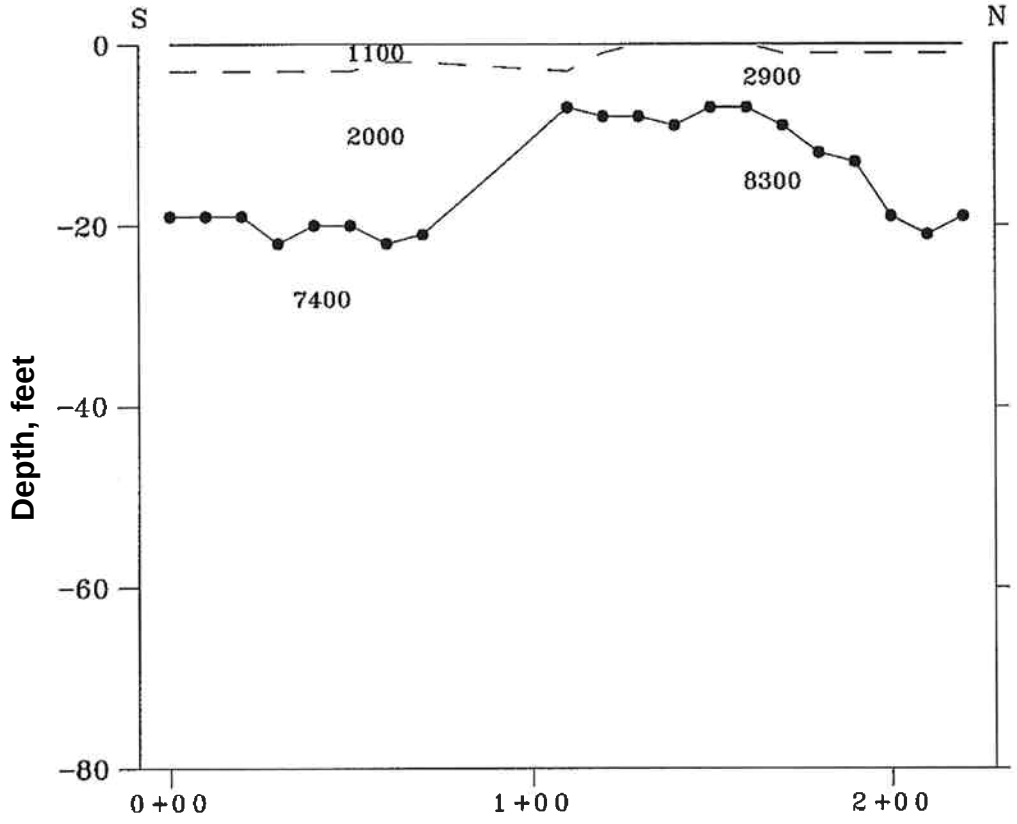




P-wave velocities in feet per second

RS7-P101-1

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-57



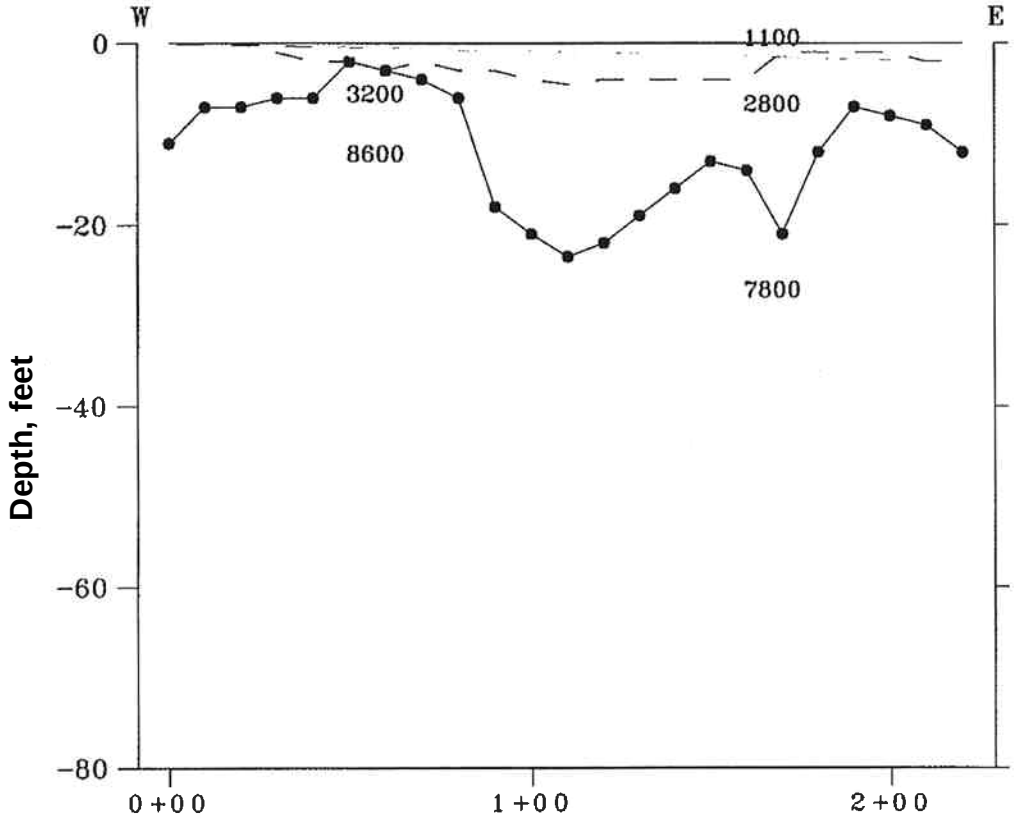
P-wave velocities in feet per second

1 in = 20 ft

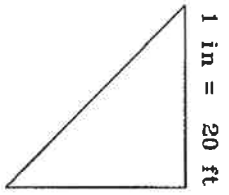
1 in = 50 ft

RS7-P102-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-58

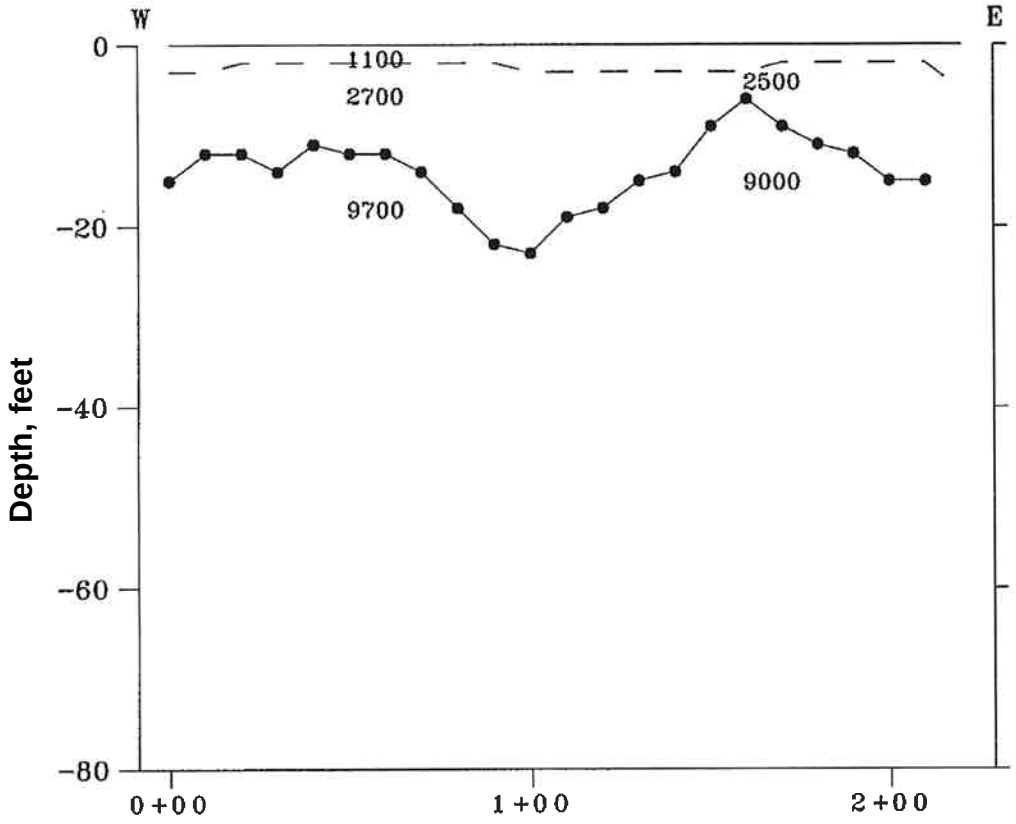


P-wave velocities in feet per second



RS7-P103-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-59



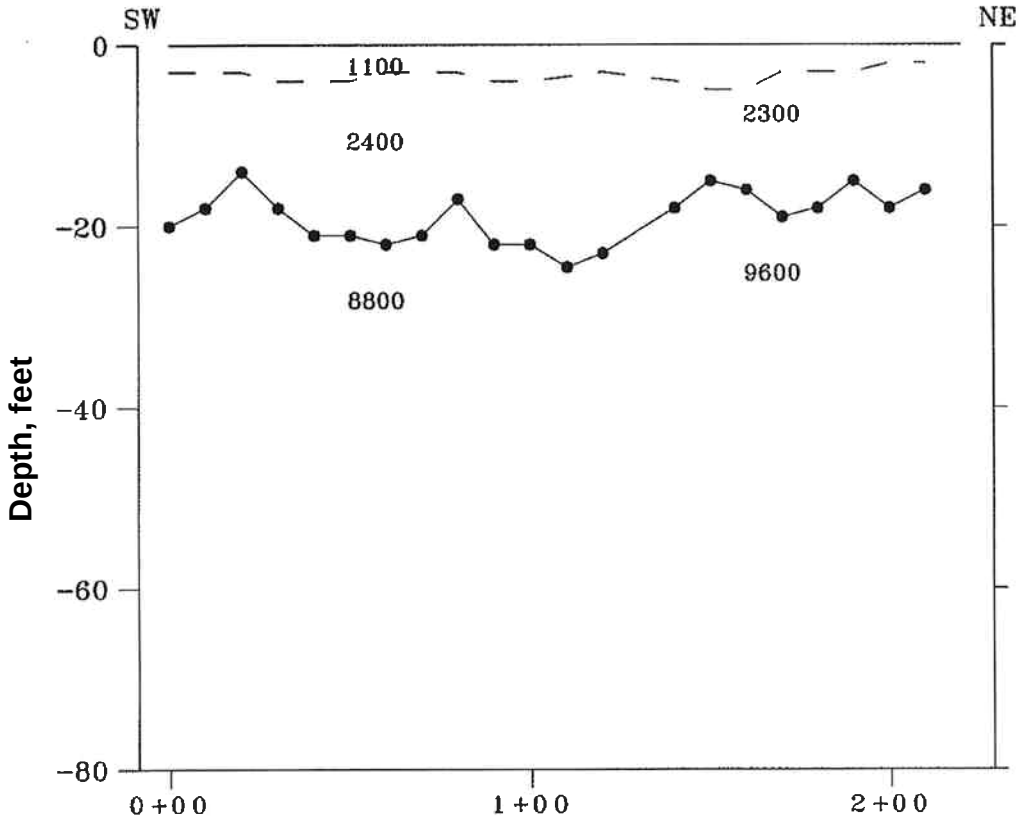
P-wave velocities in feet per second

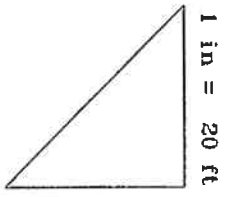
1 in = 20 ft

1 in = 50 ft

RS7-P105

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-60

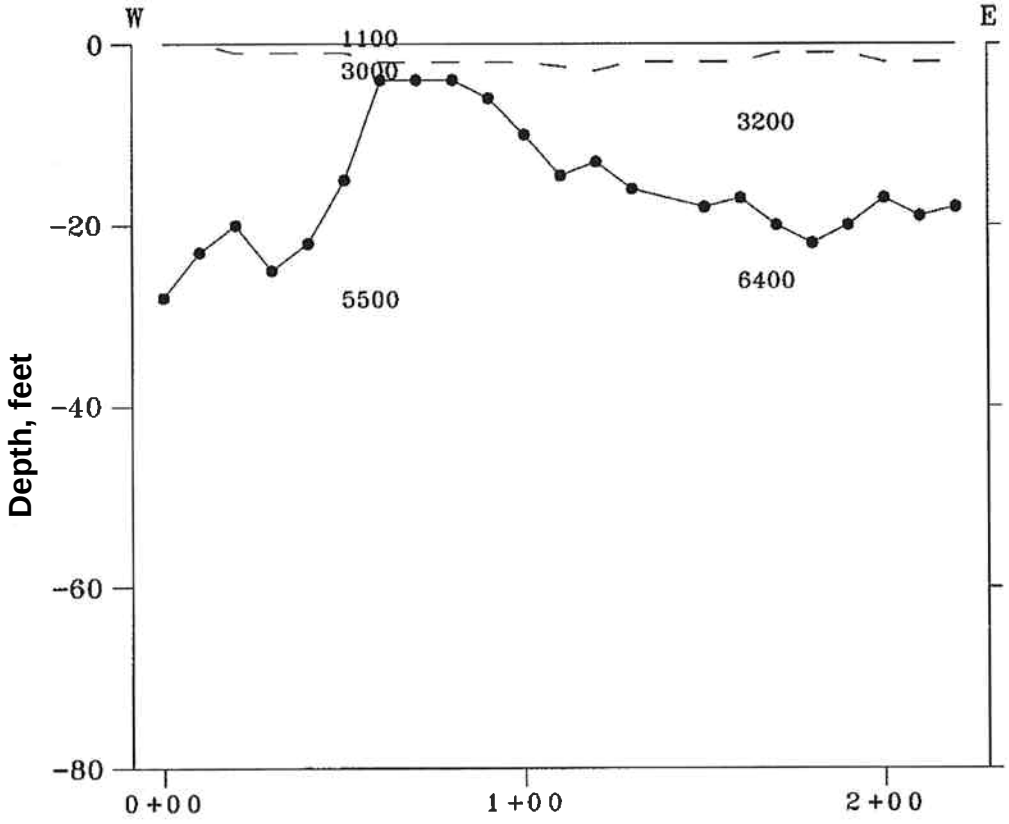




P-wave velocities in feet per second

RS7-P106

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-61



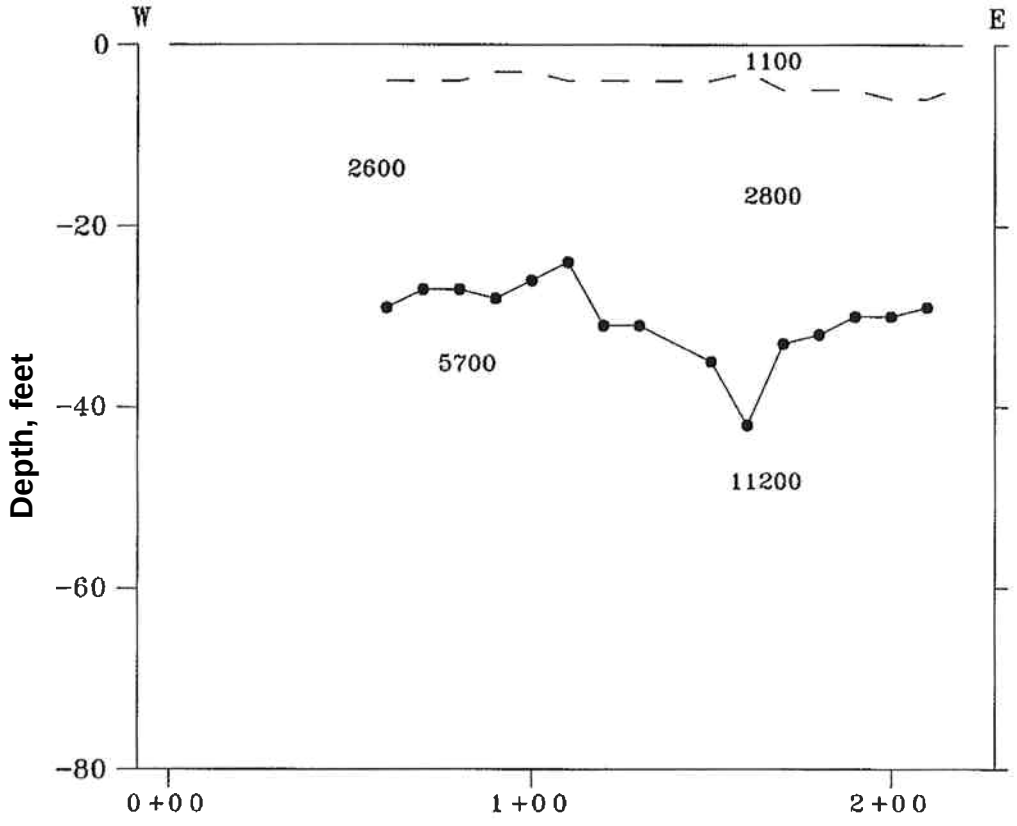
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS7-P107

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-62



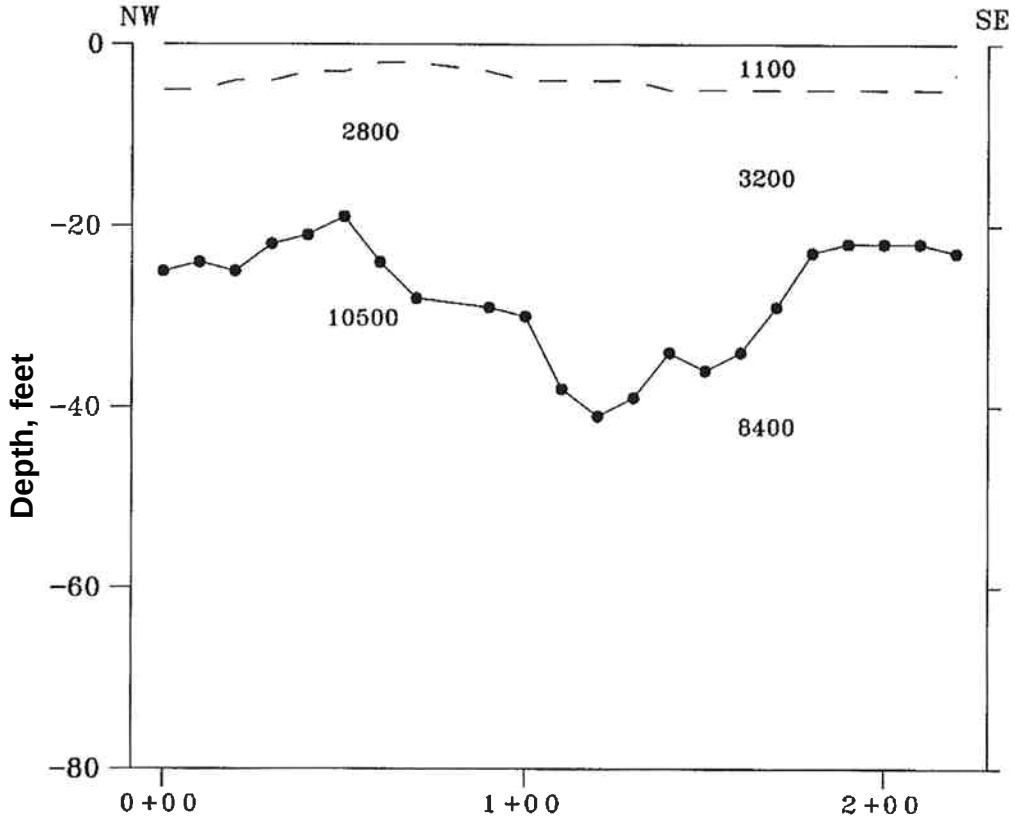
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS7-P108

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-63



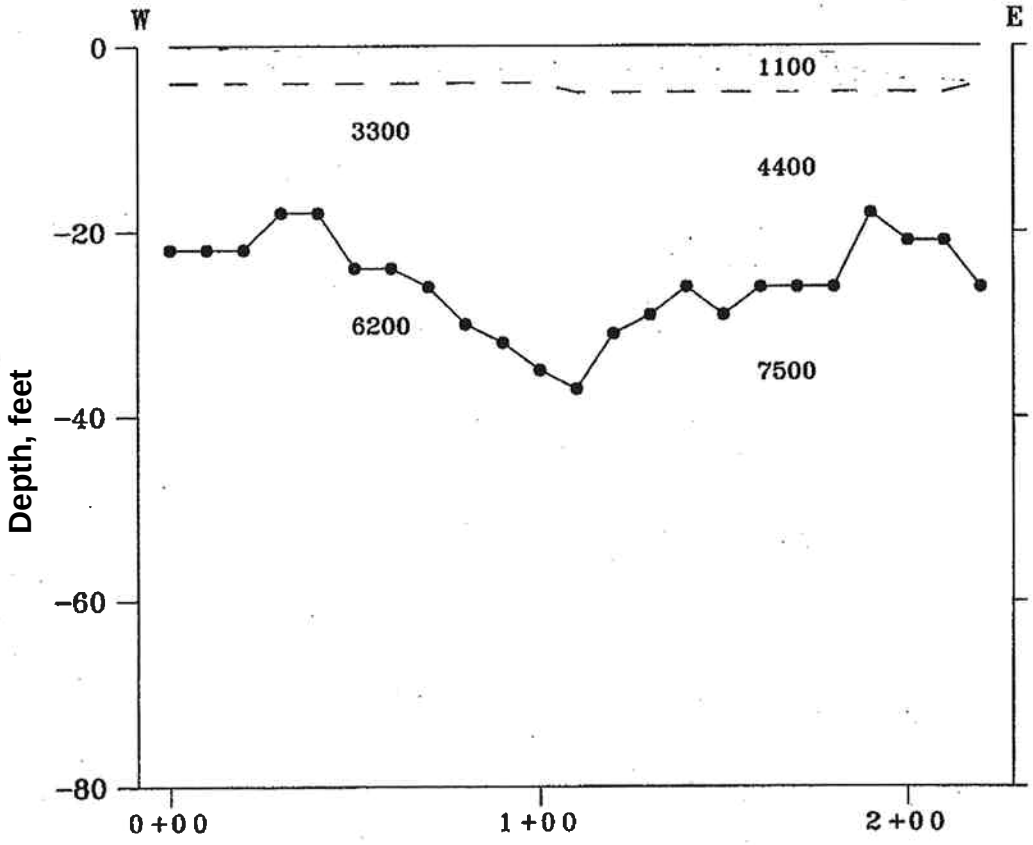
P-wave velocities in feet per second

1 in = 20 ft

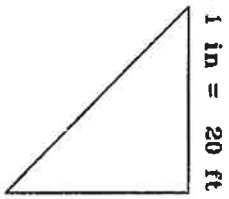
1 in = 50 ft

RS7-P109

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-64

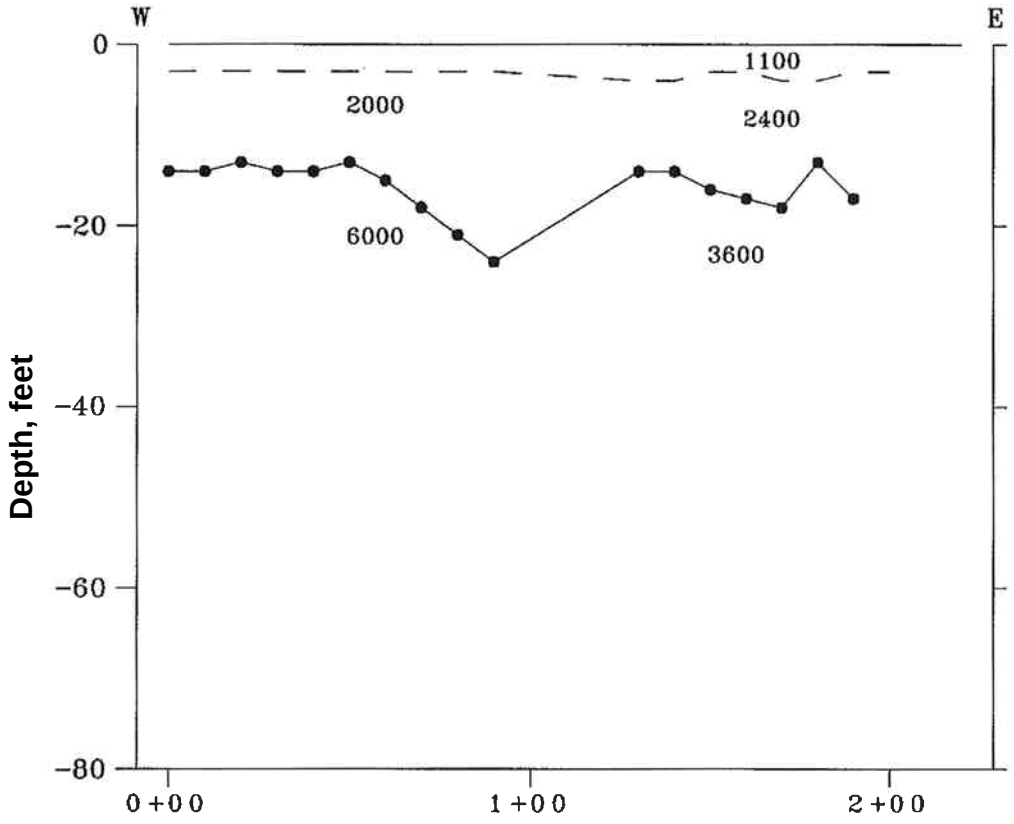


P-wave velocities in feet per second

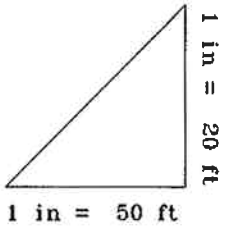


RS8-P1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-65

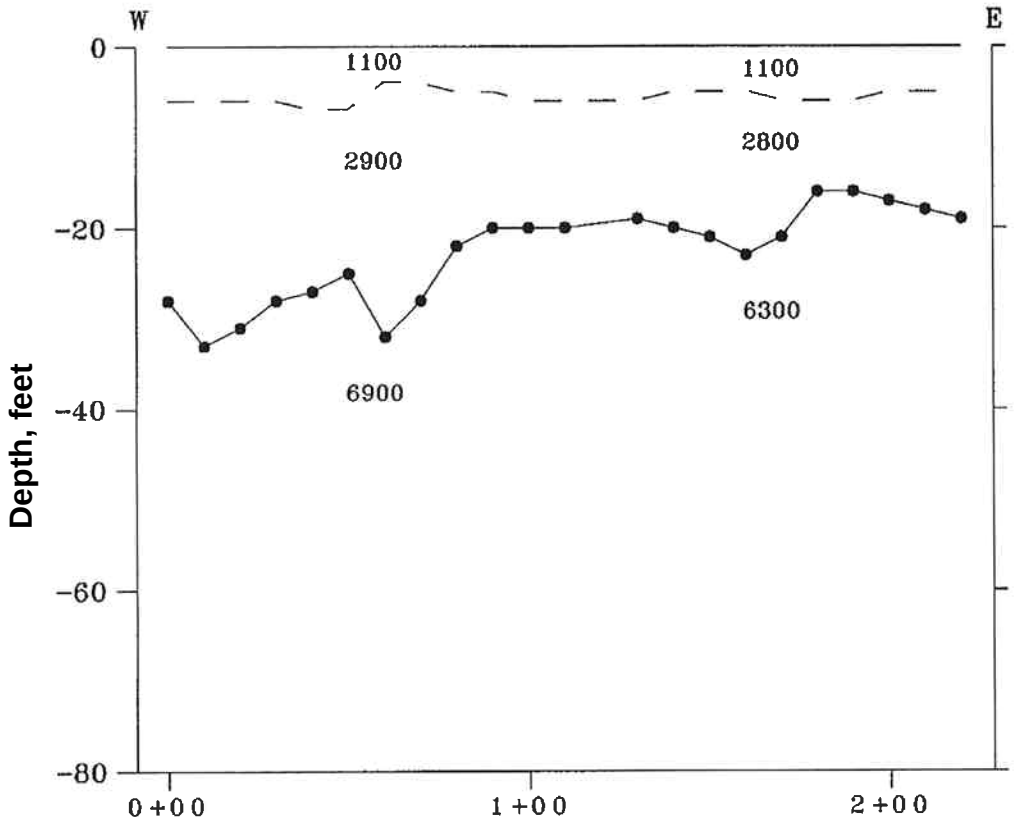


P-wave velocities in feet per second



RS8-P2-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-66



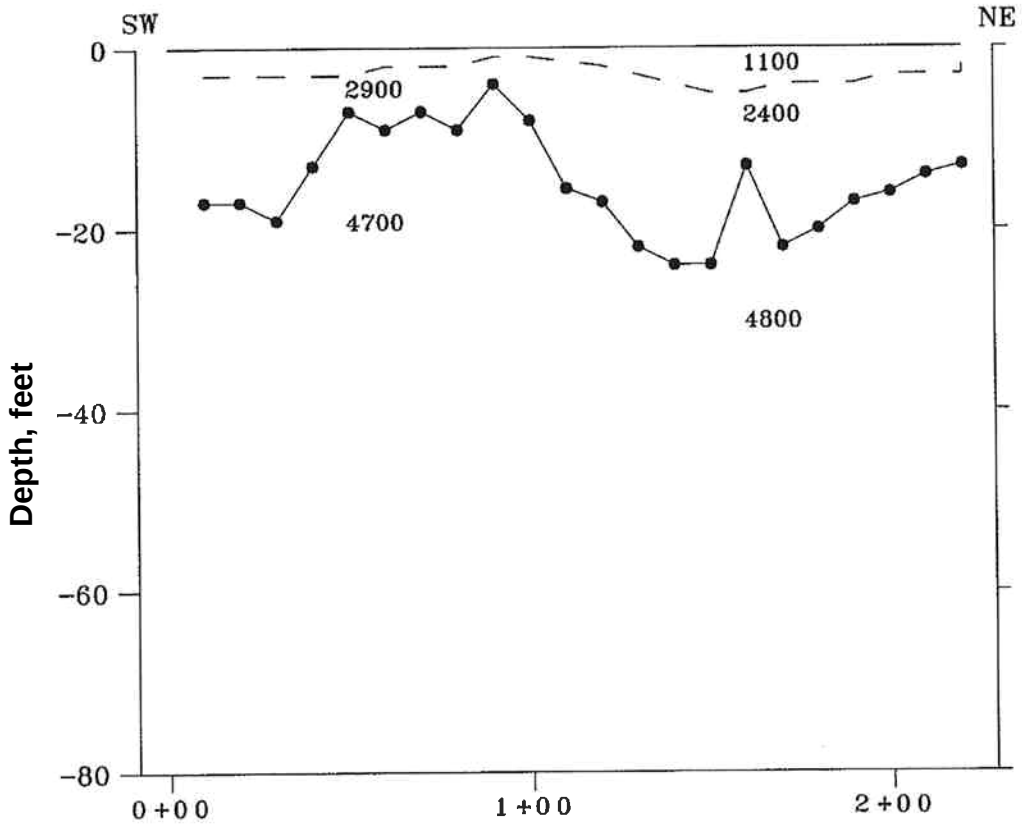
P-wave velocities in feet per second

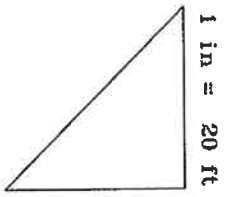
1 in = 20 ft

1 in = 50 ft

RS8-P4-2

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-67

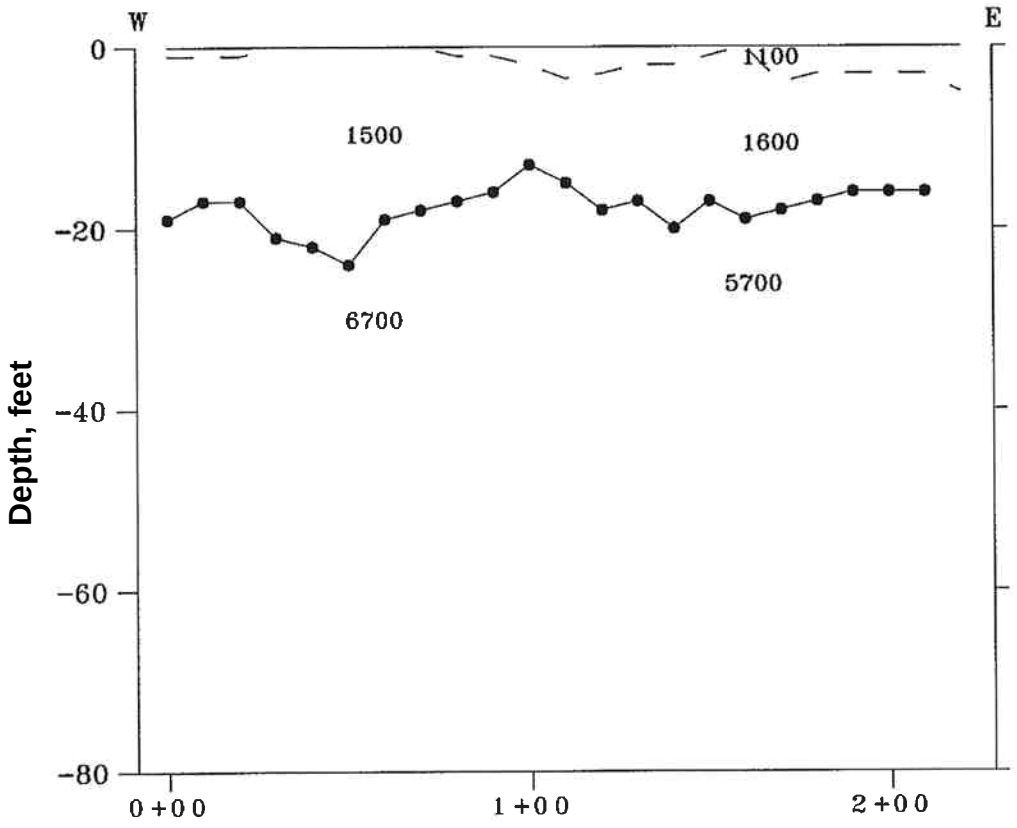




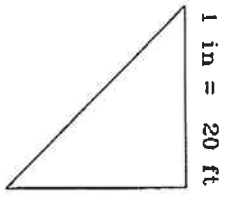
P-wave velocities in feet per second

RS8-P5-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-68

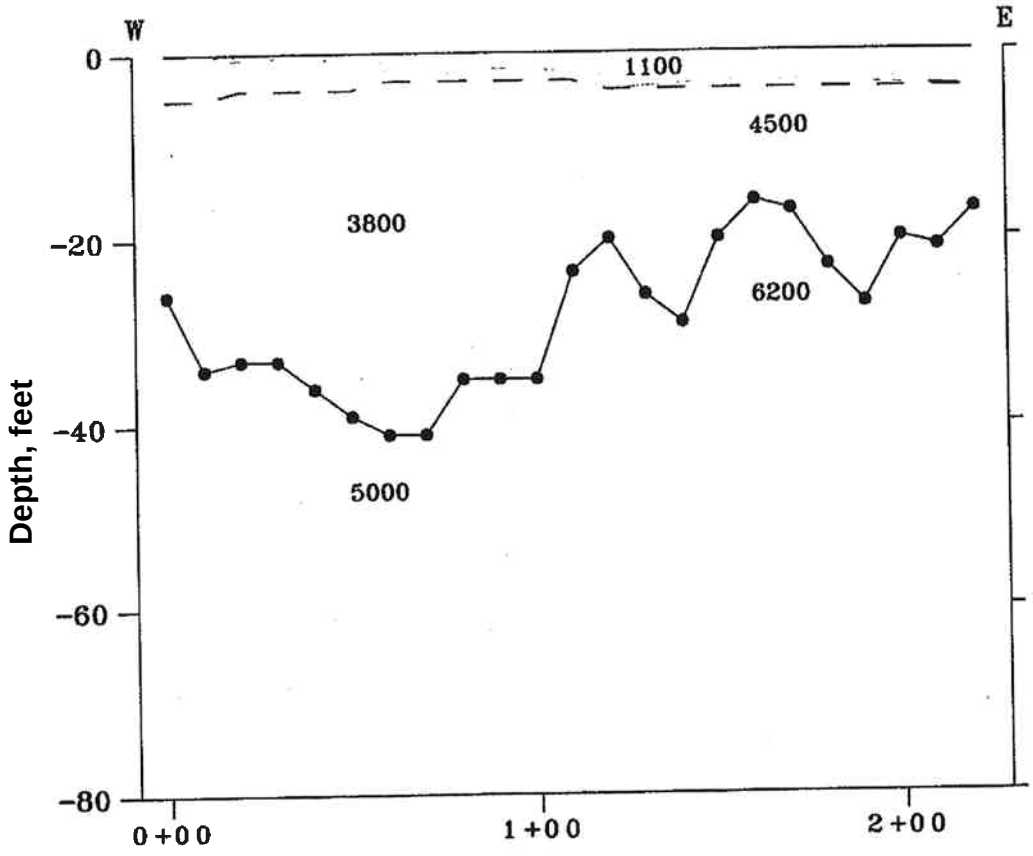


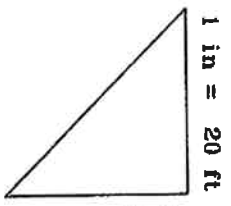
P-wave velocities in feet per second



RS8-P7-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-69

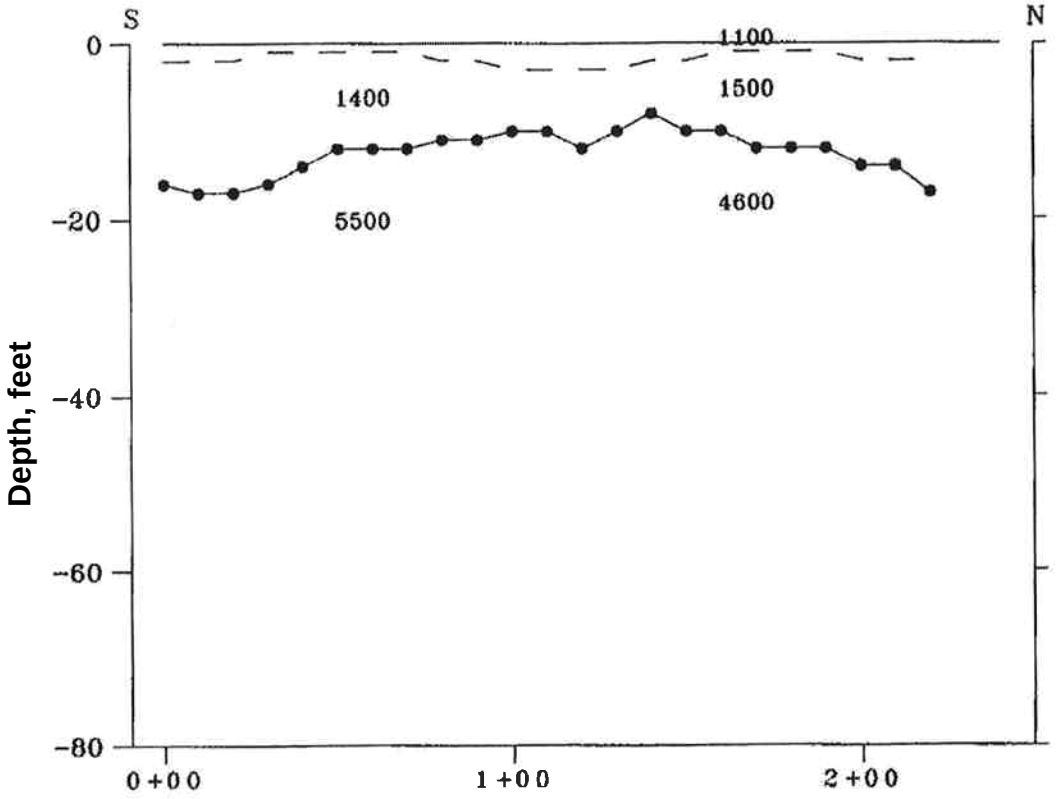


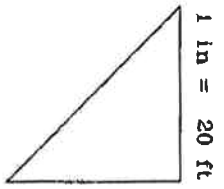


P-wave velocities in feet per second

RS8-P9

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-70

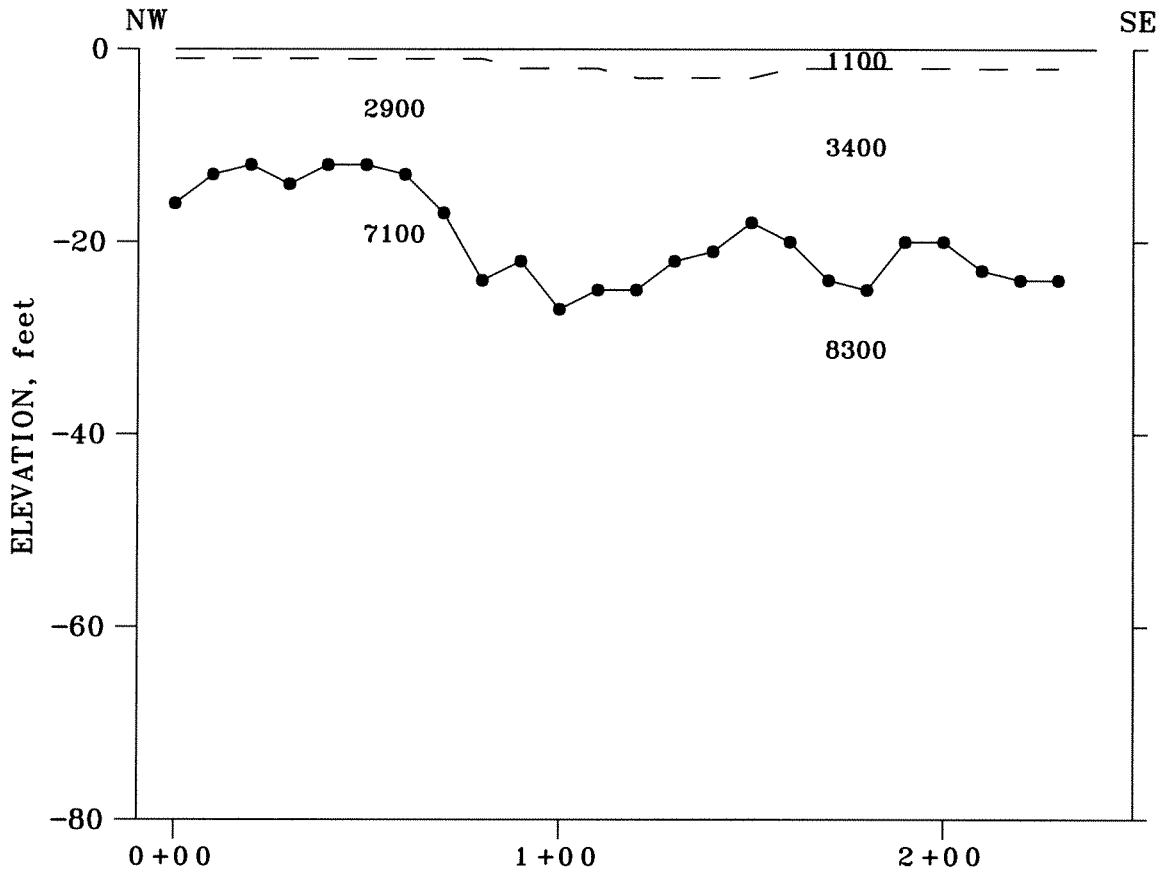




P-wave velocities in feet per second

RS8-P10

Project No. 27668031	Date: 6-7-09	**Sunrise Powerlink Project**	Fig. C-71



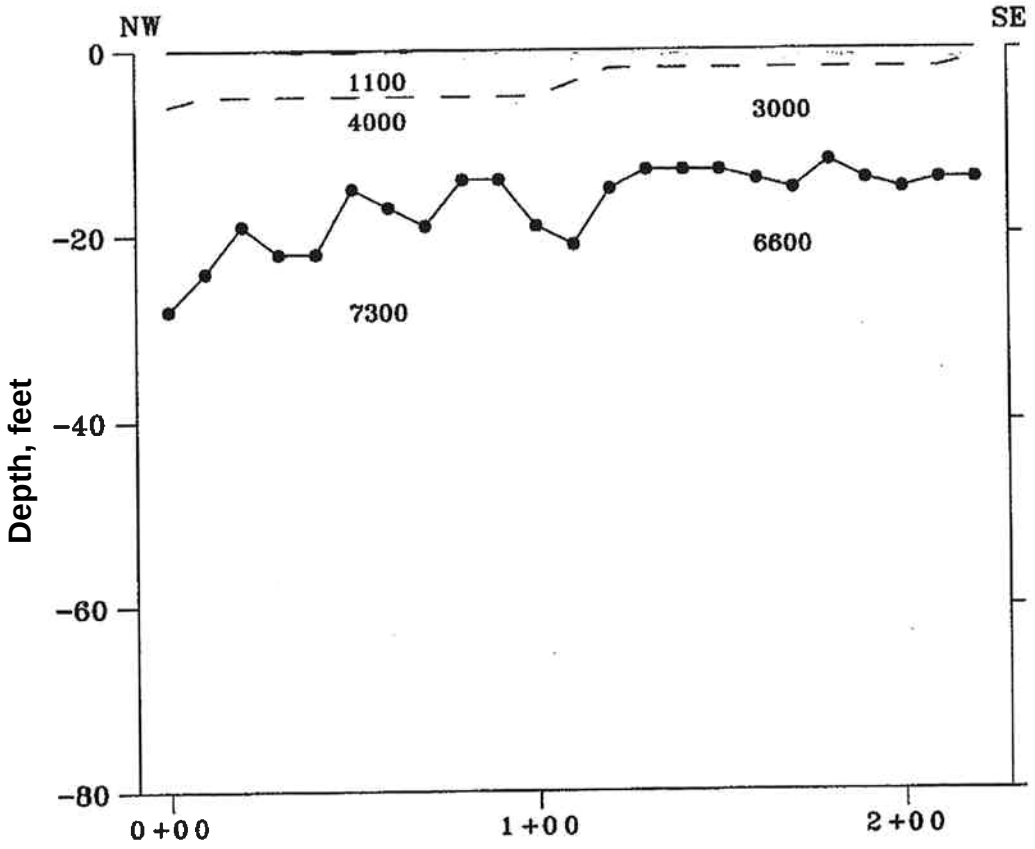
P-wave velocities in feet per second

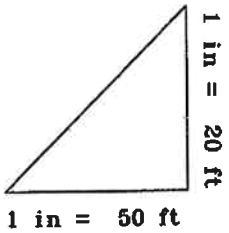
1 in = 20 ft

1 in = 50 ft

RS8-P11-2

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-72

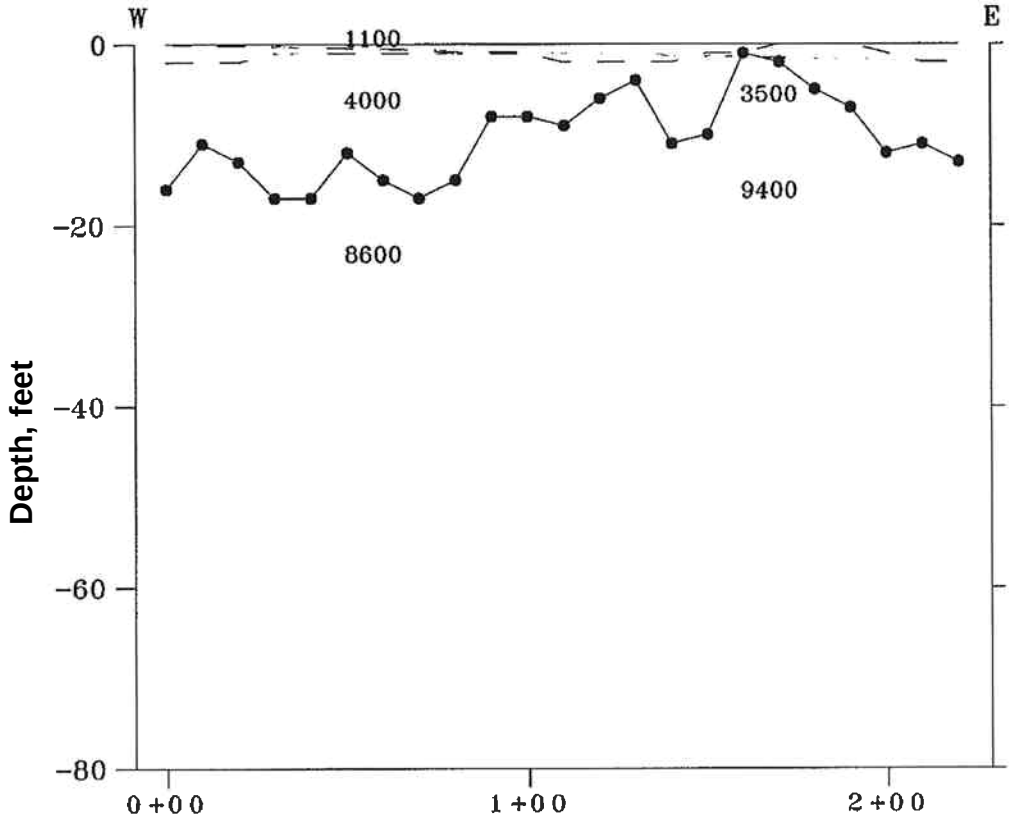




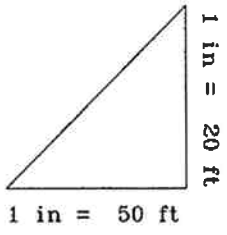
P-wave velocities in feet per second

RS8-P12

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-73

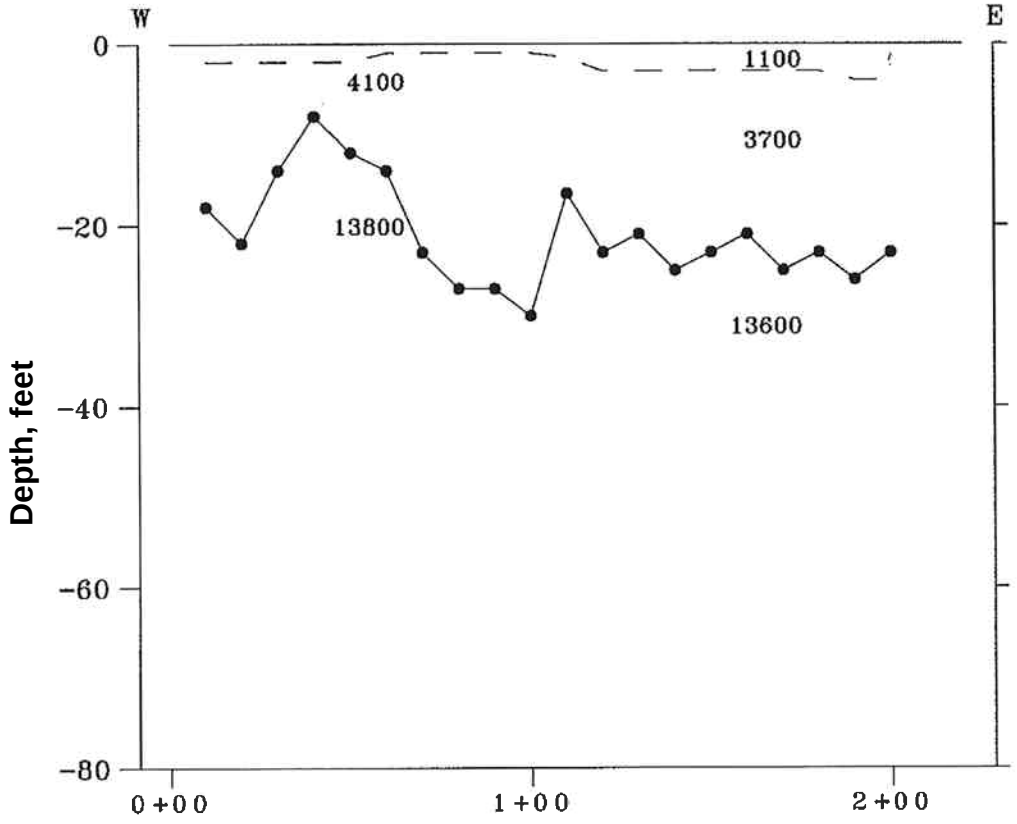


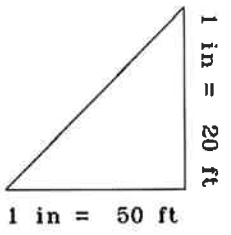
P-wave velocities in feet per second



RS8-P14-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-74

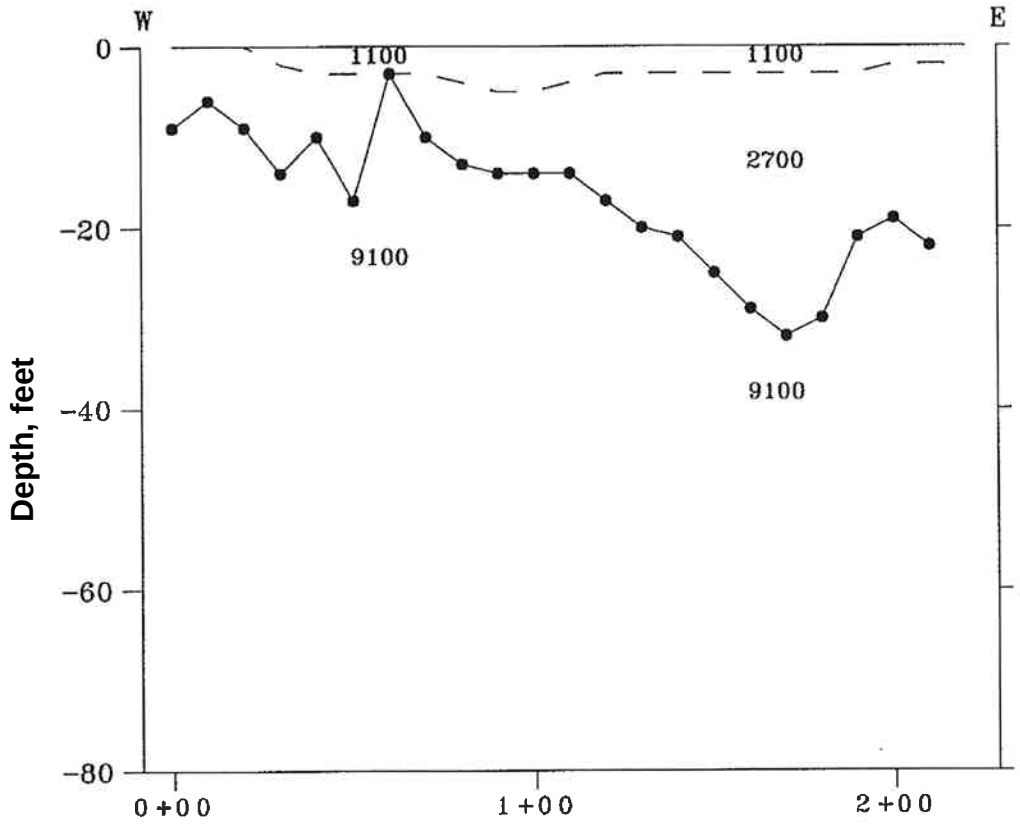




P-wave velocities in feet per second

RS8-P17

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-75



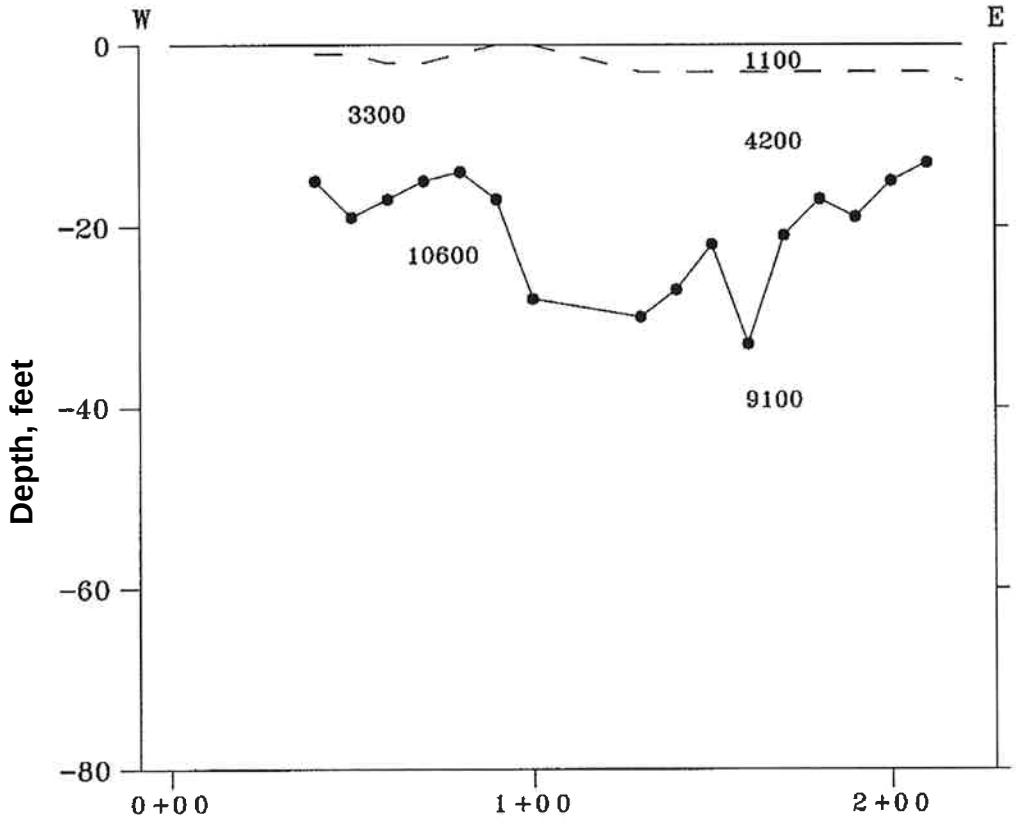
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P18

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-76



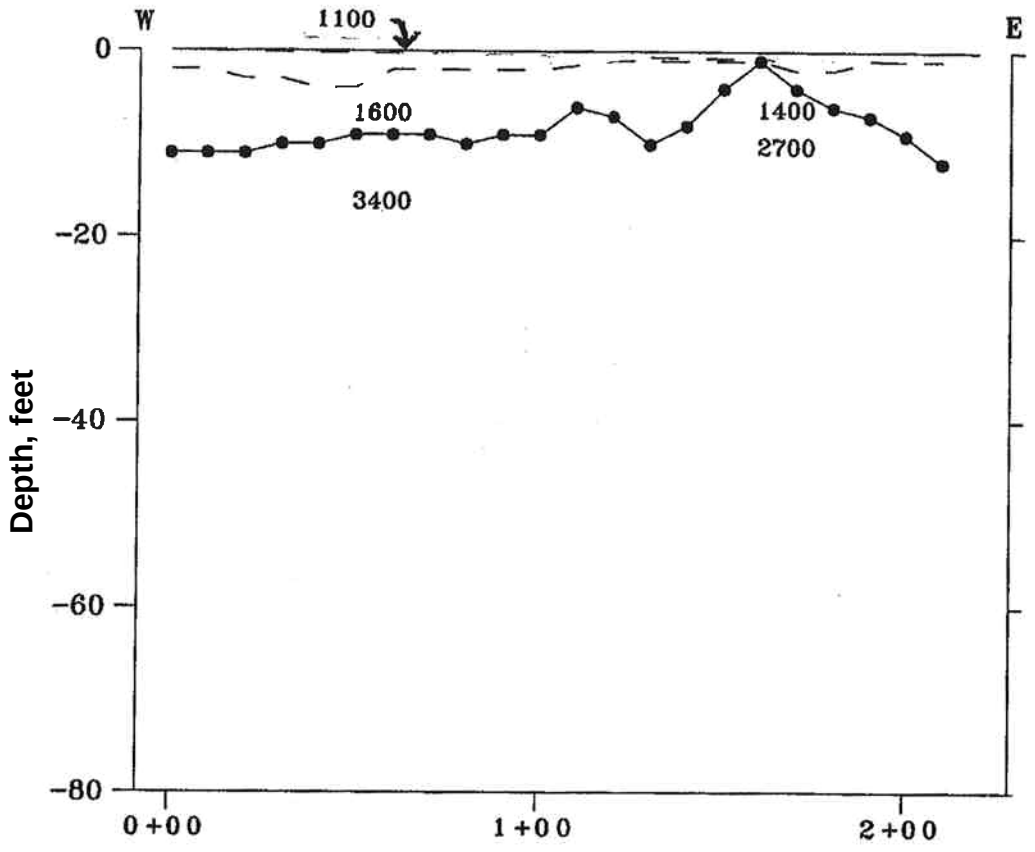
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P20-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-77



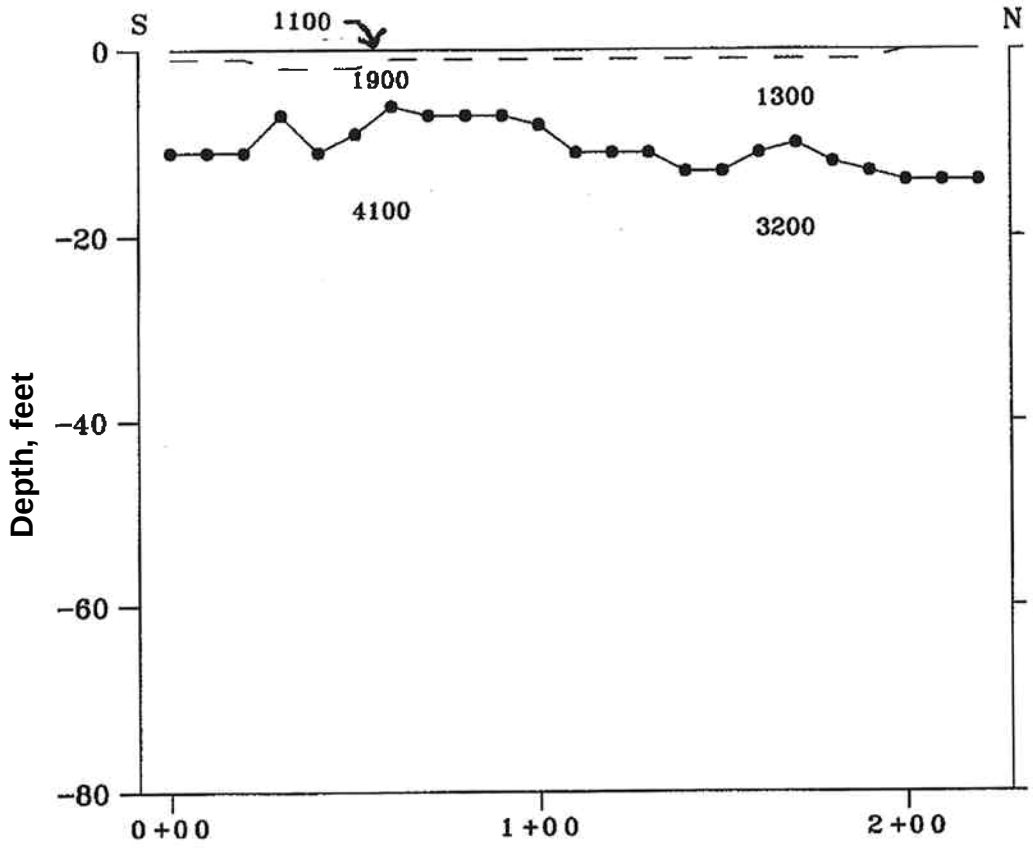
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P22

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-78



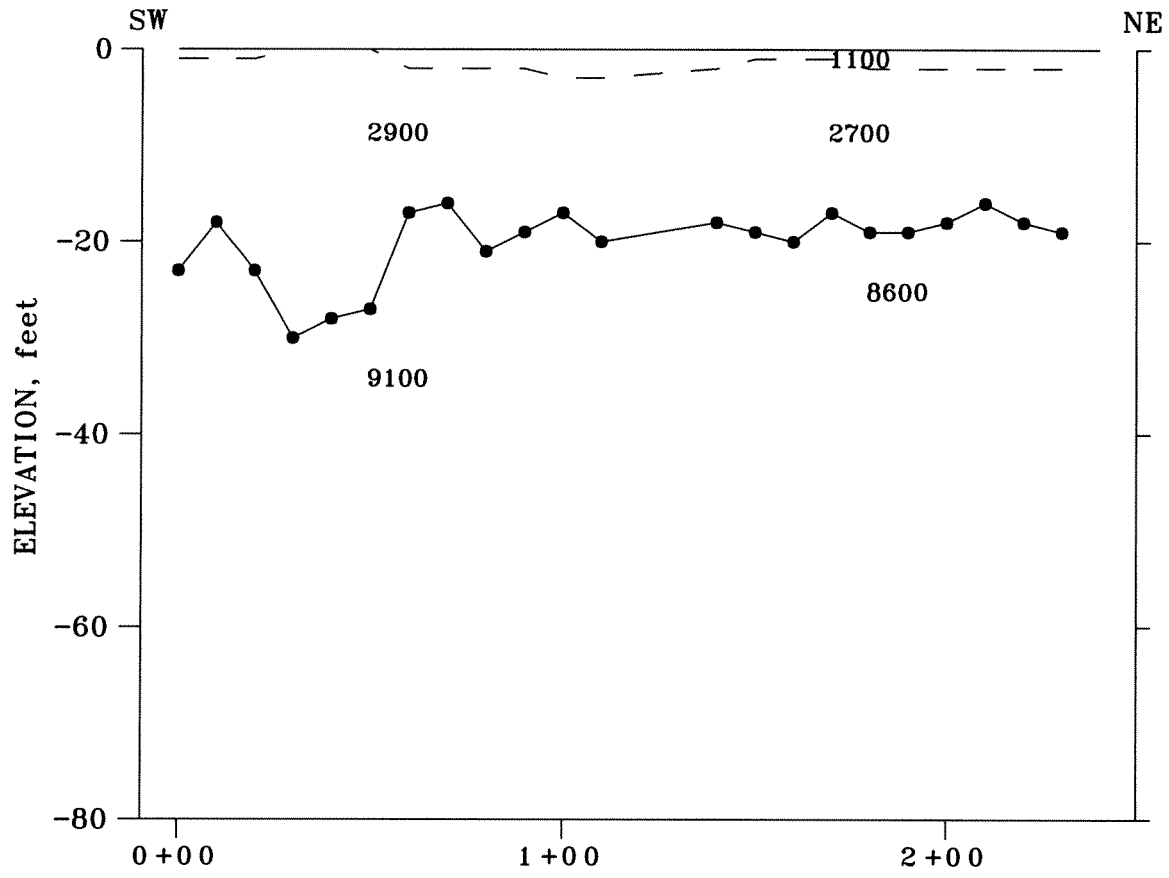
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P23-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-79



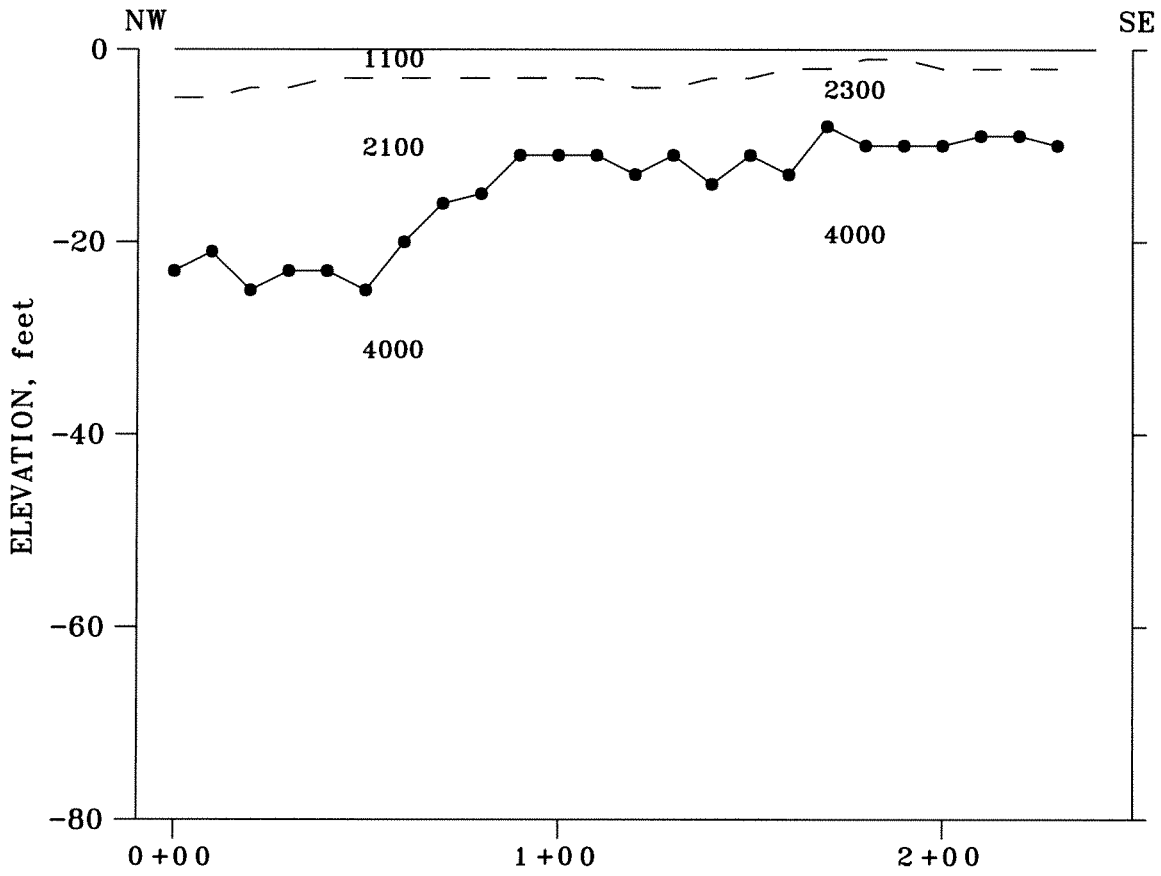
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P23-2

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-80



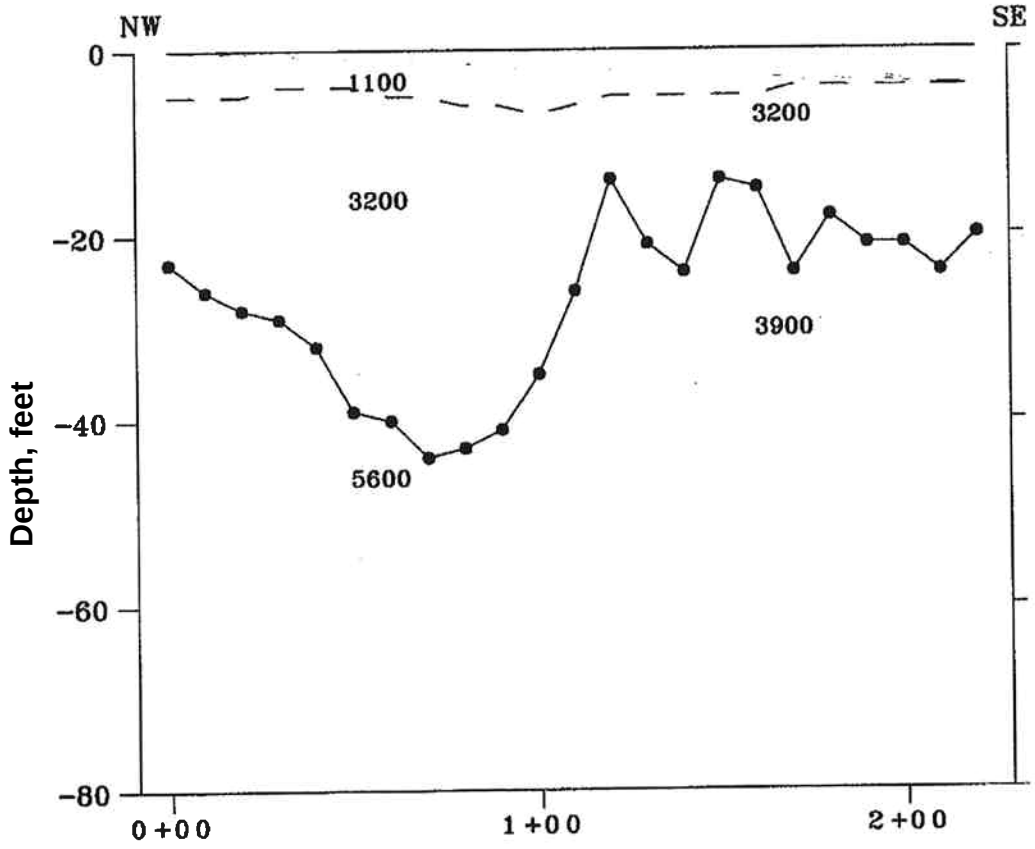
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P24-1

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-81



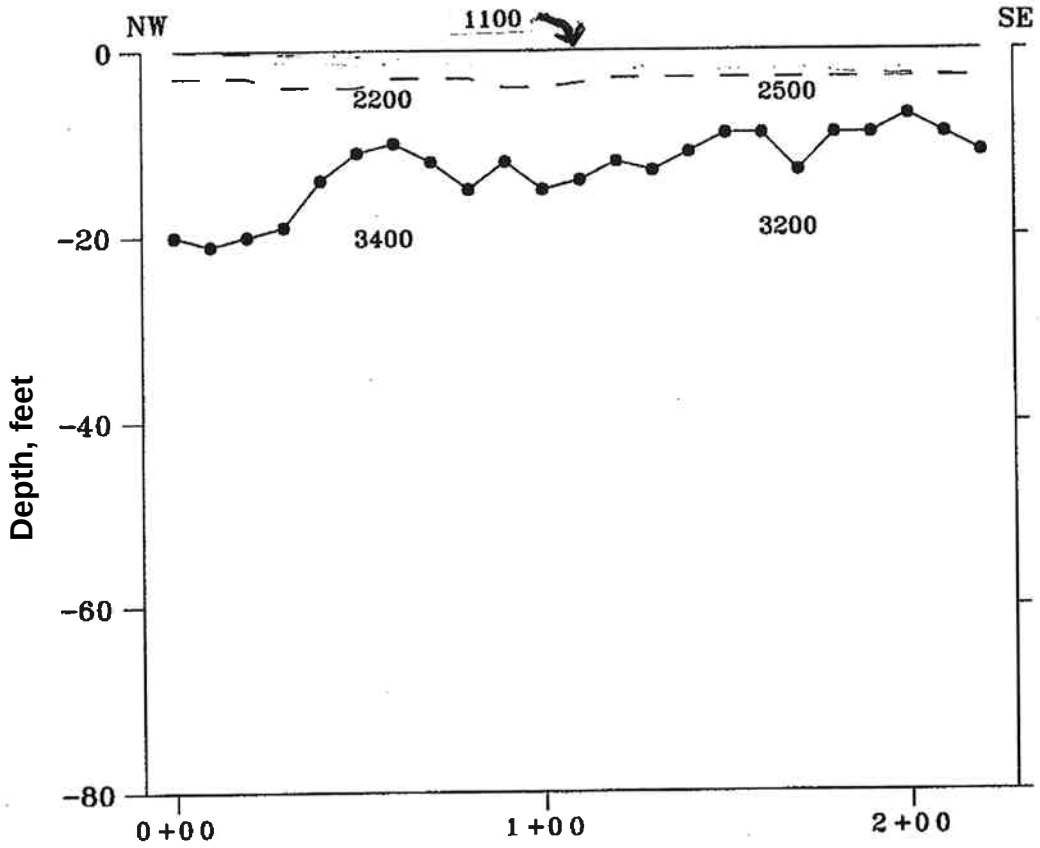
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P25-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-82



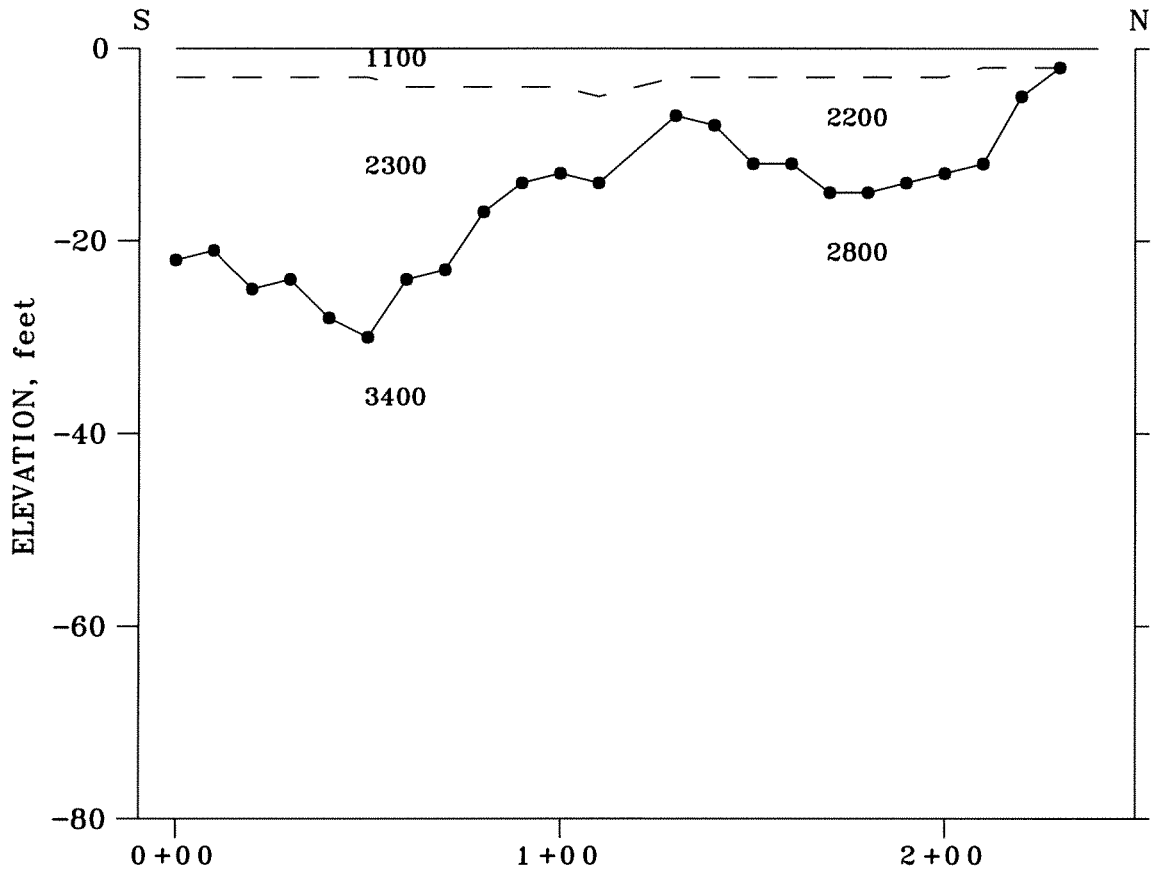
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P26

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-83



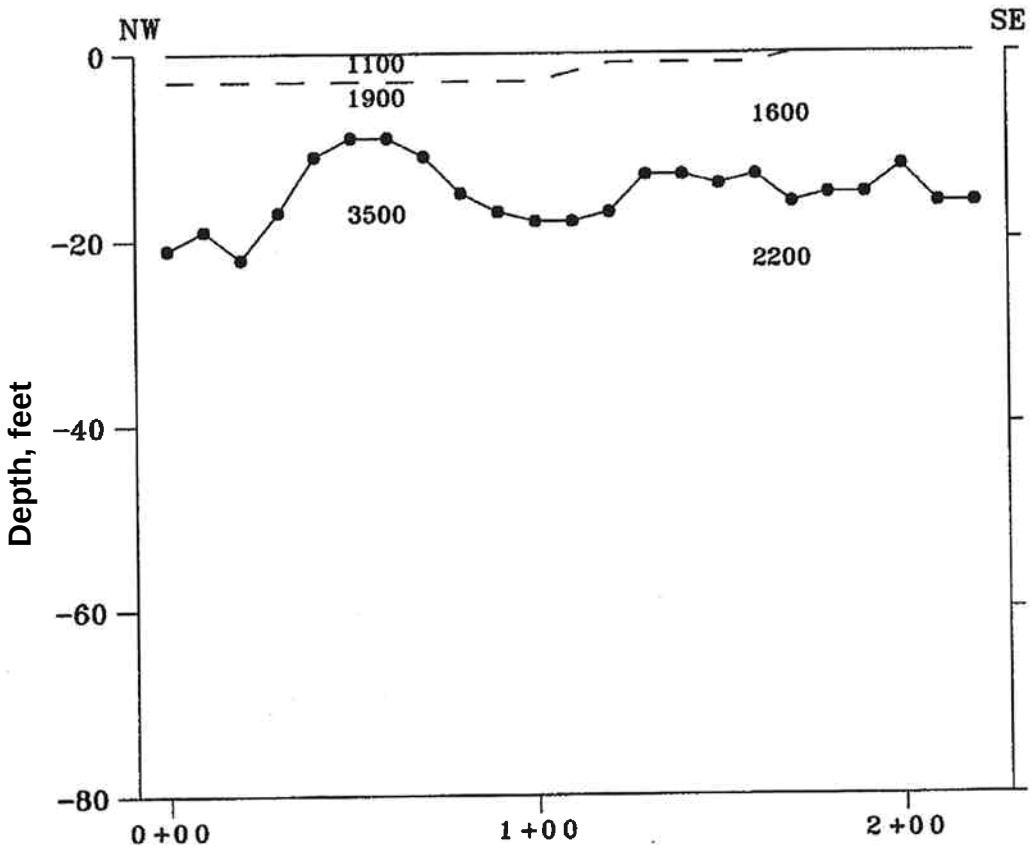
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P26-1

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-84



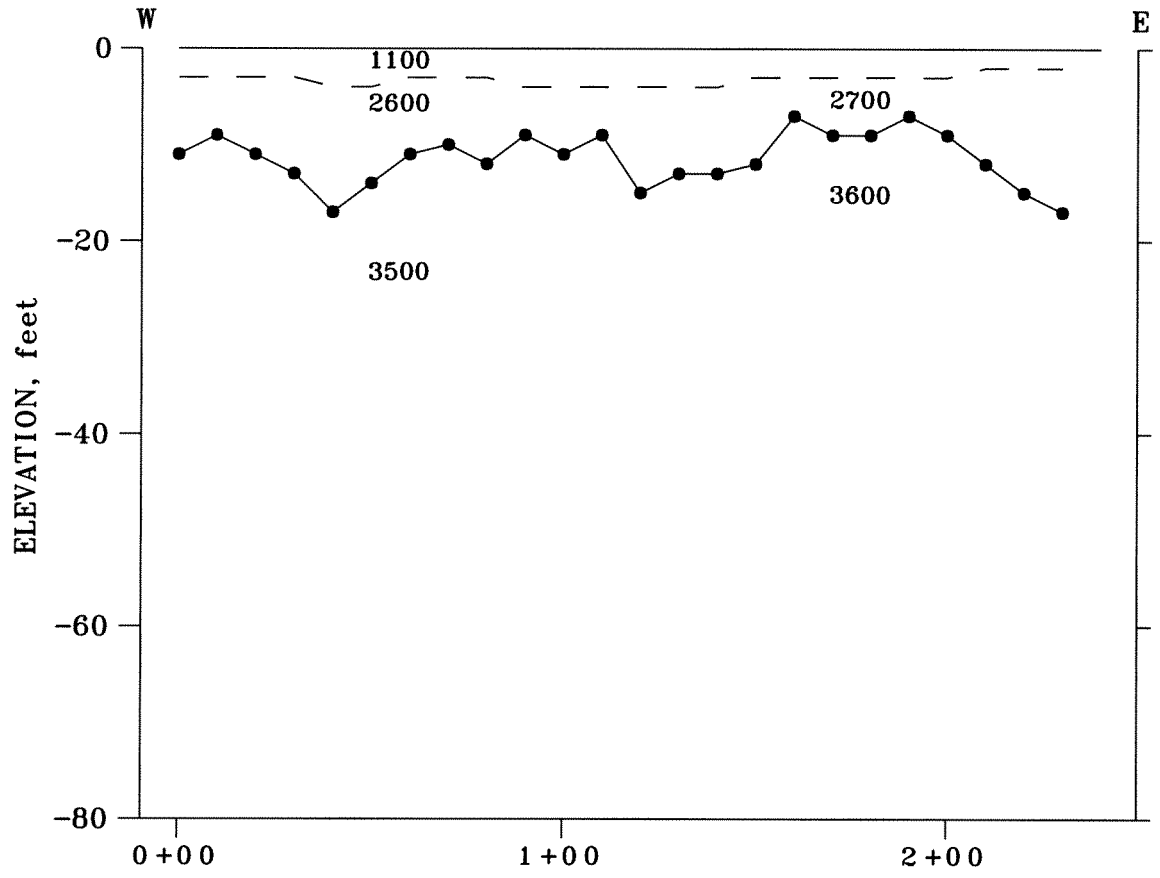
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P27

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-85



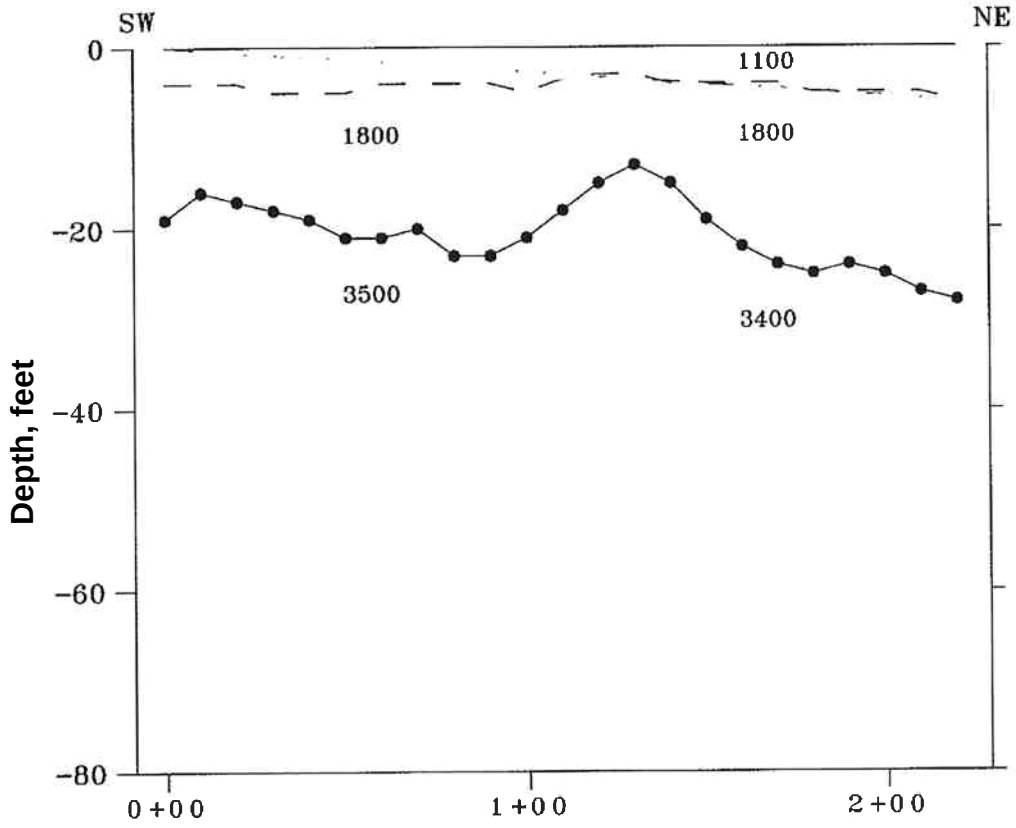
P-wave velocities in feet per second

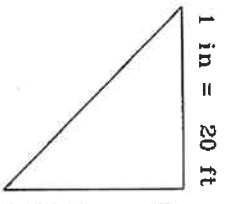
1 in = 20 ft

1 in = 50 ft

RS8-P27-1

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-86

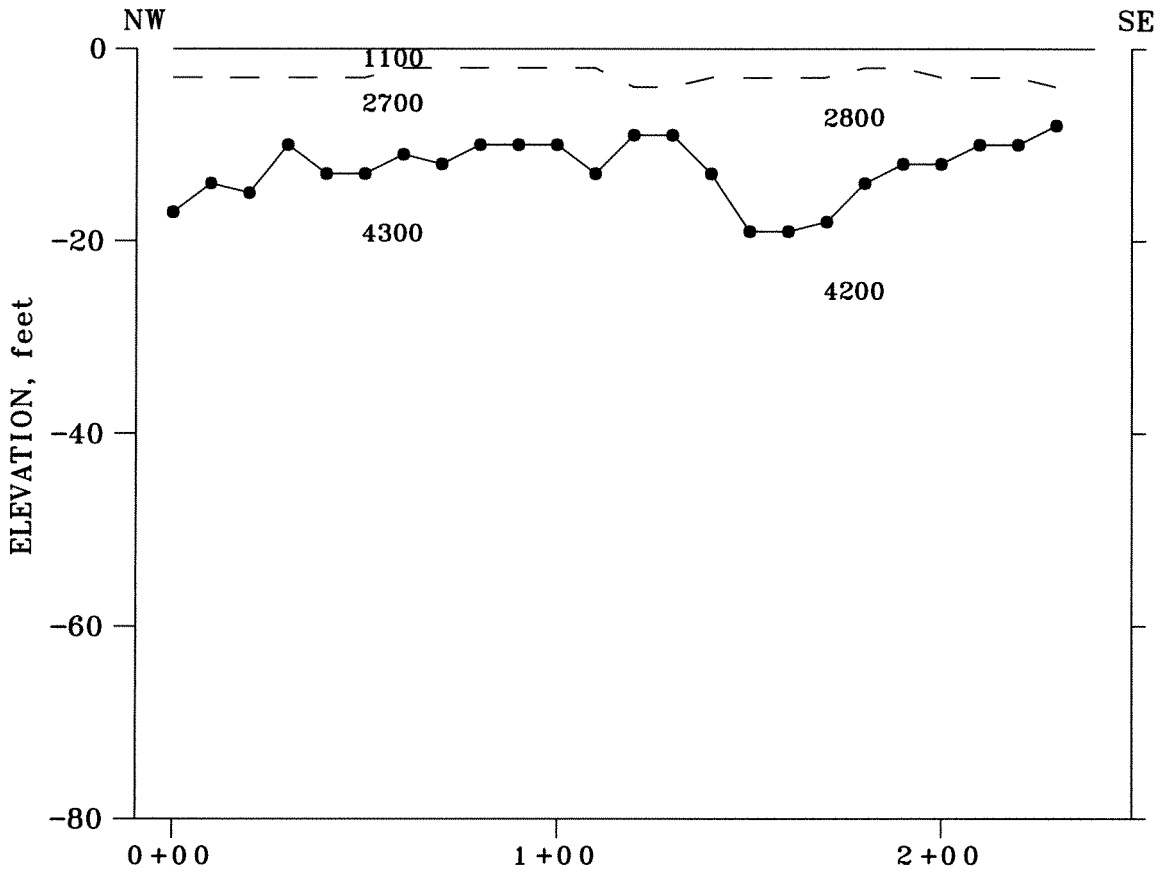




P-wave velocities in feet per second

RS8-P28

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-87



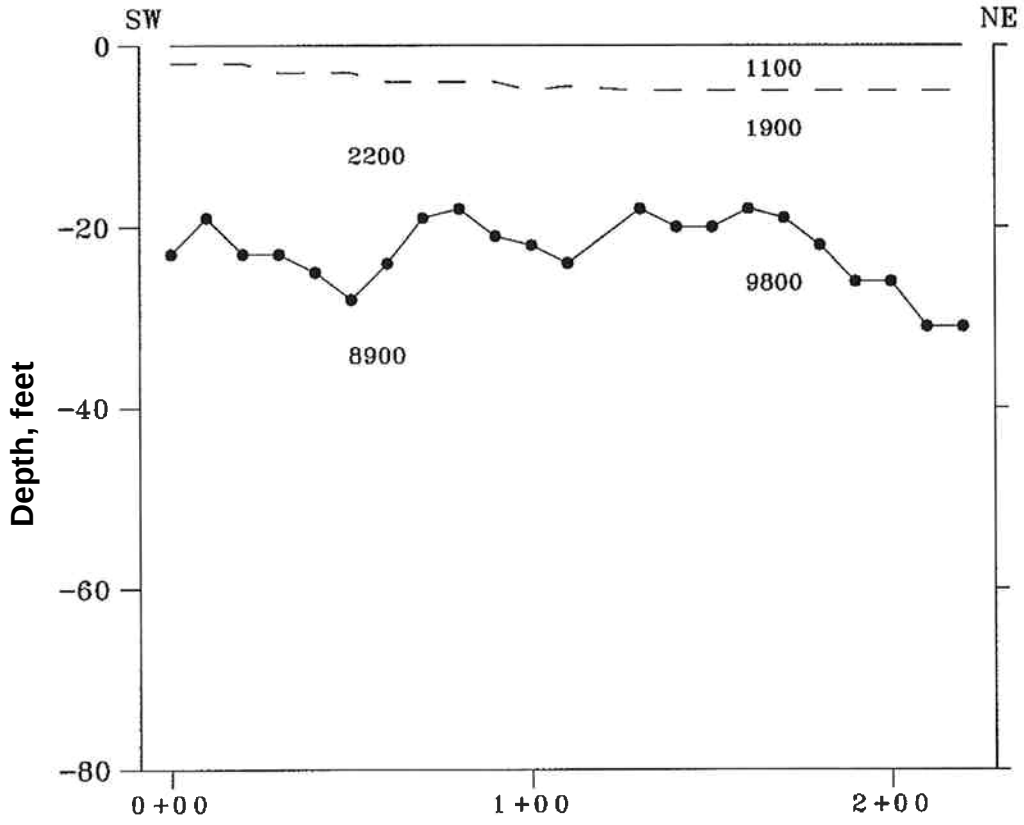
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P28-3

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-88



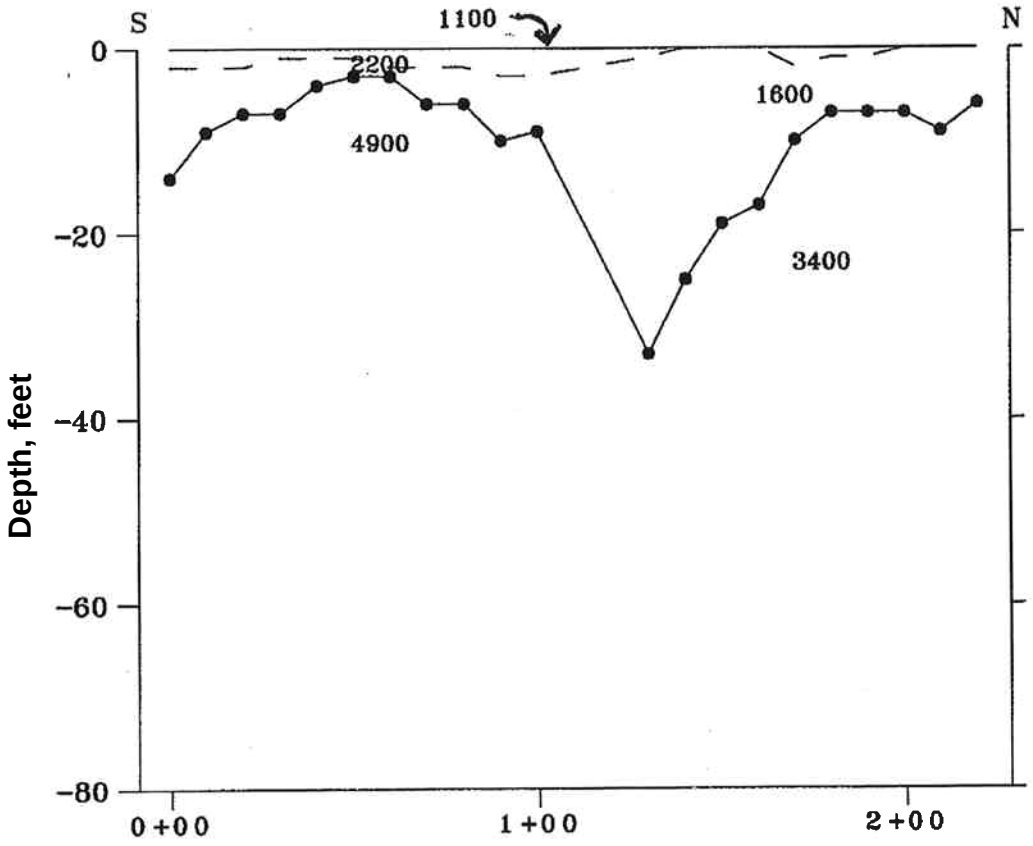
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P30

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-89



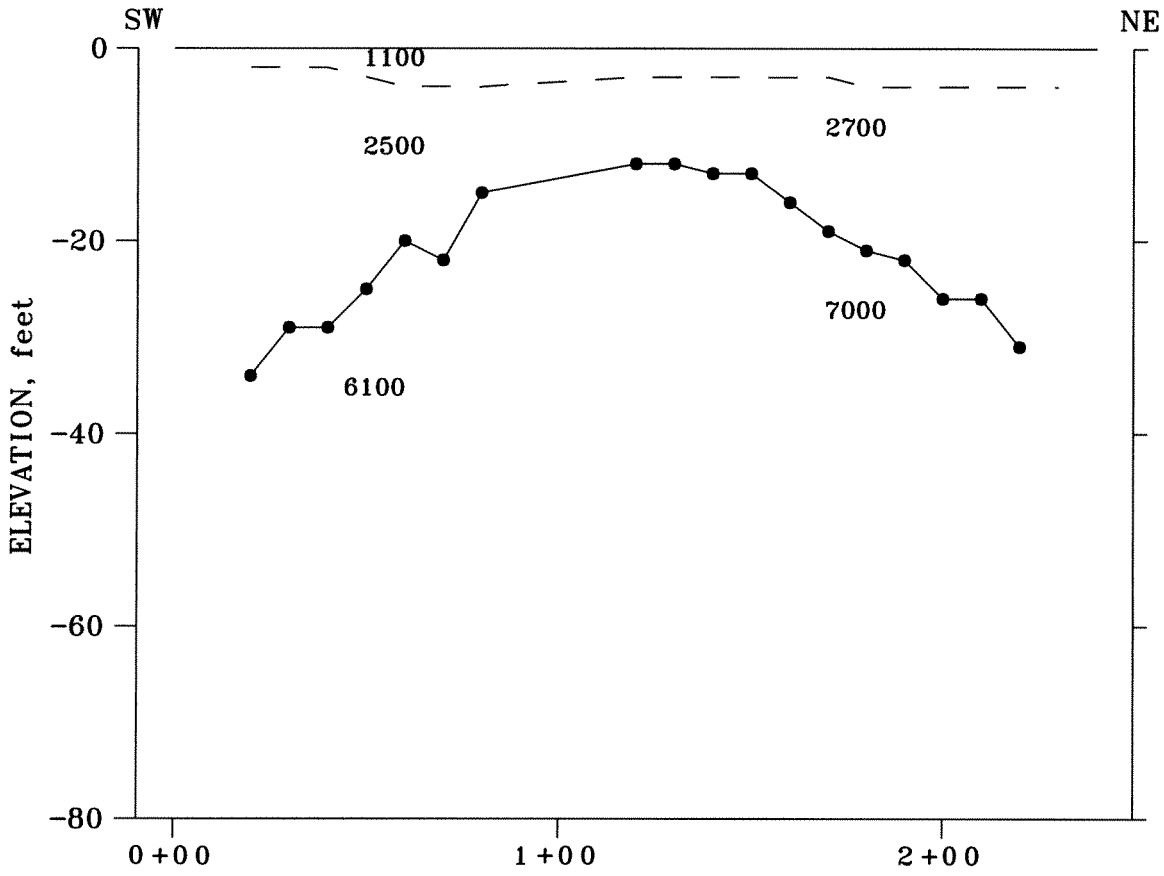
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P31

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-90



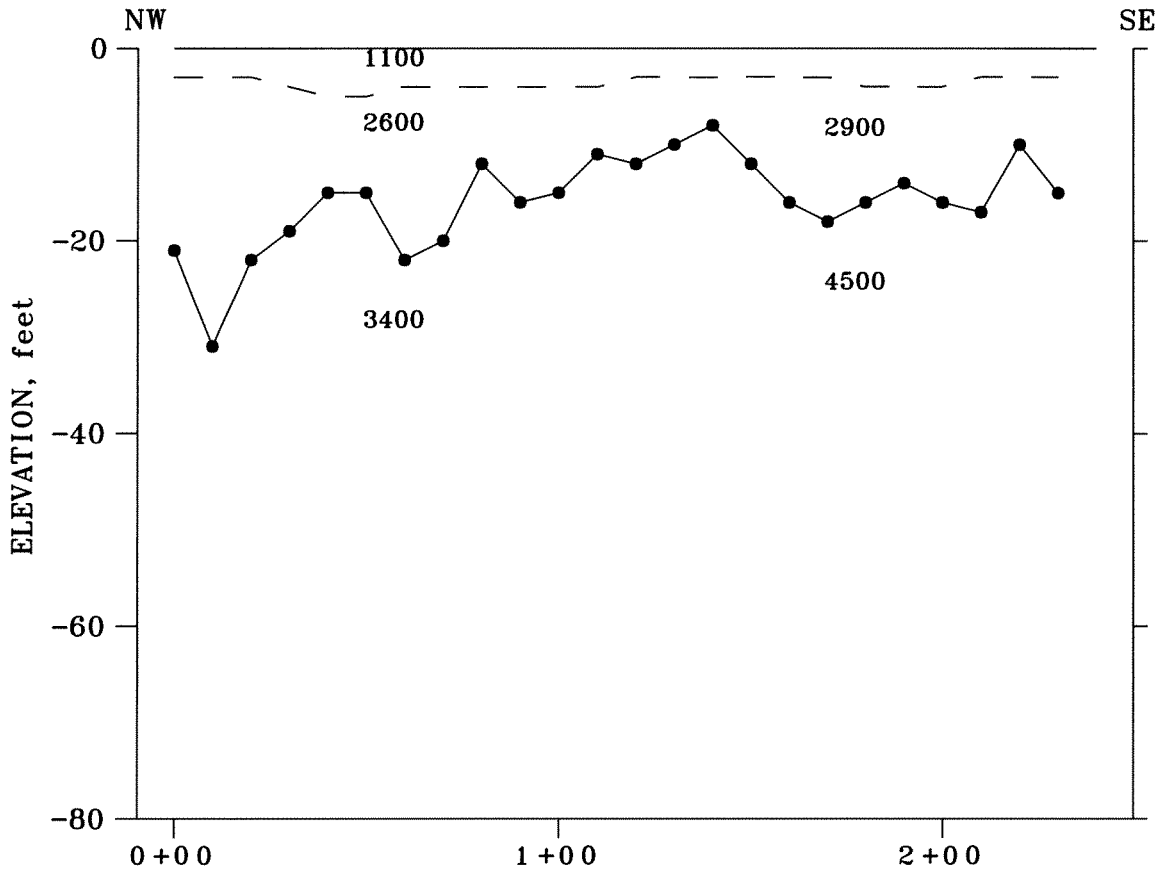
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P31-1

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-91



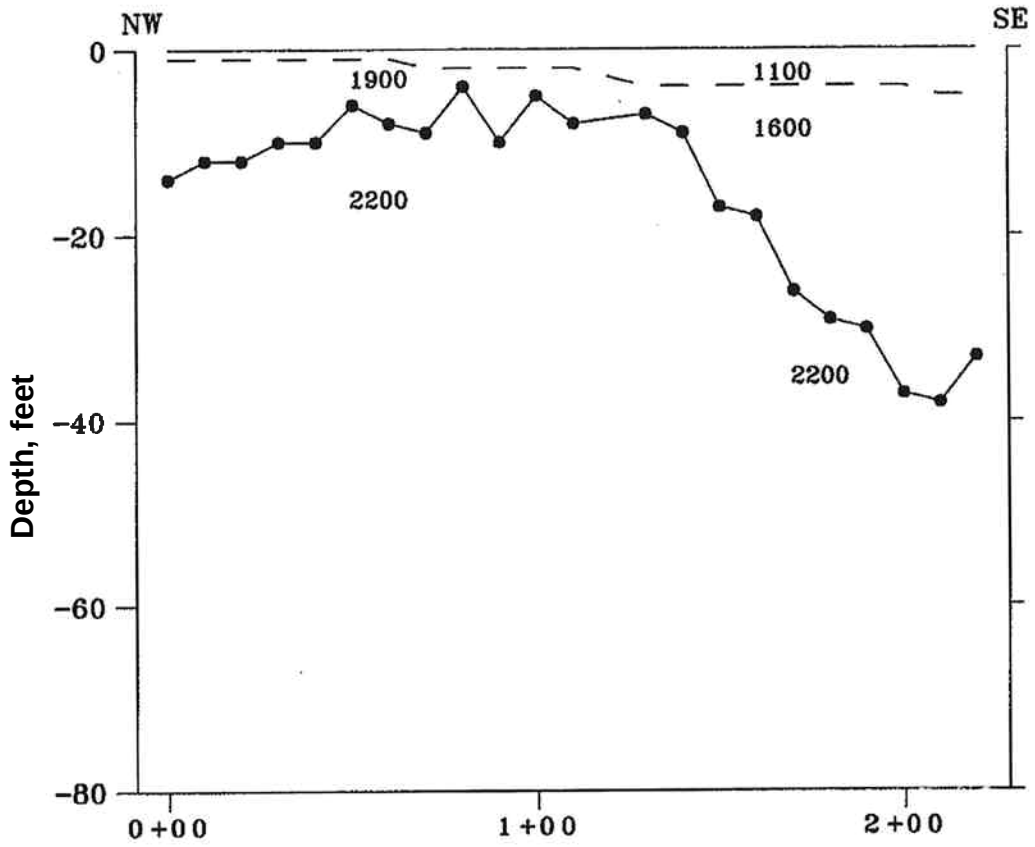
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P32-1

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-92



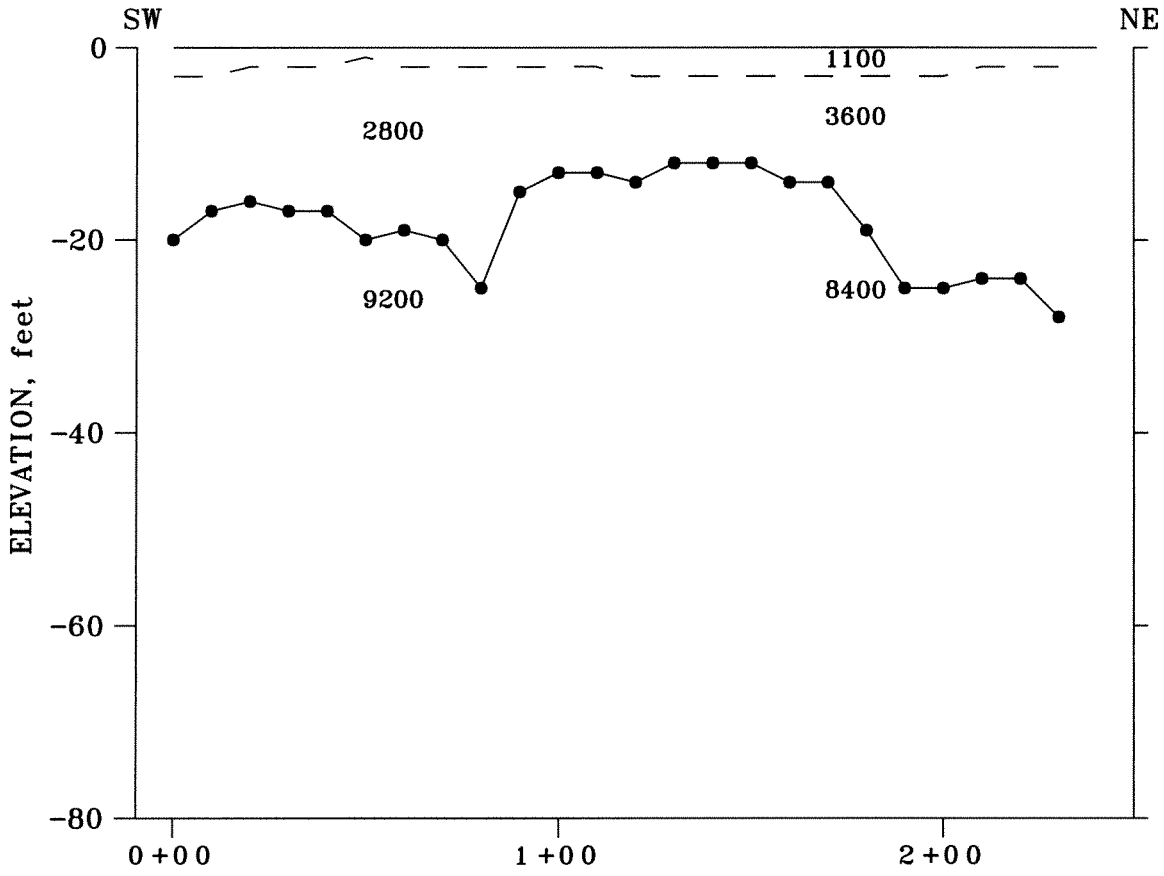
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P33

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-93



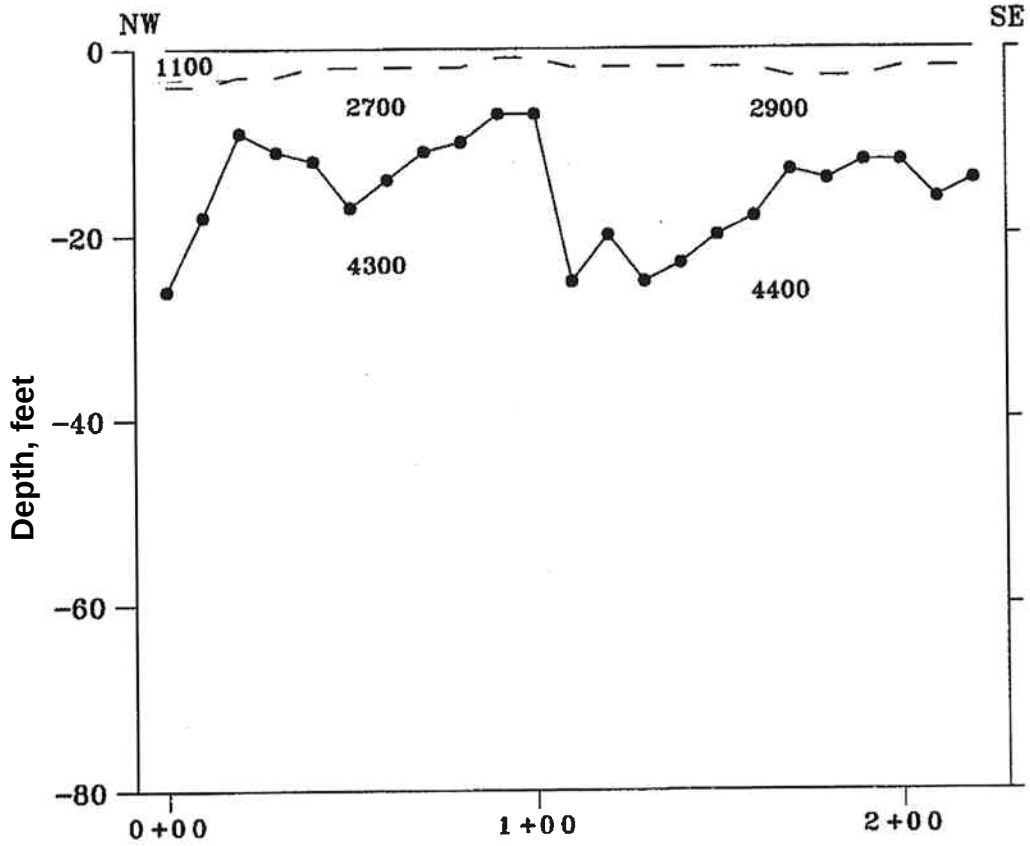
P-wave velocities in feet per second

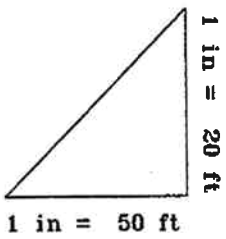
1 in = 20 ft

1 in = 50 ft

RS8-P33-1

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-94

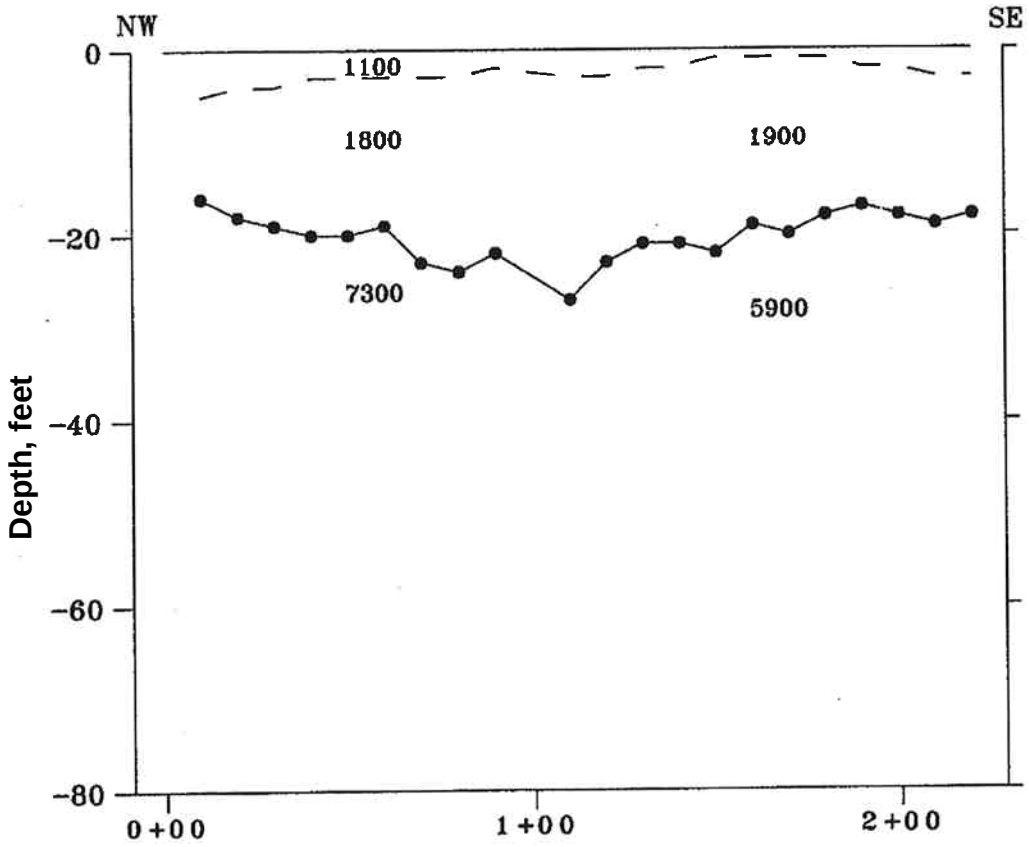




P-wave velocities in feet per second

RS8-P34

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-95



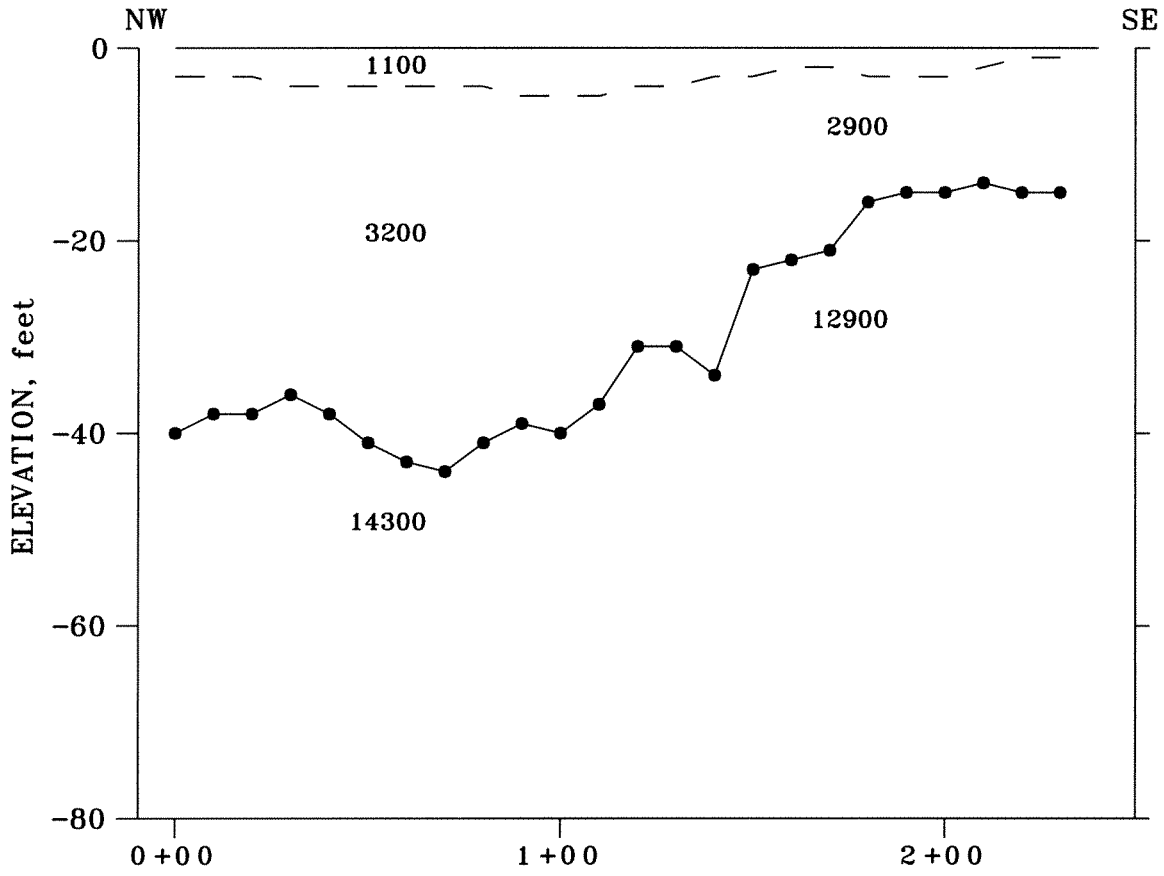
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P35

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-96



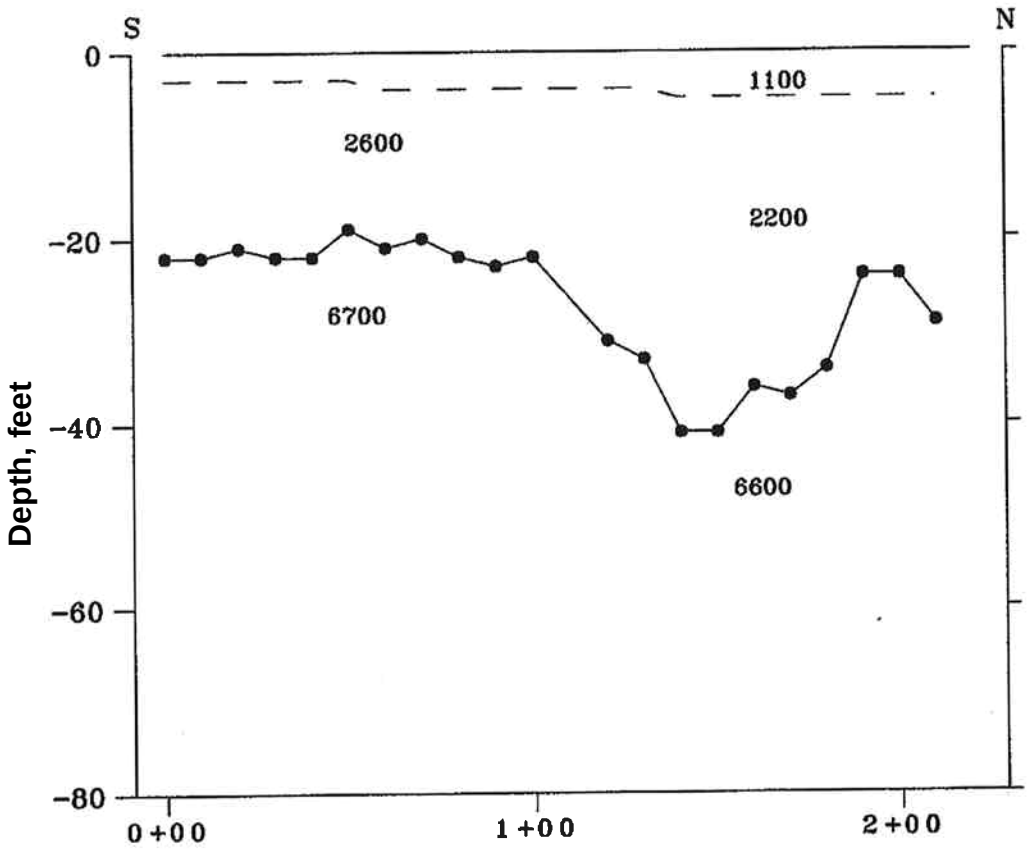
P-wave velocities in feet per second

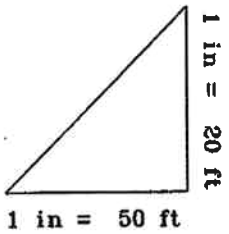
1 in = 20 ft

1 in = 50 ft

RS8-P35-1

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-97

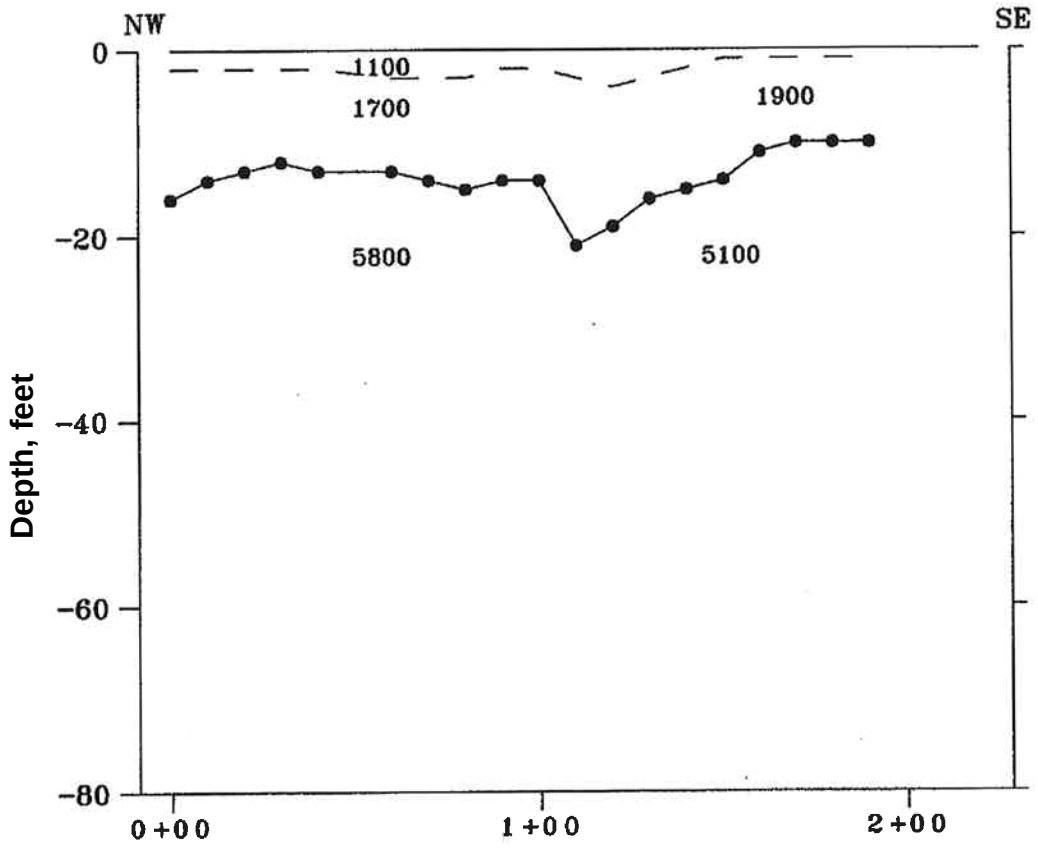




P-wave velocities in feet per second

RS8-P36

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-98



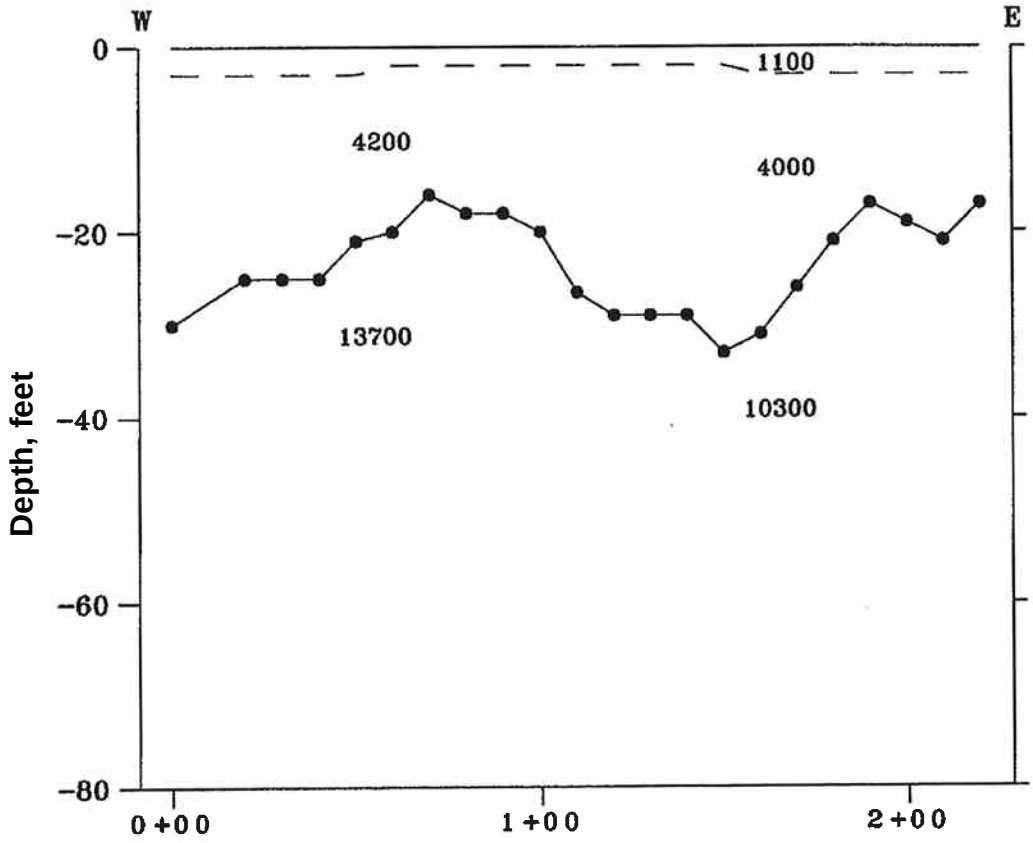
P-wave velocities in feet per second

1 in = 20 ft

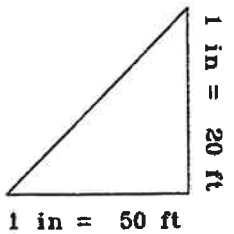
1 in = 50 ft

RS8-P37-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-99

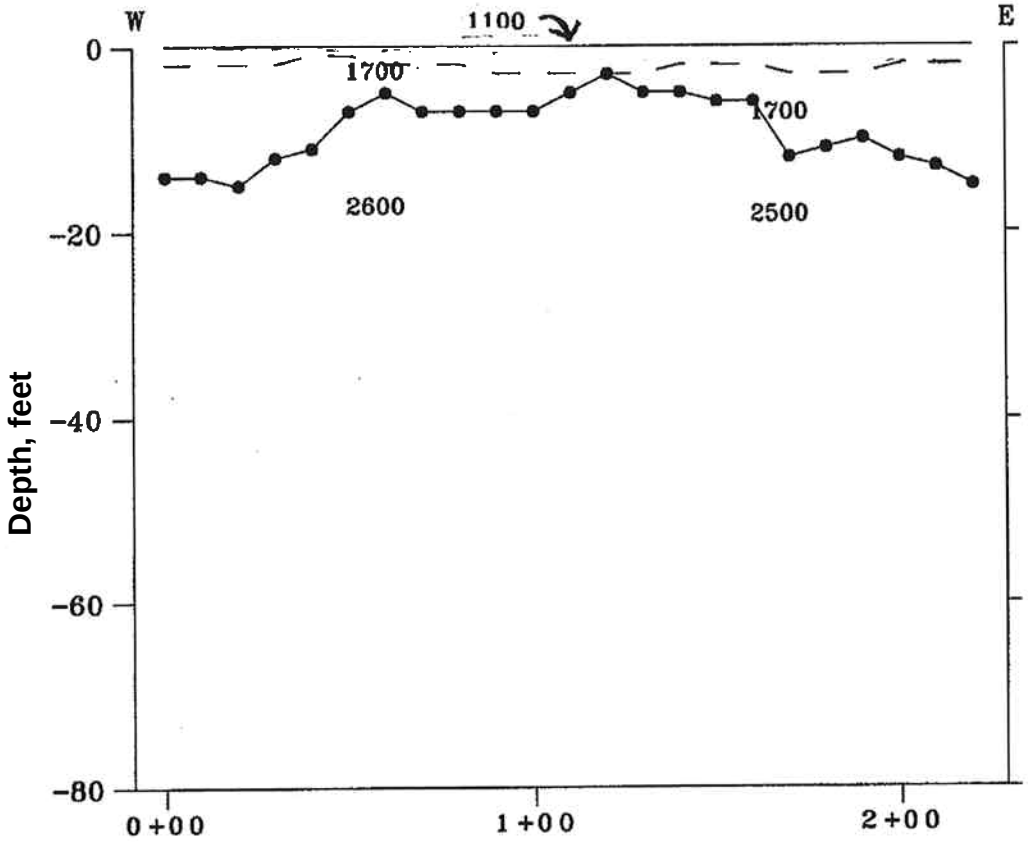


P-wave velocities in feet per second



RS8-P39

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-100



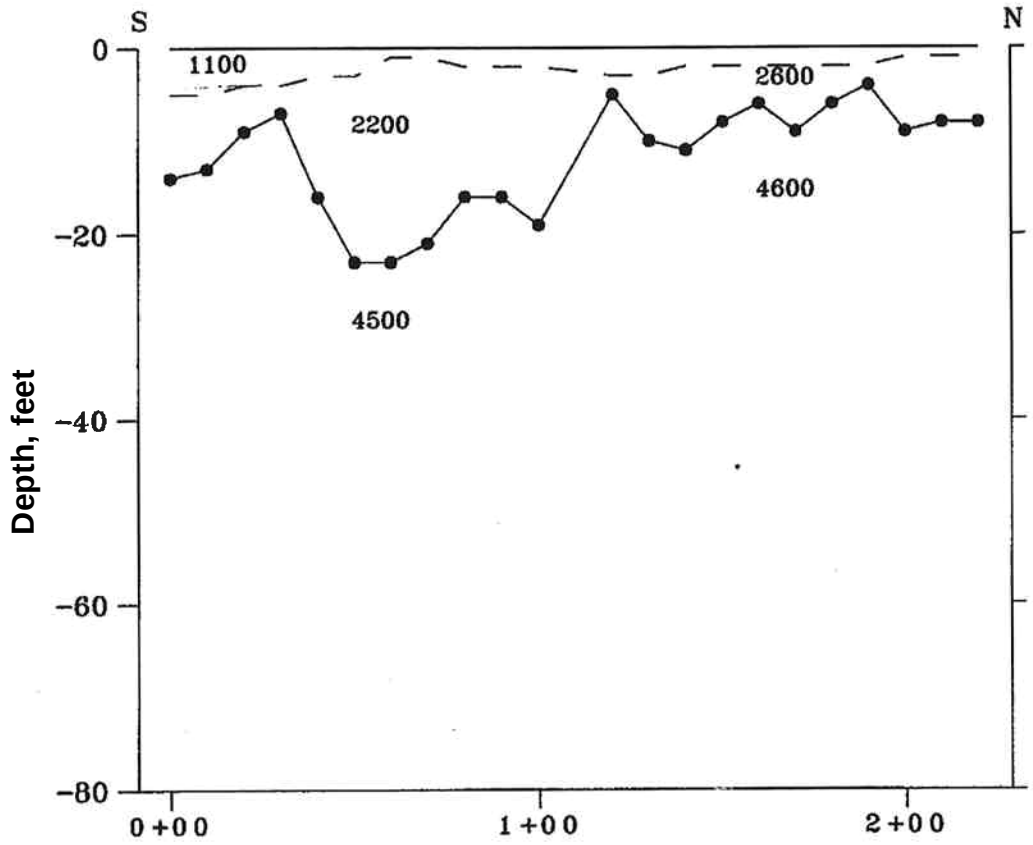
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P41

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-101



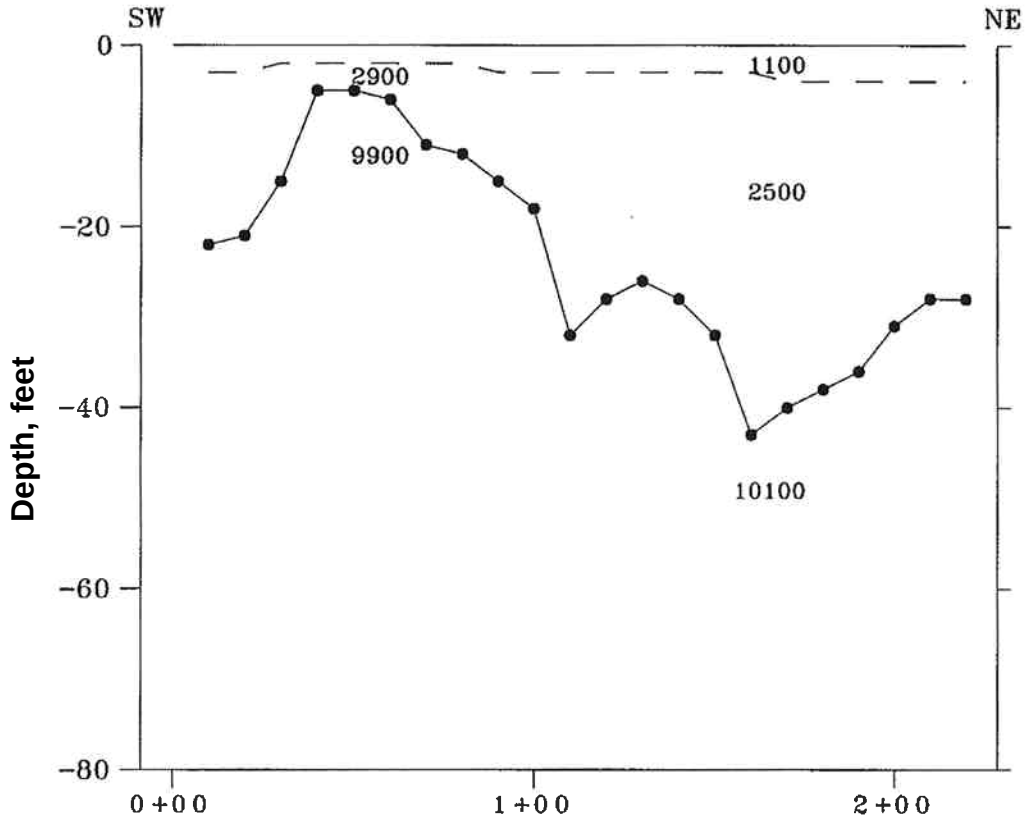
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P42

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-102



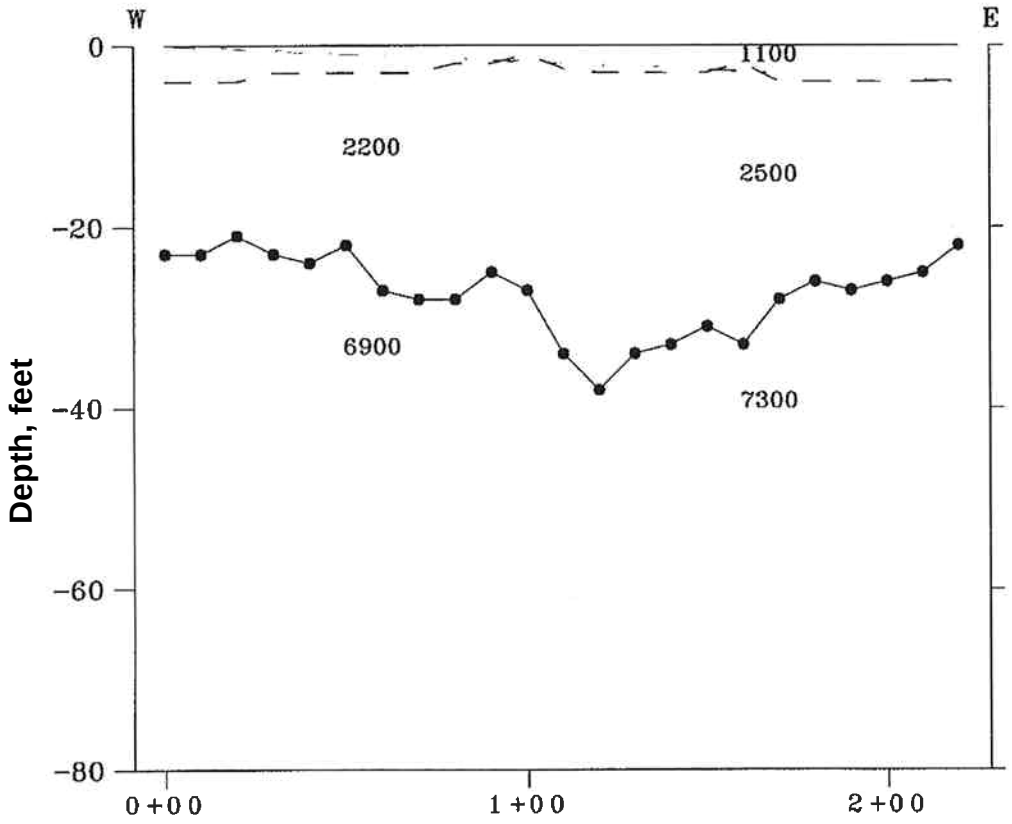
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P43-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-103



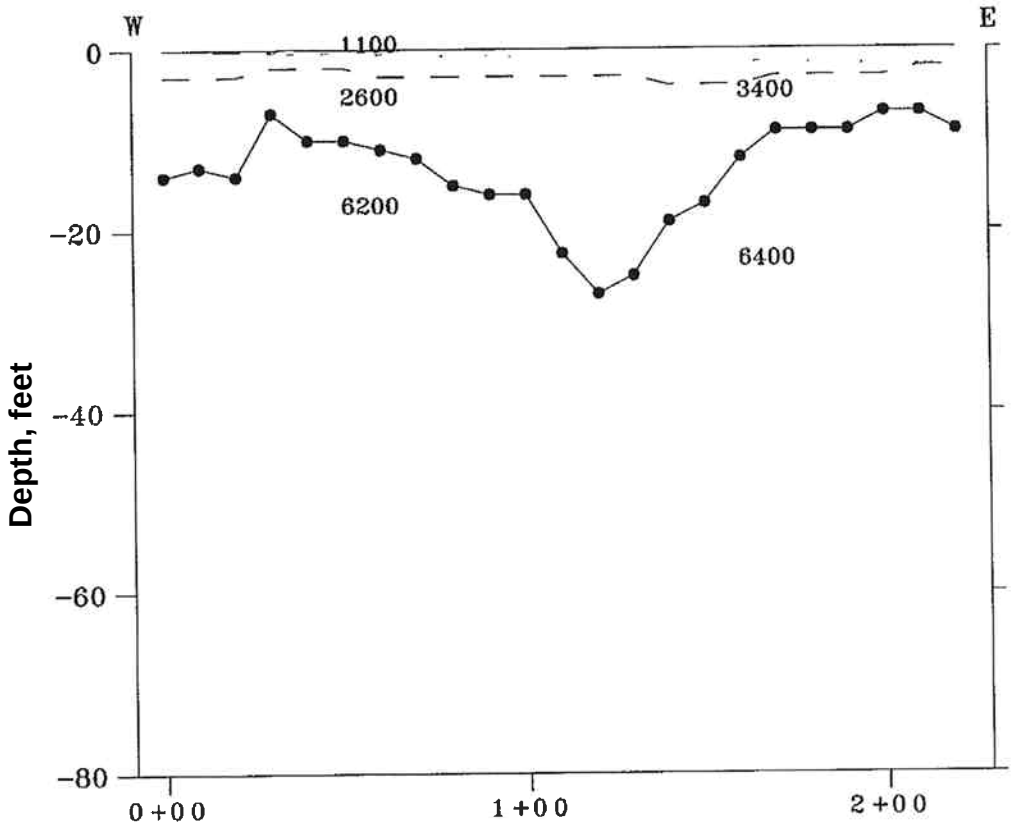
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P44

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-104



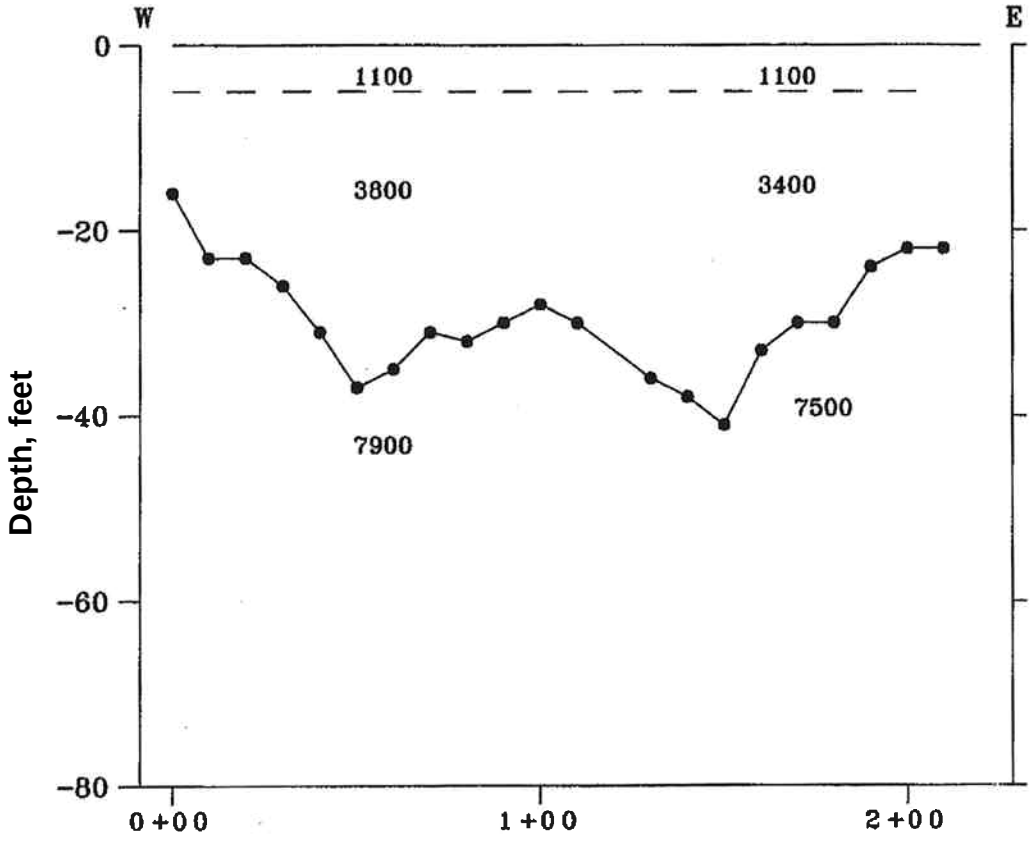
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P45

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-105



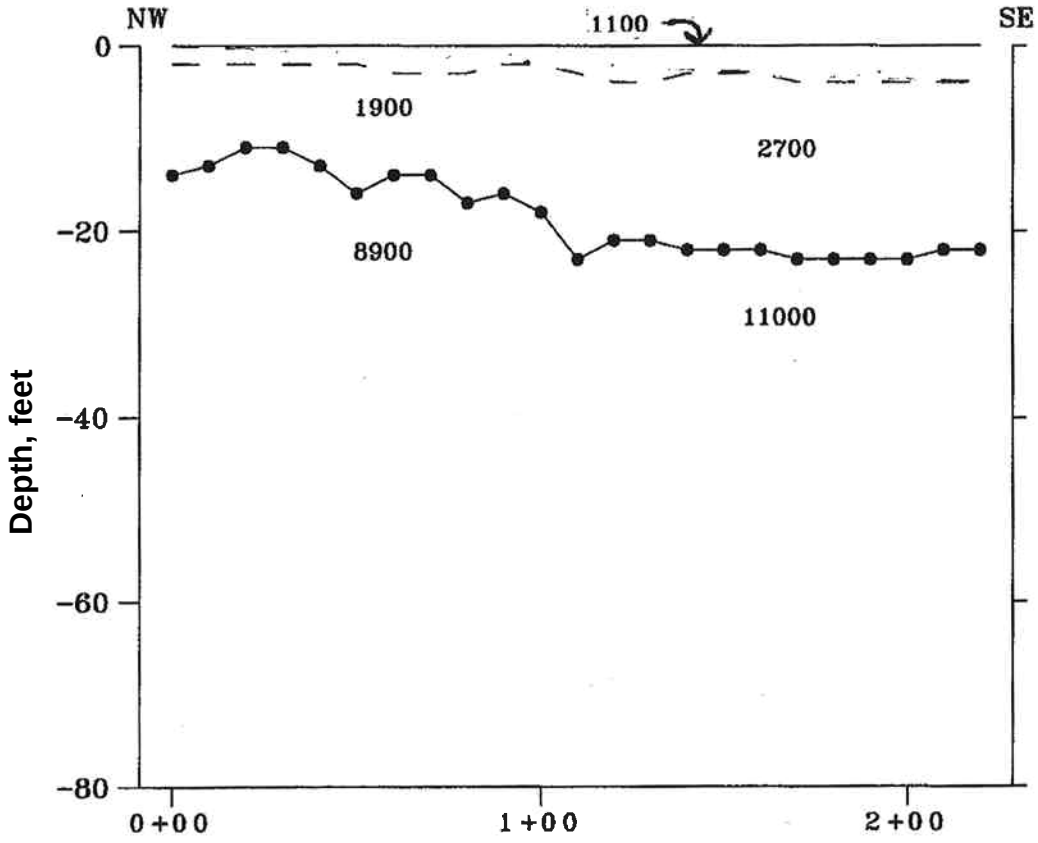
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P47

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-106



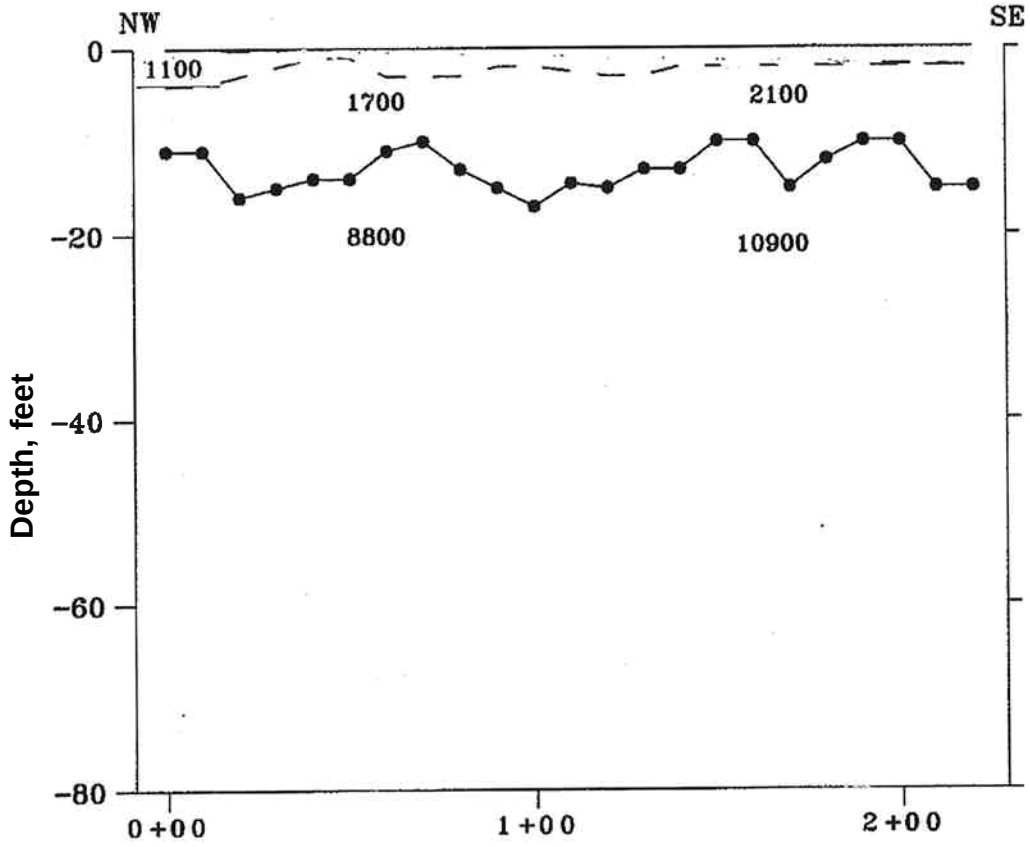
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P49

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-107



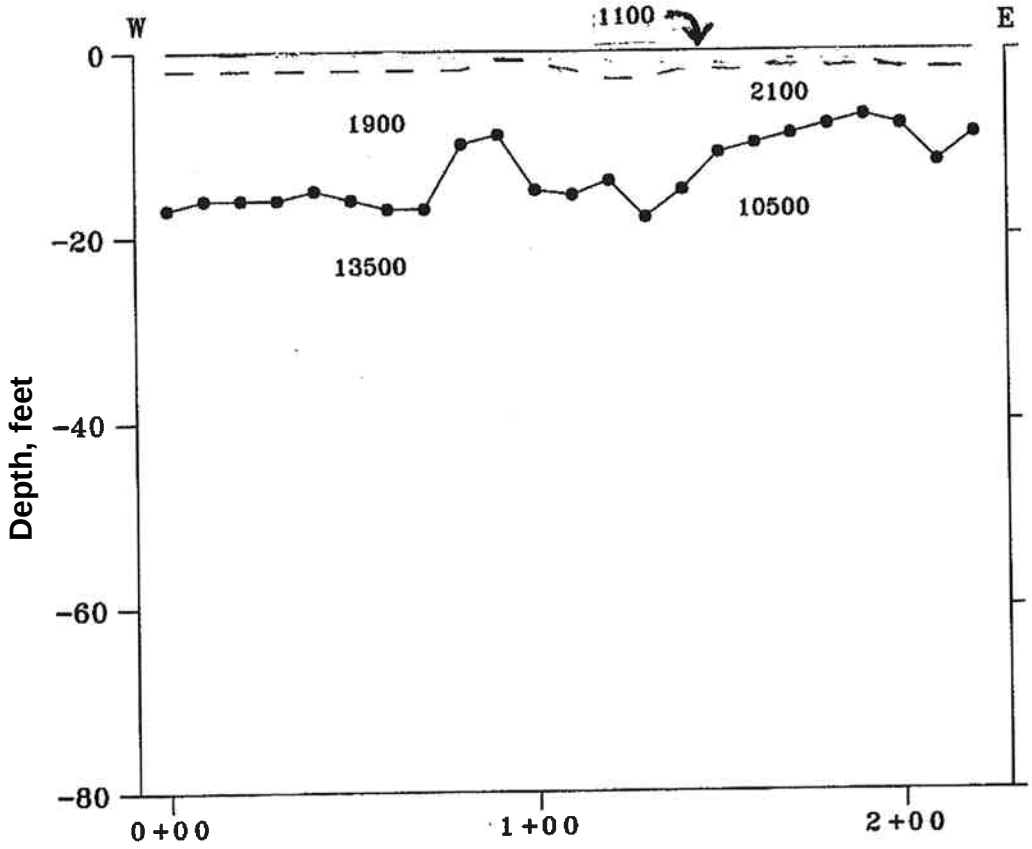
P-wave velocities in feet per second

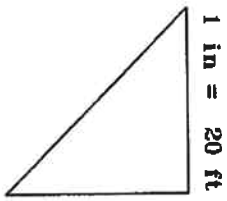
1 in = 20 ft

1 in = 50 ft

RS8-P50

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-108

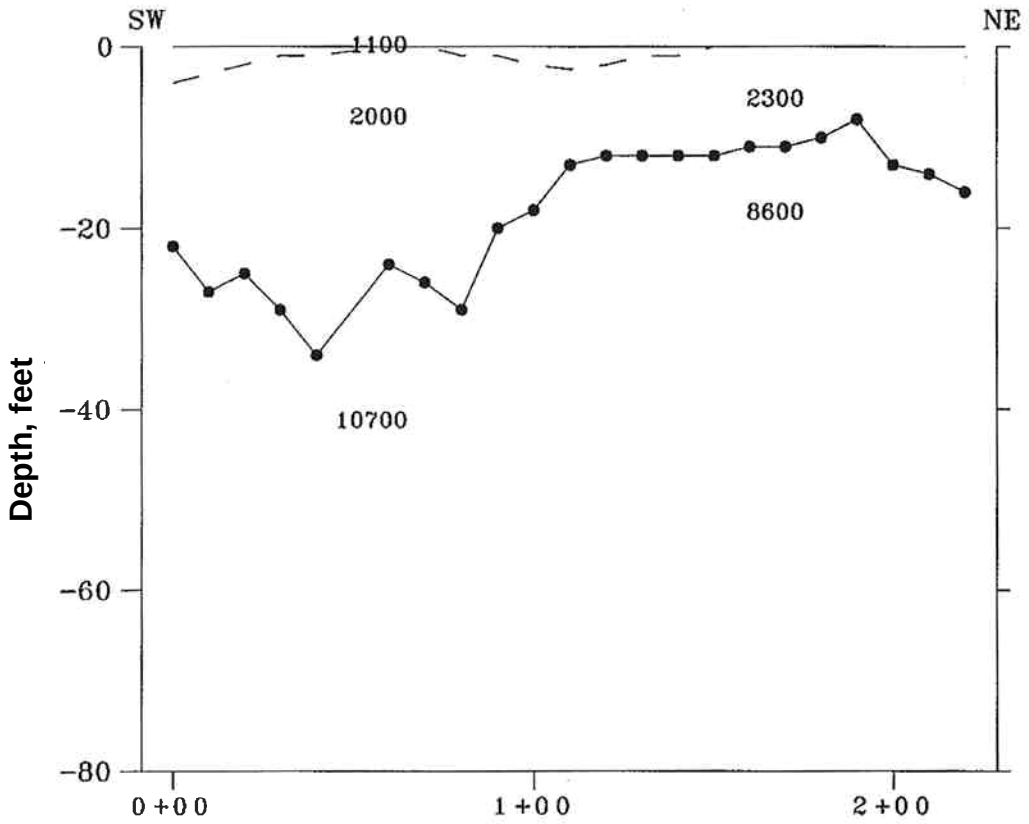




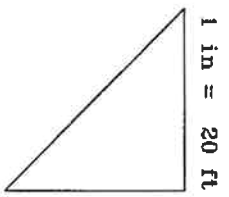
P-wave velocities in feet per second

RS8-P51

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-109

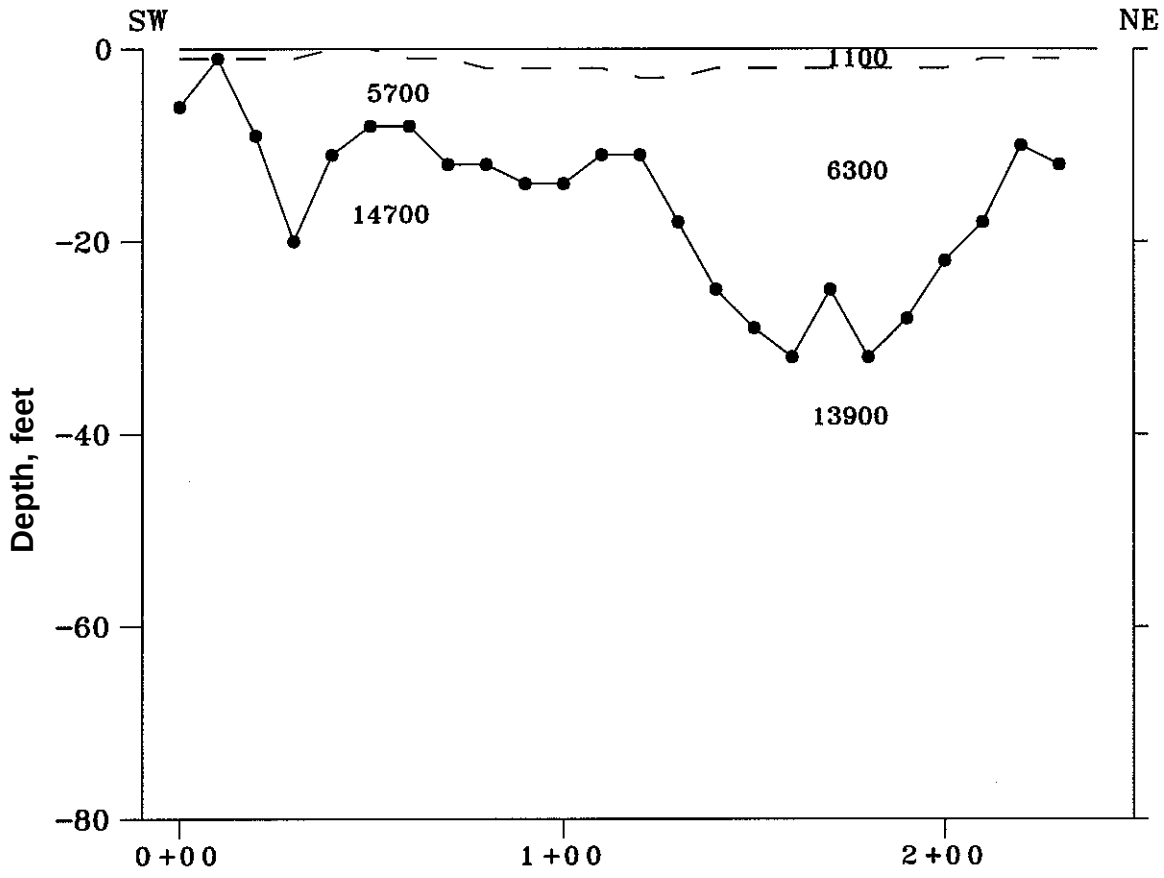


P-wave velocities in feet per second



RS8-P53-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-110



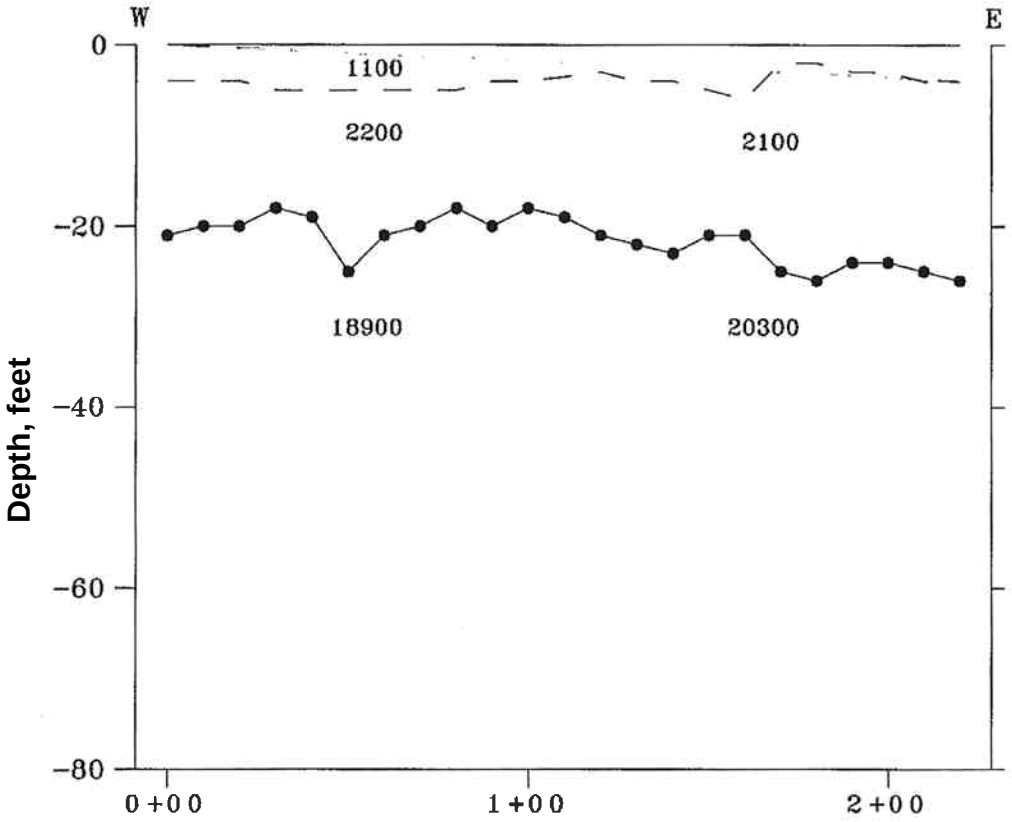
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P53-2

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-111



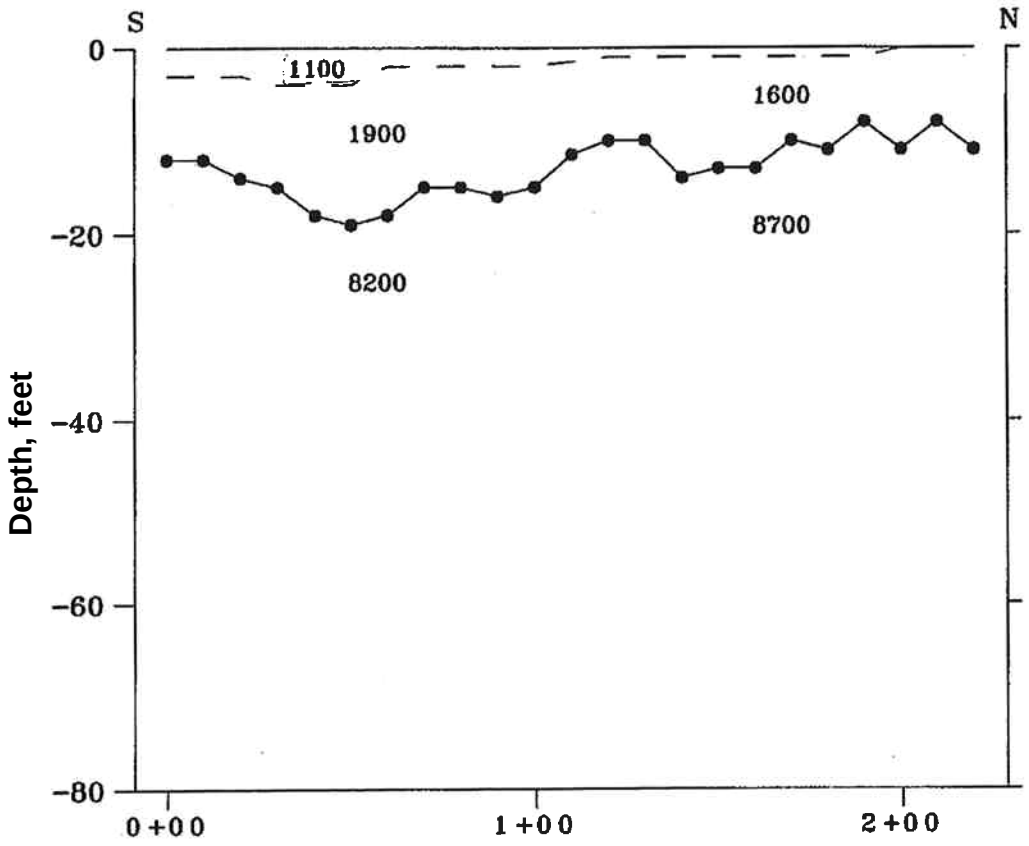
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P54

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-112



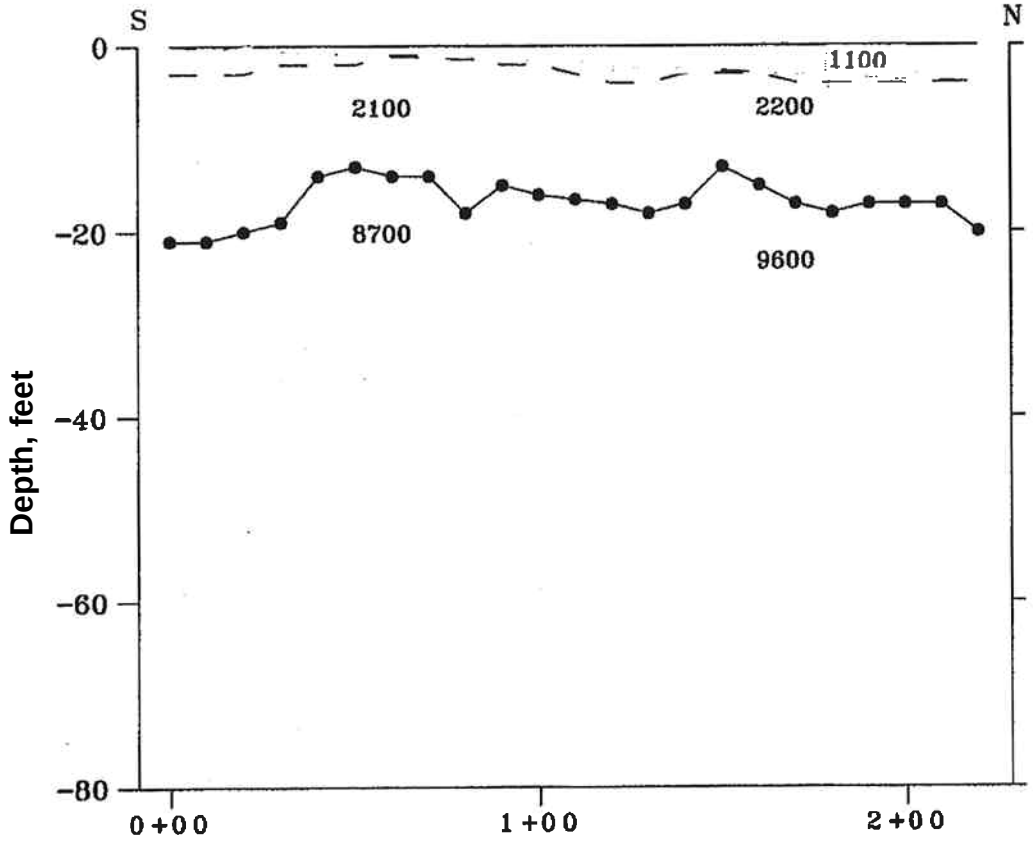
P-wave velocities in feet per second

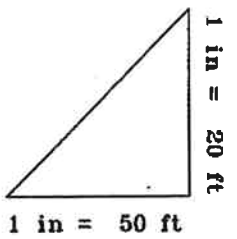
1 in = 20 ft

1 in = 50 ft

RS8-P57-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-113

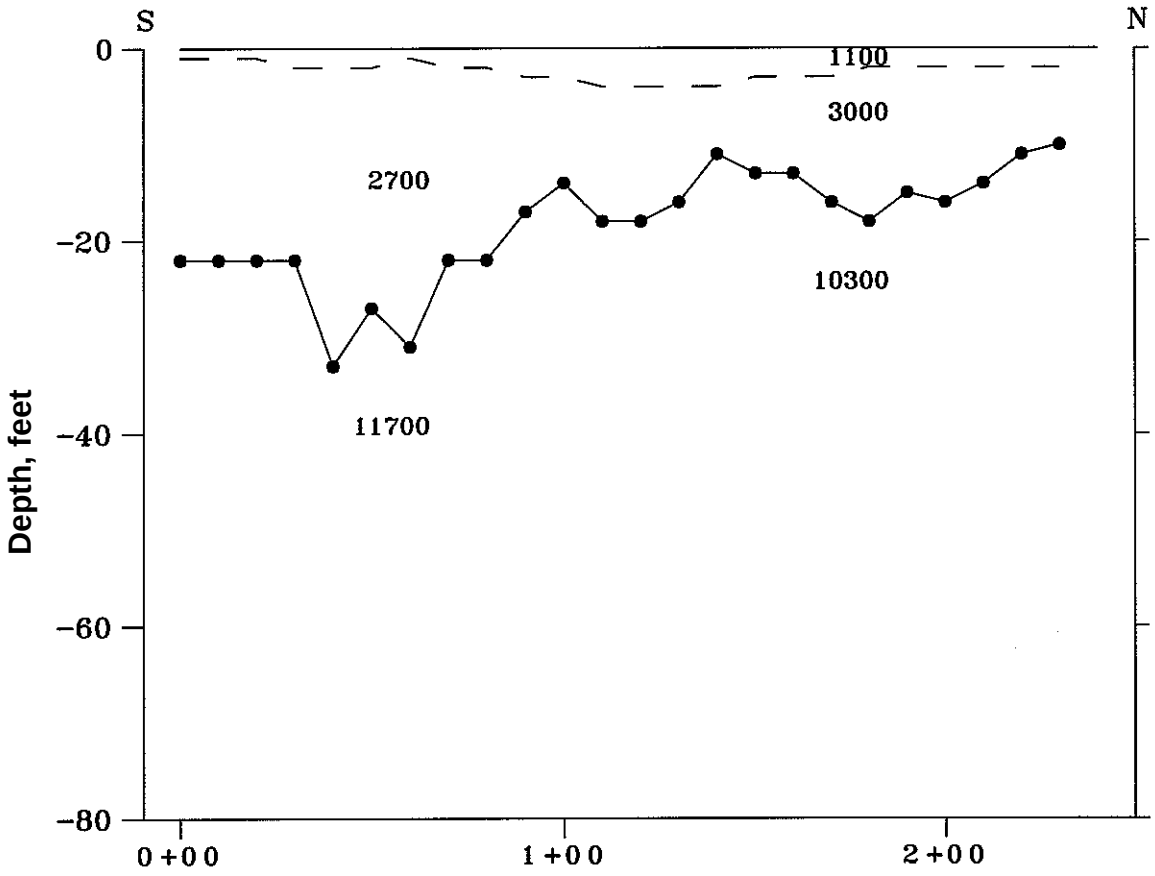




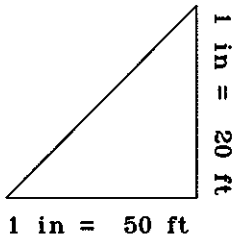
P-wave velocities in feet per second

RS8-P58

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-114

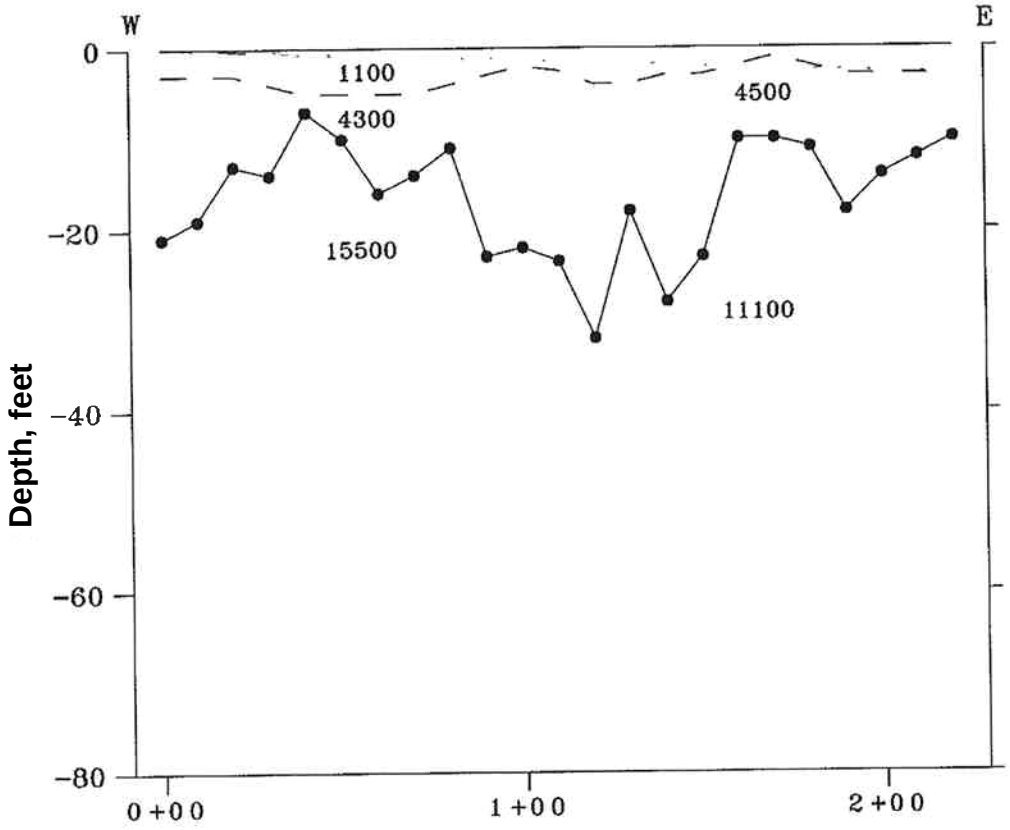


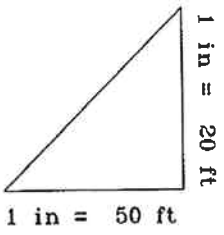
P-wave velocities in feet per second



RS8-P58-2

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-115

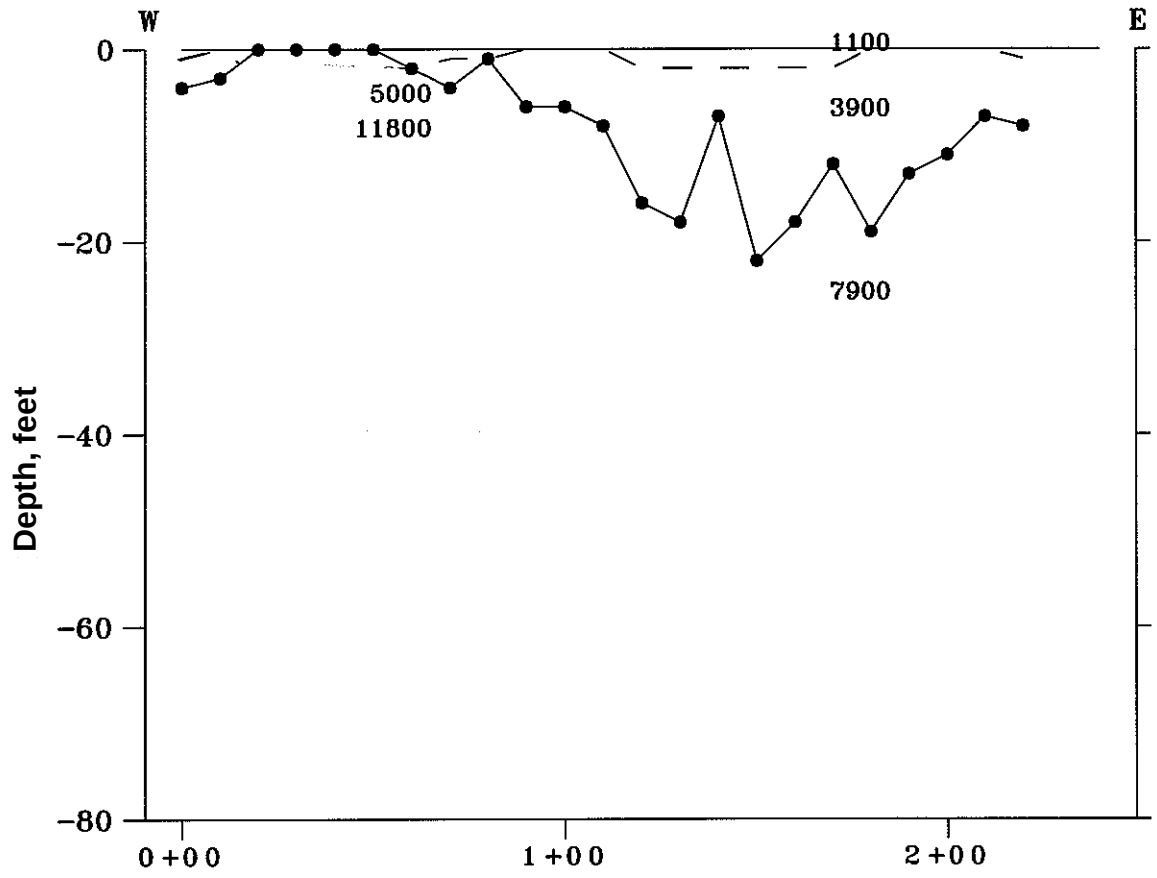




P-wave velocities in feet per second

RS8-P61

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-116



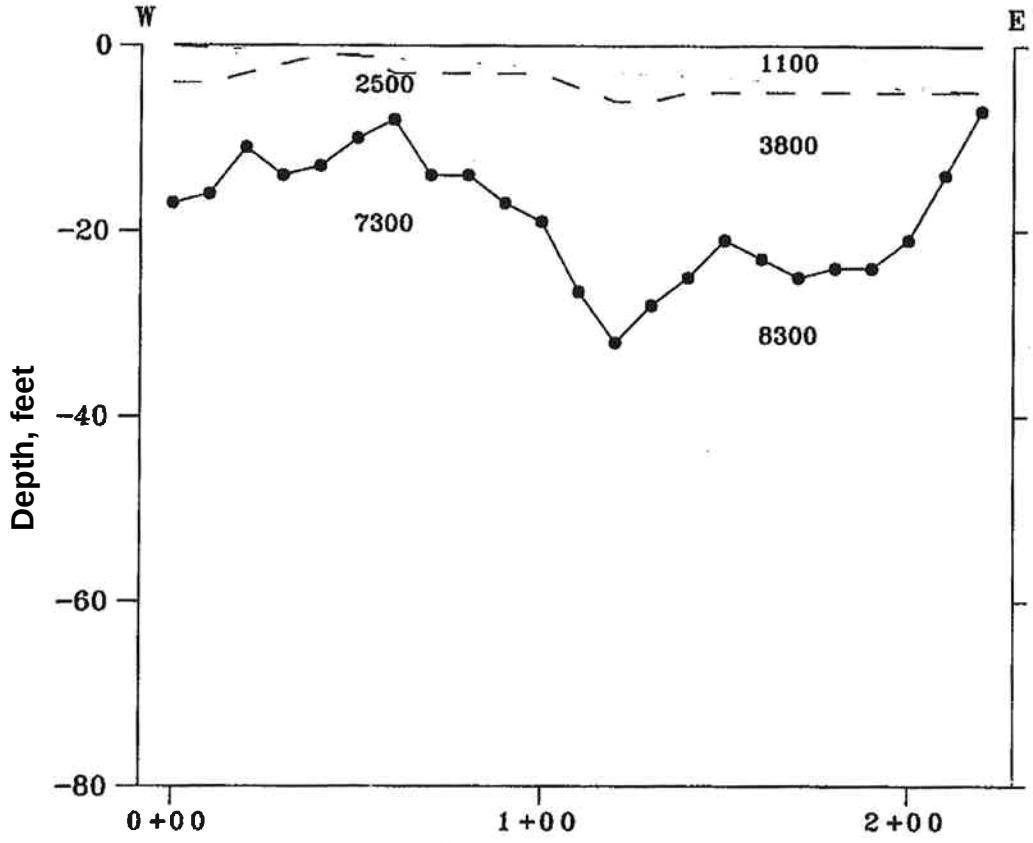
P-wave velocities in feet per second

1 in = 20 ft

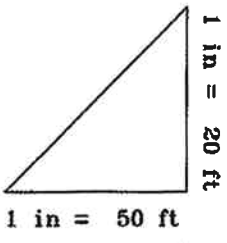
1 in = 50 ft

RS8-P62-1

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-117

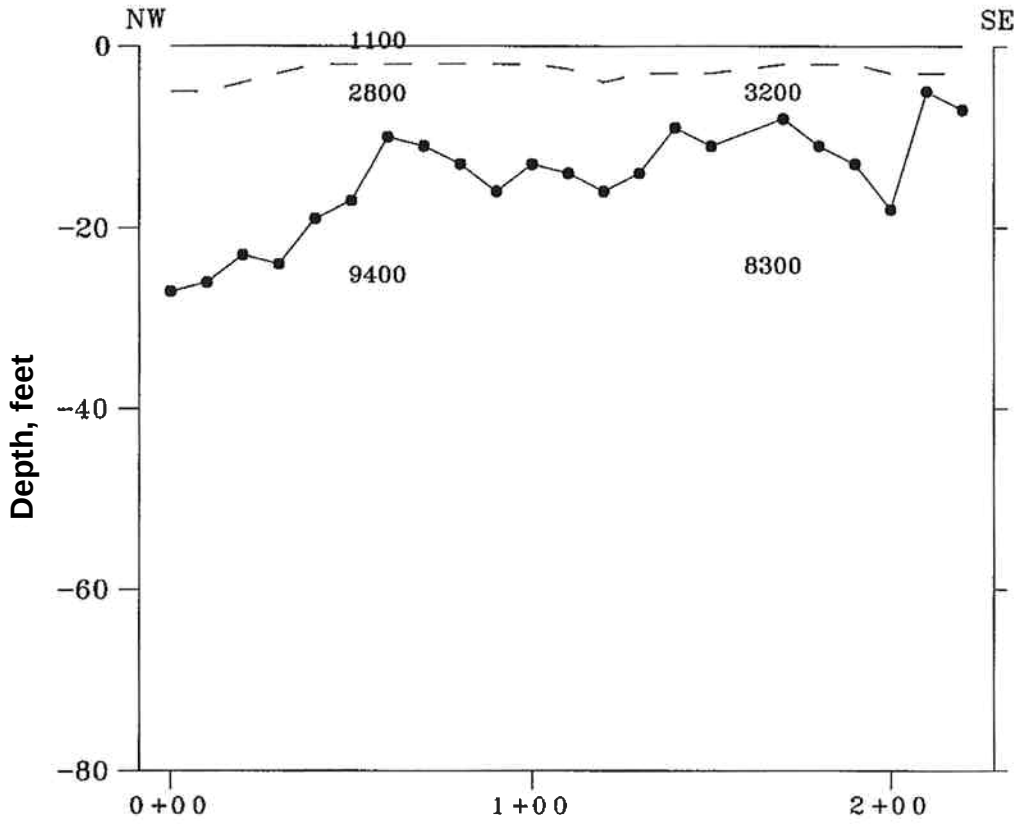


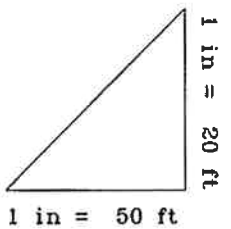
P-wave velocities in feet per second



RS8-P63

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-118

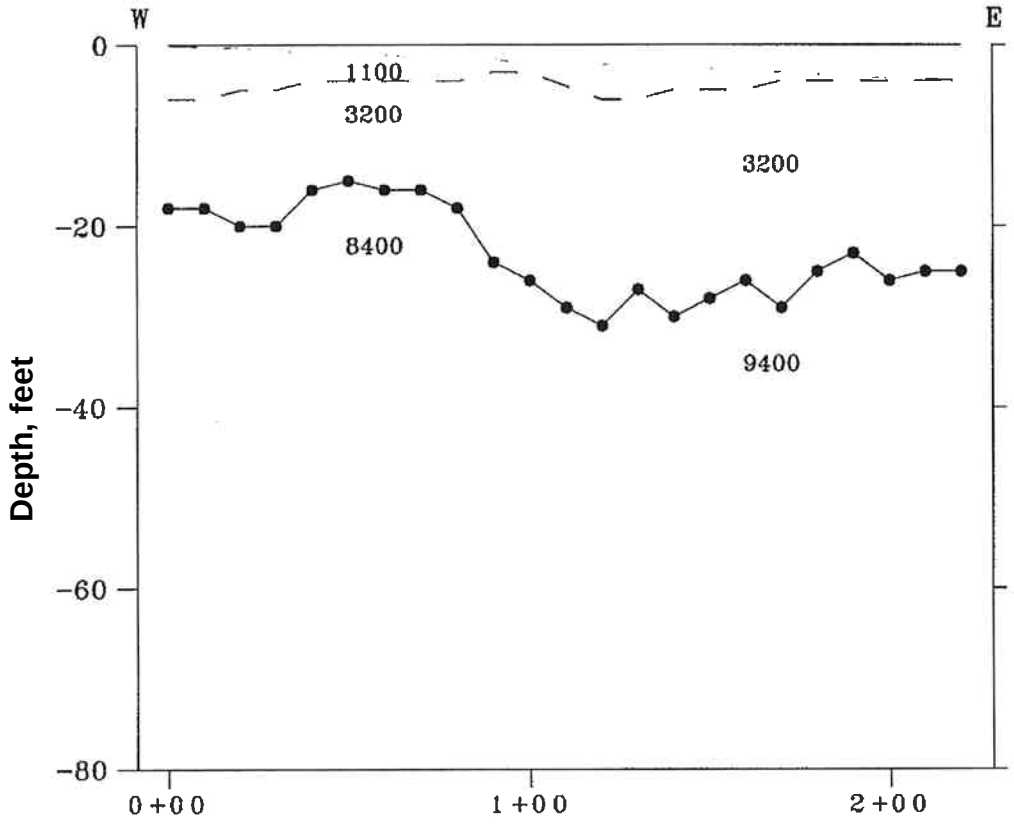




P-wave velocities in feet per second

RS8-P65-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-119



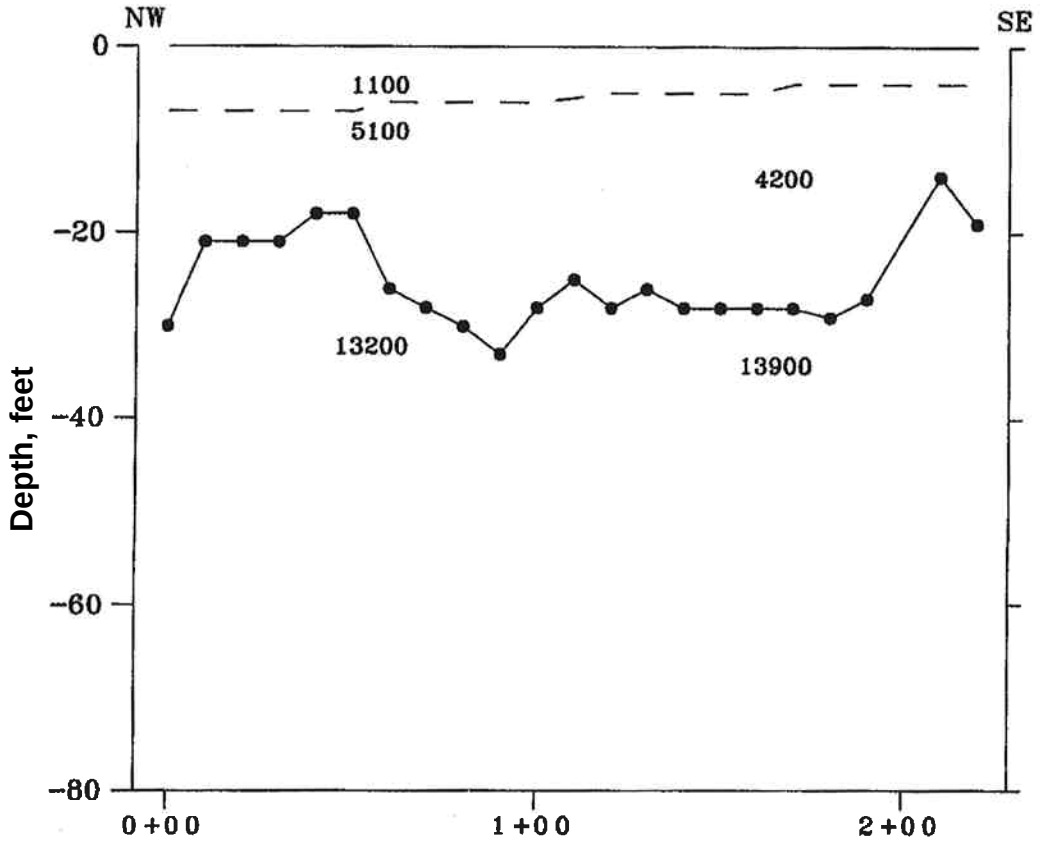
P-wave velocities in feet per second

1 in = 20 ft

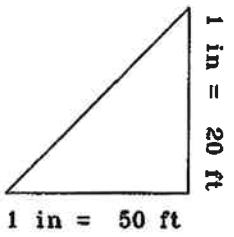
1 in = 50 ft

RS8-P66

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-120

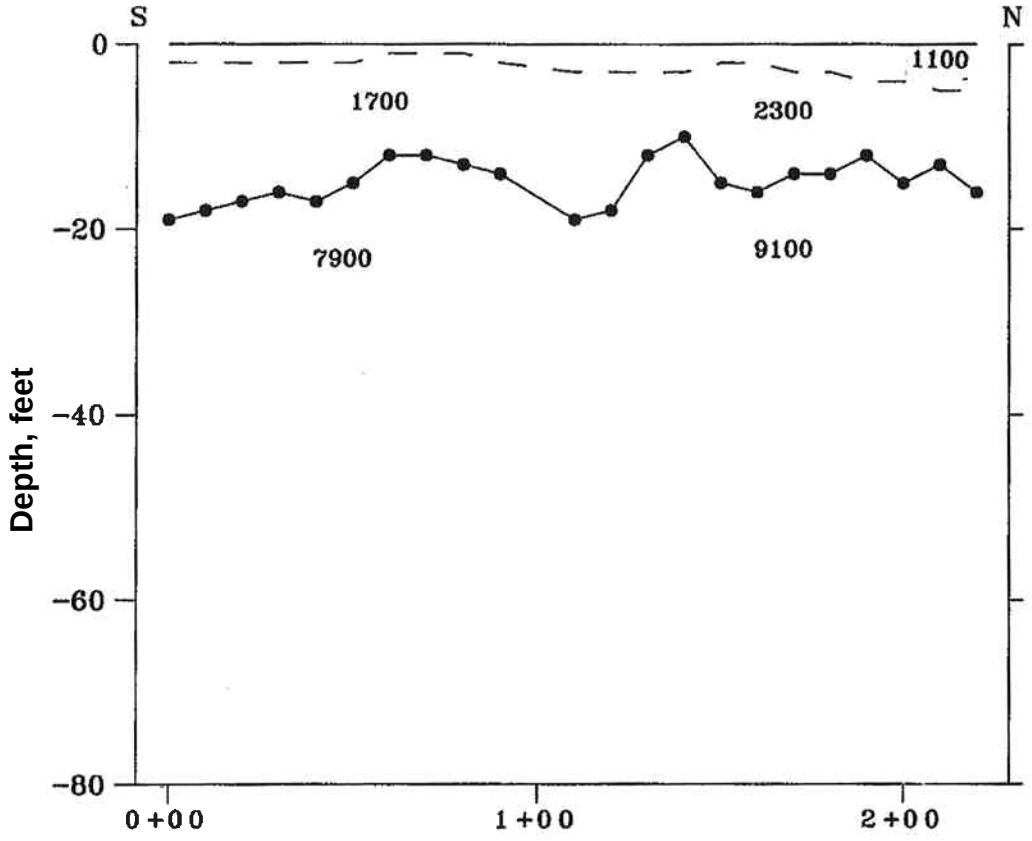


P-wave velocities in feet per second



RS8-P67

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-121



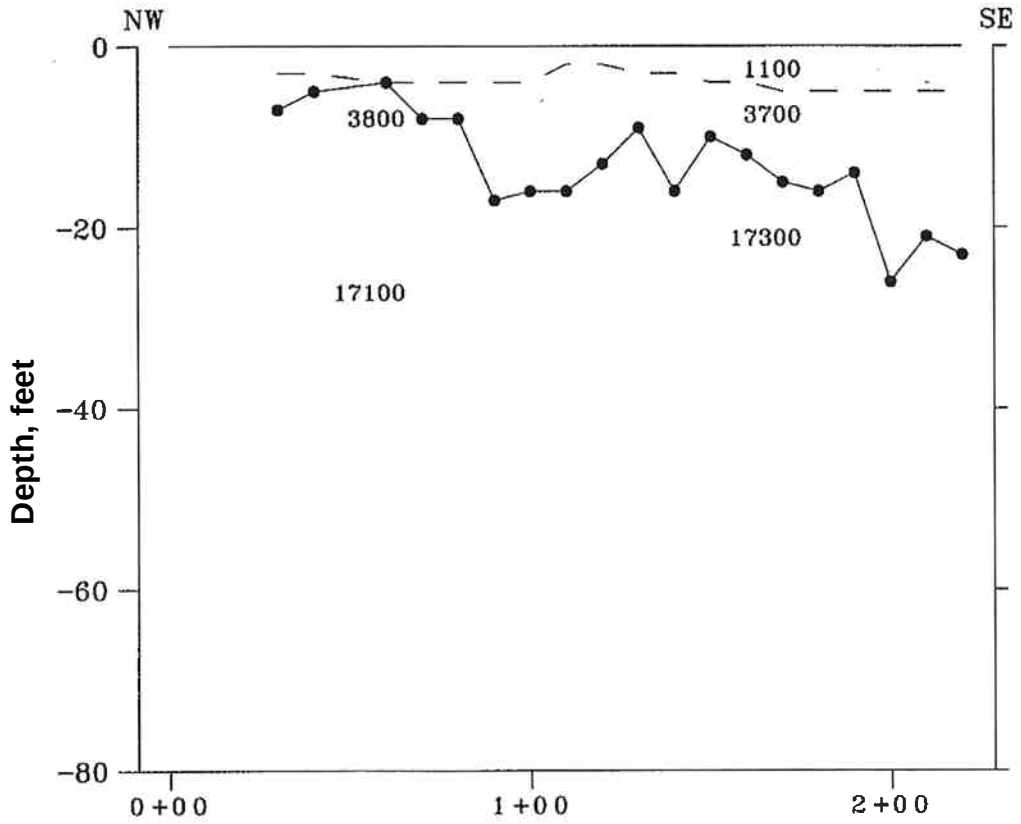
P-wave velocities in feet per second

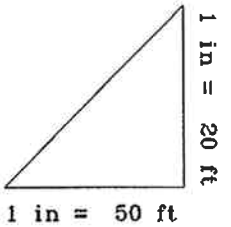
1 in = 20 ft

1 in = 50 ft

RS8-P68

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-122

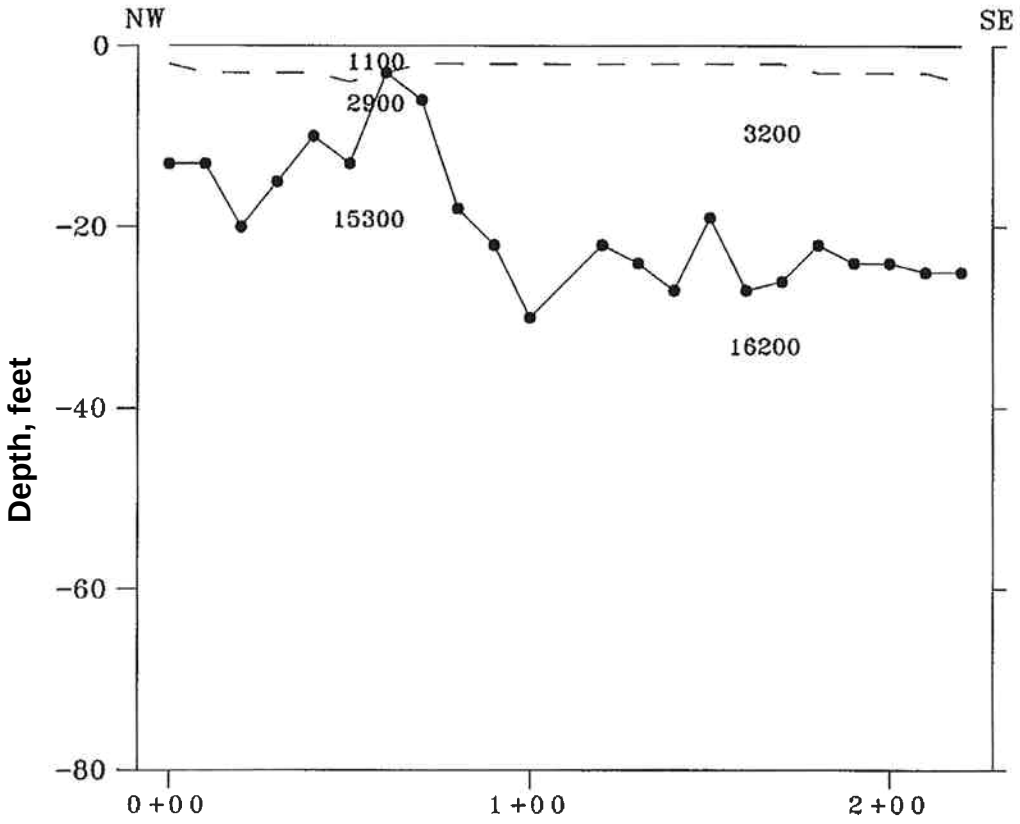




P-wave velocities in feet per second

RS8-PCTA69

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-123



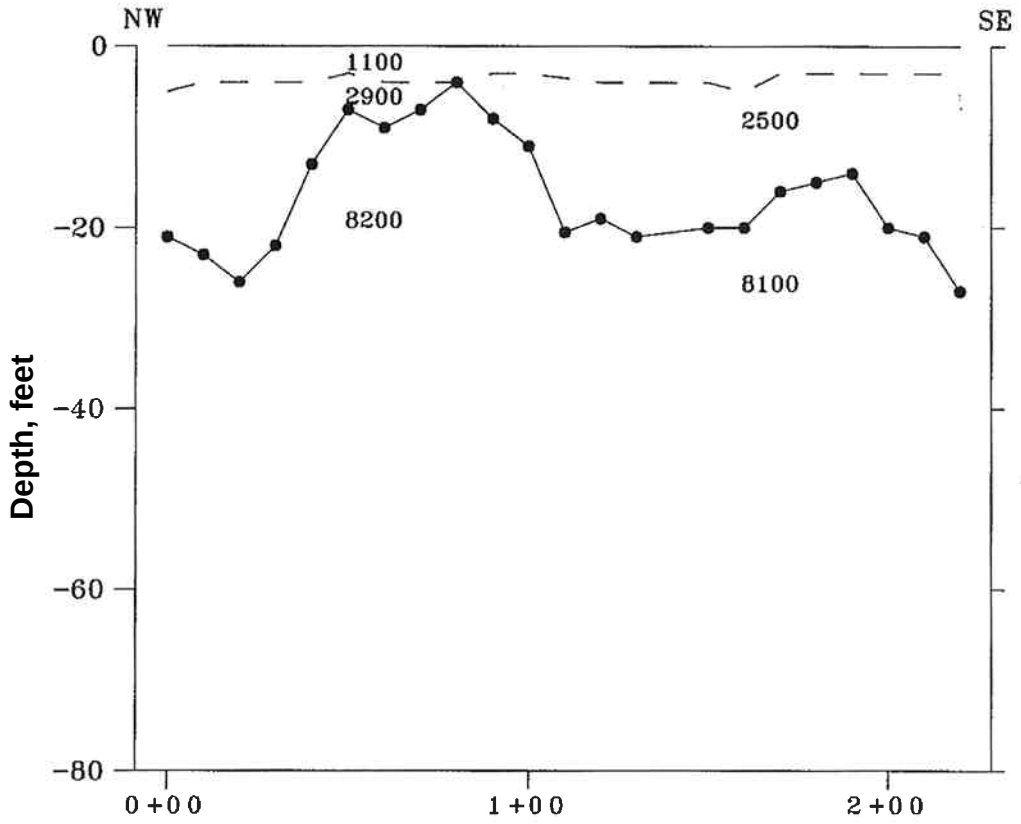
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-PCTA71

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-124



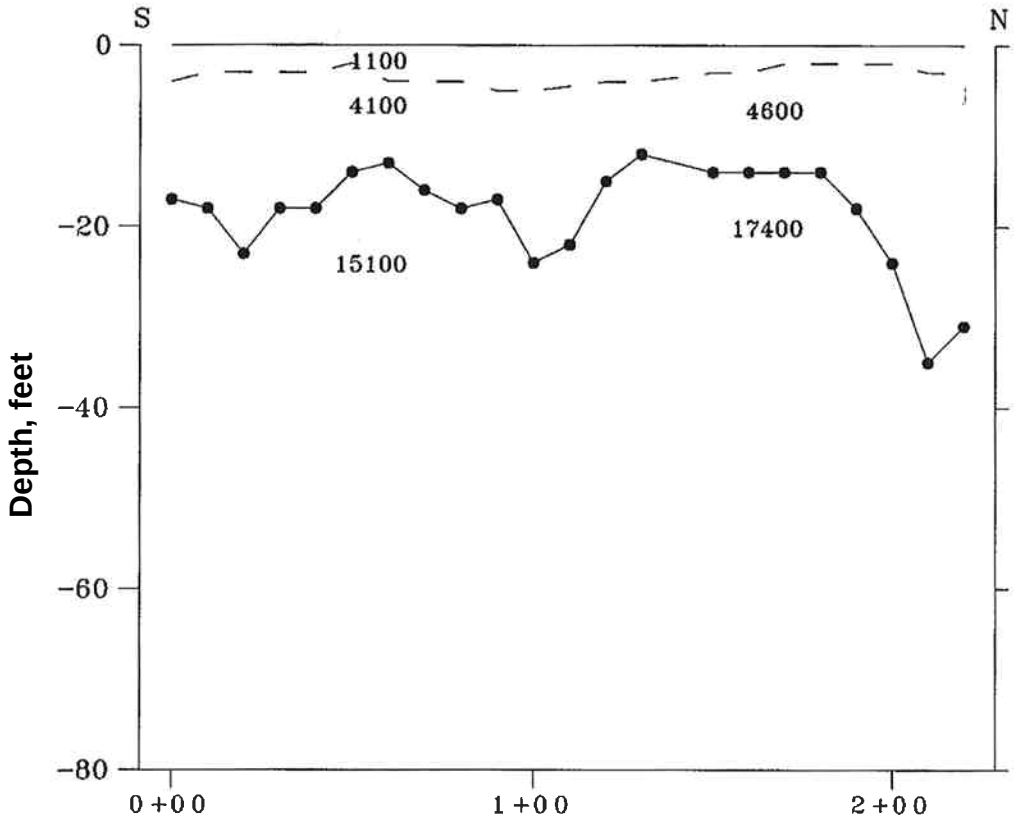
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-PCTA72

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-125



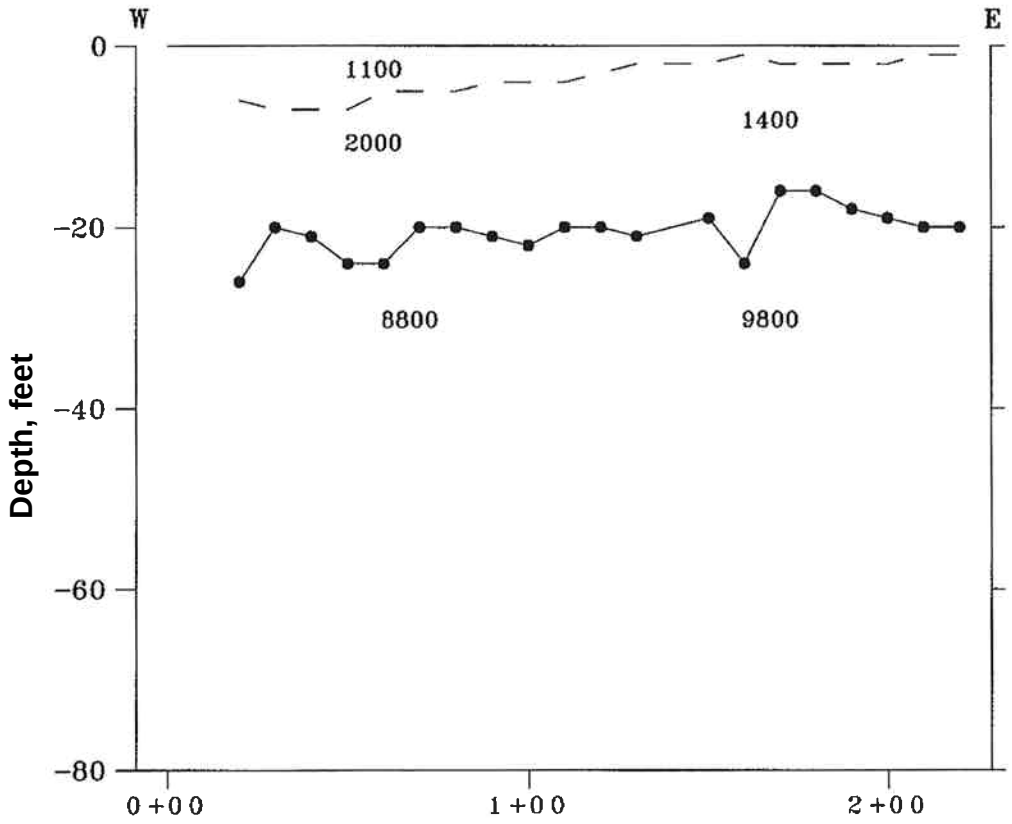
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8–PCTA75

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-126



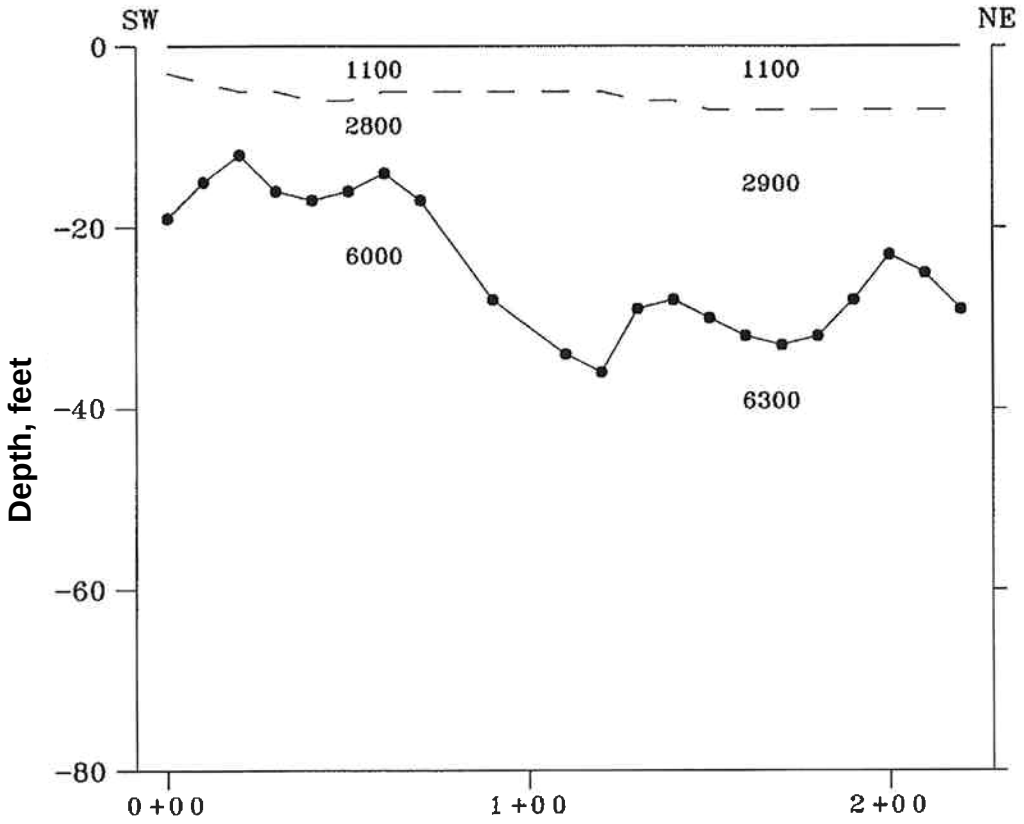
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-PCTA76

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-127



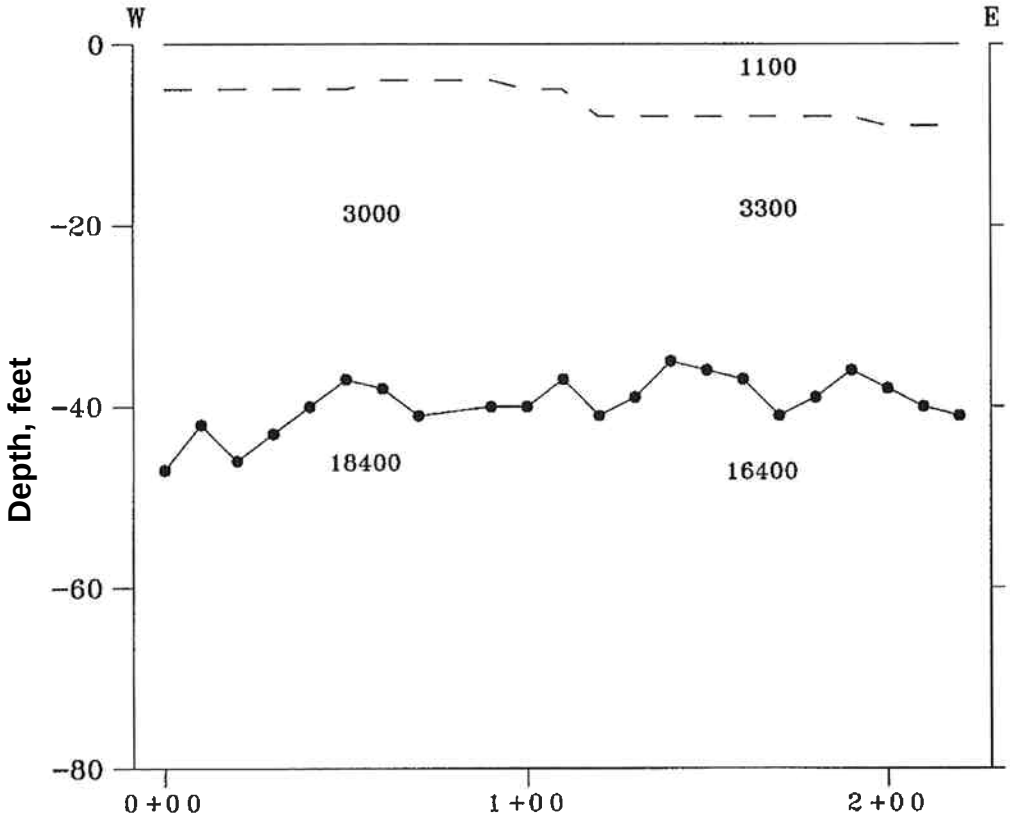
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-PCTA77

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-128



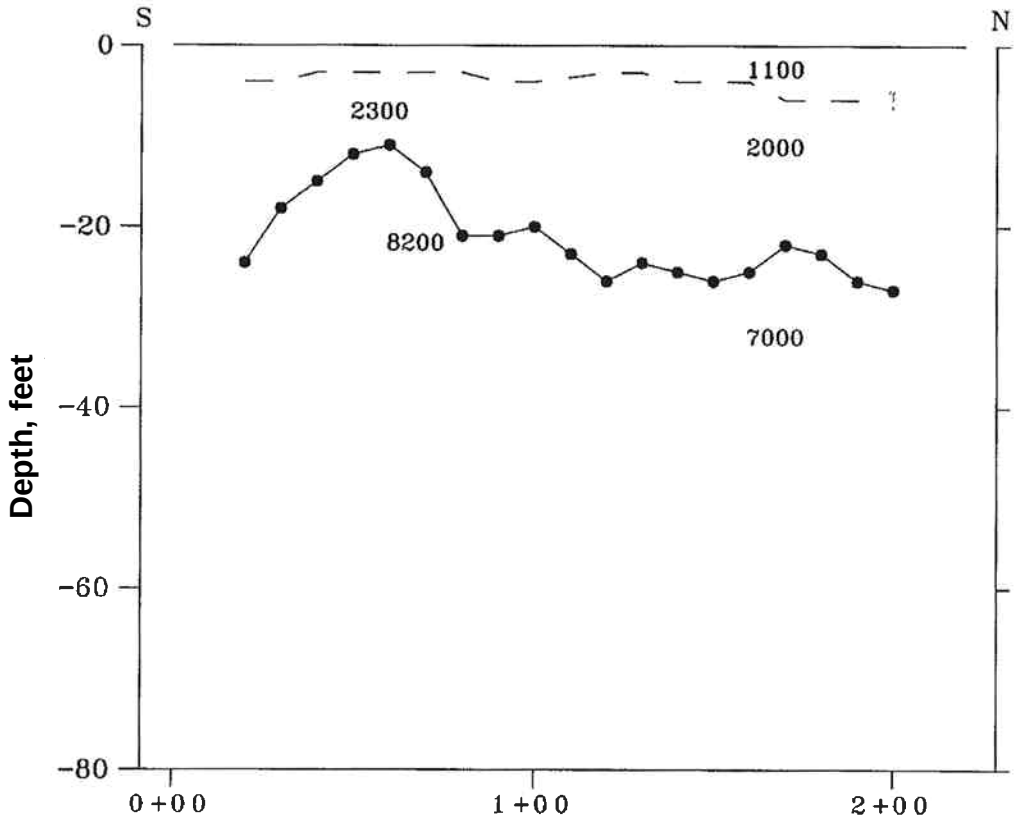
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-PCTA78

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-129



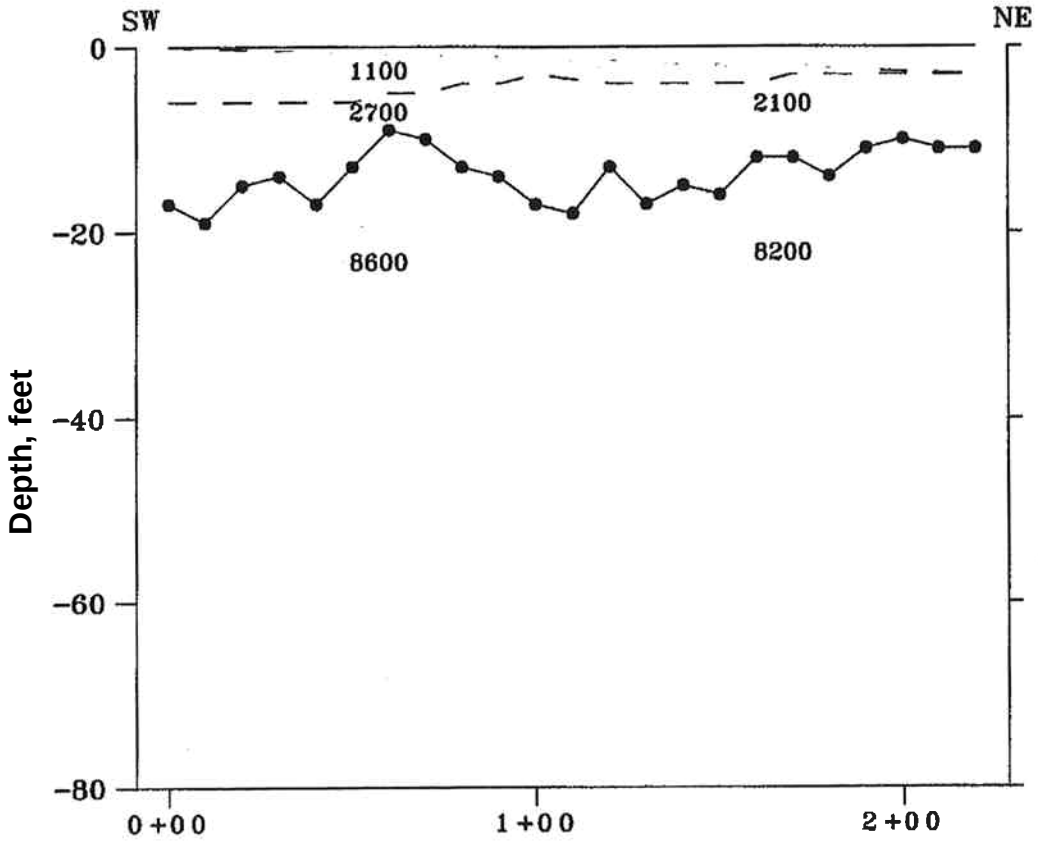
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-PCTA78-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-130



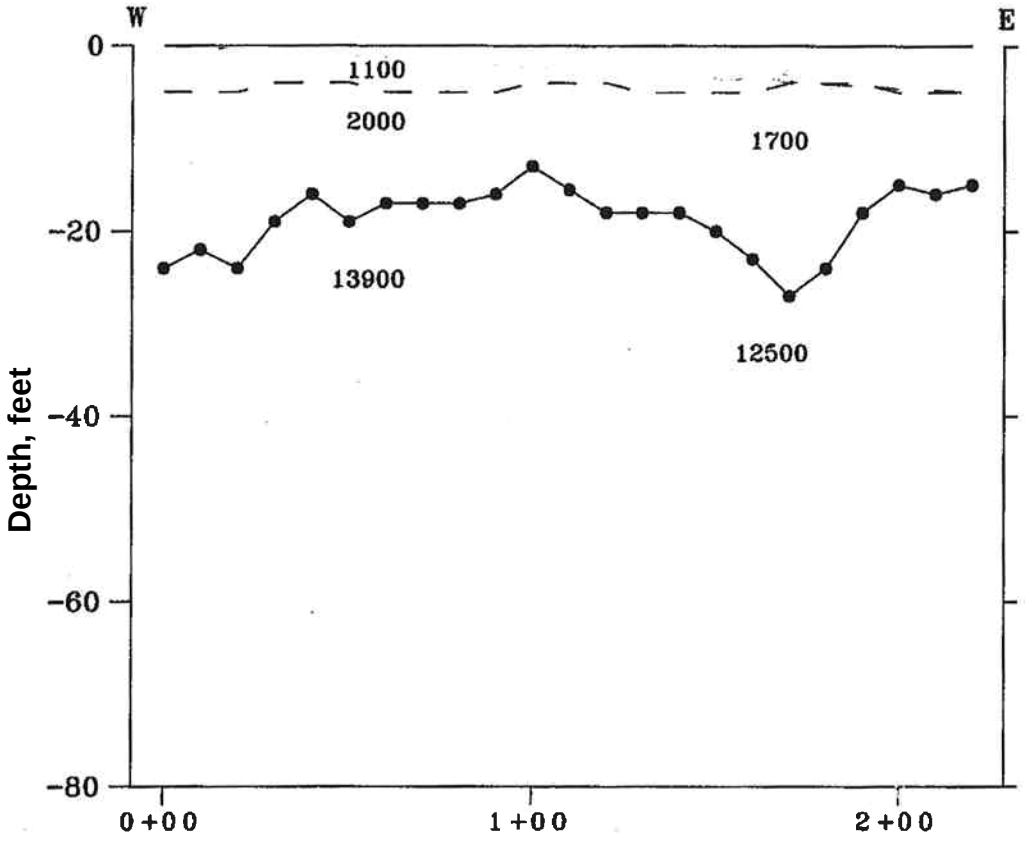
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P71

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-131



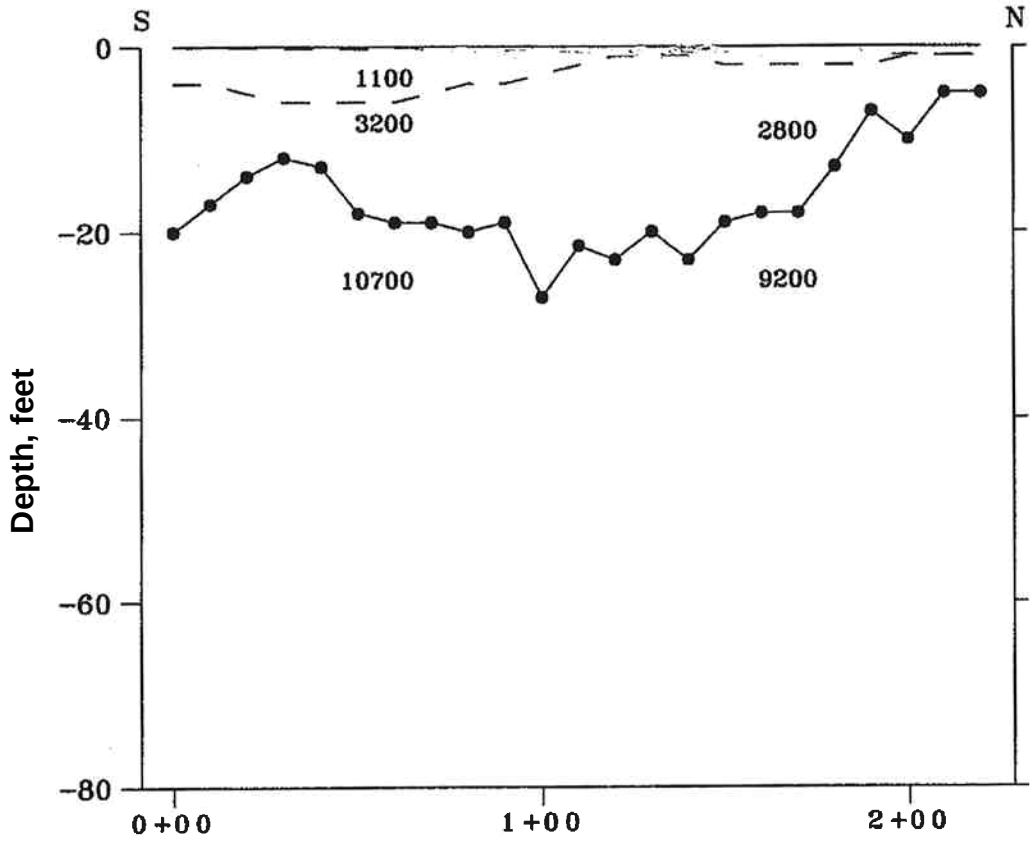
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P72

Project No. 27666031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-132



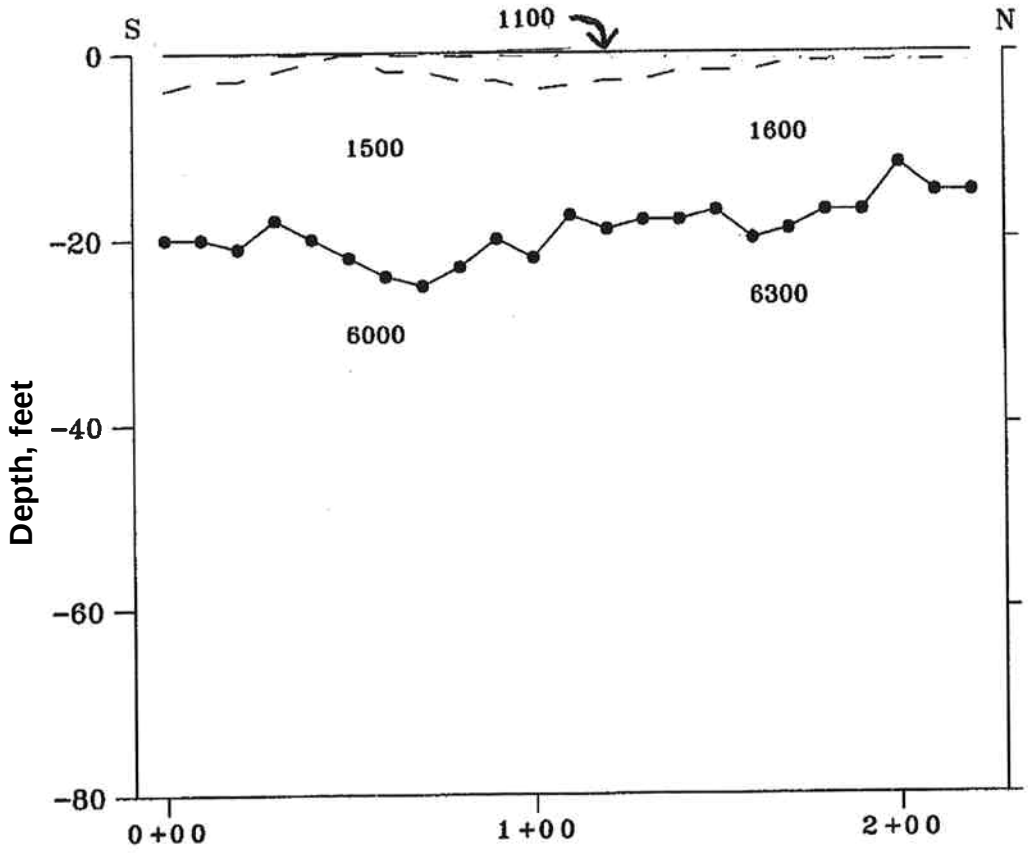
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P73

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-133



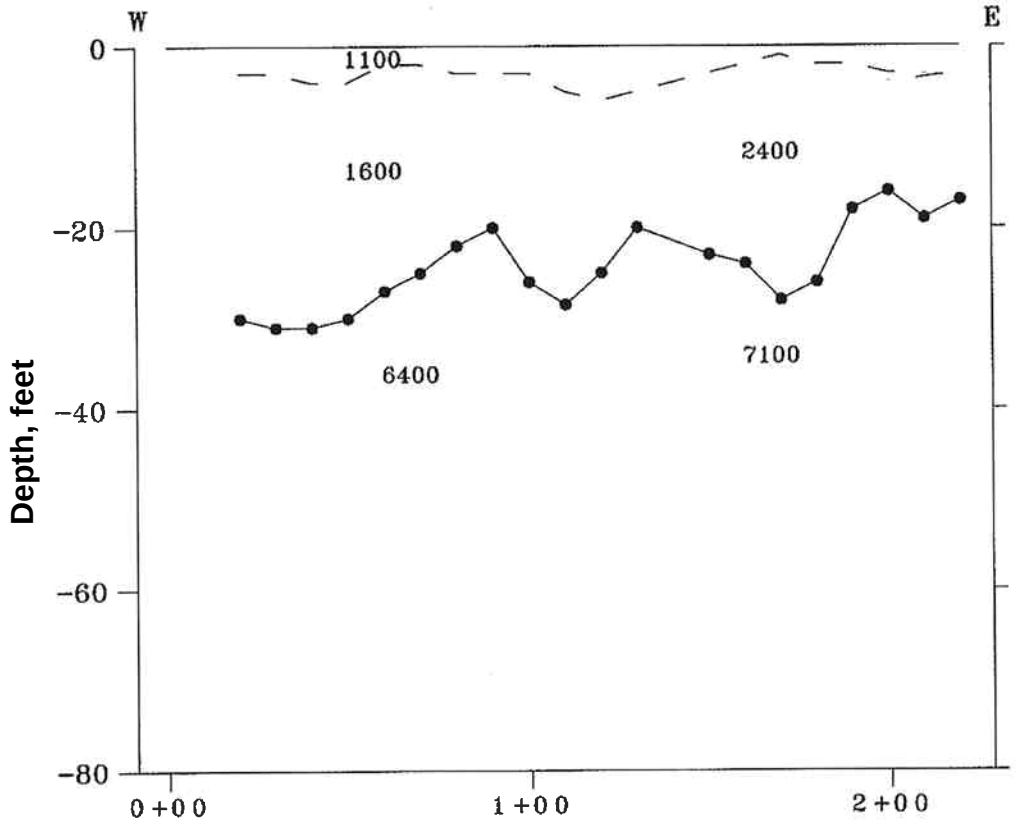
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P79

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-134



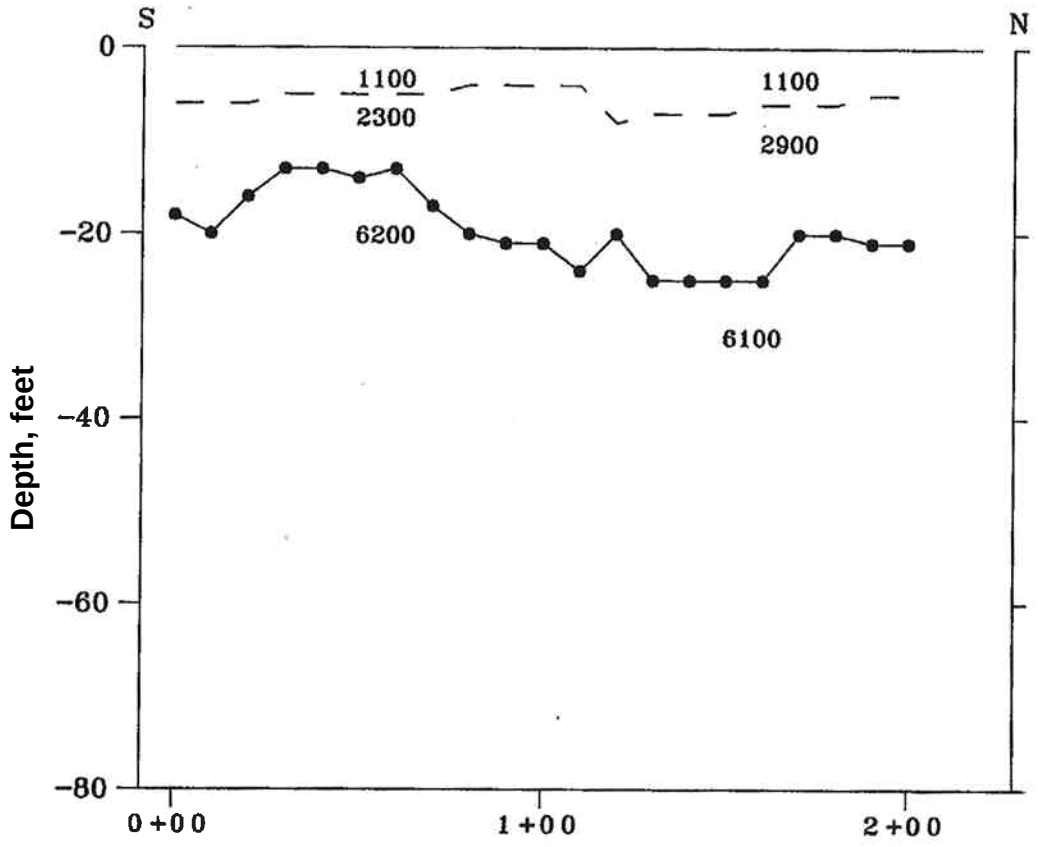
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P80

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-135



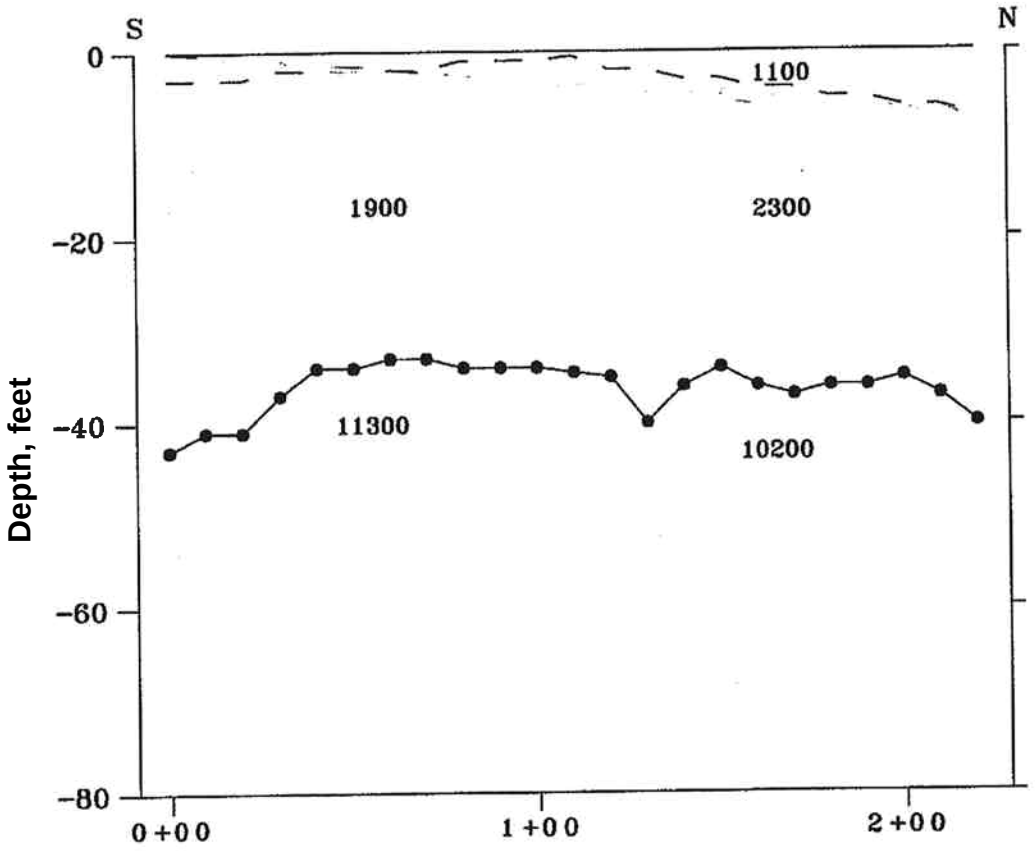
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P83

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-136



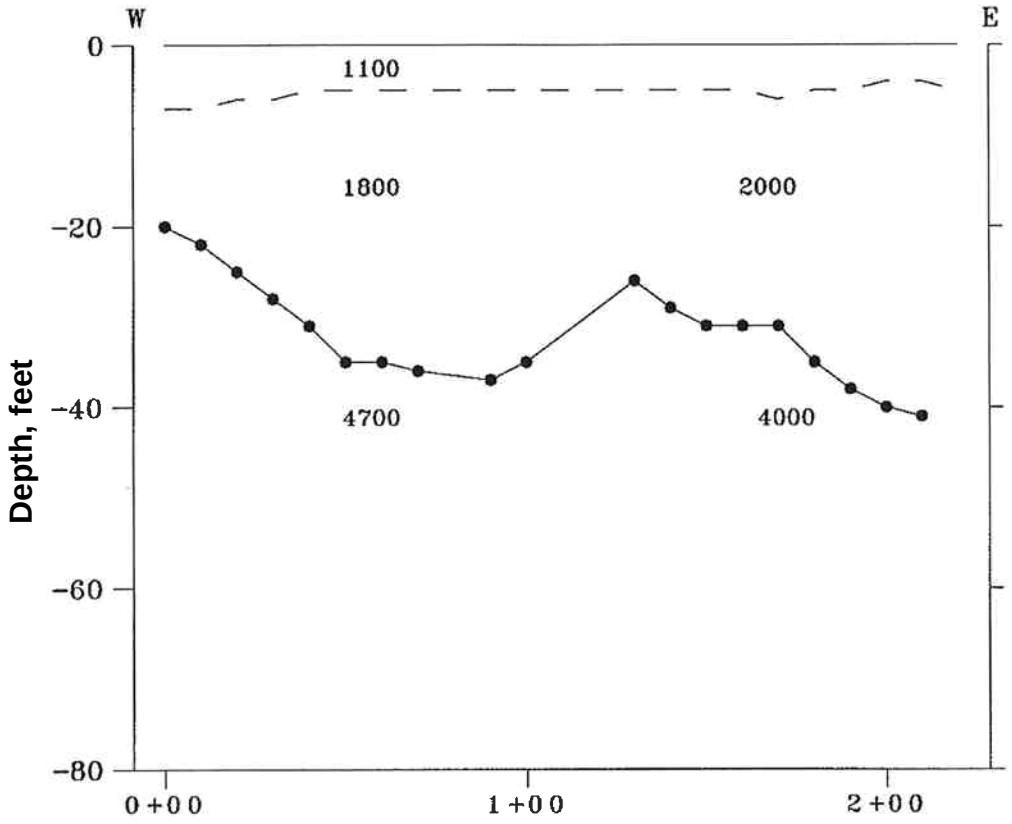
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P84

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-137



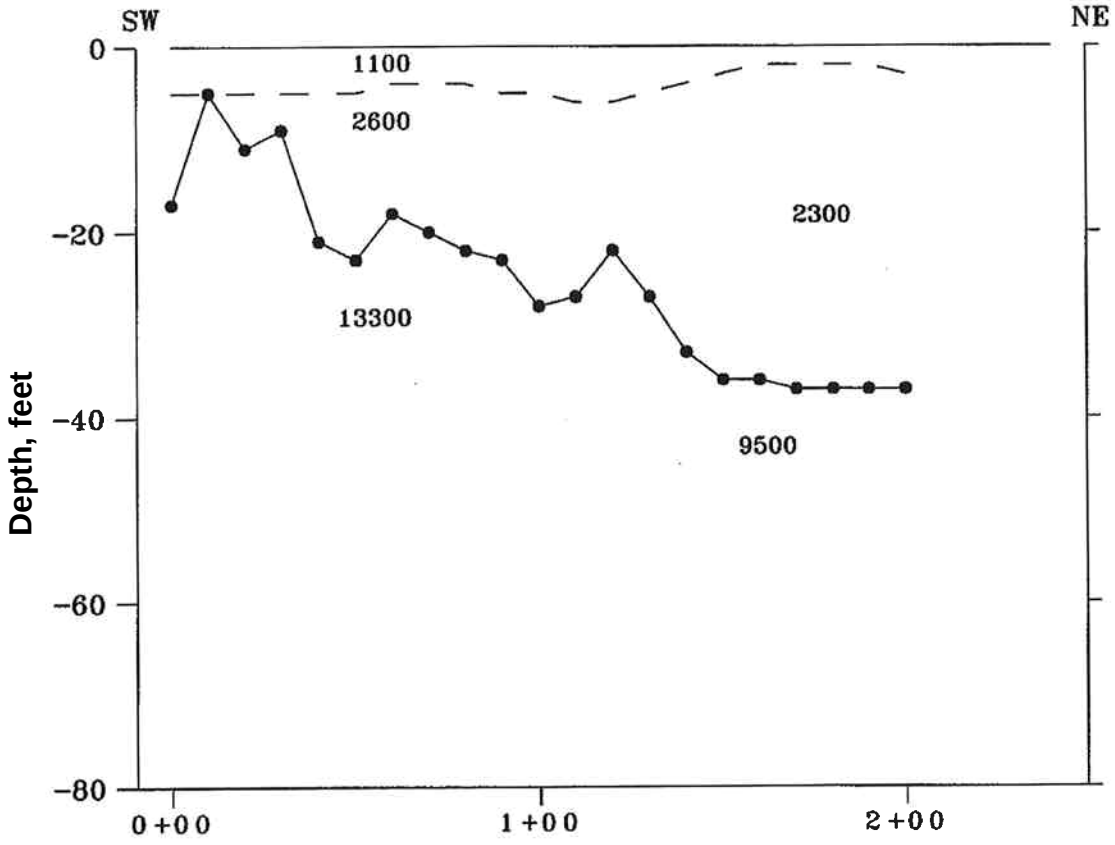
P-wave velocities in feet per second

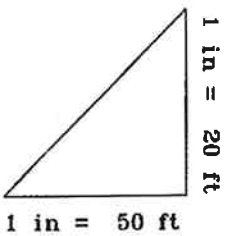
1 in = 20 ft

1 in = 50 ft

RS8-P85

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-138

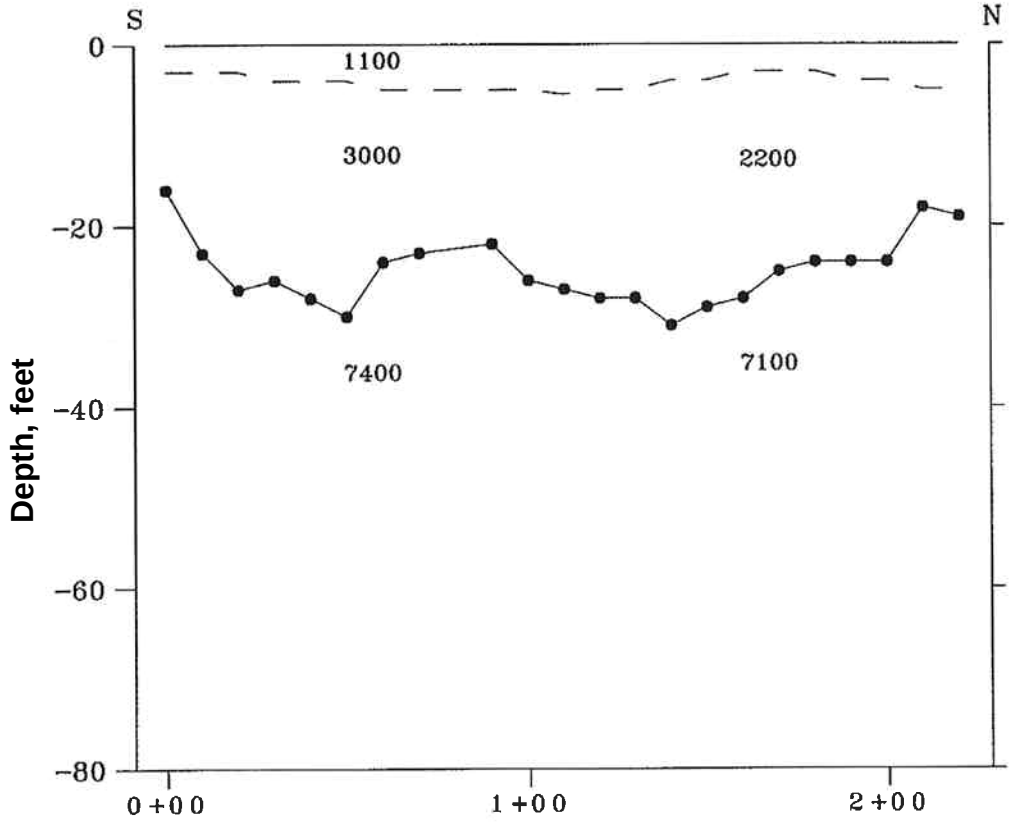




P-wave velocities in feet per second

RS8-P86

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-139



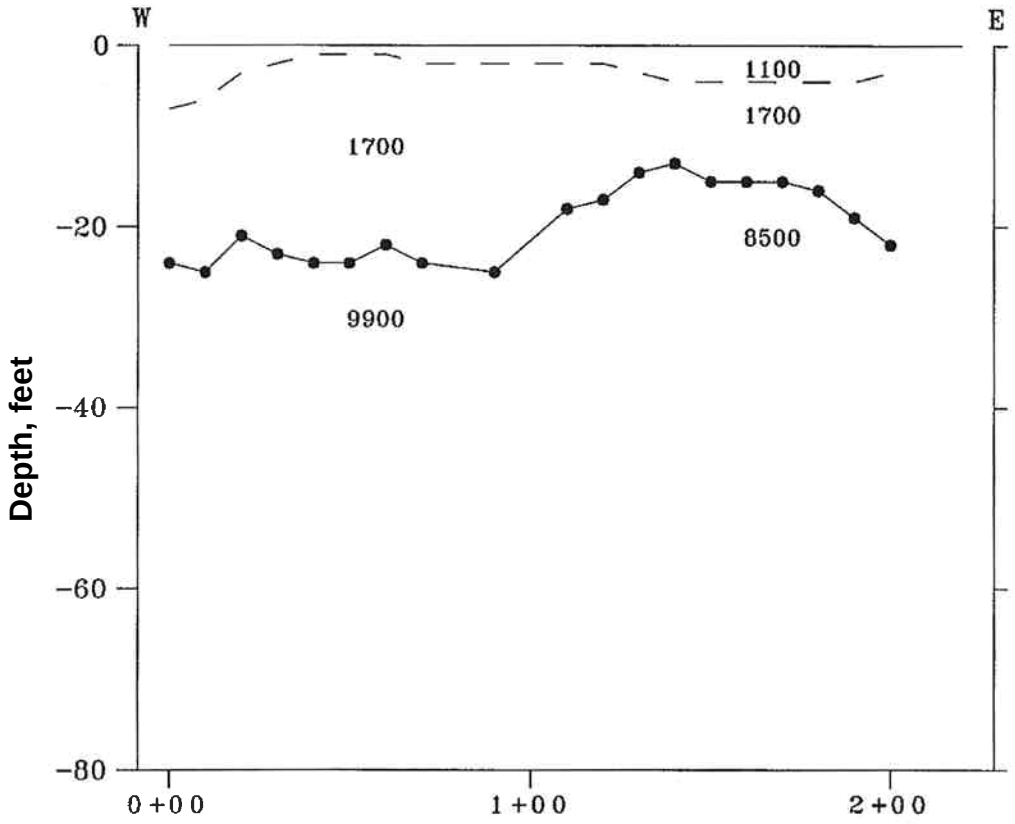
P-wave velocities in feet per second

1 in = 20 ft

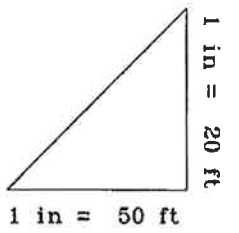
1 in = 50 ft

RS8-P87-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-140

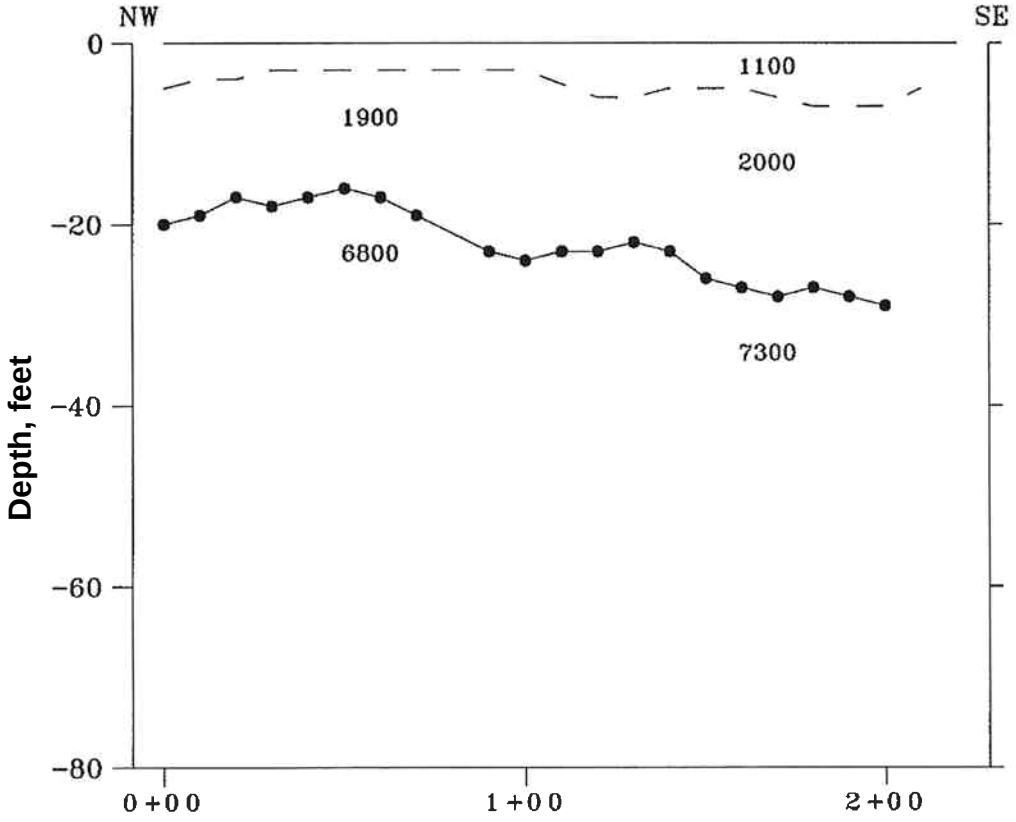


P-wave velocities in feet per second



RS8-P88

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-141



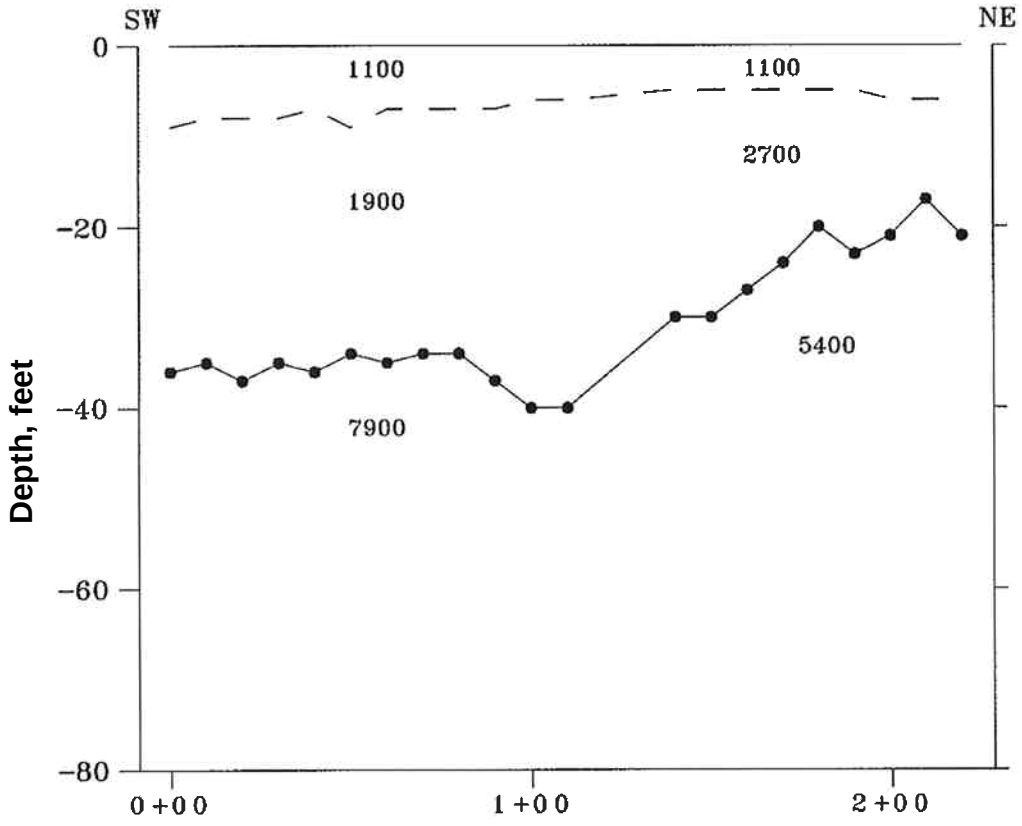
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P89-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-142



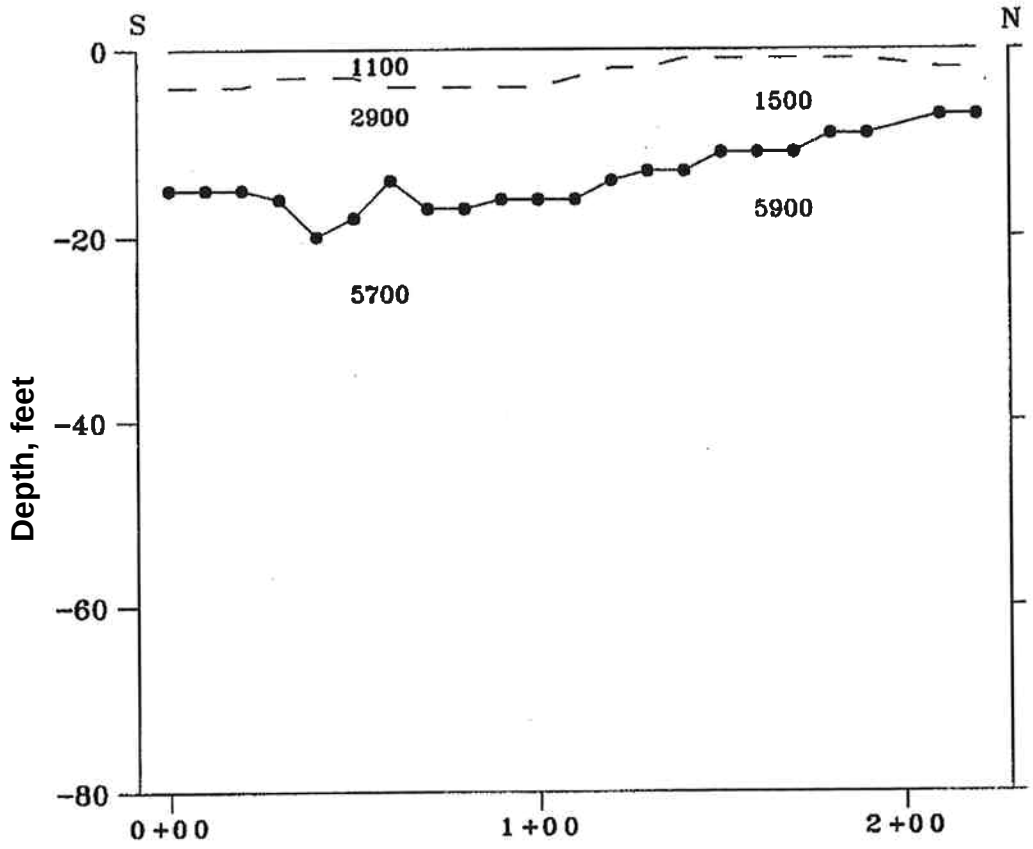
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P90

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-143



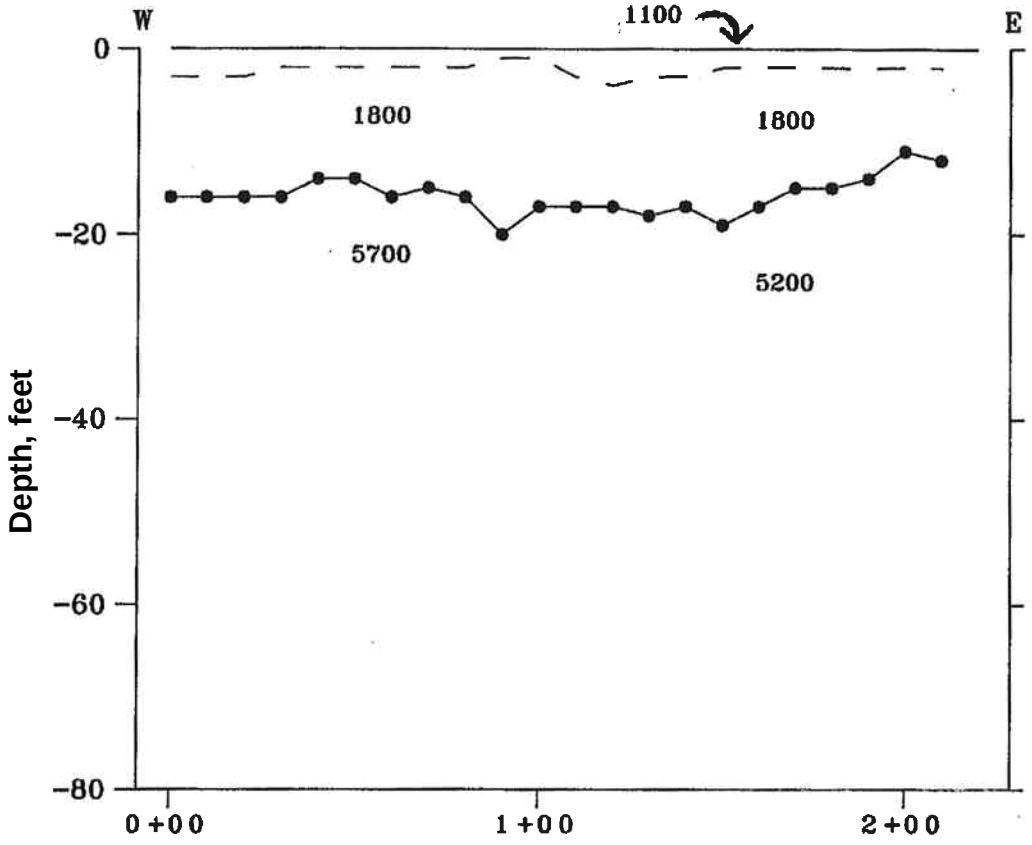
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P91

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-144



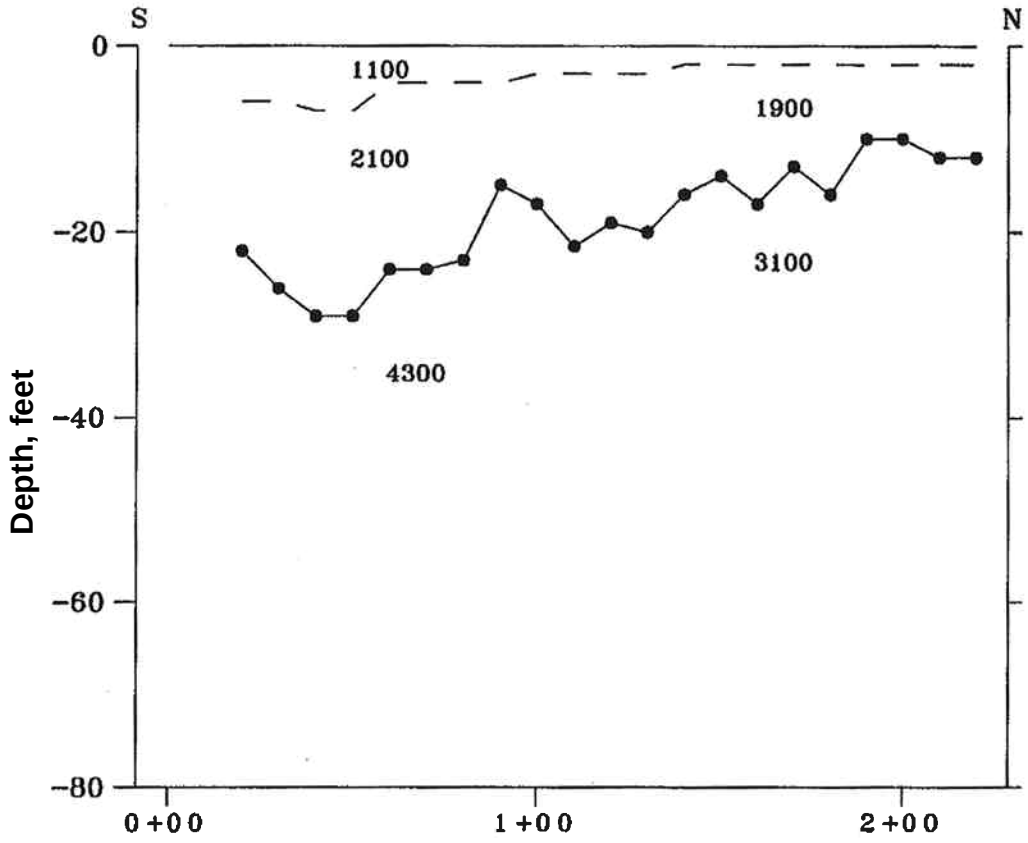
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P93

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-145



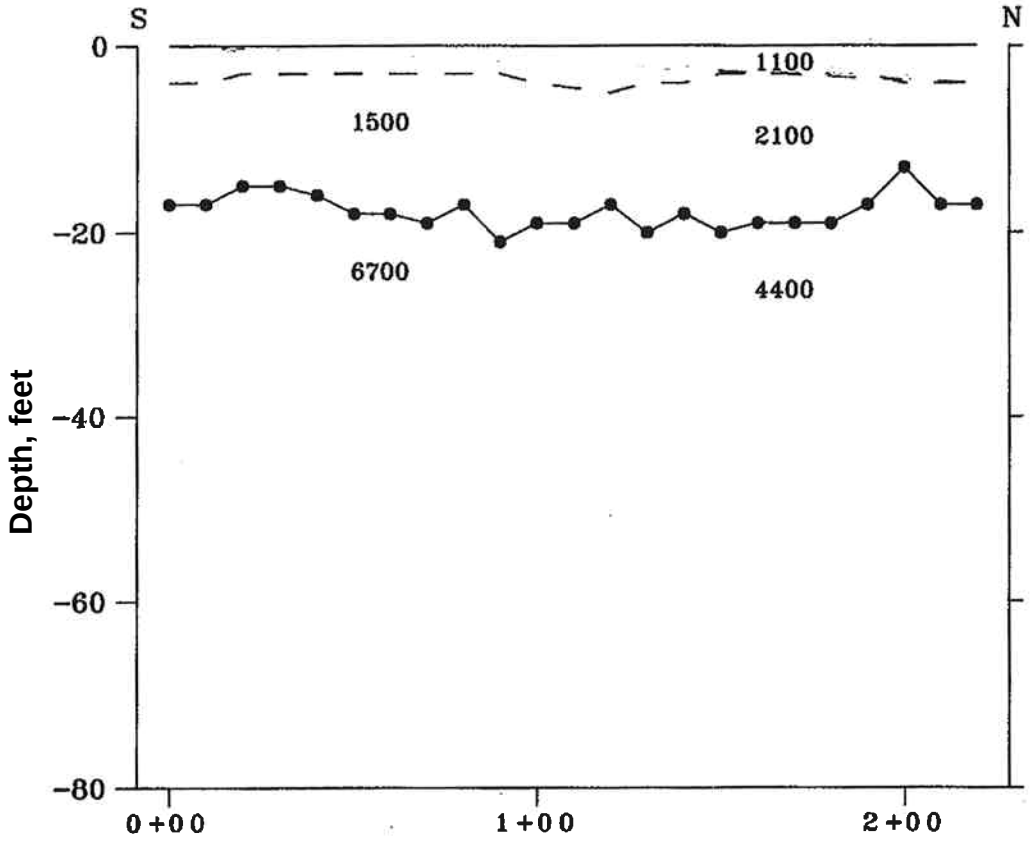
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P95

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-146



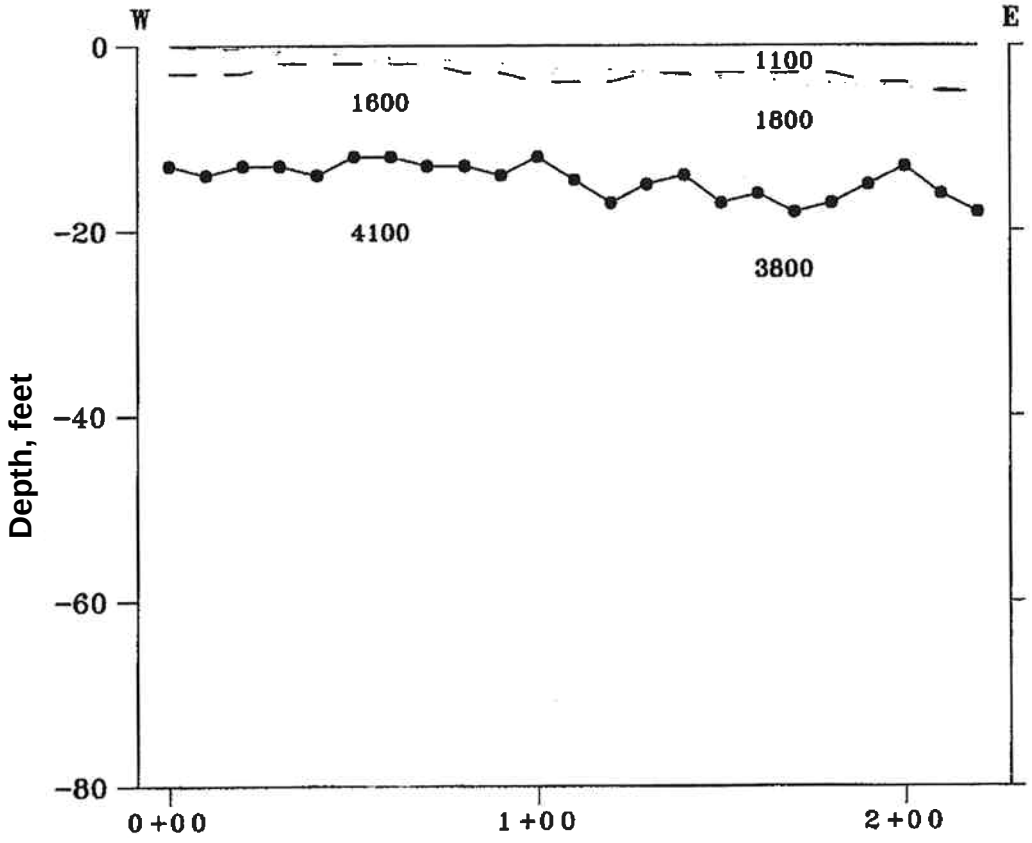
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P96

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-147



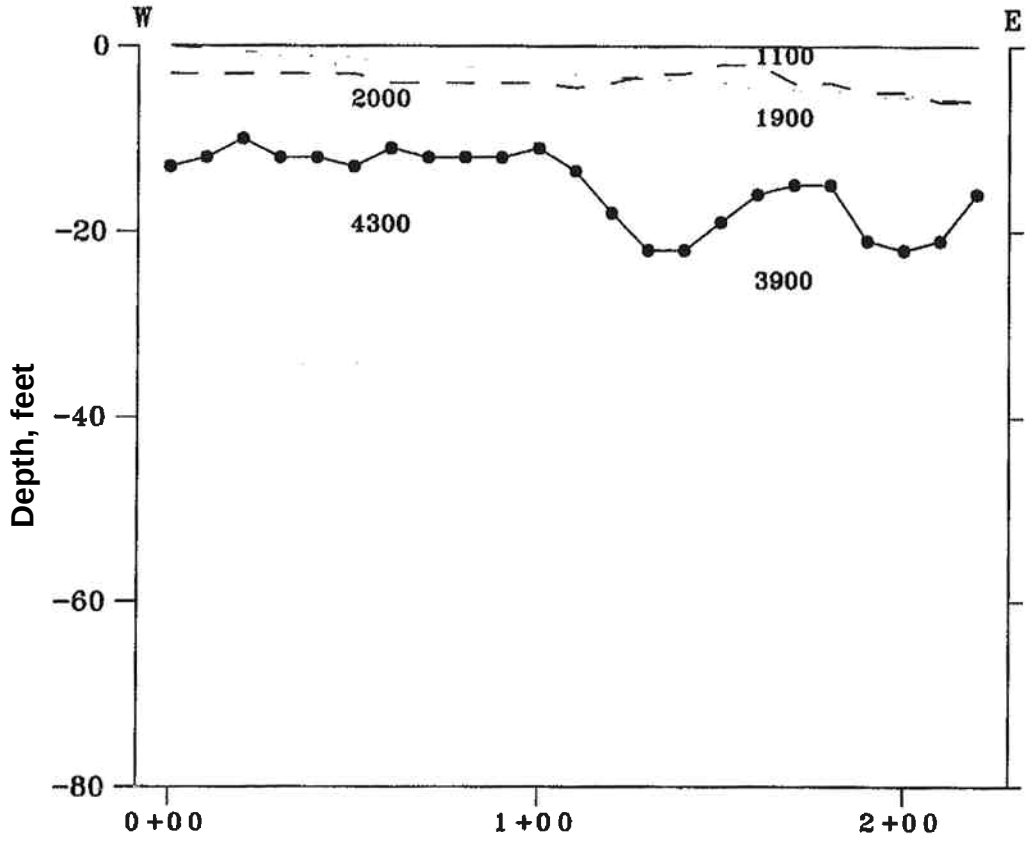
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P98

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-148



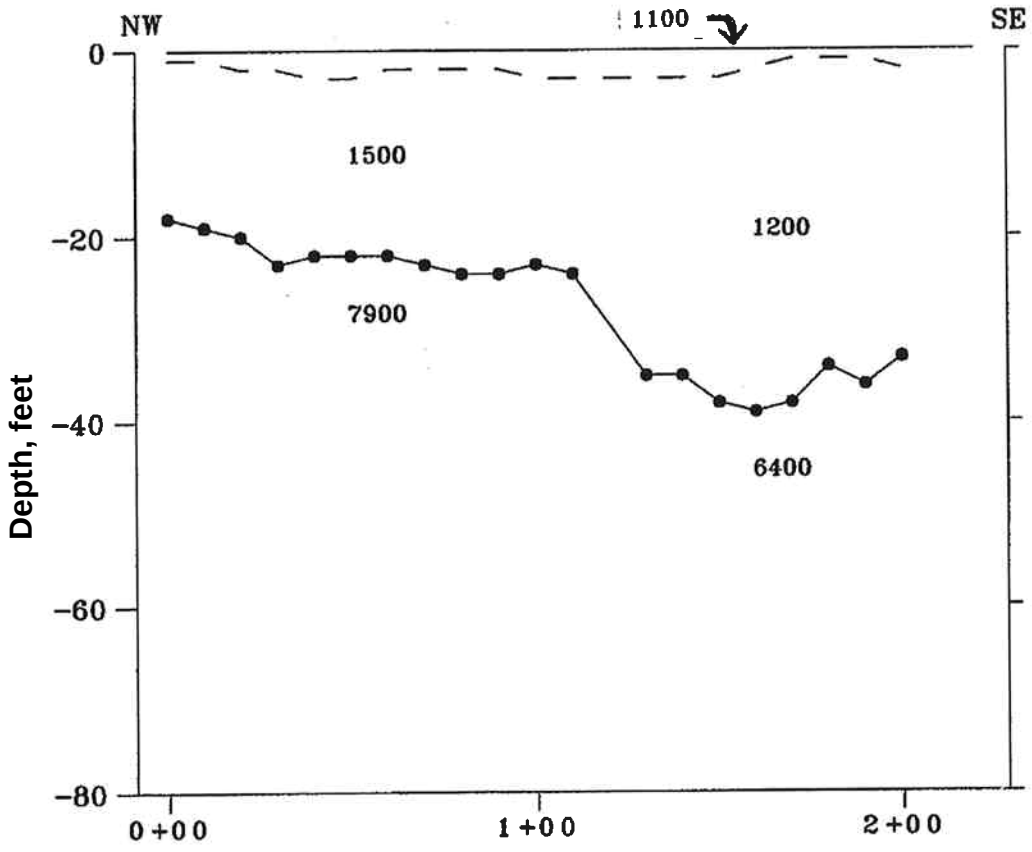
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P99

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-149



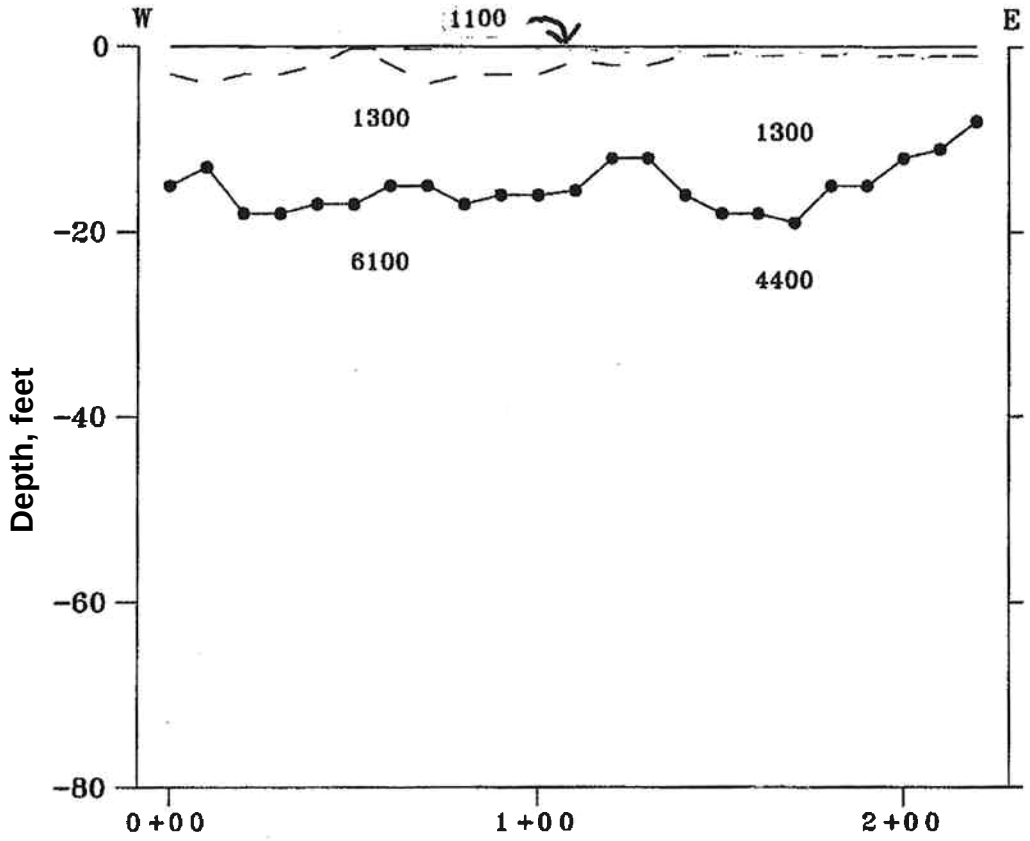
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P100

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-150



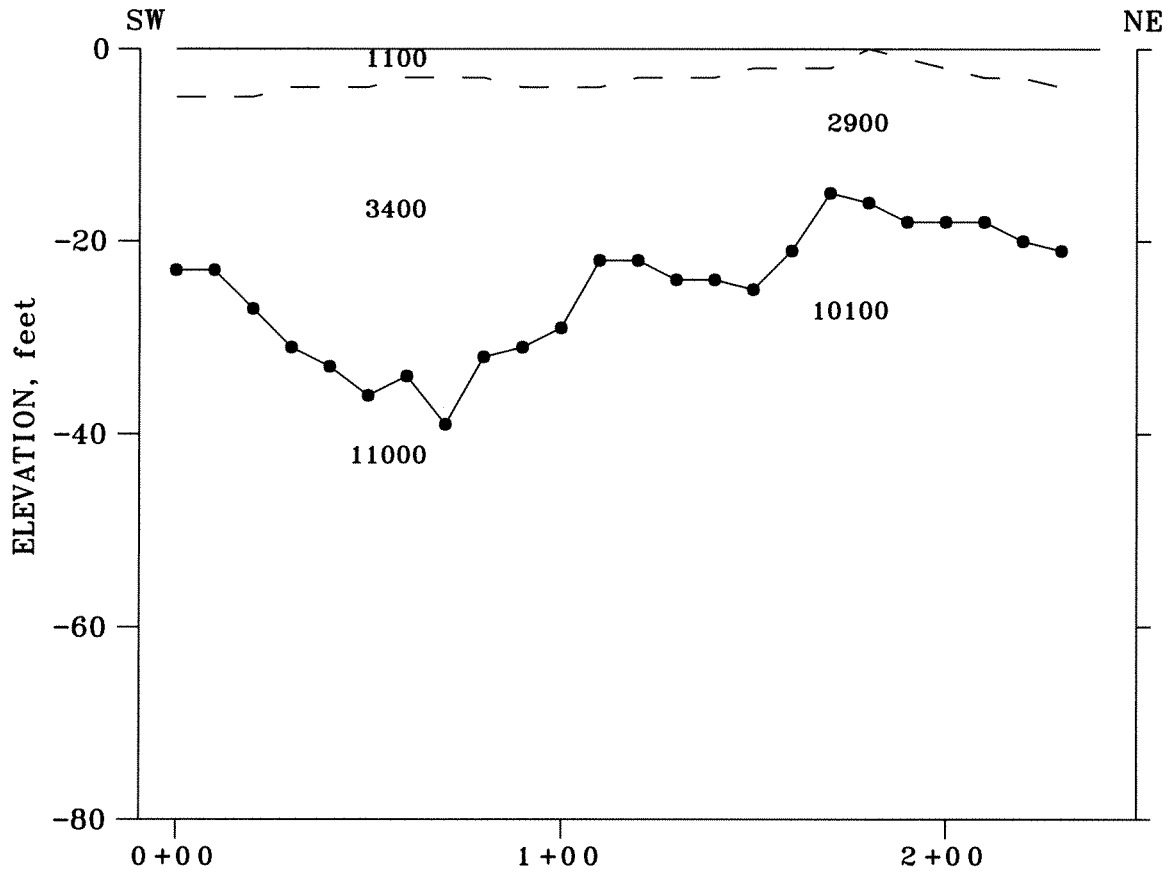
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P102

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-151



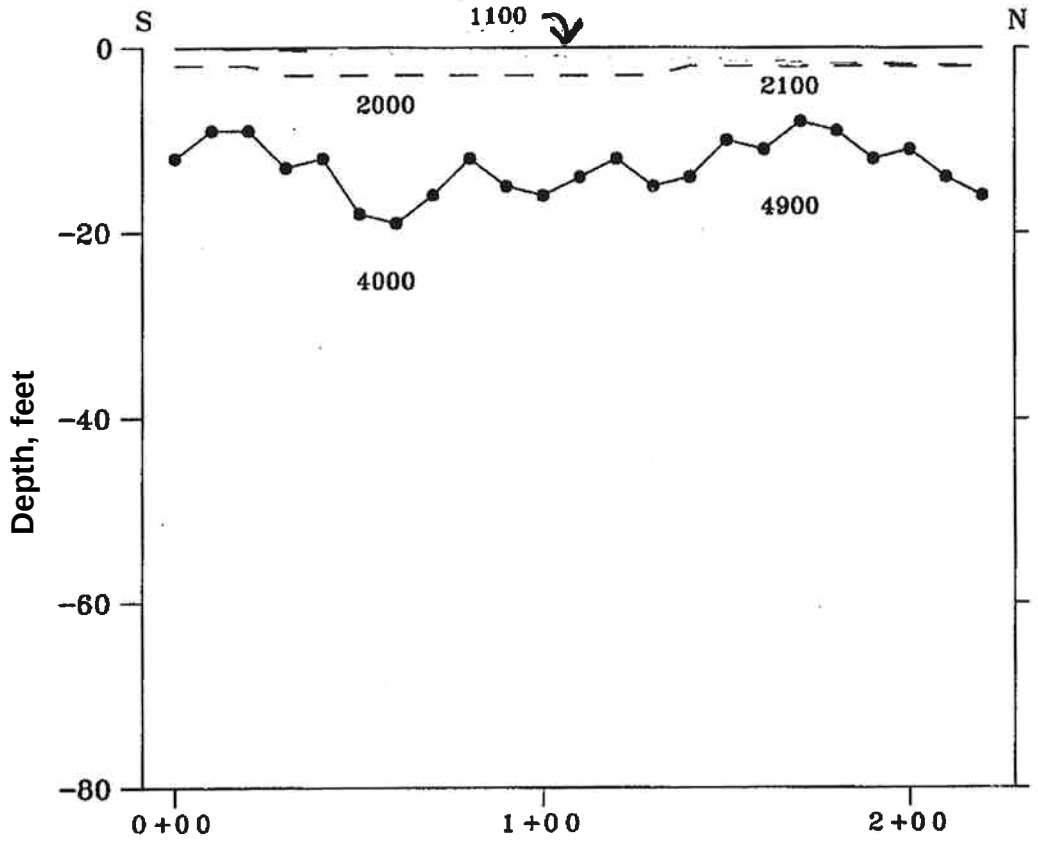
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P102-2

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-152



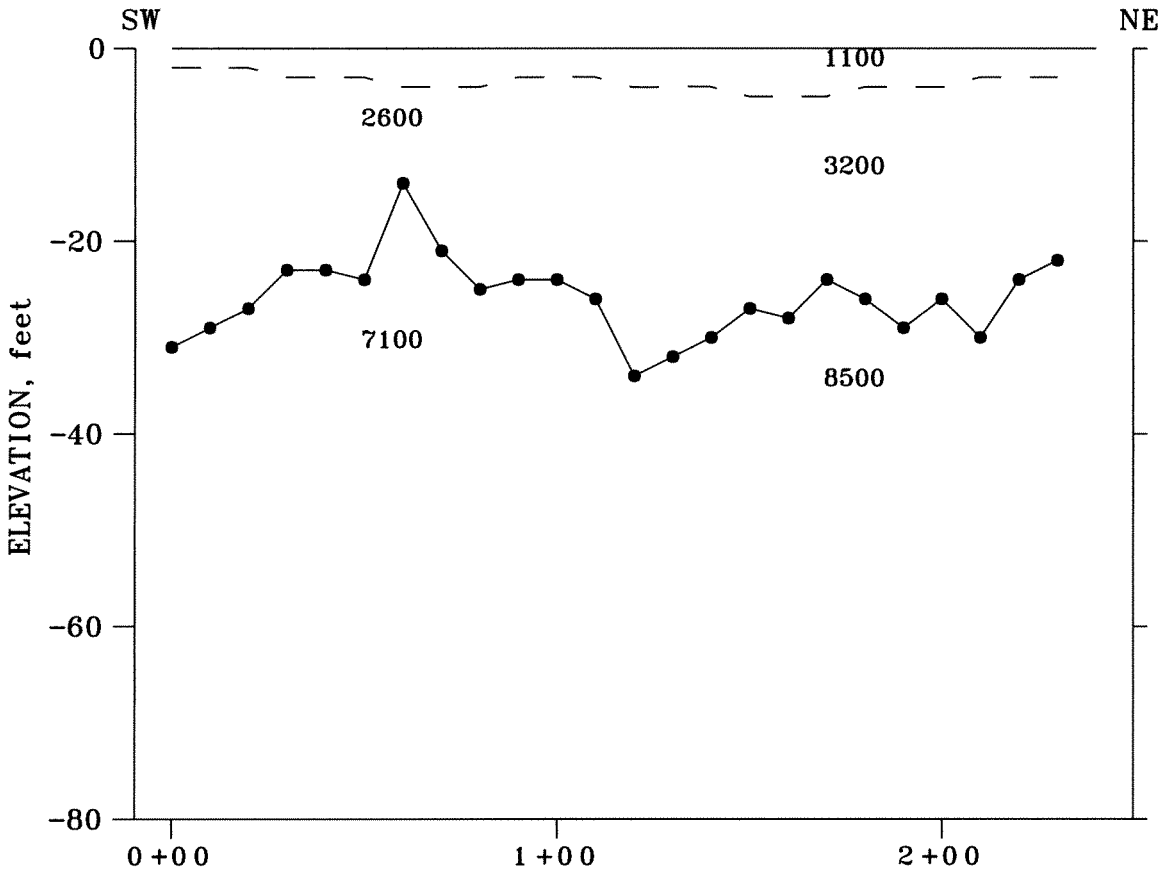
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P103

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-153



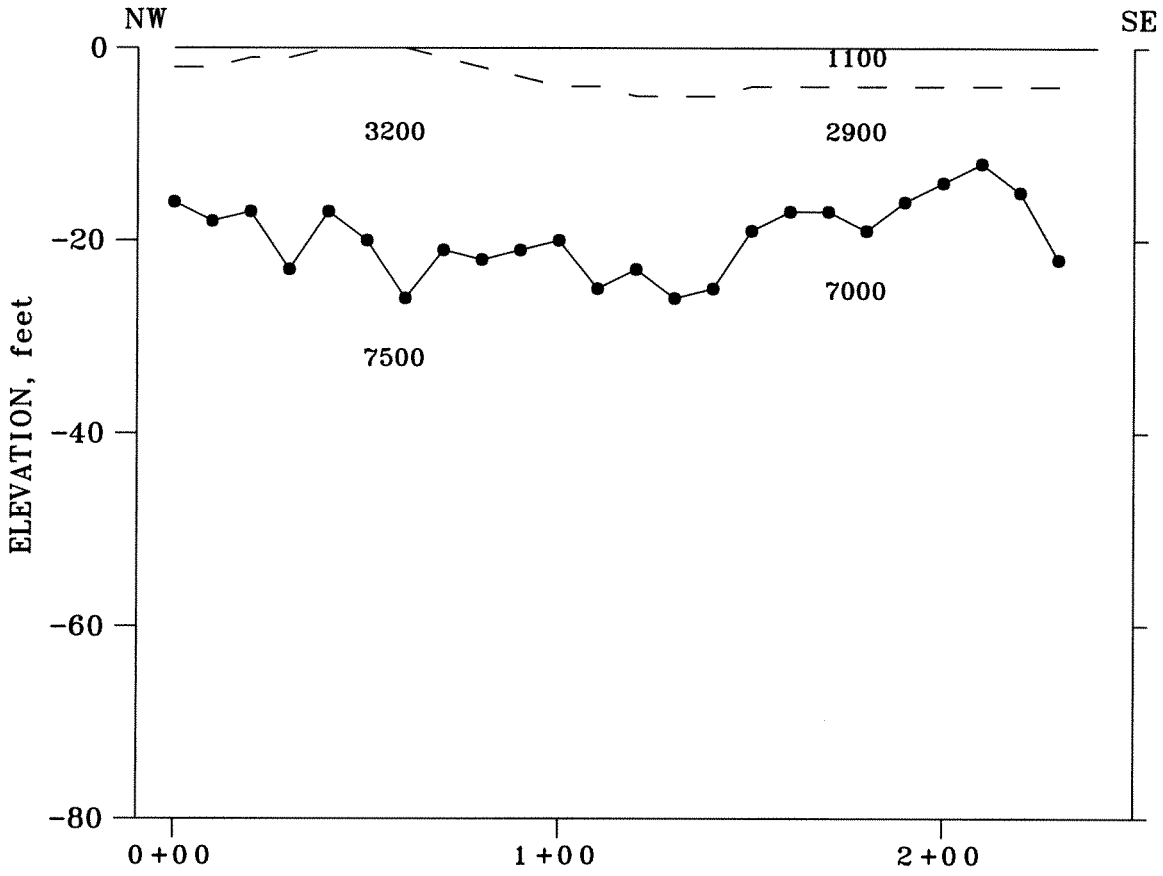
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P103A

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-154



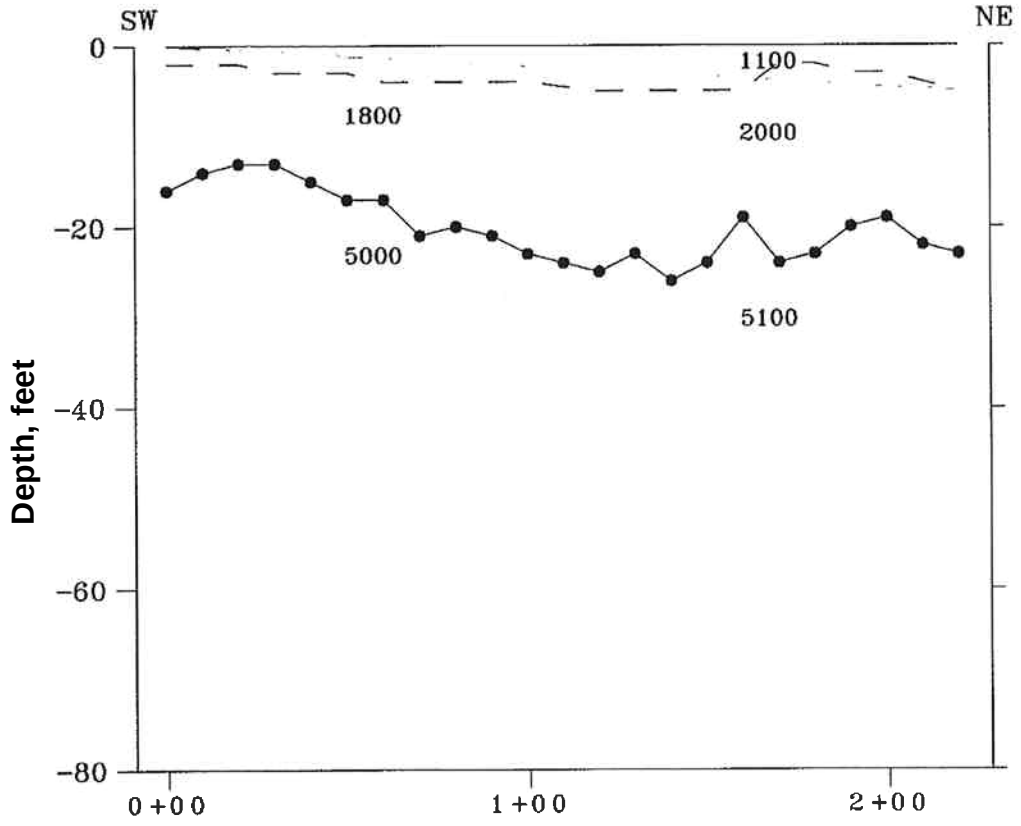
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P106-3

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-155



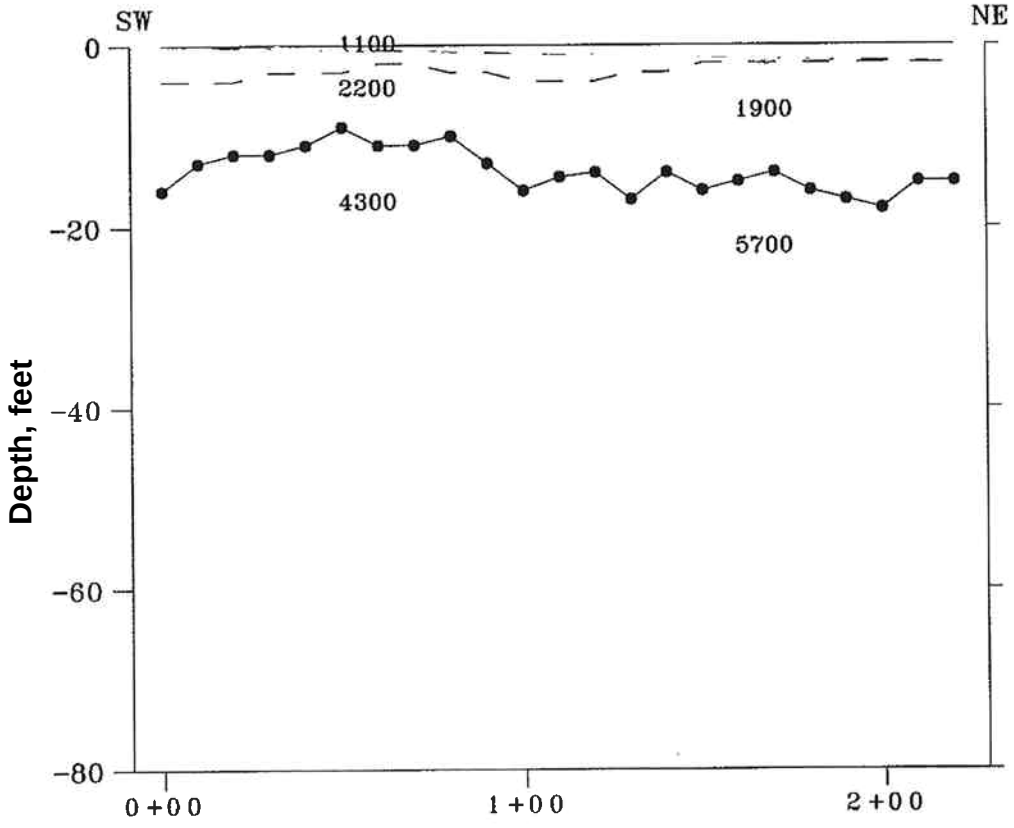
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P107

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-156



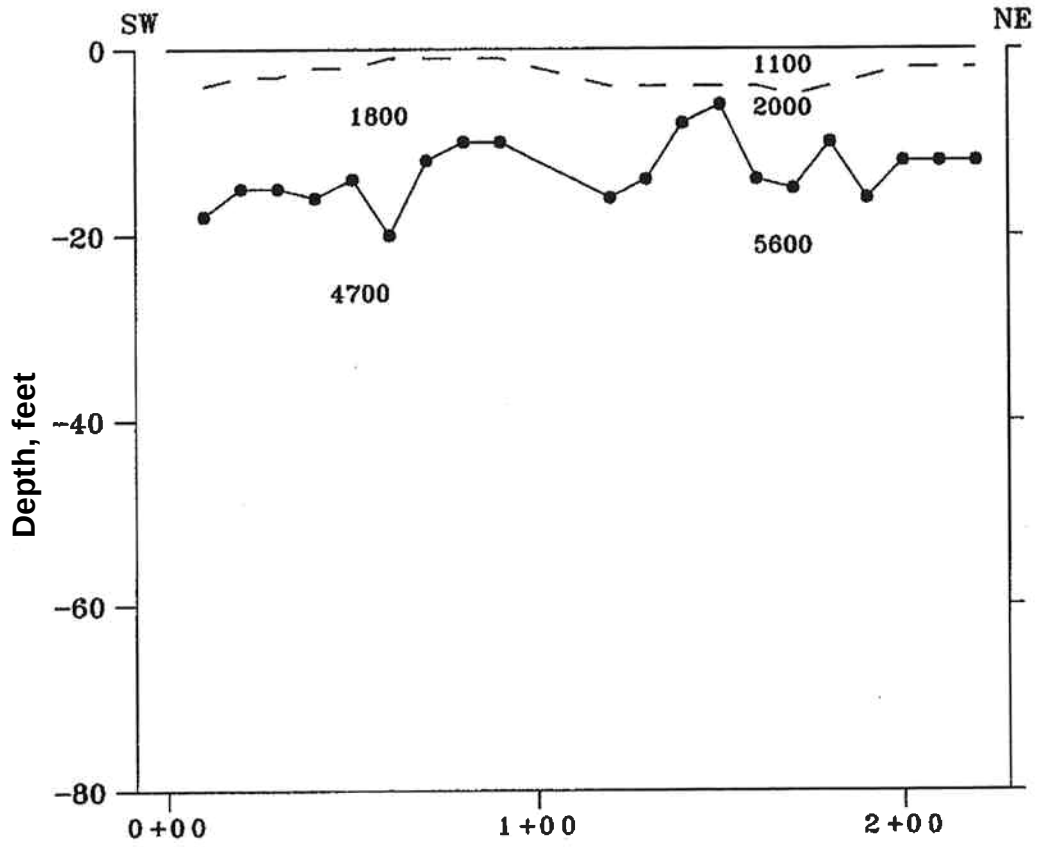
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P108

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-157



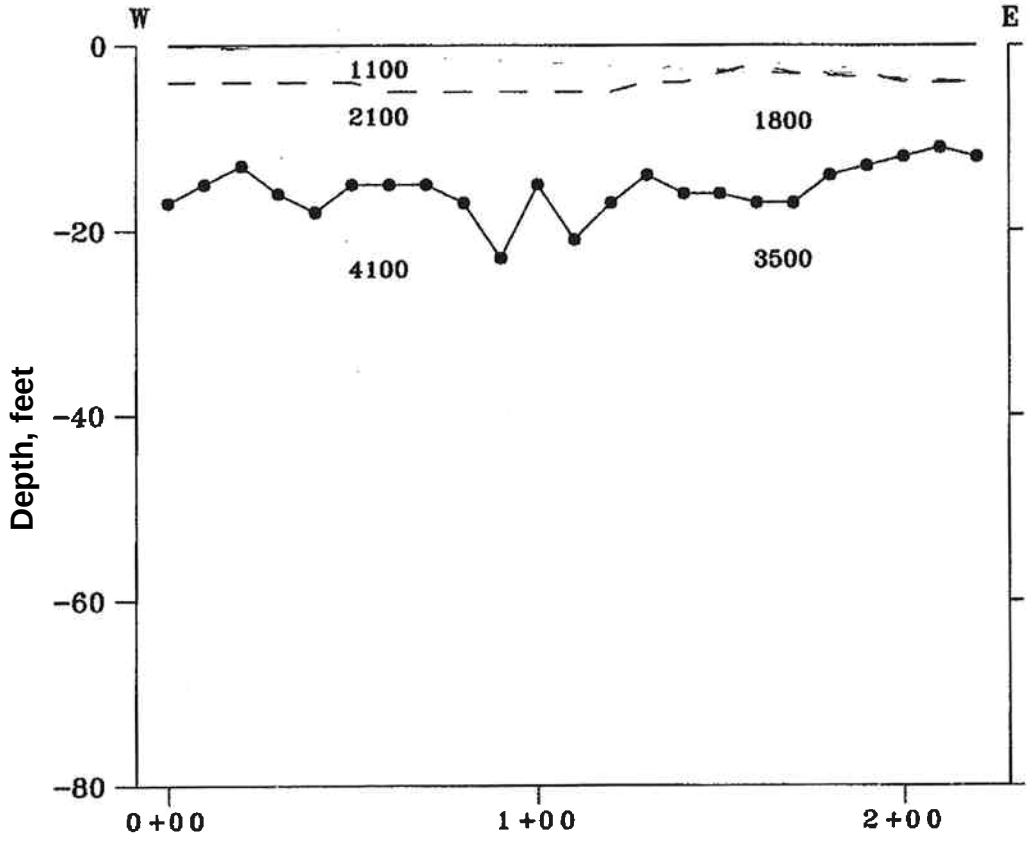
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P110

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-158



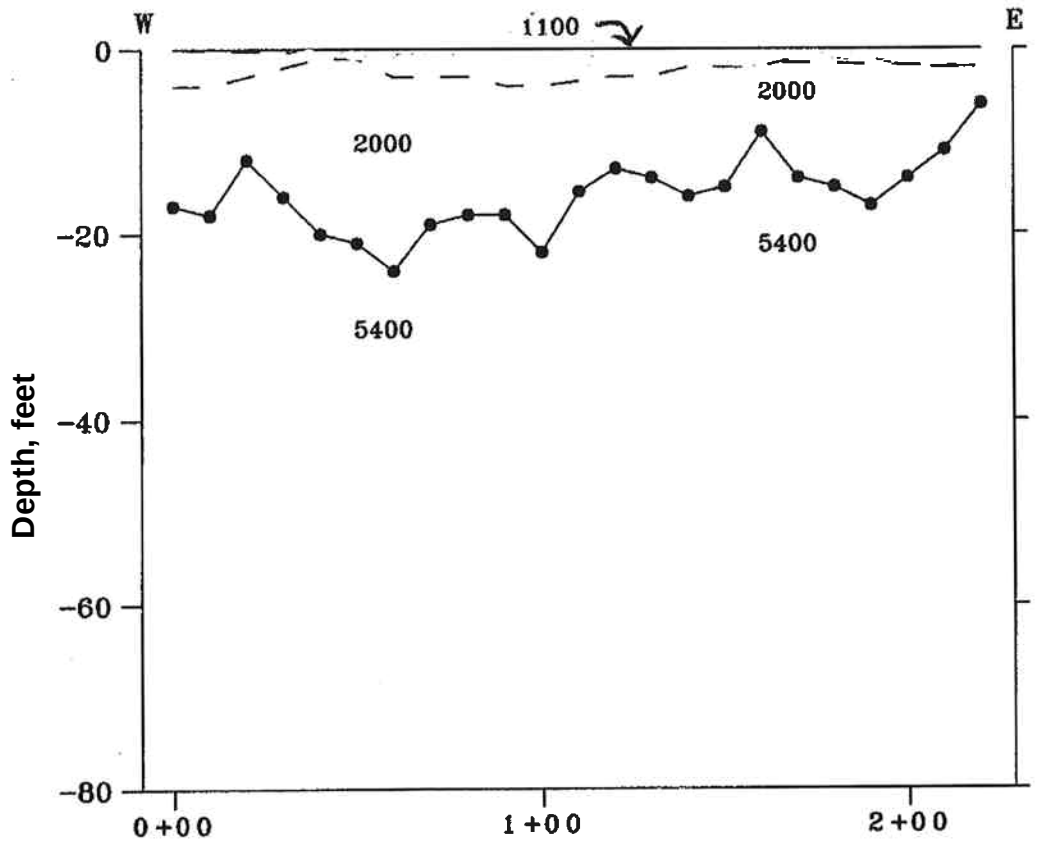
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P112

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-159



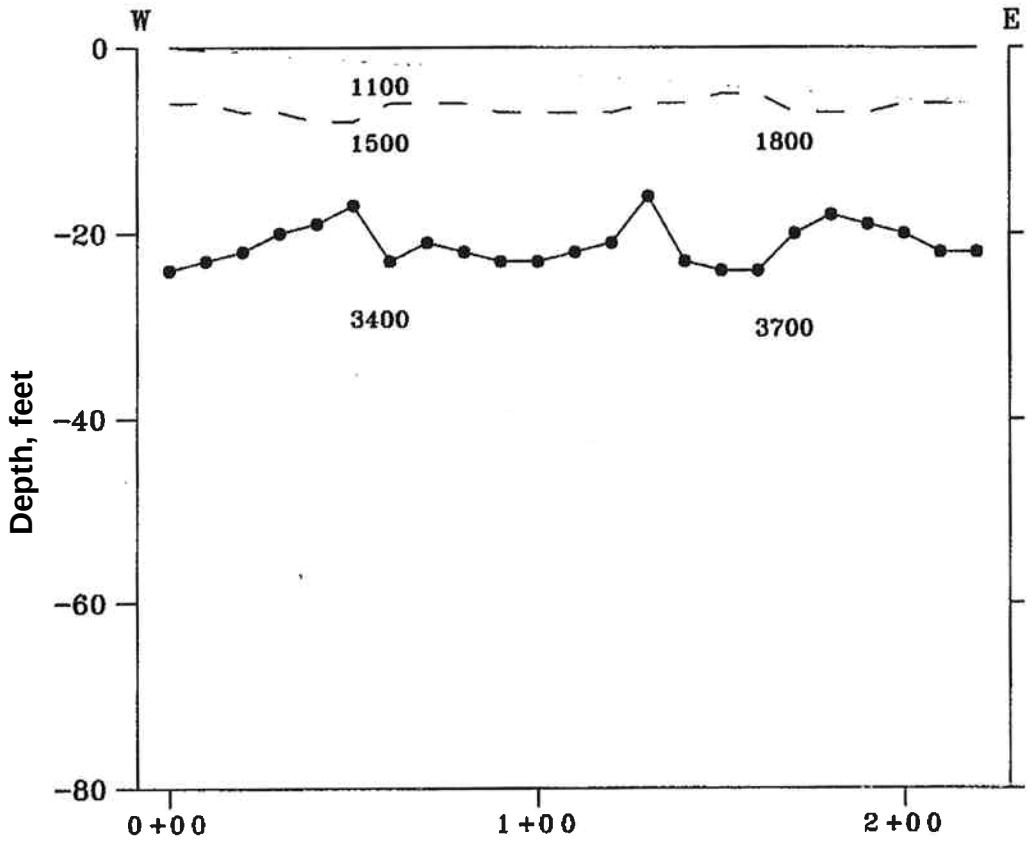
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P113

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-160



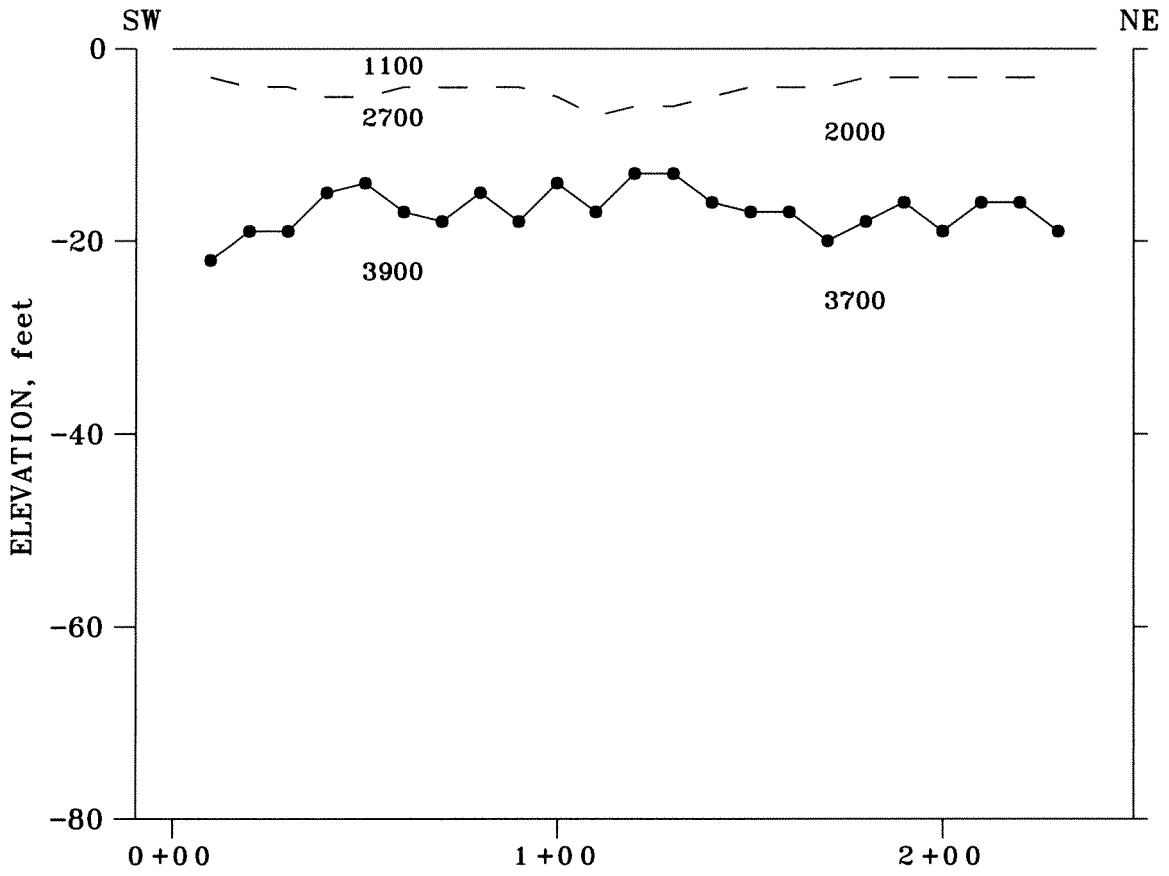
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P114

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-161



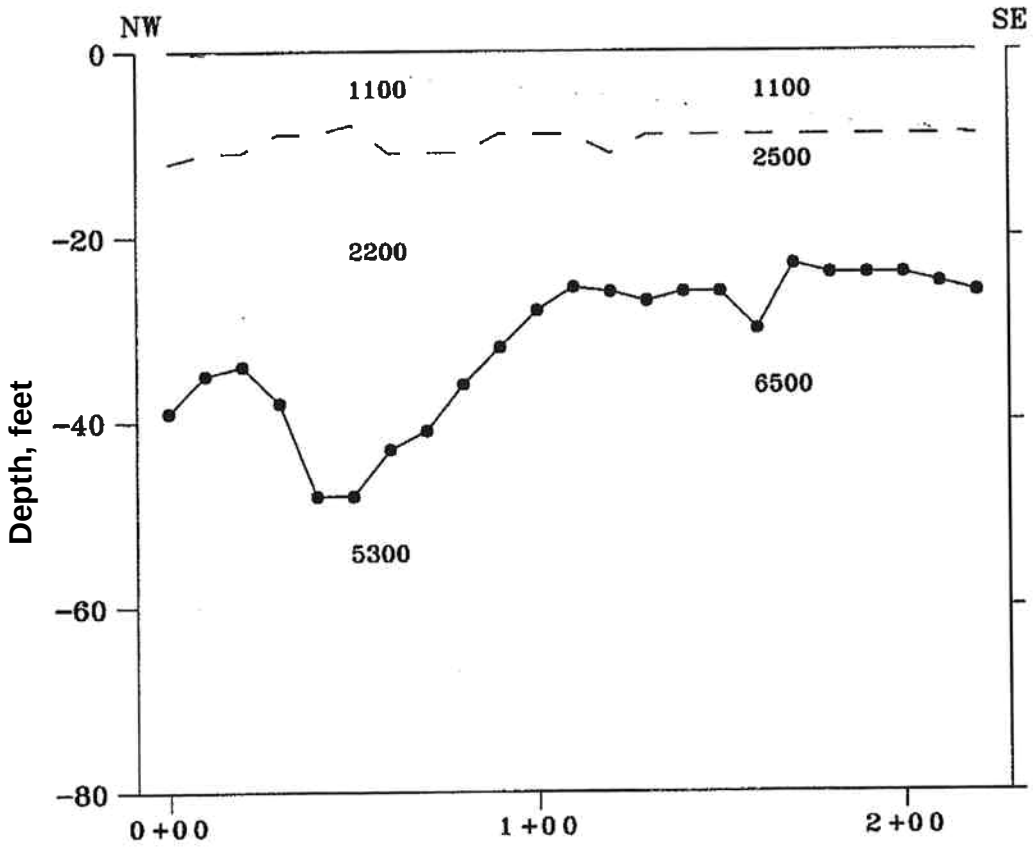
P-wave velocities in feet per second

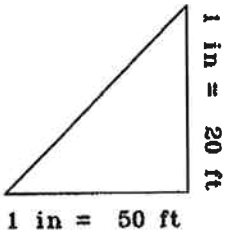
1 in = 20 ft

1 in = 50 ft

RS8-P114-1

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-162

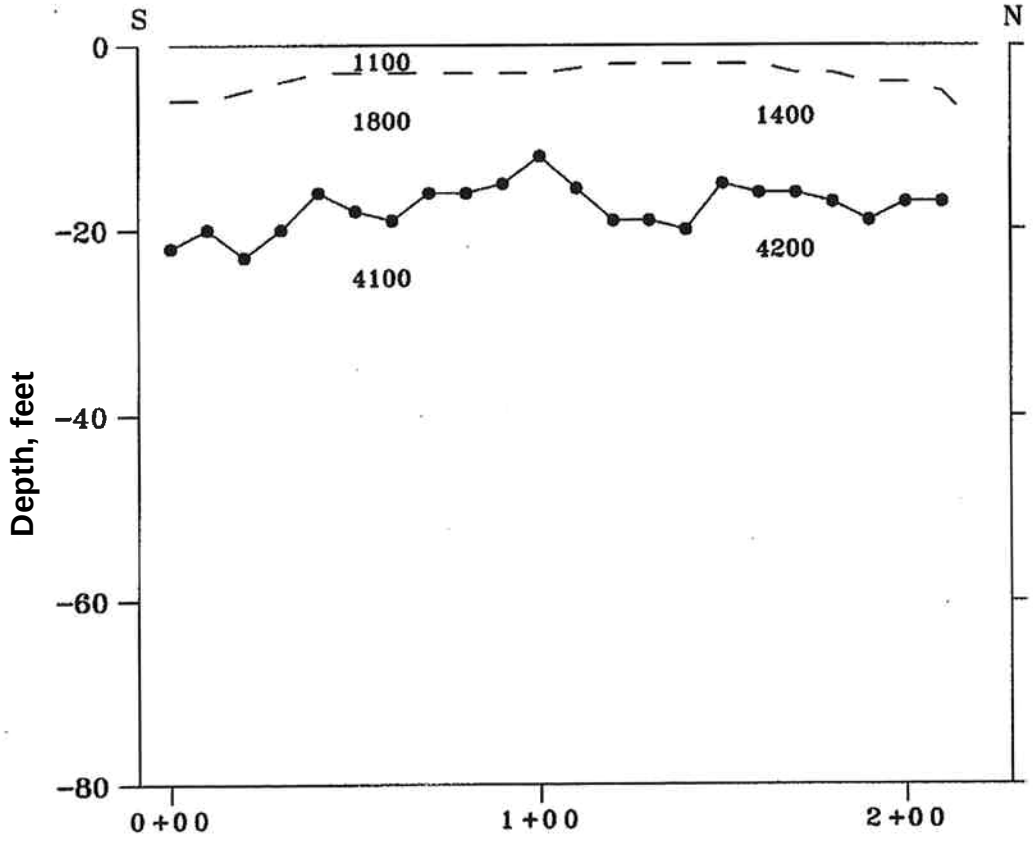




P-wave velocities in feet per second

RS8-P115

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-163



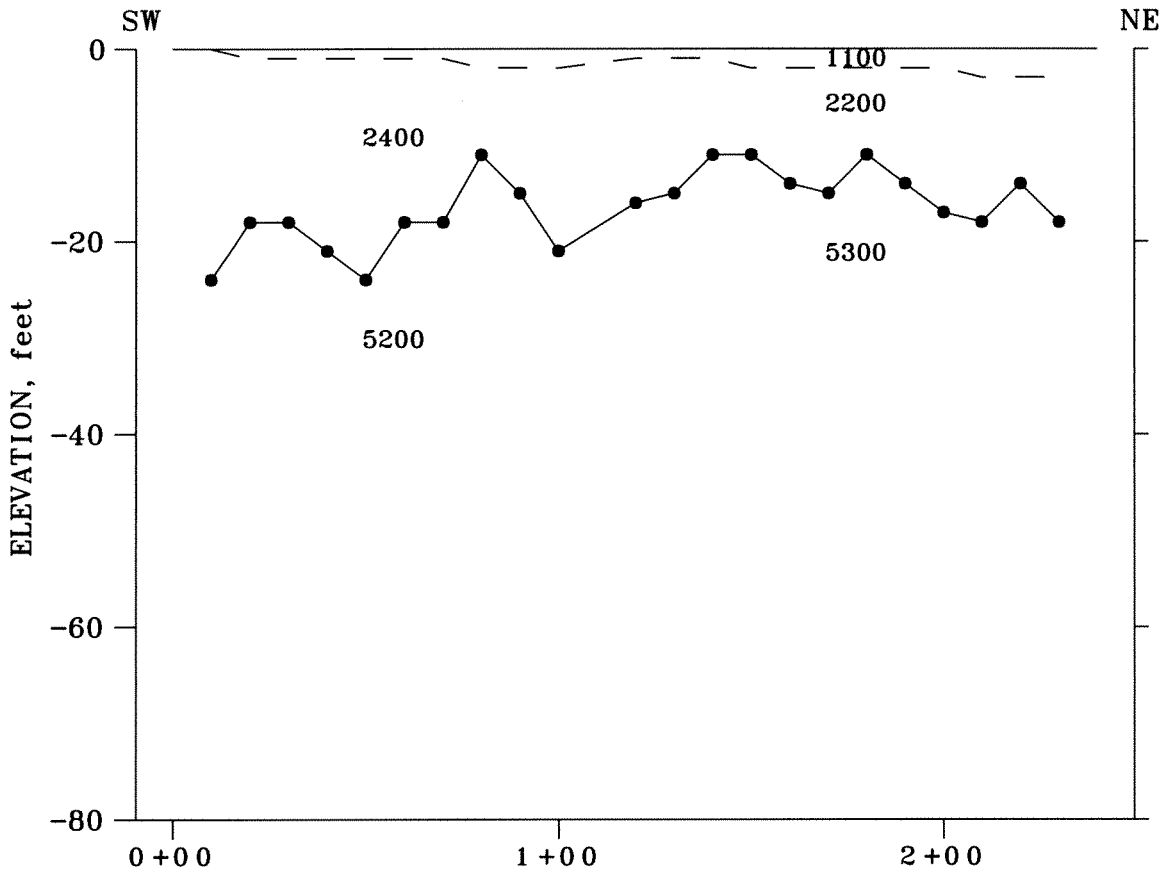
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P116

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-164



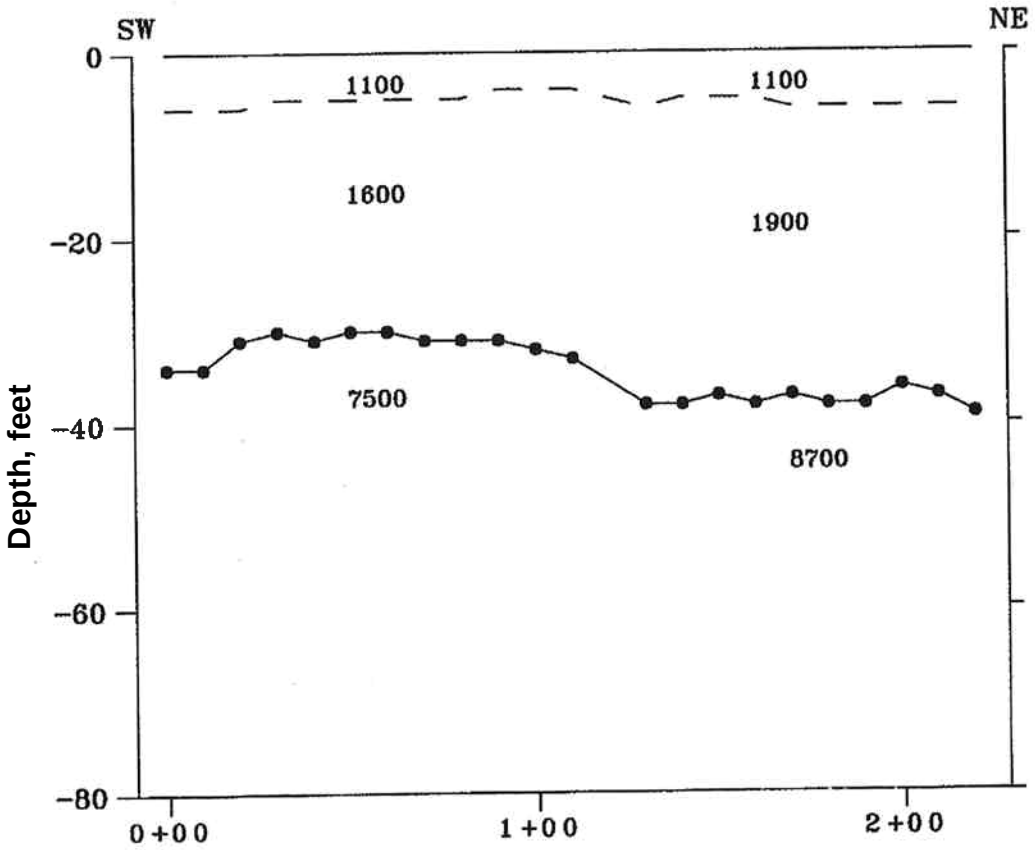
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P116-1

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-165



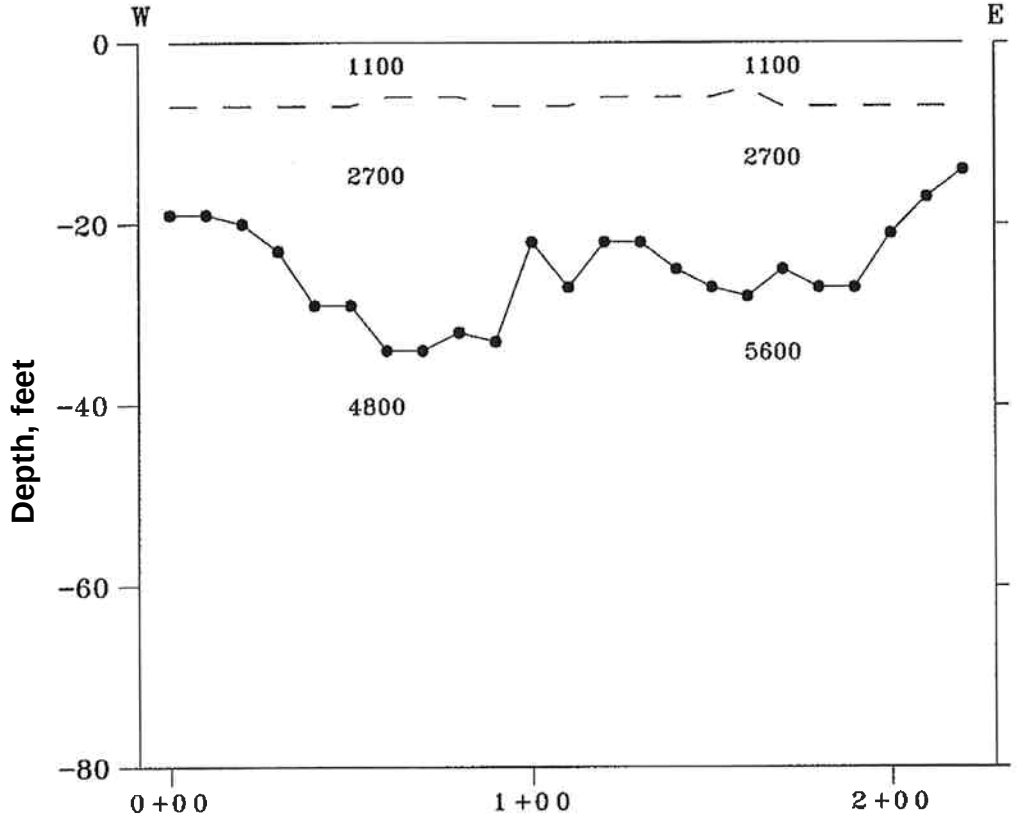
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P117

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-166



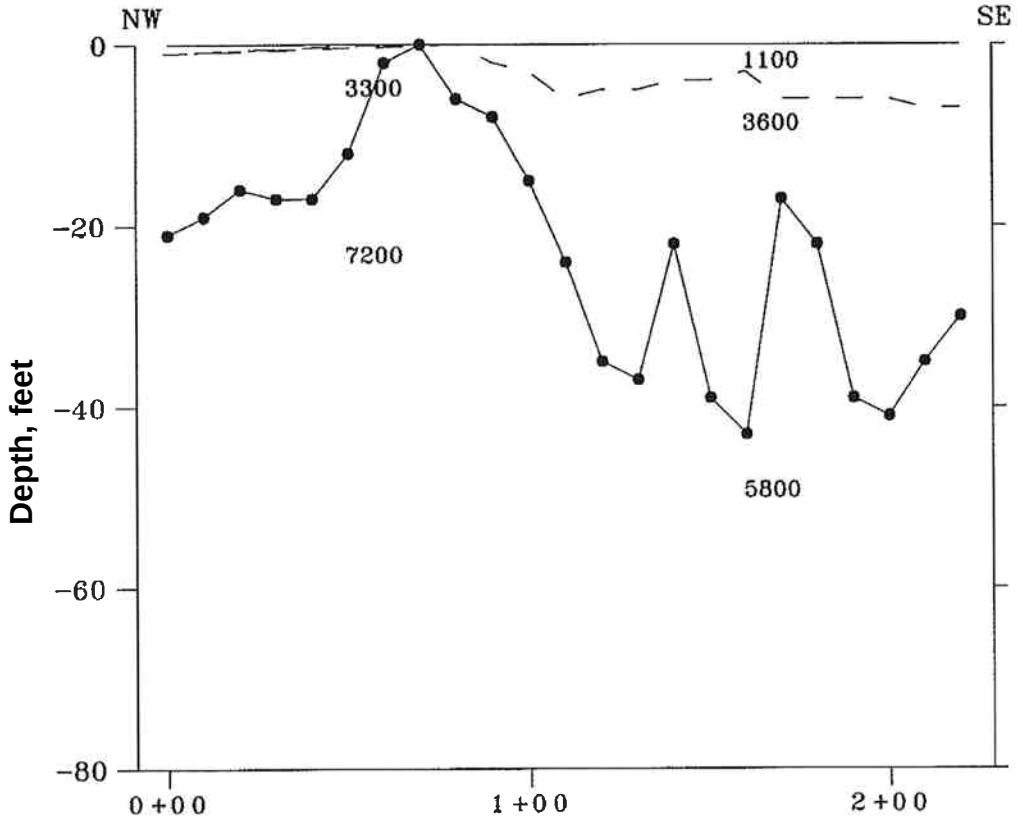
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P118

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-167



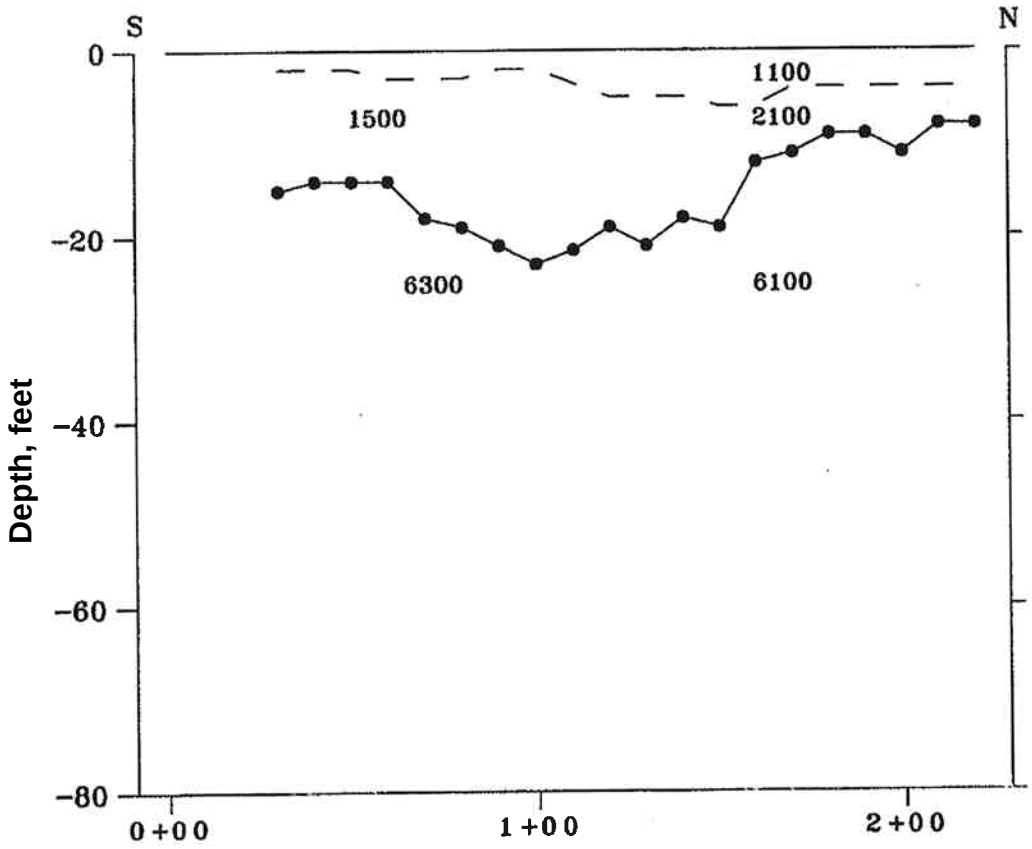
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS8-P119

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-168



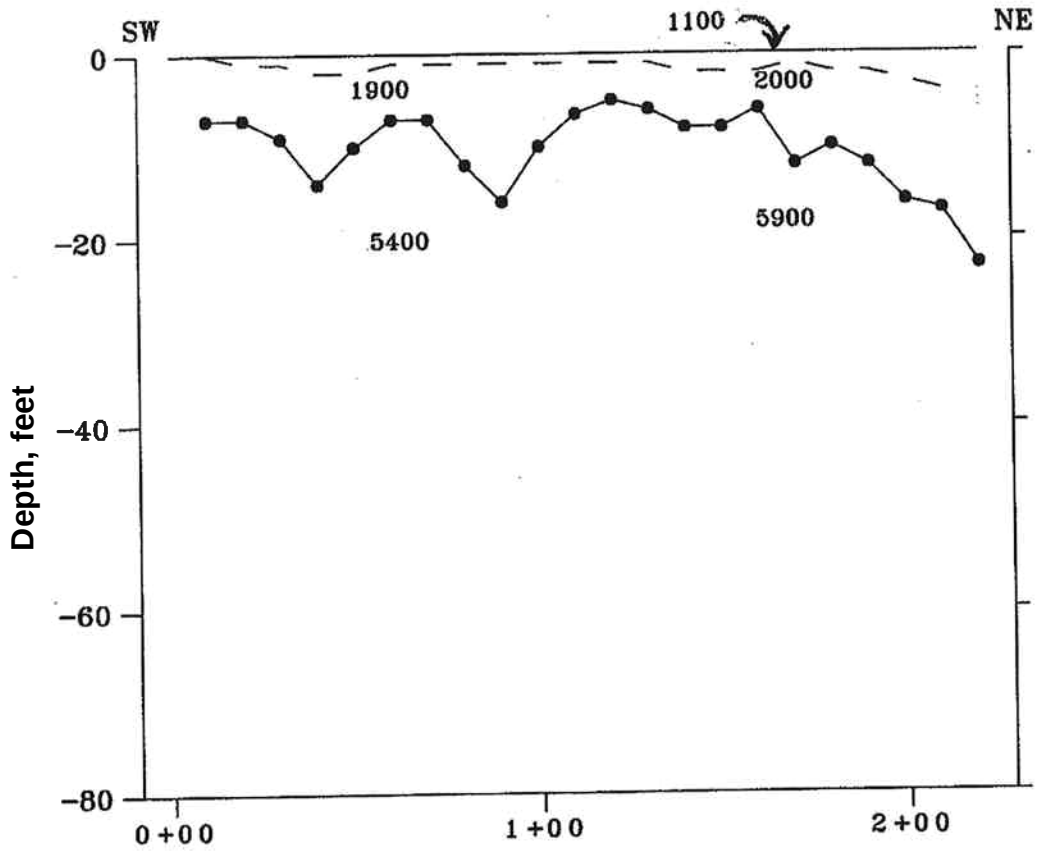
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P120-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-169



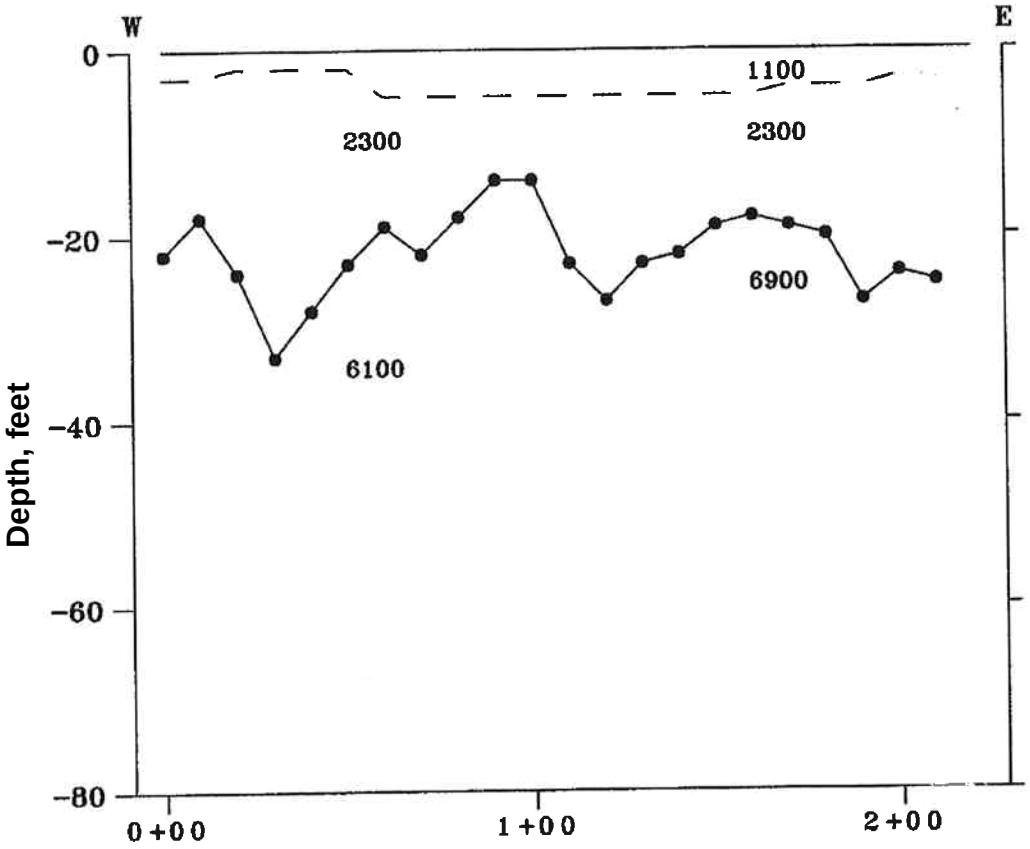
P-wave velocities in feet per second

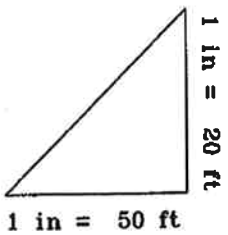
1 in = 20 ft

1 in = 50 ft

RS9-P121

Project No. 27666031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-170

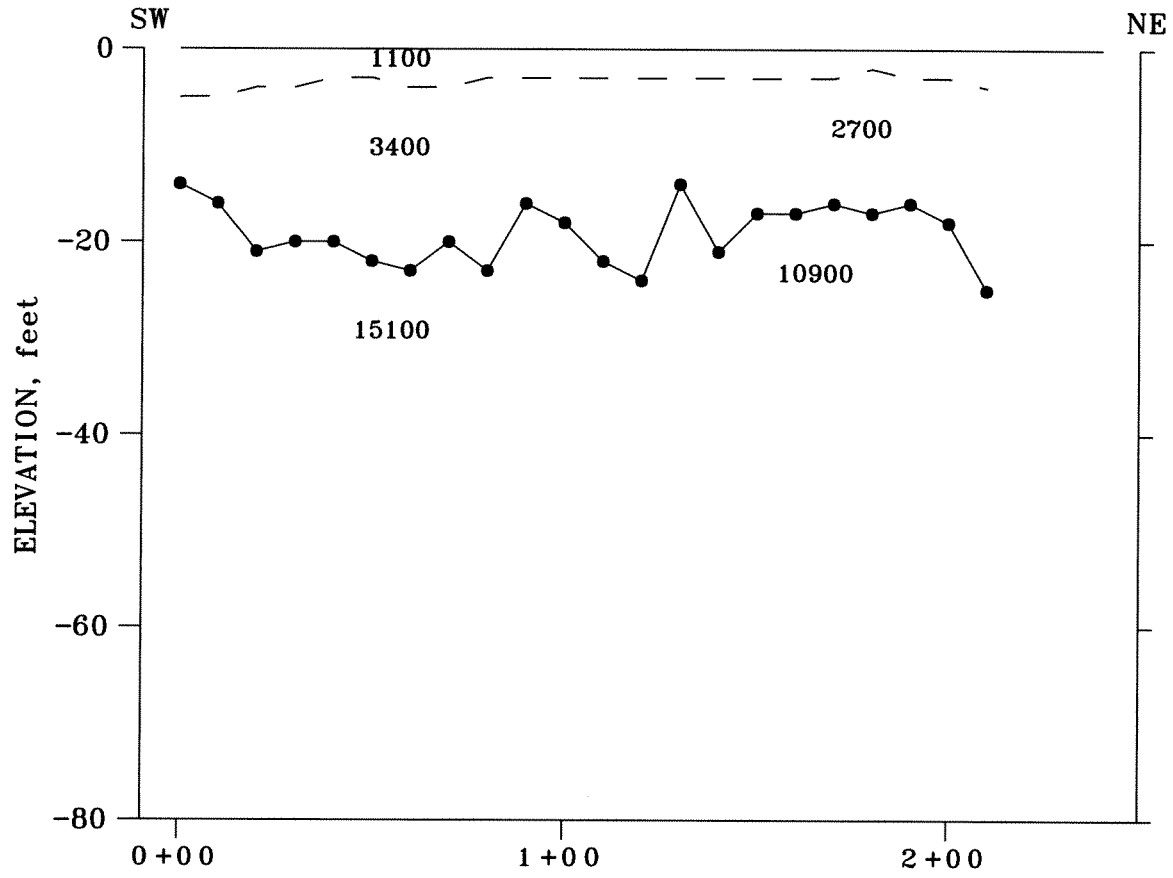




P-wave velocities in feet per second

RS9-P122

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-171



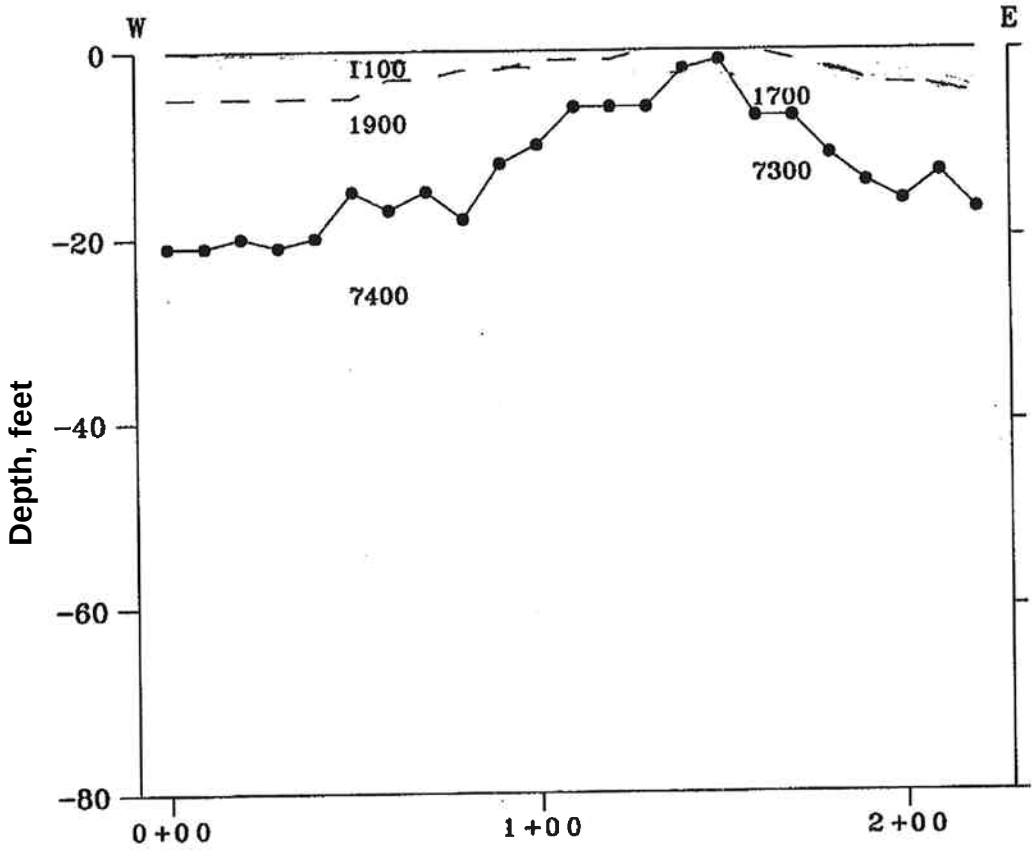
P-wave velocities in feet per second

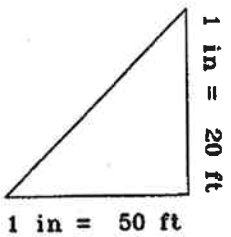
1 in = 20 ft

1 in = 50 ft

RS9-P122-2

Project No. 27668031	Date: 10-5-09	**Sunrise Powerlink Project**	Fig. C-172

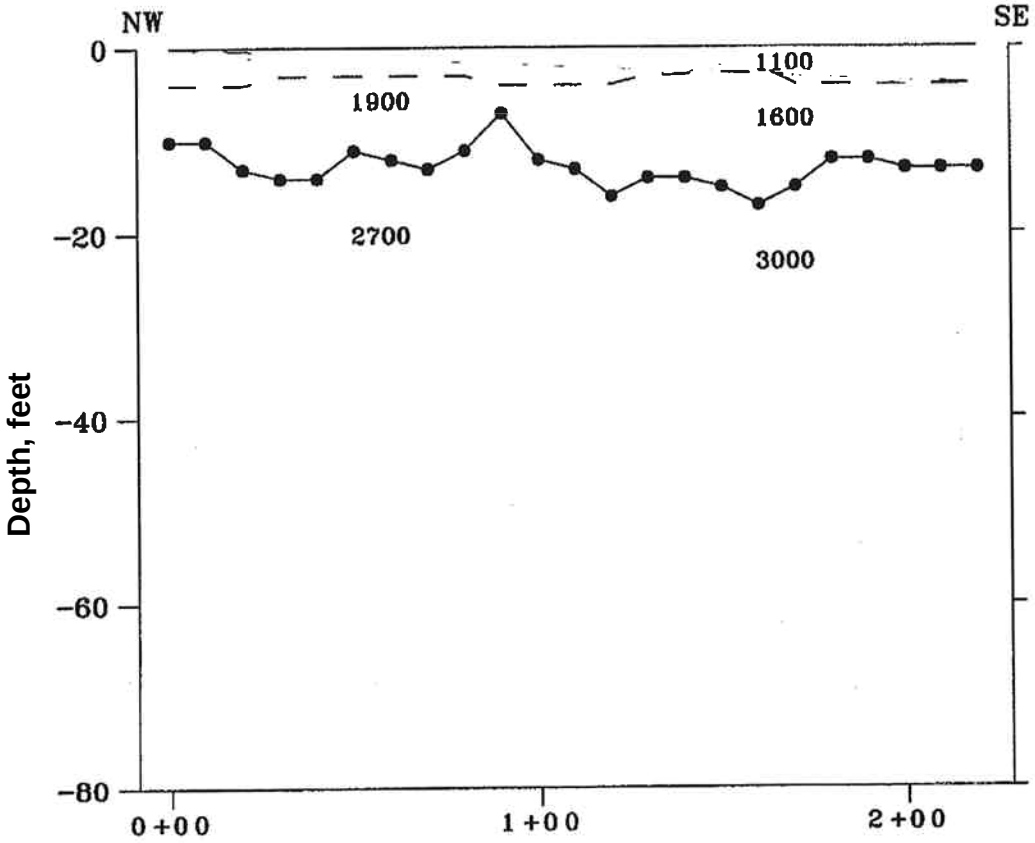




P-wave velocities in feet per second

RS9-P123-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-173



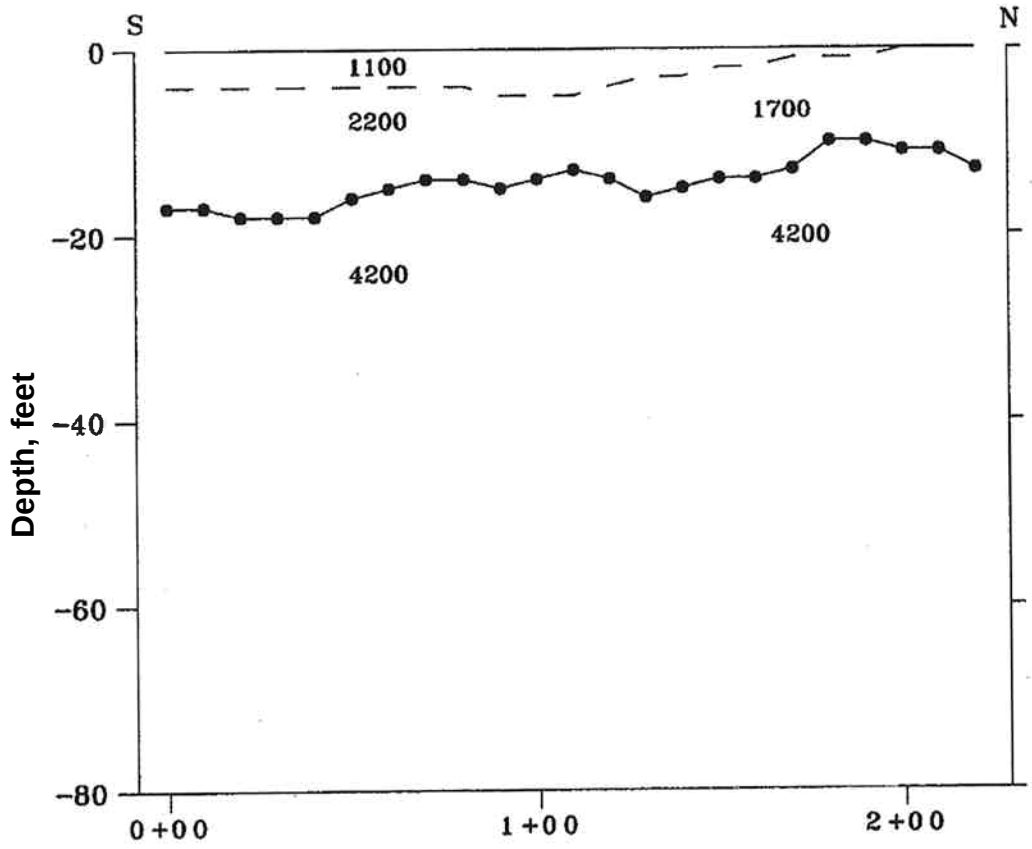
1 in = 20 ft

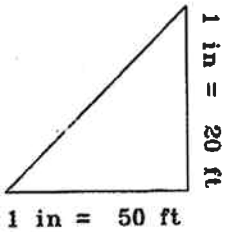
1 in = 50 ft

P-wave velocities in feet per second

RS9-P125

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-174

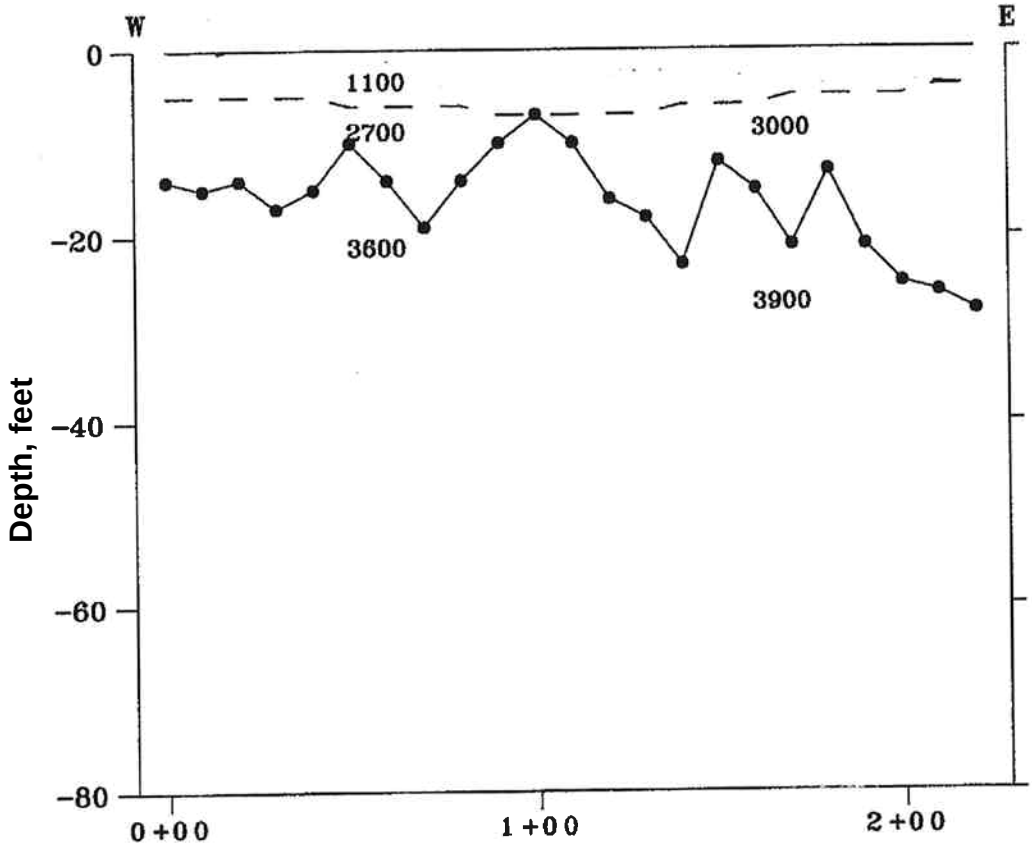


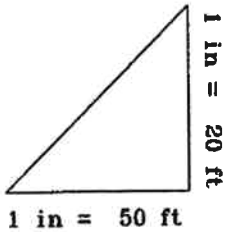


P-wave velocities in feet per second

RS9-P126

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-175

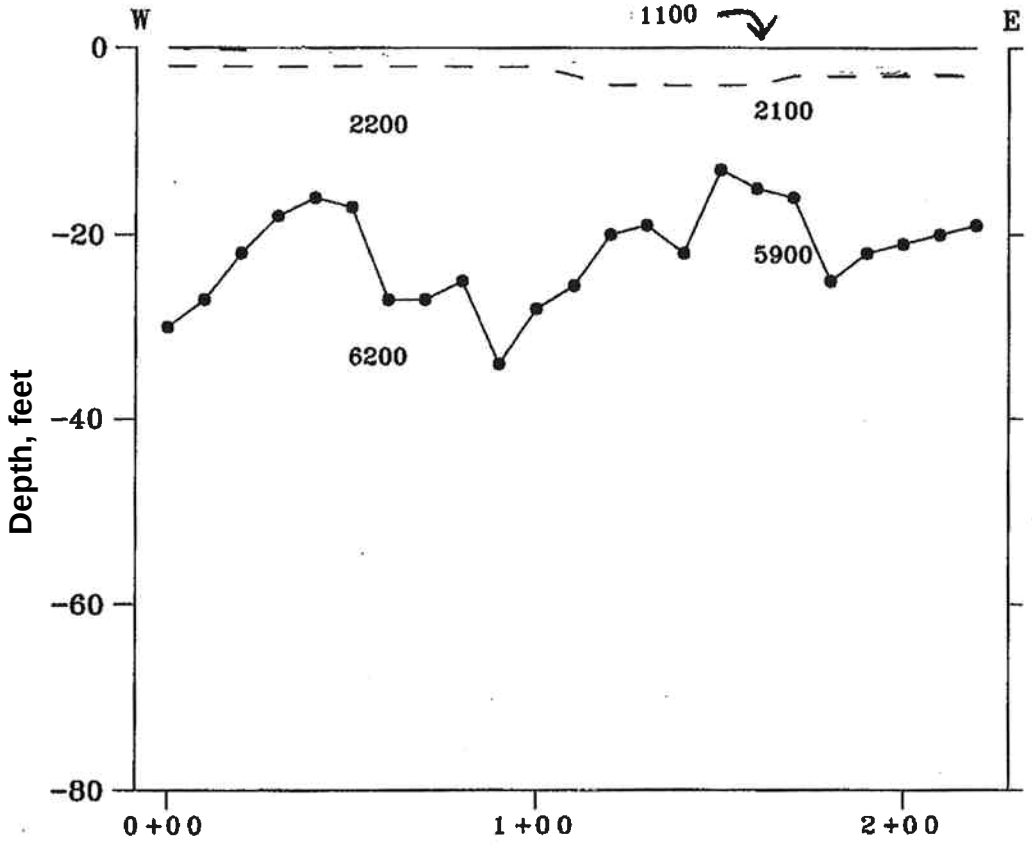




P-wave velocities in feet per second

RS9-P127

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-176



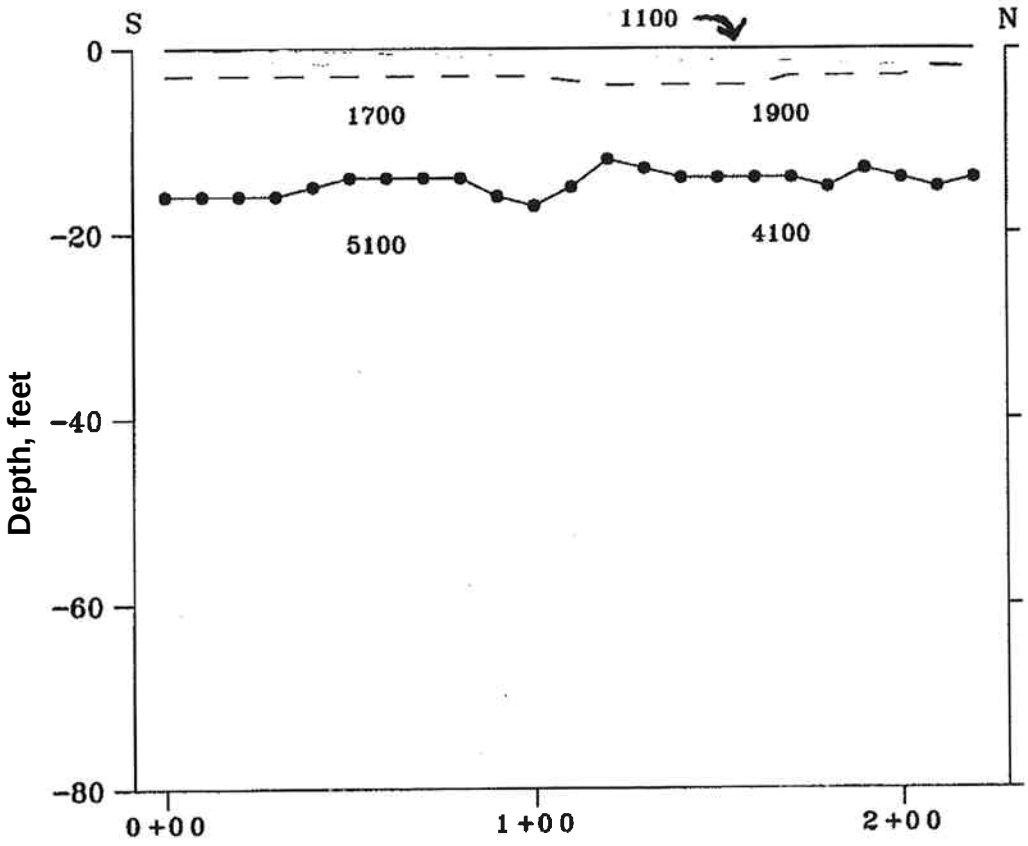
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P129

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-177



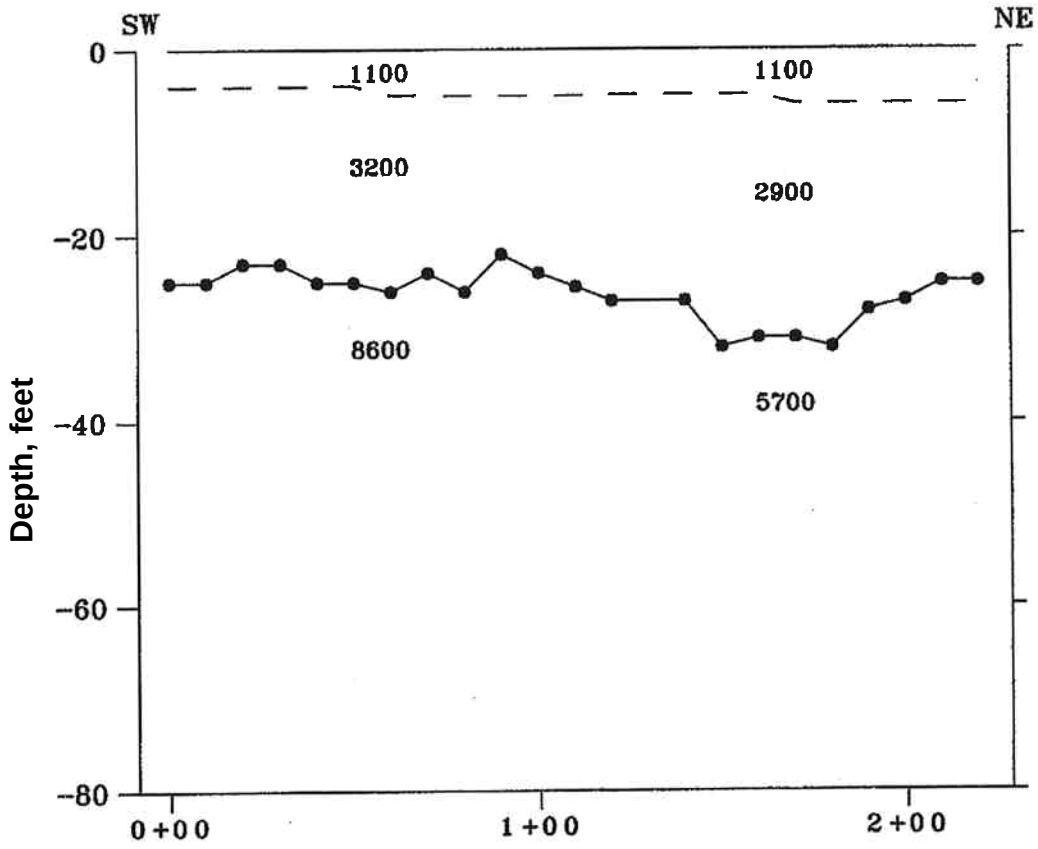
1 in = 20 ft

1 in = 50 ft

P-wave velocities in feet per second

RS9-P130

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-178



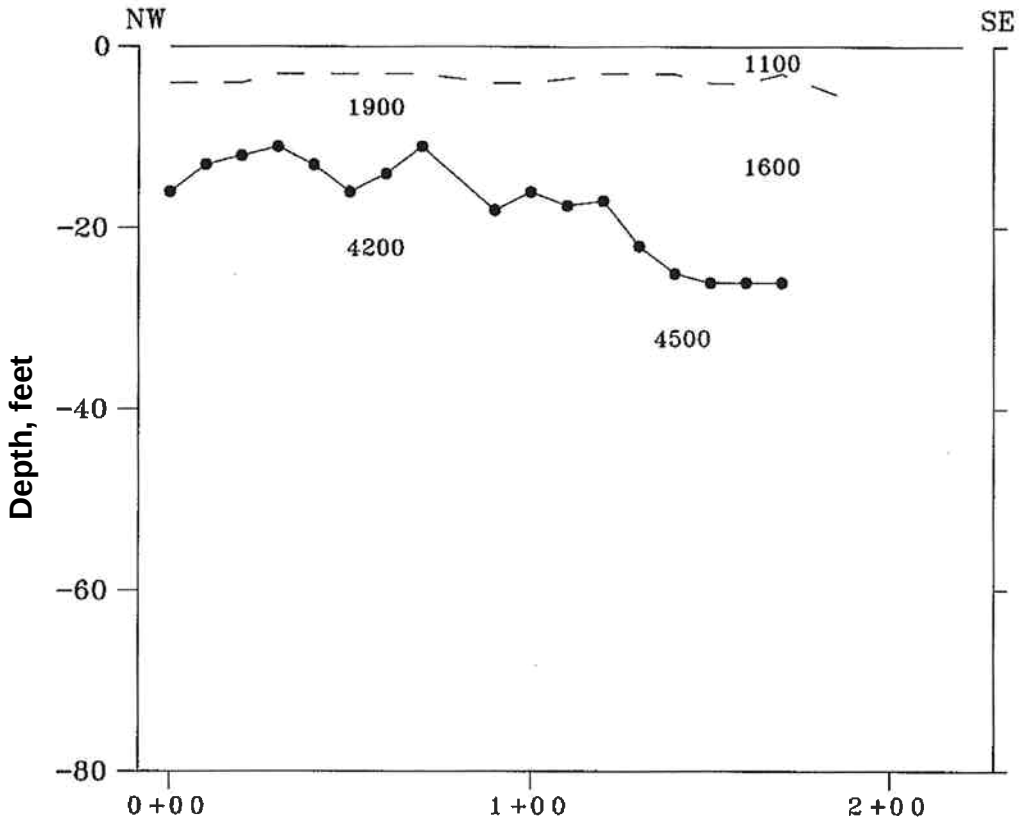
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P131

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-179



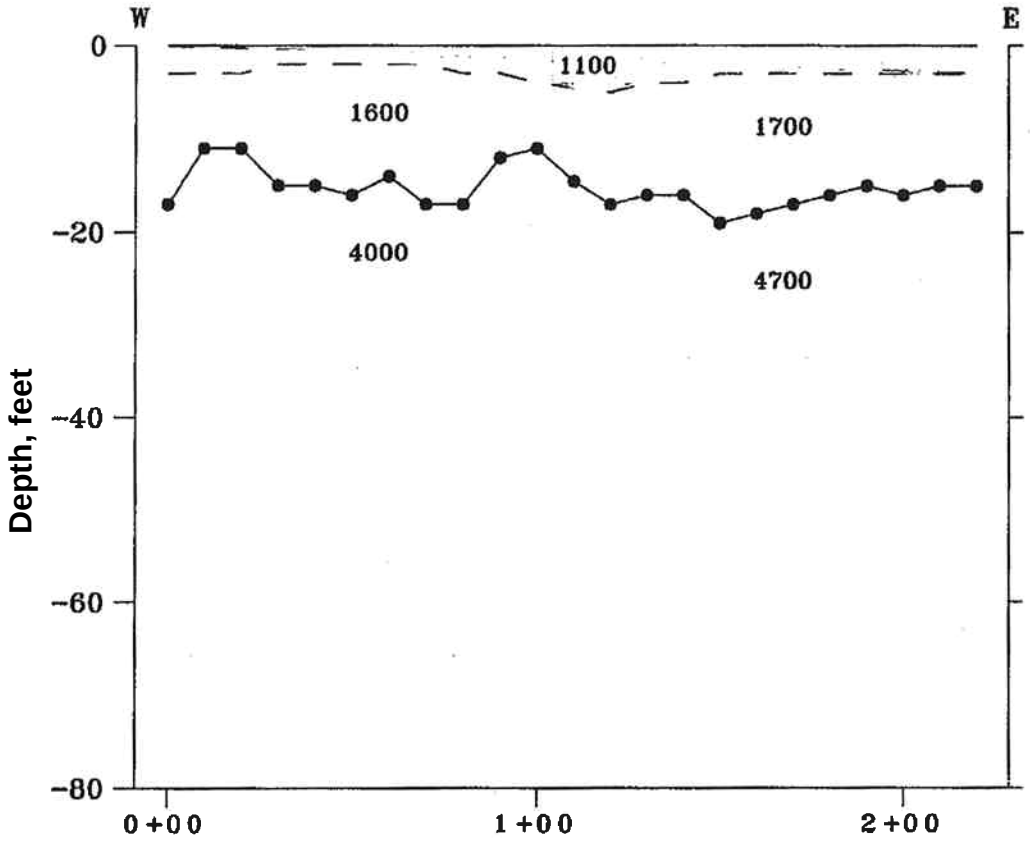
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P132-2

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-180



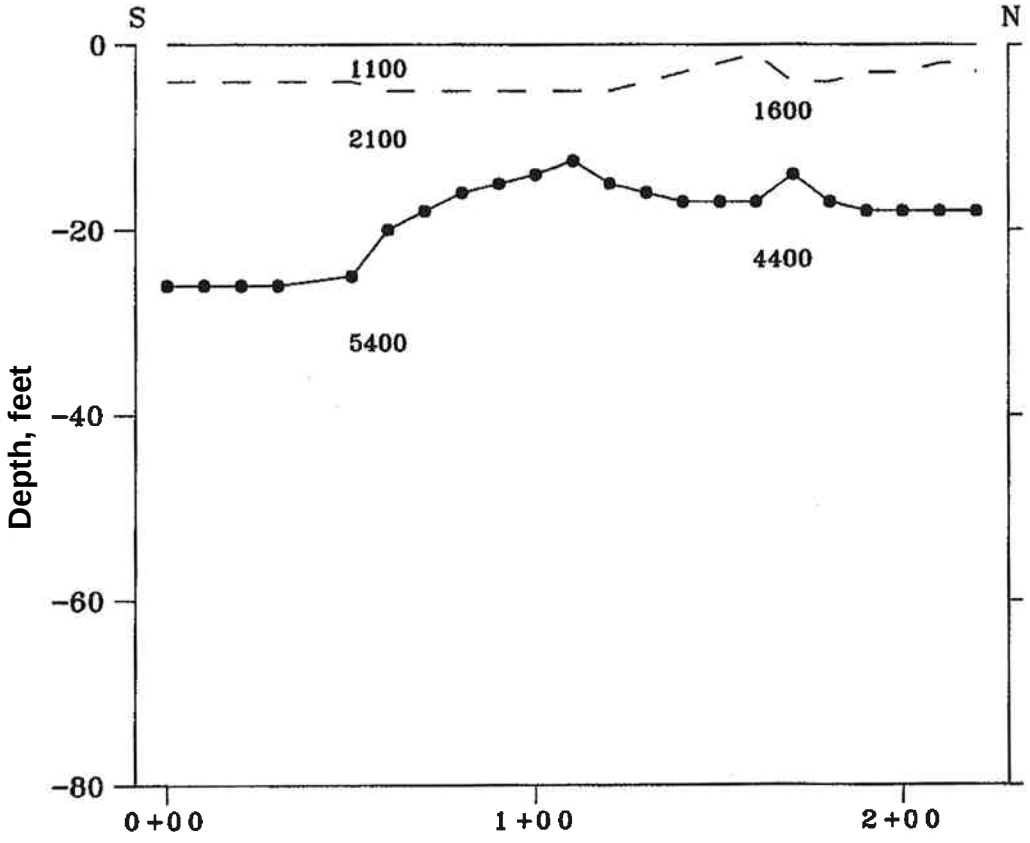
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P135

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-181



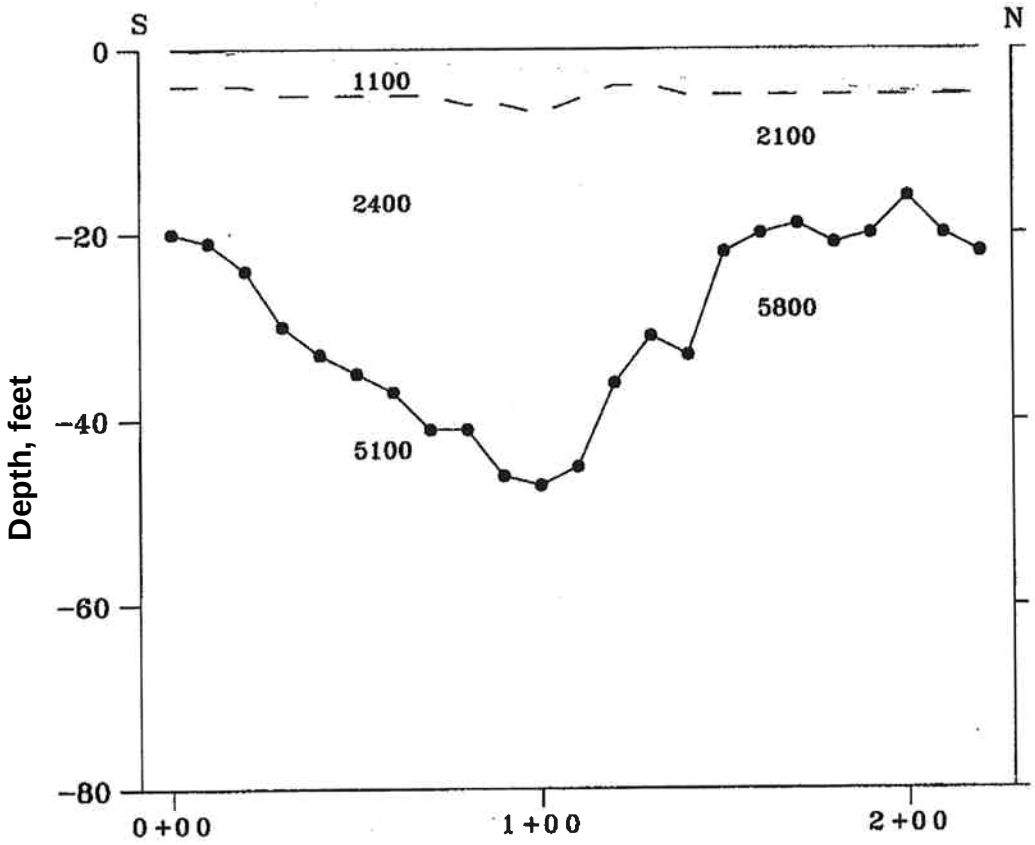
P-wave velocities in feet per second

1 in = 20 ft

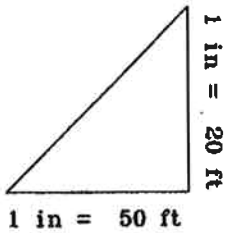
1 in = 50 ft

RS9-P137

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-182

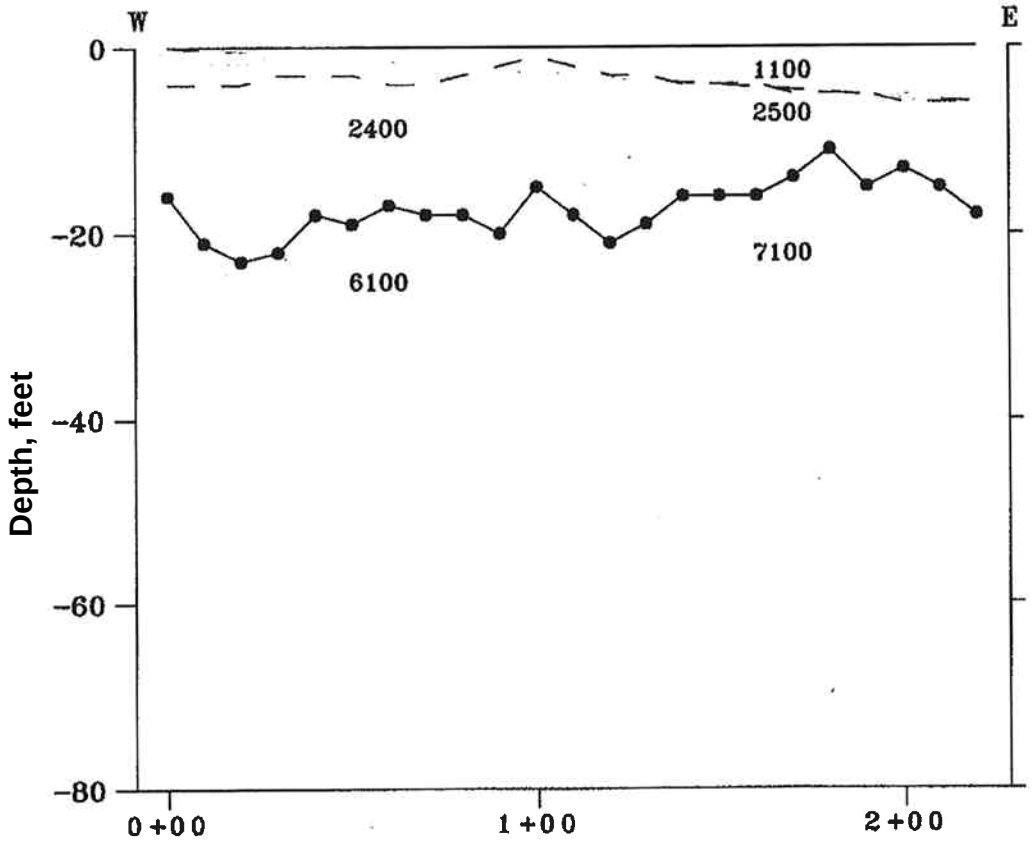


P-wave velocities in feet per second



RS9-P138

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-183



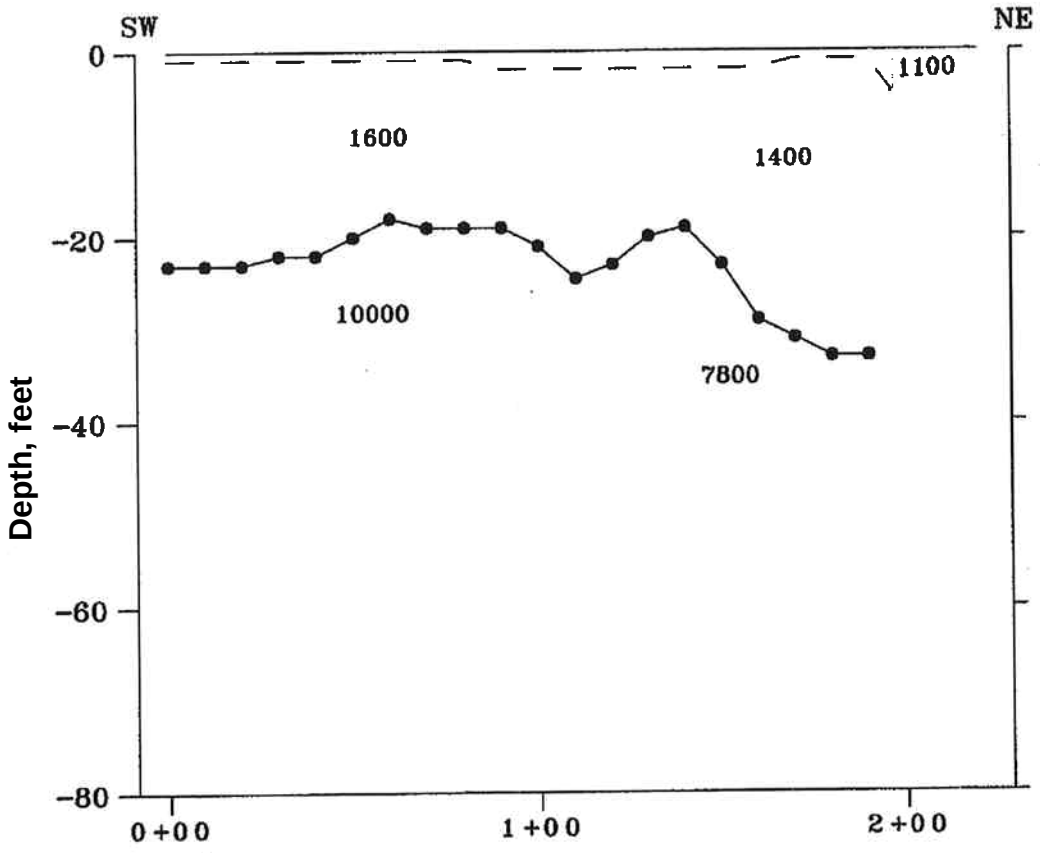
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P139

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-184



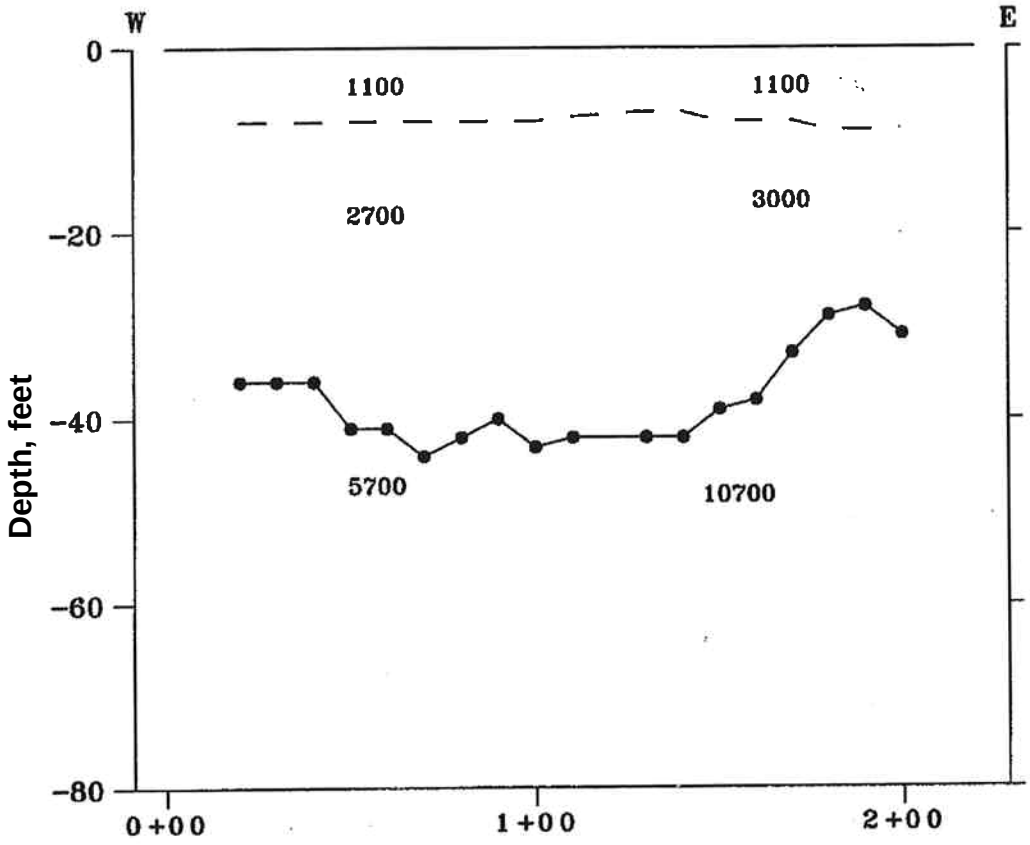
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P140

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-185



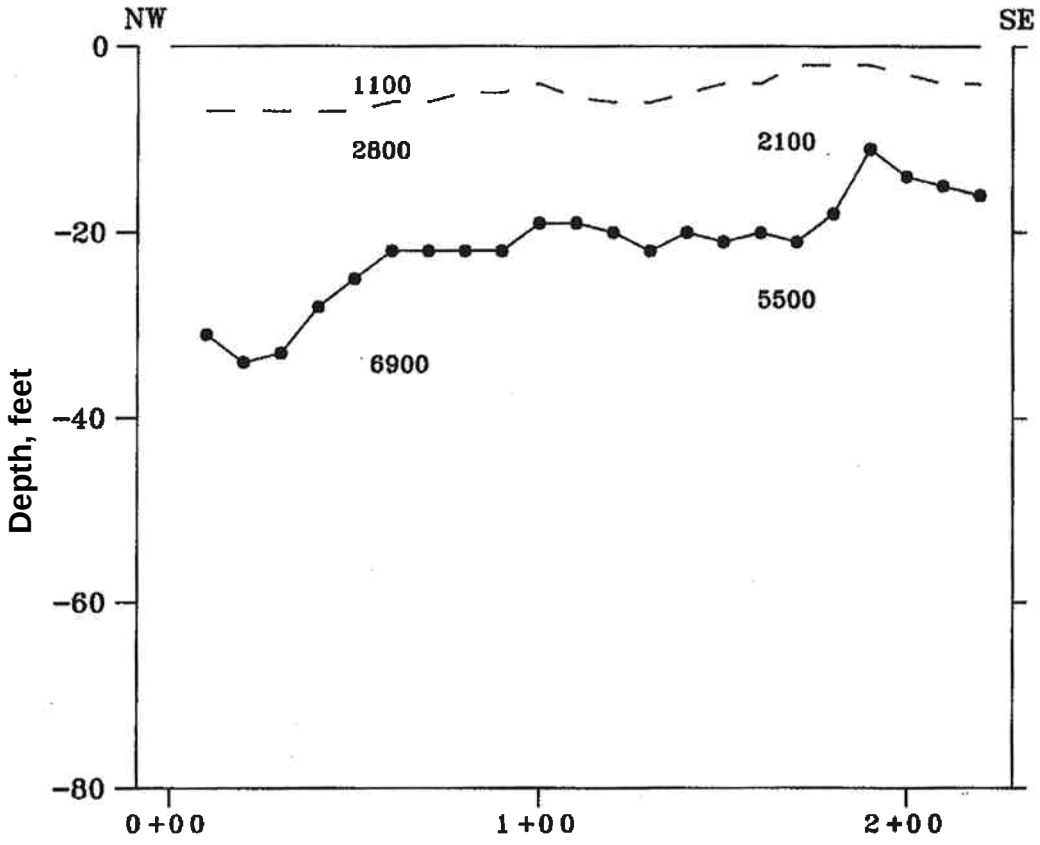
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P141

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-186



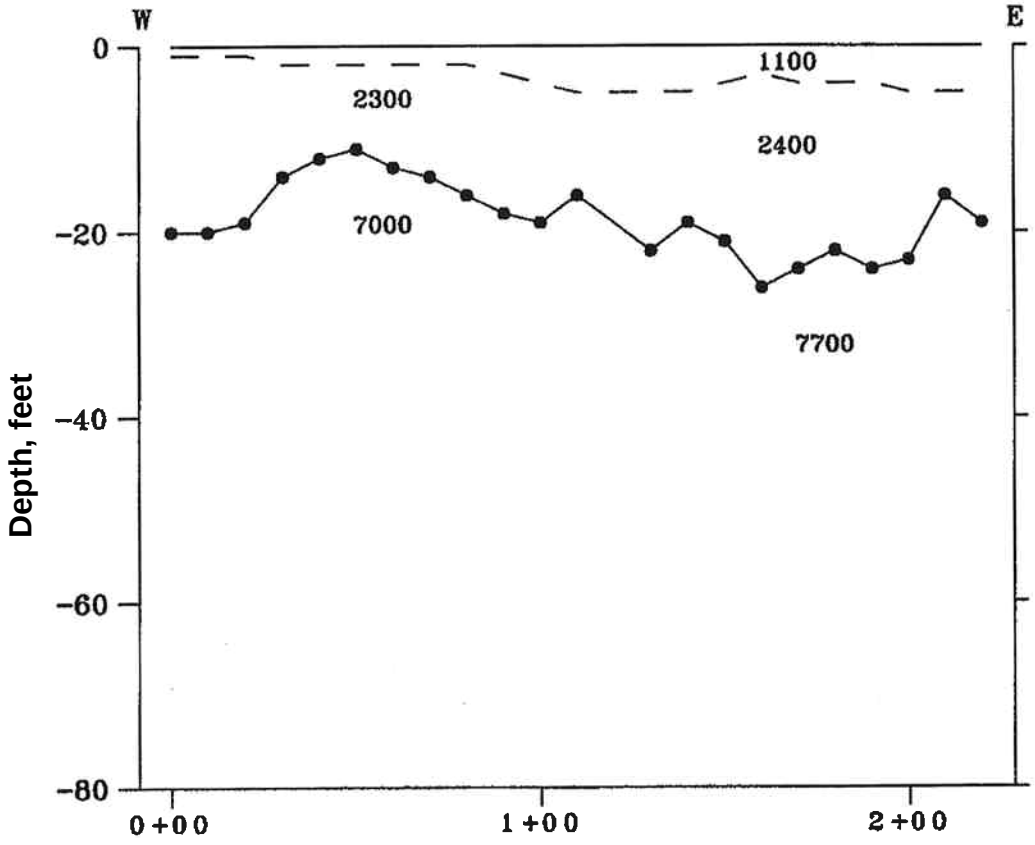
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P142-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-187



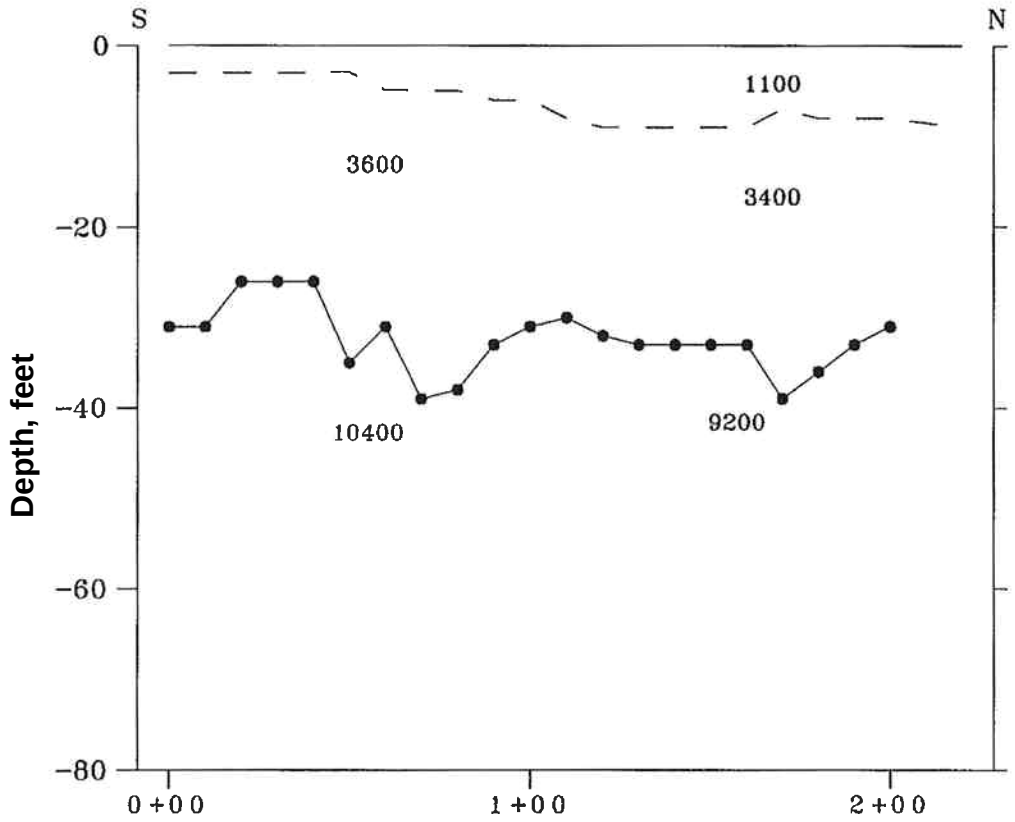
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P143-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-188



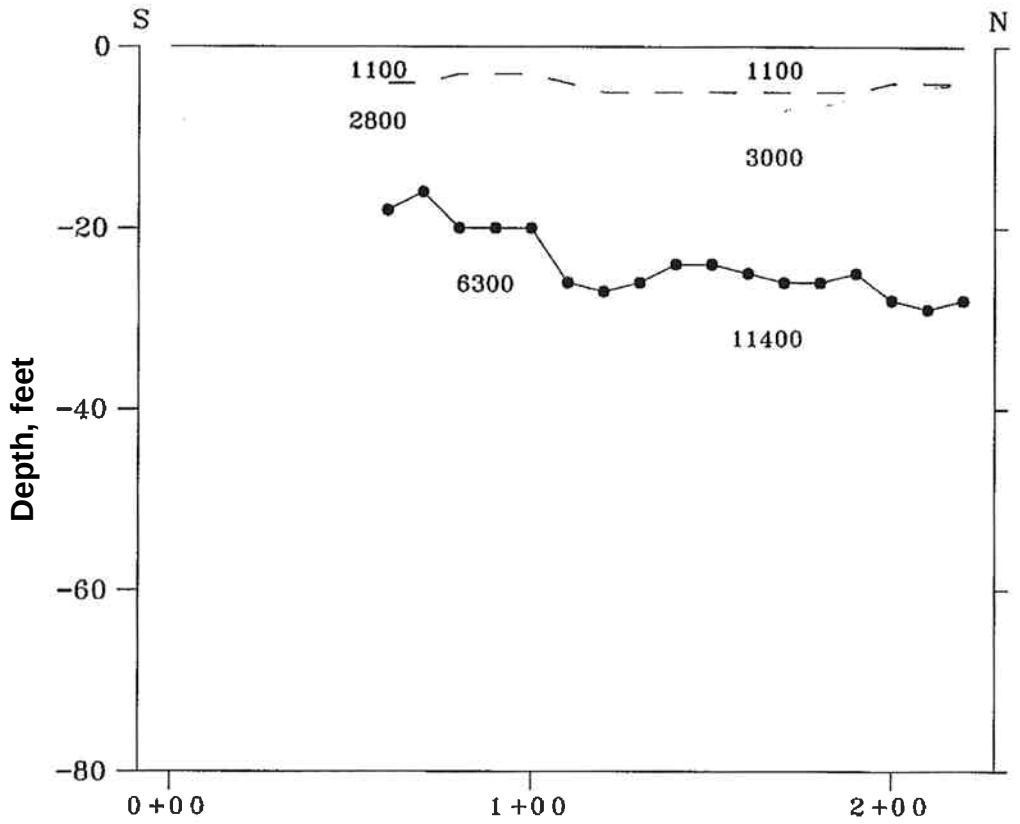
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P144

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-189



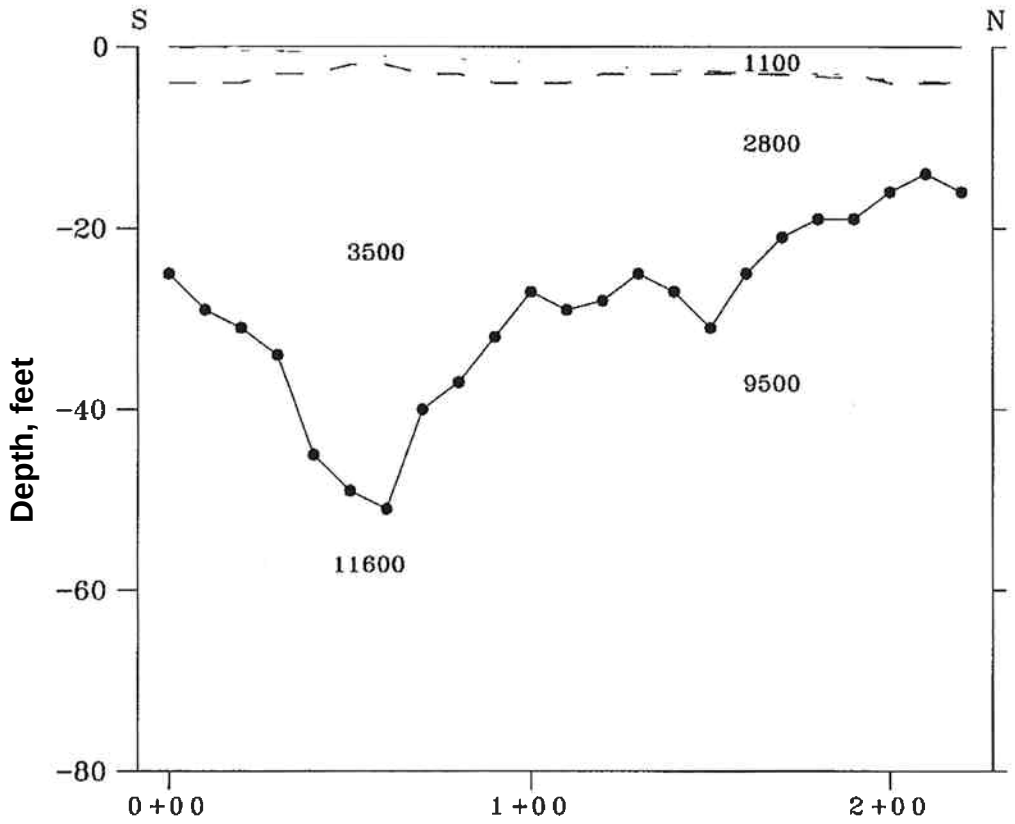
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P145

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-190



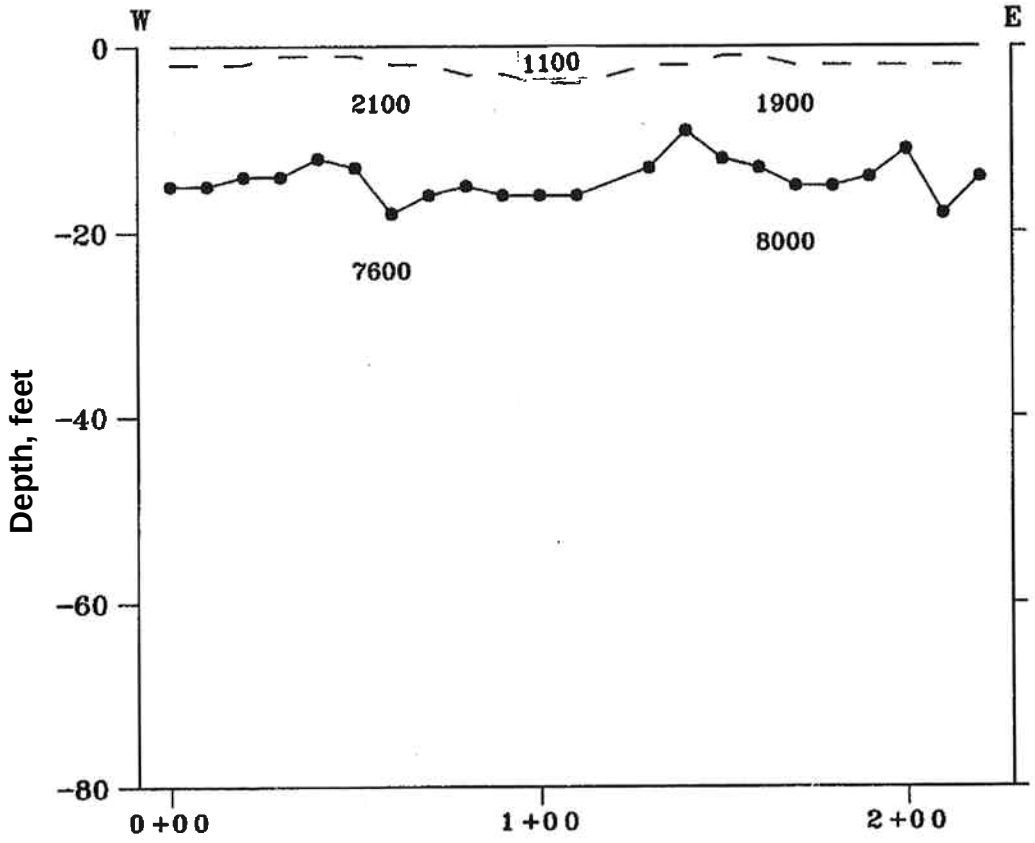
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P146

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-191



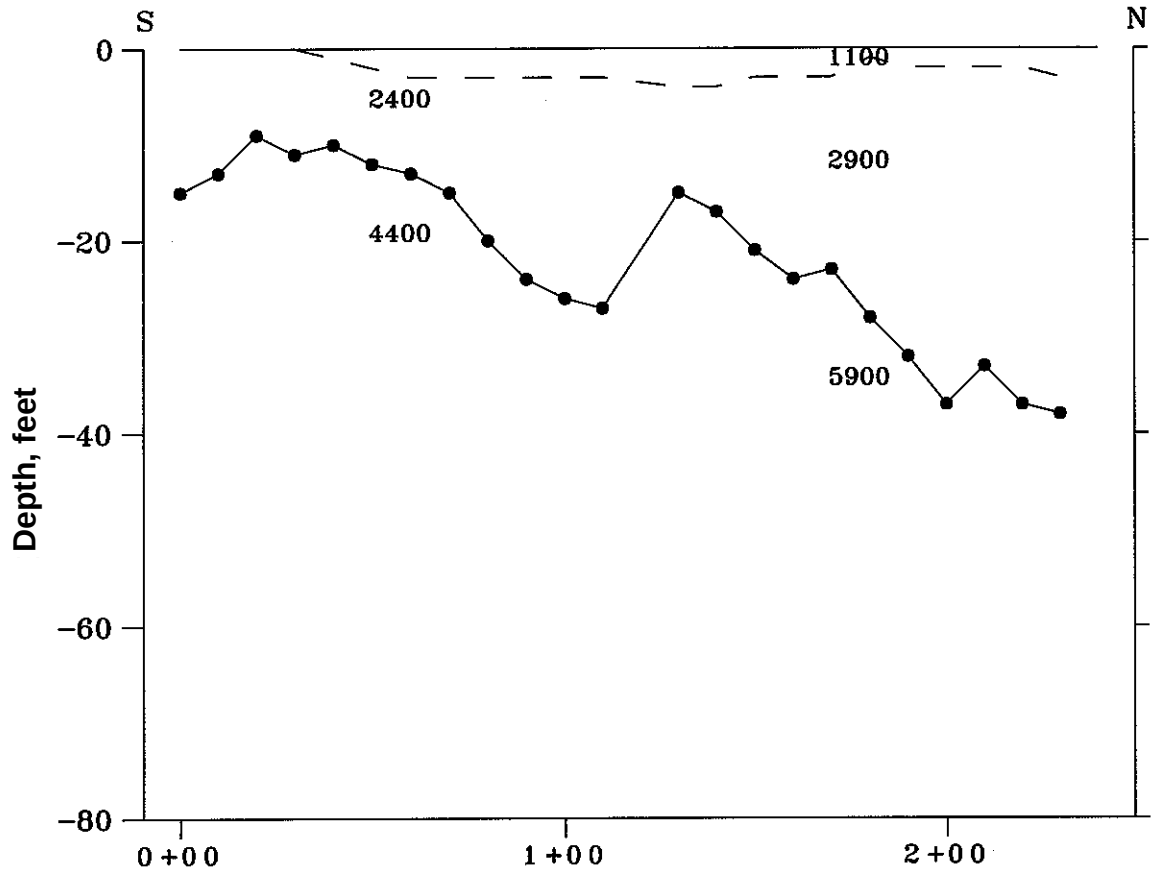
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P149

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-192



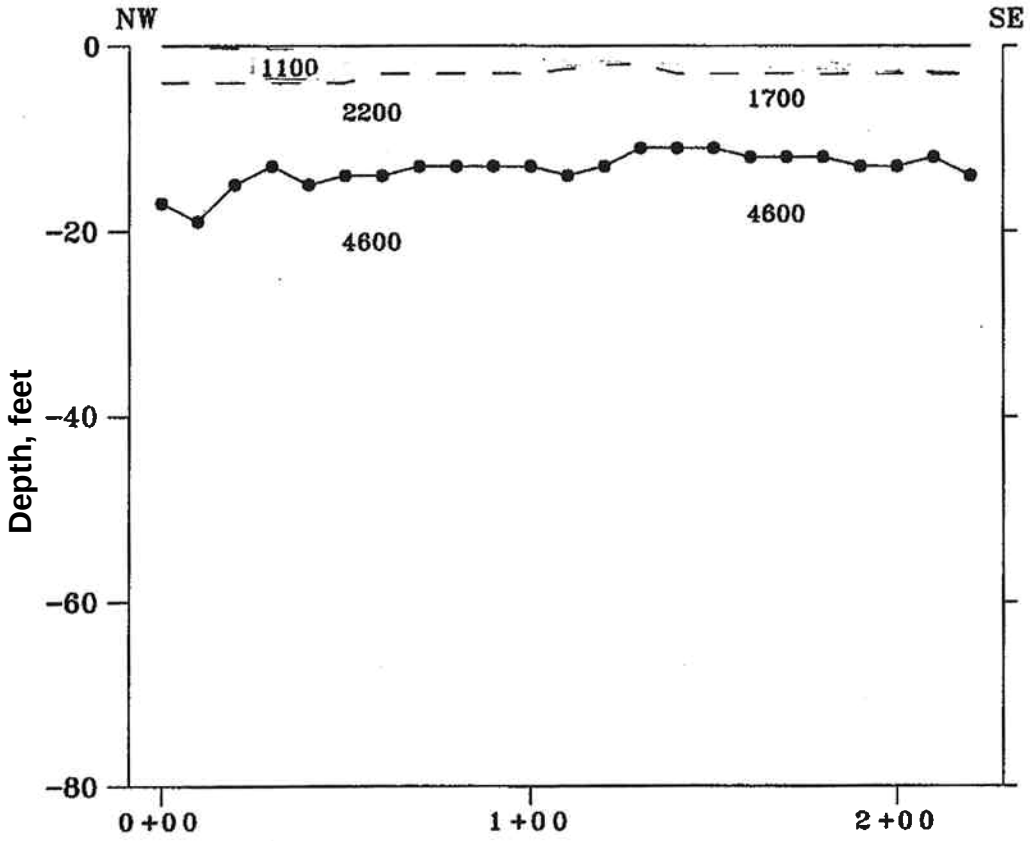
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P150

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-193



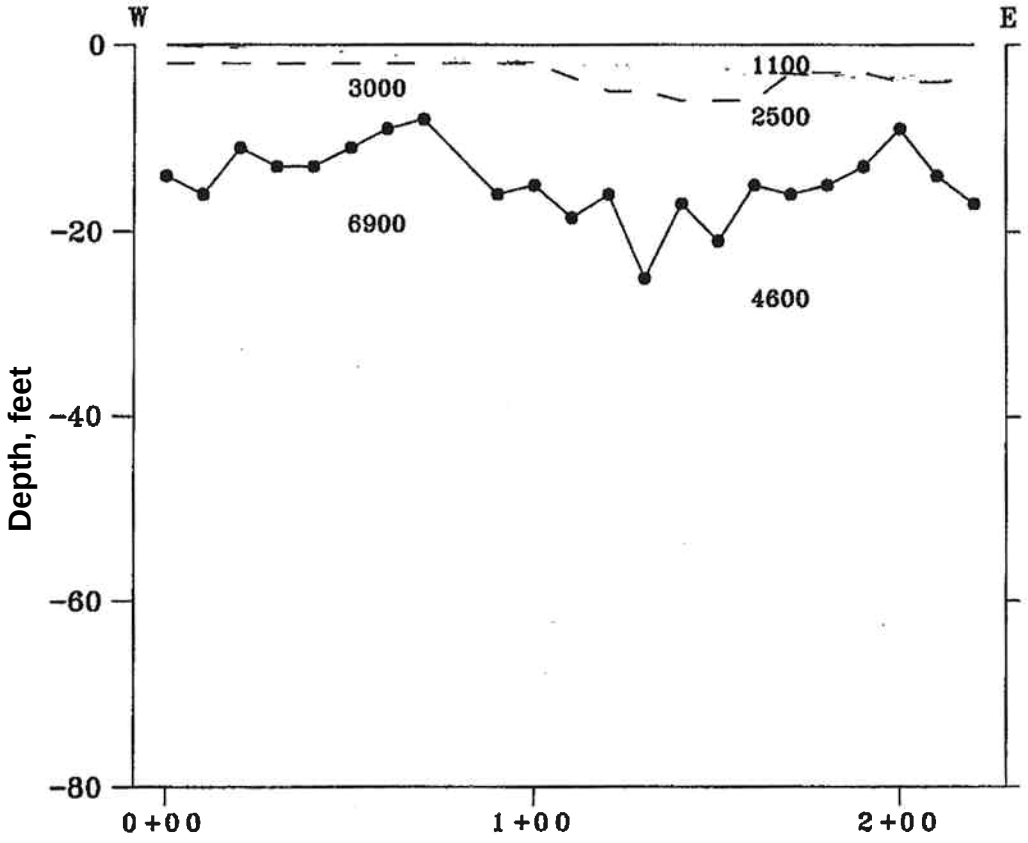
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P151

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-194



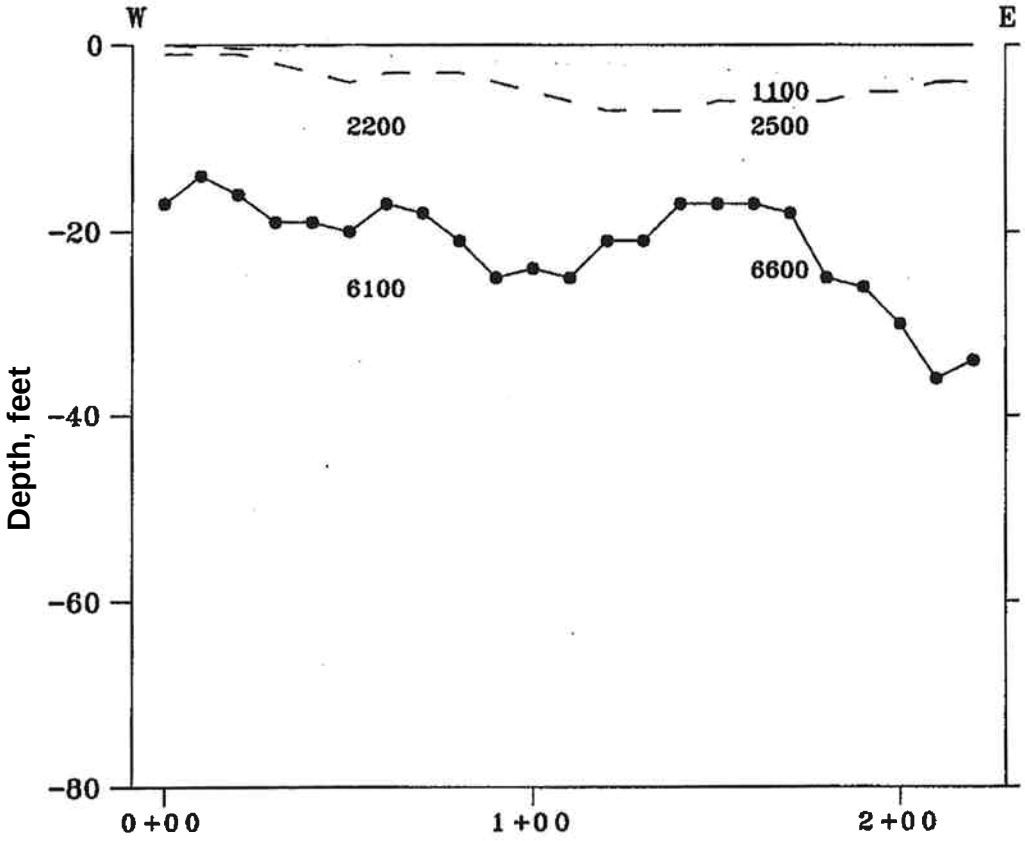
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-152-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-195



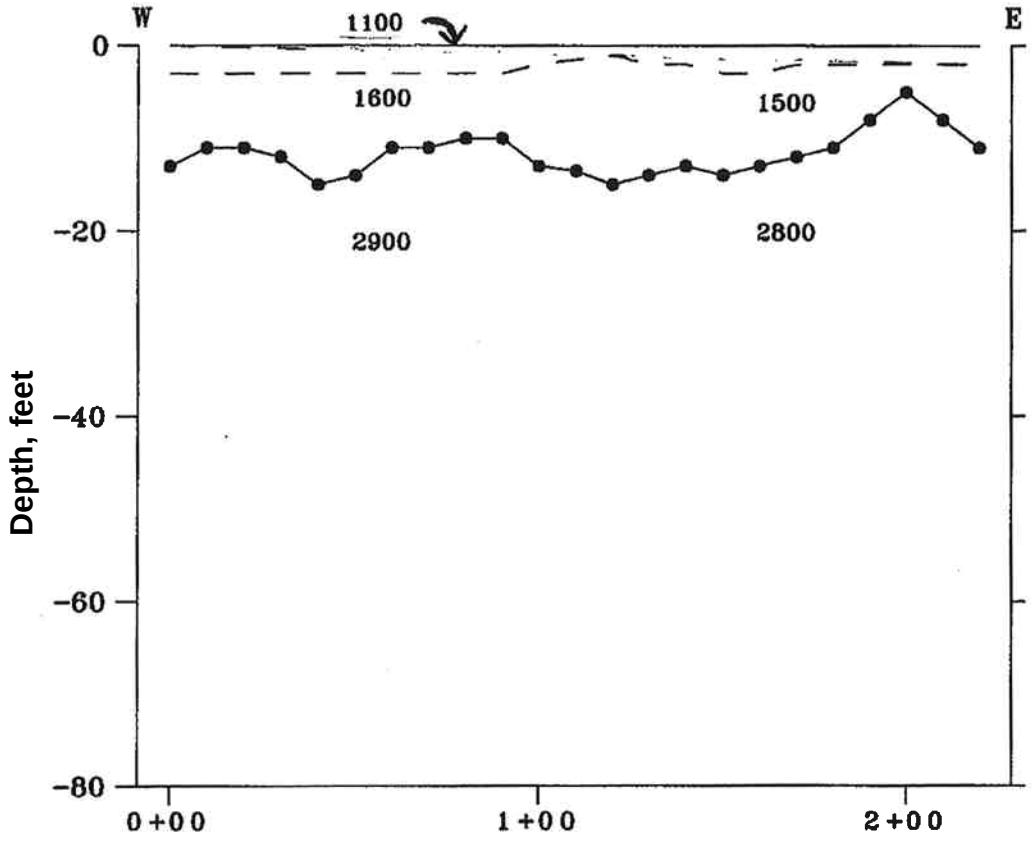
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P170

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-196



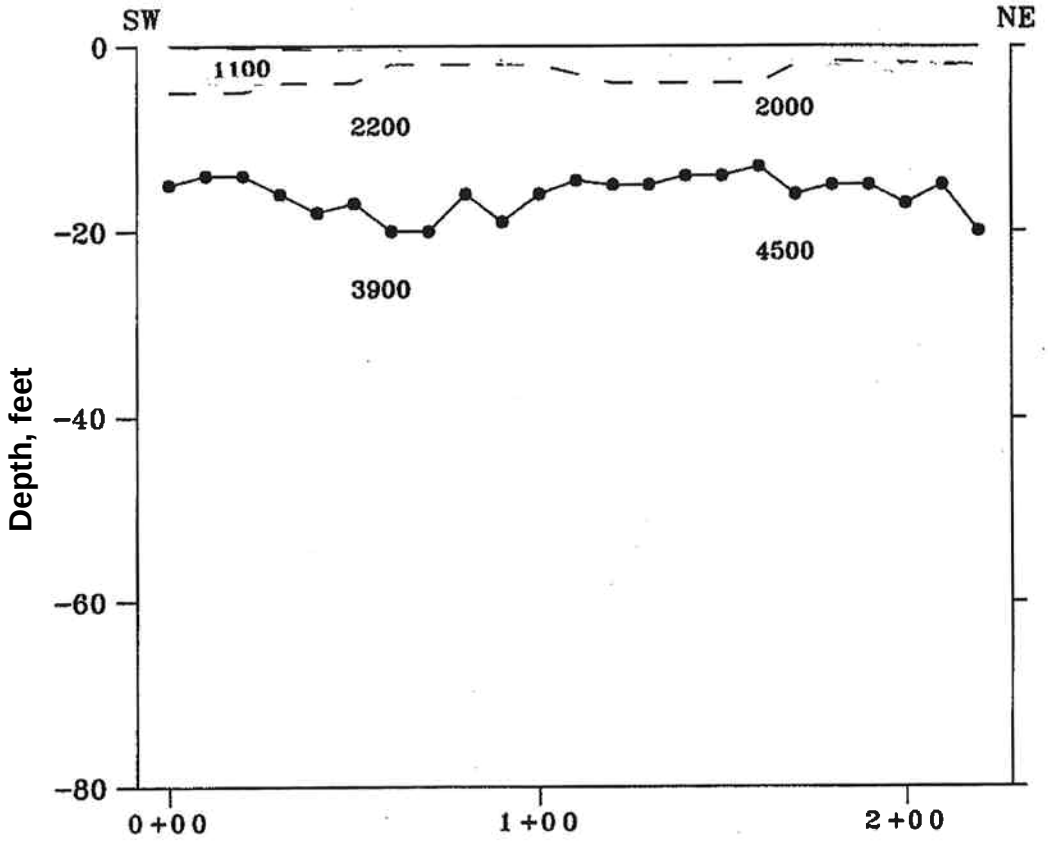
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P172

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-197



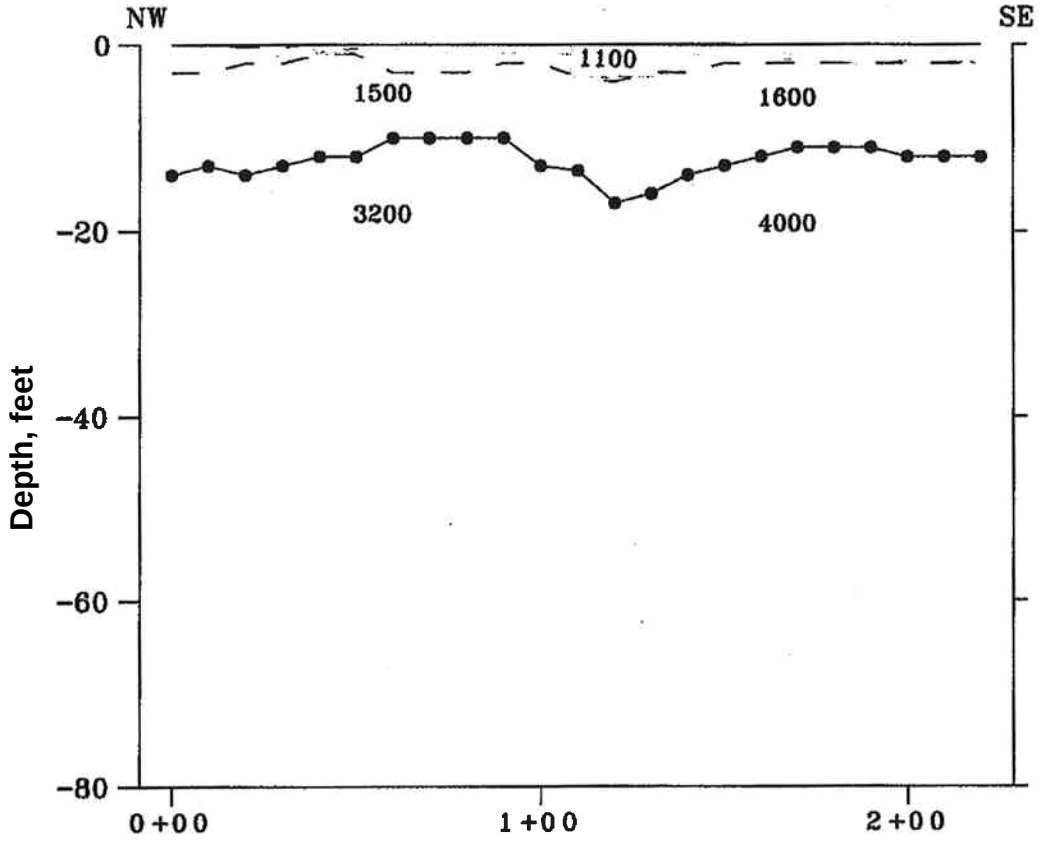
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P173

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-198



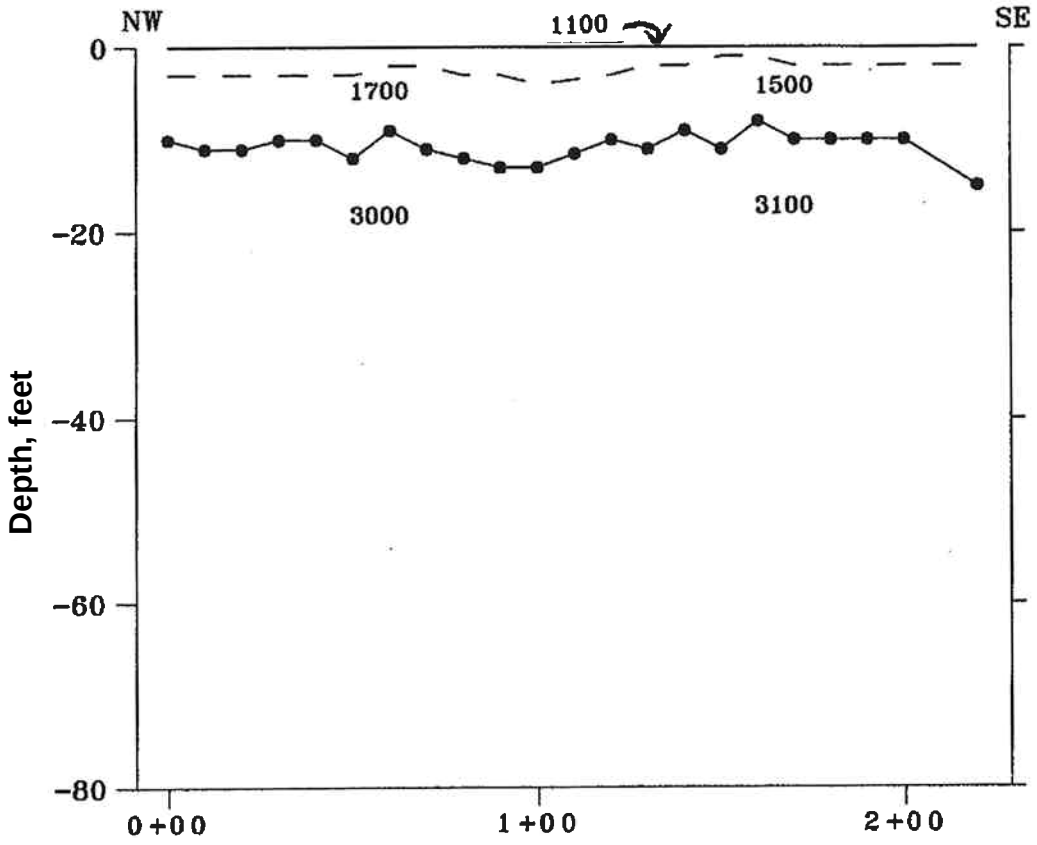
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P174

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-199



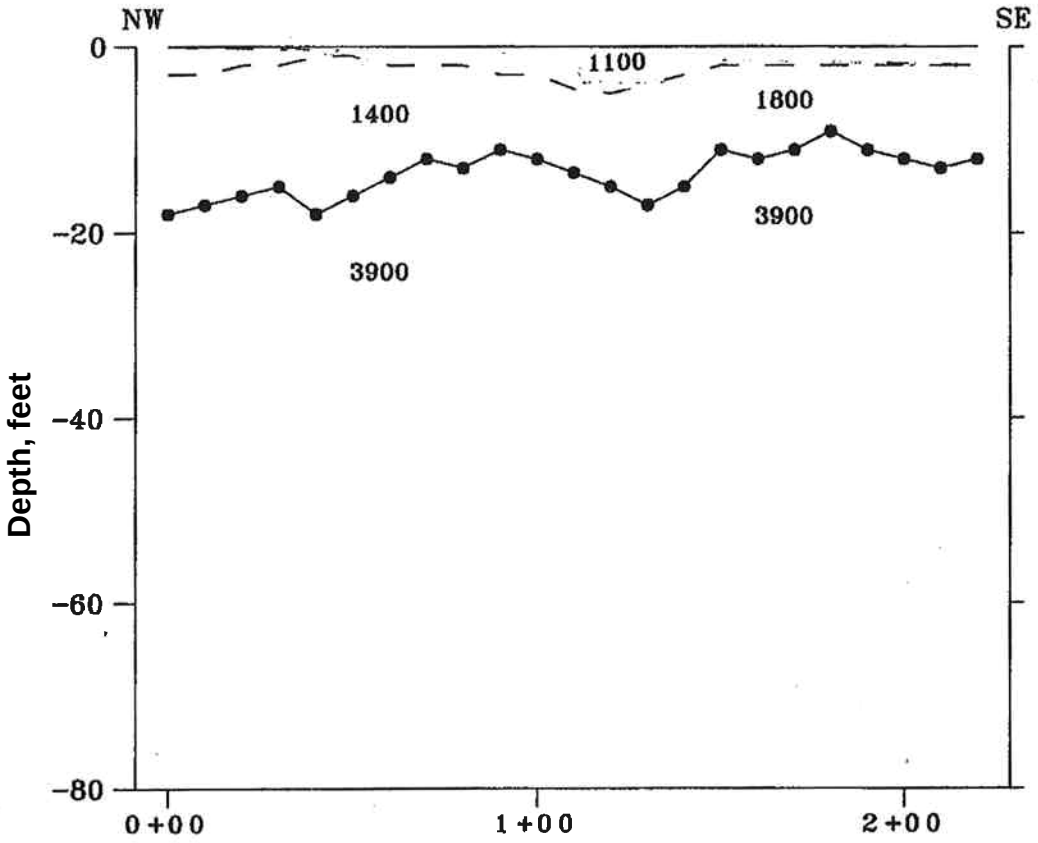
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P175

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-200



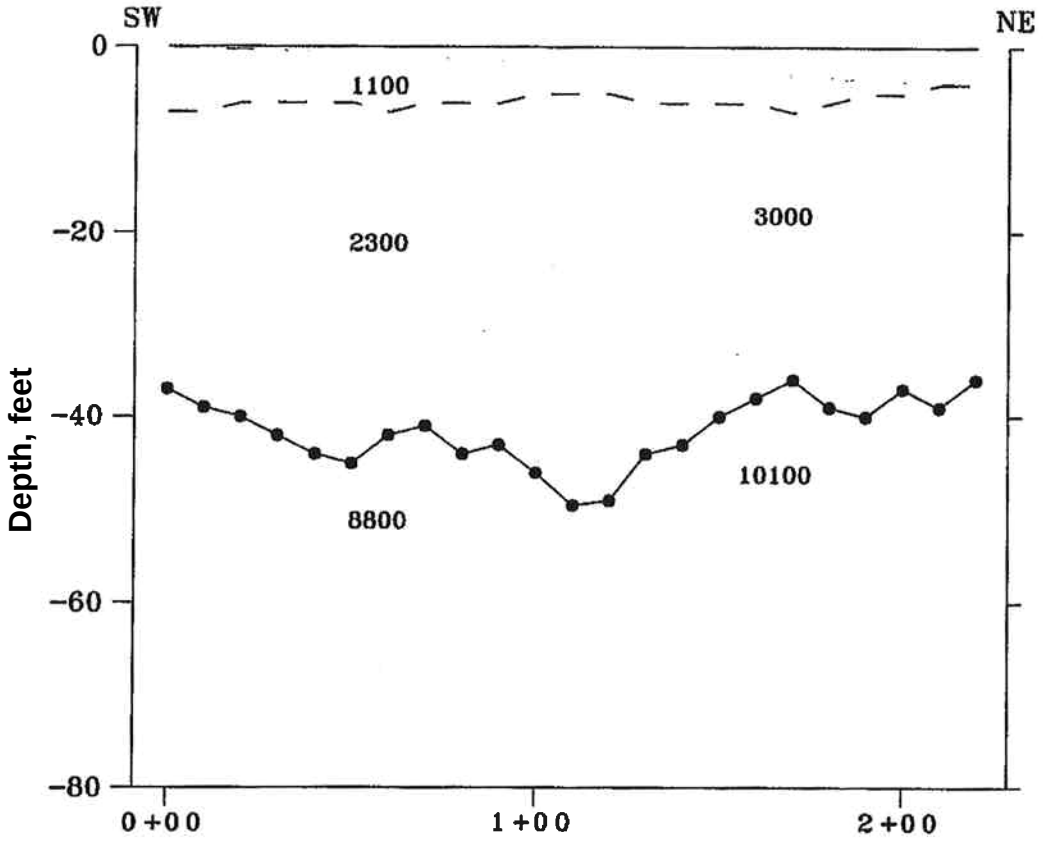
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P176

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-201



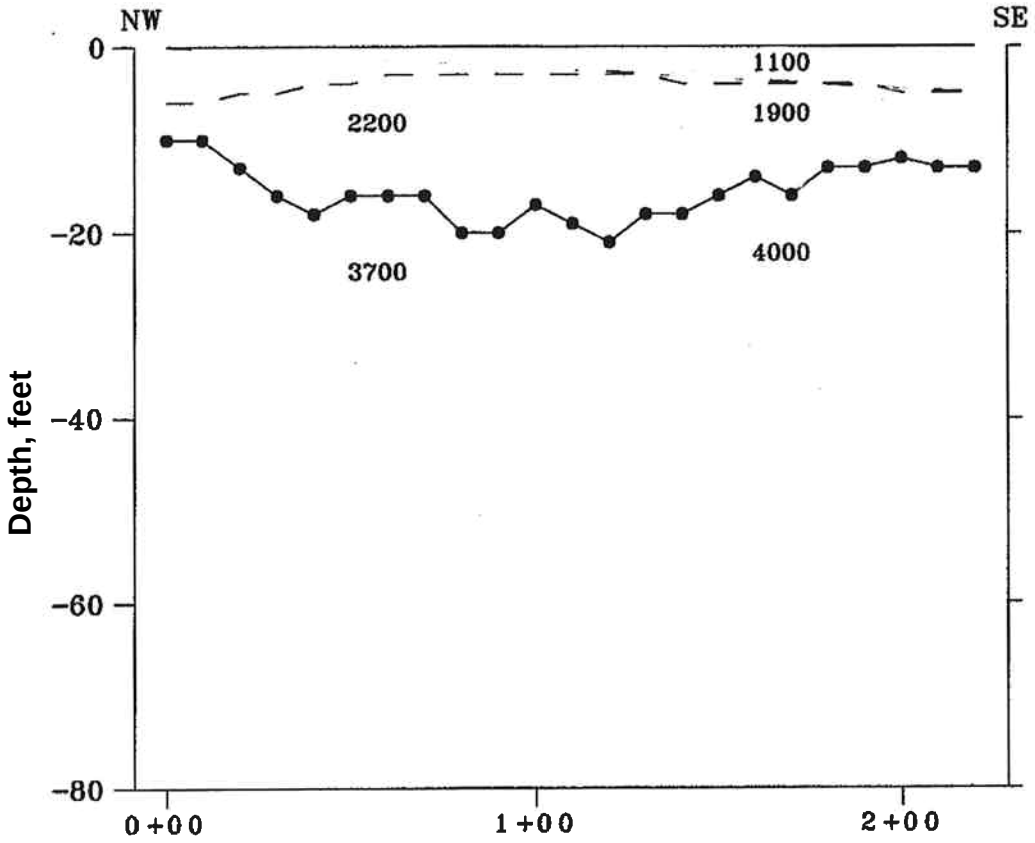
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P178

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-202



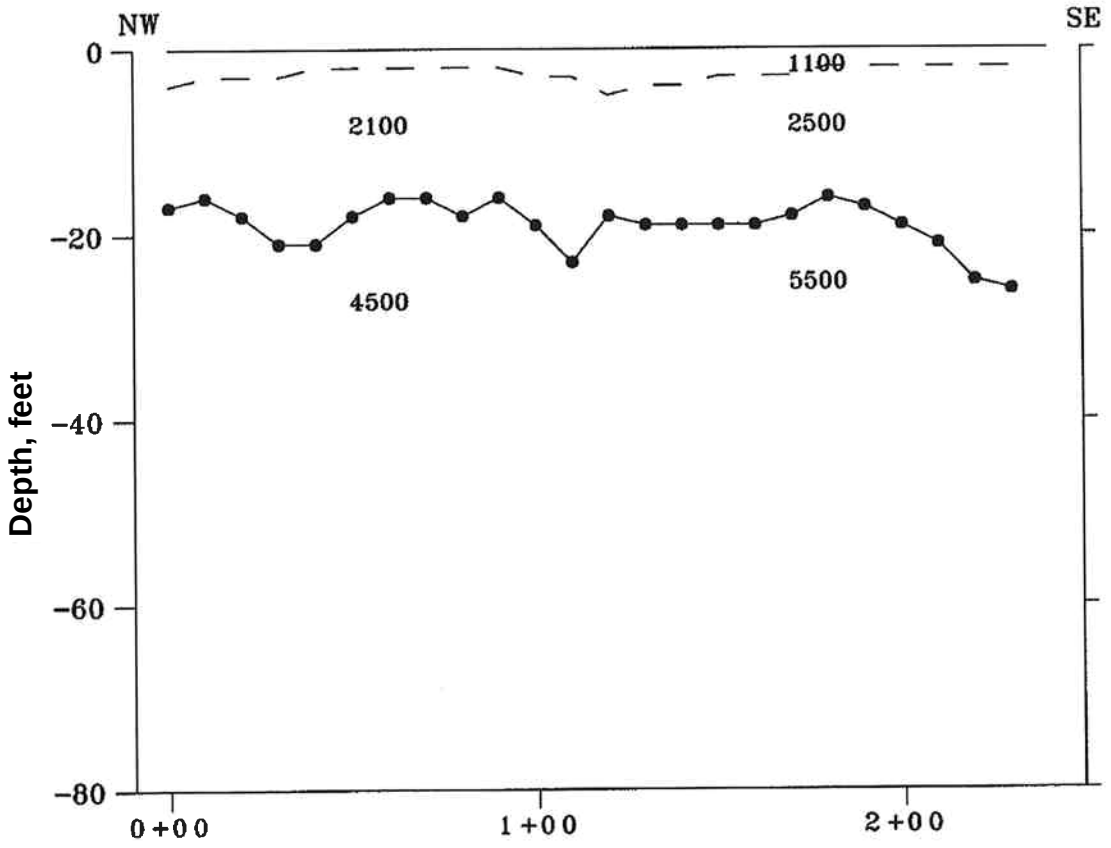
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P179

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-203



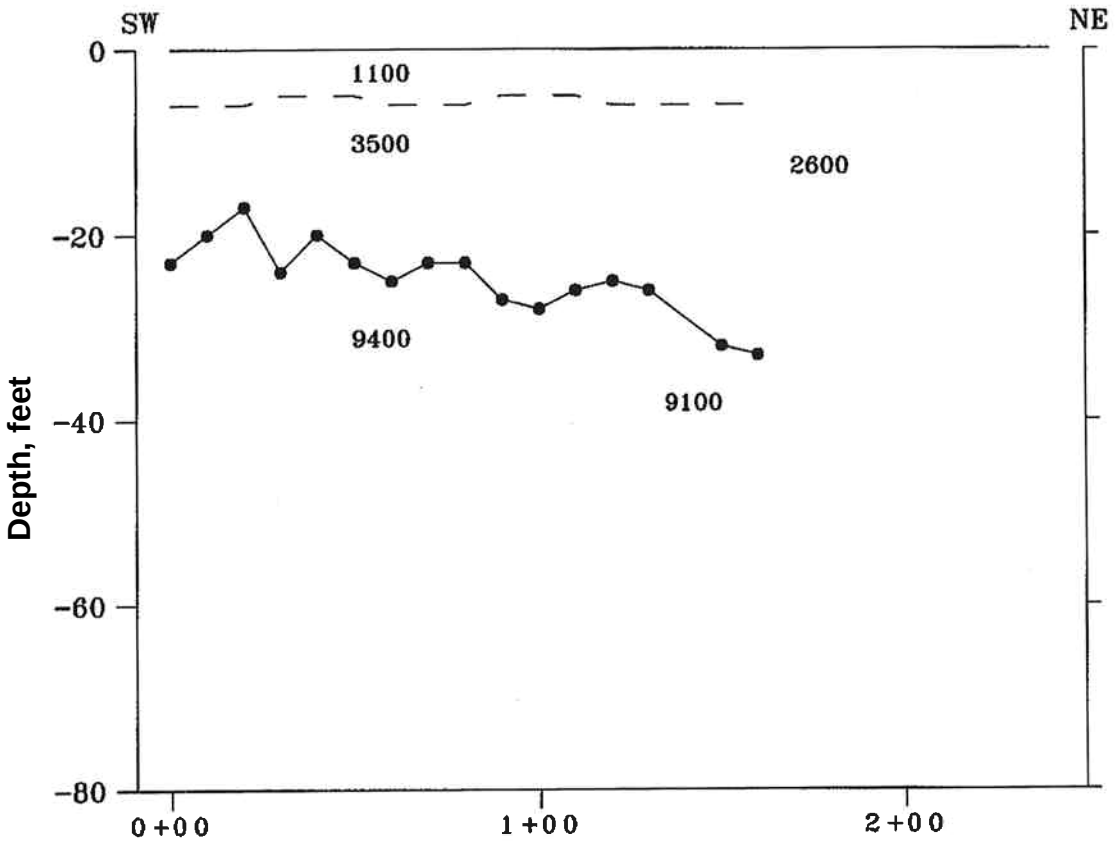
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P182-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-204



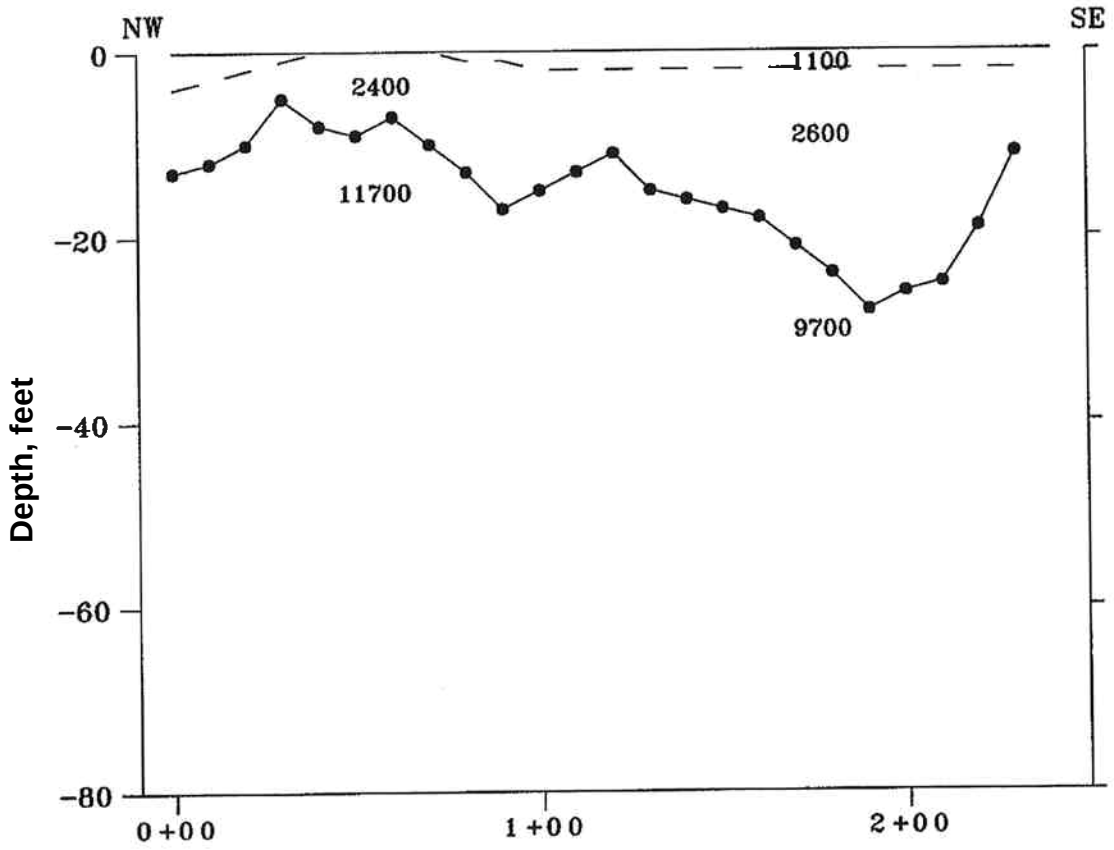
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P183

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-205



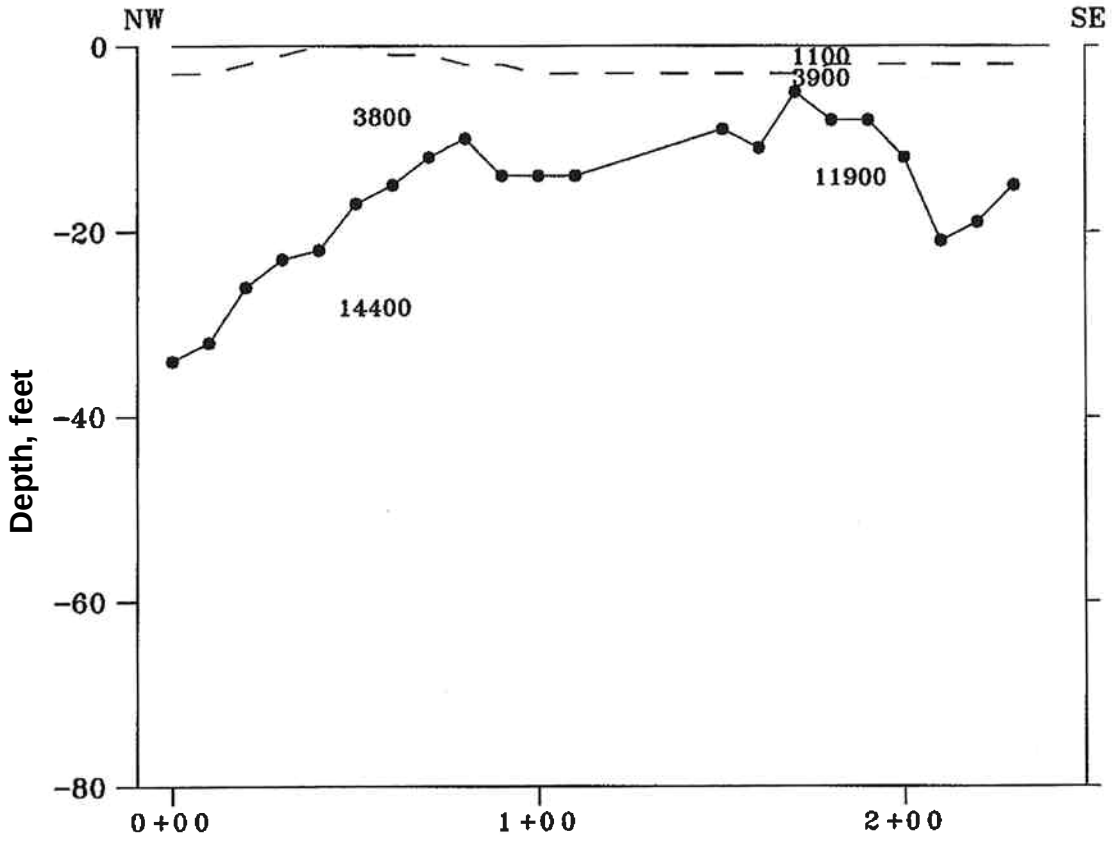
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P184-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-206



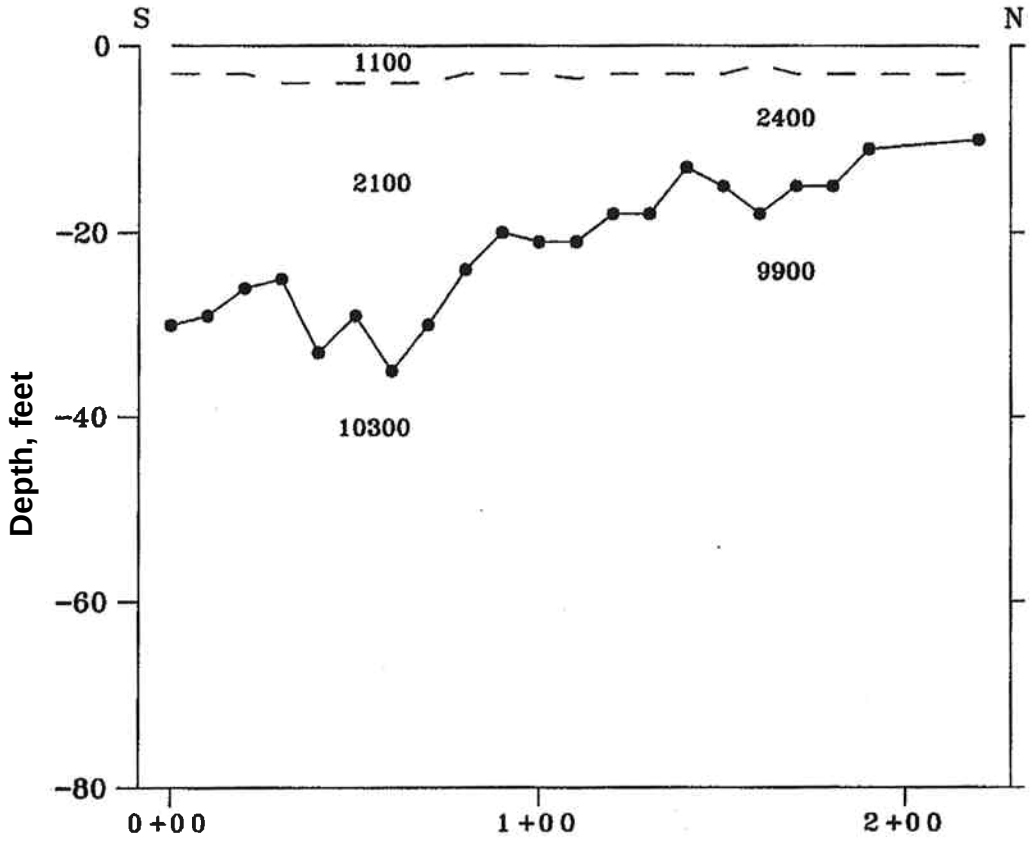
P-wave velocities in feet per second

1 in = 20 ft

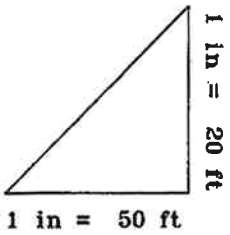
1 in = 50 ft

RS9-P185-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-207

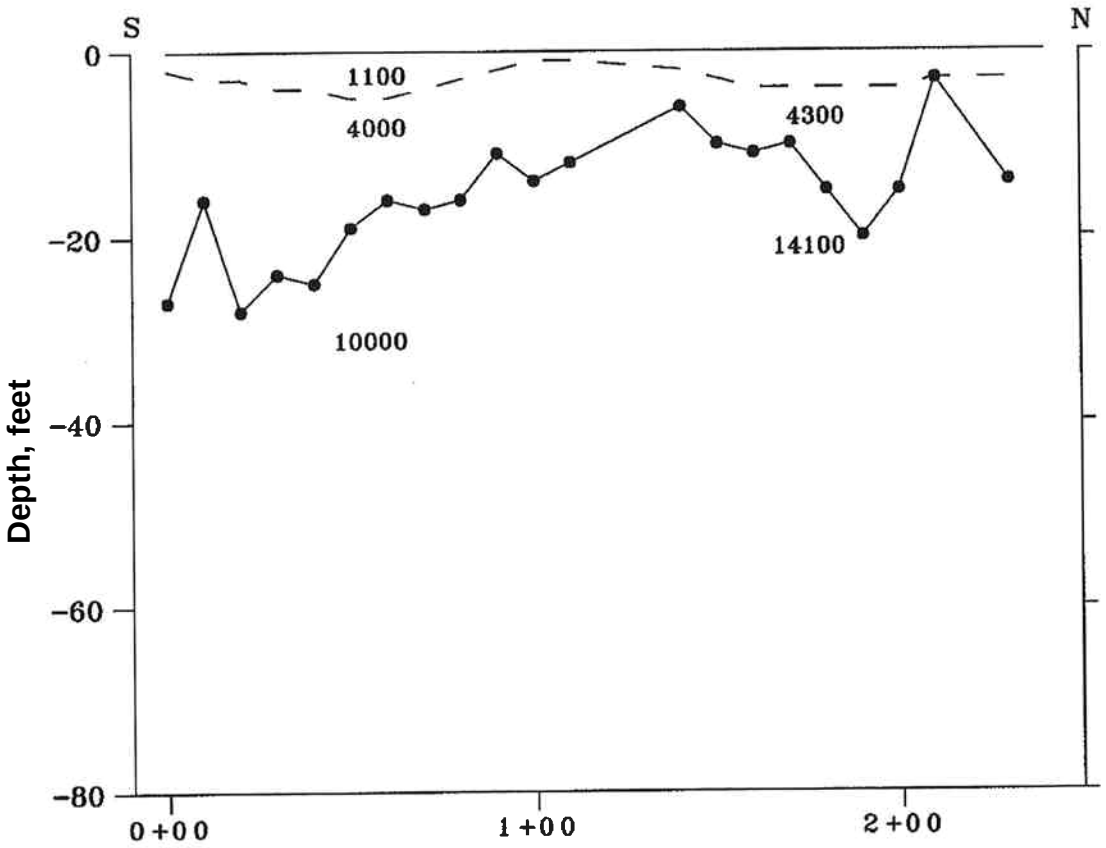


P-wave velocities in feet per second



RS9-P187-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-208



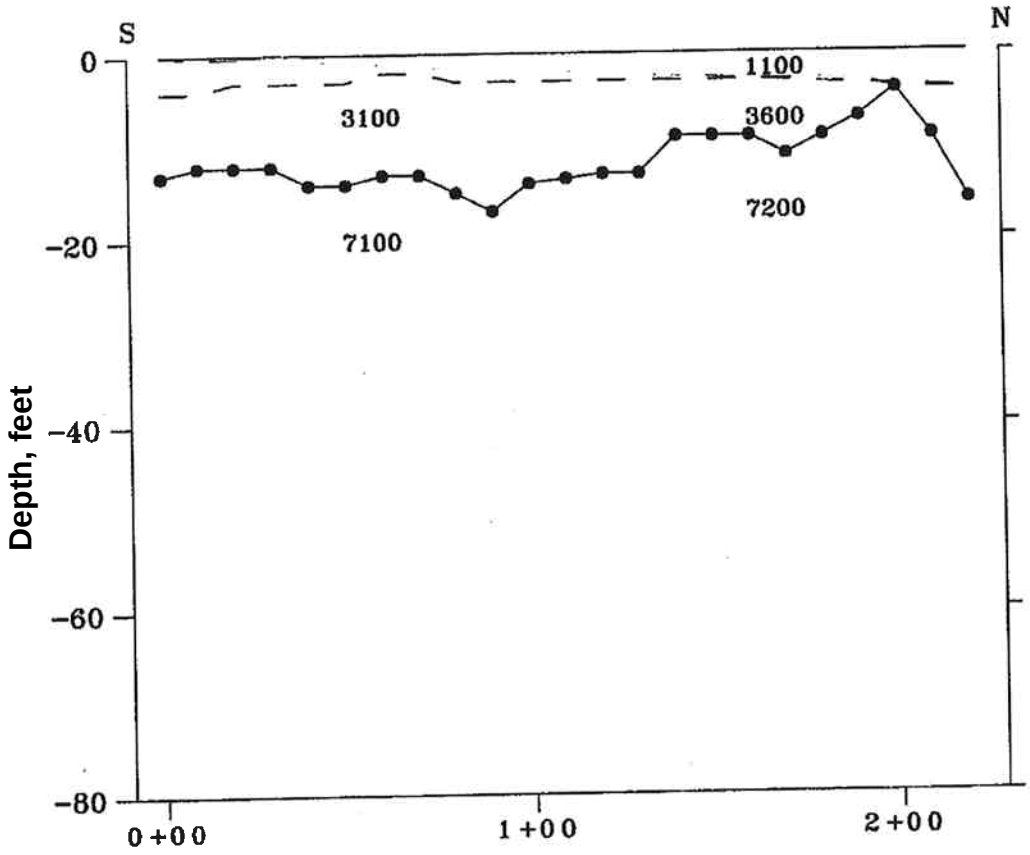
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P189-2

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-209



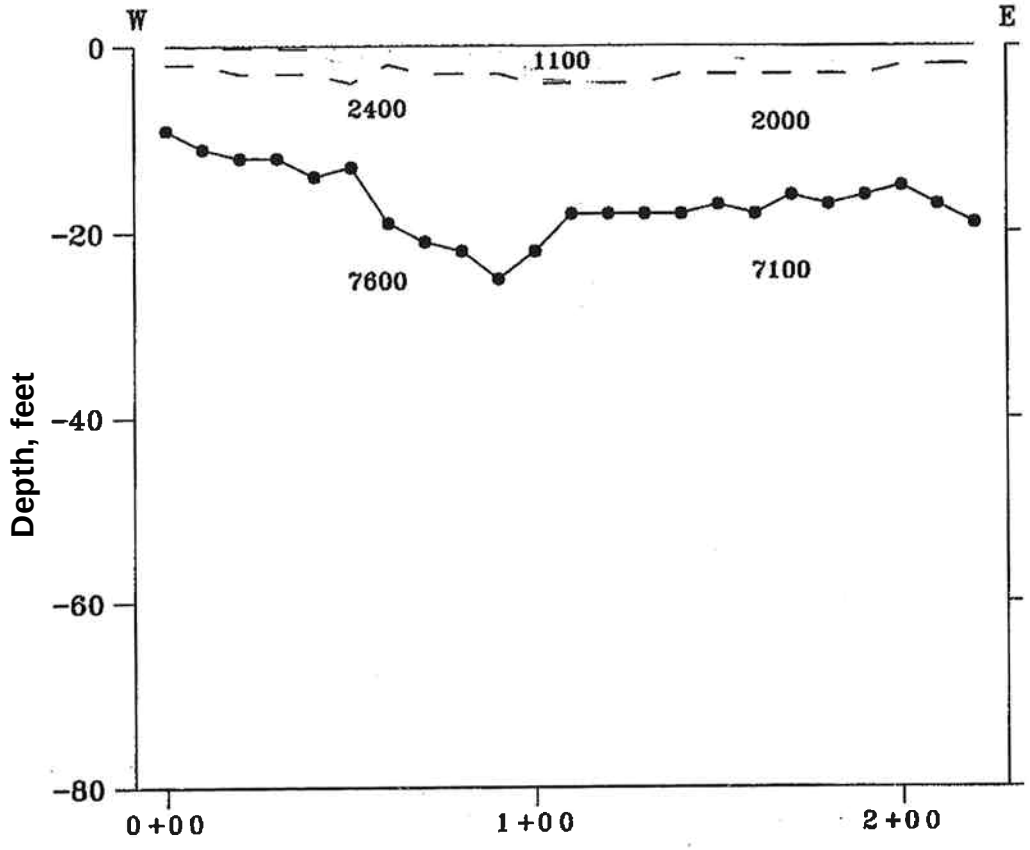
P-wave velocities in feet per second

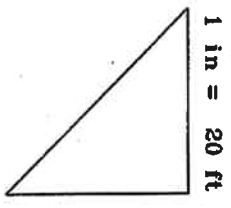
1 in = 20 ft

1 in = 50 ft

RS9-P190

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-210

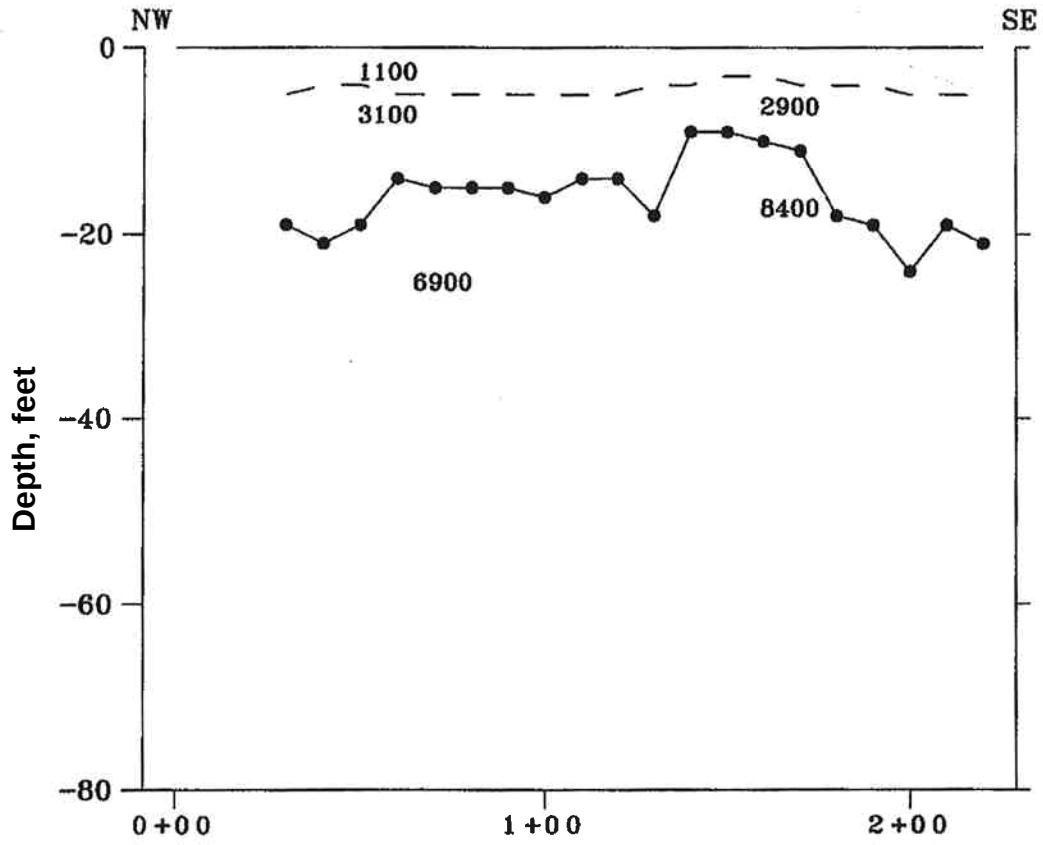




P-wave velocities in feet per second

RS9-P191-1

Project No. 27666031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-211



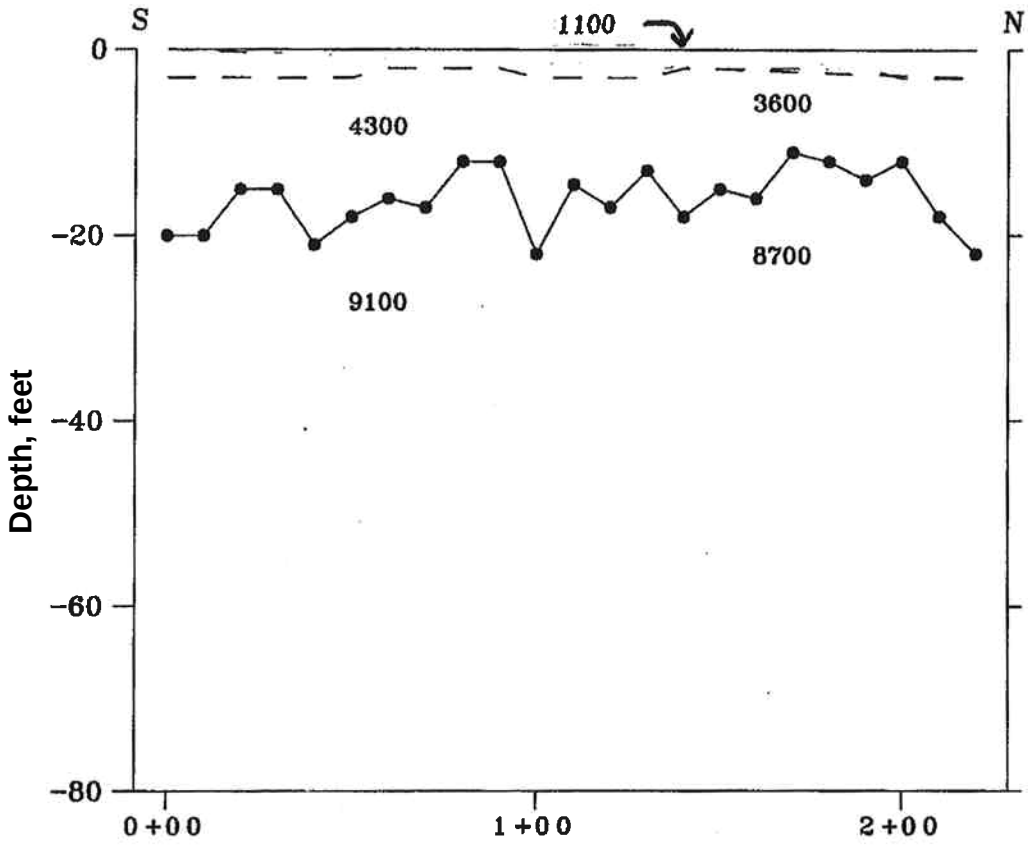
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P193-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-212



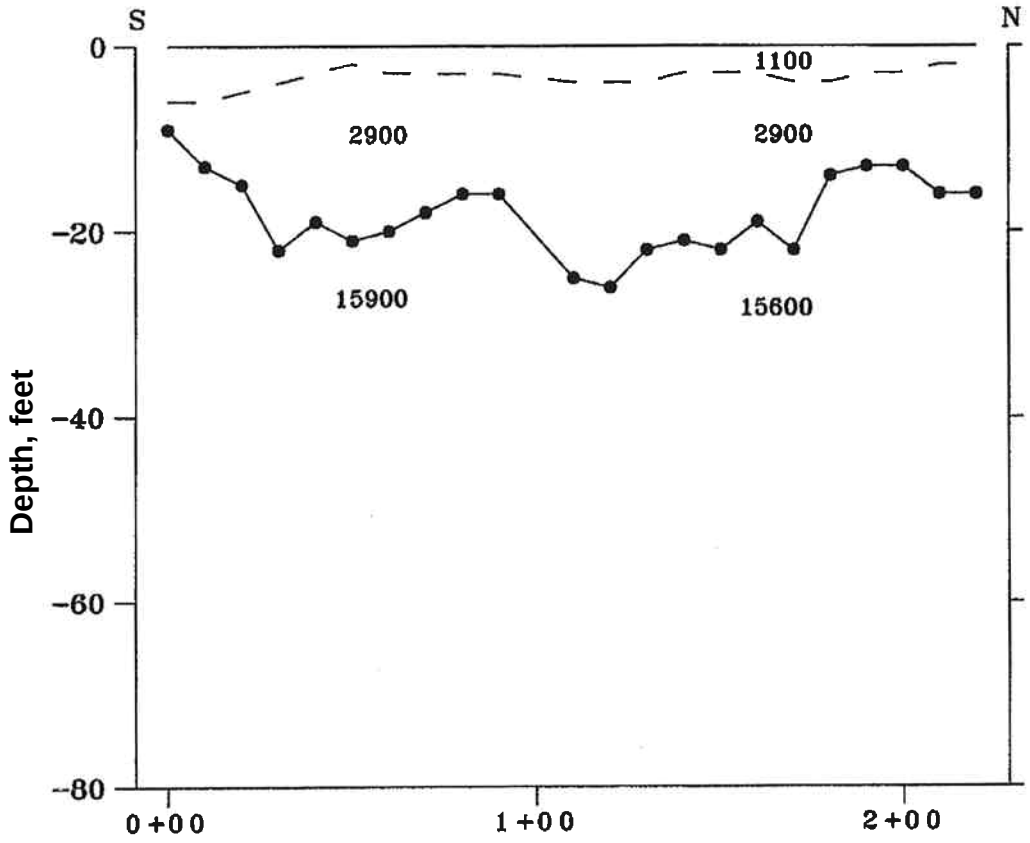
P-wave velocities in feet per second

1 in = 20 ft

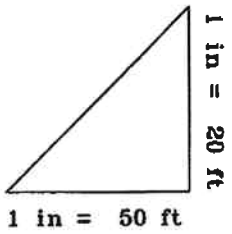
1 in = 50 ft

RS9-P194-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-213

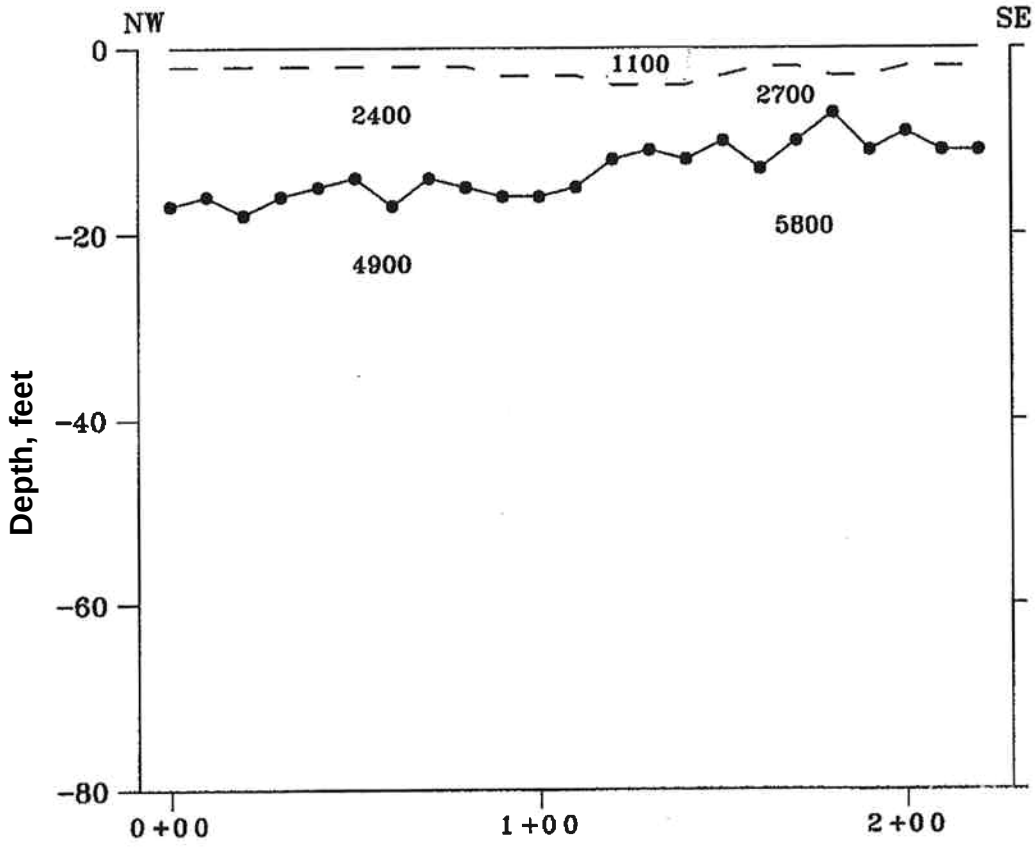


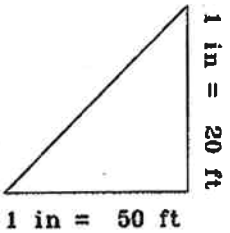
P-wave velocities in feet per second



RS9-195-1

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-214

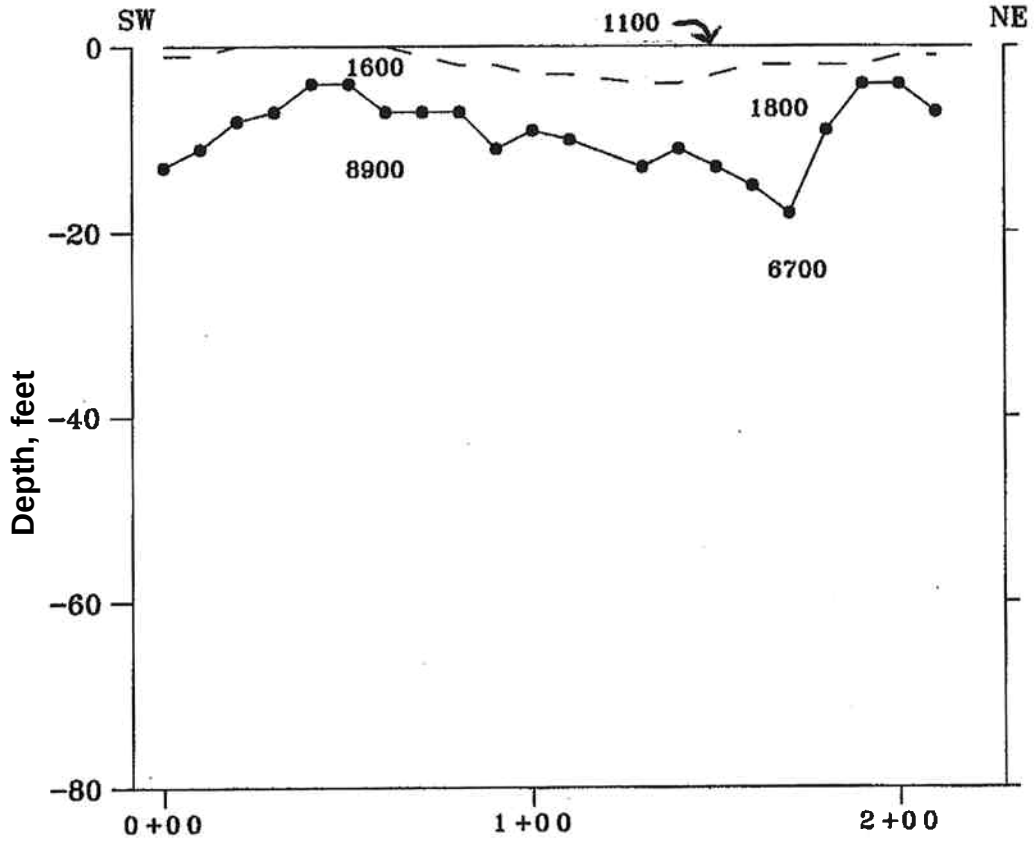




P-wave velocities in feet per second

RS9-P196

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-215



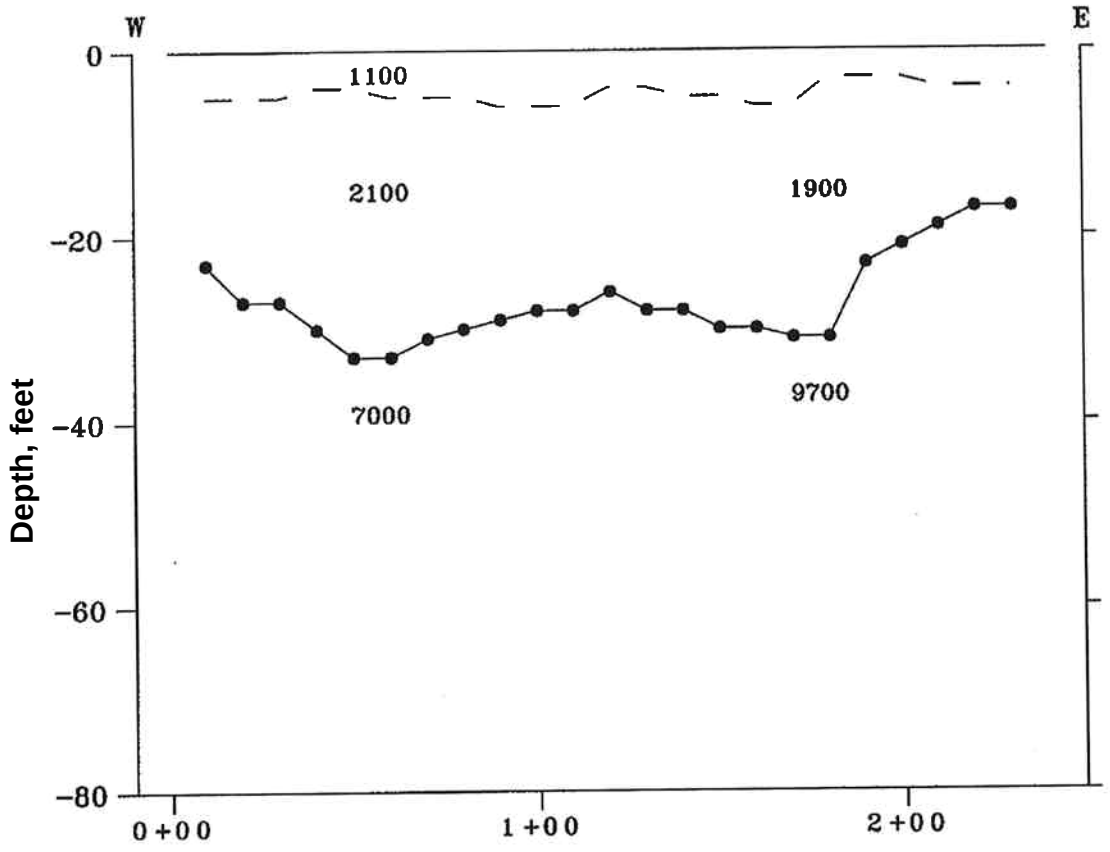
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P198

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-216



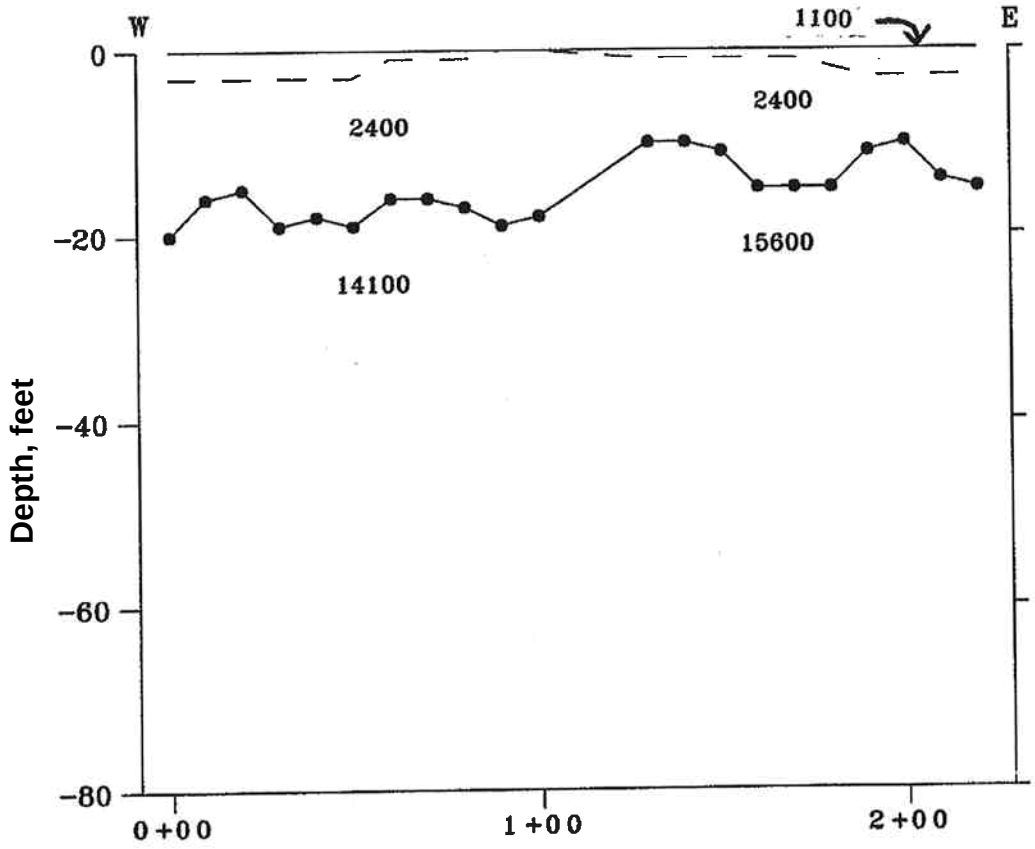
P-wave velocities in feet per second

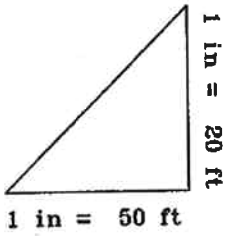
1 in = 20 ft

1 in = 50 ft

RS9-P198-2

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-217

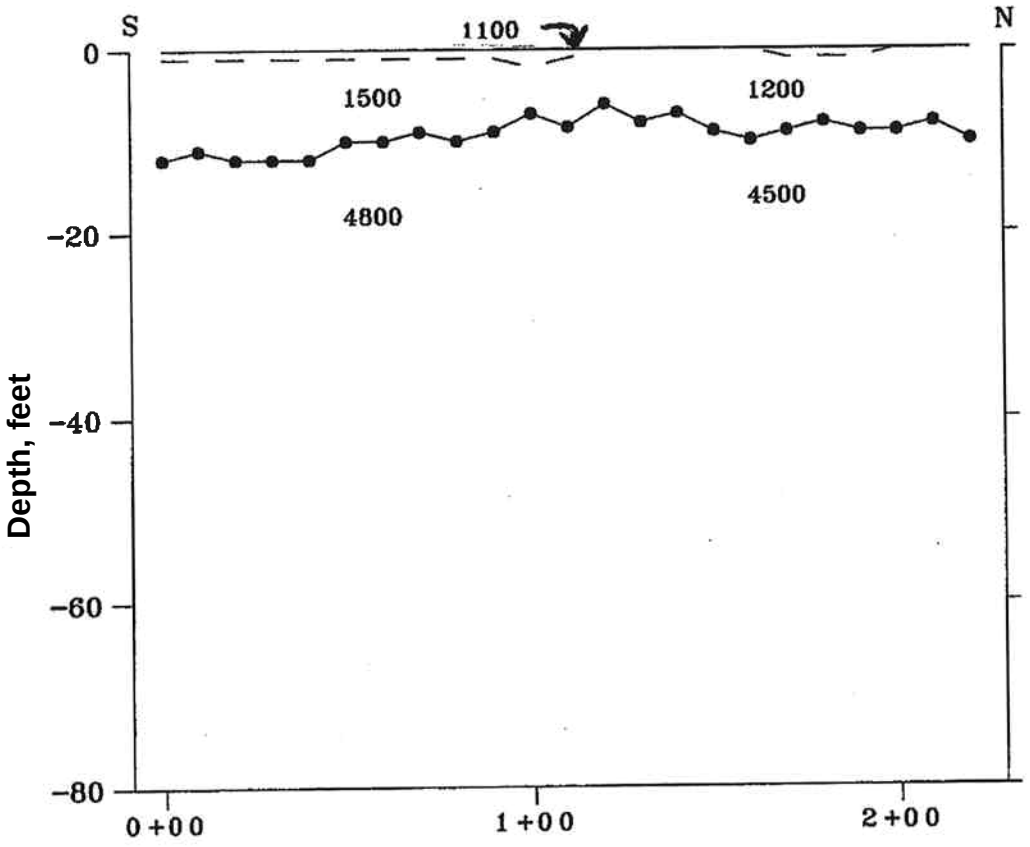




P-wave velocities in feet per second

RS9-P200

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-218



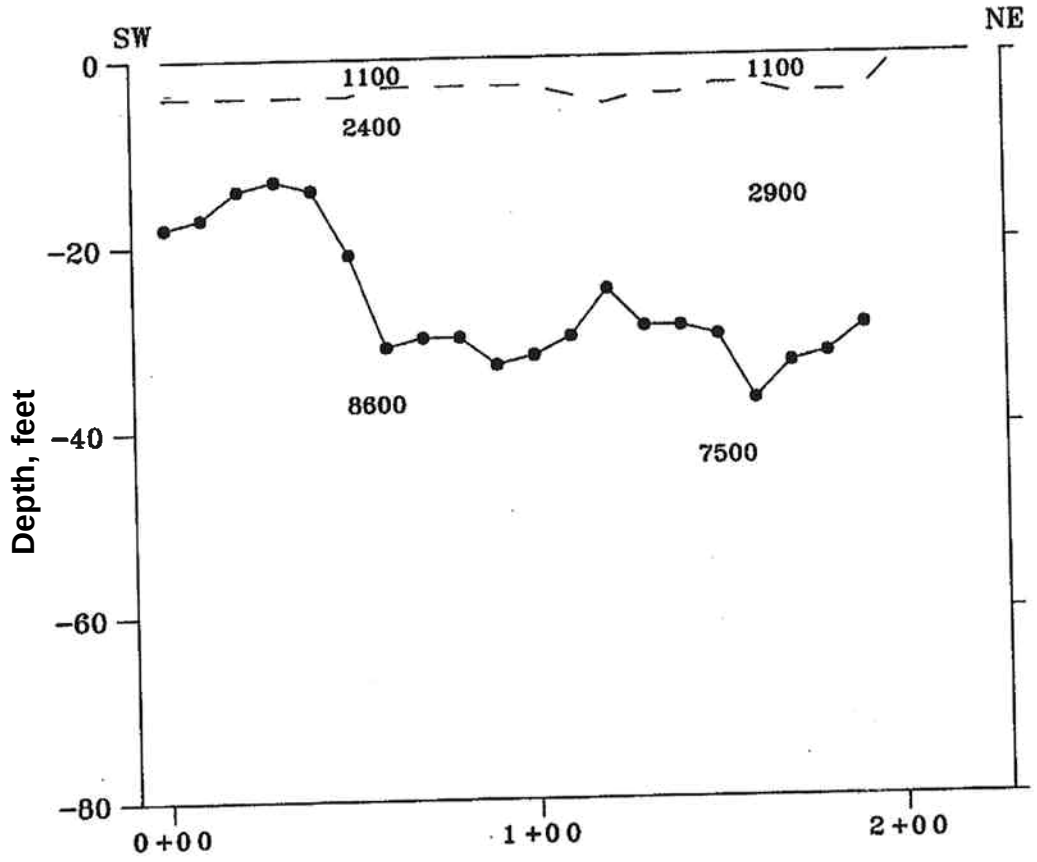
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P202

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-219



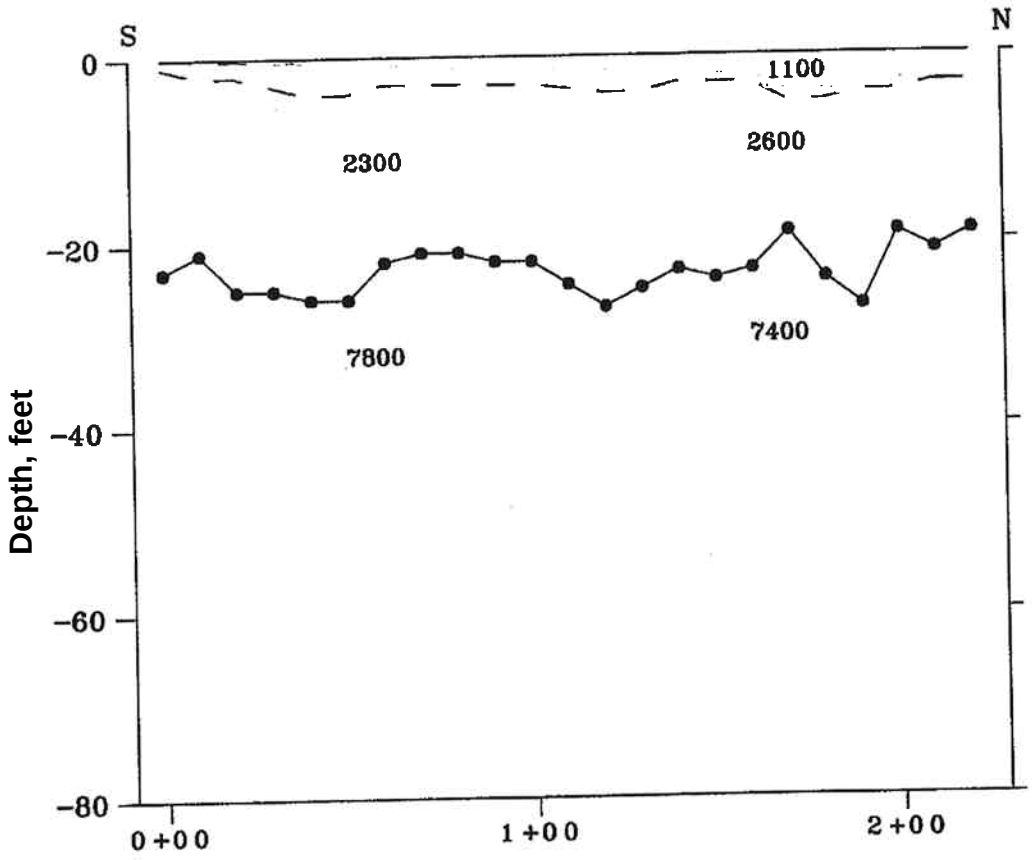
1 in = 20 ft

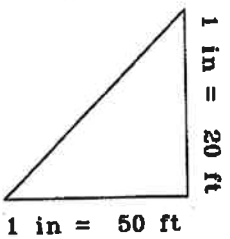
1 in = 50 ft

P-wave velocities in feet per second

RS9-P203

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-220

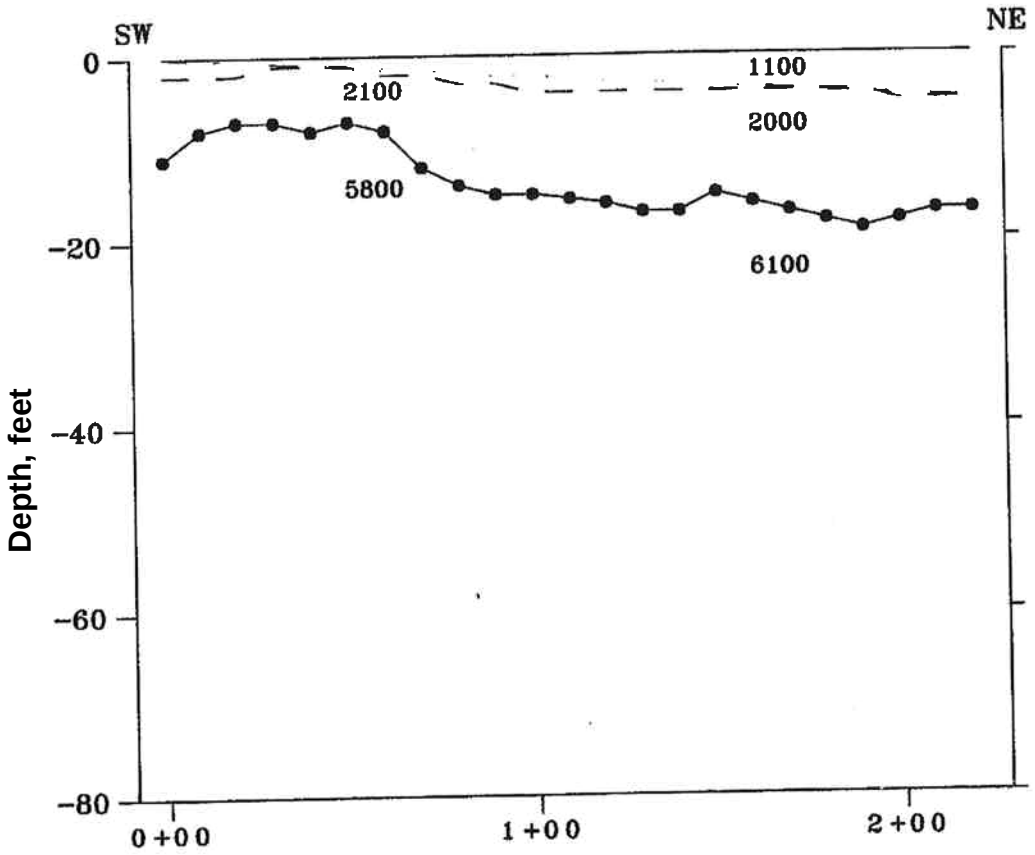




P-wave velocities in feet per second

RS9-P204

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-221



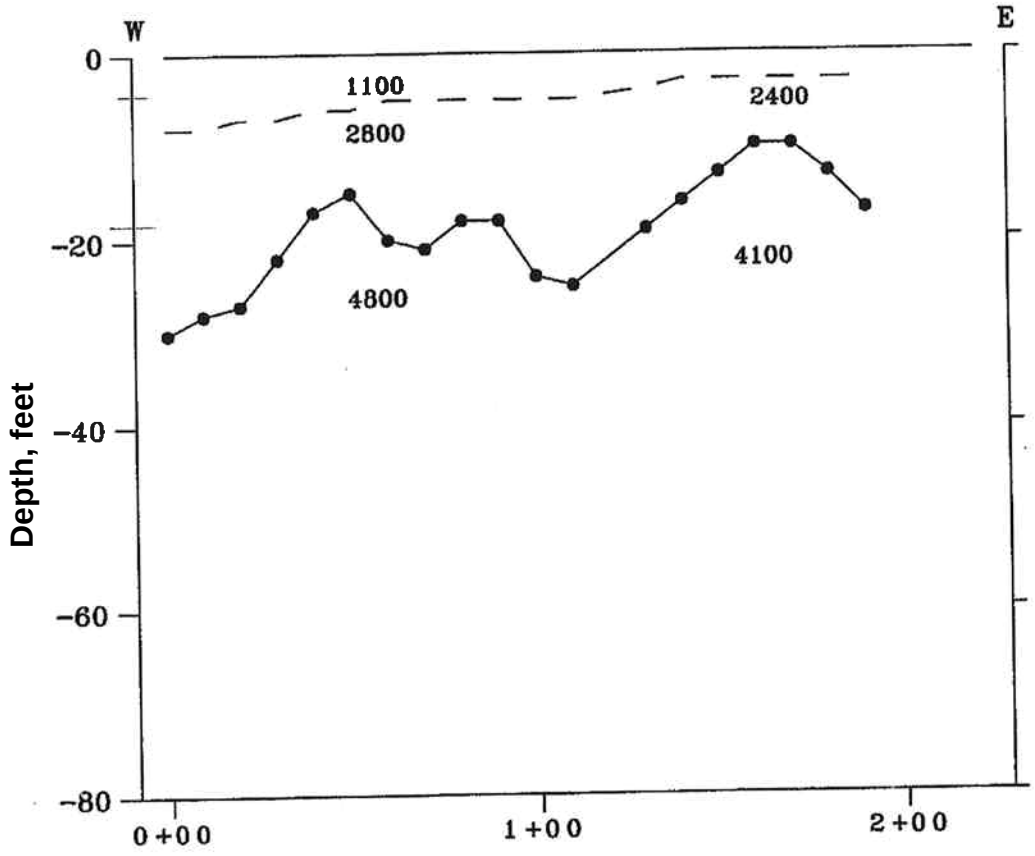
1 in = 20 ft

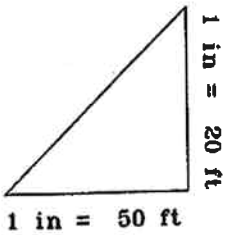
1 in = 50 ft

P-wave velocities in feet per second

RS9-P205

Project No. 27668031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-222

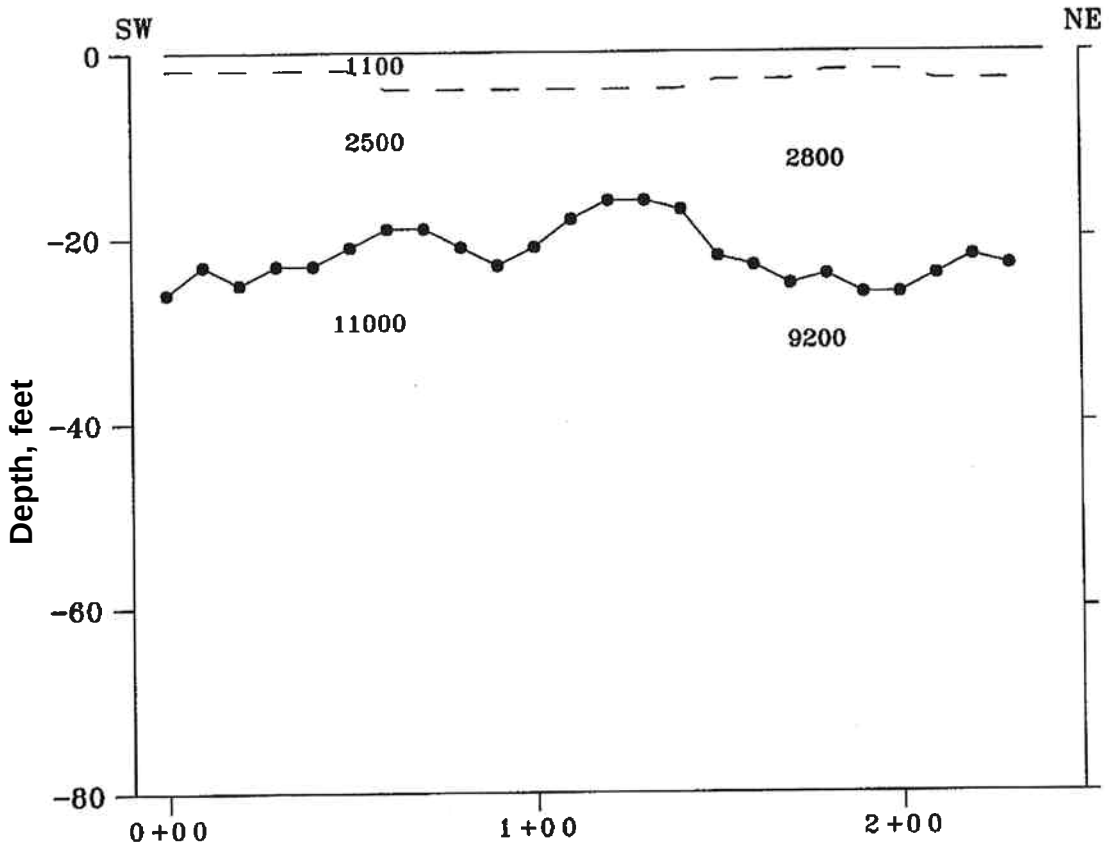




P-wave velocities in feet per second

RS9-P206

Project No. 27666031	Date: 3-15-09	Sunrise Powerlink Project	Fig. C-223



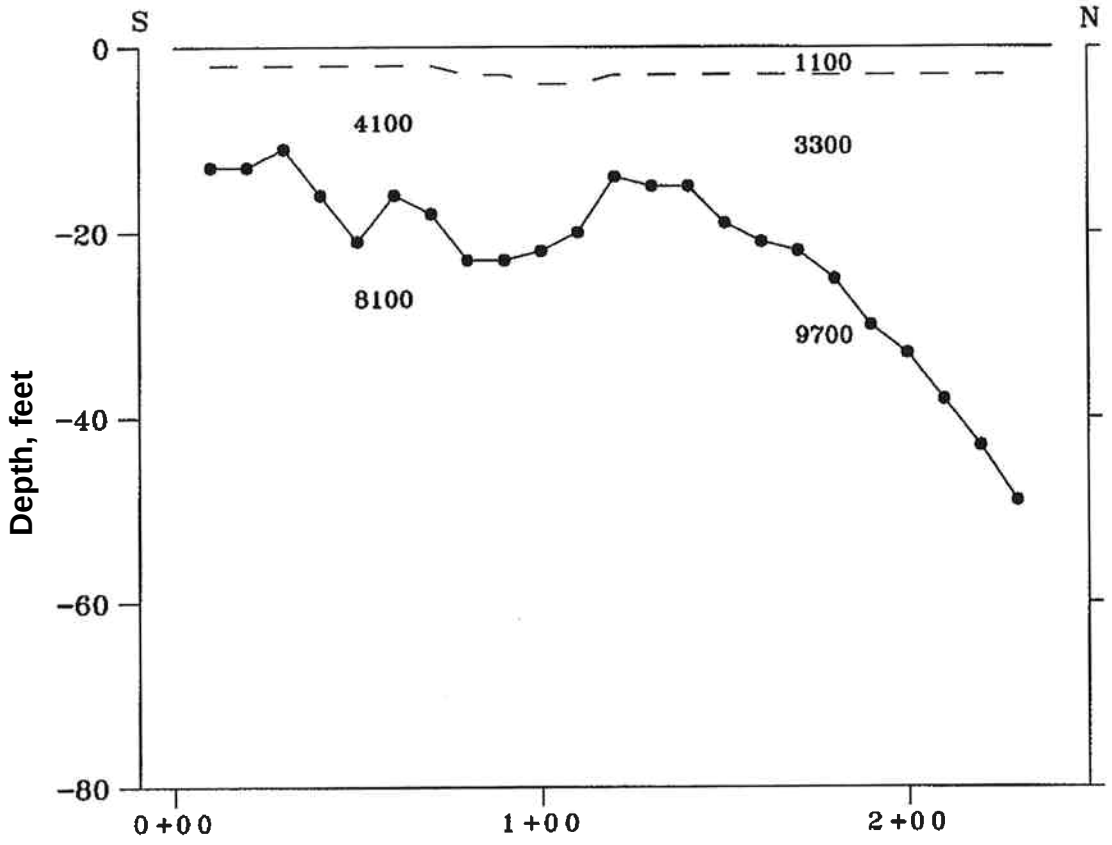
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P208

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-224



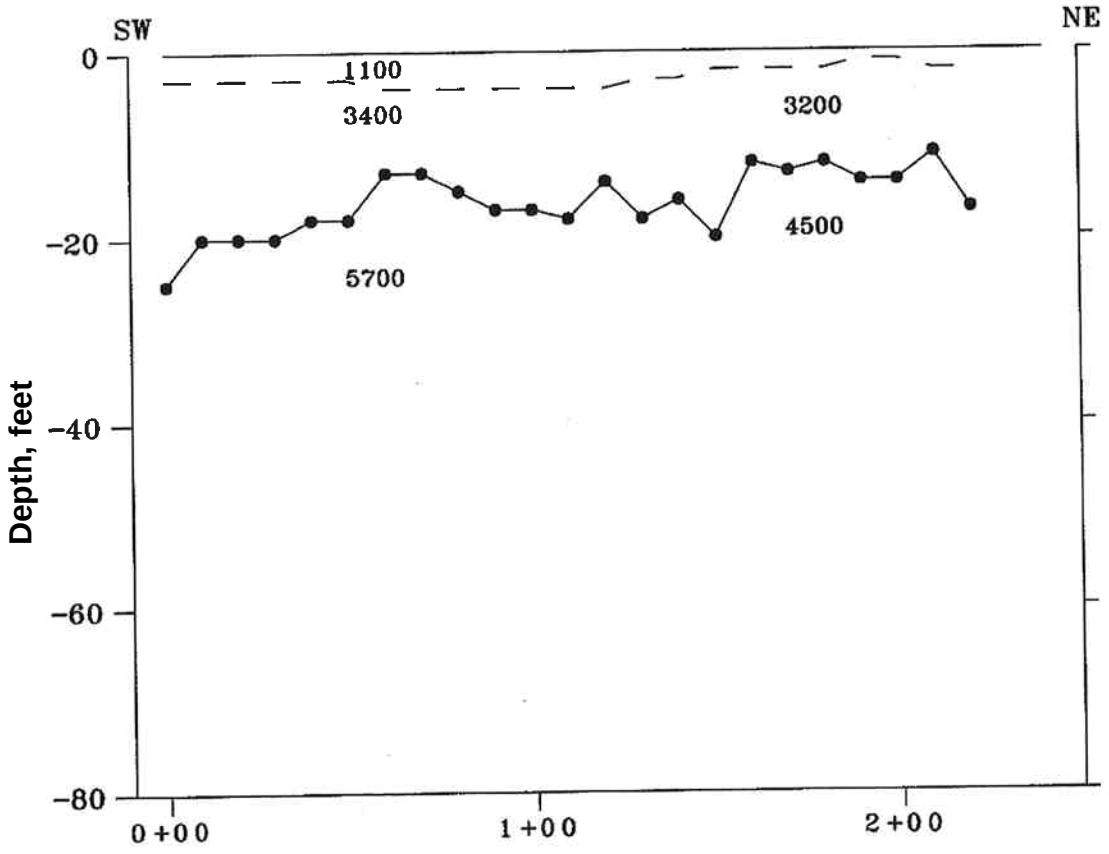
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P209

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-225



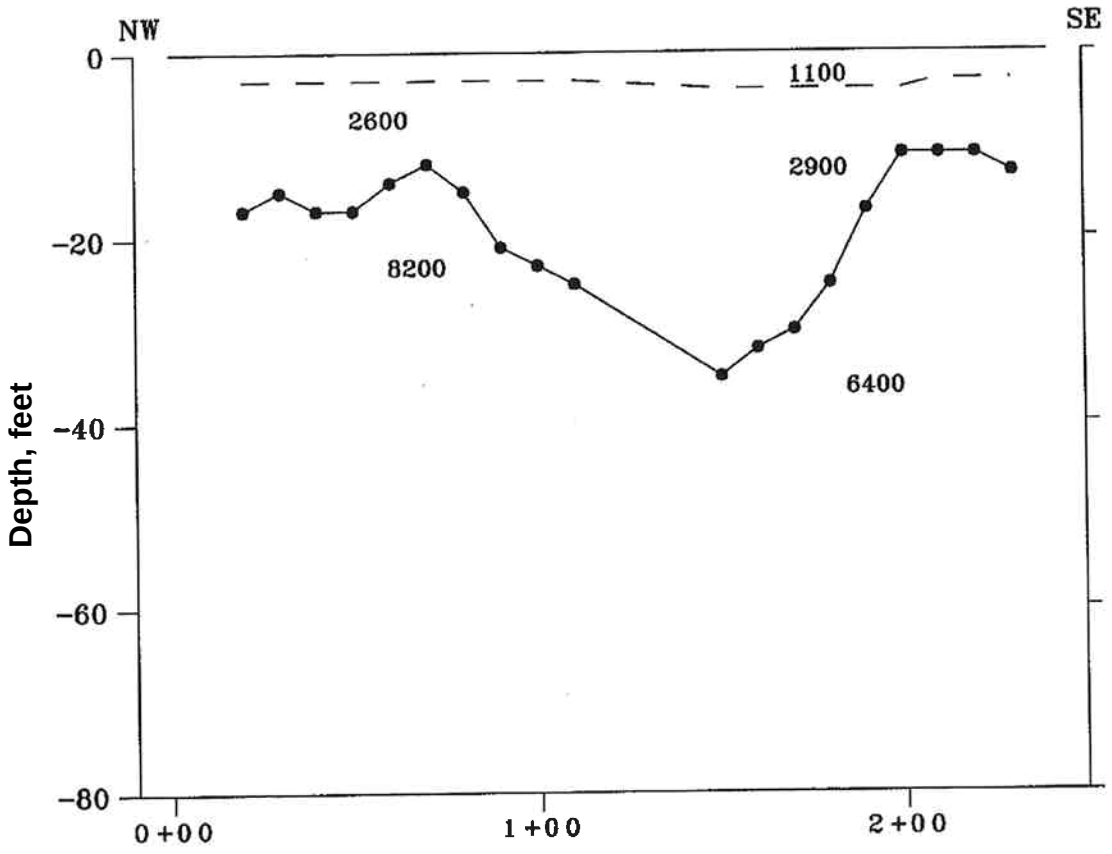
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P210

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-226



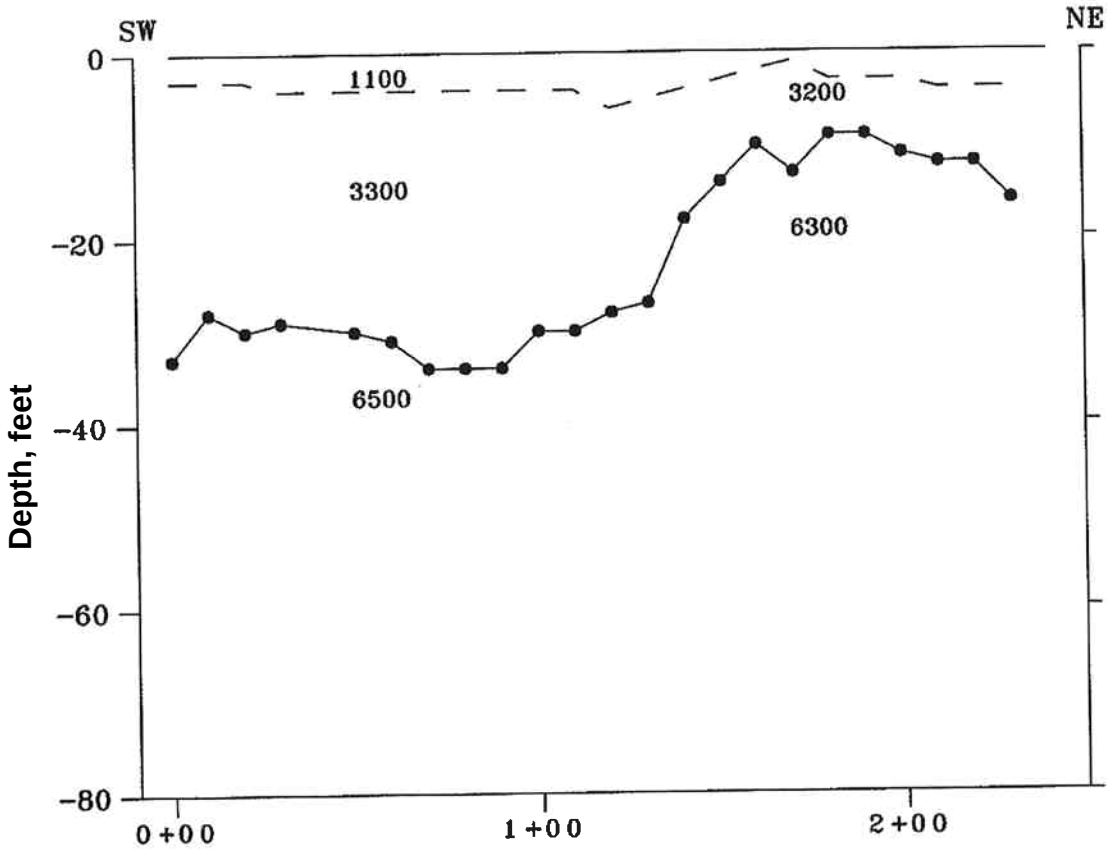
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P211

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-227



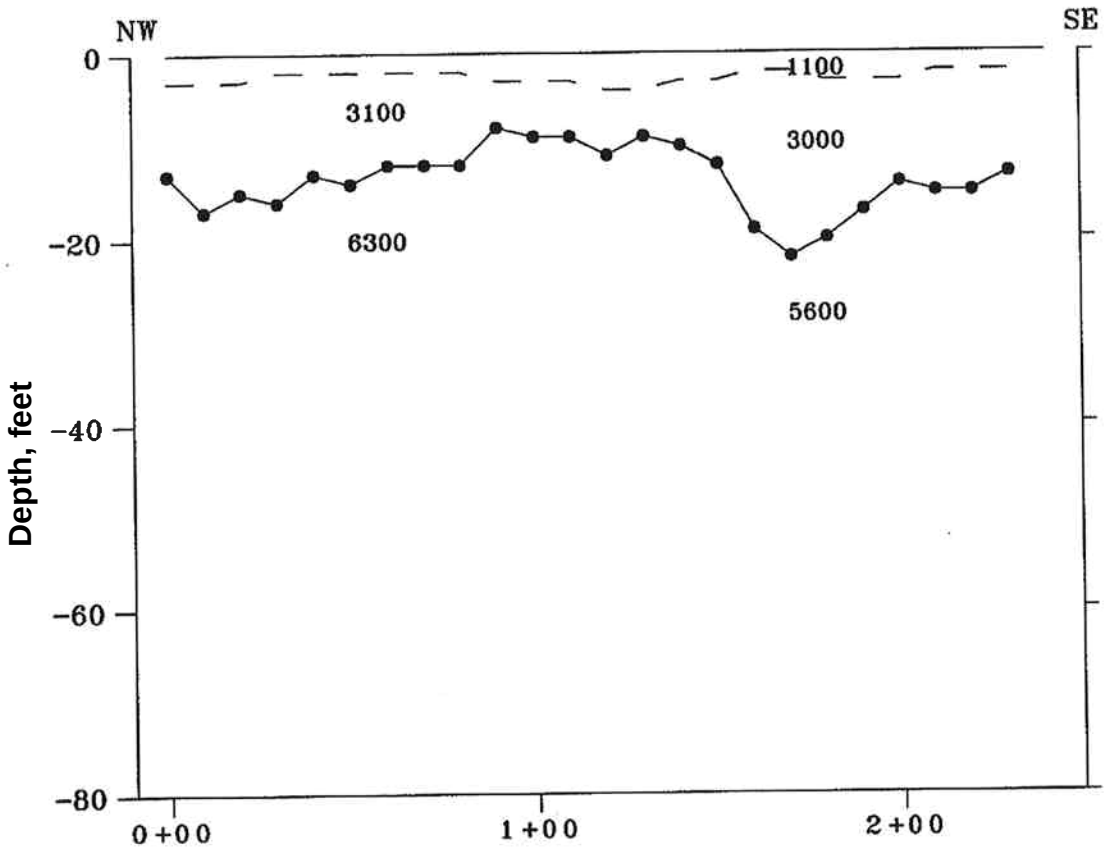
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P213

Project No. 27666031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-228



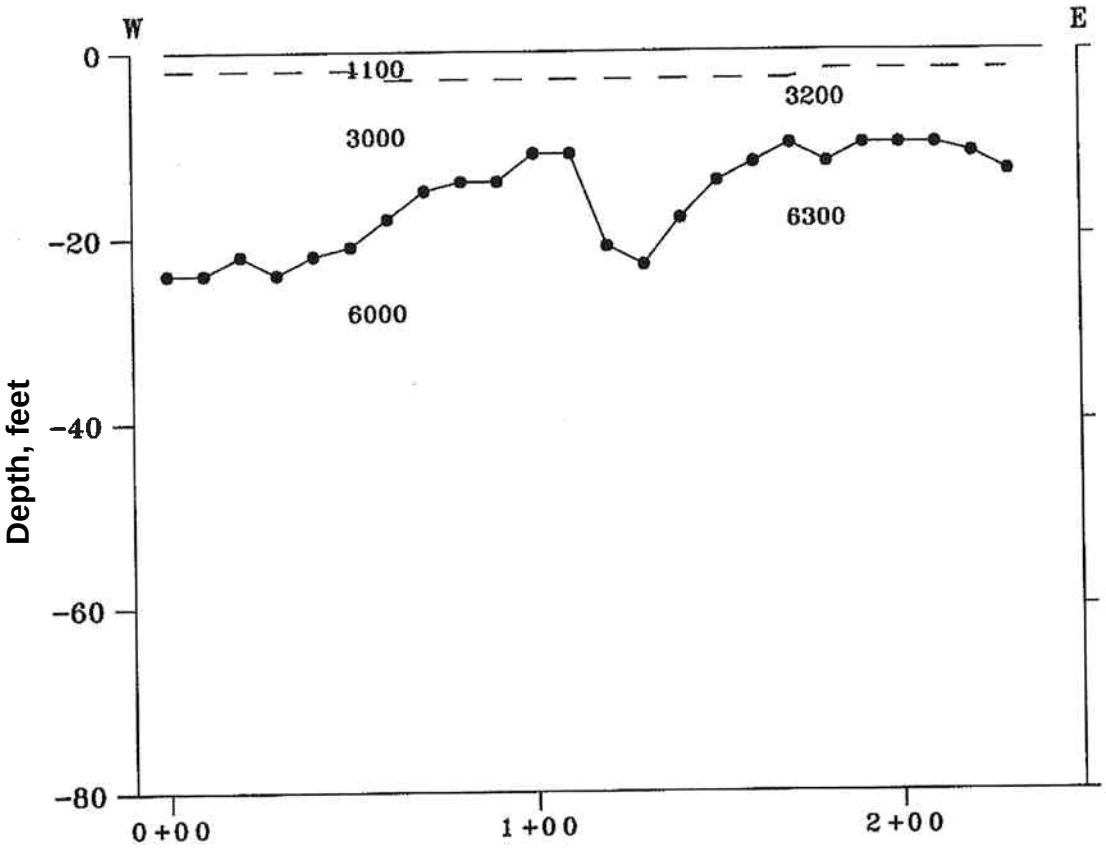
P-wave velocities in feet per second

1 in = 20 ft

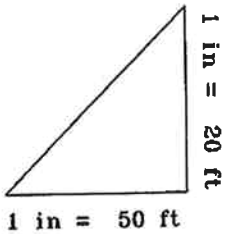
1 in = 50 ft

RS9-P215

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-229

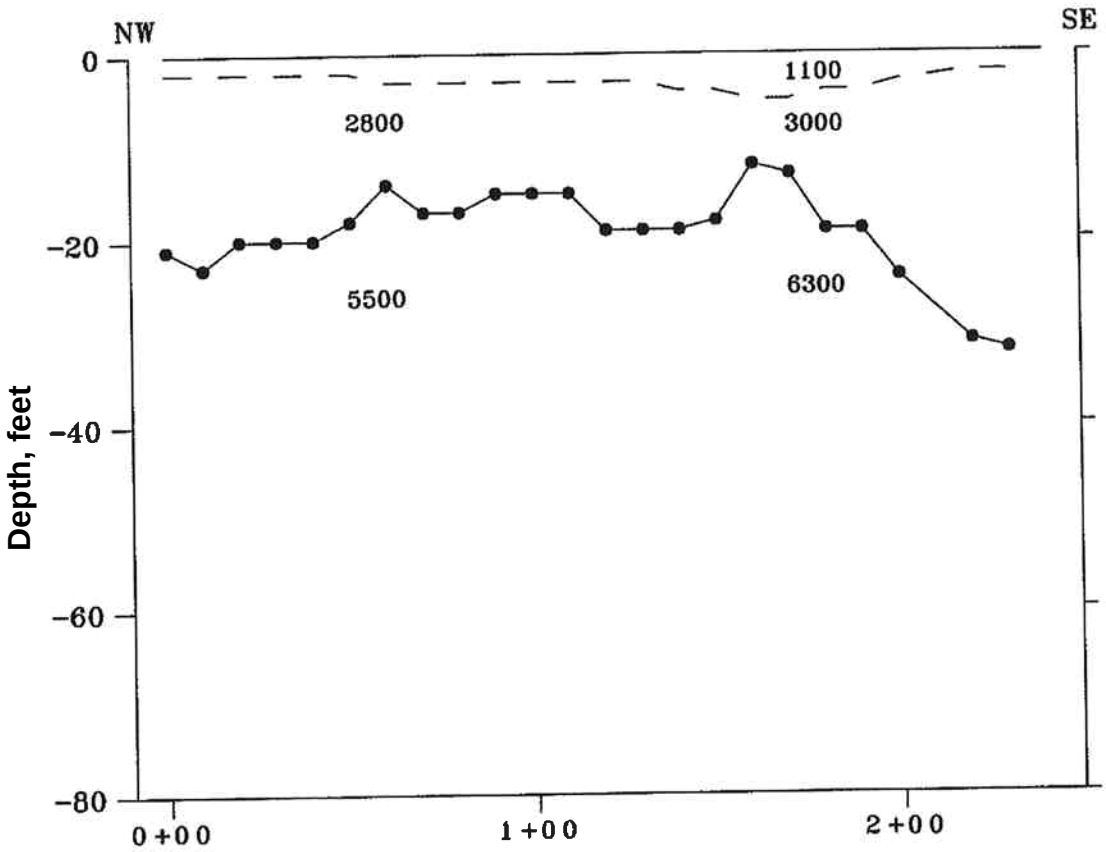


P-wave velocities in feet per second



RS9-P218

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-230



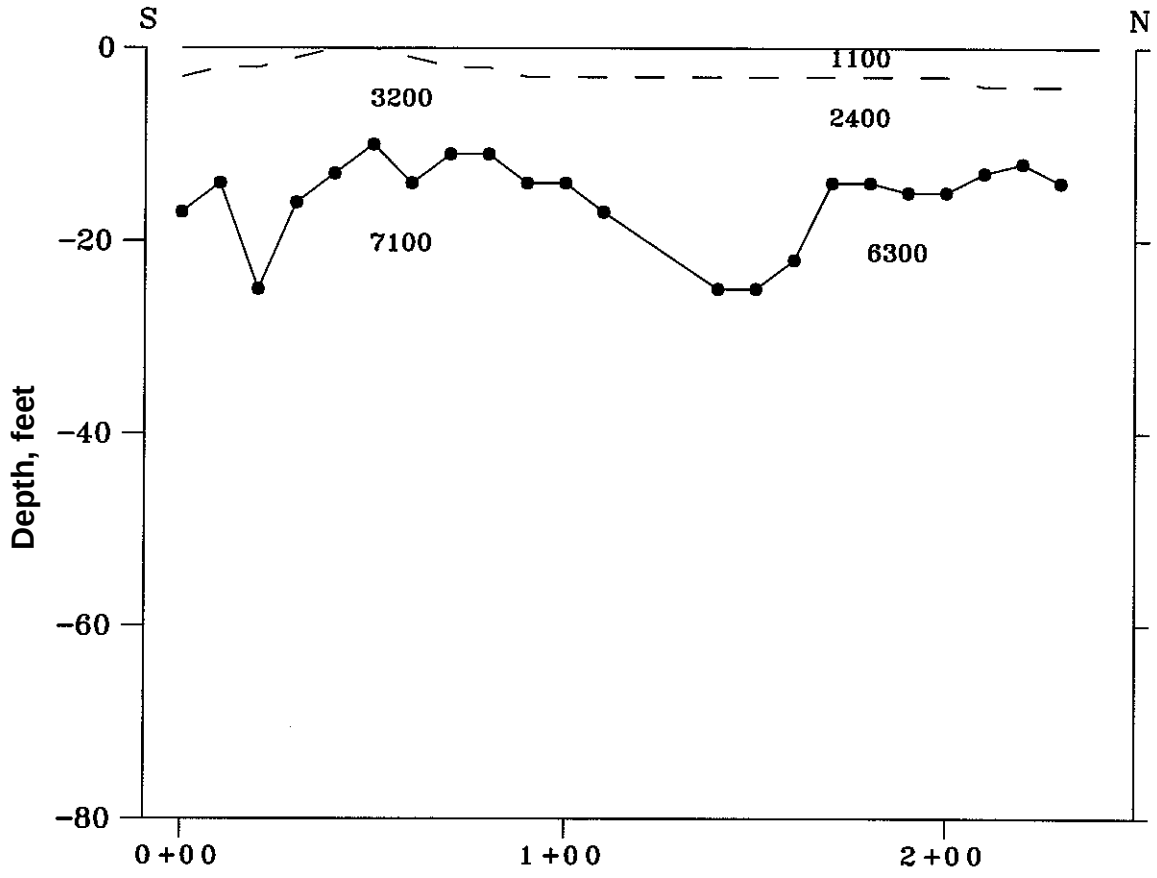
P-wave velocities in feet per second

1 in = 20 ft

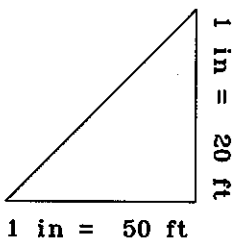
1 in = 50 ft

RS9-P219

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-231

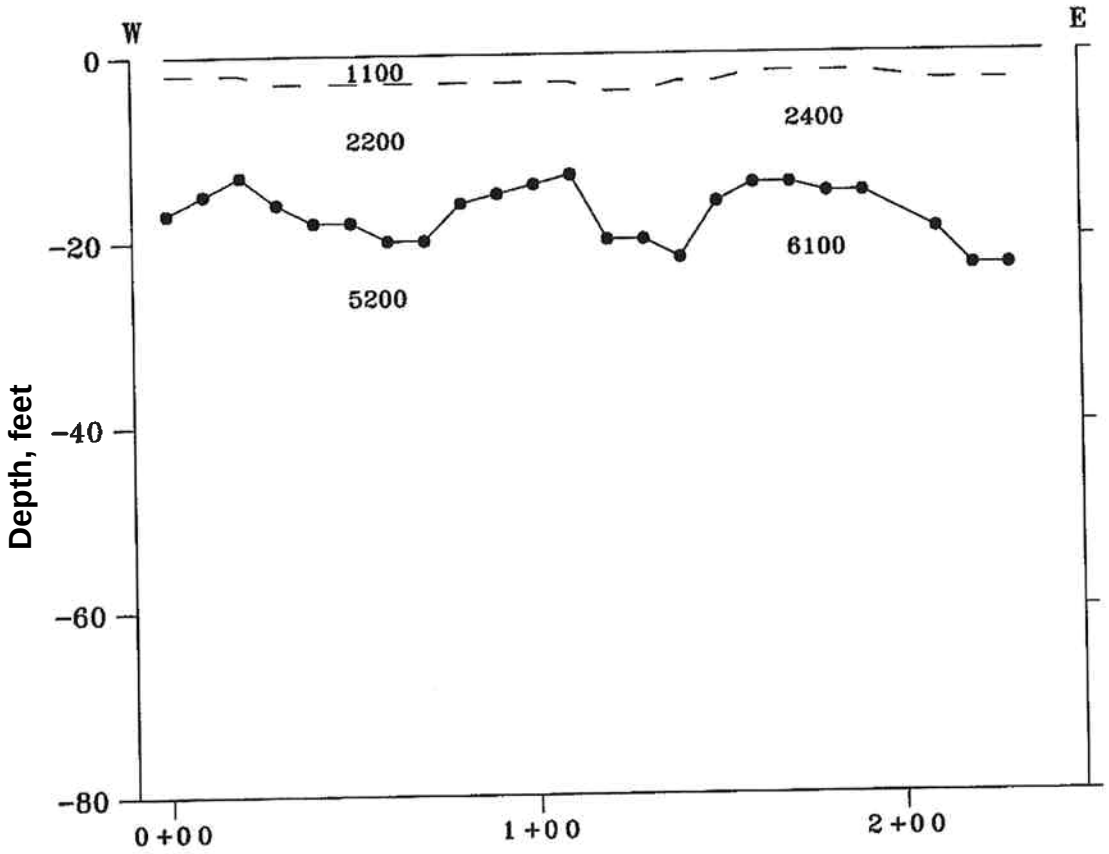


P-wave velocities in feet per second



RS9-P219-1

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-232



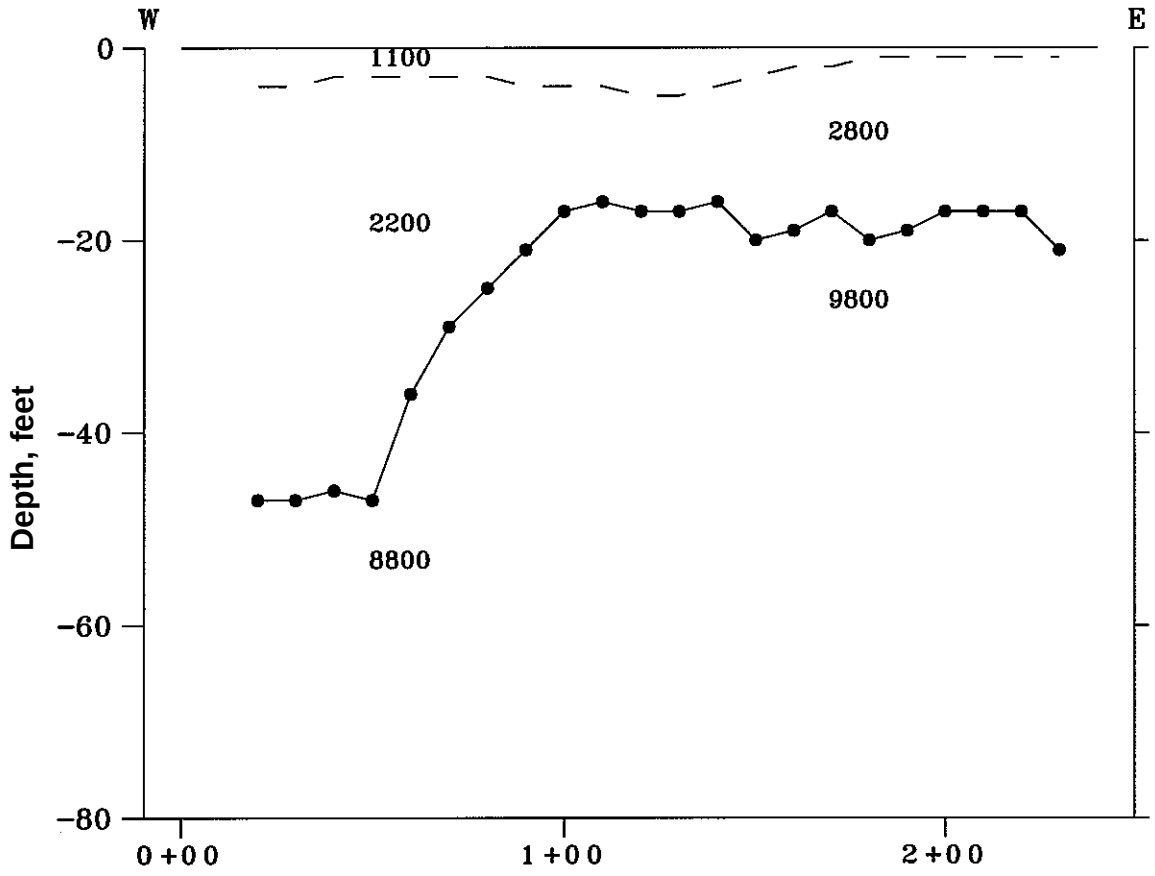
P-wave velocities in feet per second

1 in = 20 ft

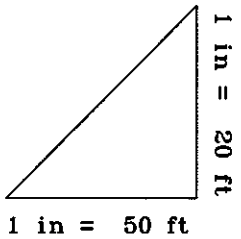
1 in = 50 ft

RS9-P220

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-233

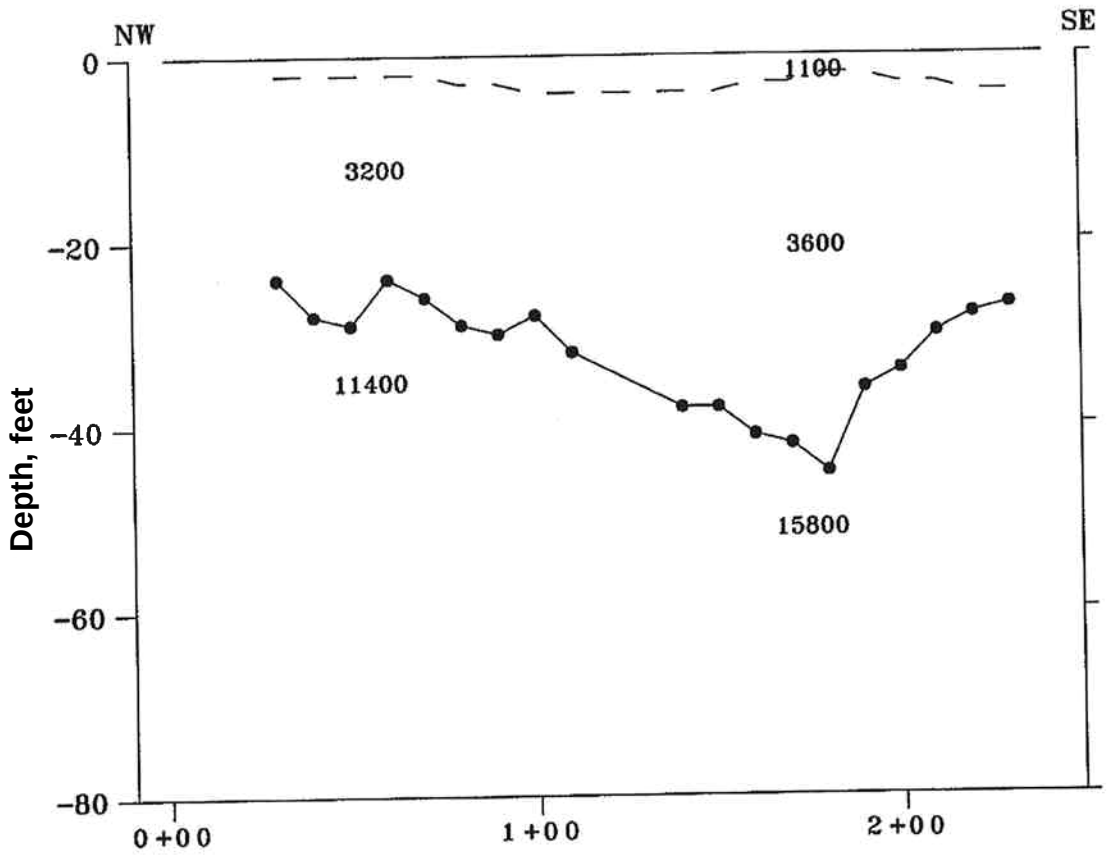


P-wave velocities in feet per second



RS9-P220-1

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-234



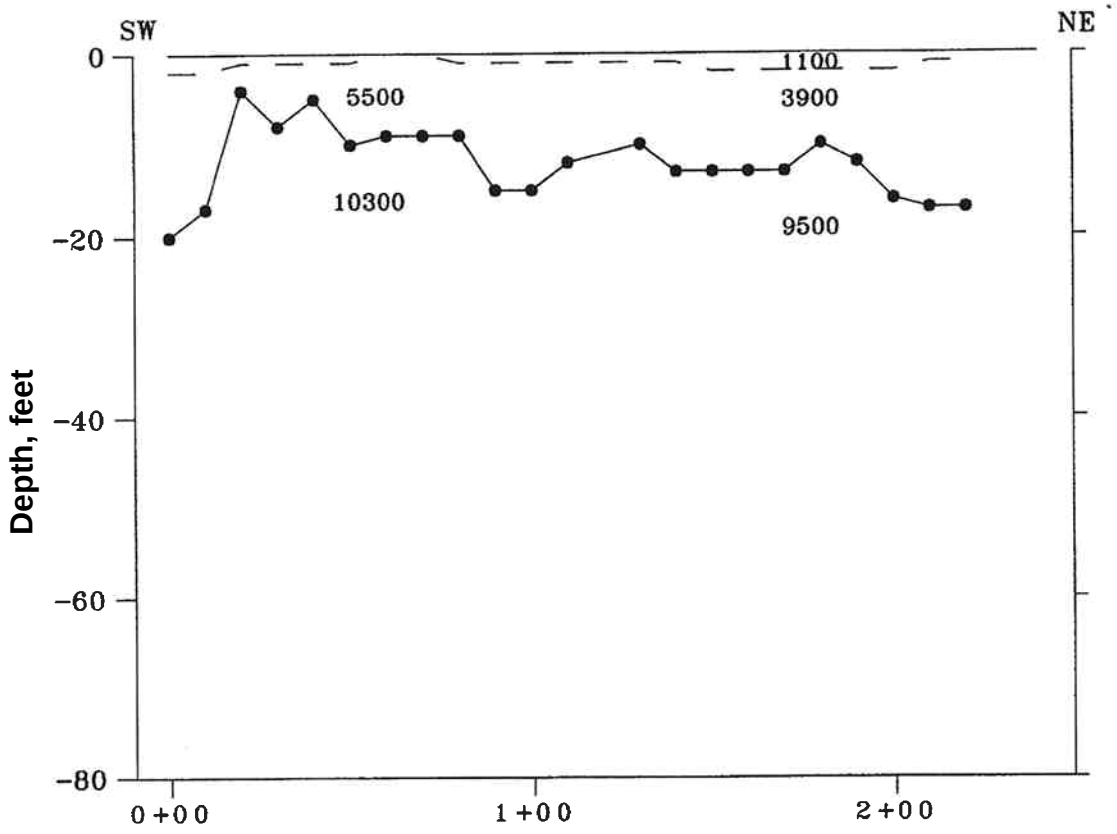
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P221

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-235



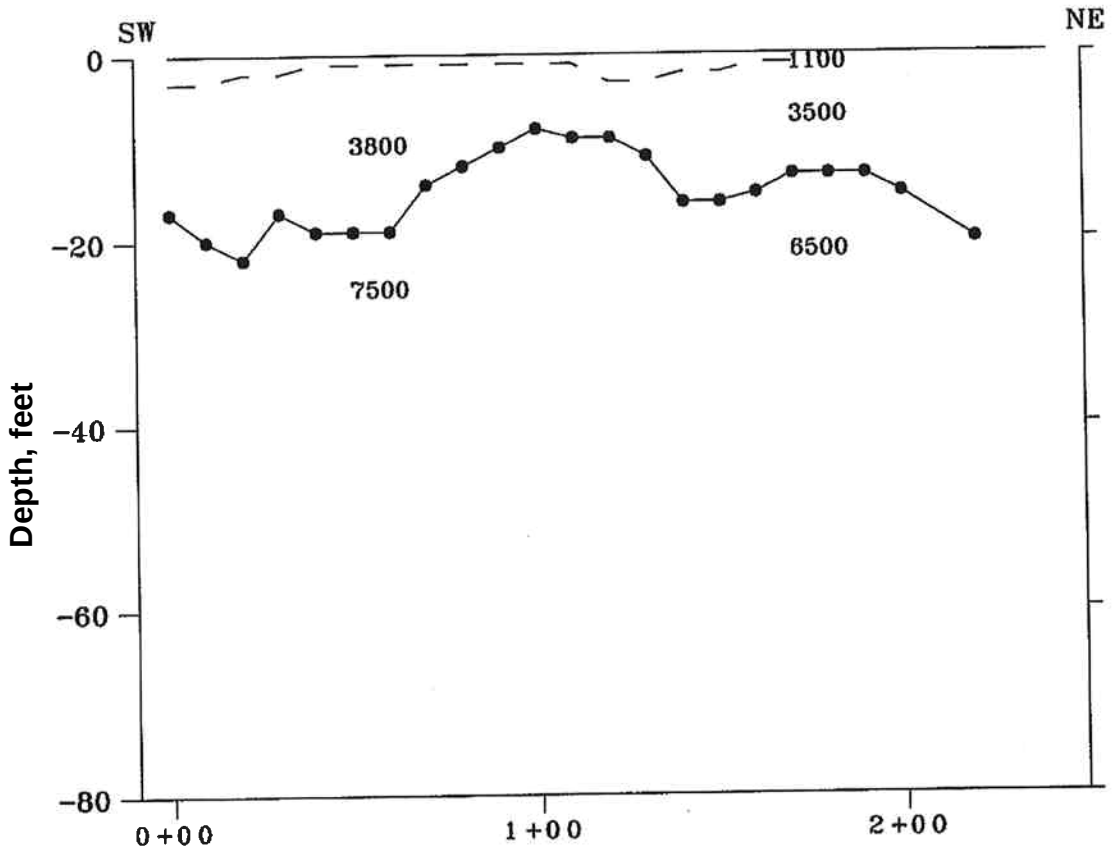
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P221A

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-236



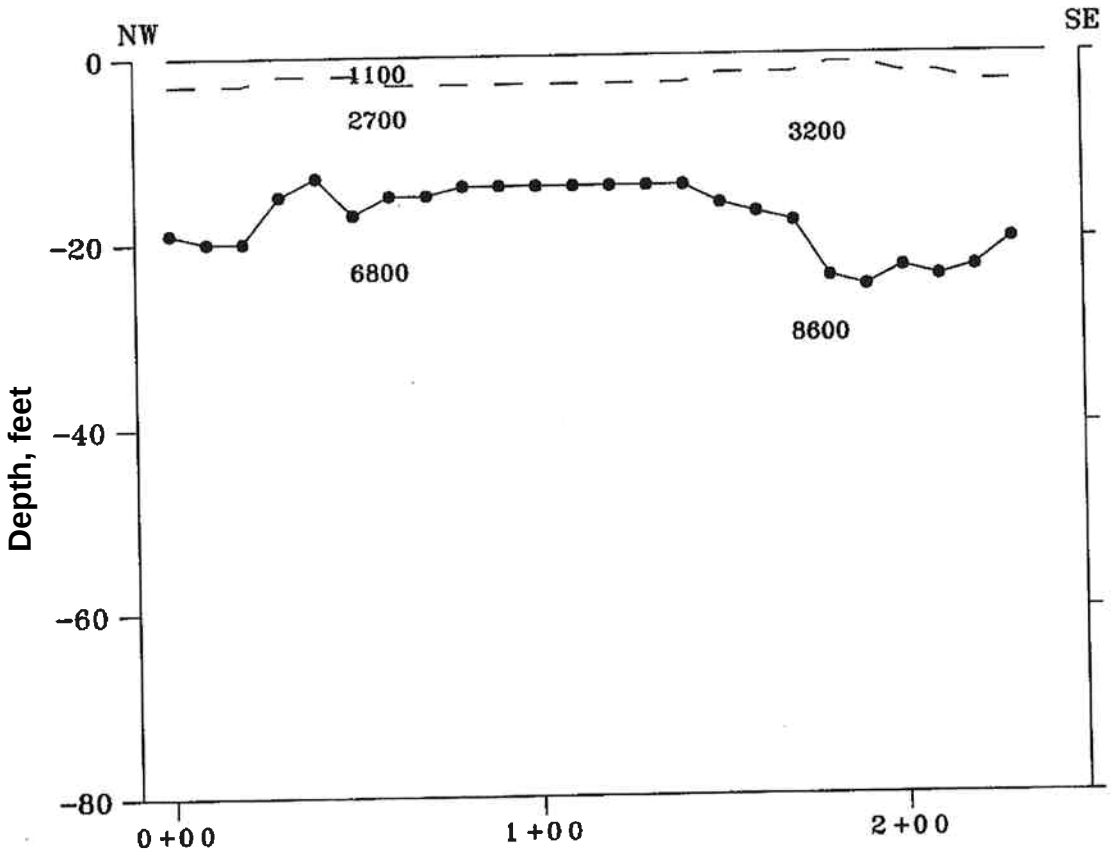
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P223-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-237



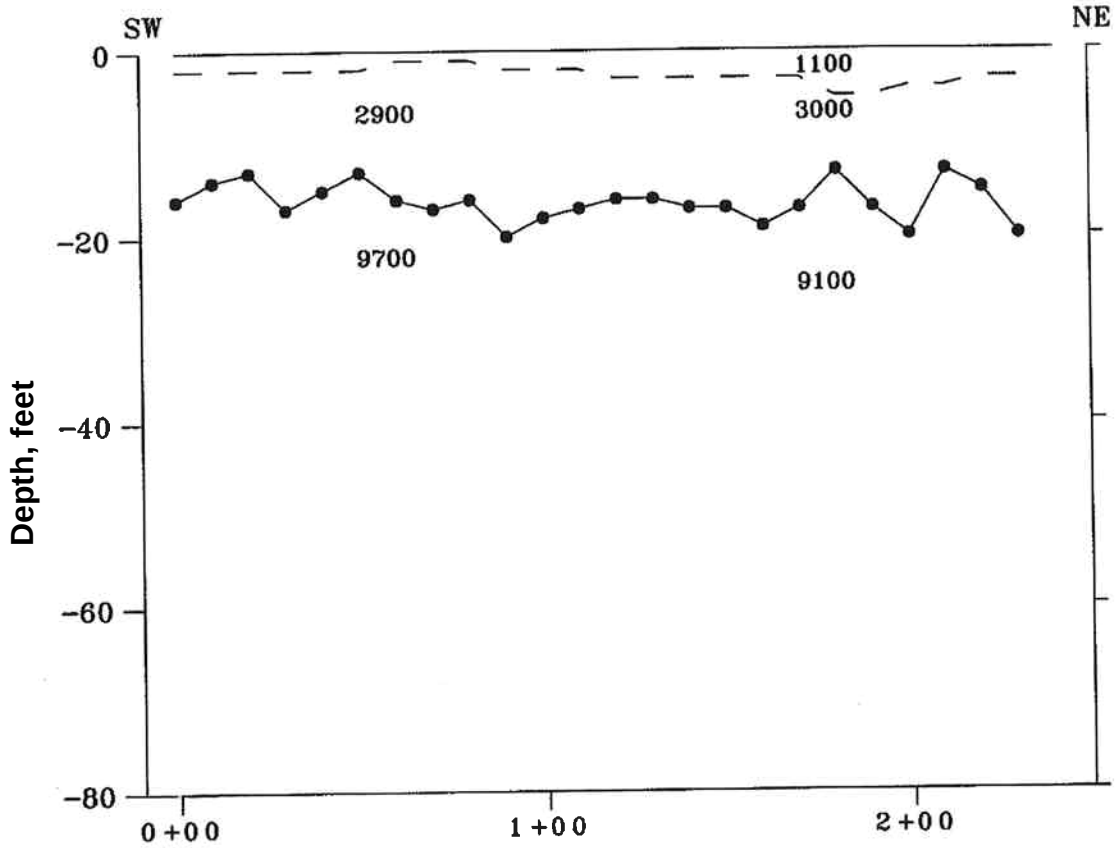
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P224-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-238



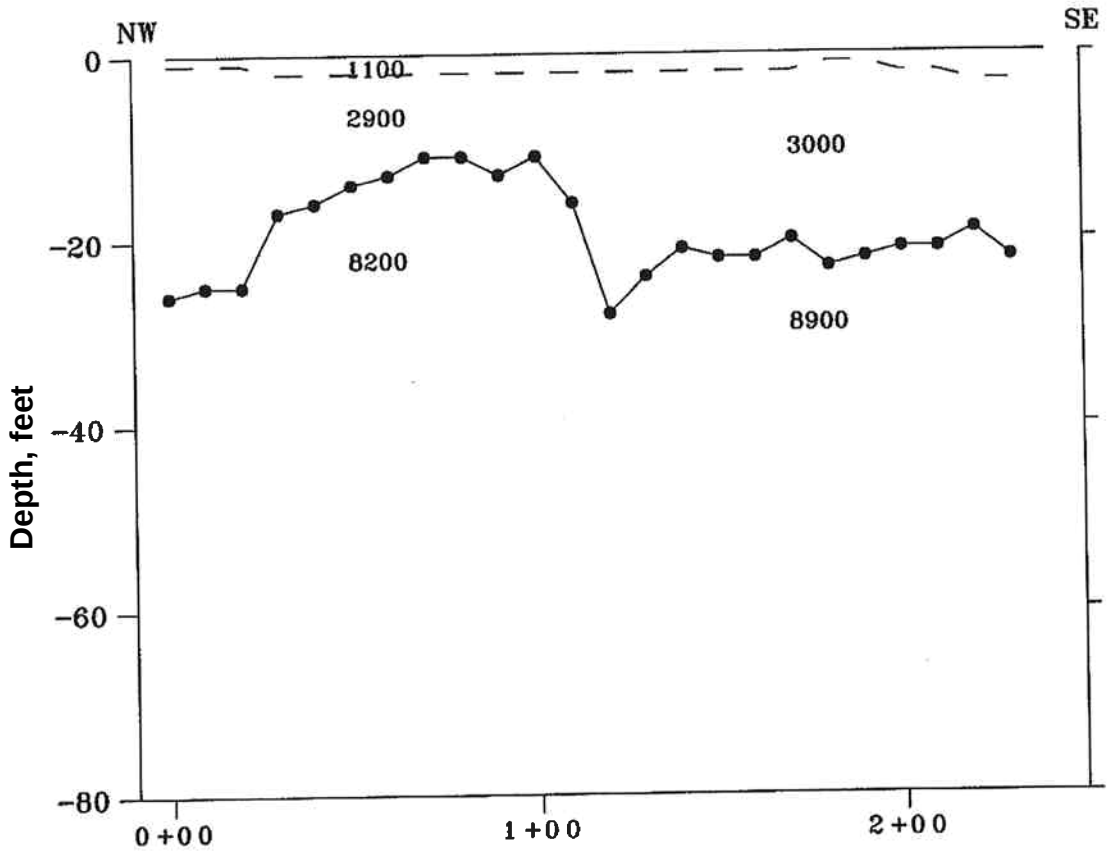
1 in = 20 ft

1 in = 50 ft

P-wave velocities in feet per second

RS9-P226

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-239



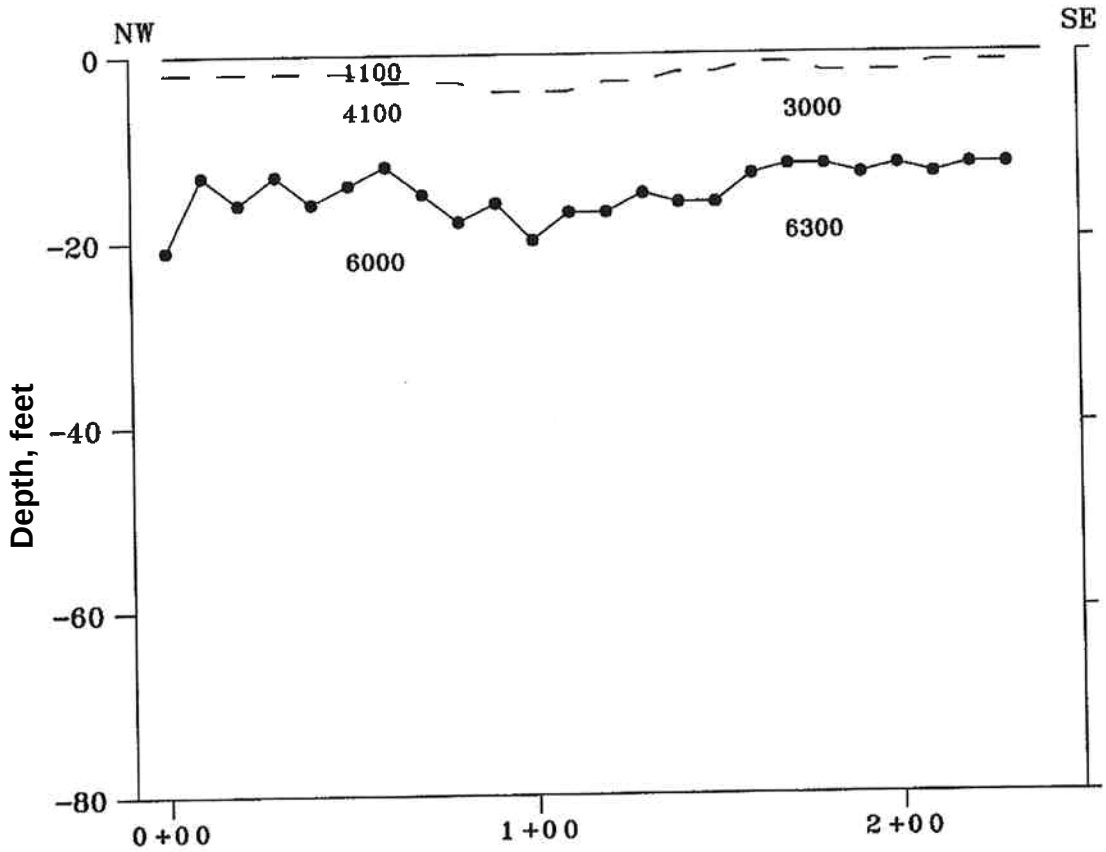
1 in = 20 ft

1 in = 50 ft

P-wave velocities in feet per second

RS9-P228

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-240



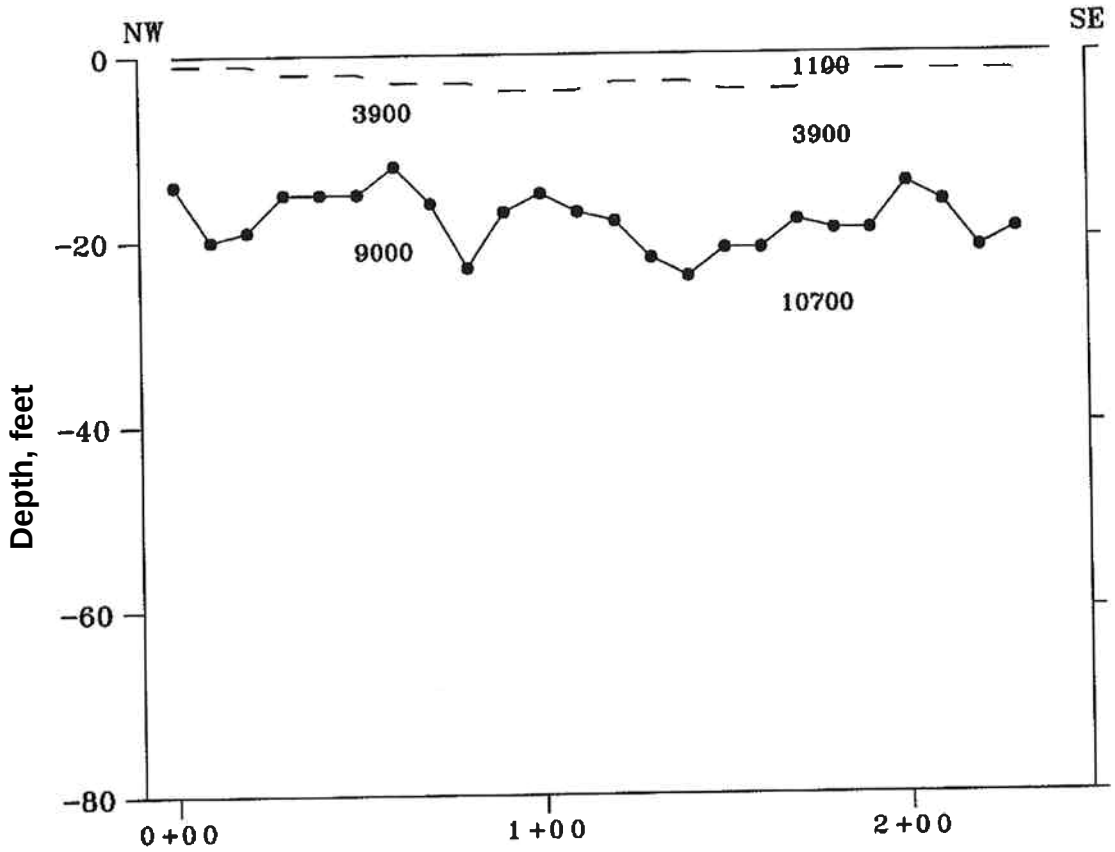
1 in = 20 ft

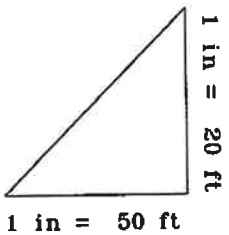
1 in = 50 ft

P-wave velocities in feet per second

RS9-P229

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-241

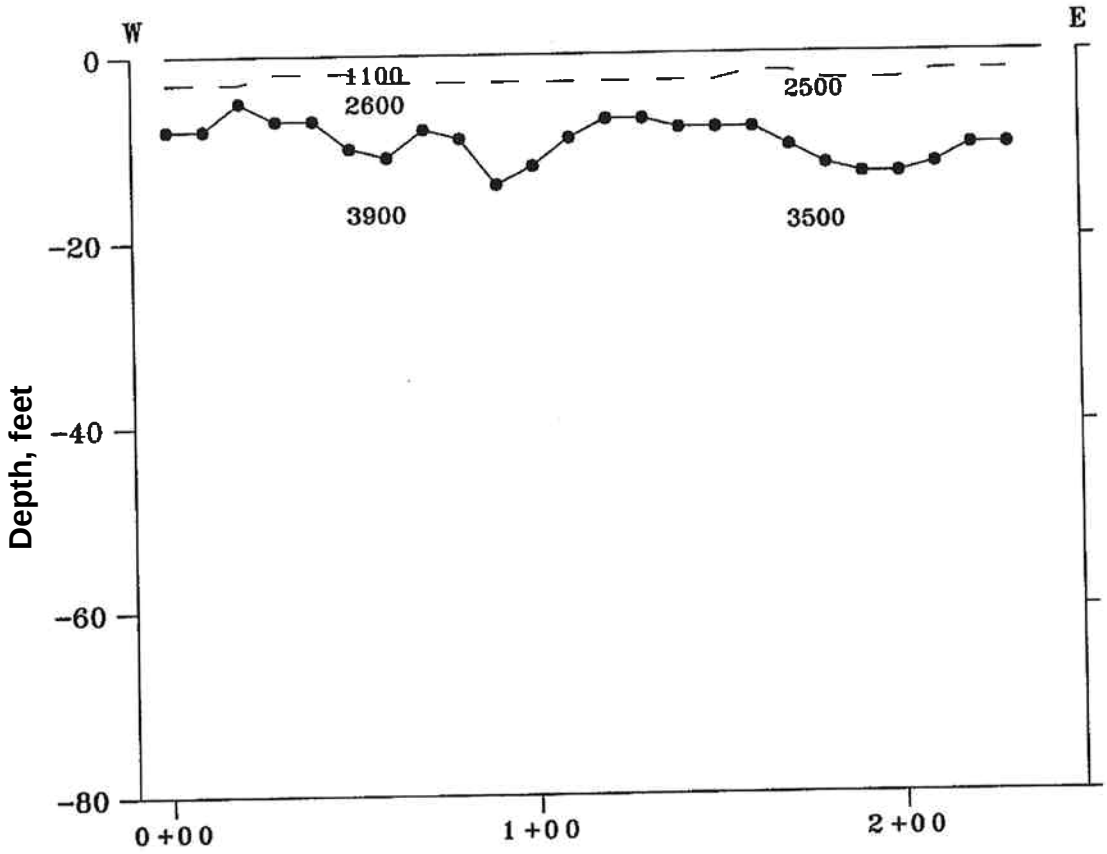




P-wave velocities in feet per second

RS9-P231

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-242



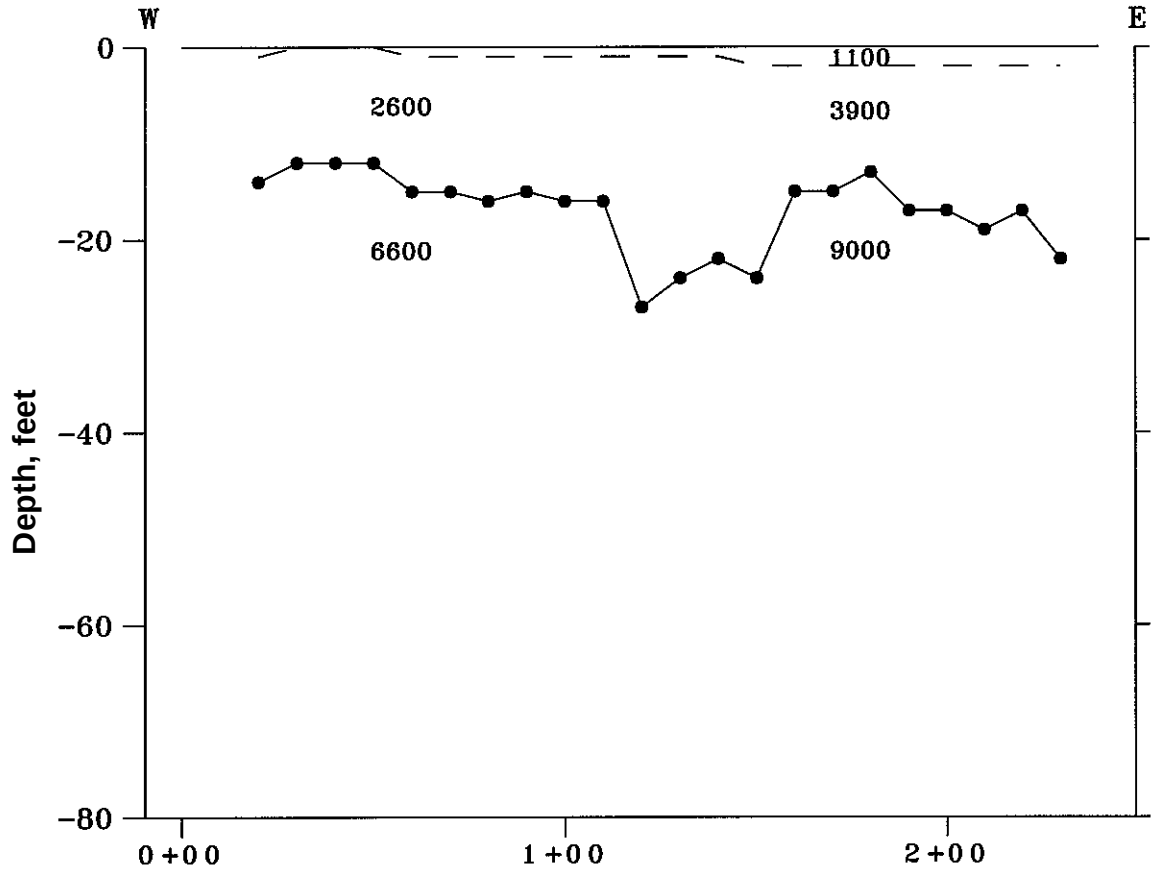
1 in = 20 ft

1 in = 50 ft

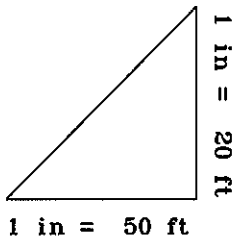
P-wave velocities in feet per second

RS9-P232

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-243

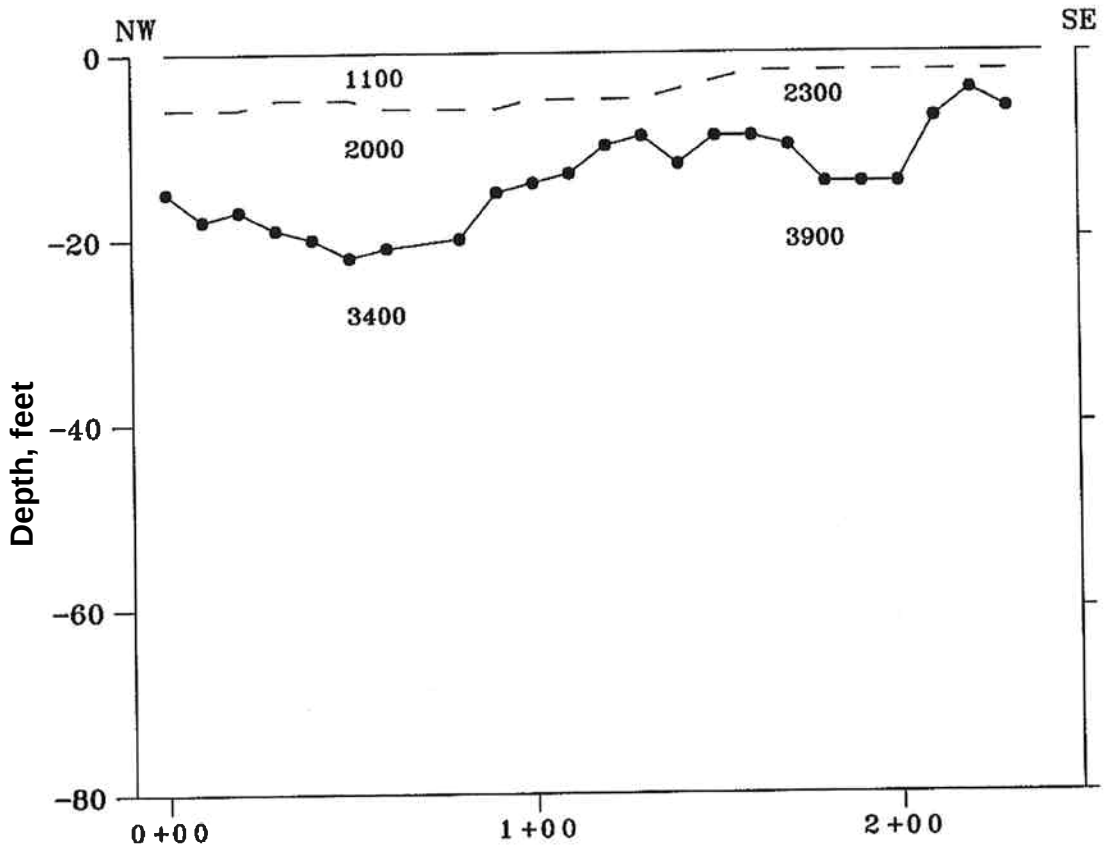


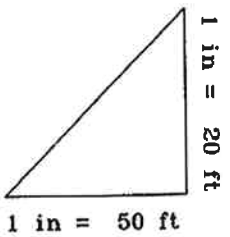
P-wave velocities in feet per second



RS9-P232-1

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-244

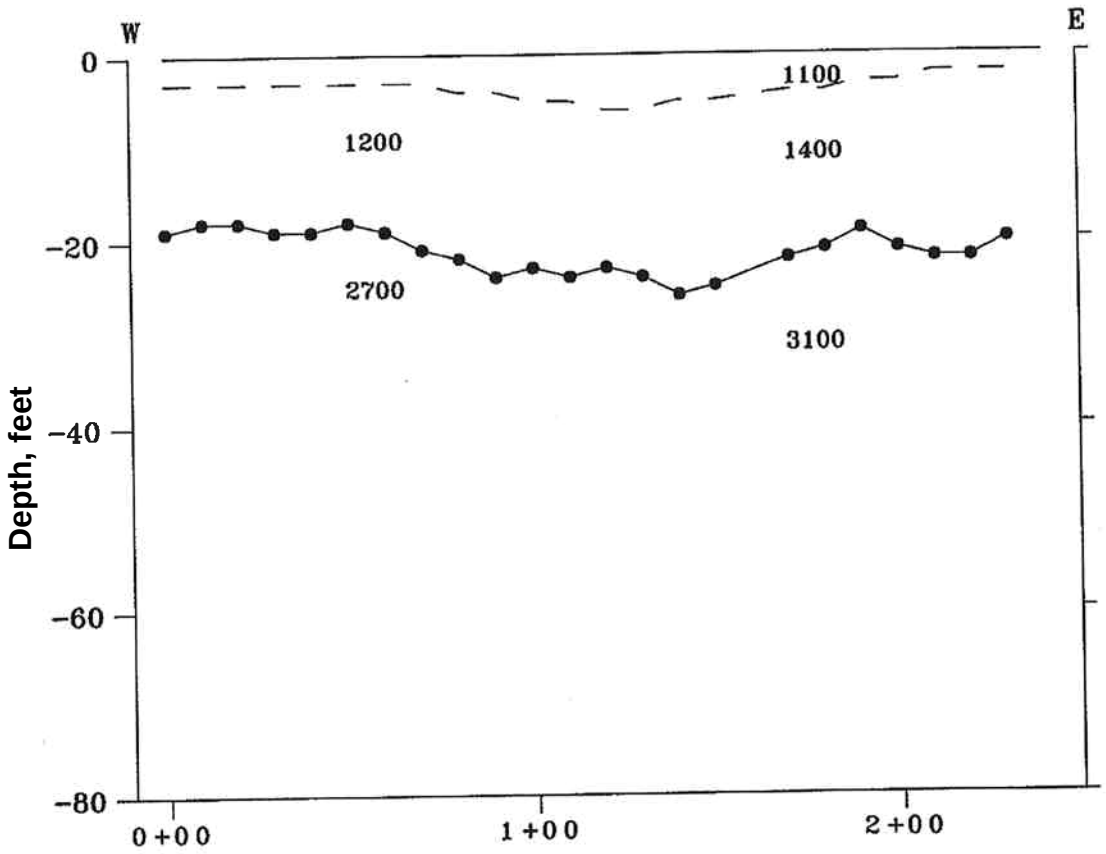


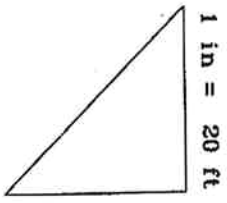


P-wave velocities in feet per second

RS9-P234

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-245

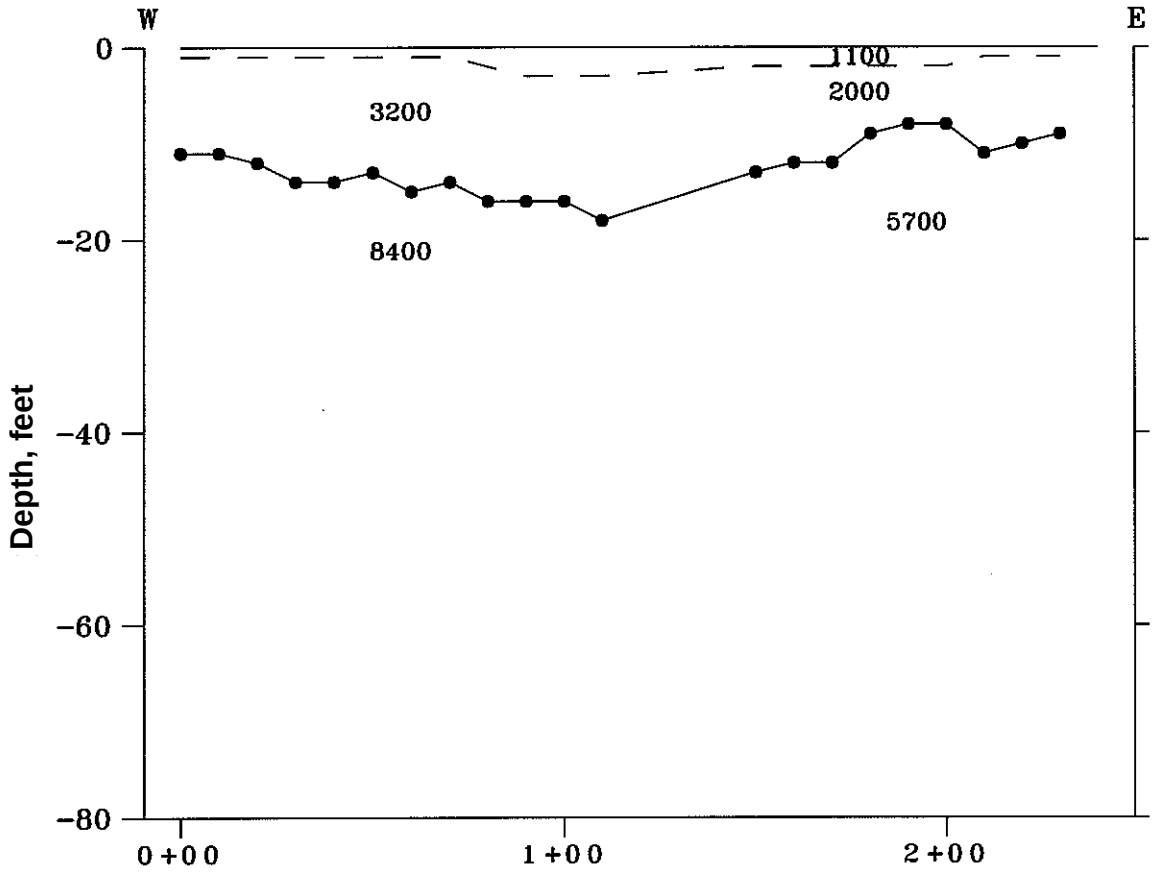




P-wave velocities in feet per second

RS9-P235

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-246



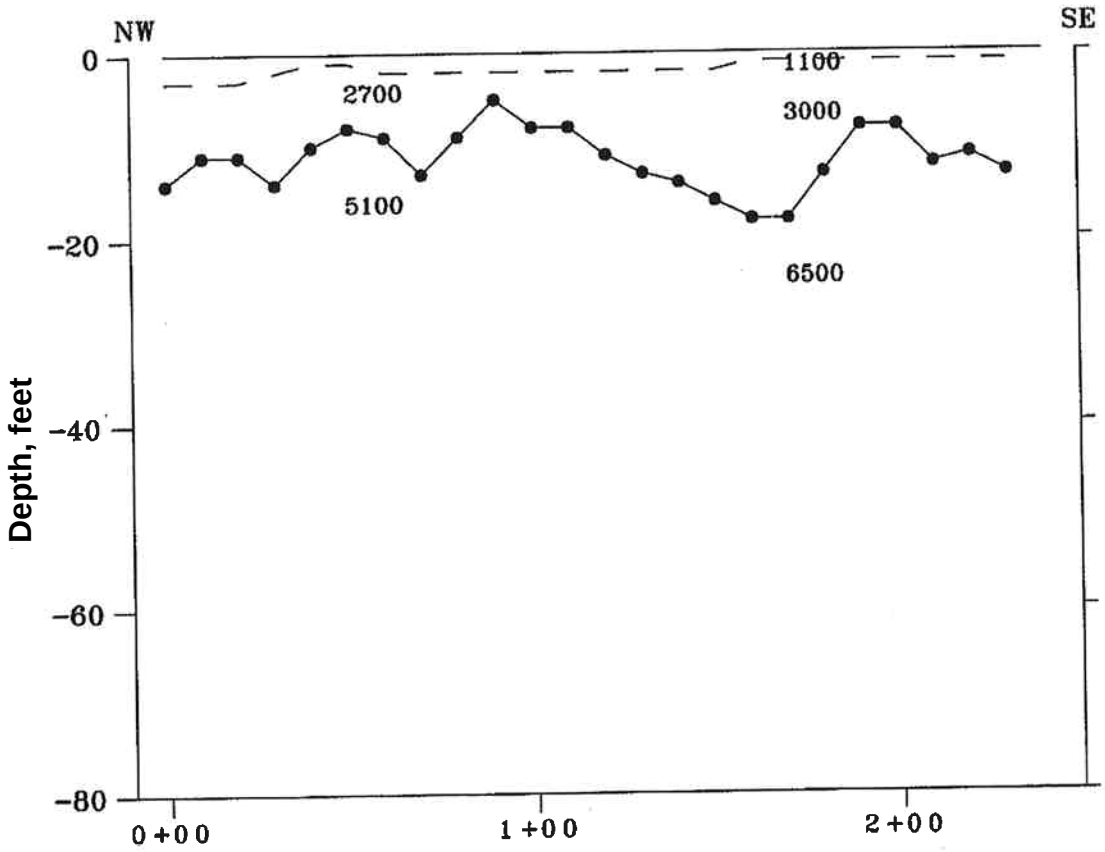
P-wave velocities in feet per second

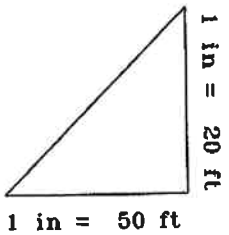
1 in = 20 ft

1 in = 50 ft

RS9-P236-1

Project No. 27668031	Date: 8-12-09	Sunrise Powerlink Project	Fig. C-247

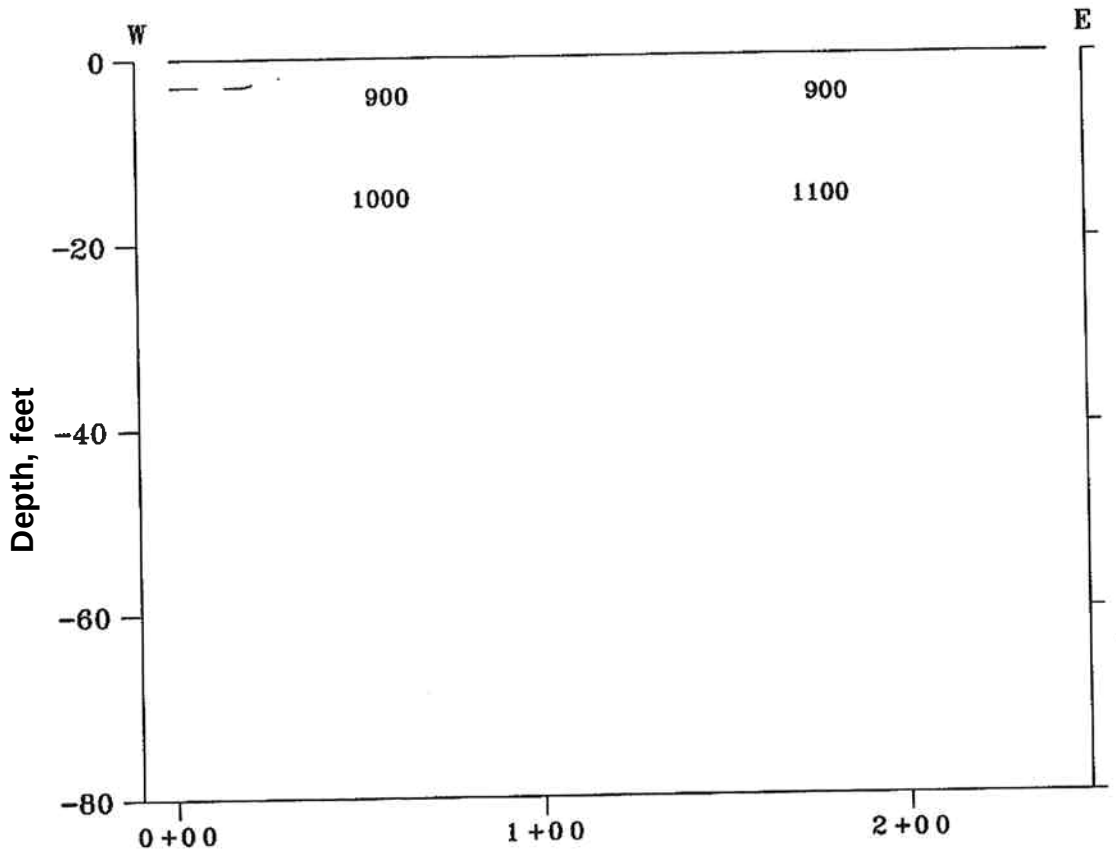


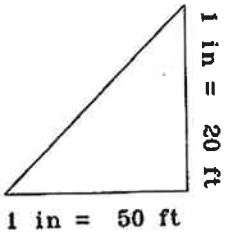


P-wave velocities in feet per second

RS9-P238

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-248

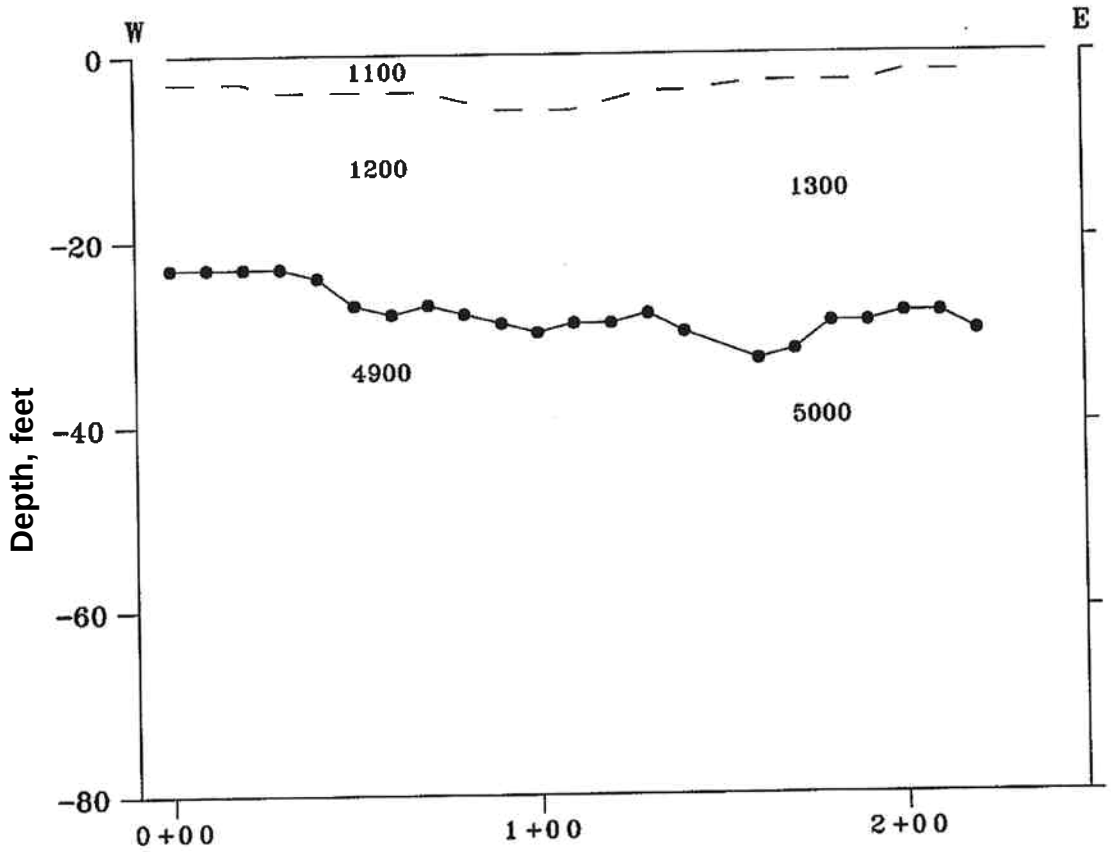




P-wave velocities in feet per second

RS9-P239

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-249



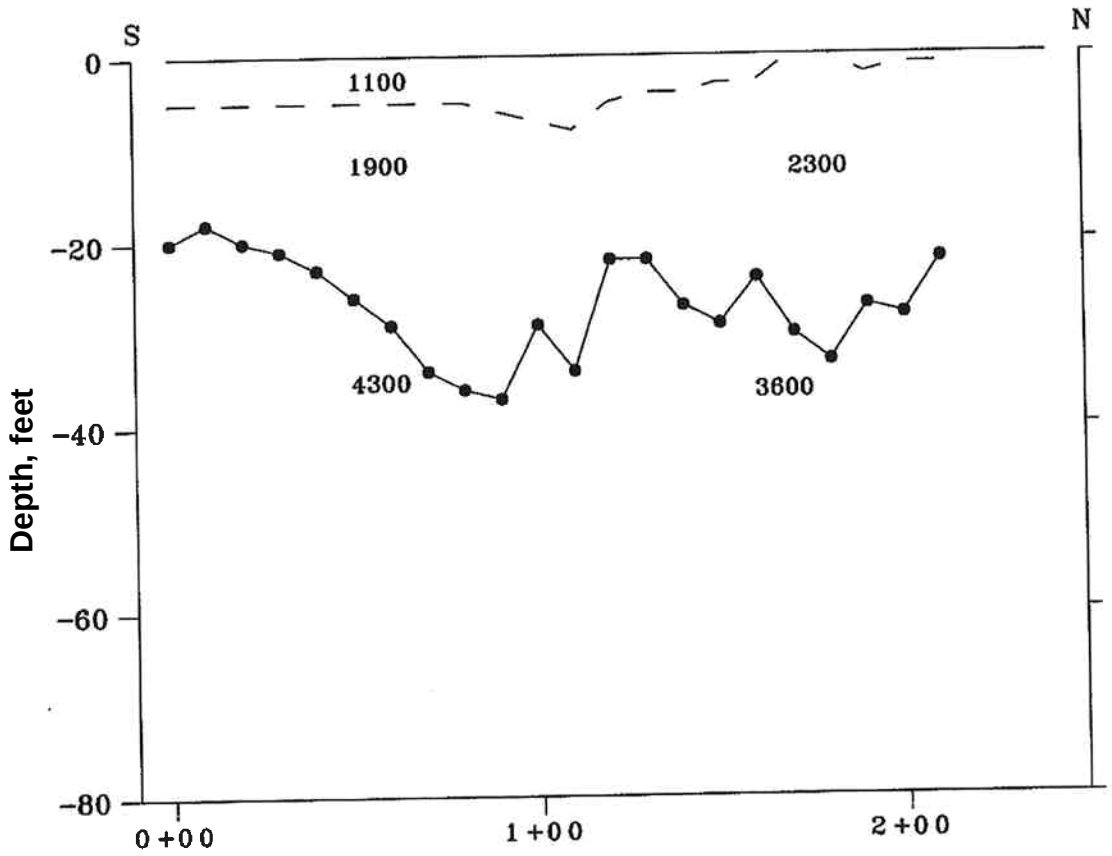
1 in = 20 ft

1 in = 50 ft

P-wave velocities in feet per second

RS9-P242

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-250



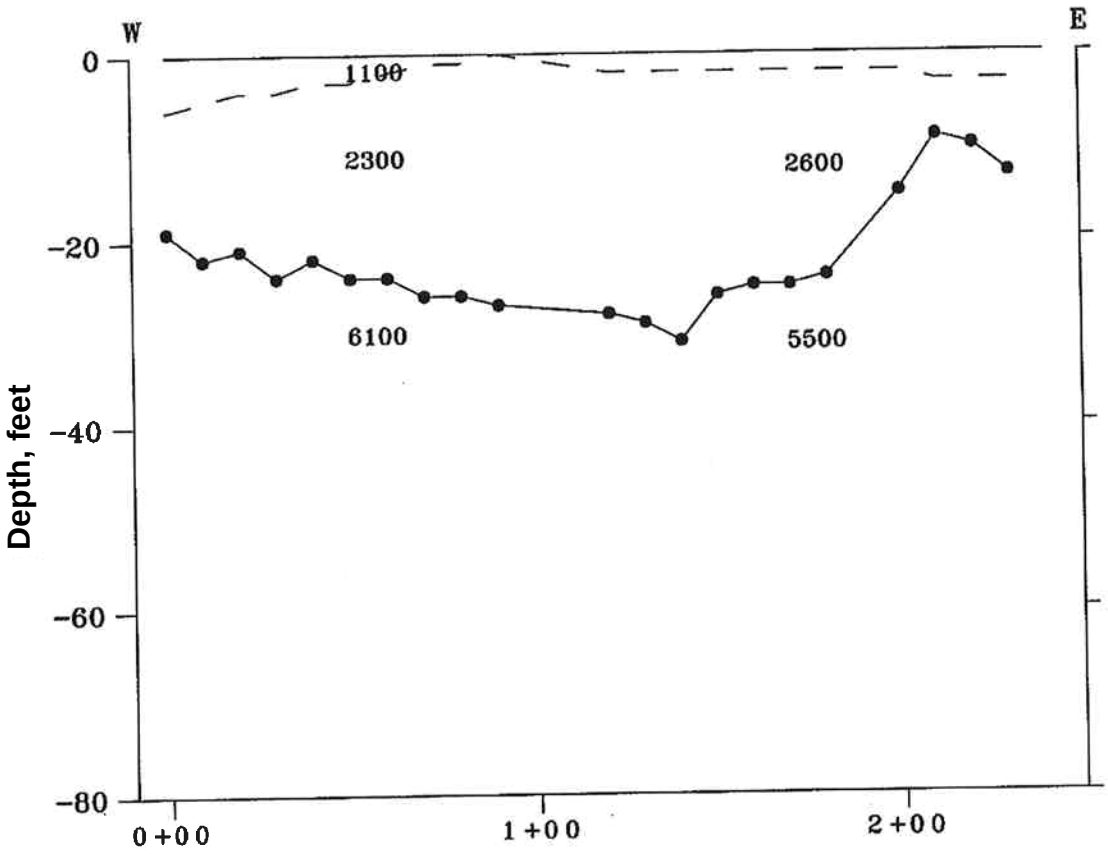
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P243

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-251



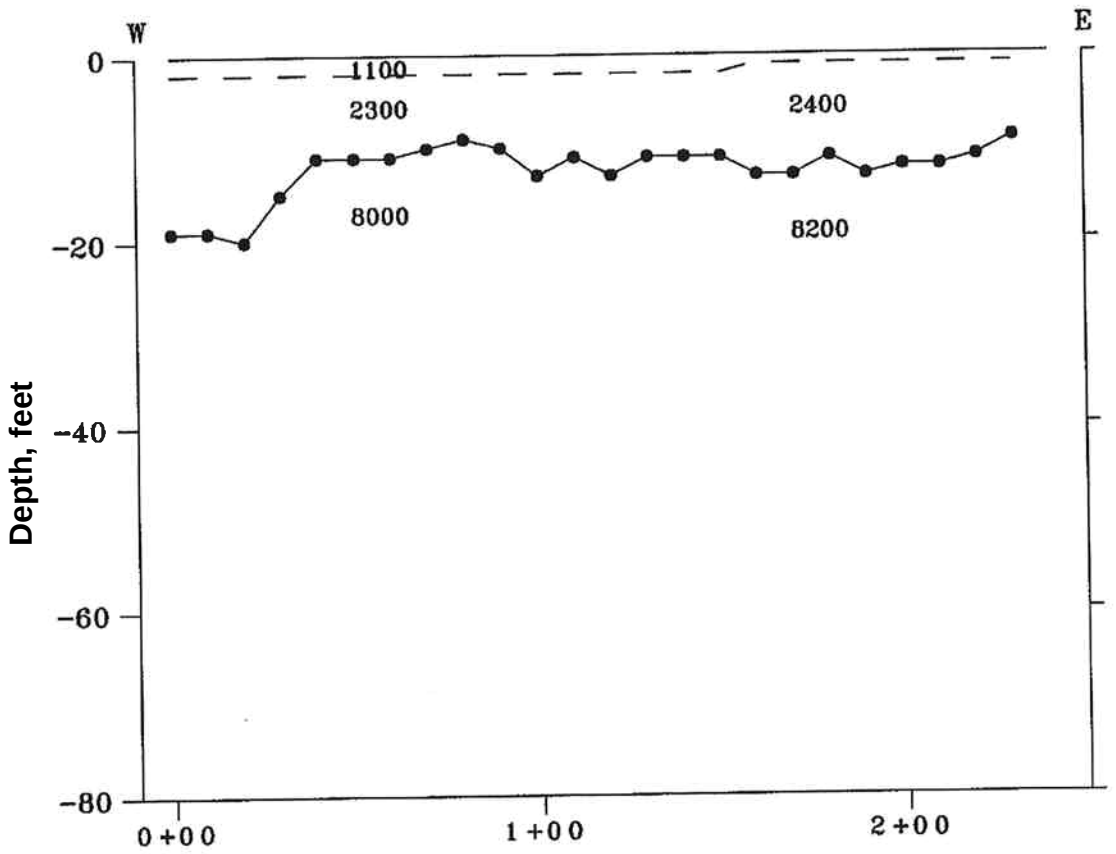
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P245

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-252



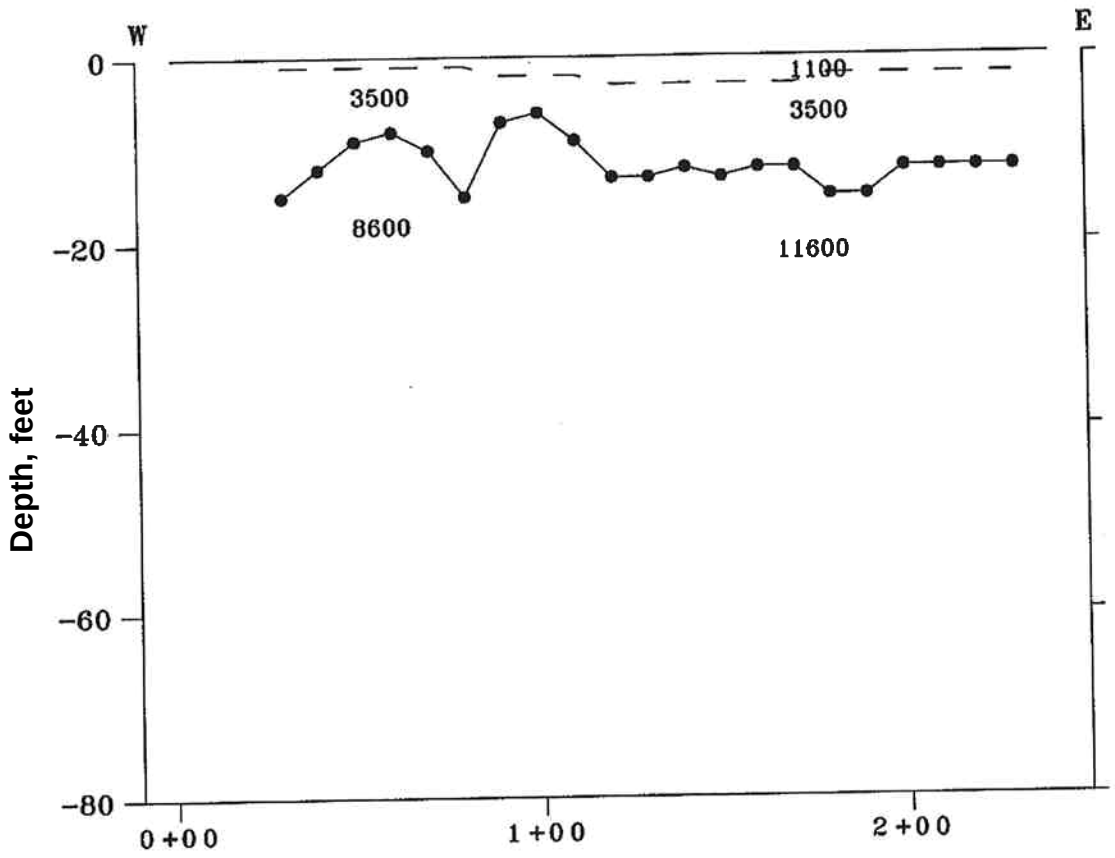
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P246

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-253



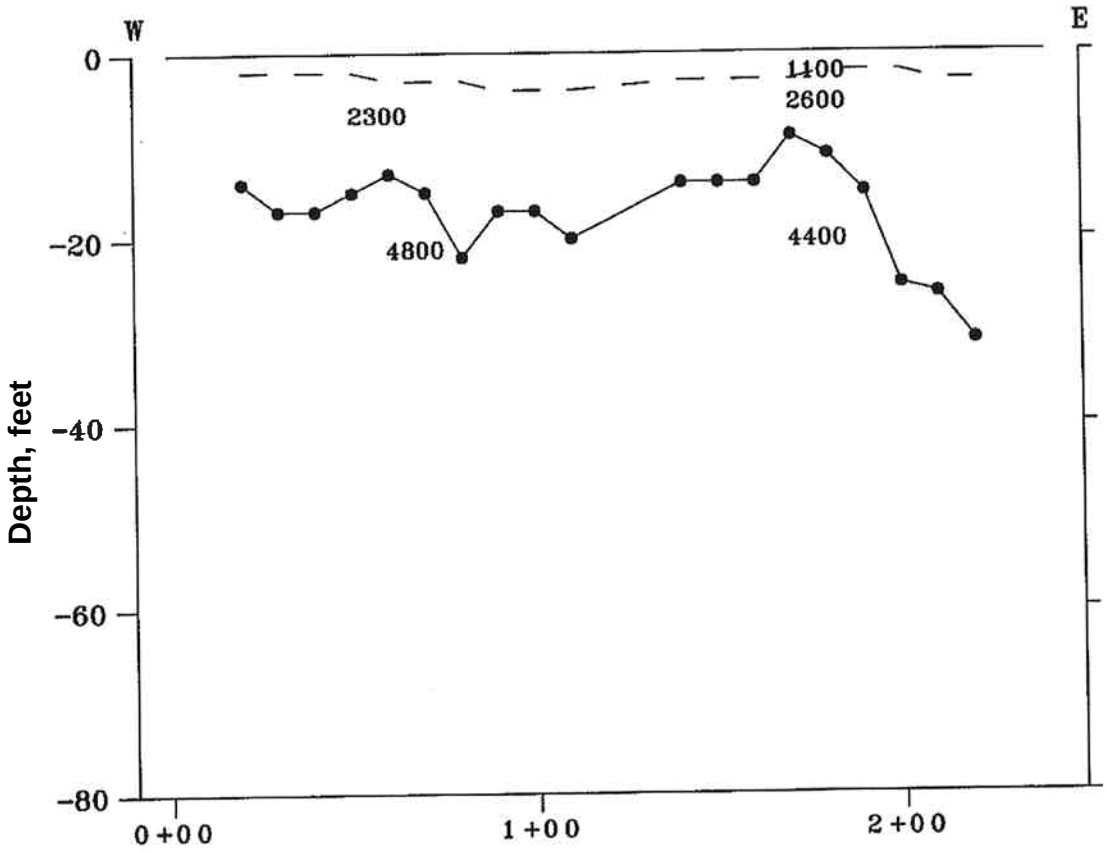
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P248-1

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-254



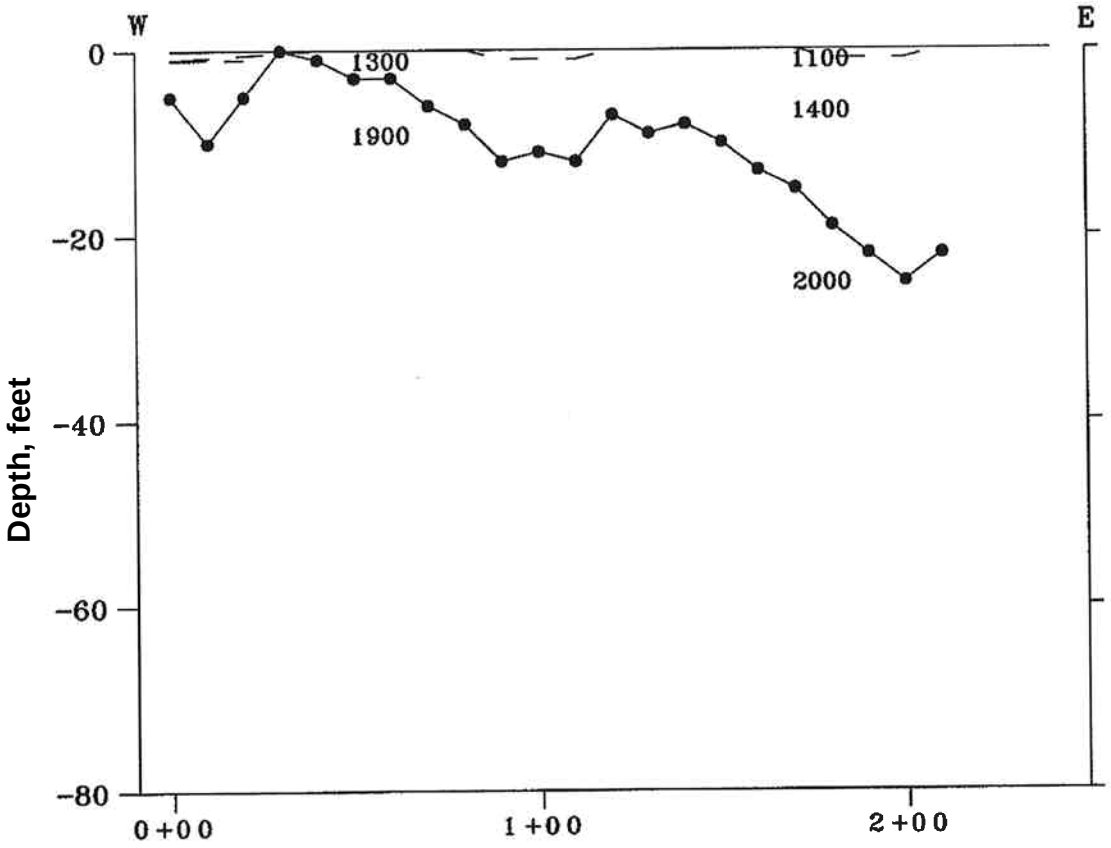
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS9-P250

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-255



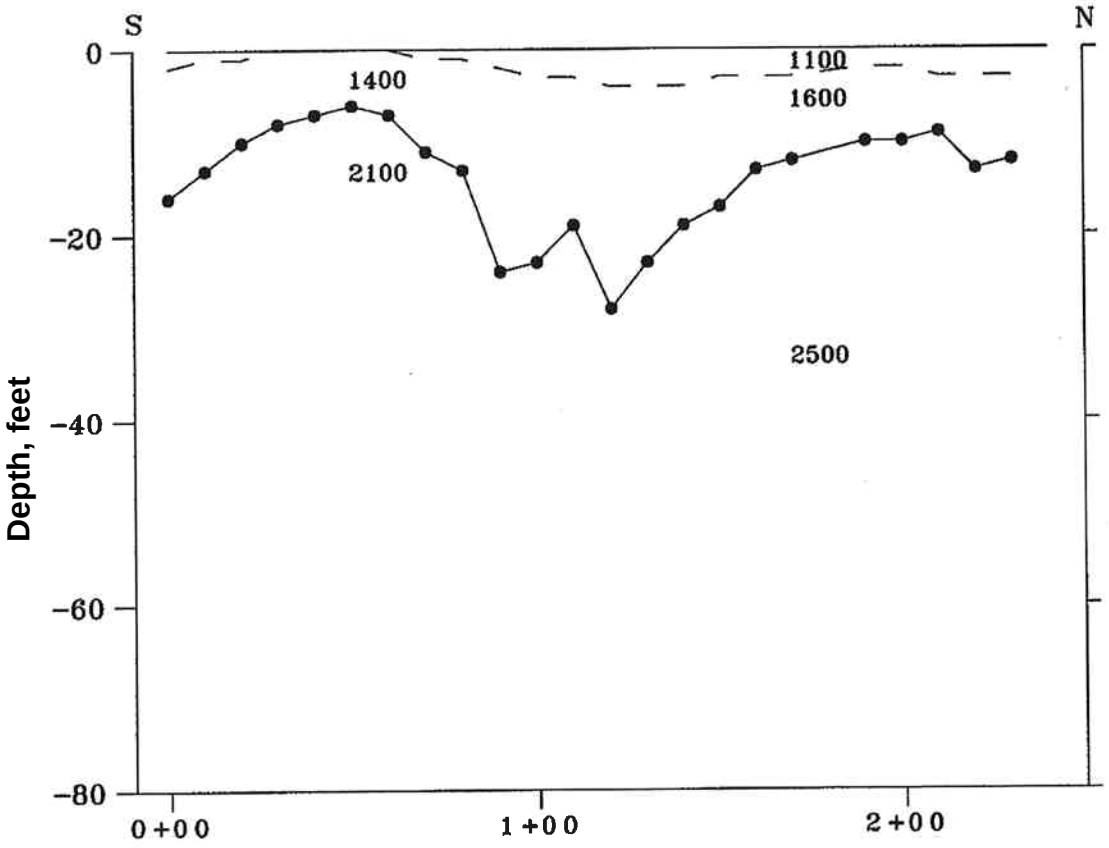
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P290

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-256



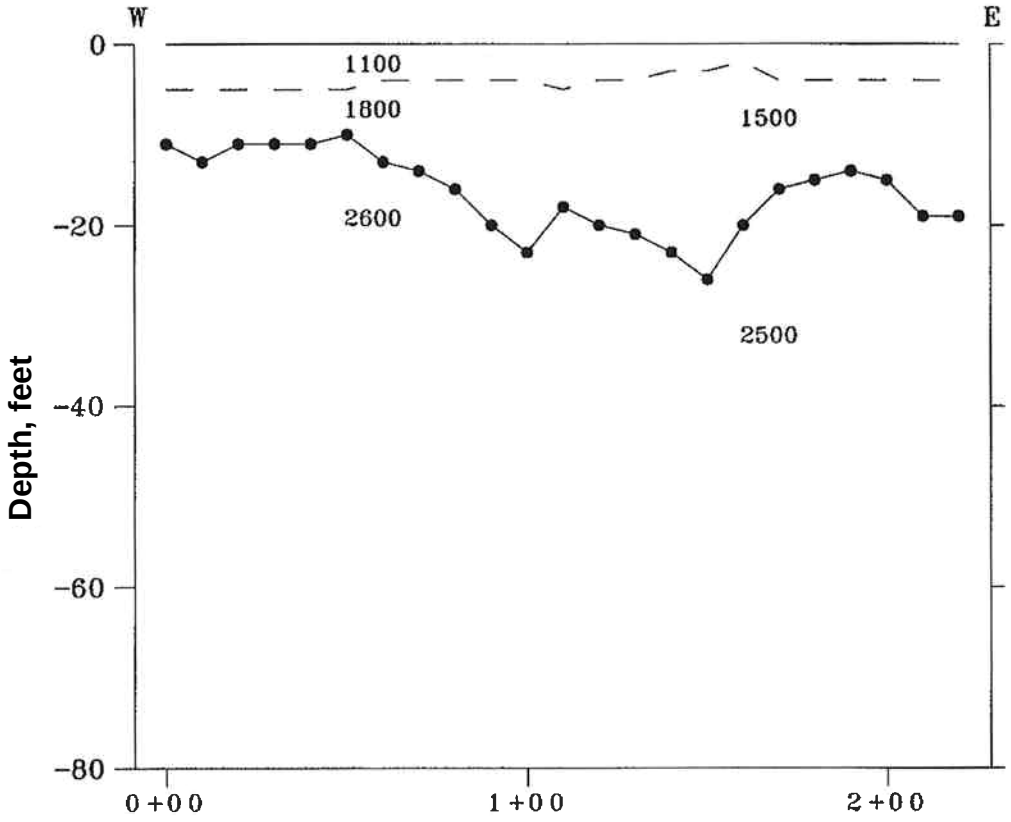
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P292

Project No. 27668031	Date: 6-7-09	Sunrise Powerlink Project	Fig. C-257



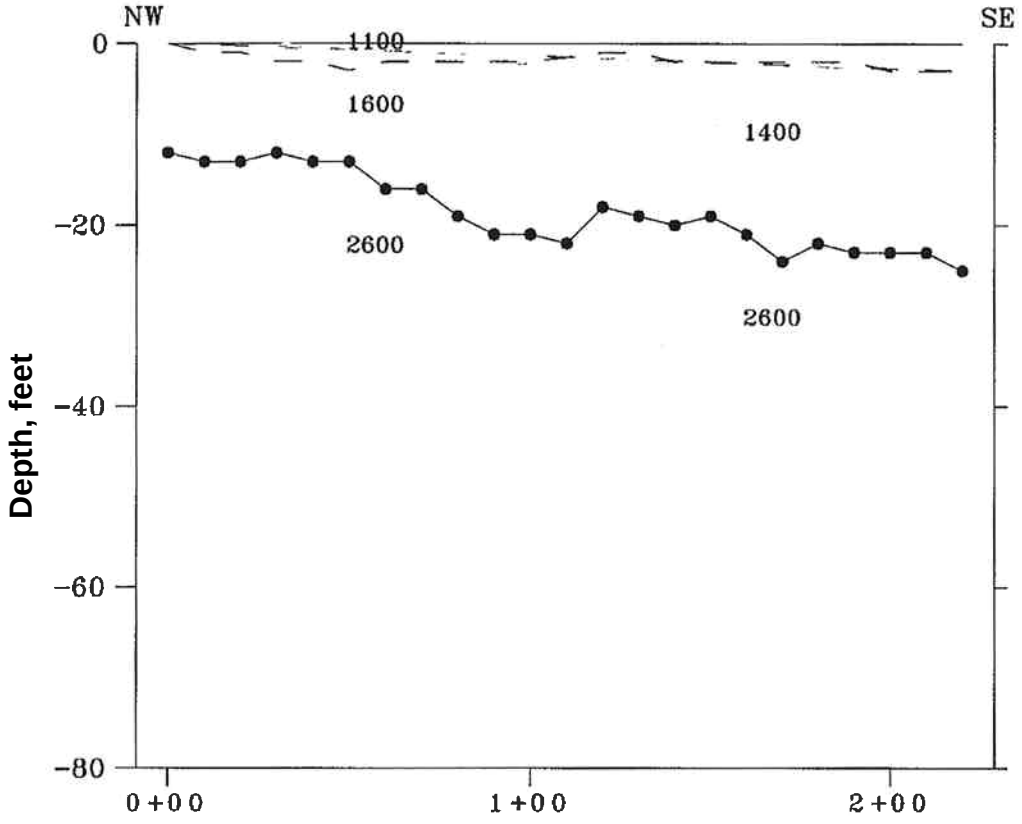
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P297

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-258



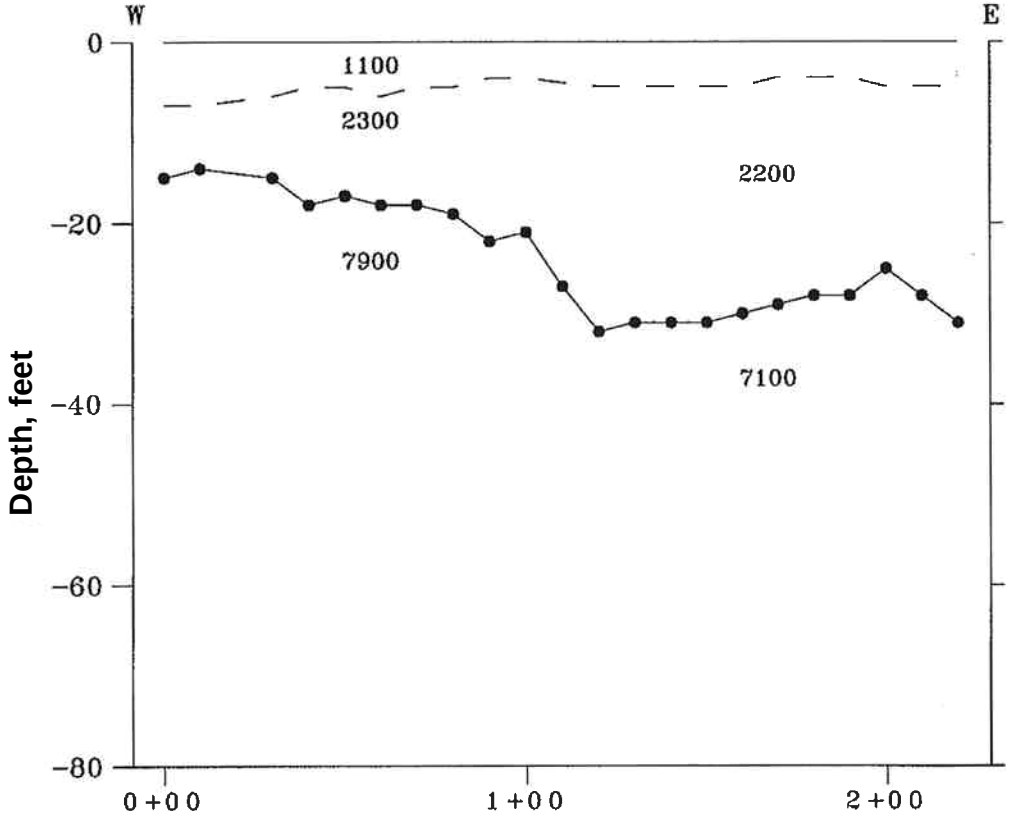
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P301

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-259



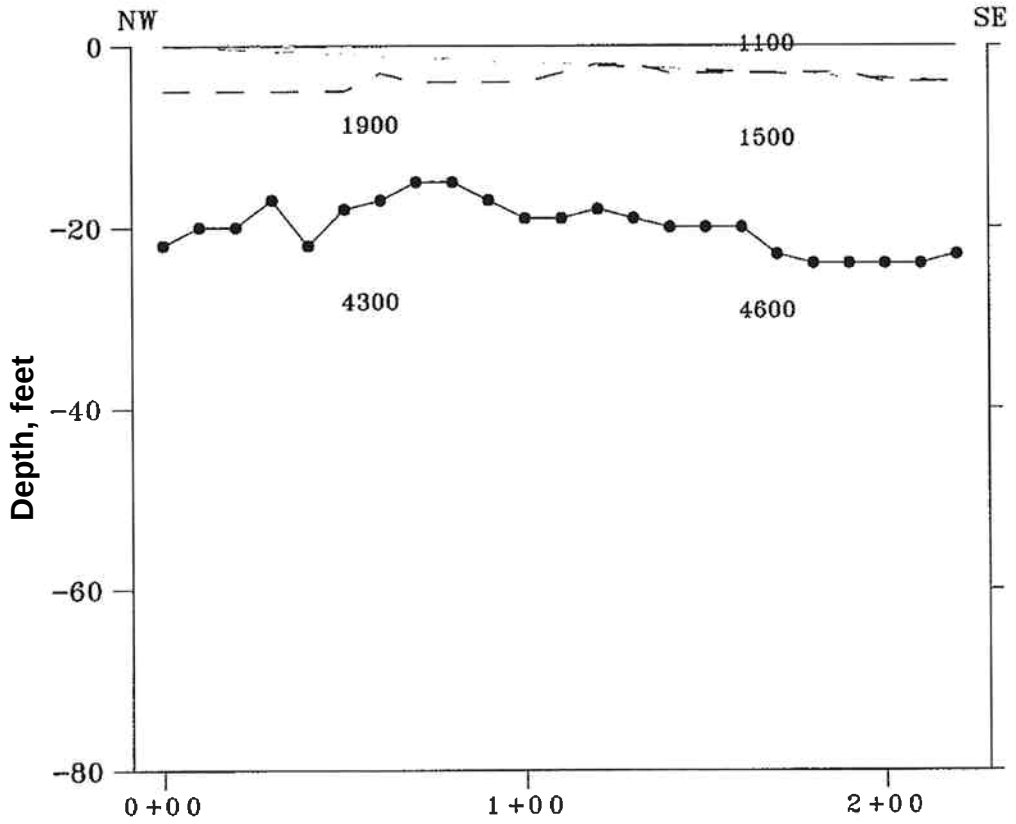
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P304

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-260



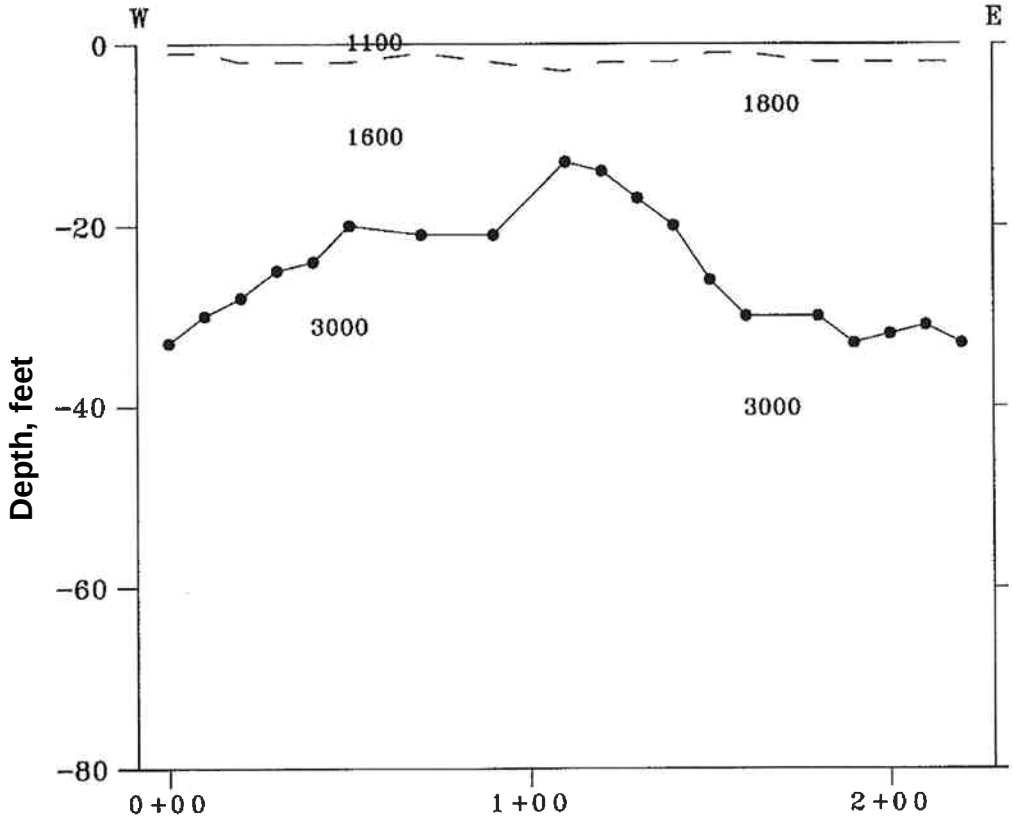
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P307-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-261



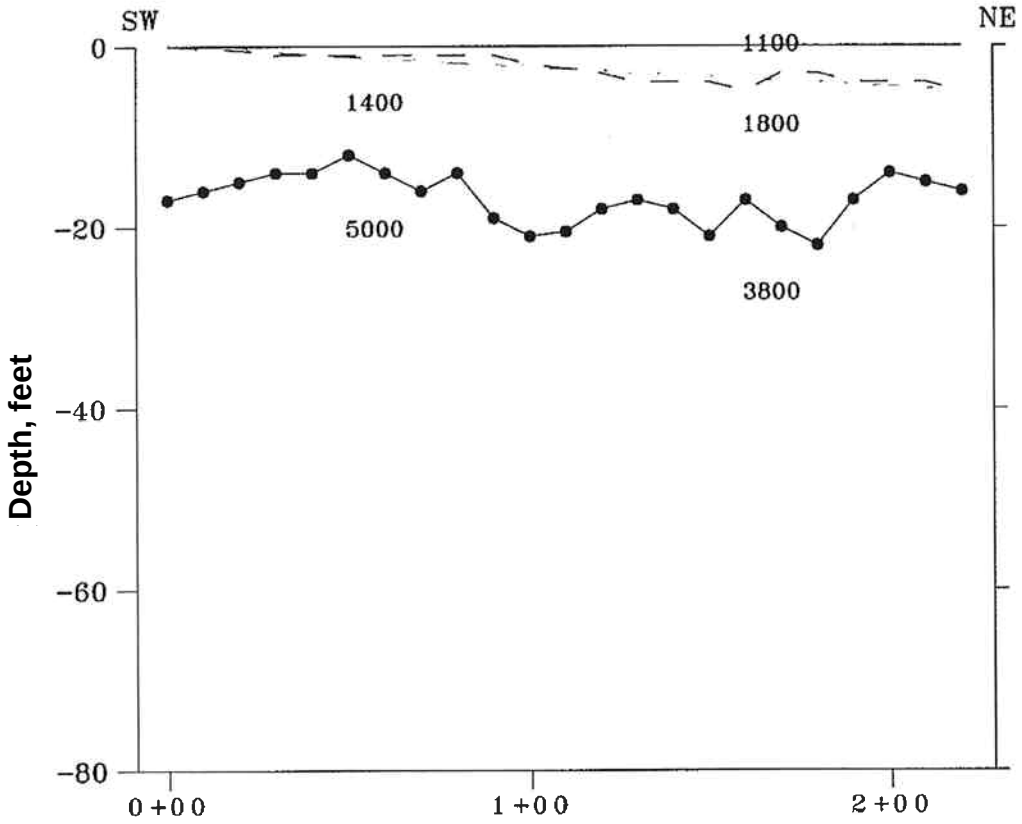
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P315-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-262



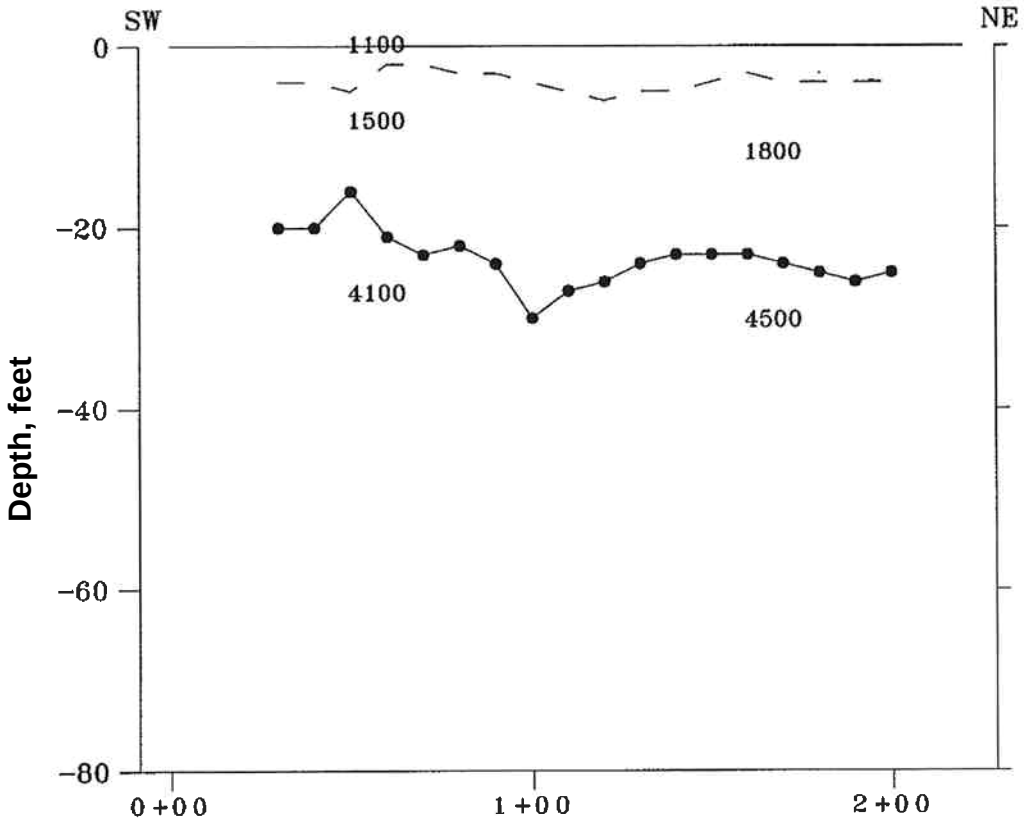
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P319-1

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-263



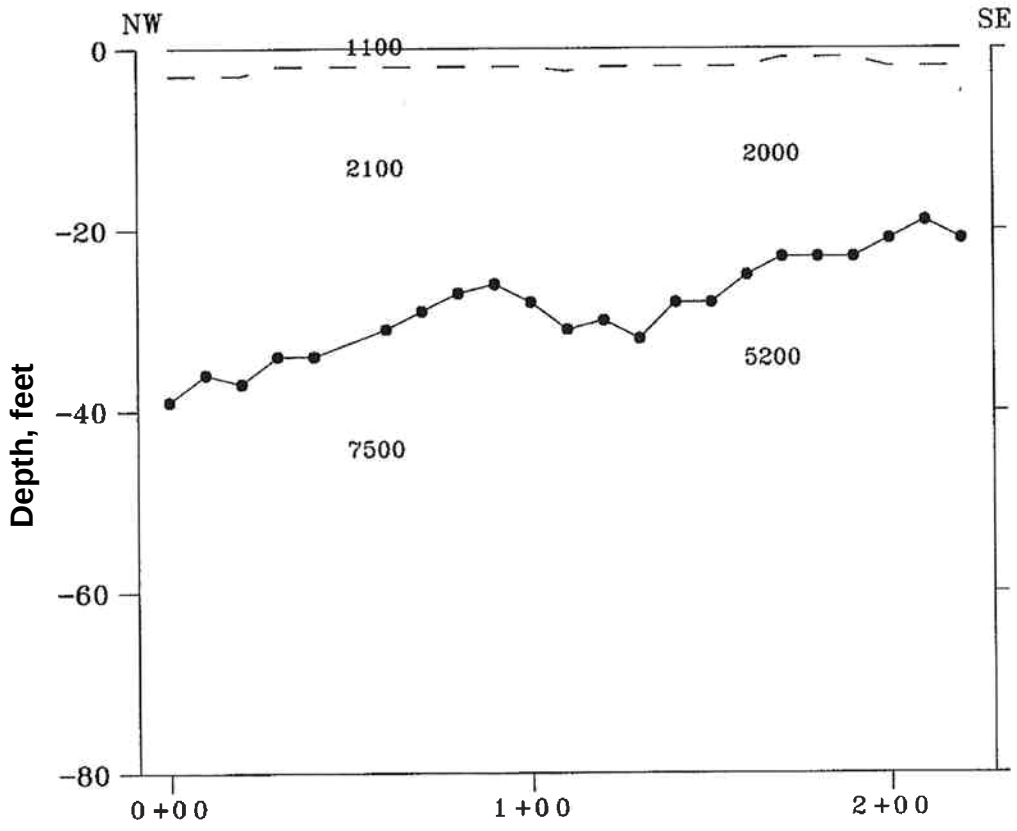
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P322-1

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-264



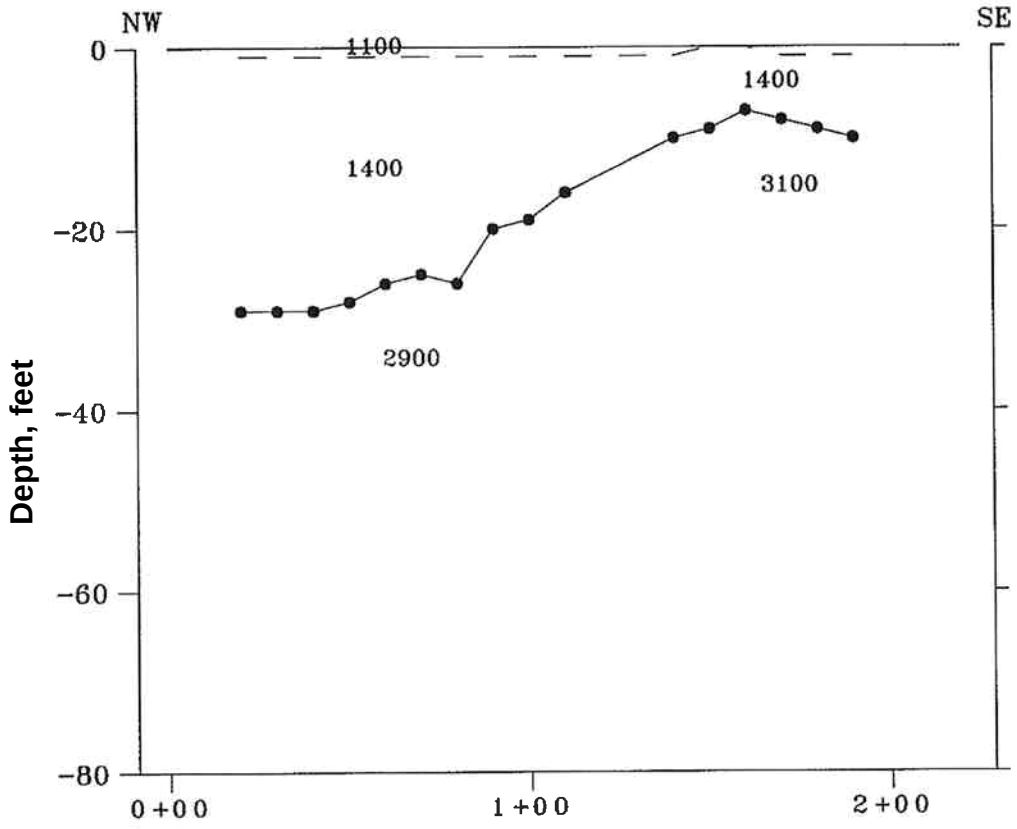
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P324

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-265



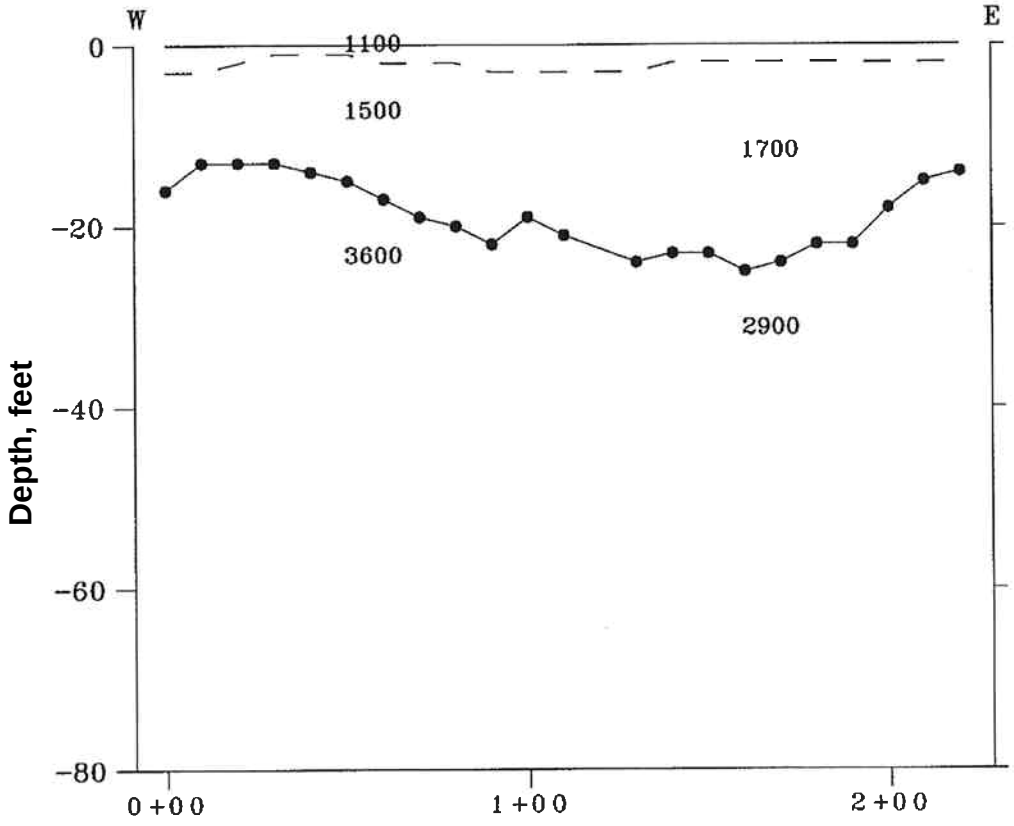
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P330

Project No. 27668031	Date: 4-4-09	**Sunrise Powerlink Project**	Fig. C-266



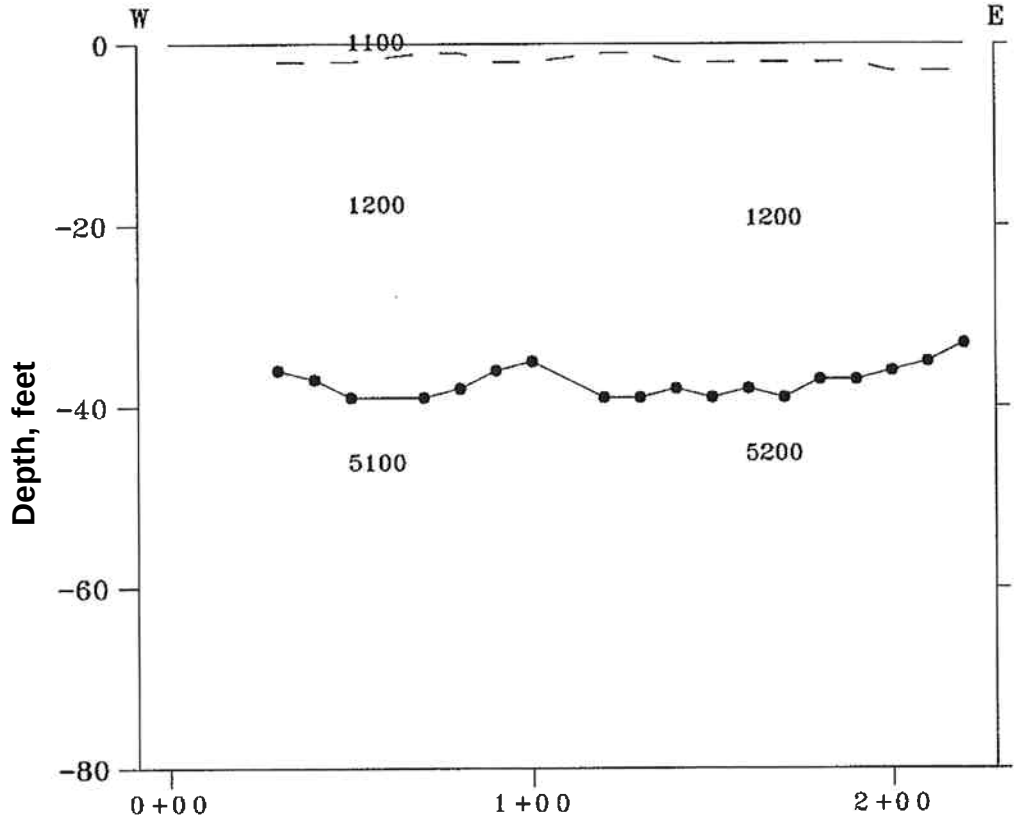
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P333

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-267



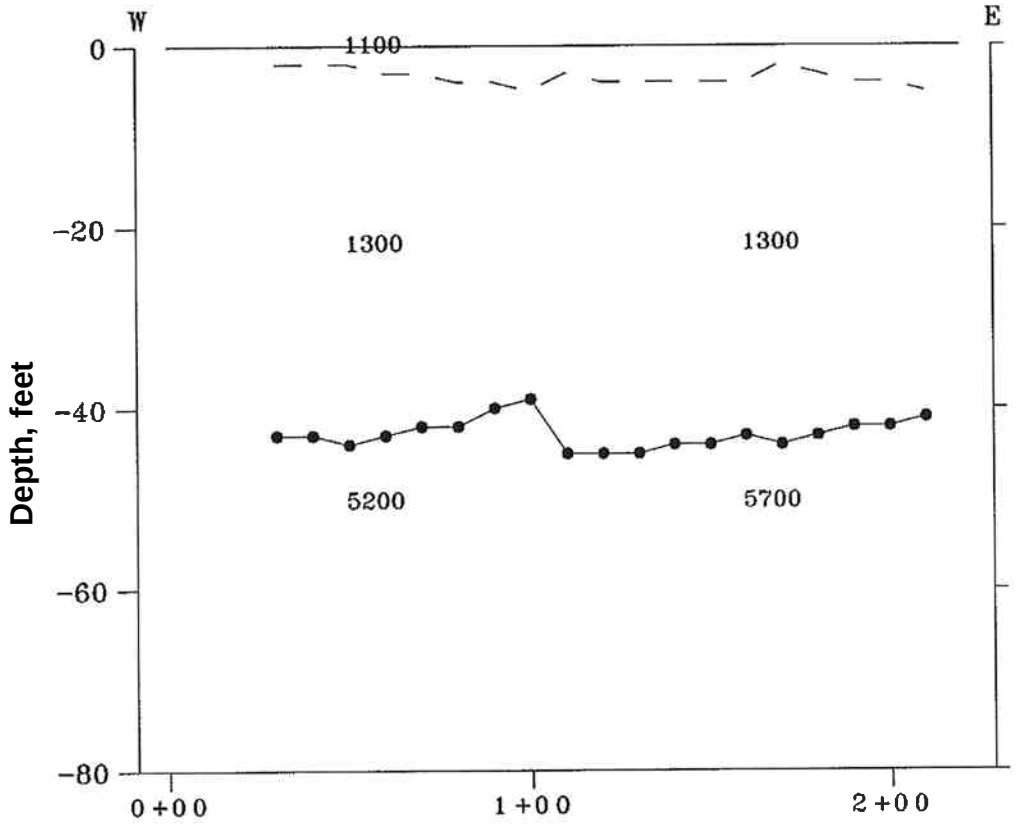
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P358

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-268



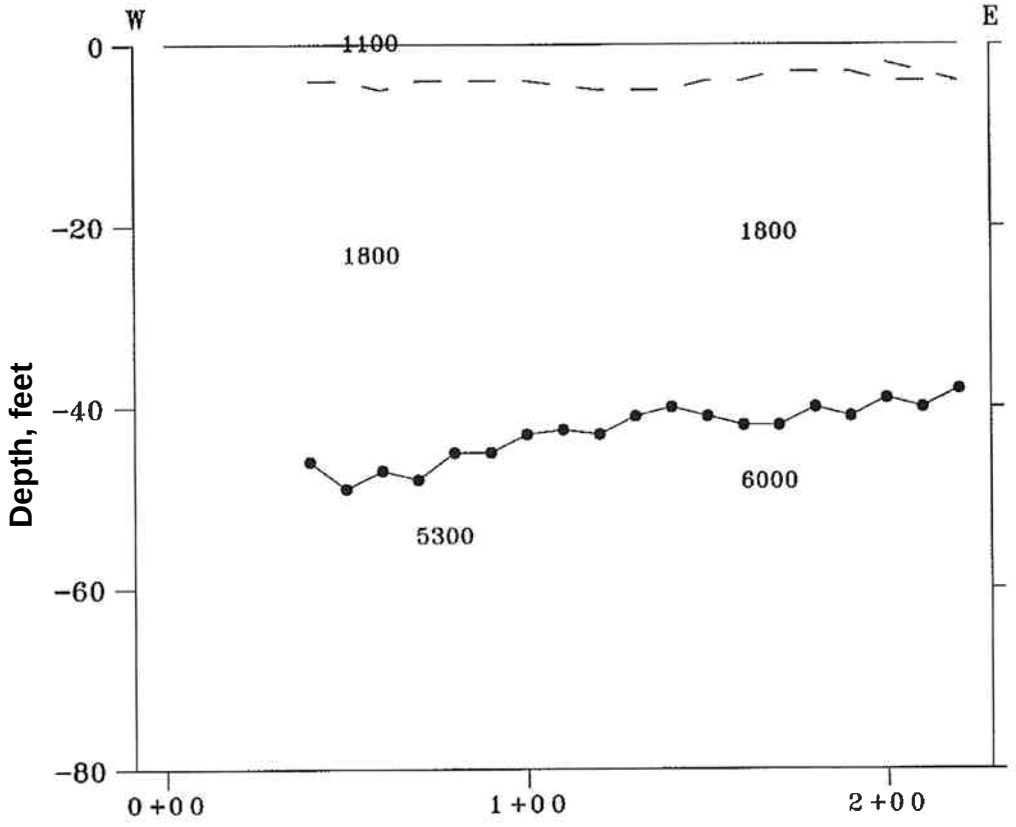
P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P361

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-269



P-wave velocities in feet per second

1 in = 20 ft

1 in = 50 ft

RS10-P363

Project No. 27668031	Date: 4-4-09	Sunrise Powerlink Project	Fig. C-270

DRAFT

Electrical resistivity surveys were performed by V&A Engineering of San Diego, California. The surveys were performed at selected locations in each transmission line section to characterize the corrosive nature of different geologic units along the alignment for the basis of designing grounding systems. The locations of the electrical resistivity surveys are presented on Figure 2a through 2z.

The electrical resistivity surveys measured the soil resistivity in accordance with the American Society for Testing and Materials (ASTM) Test Standard G57. The results of the survey are presented in a report prepared by V&A, which is included in this appendix.

DRAFT

San Diego Gas & Electric Sunrise Powerlink
Soil Resistivity Report

Prepared for:	Michael Hatch, C.E.G.
Prepared by:	Ron Deal, Associate Engineer
Reviewed by:	Glenn Wilson, P.E.
Date:	March 18, 2010
File:	09-0026

INTRODUCTION

V&A was retained by URS to conduct Wenner 4-pin soil resistivity testing at 44 power line tower sites identified and located by URS.

The objective of the soil corrosivity study is to perform field soil resistivity testing and provide a summary of the results.

In attempting to predict corrosion problems associated with particular types of structures prior to installation, it is necessary to investigate the soil conditions the structure will encounter. Since corrosion is an electrochemical process which is accompanied by current flow, the electrochemical characteristics of a soil are of primary importance when evaluating corrosivity. Test methods utilized during this investigation reflect the current practices for evaluating soil corrosivity.

TEST METHODS

FIELD SOIL RESISTIVITY TESTING

Resistivity of the soil was measured at 44 locations along the proposed alignment between January 2009 and October 2009. See generalized geological map for locations.

Soil resistivity measurements were conducted by the Wenner 4-pin method, utilizing a Soil Resistance Meter, (Model DET5/4R Earth Tester, manufactured by MEGGER, Inc.). The Wenner method involves the use of four metal electrodes driven into the ground along a straight line, equidistant from each other, as shown in Figure 1.

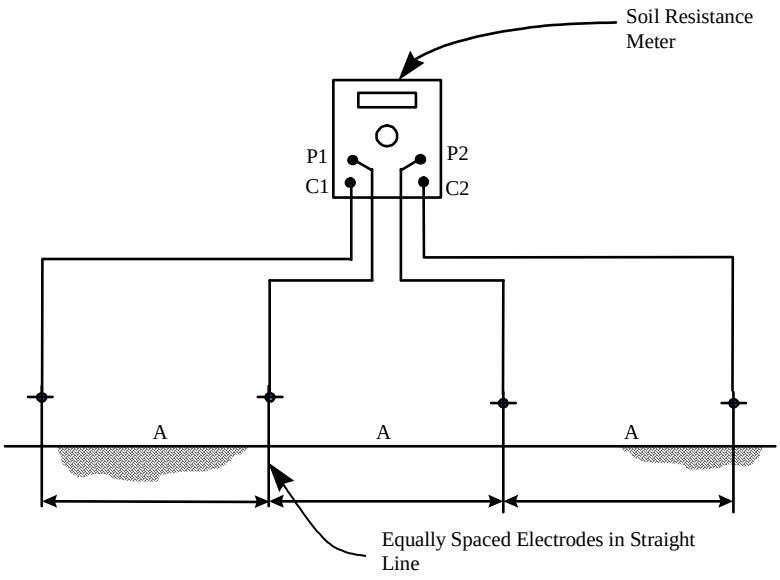


Figure 1 – Soil Resistivity Measurement

An alternating current from the Soil Resistance Meter causes a current to flow through the soil between the outside probes, C1 and C2. Due to the resistance of the soil, the current creates a voltage gradient, which is proportional to the average resistance of the soil mass to a depth equal to the distance between probes. The voltage drop is then measured across pins, P1 and P2. Resistivity of the soil is then computed from the instrument reading according to the following formula:

$$\rho = 2 \cdot \pi \cdot A \cdot R$$

Where:	ρ	=	soil resistivity (ohm-cm)
	A	=	distance between electrodes (cm)
	R	=	soil resistance, instrument reading (ohms)
	π	=	3.14 (approx.)

Soil resistivity measurements were conducted at probe spacings of 2.5, 5, 10, 15, 20 and 30 feet.

TEST RESULTS

Table 1 lists the results of the field soil resistivity measurements conducted at the site. Table 2 summarizes the results of the field soil resistivity measurements.

Table 1 – Field Soil Resistivity Data

Section	Location	Depth (feet)	Resistivity (ohm-cm)
4A	P-23	2.5	13,406
		5	65,114
		10	5,803
		15	10,629
		20	11,491
		30	14,938
	P-25-2	2.5	30,785
		5	35,430
		10	63,199
		15	132,143
		20	78,520
		30	92,500
	P-28-1	2.5	38,781
		5	50,368
		10	67,604
		15	111,460
		20	99,586
		30	114,332
	P-31-1	2.5	9,096,797
		5	191,512
		10	231,882
		15	63,687
		20	41,520
		30	45,618
	P-32-1	2.5	98,150
		5	125,584
		10	130,228
		15	103,703
		20	53,049
		30	63,486
5	P-32-2	2.5	422,258
		5	326,508
		10	258,525
		15	253,355
		20	185,066
		30	169,478

Section	Location	Depth (feet)	Resistivity (ohm-cm)
5	P-44-1	2.5	9,096,797
		5	18,193,593
		10	36,387,187
		15	54,580,780
		20	72,774,374
		30	109,161,560
	P-45-1	2.5	6,128
		5	5,649
		10	8,005
		15	17,752
		20	71,085
		30	91,403
	P-47-1	2.5	9,096,797
		5	18,193,593
		10	36,387,187
		15	54,580,780
		20	72,774,374
		30	109,161,560
	P-48-1	2.5	9,096,797
		5	18,193,593
		10	36,387,187
		15	54,580,780
		20	72,774,374
		30	109,161,560
	P-49-1	2.5	9,096,797
		5	18,193,593
		10	36,387,187
		15	54,580,780
		20	72,774,374
		30	109,161,560
7	P-97-1	2.5	8,762
		5	2,585
		10	1,724
		15	2,585
		20	2,681
		30	6,320
	P-99	2.5	4,395
		5	5,793
		10	8,235
		15	12,065
		20	13,789
		30	21,373

Section	Location	Depth (feet)	Resistivity (ohm-cm)
7	P-99-1	2.5	7,230
		5	9,576
		10	13,214
		15	23,269
		20	42,899
		30	94,798
8A	P-11-2	2.5	9,096,250
		5	18,192,500
		10	30,640,000
		15	31,023,000
		20	28,384,130
		30	11,723,056
	P-23-2	2.5	1,220,813
		5	1,321,350
		10	1,005,375
		15	449,834
		20	1,424,760
		30	5,001,532
	P-24-1	2.5	9,096,250
		5	18,192,500
		10	36,385,000
		15	54,577,500
		20	72,770,000
		30	109,155,000
	P-26-11	2.5	68,461
		5	184,798
		10	379,170
		15	1,332,840
		20	329,380
		30	5,530,520
	P-28	2.5	6,617
		5	5,841
		10	5,516
		15	6,780
		20	6,741
		30	10,399
	P-30	2.5	27,243
		5	51,708
		10	80,435
		15	42,516
		20	47,495
		30	64,348

Section	Location	Depth (feet)	Resistivity (ohm-cm)
8A	P-37-1	2.5	28,103
		5	9,096
		10	4,979
		15	6,032
		20	6,894
		30	12,639
8B	P-42	2.5	11,682
		5	12,927
		10	9,001
		15	7,469
		20	7,660
		30	10,916
8C	P-51	2.5	78,711
		5	77,371
		10	90,202
		15	103,416
		20	125,249
		30	149,379
	P-63	2.5	45,963
		5	51,517
		10	68,944
		15	87,617
		20	104,948
		30	174,084
8D	P-85	2.5	37,297
		5	37,249
		10	30,067
		15	31,312
		20	31,408
		30	37,345
	P-87-1	2.5	48,788
		5	49,410
		10	52,857
		15	73,253
		20	84,265
		30	158,572
8E	P-102-2	2.5	573,064
		5	18,001,000
		10	36,385,000
		15	3,205,710
		20	4,124,910
		30	14,498,570

Section	Location	Depth (feet)	Resistivity (ohm-cm)
8E	P-103-A	2.5	9,096,250
		5	18,192,500
		10	36,385,000
		15	48,832,500
		20	8,131,090
		30	483,325
	P-106-3	2.5	9,096,797
		5	18,193,593
		10	36,387,187
		15	54,580,780
		20	72,774,374
		30	109,161,560
	P-108	2.5	11,251
		5	14,421
		10	17,945
		15	24,561
		20	27,578
		30	39,126
	P-114-1	2.5	9,096,797
		5	18,193,593
		10	36,387,187
		15	54,580,780
		20	72,774,374
		30	109,161,560
	P-116-1	2.5	9,096,797
		5	18,193,593
		10	36,387,187
		15	54,580,780
		20	72,774,374
		30	109,161,560
9A	P-122-2	2.5	9,096,797
		5	18,193,593
		10	36,387,187
		15	54,580,780
		20	72,774,374
		30	109,161,560
	P-142-1	2.5	31,791
		5	29,301
		10	27,386
		15	35,995
		20	39,834
		30	54,581

Section	Location	Depth (feet)	Resistivity (ohm-cm)
9B	P-143-1	2.5	12,688
		5	19,151
		10	29,684
		15	41,079
		20	48,261
		30	71,242
	P-150	2.5	766,046
		5	1,053,313
		10	630,073
		15	677,951
		20	2,753,936
		30	5,165,065
	P-203	2.5	18,672
		5	22,024
		10	23,096
		15	27,922
		20	28,344
		30	40,217
	P-206	2.5	14,363
		5	16,278
		10	11,299
		15	10,916
		20	9,193
		30	12,065
9C	P-219-1	2.5	9,096,797
		5	18,193,593
		10	36,387,187
		15	54,580,780
		20	8,234,995
		30	856,056
	P-220-1	2.5	9,096,797
		5	1,151,942
		10	15,340,072
		15	287,267
		20	769,876
		30	20,223,615
	P-232-1	2.5	9,096,797
		5	18,193,593
		10	2,411,130
		15	24,647,531
		20	32,288,840
		30	23,555,916

Section	Location	Depth (feet)	Resistivity (ohm-cm)
9C	P-236-1	2.5	25,232
		5	20,492
		10	31,982
		15	8,618
		20	9,959
		30	9,767
10B	P-290	2.5	35,525
		5	29,780
		10	32,748
		15	180,978
		20	15,321
		30	62,624
	P-292	2.5	89,053
		5	85,223
		10	264,286
		15	876,165
		20	294,928
		30	350,466

Table 2 – Summary of Field Resistivity Data

Depth (feet)	Average Resistivity	Minimum Resistivity	Maximum Resistivity
2.5	2,102,197	4,395	9,096,797
5	3,038,418	2,585	18,193,593
10	5,330,075	1,724	36,387,187
15	7,934,195	2,585	54,580,780
20	8,503,303	2,681	72,774,374
30	12,225,693	6,320	109,161,560
All	6,522,313	1,724	109,161,560

FIELD SOIL RESISTIVITY

Understanding how easily current will travel through a medium surrounding a metallic object is important in evaluating the corrosive environment. Resistivity is an inverse measure of the ability of a soil to conduct an electric current, with higher resistivity resulting in a lesser degree of current flow. Corrosion rate depends on current flow between a metal and the adjacent medium. Normally the corrosion activity on metals in soil increases as soil resistivity decreases. The following table correlates resistivity values with degree of corrosivity. The interpretation of corrosivity correlation to soil resistivity varies somewhat among corrosion engineers. However, Table 3 is a generally accepted guide.

Table 3 – Soil Corrosivity

Soil Resistivity (ohm-cm)	Degree of Corrosivity
< 500	Very High
500 – 1,000	High
1,000 – 2,000	Moderate
2,000 – 10,000	Mild
> 10,000	Negligible

CONCLUSIONS

The in-situ soil resistivity testing took place in dry weather conditions and the results ranged from 109,161,560 ohm-cm to less than 1,724 ohm-cm, which is considered *negligibly to moderately corrosive* to steel. Generally, the results are negligibly to moderately corrosive throughout the alignment, but the least corrosive soils are located in Sections 5 and 9C. The sample grid provides no well defined boundary between the more corrosive and less corrosive soils. Therefore, V&A recommends that the entire site be treated as moderately corrosive to steel.

This analysis is based on the assumption that pre-cast steel pilings will be driven 20 to 40 feet into the ground.

RECOMMENDATIONS

These recommendations reflect screw and driven support piles, drilled shaft and grouted micropiles. Protect against corrosion for the 25 to 30-year design life using one or more of the following measures:

- Look into the use of abrasion-resistance polyurathane as a coating for the bare metal piling surfaces that are expected to contact the soil. *Avoid galvanized coatings, which adversely affect polyurathane adhesion*.

- Use a bare metal thickness allowance of 1 mil per year (0.001 inches per year) to offset the anticipated corrosion losses over the 25 to 30-year service life and meet the required solar panel support criteria.

- Install a galvanic cathodic protection system. A galvanic system would require wiring one or more anodes to each bare metal piling.

- V&A recommends conducting chemical analysis of soil samples along the alignment at intervals of 2,000 feet. The chemical analysis should include testing for pH, chloride content, sulfate content and minimum soil resistivities. The analysis will provide a more detailed insight into factors that may affect the level of protection needed for the structures.