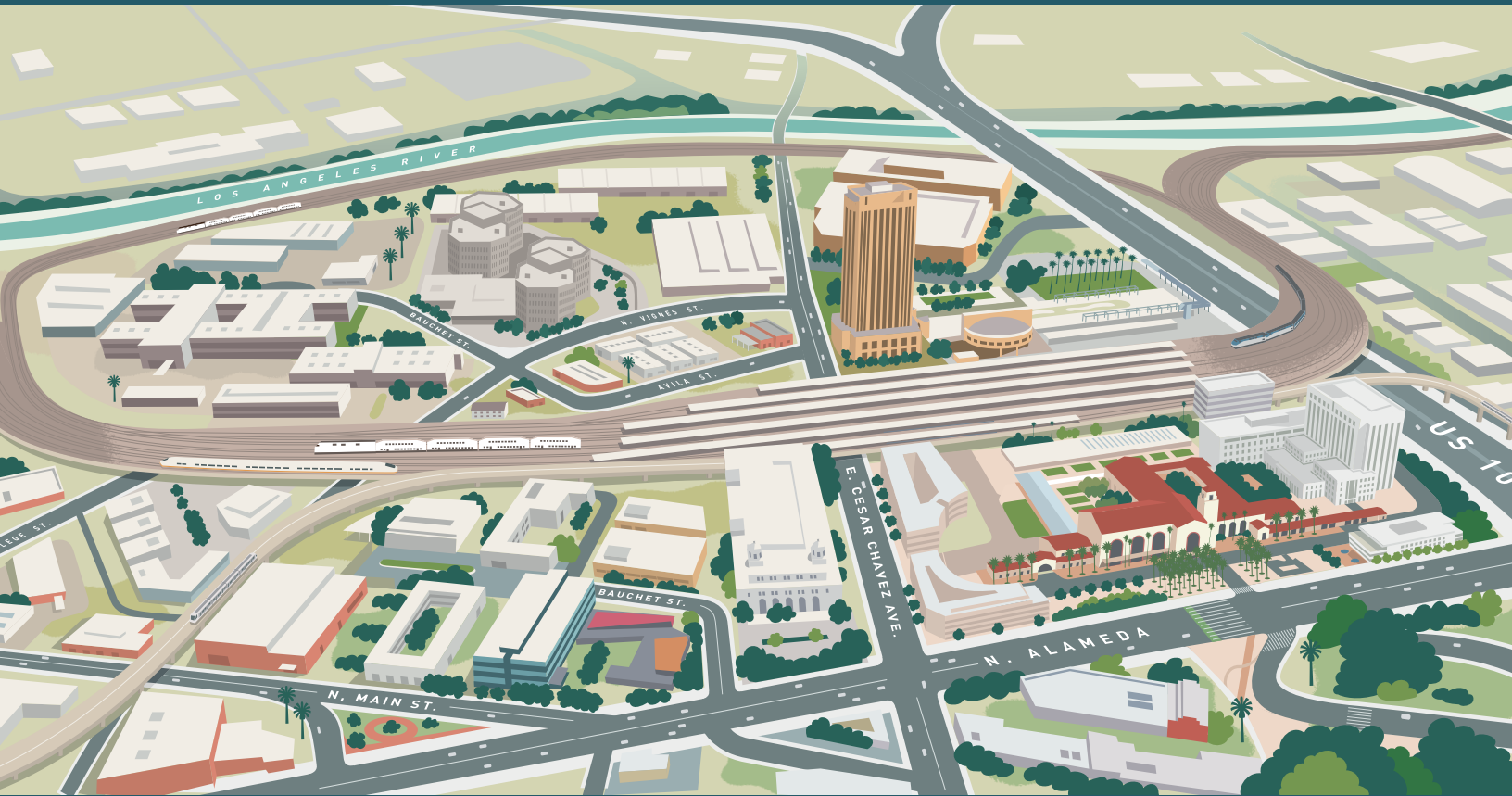


# Link Union Station

DRAFT – Preliminary Geotechnical Report

*July 2016*



**Metro**

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**ACRONYMS**

AOBB	Amtrak Office and Baggage Building
bgs	below ground surface
Caltrans	California Department of Transportation
CC	Converse Consultants, Inc.
CDMG	California Division of Mines and Geology
CGS	California Geological Survey
CIDH	cast-in-drilled-hole
CISS	cast-in-steel-shell
CPT	cone penetrometer test
EMI	Earth Mechanics, Inc.
HSB	Historic Station Building
LAUS	Los Angeles Union Station
LOTB	log of test boring
Metro	Los Angeles County Metropolitan Transportation Authority
MSL	mean sea level
ppm	parts per million
ROW	right-of-way
SCRIP	Southern California Regional Interconnector Project
SCRTD	Southern California Rapid Transit District
URS	URS Corporation
USGS	United States Geological Survey

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## ES.0 Executive Summary

This report presents the results of the review of existing data for the Link Union Station project (project) in Los Angeles, California. The purpose of the study was to review existing data at the site and provide preliminary geotechnical recommendations for the design and construction of the proposed project. The executive summary briefly summarizes results of the review and should be used only in conjunction with the findings and conclusions presented in the attached report.

A summary of findings and conclusions is presented below.

- The subsurface soils generally consisted of fill ranging from a few feet generally, to up to 30 feet in the station platform area. This fill is generally considered uncertified and may require special design considerations. Beneath the fill is a layer of alluvial soil consisting of sands, gravels, and cobbles over bedrock.
- The soils within the project site have a moderate to severe corrosion potential to buried metal structures, and the potential for sulfate attack on concrete is considered low.
- Groundwater is relatively shallow, at depths ranging from about 14 to 48 feet.
- No active or potentially active faults are known to cross the site, and the site is not located within a currently delineated State of California Alquist-Priolo Earthquake Fault Zone. Accordingly, the risk of surface rupture due to faulting is considered low. However, the project area may be subjected to strong ground shaking during its lifetime. The closest mapped fault is the Elysian Park (Upper) Fault located approximately 0.8 mile from the site.
- The California Geological Survey (CGS 1999) has identified the site within an area designated as potentially liquefiable. Potential for liquefaction may exist at the site and will be addressed after future field investigations.
- The probability of other geologic hazards, such as tsunamis, seiches, deep seated landslides, or ground subsidence affecting the site, is considered low.
- The proposed project structures are likely to be lightly loaded structures or uninhabited structures that may be able to be founded on spread footings. However, heavy loads of major structures will likely require deep foundations including driven or drilled piles. Special consideration must be given to nearby structures, subsurface conditions, and loading in determining foundation types.
- Wet method or casing may be required for drilling, with relatively clean cohesionless soils and groundwater expected at relatively shallow depths. Encountering cobbles and possibly boulders should be expected, as well as possibly contaminated soils and groundwater.

It is HDR's professional opinion that the proposed project is feasible from a geotechnical standpoint, provided the recommendations presented in this geotechnical report are incorporated into the project design and construction.

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## 1.0 Introduction

The Los Angeles County Metropolitan Transportation Authority (Metro) is proposing the Link Union Station Project (project) to transform Los Angeles Union Station (LAUS) from a “stub-end tracks station” into a “run-through tracks station” with a new passenger concourse that would improve the efficiency of the station and accommodate future growth and transportation demands in the region.

### 1.1 Project Location and Study Area

LAUS is located at 800 Alameda Street in the City of Los Angeles, California. LAUS is bounded by US-101 to the south, Alameda Street to the west, Cesar Chavez Avenue to the north, and Vignes Street to the east. Figure 1-1 depicts the regional location and general vicinity of LAUS.

Figure 1-2 depicts the project study area, which encompasses the extent of environmental study associated with potential direct, indirect, and cumulative impacts from implementation of the project. The project study area includes three main segments (Segment 1: Throat Segment, Segment 2: Concourse Segment, and Segment 3: Run-Through Segment). The existing conditions within each segment are summarized north to south below.

- **Segment 1: Throat Segment** – This segment, known as the LAUS throat, includes the area north of the platforms, from Main Street at the north to Cesar Chavez Avenue at the south. In the throat segment, all arriving and departing trains traverse five lead tracks into and out of the rail yard, except for one location near the Vignes Street Bridge where the tracks reduce to four lead tracks. Currently, special track work consisting of multiple turnouts and double-slip switches are used in the throat to direct trains into and out of the appropriate assigned terminal platform tracks.
- **Segment 2: Concourse Segment** – This segment is between Cesar Chavez Avenue and US-101 and includes LAUS, the rail yard, the Garden Tracks (stub-end tracks where private train cars are currently stored, just north of the platforms and adjacent to the existing Gold Line aerial guideway), the East Portal building, the baggage handling building with aboveground parking areas and access roads, the ticketing/waiting halls, and the pedestrian passageway with connecting ramps and stairways below the rail yard.
- **Segment 3: Run-Through Segment** – This segment is south of LAUS and extends east/west from Alameda Street to the west bank of the Los Angeles River and north/south from Keller Yard to Control Point Olympic. This segment includes US-101, the Commercial Street/Ducommun Street corridor, Metro Red and Purple Lines Maintenance Yard (Division 20 Rail Yard), BNSF West Bank Yard, Keller Yard, the main line tracks on the west bank of the Los Angeles River, from Keller Yard to Control Point Olympic, and the “Amtrak Lead Track” connecting the main line tracks with Amtrak’s Los Angeles Maintenance Facility. Businesses within the run-through segment are primarily industrial and manufacturing related.

The project study area has a dense street network ranging from major highways to local city streets. The roadways within the project study area include the El Monte Busway, US 101, Bolero Lane, Leroy Street, Bloom Street, Cesar Chavez Avenue, Commercial Street, Ducommun Street, Jackson Street, East Temple Street, Banning Street, First Street, Alameda Street, Garey Street, Vignes Street, Main Street, Aliso Street, Avila Street, Bauchet Street, and Center Street. Proposed Project Overview

The proposed project components are summarized north to south below.

- **Throat and Elevated Rail Yard** – The proposed project includes subgrade and structural improvements in Segment 1 of the project study area (throat segment) to increase the elevation of the tracks leading to the rail yard. The proposed project includes the addition of one new lead track in the throat segment for a total of six lead tracks to facilitate enhanced operations for regional/intercity rail service providers (Metrolink/Amtrak) and accommodate the planned High-Speed Rail (HSR) system within a shared track alignment. Regional/intercity and HSR trains would share the two western lead tracks in the throat segment. The rail yard would be elevated approximately 15 feet. New passenger platforms with individualized canopies would be constructed on the elevated rail yard, with an underlying assumption that the platform infrastructure and associated vertical circulation elements (stairs, escalators, and elevators) would be modified at a later date to accommodate the planned HSR system. The existing railroad bridges in the throat segment at Vignes Street and Cesar Chavez Avenue would also be reconstructed. North of Control Point Chavez, the proposed project also includes safety improvements at the Main Street public at-grade crossing on the west bank of the Los Angeles River (medians, restriping, signals, and pedestrian and vehicular gate systems) to facilitate future implementation of a quiet zone by the City of Los Angeles.
- **Above-Grade Passenger Concourse** – The proposed project includes an above-grade passenger concourse with new expanded passageway in Segment 2 of the project study area (concourse segment). The above-grade passenger concourse with new expanded passageway would include space dedicated for passenger circulation, waiting areas, ancillary support functions (back-of-house uses, baggage handling, etc.), transit-serving retail, office/commercial uses, and open spaces and terraces. The new passenger concourse would create an opportunity for an outdoor, community-oriented space and enhance Americans with Disabilities Act accessibility at LAUS. The elevated portion of the above-grade passenger concourse would be located above the rail yard, approximately 90 feet above the existing grade with new plazas east and west of the elevated rail yard (East and West Plazas). The new expanded passageway would be located below the rail yard to provide additional passenger travel-path convenience and options. Amtrak ticketing and baggage check-in services would occur at two locations at the east and west ends of LAUS, and new carousels would be constructed within the new expanded passageway. The above-grade passenger concourse includes a canopy over the West Plaza up to 70 feet in height, with individual canopies that would extend up to 25 feet over each platform. New vertical circulation elements would also be constructed throughout the concourse to enhance passenger



movements throughout LAUS while meeting Americans with Disabilities Act and National Fire Protection Association platform egress code requirements.

- **Run-Through Tracks** – The proposed project includes up to 10 new run-through tracks (including a new loop track) south of LAUS in Segment 3 of the project study area (run-through segment). The run-through tracks would facilitate connections for regional/intercity rail trains and HSR trains from LAUS to the main line tracks on the west bank of the Los Angeles River. A “common” viaduct/deck over US-101 and embankment south of US-101, from Vignes Street to Center Street, would be constructed wide enough to support regional/intercity rail run-through service, and future run-through service for the planned HSR system.

The proposed project would also require modifications to US 101 and local streets (including potential street closures and geometric modifications); railroad signal, positive train control, and communications related improvements; modifications to the Gold Line light rail platforms and tracks; modifications to the main line tracks on the west bank of the Los Angeles River; modifications to Keller Yard and BNSF West Bank Yard (First Street Yard); modifications to the Amtrak lead track; new access roadways to the railroad right-of-way (ROW); additional ROW; new utilities; utility relocations, replacements, and abandonments; and new drainage facilities/water quality improvements.

## **1.2 Build Alternative Overview**

The primary differences between the proposed project and the build alternative are related to the lead tracks north of LAUS and the new passenger concourse. Compared to the proposed project, the build alternative includes the following:

- **Dedicated Lead Tracks North of LAUS** – The build alternative includes reconstruction of the throat, with two new lead tracks that would be located outside of the existing railroad ROW, facilitating a dedicated track alignment, with a total of seven lead tracks. Reconfiguration of Bolero Lane and Leroy Street would also be required.
- **At-Grade Passenger Concourse** – The build alternative includes an at-grade passenger concourse below the rail yard.

All other infrastructure elements are similar to the proposed project. The components of the build alternative are described north to south below.

- **Throat and Elevated Rail Yard** – The build alternative accommodates future HSR trains on dedicated lead tracks in the throat segment. The build alternative includes the addition of two new lead tracks for a total of seven lead tracks in the throat segment (with future HSR trains and some express/intercity services using the two western dedicated lead tracks and most regional/intercity trains using the five eastern lead tracks). The rail yard would be elevated approximately 15 feet. New passenger platforms with a grand canopy covering the elevated rail yard would be constructed, with an underlying assumption that the platform infrastructure and associated vertical circulation elements (stairs, escalators, and elevators) would be modified at a

later date to accommodate the planned HSR system. The existing railroad bridges in the throat segment at Vignes Street and Cesar Chavez Avenue would also be reconstructed under the build alternative. North of Control Point Chavez, the build alternative also includes safety infrastructure improvements at the Main Street public at-grade crossing on the west bank of the Los Angeles River (medians, restriping, signals, and pedestrian and vehicular a four-quadrant gate systems) to facilitate future implementation of a quiet zone by the City of Los Angeles.

- **At-Grade Passenger Concourse** – The build alternative includes a new at-grade passenger concourse that would include space dedicated for passenger circulation, waiting areas, ancillary support functions (back of house uses, baggage handling, etc.), transit serving retail, office/commercial uses, and open spaces and terraces. The at-grade passenger concourse would also create an opportunity for an outdoor, community oriented space and enhanced Americans with Disabilities Act accessibility. The at-grade passenger concourse would be constructed below the elevated rail yard. Amtrak ticketing and baggage check-in services would occur at a centralized location where new carousels would be constructed at the concourse level. The at-grade passenger concourse also includes new plazas east and west of the elevated rail yard (East and West Plazas), and a grand canopy that would extend up to 70 feet above the elevated rail yard and West Plaza. New vertical circulation elements would also be constructed throughout the concourse to enhance passenger movements throughout LAUS while meeting Americans with Disabilities Act and National Fire Protection Association platform egress code requirements.
- **Run Through Tracks** – The build alternative includes up to 10 new run through tracks (including a new loop track) in the run-through segment. All infrastructure south of LAUS is the same as described above for the proposed project.

The build alternative would also require modifications to US 101 and local streets (including potential street closures and geometric modifications); railroad signal, positive train control, and communications related improvements; modifications to the Gold Line light rail platforms and tracks; modifications to the main line tracks on the west bank of the Los Angeles River; modifications to Keller Yard and BNSF West Bank Yard (First Street Yard); modifications to the Amtrak lead track; new access roadways to the railroad ROW; additional ROW; new utilities; utility relocations, replacements, and abandonments; and new drainage facilities/water quality improvements.

Figure 1-1. Project Location and Regional Vicinity

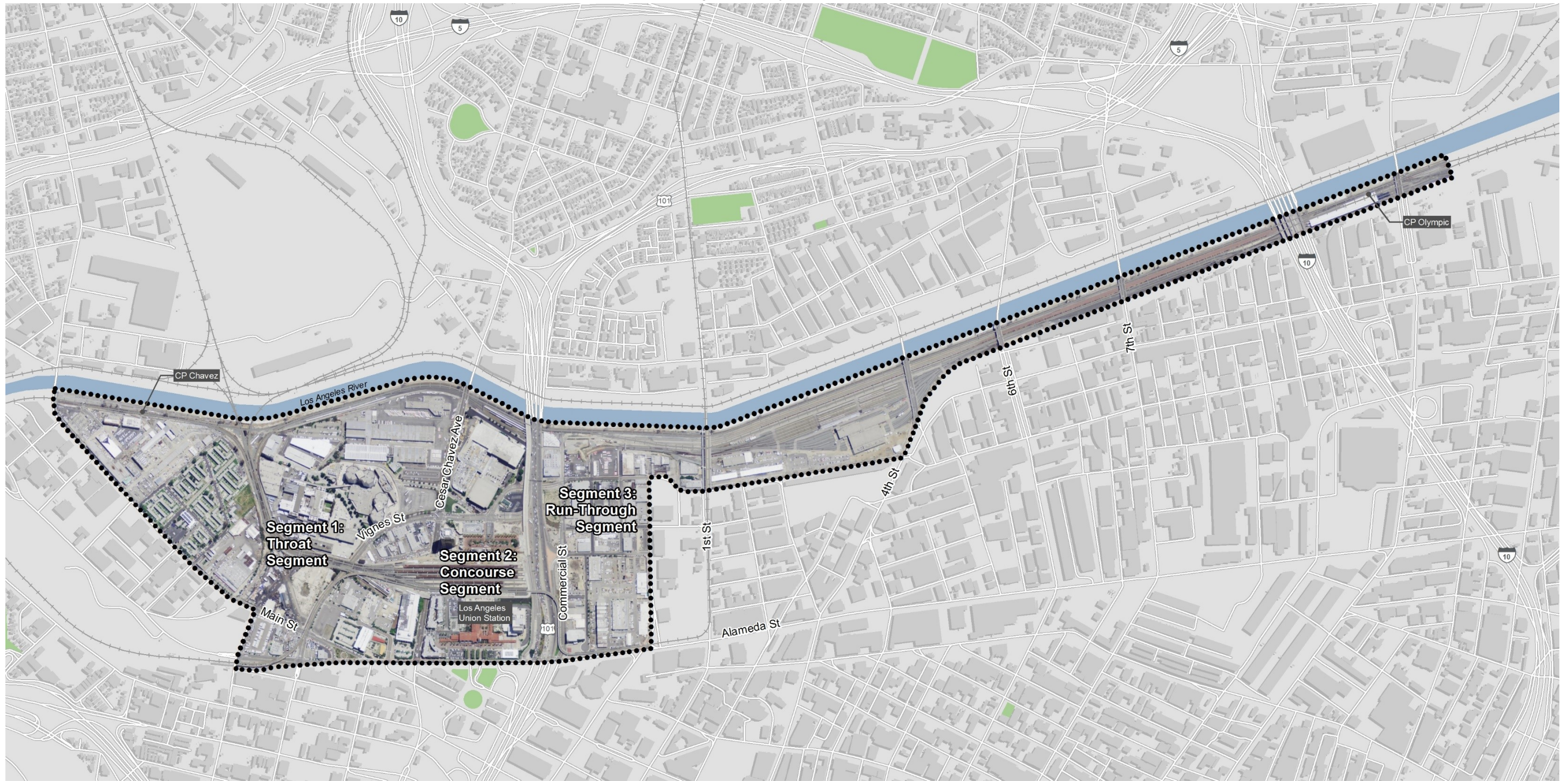


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Figure 1-2. Project Study Area



LEGEND  
Project Study Area

0 Feet 1,000



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## 2.0 Purpose

The purpose of this report is to:

- Document existing geologic, geotechnical, and seismic conditions, including subsurface soils, groundwater, seismicity, corrosion potential, subsidence, and environmental concerns relevant to the proposed project.
- Facilitate the understanding of the existing geologic and geotechnical information at the project site that would be used for the preliminary design of the proposed improvements and during the planning of future geotechnical exploratory investigations. During the planning of future geotechnical investigations, the existing available data and findings presented in this report will be taken into consideration to allocate resources where geotechnical information is missing and/or augment subsurface geotechnical information in other areas within the project limits.
- Identify constructability conditions relevant to proposed improvements considered in the Link Union Station Project. The early identification of these conditions will provide the opportunity to consider alternatives during the planning, design, and construction phases.
- Provide preliminary recommendations for foundation selection, summarize key constructability-related subsurface conditions affecting the proposed project, and provide recommendations for future geotechnical investigations.

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## 3.0 Methodology

The methodology used in this report included the following tasks:

- **Literature Review** – Public agencies were contacted to obtain relevant geotechnical and geology reports for the proposed project site. Documents reviewed were obtained from the City of Los Angeles Department of Public Works, City of Los Angeles Department of Building and Safety, California Department of Transportation (Caltrans), and Metro. The reviewed documents include published geologic maps; planning documents and hazard maps; as-built log of test borings (LOTB); and previous geotechnical and environmental reports for LAUS, Metro Red Line Tunnel, East Side Underpass Light Rail Transit (Gold Line Eastside Extension), and nearby developments. This review provided the basis for the evaluation of site conditions and geologic and geotechnical conditions present at the project site.
- **Site Conditions** – The existing site conditions present at the proposed site were described. A site reconnaissance was performed to visually identify existing facilities, evaluate the accessibility to the site for future explorations, confirm desk study findings, and identify potential issues that could affect the proposed improvements.
- **Geologic and Geotechnical Conditions** – Relevant geologic and geotechnical data were compiled in this report, along with the findings for the proposed project. Topics covered included faulting and seismicity, seismic hazards, subsurface soil conditions, groundwater, and environmental-related issues.
- **Geotechnical Considerations** – Discussion and conclusions were provided regarding foundation selection, constructability conditions, and summary of finite element analysis results for the proposed improvements.
- **Recommendations** – Recommendations for additional geotechnical investigations were provided to better characterize the subsurface conditions at the site and to confirm the preliminary findings of this report.
- **Next Steps** – Discussion was provided for subsequent actions to follow this report.
- **References** – A list of references used in the preparation of this report was provided.

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## 4.0 Literature Review

Various documents were reviewed pertaining to the project site and surrounding area. Documents reviewed include published geologic maps; planning documents and hazard maps; LOTBs; and previous geotechnical and environmental reports for LAUS, Metro Red Line Tunnel, East Side Underpass Light Rail Transit (Gold Line Eastside Extension), and nearby developments (Exhibit 4-1 in Appendix A). A list of maps, reports, and documents reviewed is presented below.

Published geologic and hazard maps include the following:

- State of California - Special Studies Zones – Los Angeles Quadrangle, Official Map. (California Division of Mines and Geology [CDMG] 1977)
- State of California Seismic Hazard Zones – Los Angeles 7.5 Minute Quadrangle (California Geological Survey [CGS] 1999)
- Los Angeles County Tsunami Inundation Maps (CGS 2009)
- Geologic Compilation of Quaternary Surficial Deposits in Southern California, Los Angeles 30'x 60' Quadrangle (CGS 2012)
- Quaternary Fault and Fold Database for the United States (United States Geological Survey [USGS] and CGS 2006)

Geotechnical information reviewed includes geotechnical reports for LAUS, as well as nearby developments, and as-built plan sheets (Appendix B) presenting LOTBs for nearby Caltrans structures. Pertinent LOTBs are provided in Appendix C, alphabetically by reference name. The complete list of documents reviewed is presented in Section 10.0. The following is a list of the most relevant geotechnical reports and documents considered in this report:

- Final Environmental Impact Report/Environmental Impact Statement, Los Angeles Union Station Run-Through Tracks Project (Caltrans 2005)
- Final Geotechnical Summary Report, SR-710 Tunnel Technical Study, Los Angeles County, California (CH2M Hill 2010)
- Geotechnical Investigation Report Volume I, Southern California Rapid Transit District [SCRTD], Metro Rail Project, (Converse Consultants, Inc. [CC] et al. 1981)
- Geotechnical Report: Metro Rail Project-Design Unit A135, LOTBs SCRTD, (CC et al. 1983)
- Union Station Area Aquifer Pump Tests Metro Rail Project (CC et al. 1986)
- Temporary Tunnel Excavation Support by Chemical Grouting. Grouting Soil Improvement and Geosynthetics Proceedings, GT Div. ASCE (Gularte et al. 1992)

- Geotechnical Engineering and Groundwater Study, Proposed Two Level Subterranean Parking Garage and Four Story Office (J. Byer Group, Inc. 1998)
- Report of Phase I Environmental Site Assessment, Alameda District Plan (Law/Crandall, Inc. 1994)
- Metro Rail Project, Main Yard and Shops Yard Leads (SCR TD 1988)
- The Phase I Subsurface Investigation at the Metro Rail A-130 Corridor (The Earth Technology Corporation 1987a)
- The Phase III Subsurface Investigation at the Metro Rail A-130 Corridor (The Earth Technology Corporation 1987b)
- The Phase IV Subsurface Investigation at the Metro Rail A-130 Corridor (The Earth Technology Corporation 1987c)
- Geotechnical Investigation, Proposed West Campus Infrastructure Project, Los Angeles, California, LOTBs (URS Corporation [URS] 2003)
- Phase I Environmental Site Assessment and Limited Phase II Testing Selected Portions of the Los Angeles Union Station Property (URS 2011)

Technical memoranda addressing specific design considerations, including preliminary seismic design parameters for proposed improvements, the lowering of the intersection grade at Commercial Street and Center Street, and potential impacts on the Metro Red Line Tunnel due to the proposed aerial structures, were also reviewed. The documents reviewed include the following:

- Preliminary Draft Report for Seismic Design Parameters, Southern California Regional Interconnector Project (SCRIP) (Earth Mechanics, Inc. [EMI] 2015)
- Draft Technical Memorandum Static and Seismic Performance of Red Line Tunnel, SCRIP (EMI 2016a)
- Draft Technical Memorandum Impact of Lateral Pile Loading on Red Line Tunnel, SCRIP Project–Geotechnical Fatal Flaw Study (EMI 2016b)

Pertinent findings and information contained within these maps, memoranda, and reports are discussed within the body of this study.

## 5.0 Site Conditions

### 5.1 Existing Facilities

LAUS is located in the northeastern portion of Downtown Los Angeles, on the property bounded by Alameda Street, Cesar Chavez Avenue, Vignes Street, and US-101 (Exhibit 5-1 in Appendix A). In general, surface conditions across the project site are considered improved, consisting of commercial/industrial and residential developments.

A field reconnaissance was conducted August 15, 2014, of the project footprint area and April 20, 2016, within the LAUS area to evaluate existing facilities and activities. The proposed project lies within a mixed industrial-commercial use area. Most of LAUS, including train platforms, rail tracks, and some nearby facilities, are owned by Metro. Other owners include the City and County of Los Angeles and private corporations. Specific site locations that were explored during these field visits included the Historic Station Building (HSB), Amtrak Office and Baggage Building (AOBB), LAUS train platforms, Gateway Station Building, Metro Red Line, Cesar Chavez Avenue Undercrossing (Bridge Number [No.] 53C-131), and the facilities in the vicinity of Commercial and Center Streets. The site overlies two major tunnels: one constructed for pedestrian access and the other for the Metro Red Line. A detailed description of the Metro Red Line Tunnel is provided in Section 5.1.1. The pedestrian tunnel is about 28 feet wide and traverses one floor level below the surface tracks and platforms connecting the AOBB and Gateway Station Building with the boarding platforms (Caltrans 2005).

The HSB is located east of Alameda Street and adjacent to the Metropolitan Water District Building. The HSB incorporates a series of retail businesses, waiting area for passengers, and ticket booths within its central portion. Driveways, an enclosed garden, and a subterranean parking garage are located within the HSB area. The eastern portion of the HSB constitutes the AOBB, used by Amtrak for luggage handling and storage area. Important features to consider for future geotechnical exploration activities include the underground tunnel for the Metro Red Line subway located north of the HSB and the connecting pedestrian tunnel that runs underneath the LAUS train platforms to the AOBB area.

The LAUS train platforms, located on the central portion of LAUS, consist of 6 reinforced concrete platforms with access to 12 rail lines serving Metrolink and Amtrak trains. There is an additional platform located adjacent to the AOBB parking lot area that is in use by the Metro Gold Line. All the Amtrak/Metrolink platforms are accessed through the underground pedestrian tunnel via stairs and access ramps located on both sides of the pedestrian tunnel. The Gold Line platform is accessed via stairs or by an elevator located adjacent to the underground pedestrian tunnel. The surficial materials encountered on the rail tracks consist predominantly of ballast rock, and the areas surrounding the platforms are either concrete or paved surfaces.

The Gateway Station Building is located on the eastern portion of LAUS, adjacent to the train platforms and north of US-101. This building serves as the eastern entrance for the Metro subway lines, Metro buses, and Amtrak/Metrolink. During the field visit conducted August 14, 2014, there were construction

activities occurring on the southern end of the parking lot and on Vignes Street. These improvements were in their final stage, and completion is anticipated in the near future.

Commercial Street, located south of LAUS and parallel to US-101, was explored to identify potential issues with the proposed aerial structures on August 14, 2014. During this site visit, personnel performed a reconnaissance of the street starting at Hewitt Street on the west end and terminating at the east end of Commercial Street near the Metro's ROW and railroad tracks. In addition, the intersection of Commercial Street and Central Street was visually explored to evaluate the potential lowering of the intersection grade. Observed land uses within the area consist of existing commercial and industrial establishments. The pavement condition ranges from poor to fair in most of the observed areas. Access to the Metro's ROW parallel to the Los Angeles River was not available on foot at the time of this visit, but future geotechnical exploration of these premises is considered accessible with the required entry permits.

Other facilities near the project footprint area include commercial buildings, parking lots, residential buildings, a Metro bus station, mechanic shops, major freeways and local streets, the Metro Gold Line Bridge, and underground utilities. Existing utility research in this area indicates existing storm drain, steam, air, petroleum products, fiber optic, sewer, electric, water, natural gas, and various other lines within LAUS and the surrounding area.

A summary of existing facilities and foundation information is provided in Table 5-1.

Table 5-1. As-Built Information – Existing Structures

Structure	Approximate Foundation Elevation (feet MSL)	Foundation Type	Number of Piles	Average Tip Elevation (feet MSL)	Approximate Pile Length (feet)	Pile Construction Technique
<b>Los Angeles River Bridge and Overhead at Aliso Street (Bridge No. 53-0405) – Initial Construction (Approximately 1954)</b>						
Abutment/Pier 1A, 2A, 1B-17B, 19D, and 20D	270	16-inch diameter CIDH	Hundreds	255	15	Drilled in place
West and East Arch Abutments, Piers 24D and 25D, Abutment 1 – Pier 25	236 at Arch abuts, 267 at Piers	Spread Footing	—	—	—	—
Pier 26 – Abutment 28	255	7-gauge fluted 16-inch diameter CISS	Hundreds	230	20 - 38	Driven
<b>Los Angeles Street Overcrossings (Bridge No. 53-0629) – Initial Construction (Approximately 1949)</b>						
All	259	Spread footing	—	—	—	—
<b>Alameda Street Overcrossing (Bridge No. 53-0782) – Initial Construction (Approximately 1952)</b>						
All	240	Spread footing	—	—	—	—
<b>Eastside Underpass [Gold Line] (Bridge No. 53-2975)– Initial Construction (Approximately 2004)</b>						
Abutment 1	288	4-foot diameter CIDH	6	210	78	Drilled in place
Bent 2 and Bents 6-9	262	8-foot diameter CIDH	1 each	190	72	
Bents 3-5	267	10-foot diameter CIDH	1 each	194	73	
Abutment 10	269	3-foot diameter CIDH	5	215	54	

Source: Caltrans n.d., 1949, 1954, and 2004

Notes:

No.=number; MSL=mean sea level, CIDH=cast-in-drilled-hole, CISS=cast-in-steel-shell

### **5.1.1 Metro Red Line Tunnel**

The Metro Red Line Tunnel is a twin cast-in-place concrete tunnel that runs in a northwest-to-southeast direction through LAUS. Each tunnel is nearly 20 feet in diameter with a nominal 12-inch thick concrete lining and located approximately 28 feet apart center-to-center. Within LAUS, this structure runs beneath the station's platforms and pedestrian tunnel. Southeast of LAUS, the Metro Red Line Tunnel begins at grade level, described as the east portal, and runs beneath the intersection of Commercial Street and Center Street, some private lots, and US-101. The construction of the tunnel segment located within LAUS was performed using the cut-and-cover method, and the excavations were supported by the implementation of tiebacks (pre-stressed soil anchors). After construction of the tunnel concrete box structure at LAUS, the tiebacks were abandoned in place (SCRTD 1988). The tunnel segment located southeast of LAUS was bored using a conventional tunnel boring machine. Horizontal and vertical grouting techniques were implemented for soil stabilization for the segments that run beneath the intersection of Commercial Street and Center Street and beneath US-101. The chemical grouting was applied around the Metro Red Line Tunnel, forming a binocular-shaped underground structure (EMI 2016a). The Metro Red Line Tunnel invert elevation ranges from about 265 feet mean sea level (MSL) near the east portal entrance and slopes down as the it advances northwest with an average invert elevation of about 237 feet MSL beneath US-101 and LAUS. Photographs taken during the construction of the Metro Red Line Tunnel are presented on Exhibits 5-2 and 5-3 in Appendix A.

During the construction of the tunnel segment between the intersection of Commercial Street and Center Street and US-101, a fire incident was reported July 13, 1990. Based on the reviewed documents, the fire was initiated by a spark from the cutting torch used during the installation of high density polyethylene membrane. During this fire, approximately 730 feet of tunnel lagging used for support was destroyed causing the collapse of this tunnel segment that, at the time of the fire, was ungrouted (Gularte et al. 1992).



## 6.0 Geologic and Geotechnical Conditions

### 6.1 Geologic Setting

The project site is located within the Los Angeles Basin near the boundary of the Transverse Ranges Province and the northern Peninsular Ranges Geomorphic Province. The mountain ranges include the Santa Monica and San Gabriel Mountains located northwest of the project site and the Palos Verdes Hills toward the southwest. The Transverse Ranges are characterized by an east to west trending complex group of mountain ranges and valleys. The Transverse Ranges are comprised predominantly of sedimentary rocks, Mesozoic granitic rocks, and ancient Precambrian rocks of all types. The northern Peninsular Ranges are characterized by a series of northwest to southwest trending mountains and faults. These mountain ranges are composed of metamorphosed sedimentary and volcanic rocks of Jurassic age that have been intruded by mid-Cretaceous plutonic rocks of the Southern California batholith and rimmed by Cenozoic sedimentary rocks (Gastil and Krummenacher 1981; Schoellhamer et al. 1981).

The project footprint area is located west of the Los Angeles River on a gently sloping alluvial surface. Topography within the proposed project footprint area slopes downward from north to south with ground elevations ranging from about 274 to 295 feet above MSL. Based on the review of the Geologic Compilation of Quaternary Surficial Deposits in Southern California (CGS 2012), the site is underlain by varying amounts of artificial fill and of Holocene-age and Pleistocene alluvium deposits consisting of silty sands, sands and silts with varying amounts of gravel and cobbles (Exhibit 6-1 in Appendix A). Beneath the alluvium layers, Miocene Puente marine sedimentary formations are present within the project footprint area (Bilodeau et al. 2007).

### 6.2 Faulting and Seismicity

The review of available literature indicates there are no known active or potentially active faults that have been mapped at the site, and the site is not located within an Alquist-Priolo Earthquake Fault Zone (Exhibit 6-2 in Appendix A). The principal seismic hazard that could affect the site is ground shaking resulting from an earthquake occurring along one of several major active or potentially active faults in Southern California. Based on the review of the Caltrans Acceleration Response Spectrum Online (Caltrans 2016), the USGS and CGS (USGS and CGS 2006) Quaternary Fault and Fold Database, and the Alquist-Priolo Special Studies Zone Map for Los Angeles Quadrangle (CDMG 1977), the closest active faults that could affect the site, approximate distances, fault lengths, and magnitudes are presented in Table 6-1.

**Table 6-1. Nearby Faults**

Fault Name	Distance from Site (Mile) <sup>2</sup>	Moment Magnitude <sup>3</sup>
Elysian Park (Upper) <sup>1</sup>	0.8	6.6
Hollywood	4.3	6.6
Puente Hills (Los Angeles) <sup>1</sup>	4.5	6.9
Raymond	4.6	6.7
Santa Monica	4.6	7.0
Verdugo	6.8	6.8
Newport Inglewood	8.4	7.2
Sierra Madre	11.0	7.2
Elsinore	11.6	6.9
Malibu Coast	16.7	6.6
Palos Verdes	17.7	7.2
San Gabriel	18.2	7.3
THUMS – Huntington Beach	19.6	6.6
Northridge Hills	19.3	6.4

**Note:**

- 1 *Blind thrust fault: Mapped by Caltrans Acceleration Response Spectrum Online but not mapped by USGS and CGS (Caltrans 2016; USGS and CGS 2006)*
- 2 *Distance from site is approximate and measured from LAUS (USGS and CGS 2006)*
- 3 *Caltrans 2016*

### 6.3 Seismic Design Criteria

To mitigate the effects of ground shaking produced by regional seismic events, seismic design should be performed in accordance with the applicable building codes. Seismic design criteria and recommendations relevant to the proposed improvements are included in a preliminary technical memorandum prepared by EMI (EMI 2015).

## 6.4 Seismic Hazards

### 6.4.1 Fault Rupture

Based on available literature and reports, no active faults are known to traverse the project site, and the site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone. The nearest special study zone as mapped by CDMG is approximately 5.5 miles from the site (CDMG 1977) (Exhibit 6-3 in Appendix A).

### 6.4.2 Seismic Ground Shaking

The proposed project is located within an active seismic region and is expected to experience ground shaking from an earthquake occurring along several major active or potentially active faults in Southern California (Section 6.2 for details). Consequently, the implementation of the proposed improvements may increase the number of people exposed to effects associated with seismically-induced ground shaking. The seismic ground shaking hazard is considered moderate to high.

### 6.4.3 Liquefaction and Seismically-Induced Settlement

Liquefaction is the loss of soil strength or stiffness due to a buildup of pore-water pressure during ground shaking. Liquefaction is associated primarily with loose (low-density), saturated, fine- to medium-grained, cohesionless soils. Effects of liquefaction can include sand boils, excessive displacements, bearing capacity failures, and lateral spreading. Seismically-induced settlement consists of dry dynamic settlement (above groundwater) and liquefaction-induced settlement (below groundwater). This settlement occurs primarily within loose to moderately dense sandy soil due to reduction in volume during and shortly after an earthquake event.

Based on the review of the Seismic Hazard Zones map for the Los Angeles 7.5-Minute Quadrangle (CGS 1999), the site is located within an area designated as potentially liquefiable (Exhibit 6-3 in Appendix A).

A review of existing borings from nearby projects and borings performed by others at LAUS and surrounding areas, the groundwater level ranges between depths of approximately 14 to 48 feet below ground surface (bgs) (corresponding groundwater elevations range from about 222 to 256 feet MSL). Historical groundwater depths as shallow as 13.5 feet below ground were reported (Law/Crandall, Inc. 1997; J. Byer Group 1998), but more recent measurements indicated a steady groundwater level decline (Section 6.6 for discussion). The soils encountered below groundwater are generally alluvial deposits consisting of medium dense to very dense sandy silts, silty sands, and sands with gravel that are not considered susceptible to liquefaction. However, there is evidence of thin interbedded loose materials within the upper 30 feet of the project footprint area. These layers will need to be evaluated during future subsurface exploration to confirm their liquefaction potential for the site. In general and from a preliminary standpoint, based on the available geotechnical data, the potential for liquefaction and seismically-induced settlement to occur at the proposed project location is considered low.

#### 6.4.4 Lateral Spreading

Lateral spreading is a type of landslide motion generally characterized by progressive cracking and ground motion near a slope face. Lateral spreading is generally associated with liquefiable soils, which allow the slope face and surrounding area to flow during or shortly after earthquake ground motions. Conditions favorable for lateral spreading are frequently found along streams and waterfronts or in loosely placed, saturated, sandy fill (Rauch 1997). The Los Angeles River is located southeast of LAUS; it is a channelized concrete channel. Based on the proposed improvements, as well as the known soil conditions, the potential for lateral spreading at the site is considered low. The project footprint area, located near the Los Angeles River where limited geotechnical information is available, needs further investigation to evaluate the lateral spreading potential.

#### 6.4.5 Seiches and Tsunamis

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. Tsunamis are waves generated in large bodies of water by fault displacement or major ground movement. Based on the absence of enclosed bodies of water near the site and the CGS Tsunami Inundation Map (CGS 2009), seiche and tsunami risks at the site are considered negligible.

### 6.5 Subsurface Earth Materials

The review of existing geotechnical data, geologic maps, reports, and other pertinent information indicates the project footprint area is underlain by varying amounts of artificial fill and young alluvium deposits ranging from loose to medium dense materials, such as silty sands/sandy silts, silt, and sands with varying amounts of gravel and cobbles. The artificial fill varies in composition but is generally known to contain construction debris, as well as imported natural earth materials. The compaction of this layer is uncertain and, therefore, this layer of fill is categorized as “uncertified fill.” Generally, in Los Angeles County, uncertified fill may not be used to support loads from structures, and the removal and recompaction of this layer should be anticipated for construction. In the review of existing data, the artificial fill layer varies from about 5 to 15 feet in thickness but may extend to depths as great as about 30 feet bgs in some locations. Within the concourse area, the artificial fill ranges from about 20 to 30 feet bgs. The young alluvium encountered within the project footprint area consists primarily of coarse-grained deposits ranging in consistency from loose to very dense silty sands, clayey sands, and sands with varying amounts of gravel and cobbles. Interbedded fine-grained deposits consisting of soft to stiff sandy silts, silt, and clay were also observed within the young alluvium in the LAUS area (CC et al. 1983). The thickness of the young alluvium within the project area ranges from about 40 to 70 feet. For the concourse area, the thickness of the young alluvium deposits ranges from about 65 to 75 feet.

Beneath the fill and younger alluvium, older alluvium deposits, sometimes referred as to the San Pedro Formation, overlay bedrock of the Puente Formation. Older alluvium materials consist of dense to very dense silty sands, sands, interbedded clays, and gravels with varying thickness from 10 to about 70 feet. The Puente Formation (bedrock) consists predominantly of interbedded siltstone and sandstone with thinly bedded claystone. The degree of weathering of the bedrock decreases with increasing depth. The

upper several feet of the bedrock is weakly cemented and susceptible to softening or slaking in the presence of water; however, deeper beds are strongly cemented. Bedrock at the project site is generally encountered at depths ranging from about 18 to 100 feet bgs or with corresponding elevations ranging from 190 to 254 feet MSL. Bedrock was encountered at relatively shallow depths ranging from about 18 to 30 feet bgs or corresponding elevations ranging from 245 to 257 feet MSL in the southwestern portion of LAUS as described in the geotechnical exploratory borings (URS 2003). Near the platforms/tracks and the concourse passenger areas, bedrock was generally encountered at approximately elevation 200 feet MSL, which is about 95 feet below existing grade (CC et al. 1983). On the southeast side of LAUS, in the vicinity of US-101 and the intersection of Commercial Street and Central Street, bedrock was generally encountered at depths ranging from 90 to 100 feet bgs. However, the borings performed for the Gold Line Eastside Extension Project located near the intersection of Alameda Street and Commercial Street encountered bedrock at depths ranging from 49 to 75 feet bgs or corresponding elevations ranging from 226 to 218 feet MSL. Other data reviewed included borings located on Cesar Chavez Avenue, Keller Street, and Lyon Street, which did not encounter bedrock within their exploration depths (up to about 50 feet bgs).

In general, the Puente Formation is of low to moderate strength with locally hard, cemented, and interbedded concretions. Limited unconfined compressive strength tests performed for the Metro Red Line Tunnel indicates unconfined compressive strengths ranging from about 10 to 175 pounds per square inch, with an average value of about 80 pounds per square inch (CC et al. 1983). Based on a review of similar projects performed for an area near LAUS by others, the unconfined compressive strength of the Puente Formation varies from about 50 to 750 pounds per square inch. The strength of cemented layers and concretions vary from 4,000 to 15,400 pounds per square inch (CH2M Hill 2010). Cross sections utilizing selected boring logs obtained from the previous reports were prepared for LAUS and Commercial Street (Exhibits 6-4 and 6-5 in Appendix A).

## **6.6 Groundwater**

Based on the review of previous reports and available data, the groundwater levels within the project footprint area range between approximately 14 and 48 feet bgs (corresponding groundwater table elevations range from about 222 to 256 feet MSL). Historical groundwater depths as shallow as 13.5 feet below ground were reported (Law/Crandall, Inc. 1997; J. Byer Group, Inc. 1998), but more recent measurements indicated a steady groundwater level decline. The groundwater quality at the project is not specifically known, but the groundwater may contain inorganic constituents, as well as organic contaminants from solvent and petroleum hydrocarbon pollution associated with industrial activities in the area (Caltrans 2005). Underground facilities, as well as temporary excavations during construction, should anticipate encountering groundwater if greater than about 10 to 15 feet bgs. See Section 6.12, Environmental Concerns regarding potential groundwater contamination.

## 6.7 Collapsible and Expansive Soils

Collapsible soils are soils that undergo settlement upon wetting, even without the application of additional loads. Typical collapsible soils are low in plasticity and have relatively low moisture contents and densities. These soils are distributed throughout the southwestern United States, specifically in areas of young alluvial fans, debris flow sediments, and loess (wind-blown sediment) deposits. Expansive soils are generally plastic clays that can undergo a substantial increase in volume with increase in moisture content and a substantial decrease in volume with a decrease in moisture content. Expansive soils can cause uplift pressures that can lead to structural damage. Based on the review of available geotechnical reports (Section 4.0), collapsible soils and expansive soils have not been identified at the proposed project site. Therefore, the soils at the site have low collapse and expansion potential.

## 6.8 Corrosion Potential

Existing available data indicates soils located within LAUS exhibited sulfate concentrations ranging from 152 to 475 parts per million (ppm) and chloride concentrations ranging from 3,000 ppm to 4,600 ppm (CC et al. 1981). Caltrans specifications define a corrosive soil as a material in which any of the following conditions exist: a chloride content greater than 500 ppm; soluble sulfate content greater than 2,000 ppm; or a pH of 5.5 or less. Based on these guidelines established by Caltrans and existing data from previous reports, the soils within the project site have a moderate to severe corrosion potential to buried metal structures, and the potential for sulfate attack on concrete is considered low. However, future studies should further assess corrosion potential.

A geotechnical report prepared for the Metro Red Line Tunnel (CC et al. 1986) described severe corrosion to groundwater monitoring instrumentation and pump equipment exposed to the groundwater in the LAUS area. During this investigation, soils within LAUS were treated with hydrogen peroxide to reduce hydrogen sulfide content in the groundwater. The hydrogen peroxide treatment was successful in the reduction of hydrogen sulfide in the groundwater within LAUS (CC et al. 1986). The subsurface soils within the project site will be evaluated in the future, planned investigations for the potential for corrosion to concrete and ferrous metals to confirm previous findings.

## 6.9 Subsidence and Settlement

Ground subsidence is a process characterized by downward displacement of surficial materials caused by natural phenomena, such as removal of underground fluids, natural consolidation, or dissolution of underground minerals, or by man-made phenomena, such as underground mining or tunneling. The project site is located north of the Union Station Oil Field. The LAUS Run-Through Tracks Project Environmental Impact Report/Environmental Impact Statement (Caltrans 2005) indicates the potential for subsidence due to the extraction of oil in the surrounding area near LAUS is considered low. It is anticipated that the proposed improvements would impose higher loads on the existing soils than presently exist; therefore, settlement, both long-term and immediate, is anticipated to occur in low density, loose deposits of silts, clays and sands for those improvements proposed to rely upon the upper zones for support using shallow foundations. The review of existing soil boring logs indicates thin,

interbedded loose deposits within the upper 30 feet of the artificial fill should be anticipated. Significant settlement was generally not a controlling issue in the reports reviewed. Proper compaction and/or the removal of fill soils should be considered for proposed improvements. Another alternative to consider is use of deep foundations which extend through the artificial fill soils and bear in firm strata.

## **6.10 Flooding**

The Flood Insurance Rate Map 06037C1636F (Federal Emergency Management Agency 2015) depicted that the project footprint area is located within Zone "X" (unshaded), an area designated to be outside the 500-year floodplain and protected by levee from 100-year floodplain. The potential for flooding for the proposed project is considered low.

## **6.11 Mineral Resources**

The project footprint area is underlain by man-made fill and alluvium materials, such as sand and gravel, which could be considered mineral resources and used as construction aggregates. However, the mining of such materials within an urbanized environment is not practical. Therefore, no significant impact on mineral resources would be attributed to the construction of the proposed project.

## **6.12 Environmental Concerns**

Several environmental reports were reviewed regarding subsurface conditions. Due to the long history and varied uses of this area of Los Angeles, the site is expected to have variable potential for contamination. The J. Byer Group reported encountering methane and hydrogen sulfide in their test wells near LAUS (J. Byer Group, Inc. 1998). In one sample at Test Well No. CMW2, located west of the HSB, combustible gas readings were high enough to reach the lower explosive limit. Similar combustible gas conditions were encountered at the site when performing pump tests as reported by others (CC et al. 1986). CC also reported previous problems had been encountered at the site when performing a pump test. CC encountered entrained gases in the water (possibly methane), which may have been released by the underlying Puente Formation. Groundwater contaminated with gas or other volatile organic compounds may be encountered during groundwater pumping on site. Other detailed recommendations for dewatering can be found in the J. Byer Group report (J. Byer Group, Inc. 1998). The area west of First Street Bridge is mapped as a Union Station Oil Field; consequently, bedrock could contain hydrocarbon odor and stains.

A boring performed near the Los Angeles River (Boring CEG-2) indicates the presence of natural oil, which was encountered at a depth of about 37 feet bgs (CC et al. 1981).

Soil and groundwater contamination at LAUS was found primarily in the eastern, northern, and southern portions of the property. The contaminants found in soil samples at LAUS included carbon disulfide, petroleum hydrocarbons, benzene, toluene, xylenes and potentially methylene choline in the upper 30 feet bgs. Twenty-eight volatile organic compounds were reported in groundwater samples, which include acetone, dichloroethane, dichloroethylene, tetrachloroethylene, toluene, methylene chloride, carbon

disulfide, and various others (Law/Crandall, Inc. 1994). Further studies (URS 2011) suggest the highest concentrations of volatile organic compounds exist on the off-site portion of the Gateway Area, near the intersection of Vignes Street and Cesar Chavez Avenue, whereas the yard tracks are contaminated with petroleum hydrocarbons, lead, and semi-volatile organic compound from historic rail operations. Similar types of contaminants are expected to be found near LAUS, including the southern parts of the First Street Viaduct Bridge, Keller Street, Ramirez Street, Commercial Street, Center Street, and various other streets.

Soil and groundwater environmental investigations for the construction of the Metro Red Line Tunnel segment between the intersection of Commercial Street and Center Street and US-101 revealed low levels to nondetectable levels of soil and groundwater contaminants (The Earth Technology Corporation 1987a, 1987b, and 1987c).

Numerous on- and off-site contamination sources are known to exist or have existed at the site. Some of these sources and their contaminants are described in previous environmental documents (Law/Crandall, Inc. 1994; URS 2011). In general, the site is impacted by volatile organic compounds from various sources, and nearby rail operation areas are impacted by petroleum hydrocarbons, lead, and semi-volatile organic compound. URS determined that these areas impacted by rail operations are generally limited to the upper 10 feet of materials below existing site grade.

### **6.13 Methane Gas**

Based on the review of the Methane and Methane Buffer Zone Map (City of Los Angeles 2004), portions of the project are located within an area designated as Methane Zone. The areas within the project limits affected by this designation are located south of US-101. Therefore, there is the potential for methane and other volatile gases to exist within the project footprint area.



## 7.0 Geotechnical Considerations

### 7.1 Foundation Type

Based on the review of previous reports, anticipated loading characteristics of the proposed improvements and the soil stratigraphy within the project site, a combination of shallow foundations and deep (pile) foundations will likely be suitable to support proposed improvements. Reviewed reports indicate allowable bearing pressures for spread footings of between 3,000 and 4,000 pounds per square foot. Where conventional spread foundations are considered, proper treatment (removal and recompaction) of the uncertified artificial fill is required. Similarly, if loading capacity is required for pile foundations (especially for lateral loading), the uncertified fill should be removed and recompacted to meet or exceed the minimum compaction criteria for the proposed improvements, or these foundations are designed to not rely on these uncertified fill soils for lateral resistance.

The foundation type selection should account for the presence of adverse conditions, such as a shallow groundwater table, presence of dense to very dense granular materials and cobbles, caving of loose granular soils, the highly urbanized area surrounding the project site, potential soil corrosion, and potential for encountering contaminated soils. Heavy column and wall loads will be best supported by a deep foundation system. Feasible deep foundation types include steel piles driven to refusal into bedrock, and cast-in-drilled-hole (CIDH) piles. Foundation types, such as CIDH piles and driven steel piles, will provide suitable support for the proposed structures with the proper design and construction methods. During the construction of pile foundations, difficult driving and/or drilling can be expected due to the presence of dense to very dense deposits, cobbles and bedrock at shallow depths within the project footprint area. CIDH piles were the prevailing recommended foundation type among the more recent documents reviewed. Where axial load demands are high, utilizing methods such as base grouting of CIDH piles should be considered to increase compressive capacity.

However, the relatively shallow depth to the Puente Formation bedrock may make driven piles a feasible alternative. Consideration should be given to underground utilities; nearby structures; and existing tunnels, which may be sensitive to ground vibrations, corrosion of pile steel, and noise impacts if driven piles are to be considered.

### 7.2 Constructability Considerations

Some known constructability-related subsurface conditions exist at the project site. The intent of the planned future exploration is to better delineate these and other conditions near proposed improvements. Anticipated subsurface conditions at the project footprint area that might affect the proposed improvements are summarized below:

- Shallow groundwater table ranging from 14 to 20 feet bgs is anticipated at LAUS.
- Environmental concerns exist, given the presence of contaminated soils and groundwater at LAUS.

- Corrosion potential of soils at LAUS is considered high.
- The impact of proposed improvements to the existing Metro Red Line Tunnel within LAUS and off-site areas must be considered (near the intersection of Commercial Street and Center Street).
- Difficult driving or drilling conditions for piles could be encountered at the site due to gravel and cobble layers and bedrock.
- Abandoned tiebacks (pre-stressed soil anchors) installed during the construction of the Metro Red Line Tunnel within LAUS could pose obstructions to deep foundations and other proposed improvements.

### **7.3 Finite Element Analysis Results**

A finite element analysis was performed by EMI to evaluate the impact on the existing Metro Red Line Tunnel due to the potential street grade modification at the intersection of Commercial and Center Streets, which includes the lowering of the roadway by approximately 7 feet below existing grade. Based on the preliminary results provided in the technical memorandum by EMI (EMI 2016a), the lowering of Commercial Street and Center Street would not affect the structural integrity of the existing Metro Red Line Tunnel. In addition, EMI did not identify any fatal flaws when evaluating the tunnel performance under static and seismic conditions due to the proposed lowered grade (EMI 2016a).

Another analysis was performed (EMI 2016b) to evaluate the impact of lateral pile loading on the Metro Red Line Tunnel near the intersection of Commercial Street and Center Street due to the proposed aerial bridge structure. The two-dimensional finite element analysis considered a 10-foot diameter CIDH pile located at approximately 20 feet apart from the Metro Red Line Tunnel. Since lateral pile demands were not available, EMI provided a range of possible pile response using incremental lateral displacements for both fixed and free pile head conditions. Based on the analysis, the pile top shear force required to displace the pile 1 inch is approximately 1,700 kips and 3,500 kips for the free-head and fixed-head conditions, respectively (EMI 2016b). These results are considered preliminary, and further analysis will be required when more detailed design information becomes available.

## 8.0 Recommendations

Future geotechnical exploration is recommended to better characterize the subsurface conditions and anticipate issues that would affect the proposed improvements. In general, additional explorations should be performed at the existing platform area within LAUS, along the proposed overhead aerial structure and on the approach tracks that would provide entrance/exit to LAUS. Special consideration should be given to the existing Metro Red Line Tunnel to identify any potential impacts that the proposed improvements might have on this underground structure. The subsurface soils and groundwater contain moderate to high levels of contamination, and the presence of combustible gases, including methane, may affect the drilling and sampling at the project site (Section 6.12).

Based on the existing project site conditions and the expected shallow depth to groundwater, rotary-wash borings are recommended. Coring of bedrock, if encountered, should be considered to obtain bedrock design information. Subsurface materials contain varying amounts of gravel and range from medium dense to very dense, but these soils can be drilled and sampled to the required depths using conventional drilling technology. Where borings would be used for foundation parameters and/or subterranean structures, they should extend to a minimum depth of 100 feet or into bedrock, whichever is shallower. The spacing of exploratory borings will depend of the type of structure and proposed improvements. In general, a minimum of one exploratory boring per bridge support is recommended. Standard penetration test blow counts (N-values) should be obtained from these borings. Geotechnical laboratory testing of recovered soil samples should be performed, as necessary, to obtain engineering design parameters of the subsurface materials.

Cone penetrometer tests (CPT) equipped with one or more geophone sensors and pushed to refusal should be considered in addition to the conventional borings, in particular at the platform areas and the proposed overhead aerial structure. Per foot of exploration, CPTs are more cost-effective than soil borings, and they also provide more precise subsurface data useful for soil characterization, liquefaction analysis, seismic analysis, and pile capacity design. The state of the practice for CPTs has improved over the years and some CPTs can now be pushed through more dense or coarse grained alluvium than in the past but may still encounter relatively shallow refusal in very dense soil layers or bedrock. CPTs could be mobilized first and exploratory borings using either hollow stem and/or mud rotary methods could then be drilled to augment data where the CPTs could not reach sufficient depths. Seismic design parameters (shear wave velocity) can be obtained by using seismic CPTs, seismic refraction, and/or downhole P-S suspension logging. Due to the presence of dense granular materials, seismic CPTs might encounter shallow refusal, consequently limiting its capabilities to gather useful data for seismic analysis. Downhole P-S suspension logging is the preferable method for obtaining seismic design data at the proposed site due to the accurate measurement of the shear wave velocity value and site specific conditions. The downhole P-S suspension logging can be performed in any exploratory boring planned for the project. Noninvasive methods, such as seismic refraction, can also be considered to obtain seismic design data for the proposed improvements.

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## 9.0 Next Steps

The findings presented in this report were based solely on the review of published geologic maps and geologic sources, planning documents, and previous geotechnical reports for LAUS and nearby developments. The findings presented in this report are considered preliminary and will need to be re-evaluated during the project's final design phase. Additional geotechnical investigations should be performed to provide site-specific design information for the proposed improvements and incorporate any modifications to the project alternatives. The next steps to be considered for the project will consist of the following:

- Delineate potential areas requiring further investigation by taking into consideration the findings presented in this report and the location of the proposed improvements
- Plan and prepare a detailed geotechnical field work plan for proposed geotechnical investigation, which will be prepared by incorporating the preliminary findings of this report and the recommendations, as described in Section 8.0
- Conduct additional geotechnical exploratory investigations to obtain additional subsurface soil information to be used to confirm preliminary findings and in the refinement of recommendations, which will reduce the risk of encountering unexpected subsurface conditions during the project's design phase
- Provide mitigation alternatives for the identified constructability-related subsurface conditions affecting the project, as described in Section 7.2
- During final design, a final geotechnical report shall be prepared incorporating new findings; refined project alternatives; and updated design recommendations, which will include soil bearing capacity, earth pressures, seismic design parameters, foundation selection, and mitigation of adverse conditions recommendations

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- 1987b. The Phase III Subsurface Investigation at the Metro Rail A-130 Corridor, Los Angeles, California.
- 1987c. The Phase IV Subsurface Investigation at the Metro Rail A-130 Corridor, Los Angeles, California.
- URS Corporation (URS). 2003. Geotechnical Investigation, Proposed West Campus Infrastructure Project, Los Angeles, California, LOTBs.
- 2011. Phase I Environmental Site Assessment and Limited Phase II Testing Selected Portions of the Los Angeles Union Station Property, Los Angeles, California.



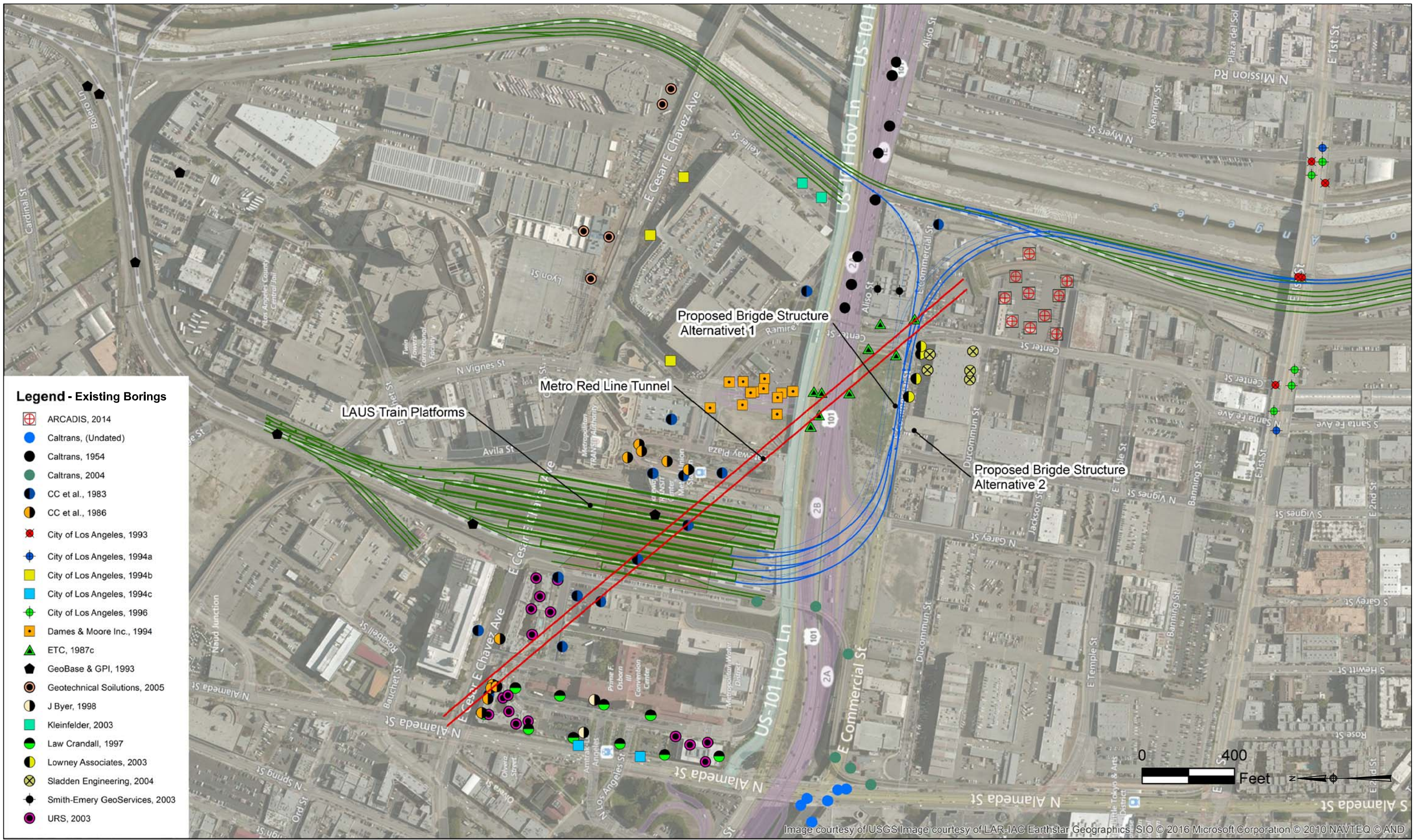
United States Geological Survey (USGS) and California Geological Survey (CGS). 2006. Quaternary Fault and Fold Database for the United States. Accessed July 9, 2014.  
[http://earthquakes.usgs.gov/regional/qfaults/.](http://earthquakes.usgs.gov/regional/qfaults/)

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## Appendix A: Exhibits

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**LINK UNION STATION**  
EXISTING DATA - EXHIBIT 4-1

**SCALE AS SHOWN**  
**DATE: 06-12-2016**



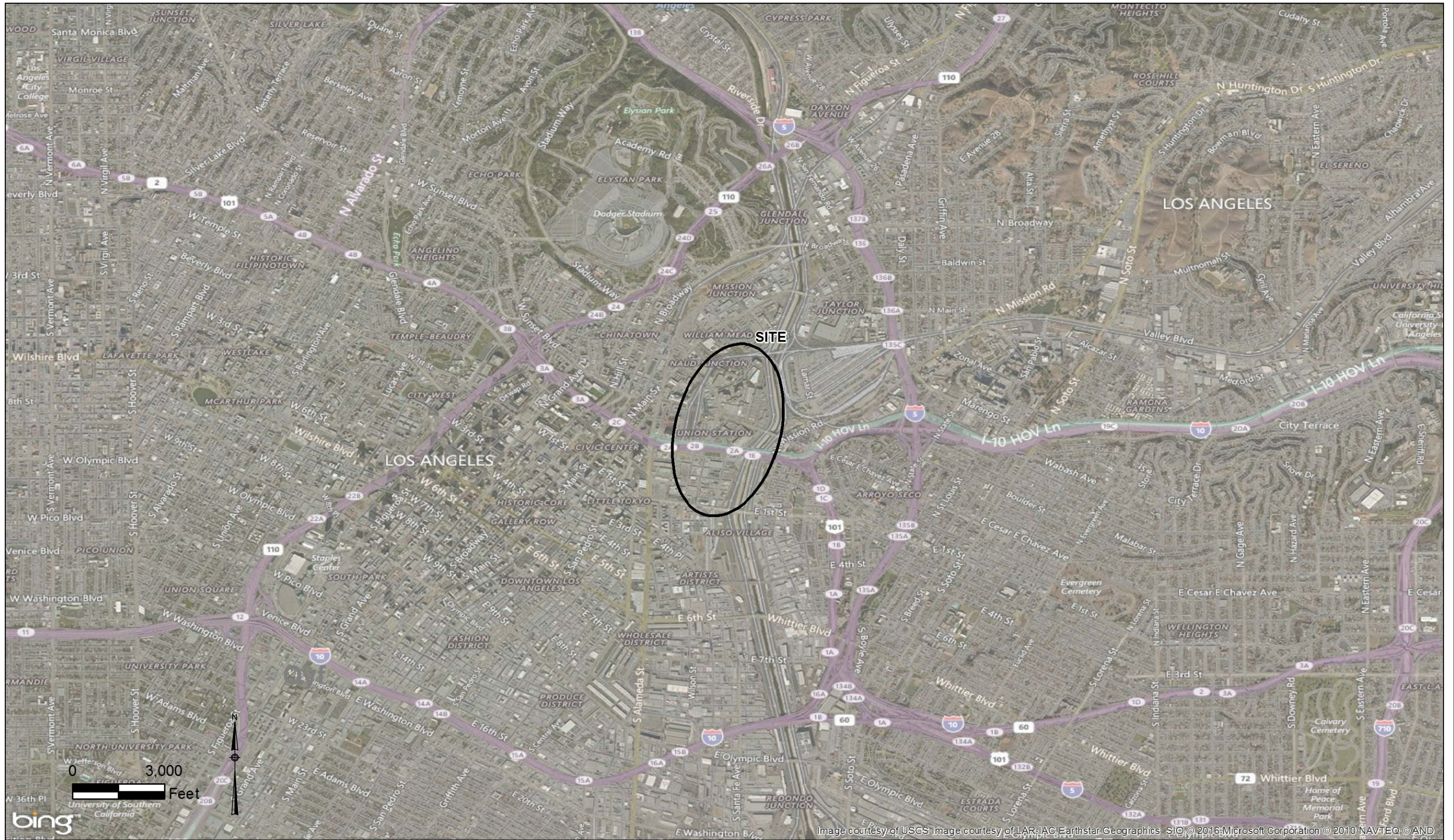


Image courtesy of USGS Image courtesy of LAR-IAC, Earthstar Geographics, SIO © 2016 Microsoft Corporation © 2010 NAVTEQ © AND



**LINK UNION STATION**  
**SITE LOCATION MAP - EXHIBIT 5-1**

**SCALE AS SHOWN**  
**DATE: 06-12-2016**





Photo No. 1. False tunnel sets at the South Tunnel Portal of YR Tunnel (south of LAUS) with tunnel shield and mucking machine in the background. Photo taken: 01/30/90. Source: SCRTRD, 1990a.



Photo No. 2. False tunnel sets and the jacking frame and struts for pushing the shield off of at the South Tunnel Portal (south of LAUS). Photo taken: 01/30/90. Source: SCRTRD, 1990a.



Photo No. 3. Mezzanine floor slab in place with column reinforcement steel protruding. The reinforcement for lift No. 4 of mezzanine floor is being placed in the foreground. Photo Taken: 01/30/90. Source: SCRTRD, 1990a.

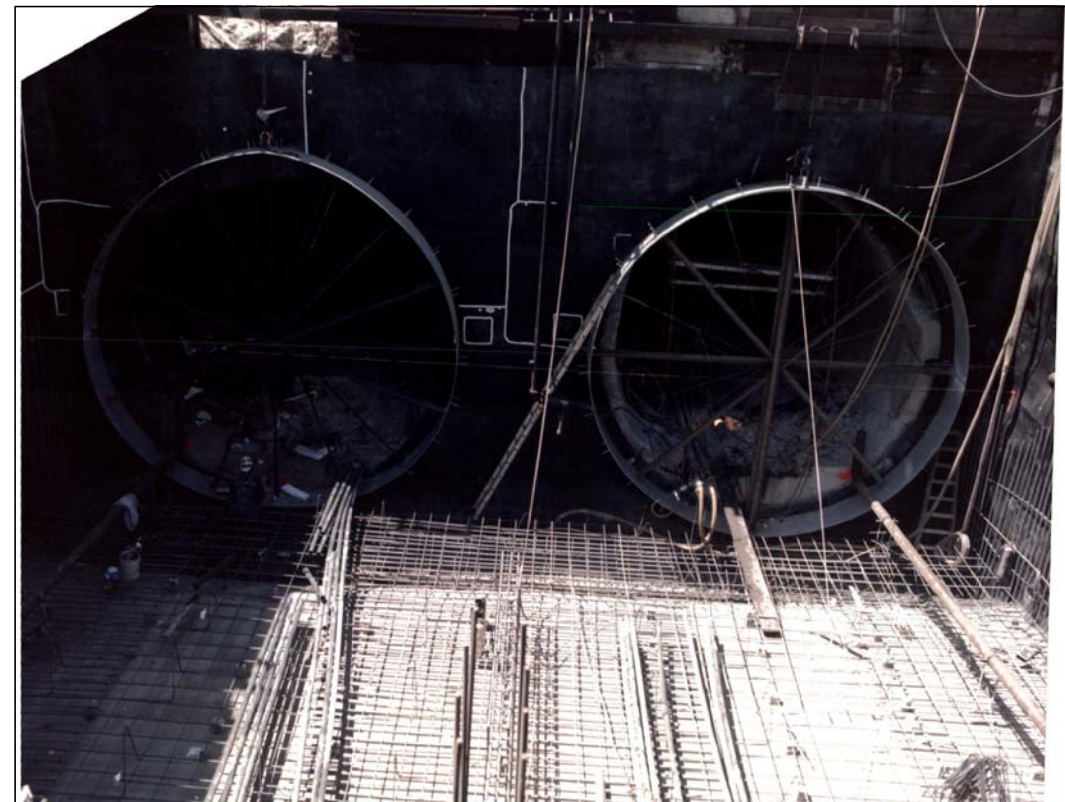


Photo No. 4. Reinforcement steel being placed in the closing slab of box structure at the south tunnel portals. Photo taken: 07/30/90. Source: SCRTRD, 1990a.



**LINK UNION STATION**  
PHOTOGRAPHS - EXHIBIT 5-2

**SCALE: AS SHOWN**  
**DATE: 06-12-2016**





NEG NO 8 ROLL NO \_\_\_\_\_  
 PICT NO 9  
 SCRTD - M.O.S. 1  
 PROJECT Main Yard and Shops -  
Yard Leads  
 CONTRACT NO A-130  
 DATE 1-18-90  
 TAKEN BY D. EDGAR  
 LOCATION STA. 4R 98400 - TRACTION  
POWER SUBSTATION.  
 COMMENT PICTURE SHOWS 2'  
BOULDER IN CUT, ENCOUNTERED  
By HOWARD - BAKER.



NEG NO 6 ROLL NO \_\_\_\_\_  
 PICT NO 7  
 SCRTD - M.O.S. 1  
 PROJECT Main Yard and Shops -  
Yard Leads  
 CONTRACT NO A-130  
 DATE 1-18-90  
 TAKEN BY D. EDGAR  
 LOCATION STA. 4R 98400 -  
POWER SUBSTATION.  
 COMMENT SENIOR INSPECTOR  
McLACKIE HOLDING MEAS  
SHOWING 4' BOULDER.

Photo No. 5. Boulders encountered at the Main Yard and Shops (currently LAUS). Photo taken: 01/18/90. Source: SCRTD, 1990b.



Photo No. 6. Interface between the box structure (LAUS area) on the YL side at Sta. 89+7 and the YL Tunnel (south of LAUS). Photo taken: 03/04/90. Source: SCRTD, 1990a.

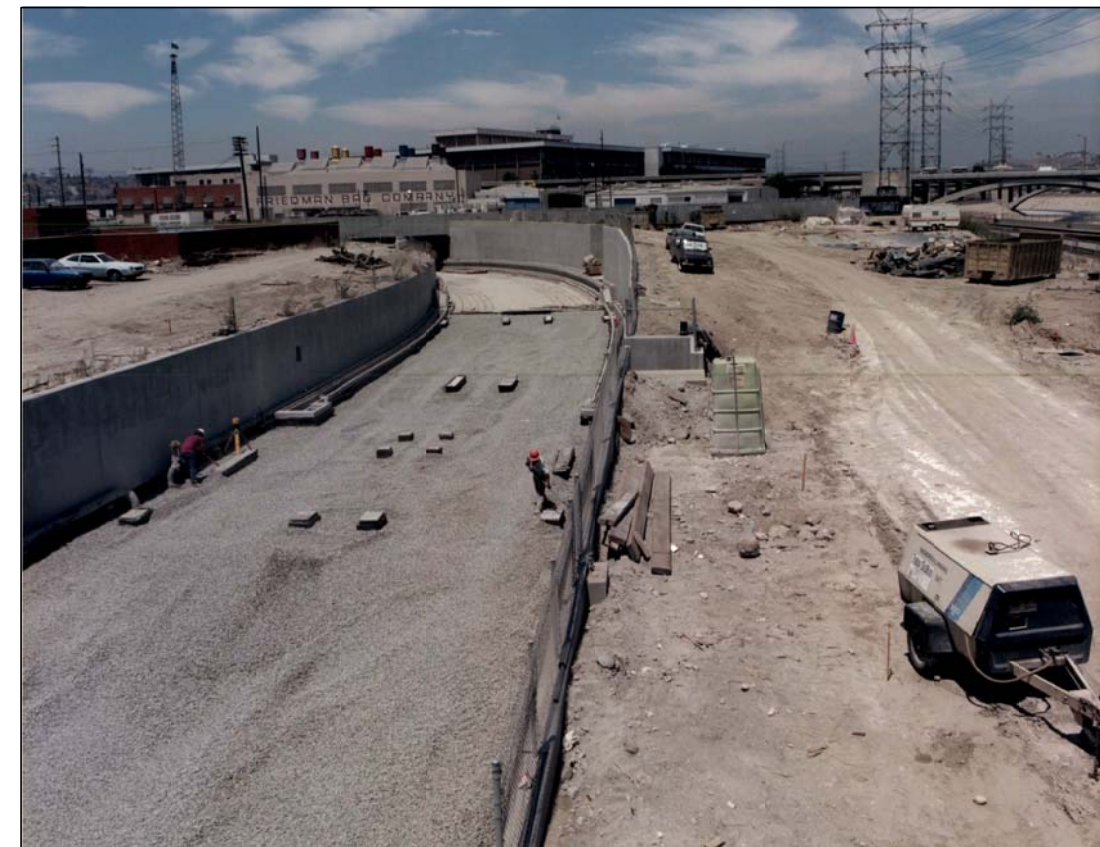


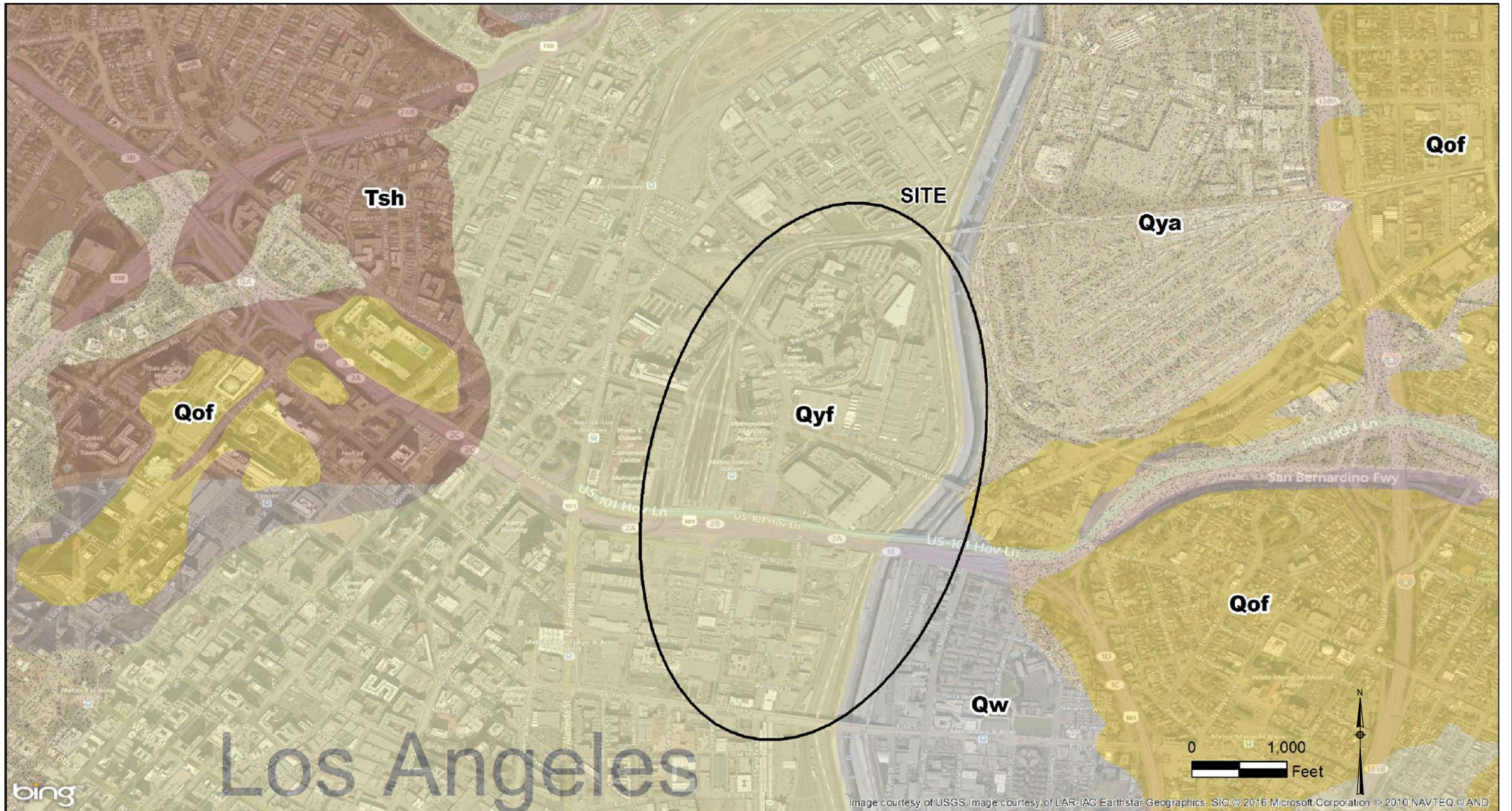
Photo No. 7. Sub-ballast placed on the base of slab in the "U" wall structure area, East Portal Entrance (south of LAUS). Looking north towards LAUS. Photo taken: 07/30/90. Source: SCRTD, 1990a.



**LINK UNION STATION**  
**PHOTOGRAPHS - EXHIBIT 5-3**

**SCALE: AS SHOWN**  
**DATE: 06-12-2016**





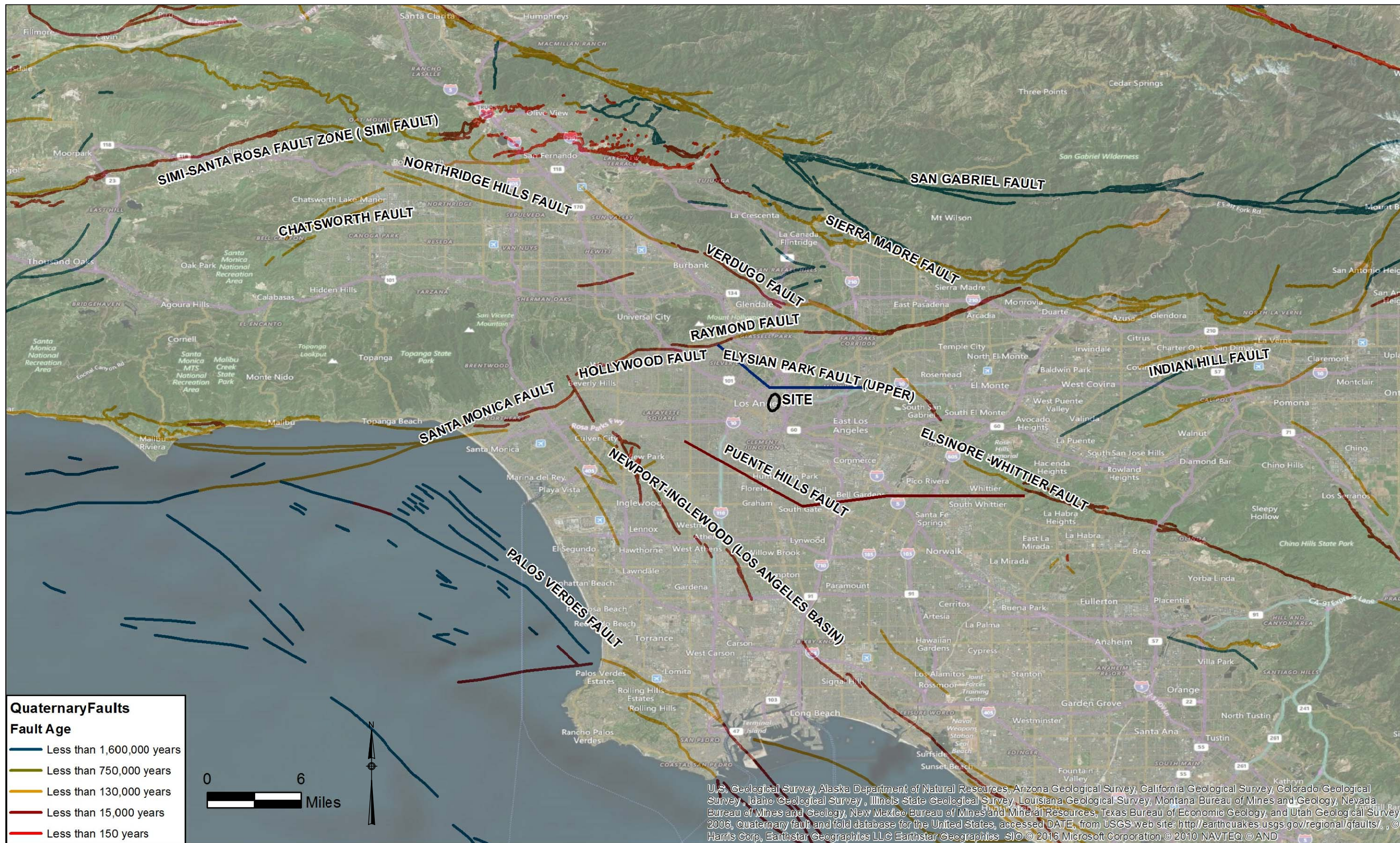
<p><b>Qyf</b></p>	<p><b>Young Alluvial Fan Deposits</b> - unconsolidated to slightly consolidated, undissected to slightly dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon</p>	<p><b>Qya</b></p>	<p><b>Young Alluvial Valley Deposits</b> - unconsolidated to slightly consolidated, undissected to slightly dissected clay, silt, sand, and gravel along stream valleys and alluvial flats of larger rivers</p>	<p>Reference: CGS, 2012</p>
<p><b>Qof</b></p>	<p><b>Old Alluvial Fan Deposits</b> - slightly to moderately consolidated, moderately dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon</p>	<p><b>Qw</b></p>	<p><b>Alluvial Wash Deposits</b> - unconsolidated sandy and gravelly sediment deposited in recently active channels of streams and rivers; may contain loose to moderately loose sand and silty sand</p>	



**LINK UNION STATION**  
**GEOLOGIC MAP - EXHIBIT 6-1**

**SCALE: AS SHOWN**  
**DATE: 06-12-2016**

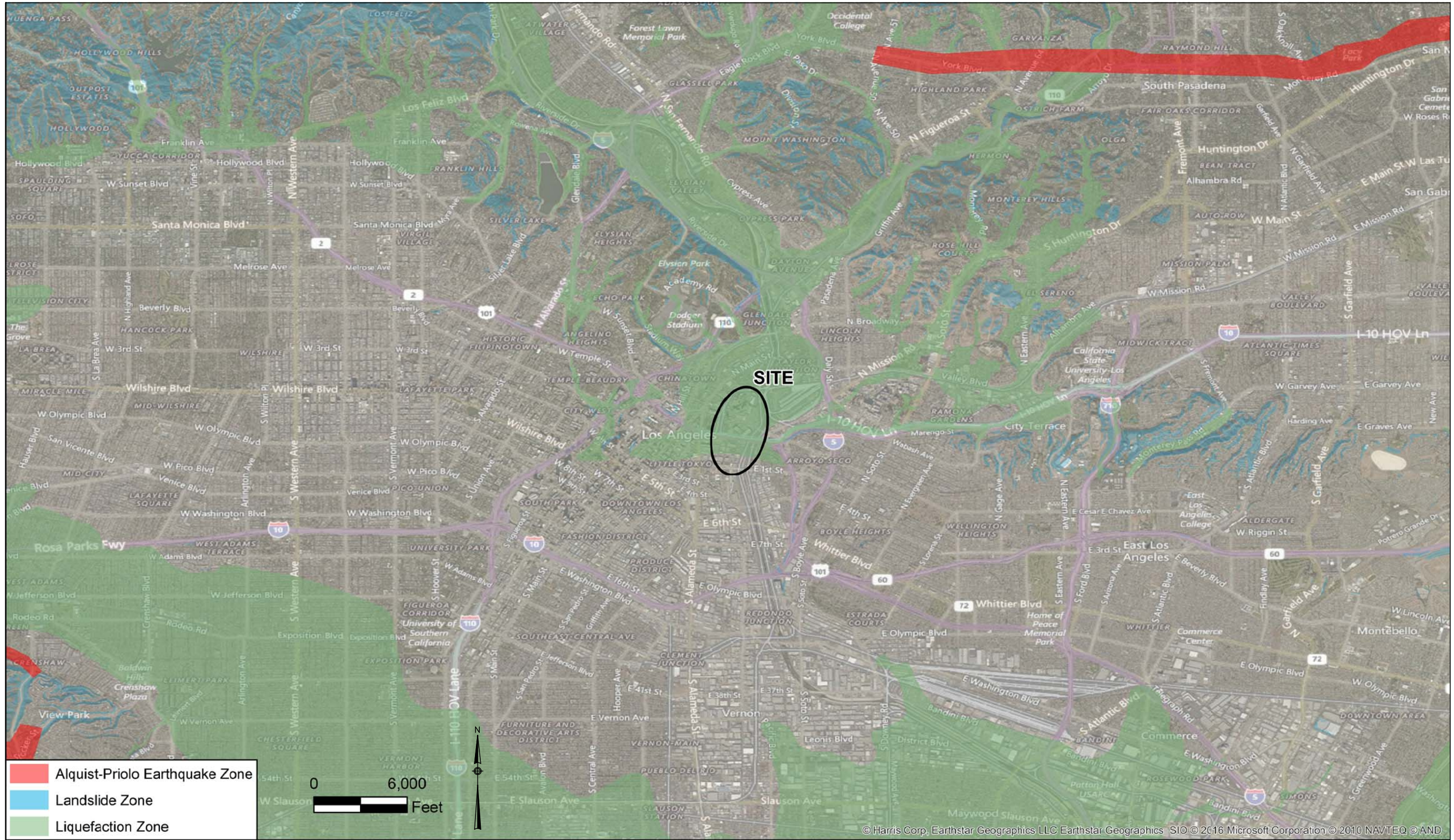




**LINK UNION STATION**  
**FAULT MAP - EXHIBIT 6-2**

**SCALE: AS SHOWN**  
**DATE: 06-12-2016**





- Alquist-Priolo Earthquake Zone
- Landslide Zone
- Liquefaction Zone

0 6,000  
Feet



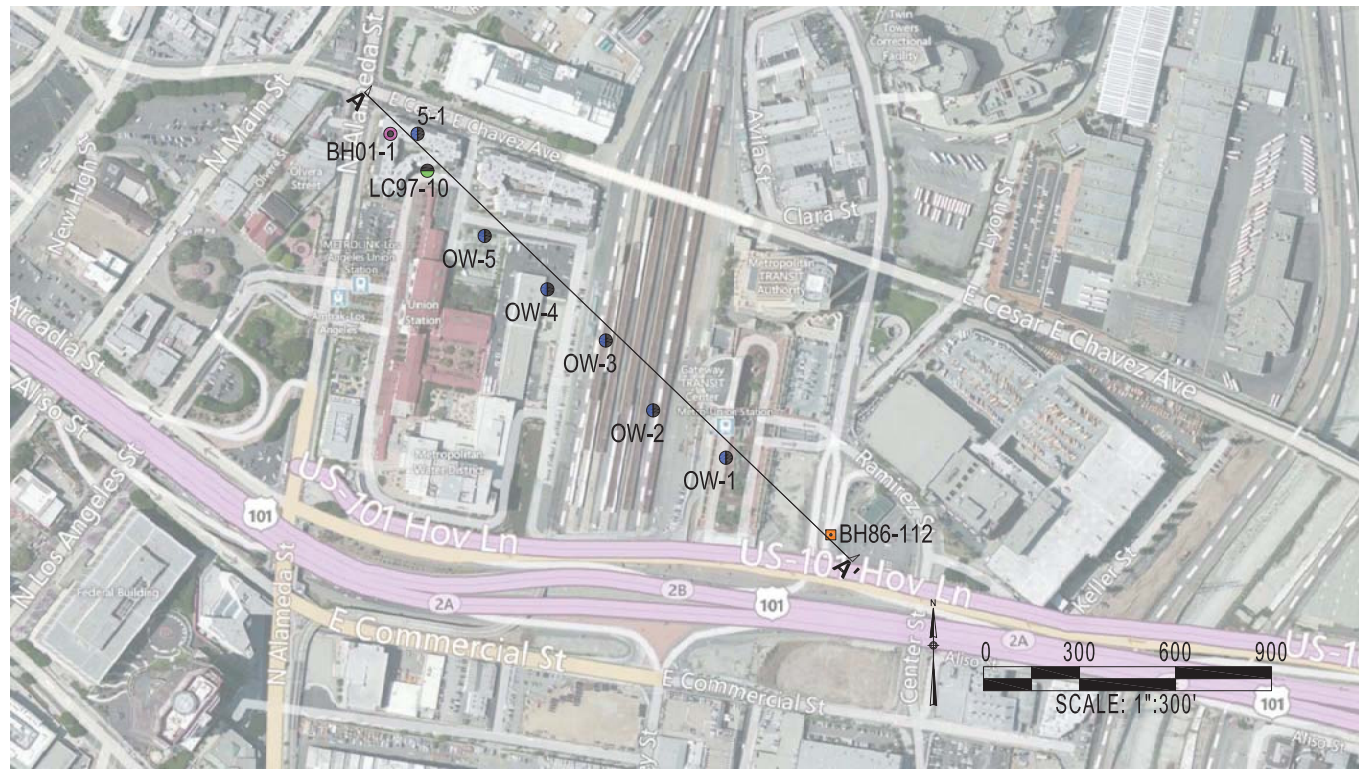
© Harris Corp, Earthstar Geographics LLC Earthstar Geographics SIO © 2016 Microsoft Corporation © 2010 NAVTEQ © AND  
References: CDMG, 1977 & CGS, 1999



**LINK UNION STATION**  
HAZARD MAP - EXHIBIT 6-3

**SCALE AS SHOWN**  
**DATE: 06-12-2016**





PLAN VIEW

**Geotechnical Investigations**

- CC et al, 1983
- Dames & Moore Inc., 1994
- Law Crandall, 1997
- URS, 2003

Source for Boring Information: HDR, 2014b, Preliminary Geotechnical Memorandum-Existing Data

**Geologic Units**

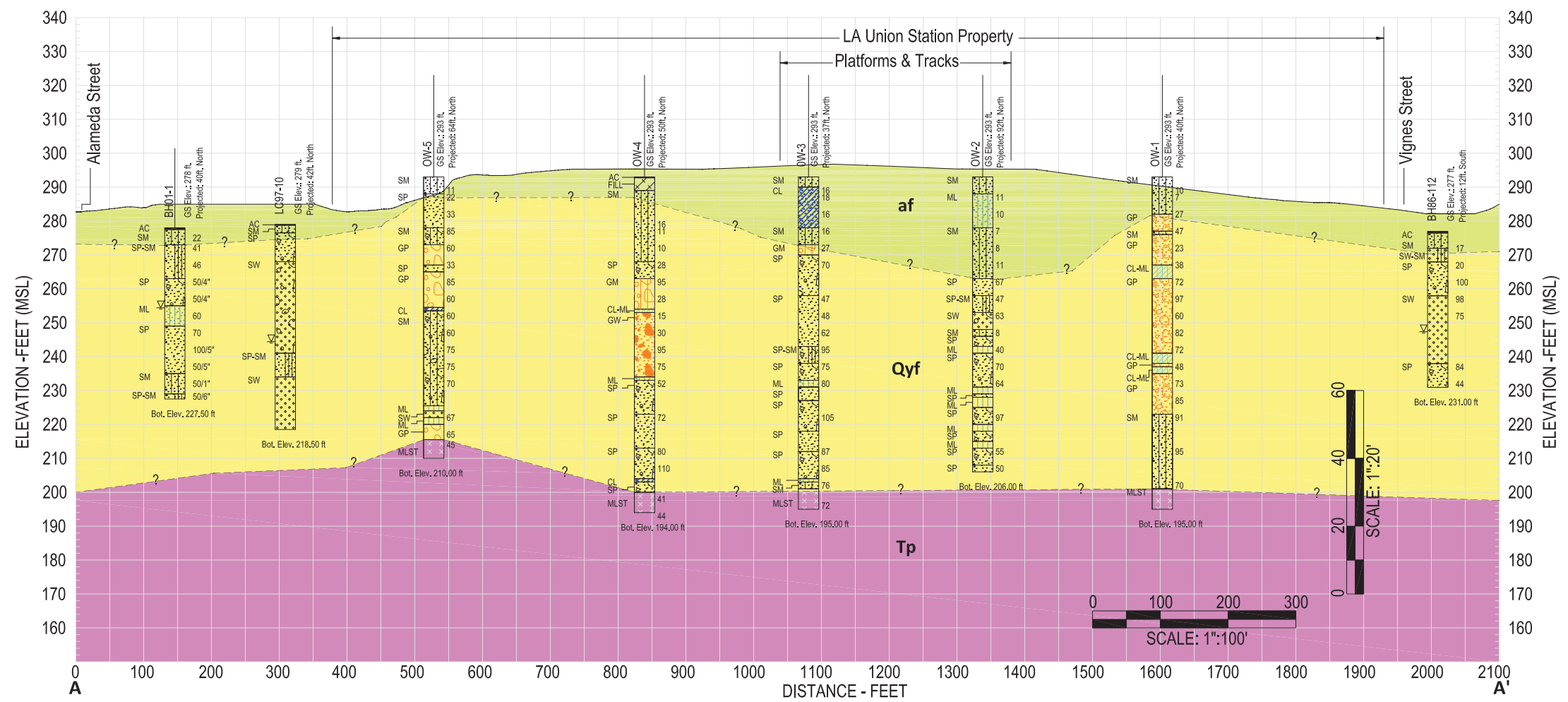
- af** Artificial Fill: Silty Sand and Clayey Sand; may contain Gravel and/or Cobbles
- Qyf** Alluvium: Sand, Silty Sand, Silt, and Clay; may contain Gravel and/or Cobbles
- Tp** Puente Formation: Siltstone, Claystone, and Siltstone/Sandstone

**EXPLANATION**

**Group Symbol & Name**

	SW	Well-Graded SAND		CL	Lean CLAY
	SW	Well-Graded SAND with GRAVEL		ML	Sandy SILT
	SP-SM	Poorly-Graded SAND with SILT		GM	Silty GRAVEL
	SP-SM	Poorly-Graded SAND with SILT and GRAVEL		GP	Poorly-Graded GRAVEL with SAND
	SW-SM	Well-Graded SAND with SILT		GP	Poorly-Graded GRAVEL with SAND
	SC	Clayey SAND with GRAVEL		GP-GM	Poorly-Graded GRAVEL with SILT
	SM	Silty SAND		GW	Well-Graded GRAVEL with SAND
	SM	Silty SAND with GRAVEL		CBBL	Cobbles
	SP	Poorly-Graded SAND		ROCK	Bedrock
	SP	Poorly-Graded SAND with GRAVEL		CLST	Claystone
	PCC	Concrete		MLST	Siltstone
	CL-ML	Silty CLAY		AC	Asphalt
	CL	Sandy Lean CLAY		FILL	Fill

Note: Abbreviation for soil group is based on ASTM D2487-11, Unified Soil Classification



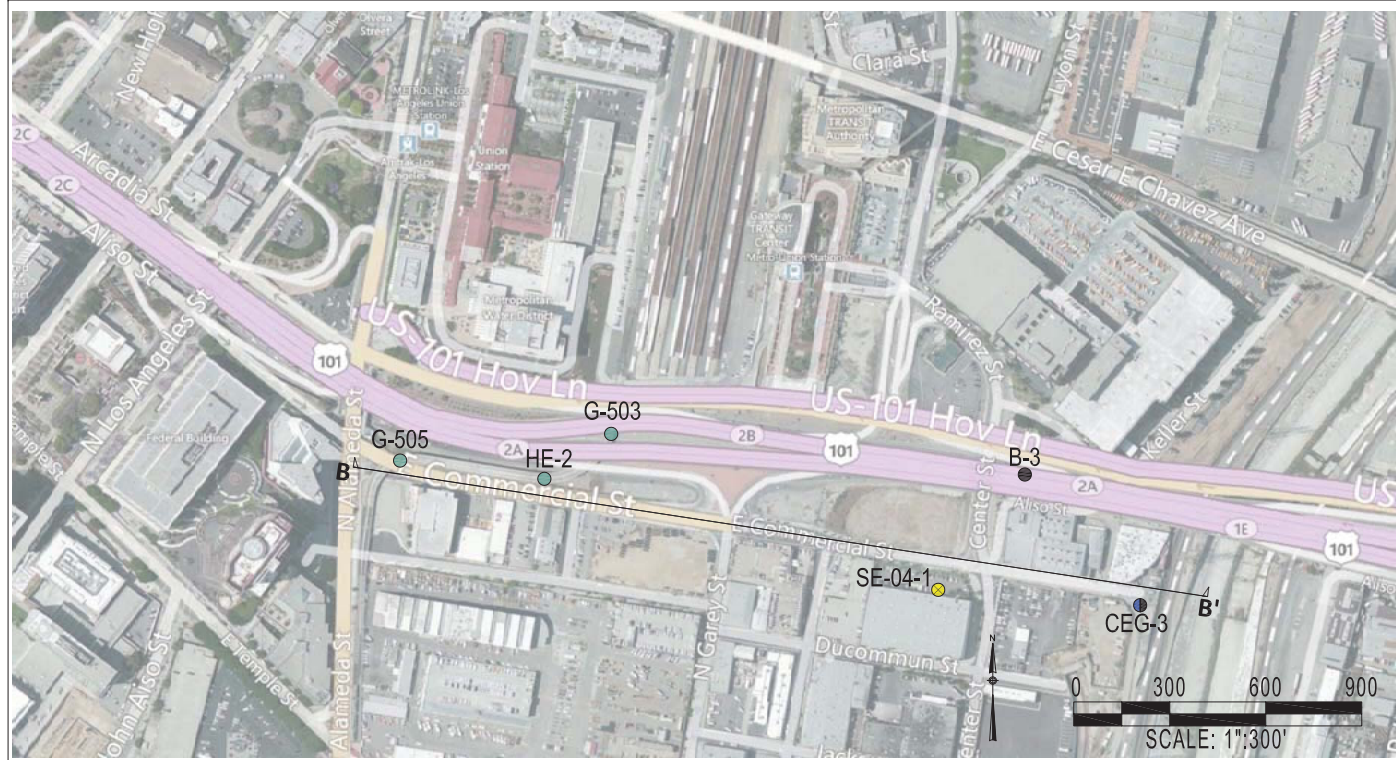
PROFILE VIEW



**LINK UNION STATION**  
GEOLOGIC PROFILE - EXHIBIT 6-4

**SCALE: AS SHOWN**  
**DATE: 06-12-2016**





PLAN VIEW

**Geotechnical Investigations**

- Caltrans, 1954
- Caltrans, 2004
- Converse Consultants, 1983
- Sladden Engineering, 2004

**Geologic Units**

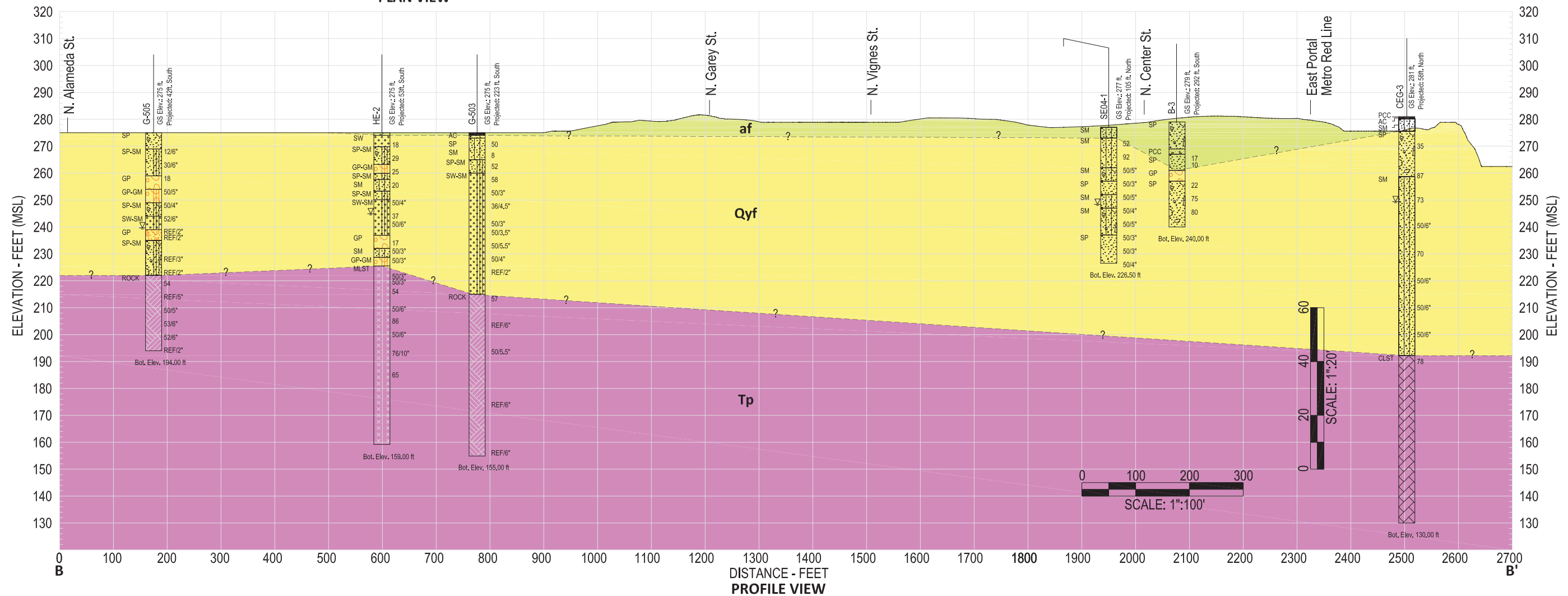
- af** Artificial Fill: Silty Sand and Clayey Sand; may contain Gravel and/or Cobbles
- Qyf** Alluvium: Sand, Silty Sand, Silt and Clay; may contain Gravel and/or Cobbles
- Tp** Puente Formation: Siltstone, Claystone, and Siltstone/Sandstone

**EXPLANATION**

**Group Symbol & Name**

	SW	Well-Graded SAND		CL	Lean CLAY
	SW	Well-Graded SAND with GRAVEL		ML	Sandy SILT
	SP-SM	Poorly-Graded SAND with SILT		GM	Silty GRAVEL
	SP-SM	Poorly-Graded SAND with SILT and GRAVEL		GP	Poorly-Graded GRAVEL
	SW-SM	Well-Graded SAND with SILT		GP	Poorly-Graded GRAVEL with SAND
	SC	Clayey SAND with GRAVEL		GP-GM	Poorly-Graded GRAVEL with SILT
	SM	Silty SAND		GW	Well-Graded GRAVEL with SAND
	SM	Silty SAND with GRAVEL		CBBL	Cobbles
	SP	Poorly-Graded SAND		ROCK	Bedrock
	SP	Poorly-Graded SAND with GRAVEL		CLST	Claystone
	PCC	Concrete		MLST	Siltstone
	CL-ML	Silty CLAY		AC	Asphalt
	CL	Sandy Lean CLAY		FILL	Fill

Group Symbol—SM  
Groundwater Level  
Soil Type  
52—Blows / ft.  
Material Change  
Note: Abbreviation for soil group is based on ASTM D2487-11, Unified Soil Classification



PROFILE VIEW



## **Appendix B: As-Built Plans**

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**As-Built Plans**  
**Los Angeles River Bridge & OH at Aliso Street, Bridge**  
**No. 53-0405**

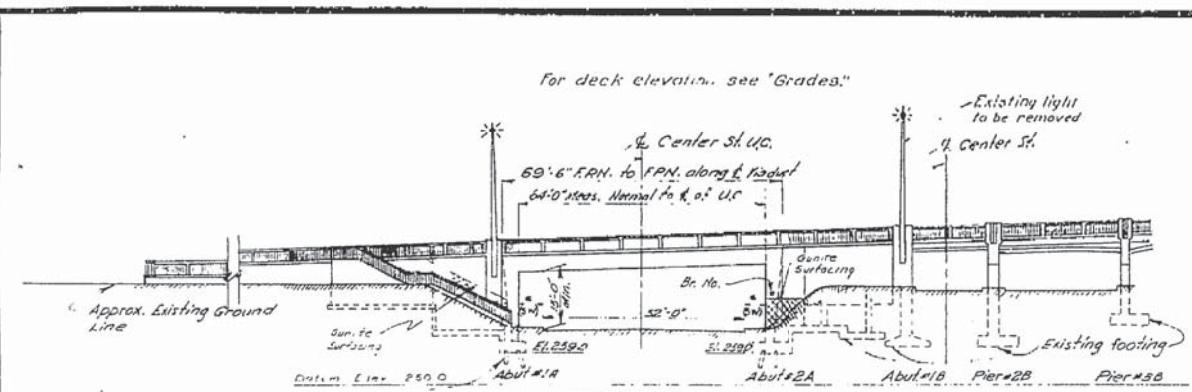
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81

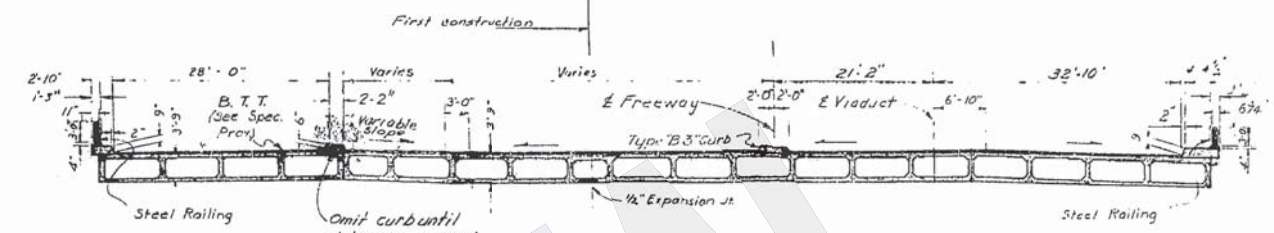
FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
7	CAL.			

DATE	BY	REVISION
11/11/54	LA	1

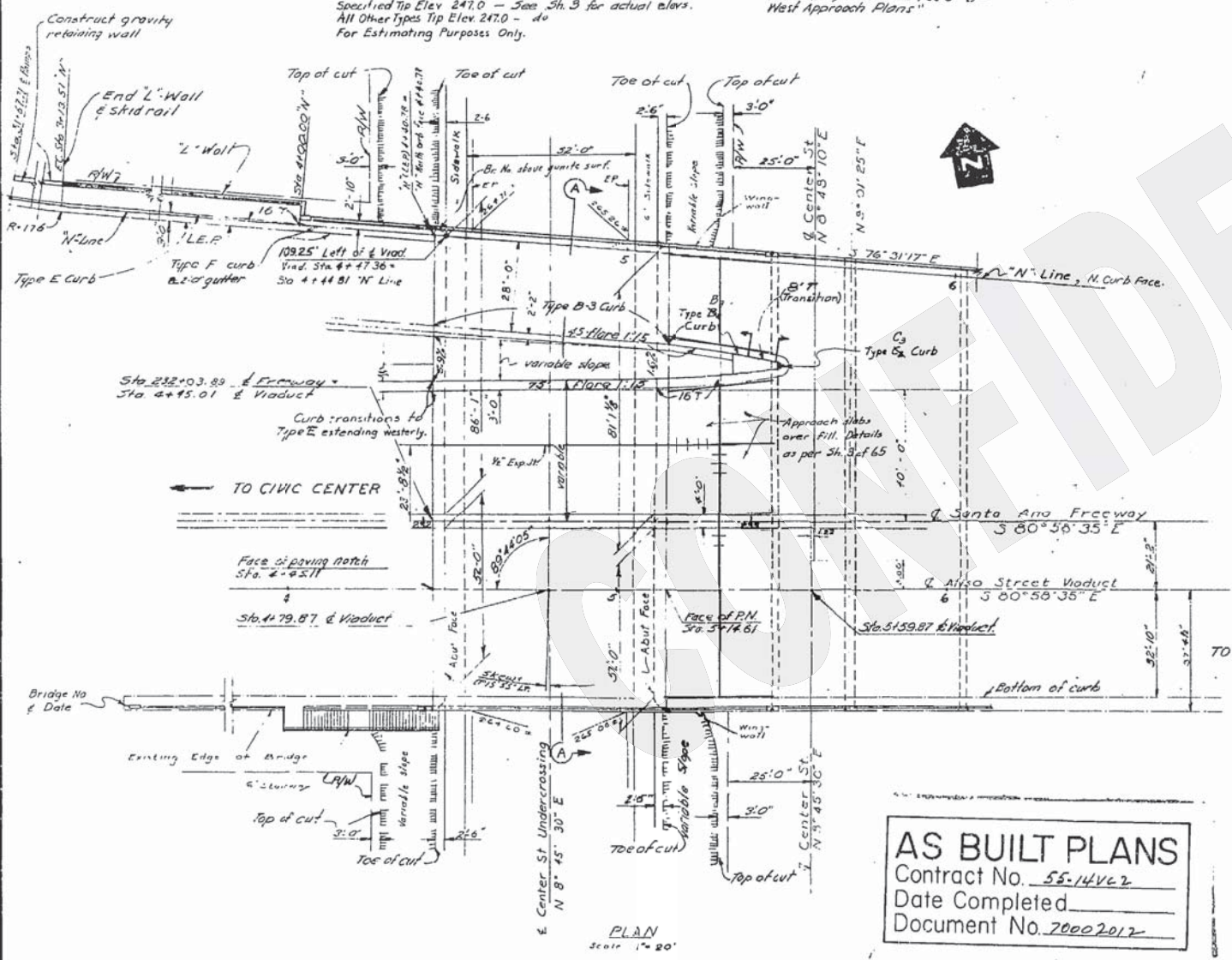
APRIL 21 1954



For deck elevation, see "Grades."  
 Existing light to be removed  
 Center St. U.C.  
 59'-6" F.R.M. to F.P.M. along E. Viaduct  
 64'-0" Max. Normal to E. of U.C.  
 Center St.  
 Abut #1A  
 Abut #2A  
 Abut #1B  
 Pier #2B  
 Pier #3B  
 Existing footing  
 Concrete Piles  
 Cast in Drilled Holes  
 Specified Tip Elev. 247.0 - See Sh. 3 for actual elevs.  
 All Other Types Tip Elev. 247.0 - do  
 For Estimating Purposes Only.  
 Note, for Details of Abut #1B  
 Pier #2B, Pier #3B, see "B-  
 West Approach Plans"



TYPICAL SECTION A-A  
 Scale 1" = 10'



AS BUILT PLANS  
 Contract No. 55-14V62  
 Date Completed \_\_\_\_\_  
 Document No. 70002012

T.B.M. Elev. 275.635'  
 Wire spike on S.E. corner Center and Aliso,  
 1.4' So. of B.C.R. on Center St. (So. of Bridge)

INDEX TO PLANS

- A-1. Structure Plan
- A-2. Foundation Plan
- A-3. Grades
- A-4. Underground Utilities
- A-5. Abutment & Pile Layout
- A-6. N.W. Wingwall Layout & Details #1.
- A-7. N.W. Wingwall Layout & Details #2.
- A-8. S.W. Wingwall & Stairway
- A-9. East Abutment & Stairways
- A-10. Abutment Details
- A-11. Typical Section
- A-12. Girder Layout
- A-13. Girder Reinforcement #1.
- A-14. Girder Reinforcement #2.
- A-15. Defour Plan
- A-16. Type 1 Cantilever Retaining Wall
- A-17. Type 2 Cantilever Retaining Wall
- A-18. Stairway Rail
- A-19. Steel Railing #1.
- A-20. Steel Railing #2.
- A-21. Electrolier Details
- A-22. Pile Details
- A-23. Standard Details
- A-24. Railing Details For Retaining Wall.

AS BUILT

CORRECTIONS BY \_\_\_\_\_  
 DATE 12-14-55

Note: All dimensions and lines dependent upon existing structure shall be verified in the field by the Contractor.  
 Bituminous Type Treatment (B.T.T.) is Asphalt Concrete.

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS

WIDENING OF L.A. RIVER BRIDGE AT ALISO ST.  
 A-CENTER STREET UNDERCROSSING  
 STRUCTURE PLAN

SCALE A: Shown BRIDGE 53-405 FILE DRAWING C-3243-3  
 PREL. DRAWING NO. P. 3243

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT PREPARED UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.  
 DATE \_\_\_\_\_ SIGNATURE \_\_\_\_\_ TITLE \_\_\_\_\_

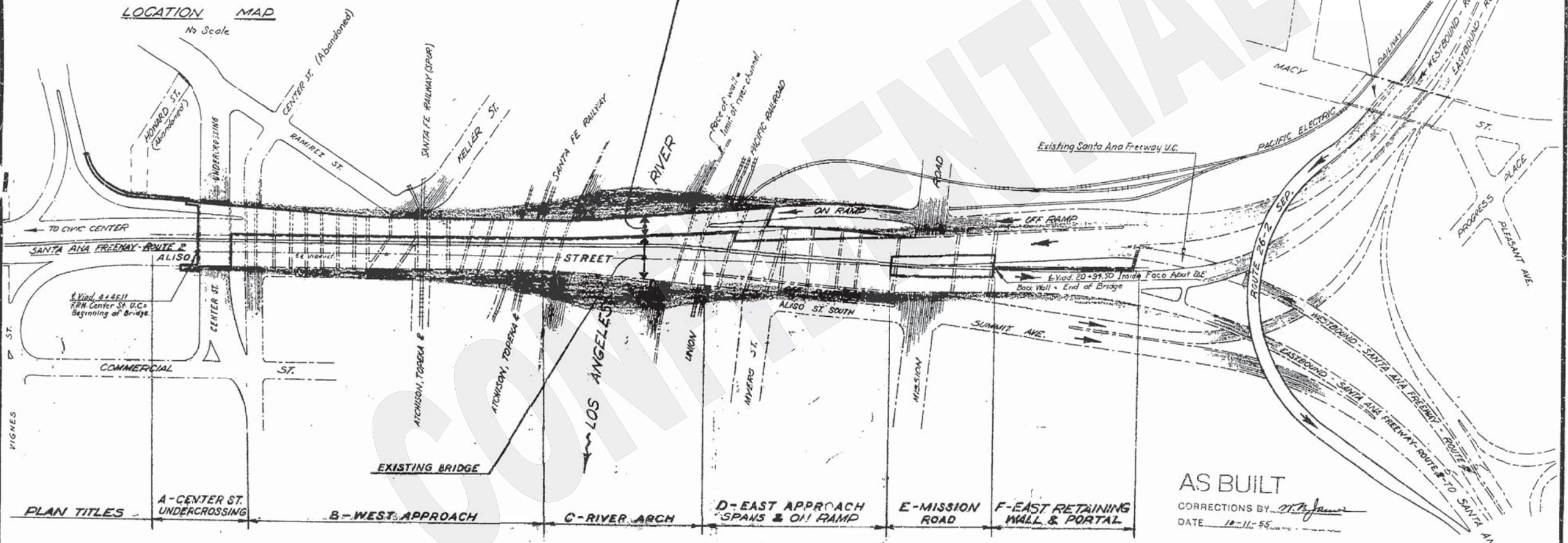
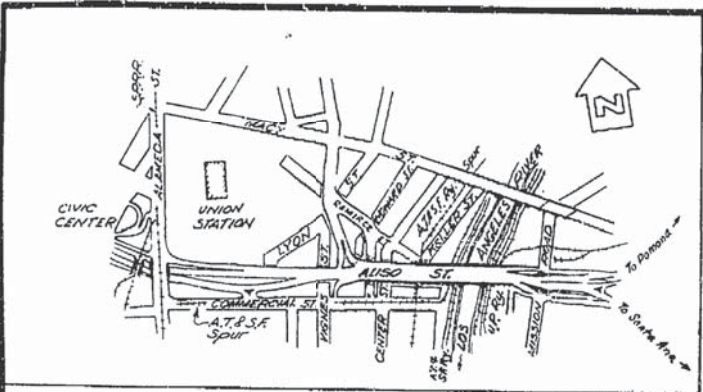


67

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
7	CAL.				

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
111	LA	2	2	137	

101  
 A. J. Meloy  
 DATE APPROVED: 12-11-55



AS BUILT  
 CORRECTIONS BY: [Signature]  
 DATE: 12-11-55

VICINITY PLAN

AS BUILT PLANS  
 Contract No. 55-14462  
 Date Completed  
 Document No. 70002017

SANTA ANA FREEWAY			
STATE OF CALIFORNIA DEPARTMENT OF PUBLIC WORKS BUREAU OF HIGHWAYS			
WIDENING OF LOS ANGELES RIVER BRIDGE & OVERHEAD AT ALISO STREET LOCATED IN THE CITY OF LOS ANGELES IN LOS ANGELES COUNTY			
VICINITY PLAN			
SCALE 1" = 100'	BRIDGE 55-405	FILE	DRAWING 1-3243-2

DESIGN SECTION 5

DESIGNED BY	DATE
CHECKED BY	DATE
APPROVED BY	DATE
QUANTITIES	
SPECIFICATIONS	

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE SAID PLANS UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SAN FRANCISCO, CALIFORNIA, IN AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE: 12-11-55



FED. ROAD DIST. NO.	STATE	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
7	CAL.			3	131

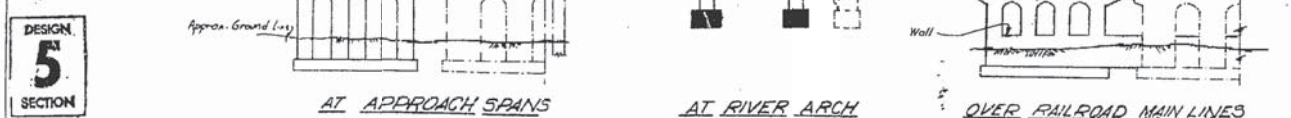
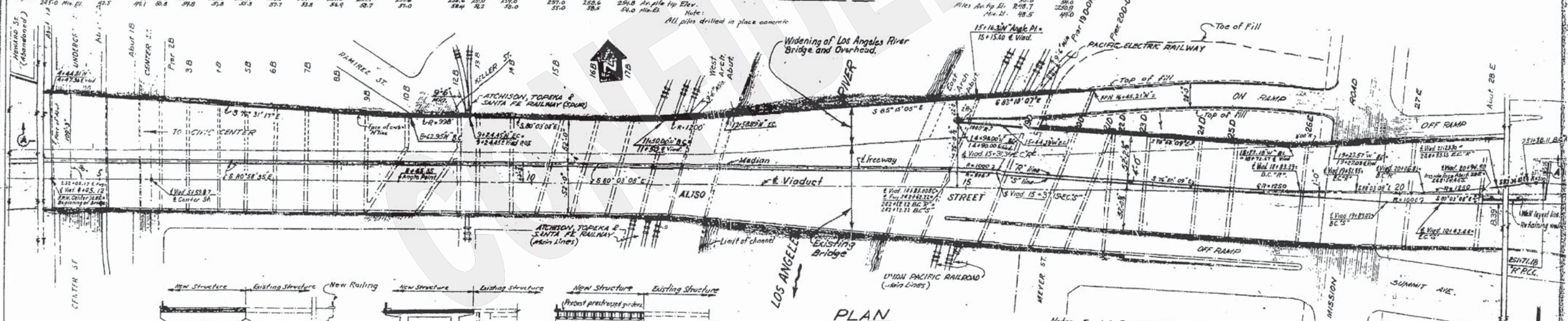
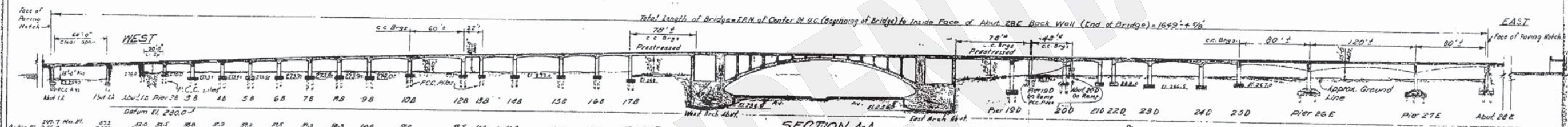
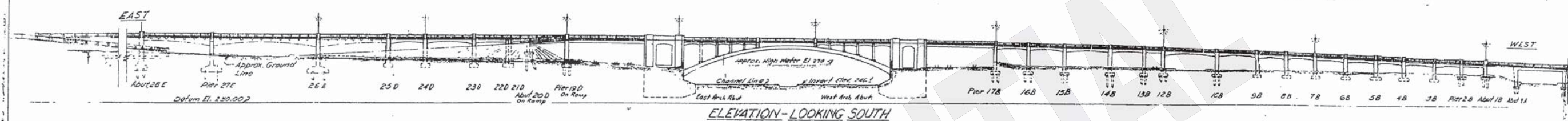
CONTRACT NO. 55-14V62  
 DATE COMPLETED 12-11-52  
 DRAWING NO. 70002012

FOR PROFILES, SEE "GRADES" SHEETS

MICROFILM

AS BUILT

CORRECTIONS BY WTB, JAMES  
DATE 12-11-52



**DESIGN SECTION 5**

NO.	DESCRIPTION	DATE	BY	CHECKED
1	DESIGN	12-11-52	W.T.B.	JAMES
2	CHECKED	12-11-52	JAMES	W.T.B.
3	APPROVED	12-11-52	W.T.B.	JAMES

**AS BUILT PLANS**  
 Contract No. 55-14V62  
 Date Completed 12-11-52  
 Document No. 70002012

**SANTA ANA FREEWAY**

STATE OF CALIFORNIA  
DEPARTMENT OF PUBLIC WORKS  
DIVISION OF HIGHWAYS

**WIDENING OF LOS ANGELES RIVER BRIDGE & OVERHEAD AT ALISO STREET**

LOCATED IN THE CITY OF LOS ANGELES IN LOS ANGELES COUNTY

**GENERAL PLAN**

BRIDGE 53-405

Notes: For L.A. River Channel work see "C-River Arch Plans."  
 For General Notes see "Index Sheet."  
 For Locations of Bridge No. & Date, see "Structure Plans."  
 All dimensions and lines dependent upon existing structure shall be verified in the field by the Contractor.  
 Various Type Treatment (RTT) Asphalt Concrete  
 Live Loading H 20-S16-44

B.M. # 6-5  
 rd. No. side Aliso St. Viaduct on E. side L.A. River at West end of Ramp # 4 in No. curb at S.W. corner of C.B. 66' E. of Mission Rd. a wire spike in curb.  
 Plan 218.75



FED. ROAD DIST. NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
7	CAL.		4	139

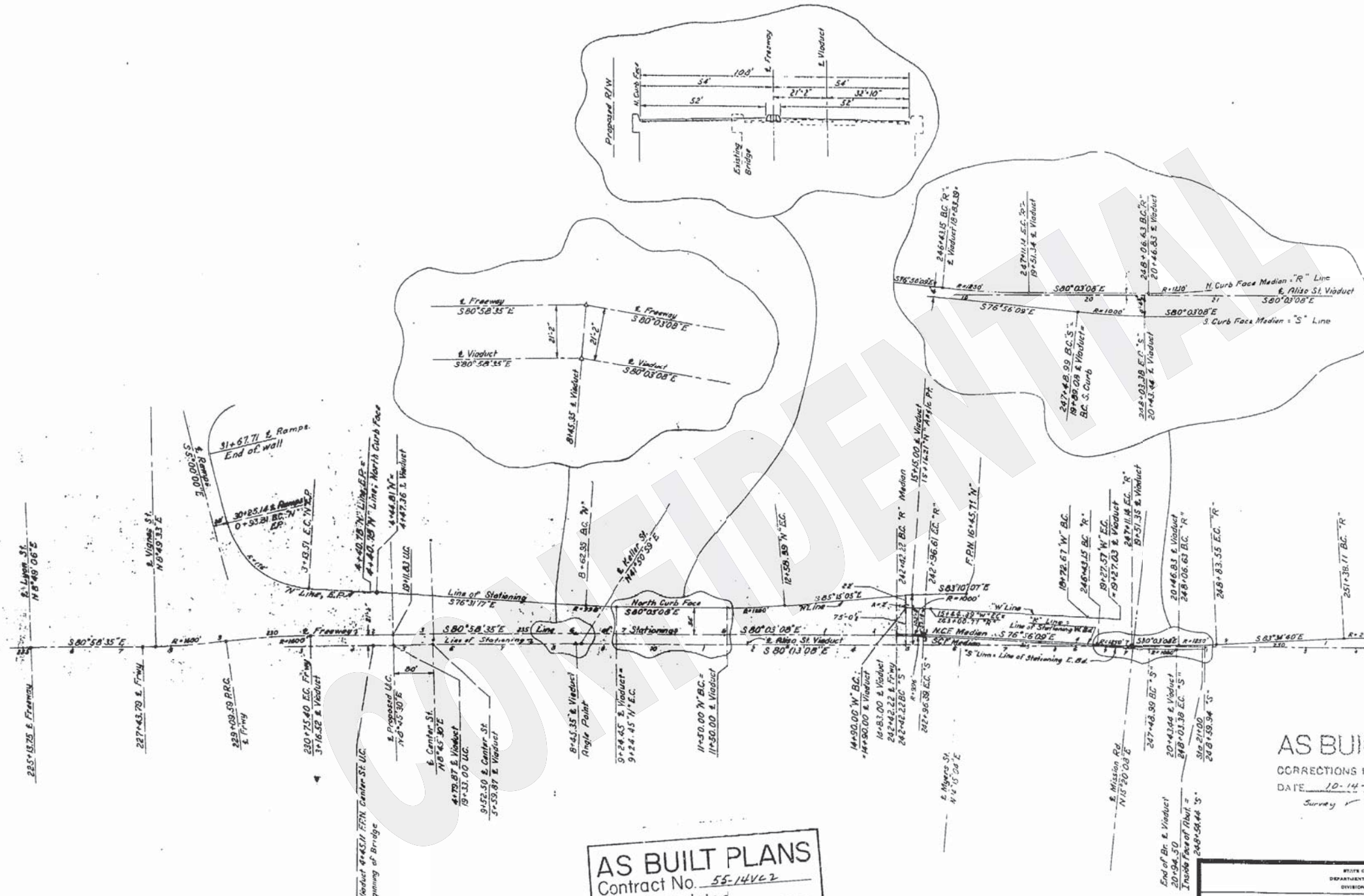
  

DATE	APRIL 26 1951
------	---------------

BRIDGE DEPARTMENT

SECTION

DATE	10-14-55
BY	SURVEY



**AS BUILT PLANS**  
 Contract No. 55-1462  
 Date Completed \_\_\_\_\_  
 Document No. 20002012

**AS BUILT**  
 CORRECTIONS BY [Signature]  
 DATE 10-14-55  
 Survey

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS

**WIDENING OF L.A. RIV. BR. & OH AT ALISO STREET**

STATION LINES & EQUIVALENT STATIONS

SCALE 1"=100' BRIDGE 53-405 FILE DRAWING C-3243-4

PREL. DRAWING NO. P. 3243

I HEREBY CERTIFY THAT THIS IS A TRUE & ACCURATE COPY OF THE ABOVE DRAWING AS GIVEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA, PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE \_\_\_\_\_ SIGNATURE \_\_\_\_\_ TITLE \_\_\_\_\_

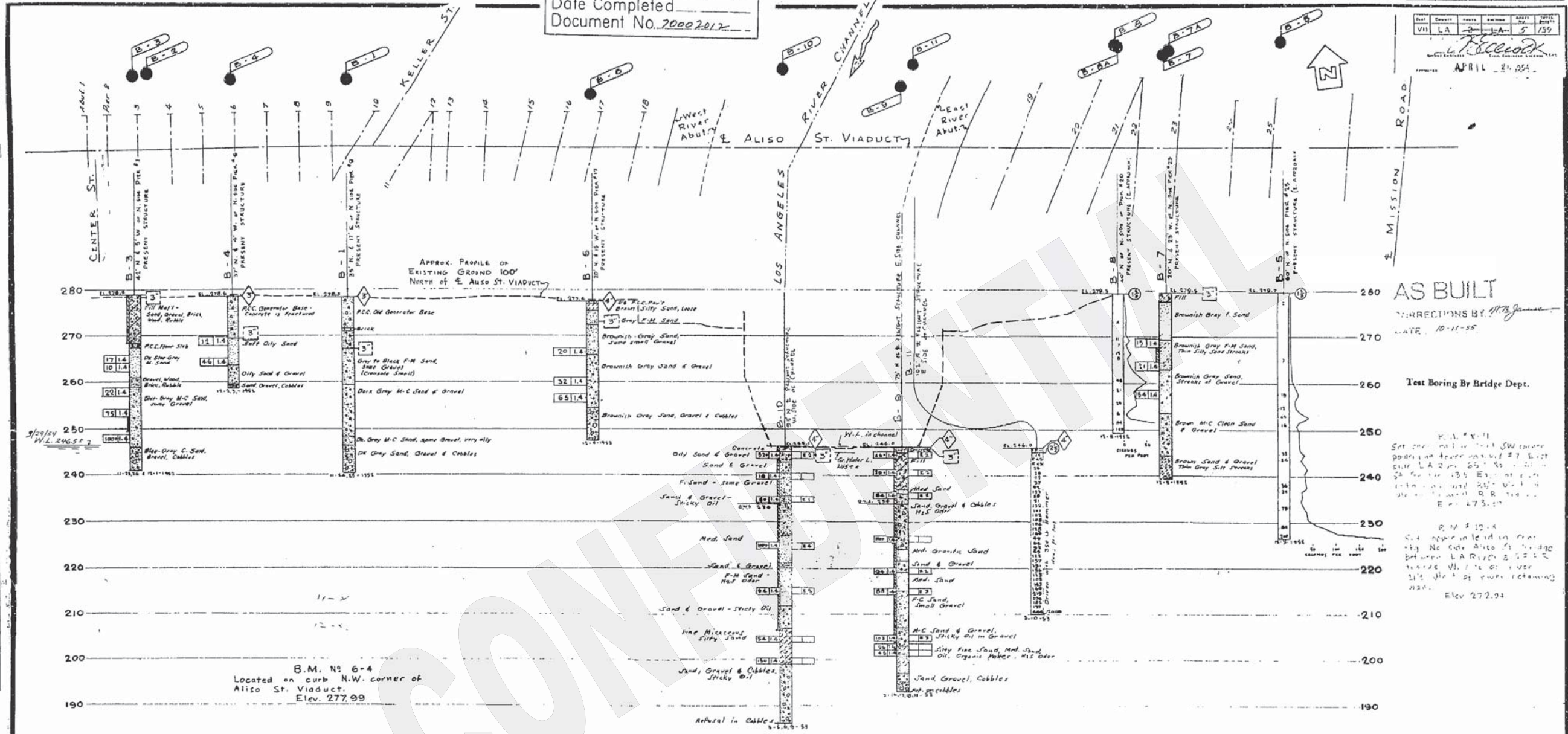


**AS BUILT PLANS**  
 Contract No. 55-14V62  
 Date Completed \_\_\_\_\_  
 Document No. 70002017

70

FED. ROAD DIST. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
2	CAL.				

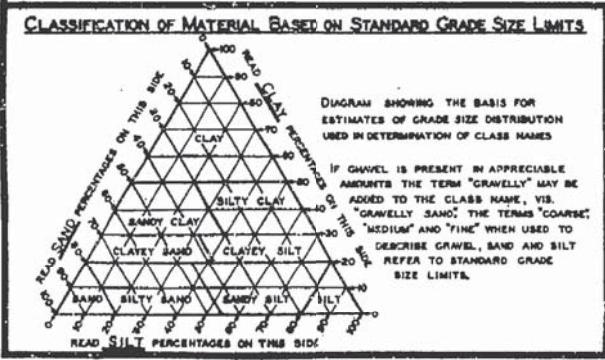
APRIL 21 1954  
 L. P. Felleck  
 CIVIL ENGINEER  
 LICENSE NO. 5159



**AS BUILT**  
 CORRECTIONS BY *M.B. Jones*  
 DATE: 10-11-55

Test Boring By Bridge Dept.  
 P.L. # 4-11  
 Set on the line of the SW corner  
 pointing at the corner of the  
 side LA 200 25' No. 101 - 01 -  
 24 Center 135' East of corner  
 10' from the line of the SW corner  
 ELEV. 272.94

B.M. No. 6-4  
 Located on curb N.W. corner of  
 Aliso St. Viaduct.  
 Elev. 277.99

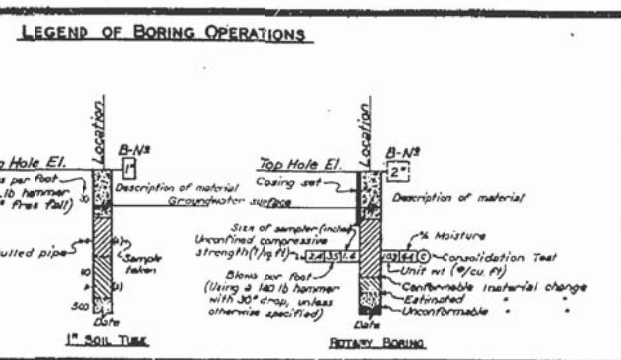


**LEGEND OF EARTH MATERIALS**

GRAVEL	SILTY CLAY OR CLAYEY SILT
SAND	PEAT AND/OR ORGANIC CLAY
SILT	FILLED MATERIAL
CLAY	IGNEOUS ROCK
SANDY CLAY OR CLAYEY SAND	SEDIMENTARY ROCK
SANDY SILT OR SILTY SAND	METAMORPHIC ROCK

**LEGEND OF BORING OPERATIONS**

PLAN OF ANY BORING
PENETROMETER
2 1/2" CONE PENETROMETER
SAMPLER BORING (DRY)
ROTARY BORING (WET)
AUGER BORING (DRY)
JET BORING
CORE BORING
TEST PIT



**NOTES**  
 THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 2, ARTICLE (C) OF THE STANDARD SPECIFICATIONS AND TO THE SPECIAL PROVISIONS ACCORDING TO THIS SET OF PLANS. CLASSIFICATION OF EARTH MATERIAL AS SHOWN ON THIS SHEET IS BASED UPON FIELD INSPECTION AND IS NOT TO BE CONSTRUED TO IMPLY MECHANICAL ANALYSIS. PENETROMETER BORINGS HAVING A RATE OF PENETRATION MEASURED IN SECONDS PER FOOT ARE DRIVEN WITH A NO. 2 MERRIMAN-TERRY AIR HAMMER AT 115 PSI.

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS

WIDENING OF LA. RIVER BRIDGE ON ALISO ST.

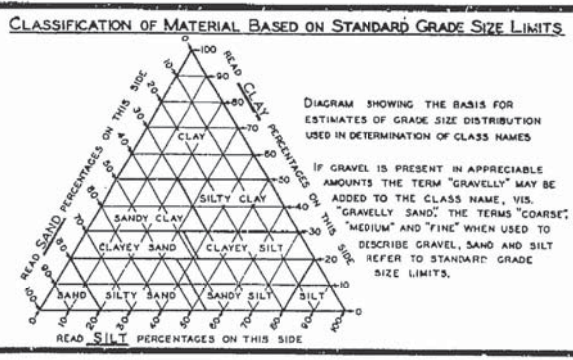
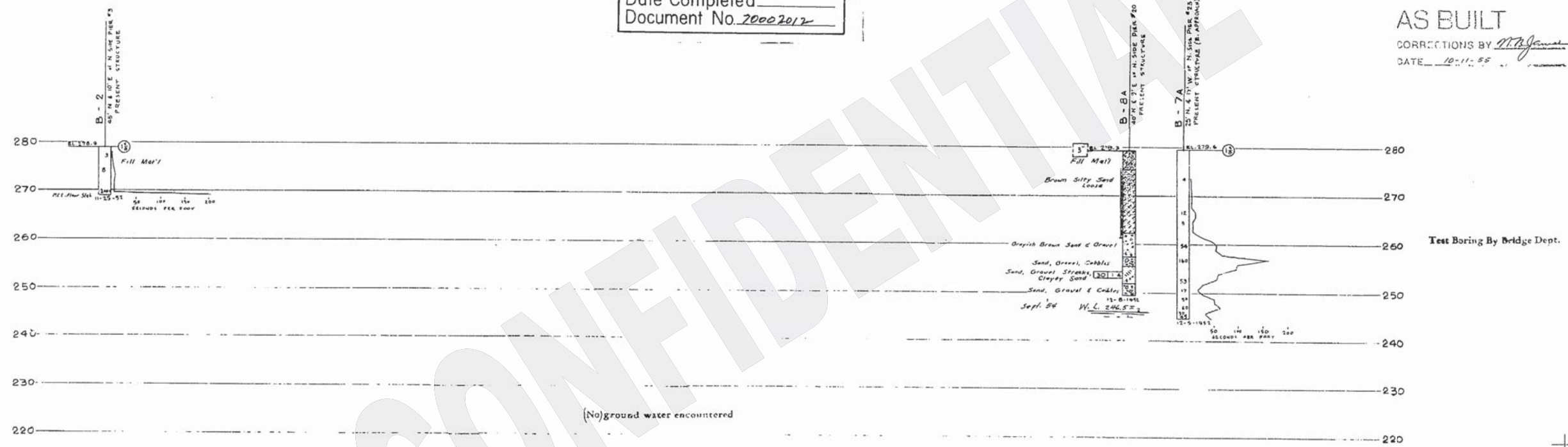
**LOG OF TEST BORINGS (1 of 3)**

SCALE: HORIZ. 1" = 50' VERT. 1" = 10'  
 BRIDGE 53-405 FILE DRAWING C-3243-5  
 PREL. DRAWING NO. P. 3243-5



**AS BUILT PLANS**  
 Contract No. 55-14V02  
 Date Completed \_\_\_\_\_  
 Document No. 70002012

**AS BUILT**  
 CORRECTIONS BY [Signature]  
 DATE 10-11-55

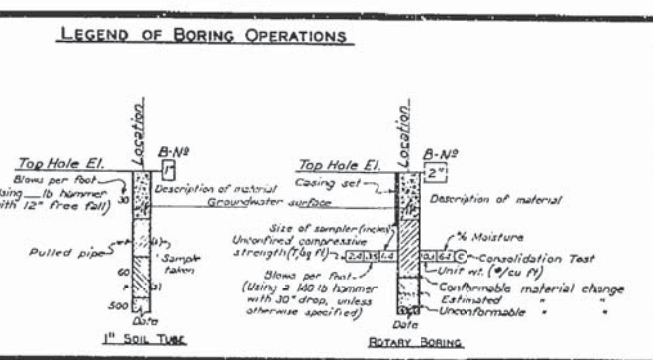


**LEGEND OF EARTH MATERIALS**

[Symbol]	GRAVEL	[Symbol]	SILTY CLAY OR CLAYEY SILT
[Symbol]	SAND	[Symbol]	PEAT AND/OR ORGANIC CLAY
[Symbol]	SILT	[Symbol]	FILLED MATERIAL
[Symbol]	CLAY	[Symbol]	IGNEOUS ROCK
[Symbol]	SANDY CLAY OR CLAYEY SAND	[Symbol]	SEDIMENTARY ROCK
[Symbol]	SANDY SILT OR SILTY SAND	[Symbol]	METAMORPHIC ROCK

**LEGEND OF BORING OPERATIONS**

[Symbol]	PLAN OF ANY BORING
[Symbol]	PENETROMETER
[Symbol]	2 1/2" CONE PENETROMETER
[Symbol]	SAMPLER BORING (DRY)
[Symbol]	ROTARY BORING (WET)
[Symbol]	AUGER BORING (DRY)
[Symbol]	JET BORING
[Symbol]	CORE BORING
[Symbol]	TEST PIT



**NOTES**

THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 2, ARTICLE (C) OF THE STANDARD SPECIFICATIONS AND TO THE SPECIAL PROVISIONS ACCOMPANYING THIS SET OF PLANS. CLASSIFICATION OF EARTH MATERIAL AS SHOWN ON THIS SHEET IS BASED UPON FIELD INSPECTION AND IS NOT TO BE CONSTRUED TO IMPLY MECHANICAL ANALYSIS. PENETROMETER BORINGS HAVING A RATE OF PENETRATION MEASURED IN SECONDS PER FOOT ARE DRIVEN WITH A No. 2 WIKRIEMAN-TERRY AIR HAMMER AT 115 PSI.

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS

WIDENING OF L.A. AVENUE BRIDGE ON AT 4150 ST.

**LOG OF TEST BORINGS (2 of 3)**

SCALE: HORIZ. 1" = 50' VERT. 1" = 10'  
 BRIDGE 53-405 FILE \_\_\_\_\_ DRAWING C-3243-6

PREL. DRAWING NO. P 2243

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE \_\_\_\_\_ SIGNATURE \_\_\_\_\_ TITLE \_\_\_\_\_



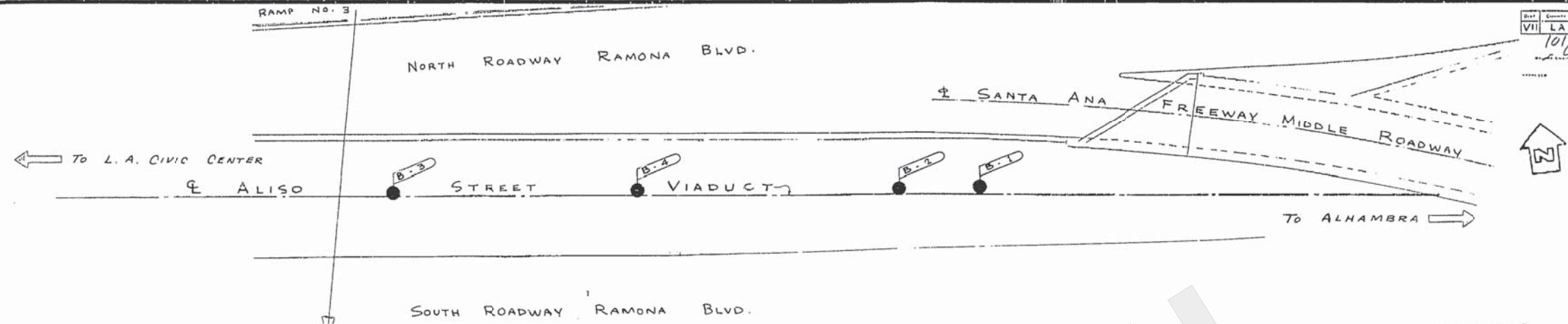
72

NO. 2	STATE	NO. 2	PHYSICAL	NO. 2	TOTAL
2	CAL.				

NO. VII	COUNTY	NO. 7	SECTION	NO. 139	TOTAL
7	LA	7	LA	7	139

10/1/55  
APR 1 1955



**AS BUILT**  
CORRECTIONS BY: *[Signature]*  
DATE: 11-11-55

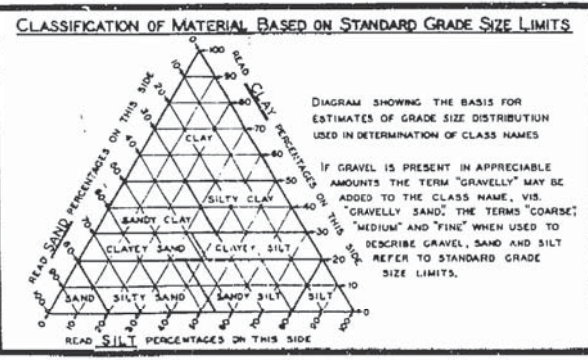
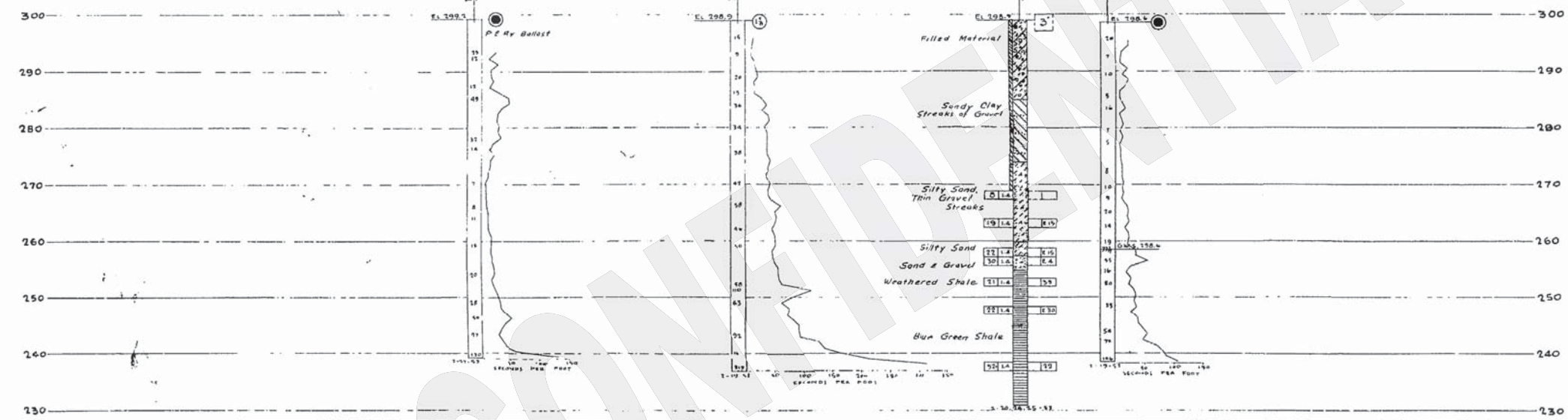
Test Boring by Bridge Dept.

**AS BUILT PLANS**  
Contract No. 55-14V62  
Date Completed \_\_\_\_\_  
Document No. 70002012

B.M. #6-5  
Pd. No. side Aliso St Viaduct on E. side L.A. River at West end of Ramp #4 in No. curb at SW. corner of CB 66' E. of Mission Rd. a wire spike in curb. Elev. 278.75

B.M. #7-11  
Set conc. nail in lead SW corner powerline tower marked #7 East side L.A. River, 65' No. of Aliso St Bridge, 13.5 East of river retaining wall, 35' West of westernmost R.R. tracks. Elev. 278.30

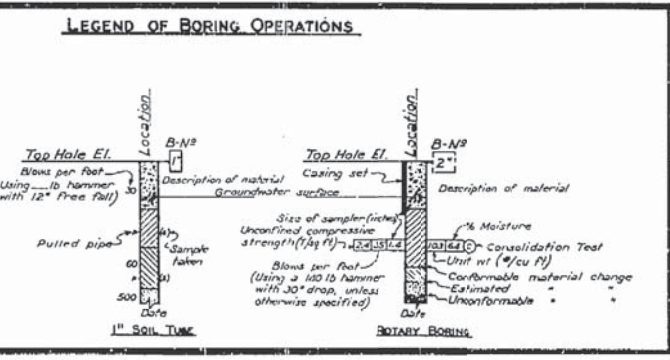
B.M. #12-X  
Set copper nail in lead in conc. Prg. N. side Aliso St Bridge between L.A. River & S.F.R.R. tracks, W. side of river 21' West of river retaining wall. Elev. 278.94



**LEGEND OF EARTH MATERIALS**

[Symbol]	GRAVEL	[Symbol]	SILTY CLAY OR CLAYEY SILT
[Symbol]	SAND	[Symbol]	PEAT AND/OR ORGANIC CLAY
[Symbol]	SILT	[Symbol]	FILLED MATERIAL
[Symbol]	CLAY	[Symbol]	IGNEOUS ROCK
[Symbol]	SANDY CLAY OR CLAYEY SAND	[Symbol]	SEDIMENTARY ROCK
[Symbol]	SANDY SILT OR SILTY SAND	[Symbol]	METAMORPHIC ROCK

- LEGEND OF BORING OPERATIONS**
- PLAN OF ANY BORING
  - PENETROMETER
  - ⊙ 2 1/2" C.W. PENETROMETER
  - SAMPLER BORING (DRY)
  - ⊞ ROTARY BORING (WET)
  - ⊞ AUGER BORING (DRY)
  - ⊞ JET BORING
  - ⊞ CORE BORING
  - ⊞ TEST PIT



**NOTES**

THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 2, ARTICLE (C) OF THE STANDARD SPECIFICATIONS AND TO THE SPECIAL PROVISIONS ACCOMPANYING THIS SET OF PLANS. CLASSIFICATION OF EARTH MATERIAL AS SHOWN ON THIS SHEET IS BASED UPON FIELD INSPECTION AND IS NOT TO BE CONSTRUED TO IMPLY MECHANICAL ANALYSIS. PENETROMETER BORINGS HAVING A RATE OF PENETRATION MEASURED IN SECONDS PER FOOT ARE DRIVEN WITH A #2 MCKERNAN-TERRY AIR HAMMER AT 115 PSI.

STATE OF CALIFORNIA  
DEPARTMENT OF PUBLIC WORKS  
DIVISION OF HIGHWAYS

WIDE N. 1/2 OF L.A. RIVER BRIDGE & N. 1/2 OF '57 ST

**LOG OF TEST BORINGS (3 of 3)**

SCALE: HORIZ. 1" = 20'  
VERT. 1" = 10'

BRIDGE 53-405 FILE DRAWING 6-3243-7

PREL. DRAWING NO. P-2243

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE \_\_\_\_\_ SIGNATURE \_\_\_\_\_ TITLE \_\_\_\_\_

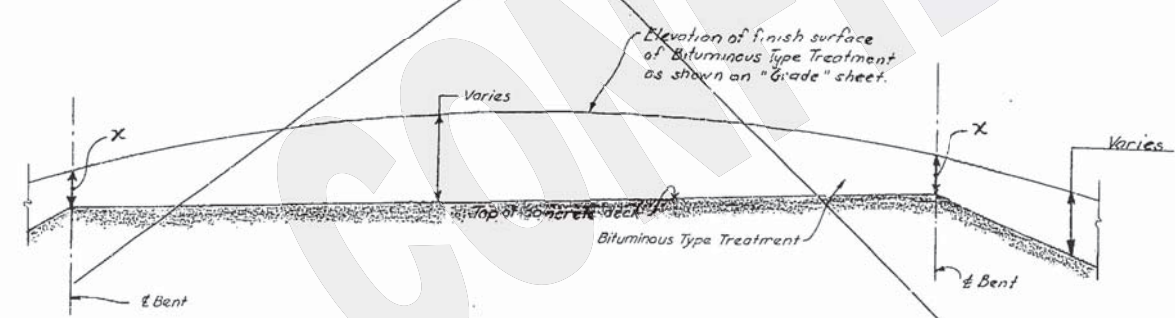
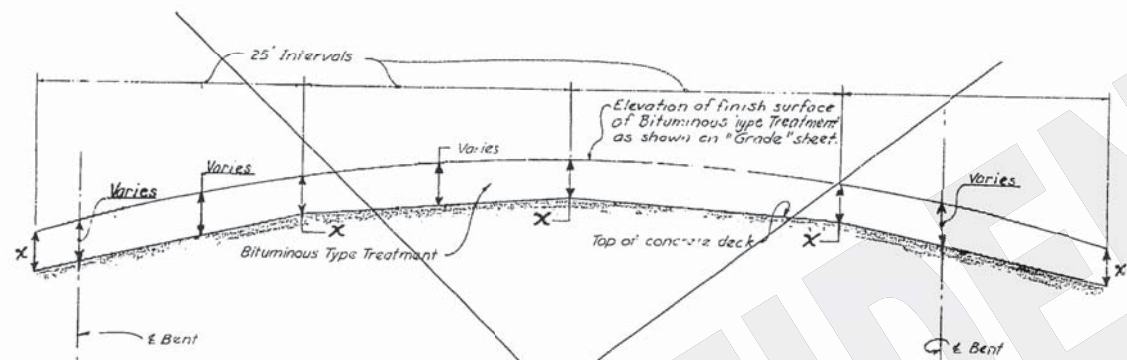
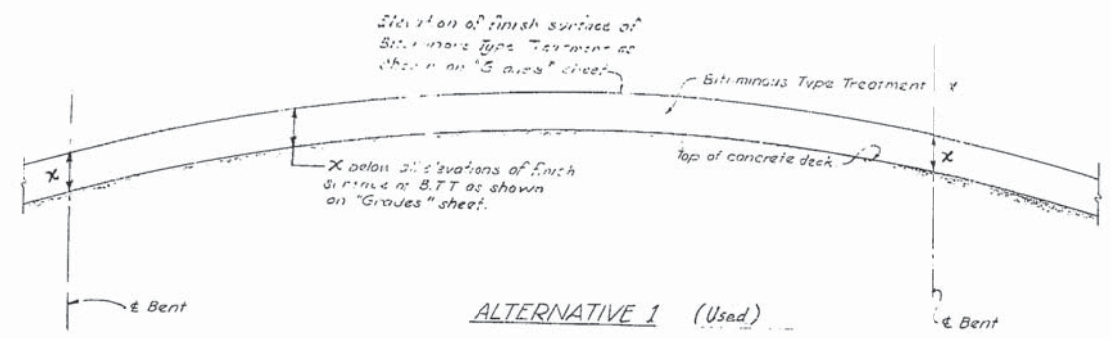


73

PROJECT NO.	STATE	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
7	CAL.			

DATE	COUNTY	ROUTE	SECTION	POST MILE	POST MILE
APRIL 25 1955				9	59



Note:  
 $x = 0.25'$  except  $x =$  difference between "Grade" elevation and top of concrete elevation shown at the following locations:  
 A - Center Street Undercrossing.  
 D - East Approach Spans & On Ramp, prestressed girder span only.  
 E - Mission Road.

Contractor may use any or a combination of alternatives shown.  
 Other alternatives may be used upon approval by the Engineer.  
 Bituminous Type Treatment (B.T.T.) is asphalt concrete.

AS BUILT  
 CORRECTIONS BY: *[Signature]*  
 DATE: 10-11-55

LONGITUDINAL SECTION

AS BUILT PLANS  
 Contract No. 55-14V62  
 Date Completed \_\_\_\_\_  
 Document No. 70002012

STATE OF CALIFORNIA DEPARTMENT OF PUBLIC WORKS DIVISION OF HIGHWAYS			
WIDENING OF LA RIVER BRIDGE AT 4150 ST.			
ELEVATIONS - TOP OF CONCRETE DECK			
SCALE	BRIDGE	FILE	DRAWING
NO SCALE	53-405		C-3243-8
PREL. DRAWING NO. P. 3243-8			

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE \_\_\_\_\_ SIGNATURE \_\_\_\_\_ TITLE \_\_\_\_\_

BRIDGE DEPARTMENT

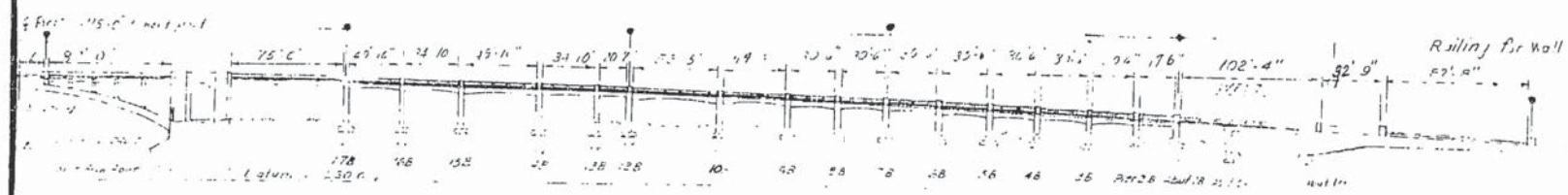
SECTION

DETAILS	BY	DATE	REVISION
QUANTITIES			
SPECIFICATIONS			

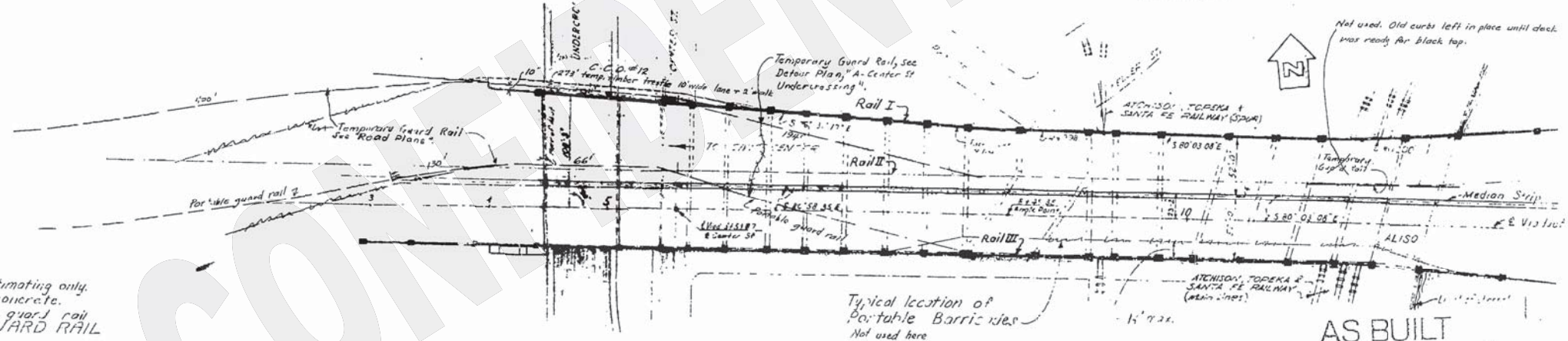
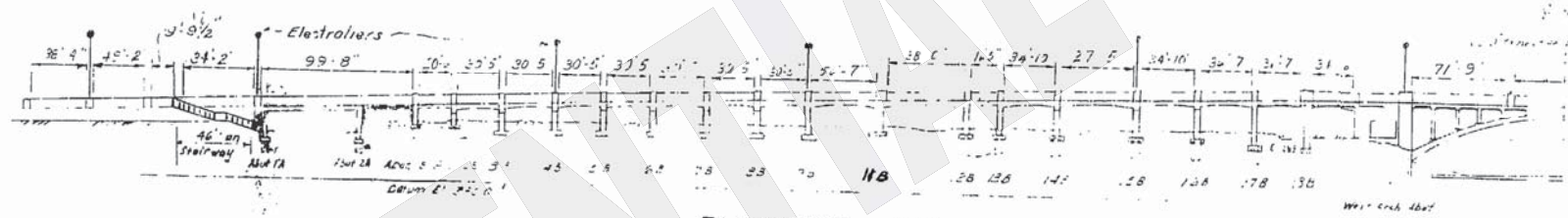


74

DATE	BY	CHECKED	DATE
10/11/55	M. B. G...		



- RAIL I FROM PIER 2 TO PIER 17 TO REMAIN IN PLACE UNTIL WATERWAY IS OPENED.
- WHEN WEST ARCH UNDER STREET AS SHOWN ON CENTER STREET UNDERPASSING, RAIL I FROM PIER 17 TO PIER 9 SHALL BE REMOVED AND REPLACED FROM PIER 9 TO WEST ARCH.
- DURING WORK ON NEW WEST ARCH RAIL I ON WEST ARCH ABUTMENT, RAIL I FROM PIER 17 TO WEST ARCH ABUTMENT, MAY BE REMOVED AND TEMPORARY GUARD RAIL SET UP IN PRESENT SIDEWALK AREA. FACE OF P X B WHEEL GUARD TO MATCH FACE OF EXISTING CURB.
- WHEN WIDENING WEST OF ARCH IS COMPLETED AND APPLYING TRAFFIC, RAIL I MAY BE REMOVED AND REPLACED FROM PIER 9 TO WEST ARCH ABUTMENT.



**AS BUILT PLANS**  
Contract No. 55-14V62  
Date Completed \_\_\_\_\_  
Document No. 70002012

STATE OF CALIFORNIA  
DEPARTMENT OF PUBLIC WORKS  
DIVISION OF HIGHWAYS

**WIDENING OF L.A. RIVER BR.  
E.O.H. AT ALISO STREET  
RAILING LAYOUT #1**

SCALE NONE BRIDGE C-3243-9 FILE DRAWING C-3243-9

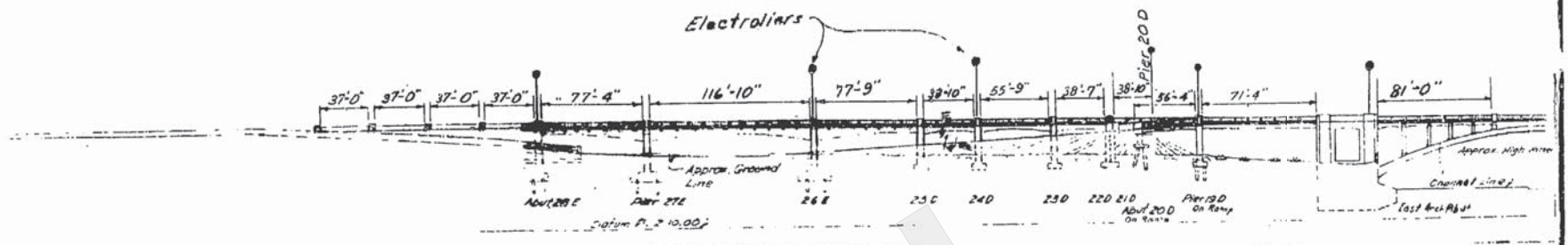
I HEREBY CERTIFY THAT THIS IS A TRUE AND CORRECT COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE \_\_\_\_\_ SIGNATURE \_\_\_\_\_ TITLE \_\_\_\_\_

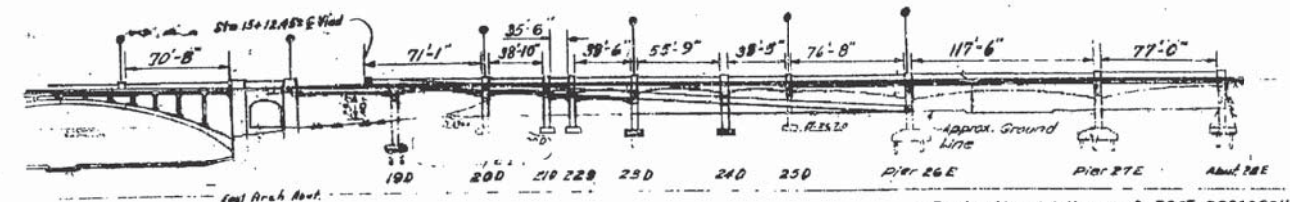


75

STATE	CAL.	PROJECT NO.	53-405	DATE	10-11-55
CITY	LA	SECTION	101	DESIGNER	J. J. Seaman

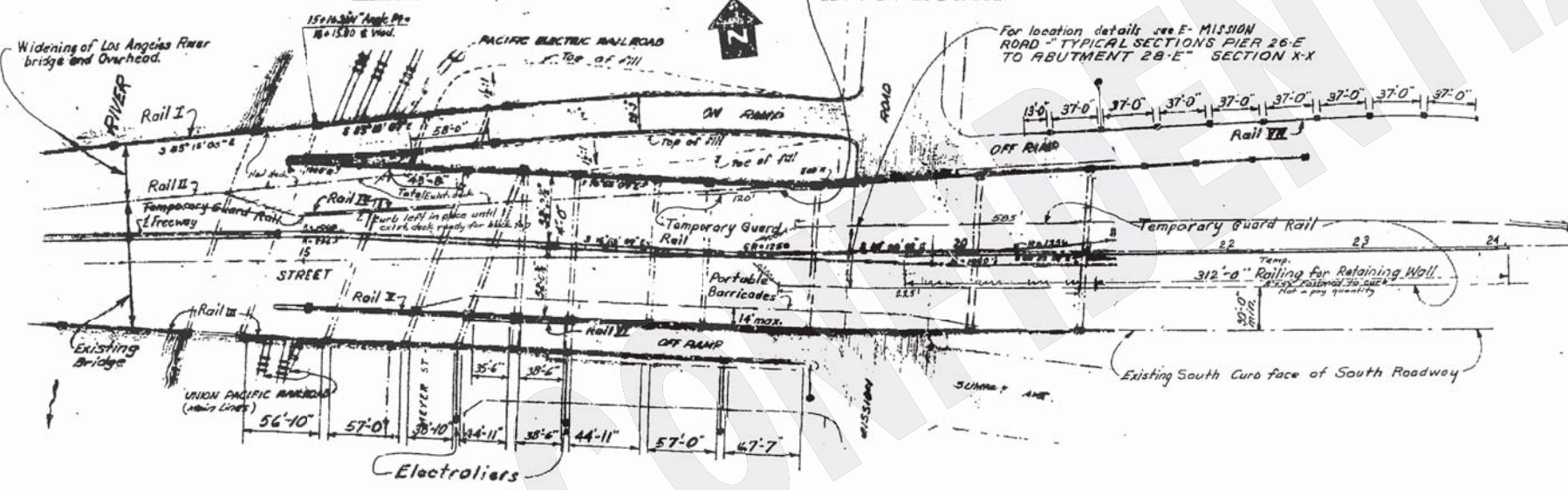


ELEVATION LOOKING SOUTH



ELEVATION LOOKING NORTH

- SEQUENCE OF RAIL WORK
1. RAIL II ON ARCH TO REMAIN IN PLACE UNTIL ARCH WIDENING IS COMPLETED.
  2. WHEN WORK IS BEING DONE ON EAST ARCH ABUT. AND THE WEST PORTION OF SECTION D, TEMPORARY GUARD RAIL WILL BE PLACED FROM PIER 200 TO STA. 15+05.17E VIAD. AND THENCE TO WEST END OF EAST ARCH ABUT. AS SHOWN.
  3. RAIL III FROM PIER 200 TO PIER 250 TO REMAIN IN PLACE UNTIL ADJACENT WIDENING, INCLUDING NEW RAIL, IS COMPLETED. CLOSE GAPS LEFT BY REMOVAL OF POSTS AT PIERS WITH TEMPORARY RAIL.
  4. RAIL IV FROM PIER 260 TO STA 22+12E VIAD. TO REMAIN IN PLACE UNTIL WORK NEAR E VIADUCT FROM PIER 260 TO TUNNEL PORTAL IS COMPLETED.
  5. RAIL III ON ARCH TO REMAIN IN PLACE UNTIL ARCH WIDENING IS COMPLETED AND CARRYING TRAFFIC.
  6. RAIL III FROM EAST ARCH ABUT. TO END OF OFF RAMP MAY BE REMOVED AND REPLACED AT ANY TIME.
  7. RAIL VI ON OFF RAMP MAY NOT BE REMOVED AND REPLACED WHILE WORK IS BEING DONE ON ADJACENT PORTION OF RAIL III.
  8. RAIL V TO REMAIN IN PLACE UNTIL WIDENING IS COMPLETED AND CARRYING TRAFFIC.
  9. RAIL VII MAY BE REMOVED AND REPLACED AT ANY TIME.



**AS BUILT PLANS**  
 Contract No. 55-144E2  
 Date Completed \_\_\_\_\_  
 Document No. 70002012

**AS BUILT**  
 CORRECTIONS BY *J. J. Seaman*  
 DATE 10-11-55

STATE OF CALIFORNIA DEPARTMENT OF PUBLIC WORKS DIVISION OF HIGHWAYS			
WIDENING OF LA RIVER BR. & O.H. AT ALISO STREET			
RAILING LAYOUT #2			
SCALE NONE	BRIDGE 53-405	FILL	DRAWING C-3243-10

PREL. DRAWING NO. P-3243

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.  
 DATE \_\_\_\_\_ SIGNATURE \_\_\_\_\_ TITLE \_\_\_\_\_

BRIDGE DEPARTMENT

DATE	10-11-55
QUANTITIES	177
SPECIFICATIONS	177
APPROVED	J. J. Seaman

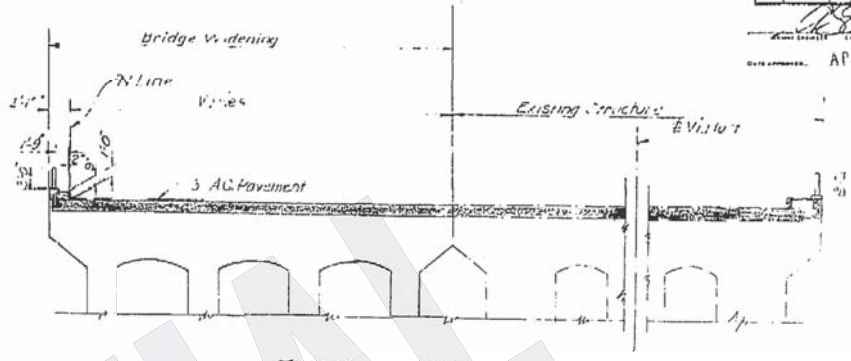
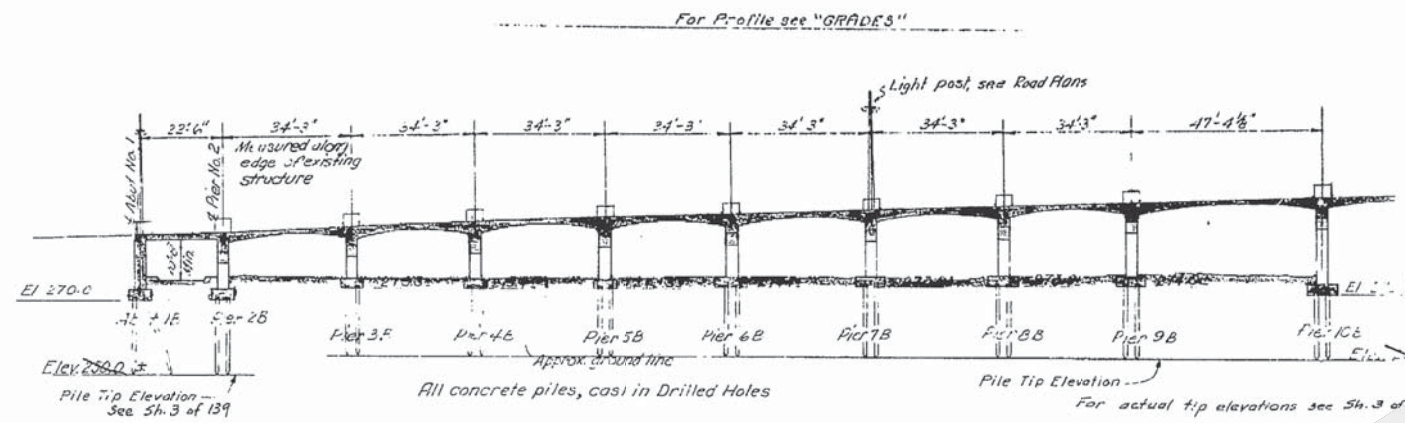


105

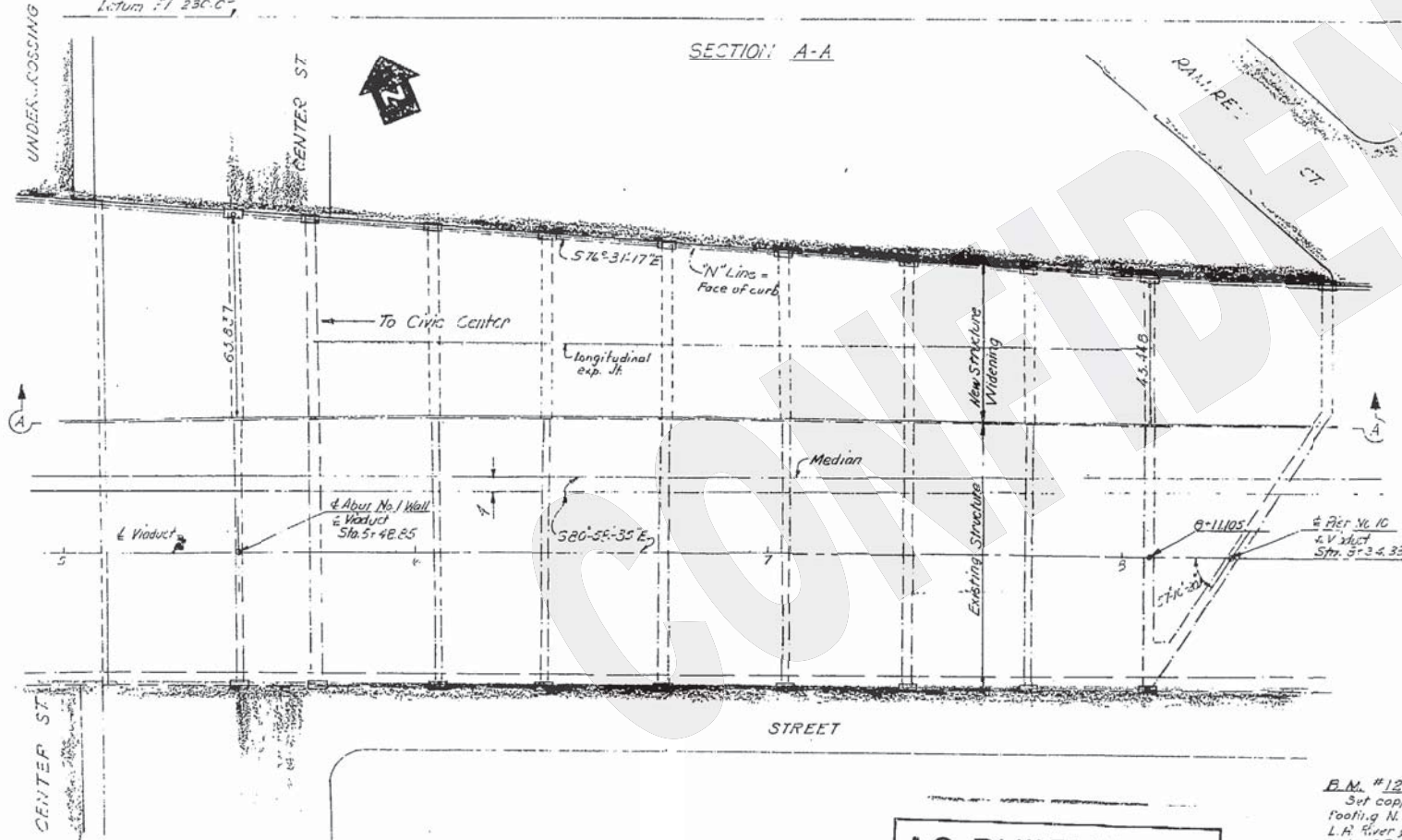
FED. ROAD DIST. NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
7	CAL.			

DIST.	COUNTY	ROUTE	SECTION	POST MILE	SHEET NO.	TOTAL SHEETS
111	LA. <td>104</td> <td>104</td> <td>1.1</td> <td>1</td> <td>1</td>	104	104	1.1	1	1

APR. 21 1955



TYPICAL SECTION  
SCALE: 1"=10'



PLAN

INDEX TO PLANS

- | Sheet No. | Title  |
|-----------|--|
| B-1       | Structure Plan No. 1   |
| B-2       | Structure Plan No. 2   |
| B-3       | Foundation Plan No. 1  |
| B-4       | Foundation Plan No. 2  |
| B-5       | Grade  |
| B-6       | Underground Utilities sheet No. 1                                      |
| B-7       | Underground Utilities sheet No. 2                                      |
| B-8       | Abut. 1-B To Pier 2- Layout & Details                                  |
| B-9       | Pier No. 3-B   |
| B-10      | Pier No. 4-B   |
| B-11      | Pier No. 5-B   |
| B-12      | Pier No. 6-B   |
| B-13      | Pier No. 7-B   |
| B-14      | Pier No. 8-B   |
| B-15      | Pier No. 9-B   |
| B-16      | Piers No. 10-B & 12-B  |
| B-17      | Piers No. 13-B, 14-B & 15-B  |
| B-18      | Piers No. 16-B & 17-B  |
| B-19      | Typical Sections   |
| B-20      | Pier 2-B To Pier 5-B Deck Reinforcement                                |
| B-21      | Pier 5-B To Pier 9-B Deck Reinforcement                                |
| B-22      | Pier 9-B To Pier 13-B Deck Reinforcement                               |
| B-23      | Pier 13-B To Pier 16-B Deck Reinforcement                              |
| B-24      | Pier 16-B To Pier 17-B Deck Reinforcement                              |
| B-25      | Prestressed Girder Layout Between Pier 17-B & West Arch Abutment Bent  |
| B-26      | Prestressed Girder Details Between Pier 17-B & West Arch Abutment Bent |

AS BUILT

CORRECTIONS BY: *W. J. James*  
DATE: 10-17-55

For details (piling, railing, etc.) not shown, see "A-Center St Undercrossing"

For General Notes see "INDEX SHEET"

Note: All dimensions and lines dependent upon existing structure shall be verified in the field by the Contractor.

For details of Sliding Plate Seaming & analysis see "D-East Approach Span, 4th Temp. Int. No. 2-443 Required"

For details of electrical and concrete part see "A-Center Street Undercrossing" sheet No. A-21  
Bituminous Type Treatment (BT) is Applied Concrete

B.M. # 12-X Elev. 272.94  
Set copper nail in lead in concrete footing N. side Abut. at Bridge, between L.R. River & R.R. & S.F.R.R. tracks, west side of River 21' west of River retaining wall.

T.B.M. Elev. 275.635  
Wire spike on S.E. corner Center & R. St. 1.4' S. of B.C.R. on center of (So. of Bridge)

**AS BUILT PLANS**  
Contract No. 55-14V62  
Date Completed \_\_\_\_\_  
Document No. 70007012

STATE OF CALIFORNIA DEPARTMENT OF PUBLIC WORKS DIVISION OF HIGHWAYS			
WIDENING OF L.A.R. 104 AT CENTER STREET			
B-WEST APPROACH			
STRUCTURAL PLAN No. 1			
SCALE: 1"=10'	BRIDGE 55-14V62	FILE	DRAWING 3243-37
PREL. DRAWING NO. P-324			

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.  
DATE \_\_\_\_\_ SIGNATURE \_\_\_\_\_ TITLE \_\_\_\_\_

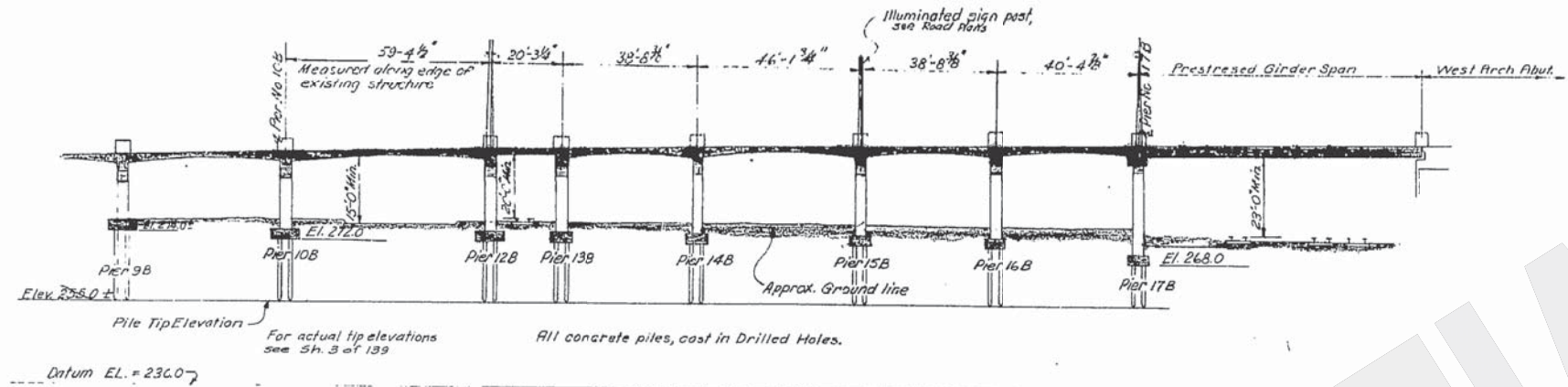


106

PROJECT NO.	STATE	PROJECT NO.	PIECE NO.	SHEET NO.	TOTAL SHEETS
7	CAL.				

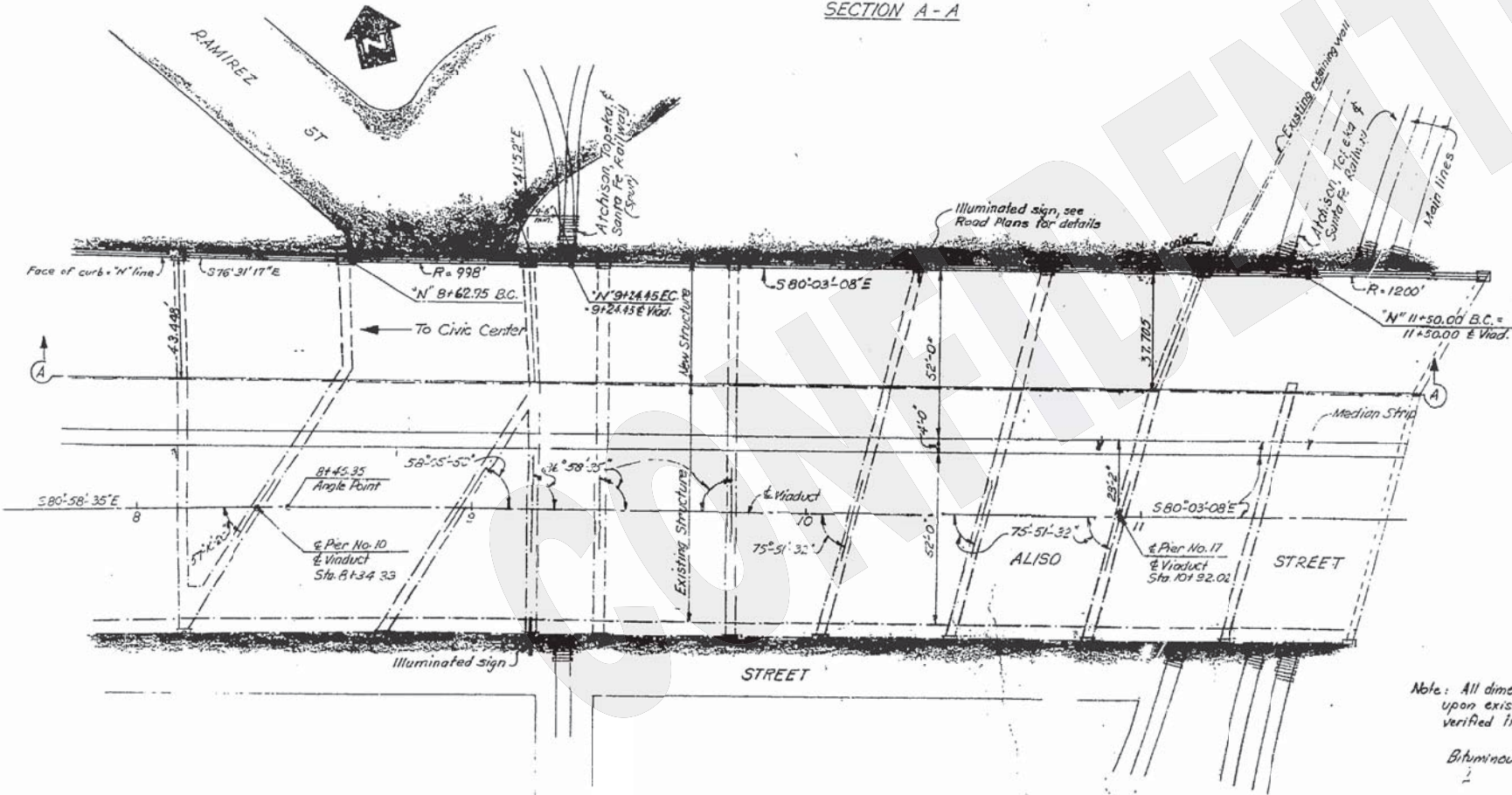
  

DATE	DESIGNED BY	CHECKED BY	DATE	TITLE
10-18-55				

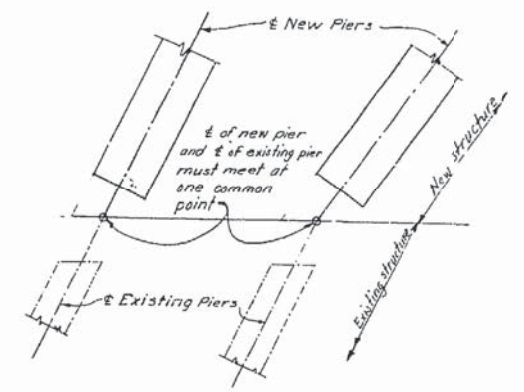


Datum EL. = 236.07

SECTION A-A



PLAN



TYPICAL PIER LAYOUT  
no scale

AS BUILT

CORRECTIONS BY: *[Signature]*  
DATE: 10-18-55

Note: All dimensions and lines dependent upon existing structure shall be verified in the field by the Contractor.

Bituminous Type Treatment (B.T.T.) is Asphalt Concrete.

**AS BUILT PLANS**  
 Contract No. 55-14V62  
 Date Completed \_\_\_\_\_  
 Document No. 70002012

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS

WIDENING OF L.A. RIV. BR. & OH. AT ALISO STREET  
 B- WEST APPROACH  
 STRUCTURE PLAN No. 2

1" = 20' except  
 SCALE as noted

BRIDGE 53-405 FILE DRAWING 3243-38

PHYL. DRAWING NO. P-3243

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE: \_\_\_\_\_ SIGNATURE: \_\_\_\_\_ TITLE: \_\_\_\_\_

BRIDGE DEPARTMENT

SECTION 5

DESIGNED BY	CHECKED BY	DATE
DATE	DATE	DATE

**As-Built Plans**  
**Alameda Street Underpass, Bridge No. 53-0782**

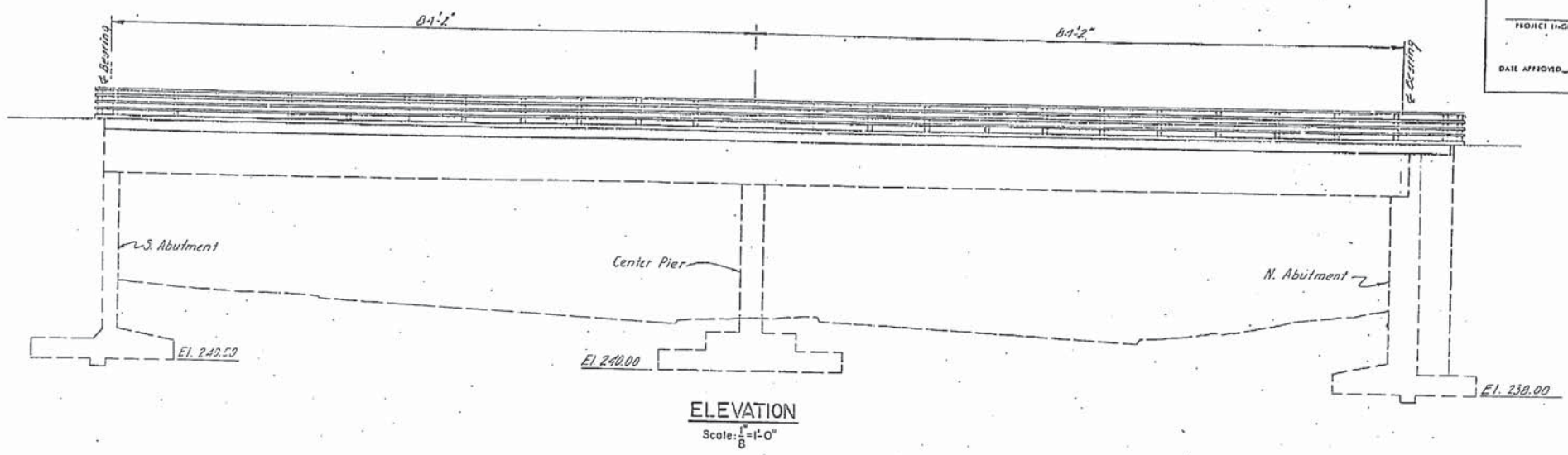
(THIS PAGE INTENTIONALLY LEFT BLANK)



THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL

PROJECT ENGINEER  
*U.C. Chang*  
 REGISTERED CIVIL ENGINEER  
 NO. 25237  
 DATE APPROVED: SEPTEMBER 16, 1985

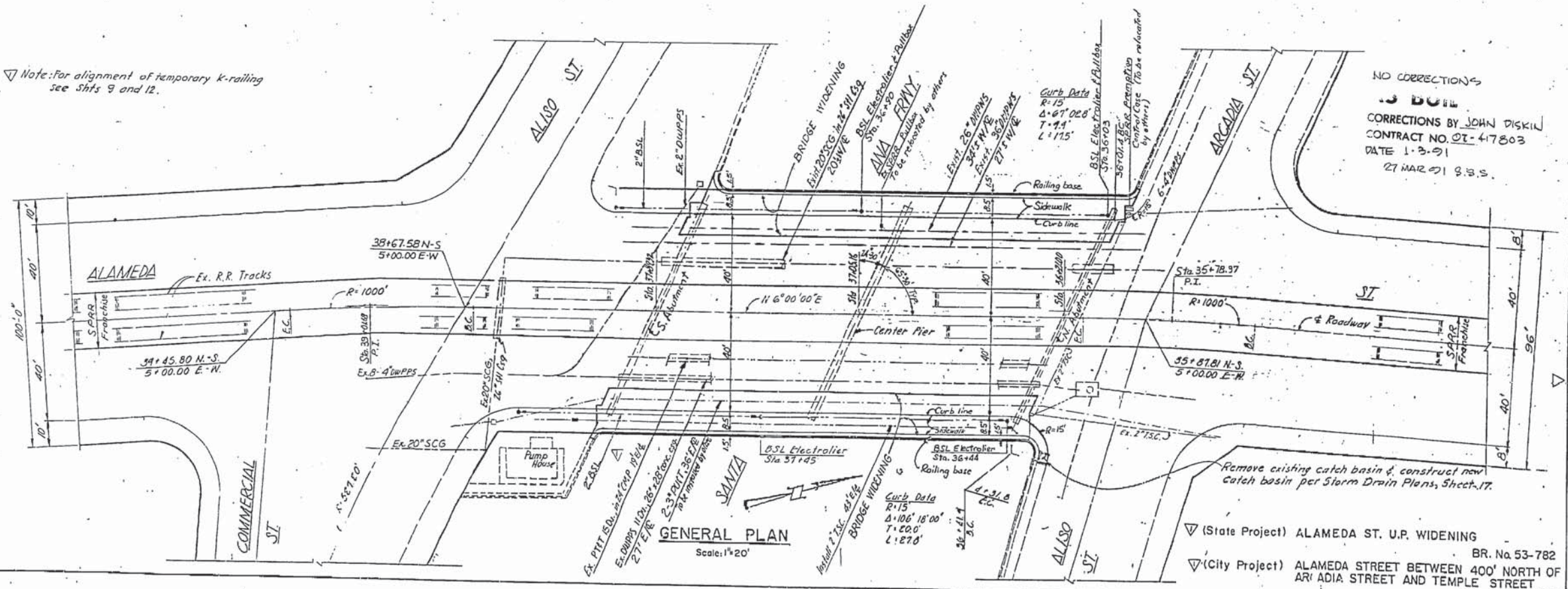
DESIGNED	DRAWN	CHECKED	SUPERVISED	PROJ. ENGR.
S. Pritchard	J. H. Brown	R. H. Conner	R. H. Conner	



**ELEVATION**  
 Scale: 1/8" = 1'-0"

**PLAN B. ELEVATION**

Note: For alignment of temporary k-railing see Shfts 9 and 12.



**GENERAL PLAN**  
 Scale: 1" = 20'

NO CORRECTIONS  
 CORRECTIONS BY JOHN DISKIN  
 CONTRACT NO. 07-417803  
 DATE 1-3-91  
 27 MAR 91 9:35

(State Project) ALAMEDA ST. U.P. WIDENING  
 BR. No 53-782  
 (City Project) ALAMEDA STREET BETWEEN 400' NORTH OF ARCADIA STREET AND TEMPLE STREET  
 V.I.D. 61584

NO.	REVISION DESCRIPTION	DATE
1	Revised for State Contract and added State project title.	3-8-83

**AS BUILT PLANS**  
 Contract No. 07-417804  
 Date Completed 12-21-90  
 Document No. \_\_\_\_\_

L.A.C.E. INDEX  
 SCALES  
 HORIZ. 1" = 40' Station  
 VERT. 1" = 20' Station  
 SHEET 6

INDEX NUMBER D-27658

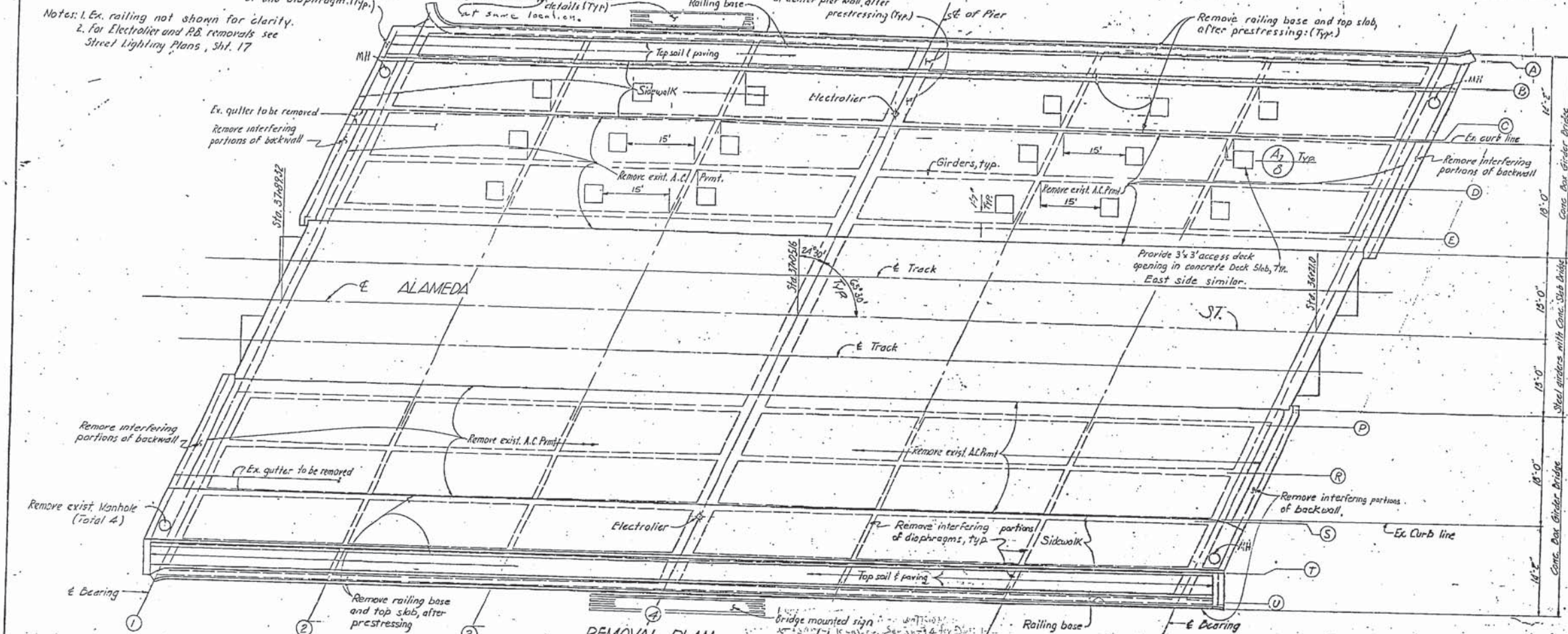
FINAL ORIGINAL

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION  
 DATE 11/11/85  
 SIGNATURE: *Donald Blackford*

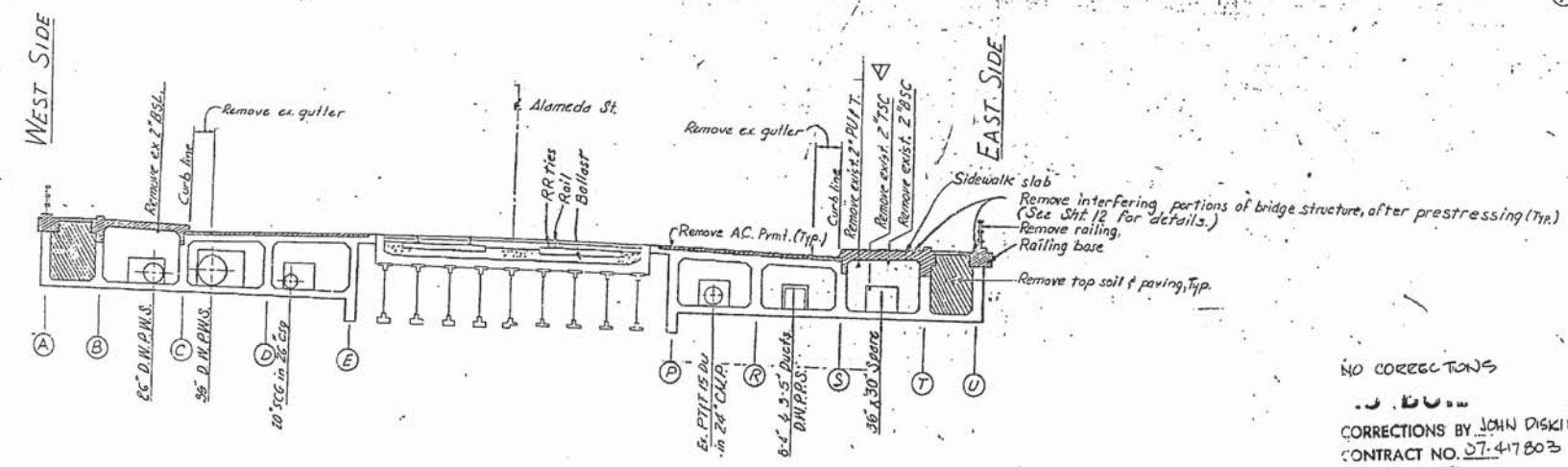




Notes: 1. Ex. railing not shown for clarity.  
2. For Electroliner and R.R. removals see Street Lighting Plans, Sht. 17



**REMOVAL PLAN**  
Not to scale



**REMOVALS OF EXISTING BRIDGE TYPICAL SECTION**  
Not to scale

▽ Note: Existing reinforcement in diaphragms, center pier wall and abutment walls shall be preserved and extended a minimum of 2'-0" into new construction.

**LEGEND**

- Ⓐ Section 2' Taken on Sheet No. 3 Shown on Sheet No. 12
- Ⓑ Detail 2' Shown on Sheet No. 16

NO CORRECTIONS  
CORRECTIONS BY JOHN DISKIN  
CONTRACT NO. 07-417803  
DATE 1-3-91

Note: All cross-hatched areas to be removed.  
Existing bridge plans included in Special Provisions.

▽ THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL.

DESIGNED	DATE
CHECKED	DATE
SUPERVISED	DATE
PROJECT ENGINEER	DATE

**REMOVAL PLAN**

NO.	REVISION DESCRIPTION	DATE
1	REVISED FOR THIS PROJECT & ADDED	3-83
2	REVISED FOR THIS PROJECT & ADDED	3-83

CITY OF LOS ANGELES  
DONALD C. TILLMAN  
CITY ENGINEER

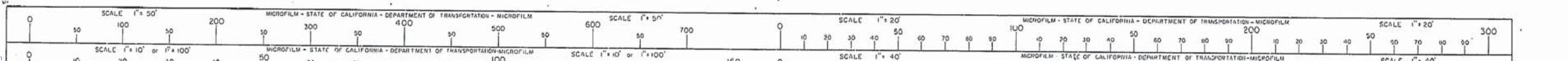
DATE: 12-21-90  
BY: [Signature]  
ENGINEER

BR. No. 53-782  
CITY PROJECT) ALAMEDA STREET L. WEEN 400' NORTH OF ARCADIA STREET AND TEMPLE STREET  
W/O. 61584

L.A.C.E. INDEX SCALES  
HORIZ. 1" = AS SHOWN  
VERT. 1" = AS SHOWN  
SHEET 7  
INDEX NUMBER D-27658

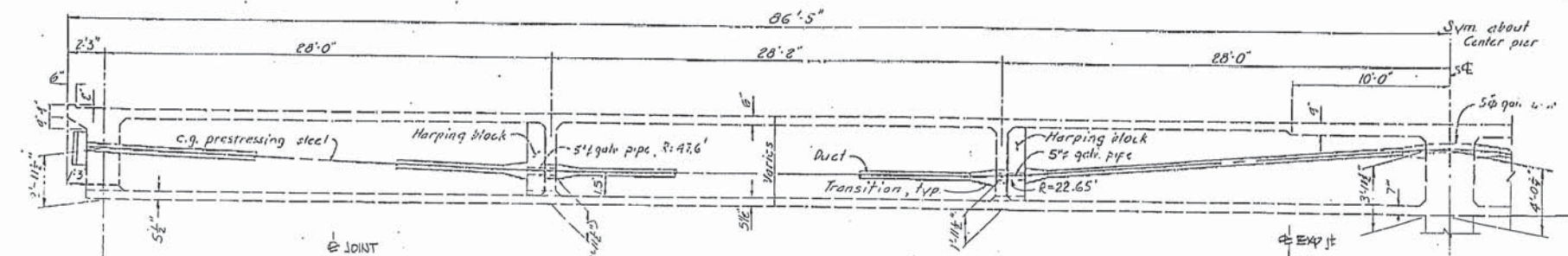
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION

DATE 5-23-91 BY [Signature]



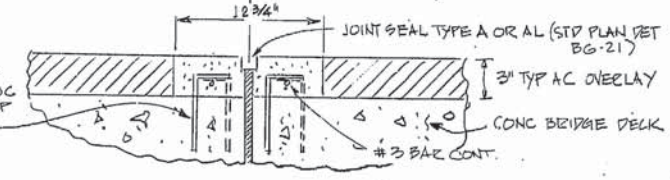


THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL.

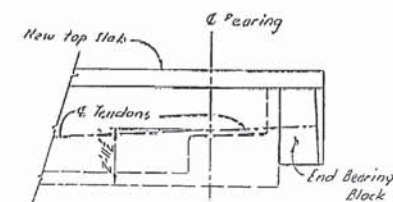


TYPICAL TENDON PROFILE BETWEEN GIRDERS B&E AND BETWEEN GIRDERS P&T  
Scale: 1/4"=1'-0"

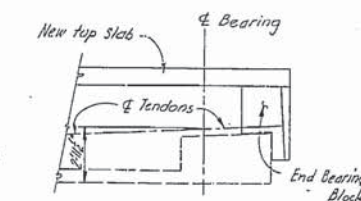
- CONSTRUCTION NOTES
1. SAW CUT 3" AC OVER LAY.
  2. CHIP OUT AC
  3. SET DOWELS (4" EMBEDMENT) REBAR
  4. MIX AND PLACE RAPID SET CONCRETE WITH 60% 3/8" MAX AGGREGATE
  5. SAW, CHIP, AND INSTALL JOINT SEAL TYPE A
  6. WHERE 1/2 OF PAVEMENT EXPANSION DAM IS EXISTING, BUILD AS DETAIL FOR OPPOSITE 1/2 OF EXP DAM.



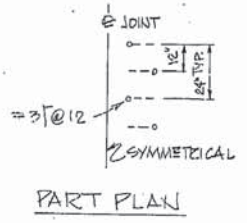
EXPANSION DAM CCO # 82 6/12/85



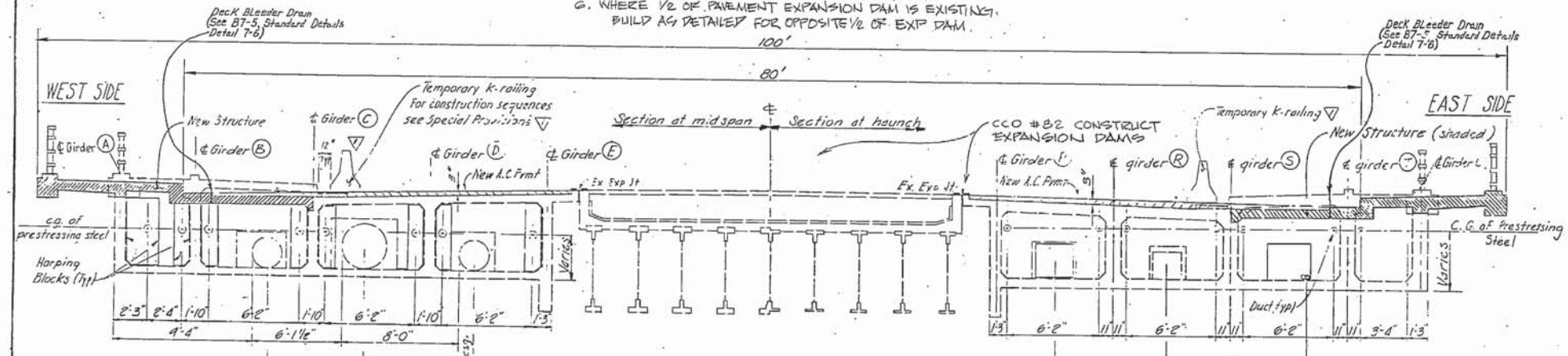
TYPICAL TENDON PROFILE BETWEEN GIRDERS T&U  
Scale: 1/4"=1'-0"



TYPICAL TENDON PROFILE BETWEEN GIRDERS A&B  
Scale: 1/4"=1'-0"



PART PLAN



TYPICAL SECTION  
Scale: 1/4"=1'-0"

AS BUILT  
CORRECTIONS BY JOHN DISKIN  
CONTRACT NO. 07-417803  
DATE 1-3-91  
27 MAR 91

DESIGN DATA

Governing Code  
AASHTO Standard Specifications for Highway Bridges (1977 Eleventh Edition) including AASHTO Interim Specifications (1982)

Loads  
Live load: HS20-44 (WSB)  
Lateral earth pressure: 36 pcf EFP plus 2ft. surcharge

Stresses  
Lightweight concrete:  $f_c = 3250$  psi at 28 days  
 $f_c = 1300$  psi  
Concrete not in prestressed area:  $f_c = 3250$  psi  
 $f_c = 1300$  psi  
Concrete bearing / harping blocks:  $f_c = 5000$  psi at 28 days  
 $f_c = 2,000$  psi  
Reinforcing steel:  $f_s = 24,000$  psi  
Prestressed steel wire:  $f_s = 270,000$  psi  
Temporary stress before loss due to creep and shrinkage:  $0.70 f_s = 189,000$  psi

PRESTRESSING NOTES

1. The following applies to each of the two bridge sections. Each section contains five (5) girders.
2. Pjacking = 4010 kips total at jacking end,  $A_5 = \frac{Pjacking}{1575}$   
Total number of girders = 5
3. Design is based on  $u = 0.25$  and  $k = 0.0002$ . Pjacking specified at the jacking end includes friction loss, anchorage loss, creep and elastic shortening (total 56.24 ksi)
4. Tendons to be jacked to .75  $f_s$  and anchored at a minimum equivalent anchor set = 0.025 inches.
5. Contractor shall submit elongation and jacking calculations based on initial stress of .933 times jacking stress at non-stressing end.
6. The design is based on one end prestressing. Half of the prestressing steel in the member shall be stressed from one end and the other half from the opposite end. In the event the Contractor wishes to stress tendons simultaneously from both ends, he shall submit to the Engineer, for approval, details and supporting calculations prepared by a registered Civil or Structural Engineer by the State of California.
7. Distribution of prestressing force: Unless otherwise noted, the prestressing force shall be distributed with an approximately equal amount in each tendon and shall be placed symmetrically about the cross section.
8. Stressing Sequence: No more than 1/2 of the prestressing force in any girder may be stressed before an equal force is stressed in the adjacent girders. At no time during the stressing operations will more than 1/2 of the total prestressing force be applied eccentrically about the center of gravity of the section.
9. The Contractor shall install the C4 x 5.4 steel girder web bracing at locations designated on the plans prior to prestressing. They shall remain in place. The Contractor shall submit shop drawings showing the connection details of the web bracing to the existing girders, to have compression and/or tension, for the Engineer's approval.
10. Harping shall be grouted into place a minimum of 14 days before prestressing.

Note: All reinforced concrete shall be normal Class A concrete except the new deck, sidewalk and railing base which shall be lightweight concrete. End bearing and harping blocks shall be 5000psi concrete.

(State Project) ALAMEDA ST, U.P. WIDENING BR. No. 53-782  
(City Project) ALAMEDA STREET BETWEEN 400' NORTH OF ARCADIA STREET AND TEMPLE STREET W.O. 61584

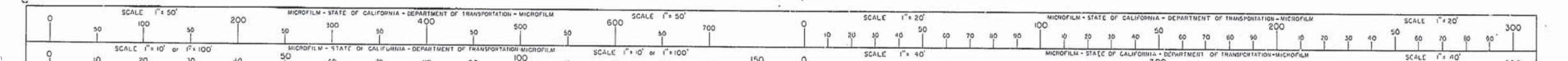
AS BUILT PLANS  
Contract No. 07-417804  
Date Completed 12-21-90  
Document No. \_\_\_\_\_

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.  
Donald Blackford

DESIGNED	W. C. Clay	DATE	5-7-85
DRAWN	J. J. ...	CHECKED	...
SUPERVISED	P. ...	DATE	4-7-85

NO.	REVISION DESCRIPTION	DATE
1	AS BUILT CORRECTIONS	1-3-91





THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL.

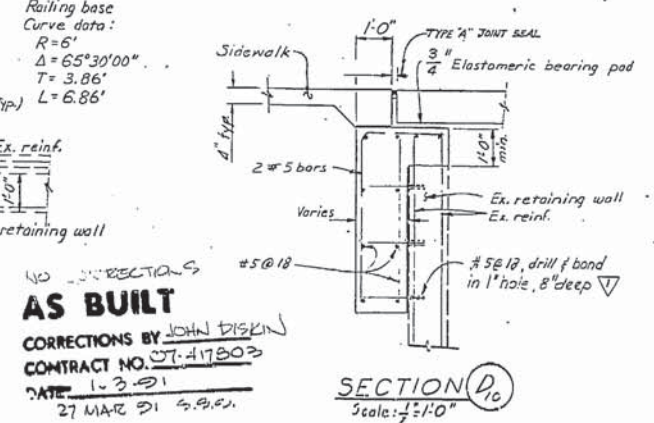
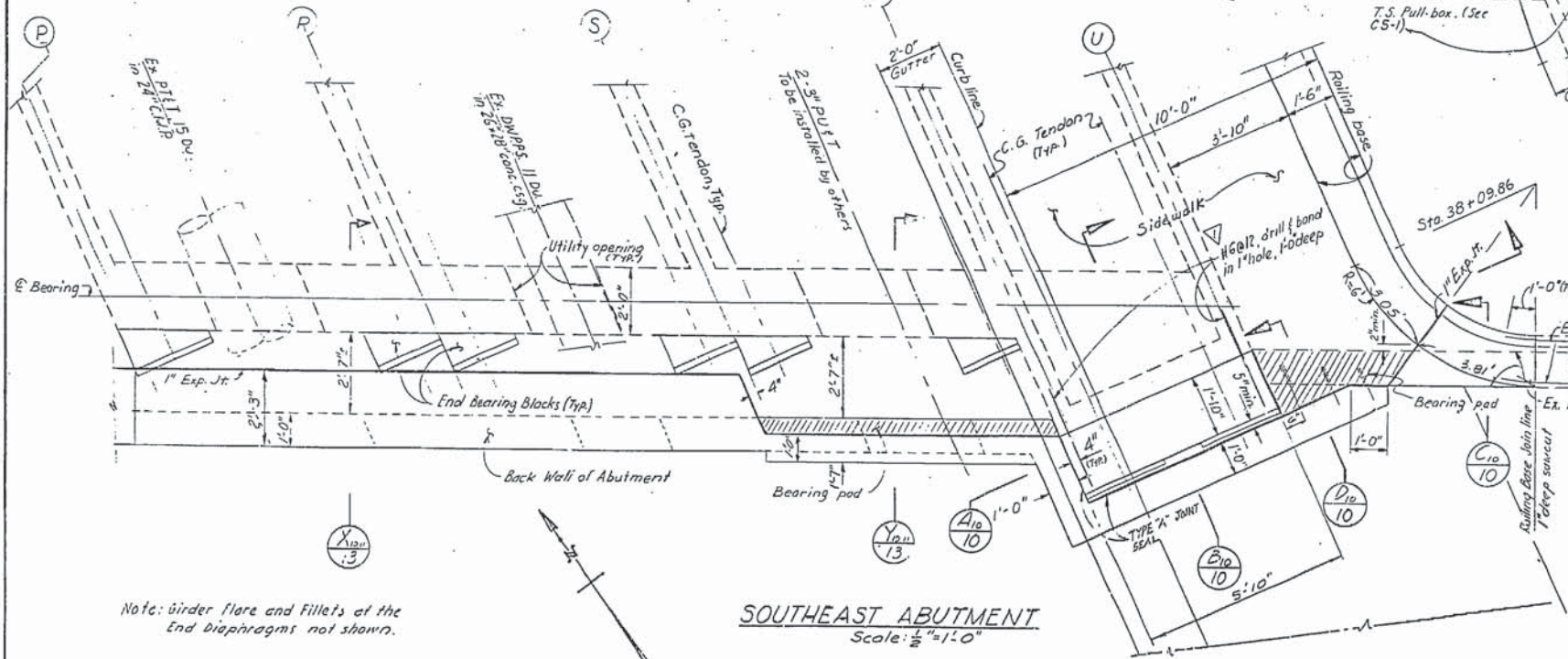
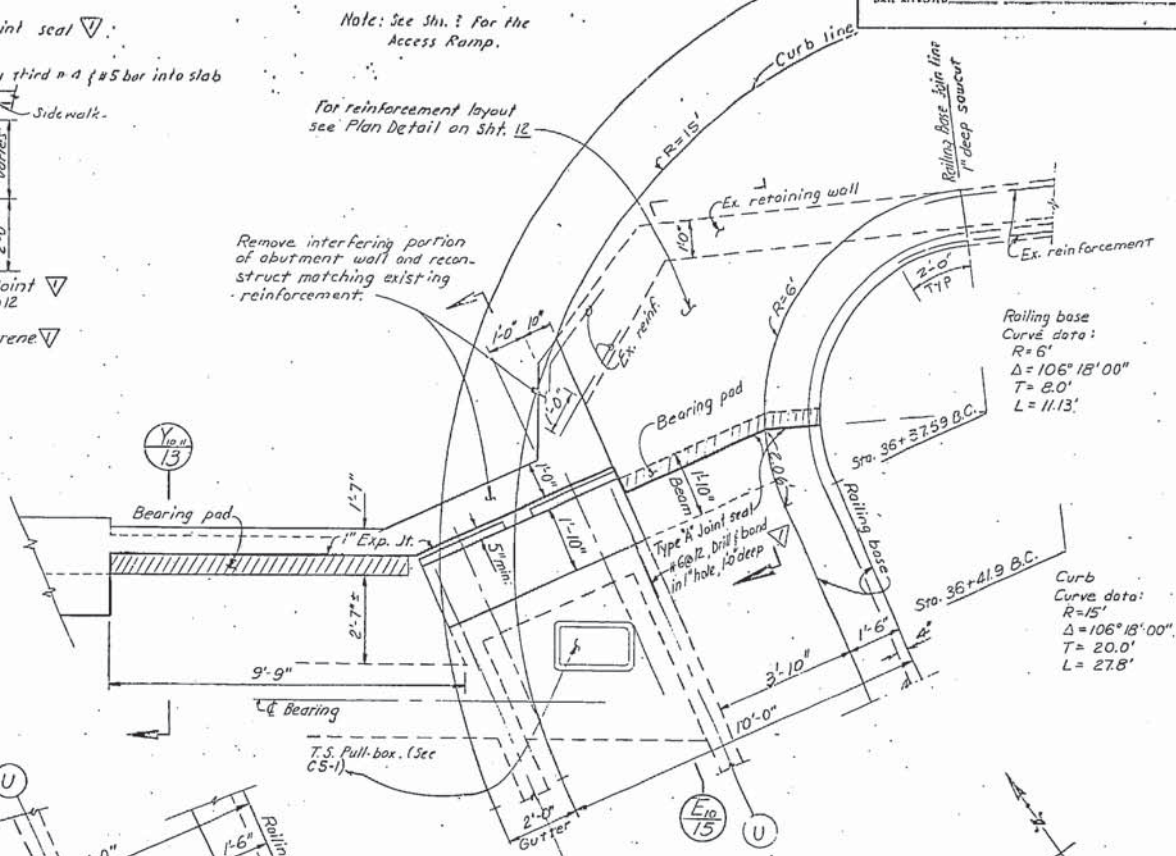
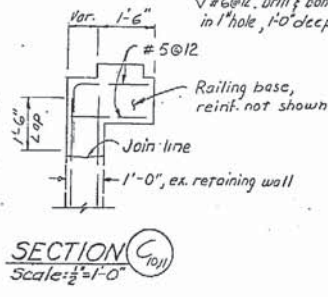
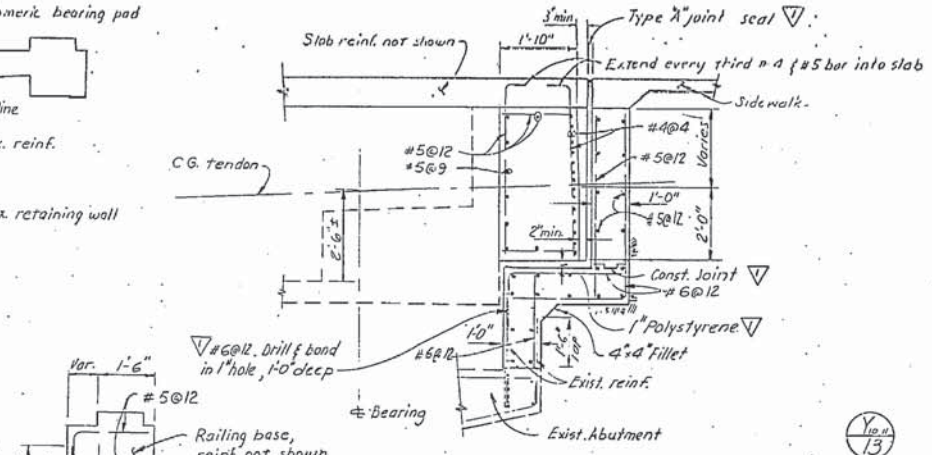
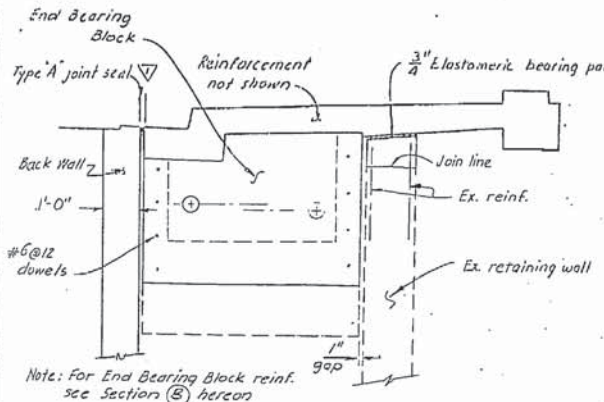
DATE	2/13/90
PROJECT ENGINEER	Min C. Oberer
DATE APPROVED	

DESIGNED	John Oberer
DRAWN	John Oberer
CHECKED	John Oberer
SUPERVISED	R. Horvath
PROJECT ENGR.	R. E. NO.
ASST. DIV. ENGR.	R. E. NO.

**CORNER DETAILS EAST SIDE**

NO.	REVISION DESCRIPTION	DATE
1	Revised for state contract and added state file project	3-9-90

CITY OF LOS ANGELES  
 DONALD C. TILLMAN  
 CITY ENGINEER  
 DATE 2/13/90  
 [Signature]



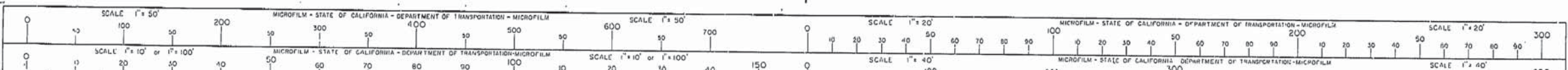
**AS BUILT**  
 CORRECTIONS BY JOHN DISKIN  
 CONTRACT NO. 07-417803  
 DATE 1-3-91  
 27 MAR 91 S.S.C.

(State Project) ALAMEDA ST. U.P. WIDENING BR. No. 53-782  
 (City Project) ALAMEDA STREET BETWEEN 400' NORTH OF ARCADIA STREET & TEMPLE STREET W.C. 61584

SCALES: HORIZ. 1" = 45' AS SHOWN; VERT. 1" = 15' AS SHOWN; SHEET 10; INDEX NUMBER D-27658

**AS BUILT PLANS**  
 Contract No. 07-417804  
 Date Completed 12-21-90  
 Document No.

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.  
 [Signature]





**As-Built Plans**  
**Los Angeles Street Overcrossing, Bridge No. 53-0629**

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Submitted Oct 17 1948  
 ENGINEER, BRIDGE & STRUCTURAL DESIGN  
 Approved Feb 17 1949  
 CITY ENGINEER, CITY OF LOS ANGELES

P.M. O. 9  
 DIST. COUNTY ROUTE SECTION SHEET TOTAL  
 VII L.A. 2 L.A. 6 1 3  
 DATE APPROVED February 28, 1949  
 STATE ENGINEER, CALIFORNIA  
 CITY ENGINEER, CITY OF LOS ANGELES

**AS BUILT PLANS**  
 Contract No. 14VC84  
 Date Completed \_\_\_\_\_  
 Document No. 70001957

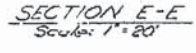
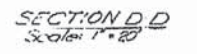
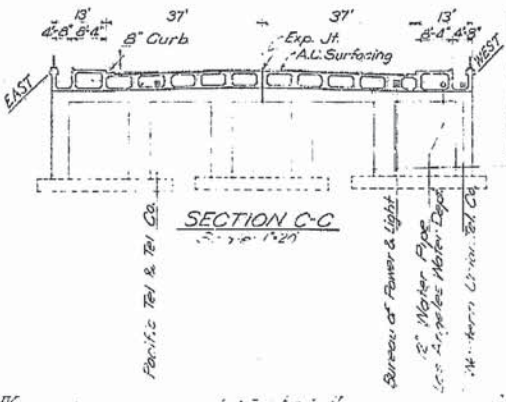
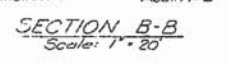
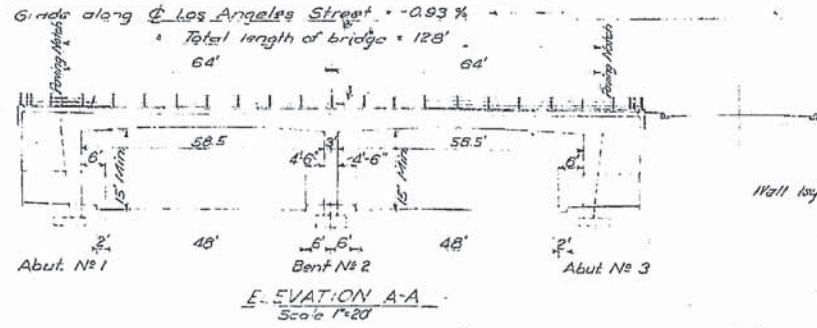
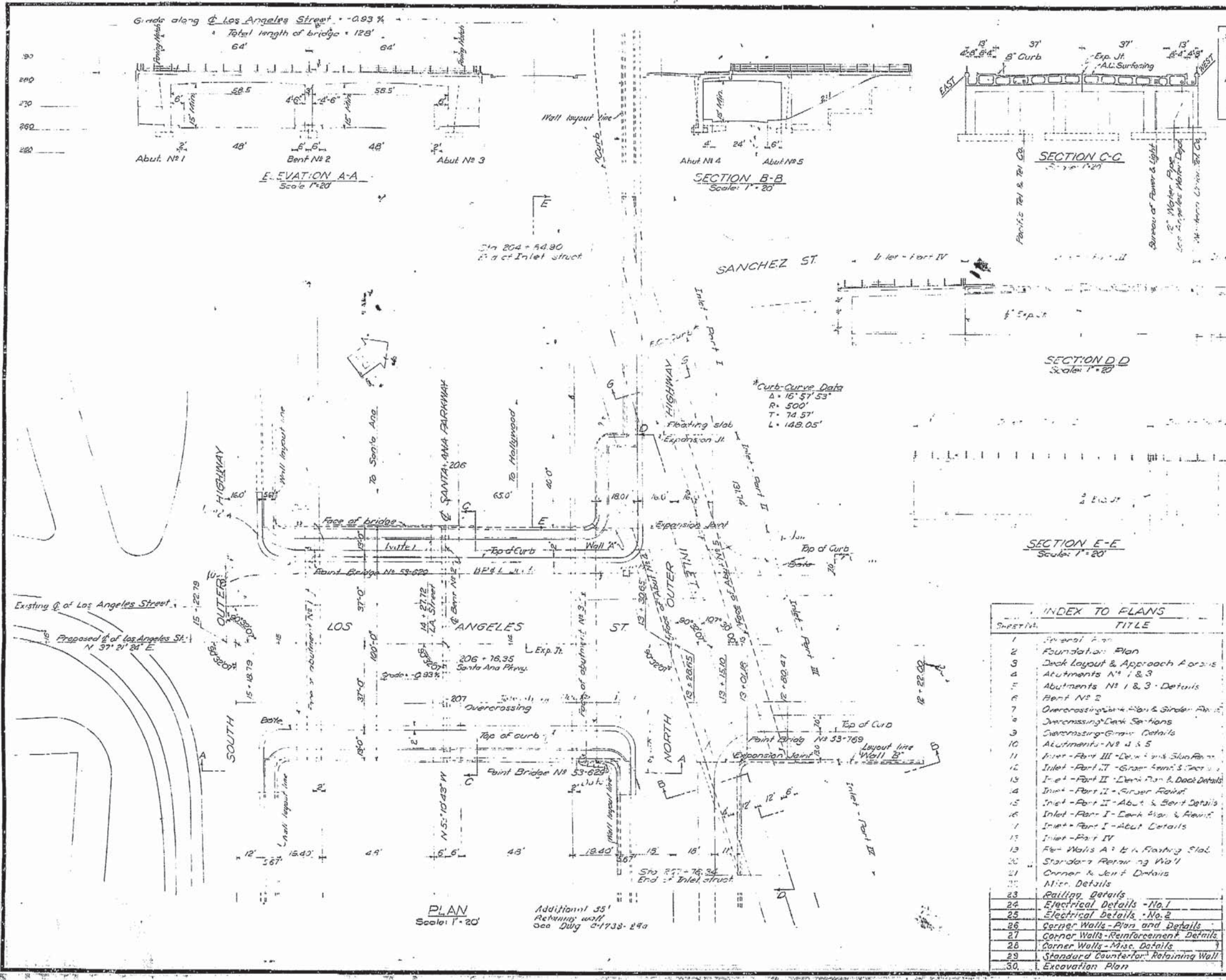
**REFERENCES**  
 District Maps 5514  
 Field Books 18413, 19618, 20120, 20168  
 Sewer Plans D-3101, D-3104, D-7929, D-7930  
 Records of Los Angeles City Eng. Div.

THIS SET OF PLANS IS THE PROPERTY OF THE CITY OF LOS ANGELES. IT IS TO BE KEPT IN THE OFFICE OF THE CITY ENGINEER. IT IS TO BE RETURNED TO THE CITY ENGINEER'S OFFICE UPON REQUEST.

**GENERAL NOTES**  
 Specifications:  
 Design: A.A.S.H.T.O. 1944 and subsequent revisions  
 Construction: Standard Specifications dated April, 1945 and special provisions accompanying this set of plans.  
 Design Data:  
 Live load H-20-S16-44  
 $E = 1200$  pounds per sq. inch  
 $f_c = 1800$  pounds per sq. inch  
 $n = 10$   
 Maximum soil pressure: 3 Tons per sq. ft.  
 Bench marks: See Sheet 1182  
 Note: Refer to "Cover Sheet" for Index to Specifications, Storm Drain, Sewer, and 12" to 18" Pipes.

SHEET NO.	TITLE
1	General Plan
2	Foundation Plan
3	Deck Layout & Approach Forms
4	Abutments No. 1 & 3
5	Abutments No. 1 & 3 - Details
6	Bent No. 2
7	Overcrossing Deck Plan & Sinder Plan
8	Overcrossing Deck Sections
9	Overcrossing Girder Details
10	Abutments No. 4 & 5
11	Inlet - Part III - Deck Reinforcement
12	Inlet - Part II - Deck Reinforcement
13	Inlet - Part I - Deck Reinforcement
14	Inlet - Part II - Sinder Reinforcement
15	Inlet - Part I - Abut. & Bent Details
16	Inlet - Part I - Deck Reinforcement
17	Inlet - Part I - Abut. Details
18	Inlet - Part IV
19	Retaining Wall A - Floating Slab
20	Standard Retaining Wall
21	Corner & Joint Details
22	Misc. Details
23	Railings Details
24	Electrical Details - No. 1
25	Electrical Details - No. 2
26	Corner Walls - Plan and Details
27	Corner Walls - Reinforcement Details
28	Corner Walls - Misc. Details
29	Standard Counter for Retaining Wall
30	Excavation Plan

**14VC84**  
 STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS  
**SANTA ANA PARKWAY  
 LOS ANGELES STREET OVERCROSSINGS  
 IN THE CITY OF LOS ANGELES, LOS ANGELES COUNTY**  
**GENERAL PLAN**  
 SCALE 1" = 20'  
 SHEET 53-629 FILE DRAWING C-1736-1



**\*Curb-Curve Data**  
 $\Delta = 15^\circ 57' 53''$   
 $R = 500'$   
 $T = 74.57'$   
 $L = 148.05'$

BRIDGE DEPARTMENT

DESIGNED BY  
 QUANTITIES BY  
 SPECIFICATIONS BY  
 APPROVED FOR THE CITY OF LOS ANGELES

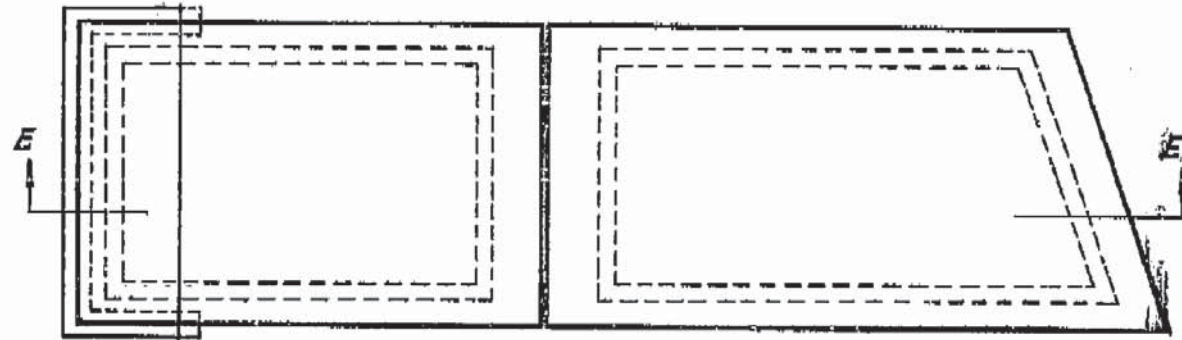
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.  
 DATE 3/16/49 SIGNATURE [Signature] TITLE Asst. Eng.



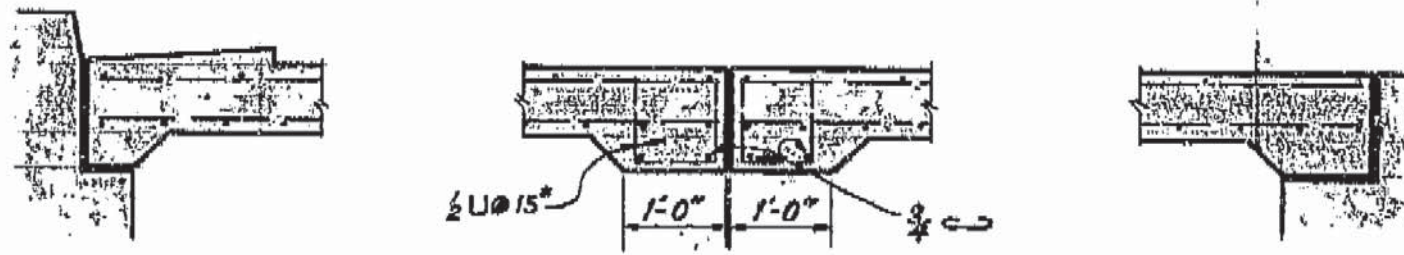
STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS  
**BRIDGE DEPARTMENT**

DIST.	COUNTY	ROUTE	SECTION
VII	L.A.	8	L.A.

*[Signature]*  
 BRIDGE ENGINEER LICENSE 5474  
 DATE APPROVED Apr. 29, 1949



**FLOATING SLAB**  
 Scale:  $\frac{3}{8}'' = 1'-0''$



**SECTION E-E**  
 Scale:  $\frac{3}{8}'' = 1'-0''$

*Note:*  
 Refer to contract Plans, Sheet No. 19,  
 for remaining details.

DRAWN BY WWS DATE 4-49  
 CHECKED BY LP DATE 4-49  
*[Signature]*

**SUPPLEMENTARY DRAWING**

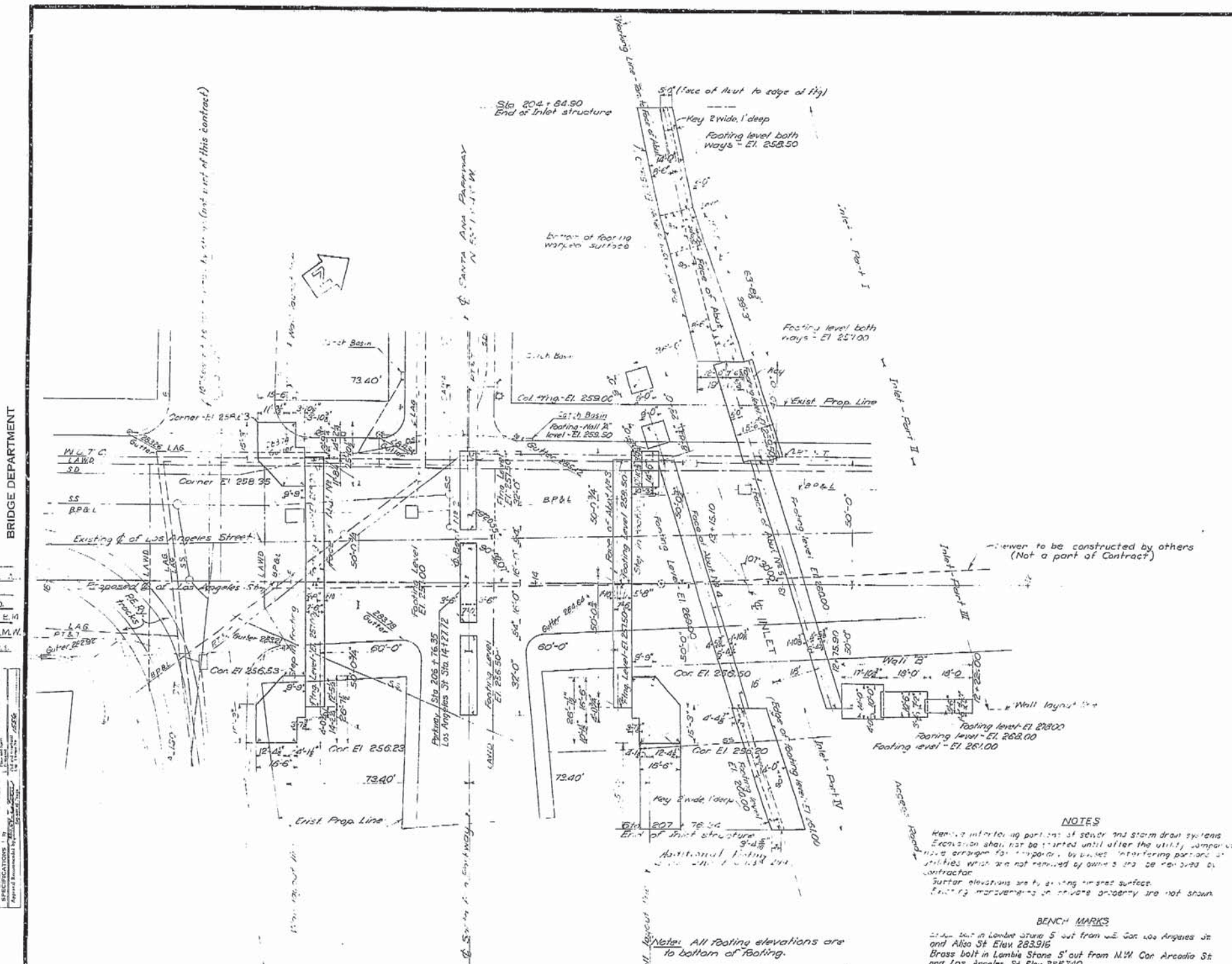
<b>LOS ANGELES ST. OVERPASS</b>	
<b>FLOATING SLAB REVISION</b>	
SCALE: <i>As Shown</i>	FILE NO. <u>LD-7-362</u>
BRIDGE NO. <u>53-629</u>	DRWG. NO. <u>SC-173B-1</u>

1840

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
2	CAL.				

SUBMITTED Jan 19 1948  
 ENGINEER OF BRIDGE & STRUCTURAL DESIGN  
 APPROVED Jan 17 1949  
George Albert  
 CITY ENGINEER CITY OF LOS ANGELES

CITY	COUNTY	FOUNDER	DESIGNER	DATE	SCALE
Los Angeles	Los Angeles			February 28, 1949	1" = 20'



**AS BUILT PLANS**  
 Contract No. 14K84  
 Date Completed \_\_\_\_\_  
 Document No. 7000/1957

THIS SET OF PLANS HAS BEEN CHECKED TO CORRESPOND TO THE "AS BUILT" RECORDS BY: AS BUILT  
 ENGINEER C. J. ...  
 TRACINGS CORRECTED BY: DATE 4-20-51

**UTILITY LEGEND**

ABOVE GROUND	BELOW GROUND
M.H. Manhole	LAWD Los Angeles Water Dept
F.H. Fire Hydrant	B.P.L. Bureau of Power & Light
T.S. Traffic Signal	L.A.G. Los Angeles Gas
T.P. Telephone Pole	S.S. Sanitary Sewer
E. Electric	S.D. Street Drain
F.A. Fire Alarm	T.S.S. Traffic Signal System
	P.T. & T. Pacific Tel. & Tel. Co.
	M.U.T.C. Western Union Telegraph Co.

**NOTES**  
 Refer to interfering portions of sewer and storm drain systems. Excavation shall not be started until after the utility companies have arranged for repairs by either interfering portions of utilities which are not removed by owner or to be removed by contractor. Elevation shown is to existing ground surface. Existing improvements in private property are not shown.

**BENCH MARKS**  
 1. In Lambie Stone 5' out from W.E. Cor. Los Angeles St and Aliso St Elev 283.915  
 2. Brass bolt in Lambie Stone 5' out from N.W. Cor. Arcadia St and Los Angeles St Elev 285.740  
 See FB 20120 records of the L.A. City Engineer for further information.

**FOUNDATION PLAN**  
 Scale 1" = 20'

Notes: All footing elevations are to bottom of footing.  
 For pipes not shown see sanitary sewer and storm drain plans.  
 For area available for use of Contractor see Sheet 30

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS

**LOS ANGELES STREET OVERCROSSINGS**

**FOUNDATION PLAN**

SCALE 1" = 20'

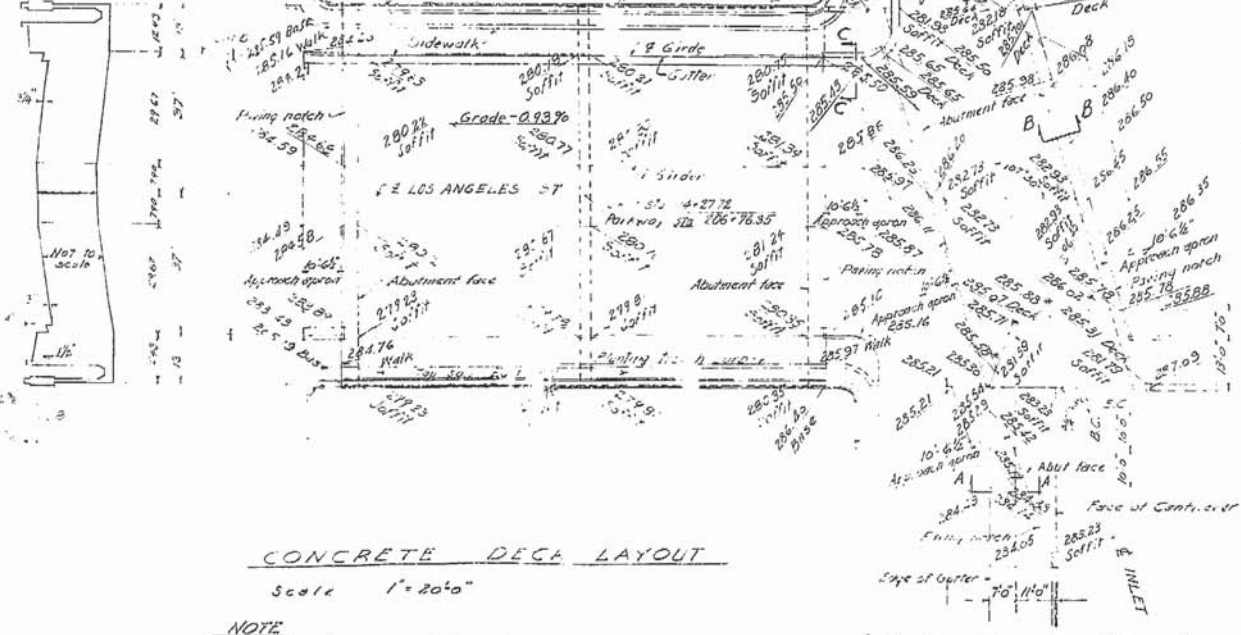
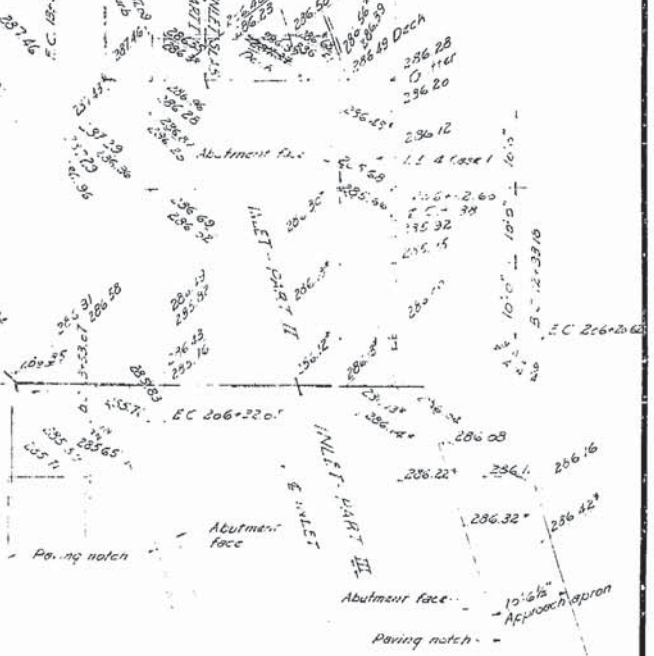
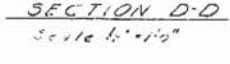
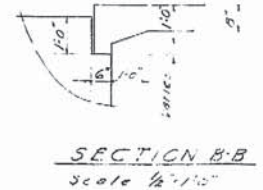
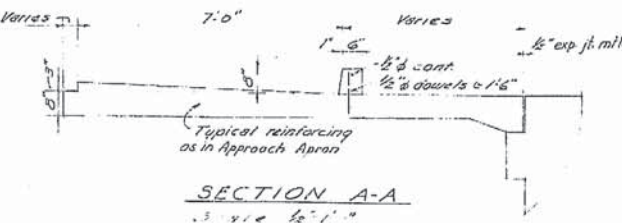
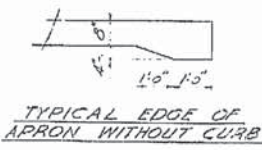
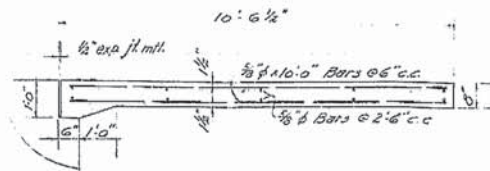
Bridge 53-629	FILE	DRAWING C-1738-2
Route 53-769		

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER THE DIRECTION AND CONTROL OF THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.  
 DATE 5/1/51 SIGNATURE [Signature] TITLE CLERK



FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
2	CAL.			30	

Submitted 10/13/49  
 Approved 1/17/50  
 Date approved: February 23, 1949  
 ENGINEER BRIDGES & STRUCTURAL DESIGN  
 101  
 DATE APPROVED: FEBRUARY 23, 1949



NOTE  
 Elevations are to top of concrete except as noted.  
 See Street Plans for finish surface elevations.

\* Elevation at top edge of Concrete Gutter

AS BUILT PLANS  
 Contract No. 141C84  
 Date Completed \_\_\_\_\_  
 Document No. 70001957

THIS SET OF PLANS AND SPECIFICATIONS IS HEREBY RETURNED TO THE ENGINEER IN FULL PAYMENT OF THE FEE FOR THE SAME.

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS  
 LOS ANGELES STREET OVERCROSSINGS  
 DECK LAYOUT & APPROACH APRONS  
 SCALE As shown: SHEETS 53-330 FILE: DRAWING C-1738-3

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.  
 DATE 9/15/51 SIGNATURE: [Signature] TITLE: Asst.

BRIDGE DEPARTMENT

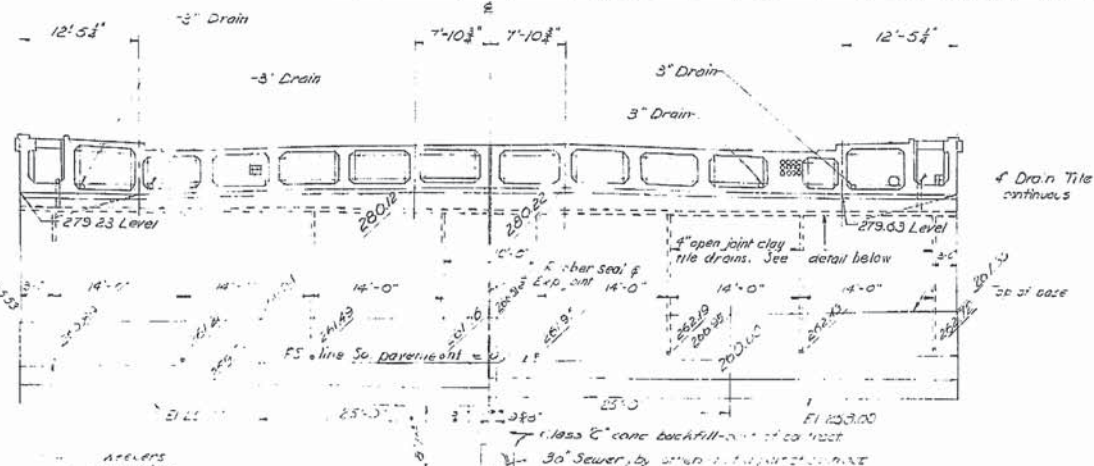
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 CHECKED BY: [Name]  
 QUANTITIES BY: [Name]  
 SPECIFICATIONS BY: [Name]



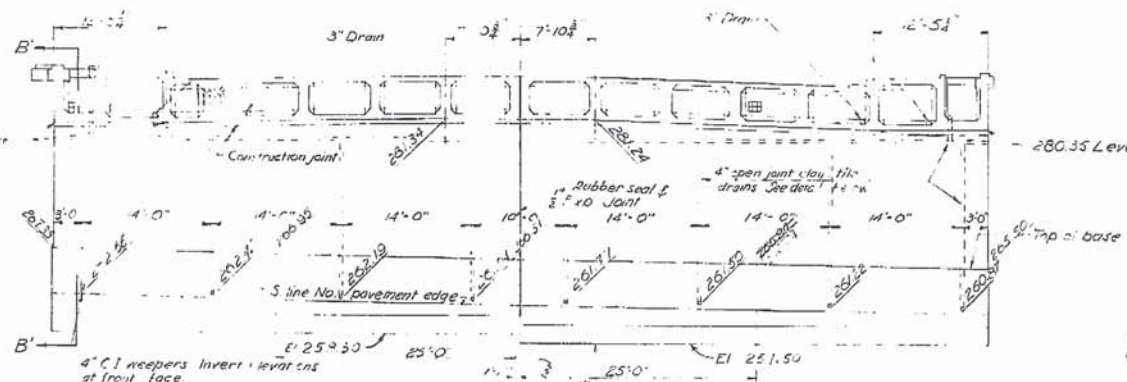
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
2	CAL.				

DIST.	COUNTY	ROUTE	SECTION	POST MILE	TOTAL MILES
VII	L.A.	101	L.A. 17	4.7	30

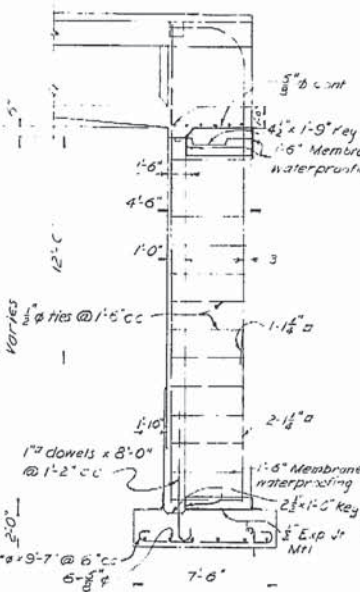
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 BY: [Signature]  
 TITLE: [Signature]



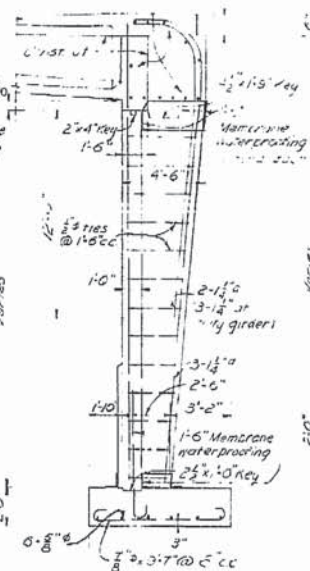
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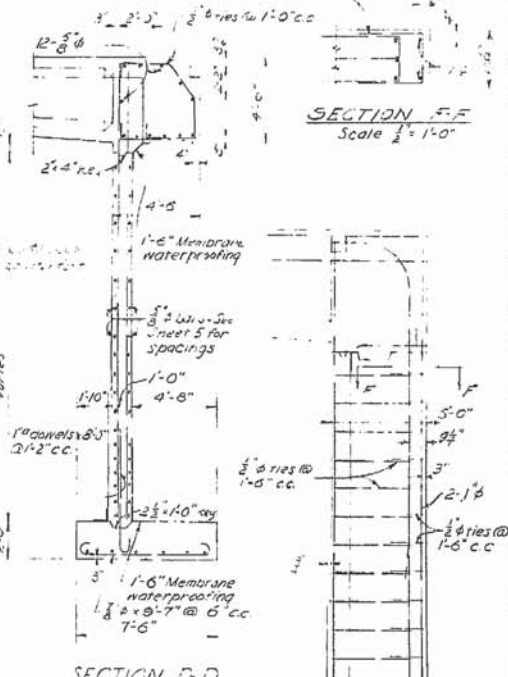
ELEVATION OF NORTH ABUTMENT (LOOKING NORTH)  
Scale 1/8" = 1'-0"



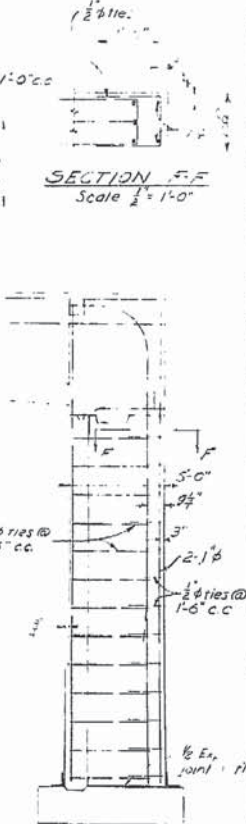
SECTION B-B  
Scale 1/2" = 1'-0"



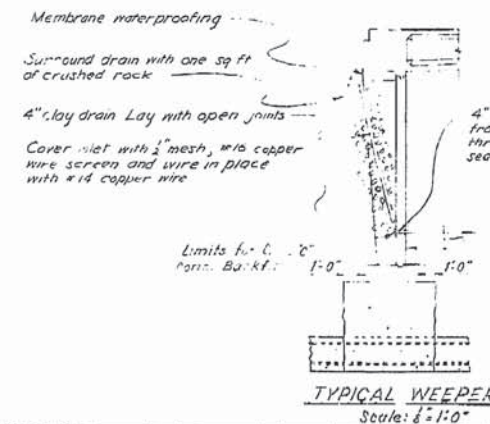
SECTION C-C  
Scale 1/2" = 1'-0"



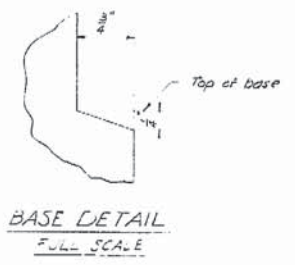
SECTION D-D  
Scale 1/2" = 1'-0"



SECTION E-E  
Scale 1/2" = 1'-0"



TYPICAL WEEPER  
Scale: 1/2" = 1'-0"



BASE DETAIL  
FULL SCALE

THIS SET OF PLANS HAS BEEN CHECKED TO CORRECT FOR ALL AS BUILT PLANS, DATED [Date], AND IS SUBMITTED BY RESIDENT ENGINEER [Name], TRACINGS CORRECTED BY [Name], DATE [Date].

Note: For location of Section B-B, C-C and D-D see sheet #5.

**AS BUILT PLANS**  
 Contract No. 141C84  
 Date Completed [Date]  
 Document No. 70001957

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS

**LOS ANGELES ST. OVERCROSSINGS**  
 ABUTMENTS #1 & #3

SCALE AS SHOWN BRIDGE #53-529 RAMP #3-269 FILE DRAWING C-1736-4

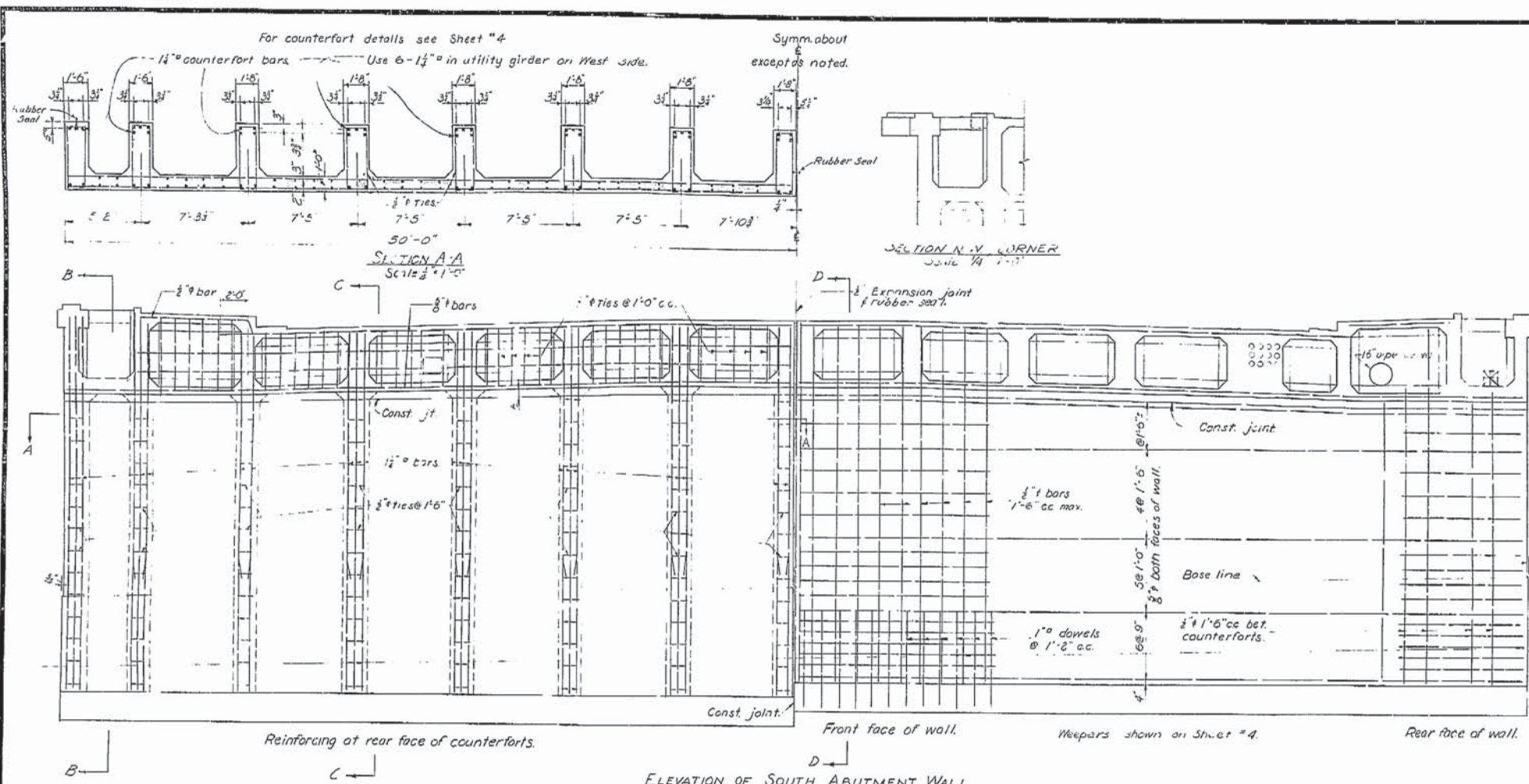
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.  
 DATE 3/1/43 SIGNATURE [Signature] TITLE [Title]



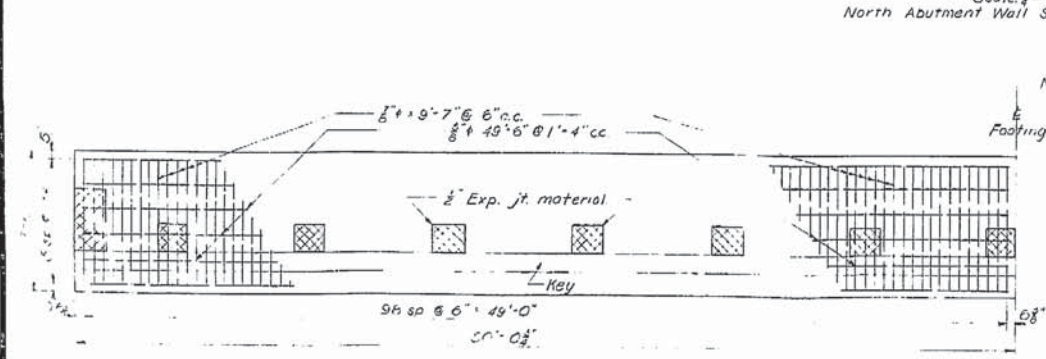
FED. DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
2	CAL.				

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
11	LA	5	LA 3	33	

DATE: Oct 19 1942  
 ENGINEER: R. P. ...  
 APPROVED: ...  
 CITY: LOS ANGELES



**ELEVATION OF SOUTH ABUTMENT WALL**  
 Scale: 1/2" = 1'-0"  
 North Abutment Wall Similar except for N.W. corner



**HALF FOOTING PLAN**  
 Scale: 1/2" = 1'-0"

**UTILITY NOTE:**  
 Location and size of utility pipes and manhole locations may be verified and directed by the Engineer.

THIS PLAN IS THE PROPERTY OF THE STATE OF CALIFORNIA AND IS LOANED TO YOU FOR YOUR INFORMATION. IT IS NOT TO BE REPRODUCED OR COPIED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF THE ENGINEER.

**NOTE:**  
 For Sections 1 & 3 see sheet C-173B-5

**AS BUILT PLANS**  
 Contract No. 144C84  
 Date Completed \_\_\_\_\_  
 Document No. 70001957

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAY  
**LOS ANGELES STREET OVERCROSSINGS**  
**ABUTMENTS 1 & 3 - DETAILS.**  
 SCALE: AS SHOWN  
 BRIDGE 58-620  
 RAMPS 53-789  
 FILE  
 DRAWING C-173B-5

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.  
 DATE: 3/1/43 SIGNATURE: [Signature] TITLE: ASST

BRIDGE DEPARTMENT

DESIGN: [Name]  
 CHECKED: [Name]  
 APPROVED: [Name]

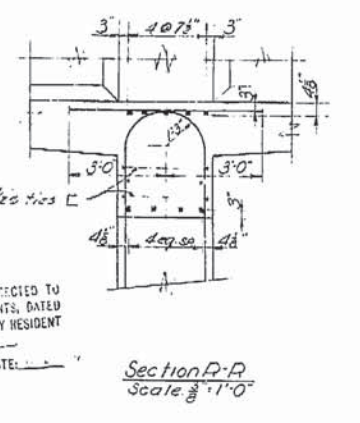
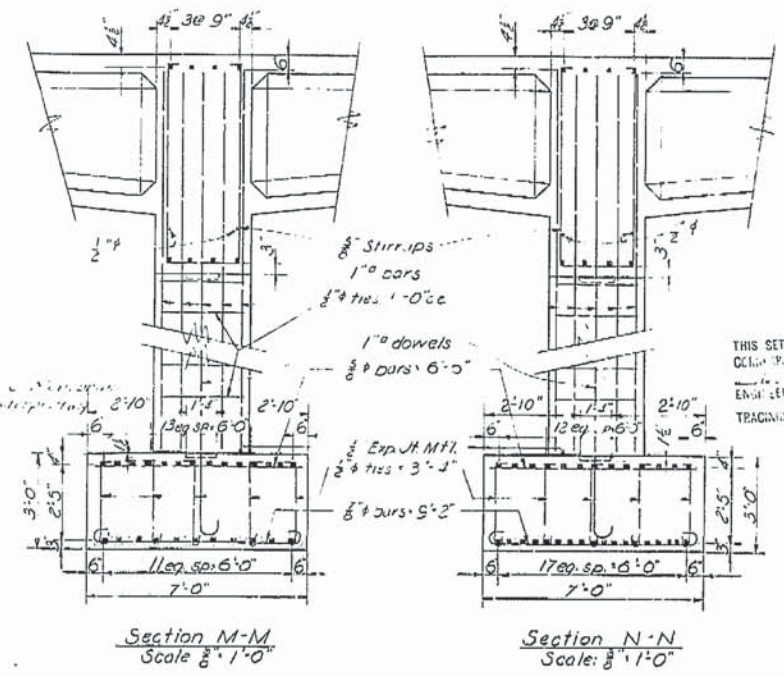
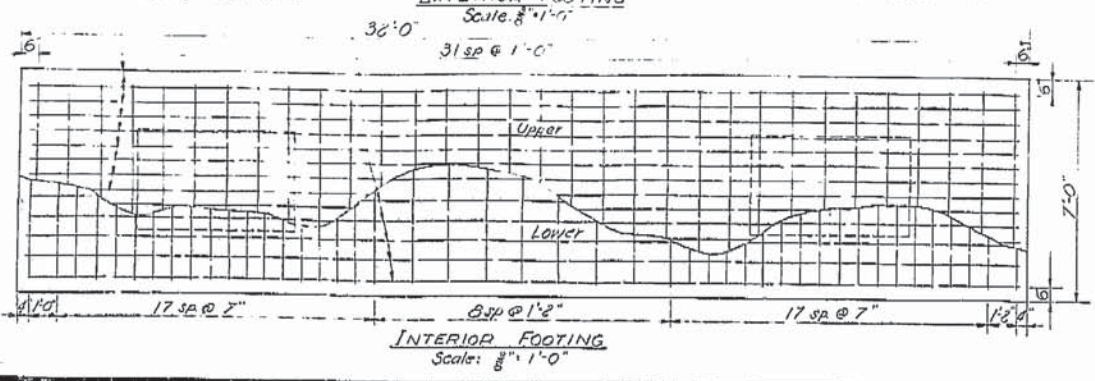
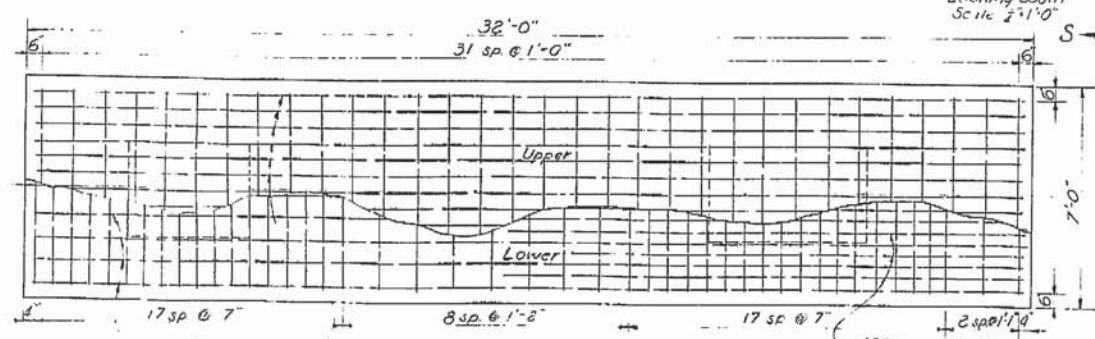
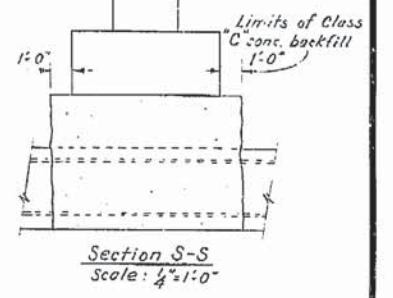
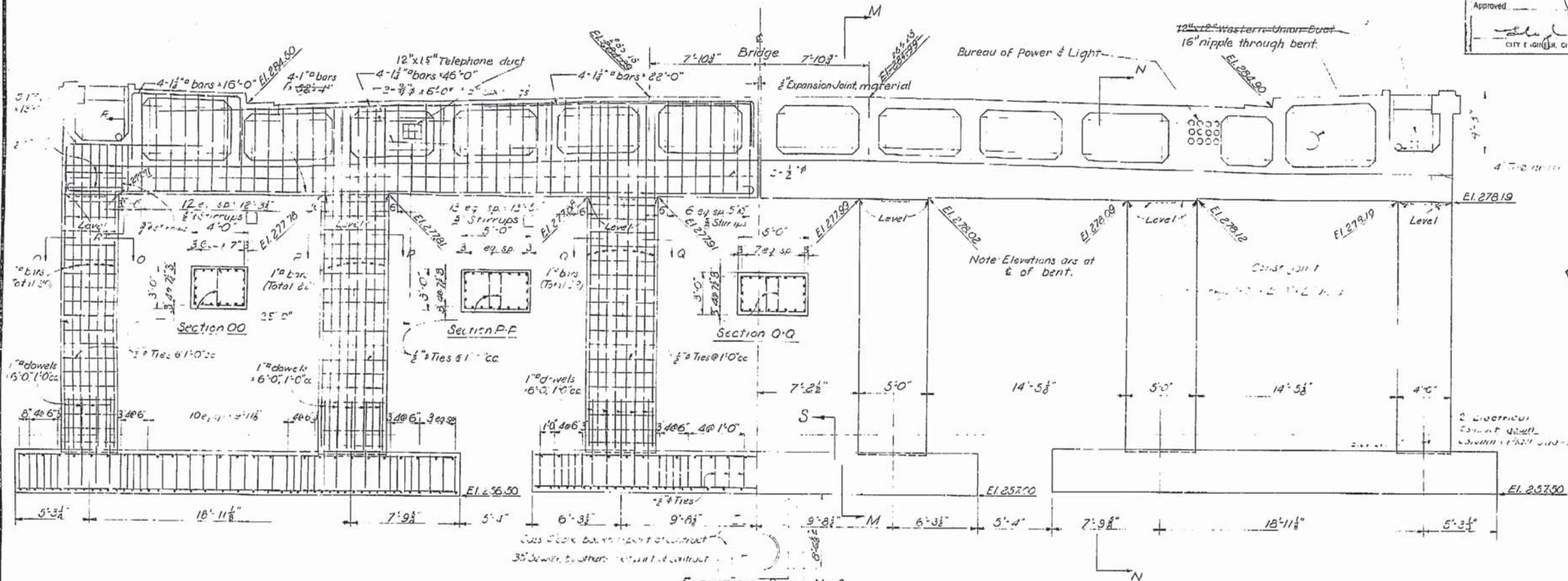


Submitted Oct 19 1948  
P. J. Moore  
 ENGINEER, BRIDGE & STRUCTURAL DESIGN  
 Approved Jan 17 1949  
[Signature]  
 CITY ENGINEER, CITY OF LOS ANGELES

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
VI	L.A.	2	L.A.	5	30

101  
 DATE APPROVED: February 23, 1949

**AS BUILT PLANS**  
 Contract No. 141C.84  
 Date Completed  
 Document No. 7000.1957



THIS SET OF PLANS HAS BEEN CORRECTED TO REFLECT THE AS BUILT PRINTS, DATED [blank], SUBMITTED BY RESIDENT ENGINEER [blank].  
 TRACING CORRECTED BY: [blank] DATE: [blank]

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS

**LOS ANGELES STREET OVERCROSSINGS**

**BENT NO. 2**

SCALE: AS SHOWN    B-103E: 53-529    RAMP: 53-769    FILE    DRAWING: C-1738-6

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 5/1/51 SIGNATURE: [Signature] TITLE: Asst.



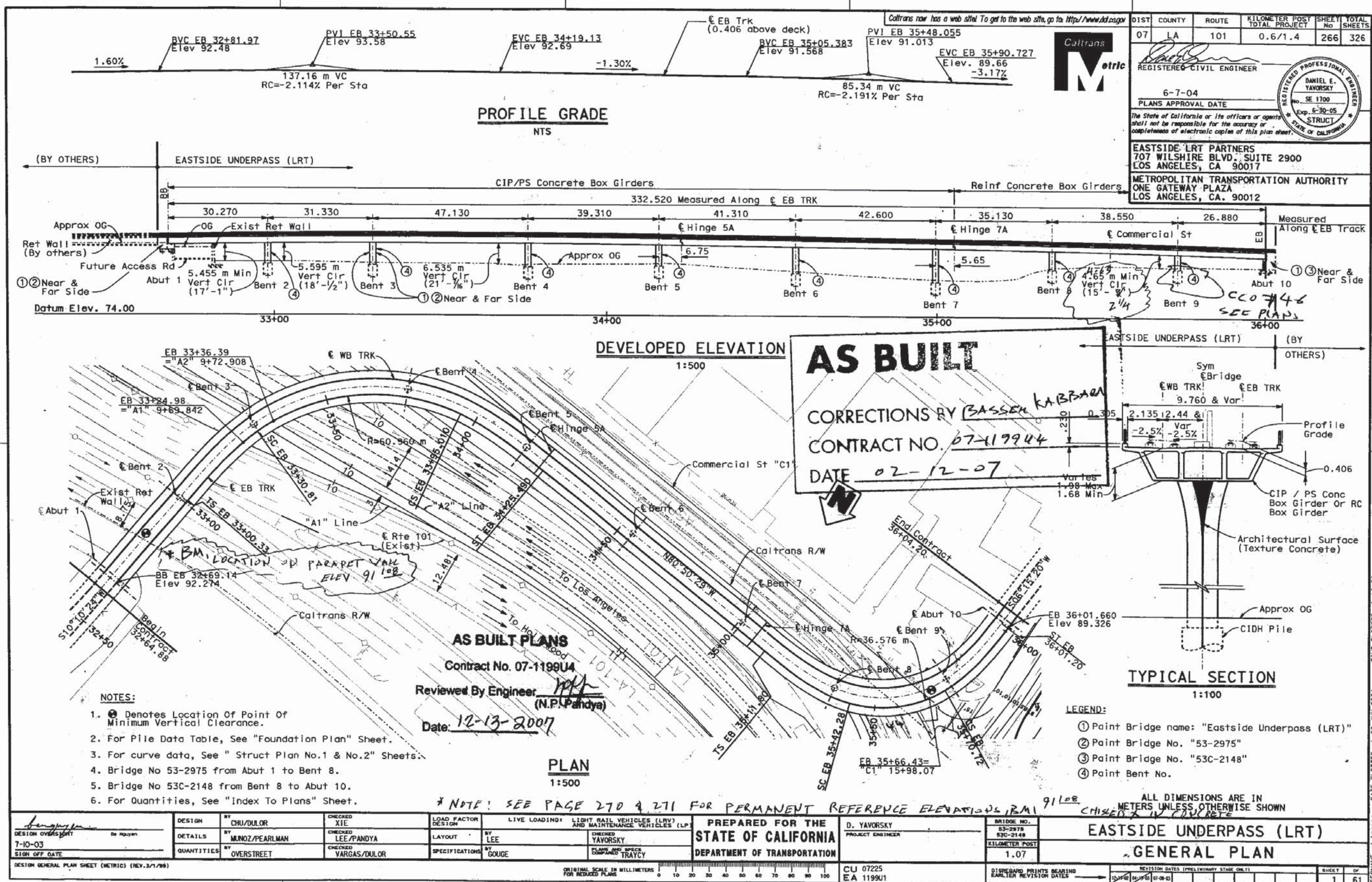


**As-Built Plans**  
**Eastside LRT Project Bridge over HWY 101,**  
**Bridge No. 53-2975**



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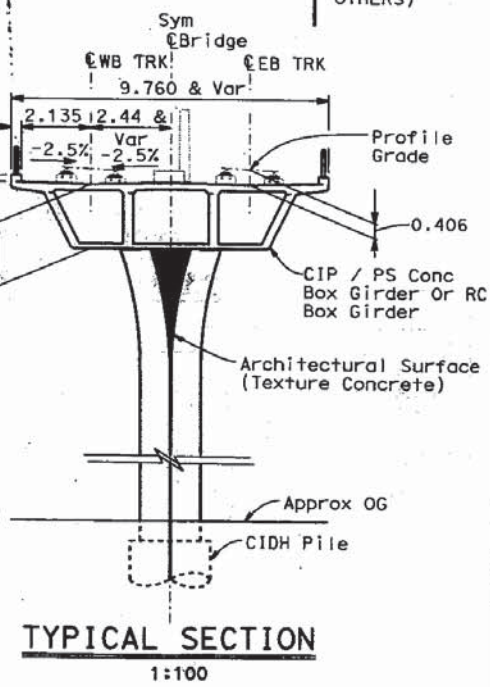




DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	101	0.6/1.4	266	326

REGISTERED CIVIL ENGINEER  
 6-7-04  
 PLANS APPROVAL DATE  
 The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.  
 EASTSIDE LRT PARTNERS  
 707 WILSHIRE BLVD., SUITE 2900  
 LOS ANGELES, CA 90017  
 METROPOLITAN TRANSPORTATION AUTHORITY  
 ONE GATEWAY PLAZA  
 LOS ANGELES, CA. 90012

**AS BUILT**  
 CORRECTIONS BY *BASSEN KARBAAH*  
 CONTRACT NO. 07-11994  
 DATE 02-12-07



- NOTES:**
- ① Denotes Location Of Point Of Minimum Vertical Clearance.
  - For Pile Data Table, See "Foundation Plan" Sheet.
  - For curve data, See "Struct Plan No.1 & No.2" Sheets.
  - Bridge No 53-2975 from Abut 1 to Bent 8.
  - Bridge No 53C-2148 from Bent 8 to Abut 10.
  - For Quantities, See "Index To Plans" Sheet.

**AS BUILT PLANS**  
 Contract No. 07-11994  
 Reviewed By Engineer: *N.P. Pandya*  
 Date: 12-13-2007

**PLAN**  
 1:500

\* NOTE: SEE PAGE 270 & 271 FOR PERMANENT REFERENCE ELEVATIONS & B.M. 91108 CHISEL IN CONCRETE

DESIGN OVERSIGHT 7-10-03 SIGN OFF DATE	DESIGN BY CHU/DULOR	CHECKED XIE	LOAD FACTOR DESIGN	LIVE LOADING LIGHT RAIL VEHICLES (LRV) AND MAINTENANCE VEHICLES (LP)	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER D. YAVORSKY	BRIDGE NO. 53-2975 53C-2148 KILOMETER POST 1.07	<b>EASTSIDE UNDERPASS (LRT)</b> <b>GENERAL PLAN</b>
DESIGN GENERAL PLAN SHEET (METRIC) (REV. 3/1/99)	DETAILS BY MUNOZ/PEARLMAN	CHECKED LEE/PANDYA	LAYOUT BY LEE	CHECKED YAVORSKY	CU 07225 EA 1199U1	FILE => oagp00001.dgn	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY) 12/13/07 06/25/08 07/04/08
	QUANTITIES BY OVERSTREET	CHECKED VARGAS/DULOR	SPECIFICATIONS BY BOUGE	PLANS AND SPECS CHECKED TRAYCY				SHEET 1 OF 61

submitted 8/5/08



INDEX TO BRIDGE PLANS

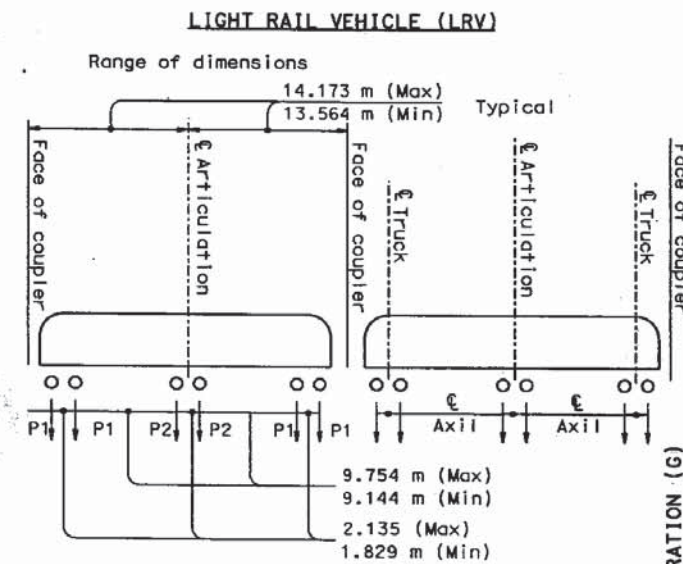
SHEET NO.	TITLE
1	GENERAL PLAN
2	INDEX TO PLANS
3	STRUCTURE PLAN No. 1
4	STRUCTURE PLAN No. 2
5	DECK CONTOURS No. 1
6	DECK CONTOURS No. 2
7	FOUNDATION PLAN
8	ABUTMENT 1 DETAILS No. 1
9	ABUTMENT 1 DETAILS No. 2
10	ABUTMENT 1 DETAILS No. 3
11	ABUTMENT 10 DETAILS No. 1
12	ABUTMENT 10 DETAILS No. 2
13	ABUTMENT 10 DETAILS No. 3
14	BENT 2 DETAILS
15	BENT 3 DETAILS
16	BENT 4 & 5 DETAILS
17	BENT 6 DETAILS
18	BENT 7, 8, & 9 DETAILS
19	COLUMN DETAILS No. 1
20	COLUMN DETAILS No. 2
21	3.0 M CIDH PILE DETAILS
22	2.4 M CIDH PILE DETAILS
23	TYPICAL SECTION No. 1
24	TYPICAL SECTION No. 2
25	TYPICAL SECTION No. 3
26	GIRDER LAYOUT No. 1
27	GIRDER LAYOUT No. 2
28	GIRDER LAYOUT No. 3
29	GIRDER REINFORCEMENT No. 1
30	GIRDER REINFORCEMENT No. 2
31	GIRDER REINFORCEMENT No. 3
32	GIRDER REINFORCEMENT No. 4
33	GIRDER DIAPHRAGM DETAILS
34	GIRDER CAMBER DIAGRAM
35	PTFE BEARING DETAILS FOR HINGE 5A
36	HINGE No. 5A DETAILS
37	HINGE No. 7A DETAILS
38	MISC DETAILS-HINGES NOS. 5A & 7A
39	CABLE RESTRAINER UNIT - TYPE 2
40	CABLE RESTRAINER UNIT - TYPE 2 DETAILS
41	JOINT SEAL ASSEMBLY (MR ≤ 100 mm)
42	JOINT SEAL DETAILS HINGE 5A (MR > 100 mm)
43	METAL SAFETY RAILING DETAILS
44	DRAINAGE DETAILS
45	OCS AND LIGHT POLE ANCHORS PLAN - 1
46	OCS AND LIGHT POLE ANCHORS PLAN - 2
47	OCS AND LIGHT POLE FOUNDATION DETAILS
48	WALKWAY AND OCS ANCHOR DETAILS
49	OCS POLE FOUNDATION DETAILS
50	OCS AND LIGHT POLE FOUNDATION SCHEDULE
51	TRACK DETAILS
52	STRAY CURRENT CONTROL No. 1
53	STRAY CURRENT CONTROL No. 2
54	STRAY CURRENT CONTROL No. 3
55	ALIGNMENT PLAN AND DATA
56	SURVEY CONTROL MONUMENTATION-METRIC
57	LOG OF BORINGS SHEET 1 OF 5
58	LOG OF BORINGS SHEET 2 OF 5
59	LOG OF BORINGS SHEET 3 OF 5
60	LOG OF BORINGS SHEET 4 OF 5
61	LOG OF BORINGS SHEET 5 OF 5

GENERAL NOTES  
LOAD FACTOR DESIGN

DESIGN: CALTRANS BRIDGE DESIGN SPECIFICATIONS (LFD VERSION APRIL 2000) (1996 AASHTO WITH INTERIM REVISIONS BY CALTRANS) AND LACMTA DESIGN CRITERIA

ADDITIONAL DEAD LOADS (AD): RAIL & PLINTHS, DUCTBANK/WALKWAY, OCS POLES

LIVE LOADING (LL): LIGHT RAIL VEHICLES (LRV) & MAINTENANCE VEHICLE (LP) (SEE LOADING DIAGRAMS)



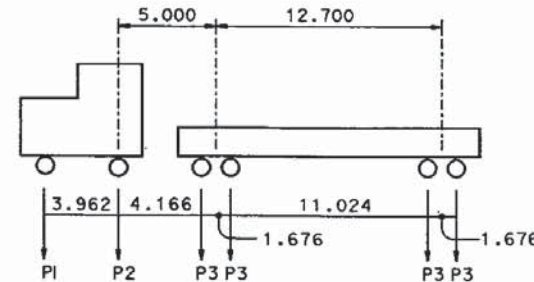
ESTIMATED LOADING DISTRIBUTION (kN)

	DISTR. TO CENTER TRUCK	P1	P2	TOTAL
UNLOADED	24%	82.83	52.31	435.93
FULLY LOADED	31%	75.20	67.57	435.93
	24%	108.98	82.29	600.51
	31%	101.42	96.97	600.51

MAX SPEED OF LIGHT RAIL VEHICLE = 25 km/h

LIGHT RAIL VEHICLE FOR SEISMIC: THE MASS OF ONE 3-CAR TRAIN IS INCLUDED WITH THE DEADLOAD MASS OF THE STRUCTURE. NO OTHER ASPECT OF LIVE LOAD IS INCLUDED IN GROUP VII LOADING

LIGHT RAIL MAINTENANCE VEHICLE (LP)

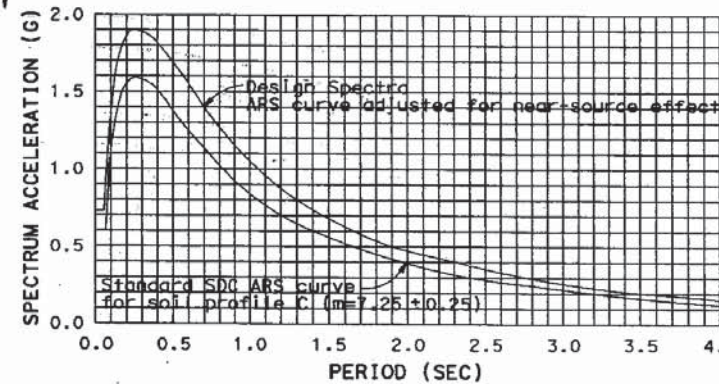


LOADING (kN)

	LOADED
P1	133.45
P2	200.17
P3	82.29

LIGHT RAIL VEHICLE (LRV) IMPACT: VERTICLE = 30% OF LL, HORIZ = 10% OF LL (NO IMPACT FOR LP LOADING)

SEISMIC LOADING (EQ): MODIFIED SDC ARS CURVE FOR SOIL PROFILE C (M= 7.25 ± 0.25) (PEAK ROCK ACCELERATION = 0.6g WITH 20% INCREASE IN SPECTRA ACCELERATION MODIFIED AS SHOWN BELOW)



REINFORCED CONCRETE: SUPERSTRUCTURE SUBSTRUCTURE  
Fy = 420 MPa Fy = 420 MPa  
F'c = 35 MPa F'c = 25 & 28 MPa

TRANSVERSE DECK SLABS (WORKING STRESS DESIGN)  
Fy = 138 MPa  
F'c = 8.3 MPa  
N = 10

PRESTRESSED CONCRETE: SEE "PRESTRESSING NOTES" IN "GIRDER LAYOUT NO. 1" SHEET



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	101	0.6/1.4	267	326

REGISTERED CIVIL ENGINEER  
6-7-04  
PLANS APPROVAL DATE  
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.  
EASTSIDE LRT PARTNERS  
707 WILSHIRE BLVD., SUITE 2900  
LOS ANGELES, CA 90017  
METROPOLITAN TRANSPORTATION AUTHORITY  
ONE GATEWAY PLAZA  
LOS ANGELES, CA. 90012

ADDITIONAL ABBREVIATIONS

- CS CIRCULAR CURVE TO SPIRAL
- EB EASTBOUND
- NIC NOT IN THIS CONTRACT (BY OTHERS)
- OCS OVERHEAD CONTACT SYSTEM
- SC SPIRAL TO CIRCULAR CURVE
- ST SPIRAL TO TANGENT OR SHORT TANGENT
- T/R TOP OF RAIL
- TRK TRACK
- TS TANGENT TO SPIRAL
- WB WESTBOUND

AS BUILT PLANS

Contract No. 07-1199U4

Reviewed By Engineer: *[Signature]*  
(N.P. Pandya)

Date: 12-13-2007

QUANTITIES

DESCRIPTION	UNIT	SUM
CONTAMINATED MATERIAL HANDLING	LUMP	SUM
STRUCTURE EXCAVATION (BRIDGE)	m <sup>3</sup>	243
STRUCTURE EXCAVATION (TYPE Y) (AERIALY DEPOSITED LEAD)	m <sup>3</sup>	44
STRUCTURE BACKFILL (BRIDGE)	m <sup>3</sup>	370
1.2 m CAST-IN-DRILLED-HOLE CONCRETE PILING	m	142
2.4 m CAST-IN-DRILLED-HOLE CONCRETE PILING	m	109
3.0 m CAST-IN-DRILLED-HOLE CONCRETE PILING	m	67
900 mm CAST-IN-DRILLED-HOLE CONCRETE PILING	m	83
PRESTRESSING CAST-IN-PLACE CONCRETE STRUCTURAL CONCRETE, BRIDGE FOOTING	LUMP	SUM
STRUCTURAL CONCRETE, BRIDGE	m <sup>3</sup>	191
FLUTED RIB TEXTURE	m <sup>2</sup>	2 360
JOINT SEAL (MR=30 mm)	m	36
JOINT SEAL ASSEMBLY (MR 70 mm)	m	10
JOINT SEAL ASSEMBLY (MR 90 mm)	m	10
JOINT SEAL ASSEMBLY (MR 101 mm - 160 mm)	m	10
BAR REINFORCING STEEL (BRIDGE)	kg	982 000
BAR REINFORCING STEEL (EPOXY COATED) (BRIDGE)	kg	6 200
MISCELLANEOUS METAL (RESTRAINER - CABLE TYPE)	kg	1 334
MISCELLANEOUS METAL (BRIDGE)	kg	18 400
METAL RAILING	m	667
PTFE BEARING	EA	4

**No As-Built Changes**

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT 7-10-03 SIGN OFF DATE	DESIGN BY: CHU CHECKED BY: XIE DETAILS BY: NGUYEN/PEARLMAN CHECKED BY: LEE/PANDYA QUANTITIES BY: OVERSTREET CHECKED BY: VARGAS/DULOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DAN YAVORSKY PROJECT ENGINEER	BRIDGE NO. 53-2975 53C-2946 KILOMETER POST 1.07	EASTSIDE UNDERPASS (LRT) INDEX TO PLANS
DESIGN DETAIL SHEET (METRIC REV. 3/1/96)	ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS	CU 07225 EA 1199U1	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY)	SHEET 2 OF 61



MARK	DATE	DESCRIPTION	BY	CH'D
1	12/25/05	Revised per RFI-198.02	VN	NP
REVISIONS				



**AS BUILT PLANS**  
 Contract No. 07-1199U4  
 Reviewed By Engineer *N.P. Pandya*  
 Date: 12-13-2007

**AS BUILT** *CCO # 57*  
 CORRECTIONS BY BASSEM KABBARA  
 CONTRACT NO. 07-119944  
 DATE 02-12-07



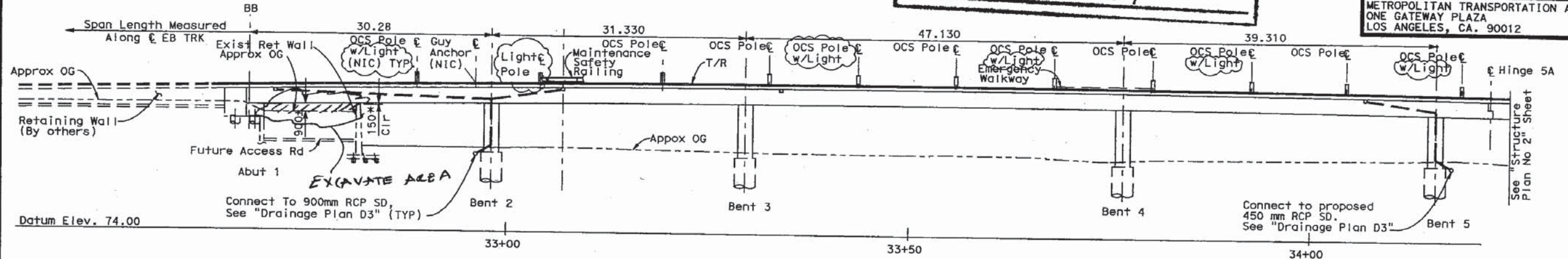
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
7	LA	101	0.6/1.4	268R	326

REGISTERED CIVIL ENGINEER  
 DANIEL E. YAVORSKY  
 No. SE 1700  
 Exp. 6-30-05  
 STATE OF CALIFORNIA

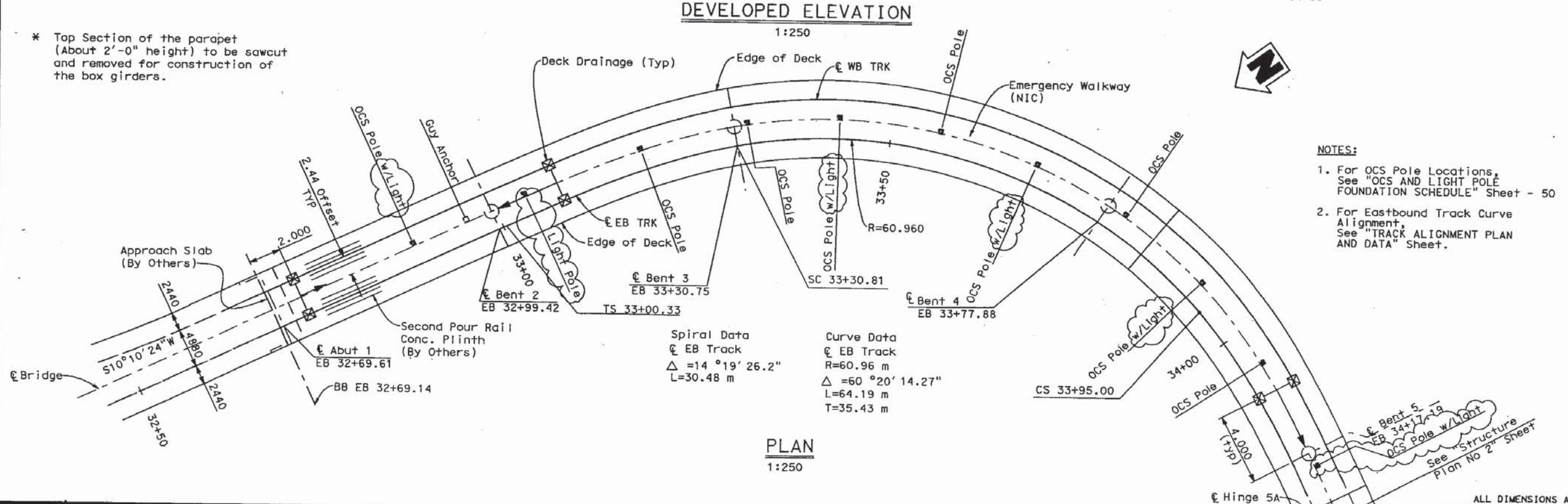
PLANS APPROVAL DATE \_\_\_\_\_  
 The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

EASTSIDE LRT PARTNERS  
 707 WILSHIRE BLVD. SUITE 2900  
 LOS ANGELES, CA 90017

METROPOLITAN TRANSPORTATION AUTHORITY  
 ONE GATEWAY PLAZA  
 LOS ANGELES, CA. 90012



\* Top Section of the parapet (About 2'-0" height) to be sawcut and removed for construction of the box girders.



DESIGN OVERSIGHT <i>BE NGUYEN</i> 7-10-05	DESIGN BY: YANG/DULOR CHECKED: XIE	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DAN YAVORSKY PROJECT ENGINEER	BRIDGE NO. 33-2975 530-2148	EASTSIDE UNDERPASS (LRT) STRUCTURE PLAN No. 1
SIGN OFF DATE	DETAILS BY: MUNOZ/PEARLMAN QUANTITIES BY: OVERSTREET	CHECKED: LEE/PANDYA CHECKED: VARGAS/DULOR	CU 07225 EA 1199U1	KILOMETER POST 1.07	
DESIGN DETAIL SHEET (METRIC REV. 3/1/98)	ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS	0 10 20 30 40 50 60 70 80 90 100	FILE => oaspl0003.dwg	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY)

3



MARK	DATE	DESCRIPTION	BY	CHK'D
1	12/25/05	Revised per RFI-198.02	VN	NP
REVISIONS				



**AS BUILT**  
 CORRECTIONS BY BASSEM KABBARA  
 CONTRACT NO. 07-119944  
 DATE 02-12-2007

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
7	LA	101	0.6/1.4	269R	326

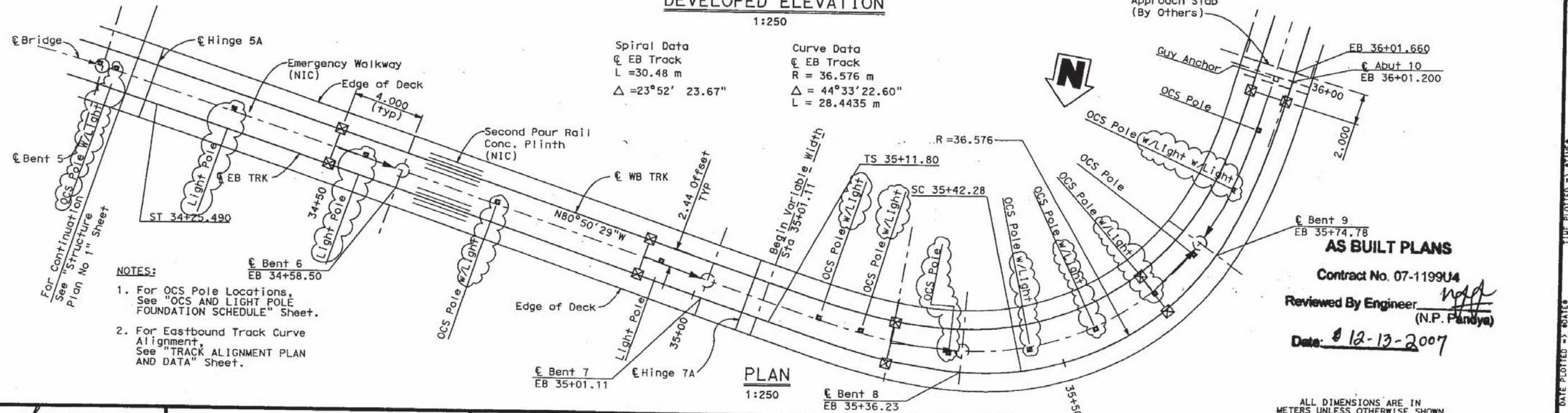
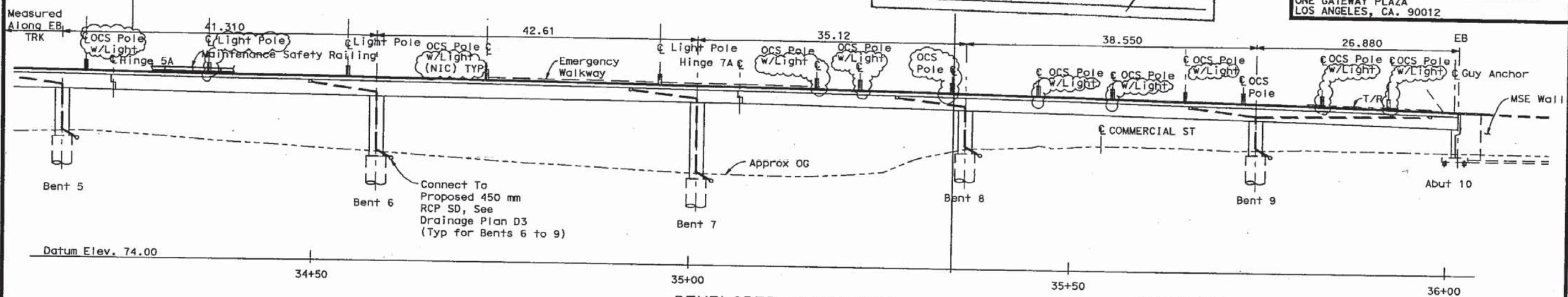
REGISTERED CIVIL ENGINEER  
 DANIEL E. YAVORSKY  
 No. SE 1700  
 Exp. 6-30-05  
 STATE OF CALIFORNIA

PLANS APPROVAL DATE

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EASTSIDE LRT PARTNERS  
 707 WILSHIRE BLVD. SUITE 2900  
 LOS ANGELES, CA 90017

METROPOLITAN TRANSPORTATION AUTHORITY  
 ONE GATEWAY PLAZA  
 LOS ANGELES, CA. 90012



- NOTES:
1. For OCS Pole Locations, See "OCS AND LIGHT POLE FOUNDATION SCHEDULE" Sheet.
  2. For Eastbound Track Curve Alignment, See "TRACK ALIGNMENT PLAN AND DATA" Sheet.

**AS BUILT PLANS**  
 Contract No. 07-119944  
 Reviewed By Engineer [Signature]  
 (N.P. Pandya)  
 Date: 12-13-2007

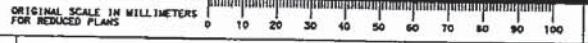
DESIGN OVERSIGHT  
[Signature] BE NGUYEN  
 SIGN OFF DATE  
7-10-03

DESIGN	BY YANG/DULOR	CHECKED XIE
DETAILS	BY MUNOZ/PEARLMAN	CHECKED LEE/PANDYA
QUANTITIES	BY OVERSTREET	CHECKED VARGAS/DULOR

PREPARED FOR THE  
 STATE OF CALIFORNIA  
 DEPARTMENT OF TRANSPORTATION

DAN YAVORSKY  
 PROJECT ENGINEER

BRIDGE NO. 53-2975 53C-2948  
 KILOMETER POST 1.07  
**EASTSIDE UNDERPASS (LRT)**  
**STRUCTURE PLAN No. 2**



CU 07225 EA 1199U1	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY)	SHEET 4 OF 61
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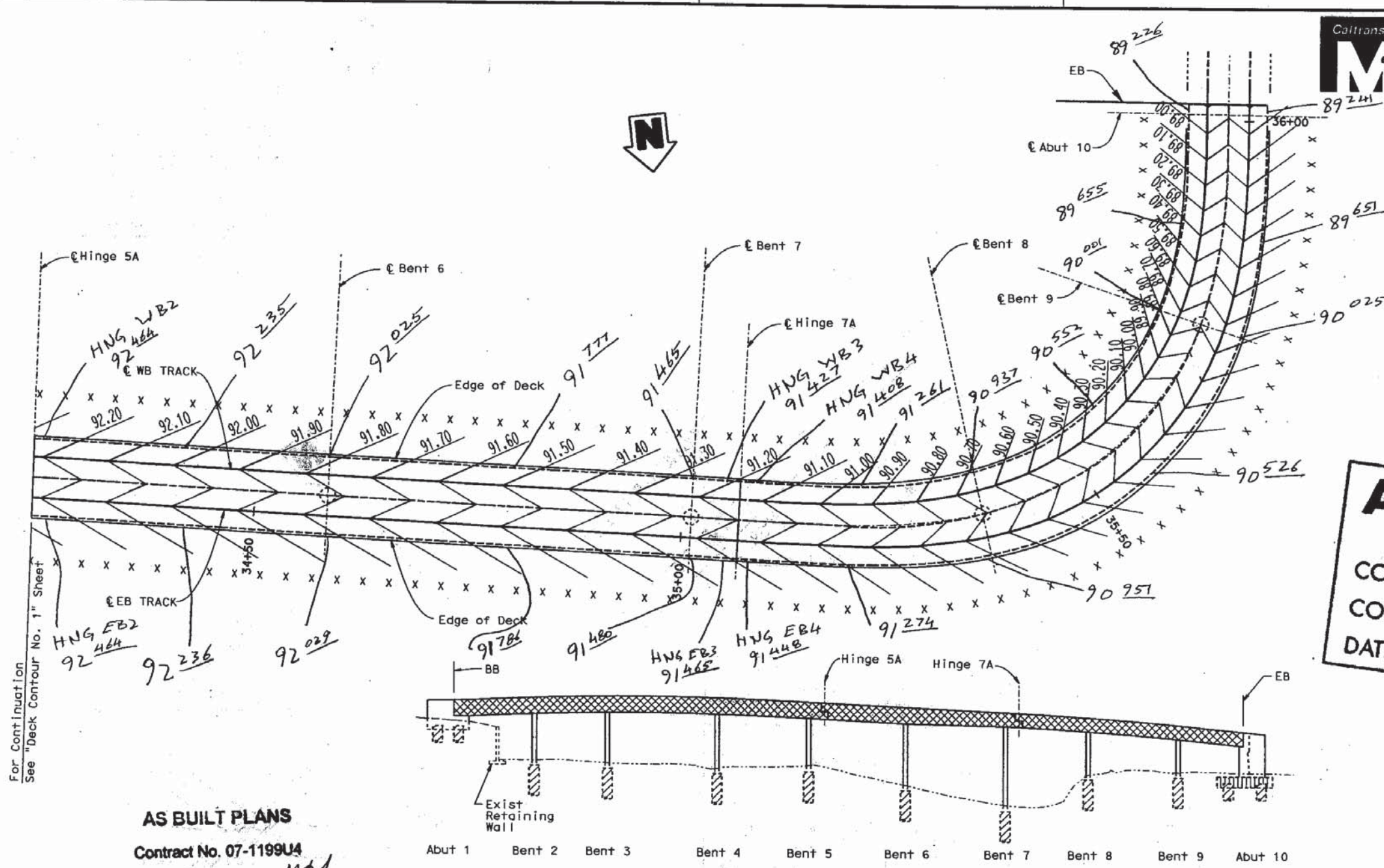






DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
07	LA	101	0.6/1.4	271	326

REGISTERED CIVIL ENGINEER  
 6-7-04  
 PLANS APPROVAL DATE  
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 EASTSIDE LRT PARTNERS  
 707 WILSHIRE BLVD. SUITE 2900  
 LOS ANGELES, CA 90017  
 METROPOLITAN TRANSPORTATION AUTHORITY  
 ONE GATEWAY PLAZA  
 LOS ANGELES, CA. 90012  
 Caltrans now has a web site! To get to the web site, go to: <http://www.dtl.ca.gov>



**AS BUILT**  
 CORRECTIONS BY BASSEM KARBARA  
 CONTRACT NO. 07-119944  
 DATE 07-12-2007

**AS BUILT PLANS**

Contract No. 07-1199U4  
 Reviewed By Engineer [Signature]  
 (N.P. Pandya)  
 Date: 12-13-2007

**CONCRETE STRENGTH AND TYPE LIMITS**

- No Scale
- STRUCTURE CONCRETE, BRIDGE (F'c = 28 MPa @ 28 DAYS)
  - STRUCTURE CONCRETE, BRIDGE (F'c = 35 MPa @ 28 DAYS)
  - CAST-IN-DRILL HOLE CONCRETE PILE, BRIDGE (F'c = 28 MPa @ 28 DAYS)
  - STRUCTURAL CONCRETE FOOTING, (F'c = 25 MPa @ 28 DAYS)

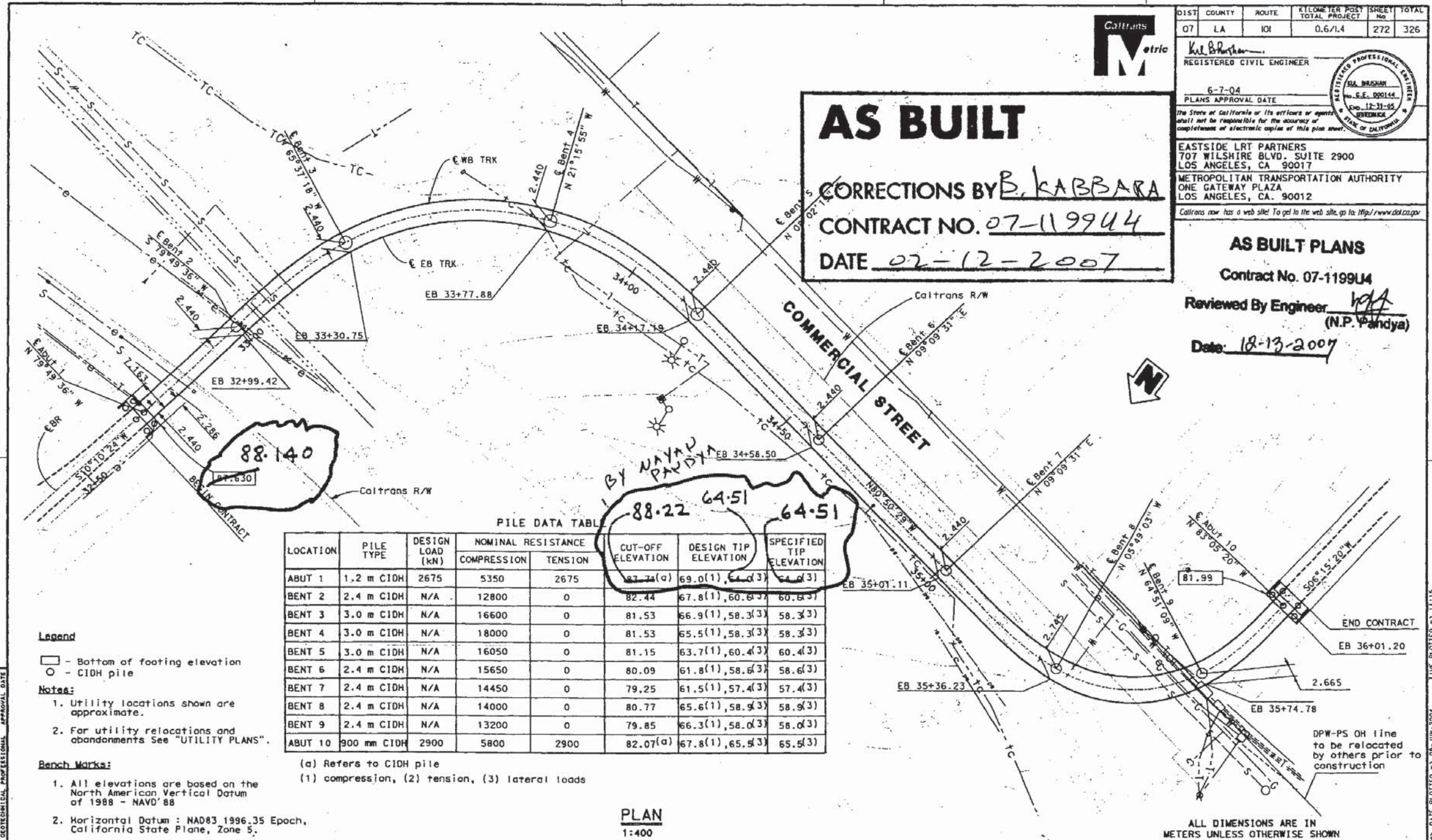
**No As-Built Change**

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT 7-10-03 SIGN OFF DATE	DESIGN BY CHU	CHECKED BY XIE	PREPARED FOR THE <b>STATE OF CALIFORNIA</b> DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER DAN YAVORSKY	BRIDGE NO. 53-2973 53C-248	<b>EASTSIDE UNDERPASS (LRT)</b> <b>DECK CONTOURS No. 2</b>
DESIGN DETAIL SHEET METRIC REV. 3/1/80	DETAILS BY NGUYEN/PEARLMAN	CHECKED BY LEE/PANDYA	QUANTITIES BY OVERSTREET	CHECKED BY VARGAS/DUJOR	KILOMETER POST 1.07	
ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100			CU 07225 EA 1199U1	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY)	SHEET 6 OF 61

6





DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL
07	LA	101	0.6/1.4	272	326

W. B. B...  
REGISTERED CIVIL ENGINEER  
6-7-04  
PLANS APPROVAL DATE  
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



EASTSIDE LRT PARTNERS  
707 WILSHIRE BLVD. SUITE 2900  
LOS ANGELES, CA 90017  
METROPOLITAN TRANSPORTATION AUTHORITY  
ONE GATEWAY PLAZA  
LOS ANGELES, CA. 90012  
Caltrans now has a web site! To get to the web site, go to: <http://www.dot.ca.gov>

**AS BUILT PLANS**  
Contract No. 07-1199U4  
Reviewed By Engineer *[Signature]*  
(N.P. Pandya)  
Date: 12-13-2007

- Legend**
- - Bottom of footing elevation
  - - CIDH pile
- Notes:**
- Utility locations shown are approximate.
  - For utility relocations and abandonments See "UTILITY PLANS".
- Bench Marks:**
- All elevations are based on the North American Vertical Datum of 1988 - NAVD'88
  - Horizontal Datum : NAD83 1996.35 Epoch, California State Plane, Zone 5.

DESIGN DATE: 7-10-03	SCALE: PHOTOGRAMMETRY AS OF:	VERT. DATUM: 1988 - NAVD'88	HORIZ. DATUM: NAD83 1996.35 Epoch, California State Plane, Zone 5.	DESIGN BY: CHU/DULOR	CHECKED BY: XIE	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER: DAN YAVORSKY	SCALE: 1:07	EASTSIDE UNDERPASS (LRT) FOUNDATION PLAN	
DESIGN CHECKED BY: [Signature]	SURVEYED BY: [Signature]	FIELD CHECKED BY: [Signature]	ALIGNMENT TIES: DRAFTED BY: [Signature]	DETAILS BY: NGUYEN /PEARLMAN	CHECKED BY: LEE/PANDYA	QUANTITIES BY: OVERSTREET	CHECKED BY: VARGAS/DULOR	PROJECT NO: 07-1199U4	REVISION DATES (PRELIMINARY STAGE ONLY)	SHEET 7 OF 61

7



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	101	0.6/1.4	273R	326

MARK	DATE	DESCRIPTION	BY	CH'D
1	11/21/06	Revised per CCO-5I	ZM	NP
REVISIONS				

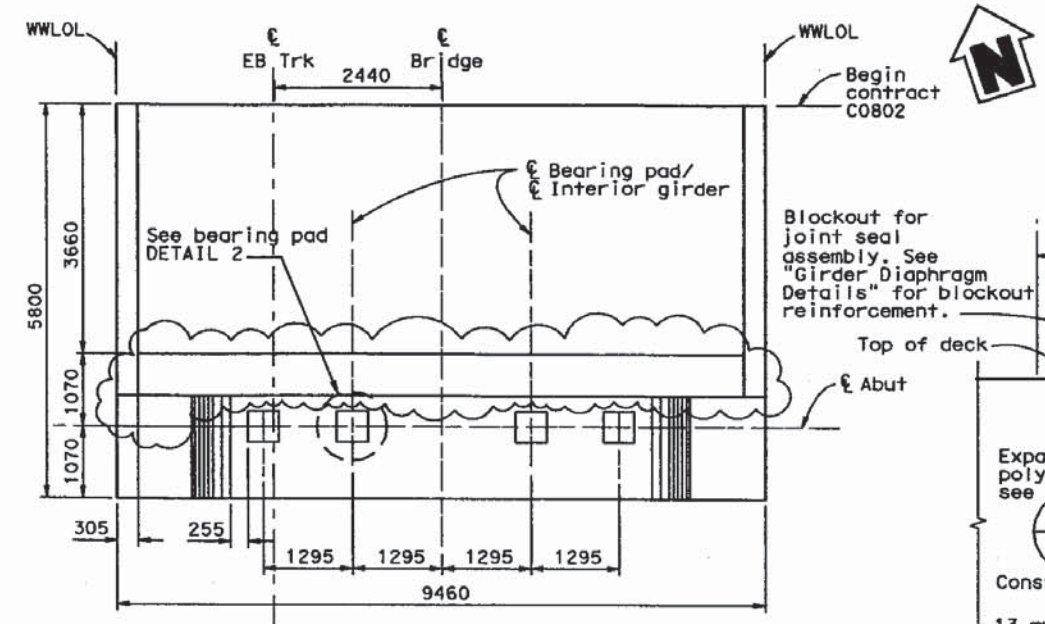


REGISTERED CIVIL ENGINEER  
 DANIEL E. YAVORSKY  
 No. SE 1700  
 Exp. 6-30-05  
 STATE OF CALIFORNIA

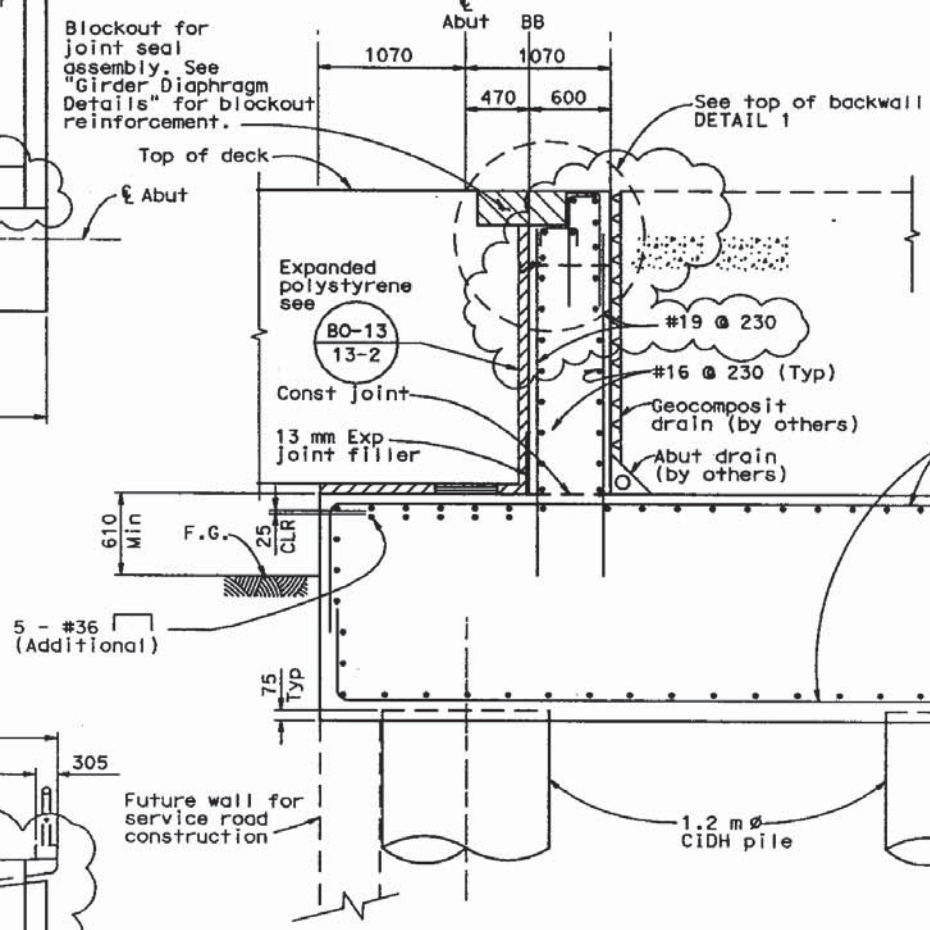
PLANS APPROVAL DATE  
 The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

EASTSIDE LRT PARTNERS  
 707 WILSHIRE BLVD. SUITE 2900  
 LOS ANGELES, CA 90017

METROPOLITAN TRANSPORTATION AUTHORITY  
 ONE GATEWAY PLAZA  
 LOS ANGELES, CA. 90012

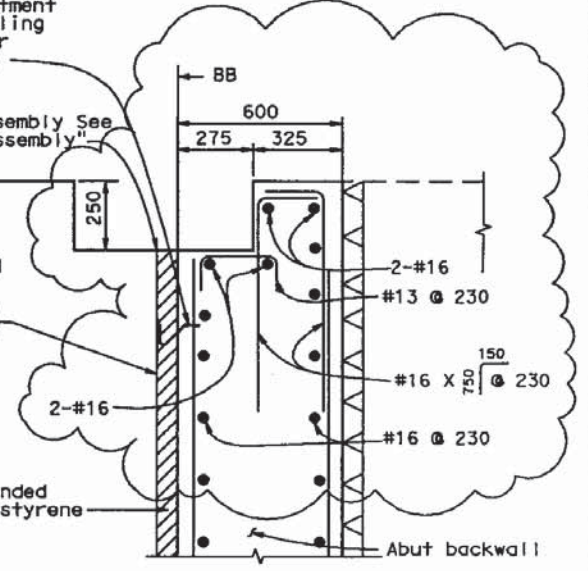


**AS BUILT PLANS**  
 Contract No. 07-1199U4  
 Reviewed By Engineer (N.P. Pandya)  
 Date: 12-13-2007  
**PLAN - ABUT 1**  
 1:50

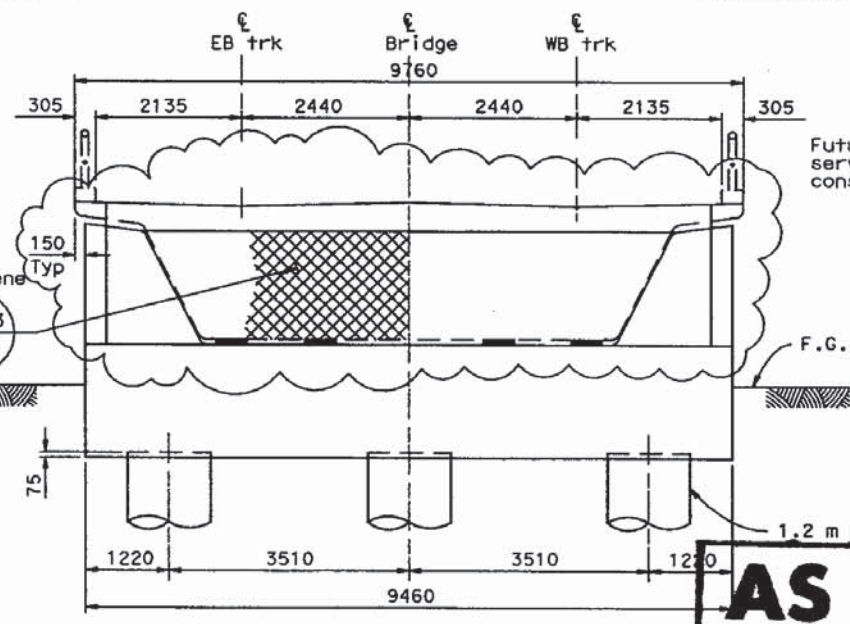


**TYPICAL SECTION**  
 1:25

3 x 305 Neoprene strip place prior to backfilling the abutment backwall and installing the temporary bumper (fold neoprene into chamfer)

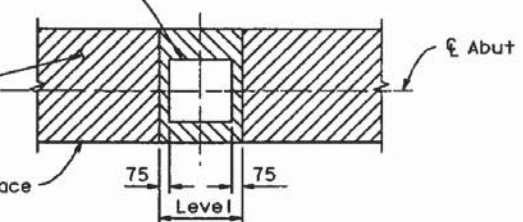


**TOP OF BACKWALL DETAIL 1**  
 No Scale



**ELEVATION - ABUT 1**  
 1:50

76 x 410 x 350 Fabric reinforced elastomeric bearing pad or 76 x 410 x 350 steel reinforced elastomeric bearing pad, coat top of pads with silicon grease and cover with 560 x 500 x 2 thick galv sheet metal (4 req'd)



**BEARING PAD PLAN - DETAIL 2**  
 No Scale

**AS BUILT**  
 CORRECTIONS BY B. KARRARA  
 CONTRACT NO. 07-119944

**BEARING PAD ELEVATION**  
 No Scale

**AS BUILT PLANS**  
 Contract No. 07-1199U4  
 Reviewed By Engineer (N.P. Pandya)

DESIGN OVERSIGHT  
 SIGN OFF DATE  
 7-10-03

DATE	BY YANG/PANDYA	CHECKED XIE 02-12-07
DETAILS	NGUYEN/Pearlman	LEUNG/PANDYA
QUANTITIES	OVERSTREET	VARGAS/DULOR

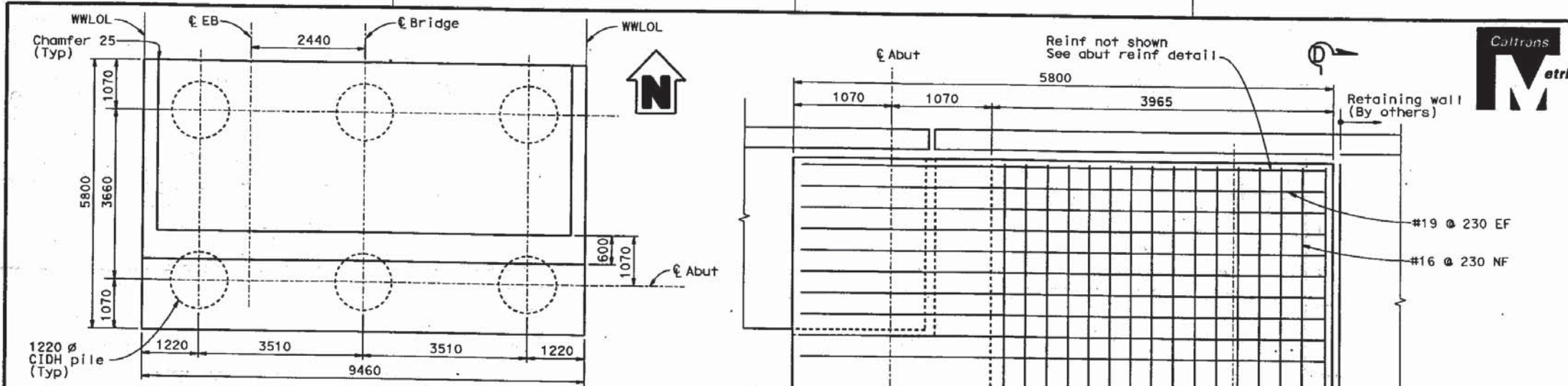
PREPARED FOR THE  
 STATE OF CALIFORNIA  
 DEPARTMENT OF TRANSPORTATION

DAN YAVORSKY  
 PROJECT ENGINEER

BRIDGE NO.  
 93-2975  
 53C-248  
 KILOMETER POST  
 1.07

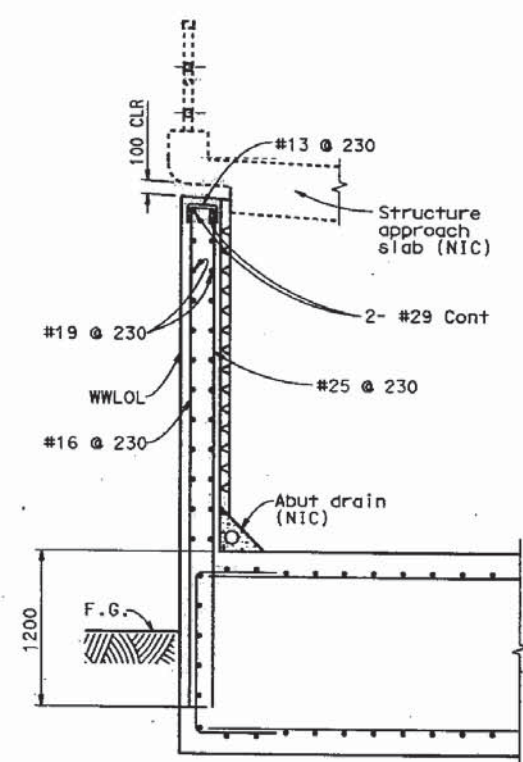
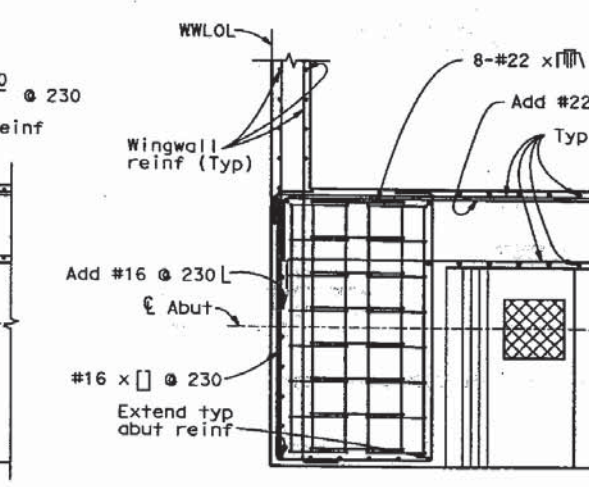
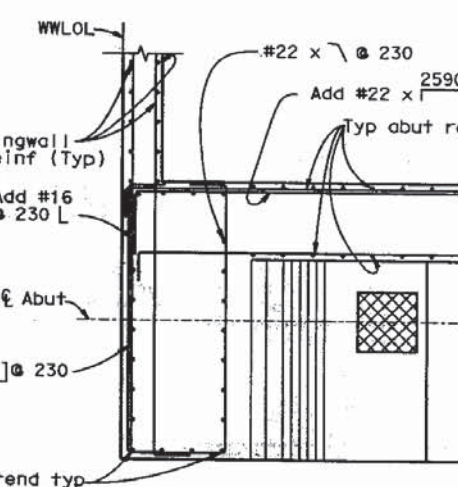
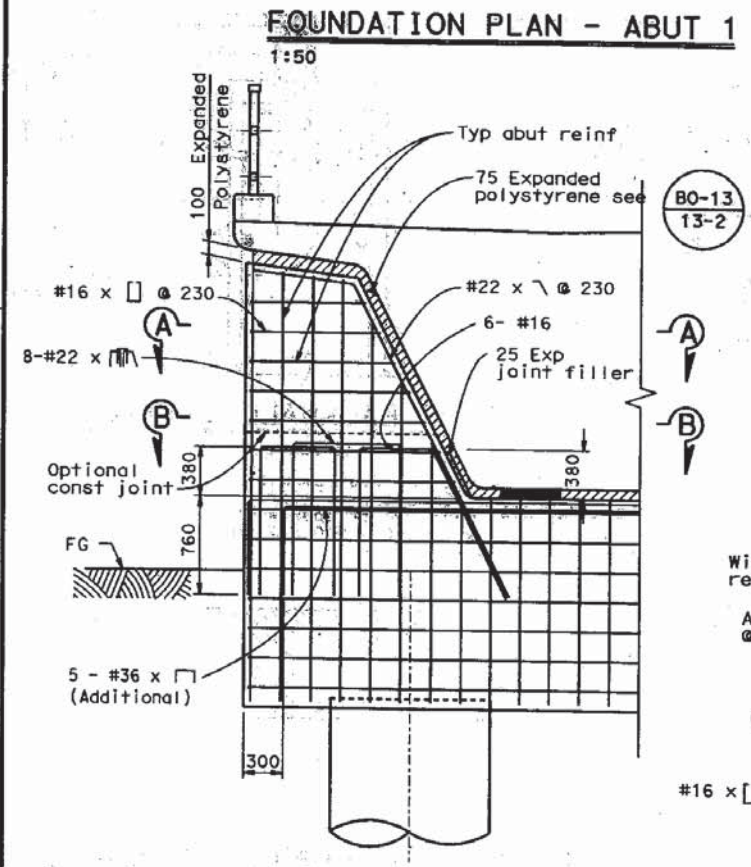
EASTSIDE UNDERPASS (LRT)  
 ABUTMENT 1 DETAILS No. 1





DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	101	0.6/1.4	274	326

REGISTERED CIVIL ENGINEER  
 6-07-04  
 PLANS APPROVAL DATE  
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**EASTSIDE LRT PARTNERS**  
 707 WILSHIRE BLVD. SUITE 2900  
 LOS ANGELES, CA 90017  
**METROPOLITAN TRANSPORTATION AUTHORITY**  
 ONE GATEWAY PLAZA  
 LOS ANGELES, CA. 90012  
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**AS BUILT** SECTION D-D AS BUILT PLANS  
 1:25  
 Contract No. 07-1199U4  
 Reviewed By Engineer *(Signature)*  
 (N.P. Pandya)  
 Date: 12-13-2007  
 CORRECTIONS BY B. KABBARA  
 CONTRACT NO. 07-1199U4  
 DATE 02-12-2007  
 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

**No As-Built Changes**

DESIGN OVERSIGHT 7-10-03 SIGN-OFF DATE DESIGN DETAIL SHEET (METRIC REV. 3/1/98)	DESIGN BY: LANG/PANDYA CHECKED BY: NGUYEN/PEARLMAN QUANTITIES BY: OVERSTREET	DATE: 7-10-03 CHECKED BY: LEE/PANDYA CHECKED BY: VARGAS/DULOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DAN YAVORSKY PROJECT ENGINEER	PROJECT NO.: 53-2975 330-246 KILOMETER POST: 1.07	EASTSIDE UNDERPASS (LRT) ABUTMENT 1 DETAILS No. 2	REVISION DATES (PRELIMINARY STAGE ONLY) 12/15/07 (12/15/07) (07-08-01)	SHEET 9 OF 61
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Contract No. 07-1199U4

Reviewed By Engineer *[Signature]*  
(N.P. Pandya)

Date: 12-13-2007



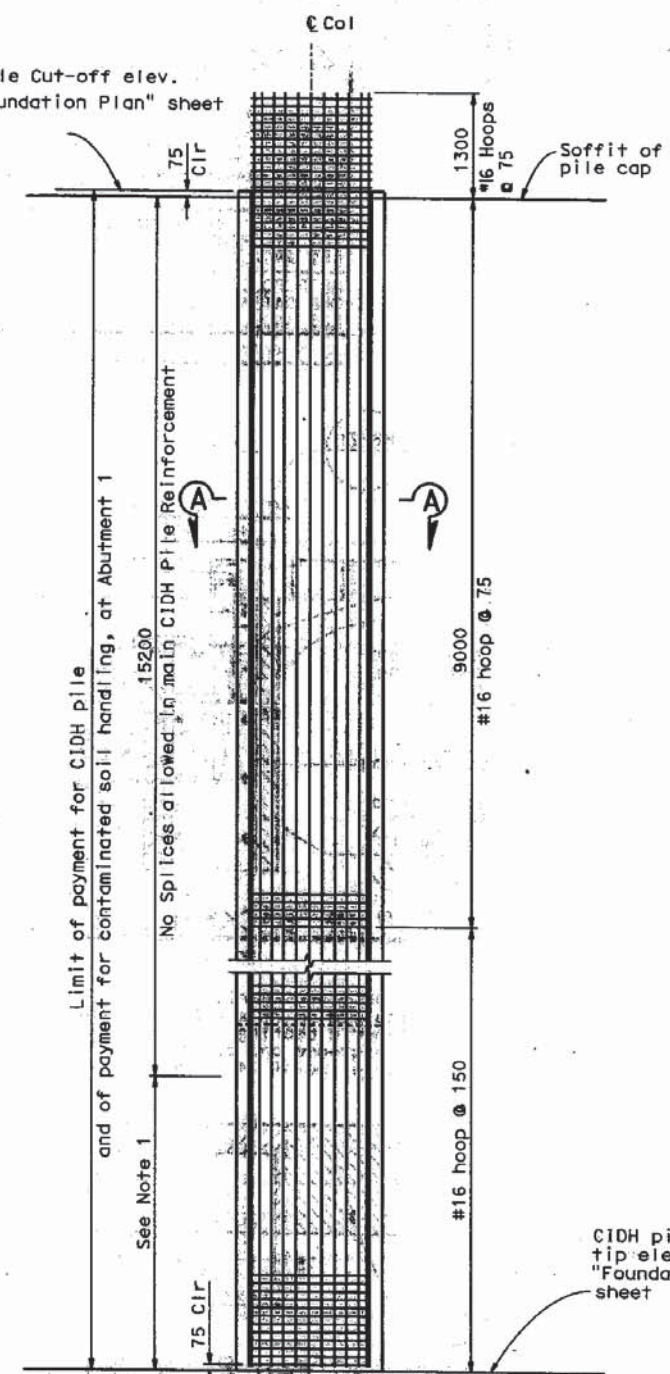
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	101	0.6/1.4	275	326

*[Signature]*  
REGISTERED CIVIL ENGINEER  
6-07-04  
PLANS APPROVAL DATE  
No. SE 1700  
Exp. 6-30-05  
STATE OF CALIFORNIA

EASTSIDE LRT PARTNERS  
707 WILSHIRE BLVD. SUITE 2900  
LOS ANGELES, CA 90017  
METROPOLITAN TRANSPORTATION AUTHORITY  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012  
Caltrans now has a web site! To get to the web site, go to <http://www.dot.ca.gov>

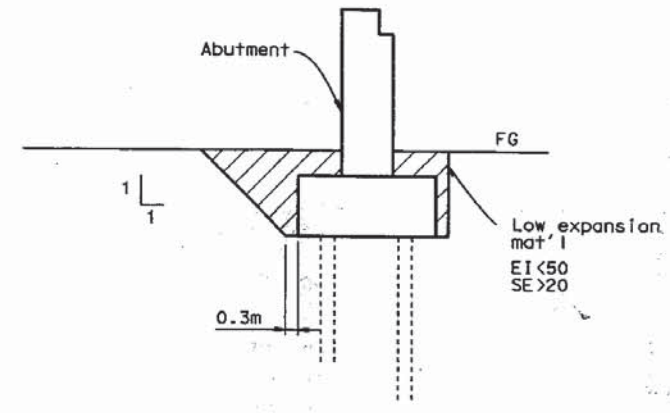
**AS BUILT**  
CORRECTIONS BY BASSEM KARRARA  
CONTRACT NO. 07-1199U4  
DATE 11/15/07

CIDH pile cut-off elev. See "Foundation Plan" sheet

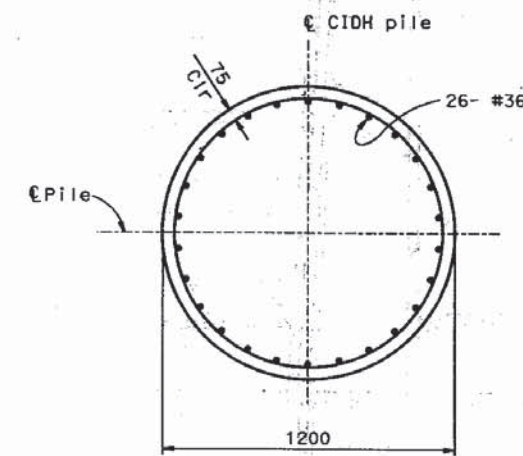


**ELEVATION (1.2 M Ø CIDH PILE)**

- 1:40 Notes:
- Only staggered "Ultimate" butt splices are allowed in main CIDH pile reinforcement in this zone.
  - All hoops are "Ultimate" butt spliced continuous.

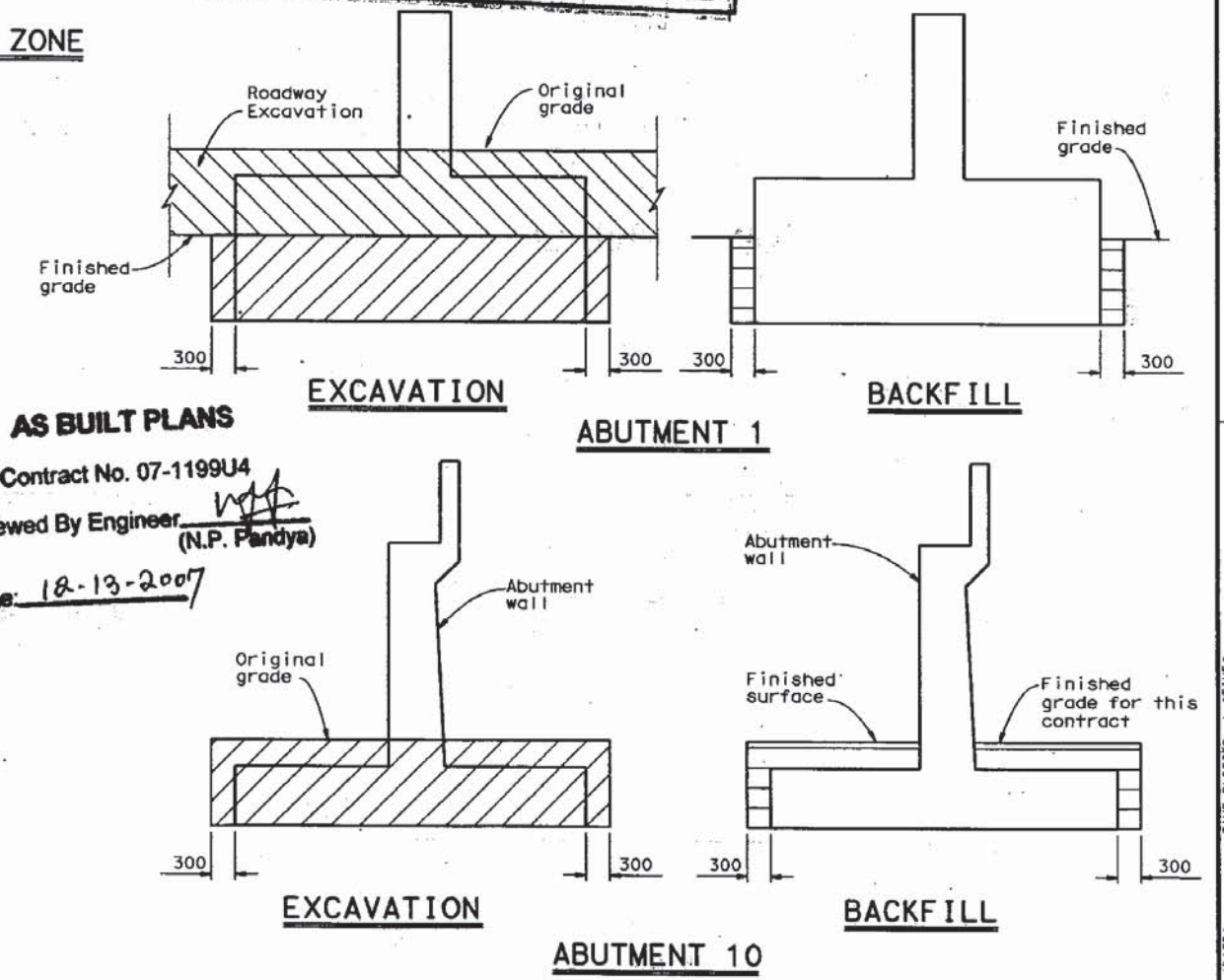


**EXPANSIVE SOIL EXCLUSION ZONE**  
No Scale



**SECTION A-A**  
No Scale

Structure excavation (bridge)  
 Structure backfill (bridge)  
For additional details see **A62C**



**LIMITS OF PAYMENT FOR STRUCTURE EXCAVATION & BACKFILL**  
No Scale

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT 7-10-03 SIGN OFF DATE	DESIGN BY: YANG/PANDYA DETAILS BY: NGUYEN/PEARLMAN QUANTITIES BY: OVERSTREET	CHECKED BY: XIE CHECKED BY: LEE/PANDYA CHECKED BY: VARGAS/DOLOR	PREPARED FOR THE <b>STATE OF CALIFORNIA</b> DEPARTMENT OF TRANSPORTATION	DAN YAVORSKY PROJECT ENGINEER	BRIDGE NO. SS-2975 SSC-2448 KILOMETER POST 1.07	<b>EASTSIDE UNDERPASS (LRT)</b> <b>ABUTMENT 1 DETAILS No.3</b>	REVISION DATES (PRELIMINARY STAGE ONLY) 12/15/07 07-04	SHEET 10 OF 61
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CU 07225  
EA 1199U1  
FILE => o0ab11010.dgn

10

## Appendix C: Existing Geotechnical Boring Logs



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## Existing Geotechnical Boring Logs ARCADIS, 2014



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Site Location:

MTA Metro  
410 Center Street  
Los Angeles, California

Borehole Depth: 50 ft

DEPTH	Sample ID	Sample Type	Recovery (feet)	Blow Counts	PID (ppm)	Lab Tests	USCS Code	Geologic Column	Stratigraphic Description
40	B-01-40	MCS 2.0	0.8	45 50	9.8		GP		Poorly Graded GRAVEL WITH SAND (55, 45, 0, 0), dark gray (10YR 4/1), wet, coarse gravel with medium- to very coarse-grained sand.
45	B-01-45	MCS 2.0	0.8	27 50	0.0		SP		POORLY GRADED SAND (25, 75, 0, 0), dark grayish brown (2.5Y 4/2), wet, medium- to coarse-grained, subangular, with some fine to coarse gravel, some larger rock fragments.
50	B-01-50	MCS 2.0	0.8	28 50	0.0		SP		POORLY GRADED SAND (0, 100, 0, 0), dark gray (2.5Y 4/1), wet, coarse-grained, subangular to angular, compacted.
55									Bottom of boring at 50 ft bgs.

**Remarks:**  
 amsl = above mean sea level; bgs = below ground surface; Dia. = diameter; ft' = feet, NA = not applicable/available; ppm = parts per million  
 (5, 95, 0, 0) = %(gravel, sand, silt, clay)  
 = First Encountered Water     = Static Water

Water Level Data		
Date	Depth	Elev.
8/19/14	30 ft bgs	NA ft amsl
NA	NA btoc	NA ft amsl









Site Location:

MTA Metro  
410 Center Street  
Los Angeles, California

Borehole Depth: 50 ft

DEPTH	Sample ID	Sample Type	Recovery (feet)	Blow Counts	PID (ppm)	Lab Tests	USCS Code	Geologic Column	Stratigraphic Description
40	B-02-39	MCS 2.0	1.3	45	0.0		SW	[Yellow dotted pattern]	Same as above.
				48					
				50-2"					
45	B-02-43	MCS 2.0	0.3	50			SW	[Yellow dotted pattern]	WELL GRADED SAND (30, 70, 0, 0), very dark gray (10YR 3/1), wet, fine- to coarse-grained, subrounded, trace medium gravel and crushed rock.
				50-3"					
50	B-02-49	MCS 2.0	1.2	50 45 45	0.0		SP	[Yellow dotted pattern]	POORLY GRADED SAND (0, 98, 2, 0), very dark gray (10YR 3/1), wet, fine- to medium-grained, subrounded, trace silt.
55									Bottom of boring at 50 ft bgs.



Remarks:

amsl = above mean sea level; bgs = below ground surface; Dia. = diameter; ft' = feet, NA = not applicable/available; ppm = parts per million

(5, 95, 0, 0) = %(gravel, sand, silt, clay)

☒ = First Encountered Water      ○ = Static Water

Water Level Data

Date	Depth	Elev.
8/26/14	☒ NA ft bgs	NA ft amsl
NA	○ NA btoc	NA ft amsl









Site Location:

MTA Metro  
410 Center Street  
Los Angeles, California

Borehole Depth: 20 ft

DEPTH	Sample ID	Sample Type	Recovery (feet)	Blow Counts	PID (ppm)	Lab Tests	USCS Code	Geologic Column	Stratigraphic Description
20									Boring terminated @ ~20' bgs due to broken auger.
25									
30									
35									



**Remarks:**

amsl = above mean sea level; bgs = below ground surface; Dia. = diameter; ft' = feet, NA = not applicable/available; ppm = parts per million

(5, 95, 0, 0) = %(gravel, sand, silt, clay)

☒ = First Encountered Water      ○ = Static Water

**Water Level Data**

Date	Depth	Elev.
NA	☒ NA ft bgs	NA ft amsl
NA	○ NA btoc	NA ft amsl







Site Location:

MTA Metro  
410 Center Street  
Los Angeles, California

Borehole Depth: 49 ft

DEPTH	Sample ID	Sample Type	Recovery (feet)		Blow Counts	PID (ppm)	Lab Tests	USCS Code	Geologic Column	Stratigraphic Description
40	B-05-38	MCS 2.0	0.9	40	50-5"	0.0		SW	WELL GRADED SAND (35, 65, 0, 0), very dark gray (10YR 3/1), medium- to coarse-grained, subrounded, fine to medium gravel, rounded.	
45	B-05-43	MCS 2.0	1.5	20	37	48		SW	WELL GRADED SAND (20, 79, 1, 0), very dark gray (10YR 3/1), subrounded, fine to coarse gravel, subangular, trace silt.	
50	B-05-48	MCS 2.0	1.5	28	44	49		SW	Same as above.	
55									Bottom of boring at 49 ft bgs.	

**Remarks:**  
 amsl = above mean sea level; bgs = below ground surface; Dia. = diameter; ft' = feet, NA = not applicable/available; ppm = parts per million  
 Drilled to 17.5 ft bgs on 8/22/14.  
 (5, 95, 0, 0) = %(gravel, sand, silt, clay)  
 ☒ = First Encountered Water      ○ = Static Water

Water Level Data		
Date	Depth	Elev.
8/25/14	☒ NA ft bgs	NA ft amsl
NA	○ NA btoc	NA ft amsl

















Site Location:

MTA Metro  
410 Center Street  
Los Angeles, California

Borehole Depth: 49 ft

DEPTH	Sample ID	Sample Type	Recovery (feet)	Blow Counts	PID (ppm)	Lab Tests	USCS Code	Geologic Column	Stratigraphic Description
40	B-06-43	MCS 2.0	0.0						No Recovery.
		MCS 2.0	0.45	50-5"	0.0		SW		WELL GRADED SAND (5, 95, 0, 0), black (10YR 2/1), wet, fine- to coarse-grained, subrounded, trace fine gravel.
45	B-06-48	MCS 2.0	1.35	40 42 50	2.1		SW		WELL GRADED SAND (5, 95, 0, 0), black (10YR 2/1), wet, fine- to coarse-grained, subrounded, trace medium gravel.
50									Bottom of boring at 49 ft bgs.
55									

**Remarks:**  
 amsl = above mean sea level; bgs = below ground surface; Dia. = diameter;  
 ft' = feet, NA = not applicable/available; ppm = parts per million  
 (5, 95, 0, 0) = %(gravel, sand, silt, clay)  
 = First Encountered Water      = Static Water

Water Level Data		
Date	Depth	Elev.
8/25/14	 NA ft bgs	NA ft amsl
NA	 NA btoc	NA ft amsl

































Site Location:

MTA Metro  
410 Center Street  
Los Angeles, California

Borehole Depth: 50 ft bgs

DEPTH	Sample ID	Sample Type	Recovery (feet)	Blow Counts	PID (ppm)	Lab Tests	USCS Code	Geologic Column	Stratigraphic Description
20	B-10-20	MCS 2.0	1.5	25	0.0	GS, MC	GP		POORLY GRADED GRAVEL (58, 38, 4, 0), light brownish gray (2.5Y 6/2), dry, medium- to very coarse-grained, subrounded.
				28					
				44					
25	B-10-25	MCS 2.0	1.5	33	0.0		SW		WELL GRADED SAND (15, 85, 0, 0), light yellowish brown (2.5Y 6/3), slightly moist, fine- to very coarse-grained, subangular.
				45					
				30					
30	B-10-29	MCS 2.0	1.5	30	0.0	GS, MC	SP		POORLY GRADED SAND (20, 73, 7, 0), dark gray (7.5YR 4/1), wet, medium-grained, subrounded.
				36					
				40					
35	B-10-35	MCS 2.0	1.5	20	0.0	GS, MC	SP		POORLY GRADED SAND (32, 60, 8, 0), dark gray (7.5YR 4/1), wet, medium-grained, subrounded. 30% fine to coarse gravel.
				25					
				38					

**Remarks:**  
 amsl = above mean sea level; bgs = below ground surface; Dia. = diameter; ft' = feet, NA = not applicable/available; ppm = parts per million  
 (5, 95, 0, 0) = %(gravel, sand, silt, clay)  
 = First Encountered Water     = Static Water

Water Level Data		
Date	Depth	Elev.
8/29/14	31 ft bgs	NA ft amsl
NA	NA btoc	NA ft amsl







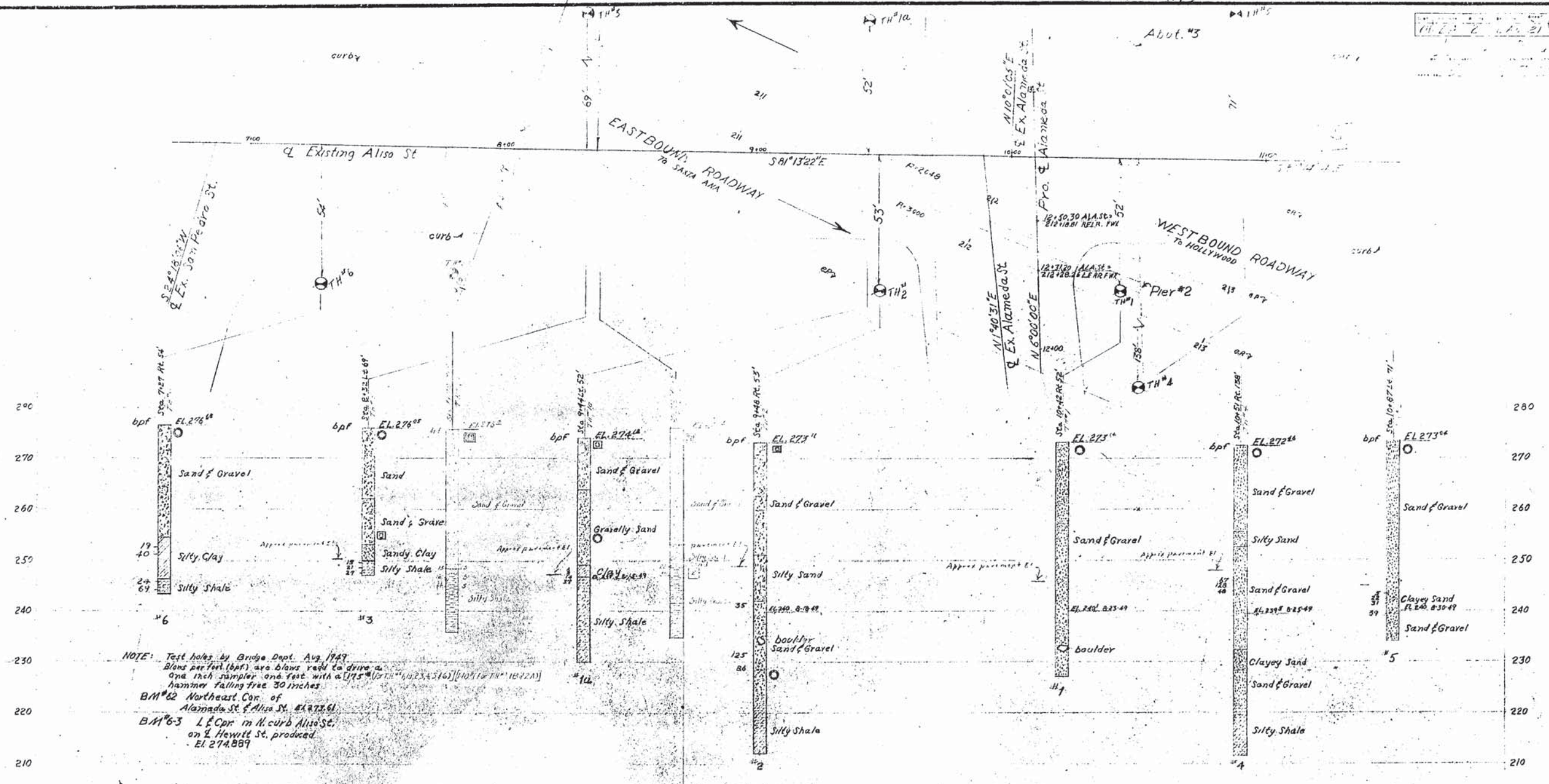
## Existing Geotechnical Boring Logs Caltrans (Updated)

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U-403 (11)

19 2 2 19 23



NOTE: Test holes by Bridge Dept. Aug. 1949.  
Blows per foot (bpf) are blows used to drive a  
one inch sampler and test with a [145] [10712 FN" 18-22A]  
hammer falling free 30 inches.

B.M. #62 Northeast Cor. of  
Alameda St. & Aliso St. EL. 273.61

B.M. #63 L.E. Cor. in N. curb Aliso St.  
on E. Hewitt St. produced  
EL. 274.889

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS



DIAGRAM AND TABLE SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES.

CLASS NAME	PERCENTAGE OF SIZES PRESENT		
	SAND	SILT	CLAY
SAND	60-100	0-20	0-20
SILTY SAND	45-60	0-55	0-20
SANDY SILT	0-45	35-60	0-20
SILT	0-20	60-100	0-20
CLAYEY SAND	38-60	0-42	20-30
CLAYEY SILT	0-38	32-60	20-30
SANDY CLAY	30-70	0-40	30-50
SILTY CLAY	0-30	20-70	30-50
CLAY	0-30	0-50	50-100

IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIS "GRAVELLY SAND". THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE GRAVEL, SAND AND SILT REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF BORING OPERATIONS

- PLAN OF ANY BORING
  - 1" SAMPLER BORING
  - ROTARY WASH BORING
  - 1" CLOSED SAMPLER DRIVEN
  - CORE BORING
  - 2 1/2" PENETROMETER DRIVEN
  - 2" SAMPLER BORING
  - 2 1/2" AUGER BORING
  - 6" @ 20° AUGER BORING
  - CASING DRIVEN
  - JET BORING
  - (S) SAMPLE TAKEN
- THE APPROPRIATE BORING SYMBOLS DESIGNATING THE METHOD OF OPERATION ARE SHOWN AT THE UPPER RIGHT-HAND CORNER OF THE RESPECTIVE BORING. WHERE TOOL CHANGES WERE MADE DURING THE BORING OPERATION SYMBOLS ARE SHOWN AT THE POINT OF CHANGE.

LEGEND OF EARTH MATERIALS

- GRAVEL - G
- SAND - S
- SILT - Si
- CLAY - C
- SILTY SAND - Si S
- CLAYEY SAND - CS
- SANDY SILT - S St
- CLAYEY SILT - C Si
- SANDY CLAY - SC
- SILTY CLAY - Si C
- PEAT 20% ORGANIC CLAY - O
- SANDSTONE - SS
- SHALE - SH
- BROKEN ROCK (FRAGMENTS) - BR
- ROCK - R

ABBREVIATIONS

- EL. 69.4 ELEVATION OF GROUND AT TEST HOLE
- bpf BLOWS PER FOOT—(SEE NOTE ABOVE)
- P PULLED PIPE
- M MOISTURE AS % DRY WEIGHT
- EL. 240.8-244.9 ELEVATION OF GROUND WATER AND DATE

NOTES

THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 2, ARTICLE (C) OF THE STANDARD SPECIFICATIONS AND TO THE SPECIAL PROVISIONS ACCOMPANYING THIS SET OF PLANS.  
CLASSIFICATION OF EARTH MATERIAL AS SHOWN ON THIS SHEET IS BASED UPON FIELD INSPECTION AND IS NOT TO BE CONSTRUED TO IMPLY MECHANICAL ANALYSIS.

**ALAMEDA ST. UNDERPASS**  
**LOG OF TEST BORINGS**  
SCALE HOR 1" = 20'  
VERT 1" = 10'  
BRIDGE NO. 53-782  
FILE NO.  
DRAWING NO.

BRIDGE DEPARTMENT



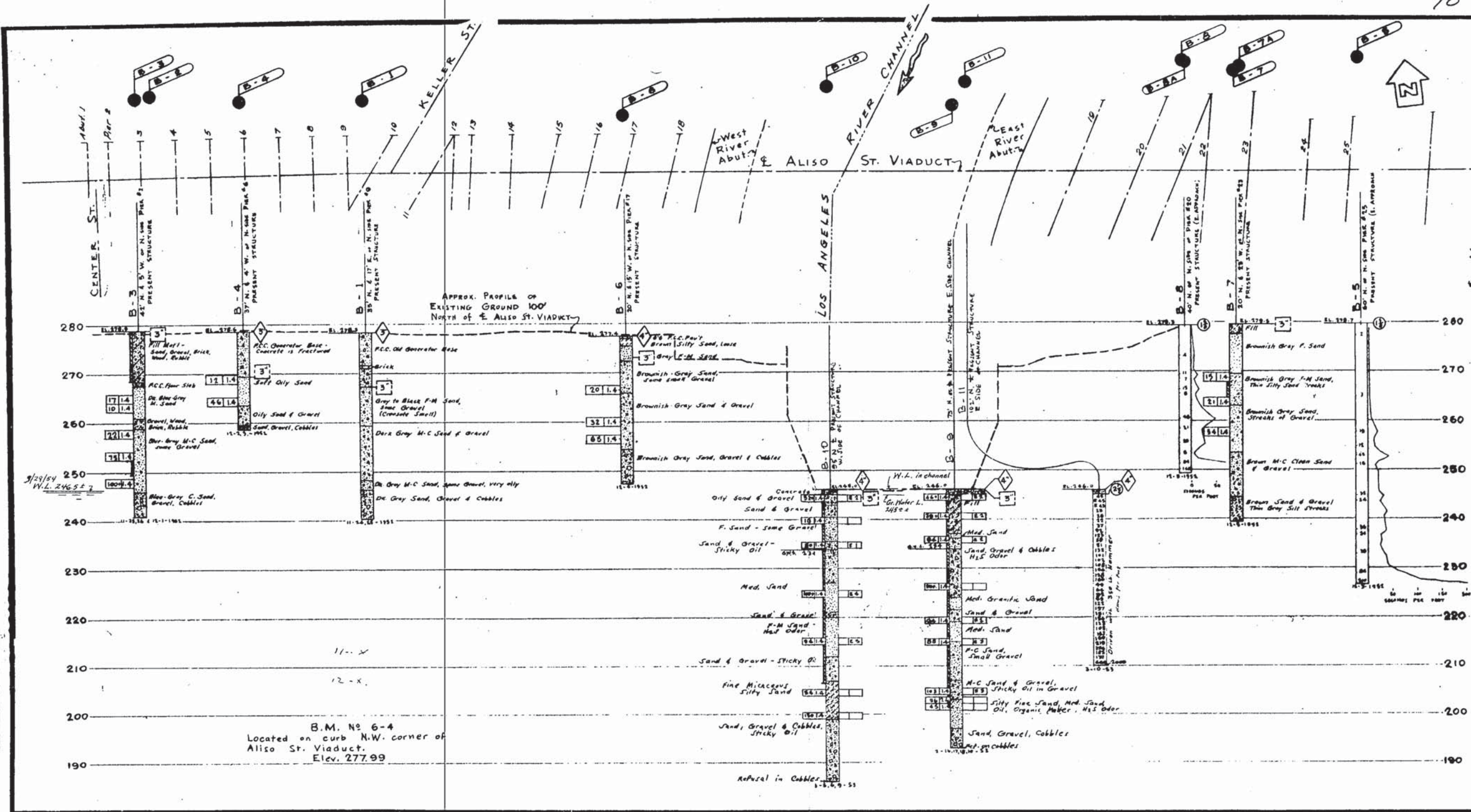


## Existing Geotechnical Boring Logs Caltrans, 1954



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**AS BUILT**  
 CORRECTIONS BY: *H. B. James*  
 DATE: 10-11-55

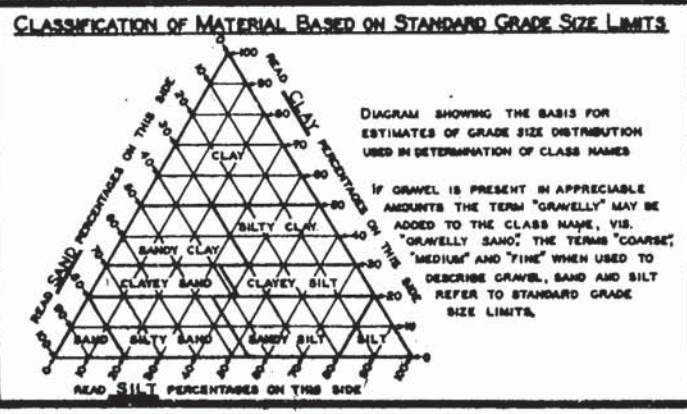
**Test Boring By Bridge Dept.**

B.M. # 12-A  
 Set copper nail in lead SW corner power line tower marking #7 East side LA River, 65' N. of Aliso St. Gr. 135 East of river retaining wall 35' West of Western end R.R. track Elev. 273.50

B.M. # 12-A  
 Set copper in lead in conc. ftg. No. side Aliso St. Bridge between LA River & S.F. R.R. track West side of river 21' West of river retaining wall. Elev. 272.94

BRIDGE DEPARTMENT

MICROFILM

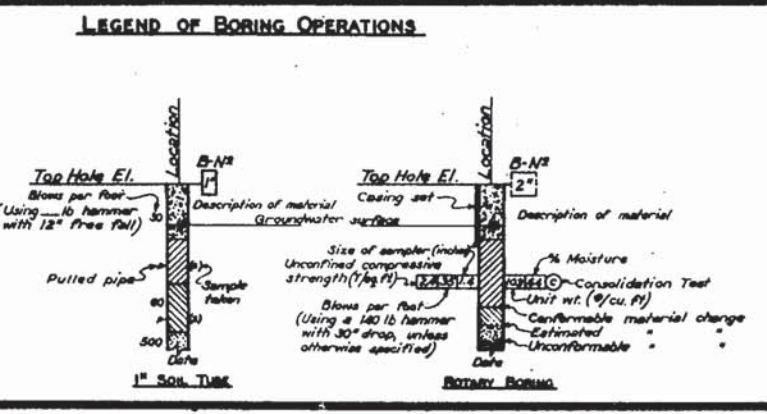


**LEGEND OF EARTH MATERIALS**

	GRAVEL		SILTY CLAY OR CLAYEY SILT
	SAND		PEAT AND/OR ORGANIC CLAY
	SILT		FILLED MATERIAL
	CLAY		IGNEOUS ROCK
	SANDY CLAY OR CLAYEY SAND		SEDIMENTARY ROCK
	SANDY SILT OR SILTY SAND		METAMORPHIC ROCK

**LEGEND OF BORING OPERATIONS**

	PLAN OF ANY BORING
	PENETROMETER
	2 1/2" CONE PENETROMETER
	SAMPLER BORING (DRY)
	ROTARY BORING (WET)
	AUGER BORING (DRY)
	JET BORING
	CORE BORING
	TEST PIT



**NOTES**

THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 2, ARTICLE (C) OF THE STANDARD SPECIFICATIONS AND TO THE SPECIAL PROVISIONS ACCOMPANYING THIS SET OF PLANS. CLASSIFICATION OF EARTH MATERIAL AS SHOWN ON THIS SHEET IS BASED UPON FIELD INSPECTION AND IS NOT TO BE CONSTRUED TO IMPLY MECHANICAL ANALYSIS. PENETROMETER BORINGS HAVING A RATE OF PENETRATION MEASURED IN SECONDS PER FOOT ARE DRIVEN WITH A #2 WIKERMAN-TERRY AIR HAMMER AT 115 PSI.

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS

WIDENING OF L.A. RIV. BR. & OH AT ALISO ST.

**LOG OF TEST BORINGS (1 of 3)**

SCALE: HORIZ. 1" = 50' VERT. 1" = 10'

BRIDGE 53-405 FILE DRAWING 6-3243-5

PREL. DRAWING NO. P. 3243



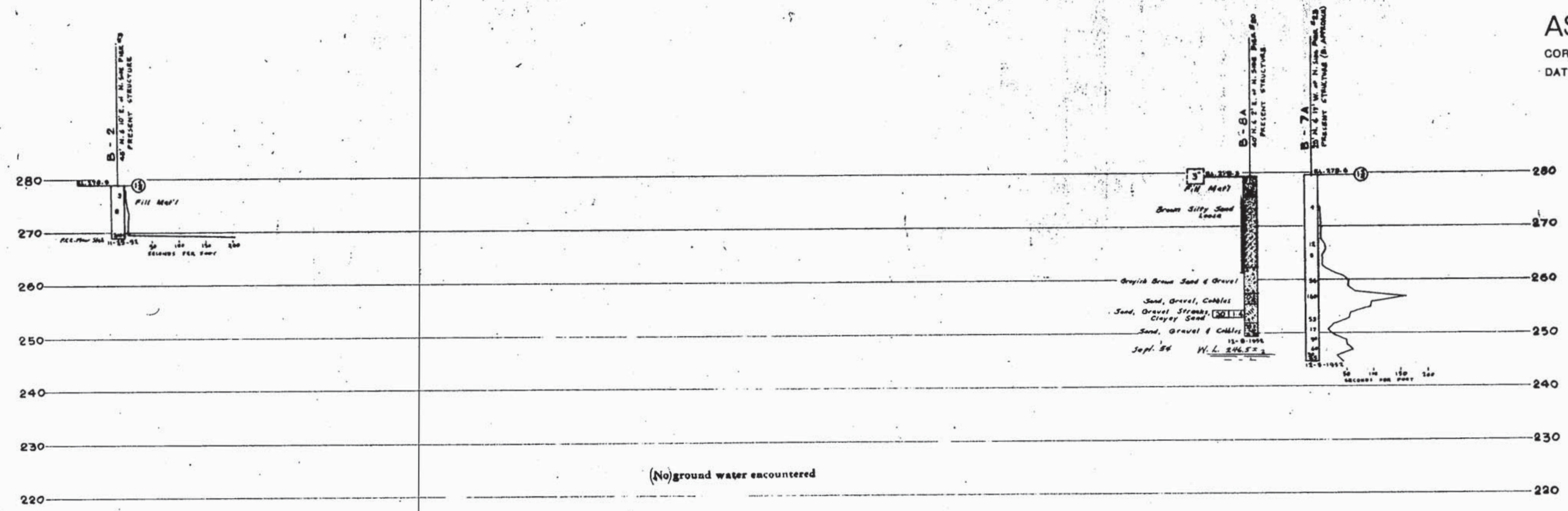
71



BRIDGE DEPARTMENT

MICROFILM

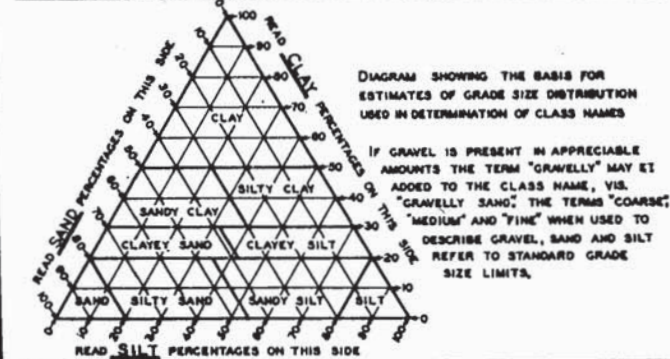
**AS BUILT**  
CORRECTIONS BY M. J. Jones  
DATE 10-11-55



Test Boring By Bridge Dept.

FIELD STUDY  
DRAWN BY  
CHECKED BY  
APPROVED BY

**CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS**

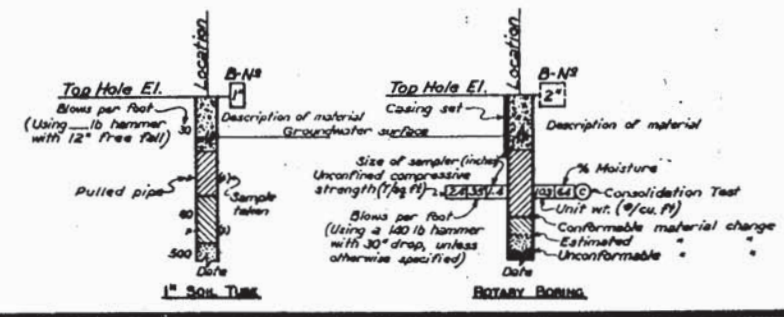


**LEGEND OF EARTH MATERIALS**

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC CLAY
- FILLED MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

**LEGEND OF BORING OPERATIONS**

- PLAN OF ANY BORING
- PENETROMETER
- 2 1/2" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



**NOTES**

THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 2, ARTICLE (C) OF THE STANDARD SPECIFICATIONS AND TO THE SPECIAL PROVISIONS ACCOMPANYING THIS SET OF PLANS. CLASSIFICATION OF EARTH MATERIAL AS SHOWN ON THIS SHEET IS BASED UPON FIELD INSPECTION AND IS NOT TO BE CONSTRUED TO IMPLY MECHANICAL ANALYSIS. PENETROMETER BORINGS HAVING A RATE OF PENETRATION MEASURED IN SECONDS PER FOOT ARE DRIVEN WITH A #2 MHIERNAN-TERRY AIR HAMMER AT 115 PSI.

STATE OF CALIFORNIA  
DEPARTMENT OF PUBLIC WORKS  
DIVISION OF HIGHWAYS

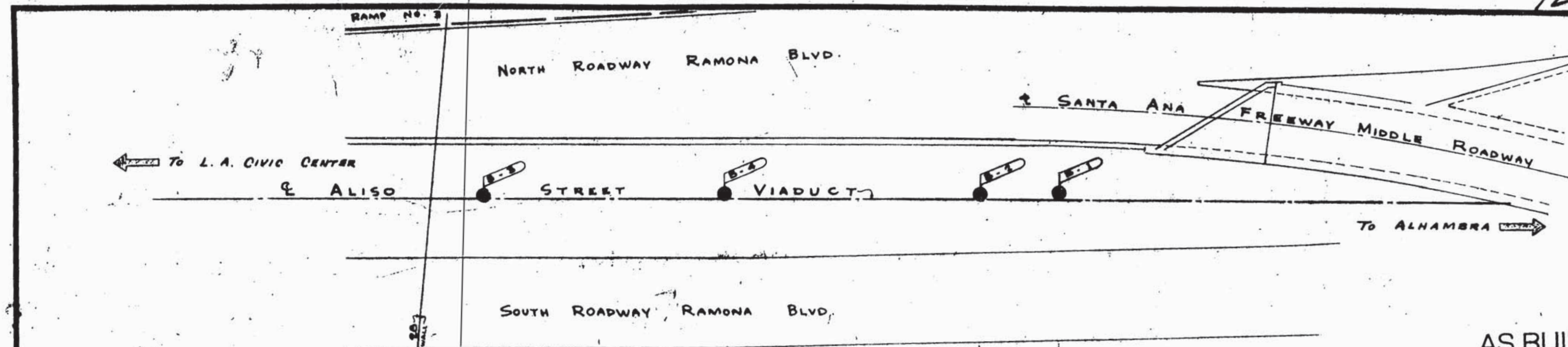
WIDENING OF L.A. RIV. BR. & OH. AT ALISO ST.

**LOG OF TEST BORINGS (2 of 3)**

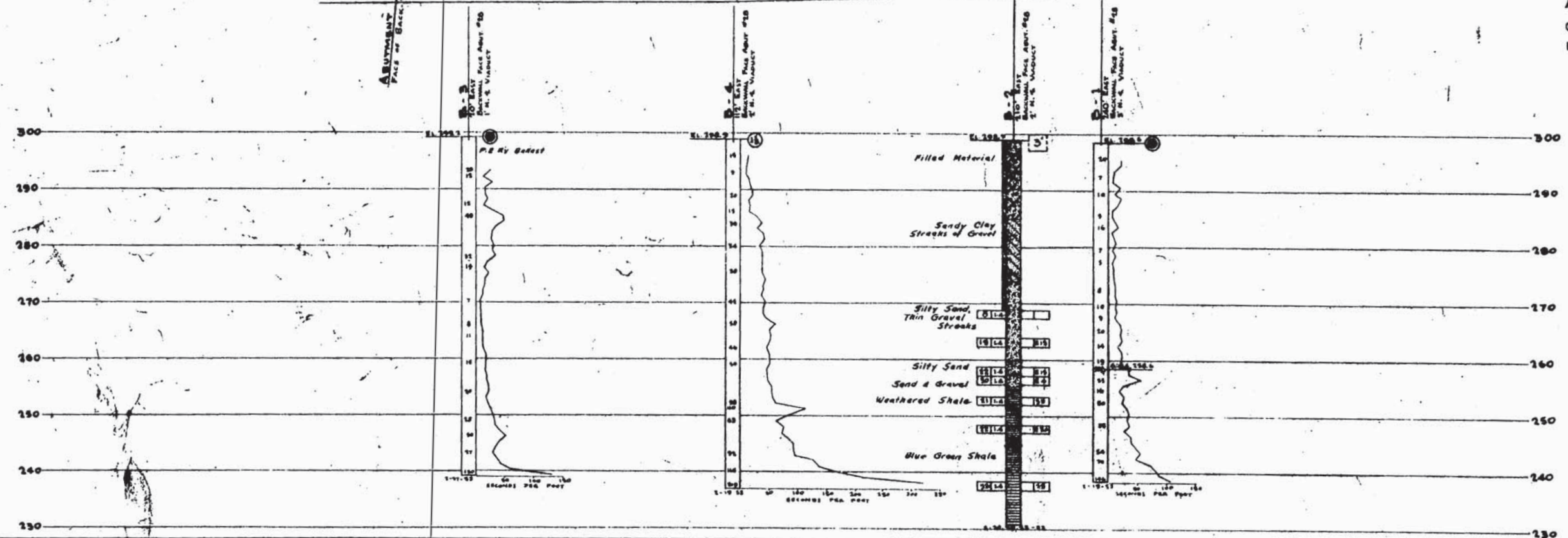
SCALE: HORIZ. 1" = 10' VERT. 1" = 5'  
BRIDGE 53-405 FILE DRAWING C-3243-6

PREL. DRAWING NO. P-3243





**AS BUILT**  
 CORRECTIONS BY *11/2 James*  
 DATE 12-11-55



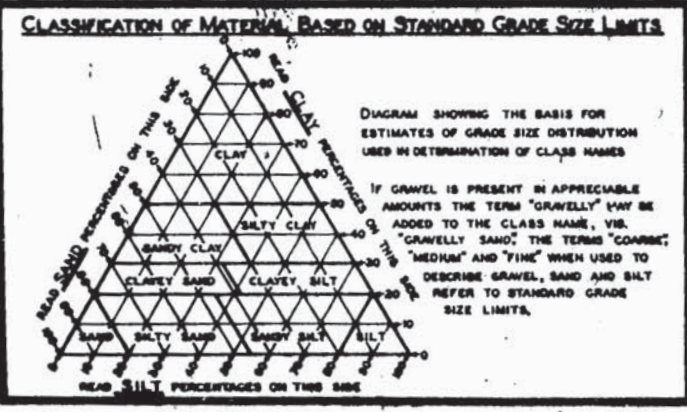
Test Boring by Bridge Dept.

B.M. #6-5  
 Fd. No. side Aliso St. Viaduct on E. side L.A. River at West end of Ramp 84 in No. Curb at S.W. corner of C.B. 66' E. of Mission Rd, a wire spike in curb.  
 Elev. 276.75

B.M. #11  
 Set conc. nail in lead SW corner powerline tower marked #7 East side L.A. River, 65' N. of Aliso St. Bridge, 13.5 East of river retaining wall, 35' West of westerly most R.R. tracks.  
 Elev. 278.30

B.M. #12-X  
 Set copper nail in lead in conc. ftg. N. side Aliso St. Bridge between L.A. River & S.P.R.R. tracks, W. side of river. 21' West of river retaining wall.  
 Elev. 272.94

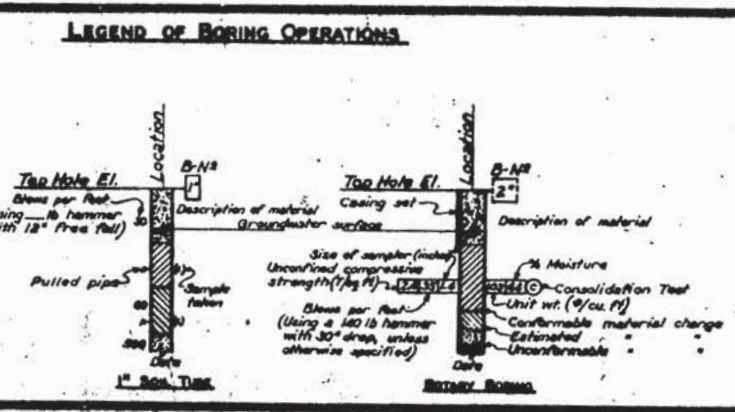
BRIDGE DEPARTMENT



**LEGEND OF EARTH MATERIALS**

GRAVEL	SILTY CLAY OR CLAYEY SILT
SAND	PEAT AND/OR ORGANIC CLAY
SILT	FILLED MATERIAL
CLAY	IGNEOUS ROCK
SANDY CLAY OR CLAYEY SAND	SEDIMENTARY ROCK
SANDY SILT OR SILTY SAND	METAMORPHIC ROCK

- LEGEND OF BORING OPERATIONS**
- PLAN OF ANY BORING
  - PENETROMETER
  - 2 1/2" CONE PENETROMETER
  - SAMPLER BORING (DRY)
  - ROTARY BORING (WET)
  - AUGER BORING (DRY)
  - JET BORING
  - ◇ CORE BORING
  - TEST PIT



**NOTES**

THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 2, ARTICLE (C) OF THE STANDARD SPECIFICATIONS AND TO THE SPECIAL PROVISIONS ACCOMPANYING THIS SET OF PLANS. CLASSIFICATION OF EARTH MATERIAL AS SHOWN ON THIS SHEET IS BASED UPON FIELD INSPECTION AND IS NOT TO BE CONSTRUED TO IMPLY MECHANICAL ANALYSIS. PENETROMETER BORINGS HAVING A RATE OF PENETRATION MEASURED IN SECONDS PER FOOT ARE DRIVEN WITH A #2 SMITHSONIAN-TERRY AIR HAMMER AT 115 PSI.

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF HIGHWAYS

WIDENING OF L.A. RIV. BR. & OVI AT ALISO ST.

**LOG OF TEST BORINGS (3 of 3)**

SCALE: HORIZ. 1" = 20' VERT. 1" = 10'

BRIDGE 53-405 FILE DRAWING C-3243-7

PREL. DRAWING NO. P-3243



## Existing Geotechnical Boring Logs Caltrans, 2004



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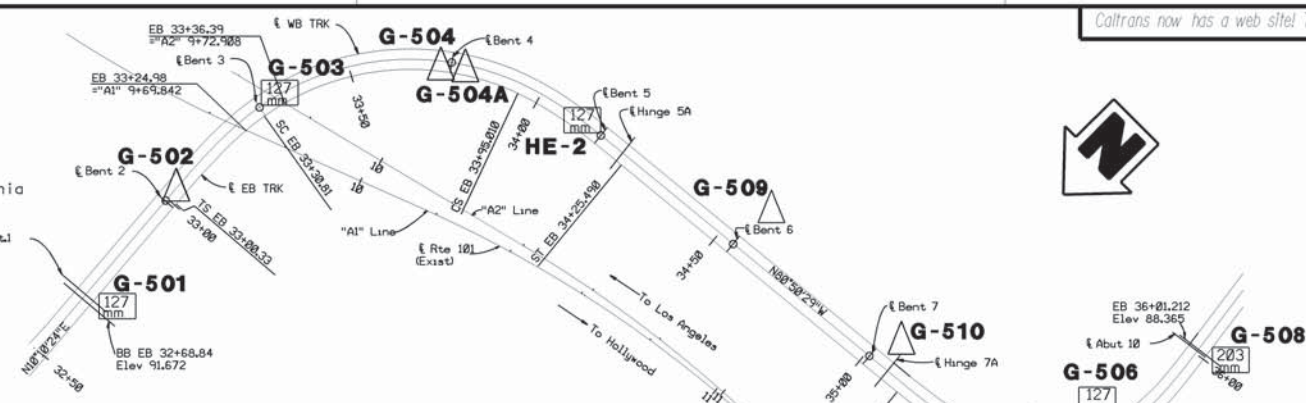


DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	101	0.6/1.4	323	326

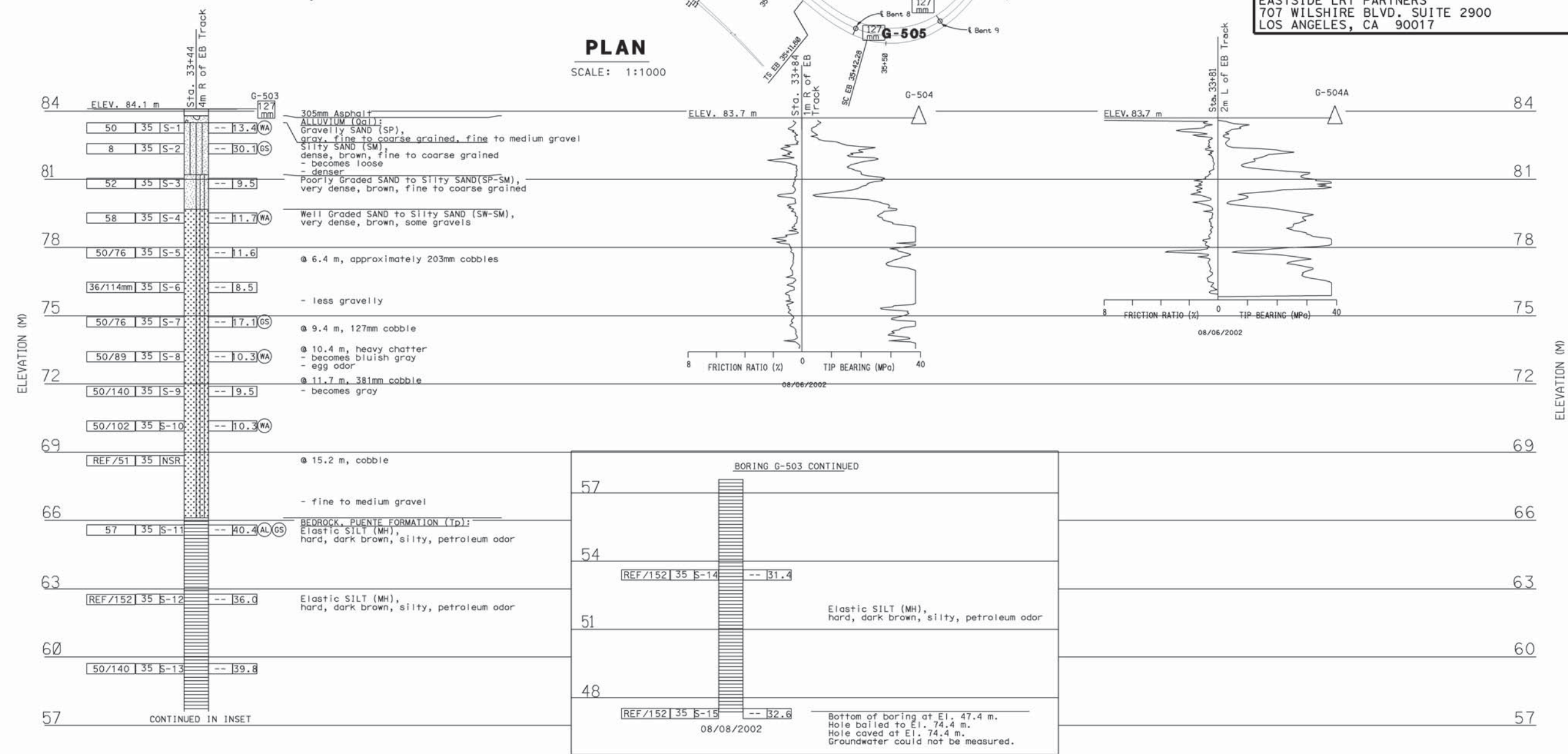
*Kul Bhushan* 12/13/02  
 GEOTECHNICAL PROFESSIONAL  
 6-7-04  
 PLANS APPROVAL DATE  
 The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



METROPOLITAN TRANSPORTATION AUTHORITY  
 ONE GATEWAY PLAZA  
 LOS ANGELES, CA. 90012  
 EASTSIDE LRT PARTNERS  
 707 WILSHIRE BLVD. SUITE 2900  
 LOS ANGELES, CA 90017



**PLAN**  
 SCALE: 1:1000



**PROFILE**  
 VERTICAL SCALE: 1:100  
 HORIZONTAL SCALE: NONE

**PLATE 2**

All dimensions and elevations are in meters except as noted

**LEGEND OF BORING OPERATIONS**

**ELECTRONIC CONE PENETROMETER TEST**  
 Cone Penetrometer dimensions and testing standards: 50mm dia. cone, 100mm dia. tip, 100mm dia. sleeve, 100mm dia. collar, 100mm dia. base.

**57 mm CONE PENETRATION BORING**  
 Penetration Boring dimensions and testing standards: 57mm dia. cone, 114mm dia. tip, 114mm dia. sleeve, 114mm dia. collar, 114mm dia. base.

**ROTARY SAMPLE BORING (WET)**  
 Rotary Sample Boring dimensions and testing standards: 76mm dia. casing, 50mm dia. sampler, 100mm dia. core.

**SAMPLE BORING (DRY)**  
 Sample Boring dimensions and testing standards: 76mm dia. casing, 50mm dia. sampler, 100mm dia. core.

**LEGEND OF EARTH MATERIALS**

**CONSISTENCY CLASSIFICATION FOR SOILS**

According to the Standard Penetration Test

SPT (blows/30cm)	Consistency
0-4	Very Loose
5-10	Loose
11-20	Medium Dense
21-30	Dense
31-50	Very Dense
>50	Hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

DESIGN OVERSIGHT: *Be Nguyen*  
 7-10-03  
 SIGN OFF DATE

DRAWN BY: K. FERNANDES  
 CHECKED BY: C. SCHEYHING

N. NGHIEM  
 FIELD INVESTIGATION BY:  
 DATE:

PREPARED FOR THE  
**STATE OF CALIFORNIA**  
 DEPARTMENT OF TRANSPORTATION

D. YAVORSKY  
 PROJECT ENGINEER

BRIDGE NO.  
 53-2975  
 53C-2148  
 KILOMETER POST  
 1.07

**EASTSIDE LRT PROJECT BRIDGE OVER HWY 101**  
**LOG OF TEST BORINGS SHEET 2 OF 5**



CU 07225  
 EA 1199U1

DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY)	SHEET 58 OF 61
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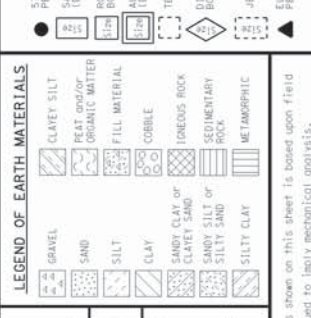
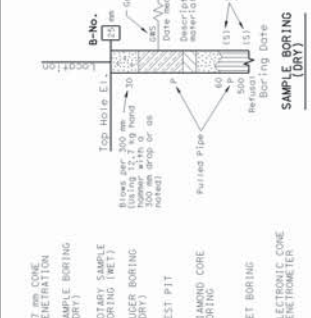
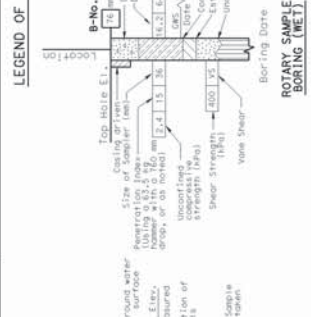
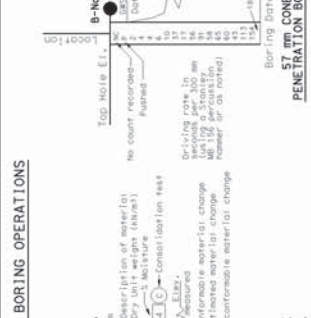
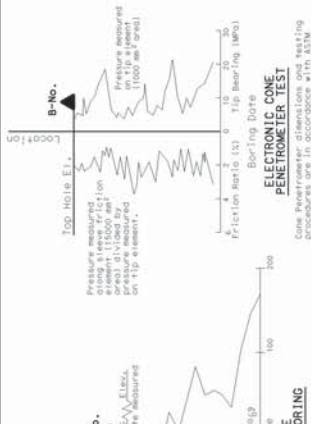


DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	101	0.6/1.4	325	326

*Kul Brushan* 12/13/02  
 GEOTECHNICAL PROFESSIONAL  
 6-7-04  
 PLANS APPROVAL DATE  
 The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



METROPOLITAN TRANSPORTATION AUTHORITY  
 ONE GATEWAY PLAZA  
 LOS ANGELES, CA 90012  
 EASTSIDE LRT PARTNERS  
 707 WILSHIRE BLVD. SUITE 2900  
 LOS ANGELES, CA 90017



**LEGEND OF EARTH MATERIALS**

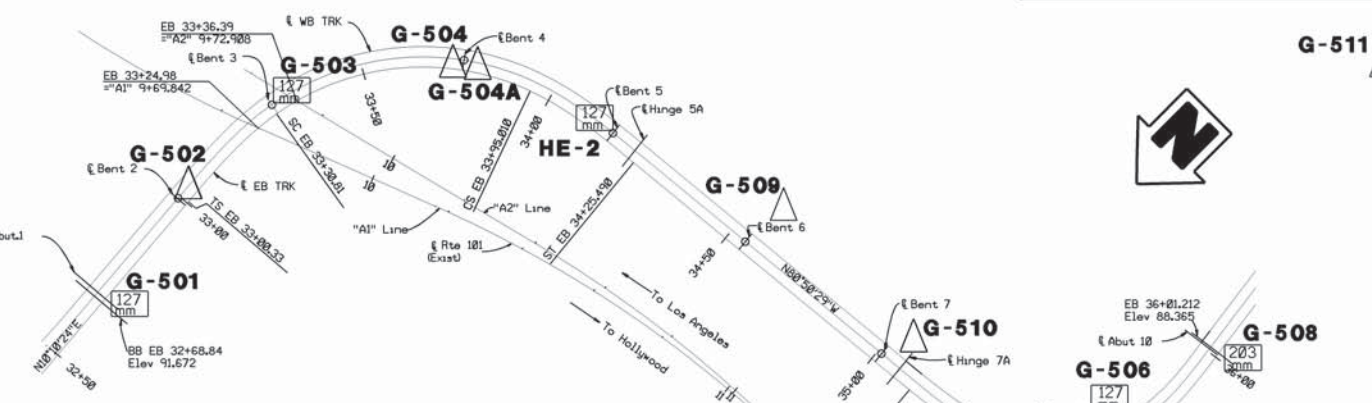
GRAVEL	CLAYEY SILT
SAND	PEAT and/or ORGANIC MATERIAL
SILT	FILL MATERIAL
CLAY	COBBLE
SANDY CLAY or CLAYEY SAND	LOOSE ROCK
SILT CLAY or SILTY SAND	SEDIMENTARY ROCK
SILTY CLAY	METAMORPHIC

**CONSISTENCY CLASSIFICATION FOR SOILS**

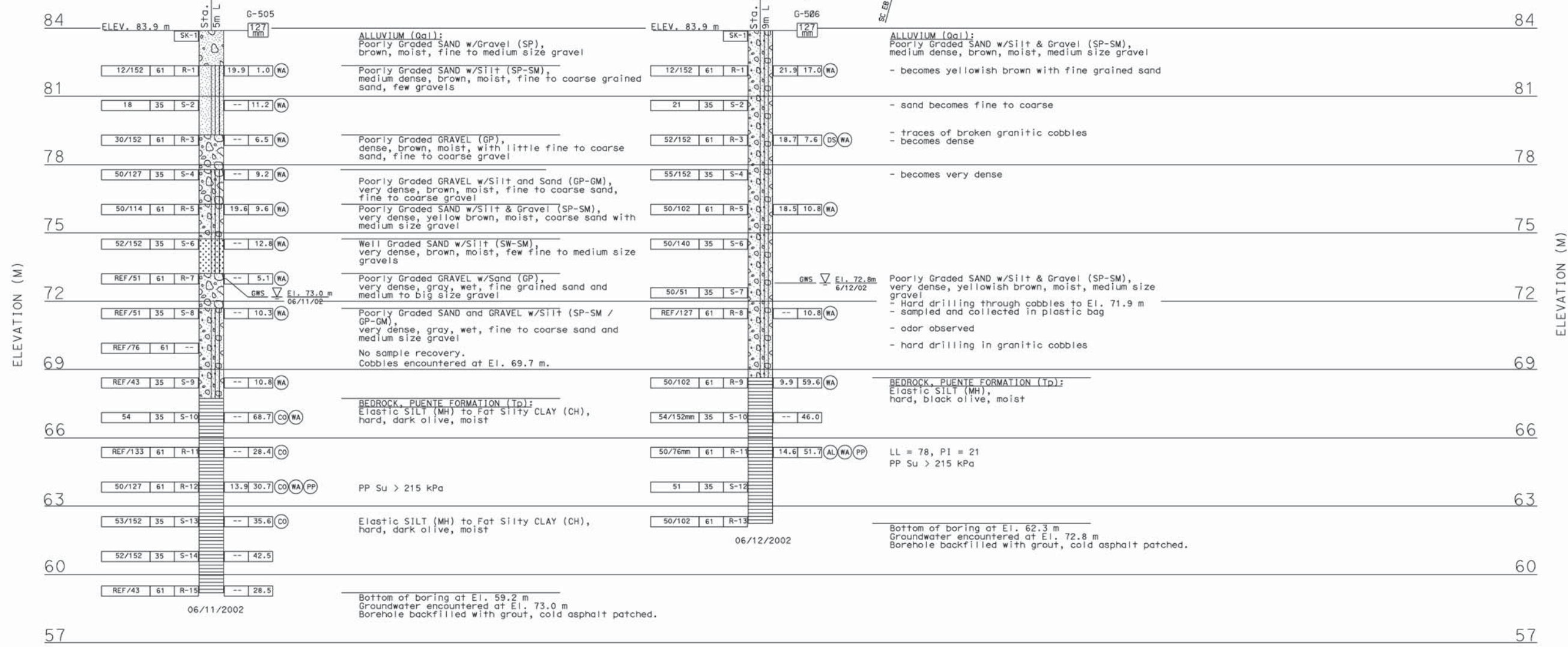
SPT Blow Count (0-30)	0-4	Very Loose
5-10	Loose	
11-30	Medium Dense	
31-50	Dense	
>50	Very Dense	
Q (kg/cm²)	2-4	Very Soft
5-8	Soft	
9-15	Firm	
16-30	Stiff	
>31	Very Stiff	
	Hard	

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

BENCHMARK  
 ESE-252 CALTRANS SR 98-146  
 FD CALTRANS BRASS DISC IN EAST  
 SIDEWALK OF ALAMEDA ST. O/C AND  
 ROUTE 101  
 NORTHING: 561498.646  
 EASTING: 1978051.044  
 ELEVATION: 83.920 m  
 Horizontal Datum: NAD83 1996.35 EPOCH, California  
 State Plane Zone 5.  
 Vertical Datum: NAVD 88



**PLAN**  
 SCALE: 1:1000



**PROFILE**  
 VERTICAL SCALE: 1:100  
 HORIZONTAL SCALE: NONE

**PLATE 4**  
 All dimensions and elevations are in meters except as noted

DESIGN OVERSIGHT: *Be Nguyen*  
 7-10-03  
 SIGN OFF DATE

DRAWN BY: K. FERNANDES  
 CHECKED BY: C. SCHEYHING

N. NGHIEM  
 FIELD INVESTIGATION BY:  
 DATE:

PREPARED FOR THE  
**STATE OF CALIFORNIA**  
 DEPARTMENT OF TRANSPORTATION

D. YAVORSKY  
 PROJECT ENGINEER

BRIDGE NO.  
 53-2975  
 53C-2148  
 KILOMETER POST  
 1.07

**EASTSIDE LRT PROJECT BRIDGE OVER HWY 101**  
**LOG OF TEST BORINGS SHEET 4 OF 5**

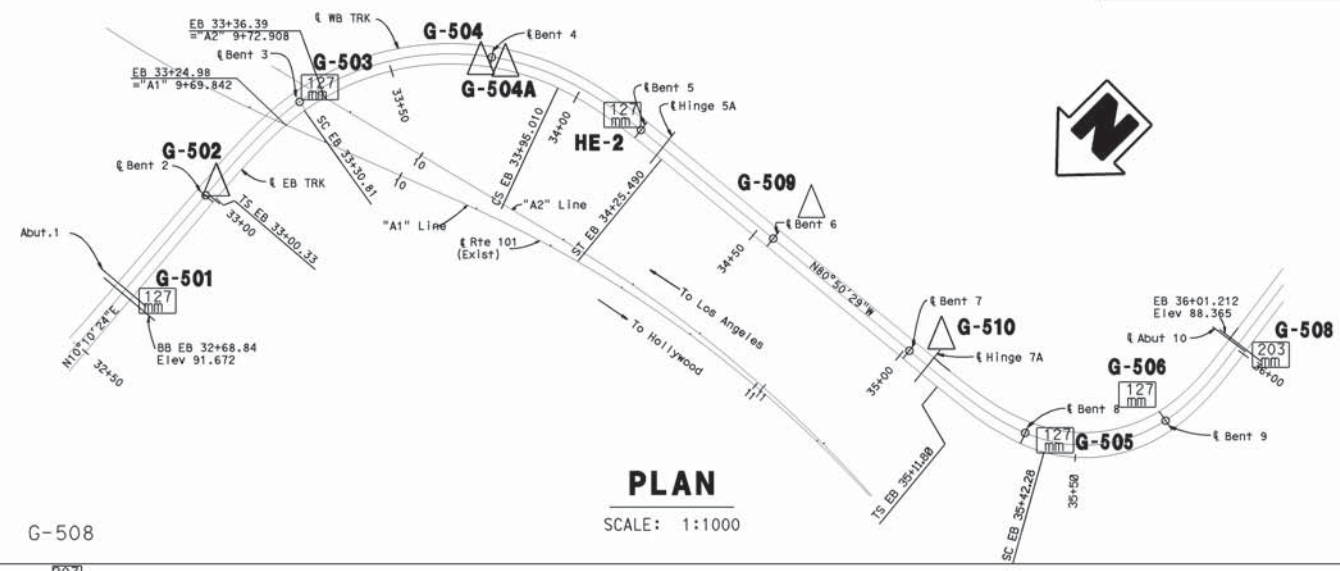


DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	101	0.6/1.4	326	326

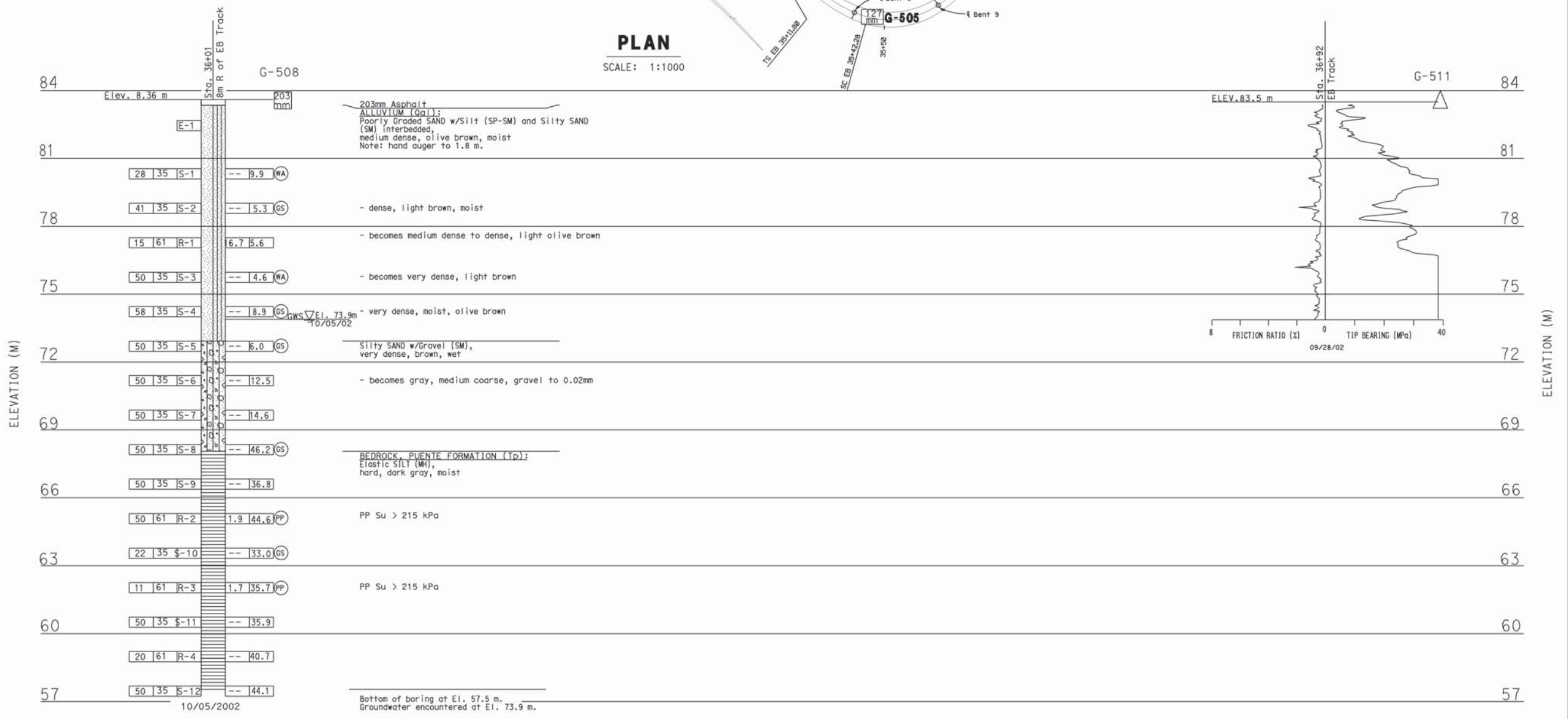
*Kul Bhushan* 12/13/02  
 GEOTECHNICAL PROFESSIONAL  
 6-7-04  
 PLANS APPROVAL DATE  
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METROPOLITAN TRANSPORTATION AUTHORITY  
 ONE GATEWAY PLAZA  
 LOS ANGELES, CA. 90012  
 EASTSIDE LRT PARTNERS  
 707 WILSHIRE BLVD. SUITE 2900  
 LOS ANGELES, CA 90017



**PLAN**  
 SCALE: 1:1000



**PROFILE**  
 VERTICAL SCALE: 1:100  
 HORIZONTAL SCALE: NONE

**PLATE 5**

All dimensions and elevations are in meters except as noted

**LEGEND OF BORING OPERATIONS**

**ELECTRONIC CONE PENETROMETER TEST**  
 Cone Penetrometer dimensions and testing standard: ASTM F1576-00, or as noted.

**57 mm CONE PENETRATION BORING**  
 No cone resistance data measuring

**ROTARY SAMPLE BORING (WET)**  
 Castings of wet samples (dry unit weight) (Moisture) (Liquid Limit) (Plasticity Index) (Consolidation test) (Grain size analysis) (Liquid Limit) (Plasticity Index) (Consolidation test) (Grain size analysis) (Liquid Limit) (Plasticity Index) (Consolidation test) (Grain size analysis)

**SAMPLE BORING (DRY)**  
 Sample taken from boring

**LEGEND OF EARTH MATERIALS**

**CONSISTENCY CLASSIFICATION FOR SOILS**  
 According to the Standard Penetration Test

**NOTE:** Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

*Benny Nguyen*  
 DESIGN OVERSIGHT  
 7-10-03  
 SIGN OFF DATE

DRAWN BY: K. FERNANDES  
 CHECKED BY: C. SCHEYHING

N. NGHIEM  
 FIELD INVESTIGATION BY:  
 DATE:

PREPARED FOR THE  
**STATE OF CALIFORNIA**  
 DEPARTMENT OF TRANSPORTATION

D. YAVORSKY  
 PROJECT ENGINEER

BRIDGE NO.  
 53-2975  
 53C-2148  
 KILOMETER POST  
 1.07

**EASTSIDE LRT PROJECT BRIDGE OVER HWY 101**  
**LOG OF TEST BORINGS SHEET 5 OF 5**



CU 07225  
 EA 1199U1





## Existing Geotechnical Boring Logs City of Los Angeles, 1993

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# LOG OF TEST BORING

PROJECT: 140-4046

DATE: Nov. 18, 1992

BORING NO.: 1

ELEV.: 265'

BORING LOCATION: 124' W/O N. Myers St. & 76' S/O SCF E. 1st St.

DRILL RIG TYPE: CME-75 HT using 8" diameter hollow stem augers

DRILLER: Cooksey

LOGGER: C. Kunesh

ENGINEER: Yew/Adams

DEPTH TO STANDING WATER: none

DEPTH TO WATER SEEPAGE: none

ELEVATION DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND BLOWS/INCHES	USCS	Field Description	Standard Pen. Readings 1st 6" / 2nd 6" / 3rd 6"
265 — 0 260 — 5 255 — 10 250 — 15 245 — 20 240 — 25 235 — 30		SP  SW- SM  SP- SM  SM	Brown poorly graded sand with gravel. Trace of silt. Moist and dense.  Light brown to tan, well graded sand with silt, granitic gravel and cobbles. Dry to moist and dense.  Light brown to tan poorly graded sand with silt and gravel. Gravel content ranges from 8% to 42%. Moist and dense to very dense.	  8 / 6 / 9  6 / 9 / 10  18 / 14 / 19  19 / 33 / 18  29 / 30 / 24





# LOG OF TEST BORING

PROJECT: 140-4046

DATE: Nov. 13, 1992

BORING NO.: 2

ELEV.: 250'

BORING LOCATION: W/S L.A. River channel, below 1st St. Bridge

DRILL RIG TYPE: CME-75 HT using 8" diameter hollow stem augers

DRILLER: Cooksey

LOGGER: C. Kunesh

ENGINEER: Yew/Adams

DEPTH TO STANDING WATER: none

DEPTH TO WATER SEEPAGE: none

ELEVATION DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND BLOWS/INCHES	USCS	Field Description	Standard Pen. Readings 1st 6" / 2nd 6" / 3rd 6"
<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>250 — 0</p> <p>245 — 5</p> <p>240 — 10</p> </div> </div>			<p>12" PCC.</p> <p>SP- SM Brown to rusty brown poorly graded sand with silt and gravel. Gravel content is 29%. Moist and dense. Encountered granitic cobbles from 4' to 10'.</p>	<p>18 / 20 / 31</p>
		GW- GM	<p>Brown to rusty brown well graded gravel with silt, sand and granitic cobbles. Sand content is 31%. Moist and dense.</p> <p style="text-align: center;">- No Water -</p>	<p>25 / 27 / 27</p>

# LOG OF TEST BORING

PROJECT: 140-4046

DATE: Nov. 17, 1992

BORING NO.: 2A

ELEV.: 250'

BORING LOCATION: W/S River channel, below 1st St. Bridge, 17' N/O T.H. 2

DRILL RIG TYPE: CME-75 HT using 8" diameter hollow stem augers

DRILLER: Cooksey

LOGGER: C. Kunesh

ENGINEER: Yew/Adams

DEPTH TO STANDING WATER: none

DEPTH TO WATER SEEPAGE: none

ELEVATION DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND BLOWS/INCHES	USCS	Field Description	Standard Pen. Readings 1st 6" / 2nd 6" / 3rd 6"
<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>250 — 0</p> <p>215 — 5</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> </div> </div>	<p>SP- SM</p>	<p>12" PCC.</p> <p>Brown to rusty brown poorly graded sand with silt and gravel. Gravel content is about 29%. Moist and dense. Encountered cobbles from 4' to 8'.</p> <p style="text-align: center;">- No Water -</p>		

## Existing Geotechnical Boring Logs City of Los Angeles, 1994a



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Legend:

Symbol:      Description:

Symbol:      Description:



Poorly graded sand with gravel. Trace of silt.



Well graded sand with silt, granitic gravel and cobbles.



Poorly graded sand with silt and gravel.



PCC.



Well graded gravel with silt, sand and granitic cobbles.



Representative sample (disturbed)



Water at depth indicated during drilling



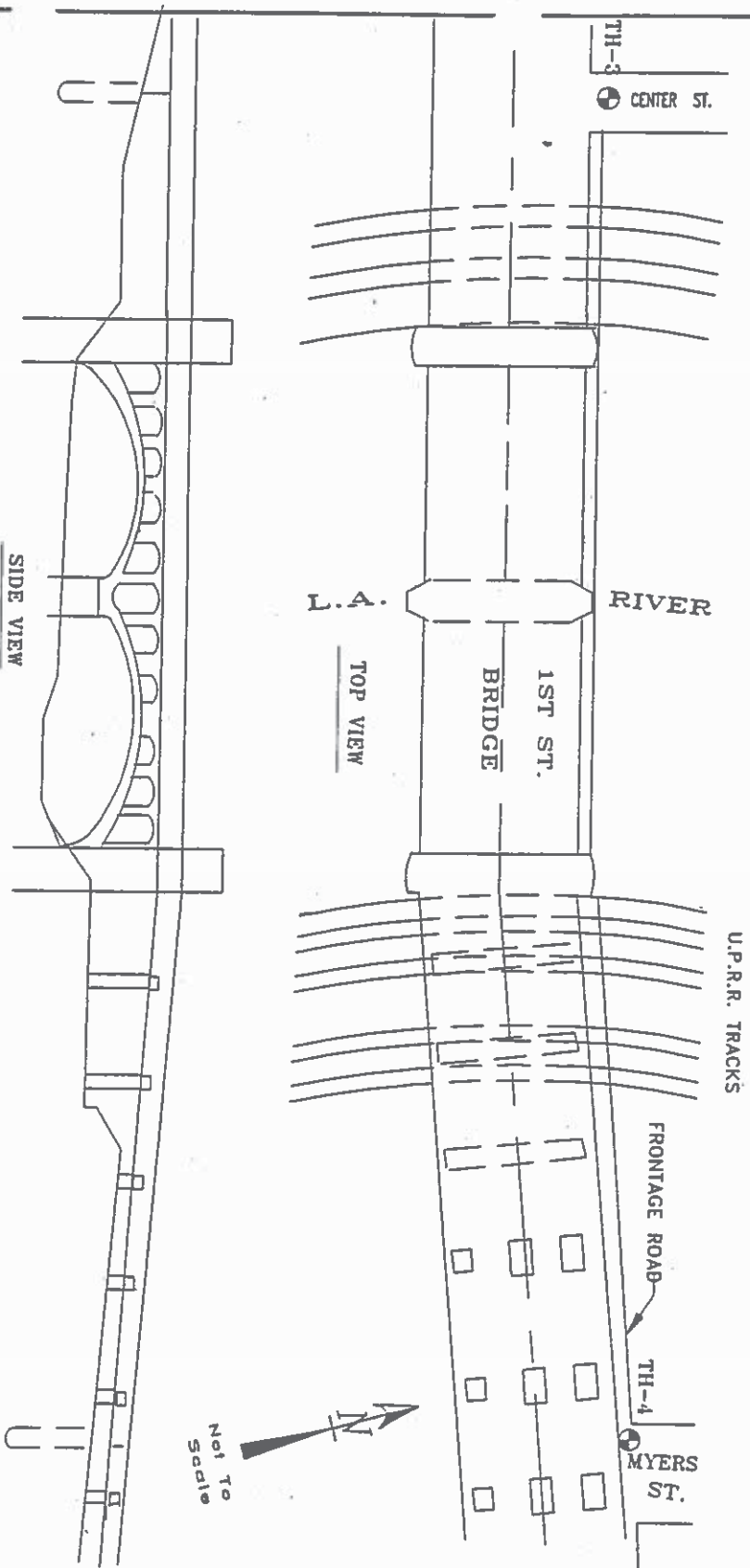
Depth to perched water



Rig refusal or end of boring

Notes:

1. Exploratory borings were drilled on November 13, 17, & 18, 1992 with a CME-75 HT drill rig using 8" diameter hollow stem augers.
2. Free water was not encountered during the drilling of this project.
3. The boring locations and elevations were provided by Geotechnical Services.
4. Abbreviations used on logs: HT = high torque  
 N/O = north of                      NCF = north curb face                      C/L = center line  
 S/O = south of                      SCF = south curb face                      BCR = begin curb return  
 E/O = east of                      ECF = east curb face                      PL = property line  
 W/O = west of                      WCF = west curb face                      ELEV. = elevation  
 OVA = organic vapor analyzer                      LEL = lower explosive limit  
 AC = asphalt concrete                      PCC = Portland cement concrete
5. A maximum blow count value of 75 per 6 inch increment was used for the Standard Penetration Test.



Project Title : 1ST STREET VIADUCT OVER L.A. RIVER-SUPPLEMENTAL.

CITY OF LOS ANGELES  
 DEPARTMENT OF GENERAL SERVICES  
 STANDARDS DIVISION

**TEST BORING LOCATIONS**

Lab No. 140-4046 Ref. No. 08573  
 Date: 3-10-93  
 CADD BY R.B.





# LOG OF TEST BORING

**LAB. NO.:** 140- 4046      **PROJECT:** FIRST STREET VIADUCT OVER L.A. RIVER-SUPPLEMENTAL  
**BORING NO.:** 4      **ELEVATION:** 265'      **DRILLING DATE:** January 22, 1993  
**BORING LOCATION:** 7' W/O C/L N. Myers St. & approx. C/L 1st St. frontage Road  
**DRILL RIG TYPE:** CME-75 using 8" diameter hollow stem augers  
**DEPTH TO STANDING WATER:** none      **DEPTH TO WATER SEEPAGE:** none  
**DRILLER:** Cooksey      **LOGGER:** C. Kunesh      **ENGINEER:** Zadoorian

ELEVATION / DEPTH (ft)	SOIL SYMBOLS, SAMPLER SYMBOLS AND BLOWS/INCHES	USCS	Field Description	Moisture %	Density Pcf
265 — 0 260 — 5 255 — 10 250 — 15 245 — 20 240 — 25 235 — 30 230 — 35		SM  SW/SP	6" AC pavement in good condition. Brown silty sand. Few gravels and red brick fragments. Fill material. Moist.  Brown well to poorly graded sand. Trace of silt. Few granitic gravel. Silt content decreasing with depth. Moist and dense to very dense.  Encountered 1' lense of well graded gravel with sand at 12.5'.	2.9   1.9  2.8  2.5  3.0  1.7  2.4  2.9  2.1	127   123  125  118  127  135  112  124  132
			No Water		

## Existing Geotechnical Boring Logs City of Los Angeles, 1994b



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# LOG OF TEST BORING

940230H12

LAB. NO.: 140- 4340

PROJECT: PIPER TECHNICAL CENTER

BORING NO.: H-9A

ELEVATION: 280'

DRILLING DATE: 08-31-94

(CONTAMINATION)

BORING LOCATION: 56' S/o and 32' W/o NW corner of column QR at Space 120' Building #2

DRILL RIG TYPE: CME-55 using 8" diameter hollow stem augers.

DEPTH TO STANDING WATER: none

DEPTH TO WATER SEEPAGE: none

DRILLER: L. Cooksey

LOGGER: J. Kunesh

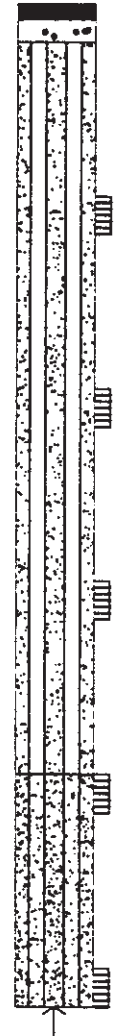
ENGINEER: Burnett

ELEVATION / DEPTH (ft)	SOIL SYMBOLS, SAMPLER SYMBOLS AND BLOWS/INCHES	OVA (PPM)	USCS	Field Description
<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>280 — 0</p> <p>275 — 5</p> <p>270 — 10</p> <p>265 — 15</p> <p>260 — 20</p> <p>255 — 25</p> <p>250 — 30</p> <p>245 — 35</p> </div> </div>				<p>4" AC pavement in good condition.</p> <p>Crushed aggregate base with some sand.</p> <p>FILL MATERIAL. Grayish-brown silty sand with some gravel. Slight petrochemical odor from 8' depth. No sampling at 5' and 10' depths per engineer present. Concrete fragments present from 11' to 13' depth. Granite cobble lodged in split spoon sampler at 16' depth. Petrochemical odor decreasing with depth. Moist and dense.</p>
	40/12	7	SP	<p>Brown poorly graded sand with some granitic gravel and cobbles. Sand color becoming lighter with depth. Trace of petrochemical odor present. Moist and dense.</p>
	16/12	8		<p>--- No water ---</p>



# LOG OF TEST BORING 940230421

**LAB. NO.:** 140- 4340      **PROJECT:** PIPER TECHNICAL CENTER  
**BORING NO.:** H-18      **ELEVATION:** 280'    **DRILLING DATE:** 08-25-94    **(CONTAMINATION)**  
**BORING LOCATION:** 61' W/o and 11' N/o Diesel Pump at back of building #1 Space 150  
**DRILL RIG TYPE:** CME-75 using 8" diameter hollow stem augers.  
**DEPTH TO STANDING WATER:** none      **DEPTH TO WATER SEEPAGE:** none  
**DRILLER:** L. Cooksey      **LOGGER:** Redlin      **ENGINEER:** Burnett

ELEVATION / DEPTH (ft)	SOIL SYMBOLS, SAMPLER SYMBOLS AND BLOWS/INCHES	OVA (PPM)	USCS	Field Description
280 — 0 275 — 5 270 — 10 265 — 15 260 — 20 255 — 25 250 — 30 245 — 35	 <p style="margin-left: 20px;">             4/12              11/12              13/12              11/12              10/12           </p> <p style="margin-left: 20px;"> <span style="font-size: 1.5em;">26</span> </p>			<p>5" AC pavement in fair condition.            Sand/gravel base.  <b>FILL MATERIAL.</b> Gray/brown silty sand with some clay binders, gravel and a few red brick fragments. Moist and fairly loose. Slight petrochemical odor at 10'.</p> <hr/> <p><b>SP-SM</b>    Light brown/tan poorly graded sand. Moist and fairly loose. No petrochemical odor. Encountered some gravel at 25'. Sand is becoming coarser with depth.</p> <hr/> <p style="text-align: center;">           ---            No water            ---         </p>

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## Existing Geotechnical Boring Logs City of Los Angeles, 1994c



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# LOG OF TEST BORING

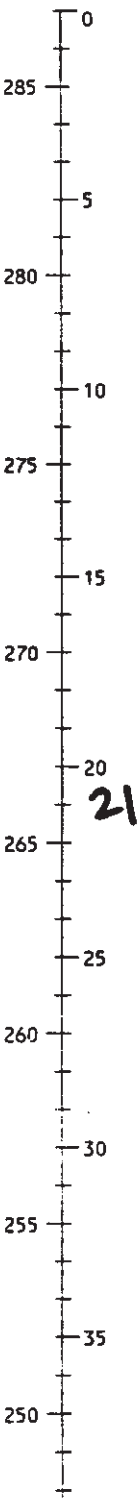
**LAB. NO.:** 140- 4413    **PROJECT:** ALAMEDA SEWER REHABILITATION AT LOS ANGELES ST.  
**BORING NO.:** B-1A    **ELEVATION:** 287'    **DRILLING DATE:** 12-28-94  
**BORING LOCATION:** 3.5' W/o ECF Alameda St. and 92' S/o SCF Union Station Parking Ent.  
**DRILL RIG TYPE:** CME-75 using 8" diameter hollow stem augers.  
**DEPTH TO STANDING WATER:** None    **DEPTH TO WATER SEEPAGE:** None  
**DRILLER:** Adams    **LOGGER:** A. Gharai    **ENGINEER:** None Present

ELEVATION / DEPTH (ft)	SOIL SYMBOLS, SAMPLER SYMBOLS AND BLOWS/INCHES	USCS	Field Description	Moist. %	Dens. Pcf
0			9" AC pavement in good condition.		
285	 7/12		FILL MATERIAL. Light brown poorly graded sand with some silt and gravel. Concrete slurry present from 4.5' to 6' depth.	3.1	122
5	 43/12			7.2	116
280	 6/12	SP	POSSIBLE FILL MATERIAL from existing sewer line. Light brown sand with some granitic gravel and traces of silt. Moist and loose.	3.7	111
10	 6/12			3.7	111
275	 18/12	ML	Light green silt with clay. Moist and firm. Density increasing with depth.	28.0	96
15	 18/12			28.0	96
270	 28/12			23.1	104
20	 28/12			23.1	104
265			--- No water. ---		
25					
260					
30					
255					
35					
250					

# LOG OF TEST BORING

**LAB. NO.:** 140- 4413     **PROJECT:** ALAMEDA SEWER REHABILITATION AT LOS ANGELES ST.  
**BORING NO.:** B-2     **ELEVATION:** 287'     **DRILLING DATE:** 12-28-94  
**BORING LOCATION:** 3.5' W/o ECF Alameda St. and 24' S/o SCF Union Station Parking Exit  
**DRILL RIG TYPE:** CME-75 using 8" diameter hollow stem augers.  
**DEPTH TO STANDING WATER:** None     **DEPTH TO WATER SEEPAGE:** None  
**DRILLER:** Adams     **LOGGER:** A. Gharai     **ENGINEER:** None Present

ELEVATION / DEPTH (ft)	SOIL SYMBOLS, SAMPLER SYMBOLS AND BLOWS/INCHES	USCS	Field Description	Moist. %	Dens. Pcf
0			9" AC pavement in good condition.		
285	2/12		FILL MATERIAL. Light brown silty sand with some gravel. Wood fragments (plywood) present at 3' depth. PVC pipe and concrete slurry present at 5' depth. Concrete fragments, sand and cobbles present from 10' to 15' depth. Moist.	10.2	100
280					
275	13/12				
270	17/12			27.8	96
265	29/12	ML	Light green/brown silt with sand and clay. Moist and firm. Moisture increasing with depth.	32.9	91
260			--- No water. ---		
255					
250					





# Existing Geotechnical Boring Logs City of Los Angeles, 1996

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# KEY TO SYMBOLS

Symbol      Description

## STRATA



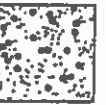
AC pavement



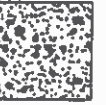
Silty sand.



Fine to very fine sandy silt.



Well graded sands. Few granitic gravel.



Well to poorly graded sand. Trace of silt.

## MISCELLANEOUS



End of Boring

## SAMPLERS



Split spoon sampler



# KEY TO SYMBOLS

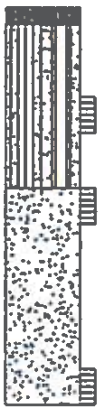
## Notes:

1. Exploratory borings were drilled on January 21, 1993 with a CME-75 HT drill rig and on January 22, 1993 with a CME-75 drill rig using 8" diameter hollow stem augers.
2. Free water was not encountered during the drilling of this project.
3. The boring locations and elevations were provided by Geotechnical Services.
4. Test Holes No. 1 & 2 were drilled on November 17th & 18th, 1992.
5. Abbreviations used on logs:

N/O = north of	NCF = north curb face	NE = northeast
S/O = south of	SCF = south curb face	NW = northwest
E/O = east of	ECF = east curb face	SE = southeast
W/O = west of	WCF = west curb face	SW = southwest
C/L = center line	PL = property line	
AC = asphalt concrete	PCC = Portland cement concrete	
OVA = organic vapor analyzer	LEL = lower explosive limit	
	HT = high torque	

# LOG OF TEST BORING

**LAB. NO.:** 140- 4536      **PROJECT:** 1ST STREET VIADUCT OVER L.A. RIVER-SEISMIC RETROFIT  
**BORING NO.:** H-2      **ELEVATION:** 270'      **DRILLING DATE:** 02-15-96      **(CONTAMINATION)**  
**BORING LOCATION:** 5' N/o SCF 1st St. (N/s Frontage Rd.) and 48' E/o ECF Santa Fe Ave.  
**DRILL RIG TYPE:** CME-75 using 6" diameter conventional flight augers.  
**DEPTH TO STANDING WATER:** None      **DEPTH TO WATER SEEPAGE:** None  
**DRILLER:** Ramirez      **LOGGER:** Redlin      **ENGINEER:** Burnett

ELEVATION / DEPTH (ft)	SOIL SYMBOLS, SAMPLER SYMBOLS AND BLOWS/INCHES	OVA (PPM)	USCS	Field Description
70 0 65 5 60 10 55 15 50 20 45 25 40 30 35 35		0 0 0	SM-ML SP	<p>6" AC pavement in poor condition.</p> <p>Light brown silty sand/sandy silt with some clay binders. Sand is fine in texture. Moist and firm. No petrochemical odor.</p> <p>Light tan sand with a little silt and gravel. Moist and dense. Sand is becoming coarser in texture with depth. Gravel content is increasing with depth. No petrochemical odor.</p> <p style="text-align: center;">--- No free water. ---</p>

# LOG OF TEST BORING

LAB. NO.: 140- 4536      PROJECT: 1ST STREET VIADUCT OVER L.A. RIVER-SEISMIC RETROFIT

BORING NO.: H-1      ELEVATION: 270'      DRILLING DATE: 02-15-96      (CONTAMINATION)

BORING LOCATION: 11' E/o WCF Center St. and 53' S/o SCF 1st St. (N/s Frontage Rd.) under bridge

DRILL RIG TYPE: CME-75 using 6" diameter conventional flight augers.

DEPTH TO STANDING WATER: None      DEPTH TO WATER SEEPAGE: None

DRILLER: Ramirez      LOGGER: Redlin      ENGINEER: Burnett

ELEVATION / DEPTH (ft)	SOIL SYMBOLS, SAMPLER SYMBOLS AND BLOWS/INCHES	OVA (PPM)	USCS	Field Description
270 0 265 5 260 10 255 15 250 20 245 25 240 30 235 35		0 0 0	SM ML SP	<p>6" AC pavement in poor condition.</p> <p>FILL MATERIAL. Light brown silty sand with some clay binders and a trace of gravel. Sand is fine in texture. Moist and firm. Encountered some red brick fragments at 2.5' depth.</p> <p>Light brown sandy silt with some clay binders. Moist and firm. No petrochemical odor.</p> <p>Light tan sand with some gravel. Moist and dense. No petrochemical odor.</p> <p style="text-align: center;">--- No free water. ---</p> <p style="text-align: center;">Used break down mast under bridge.</p>



# LOG OF TEST BORING

LAB. NO.: 140- 4536      PROJECT: 1ST STREET VIADUCT OVER L.A. RIVER-SEISMIC RETROFIT

BORING NO.: H-5      ELEVATION: 275'      DRILLING DATE: 02-15-96      (CONTAMINATION)

BORING LOCATION: 45' W/o ECF Myers St. and 53' S/o SCF 1st St. (N/s Frontage Rd.)- under bridge

DRILL RIG TYPE: CME-75 using 6" diameter conventional flight augers.

DEPTH TO STANDING WATER: None

DEPTH TO WATER SEEPAGE: None

DRILLER: Ramirez

LOGGER: Redlin

ENGINEER: Burnett

ELEVATION / DEPTH (ft)	SOIL SYMBOLS, SAMPLER SYMBOLS AND BLOWS/INCHES	OVA (PPM)	USCS	Field Description
275 - 0	<p>10/12 12/12 17/12</p>		SP	6" AC pavement in poor condition. Light brown/tan poorly graded sand. Sand is fine in texture. Moist and dense. Sand is becoming coarser in texture with depth. No petrochemical odor.
270 - 5		0		
265 - 10		0		Encountered gravel and small cobbles at 10' depth.
260 - 15				--- No free water. --- Used break down mast under bridge.
255 - 20				
250 - 25				
245 - 30				
240 - 35				

# LOG OF TEST BORING

**AB. NO.:** 140- 4536      **PROJECT:** 1ST STREET VIADUCT OVER L.A. RIVER-SEISMIC RETROFIT  
**BORING NO.:** H-4      **ELEVATION:** 275'      **DRILLING DATE:** 02-15-96      **(CONTAMINATION)**  
**BORING LOCATION:** 28' S/o SCF 1st St. (N/s Frontage Rd.) and 104' W/o ECF Myers St.- under bridge  
**DRILL RIG TYPE:** CME-75 using 6" diameter conventional flight augers.  
**DEPTH TO STANDING WATER:** None      **DEPTH TO WATER SEEPAGE:** None  
**DRILLER:** Ramirez      **LOGGER:** Redlin      **ENGINEER:** Burnett

ELEVATION / DEPTH (ft)	SOIL SYMBOLS, SAMPLER SYMBOLS AND BLOWS/INCHES	OVA (PPM)	USCS	Field Description
<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>75 0</p> <p>70 5</p> <p>65 10</p> <p>60 15</p> <p>55 20</p> <p>50 25</p> <p>45 30</p> <p>40 35</p> </div> </div>	<p>9/12</p> <p>10/12</p> <p>17/12</p>	<p>0</p> <p>0</p> <p>0</p>	<p>CL-ML</p> <p>SP</p>	<p>6" AC pavement in poor condition.</p> <p>POSSIBLE FILL MATERIAL (due to presence of disturbed soil matrix) Light brown silty clay/clayey silt with some sand and gravel pockets. Moist and firm. No petrochemical odor.</p> <p>Light brown/tan sand with some gravel. Moist and dense. Gravel content is increasing with depth. No petrochemical odor.</p> <p>Encountered small cobbles at 10' depth.</p> <p style="text-align: center;">--- No free water. ---</p> <p style="text-align: center;">Used break down mast under bridge.</p>

# LOG OF TEST BORING

**LAB. NO.:** 140- 4536      **PROJECT:** 1ST STREET VIADUCT OVER L.A. RIVER-SEISMIC RETROFIT  
**BORING NO.:** H-3      **ELEVATION:** 271'      **DRILLING DATE:** 02-15-96      **(CONTAMINATION)**  
**BORING LOCATION:** 59' E/o ECF Center St. and 54' S/o SCF 1st St. (N/s Frontage Rd.) under bridge  
**DRILL RIG TYPE:** CME-75 using 6" diameter conventional flight augers.  
**DEPTH TO STANDING WATER:** None      **DEPTH TO WATER SEEPAGE:** None  
**DRILLER:** Ramirez      **LOGGER:** Redlin      **ENGINEER:** Burnett

ELEVATION / DEPTH (ft)	SOIL SYMBOLS, SAMPLER SYMBOLS AND BLOWS/INCHES	OVA (PPM)	USCS	Field Description
<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p>0</p> <p>270</p> <p>5</p> <p>265</p> <p>10</p> <p>260</p> <p>15</p> <p>255</p> <p>20</p> <p>250</p> <p>25</p> <p>245</p> <p>30</p> <p>240</p> <p>35</p> <p>235</p> </div> <div style="flex: 1; border-left: 1px solid black; border-right: 1px solid black; padding: 0 5px;"> </div> </div>			<p>SP-SM</p>	<p>6" AC pavement in poor condition.</p> <p>POSSIBLE FILL MATERIAL (due to low blow count and location near bridge footing) Light brown poorly graded sand with some silt and gravel. Moist and loose.</p> <p>Encountered some small cobbles at 7' depth.</p> <p style="text-align: center;">--- No free water. ---</p> <p style="text-align: center;">Used break down mast under bridge.</p>

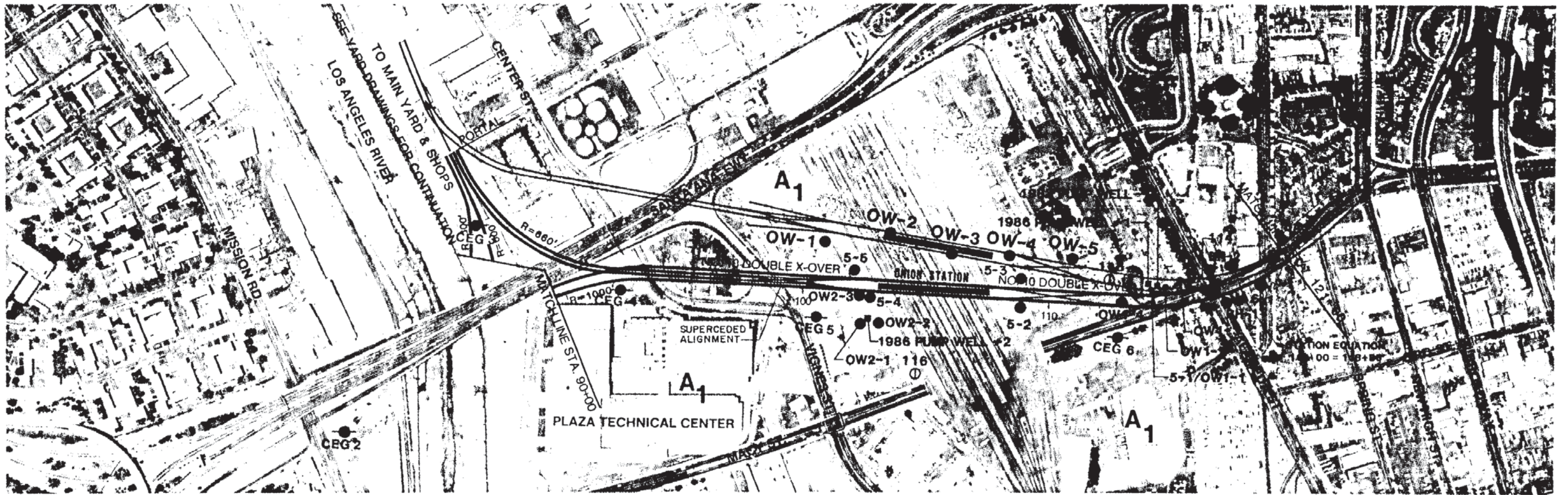


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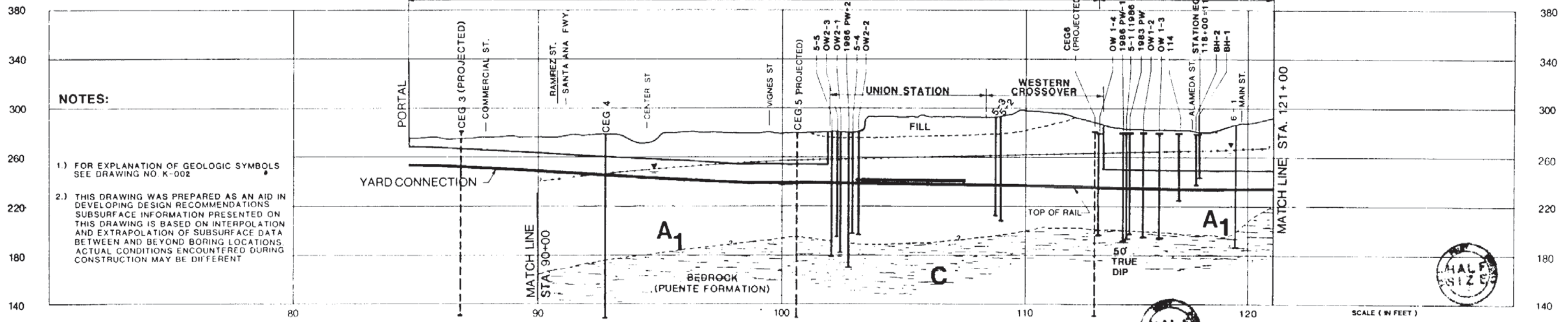
**Existing Geotechnical Boring Logs  
Converse Consultants/Earth Sciences Associates  
Geo/Resource Consultants, 1983 and 1986**

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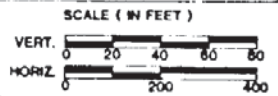


LOCATION OF BORINGS  
CUT & COVER



- NOTES:
- FOR EXPLANATION OF GEOLOGIC SYMBOLS SEE DRAWING NO. K-002
  - THIS DRAWING WAS PREPARED AS AN AID IN DEVELOPING DESIGN RECOMMENDATIONS. SUBSURFACE INFORMATION PRESENTED ON THIS DRAWING IS BASED ON INTERPOLATION AND EXTRAPOLATION OF SUBSURFACE DATA BETWEEN AND BEYOND BORING LOCATIONS. ACTUAL CONDITIONS ENCOUNTERED DURING CONSTRUCTION MAY BE DIFFERENT.

GEOLOGIC SECTION THROUGH SUPERCEDED ALIGNMENT



THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U.S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.				DESIGNED BY DRAWN BY CHECKED BY IN CHARGE DATE 2-13-87	SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT <b>METRO RAIL PROJECT</b> 	LA CBD TO NORTH HOLLYWOOD <b>UNION STATION</b> LOCATION OF BORINGS AND GEOLOGIC SECTION	CONTRACT NO. A136 DRAWING NO. K-001 SCALE AS SHOWN SHEET NO. 47
REV. DATE BY SUB APP DESCRIPTION	0/ 8/5/87 JAK WJA INITIAL ISSUE	CCI/ESA/GRC General Geotechnical Consultants Submitted <i>R. P. ...</i> Date 12-21-82 DMJM/PBOD/KE/HWA GENERAL CONSULTANTS APPROVED <i>[Signature]</i>					



# GEOLOGIC EXPLANATION

## GEOLOGIC UNITS

QUATERNARY	PLEISTOCENE HOLOCENE	A1	YOUNG ALLUVIUM (Granular): Includes clean sands, silty sands, gravelly sands, sandy gravels, and locally contains cobbles and boulders. Primarily dense, but ranges from loose to very dense.
		A2	YOUNG ALLUVIUM (Fine-grained): Includes clays, clayey silts, sandy silts, sandy clays, clayey sands. Primarily stiff, but ranges from firm to hard.
		A3	OLD ALLUVIUM (Granular): Includes clean sands, silty sands, gravelly sands, and sandy gravels. Primarily dense, but ranges from medium dense to very dense.
		A4	OLD ALLUVIUM (Fine-grained): Includes clays, clayey silts, sandy silts, sandy clays, and clayey sands. Primarily stiff, but ranges from firm to hard.
		SP	SAN PEDRO FORMATION: Predominantly clean, cohesionless, fine to medium-grained sands, but includes layers of silts, silty sands, and fine gravels. Primarily dense, but ranges from medium dense to very dense. Locally impregnated with oil or tar.
TERTIARY	MIOCENE PLIOCENE	C	FERNANDO AND PUENTE FORMATIONS: Claystone, siltstone, and sandstone, thinly to thickly bedded. Primarily low hardness, weak to moderately strong. Locally contains very hard, thin cemented beds and cemented nodules. Locally contains gas and oil.

## SYMBOLS

- Geologic contact: approximately located, queried where inferred.
- Fault: approximately located; queried where inferred; arrows indicate probable movement; attitude in profile is an apparent dip and is not corrected for scale distortion.
- Dip of bedding: from unoriented core samples, bedding attitudes may not be correctly oriented to the plane of the profile, but represent dips to illustrate regional geologic trends; number gives true dip in degrees, as encountered in boring.
- Perched water level: approximately located; queried where inferred.
- Permanent water level: approximately located, queried where inferred.
- Boring - CEG (1981)
- Boring - CCI/ESA/GRC (1983, 1984 & 1985)
- Boring - Woodward - Clyde (1977)
- Boring - Kaiser Engineers (1982) } See appropriate Woodward - Clyde and Kaiser report(s).
- Boring - Other (USGS 1977 and various foundation studies)
- Boring - Nuclear Regulatory Commission (1980) } Borings not drilled for Metro Rail Project. Logs not available in Metro Rail Transit Consultants' office.

## NOTES

- 1) The geologic sections are based on interpolation between borings and were prepared as an aid in developing design recommendations. Actual conditions encountered during construction may be different. Geologic sections are plotted for AR (Outbound) track.
- 2) Track alignment plan and profiles are approximate.
- 3) Borings projected more than 200' to the profile line were considered in some of the interpretation of subsurface conditions. However, final interpretation is based on numerous factors and may not reflect the boring logs as presented on Drawings No. K-001.
- 4) Displacements shown along faults are graphic representations. Actual vertical offsets are unknown.
- 5) Additional information on observation wells (OW) and pump wells (PW) located in the Union Station vicinity, is presented in the report titled "Union Station Area Aquifer Pump Test", dated November 11, 1986.
- 6) CONTRACTOR SHOULD BE AWARE OF THE PRESENCE OF COBBLES AND BOULDERS AT LOWER DEPTHS IN THE BORINGS, ABOVE THE PUENTE FORMATION

## REVISIONS

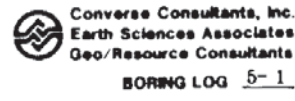
- 1) Added supplemental borings to plan and geologic section.
- 2) The following data was added to boring logs

Boring 5-1 : Drill Rig - Failing 1500  
 Boring 5-2 : Drill Rig - Failing 1500  
 Boring 5-3 : Drill Rig - Failing 1500  
 Boring 5-4 : Drill Rig - Failing 1500  
 Boring 5-5 : Drill Rig - Failing 1500



THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA										DESIGNED BY _____ DRAWN BY _____ CHECKED BY _____ IN CHARGE _____ DATE 2-13-87		N/A		SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT <b>METRO RAIL PROJECT</b>				LA CBD TO NORTH HOLLYWOOD UNION STATION		CONTRACT NO. A136 DRAWING NO. K-002 REV. 0 SCALE NONE SHEET NO. 48	
SUBMITTED <i>[Signature]</i> 2-13-87										APPROVED <i>[Signature]</i>		EXPLANATIONS, NOTES AND REVISIONS									

THIS BORING LOG IS BASED ON FIELD CLASSIFICATION AND VISUAL  
SAMPLING. IT IS ADVISED TO INCLUDE RESULTS OF  
LABORATORY CLASSIFICATION TESTS WHERE AVAILABLE. THIS LOG  
IS APPLICABLE ONLY AT THIS LOCATION AND TIME. CONDITIONS  
MAY DIFFER AT OTHER LOCATIONS OR TIME.



Converse Consultants, Inc.  
Earth Sciences Associates  
Geo/Resource Consultants

BORING LOG 5-1

Proj: DESIGN UNIT A135 Date Drilled 2-4-83 Ground Elev. 279.1'  
Drill Rig Logged By B. Ingraham Total Depth 85.0'  
Hole Diameter 4 3/4" Hammer Weight & Fall 320 lbs. 2 3/4"

DEPTH (FEET)	LOG	MATERIAL CLASSIFICATION	SPT	REMARKS
0	SM	0.0-0.4 ASPHALT PAVEMENT	RD	
0.4	SM	0.4-2.0 FILL SILTY SAND mottled brown, moist, dense	1-1 DR	
2.0	SM	ALLOYIUM 2.0-4.0 SILTY SAND/SANDY SILT: red-brown moist, medium dense, fine sand with silt, slightly porous		
4.0	SM	4.0-8.0 SILTY SAND: gray brown, moist, medium dense, fine sand with silt and trace gravel to 1"	1-2 DR RD	
8.0	SM	8.0-70.0 GRAVELLY SAND		
10.0			100 SS RD	Refusal at 5'
12.0				
14.0				
16.0				
18.0				
20.0				

Sheet 1 of 4

Project DESIGN UNIT A135 Date Drilled 2-4-83 Hole No. 5-1

DEPTH (FEET)	LOG	MATERIAL CLASSIFICATION	SPT	REMARKS
20	SM	8.0-70.0 GRAVELLY SAND (continued)		NO RECOVERY
22				
24				
26				
28				
30				
32				
34				
36				
38				
40				
42				
44				

Intermittent lenses of increased gravel content

Sulphur odor in sample  
Poor Recovery

Sheet 2 of 4

Project DESIGN UNIT A135 Date Drilled 2-4-83 Hole No. 5-1

DEPTH (FEET)	LOG	MATERIAL CLASSIFICATION	SPT	REMARKS
44	SM	8.0-70.0 GRAVELLY SAND (continued)		
46				
48				
50				
52				
54				
56				
58				
60				
62				
64				
66				
68				
70				
72				
74				
76				
78				
80				
82				
84				
86				
88				

Sulphur odor  
Poor Sample Recovery

No Recovery

Slight Sulphur Odor  
Poor Sample Recovery

Sulphur Odor  
Poor Recovery

Sheet 3 of 4

Project DESIGN UNIT A135 Date Drilled 2-4-83 Hole No. 5-1

DEPTH (FEET)	LOG	MATERIAL CLASSIFICATION	SPT	REMARKS
88	SM	8.0-70.0 GRAVELLY SAND (continued)		
90				
92				
94				
96				
98				
100				
102				
104				
106				
108				
110				
112				
114				
116				
118				
120				

70.0-79.5 BOULDERS

NO RECOVERY

Refusal

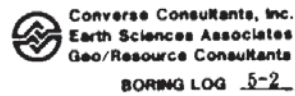
BEDROCK  
79.5-85.0 SANDY SLATSTONE AND CLAYEY  
SANDSTONE: olive-gray, moist,  
fresh, thinly laminated,  
friable strength, friable to low  
hardness. Tends to fracture  
along laminations

END OF BORING 85.0 FT

Piezometer set to  
85.0' perforated  
interval 45'-85'

Sheet 4 of 4

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LABORATORY CLASSIFICATION TESTS WHERE AVAILABLE. THIS LOG  
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Converse Consultants, Inc.  
Earth Sciences Associates  
Geo/Resource Consultants

BORING LOG 5-2

Proj: DESIGN UNIT A135 Date Drilled 2-3-83 Ground Elev. 292.2'  
Drill Rig Logged By B. Ingraham Total Depth 85.0'  
Hole Diameter 4 3/4" Hammer Weight & Fall 320 lbs. 2 3/4"

DEPTH (FEET)	LOG	MATERIAL CLASSIFICATION	SPT	REMARKS
0	SM	0.0-0.4 Concrete Slab	RD	
0.4	SM	0.4-0.8 BASE CONCRETE	RD	
0.8	SM	0.8-14.0 FILL CLAYEY SILT AND SILTY CLAY mottled brown and green-gray, moist, stiff with trace gravel and fine sand	2-1 DR RD	
14.0	SM	13.0 Rock or Concrete	100 SS RD	SPT REFUSAL AT 0"
14.0	SM	14.0-19.0 ALLOYIUM SILTY SAND gray-brown, moist, medium dense, fine to very fine sand with silt		
19.0	SM	19.0-72.0 GRAVELLY SAND		
20.0				

Sheet 1 of 4

Project DESIGN UNIT A135 Date Drilled 2-3-83 Hole No. 5-2

DEPTH (FEET)	LOG	MATERIAL CLASSIFICATION	SPT	REMARKS
20	SM	19.0-72.0 GRAVELLY SAND (continued)	2-2	Disturbed Sample
22				
24				
26				
28				
30				
32				
34				
36				
38				
40				
42				
44				

gray, dense, medium to coarse  
sand, gravel to 2"

Refusal at 9"

Increasing content of fine and  
very fine sand

No sample recovery

Sheet 2 of 4

Project DESIGN UNIT A135 Date Drilled 2-3-83 Hole No. 5-2

DEPTH (FEET)	LOG	MATERIAL CLASSIFICATION	SPT	REMARKS
44	SM	19.0-72.0 GRAVELLY SAND (continued)		
46				
48				
50				
52				
54				
56				
58				
60				
62				
64				
66				
68				
70				
72				
74				
76				
78				
80				
82				
84				
86				
88				
90				
92				

color change observed to dark  
gray

Slight sulphur odor  
poor sample recovery

no sample recovery

Refusal at 5'

Sheet 3 of 4

Project DESIGN UNIT A135 Date Drilled 2-3-83 Hole No. 5-2

DEPTH (FEET)	LOG	MATERIAL CLASSIFICATION	SPT	REMARKS
44	SM	19.0-72.0 GRAVELLY SAND (continued)		
46				
48				
50				
52				
54				
56				
58				
60				
62				
64				
66				
68				
70				
72				
74				
76				
78				
80				
82				
84				
86				
88				
90				
92				

decreasing gravel content

slight sulphur odor

72.0-83.0 SAND: dark gray, very dense,  
medium sand with trace gravel  
to 2"

100  
SS  
RD

sulphur odor  
refusal at 5'

fine to very fine sand  
thin lenses of silty sand

2-5  
DR  
RD

sulphur odor

83.0-84.0 BOULDERS

END OF BORING 84.0 FT

Sheet 4 of 4



REV.	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED BY \_\_\_\_\_

DRAWN BY DKM/JAP

CHECKER BY J.A. [Signature]

IN CHARGE R.M. [Signature]

DATE 30 NOV. 84

N/A

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT  
METRO RAIL PROJECT

CCI/ESA/GRC  
General Geotechnical Consultants

DMJM/PE QD/KE/HWA  
GENERAL CONSULTANTS

APPROVED [Signature]

LA CBD TO NORTH HOLLYWOOD  
UNION STATION  
BORING LOGS 5-1 & 5-2

CONTRACT NO. A136

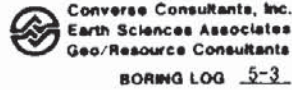
DRAWING NO. K-003 REV. 0

SCALE: NO SCALE

SHEET NO. 49



THIS BORING LOG IS BASED ON FIELD CLASSIFICATION AND VISUAL SOIL DESCRIPTION BUT IS NOT MEANT TO BE A SUBSTITUTE FOR LABORATORY CLASSIFICATION TESTS WHERE AVAILABLE. THIS LOG IS APPLICABLE ONLY AT THE LOCATION AND TIME INDICATED. CONDITIONS MAY VARY AT OTHER LOCATIONS OR TIME.



**BORING LOG 5-3**

Project: DESIGN UNIT A135 Date Drilled: 2-2-83 Hole No: 5-3  
 Ground Elev: 292.8'  
 Drill Rig: Logged By: B. Inghram Total Depth: 80.0'  
 Hole Diameter: 4.3/4" Hammer Weight & Fall: 320#, 36"

DEPTH (FEET)	MATERIAL CLASSIFICATION	UNIT	W	F	C	REMARKS
0	0-0-0 ASPHALT PAVEMENT					
0	FILL					
0-8	0-8-4.6 GRAVEL: gravel to 2-1/2", sub-angular to subrounded					no sample recovery
8-14	4-6-14.0 CLAYEY SILT, green gray, moist, stiff, with variable sand content					
14-18	4-6-14.0 CLAYEY SILT, green gray, moist, stiff, with variable sand content					very stiff to hard
18-20	SM 14-18.0 SILTY SAND, gray brown, moist, dense, fine to very fine sand with silt					
20	SM 19-0-74.0 GRAVELLY SAND					

Sheet 1 of 4

Project: DESIGN UNIT A135 Date Drilled: 2-2-83 Hole No: 5-3

DEPTH (FEET)	MATERIAL CLASSIFICATION	UNIT	W	F	C	REMARKS
20	SM 19-0-74.0 GRAVELLY SAND, continued					no sample recovery
22						
24						24-28' intermittent drill rig chatter
26						sand and gravel strata
28						
30						poor sample recovery
32						
34						
36						
38						
40						sulphur odor
42						drill rig chatter at 41'
44						

Sheet 2 of 4

Project: DESIGN UNIT A135 Date Drilled: 2-2-84 Hole No: 5-3

DEPTH (FEET)	MATERIAL CLASSIFICATION	UNIT	W	F	C	REMARKS
44	SM 19-0-74.0 GRAVELLY SAND, continued					
46						
48						
50						sulphur odor in sample
52						
54						53' intermittent drill rig chatter to 58'
56						
58						slight sulphur odor in sample
60						poor recovery
62						
64						
66						
68						
70						
72						
74						
76						
78						
80						
82						

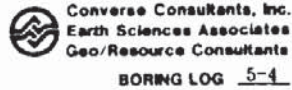
Sheet 3 of 4

Project: DESIGN UNIT A135 Date Drilled: 2-2-83 Hole No: 5-3

DEPTH (FEET)	MATERIAL CLASSIFICATION	UNIT	W	F	C	REMARKS
68	SM 19-0-74.0 GRAVELLY SAND, continued					
70						slight sulphur odor in sample
72						
74	SP 74-0-80.0 SAND, dark gray, medium dense to dense, fine to very fine, micaceous silty sand lenses					
76						
78						
80						sulphur odor in sample
82	End of Boring 80.0'					

Sheet 4 of 4

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**BORING LOG 5-4**

Project: DESIGN UNIT A135 Date Drilled: 1-31-83 Hole No: 5-4  
 Ground Elev: 280.6'  
 Drill Rig: Logged By: B. Inghram Total Depth: 80.0'  
 Hole Diameter: 4.3/4" Hammer Weight & Fall: 320#, 36"

DEPTH (FEET)	MATERIAL CLASSIFICATION	UNIT	W	F	C	REMARKS
0	0-0-0 ASPHALT PAVEMENT					
0	FILL					
0-3	0-3-3.5 SANDY SILT: dark brown, moist, stiff, with fine to medium sand, trace gravel and brick chunks					
3-4	3-5-4.0 CONCRETE BLOCK					
4	SM 4-0-7.0 SILTY SAND, gray brown, moist, dense, fine to very fine sand with silt					
4-7	SM 4-0-7.0 SILTY SAND, gray brown, moist, dense, fine to very fine sand with silt					
7-10	SP 7-0-18.0 SAND, gray, moist, dense, clean fine sand					
10						
12						
14						
16						
18						
20	SM 18-0-28.0 GRAVELLY SAND, brown/gray/white, moist, medium to coarse sand with gravel to 2", subrounded to sub-angular grains					

Sheet 1 of 4

Project: DESIGN UNIT A135 Date Drilled: 1-31-83 Hole No: 5-4

DEPTH (FEET)	MATERIAL CLASSIFICATION	UNIT	W	F	C	REMARKS
20	SM 18-0-28.0 GRAVELLY SAND, continued					
22						
24						
26						Refusal at 5'
28						
28	SP 28-0-41.0 SAND/SILTY CLAY, gray, moist, very dense, clean sand, interbeds of dark gray, stiff, moist silty clay to 31.5'					
30						
32						
34						
36						
38						
40						
42	SM 41-0-68.0 GRAVELLY SAND, dark gray, very dense, subrounded grains, fine to coarse sand with gravel to 1", micaceous					no sample recovery
44						

Sheet 2 of 4

Project: DESIGN UNIT A135 Date Drilled: 1-31-83 Hole No: 5-4

DEPTH (FEET)	MATERIAL CLASSIFICATION	UNIT	W	F	C	REMARKS
44	SM 41-0-68.0 GRAVELLY SAND, continued					
46						Refusal at 17'
48						
50						
50	50-5' clay interbeds					sulphurous odor in sample
52						
54						
56						
58						
60						sulphurous odor refusal at 3'
62						
64						
66						
68						
70						
72						
74						
76						
78						
80						
82						

Sheet 3 of 4

Project: DESIGN UNIT A135 Date Drilled: 1-31-83 Hole No: 5-4

DEPTH (FEET)	MATERIAL CLASSIFICATION	UNIT	W	F	C	REMARKS
68	SP 68-0-75.0 SAND, gray, dense, micaceous, fine to very fine sand					
70						
72						sulphur/hydrothermal odor in sample
74						
76	SM 75-0-80.0 GRAVELLY SAND, gravel to 1-1/2", gray, dense to very dense					
78						
80						
82	End of Boring 80.0'					

Sheet 4 of 4



THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U.S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.					
DESIGNED BY	N/A				
DRAWN BY	DKM/JAP				
CHECKER BY	J.A. Spolittle				
IN CHARGE	R.M. Pude				
DATE	30 Nov. 84				
REV	DATE	BY	SUB	APP	DESCRIPTION
01	8/31/89	JAK	N/A		INITIAL ISSUE

DESIGNED BY	N/A				
DRAWN BY	DKM/JAP				
CHECKER BY	J.A. Spolittle				
IN CHARGE	R.M. Pude				
DATE	30 Nov. 84				

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT  
**METRO RAIL PROJECT**

General Geotechnical Consultants

GENERAL CONSULTANTS

SUBMITTED: R.M. Pude

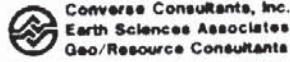
APPROVED: Howard Schabert

LA CBD TO NORTH HOLLYWOOD  
 UNION STATION  
 BORING LOGS 5-3 & 5-4

CONTRACT NO. A136  
 DRAWING NO. K-004  
 REV. 0  
 SCALE: NO SCALE  
 SHEET NO. 50



THIS BORING LOG IS BASED ON FIELD CLASSIFICATION AND VISUAL SOIL DESCRIPTION. BUT IS SUBJECT TO REVISION IN VIEWS OF LABORATORY CLASSIFICATION TESTS WHEN AVAILABLE. THIS LOG IS APPLICABLE ONLY AT THE LOCATION AND THE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THE AREA.



**Converse Consultants, Inc.**  
Earth Sciences Associates  
Geo/Resource Consultants

**BORING LOG 5-5**

Proj: DESIGN UNIT A-135 Date Drilled: 2/1/83 Ground Elev: 280.8'  
Drill Rig: Logged By: A. Inghram Total Depth: 100.0'  
Hole Diameter: 4 3/4" Hammer Weight & Fall: 322 lb, 36"

DEPTH (ft)	MATERIAL CLASSIFICATION	UNIT	Wt. (lb)	Moist. (%)	REMARKS
0-0.7	ASPHALTE Pavement	RD			
0.7-5.5	FILL - SANDY SILT & SILTY SAND Mottled and intermixed, moist, stiff, medium dense w/brick debris	SS	16	25	
5.5-11.0	ALUVIUM SILTY SAND Gray-brown, moist, medium dense, fine to very fine sand with silt	S-1	10	17	
11.0-14.0	SAND Gray-brown, moist, medium dense to dense, poorly graded fine sand with trace silt	SS	17	25	
14.0-62.0	GRAVELLY SAND Brown, dense, medium to coarse sand with gravel to 2", subangu- lar to subrounded grains	S-2			

Sheet 1 of 5

Project: DESIGN UNIT A-135 Date Drilled: 2/1/83 Hole No. 5-5

DEPTH (ft)	MATERIAL CLASSIFICATION	UNIT	Wt. (lb)	Moist. (%)	REMARKS
14.0-62.0	GRAVELLY SAND (Cont'd)				refusal at 5"
25.5-26.0	Tens of fine sand	S-3			
30.0	color change to dark gray				slight gas odor refusal at 9"
38.0		S-4			slight gas odor
42.0-43.0		J-1			refusal at 15"

Sheet 2 of 5

Project: DESIGN UNIT A-135 Date Drilled: 2/1/83 Hole No. 5-5

DEPTH (ft)	MATERIAL CLASSIFICATION	UNIT	Wt. (lb)	Moist. (%)	REMARKS
14.0-62.0	GRAVELLY SAND (Cont'd)				
62.0-78.0	SAND dark gray, dense, fine to very fine sand, micaceous	SP			slight sulphur odor poor sample recovery
78.0-90.0	BOULDERS				
90.0-100.0	CLAYSTONE				no sample recovery

Sheet 3 of 5

Project: DESIGN UNIT A-135 Date Drilled: 2/1/83 Hole No. 5-5

DEPTH (ft)	MATERIAL CLASSIFICATION	UNIT	Wt. (lb)	Moist. (%)	REMARKS
62.0-78.0	SAND (Cont'd)				slight sulphur odor
78.0-90.0	BOULDERS				
90.0-100.0	CLAYSTONE				no sample recovery

Sheet 4 of 5

Project: DESIGN UNIT A-135 Date Drilled: 2/1/83 Hole No. 5-5

DEPTH (ft)	MATERIAL CLASSIFICATION	UNIT	Wt. (lb)	Moist. (%)	REMARKS
90.0-100.0	CLAYSTONE (Cont'd) olive-gray color, moist, plastic to friable strength, soft to friable hardness, thinly laminated with silty claystone and sandstone blades, tends to fracture along laminations	RD			
100.0	End of Boring 100.0 ft.				piezometer set to 20' - perforated in lowest 80'

Sheet 5 of 5

Converse Consultants, Inc. Earth Sciences Associates Geo/Resource Consultants  
**BORING LOG 6A**

Proj: DESIGN UNIT A135 Date Drilled: 2-10-83 Ground Elev: 290.0'  
Drill Rig: BIRKBEIT AUGER Logged By: D. Gillette Total Depth: 35.0'  
Hole Diameter: 3.0" Hammer Weight & Fall: NA

DEPTH (ft)	MATERIAL CLASSIFICATION	UNIT	Wt. (lb)	Moist. (%)	REMARKS
0-0.22	ALUVIUM SAND AND GRAVEL light brown, medium to coarse sand with silt, little gravel to 1/2", subrounded, trace cobbles and boulders, moist, medium dense	SP			0.0-15.0 bellling and aving
12.0-13.0	clay with trace gravel				
15.5-16.0	clay				
19.0-19.5	gravel lens				

Sheet 1 of 3

Project: DESIGN UNIT A135 Date Drilled: 2-10-83 Hole No. 6A

DEPTH (ft)	MATERIAL CLASSIFICATION	UNIT	Wt. (lb)	Moist. (%)	REMARKS
0-0.22	SAND AND GRAVEL continued				
22.0-55.0	SILTY SAND, olive gray, fine sand, slightly micaceous, moist to very moist, medium dense	SM			water seeps at 22.0'
28.0	dark greenish gray				

Sheet 2 of 3

Project: DESIGN UNIT A135 Date Drilled: 2-10-83 Hole No. 6A

DEPTH (ft)	MATERIAL CLASSIFICATION	UNIT	Wt. (lb)	Moist. (%)	REMARKS
22.0-55.0	SILTY SAND continued				
55.0	END OF BORING 55.0'				Special Note Closure 2-14-83 Hole filled to 25' with pea gravel 2-15-83 Hole jumped to 25' and slurry placed to -11- 2-16-83 Placed concrete cap to surface

Sheet 3 of 3

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U.S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.					DESIGNED BY: _____						
DRAWN BY: D.K.M./J.A.P.					CHECKER BY: J.A. Gillette						
IN-CHARGE: R.M. Pugh					DATE: 30 Nov 83						
REV	DATE	BY	SUB	APP	DESCRIPTION	REV	DATE	BY	SUB	APP	DESCRIPTION

**SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT**  
**METRO RAIL PROJECT**

CC/ESA/GRC  
General Geotechnical Consultants

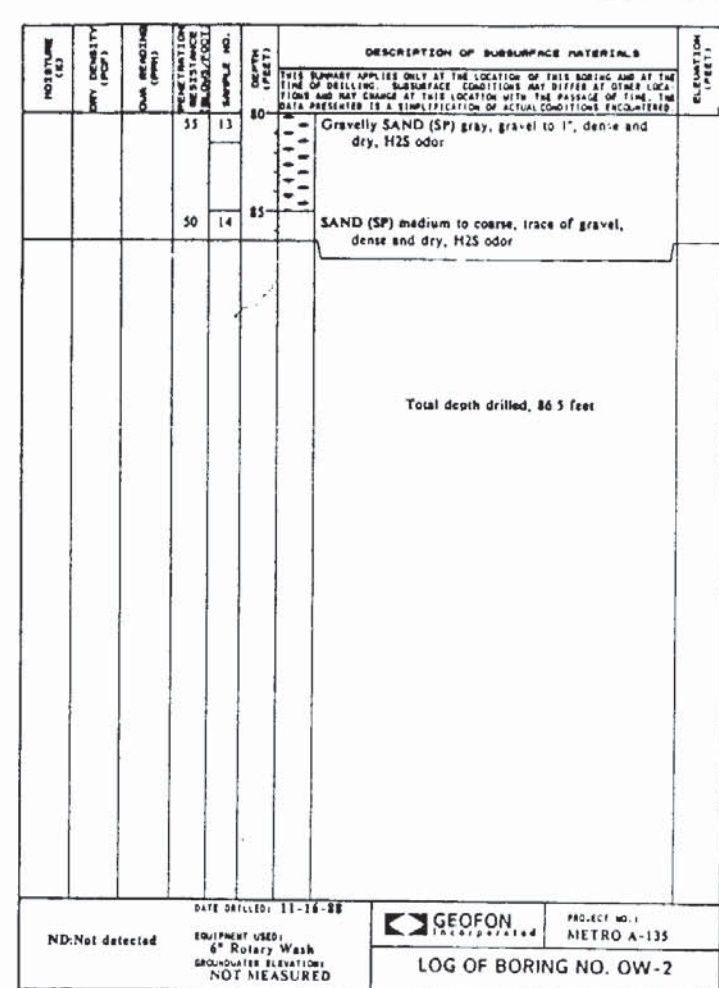
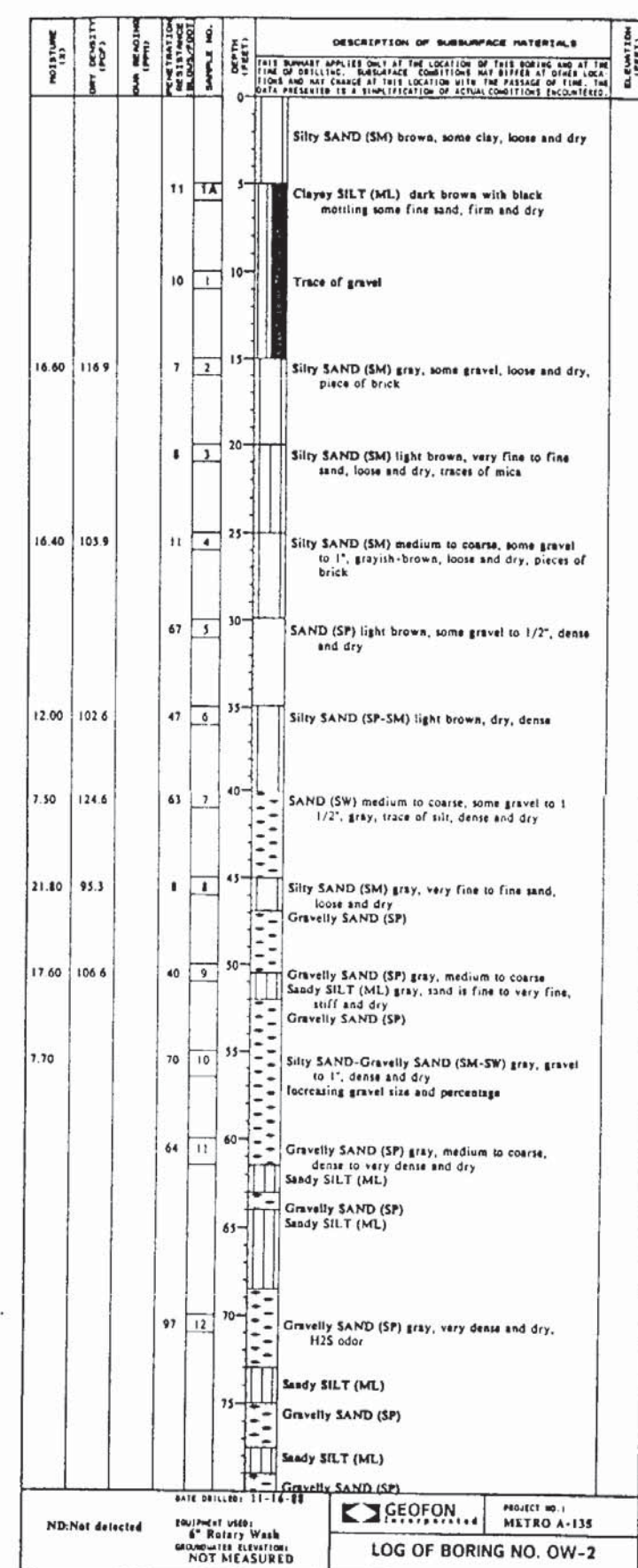
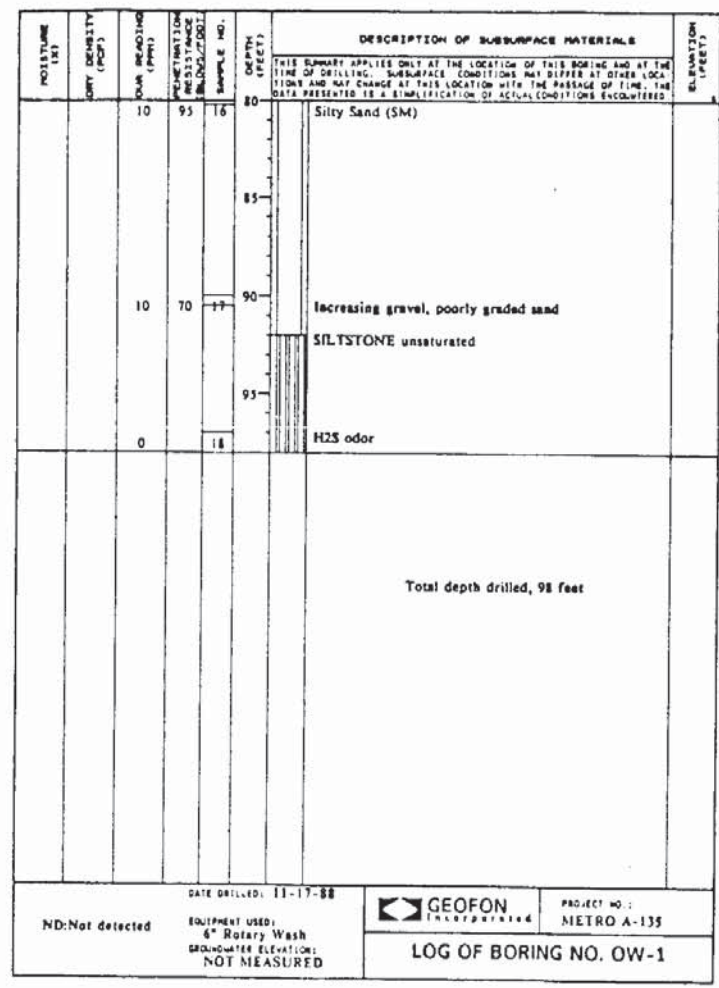
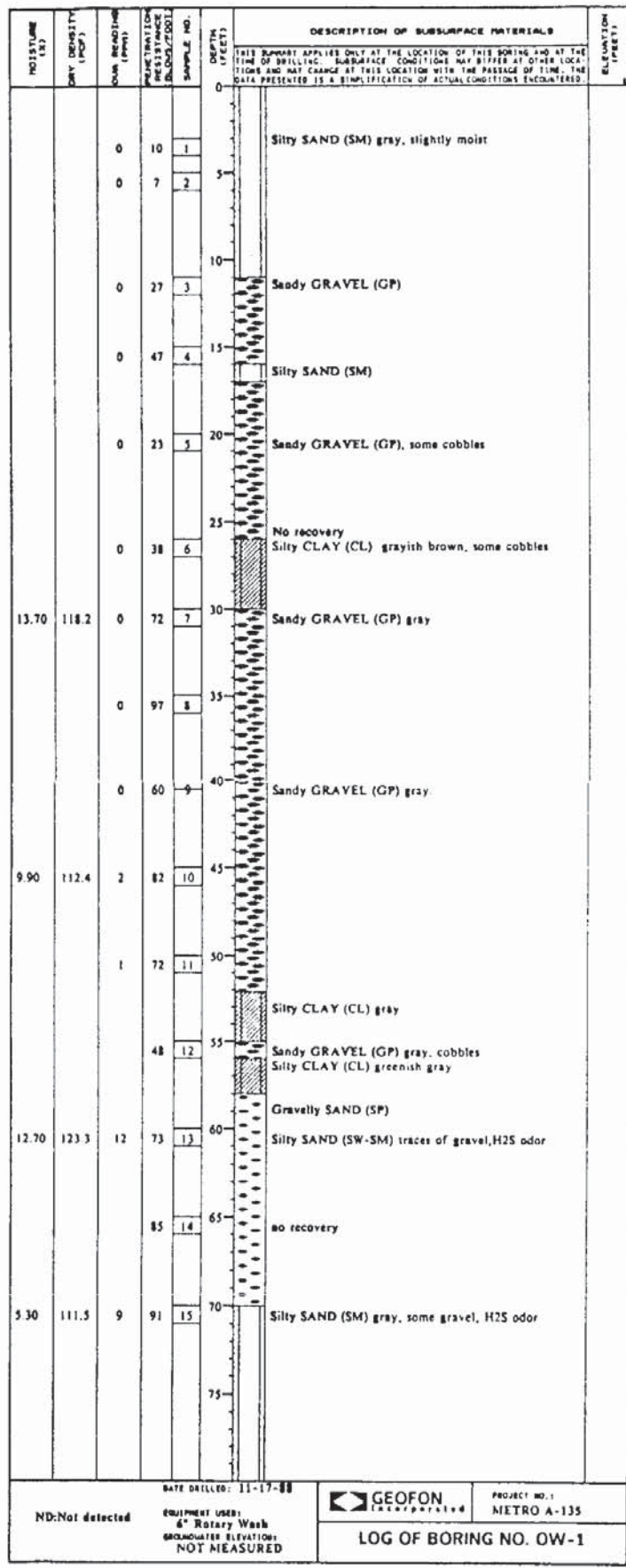
DMJM/PBOD/KE-HWA  
GENERAL CONSULTANTS

APPROVED: *[Signature]*

**LA CBD TO NORTH HOLLYWOOD**  
**UNION STATION**  
BORING LOGS 5-5 & 6A

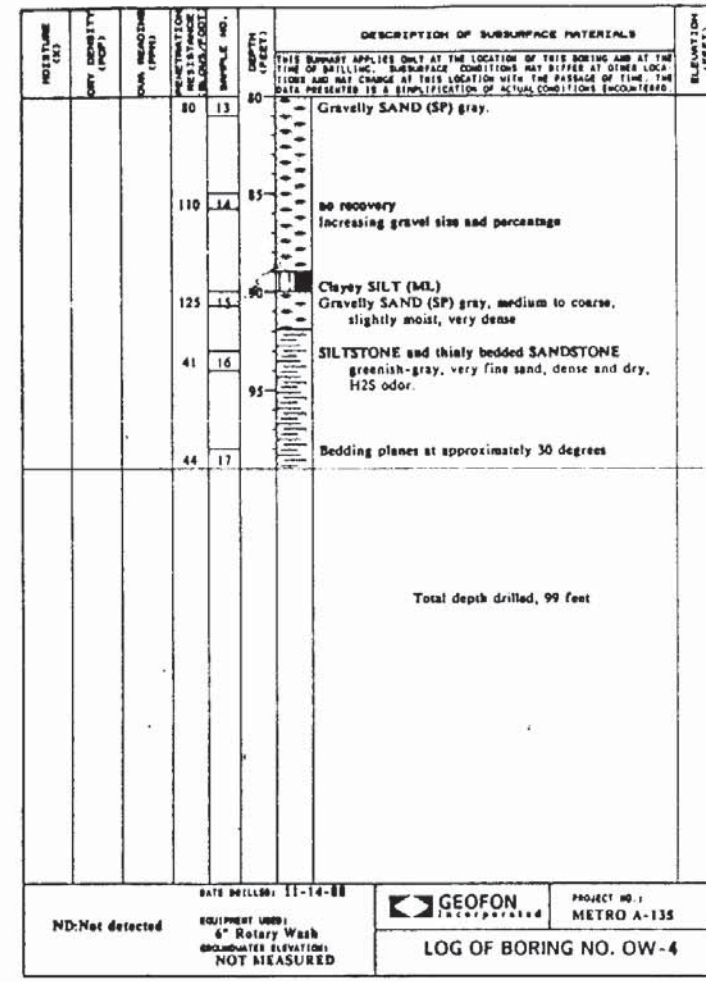
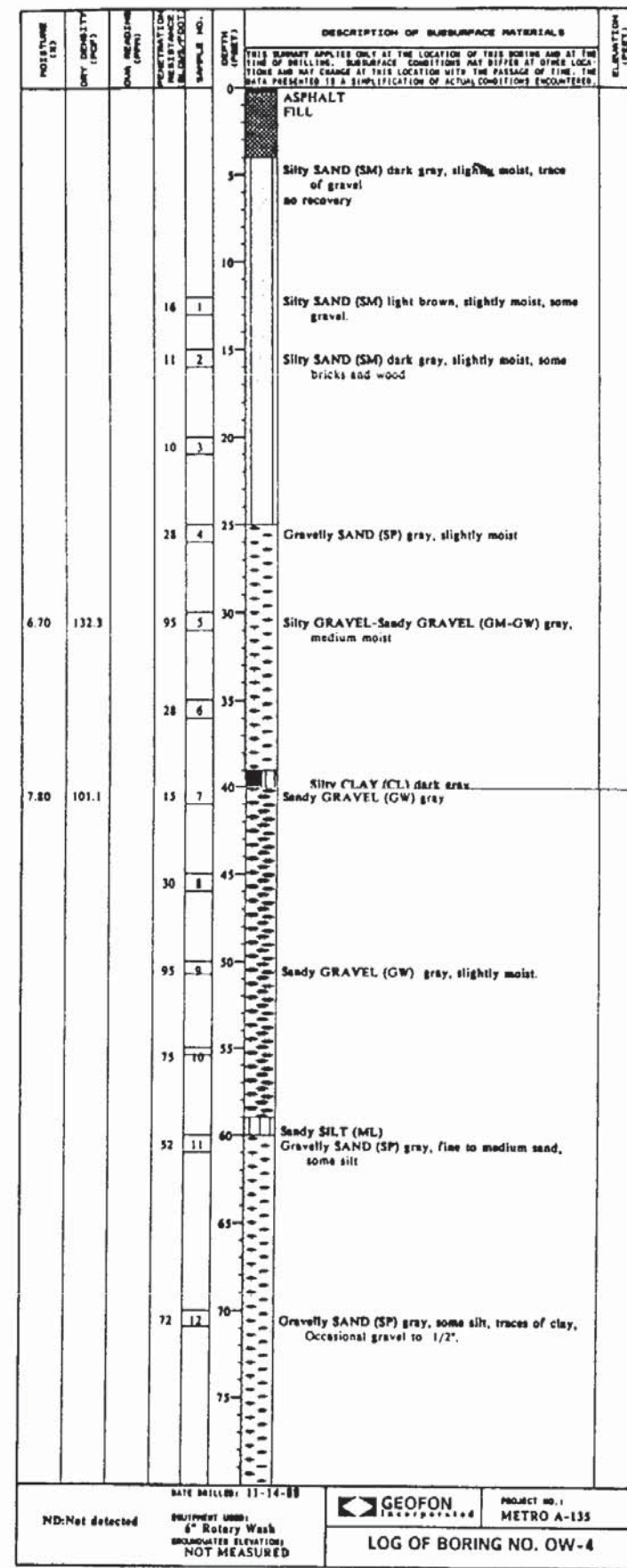
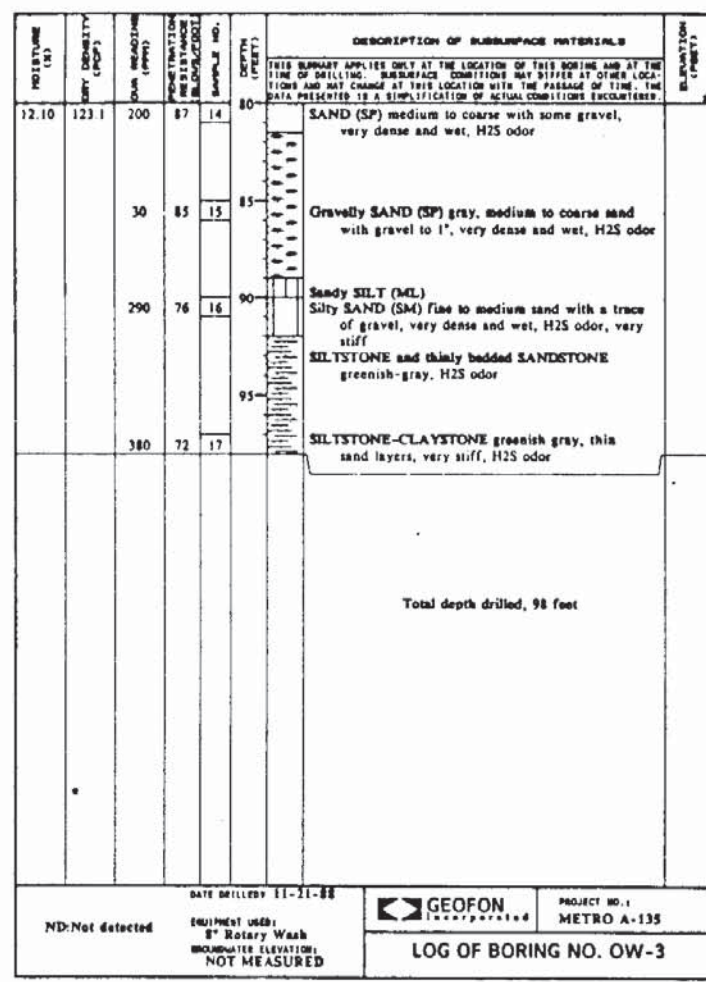
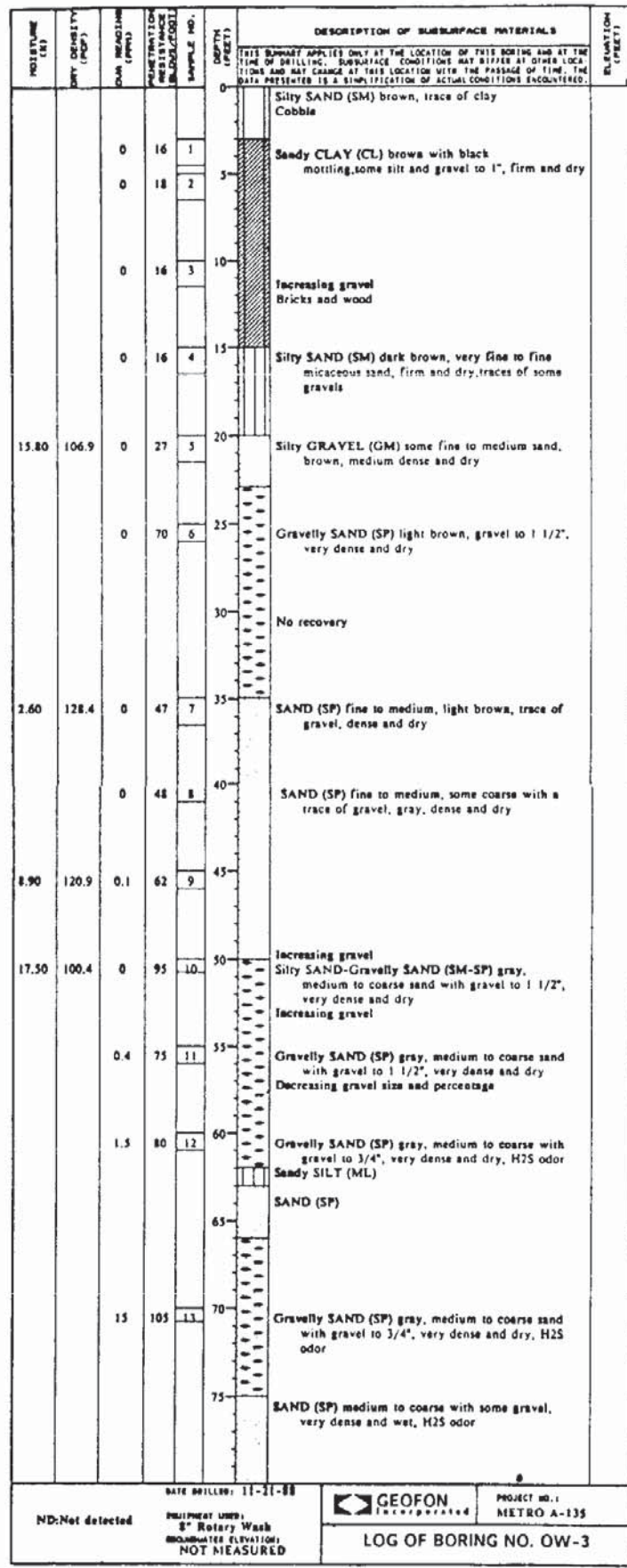
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DRAWING NO: K-005 REV: 0  
SCALE: NO SCALE  
SHEET NO: 51





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METRO RAIL TRANSIT CONSULTANTS 11011 WILSON BLVD VAN NUYS, CA 91411		DMJM/PBOD/KE/HWA GENERAL CONSULTANTS		BORING LOGS OW-1 & OW-2			





THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.				DESIGNED BY _____ DRAWN BY _____ CHECKED BY _____ IN CHARGE _____ DATE 02OCT89		SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT <b>METRO RAIL PROJECT</b>				LA CBD TO NORTH HOLLYWOOD UNION STATION		CONTRACT NO. A136 DRAWING NO. K-007 REV 0 SCALE: NO SCALE SHEET NO. 53	
M/JA/JJA INITIAL ISSUE				N/A		METRO RAIL TRANSIT CONSULTANTS DMJM/PBQD/KE/HWA GENERAL CONSULTANTS				BORING LOGS OW-3 & OW-4		APPROVED:	



PROBABLE (E)	DRY DENSITY (PCF)	SOIL REACTION (PH)	PERCENT FINES (NO. 200)	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0		
	0		11	1	Silty SAND (SM) dark brown, some gravel, slightly moist Sand (SP) light brown, slightly moist.	
	0		22	2		
	0		33	3	SAND (SP) fine, light brown, slightly moist, medium dense	
	0		85	4	Silty SAND (SM) brown, trace of gravel	
7.10	100.6	0	60	5	Sandy GRAVEL (GP) gray, some gravel to 3/4", dense and dry.	
			33	6	No recovery SAND (SP)	
			85	7	Silty SAND (SM) Sandy GRAVEL (GP)	
7.60	109.6	0	60	8	No recovery, Granodiorite cobble	
			60	9	Silty CLAY (CL) H2S odor Silty SAND (SM) No recovery	
					Gravel, strong H2S odor	
			60	10	Silty SAND (SM) gray, medium to coarse sand with gravel to 1 1/2", very dense and dry, slight H2S odor	
			75	11	Silty SAND (SM) gray, very dense and dry, some gravel to 3/8"	
			75	12	No recovery	
			70	13	No recovery	
					No recovery	
			67	14	Clayey SILT (ML) Gravelly SAND (SW) No recovery Sandy SILT (ML) green, very dense	
			65	15	Sandy GRAVEL (GP) gray, granodiorite cobbles, no recovery	
			45	16	SILTSTONE with thialy bedded SANDSTONE greenish gray, no recovery	

PROBABLE (E)	DRY DENSITY (PCF)	SOIL REACTION (PH)	PERCENT FINES (NO. 200)	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				80	SILTSTONE with thialy bedded SANDSTONE	
					Total depth drilled, 83 feet	

DATE DRILLED: 12-21-88  
EQUIPMENT USED:  
6" Rotary Wash  
GROUNDWATER ELEVATION:  
NOT MEASURED

ND: Not detected

**GEOFON**  
INCORPORATED

PROJECT NO. 1  
METRO A-135

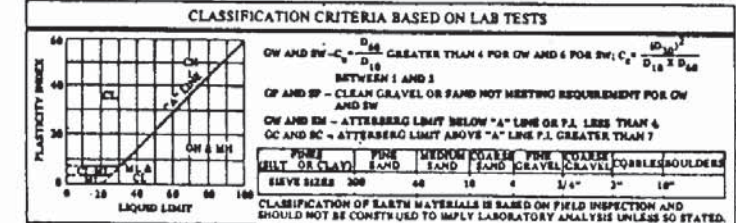
**LOG OF BORING NO. OW-5**

PRIMARY DIVISIONS	GROUP SYMBOL	SECONDARY DIVISIONS	
COARSE GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN # 200 SIEVE SIZE	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN # 47.5 SIEVE	CW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GW	POORLY GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES
		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES
		GW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN # 47.5 SIEVE	SW	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES
		SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES
		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOES, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN # 200 SIEVE SIZE	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, PLASTIC SILTS	
	OH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
	OC	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
	PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

PENETRATION RESISTANCE (PR)		CLAYS AND SILTS		
SANDS AND GRAVELS		CONSISTENCY	BLOWS/FOOT*	STRENGTH**
RELATIVE DENSITY	BLOWS/FOOT*	VERY SOFT	0-2	0-N
VERY LOOSE	0-4	SOFT	2-4	N-N
LOOSE	4-10	FIRM	4-8	N-1
MEDIUM DENSE	10-30	STIFF	8-15	1-2
DENSE	30-50	VERY STIFF	15-30	3-4
VERY DENSE	OVER 50	HARD	OVER 30	OVER 4

\* NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 36 INCHES TO DRIVE A 1 INCH O.D. (1.25 INCH I.D.) SPLIT BARREL SAMPLER (ASTM-15M STANDARD PENETRATION TEST)

\*\* UNCONFINED COMPRESSIVE STRENGTH IN TONS/SQ. FT. READ FROM POCKET PENETROMETER



**GEOFON**

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REV. DATE BY SUB APP DESCRIPTION	REV. DATE BY SUB APP DESCRIPTION	METRO RAIL TRANSIT CONSULTANTS A JOINT VENTURE DMJM/PBQD/KE/HWA GENERAL CONSULTANTS	APPROVED:	LA CBD TO NORTH HOLLYWOOD UNION STATION BORING LOG 5 & CLASSIFICATION CRITERIA			

THIS BORING LOG IS BASED ON FIELD CLASSIFICATION AND WHEN SOON IS DESCRIBED BY IT IS MODIFIED TO INCLUDE RESULTS OF LABORATORY CLASSIFICATION TESTS WHERE AVAILABLE. THE LOG IS APPLICABLE ONLY AT THE LOCATION AND THE CONDITIONS SHOWN AT EACH LOCATION ON THE



**BORING LOG 5**

Project: DESIGN UNIT A135 Date Drilled: 1-2-80 Hole No.: 5  
 Drill Rig: Fisking 1500 Logged By: Stephen M. Tavis Total Depth: 150.0'  
 Hole Diameter: 6.25" x 7.75" Hammer Weight & Fall: 140 lb x 30"

DEPTH (FEET)	MATERIAL CLASSIFICATION	SAMPLE NO.	TESTS	REMARKS
0	ALLUVIUM			
0-3	0.3-32.0 SANDY GRAVEL: primarily gravel up to 8" with medium to coarse sand; poorly graded			moderate to heavy rig chatter from 3.0
2				
4				
6				
8				
10				
12				
14				
16				
18				
20				

Project: DESIGN UNIT A135 Date Drilled: 1-2-80 Hole No.: 5

DEPTH (FEET)	MATERIAL CLASSIFICATION	SAMPLE NO.	TESTS	REMARKS
30	0.3-32.0 SANDY GRAVEL: (continued)			moderate to heavy rig chatter from 3.0
32				
34				
36				
38				
40				
42				
44				
46				
48				
50				
52				
54				
56				
58				
60				
62				
64				
66				
68				
70				
72				
74				
76				
78				
80				
82				
84				
86				
88				
90				
92				
94				
96				
98				
100				
102				
104				
106				
108				
110				
112				
114				
116				
118				
120				

Project: DESIGN UNIT A135 Date Drilled: 1-2-80 Hole No.: 5

DEPTH (FEET)	MATERIAL CLASSIFICATION	SAMPLE NO.	TESTS	REMARKS
40	0.3-32.0 SANDY GRAVEL: (continued)			heavy rig shaking to 52.0
42				
44				
46				
48				
50				
52	32.0-52.0 GRAVELLY SAND: medium dark gray; medium to coarse sand with gravel up to 3 inch; some silt	1.1 47 53		0.5-1.5 recovery refusal at 10"
54				rig shaking from 55.0 to 60.0
56	55.0-64.2 SANDY GRAVEL:			
58				
60				
62				
64				
66				
68				
70				
72				
74				
76				
78				
80				
82				
84				
86				
88				
90				
92				
94				
96				
98				
100				
102				
104				
106				
108				
110				
112				
114				
116				
118				
120				

Project: DESIGN UNIT A135 Date Drilled: 1-2-81/1-3-81 Hole No.: 5

DEPTH (FEET)	MATERIAL CLASSIFICATION	SAMPLE NO.	TESTS	REMARKS
60	55.0-64.2 SANDY GRAVEL: (continued)			
62				
64				
66				
68				
70				
72				
74				
76				
78				
80				
82				
84				
86				
88				
90				
92				
94				
96				
98				
100				
102				
104				
106				
108				
110				
112				
114				
116				
118				
120				

Project: DESIGN UNIT A135 Date Drilled: 1-2-80 Hole No.: 5

DEPTH (FEET)	MATERIAL CLASSIFICATION	SAMPLE NO.	TESTS	REMARKS
88	64.2-150.0 CLAYSTONE: (continued) primarily claystone from 93.5 to 100.6	Box 1		pocket penetrometer 4.5 tsf 2-9-81 2.2/2.5 recovery
90				1.9/2.5 recovery
92	thin sandstone lamina at 96.8; 97.1'			
94				
96				
98				
100				
102				
104				
106				
108				
110				
112				
114				
116				
118				
120				

Project: DESIGN UNIT A135 Date Drilled: 1-3-80 Hole No.: 5

DEPTH (FEET)	MATERIAL CLASSIFICATION	SAMPLE NO.	TESTS	REMARKS
118	64.2-150.0 CLAYSTONE: (continued) primarily claystone with alternating very thin to medium lamina of sandstone; micaceous fossiliferous claystone	Box 3		2.5/2.5 recovery
120				
122				
124				
126				
128				
130				
132				
134				
136				
138				
140				
142				
144				
146				
148				
150				

Project: DESIGN UNIT A135 Date Drilled: 1-2-81 Hole No.: 5

DEPTH (FEET)	MATERIAL CLASSIFICATION	SAMPLE NO.	TESTS	REMARKS
140	64.2-150.0 CLAYSTONE: (continued) very thin to medium alternating lamina of claystone; sandstone and silty claystone; variable thickness of lamina; primary claystone to 142.2; very fine sandstone from 142.3-142.6; 143.1-145.2	Box 5		pocket penetrometer in sand lens 3.5 1.9/2.5 recovery
142				
144				
146				
148				
150				
152				
154				
156				
158				
160				
162				
164				
166				
168				
170				
172				
174				
176				
178				
180				
182				
184				
186				
188				
190				
192				
194				
196				
198				
200				

**RECORD DRAWING**

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NO REVISIONS INDICATED ON CH'S A-9 BUILT MAR 1975 RECEIVED 5-2-91 REVISED PER CRS-208		CCI/ESA/GRC General Geotechnical Consultants SUBMITTED <i>R.M. Price</i>		DMJM/PBOD/KE/HWA GENERAL CONSULTANTS APPROVED <i>Shirley K. Kelly</i>		REV. DATE BY SUB. APP. DESCRIPTION		REV. DATE BY SUB. APP. DESCRIPTION	



THIS BORING LOG IS BASED ON FIELD CLASSIFICATION AND VISUAL SOIL DESCRIPTION BUT IS INTENDED TO INCLUDE RESULTS OF LABORATORY CLASSIFICATION TESTS WHEN AVAILABLE. THIS LOG IS APPLICABLE ONLY AT THE LOCATION AND TIME SPECIFIED AND NOT AT OTHER LOCATIONS OR TIME.



**BORING LOG 4**

Project: DESIGN UNIT A135 Date Drilled: 2-9-81 Ground Elev.: 278'  
 Drill Rig: Falling 1500 Logged By: Stephen H. Tosta Total Depth: 150.0'  
 Hole Diameter: 4 7/8" Hammer Weight & Fall: 140 lb. 9'30"

DEPTH (FEET)	MATERIAL CLASSIFICATION	REMARKS
0-14.0	0-0-0-2 CONCRETE; 0-1-14.0 FILL Primarily crushed asphalt and brick	
14.0-21.0	ALLUVIUM 14.0-21.0 GRAVELLY SAND; olive-black; fine to medium sand and gravel; wet; very dense; all odor	1.0/1.5 Recovery

Project: DESIGN UNIT A 135 Date Drilled: 2-9-81 Hole No.: 4

DEPTH (FEET)	MATERIAL CLASSIFICATION	REMARKS
20-21.0	14.0-21.0 GRAVELLY SAND: (continued)	No Recovery; SPT at 20.5'; No Recovery; refusal at 5'
21.0-101.5	SANDY GRAVEL Numerous cobbles and boulders	moderate to heavy r/c shaking continues refusal at 3' No Recovery; diffi- culty getting back into hole
101.5-110.0	gravel; subangular to subrounded; poorly graded	No Recovery; refusal at 4" casing at 32'

Project: DESIGN UNIT A135 Date Drilled: 2-9-81/2-10-81 Hole No.: 4

DEPTH (FEET)	MATERIAL CLASSIFICATION	REMARKS
44-101.5	21.0-101.5 SANDY GRAVEL: (continued) numerous cobbles and boulders	moderate to heavy r/c shaking continues
101.5-110.0	continued; numerous cobbles and boulders	No Recovery; refusal at 3" 2-9-81 2-10-81

Project: DESIGN UNIT A 135 Date Drilled: 2-10-81 Hole No.: 4

DEPTH (FEET)	MATERIAL CLASSIFICATION	REMARKS
101.5-110.0	21.0-101.5 SANDY GRAVEL: (continued) primarily cobbles and boulders	moderate to heavy r/c shaking continues No recovery; difficult getting back into hole; refusal at 2"
110.0-119.7	continued; primarily cobbles and boulders	No recovery; refusal at 4"

Project: DESIGN UNIT A135 Date Drilled: 2-10-81 Hole No.: 4

DEPTH (FEET)	MATERIAL CLASSIFICATION	REMARKS
101.5-110.0	21.0-101.5 SANDY GRAVEL: (continued) sand with numerous cobbles and boulders	moderate to heavy r/c shaking to 101.5
110.0-119.7	BRICK 101.5-110.0 CLAYSTONE; olive-gray; micaceous claystone; with very fine sand PHYSICAL CONDITION: massive; soft to friable hardness; plastic to weak strength; fresh; tends to fracture along bedding planes	2.0/2.0 recovery
119.7-127.0	107.0'; very thin to medium banding	2.0/2.0 recovery
127.0-132.1	112.1'; clay filled fracture with undeterminable offset	2.0/2.0 recovery
132.1-149.7	119.7'; alternating claystone and very thin grayish brown fine sand lamination	2.0/2.0 recovery

Project: DESIGN UNIT A135 Date Drilled: 2-10-81/2-11-81 Hole No.: 4

DEPTH (FEET)	MATERIAL CLASSIFICATION	REMARKS
110.0-119.7	101.5-110.0 CLAYSTONE: (continued) PHYSICAL CONDITION: (continued) massive; soft to friable hardness; plastic to weak strength; fresh; tends to fracture along bedding planes; primarily clay stone with alternating very thin to thin sandstone lamina 119.3-119.9 intensely fractured	2.0/2.0 recovery 2.4/2.0 recovery 2.0/2.0 recovery 2-10-81 2-11-81
119.7-127.0	primarily claystone with fine sandstone	2.0/2.0 recovery
127.0-132.1	continued	2.0/2.0 recovery
132.1-149.7	continued	2.0/2.0 recovery

Project: DESIGN UNIT A135 Date Drilled: 2-11-81 Hole No.: 4

DEPTH (FEET)	MATERIAL CLASSIFICATION	REMARKS
140-146.3	101.5-110.0 CLAYSTONE: (continued) 140.7-141.7 (cont'd); very fine greenish gray sandstone	2.0/2.0 recovery Pocket penetrometer > 4.0 tsf
146.3-148.3	144.5-145.3 grayish brown; fine to medium sand; partially saturated with oil 145.3 untested claystone with oil saturated fine to medium sand	1.0/2.0 recovery petroleum sample 145-146' 2.0/2.0 recovery 2.7/2.7 recovery
148.3-150.0	150.0' TERMINATED HOLE E-LOG CONDUCTED	Installed 150.0' piezometer and backfilled hole with wet gravel and bentonite plug at surface

**NOTES:**

- DRILL THREE PROPOSED BORINGS TO AT LEAST 5 FEET INTO BEDROCK.
- TAKE SOIL SAMPLES AT EVERY 5-FOOT INTERVALS TO AT LEAST 60 FEET DEPTH REQUIRED AT CLOSER DEPTHS. AFTER 60 FEET TAKE SAMPLES AT EVERY 10-FOOT INTERVALS OR AS REQUIRED. TAKE N-VALUES (STANDARD PENETRATION TEST) WHILE SAW USING A SPLIT SPOON OR EQUIVALENT CALIFORNIA SAMPLER.
- DETERMINE GROUND WATER DEPTHS, DURING AND AFTER DRILLING TO LOCATE EXISTING GROUNDWATER LEVEL IN EACH BORING. MONITOR FOR PRESENCE OF GAS/OIL.
- PERFORM NECESSARY LABORATORY TESTING ON RELATIVELY UNDISTURBED SOIL SAMPLES. DETERMINE MOISTURE/DENSITY, C AND Ø VALUES, SETTLEMENT PARAMETERS, PERMEABILITY PARAMETERS AND GRAIN SIZE DISTRIBUTION. CONTRACTOR SHALL PROVIDE ADDITIONAL SOIL TEST DATA, IF REQUIRED BY THE DISTRICT ON ITS DESIGNEE. ALL SAMPLES TO BE TESTED AND STORED IN A RECOGNIZED SOILS LABORATORY. SAMPLES SHALL BE PRESERVED FOR ONE MONTH AFTER COMPLETION OF TESTING AND THEN THE SA SHOULD BE TRANSFERRED TO THE DISTRICT ON ITS DESIGNEE. SOIL TESTS SHALL BE PERFORMED AS PER APPROPRIATE ASTM CRITERIA.
- TEST WATER AND SOIL SAMPLES FOR MEASURING LEVELS OF PRIORITY POLLUTANTS. AT LEAST FIVE SOIL SAMPLES (COLLECTED IN AIRTIGHT GLASS JARS) AND TWO WATER SAMPLES FOR FOLLOWING CHEMICAL ANALYSIS IN A STATE APPROVED LABORATORY: 604, 608, 624, 625, 6020, 6020, 6040, 6080, 6240 AND 6270-APHA 209B.
- COLLECT AND DISPOSE OF ALL SPOIL AS APPROPRIATE, MEETING CITY AND STATE REQUIREMENTS.
- CONTRACTOR MAY USE THESE BORINGS TO PROVIDE OBSERVATION WELLS. IN THAT BORINGS SHALL BE COVERED WITH TIMBER OR METAL PLATE FOR SITE SAFETY UNTIL ARE INSTALLED. CONTRACTOR MUST ENSURE BEFORE DRILLING SPECIFIED REQUIREMENTS FOR INSTALLING AND DEVELOPING WELLS.
- CHECK PRESENCE OF POLYCHLORINATED BIPHENOLS ALONG THE TRACK AREA IN THE UP TO 5 FEET OF SUBSOIL, IN THE THREE BORINGS OR NEAR BY.
- FINAL BORING LOGS SHOULD BE PREPARED BY A GEOTECHNICAL ENGINEER. SOILS TO BE IDENTIFIED BY USING THE UNIFIED SOILS CLASSIFICATION SYSTEM.
- FIELD AND LABORATORY WORK SHALL BE CARRIED OUT UNDER THE FULL SUPERVISION OF A GEOTECHNICAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA, WHO WILL PROVIDE SEAL AND SIGNATURE ON ALL PERTINENT DOCUMENTS. FIELD AND TEST DATA SHALL BE MADE AVAILABLE TO THE DISTRICT ON ITS DESIGNEE IMMEDIATELY UPON COMPLETION.

**RECORD DRAWING**

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE U.S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION, UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED, AND IN PART BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.				DESIGNED BY DRAWN BY CHECKED BY DATE: 2-10-81		SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT <b>METRO RAIL PROJECT</b> 		LA CBD TO NORTH HOLLYWOOD UNION STATION BORING LOG 4		CONTRACT NO. A-135 DRAWING NO. K-002 SCALE: NO SCALE SHEET NO. 38	
NO REVISIONS INDICATED ON CHS 15 BUILT MARK UPS RECEIVED 3-5-81				REVISED PER ACR135-3 REVISED PER CR 7-507 REVISED PER CR 5-208		CCI/ESA/GRC General Geotechnical Consultants SUBMITTED: <i>R.M. Tosta</i>		DMJM/PBQD/KE/HWA GENERAL CONSULTANTS APPROVED: <i>Cheliff</i>			

#### B.4 SAMPLING AND LOGGING PROCEDURES

Logging and sampling were performed in the field by the geologist. The following describes sampling equipment and procedures and notations used on the lithologic logs to indicate drilling and sampling modes.

##### B.4.1 Sampling

In the overburden at about 10-foot intervals, the Converse ring sampler was driven using a down-hole 450-pound slip-jar hammer. The Converse sampler was followed with the standard split spoon sample (SPT) driven with a 140-pound hammer with a 30 inch stroke. Where the Puente Formation was encountered, the borings were sampled using a Pitcher-Barrel and Converse ring sampler at 20-foot intervals.

The most common cause for loss of samples or altering the sample interval was when gravels were encountered at the desired sampling depth. Standard penetration blow count information can often be misleading in this type of formation, and it is difficult to recover an undisturbed sample. Therefore at some locations borings were advanced until drill response and cutting suggested a change in formation.

The following symbols were used on the logs to indicate the type of sample and the drilling mode:

<u>Log Symbol</u>	<u>Sample Type</u>	<u>Type of Sampler</u>
B	Bag	-
J	Jar	Split Spoon
C	Can	Converse Ring
S	Shelby Tube	Pitcher Barrel
Box	Box	Pitcher Barrel, Core Barrel

<u>Log Symbol</u>	<u>Drilling Mode</u>
AD	Auger Drill
RD	Rotary Drill
PB	Pitcher Barrel Sampling
SS	Split Spoon
DR	Converse Drive Sample
C	Coring



### B.4.2 Field Classification of Soils

All soil types were classified in the field by the site geologist using the "Unified Soil Classification System". Based on the characteristics of the soil, this system indicates the behavior of the soil as an engineering construction material.\* Although particle size distribution estimates were based on volume rather than weight, the field estimates should fall within an acceptable range of accuracy.

Table A-1 shows the correlation of standard penetration information and the physical description of the consistency of clays (hand-specimen) and the compactness of sands used by the field geologists for describing the materials encountered.

TABLE A-1 Correlation of N-Values and Consistency/Compactness of Soil Obtained in the Field

N-Values (blows/foot)	Hand-Specimen (clay only)	Consistency (clay or silt)	Compactness (sand only)	N-Values (blows/foot)
0 - 2	Will squeeze between fingers when hand is closed	Very soft	Very loose	0 - 4
2 - 4	Easily molded by fingers	Soft	Loose	4 - 10
4 - 8	Molded by strong pressure of fingers	Firm	---	---
8 - 16	Dented by strong pressure of fingers	Stiff	Medium dense	10 - 30
16 - 32	Dented only slightly by finger pressure	Very stiff	Dense	30 - 50
32+	Dented only slightly by pencil point	Hard	Very dense	50+

### B.4.3 Field Description of the Formations

The description of the formations is subdivided in two parts: lithology and physical condition. The lithologic description consists of:

- ° rock name;
- ° color of wet core (from GSA rock color chart);
- ° mineralogy, textural and structural features; and
- ° any other distinctive features which aid in correlating or interpreting the geology.

The physical condition describes the physical characteristics of the rock believed important for engineering design consideration. The form for the description is as follows:

Physical condition: \_\_\_\_\_ fractured, minimum \_\_\_\_\_,  
 maximum \_\_\_\_\_, mostly \_\_\_\_\_; \_\_\_\_\_ hardness;  
 \_\_\_\_\_ strength; \_\_\_\_\_ weathered.

\* For a more complete discussion of the Unified Soil Classification System, refer to Corps of Engineers, Technical Memorandum No. 3-357, March 1953, or Department of the Interior, Bureau of Reclamation, Earth Manual, 1963.



Converse Consultants



Boring Log PT-1

THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME.  
CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.

PROJECT SC RTD 83-1101-11 DATE DRILLED 3/15, 16, 17, 18/83 HOLE NO. PT-1  
 LOCATION 194' E/O ALAMEDA 7/0 NACRY AT N edge of Union Stn Pad Ls GROUND ELEV. 279.1  
 DRILLING CONTRACTOR Roscoe Moss LOGGED BY DAN Gillette DEPTH TO GROUND WATER 20.0  
 TYPE OF RIG Cable Tool HOLE DIAMETER 14-15 inch HAMMER WEIGHT AND FALL NA 3/11  
 SURFACE CONDITIONS Asphalt Parking Lot TOTAL DEPTH 82.5 NO. CORE BOXES NA

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6")	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
0.0	AF	0.0-1.5 ARTIFICIAL FILL			PUMP			ASPHALT PAVING Top 3"
2	SP	1.5-60.0 SAND AND GRAVEL			TEST			
4		MODERATE REDDISH BROWN (10R 4/6); contains			HOLE			
6		50-75% SAND			NO SAMPLES			
8					REQUIRED			
10.0					RD			
12					↓			
14								
16								
18								
20.0								
22								
24								
26								
28								
30.0								
32								
34								
36								
38								
40								
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								
70								
72								
74								
76								
78								
80								
82.5								

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (bl)	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
15.0	SP	1.5-60.0 SAND AND GRAVEL			RD ↓			
20.0								
25.0								
30.0								
35.0								
40.0								
45.0								
50.0								
55.0								
60.0		60.0-80.0 SAND AND BOULDERS light gray (N 7); contains 40-80% SAND AND Granitic Boulders						
65.0								
70.0								
75.0								
80.0	TP	80.0-82.0 SILTSTONE AND CLAYSTONE OLIVE BLACK (SY 2/1)						
82.5		END BORING 82.5						

3/

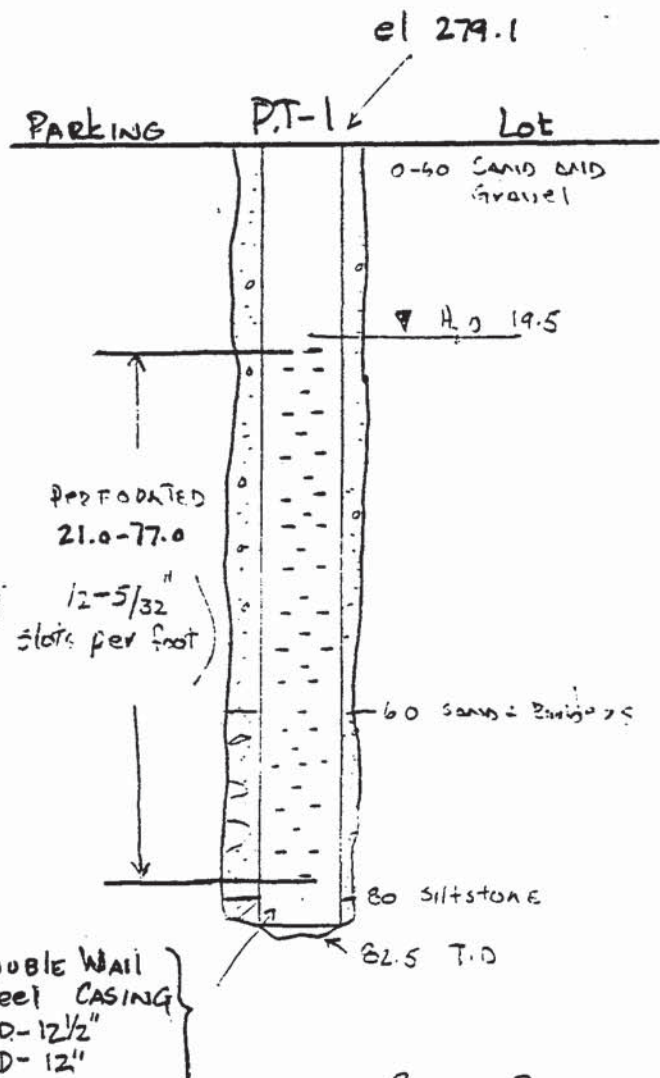
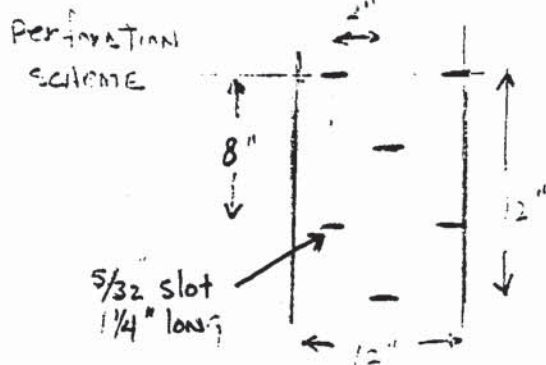
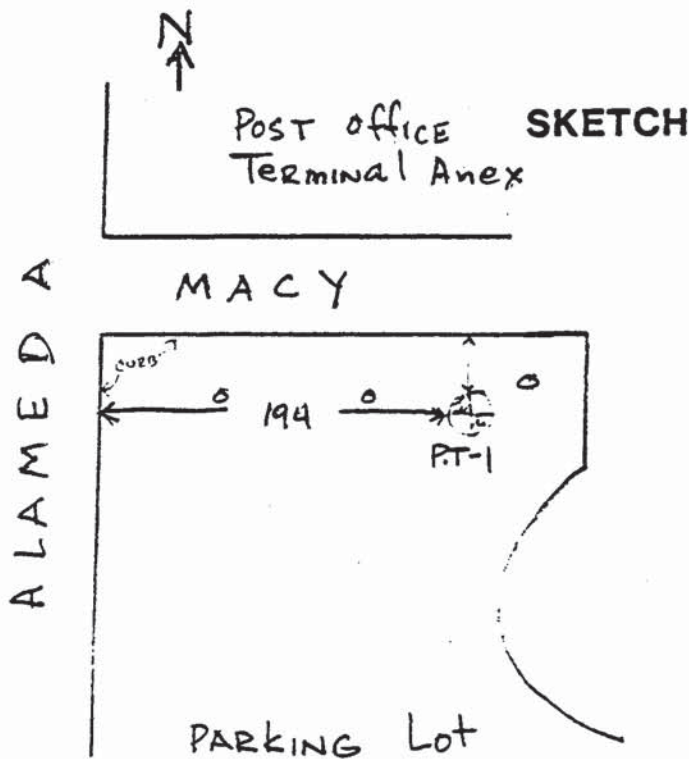
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# SUMMARY BORING NO. PT-1

PROJECT 83-1101-11 SC RTD STATION HOLE YES DATE DRILLED 3/15, 16, 17, 18/83  
 OVERBURDEN DEPTH (FT.) 0.0 TO 80.0.  
 BEDROCK DEPTH (FT.) 80.0 TO 82.5 (T.D.).  
 WATER PRESS. TEST No; INTERVAL(S) — TO —, — TO —.  
 GROUND WATER DEPTH (FT.) 20.6 DATE 3/15/83; 19.7 DATE 3/21/83. (Rainfall 3/17, 3/20 use 20.0 as mean)  
 GAS No; DEPTH FIRST NOTICED —, DATE —.  
 E-LOG No.  
 DOWN-HOLE SURVEY No.  
 CROSS-HOLE SURVEY No.  
 PVC CASING (I.D.): 4" No TO —; 3" No TO —; 2" No TO —.  
 Steel CASING - See Boring  
 GROUND ELEVATION REF. —





THIS BORING LOG IS BASED ON FIELD CLASSIFICATION AND VISUAL SOIL DESCRIPTION, BUT IS MODIFIED TO INCLUDE RESULTS OF LABORATORY CLASSIFICATION TESTS WHERE AVAILABLE. THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME. CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.



**Converse Consultants, Inc.**  
**Earth Sciences Associates**  
**Geo/Resource Consultants**

**BORING LOG** SITE # 1  
 PUMP WELL

Proj: 83-1140-06 Date Drilled 6/18-20/86 Ground Elev. 279  
 Drill Rig Gus Drill 4 Scope Kelly Logged By MBS Total Depth 88'  
 Hole Diameter 24" Bucket Hammer Weight & Fall (NO SAMPLING PERFORMED)

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	BLOWS (6")	DRILL MODE	REMARKS
0	////	0.0-0.3 ASPHALTIC PAVEMENT	(NO SAMPLING)			0700
0-2	ML	0.3-6.0 SANDY SILT w/ DEORI (Fill) SILT WITH FINE SAND, SOME CLAY BINDER, MOIST, LOOSE - MEDIUM DENSE, MISC. DEORI AND RUBBLE DECREASING WITH DEPTH, OLIVE BROWN COLOR	(0-20-80)		24" BUCKET AUGER	FILL RED BRICK LAYER @ 2'
6-16	SW (SW)	6.0-70.0 GRAVELLY SAND FINE TO COARSE SAND WITH GRAVELS, OCCASSIONAL COBBLES TO 5", CLASTS SUBROUNDED TO ROUNDED, RIVER DEPOSITS  OCCASSIONAL DRILL RIG CHATTER FROM COBBLES AND GRAVELS  OCCASSIONAL COBBLES TO 14" SUBROUNDED TO ROUNDED PREDOMINANTLY GRAVELLY SAND	(35-65-0)		AD ↓	6' ADDED DRILLING FLUID (SUPERCOL (20%) AND WATER MIX) BUILT SOIL BERM TO CONTAIN FLUIDS AT SURFACE  DRILLING FLUID IN BORING WASHING OUT MANY OF THE FINES IN EACH BUCKET
20						Sheet <u>1</u> of <u>4</u>

Project 83-1140-06

Date Drilled 6-18-86

Hole No. PUMP WELL

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	BLOWS (6")	DRILL MODE	REMARKS
20		GRAVELLY SAND WITH OCCASSIONAL COBBLES - CONTINUED	✓		AD ↓	
22		INTERBEDDED LENSES OF COARSE GRAVEL AND SMALL COBBLES ALTERNATING WITH LENSES OF SANDS AND GRAVELLY SANDS				H <sub>2</sub> S ODOR ↓
24						
26						
28		28' COBBLES WITH POSSIBLE SMALL BOULDERS, DIFFICULT DRILLING, DRILL RIG CHATTER, COBBLES TO 14"				(0900) PLACED NEW TEETH ON 24" BUCKET
30						
32		INTERBEDDED THIN LAYERS OF CLAY AND SILT, OLIVE GRAY TO GRAY, PREDOMINANTLY SAND AND GRAVELLY SANDS WITH COBBLES, AVERAGE COBBLE SIZE 3-6", OCCASSIONAL COBBLES TO 14"	(40-60)			
34						
36						
38						
40		OCCASSIONAL CLAYEY GRAVEL LAYERS VARIABLE THICKNESS, 1-2', OLIVE GRAY COLOR WITH H <sub>2</sub> S ODOR				
42						
44						

Project 83-1140-06

Date Drilled 6-18-86

SITS #1  
Hole No. PUMP WELL

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
44	SW	<u>GRAVELLY SANDS - CONTINUED</u> FINE TO COARSE SAND WITH GRAVEL, OCCASSIONAL COBBLES FROM 6"-14", SUBROUNDED TO ROUNDED.	∅		AD ↓	(1000)
46						
48		INTERBEDDED THIN LENSES OF CLAY AND SILTY CLAY - VARIABLE, PREDOMINANTLY GRAVELLY SANDS				
50						
52						
54						(1100)
56						HYDRAULIC LEAK DEVELOPING ON DRILL RIG RING GEAR
58						
60		<u>GRAVELLY SANDS - CONTINUED,</u> OCCASSIONAL SMALL COBBLES				
62						
64						
66						(1200)
68						Sheet <u>3</u> of <u>4</u>



DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
68		GRAVELLY SANDS - CONTINUOUS INCREASING FINES			AD ↓	
70	SC CL	70.0 - 74.0 GRAVELLY SAND w/ CLAY MIXTURE OF SAND AND GRAVEL WITH A CLAY / SILTY CLAY BINDER, GRAY, DENSE, H <sub>2</sub> S ODOOR IN FINER MATERIALS, OCCASSIONAL COBBLES, CLASTS SUBANGULAR TO SUBROUNDED	(35-40-25)			ADDED ±20lbs OF SUPERCOL TO DRILLING FLUID IN BORING.  (1320)
72						
74	GW	74.0 - 80.0 COBBLES WITH SANDY GRAVEL SUBROUNDED TO ROUNDED COBBLES TO 12", COBBLES GENERALLY 4"-8", SOME SANDY GRAVEL CONSISTING OF MEDIUM TO COARSE SANDS AND GRAVELS, RIVER DEPOSITS, H <sub>2</sub> S ODOOR  GRADATIONAL CONTACT				PLACED NEW TEETH (2ND SET) ON 24" (1400) BUCKET 6-18-86 74'- SHUTDOWN AT 1430, NEED SPECIAL BUCKETS TO REMOVE COBBLES, SECURED SITE 6-20-86 ATTEMPTED TO BREAK THROUGH ROCK IN BOTTOM OF BORING APPEARS TO BE LARGE COBBLE OR BOULDER, USING CHOPPING BUCKET AND LARGE SINGLE TOOTH WITH NO SUCCESS 6-21-86 USING CORING BUCKET TO ADVANCE THROUGH ROCK, HOLE REMAINED OPEN PAST TWO DAYS WITH A MINIMUM OF DRILLING FLUID
76						
78						
80		80.0 - 88' <u>BEDROCK</u> <u>CLAYSTONE / SILTSTONE</u> <u>PUNTE FORMATION</u>				
82		OLIVE GRAY SILTSTONE AND CLAYSTONE, MEDIUM PLASTICITY, AQUICLUDE MATERIAL				EASY DRILLING (0900) THROUGH SILTSTONE/ CLAYSTONE  (0930)
84						
86						
88		END OF BORING 88' USED 1 BAG SUPERCOL (50lbs) FOR BORING INSTALLED PUMP WELL CASINGS CONSISTING OF 12" AND 2" MACHINE SLOTTED PVC CASINGS FROM APPROX 7' TO 87' 0-7' NON SLOTTED CASING ENDS CAPPED, WELL CENTRALIZERS AT 7', 40', 87', BACKFILLED AROUND SLOTTED CASING WITH (SW) SAND CONSISTING OF IMPORTED DESIGN FILTER MIX FROM 5'-88', MONITORED BACKFILLING WITH TAPE SOUNDINGS				
90						
92						Sheet <u>4</u> of <u>4</u>



THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME.  
CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.

PROJECT SCRTD - UNION STATION DATE DRILLED 2/4/83 HOLE NO. 5-1 (1983)  
 LOCATION NORTHEAST CORNER OF PUBLIC PARKING LOT GROUND ELEV. 279.1'  
 DRILLING CONTRACTOR CONVERSE - LAS VEGAS LOGGED BY B. INGRAM DEPTH TO GROUND WATER 20.3  
 TYPE OF RIG \_\_\_\_\_ HOLE DIAMETER 4 1/4" HAMMER WEIGHT AND FALL 320# 36" 2-8-83  
 SURFACE CONDITIONS A.C. PARKING AREA TOTAL DEPTH 85.0 NO. CORE BOXES \_\_\_\_\_

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6')	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
0.0	SM	0.0 - 0.4' ASPHALT PAVEMENT			RD			SET UP 7:00 AM BEGIN DRILLING 7:30 AM WEATHER: CLEAR, WARM
0.4		0.4 - 2.0 FILL - SILTY SAND MOTTLED BRN, MOIST, DENSE VARIABLE COMPOSITION	1-1 12K		CCI DR			
2.0	SM/ML	YOUNG ALLUVIUM 2.0 - 4.0 SILTY SAND/SANDY SILT			RD			SLIGHTLY POROUS
4.0	SM	RED-BRN., MOIST, M. DENSE V. FINE SAND - 50-60% SILT - 40-50%	1-2 6K		CCI DR			
4.0		4.0 - 8.0 SILTY SAND GRAY-BRN., MOIST, M. DENSE FINE SAND WITH 20% SILT AND TRACE GRAVEL TO 1"			RD			
8.0	SW	8.0 - 70.0 GRAVELLY SAND						
10.0			5"	100 SPT	REFUSAL RD			
12.0								
14.0								
16.0								
18.0								
20.0								



DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (bl)	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
20.0	SW	8.0-70.0 <u>GRAVELLY SAND</u> (CONTINUED)	50K		CCI DR			DELICATE SAMPLE, DIFFICULTY EXTRUDING - SAMPLE DESTROYED
22.0					RD			
24.0								
26.0								
28.0								
30.0			1-3 45K		CCI DR			POOR RECOVERY, DELICATE SAMPLE 3 RINGS ONLY
32.0					RD			
34.0		INTERMITTENT LENSES OF INCREASED GRAVEL CONTENT						
36.0								
38.0								
40.0			1-4 55K		CCI DR			SULPHUR ODOR IN SAMPLE POOR RECOVERY, 2 RINGS ONLY
42.0					RD			
44.0								SHEET <u>2</u> OF <u>5</u>



PROJECT SCRTD - UNION STATION DATE DRILLED 2/4/83

SITE #1  
OBSERVATION WELL #1  
HOLE NO. \_\_\_\_\_

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (blows)	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
44.0	SW	8.0 - 70.0 <u>GRAVELLY SAND</u>  (CONTINUED)			RD			SULPHUR ODOR POOR SAMPLE RECOVERY - 2 RINGS ONLY
46.0			1-5 57K	CCI DR				
48.0				RD				
50.0			80K	CCI DR				
52.0				RD				
54.0								
56.0			1-6 100K - 10"	CCI DR				
58.0				RD				
60.0								
62.0								
64.0								
66.0								
68.0								
70.0								
72.0								
74.0								
76.0								
78.0								
80.0								
82.0								
84.0								
86.0								
88.0								
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384.0								
386.0								
388.0								
390.0								
392.0								
394.0								
396.0								
398.0								
400.0								

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (blows)	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
68.0	SW	8.0-70.0 <u>GRAVELLY SAND</u> (CONTINUED)			RD			
70.0	B	70.0-79.5 <u>BOULDERS</u> GRANITIC-TYPE CUTTINGS						
72.0								
74.0								
76.0				100K - 0" REFUSAL				ATTEMPTED TO SAMPLE - COULD NOT DRIVE SAMPLER TOO HARD TO SAMPLE
78.0								
80.0	CL/ SC	<u>PUENTE FORMATION</u> 79.5-85.0 <u>SANDY CLAYSTONE</u> <u>AND CLAYEY SANDSTONE</u>	1-8 50K		CCI DR			
82.0		OLIVE-GRAY COLOR, MOIST, FRESH THINLY LAMINATED, BEDDING PLANES DIP ~ 50° (SAMPLES NOT ORIENTED).			RD			
84.0		FRIABLE. STRENGTH, FRIABLE TO LOW HARDNESS. TENDS TO FRACTURE ALONG LAMINATIONS	1-9 40K		CCI DR			
		END BORING 85.0 FT PIEZOMETER SET TO 85.0' PERFORATED INTERVAL: 45'-85'						



THIS BORING LOG IS BASED ON FIELD CLASSIFICATION AND VISUAL SOIL DESCRIPTION, BUT IS MODIFIED TO INCLUDE RESULTS OF LABORATORY CLASSIFICATION TESTS WHERE AVAILABLE. THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME. CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.



**Converse Consultants, Inc.**  
**Earth Sciences Associates**  
**Geo/Resource Consultants**

**BORING LOG** SITE #1  
O.W.-4

Proj: 83-1140-06  
MRTL PUMP TEST  
UNION STATION AREA Date Drilled 3/1-3/86 Ground Elev. 281'  
 Drill Rig FAILING 1500 ROTARY WASH Logged By EMIR UTUSH Total Depth 24'  
 Hole Diameter 4 7/8" Hammer Weight & Fall 250# @ 30"

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
0		0-0.5' ASPHALTIC PAVEMENT AND BASE			C	
0.5	ML	0.5'-5' <u>SANDY SILT</u> BROWN, MOIST, VERY FINE SAND AND SILT			AD	
5	SP	5'-6' <u>GRAVELLY SAND</u> , BROWN				
6						INSTALLED CASING MIXED REVERT
6	GP	6'-13' <u>SANDY GRAVEL</u> LIGHT BROWN AND GRAY, MEDIUM TO COARSE SAND, POORLY GRADED, COBBLES TO 4", SUBROUNDED, MOIST, LOOSE TO MEDIUM DENSE, TRACE FINES			RD	
10			C-1		DR	
12					RD	
13	SP	13'-15' <u>SAND</u> YELLOWISH BROWN, GRANITIC FRAGMENTS, MEDIUM TO COARSE, TRACE FINE GRAVEL				
15						
15	GP	15'-20' <u>SAND AND GRAVEL</u> YELLOWISH BROWN, MEDIUM TO COARSE SAND, COARSE GRAVEL AND SMALL COBBLES, SAND LENSES, TRACE SILT AND CLAY, POORLY GRADED WITH TRACE FINES			DR	
16	SP		C-2			
18					RD	
20		▲ APPROXIMATE GROUNDWATER LEVEL: 20.0'				



Project 83-1140-06  
MRTZ PUMP TEST

Date Drilled

2/28 - 3/3/86

Hole No. 0.W.-4 SITE #1

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	BLOWS (6")	DRILL MODE	REMARKS
20	GM	20'-22' <u>SANDY GRAVEL</u> DARK GRAY, SILT, COARSE GRAVEL TO 3"			RD	
			C-3		DR	3/28/86
22	SM	22'-30' <u>SILTY SAND</u> DARK GRAY TO GREENISH GRAY, COARSE SAND			RD	3/3/86 CAVING TO 17.5' REDRILLED BORING
24						
26		COARSE GRAVEL, ANGULAR, MEDIUM SAND, LENSES OF SANDY SILT AND CLAY	C-4		DR	
28						
30	SP	30'-34' <u>SAND</u> GRAY, MEDIUM TO COARSE SAND, POORLY GRADED, LITTLE GRAVEL, TRACE SILT.			RD	HYDROGEN SULFIDE ODOR ↓
32			C-5		DR	
34	GP	34-35.6 <u>SANDY GRAVEL</u>			RD	DRILL RIG CHATTER
36	SP	35.6-40 <u>SAND</u> GRAY, MEDIUM TO COARSE SAND, GRAVEL TO 1.5", TRACE SILT, H <sub>2</sub> S ODOR			DR	
38	SP GP				RD	DRILL RIG CHATTER
40	SP	40-45.5 <u>SAND</u> GRAY, MEDIUM TO COARSE SAND			DR	SAMPLES NOT RECOVERED
42	SM SP	SAND SILT LENSE WITH CLAY BINDER			DR	
			C-7		DR	
44					RD	Sheet <u>2</u> of <u>4</u>

Project 83-1140-06  
MRTC PUMP TEST

Date Drilled 3/3/86

Site #1  
 Hole No. O.W. - 4

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
44	SP	40'-45.5' <u>SAND</u> - CONTINUED				HYDROGEN SULPHIDE ODOR - CONTINUED
46	GM GP	45.5'-47' <u>SANDY GRAVEL</u> WITH SILT, SUBROUND GRAVEL TO 1/2", GREEN CLAYEY SILT			RD	DRILL RIG CHATTER
48	SP	47'-49' <u>SAND</u> GRAY, MEDIUM TO COARSE			DR	
			C-8			
50	GP SP GP	49'-51' <u>SANDY GRAVEL</u> TRACE FINES OCCASSIONAL SAND LENSES			RD	DRILL RIG CHATTER
52	GM SM	51'-52.8' <u>SILTY SAND AND GRAVEL</u>				
54	SW	52.8'-57' <u>SAND</u> GRAY, MODERATELY TO POORLY GRADED, MEDIUM TO COARSE SAND, TRACE SILT			DR	
			C-9			
56					RD	
58	GP	57'-58' <u>SANDY GRAVEL</u>				DRILL RIG CHATTER
					DR	
60	SW SM	58'-60' <u>SILTY SAND</u> GRAY, FINE TO MEDIUM SAND MODERATELY GRADED, TRACE SILT				H <sub>2</sub> S ODOR
			C-10			
62	SM	60'-67.4' <u>SILTY SAND</u> GREENISH-GRAY VERY FINE SAND, TRACE CLAY, POORLY GRADED, DELAYING PLANT MATERIAL			RD	
					DR	
64			C-11			
66					RD	
		LENSE OF SILTY GRAVEL WITH CLAY				DRILL RIG CHATTER
68	GM GP	67.4'-70.0' <u>SANDY GRAVEL</u>				Sheet <u>3</u> of <u>4</u>



DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS	
68	GP	67.4-70' <u>SANDY GRAVEL</u> GRAY, COARSE, TRACE FINES			RD		
70	SW	70-72' <u>GRAVELLY SAND</u> GRAY, FINE TO COARSE SAND, SOME SILT, GRAVELS TO 3" MODERATELY WELL GRADED, COBBLES	C-12		DR	SMALL COBBLE IN SAMPLER TIP	
72	GP	72-78' <u>SANDY GRAVEL</u> GRAY, COARSE, COBBLES AND BOULDERS, TRACE FINES			RD	DRILL RIG CHATTER	
78	SM	78-79' <u>SANDY SILT</u> BROWNISH GREEN, POORLY GRADED, TRANSITION ZONE					
80	TP	79-84' <u>BEDROCK - PUENTE FORMATION</u> SILTSTONE / CLAYSTONE OLIVE GRAY, STIFF, TRACE VERY FINE SAND					
84		<p>END OF BORING 84'</p> <ul style="list-style-type: none"> <li>- INSTALLED PIEZOMETER</li> <li>0'-10' NON SLOTTED 2" PVC CASING</li> <li>10'-79' MACHINE SLOTTED 2" CASING, 0.20" SLOTS, END CAPPED</li> <li>- FLUSHED CASING AND BORING WITH CLEAN WATER (± 1000 GALLONS)</li> <li>- BACKFILLED BORING WITH #3 MONTEREY SAND, 12-100# SACS</li> <li>- SEALED TOP 5' WITH CONCRETE GROUT AND BENTONITE, INSTALLED 2.5' CASING AND WELL COVER.</li> </ul>					
86							
88							
90							
92							



THIS BORING LOG IS BASED ON FIELD CLASSIFICATION AND VISUAL SOIL DESCRIPTION, BUT IS MODIFIED TO INCLUDE RESULTS OF LABORATORY CLASSIFICATION TESTS WHERE AVAILABLE. THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME. CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.



**Converse Consultants, Inc.**  
**Earth Sciences Associates**  
**Geo/Resource Consultants**

SITE #2  
**BORING LOG** Pump Well

83-1140-06  
 MRTL PUMP TEST  
 Proj: UNION STATION AREA Date Drilled 3/3-6/86 Ground Elev. 279.5  
 Drill Rig INGERSOLL RAND TH60 Logged By MARK SCHLUTER Total Depth \_\_\_\_\_  
 Hole Diameter 10" REAMED TO 24" Hammer Weight & Fall (NO SAMPLING PERFORMED)

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	BLOWS (6")	DRILL MODE	REMARKS
0		0.0 - 9.0 <u>FILL</u> GRAVELLY SAND, SILT, AND SANDY SILT, TRACE AMOUNT OF DEBRI AND RUBBLE INCLUDING FRAGMENTS OF CONCRETE, BRICK, METAL	(NO SAMPLING)			STARTED DRILLING AT (0945) 3-3-86 3/3/86 AIR-LIFTED CUTTING WITH DRILL RIG COMPRESSOR FROM 0-10' 3/3/86 (1240) STARTED REAMING BORING WITH MODIFIED 24" DRILL BIT AIR ROTARY 3/4/86 (0730) DRILLED OUT HOLE WITH 12" TRI-CONE BIT TO CLEAN OUT FALLEN GRAVELS AND COBBLES FROM 24" REAMING DRILLED TO 110' WITH 12" BIT. (1100)
9.0		9.0 - 85' <u>GRAVELLY SAND</u> MEDIUM TO COARSE SAND, SOME GRAVELS, TRACE SILT BORING LOGGED BASED ON ROTARY WASH CUTTING, GRAVELS AND COBBLES BROKEN UP DURING DRILLING.				3/3/86 DRILLED TO 10', SET UP FOR 10" ROTARY WASH DRILLING 3-3-86 ATTACHED 10" TRI-CONE BIT TO 10' LONG REAMING SECTION AND STARTED ROTARY WASH DRILLING OF PILOT HOLE. RD DRILLED 10" PILOT HOLE TO 100' 3-3-86 ADDED SUPERCOLD GUAR GUM TO DRILLING FLUID.
16		16' - DRILL RIG CHATTER GRAVELS AND COBBLES PROGRESS SLOWED				3/3/86 (1340) AT 16" WITH 24" MODIFIED DRILL BIT

83-1140-06  
MRTC PUMP TEST

SITE #2

Project UNION STATION AREA

Date Drilled 3/3-6/86

Hole No. PUMP WELL

DEPTH USGS	MATERIAL CLASSIFICATION	SAMPLE	BLOWS 16"	DRILL MODE	REMARKS
20	9.0 - 85' <u>GRAVELLY SANDS</u> - CONTINUED -	(NO SAMPLING)			3/3/86 (1030) AT 20' WITH 10" TRI-CONE BIT.
22				RD ↓	
24					
26	25' - DRILL RIG CHATTER - 10" BIT COBBLES AND GRAVELS				3/3/86 (1040) AT 25' WITH 10" TRI-CONE BIT
28					3/3/86 (1510) AT 28' WITH MODIFIED 24" BIT, GRAVELS AND COBBLES FALLING INTO PILOT HOLE, PULLED 24" MODIFIED BIT OUT OF HOLE AND ATTACHED 12" TRI-CONE BIT TO CLEAN OUT PILOT HOLE
30					
32					
34					
36					
38					
40					
42					
44					

83-1140-06  
MRTC PUMP TEST  
UNION STATION AREA

Date Drilled 3/3-6/86

SITE #2  
Hole No. PUMP WELL

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
44		9.0-85' GRAVELLY SANDS - CONTINUED -	(NO SAMPLING)			
46					RD ↓	
48						
50						3/4/86 (1430) AT 50' WITH 24" MODIFIED DRILL BIT
52						
54						
56						
58						
60						3/5/86 (0820) AT 60', STARTED DRILLING WITH NEW 24" MODIFIED DRILL BIT, 2ND BIT USED. GRAVELS AND COBBLES FALLING INTO CLEANED OUT PILOT HOLE AS 24" BIT IS ADVANCED
62						
64						
66						
68						



83-1140-06  
MRTC PUMP TEST  
Project UNION STATION AREA

Date Drilled 3/3-6/86

Site #2  
Hole No. PUMP WELL

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
68		9.0 - 85' <u>GRAVELLY SANDS</u> - CONTINUED -	(NO SAMPLING)			
70					RD ↓	3/4/86 (1630) AT 70' WITH MODIFIED DRILL BIT, WELDED WINGS WORN DOWN TO NUBS (14") PULLED ROPE AND BIT TO ATTACH SECOND MODIFIED DRILL BIT ON 3/5/86 A.M. (SEE 3/5/86 AT 60')
72						
74						
76						
78						
80						3/3/86 (1145) AT 80' WITH PILOT HOLE USING 10" TRI-CONE BIT.
82						3/5/86 (1400) AT 80' WITH 2ND 24" MODIFIED DRILL BIT, PROGRESSES SLOW, GRAVELS AND COBBLES ACCUMULATING IN PILOT BORING
84						
86		85' - 110' <u>BEDROCK</u> <u>PUNTE FORMATION</u> SILTSTONE / CLAYSTONE OLIVE GRAY COLOR				
88						3/5/86 (1450) AT 88' WITH WORN 20" MODIFIED BIT, DRILLING MUCH EASIER IN BEDROCK, STILL SOME DRILL RIG CHATTER FROM GRAVELS AND COBBLES THAT FELL INTO PILOT BORING
90						
92						

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
92		<p>85'-110' <u>BEDROCK</u> <u>PUENTE FORMATION</u> SILTSTONE / CLAYSTONE - CONTINUED -</p>	(NO SAMPLING)		<p>RD ↓</p>	
94						
96						
98						
100						
102						
104						
106						
108						
110						
112		<p>END OF BORING 110' 4/5/86 (1500) FLUSHED BORING WITH DRILLING FLUID TO REMOVE CUTTINGS (1535) - ADDED FRESH WATER TO THIN DOWN SUPERCOL GUAR GUM DRILLING FLUID. - CONTINUED TO FLUSH BORING WITH CLEAN WATER FROM WATER TRUCK - BOTTOM OF BORING SOUNDED @ 87' WITH TAKE (SOFT BOTTOM) (1605) INSTALLED 12" AND 2" MACHINE SLOTTED CASING INTO BORING 0-7' NON SLOTTED 7-87' MACHINE SLOTTED BACKFILLED AROUND CASING WITH FILTER MIXED SAND, REPEATEDLY SOUNDED DEPTH TO SAND DURING BACKFILL</p>				<p>3/4/86 (1100) COMPLETED PILOT HOLE CLEAN-OUT WITH 12" BIT TO 110', PULLED OUT AND ATTACHED 24" MODIFIED BIT 3/5/86 (1500) AT 110' WITH WORN 20" MODIFIED BIT, HEAVY DRILL RIG CHATTER - GRAVELS &amp; COBBLES ACCUMULATED IN PILOT HOLE, LAST 20' - EASIER DRILLING IN BEDROCK</p>
114						
116		<p>4/6/86 (0800) STARTED "AIR-LIFT" DEVELOPMENT OF PUMP WELL</p>				<p>Sheet <u>5</u> of <u>5</u></p>



THIS BORING LOG IS BASED ON FIELD CLASSIFICATION AND VISUAL SOIL DESCRIPTION, BUT IS MODIFIED TO INCLUDE RESULTS OF LABORATORY CLASSIFICATION TESTS WHERE AVAILABLE. THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME. CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.



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**Geo/Resource Consultants**

SITE #2  
**BORING LOG** OW-1

83-1140-06  
 MRTC PUMP TEST  
 Proj: UNION STATION AREA Date Drilled 2/24-25/86 Ground Elev. 279'  
 Drill Rig FAILING 1500 ROTARY WASH Logged By EMIR UTUSH Total Depth 94'  
 Hole Diameter 4 7/8" Hammer Weight & Fall 250# @ 30"

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
0	Fill (AF)	0-2' GRAVELY SAND - (FILL)			AD/C	FILL
2	Fill (AF)	2-7' SILT - (FILL), DARK BROWN GRADING INTO OLIVE GREEN, LITTLE FINE-TO-MEDIUM GRAVEL AND SAND				PIECE OF METAL AT 3.5'
8	SM/ML	7-9' SANDY SILT, LIGHT OLIVE BROWN, SOME GRAVEL AND FINE SAND. GRADATIONAL FILL CONTACT.				3" SMALL COBBLE
10	SP/GP	9'-28' GRAVELY SAND/SANDY GRAVEL ANGULAR TO SUBROUNDED GRAVEL WITH MEDIUM TO COARSE SAND, TRACE FINES	C-1		DR	
12	SP/GP	COARSE SAND AND GRAVEL			RD	SET 12.5' OF CASING ADDED 1/2 BAG OF JOHNSON REVERT STRONG DRILL RIG CHATTER AT 11'
16	SP/GP	MEDIUM TO COARSE SAND LENSE				DRILL RIG CHATTER STOPPED FROM 16'-17'
18						
20						





Project 83-1140-06  
MRTC PUMP TEST

Date Drilled

2-24-86

Site #2  
 Hole No. OW-1

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	BLOWS (6")	DRILL MODE	REMARKS	
20	GP	<u>SANDY GRAVEL (CONTINUED)</u> WHITE AND GRAY COBBLES WITH COARSE SAND, TRACE SILT AND CLAY   GROUND WATER AT 25.7' LEVEL MEASURED @ 1100 A.M. ON 3/3/86	C-2		DR	SOFT ZONE @ 22'  VARIABLE DRILL RIG CHATTER 	
22					RD		
24				C-3			DR
26	GP SP						RD
28	SM ML	28'-30' FINE SAND AND SILT TRACE CLAY, SLIGHTLY DAMP, DARK GREEN, TRACE ORGANICS	C-4		DR		
30	GP	30'-31' SANDY GRAVEL			RD	DRILL RIG CHATTER AT 30'	
32	ML AND GP	31'-36' SILT AND SANDY GRAVEL INTERBEDDED LENSES OF SILT AND SANDY GRAVEL, SILT - DARK GREEN, TRACE CLAY  SANDY GRAVEL - COARSE GRAVEL AND SAND, LITTLE FINES IN SANDS, SILT SEAMS	C-5		DR	2" COBBLE FRAGMENT IN DRIVE SAMPLE	
34					RD		
36	GP	36'-39.5' SANDY GRAVEL SAND AND GRAVEL WITH COBBLES AND BOULDERS			DR	STRONG DRILL RIG CHATTER AT 36' VERY STRONG DRILL RIG CHATTER AT 37' - BOULDER?	
38			NO RETURN		DR		
40	ML	39.5'-40.5' SILT (?) SOFT ZONE			RD	VERY STRONG DRILL RIG CHATTER 39.5'	
42	GP	40.5'-43.5' SANDY GRAVEL SAND AND GRAVEL WITH COBBLES AND BOULDERS				INCREASING RESISTANCE  GASTEL METER READING -NO COMBUSTIBLE GAS AT SURFACE ABOVE DRILLING FLUID	
44	GP	43.5'-45.5' SANDY GRAVEL	C-7		DR	Sheet <u>2</u> of <u>5</u>	

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
44	GP	<u>SANDY GRAVEL - CONTINUED</u> MOTTLED WHITE AND GRAY, CLASTS SUBANGULAR TO SUBROUNDED, TRACE SILT WITH CLAY			DR	STRONG DRILL RIG CHATTER AT 45'
46	SP	<u>45.5'-49.5' GRAVELLY SAND</u> LIGHT GRAY AND WHITE, COARSE SAND, TRACE SILT, SOME GRAVEL			RD	
50	SP	<u>49.5'-52.5' SAND</u> GRAY, LITTLE GRAVEL, TRACE SILT, MEDIUM TO COARSE SAND	C-8		DR	VARIABLE DRILL RIG CHATTER AT: 52.5', 53.5', 54'
52					RD	
54	SP	<u>52.5'-57.5' SAND</u> SAND WITH INTERBEDDED SANDY GRAVEL LENSES MEDIUM TO COARSE SAND, CLASTS SUBANGULAR TO SUB-ROUNDED				
56	GP		C-9		DR	DRILL RIG CHATTER AT 57.5' AND 60'
58	GP	<u>57.5'-61.5' GRAVEL</u> GRAVELS WITH SOME MEDIUM TO COARSE SAND			RD	
60		GRADATIONAL CONTACT				DRILL RIG CHATTER AT 61'
62	SM ML	<u>61.5'-69.5' SAND AND SILT</u> DARK GREEN, FINE SAND AND SILT, TRACE CLAY, TRACE SMALL GRAVEL, H <sub>2</sub> S ODOR IN SAMPLE	C-10		DR	LOST DRILLING FLUID CIRCULATION SMELL OF HYDROGEN SULPHIDE IN SAMPLE
64					RD	CAVING - BORING CAVED TO 7'
66						
68						



DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
68	SP ML	SAND AND SILT - CONTINUED			RD	
70	GP	69.5'-71' <u>SAND</u> GRAY, MEDIUM COARSE, TRACE SMALL GRAVEL	C-11		DR	
72	GP	71'-76.5' <u>SANDY GRAVEL</u>			RD	DRILL RIG CHATTER AT 71'
74		(SP) SAND LENSE AT 74'				DECREASED DRILL RIG CHATTER AT 74' AND 75.5'
76		(SP) SAND LENSE AT 76'				
78	SP	76.5'-77.5' <u>GRAVELLY SAND</u>				DRILL RIG CHATTER AT 77.5'
80	GP	77.5'-80.5' <u>SANDY GRAVEL</u>				
80		(SP) AND (GP) SAND AND GRAVEL LENSES				
82	GM GP	80.5'-84.5' <u>SANDY GRAVEL</u> FINE TO COARSE SAND, SUBGRADED FINE TO MEDIUM GRAVEL, TRACE BLuish GRAY SILT AND CLAY	C-12		DR	2-24-86 2-25-86
84		GRADATIONAL CONTACT			RD	
86	TP	84.5'-94.0' <u>BEDROCK-SILTSTONE/CLAYSTONE</u> PUENTE FORMATION, OLIVE GREEN, SOFT, MOIST, INTERBEDDED FINE SAND LAYERS				
88		VERY FINE SAND INTERBEDS THINLY BEDDED TO LAMINATED DIPPING AT APPROX. 40°	NO RECOVERY		DR	
90		STIFF TO VERY STIFF			RD	
92			C-14		DR	ADDED 1 GAL (25#) OF REVERT Sheet <u>4</u> of <u>5</u>



DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
92	Tp	BEDROCK - SILTSTONE / CLAYSTONE CONTINUED PUENTE FORMATION			RD	
94						
94.0		END OF BORING 94.0'				
94.5		- FLUSHED BORING				
95.0		- INSTALLED PIEZOMETER				
95.5		0'-10' NON SLOTTED 2" CASING				
96.0		10'-89' MACHINE SLOTTED 2" CASING,				
96.5		0.20" SLOTS, END CAPPED				
97.0		BACKFILLED BORING WITH #3				
97.5		MONTEREY SAND, 6-100# SACS				
98.0		- FLUSHED PIEZOMETER WITH FRESH				
98.5		WATER.				
99.0		- INSTALLED WELL COVER AND				
99.5		SEALED TOP 4.5' WITH CONCRETE				
100.0		GROUT AND BENTONITE.				
100.5						
101.0						
101.5						
102.0						
102.5						
103.0						
103.5						
104.0						
104.5						
105.0						
105.5						
106.0						
106.5						
107.0						
107.5						
108.0						
108.5						
109.0						
109.5						
110.0						
110.5						
111.0						
111.5						
112.0						
112.5						
113.0						
113.5						
114.0						
114.5						
115.0						
115.5						
116.0						

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**Earth Sciences Associates**  
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SITE #2

**BORING LOG** O.W.-2

Proj: 83-1140-06 MRTC PUMP TEST UNION STATION AREA Date Drilled 2/25-27/86 Ground Elev. 280'  
 Drill Rig FAILING 1500 ROTARY WASH Logged By EMIR UTUSH Total Depth 84'  
 Hole Diameter 4 7/8" Hammer Weight & Fall 250\* @ 30"

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
0	Fill (AF)	0-4' SAND AND GRAVEL - (FILL) WITH DARK BROWN SILT			AD/C	FILL
2						
4	Fill (AF)	4-7' SILT - (FILL) BROWN, DRY, LOOSE				PIECES OF METAL, NAILS, GLASS AND SLAG-LIKE MATERIAL AT 4'
6		SIGHTLY DAMP LITTLE CLAY BINDER AT 7'				LARGE BENT METAL SPIKE AT 5'
8	ML	7-8' SILT - BROWN, SLIGHTLY DAMP, TRACE CLAY, SOFT				
8	SP	8-10' SAND - LIGHT BROWN, DAMP, LOOSE TO MEDIUM DENSE, LITTLE FINE GRAVEL, POORLY GRADED	C-1		DR	SET 11.5' OF CASING ADDED JOHNSON REVERT
10						
10	GP	10-16' SANDY GRAVEL BROWN TO LIGHT GRAY. GRAVEL - COARSE, SUB-ROUNDED SAND - POORLY GRADED WITH LITTLE SILT			RD	
12						
14						
16			C-2		DR	POOR RECOVERY
16	SP	16'-20.5' GRAVELLY SAND LIGHT BROWN TO SPECKLED YELLOW/GRAY, WET, MEDIUM DENSE, POORLY GRADED MEDIUM TO COARSE SAND, MEDIUM GRAVEL TO 3/4", TRACE SILT			RD	
18						
20						



Project 83-1140-06  
MRTC PUMP TEST

Date Drilled

2/25/86

Hole No.

SITE #2  
O.W.-2

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	BLOWS (6")	DRILL MODE	REMARKS
20	SP	<u>GRAVELLY SAND</u>				
	GP	20.5'-24' <u>SANDY GRAVEL</u> LIGHT BROWN WITH GRAY AND YELLOW, MEDIUM TO COARSE GRAVEL, POORLY GRADED SAND, LITTLE SILT			RD	DRILL RIG CHATTER AT 20.5'
22	GM					
	ML	25' THIN CLAY SILT SEAM, SOME SAND				
24	GP					
	SM	24'-26.8' <u>SILTY SAND</u> BROWN, MEDIUM DENSE, WET, SOME GRAVEL, TRACE CLAY	C-3		DR	GROUNDWATER AT 25.9' LEVEL MEASURED @ 1158 A.M. ON 3/3/86
26	SP	26.8'-30.2' <u>SAND</u> GRAY, MEDIUM TO COARSE SAND, SOME GRAVEL, TRACE SILT, POORLY GRADED				CAVING FROM 26' TO 31'
28						
30		SLEIGHT INCREASE IN SILT			RD	
	GP	30.2'-30.7' <u>GRAVEL</u>				INCREASED DRILL RIG CHATTER
32		30.7'-37'				SMOOTH
	GM					
34		<u>SANDY GRAVEL</u> WITH SILT, GRAY, LOOSE TO MEDIUM DENSE	C-4		DR	
	GP					DRILL RIG CHATTER AT 35'
36	GM					
		37'-45' <u>SANDY GRAVEL</u> COARSE SAND AND GRAVEL COBBLE AND BOULDER ZONES				
38	GP				RD	STRONG DRILL CHATTER AT 38'
40		LENSES OF COBBLES AND BOULDERS - VARIABLE -				
						STRONG, DRILL CHATTER AT 41'
42						
						STRONG DRILL CHATTER AT 42'
44						



DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
44	GP	<u>SANDY GRAVEL</u>			RD	SLIGHT H <sub>2</sub> S ODOR
45-46	SP	<u>GRAVELLY SAND</u>				
46	GP	46-51.4 <u>GRAVEL</u> GRAY, WITH SAND AND SOME SILT, COARSE GRAVEL TO COBBLE SIZE CLASTS, COARSE SAND	C-5		DR	CAVING TO 44' STRONG DRILL RIG CHATTER, ADDED ADDITIONAL REVERT TO DRILLING FLUID, BOULDERS AND COBBLES BLOCKING BORING. 2-25-86 2-26-86 CAVING TO 31', BORING BLOCKED, REPOSITIONED BORING ADJACENT TO CAVED HOLE, DROVE CASING TO 32', RESUMED DRILLING ADDED REVERT TO DRILLING FLUID.
48	GP/SP					
50		<u>SANDY GRAVEL</u> COARSE SAND, TRACE FINES			RD	
52	SP	51.4-56' <u>GRAVELLY SAND</u> GRAY, COARSE SAND, POORLY GRADED, LITTLE SILT				
54		H <sub>2</sub> S ODOR IN SAMPLE				
56	SP	56-58' <u>SAND</u> GRAY, MEDIUM DENSE, FINE TO MEDIUM SAND, TRACE SILT H <sub>2</sub> S ODOR IN SAMPLE	C-6		DR	
58	GP	58-61' <u>SANDY GRAVEL</u> GRAY				
60					RD	
62	SM/ML	61-70' <u>SAND AND SILT</u> DARK GREEN TO GRAY, LOOSE TO MEDIUM DENSE, SOME CLAY AND GRAVEL, VERY FINE SAND, PALE ORGANICS (PLANT ROOTLETS)				
64					DR	
66			C-7			
68					RD	

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
68	ML	<u>SAND AND SILT</u> - CONTINUED -				
70	SP	70'-71' <u>SAND</u> MEDIUM COARSE, LITTLE GRAVEL			RD	
72	GP	71'-72' <u>SANDY GRAVEL</u> COARSE SAND AND GRAVEL, COBBLES AND BOULDERS				STRONG DRILL RIG CHATTER
74						
76			X		DR	NO RECOVERY
78					RD	STRONG DRILL RIG CHATTER
80						LOST DRILLING FLUID CIRCULATION MIXED IN ADDITIONAL REVERT CAVING UP TO 32' ADDING ADDITIONAL REVERT
82	GM GP	81'-82' <u>SANDY GRAVEL</u> WITH SILT, LUMPS OF DARK GRAY/GREEN SILT WITH CLAY BINDER				82' LOSING FLUID ADDED TOTAL 3 SACS OF REVERT, DRILLED TO 84' AND INSTALLED 2" CASING
84	GP	82'-84' <u>SANDY GRAVEL</u> COARSE SAND AND GRAVEL, LITTLE FINES				
86		END OF BORING 84.0 (BORING CLOSE TO BEDROCK) - INSTALLED PIEZOMETER 0-12' NON SLOTTED 2" CASING 12'-81' MACHINE SLOTTED 2" CASING 0.20" SLOTS, END CAPPED				
88		- FLUSHED BORING AND CASING WITH CLEAN WATER (±400 GALLONS), CONTINUED TO FLUSH, WATER NOT RETURNING TO SURFACE - LOST TO FORMATION, PUMPED DOWN ADDITIONAL WATER AND 1 GALLON OF BLEACH (±800 GALLONS)				
90		- BACKFILLED BORING WITH #3 MONTEREY SAND; 8 - 100# SACS - INSTALLED WELL COVER AND SEALED TOP 5' WITH CONCRETE GROUT AND BENTONITE,				
92						Sheet <u>4</u> of <u>4</u>



THIS BORING LOG IS BASED ON FIELD CLASSIFICATION AND VISUAL SOIL DESCRIPTION, BUT IS MODIFIED TO INCLUDE RESULTS OF LABORATORY CLASSIFICATION TESTS WHERE AVAILABLE. THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME. CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.



**Converse Consultants, Inc.**  
**Earth Sciences Associates**  
**Geo/Resource Consultants**

SITE #2  
 O.W. -3

**BORING LOG**

83-114D-06  
 MRTEL PUMP TEST  
 Proj: UNION STATION AREA Date Drilled 2/28-3/1/86 Ground Elev. 280'  
 Drill Rig FAILING 1500 ROTARY WASH Logged By EMIR UTUSH Total Depth 85'  
 Hole Diameter 4 7/8" Hammer Weight & Fall 250# @ 30"

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
0	Fill (AF)	0.0'-8' <u>SILTY SAND</u> BROWN, DRY, LOOSE, BROKEN BRICK FRAGMENTS, TOP 6" ASPHALT AND BASE SUBGRADE			AD	CORED THROUGH ASPHALT PAVEMENT FILL
8	ML	8'-11' <u>SANDY SILT</u> SILT WITH VERY FINE SAND, BROWN, LOOSE, TRACE CLAY, POSSIBLE FILL?	C-1		DR	SET CASING AND ADDED REVERT TO DRIVING FLUID
11	GP	11'-17' <u>SANDY GRAVEL</u> LIGHT GRAY TO LIGHT BROWN, GRANITIC CLASTS, POORLY GRADED, CLASTS SUBANGULAR TO SUBROUND			RD	
17	SP	17-18.4 <u>SAND</u> GRAY TO LIGHT BROWN, LOOSE, WITH SILT AND GRAVEL	C-2		DR	DRILL RIG CHATTER AT 19'
18	GP	INCREASING GRAVELS			RD	
18.4	GM	18.4-23 <u>SILTY GRAVEL</u>				Sheet <u>1</u> of <u>4</u>



DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	BLOWS 16"	DRILL MODE	REMARKS
20	GM	18.4'-23' <u>SILTY SAND AND GRAVEL</u> SILT WITH COARSE SAND AND GRAVEL, LUMPS OF GRAY/GREEN CLAY	C-3		RD	
22	SM				DR	
24	GP	23'-26' <u>SANDY GRAVEL</u> SAND AND GRAVEL, POORLY GRADED, COARSE, TRACE SILT	C-4		RD	DRILL RIG CHATTER @ 22'
26	SP	26'-29' <u>GRAVELLY SAND</u> COARSE, POORLY GRADED, LITTLE SILT			RD	<u>GROUNDWATER</u> ▼ AT 26.8' — LEVEL MEASURED AT 1050 A.M. ON 3/3/86
30	GP	29'-30.6' <u>SANDY GRAVEL</u> COARSE GRAVEL, SUBANGULAR TO SUBROUNDED			RD	DRILL RIG CHATTER AT 29'
32	GM	30.6'-31' <u>SILTY GRAVEL WITH TRACE CLAY</u>				
32	SP	31'-33.5' <u>SAND</u> GRAY, MODERATELY GRADED, MEDIUM TO COARSE SAND, SOME FINE SAND, TRACE SILT	C-5		DR	
34	GM	33.5'-43.0' <u>SANDY GRAVEL</u> WHITE TO GRAY WITH CLAYEY SILT INCLUSIONS, SOME SILT, POORLY GRADED COARSE SAND			RD	ADDING ADDITIONAL REVERT TO THICKEN FLUID. ROCK FRAGMENTS AND GRAVELS ACCUMULATING IN BOTTOM OF BORING, ATTEMPTING TO FLUSH WITH THICKENED FLUID DRILL RIG CHATTER
40		GRAY, COARSE GRAVEL TO 3"; COARSE SAND WITH SILT, DENSE	C-6		DR	
42					RD	
44	GP	43'-47' <u>SANDY GRAVEL</u> SOME SILT, COARSE GRAVEL			RD	DRILL RIG CHATTER AT 43'

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
44	GP	43'-47' <u>SANDY GRAVEL</u> SOME SILT, COARSE GRAVEL				DRILL RIG CHATTER
46					RD	
48	GM	47'-49' <u>SANDY GRAVEL</u> WITH SILT, GREEN CLAYED SILT				
50	SP SM	49'-52' <u>SAND</u> GRAY, DENSE, SOME SILT AND GRAVEL, COARSE TO MEDIUM COARSE SAND, POORLY GRADED.	C-7		DR	
52	GP SP	52'-61' <u>SANDY GRAVEL</u> MIXTURE OF SAND AND GRAVEL, TRACES FINES, OCCASSIONAL LENSES OF GRAVELS AND COBBLES			RD	OCCASSIONAL DRILL RIG CHATTER
54						54' - STRONG DRILL RIG CHATTER
56						
58						VARIABLE DRILL RIG CHATTER
60						↓
62	SP	61'-64' <u>SAND</u> GRAY, MEDIUM COARSE SAND, SOME GRAVEL, TRACE FINES	C-8		DR	LOOSE SAMPLE
64	GP	OCCASSIONAL GRAVEL/COBBLE LENSES			RD	
66	SM ML	64'-69' <u>SAND AND SILT</u> DARK GRAYISH GREEN, FINE SAND AND SILT, POORLY GRADED, TRACE ORGANICS (PLANT ROOTS), TRACE GRAVEL.	C-9		DR	
68					RD	



DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
68	SM ML	64'-69' <u>SAND AND SILT</u> DARK GREEN TO GRAY, FINE SAND, LITTLE GRAVEL				
70	GP	69'-71' <u>SANDY GRAVEL</u>			RD	DRILL RIG CHATTER
72	SP	71'-74' <u>SAND</u> GRAY, COARSE SAND LITTLE GRAVEL				
74	GP	74'-84' <u>GRAVEL</u> COARSE GRAVEL TO 2", WITH MEDIUM TO COARSE SAND, TRACE SILT, GRAY COLOR	C-10		DR	DRILL RIG CHATTER ↓
76						STARTED LOSING DRILLING FLUID TO FORMATION, MIXING IN ADDITIONAL REVERT
78					RD	2/28/86 3/1/86
80		<u>SANDY GRAVEL</u> SUBROUNDED TO WELL ROUNDED PEBBLES				CAVING TO 72', MIXED ADDITIONAL REVERT, BOTTOM OF BORING CAVING
82						
84	TP P	84'-85' <u>BEDROCK - PUENTE FORMATION</u> OLIVE GRAY SILTSTONE/CLAYSTONE				DRILLED TO 85' AND INSTALLED CASING
86		<u>END OF BORING 85'</u> -INSTALLED PIEZOMETER 0-10' NON SLOTTED 2" PVC CASING 10'-78.5' MACHINE SLOTTED 2" CASING 0.20" SLOTS, END CAPPED				
88		-FLUSHED CASING AND BORING WITH CLEAN WATER (±1800 GALLONS WITH ±650 GALLONS RETURNING) RETURN FLUID REDUCED AS BORING WAS FLUSHED. ADDED 1/2 QUART BLEACH.				
90		-BACKFILLED BORING WITH #3 MONTEREY SAND -INSTALLED WELL COVER AND CASING TOP 2.5', SEALED TOP 5' WITH CONCRETE GROUT AND BENTONITE				
92						Sheet <u>4</u> of <u>4</u>





PROJECT SCRTD - UNION STA. DATE DRILLED 2/1/83 HOLE NO. 5-5(1983)

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6')	DRILL MODE	RUN NO.	CORE REC. %	REMARKS	
20.0	SW	14.0 - 42.0 <u>GRAVELLY SAND</u> (CONTINUED)	5"	100	SPT				
				REFCAL	RD				
22.0									
24.0									
26.0			25.5 - 26.0 -	LENS OF FINE SAND IN SAMPLE	5-3		CCI DR		
					36K		RD		
28.0									
30.0			30.0	COLOR CHANGE TO DR. GRAY INCREASED MAFIC CONTENT: GRANITIC/DIORITIC COMP.	7 1/2"	75	T		SLIGHT GAS ODOR
					REFCAL	RD			
32.0									
34.0									
36.0			5-4		CCI DR		SLIGHT GAS ODOR GRAVELLY SAMPLE - ONLY 5 GOOD RINGS		
			40K		RD				
38.0									
40.0			J-1	25	S				
				75	P				
			7 1/2"	100	T				
42.0			REFCAL	RD					
44.0									



PROJECT SCRTD - UNION STA. DATE DRILLED 2/1/83 HOLE NO. 5-5 (1983)

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6')	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
44.0		14.0 - 62.0 <u>GRAVELLY SAND</u>			RD			
		(CONTINUED)						
46.0								
48.0								
50.0								
			75K		CCI DR			SULPHUR ODOR POOR SAMPLE RECOVERY - REMAINING SAMPLE DESTROYED IN HANDLING
52.0					RD			
54.0								
		GRAD. DECREASING GRAVEL CONTENT ↓						
56.0								
58.0								
60.0			5-5 50K		CCI DR			SLIGHT SULPHUR ODOR
62.0	SP	62.0 - 78.0 <u>SAND</u>			RD			
		DARK GRAY, DENSE POORLY GRADED UNIFORM FINE TO VERY FINE GRAINED MICACEOUS						
64.0								
66.0								
68.0								



PROJECT SCRTD - UNION ST. DATE DRILLED 2/1/83 HOLE NO. 5-5 (1983)

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6")	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
66.0	SP	62.0-78.0 SAND			RD			
		(CONTINUED)						
70.0			5-6		CCI DR			STRONGER SULPHUR ODOR
			5DK		RD			POOR SAMPLE RECOVERY: 4 1/2 RINGS ONLY
72.0								
74.0								
76.0								
78.0		78.0-90.0 BOULDERS						78.0 - CHANGE IN DRILLING CONDITIONS - V. HARD DRILLING, FULL WT. OF RIG (10TON) ON BIT. TOO HARD TO SAMPLE TO 90.0'
		CUTTINGS: MED. TO COARSE SUBANGULAR GRAINS GRANITIC COMPOSITION						No SAMPLE RECOVERY
80.0			60K-1" REFUSAL		CCI DR RD			
82.0								
84.0								
86.0			100K-0" REFUSAL		RD			ATTEMPTED TO SAMPLE - UNSUCCESSFUL
88.0			J-2 CUTTINGS					JAR SAMPLE OF CUTTINGS TAKEN
90.0	CL	PUENTE FORMATION 90.0-100.0 CLAYSTONE						EASY DRILLING FROM 90.0' CLAYSTONE CUTTINGS OBTAINED
92.0		(SEE NEXT PAGE)						SHEET 4 OF 6

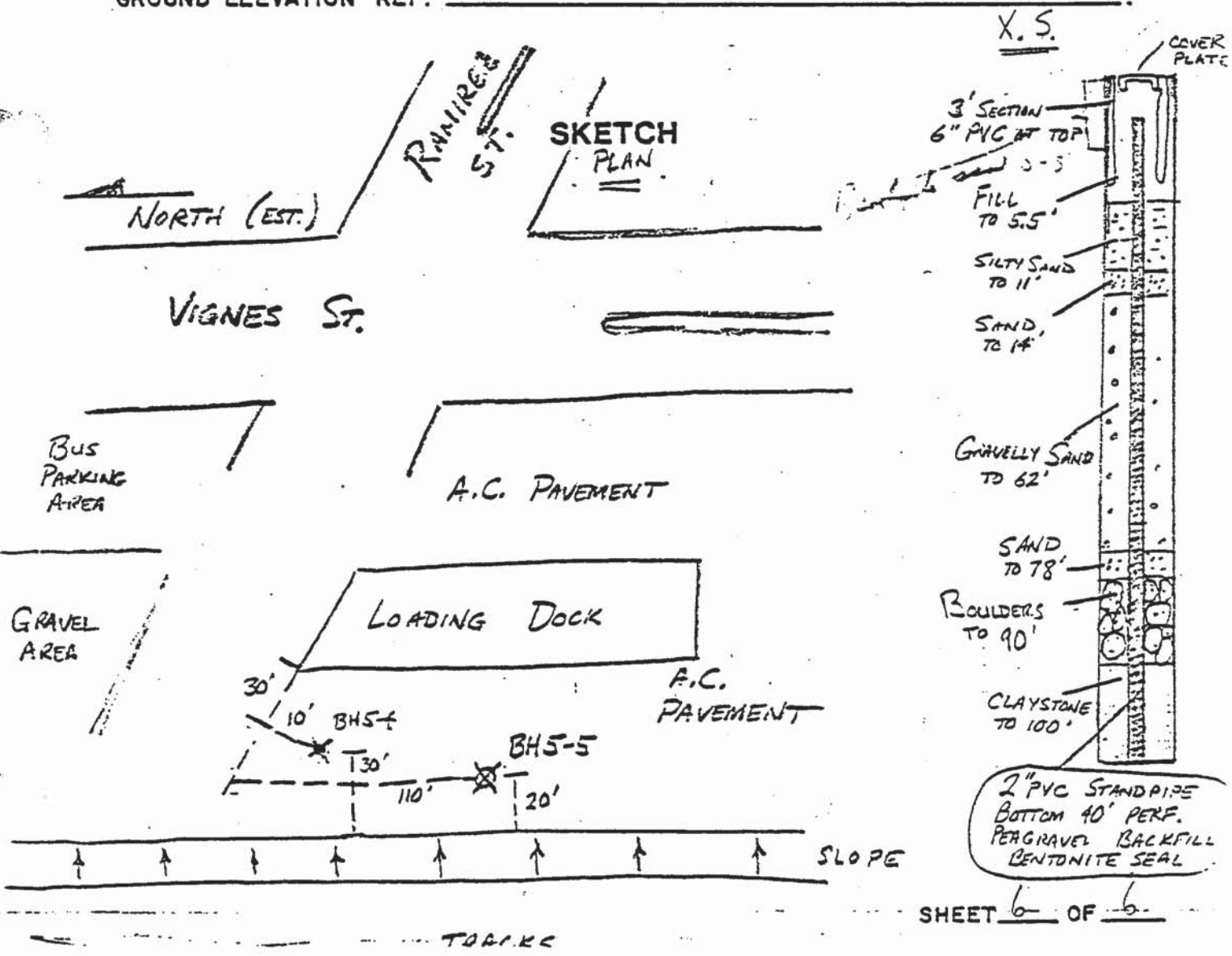
PROJECT SCRTD - UNION STA DATE DRILLED 2/1/83 HOLE NO. 5-5 (1983)

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6')	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
72.0	CL	90.0-100.0 <u>CLAYSTONE</u> (CONTINUED) OLIVE-GRAY COLOR, MOIST. PLASTIC TO FRAGILE STRENGTH, SOFT FRAGILE HARDNESS, THINLY LAMINATED W/ SILTY CLAYSTONE - 20% SANDSTONE BLEBS. TENDS TO FRACTURE ALONG LAMINATIONS	5-7 SBK		RD			
94.0					CCI			
96.0					DR			
98.0								
100.0								
		END BORING 100.0 FT PIEZOMETER SET TO 100' PERFORMED IN LOWEST 40'						



SUMMARY BORING NO. 5-5 (1983)

PROJECT SCRTD STATION HOLE UNION STA. DATE DRILLED 2/1/83  
 OVERBURDEN DEPTH (FT.) 0.0 TO 90.0  
 BEDROCK DEPTH (FT.) 90.0 TO 100.0 (T.D.)  
 WATER PRESS. TEST No; INTERVAL(S) — TO —, — TO —  
 GROUND WATER DEPTH (FT.) 28.0 DATE 2/3/83; 27.9 DATE 2/8/83  
 GAS YES; DEPTH FIRST NOTICED 30', DATE —. (SULPHUR ODOR)  
 E-LOG No  
 DOWN-HOLE SURVEY No  
 CROSS-HOLE SURVEY No  
 PVC CASING (I.D.): 4" — TO —; 3" — TO —; 2" 0.4 TO 100.0  
 GROUND ELEVATION REF. —





1983 UNION STATION BORING LOGS

DESIGN UNIT A135

BORING LOGS FOR HOLE NUMBERS 5-2, 5-3 and 5-4



THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME.  
CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.

PROJECT SCRTD - UNION STATION DATE DRILLED 2/3/83 HOLE NO. 5-2  
 LOCATION BETWEEN TRACKS & BARRAGE BUILDING GROUND ELEV. 292.7'  
 DRILLING CONTRACTOR CONVERSE-LAS VEGAS LOGGED BY B. INGRAM DEPTH TO GROUND WATER \_\_\_\_\_  
 TYPE OF RIG \_\_\_\_\_ HOLE DIAMETER 4 3/4" HAMMER WEIGHT AND FALL 320#, 36"  
 SURFACE CONDITIONS A.S. / CONCRETE PAVED AREA TOTAL DEPTH 85.0' NO. CORE BOXES \_\_\_\_\_

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6')	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
0.0		0.0-0.4' CONCRETE SLAB			RD			SET UP 7:00 AM BEGIN DRILLING 7:30 AM WEATHER: OVERCAST, COOL
		0.4-0.8' BASE COURSE						
0.8	ML & CL	0.8-14.0' FILL - CLAYEY SILT AND SILTY CLAY	2-1 8K		CC DR			
2.0		MOTTLED BRN & GREEN-GRAY, MOIST, STIFF.			RD			
4.0		W/ TRACE GRAVEL AND 10% FINE SAND						
6.0								
8.0								
10.0								
12.0				8 11 24	S P T			
13.0		ROCK OR CONCRETE ENCOUNTERED			RD			
14.0	SM	14.0-19.0' YOUNG ALLUVIUM SILTY SAND						Tried to sample with SPT - could not drive.
16.0		GRAY-BRN, MOIST, MED. DENSE FINE TO V. FINE SAND W/ 20% SILT		6 7 14	S P T			
18.0					RD			
19.0	SW	19.0-72.0' GRAVELLY SAND (SEE NEXT PAGE)						
20.0								

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (ft)	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
20.0	SW	17.0 - 22.0 GRAVELLY SAND (CONTINUED)	2-2 25K		CCT DR			DISTURBED SAMPLE - 4 RINGS ONLY
22.0		GRAY, DENSE WELL GRADED - MED. TO COARSE SAND, GRAVEL TO 2", PERCENTAGES VARYING WITH DEPTH GRANITIC COMPOSITION			RD			
24.0								
26.0								
28.0								
30.0								
32.0								
34.0								
36.0								
38.0								
40.0								
42.0								
44.0								

70 S  
100 P  
5" REFUSAL RD

RUSTY STAINED GRAINS  
IN SAMPLE -  
OXYDIZING ENVIRONMENT

INCREASING CONTENT  
OF FINE & V. FINE  
GRAINED SAND ↓

50K  
CCT  
DR  
RD

No SAMPLE RECOVERY



DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6")	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
4.4.0	SW	19.0 - 72.0 <u>GRAVELLY SAND</u>			KD			
		(CONTINUED)	2-3		CCI DR			SLIGHT SULPHUR ODOR, GRAY SAMPLE -
46.0		COLOR CHANGE OBSERVED - TO DK. GRAY	75K		RD			REDUCING ENVIRONMENT POOR SAMPLE RECOVERY - - 4 DISTURBED RINGS ONLY
48.0								
50.0								
52.0								
54.0								
56.0			80K		CCI DR			No SAMPLE RECOVERY
58.0					RD			
60.0			75K		CCI DR			No SAMPLE RECOVERY
62.0		GRAVEL CONTENT DECREASES W/ DEPTH ↓			RD			
64.0								
66.0			5-5" 100 SPT REFUSAL		RD			
68.0								

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (ft)	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
68.0	SW	19.0-72.0 <u>GRAVELLY SAND</u>			RD			
70.0		(CONTINUED) DECREASING GRAVEL CONTENT	2-4 60K		CCI DR			SLIGHT SULPHUR ODOR
72.0	SP	72.0-83.0 <u>SAND</u>			RD			EASIER DRILLING
74.0		DARK GRAY, DENSE, POORLY GRADED FREDDOM. MED. GRAINED TRACE GRAVEL TO 2"						
76.0			5"	100	SPT RD			SULPHUR ODOR
78.0		SAND BECOMES MORE FINE-GRAINED						
80.0		FINE TO V. FINE GRAINED	2-5 50K		CCI DR			SULPHUR ODOR DISTURBED SAMPLE ONLY 5 RINGS
82.0		THIN LENSES OF SILTY SAND			RD			
83.0-84.0		<u>BOULDERS</u> GRANITIC-TYPE CUTTINGS	50K-0"		CCI			HARD DRILLING TRIED TO SAMPLE - COULD NOT DRIVE SAMPER
84.0		PERICAL						
		END BORING 84.0 FT						



# SUMMARY BORING NO. 5-2

PROJECT SCRTD STATION HOLE UNION STATION DATE DRILLED 2/3/83

OVERBURDEN DEPTH (FT.) 0.0 TO 84.0 (T.D.)

BEDROCK DEPTH (FT.)      TO      (T.D.)

WATER PRESS. TEST No; INTERVAL(S)      TO     ,      TO     

GROUND WATER DEPTH (FT.)      DATE     ;      DATE       
ROTARY WASH BORING - COULD NOT DETERMINE

GAS Yes; DEPTH FIRST NOTICED 45', DATE 2/3/83 - SULPHUR ODOR

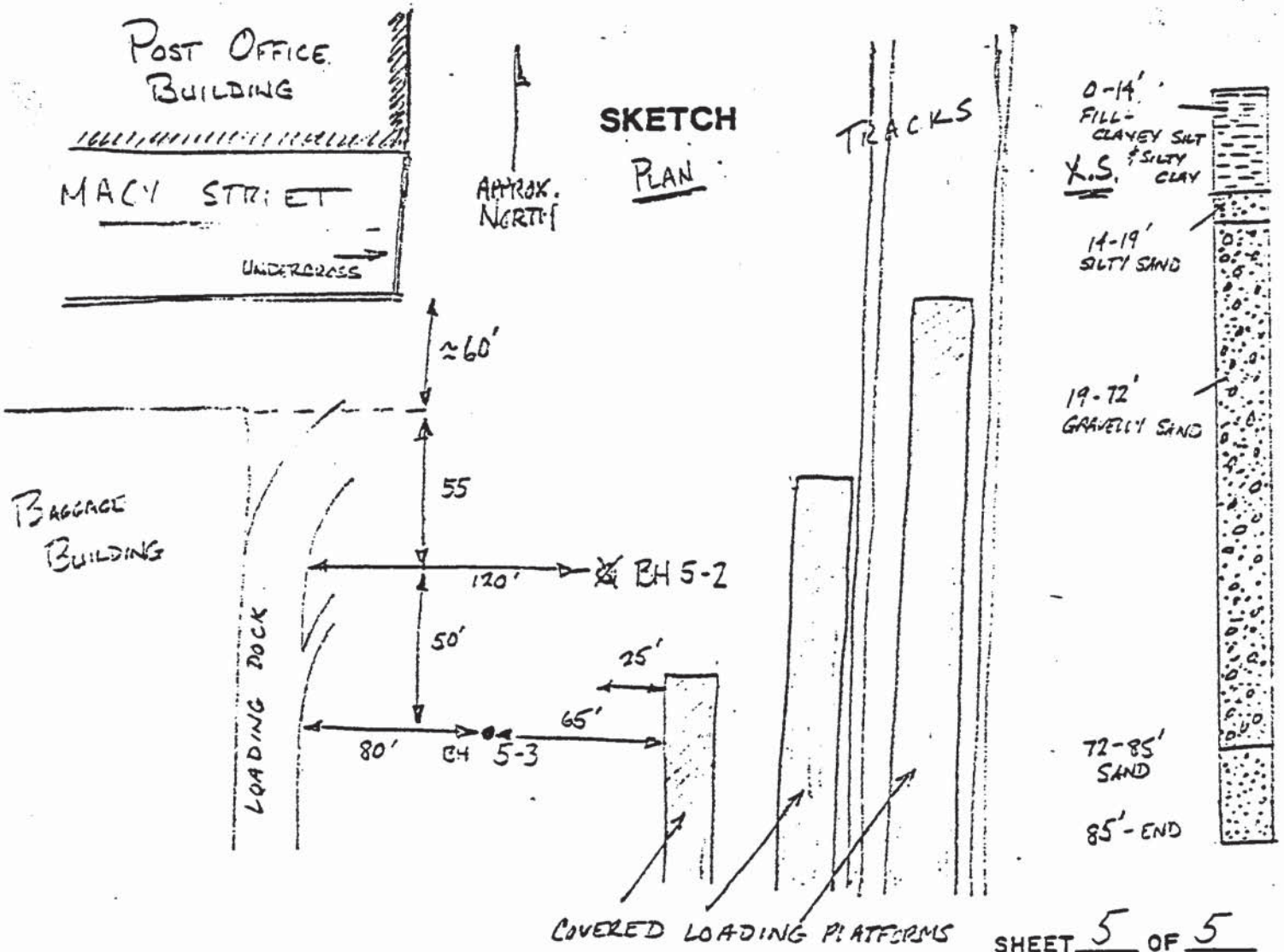
E-LOG No

DOWN-HOLE SURVEY No

CROSS-HOLE SURVEY No

PVC CASING (I.D.): 4" NONE TO     ; 3"      TO     ; 2"      TO     

GROUND ELEVATION REF.     







THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME.  
CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.

PROJECT SCRTD - UNION STATION DATE DRILLED 2/2/93 HOLE NO. 5-3  
 LOCATION BETWEEN TRACKS & BAGGAGE BLDG. GROUND ELEV. 292.8'  
 DRILLING CONTRACTOR CONVERSE - LAS VEGAS LOGGED BY B. INGRAM DEPTH TO GROUND WATER \_\_\_\_\_  
 TYPE OF RIG \_\_\_\_\_ HOLE DIAMETER 4 3/4" HAMMER WEIGHT AND FALL 320#, 36"  
 SURFACE CONDITIONS A.C. PAVED AREA TOTAL DEPTH 80.0' NO. CORE BOXES \_\_\_\_\_

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6")	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
0.0		0.0 - 0.8' ASHALT PAVEMENT			RD			SET UP 7:00 AM BEGIN DRILLING 7:30 AM WEATHER: COOL, RAINING  NO SAMPLE RECOVERY  LOST CIRCULATION OF DRILLING FLUID
0.8	GN	0.8 - 4.6' <u>FILL - GRAVEL</u>			CCI DR			
2.0		WELL GRADED GRAVEL TO 2 1/2", COMPOSITION VARIABLE SUBANGULAR TO SUBROUNDED	20K		RD			
4.0								
4.6	ML	4.6 - 14.0 <u>CLAYEY SILT</u>			CCI DR			
6.0		GREEN-GRAY, MOIST, STIFF CONSISTENCY VARIABLE SAND CONTENT (LOCALLY 3-30%)	3-1 15K		RD			
8.0								
10.0		TO VERY STIFF CONSISTENCY		15 25 45	S P T			
12.0					RD			
14.0								
14.0	SM	<u>YOUNG ALLUVIUM</u>						
14.0		14.0 - 19.0 <u>SILTY SAND</u>						
16.0		GRAY-BROWN, MOIST, MED. DENSE. FINE TO V. FINE SAND WITH 20% SILT		20 13 20	S P T			
18.0					RD			
19.0	SW	19.0 - 74.0 <u>GRAVELLY SAND</u>						
20.0		(SEE NEXT PAGE)						

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (blows)	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
20.0	SW	19.0 - 74.0 <u>GRAVELLY SAND</u> (CONTINUED)	37K		CCI DR			No SAMPLE RECOVERY
22.0		BROWN, VERY DENSE, WELL GRADED - MED. TO COARSE SAND (70%), GRAVEL TO 3" + (30%) SUBANGULAR TO SUBROUNDED GRAINS; GRANITE COMP.			RD			
24.0		ALTERNATING SAND & GRAVEL STRATA						24-28' INTERMITTENT RIG CHATTER
26.0								
28.0								
30.0								
32.0			20K-9"		CCI DR			POOR SAMPLE RECOVERY LARGE GRAVEL - SAMPLE DESTROYED BY HANDLING
34.0					RD			
36.0								
38.0								
40.0		CHANGE OF SAMPLE COLOR TO DARK GRAY	5TK		CCI DR			SULPHUR ODOR LARGE GRAVEL IN SAMPLE - SAMPLE DESTROYED BY HANDLING
42.0					RD			RIG CHATTER AT 43'
44.0								SHEET <u>2</u> OF <u>5</u>



DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (K)	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
44.0	SW	19.0-74.0 <u>GRAVELLY SAND</u> (CONTINUED)			RD			
46.0								
48.0								
50.0			3-2 41K		CCI DR			SULPHUR ODOR IN SAMPLE
52.0		ALTERNATING SAND AND GRAVEL STRATA			RD			
54.0								53' INTERMITTENT RIG CHATTER TO 58'
56.0								
58.0								
60.0			82K		CCI DR			SLIGHT SULPHUR ODOR IN SAMPLE
62.0					RD			POOR RECOVERY - SAMPLE DESTROYED BY HANDLING
64.0		LESS GRAVEL, LENSES FURTHER APART						
66.0								
68.0								



DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (blows)	DRILL MODE	RUN NO.	CORE REC. %	REMARKS		
68.0	SW	19.0-74.0 <u>GRAVELLY SAND</u> (CONTINUED)			RD					
70.0									CCI DR	SLIGHT SULPHUR ODOR IN SAMPLE
72.0									RD	
74.0	SP	74.0-80.0 <u>SAND</u>  DARK GRAY, MED. DENSE TO DENSE; POORLY GRADED, UNIFORM FINE TO V. FINE GRAINED, MICACLOUS SILTY SAND LENSES						74' EASIER DRILLING		
76.0										
78.0										
80.0								CCI DR	SULPHUR ODOR IN SAMPLE	
		END BORING 80.0 FT								

# SUMMARY BORING NO. 5-3

PROJECT SCRTD STATION HOLE UNION STATION DATE DRILLED 2/2/83

OVERBURDEN DEPTH (FT.) 0.0 TO 80.0 (T.D.)

BEDROCK DEPTH (FT.)      TO      (~~7.0~~)

WATER PRESS. TEST No; INTERVAL(S)      TO     ,      TO     .

GROUND WATER DEPTH (FT.)      DATE     ;      DATE     .  
ROTARY WASH BORING - COULD NOT DETERMINE

GAS Yes; DEPTH FIRST NOTICED 40', DATE 2/2/83 - SULPHUR ODOR

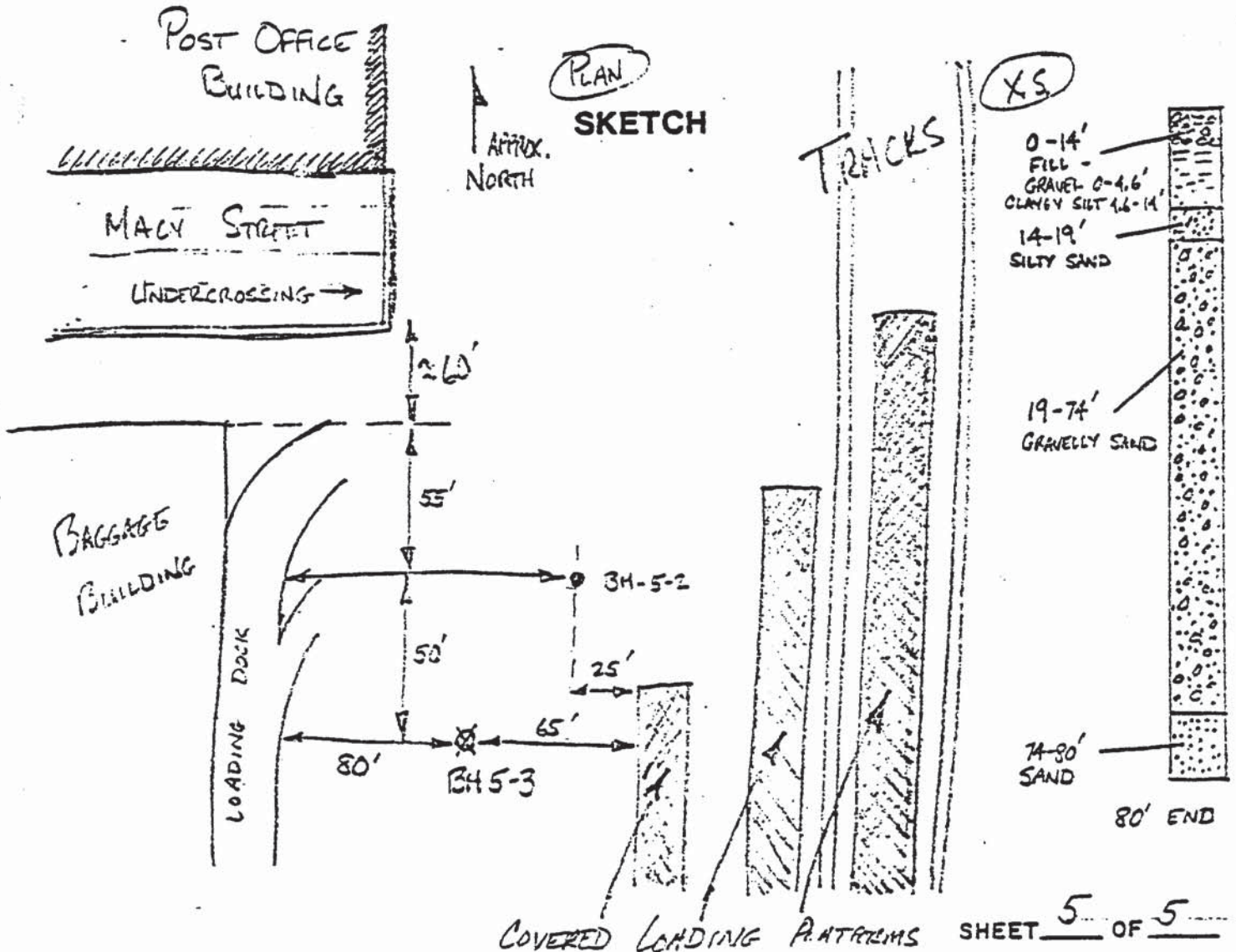
E-LOG No

DOWN-HOLE SURVEY No

CROSS-HOLE SURVEY No

PVC CASING (I.D.): 4"      TO      <sup>NONE</sup>; 3"      TO     ; 2"      TO     

GROUND ELEVATION REF.     







THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME.  
 CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.

PROJECT SCRTD DATE DRILLED 1/31/83 HOLE NO. 5-4  
 LOCATION LOADING DOCK INT. VIGNES & RAMIREZ STREETS GROUND ELEV. 287.6'  
 DRILLING CONTRACTOR CONVERSE - LAS VEGAS LOGGED BY B. INGRAM DEPTH TO GROUND WATER \_\_\_\_\_  
 TYPE OF RIG \_\_\_\_\_ HOLE DIAMETER 4 3/4" HAMMER WEIGHT AND FALL 320#, 36"  
 SURFACE CONDITIONS A.P. PARKING AREA TOTAL DEPTH 80.0' NO. CORE BOXES \_\_\_\_\_

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6')	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
0.0	ML	0.0-0.3 ASPHALT PAVEMENT			RD			BEGIN DRILLING 8:15AM WEATHER: CLEAR, WARM
0.3-3.5		FILL - SANDY SILT DARK BRN, MOIST, STIFF	4-1		CCI DR			
2.0		SILT - 50%, FINE TO MED SAND 40% 10% GRAVEL & BRCK CHNKS	16K		RD			
4.0		3.5-4.0 CONCRETE BLOCK						
4.0	SM	YOUNG ALLUVIUM - 4.0-7.0 SILTY SAND						
6.0		GRAY-BRN, MOIST, DENSE FINE TO VERY FINE - 70%, SILT - 30%	J-1	30 18 24	S P T			
8.0	SP	7.0-13.0 SAND GRAY, MOIST, DENSE. CLEAN, UNIFORM FINE SAND			RD			
10.0			14-2 17K		CCI DR RD			
12.0		BECOMES COARSER: TO MED. GRAINED						
16.0			J-2	5 4 11	S P T			
18.0	SW	18.0-28.0 GRAVELLY SAND BRN / GRAY FINE MOIST DENSE MED. TO COARSE CLEAN SAND - 60%, GRAVEL TO 2" - 40%. SUBROUNDED TO SUBANGULAR GRANS. GRANITIC / CRYSTALLINE COMPOSITION			RD			
20.0								



DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6")	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
20.0	SW	18.0-28.0 <u>GRAVELLY SAND</u> (CONTINUED)	4-3 75K		CCI DR RD			HIGHLY DISTURBED SAMPLE DUE TO LG. GRAVEL PEECS IN SAMPLE BARREL
22.0								
24.0								
26.0				5" REFUGAL	100 SPT RD			
28.0	SP/CL	28.0-41.0' <u>SAND/SILTY CLAY</u> GRAY, MOIST, DENSE CLEAN SAND; INTERBEDS OF DARK GRAY, STIFF, MOIST SILTY CLAY TO 31.5'	4-4 55K		CCI DR RD			
30.0								
32.0	SP	31.5' <u>END CLAY INTERBEDS</u>						
34.0								
36.0			J-3	57 55 70	S P T RD			
38.0								
40.0			30K	0" REFUGAL				No SAMPLE RECOVERY
42.0	SW	41.0-68.0 <u>GRAVELLY SAND</u> DARK GRAY, VERY DENSE SUBROUNDED GRAINS, WELLGRADED V. FINE TO COARSE SAND - 75% GRAVEL TO 1" - 25% HIGHLY MICACEOUS - DIORITIC COMPOSITION						
44.0								

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (#)	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
44.0	SW	41.0-68.0 <u>GRAVELLY SAND</u> (CONTINUED)			RD			
46.0				75 78 5'-100	S P T RD			
48.0								
50.0								
50.5		50.5' CLAY INTERBEDS DECREASING GRAVEL (TO ≈ 15%)	4-5 70K		CCI DR RD			4 RINGS ONLY SULPHUREOUS ODOR IN SAMPLE
52.0								
54.0								
56.0				3'-100 REFUSAL	SPT RD			SULPHUREOUS ODOR
58.0								
60.0				1-6 15'-9"	CCI DR RD			SULPHUR MICROTHERMAL ODOR
62.0								
64.0								
66.0				105 1'-50	S P T RD			SULPHUR ODOR
68.0								

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6")	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
68.0	SP	68.0-75.0 SAND			KV			SULPHUR/HYDROTHERMAL ODOR IN SAMPLE
70.0		GRAY, DENSE UNIFORM MICACEOUS FINE TO VERY FINE GRAINED	4-7 25K		CCI DR			
72.0					RD			
74.0								
76.0	SW	75.0-80.0 GRAVELLY SAND						
78.0		20% GRAVEL TO 1 1/2" GRAY, DENSE TO V. DENSE						
80.0			4-8 75K		CCI DR			STOP DRILLING 2:30 PM
		END BORING 80.0 FT						



**SUMMARY BORING NO. 5-4**

PROJECT 83-1101-41 STATION HOLE UNION STA. DATE DRILLED 1/31/83

OVERBURDEN DEPTH (FT.) 0.0 TO 80.0 (T.D.)

BEDROCK DEPTH (FT.) NOT ENCOUNTERED TO (T.D.)

WATER PRESS. TEST No; INTERVAL(S) — TO —, — TO —

GROUND WATER DEPTH (FT.) ROTARY WASH - COULD NOT DETERMINE DATE —; — DATE —

GAS Yes; DEPTH FIRST NOTICED 50', DATE 1/31 - SULFUR ODOOR

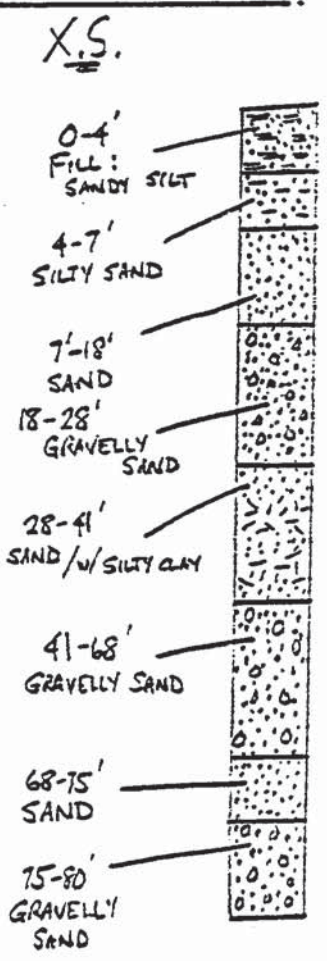
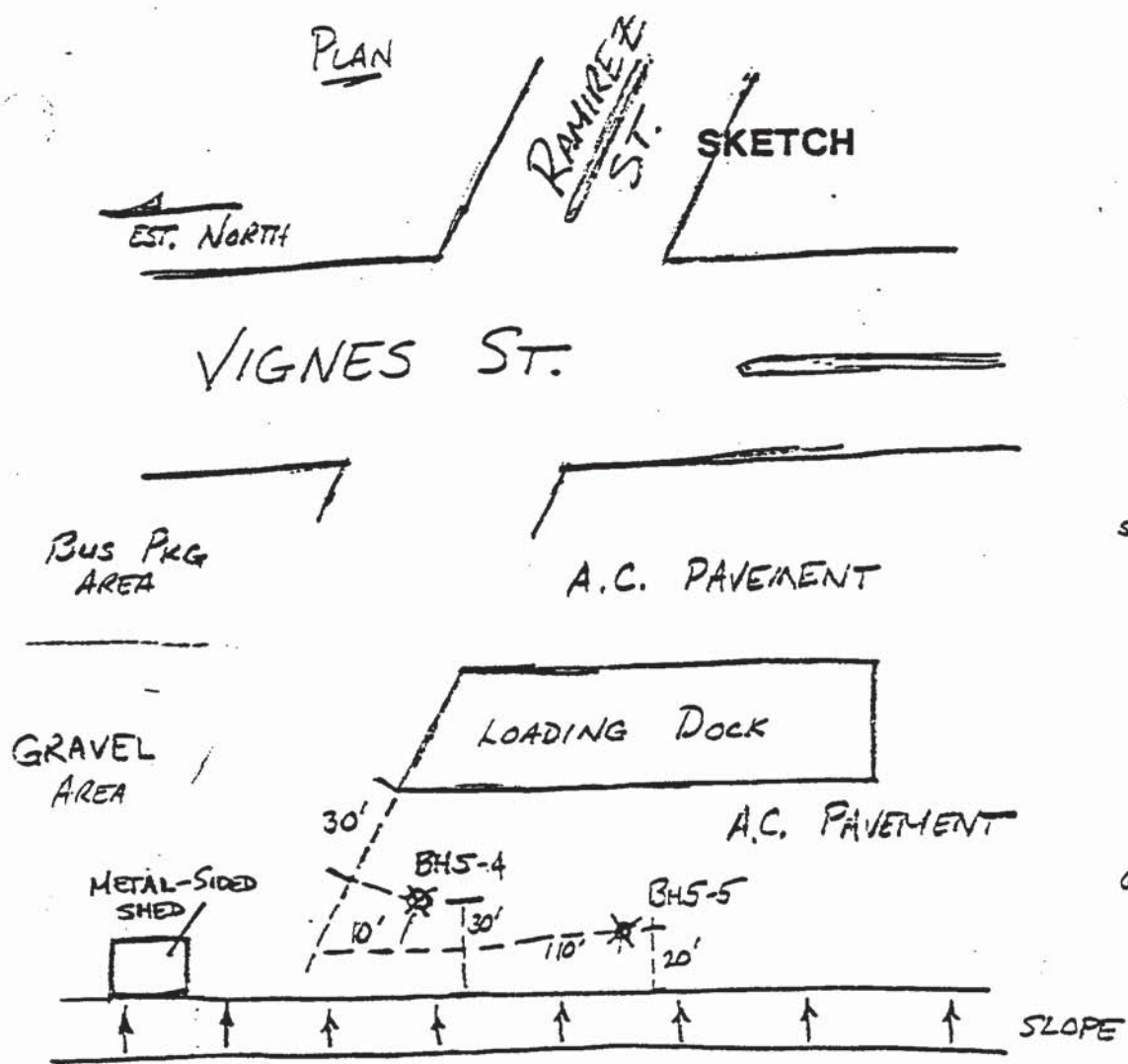
E-LOG No

DOWN-HOLE SURVEY No

CROSS-HOLE SURVEY No

PVC CASING (I.D.): 4" (NONE) TO —; 3" — TO —; 2" — TO —

GROUND ELEVATION REF. —



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**Existing Geotechnical Boring Logs  
The Earth Technology Corporation, 1987c**



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**APPENDIX C**  
**SITE BORING LOGS**

**BOREHOLE LOG**

**METRO RAIL TRANSIT**

Project Name: \_\_\_\_\_  
 Project Number: 87-600-0033 Field Log of Borehole Number: BH-201 Sheet 1 of 2

Borehole Location: <b>Traffic Island off 101 Fwy</b>		Elevation and Datum: <b>277.4 feet</b>	
Drilling Agency: <b>DRILL LINE</b>	Driller: <b>Gregg DeLuca John Hale</b>	Date Started: <b>1-8-87</b>	Date Finished: <b>1-8-87</b>
Drilling Equipment: <b>B-53</b>		Completion: <b>46.5</b>	Rock Depth: (feet)
Method of Drilling: <b>Hollow Stem Auger - 6 Inch Dia.</b>		Number of Samples: <b>6</b>	Dist.: <b>6</b> Core:
Borehole Size: <b>8 Inch</b>		Water Depth (ft): <b>29</b>	First: <b>24 hrs.</b>
Type of Perforation Backfill: <b>None</b>		Logged By: <b>Sharon Lagas</b>	
Type of Seal: <b>5% Bentonite Cement Grout</b>		Checked by: <b>Barbara Fontes</b>	

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	Dry, dark brown, silty fine to medium size grain sand with some small gravel	SM					9:30	Baseline OVA reading at 2 ppm. Traffic island has been disturbed during freeway construction OVA Readings at Baseline
5-6.5'	Same as above with small chips of brick	SM	1	1	Z	12/26/26	10:00	
7'	Hit debris (possibly brick)							
10-11.5'	Dry, dark brown, silty, fine to medium size sand	SM	1	2	Z	18/22/32	10:08	OVA Readings at Baseline
15-16.5'	Dry, brown to light brown silty sand with gravel	SM	-	3	Z	14/9/7	10:13	OVA Readings at Baseline No recovery for OVA
20'	No recovery-cobble, gravel		-			NOTE	10:20	OVA Readings at Baseline
25'	No recovery - 5" chunk of concrete		-			NOTE	10:30	Possibility of disturbed soil to 25 ft. OVA readings at Baseline
	Groundwater encountered at approximately 29 feet							



BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-201 Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples			Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	
30-31.5'	Wet, gray, fine to medium size sand	SP	70	4	16/32/37	10:37	OVA Readings at Baseline, sample has oily film and slight oily odor with sheen
35-36.5'	Wet, gray, medium to coarse grained sand	SP	-	5	10/22/50	10:54	OVA Readings at Baseline No recovery for OVA
40'	No recovery - cobble, gravel	-	-	-	50/6"	11:04	
45-46.0'	Wet, dark gray, fine to medium size sand	SP	8	6	5/50	11:18	OVA Readings at Baseline
46.5'	Hit boulder End Hole					11:25	Collected water samples
55'	Note: On this and all logs that follow, there are missing blow counts at some sampling intervals. In those cases, blow counts were not recorded due to other demands on personnel time.						

**BOREHOLE LOG**

METRO RAIL TRANSIT

Project Name: \_\_\_\_\_  
 Project Number: 87-600-0033 Field Log of Borehole Number: BH-202 Sheet 1 of 2

Borehole Location: <b>Traffic Island off 101 FWY</b>		Elevation and Datum: <b>277.3 ft</b>	
Drilling Agency: <b>DRILL LINE</b>	Driller: <b>Gregg DeLuca John Hale</b>	Date Started: <b>1/8/87</b>	Date Finished: <b>1/8/87</b>
Drilling Equipment: <b>B-53</b>		Completion: <b>50</b>	Rock Depth: (feet)
Method of Drilling: <b>Hollow Stem Auger - 6 Inch Dia.</b>		Number of Samples: <b>8</b>	Dist.: <b>8</b> Core:
Borehole Size: <b>8 Inch</b>		Water Depth (ft): <b>29</b>	First: <b>24 hrs.</b> Compl.:
Type of Perforation Backfill: <b>None</b>		Logged By: <b>Sharon Lagas</b> Checked by: <b>Barbara Fontes</b>	
Type of Seal: <b>5% Bentonite Cement Grout</b>			

Depth (feet)	Description	Graphic Log		Samples			Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	
	Dry, dark brown, silty fine to medium size sand with gravel. Hit concrete @ 1'	SM Fill					1:30 Baseline OVA Reading @2 ppm
5-6.5'	Dry, light brown, fine to medium size sand with some silt	SM	2	1	8/12/13	1:40	OVA Readings at Baseline
10-10.5'	Dry, brown, silty, fine to medium size sand with clay	SC	1	2	8/4/16	1:45	OVA Reading at Baseline
10.5-11.5'	Dry, light brown, medium to coarse grained sand with gravel	SP					
15-16.5'	Dry, light brown, medium to coarse sand with gravel	SP	4	3	23/40/25	1:50	OVA Readings at Baseline
17.5'	Hit cobble						
20-21.0'	Same as above						
		SP	2	4	28/50	1:58	OVA Readings at Baseline, oily film on sand
25-25.5'	Dry, light brown, medium to coarse sand which grades into a brown-gray silty clay	SP/CL	6	5	14/23	2:06	OVA Readings at Baseline
25.5-26.0'	Moist, brown-gray, medium to coarse sand Groundwater encountered at approximately 29 feet	SP					

BOREHOLE LOG

METRO RAIL TRANSIT

Project name: \_\_\_\_\_  
 Project Number: 87-600-0033 Field Log of Borehole Number: BH-202 Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples			Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	
30-31.5'	Wet, gray, medium to coarse grained sand	SP	16	6	△	13/35/ 50	2:15 OVA Readings at Baseline
35'	No Recovery	-	-	-	-	8/16/ 40	2:20
40-41.5'	Wet, gray, medium to coarse grained sand	SP	10	7	△	8/16 47	2:28 OVA Readings at Baseline
45'	Hit boulder						
45.5'-46.5'	Wet, dark gray, fine to medium size sand	SP	-	8	△	30/50	2:42 OVA Readings at Baseline No recovery for OVA
50'	Hammer broke, ended hole						3:15 No water sample



**BOREHOLE LOG**

Project Name: METRO RAIL TRANSIT  
 Project Number: 87-600-0033 Field Log of Borehole Number: BH-203 Sheet 1 of 2

Borehole Location: <b>Traffic Island off 101 FWY</b>		Elevation and Datum: <b>276.5 ft</b>	
Drilling Agency: <b>DRILL LINE</b>	Driller: <b>Gregg Deluca John Hale</b>	Date Started: <b>1/14/87</b>	Date Finished: <b>1/14/87</b>
Drilling Equipment: <b>B-53</b>		Completion: <b>60</b>	Rock Depth: (feet)
Method of Drilling: <b>Hollow Stem Auger - 6 Inch Dia.</b>		Number of Samples: <b>5</b>	Dist.: <b>5</b> Undist.: <b>5</b> Core:
Borehole Size: <b>8 Inch</b>		Water Depth (ft): <b>30</b>	First: <b>24 hrs.</b> Compl.:
Type of Perforation Backfill: <b>None</b>		Logged By: <b>Sharon Lagas</b> Checked by: <b>Barbara Fontes</b>	
Type of Seal: <b>5% Bentonite Cement Grout</b>			

Depth (feet)	Description	Graphic Log		Samples			Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	
0-5'	Dry, brown, silty fine to medium size sand - at 6" hit old brick and large boulder	SM					10:00 OVA not working
5'	Same as above with gravel and cobble - no sample collected	FILL			Note		No sample collected, augers grinding on gravel and cobble
7'	Broke through gravel	---					Black brown color soil
10-11.5'	Dry, black-brown, fine to medium sand and silt with small wood fragments	SM		1		15/19 26	10:51 Soil becomes brown in color and fluffy in texture
15-16.5'	Dry, brown, medium to coarse grained sand with gravel	SP		2		10/10 8	11:00
20'	No recovery				Note		Hammer sticking so drilling another 5 feet
25-25.5'	Dry, light brown, medium to coarse grained sand with gravel	SP		3	Note		11:21 Only 6" of sample due to sampler falling at an angle. Sampler hitting against the auger
30'	Groundwater encountered at approx. 30 feet						

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-203 Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples			Remarks	
		Lithology	QVA (ppm)	Number	Type	Blow Count		Drilling Rate/Time
30-30.5'	Wet, brown, coarse grained sand and gravel	SP		4		50/6"	1:30	
32.5'	Small Cobble, large gravel	GP						
35-35.7'	Wet, gray, medium to coarse grained sand	SP		5		39/50 for 2"	1:43	Slight oily odor, only 8-10" of sample, rest was slough
39'	Small Cobble, large gravel (about 2 in.)	GP						
40'	No recovery - Possibly cobble and gravel*			-		Note	12:00	Hammer sticking
45'	No recovery - Possibly cobble and gravel*			-		Note	1:11	Hammer sticking- cannot sample without hammer getting stuck so continuing on to 60 feet
50'	No recovery - Possibly cobble and gravel*			-		Note	12:17	
55'	No recovery			-		Note		Hitting cobbles
60'	Wet, gray, medium to coarse grained sand with slight hydrocarbon odor coming up from augers 60' End hole						12:33	Appears to be predominantly slough Collected water samples
65'								
70'								

\*Augers bringing up slough from upper portion of borehole.

**BOREHOLE LOG**

METRO RAIL TRANSIT

Project Name: \_\_\_\_\_  
 Project Number: 87-600-0033 Field Log of Borehole Number: BH-204 Sheet 1 of 2

Borehole Location: <b>Old Center St. (b/t Aliso &amp; Comm.)</b>		Elevation and Datum: <b>275.4 ft</b>	
Drilling Agency: <b>DRILL LINE</b>	Driller: <b>Gregg DeLuca John Hale</b>	Date Started: <b>1/12/87</b>	Date Finished: <b>1/12/87</b>
Drilling Equipment: <b>B-53</b>		Completion: <b>61.5</b>	Rock Depth: (feet)
Method of Drilling: <b>Hollow Stem Auger - 6 Inch Dia.</b>		Number of Samples: <b>6</b>	Dist.: <b>6</b> Core:
Borehole Size: <b>8 Inch</b>		Water Depth (ft): <b>30</b>	First: <b>24 hrs.</b> Compl.:
Type of Perforation Backfill: <b>None</b>		Logged By: <b>Barbara Fontes</b> Checked by: <b>Sharon Lagas</b>	
Type of Seal: <b>5% Bentonite Cement Grout</b>			

Depth (feet)	Description	Graphic Log		Samples			Remarks	
		Lithology	OVA (ppm)	Number	Type	Blow Count		Drilling Rate/Time
	Asphalt, concrete debris						7:30	Baseline OVA Reading at 4 ppm
	Dry, dark brown, silty fine to medium size sand	SM						
5'	Same as above	SM		-				No samples collected
8-9'	Moist clayey sand	SC						
10-11.5'	Dry, brown, silty, fine to medium size sand	SM	2	1	8/15/11	8:00		OVA Readings @ baseline
15-15.5'	Same as above	SM	4	2	18/6"	8:10		Collected only OVA sample. Hit large object-refusal. Sampler is not penetrating
20-21.5'	Dry, brown, medium to coarse grained sand with fragmented gravel and small cobbles	SP	4	3	39/50/49	8:17		OVA readings @ baseline
25-25.5'	Same as above	SP	160	4	25/6"	8:25		Soil has hydrocarbon odor. OVA values recorded at 160 ppm
	Groundwater encountered at approx. 30 feet							



BOREHOLE LOG

METRO RAIL TRANSIT

Project name: \_\_\_\_\_

Project Number: 87-600-0033 Field Log of Borehole Number: BH-204 Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples			Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	
30-31.0'	Wet, gray, coarse grained sand	SP	-	5		20/50	No OVA recovery
35-36.5'	Same as above	SP		6		Note	
38.5'	Cobble, gravel						
40'	No recovery - cobble, gravel			-		Note	8:59 OVA reading 2 ppm Hole has slight creosote odor (40 to 60 feet)
45'	No recovery - cobble, gravel			-		Note	
50'	No recovery - slough			-		Note	Augers contained approx. 4 feet of slough
55'	No recovery			-		Note	
60'	Wet, gray, coarse grained sand End Hole	SP	>1000	-		8/11/16	9:44 10:01 Collected water samples, not enough recovery for soil samples

BOREHOLE LOG

METRO RAIL TRANSIT

Project Name: \_\_\_\_\_

Project Number: 87-600-0033 Field Log of Borehole Number: BH-205 Sheet 1 of 2

Borehole Location: Commercial and Center St., West		Elevation and Datum: 274.7 ft	
Drilling Agency: DRILL LINE	Driller: Gregg DeLuca John Hale	Date Started: 1/13/87	Date Finished: 1/13/87
Drilling Equipment: B-53		Completion: Depth (feet) 61.5	Rock Depth: (feet)
Method of Drilling: Hollow Stem Auger - 6 Inch Dia.		Number of Samples: 7	Dist.: Undist.: 7 Core:
Borehole Size: 8 Inch		Water Depth (ft): 30	First: Compl.: 24 hrs.
Type of Perforation Backfill: None		Logged By: Barbara Fontes	
Type of Seal: 5% Bentonite Cement Grout		Checked by: Sharon Lagas	

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	Dry, brown, silty, fine to medium size sand with brick chips, possibly fill material	SM Fill					9:00	Baseline OVA reading @ 2ppm Surface soil contains shells and broken pottery. Soil type not evident in other areas
5'	No sample collected	----	-		Note			
10-11.5'	Dry, light brown, medium to coarse sand with gravel	SP	4	1	26/22/23	9:05		
15-16.0'	Same as above	SP	-	2	48/50	9:10		
20-21.0'	Dry, brown, coarse grained sand and small gravel	SP	-	3	49/50	9:20		
25-26.0'	Same as above	SP	-	4	33/56	9:36	Decomposed granite cobble in auger (cobble > 3 in.)	

BOREHOLE LOG

METRO RAIL TRANSIT

Project name: \_\_\_\_\_  
 Project Number: 87-600-0033 Field Log of Borehole Number: BH-205 Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples			Remarks	
		Lithology	OVA (ppm)	Number	Type	Blow Count		Drilling Rate/Time
30-31.0'	Wet, grey, medium to coarse grained sand Groundwater encountered at approximately 30 feet	SP	30	5	✓	28/50	9:48	OVA and 1 brass recovery
35-36.5'	Same as above	SP	4	6	✓	14/37/48	9:54	
40-41.5'	Same as above	SP		7	✓	Note	10:00	1 brass recovery, no OVA sample OVA reading @ base-line
43'	Cobble, gravel	GP						
45'	No recovery - cobble, gravel			-		Note	10:27	
50'	Wet, dark gray, fine to medium size sand, oily film and odor	SP	100	-		10/26/50	10:37	Only OVA sample recovery OVA reading @ base-line
55-56.5'	Same as above	SP	100	-		3/13/50	10:48	
60'	No recovery-sampler and "A" rods stuck in augers End Hole			-		Note	10:59	Water samples collected





BOREHOLE LOG

METRO RAIL TRANSIT

Project Name: \_\_\_\_\_  
 Project Number: 87-600-003 Field Log of Borehole Number: BH-206A Sheet 1 of 2

Borehole Location: <b>Vignes St. (C.C. Meyer's yard)</b>		Elevation and Datum: <b>276.5 ft</b>	
Drilling Agency: <b>DRILL LINE</b>	Driller: <b>Gregg DeLuca John Hale</b>	Date Started: <b>1-9-87</b>	Date Finished: <b>1-9-87</b>
Drilling Equipment: <b>B-53</b>		Completion: <b>41.5</b>	Rock Depth: (feet)
Method of Drilling: <b>Hollow Stem Auger - 6 Inch Dia.</b>		Number of Samples: <b>6</b>	Dist.: <b>6</b> Core:
Borehole Size: <b>8 Inch</b>		Water Depth (ft): <b>29.5</b>	First: <b>24 hrs.</b>
Type of Perforation Backfill: <b>None</b>		Logged By: <b>Sharon Lagas</b>	
Type of Seal: <b>5% Bentonite Cement Grout</b>		Checked by: <b>Barbara Fontes</b>	

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	Dry, dark brown, sand and gravel with some silt	SP					10:00	Baseline OVA reading @ 2 to 5ppm
5	5-6' Dry, medium to coarse sand with some gravel	SP	3	1	10/10	10/10	10:10	OVA reading @ baseline
	6-6.5' Dry, medium grained sand with silt and some clay	SC						
10	10' No recovery (probably fill)					10/15	10:13	OVA reading @ baseline
						27		
15	15-15.5' Dry, light brown, medium to coarse sand with gravel	SP	14	2	50/6"		10:23	OVA reading @ baseline
20	20' Dry, gravel with coarse grained sand	GP				23/6"	10:30	No recovery, cobble stuck in sampler
	23' Gravel and cobble	GP						
25	25-26.5' Moist, medium to coarse grained sand with gravel	SP	12	3	10/43	10/38	10:38	OVA reading @ baseline
					50			
30	Groundwater encountered at approx. 29.5 feet							

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-206A Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples			Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	
30-31.5'	Wet, gray, medium to coarse grained sand	SP	8	4	3/6/10	11:20	OVA reading @ baseline
35-36.5'	Wet, gray, fine to medium size sand	SP	10	5	6/10/13	11:26	OVA reading @ baseline
40-41.5'	Same as above End Hole	SP	6	6	23/49/48	11:36	OVA reading at baseline, 10 feet of slough in hole Collected water samples



**BOREHOLE LOG**

METRO RAIL TRANSIT

Project Name: \_\_\_\_\_

Project Number: 87-600-0033 Field Log of Borehole Number: BH-207 Sheet 1 of 2

Borehole Location: 101 FWY South from Vignes		Elevation and Datum: 276.9 ft	
Drilling Agency: DRILL LINE	Driller: Gregg DeLuca John Hale	Date Started: 1/12/87	Date Finished: 1/12/87
Drilling Equipment: B-53		Completion: Depth (feet) 60	Rock Depth: (feet)
Method of Drilling: Hollow Stem Auger - 6 Inch Dia.		Number of Samples: 4	Dist.: Undist.: 4 Core:
Borehole Size: 8 Inch		Water Depth (ft): 30	First: Compl.: 24 hrs.
Type of Perforation Backfill: None		Logged By: Barbara Fontes	
Type of Seal: 5% Bentonite Cement Grout		Checked by: Sharon Lagas	

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
5	Dry, dark brown, silty, fine to medium size sand with gravel and rock/garbage debris	Fill					12:10	Baseline OVA reading @ 2 ppm
5-6.5'	Same as above	Fill			Note			Very little pressure on augers
10	10-11.5' Moist, black-brown, silty sand, medium plasticity clay with oxidation staining	SC	2	1	3/5/8		12:28	
12.5'	Hit debris-augers crunching							
15	15-16.5' Moist to dry, medium to coarse sand	SP	4	2	31/36/33		12:35	OVA reading @ baseline
19'	Gravel and cobbles	GP						
20'	Dry, coarse grained sand with gravel and cobbles	SP	6	-	50/6"		12:56	OVA reading @ baseline, cobble stuck in sampler No recovery for lab samples
25'	Same as above	SP	6	-	50/6"		1:01	No recovery for lab samples

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-207 Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples			Remarks	
		Lithology	GVA (ppm)	Number	Type	Blow Count		Drilling Rate/Time
30-31.5'	Wet, gray, coarse sand with some silt Groundwater encountered at approximately 30 feet	SP	12	3		4/4/24	1:07	
35-36.0'	Same as above	SP	4	4		20/50	1:14	
38'	Gravel and cobble	GP						Augers vibrating
40'	Wet, gray, medium to coarse grained sand	SP	12	-		50/6	1:27	No recovery for lab samples
45'	No recovery - Possibly medium to coarse grained sand			-		Note	1:30	Having problem with sand heaves going to 60'-sand locking around drill
50'	No recovery - Possibly medium to coarse grained sand			-		Note		
55'	No recovery - Possibly medium to coarse grained sand			-		Note		
60'	End Hole						2:15	Collected water Samples

BOREHOLE LOG

METRO RAIL TRANSIT

Project Name: \_\_\_\_\_  
 Project Number: 87-600-0033 Field Log of Borehole Number: BH-208 Sheet 1 of 2

Borehole Location: <b>NE of BH-205/Adjacent to Center St.</b>		Elevation and Datum: <b>270.6 ft</b>	
Drilling Agency: <b>DRILL LINE</b>	Driller: <b>Gregg Deluca John Hale</b>	Date Started: <b>1/13/87</b>	Date Finished: <b>1/13/87</b>
Drilling Equipment: <b>B-53</b>		Completion: Depth (feet) <b>60</b>	Risk Depth (feet)
Method of Drilling: <b>Hollow Stem Auger - 6 Inch Dia.</b>		Number of Samples: <b>6</b>	Dist.: <b>6</b> Core:
Borehole Size: <b>8 Inch</b>		Water Depth (ft): <b>25</b>	First: <b>24 hrs.</b> Compl.:
Type of Perforation Backfill: <b>None</b>		Logged By: <b>Barbara Fontes</b> Checked by: <b>Sharon Lagas</b>	
Type of Seal: <b>5% Bentonite Cement Grout</b>			

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	Dry, dark brown, silty fine to medium size sand	SM					12:42	Baseline OVA reading @ 2 ppm
5'	No sample collected					Note	12:45	OVA reading @ baseline
10-11.5'	Dry, brown, medium to coarse grained sand with gravel	SP	2	1	Z	33/45/45	12:48	OVA reading @ baseline, large cobble in sampler
15-16.0'	Dry, brown, fine to medium grained sand	SP	2	2	Z	34/50	12:58	OVA reading @ baseline
20-21.0'	Dry, brown, medium to coarse sand with gravel and broken cobble	SP	4	3	Z	40/50	1:05	Bouncing off large cobble
25-26.5'	Wet, gray, medium to coarse grained sand with occasional gravel Groundwater encountered at approx. 25 feet	SP	100	4	Z	16/19/15	1:12	Slight oily odor



BOREHOLE LOG

METRO RAIL TRANSIT

Project name: \_\_\_\_\_  
 Project Number: 87-600-0033 Field Log of Borehole Number: BH-208 Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples			Remarks	
		Lithology	OVA (ppm)	Number	Type	Blow Count		Drilling Rate/Time
30-31.5'	Same as above-not as coarse	SP	40	5	/	7/7/13	1:19	Drilling very difficult
34'	Gravel and cobble	GP						
35'	No recovery-gravel and cobble	GP		-		Note	1:28	
40-41.5'	Wet, gray, medium grained sand	SP	2	6	/	7/9/34	1:43	OVA reading @ baseline, slight creosote odor
45'	No recovery - Possibly sand			-		Note		
50'	No recovery-6 feet of slough in augers - Possibly sand			-		Note		
55'	No recovery - Possibly sand			-		Note		
60'	Abandoned hole due to sampler being stuck in augers. Could not advance hole any further						2:44	Upon removal of augers, strong creosote odor. No water samples collected due to sampler being stuck

**BOREHOLE LOG**

Project Name: METRO RAIL TRANSIT  
 Project Number: 87-600-0033 Field Log of Borehole Number: BH-200 Sheet 1 of 2

Borehole Location: <b>East Corner Center &amp; Commercial St.</b>		Elevation and Datum: <b>273.6 ft</b>	
Drilling Agency: <b>DRILL LINE</b>	Driller: <b>Greg Deluca John Hale</b>	Date Started: <b>1/21/87</b>	Date Finished: <b>1/21/87</b>
Drilling Equipment: <b>B-53</b>		Completion: Depth (feet) <b>50</b>	Rock Depth: (feet)
Method of Drilling: <b>Hollow Stem Auger - 6 Inch Dia.</b>		Number of Samples: <b>8</b>	Dist.: <b>8</b> Core:
Borehole Size: <b>8 Inch</b>		Water Depth (ft): <b>30</b>	First: <b>24 hrs.</b> Compl.:
Type of Perforation Backfill: <b>None</b>		Logged By: <b>Sharon Lagas</b> Checked by: <b>Barbara Fontes</b>	
Type of Seal: <b>5% Bentonite Cement Grout</b>			

Depth (feet)	Description	Graphic Log		Samples			Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	
0-6"	Asphalt						9:18 Baseline OVA reading @ 6 ppm
6"-1.2'	Brick Road						
1.2'-1.6'	Concrete	F11					
5-6.5'	Dry, dark brown, silty, fine to medium size sand with some gravel	SM	6	1	5/4/4	9:54	OVA reading @ baseline, only OVA sample recovery
10.7-11.7'	Moist, black-brown, silty, fine to medium size sand with some gravel	SM	6	2	16/17	10:00	At 10' sampler hit pocket and dropped approx. 8"
15-16.5'	Dry, brown, fine to medium sand with pea size gravel. Upper 8" stained black. Gravel increasing in size with depth. Entire sample saturated with gasoline	SP	33	3	14/41/37	10:05	OVA reading @ baseline Large cobble in bottom of sampler Oily film on sampler
20-20.5'	Dry, brown, silty sand	SM	6	4	20/37/43	10:20	OVA reading @ baseline
20.5-21.5'	Moist, gray, medium to coarse sand with pea size gravel	SP					Strong oily odor
25-26.0'	Dry, brown, silty, medium to coarse sand with gravel.	SM	6	5	27/50	10:27	OVA reading @ baseline Strong oily odor
27.5'	Hit cobble and gravel Groundwater encountered at approx. 30 feet	GP					

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-209 Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples			Remarks	
		Lithology	OVA (ppm)	Number	Type	Blow Count		Drilling Rate/Time
30-31.0'	Wet, green-gray, medium to coarse sand with some gravel	SP	24	6		36/50	10:35	OVA reading at baseline Hit void Soil has H <sub>2</sub> S odor Oily film on sampler
35'	35'-35.5' Wet, gray, medium to coarse grained sand	SP	46	7		50/6"	10:44	OVA reading @ baseline
37'	Hit cobble and gravel	GP						Strong H <sub>2</sub> S odor
39'	Broke through cobble							Slight creosote odor on sampler
40-41.5'	Wet, gray, medium to coarse grained sand with gravel	SP	12	8		6/8/16	10:59	OVA reading @ baseline Oily film on sampler
45'	No recovery - 4' slough in augers			-		Note		
50'	End hole - no recovery due to sampler sticking in augers						11:21	Water samples collected OVA reading 14 ppm at top of hole



## Existing Geotechnical Boring Logs GeoBase & GPI, 1993

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## UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)

PRIMARY DIVISIONS		GROUP SYMBOL	SECONDARY DIVISIONS	
<b>COARSE GRAINED SOILS</b>  MORE THAN HALF OF MATERIALS IS LARGER THAN #200 SIEVE SIZE	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN #4 SIEVE	CLEAN GRAVELS (LESS THAN 5% FINES)	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
		GRAVEL WITH FINES	GP	POORLY GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		CLEAN SANDS (LESS THAN 5% FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURE, NON PLASTIC FINES
		SANDS WITH FINES	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES.
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN #4 SIEVE	CLEAN SANDS (LESS THAN 5% FINES)	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.
		SANDS WITH FINES	SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.
SANDS WITH FINES		SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES.	
SANDS WITH FINES		SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES.	
<b>FINE GRAINED SOILS</b>  MORE THAN HALF OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY.
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY.
			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS.
	HIGHLY ORGANIC SOILS		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.
HIGHLY ORGANIC SOILS		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS.	

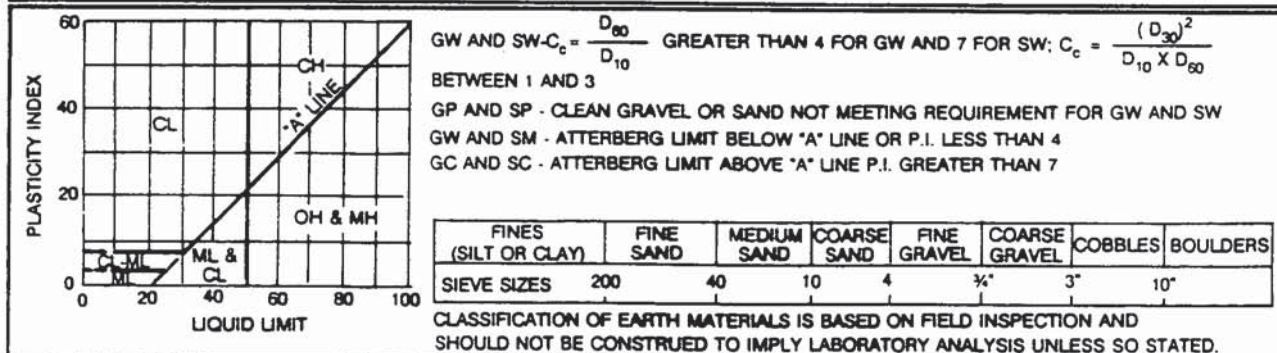
### CLASSIFICATION CRITERIA BASED ON FIELD TESTS

PENETRATION RESISTANCE (PR)		CLAYS AND SILTS		
SANDS AND GRAVELS		CONSISTENCY	BLOWS/FOOT*	STRENGTH**
RELATIVE DENSITY	BLOWS/FOOT*	VERY SOFT	0 - 2	0 - ¼
VERY LOOSE	0 - 4	SOFT	2 - 4	¼ - ½
LOOSE	4 - 10	FIRM	4 - 8	½ - 1
MEDIUM DENSE	10 - 30	STIFF	8 - 15	1 - 2
DENSE	30 - 50	VERY STIFF	15 - 30	2 - 4
VERY DENSE	OVER 50	HARD	OVER 30	OVER 4

\* NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1 ¾ INCH I.D.) SPLIT BARREL SAMPLER (ASTM-1586 STANDARD PENETRATION TEST)

\*\* UNCONFINED COMPRESSIVE STRENGTH IN TONS/SQ. FT. READ FROM POCKET PENETROMETER

### CLASSIFICATION CRITERIA BASED ON LAB TESTS







## GEOBASE/GPI

## KEY FOR SOIL EXPLORATION LOGS

FIGURE A-1





	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
	28.2	90		B	0		FILL: SILTY GRAVEL (GM), grey, dry, loose, 3/4 to 1.5 inch gravels, trace sand	-290-
				B			SILTY CLAY to CLAYEY SILT (CL-ML), mottled brown green, moist, very stiff	
		29.5		B			@ 5.5', black ash	
	13.0			B	5		SILTY SAND (SM), grey, moist, medium dense to dense	-285-
					7.5		Refusal on rock at 7.5 feet.	

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<b>SAMPLE TYPES</b> <input type="checkbox"/> Rock Core <input type="checkbox"/> Standard Split Spoon <input type="checkbox"/> Drive Sample <input type="checkbox"/> Bulk Sample <input type="checkbox"/> Tube Sample	DATE DRILLED: 9-10-93  EQUIPMENT USED: HAND  GROUNDWATER LEVEL: NOT ENCOUNTERED	<b>GEOBASE/GPI</b>  <b>LOG OF BORING NO. B-2</b>	PROJECT NO.: 1133.21 METROLINK
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FIGURE A-3

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	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
	3.2	144		B	0		FILL: SILTY GRAVEL (GM), brown, slightly moist, very dense, 1" to 3" crushed rock, trace sand	294.6
	18.6	100		B			SILTY CLAY to CLAYEY SILT (CL-ML), light brown, stiff to very stiff, moist, trace sand	
	9.1			B			SILTY SAND (SM), brown, moist, medium dense, bricks, concrete, clay chunks	
							Refusal on concrete at 3.5 feet.	

**SAMPLE TYPES**

- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 9-2-93

EQUIPMENT USED:  
HAND

GROUNDWATER LEVEL:  
NOT ENCOUNTERED

**GEOBASE/GPI**



PROJECT NO.: 1133.21  
METROLINK

**LOG OF BORING NO. B-3**

FIGURE A-4

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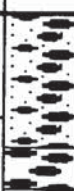


	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOHS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
	2.7	140		B	0		FILL: SILTY GRAVEL (GM), brown, slightly moist, very dense, crushed gravels to 3", trace sand	-295-
	29.1			B			SILTY CLAY to CLAYEY SILT (CL-ML), mottled dark brown, brown, grey, stiff to very stiff, siltstone fragments	
	16.8			B			Refusal at 4.5 feet.	

1133.21 METROLINK

<b>SAMPLE TYPES</b> <input type="checkbox"/> Rock Core <input type="checkbox"/> Standard Split Spoon <input type="checkbox"/> Drive Sample <input checked="" type="checkbox"/> Bulk Sample <input type="checkbox"/> Tube Sample	DATE DRILLED: 9-2-93 EQUIPMENT USED: HAND GROUNDWATER LEVEL: NOT ENCOUNTERED	<b>GEOBASE/GPI</b> PROJECT NO.: 1133.21 METROLINK
	<b>LOG OF BORING NO. B-4</b> FIGURE A-5	

11304370272

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
				0		FILL: SANDY GRAVEL (GW), brown, dry, loose, glass, trash	290
						SANDY GRAVEL (GP), grey, dry, loose, 3/8" round gravels	
						Refusal at 20 inches on asphalt concrete.	

<b>SAMPLE TYPES</b> <input type="checkbox"/> Rock Core <input type="checkbox"/> Standard Split Spoon <input type="checkbox"/> Drive Sample <input type="checkbox"/> Bulk Sample <input type="checkbox"/> Tube Sample	DATE DRILLED: 9-2-93  EQUIPMENT USED: HAND  GROUNDWATER LEVEL: NOT ENCOUNTERED	<b>GEOBASE/GPI</b>	PROJECT NO.: 1133.21 METROLINK
<b>LOG OF BORING NO. B-5</b>			FIGURE A-9

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MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLONS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
10.7	113		B	0	FILL: SILTY SAND to SAND (SM-SP), brown, slightly moist to moist, medium dense, gravels to 3 inches, concrete fragments, bricks  @ 7.5' - 9.0', bricks, ash	-295-	
3.4	99	1	D				
7.7	99	3	D	5			
10.6	97	6	D				
12.7	96	PUSH	D	10			
22.9	96	3	D				
				15	NATIVE: SILTY SAND to SAND (SM-SP), green, moist, dense, gravels, strong petroleum odor  Terminated at 15 feet. No caving.	-285-	

**SAMPLE TYPES**

- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 9-7-93

EQUIPMENT USED:  
18" BUCKET AUGER

GROUNDWATER LEVEL:  
NOT ENCOUNTERED

**GEOBASE/GPI**

PROJECT NO.: 1133.21  
METROLINK

**LOG OF BORING NO. B-6**

FIGURE A-7



	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
	4.1	111		B	0		<b>FILL:</b> SILTY SAND (SM), brown, slightly moist to moist, loose to medium dense, glass, bricks, gravels, concrete, chunks of clay.  @ 5', brick  @ 7', refusal on concrete, moved boring 5 feet. SAND (SP), grey, slightly moist, dense SANDY CLAY (CL), brown, moist, stiff, bricks <b>NATIVE:</b> SAND (SW), grey, moist, dense, gravels to 3"	-295-
	6.6	91	1	D				
	12.5	99	PUSH	D	5			
	3.1		3	D				-290-
	5.8	97	6	D	10			
	3.2		5	D	15			-285-
						Terminated at 16 feet. Slight caving and ravelling.		

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<b>SAMPLE TYPES</b> <input type="checkbox"/> Rock Core <input type="checkbox"/> Standard Split Spoon <input type="checkbox"/> Drive Sample <input type="checkbox"/> Bulk Sample <input type="checkbox"/> Tube Sample	DATE DRILLED: 9-7-93  EQUIPMENT USED: 18" BUCKET AUGER  GROUNDWATER LEVEL: NOT ENCOUNTERED	<b>GEOBASE/GPI</b>	PROJECT NO.: 1133.21 METROLINK
<b>LOG OF BORING NO. B-7</b>			FIGURE A-8

1150370273

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOBS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
4.1	117	1	B	0		-285-	
3.4	92		D	2			
2.6	119	6	D	5	-280-		
6.2	102	10	D	10			
					Terminated at 11 feet. No caving.		

<b>SAMPLE TYPES</b> <input type="checkbox"/> Rock Core <input type="checkbox"/> Standard Split Spoon <input type="checkbox"/> Drive Sample <input type="checkbox"/> Bulk Sample <input type="checkbox"/> Tube Sample	DATE DRILLED: 9-7-93  EQUIPMENT USED: 18" BUCKET AUGER  GROUNDWATER LEVEL: NOT ENCOUNTERED	<b>GEOBASE/GPI</b>  <b>LOG OF BORING NO. B-8</b>	PROJECT NO.: 1133.21 METROLINK
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FIGURE A-9

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## Existing Geotechnical Boring Logs Geotechnical Soilutions, 2005

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<b>Geotechnical Soillutions, Inc.</b>		<b>Project No:</b> GS5101	<b>Client:</b> Tetra Tech
501 S. Fairfax Avenue, Suite 101 Los Angeles, California 90036 Tel: (323) 937-1097 Fax: (323) 937-1099		<b>Location:</b> Aliso Sector D/MTA	
Logged by: SMD		<b>Drilling Contractor:</b> C&C Drilling	
Date: 5/9/2005		<b>Equipment:</b> 8" Hollow Stem Auger	Boring 1
		<b>Driving Weight:</b> 140 lbs	Sheet 1
		<b>Surface Elevation:</b>	of 1
		<b>Reference:</b>	

Depth in Feet	Drive Sample	Sample Type	Bag Sample	Blows Per 6 inches	Visual Description	Moisture Content %	Dry Unit Weight (Pcf)
0					About 4 inches asphalt, about 4 inches base. Fill: Dark gray brown fine sand and gravel, pieces of concrete and brick, dry, moderately loose.		
5					Fine black sand, brick pieces, slightly moist, moderately loose.		
12	CA				Discarded sample, abundant brick pieces.		
17							
30							
10					<u>Possible Native:</u> Brown medium grained sand, moist, moderately dense.		
7	CA						
10							
15					Brown medium grained sand, moist, moderately dense.		
6	CA				End of boring 14 feet.		
12					Fill to about 10 feet. No groundwater.		

PLATE XVIII



**Geotechnical Soilutions, Inc.**

501 S. Fairfax Avenue, Suite 101  
 Los Angeles, California 90036  
 Tel: (323) 937-1097  
 Fax: (323) 937-1099

**Project No:**  
 GS5101

**Client:** Tetra Tech  
**Location:** Aliso Sector D/MTA

**Drilling Contractor:** C&C Drilling

**Equipment:** 8" Hollow Stem Auger

**Driving Weight:** 140 lbs

**Surface Elevation:**

Boring 2

Sheet 1  
 of 1

Logged by: SMD

Date: 5/9/2005

**Reference:**

Depth in Feet	Drive Sample	Sample Type	Bag Sample	Blows Per 6 inches	Visual Description	Moisture Content %	Dry Unit Weight (Pcf)
0					About 6 inches asphalt, about 5 inches base. <u>Fill:</u> Dark gray medium grained sand, lumps of brown clay, pieces of concrete, brick and asphalt, slightly moist, moderateley loose.		
5					Black sand, pieces of brick and concrete, slightly moist, moderately loose.		
		SPT		6 6 6			
10					<u>Possible Native:</u> Brown sand, medium grained, scattered gravel, slightly moist, moderately loose.		
		CA		11	End of boring 11 feet.		
				13	Fill to about 10 feet		
15					No groundwater.		

<b>Geotechnical Soillutions, Inc.</b>				<b>Project No:</b> GS5101	<b>Client:</b> Tetra Tech <b>Location:</b> Aliso Sector D/MTA		
501 S. Fairfax Avenue, Suite 101 Los Angeles, California 90036 Tel: (323) 937-1097 Fax: (323) 937-1099				<b>Drilling Contractor:</b> C&C Drilling			
Logged by: SMD				Date: 5/9/2005	<b>Equipment:</b> 8" Hollow Stem Auger		
					Boring 3		
					<b>Driving Weight:</b> 140 lbs		
					Sheet 1		
				<b>Surface Elevation:</b>	of 1		
				<b>Reference:</b>	1		
Depth in Feet	Drive Sample	Sample Type	Bag Sample	Blows Per 6 inches	Visual Description	Moisture Content %	Dry Unit Weight (Pcf)
0					About 6 inches asphalt, about 5 inches base. Fill: Gray-brown sand, pieces of brick and asphalt, slightly moist, moderately loose. Black sand, pieces of brick and concrete, slightly moist, moderately loose.		
5							
10							
11		SPT			11 Black sand and clayey sand, slight odor, scattered pieces of brick, gravel, slightly moist, moderately loose.		
15							
15		CA			26 Possible Native: Light gray coarse sand with abundant gravel, odor, slightly moist, moderately dense.		
20							
20		CA			100 Light gray coarse sand and gravel, odor, slightly moist, moderately dense. 6" Layers of coarse gravel/boulders.		
25							
25		CA			20 Gray clayey silt and coarse sand, odor, moist to wet, moderately dense.		
					32 End of boring at 26 feet.		
					33 Water at 26 feet, possibly perched. Fill to about 15 feet.		

PLATE XX

<b>Geotechnical Soilutions, Inc.</b>				<b>Project No:</b> GS5101	<b>Client:</b> Tetra Tech <b>Location:</b> Aliso Sector D/MTA		
501 S. Fairfax Avenue, Suite 101 Los Angeles, California 90036 Tel: (323) 937-1097 Fax: (323) 937-1099				<b>Drilling Contractor:</b> C&C Drilling			
Logged by: SMD				<b>Equipment:</b> 8" Hollow Stem Auger	Boring 4		
Date: 5/9/2005				<b>Driving Weight:</b> 140 lbs	Sheet 1 of 2		
				<b>Surface Elevation:</b>			
				<b>Reference:</b>			
Depth in Feet	Drive Sample No.	Sample Type	Bag Sample	Blows Per 6 inches	Visual Description	Moisture Content %	Dry Unit Weight (Pcf)
0					About 8 inches asphalt, about 5 inches base. <u>Fill:</u> Medium grained brown sand and gravel, pieces of brick and wood, slightly moist, moderately loose. Mottled dark gray and light brown silty clay, slightly moist, moderately stiff.		
5							
10	CA			6 7 25	Black silty clay, scattered brick fragments, odor, moist, moderately stiff.		
15	CA			10 15 28	<u>Possible Native:</u> Dark gray fine sand, slightly moist, moderately dense.		
20	CA			27 50 2"	Dark gray coarse sand and gravel, strong odor, moist, moderately dense.		
25	SPT			25 35 50 5"	Dark gray coarse sand and abundant gravel, strong odor, moist, moderately dense.		
30				28 50	Dark gray medium grained sand, strong odor, moist, moderately dense.		

PLATE XXI

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<b>Geotechnical Soilutions, Inc.</b>				<b>Project No:</b> GS5101	<b>Client:</b> Tetra Tech		
501 S. Fairfax Avenue, Suite 101 Los Angeles, California 90036 Tel: (323) 937-1097 Fax: (323) 937-1099				<b>Location:</b> Aliso Sector D/MTA			
Logged by: SMD				Date: 5/9/2005			
				<b>Drilling Contractor:</b> C&C Drilling			
				<b>Equipment:</b> 8" Hollow Stem Auger			
				<b>Driving Weight:</b> 140 lbs			
				<b>Surface Elevation:</b>			
				<b>Reference:</b>			
				Boring 4			
				Sheet 2			
				of 2			
Depth in Feet	Drive Sample	Sample Type	Bag Sample	Blows Per 6 inches	Visual Description	Moisture Content %	Dry Unit Weight (Pcf)
30					End of boring at 31 feet. Fill to about 15 feet. No groundwater.		
35							

PLATE XXII

1010212200744795

<b>Geotechnical Soilutions, Inc.</b>				<b>Project No:</b> GS5101	<b>Client:</b> Tetra Tech <b>Location:</b> Aliso Sector D/MTA		
501 S. Fairfax Avenue, Suite 101 Los Angeles, California 90036 Tel: (323) 937-1097 Fax: (323) 937-1099				<b>Drilling Contractor:</b> C&C Drilling			
Logged by: SMD				<b>Equipment:</b> 8" Hollow Stem Auger	Boring 5		
Date: 5/9/2005				<b>Driving Weight:</b> 140 lbs			
				<b>Surface Elevation:</b>	Sheet 1		
				<b>Reference:</b>	of 1		
Depth in Feet	Drive Sample	Sample Type	Bag Sample	Blows Per 6 inches	Visual Description	Moisture Content %	Dry Unit Weight (Pcf)
0					About 4 inches asphalt, about 8 inches base. Fill: Brown medium grained sand, abundant gravel, brick pieces, slightly moist, moderately loose.		
5							
10		CA			Gray and brown silty clay, moist, moderately stiff.		
				10	Gray-brown silty fine sand, moist, moderately dense, slight odor.		
				10			
				15			
15		CA			<u>Possible Native:</u> Light brown coarse sand and gravel, moist, moderately dense.		
				18			
				38			
				50			
20		SPT			Light brown silty fine sand with occasional gravel, slightly moist, dense.		
				50			
				5"			
25		CA			Gray fine to coarse sand and gravel, slight odor, slightly moist, dense.		
				40			
				50	End of boring at 26 feet.		
				5"	Fill to about 15 feet.		
					No groundwater.		
30							

PLATE XXIII

1010212200744793

## Existing Geotechnical Boring Logs Kleinfelder, 2003



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Date Drilled:  
 Drilled By:  
 Drilling Method:  
 Logged By:

Water Depth:  
 Date Measured:  
 Reference Elevation:  
 Datum:

Elevation (feet) Depth	Sample	Sample No.	Blow Count (Blows/ft.)	Graphic Log	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Dry Density (pcf)	Moisture Content (%)	Additional Tests
0		1	6			108	10	DS, SE
5		2	12					GS
	(1)	(2)	(3)	(4)	(5)	(6)	(6)	(7)

NOTES ON FIELD INVESTIGATION

- SAMPLE** - Graphical representation of sample type as shown below.

Split Spoon - Standard Penetration Test Sample (SPT)

Drive Sample - California Sample (Cal)

Bulk Sample - Obtained by collecting cuttings in a plastic bag

Tube Sample - Shelby/Pitcher Tube Sample
- SAMPLE NO.** - Sample Number
- BLOWS/FT** - Number of blows required to advance sampler 1 foot (unless a lesser distance is specified). Samplers in general were driven into the soil at the bottom of the hole with a standard (140 lb) hammer dropping a standard 30 inches. Drive samples collected in bucket auger borings may be obtained by dropping non-standard weight from variable heights. When a SPT sampler is used the blow count conforms to ASTM D-1586.

**SCR/ROD** - Sample Core Recovery (SCR) in percent (%) and Rock Quality Designation (ROD) in percent (%). ROD is defined as the percentage of core in each run which the spacing between natural fractures is greater than 4 inches. Mechanical breaks of the core are not considered.
- GRAPHIC LOG** - Standard symbols for soil and rock types, as shown on plate B-1b.
- GEOTECHNICAL DESCRIPTION**

Soil - Soil classifications are based on the Unified Soil Classification System per ASTM D-2487, and designations include consistency, moisture, color and other modifiers. Field descriptions have been modified to reflect results of laboratory analyses where deemed appropriate.

Rock - Rock classifications generally include a rock type, color, moisture, mineral constituents, degree of weathering, alteration, and the mechanical properties of the rock. Fabric, lineations, bedding spacing, foliations, and degree of cementation are also presented where appropriate.

Description of soil origin or rock formation is placed in brackets at the beginning of the description where applicable, for example, Residual Soil.
- DRY DENSITY, MOISTURE CONTENT:** As estimated by laboratory or field testing.
- ADDITIONAL TESTS** - (Indicates sample tested for properties other than the above):

MAX - Maximum Dry Density	SG - Specific Gravity	PP - Pocket Penetrometer
GS - Grain Size Distribution	HA - Hydrometer Analysis	WA - Wash Analysis
SE - Sand Equivalent	AL - Atterberg Limits	DS - Direct Shear
EI - Expansion Index	RV - R-Value	CP - Collapse Potential
CHEM - Sulfate and Chloride Content, pH, Resistivity	CN - Consolidation	UC - Unconfined Compression
PM - Permeability	CU - Consolidation Undrained Triaxial	T - Torvone
UU - Unconsolidated Undrained Triaxial	CD - Consolidated Drained Triaxial	
- ATTITUDES** - Orientation of rock discontinuity observed in bucket auger boring or rock core, expressed in strike/dip and dip angle, respectively, preceded by a one-letter symbol denoting nature of discontinuity as shown below.

B: Bedding Plane      J: Jointing      C: Contact      F: Fault      S: Shear





















EXPLANATION OF LOGS

PLATE  
A-1a



# UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)

PRIMARY DIVISIONS			GROUP SYMBOLS	SECONDARY DIVISIONS	
<b>COARSE-GRAINED SOILS</b> <small>MORE THAN HALF OF MATERIALS IS LARGER THAN #200 SIEVE SIZE</small>	<b>GRAVELS</b> <small>MORE THAN HALF OF COARSE FRACTION IS LARGER THAN #4 SIEVE</small>	<b>CLEAN GRAVELS (LESS THAN 5% FINES)</b>	GW		WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		<b>GRAVEL WITH FINES</b>	GM		SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
		<b>CLEAN SANDS (LESS THAN 5% FINES)</b>	SW		WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		<b>SANDS WITH FINES</b>	SM		SILTY SANDS, SAND-SILT MIXTURES
	<b>SANDS</b> <small>MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN #4 SIEVE</small>	<b>CLEAN SANDS (LESS THAN 5% FINES)</b>	SP		POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		<b>SANDS WITH FINES</b>	SC		CLAYEY SANDS, SAND-CLAY MIXTURES
		<b>SILTS AND CLAYS</b> <small>LIQUID LIMIT IS LESS THAN 50</small>	<b>ML</b>		INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS
			<b>CL</b>		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
<b>OL</b>			ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY		
<b>SILTS AND CLAYS</b> <small>LIQUID LIMIT IS GREATER THAN 50</small>	<b>MH</b>		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDS OR SILTS, ELASTIC SILTS		
	<b>CH</b>		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS		
	<b>OH</b>		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
<b>HIGHLY ORGANIC SOILS</b>		<b>PT</b>		PEAT, MUCK AND OTHER HIGHLY ORGANIC SOILS	
<b>TYPICAL FORMATIONAL MATERIALS</b>	<b>SANDSTONES</b>	<b>SS</b>			
	<b>SILTSTONES</b>	<b>SH</b>			
	<b>CLAYSTONES</b>	<b>CS</b>			
	<b>LIMESTONES</b>	<b>LS</b>			
	<b>SHALE</b>	<b>SL</b>			

## CONSISTENCY CRITERIA BASED ON FIELD TESTS

RELATIVE DENSITY: COARSE-GRAINED SOIL			CONSISTENCY: FINE-GRAINED SOIL		TORVANE	POCKET ** PENETROMETER
RELATIVE DENSITY	SPT * (# blows/ft)	RELATIVE DENSITY (%)	CONSISTENCY	SPT (# blows/ft)	UNDRAINED SHEAR STRENGTH (tsf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)
Very Loose	<4	0 - 15	Very Soft	<2	<0.13	<0.25
Loose	4 - 10	15 - 35	Soft	2 - 4	0.13 - 0.25	0.25 - 0.5
Medium Dense	10 - 30	35 - 65	Medium Stiff	4 - 8	0.25 - 0.5	0.5 - 1.0
Dense	30 - 50	65 - 85	Stiff	8 - 15	0.5 - 1.0	1.0 - 2.0
Very Dense	>50	85 - 100	Very Stiff	15 - 30	1.0 - 2.0	2.0 - 4.0
			Hard	>30	>2.0	>4.0

\* NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1 3/8 INCH I.D.) SPLIT BARREL SAMPLER (ASTM-1586 STANDARD PENETRATION TEST)

\*\* UNCONFINED COMPRESSIVE STRENGTH IN TONS/SQ.FT. READ FROM POCKET PENETROMETER

### MOISTURE CONTENT

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

### CEMENTATION

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure



**KLEINFELDER**

EXPLANATION OF LOGS

PLATE  
A-1b

1010210200513241



Date Drilled: 4/24/03      Water Depth: >30.5 feet  
 Drilled By: West Hazmat      Date Measured: 4/24/03  
 Drilling Method: Hollow Stem Auger 6"      Elevation: ~280 feet  
 Logged By: Ed Che      Reference Datum: MSL

Elevation (feet) Depth	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Unit Weight (pcf)	Moisture Content (%)	Additional Tests	
								PID	(ppm)
280					<b>Asphaltic Concrete (AC):</b> approximately 3 inches thick over 1 foot base approximatley				
					<b>Artificial Fill (Af):</b>				
					<b>Sandy Clay (CL):</b> olive gray, moist, fine to coarse sand, brick fragments found, no odor				
					<b>Sandy Silt (ML):</b> olive brown, moist, very stiff, iron oxide stains, mottled with pockets of clay, no odor				
275	5	1	35			90	20.9	DS	
					<b>Native: Sand (SP):</b> yellow brown, slightly moist, medium dense, fine grained, no odor				
270	10	2	32					WA	
265	15	3	45						
					-- moist, dense, fine to coarse grained, some fine gravel, 2 inch layer of gray clay, highly moist, no odor				
260		4	81			110	6.8		



PROJECT NO. 29712

Proposed Shored Excavation Project  
 710 N. Keller Street  
 Los Angeles, California  
**LOG OF BORING B-1**

PLATE  
 A-2a

Elevation (feet) Depth	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION <i>(Continued From Previous Page)</i>		Dry Unit Weight (pcf)	Moisture Content (%)	Additional Tests	PID (ppm)
260					-- very dense					
255 25		5	26 50/6"							
250 30		6	19 50/6"		<p><b>Gravelly Sand with Silt (SP-SM):</b> gray, moist, very dense, fine to medium grained, fine and coarse gravel, no odor</p> <p>Total depth of boring: 30.5 feet            No groundwater encountered            Boring backfilled with bentonite grout and topped with rapid set concrete</p>					



PROJECT NO. 29712

Proposed Shored Excavation Project  
 710 N. Keller Street  
 Los Angeles, California  
**LOG OF BORING B-1**

PLATE  
 A-2b

Explanation To Logs On Plate A-1

1010210200513241

Date Drilled: 4/24/03      Water Depth: >31 feet  
 Drilled By: West Hazmat      Date Measured: 4/24/03  
 Drilling Method: Hollow Stem Auger 6"      Elevation: ~280 feet  
 Logged By: Ed Che      Reference Datum: MSL

Elevation (feet) Depth	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	SOIL DESCRIPTION AND CLASSIFICATION	Dry Unit Weight (pcf)	Moisture Content (%)	Additional Tests	
								PID (ppm)	
280					<b>Asphaltic Concrete (AC):</b> approximately 3.5 inches thick without base				
					<b>Artificial Fill (Af):</b>				
					<b>Clayey Sand (SC):</b> dark olive gray, moist, fine to medium sand, brick fragments, trace fine gravel, some staining, no odor, trace coarse gravel and cobbles, concrete debris				
275	5	1	16		-- olive brown, trace wood debris and fragments of ceramics	94	22.7	CHEM, WA	
					<b>Native:</b>				
					<b>Sand (SP):</b> yellow brown, moist, dense, fine to medium grained, some coarse gravel, no odor	105	6.0	GS	
270	10	2	39						
					<b>Silty Sand (SM):</b> olive brown, moist, very dense, fine grained, no odor				
265	15	3	28 50/6"			87	7.4		
					<b>Gravelly Sand with Silt (SP-SM):</b> gray, moist to very moist, dense, fine to coarse grained, fine and coarse gravel, occasional layers of sandy gravel, no odor				
260		4	59						



PROJECT NO. 29712

Proposed Shored Excavation Project  
 710 N. Keller Street  
 Los Angeles, California

LOG OF BORING B-2

PLATE

A-3a

Explanation To Logs On Plate A-1

1010210200513241



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**Existing Geotechnical Boring Logs  
Lowney Associates, 2003**

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# EXPLORATORY BORING: LB-01

Sheet 1 of 1

DRILL RIG: AL-ROY DRILLING CO.

PROJECT NO: 1651-15A

BORING TYPE: BUCKET AUGER

PROJECT: TOSCO CENTER STREET REMEDIATION

LOGGED BY: TKK

LOCATION: LOS ANGELES, CALIFORNIA

START DATE: 7-30-03

FINISH DATE: 7-30-03

COMPLETION DEPTH: 17.5 FT.

This log is a part of a report by Lowney Associates, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE	Undrained Shear Strength (ksf)
274.0	0		SURFACE ELEVATION: 274 FT. (+/-)							
	0	5-INCHES OF ASPHALT		GW						
	0	2-INCHES OF CRUSHED AGGREGATED BASE (GW), greenish brown								
	0	FILL: SILTY SAND (SM), trace of fine gravel and asphalt, moist, dark brown to black							33	
	5		- loose, no odor	SM	1	X	12	102		
	10		AUGER REFUSAL DUE TO STEEL PIPE MOVED TO 3- FEET SOUTH OF ORIGINAL LOCATION							
	10		- weak petroleum odor							
	10		- weak petroleum odor, cohesive		6	X	11	122		
	15		NATIVE: SAND (SP), fine to coarse, trace of fine gravel, dense, moist, light brown, no odor	SP						
	15				14	X	4	127		
	17.5		AUGER REFUSAL DUE TO BOULDER (greater than 18-inches in diameter)							
	17.5		BOTTOM OF BORING AT 17½ FEET							
	17.5		NO FREE GROUNDWATER ENCOUNTERED							
	17.5		BORING WAS BACKFILLED WITH CUTTINGS							
	17.5		WEIGHT OF KELLY: 0 TO 24- FEET: 2,150 POUNDS 25 TO 44- FEET: 1,350 POUNDS 45 TO 65- FEET: 650 POUNDS							

GROUND WATER OBSERVATIONS:  
NO FREE GROUNDWATER ENCOUNTERED

LA CORP.GDT\_08/15/03 Fullerton-JSR



# EXPLORATORY BORING: LB-02

Sheet 1 of 2

DRILL RIG: AL-ROY DRILLING CO.

PROJECT NO: 1651-15A

BORING TYPE: BUCKET AUGER

PROJECT: TOSCO CENTER STREET REMEDIATION

LOGGED BY: TKK

LOCATION: LOS ANGELES, CALIFORNIA

START DATE: 7-30-03      FINISH DATE: 7-30-03

COMPLETION DEPTH: 32.0 FT.

This log is a part of a report by Lowney Associates, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE	Undrained Shear Strength (ksf)					
										1.0	2.0	3.0	4.0		
272.0	0		<b>SURFACE ELEVATION: 272 FT. (+/-)</b>												
			<b>FILL: SILTY SAND (SM)</b> , trace of fine gravel, slightly moist to moist, brick rubble, brown	SM											
	5		<b>FILL: SILT (ML)</b> , trace of sand and fine gravel, medium stiff, moist, brown, no odor	ML											
			<b>FILL: SAND (SP)</b> , fine to coarse, with fine to coarse gravel and cobbles less than 12-inches in diameter, moist, light brown - concrete rubble greater than 24-inches in diameter	SP	3	×	10	104							
	10		<b>REFUSAL DUE TO SAND CAVING, MOVED TO 5-FEET NORTH, 4-FEET WEST OF ORIGINAL LOCATION</b> <b>SAND (SP)</b> , with fine to coarse gravel and cobbles less than 12-inches in diameter, medium dense, orange brown	SP	6	×	4	110							
	15		- brown	SP	18	×	3	130							
	20														
			<b>GRAVELLY SAND (SW)</b> , fine to coarse gravel and cobbles less than 12-inches in diameter, dense, moist, orange brown with white mottling, no odor	SW	19	×	7	114							
	25		<b>SAND (SP)</b> , medium to coarse, trace of gravel and cobbles less than 12-inches in diameter, dense to very dense, olive green, no odor	SP	30/10"	×	6	115							
	30		- fine to medium, moist to very moist	SP	30/10"	×	19	105							
240.0															

*Continued Next Page*

**GROUND WATER OBSERVATIONS:**

▽: FREE GROUND WATER MEASURED DURING DRILLING AT 32.0 FEET

LA CORP.GDT\_08/15/03 Fullerton JSR

# EXPLORATORY BORING: LB-02 Cont'd

Sheet 2 of 2

DRILL RIG: AL-ROY DRILLING CO.

PROJECT NO: 1651-15A

BORING TYPE: BUCKET AUGER

PROJECT: TOSCO CENTER STREET REMEDIATION

LOGGED BY: TKK

LOCATION: LOS ANGELES, CALIFORNIA

START DATE: 7-30-03      FINISH DATE: 7-30-03

COMPLETION DEPTH: 32.0 FT.

This log is a part of a report by Lowney Associates, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE	Undrained Shear Strength (ksf)					
										○ Pocket Penetrometer	△ Torvane	● Unconfined Compression	▲ U-U Triaxial Compression	1.0   2.0   3.0   4.0	
240.0			<p><b>BOTTOM OF BORING AT 32 FEET</b></p> <p><b>FREE GROUNDWATER ENCOUNTERED AT 32 FEET</b></p> <p><b>BORING WAS BACKFILLED WITH CUTTINGS</b></p> <p><b>BORING HALTED AT 32-FEET DUE TO REFUSAL, BOULDERS GREATER THAN 18-INCH DIAMETER, ALSO SAND CAVED DUE TO GROUNDWATER</b></p> <p><b>WEIGHT OF KELLY:</b>                      0 TO 24-FEET: 2,150 POUNDS                      25 TO 44-FEET: 1,350 POUNDS                      45 TO 65-FEET: 650 POUNDS</p>												
	35														
	40														
	45														
	50														
	55														
	60														

**GROUND WATER OBSERVATIONS:**

∇ : FREE GROUND WATER MEASURED DURING DRILLING AT 32.0 FEET

LA CORP GDT 08/15/03 Fullerton\* JSR



# EXPLORATORY BORING: LB-03

Sheet 1 of 1

DRILL RIG: AL-ROY DRILLING CO.

PROJECT NO: 1651-15A

BORING TYPE: BUCKET AUGER

PROJECT: TOSCO CENTER STREET REMEDIATION

LOGGED BY: TKK

LOCATION: LOS ANGELES, CALIFORNIA

START DATE: 7-30-03 FINISH DATE: 7-30-03

COMPLETION DEPTH: 24.0 FT.

This log is a part of a report by Lowney Associates, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE	Undrained Shear Strength (ksf)
272.0	0		SURFACE ELEVATION: 272 FT. (+/-)							
	0		FILL: SILT (ML), trace of fine sand and gravel, slightly moist to moist, brick rubble, brown	ML						
	5		FILL: CLAYEY SAND (SC), with fine gravel, trace of asphalt, low to medium plasticity, moist, brown	SC					45	
	5		FILL: SAND (SP), medium to coarse, trace of gravel and cobbles less than 12-inches in diameter, medium dense to dense, moist, light brown to brown	SP	8	X	5	110		
	10		- light brown  - with gravel and cobbles less than 12-inches in diameter	SP	10	X	3	114		
	15		SILT (ML), trace of fine sand, soft to medium stiff, moist, brown with iron oxide stains, no odor	ML	4	X	12	107		
	20		SILTY SAND (SM), with gravel and cobbles less than 12-inches in diameter, fine to coarse, moist, brown	SM						
	20		SAND (SP), fine to coarse with gravel and cobbles less than 12-inches in diameter, medium dense to dense, moist, orange brown, no odor - olive green	SP	13	X	6	115		
	25		BOTTOM OF BORING AT 24 FEET NO FREE GROUNDWATER ENCOUNTERED BORING HOLE WAS BACKFILLED WITH CUTTINGS BORING STOPPED AT 34 FEET DUE TO REFUSAL, BOULDER GREATER THAN 18-INCHES IN DIAMETER							
	30		WEIGHT OF KELLY: 0 TO 24-FEET: 2,150 POUNDS 25 TO 44-FEET: 1,350 POUNDS 45 TO 65-FEET: 650 POUNDS							

GROUND WATER OBSERVATIONS:  
NO FREE GROUNDWATER ENCOUNTERED

LA CORP.GDT 08/15/03 Fullerton JSR

# EXPLORATORY BORING: LB-04

Sheet 1 of 1

DRILL RIG: AL-ROY DRILLING CO.

PROJECT NO: 1651-15A

BORING TYPE: BUCKET AUGER

PROJECT: TOSCO CENTER STREET REMEDIATION

LOGGED BY: TKK

LOCATION: LOS ANGELES, CALIFORNIA

START DATE: 7-30-03      FINISH DATE: 7-30-03

COMPLETION DEPTH: 24.0 FT.

This log is a part of a report by Lowney Associates, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE	Undrained Shear Strength (ksf)
272.0	0		<b>SURFACE ELEVATION: 272 FT. (+/-)</b>							
	0 - 5		<b>FILL: SILT (ML)</b> , with sand, trace of gravel, slightly moist to moist, brown  - trace of sand, moist, gray brown  - trace of fine sand, soft, brown	ML		X	10	105		
	5 - 8		<b>FILL: SILTY SAND (SM)</b> , fine to coarse, moist, dark brown	SM	3	X				
	8 - 15		<b>NATIVE: SAND (SP)</b> , medium to coarse, with gravel, medium dense, moist, light brown  - disturbed soil sample was retrieved in sampler tip, only, due to gravel	SP	9	X	2	128		
	15 - 18		- disturbed soil sample was retrieved in sampler tip, only, due to gravel		9	O	3			
	18 - 20		<b>SILT (ML)</b> , trace of fine sand and gravel, moist, gray brown	ML						
	20 - 24		<b>SAND (SP)</b> , fine to coarse, with gravel and cobbles less than 12-inches in diameter, moist, light brown  - medium to coarse, medium dense  - required 30 minutes to drill from 22-feet to 24-feet due to gravel and cobbles less than 12-inches in diameter	SP	9	X	3	125		
	24 - 25		<b>BOTTOM OF THE BORING AT 24 FEET</b> <b>NO GROUNDWATER ENCOUNTERED</b> <b>BORING WAS BACKFILLED WITH CUTTINGS</b> <b>BORING STOPPED AT 24-FEET DUE TO REFUSAL</b>							
	25 - 30		<b>WEIGHT OF KELLY:</b> <b>0 TO 24-FEET: 2,150 POUNDS</b> <b>25 TO 44-FEET: 1,350 POUNDS</b> <b>45 TO 65-FEET: 650 POUNDS</b>							

GROUND WATER OBSERVATIONS:  
NO FREE GROUNDWATER ENCOUNTERED

LA CORP.GDT 08/15/03 Fullerton\* JSR





**Existing Geotechnical Boring Logs  
Sladden Engineering, 2004**

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**Dynamic Builders**  
**718 & 728 East Commercial, L.A.**

Date: 2/14/2004

Boring No. 1

Job Number:

444-4041

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0			..	Silty Sand with Gravel: Brown	SM	..	..	..	Artificial Fill 4'
5			10/24/28	No Recovery	---	---	---	---	Native Soils
10			11/42/50	Silty Sand: Grey Brown	SM	107	3	4	
15			50-5"	Gravelly Sand: Brown	SM		2		
20			34/50-3"	Sand: Grey Brown	SM	103	3	2	
25			50-5"	Silty Sand: Grey Brown	SM		4		
30			50-4"	Gravelly Sand: Grey	SM		11		Petroleum Odor Groundwater @ 29'
35			50-5"	Gravelly Sand: Grey	SM		10		
40			40/50-3"	Sand: Grey	SM		11		Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.
45			50-3"	Sand: Grey	SM		15		Total Depth = 50.5' No Bedrock
50			50-4"	Sand: Grey	SM		10		



**Dynamic Builders**  
**718 & 728 East Commercial, L.A.**

Date: 2/14/2004      Boring No. 2      Job Number: 444-4041

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks	
0			::	Silty Sand: Brown	SM	::	::	::	Artificial Fill 5'	
5		█	18/20/22	Silty Sand: Grey	SM	99	3	8	Native Soils  Disturbed Sample	
10		█	18/22/26	Silty Sand: Brown	SM	---	2	---		
15		█	50-5"	Gravelly Silty Sand: Brown	SM	101	3	5		
20		█	50-3"	Gravelly Sand: Brown	SM	102	2	6		
25									Total Depth = 20.5' No Bedrock No Groundwater	
30		█		Recovered Sample						
		⊗		Unrecovered Sample						
		█		Standard Penetration Sample						
40				Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.						
45										
50										

**Dynamic Builders**  
**718 & 728 East Commercial, L.A.**

Date: 2/14/2004

Boring No. 3

Job Number:

444-4041

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0			::	Silty Sand: Brown	SM	::	::	::	Artificial Fill 5'
6				8" to 12" Thick Concrete @ 5'					
6		36/50-5"		Gravelly Silty Sand: Grey Brown	SM	104	3	6	Native Soils
10		10/16/23		Silty Sand: Brown	SM	98	7	5	
15		27/40/50		Gravelly Sand: Brown	SM	123	4	4	
20		39/50-3"		Gravelly Sand: Brown	SM	104	3	6	
25									Total Depth = 20.5' No Bedrock No Groundwater
30		Recovered Sample							
		Unrecovered Sample							
		Standard Penetration Sample							
40				Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.					
45									
50									

**Dynamic Builders  
718 & 728 East Commercial, L.A.**

Date: 2/14/2004

Boring No. 4

Job Number:

444-4041

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks	
0			::	Silty Sand: Brown	SM	::	::	::	Artificial Fill 19'	
5		█	18/40/50	Gravelly Silty Sand: Dark Brown	SM	119	12	45		
10		█	20/31/42	Silty Sand with Gravel: Dark Grey Brown	SM	119	10	30		
15		⊗	50-3"	No Recovery	---	---	---	---		
20		█	42/50-3"	Gravelly Silty Sand: Brown	SM	107	3	6	Native Soils	
25									Total Depth = 20.5' No Bedrock No Groundwater	
30		█		Recovered Sample						
32		⊗		Unrecovered Sample						
34		█		Standard Penetration Sample						
40				Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.						
45										
50										



**Dynamic Builders**  
**718 & 728 East Commercial, L.A.**

Date: 2/14/2004

Boring No. 5

Job Number:

444-4041

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks	
0			---	Silty Sand with Gravel: Grey Brown	SM	---	---	---	Artificial Fill 9'	
5		7/7/7		Silty Sand with Gravel: Grey Brown	SM	96	9	31		
10		35/50-2"		Silty Sand: Grey Brown	SM	106	3	6	Native Soils	
15		36/50-2"		Gravelly Sand: Brown	SM	113	2	7		
20		28/30/50		No Recovery	---	---	---	---		
25									Total Depth = 20.5' No Bedrock No Groundwater	
30		Recovered Sample								
		Unrecovered Sample								
		Standard Penetration Sample								
40				Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.						
45										
50										

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**Existing Geotechnical Boring Logs  
Smith-Emery GeoServices, 2003**



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MAJOR SUBDIVISIONS			GROUP SYMBOL	MAJOR SUBDIVISIONS			
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.		
				GP	POORLY GRADED GRAVELS, OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.		
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES.		
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES.		
	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.		
				SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.		
	MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION <u>RETAINED</u> ON A NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES.	
					SC	CLAYEY SANDS, SAND-CLAY MIXTURES.	
		FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT <u>LESS</u> THAN 50.		ML	INORGANIC SILTS, SANDY SILTS, AND CLAYEY SILTS OF LOW PLASTICITY.
						CL	INORGANIC CLAYS OF LOW TO MED. PLASTICITY; GRAVELLY, SANDY OR SILTY CLAYS, LEAN CLAYS.
	OL				ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY.		
MORE THAN 50% OF MATERIAL IS <u>SMALLER</u> THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS		LIQUID LIMIT <u>GREATER</u> THAN 50.		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS. PLASTIC SILTS.	
					CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.	
					OH	ORGANIC CLAYS AND SILTY CLAYS OF MEDIUM TO HIGH PLASTICITY.	
HIGHLY ORGANIC SOILS				PT	PEAT AND OTHER HIGHLY ORGANIC SOILS.		

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE CLASSIFICATIONS

### SOIL CLASSIFICATION CHART

UNIFIED SOIL CLASSIFICATION SYSTEM

*Smith-Emery GeoServices*

PLATE NO.: A-1A

1010330200515544

# KEY TO LOG OF BORINGS

SYMBOL	TYPE OF TEST	KEY TO SAMPLES
COMP	COMPACTION CHARACTERISTICS	<input type="checkbox"/> INDICATES DEPTH OF UNDISTURBED SAMPLE
TX	TRIAxIAL COMPRESSION TEST	<input type="checkbox"/> INDICATES DEPTH OF BULK SAMPLE
DS	DIRECT SHEAR TEST	<input type="checkbox"/> INDICATES DEPTH OF SAMPLING ATTEMPT WITH NO RECOVERY
UC	UNCONFINED COMPRESSION TEST	<input type="checkbox"/> INDICATES DEPTH OF STANDARD PENETRATION TEST (SPT)
C	CONSOLIDATION TEST	<input checked="" type="checkbox"/> INDICATES DEPTH OF DISTURBED SAMPLE
COLL	COLLAPSE TEST	
EXP	PERCENT EXPANSION	
EI	EXPANSION INDEX	
SA	SIEVE ANALYSIS (+ #200 ONLY)	
-200	% PASSING #200 SIEVE	
HA	HYDROMETER ANALYSIS (- #200 ONLY)	
AL	ATTERBERG LIMITS	
SE	SAND EQUIVALENT	
P	PERMEABILITY	
R	R-VALUE	
Gs	SPECIFIC GRAVITY	
S	SOLUBLE SULFATES	
CH	HYDROGEN ION CONTENT	
RE	RESISTIVITY	
CL	CHLORIDE	
PTV	POCKET TORQUE VANE	
PP	POCKET PENETROMETER	

**NOTE ON SAMPLERS:**

Undisturbed samples were obtained with a "California" sampler having an O.D. of 3.0 inches and an I.D. of 2.4 inches. The SPT sampler is 2 inches O.D.; the bit has an I.D. of 1.4 inches and the split barrel has an I.D. of 1.5 inches. Unless practical refusal was encountered, the samplers were driven 18 inches into the soil using a 140 pound weight falling 30 inches. The blow count for the final 12 inches is recorded on the boring logs.

**NOTES:**

The descriptions on the boring logs apply only at the specific boring locations and at the time the borings were made. They are not warranted to be representative of subsurface conditions. Soil and rock descriptions are based on commonly accepted geotechnical methods of identification and classification and are based on our professional judgment and experience. Field descriptions have been modified where appropriate to reflect laboratory test results. The stratification of soil layers is represented with approximate boundaries and the transition between soil types may be gradual. Groundwater depths indicated on boring logs are specific to the time of drilling. The term "encountered" refers to the level at which free water was first noticed in the boring. The term "stabilized" refers to the level of the water after a lapse of at least one hour.

*Smith-Emery GeoServices*

PLATE NO.: A-1B

1010330200515544



# SMITH-EMERY GEOSERVICES

PROJECT: Proposed Two Elevators  
 LOCATION: 801 E. Commercial Street, Los Angeles, California  
 SURFACE ELEVATION: (Not surveyed)  
 GROUNDWATER LEVEL: Not encountered  
 DATUM

FILE NO.: 33182-1  
 REPORT NO. G-03-5577  
 DATE DRILLED: 9-11-03  
 CORRECTED LOG BY: ABC  
 SHEET 1 OF 1

### LOG OF BORING NO. 1

PLATE NO. A-2A

SP-SM: MDD = 121.2 pcf

D (FT.)	ST	MATERIAL DESCRIPTION	USC	SYM	N'	G <sub>s</sub> (pcf)	W %	S %	LL %	PL %	% -200	RC %	G <sub>m</sub> (pcf)
0		5" thick reinforced concrete floor slab											
		Fill: SILTY SAND- brown, some gravel, brick fragments, loose, damp	SM		31	98.9	6.6	26.0				81.6	105.4
		(moist)			27	111.5	10.6	58.2				92.0	123.3
5		FINE SANDY SILT - olive brown, very loose, moist	ML		22	87.8	19.8	59.4			63.5	76.3	105.2
		(wet)			29	85.2	33.0	92.9				74.1	113.3
10		Bottom at 10 feet											

### LOG OF BORING NO. 2

0		3" thick concrete floor slab											
		SILTY SAND- olive brown, w/ gravel, loose to medium dense, humid	SP		28	104.0	1.7	7.6				85.8	105.8
					42	108.0	2.2	11.0			4.0	89.1	110.4
5					38	106.0	3.2	15.1				87.5	109.4
					45	109.0	3.3	16.9				89.9	112.6
10		Bottom at 9 feet											

ML: MDD\* = 115.0 pcf  
 \*Estimated

**LEGEND:**

B - Bedding  
 J - Joint  
 C - Contact  
 F - Fault  
 RS - Rupture Surface

N' - Blows per Foot (35-lb. weight)  
 G<sub>s</sub> - Dry Unit Weight  
 W - Water Content  
 S - Saturation  
 LL - Liquid Limit  
 MDD - Maximum Dry Density

PL - Plastic Limit  
 RC - Relative Compaction  
 ST - Sample Type  
 USC - Unified Classification System  
 D - Depth  
 G<sub>m</sub> - Moist Density (pcf)

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**Existing Geotechnical Boring Logs**  
**URS, 2003**



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## SOIL CLASSIFICATION CHART

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

NOTE: Dual symbols are used to indicate gravels or sand with 5-12% fines and soils with fines classifying as CL-ML. Symbols separated by a slash indicate borderline soil classifications.

### Sampler and Symbol Descriptions

- Dames & Moore Type-U sample
- Standard Penetration Test
- No Recovery
- Bk  Bulk sample
- Disturbed Type-U Sample
- Shelby Tube Sample
- Rock Core Sample
- Approximate depth of perched water or groundwater

Note: Number of blows required to advance driven sample 12" (or length noted) is recorded.

### Laboratory and Field Test Abbreviations

<b>CBR</b>	California Bearing Ratio test
<b>COL</b>	Collapse Potential test (test result in parentheses)
<b>COMP</b>	Compaction test
<b>CON</b>	Consolidation test
<b>CORR</b>	Corrosivity test
<b>DSCD</b>	Consolidated drained direct shear test (normal pressure and shear strength results shown)
<b>EI</b>	Expansion Index test (test result in parentheses)
<b>LL=29</b>	Liquid limit (Atterberg limits test)
<b>PI=11</b>	Plasticity Index (Atterberg limits test)
<b>PP</b>	Pocket Penetrometer test (test result in parentheses, tsf)
<b>R-Value</b>	Resistance Value test
<b>SA</b>	Sieve Analysis (-200 result in parentheses)
<b>SE</b>	Sand Equivalent test (test result in parentheses)
<b>SWELL</b>	Swell Load test (test result in parentheses)
<b>TV</b>	Torvane test (test result in parentheses, tsf)
<b>-200</b>	Percent passing #200 sieve (test result in parentheses)

## KEY TO LOG OF BORING

PROPOSED WEST CAMPUS INFRASTRUCTURE PROJECT  
UNION STATION  
LOS ANGELES, CALIFORNIA

Date(s) Drilled	10-14-02	Logged By	Jeff Pyska	<b>Boring B-1</b> <b>Sheet 1 of 1</b>	
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8-inch O.D.		
Drill Rig Type	B61	Hammer Data	140 lbs, 30-inch drop		
Sampling Method(s)	Dames & Moore Type-U, SPT, Bulk			Job Number	29401632.00001
Approximate Groundwater Depth and Date Measured	Groundwater encountered at 24 feet below ground surface on 10/14/2002			Total Depth Drilled (ft)	40.0
Comments	None			Approximate Ground Surface Elevation(ft)	278 feet MSL

Elevation (ft)	SAMPLES			Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	Depth (ft)	Type	Number						
0	0	☒	Bk-1		SM	About 2.5-inch thick Asphaltic Concrete			
	1	■	1	35		<b>FILL</b> Silty SAND mottled brown, loose to medium dense, moist, fine to coarse, with fine gravel Pieces of bricks in cuttings	12	101	-200(26); +4(27)
	5	□		11		Grades dark gray, with trace asphalt	11		
	2	■	2	4					
270	3	■	3	35/1*					
	10	■	4	28	SM	<b>ALLUVIUM</b> Silty SAND brown, medium dense, slightly moist, fine to coarse, with fine to coarse gravel Gravel/rock powder in shoe	2		
	15	■	5	91/11*	SP-SM	SAND with silt brown, very dense, slightly moist, fine to coarse, with fine to coarse gravel	3	124	
260									
	20	■	6	50/5*					
	25	■	7	56		Grades wet	13	111	
250									
	30	■	8	56	SM	Silty SAND gray, very dense, wet, fine to coarse, with fine to coarse gravel			
	35	■	9	50/0*		Grades with coarse gravel and cobble			
240									
	40	■	10	50/2*					

This log is part of the report prepared by URS for this project and should be read together with the report. This summary applies only at the location of the exploration and at the time of drilling or excavation. Subsurface conditions may differ at other locations and may change at this location with time. Data presented are a simplification of actual conditions encountered.

**LOG OF BORING**  
**PROPOSED WEST CAMPUS INFRASTRUCTURE PROJECT**  
**UNION STATION**  
**LOS ANGELES, CALIFORNIA**



FIGURE A-2

1020312200514722



Date(s) Drilled	10-14-02	Logged By	Jeff Pyska	<b>Boring B-2</b> <b>Sheet 1 of 2</b>	
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8-inch O.D.		
Drill Rig Type	B61	Hammer Data	140 lbs, 30-inch drop		
Sampling Method(s)	Dames & Moore Type-U, SPT, Bulk			Job Number	29401632.00001
Approximate Groundwater Depth and Date Measured	Groundwater encountered at 40 feet below ground surface on 10/14/2002			Total Depth Drilled (ft)	51.5
Comments	None			Approximate Ground Surface Elevation(ft)	293 feet MSL

Elevation (ft)	Depth (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per 6-inch					
0		☒ BK-1				About 2.5-inch thick Asphaltic Concrete			
290					SM	<b>FILL</b> Silty SAND brown, loose to medium dense, moist, fine to coarse, with fine gravel and pieces of brick			COMP DSCD
5		█ 1	14		ML	Sandy SILT olive-brown, medium dense, moist, fine to coarse, with trace fine gravel and pieces of siltstone	20		-200(57); +4(7)
10		█ 2	42			Grades mottled brown and gray, with fine to coarse gravel			
280		█ 3	50/6"			Grades very dense	10		
15		█ 4	28		SM	<b>ALLUVIUM</b> Silty SAND gray, loose to medium dense, moist, fine to coarse, with trace fine gravel			
20		█ 5	8		ML	Grades with less silt and gravel Sandy SILT gray, medium dense, moist, fine			DSCD
270		█ 6	35			White with black crystals rock in shoe			
25		█ 7	27		SM	Silty SAND light greenish-gray, medium dense, slightly moist, fine to coarse, with some fine to coarse gravel	4		
30		█ 8	79			Grades with some brown layers, dense			
35		█ 9	38		SP-SM	SAND with silt gray, dense, slightly moist, fine			
260		█ 10	36		SM	Silty SAND greenish-gray to gray, medium dense, slightly moist, fine to coarse, with some fine to coarse gravel	25	96	CON
35		█ 11	50/5"			Grades greenish-gray to brown, very dense, with more sand	3		
40									

Report: URS-1FOOT; Project File: G:\GINT-ZZWP\PROJECTS\UNION3.GPJ; Data Template: DMLA.GDT Printed: 10/24/03

This log is part of the report prepared by URS for this project and should be read together with the report. This summary applies only at the location of the exploration and at the time of drilling or excavation. Subsurface conditions may differ at other locations and may change at this location with time. Data presented are a simplification of actual conditions encountered.

**LOG OF BORING**  
**PROPOSED WEST CAMPUS INFRASTRUCTURE PROJECT**  
**UNION STATION**  
**LOS ANGELES, CALIFORNIA**



FIGURE A-3

1020312200514722

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number						
40		■	12	64	SM	Silty SAND greenish-gray to brown, dense, wet, fine to coarse, with fine to coarse gravel			
250	45	■	13	28	SP-SM	SAND with silt gray, medium dense, moist, fine to coarse, with trace fine gravel	12	112	-200(8); +4(7)
50		■	14	45			9		
240	55								
60									
230	65								
70									
220	75								
80									
210	85								
90									

Report: URS-1FOOT; Project File: G:\GINT-ZZWP\PROJECTS\UNION3.GPJ; Data Template: DMLA.GDT Printed: 10/24/03



FIGURE A-3

1020312200514722



Date(s) Drilled	10-16-02	Logged By	Jeff Pyska	<b>Boring B-3</b> Sheet 1 of 2	
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8-inch O.D.		
Drill Rig Type	B61	Hammer Data	140 lbs, 30-inch drop		
Sampling Method(s)	Dames & Moore Type-U, SPT, Bulk			Job Number	29401632.00001
Approximate Groundwater Depth and Date Measured	Groundwater encountered at 38 feet below ground surface on 10/16/2002			Total Depth Drilled (ft)	51.5
Comments	None			Approximate Ground Surface Elevation(ft)	293 feet MSL

Elevation (ft)	Depth (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per 6-inch					
0		Bk-1			SM	About 2.5-inch thick Asphaltic Concrete FILL			
290					CL	Silty SAND brown, loose to medium dense, moist, fine to coarse, with fine to coarse gravel			CORR
	5	1	11		CL	Sandy CLAY mottled brown and gray, stiff, moist, fine to coarse, with trace fine gravel and some organics	19		-200(61); +4(2)
	10	2	37			Grades very stiff, with some silty sand layers, some siltstone fragments, and no organics	23	103	-200(76); +4(2)
280		3	26			Grades with pieces of wood and brick in cuttings	26		
	15	5	22			Grades stiff, with large gravel particle in bottom ring and nothing in shoe	26	98	
	20	6	7		SM	ALLUVIUM Silty SAND dark gray, loose, moist, fine, with organics			
270		8	39			Grades gray, dense, fine to coarse, with fine to coarse gravel			
	25	9	50/4"			Grades gray to brown, very dense, slightly moist, coarse gravel in shoe	4	120	
	30	10	50/6"						
260		11	50/4"		SP-SM	SAND with silt gray, very dense, moist, fine to coarse, with fine to coarse gravel			
	35								
40									

Report: URS-1FOOT; Project File: G:\GINT-ZZWP\PROJECTS\UNION3.GPJ; Data Template: DMLA.GDT Printed: 10/24/03

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**LOG OF BORING**  
**PROPOSED WEST CAMPUS INFRASTRUCTURE PROJECT**  
**UNION STATION**  
**LOS ANGELES, CALIFORNIA**



FIGURE A-4

1020312200514722



Elevation (ft)	Depth (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per 6-inch					
40		■	12	79/11*	SP-SM	SAND with silt gray, very dense, moist, fine to coarse, with fine to coarse gravel	8	128	
250	45	■	13	50/6*					
50	50	■	14	69/11*					
240	55								
60	60								
230	65								
70	70								
220	75								
80	80								
210	85								
90	90								

Report: URS-1FOOT; Project File: G:\GINT-ZZ\PROJECTS\UNION3 GP.J; Data Template: DMLA.GDT Printed: 10/24/03



FIGURE A-4

Date(s) Drilled	10-16-02	Logged By	Jeff Pyska	<b>Boring B-4</b> Sheet 1 of 2	
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8-inch O.D.		
Drill Rig Type	B61	Hammer Data	140 lbs, 30-inch drop		
Sampling Method(s)	Dames & Moore Type-U, SPT, Bulk			Job Number	29401632.00001
Approximate Groundwater Depth and Date Measured	Groundwater encountered at 39 feet below ground surface on 10/16/2002			Total Depth Drilled (ft)	51.5
Comments	None			Approximate Ground Surface Elevation(ft)	293 feet MSL

Elevation (ft)	Depth (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per 6-inch					
0		☒ Bk-1			SM	About 2.5-inch thick Asphaltic Concrete			
290	5	■ 1	36			<b>FILL</b> Silty SAND brown to reddish-brown, loose to medium dense, moist, fine to coarse, with trace fine gravel	16	112	
	10	■ 2	50/6*			Grades gray, moist, very dense, with asphalt and grass	11		
280	15	■ 4	24		ML	Pieces of brick and wood in cuttings <b>SILT</b> gray, black, and brown mottled, very stiff, moist, with fine to coarse sand and pieces of wood	16		
	20	■ 6	21			Grades with pieces of wood and concrete			
270	25	□ 7	50/6*		SM	<b>ALLUVIUM</b> Silty SAND grayish-brown, very dense, slightly moist, fine to coarse, with trace fine gravel	4		
	30	■ 10	50/6*						
260	35	☒ 11	89/11*			Grades gray, with fine to coarse gravel			
	40								

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**LOG OF BORING**  
**PROPOSED WEST CAMPUS INFRASTRUCTURE PROJECT**  
**UNION STATION**  
**LOS ANGELES, CALIFORNIA**

FIGURE A-5



1020312200514722

Report: URS-1FOOT; Project File: G:\GINT-ZZ\PROJECTS\UNION3.GPJ; Data Template: DMLA.GDT Printed: 10/24/03

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS		
		Type	Number							Blows per 6-inch	
40	40	■	12	53	SM	Silty SAND gray, very dense, moist, fine to coarse, with fine to coarse gravel					
250	45	■	13	50/5*						SP-SM	SAND with silt gray, very dense, wet, fine to coarse, with fine gravel
50	50	■	14								
240	55										
60	60										
230	65										
70	70										
220	75										
80	80										
210	85										
90	90										

Report: URS-1FOOT, Project File: G:\GINT-ZZWP\PROJECTS\UNION3.GPJ, Data Template DMLA.GDT Printed: 10/24/03



Date(s) Drilled	10-14-02	Logged By	Jeff Pyska	<b>Boring B-6</b> Sheet 1 of 2	
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8-inch O.D.		
Drill Rig Type	B61	Hammer Data	140 lbs, 30-inch drop		
Sampling Method(s)	Dames & Moore Type-U, SPT, Bulk			Job Number	29401632.00001
Approximate Groundwater Depth and Date Measured	Groundwater encountered at 24 feet below ground surface on 10/14/2002			Total Depth Drilled (ft)	51.0
Comments	None			Approximate Ground Surface Elevation(ft)	278 feet MSL

Elevation (ft)	Depth (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per 6-inch					
0		☒ Bk-1			SM ML	About 2.5-inch thick Asphaltic Concrete <b>FILL</b> Silty SAND brown, moist, fine to coarse, with fine gravel Sandy SILT grayish-brown, loose, moist, fine to coarse, with trace fine to coarse gravel and some clay	25		-200(76); +4(0) CORR
	1	█	1	9					
	2	☒	2	26	SM		3	92	
	3	█	3	35			2		
270	4	█	4	63		Grades with iron-oxide staining and trace gray clay/silt chunks			
	5	█	5	50/6"		Grades very dense, without clay/silt chunks	4		-200(9); +4(39)
260	6	█	6	50/6"		Grades gray	3	115	
	7	█	7	37		Grades dense, wet	12		
250	8	█	8	31	ML	Sandy SILT greenish-gray, medium dense, wet, fine to coarse, with fine to coarse gravel and some clay			CON, DSCD
	9	█	9	5		Grades loose	45		-200(92); +4(0)
240					SP	SAND			
40									

Report: URS-1FOOT; Project File: G:\INT-ZZWP\PROJECTS\UNION3.GPJ; Data Template: DMLA.GDT Printed: 10/24/03

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**LOG OF BORING**  
**PROPOSED WEST CAMPUS INFRASTRUCTURE PROJECT**  
**UNION STATION**  
**LOS ANGELES, CALIFORNIA**

FIGURE A-7



1020312200514722

Elevation (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	Type	Number	Blows per 6-inch					
40	■	10	36	SP	SAND gray, medium dense, wet, fine to coarse			
45	▣	11	56	SM	Silty SAND gray to greenish-gray, very dense, wet, fine to coarse, with some fine gravel			
50	⊗	12	50/6*			12		
55								
60								
65								
70								
75								
80								
85								
90								

Report: URS-1FOOT; Project File: G:\GINT-ZZWP\PROJECTS\UNION3.GPJ; Data Template: DMLA.GDT Printed: 10/24/03

Date(s) Drilled	10-16-02	Logged By	Jeff Pyska	<b>Boring B-7</b> <b>Sheet 1 of 1</b>	
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8-inch O.D.		
Drill Rig Type	B61	Hammer Data	140 lbs, 30-inch drop		
Sampling Method(s)	Dames & Moore Type-U, SPT, Bulk			Job Number	29401632.00001
Approximate Groundwater Depth and Date Measured	No groundwater encountered			Total Depth Drilled (ft)	16.0
Comments	None			Approximate Ground Surface Elevation(ft)	278 feet MSL

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number						
0		☒ Bk-1			SM	About 4-inch thick Asphaltic Concrete over 2-inch thick Base			
		☑ 1	4		ML	<b>FILL</b> Silty SAND reddish-brown, moist, fine to coarse, with trace fine to coarse gravel and brick fragments	13		-200(37); +4(18)
	5	☑ 2	35		SP-SM	Sandy SILT dark brown, loose, moist, fine to coarse	8	115	
270		☑ 3	34			<b>ALLUVIUM</b> SAND with silt yellowish-brown, medium dense to dense, moist, fine to coarse, with some fine to coarse gravel			
	10	☐ 4	50/5*			Grades very dense			
	15	☑ 5	50/5*				5		
260									
	20								
	25								
250									
	30								
	35								
240									
	40								

Report: URS-1FOOT; Project File: G:\GINT-ZZWP\PROJECTS\UNIONS.GPJ; Data Template DMLA.CDT Printed: 10/24/03

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**LOG OF BORING**  
**PROPOSED WEST CAMPUS INFRASTRUCTURE PROJECT**  
**UNION STATION**  
**LOS ANGELES, CALIFORNIA**

FIGURE A-8



1020312200514/22



Date(s) Drilled	10-16-02	Logged By	Jeff Pyska	<b>Boring B-8</b> Sheet 1 of 1	
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8-inch O.D.		
Drill Rig Type	B61	Hammer Data	140 lbs, 30-inch drop		
Sampling Method(s)	Dames & Moore Type-U, SPT, Bulk			Job Number	29401632.00001
Approximate Groundwater Depth and Date Measured	No groundwater encountered			Total Depth Drilled (ft)	16.5
Comments	None			Approximate Ground Surface Elevation(ft)	278 feet MSL

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number						
0	0	Bk-1			SM	About 4-inch thick Asphaltic Concrete			
	1		19		SM	<b>FILL</b> Silty SAND brown to dark brown, loose, moist, fine to coarse, with fine to coarse gravel and concrete debris			
	2		25		SM	<b>ALLUVIUM</b> Silty SAND brown to yellowish-brown, medium dense, slightly moist, fine to coarse, with fine to coarse gravel	2		
270	3		26		SP-SM	SAND with silt brown, medium dense, slightly moist, fine to coarse, with trace fine gravel	4	96	
	4		10						
	5		24			Grades yellowish-brown, moist, with some silt lenses, and iron-oxide staining	8	100	
260									
	20								
	25								
250									
	30								
	35								
240									
	40								

Report: URS-1FOOT; Project File: G:\GINT-ZZWP\PROJECTS\UNION3.GPJ; Data Template:DMLA.GDT Printed: 10/24/03

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

**LOG OF BORING**  
**PROPOSED WEST CAMPUS INFRASTRUCTURE PROJECT**  
**UNION STATION**  
**LOS ANGELES, CALIFORNIA**

FIGURE A-9



1020312200514722

## SOIL CLASSIFICATION CHART

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

NOTE: Dual symbols are used to indicate gravels or sand with 5-12% fines and soils with fines classifying as CL-ML. Symbols separated by a slash indicate borderline soil classifications.

### Sampler and Symbol Descriptions

- Dames & Moore Type-U sample
- Standard Penetration Test
- No Recovery
- Bk  Bulk sample
- Disturbed Type-U Sample
- Pitcher Tube Sample
- Shelby Tube Sample
- Rock Core Sample
- Approximate depth of perched water or groundwater

Note: Number of blows required to advance driven sample 12" (or length noted) is recorded.

### Laboratory and Field Test Abbreviations

- CBR California Bearing Ratio Test
- COL Collapse Potential test (test result in parentheses)
- COMP Compaction test
- CON Consolidation test
- CORR Corrosivity test
- DSCD Consolidated drained direct shear test (normal pressure and shear strength results shown)
- EI Expansion Index test (test result in parentheses)
- LL=29 Liquid limit (Atterberg limits test)
- PI=11 Plasticity Index (Atterberg limits test)
- PP Pocket Penetrometer test (test result in parentheses, tsf)
- R-Value Resistance Value test
- SA Sieve Analysis (-200 result in parentheses)
- SE Sand Equivalent test (test result in parentheses)
- SWELL Swell Load test (test result in parentheses)
- TV Torvane test (test result in parentheses, tsf)
- 200 Percent passing #200 sieve (test result in parentheses)

**KEY TO LOG OF BORING**  
 PROPOSED 3-STORY OFFICE BUILDING  
 LOS ANGELES, CALIFORNIA  
 FOR: CATELLUS DEVELOPMENT CORPORATION

Figure A-0



Date(s) Drilled	9/11/01	Logged By	TO	<b>Boring BH-1</b> Sheet 1 of 2	
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	Drag		
Drill Rig Type	Mobile Drill B-61	Hammer Data	140-lbs Hammer / 30-inch drop		
Sampling Method(s)	Dames & Moore Type U, SPT, Bulk			Job Number	59-00112046.01
Approximate Groundwater Depth and Date Measured	Not encountered			Total Depth Drilled (ft)	51.5
Comments	None			Approximate Ground Surface Elevation(ft)	278

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type Number	Blows per foot						
0					SM	4-inch Asphalt over 6-inch base material <b>ARTIFICIAL FILL (Af):</b> Dark brown silty fine to medium SAND, moist (loose)			
	5	☒ Bk-1 1	23				7	107	
270					SP	<b>ALLUVIUM (Qal):</b> Dark gray fine to coarse SAND with fine gravel, moist (medium dense)			
	10	☐ 2	23						
	15	■ 3	100/8"			Grades medium to coarse sand with fine gravel (very dense)	3		DSCD -200(5)
260									
	20	▣ 4	52			<b>PUENTE FORMATION (Tp):</b> Dark olive-gray SILTSTONE and CLAYSTONE, moist (weathered)			
	25	■ 5	50/2"						
250									
	30	▣ 6	50/6"			Grades with clasts			
	35	■ 7	50/5"						
240									
40									

Report: DMG4; Project File: G:\GINT\PROJECTS\UNIONZ.GPJ; Data Template: DMLA.GDT Printed: 10/30/02

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**LOG OF BORING**  
**PROPOSED 3-STORY OFFICE BUILDING**  
**LOS ANGELES, CALIFORNIA**  
**FOR: CATELLUS DEVELOPMENT CORPORATION**



Figure A-1

1020312200514722



Elevation (ft)	SAMPLES			Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	Depth (ft)	Type Number	Blows per foot						
40	8	80							
45	9	32				Grades olive-brown			
50	10	70/10"				<p>Becomes interbedded with SANDSTONE, thinly bedded, bedding inclined about 40 degrees from horizontal</p> <p>Boring completed to a depth of 51.5 feet below the existing ground surface. Borehole backfilled with soil cuttings on 9/11/01.</p>			
55									
60									
65									
70									
75									
80									
85									
90									

Report: DMG4; Project File: G:\GINTW\PROJECTS\UNION2.GPJ; Data Template: DMLA.GDT Printed: 10/30/02



Figure A-1

Date(s) Drilled	9/11/01	Logged By	TO	<b>Boring BH-2</b> Sheet 1 of 2	
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	Drag		
Drill Rig Type	Mobile Drill B-61	Hammer Data	140-lbs Hammer / 30-inch drop		
Sampling Method(s)	Dames & Moore Type U, SPT			Job Number	59-00112046.01
Approximate Groundwater Depth and Date Measured	24.5 feet			Total Depth Drilled (ft)	50.9
Comments	None			Approximate Ground Surface Elevation(ft)	278

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type Number	Blows per foot						
0					SM	4-inch of asphalt over 6-inch of base material <b>ARTIFICIAL FILL (Af):</b> Dark brown moist silty fine to medium SAND with gravel to 0.5 inches, moist (medium dense)			
5	1	29			CL	Dark brown silty CLAY with coarse sand, moist (stiff)			
270	2	42			SP	<b>ALLUVIUM (Ga):</b> Yellowish-brown fine to medium SAND with trace coarse sand, moist (medium dense)	3	108	DSCD
10	3	11			ML	Dark brown fine to medium sandy SILT, wet (medium dense)	12		
15	4	50/6"			SP	Yellowish-brown fine to medium SAND with trace gravel up to 2-inch, moist (very dense)	3	97	
260	5	50/6"							
25					CL	Light brown silty CLAY, wet (hard)			
250	6					Grades bluish-gray			
30	7	79				<b>PUENTE FORMATION (Tp):</b> Dark olive-gray interbedded CLAYSTONE and SANDSTONE, wet (weathered)			
35	8	50/4"							
240									
40									

Report: DMG4; Project File: G:\GINT\PROJECTS\UNION2.GPJ; Data Template: DMLA.GDT Printed: 10/30/02

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**LOG OF BORING**  
**PROPOSED 3-STORY OFFICE BUILDING**  
**LOS ANGELES, CALIFORNIA**  
**FOR: CATELLUS DEVELOPMENT CORPORATION**



Figure A-2

1020312200514722

Elevation (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	Depth (ft)	Type Number	Blows per foot					
40		9	50/6"					
45		10	100/10"		Grades black SILTSTONE with fine sand			
50		11	50/5"		Grades dark gray			
55	Boring completed to a depth of 51 feet below the existing ground surface. Borehole backfilled with soil cuttings 9/11/01.							
60								
65								
70								
75								
80								
85								
90								

Report: DMG4; Project File: G:\GINT\PROJECTS\UNION2.GPJ; Data Template: DMLA.GDT Printed: 10/30/02



Figure A-2

1020012200514722



Date(s) Drilled	9/11/01	Logged By	TO	<b>Boring BH-3</b> Sheet 1 of 2	
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	Drag		
Drill Rig Type	Mobile Drill B-61	Hammer Data	140-lbs Hammer / 30-inch drop		
Sampling Method(s)	Dames & Moore Type U, SPT			Job Number	59-00112046.01
Approximate Groundwater Depth and Date Measured	20 feet			Total Depth Drilled (ft)	51.0
Comments	None			Approximate Ground Surface Elevation(ft)	278

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type Number	Blows per foot						
0					SM	4-inch of Asphalt over 6-inch of base material <b>ARTIFICIAL FILL (Af):</b> Dark brown silty fine to medium SAND with gravel up to 0.5-inch, moist (loose to medium dense)			
5	1	27			SP	<b>ALLUVIUM (Qal):</b> Yellowish-brown fine to medium SAND, slightly moist (loose)			DSCD CORR
270					SP-SC	Dark brown fine to medium SAND with clay, moist (medium dense)			
10	2	45			SP	Yellowish-brown fine to coarse SAND with fine to coarse gravel, slightly moist (dense)	3		SA(3) CORR
15	3	50/5*					3	93	CON
260						<b>PUEENTE FORMATION (Tp):</b> Yellowish-brown SANDSTONE and bluish-gray SILTSTONE, thinly bedded, moist (weathered)			
20	4	50							
25	5	50/5*				Becomes wet, less weathered	27	95	CON
250									
30	6	50							
35	7	100/8*							
240									
40									

This log is part of the report prepared by URS for this project and should be read together with the report. This summary applies only at the location of the exploration and at the time of drilling or excavation. Subsurface conditions may differ at other locations and may change at this location with time. Data presented are a simplification of actual conditions encountered.

**LOG OF BORING**  
**PROPOSED 3-STORY OFFICE BUILDING**  
**LOS ANGELES, CALIFORNIA**  
**FOR: CATELLUS DEVELOPMENT CORPORATION**



Figure A-3

1020312200514720

Elevation (ft)	SAMPLES			Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pct)	OTHER TESTS and REMARKS
	Depth (ft)	Type Number	Blows per foot						
40		8	85						Bedding inclined at about 30 to 35 degrees from horizontal
45		9	50/6'						Bedding inclined at about 65 to 70 degrees from horizontal
50		10	50						
55	Boring completed to a depth of 51 feet below the existing ground surface. Borehole backfilled with soil cuttings 9/11/01.								
60									
65									
70									
75									
80									
85									
90									

Report: DMG4; Project File: G:\GINT\PROJECTS\UNION2.GPJ; Data Template: DMLA.GDT Printed: 10/30/02



Figure A-3

Date(s) Drilled	9/11/01	Logged By	TO	<b>Boring BH-4</b> Sheet 1 of 2	
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	Drag		
Drill Rig Type	Mobile Drill B-61	Hammer Data	140-lbs Hammer / 30-inch drop		
Sampling Method(s)	Dames & Moore Type U, SPT			Job Number	59-00112046.01
Approximate Groundwater Depth and Date Measured	19.5 feet			Total Depth Drilled (ft)	50.9
Comments	None			Approximate Ground Surface Elevation(ft)	278

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number						
0					SM	4-inch of Asphalt over 6-inch of base material <b>ARTIFICIAL FILL (Af):</b> Dark brown silty fine to medium SAND with gravel up to 2.5-inch, moist (loose)			
5	1	■	20			Grades brown	12	116	-200(30)
270					SP	<b>ALLUVIUM (Qal):</b> Yellowish-brown fine SAND with trace coarse sand and fine to coarse gravel, moist (dense)			
10	2	▣	40				3		
15	3	■	50/4"				5	116	
260									
20	4	▣	38			<b>PUEENTE FORMATION (Tp):</b> Gray CLAYSTONE and yellowish-brown SANDSTONE, thinly bedded, wet (weathered)			Bedding inclined at about 50 to 60 degrees from horizontal
25	5	■	50/5"						
250									
30	6	▣	65			Grades light bluish-gray and dark gray			
35	7	■	50/4"						
240									
40									

Report: DMG4; Project File: G:\GINTWAPROJECTS\UNION2.GPJ; Data Template: DMLA.GDT Printed: 10/30/02

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**LOG OF BORING**  
**PROPOSED 3-STORY OFFICE BUILDING**  
**LOS ANGELES, CALIFORNIA**  
**FOR: CATELLUS DEVELOPMENT CORPORATION**



Figure A-4

1020312200514722



Elevation (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	Depth (ft)	Type Number						
40		8	50/5					
45		9	50/4					
50		10	50/5					
55	Boring completed to a depth of 51 feet below the existing ground surface. Borehole backfilled with soil cuttings 9/11/01.							
60								
65								
70								
75								
80								
85								
90								

Report: DMG4; Project File: G:\GINT\PROJECTS\UNION2.GPJ; Data Template: DMLA.GDT Printed: 10/30/02

Date(s) Drilled	5/22/01	Logged By	KK - AP Engineering	<b>Boring BH-1</b> Sheet 1 of 2	
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch O.D.		
Drill Rig Type	Mobile Drill B-61	Hammer Data	140 lbs, 30-inch drop		
Sampling Method(s)	Dames & Moore Type U, SPT, Bulk			Job Number	59-00112046.01
Approximate Groundwater Depth and Date Measured	Encountered at 24.0 feet, 5/22/01			Total Depth Drilled (ft)	50.5
	None			Approximate Ground Surface Elevation(ft)	278.0

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number						
0					SM	5-inches Asphalt Grayish-brown, silty fine SAND with gravel, dry (medium dense)			
	2	☒		22					SA(13)
	5	■		41	SP-SM	Brown, fine SAND with silt and gravel to 3/4-inch, medium to coarse, dry (medium dense)	2	119	
270									
	10	☒		46		Becomes yellowish-brown to grayish-brown (dense)	3		SA(5)
	15	■		50/4"	SP	Yellowish-brown, poorly graded SAND with gravel to 3/8-inch, medium to coarse, moist (very dense)	8	104	-200(4), DS
260									
	20	□		50/4"					No recovery @ 20'
	25	■		60	ML	Gray, sandy SILT, moist (dense) Becomes wet	29	96	-200(78), DS, CON
250									
	30	☒		70	SP	Gray, poorly graded SAND, medium, trace gravel, wet (very dense)	13		-200(2)
	35	■		100/5"		Becomes coarse with more gravel	14	119	
240									
	40								

DMG4 UNION\_-1.GPJ DMLA.GDT 7/23/01

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**LOG OF BORING**  
**ONE UNION STATION PLAZA**  
**LOS ANGELES, CALIFORNIA**  
**FOR: CATELLUS DEVELOPMENT CORPORATION**



1020312200514722

Elevation (ft)	SAMPLES			Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	Type	Number	Blows per foot						
40	█		50/5"				17		
45	█		50/1"		SM	Gray, silty fine to medium SAND, wet (very dense)	19	108	DS, CON
230					SP-SM	Gray, fine to medium SAND with silt, wet (very dense)			
50	█		50/6"				24		Borehole completed to a depth of 50 1/2 feet below the ground surface on 05/22/01. Borehole backfilled with soil cuttings.
55									
220									
60									
65									
210									
70									
75									
200									
80									
85									
190									
90									

DMG4 UNION\_-1.GPJ DMLA.GDT 7/23/01





Date(s) Drilled	5/22/01	Logged By	KK - AP Engineering	<b>Boring BH-2</b> <b>Sheet 1 of 2</b>	
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch O.D.		
Drill Rig Type	Mobile Drill B-61	Hammer Data	140 lbs, 30-inch drop		
Sampling Method(s)	Dames & Moore Type U, SPT, Bulk			Job Number	59-00112046.01
Approximate Groundwater Depth and Date Measured	Encountered at 30.0 feet, 5/22/01			Total Depth Drilled (ft)	50.8
None				Approximate Ground Surface Elevation(ft)	278.0

Elevation (ft)	SAMPLES			Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	Depth (ft)	Type Number	Blows per foot						
0					SM	4-inches Asphalt over 3-inches of Base			
2	2	24				Dark grayish-brown, silty fine to medium SAND with fine gravel, moist (medium dense)	14	117	
5	5	53			SP-SM	Grayish-brown, medium SAND with silt and gravel to 3/8-inch, moist (medium dense)		118	
10	10	62			SM	Grayish-brown, silty medium to coarse SAND, moist (dense)	8		-200(17)
15	15	50			SP-SM	Olive-brown, medium SAND with silt and fine gravel, moist (very dense)	4		CORR
20	20	50/2"				Becomes yellowish-brown, gravel to 3/4-inch	6		-200(7)
25	25	30					22		
25	25				ML	Gray, sandy SILT, moist (medium dense)			
30	30	36				Becomes wet	38	79	LL=44, PI=15 -200(88), DS, CON
35	35	70			SP	Gray, poorly graded SAND with gravel, medium, wet (very dense)	9		-200(4)
40									

DMG4 UNION\_-1.GPJ DMLA.GDT 7/23/01

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**LOG OF BORING**  
**ONE UNION STATION PLAZA**  
**LOS ANGELES, CALIFORNIA**  
**FOR: CATELLUS DEVELOPMENT CORPORATION**



1020312200514722

Elevation (ft)	Depth (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per foot					
40	40	■		50/2"		Becomes fine to medium	17	117	
45	45	■		40	SP-SM	Gray, medium SAND with silt, trace gravel, wet (dense)	18		-200(7)
50	50	■		50/3"		Becomes very dense	18	112	DS
Borehole completed to a depth of 50 3/4 feet below the ground surface on 05/22/01. Borehole backfilled with soil cuttings.									
55									
60									
65									
70									
75									
80									
85									
90									

DMG4 UNION\_-1.GPJ DMLA.GDT 7/23/01

Date(s) Drilled	5/22/01	Logged By	KK - AP Engineering	<b>Boring BH-3</b> Sheet 1 of 1	
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch O.D.		
Drill Rig Type	Mobile Drill B-61	Hammer Data	140 lbs, 30-inch drop		
Sampling Method(s)	Dames & Moore Type U, SPT, Bulk			Job Number	59-00112046.01
Approximate Groundwater Depth and Date Measured	Encountered at 24.0 feet, 5/22/01			Total Depth Drilled (ft)	36.0
	None			Approximate Ground Surface Elevation(ft)	278.0

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number						
0					SM	4-inches Asphalt Dark brown, silty fine to medium SAND, moist (medium dense)			
	17	☒							
5		■			SP	Yellowish-brown, poorly graded SAND with gravel to 3/4-inch, medium, dry (medium dense)	2	115	-200(2)
270									
10		☒				Gravel to 3/8-inch (very dense)	2		
15		■			SP-SM	Brown, medium to coarse SAND with silt and gravel to 3/8-inch, dry (very dense)	3	112	-200(6)
260									
20		☒				Becomes grayish-brown, medium	3		
25		■				Becomes wet	20	100	DS
250									
30		☒				Becomes gray	11		-200(7)
35		■					16	108	Drill chatter @ 35' DS
240						Borehole terminated due to refusal at a depth of 36 feet below the ground surface on 05/22/01. Borehole backfilled with soil cuttings.			
40									

DMG4 UNION\_1.GPJ DMLA.GDT 7/23/01

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**LOG OF BORING**  
**ONE UNION STATION PLAZA**  
**LOS ANGELES, CALIFORNIA**  
**FOR: CATELLUS DEVELOPMENT CORPORATION**



1020312200514722



Date(s) Drilled	5/22/01	Logged By	KK - AP Engineering	<b>Boring BH-4</b> <b>Sheet 1 of 2</b>	
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	8-inch O.D.		
Drill Rig Type	Mobile Drill B-61	Hammer Data	140 lbs, 30-inch drop		
Sampling Method(s)	Dames & Moore Type U, SPT, Bulk			Job Number	59-00112046.01
Approximate Groundwater Depth and Date Measured	Encountered at 29.0 feet, 5/22/01			Total Depth Drilled (ft)	50.9
	None			Approximate Ground Surface Elevation(ft)	278.0

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number						
0					SP-SM	5-inches Asphalt over 5-inches Base Grayish-brown, fine SAND with silt, dry (loose)			
	15	☒					6	115	
	5	☒				Becomes medium with gravel to 3/8-inch (medium dense)	2		
270					SM	Brown, silty medium SAND with gravel to 3/8-inch, moist (dense)			
	10	☒					16	106	-200(34)
	15	☒	50/6"		SP-SM	Grayish-brown, medium SAND with silt and gravel to 3/8-inch, dry (very dense)	3		CORR
260					SM	Gray, silty fine SAND, moist (medium dense)			
	20	☒					27	98	-200(45), DS, CON
	25	☒			SP-SM	Gray, medium SAND with silt, moist (dense)			
	31						11		
250					ML	Gray, sandy SILT, very moist (medium dense)			
	30	☒				Becomes wet	34		-200(84)
	35	☒			SP-SM	Gray, medium SAND with silt and gravel, wet (very dense)			
	55						10		-200(7)
240									
40									

DMG4 UNION\_-1.GPJ DMLA.GDT 7/23/01

This log is part of the report prepared by Dames & Moore for this project and should be read together with the report. This summary applies only at the location of the exploration and at the time of drilling or excavation. Subsurface conditions may differ at other locations and may change at this location with time. Data presented are a simplification of actual conditions encountered.

**LOG OF BORING**  
**ONE UNION STATION PLAZA**  
**LOS ANGELES, CALIFORNIA**  
**FOR: CATELLUS DEVELOPMENT CORPORATION**



1020312200514722

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number						
40	40	█		49			18		-200(7)
45	45	█		50/5"	ML	Gray, sandy SILT, wet (very dense)	12		
50	50	█		50/5"					
Borehole completed to a depth of 51 feet below the ground surface on 05/22/01. Borehole backfilled with soil cuttings.									
55									
60									
65									
70									
75									
80									
85									
90									

DMG4 UNION\_-1.GPJ DMLA.GDT 7/23/01

## Existing Geotechnical Boring Logs Law Crandall, 1997



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# BORING 1

DATE DRILLED: August 19, 1997  
 EQUIPMENT USED: 8" - Diameter Hollow Stem Auger  
 ELEVATION: 275\*\*

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.
270	5	23.2	89	0		23	ML
		19.5	104	0		14	ML
265	10	--	--	0		16	SP
260	15	1.7	106	0		41	
255	20	9.9	105	0		105	
250	25	31.0	85	> 1000		65	
245	30	--	--			75 for 4"	
240	35	27.0	93	> 1000		76	
		30.3	90	> 1000		79	
235	40	33.6	84	> 1000		55	

3" Asphalt Paving  
ARTIFICIAL FILL (af)  
 CLAYEY SILT - some bedrock fragments, some roots, light brown

SANDY SILT - brown

ALLUVIUM (Qal)  
 SAND - fine to coarse, some Gravel, few Cobbles (to 6" in size), brown  
 Sample not recovered

Some Silt

SAN PEDRO FORMATION (Qsp)  
 SILT - bedded, lenses of fine Sand, dark grey

Sample not recovered

Sample not recovered  
 Some Clay  
 Some sulfur odor

\* Number of blows required to drive the Standard sampler 12 inches using a 140 pound hammer falling 30 inches.  
 \*\* See Plot Plan for location of bench mark  
 \*\*\* OVA Gastechtor Model No. 1238 used

NOTE: Water not encountered.

END OF BORING AT 40'

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

## LOG OF BORING

LAW/CRANDALL



# BORING 2

DATE DRILLED: August 19 and 21, 1997  
 EQUIPMENT USED: 24"-Diameter Bucket to 16 1/2'  
 10"-Dia. Hollow Stem Auger to 40 1/2'  
 ELEVATION: 275

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.
		12.1	114	0		1	SM
		4.8	119	0		1	
270	5	2.3	111	0		4	SW
		2.1	122	20		6	
265	10						
		2.9	128	30		5	
260	15	8.1	133	0		12	
255	20			0	100		SP-SM
		16.4	116	0		68+	SW
250	25			0	90		
		24.1	98	0		47	
245	30			0	100 for 8"		
240	35	25.6	100	0		65	
235	40			0	50		

4" Asphalt Paving  
**ARTIFICIAL FILL (af)**  
 SILTY SAND - fine to coarse, about 40% Gravel, few Cobbles (to 5" in size), some pieces of brick, brown

---

**ALLUVIUM (Qal)**  
 SAND - well graded, about 10% Gravel and Cobbles, light brownish grey

About 30% Gravel and Cobbles (to 6" in size)

Grey

SAND and SILTY SAND - fine to coarse, about 20% Gravel, light greyish brown

---

**SAN PEDRO FORMATION (Qsp)**  
 SAND - well graded, thin layers of Clayey Silt, some Gravel, grey to dark grey

Some fine Sand

SILT - bedded, lenses of fine Sand, dark grey

\* Number of blows required to drive the Crandall sampler 12 inches using a 1600 pound hammer falling 12 inches.  
 + Number of blows required to drive the Crandall sampler 12 inches using a 140 pound hammer falling 30 inches.

It is not warranted to be representative of subsurface conditions at other locations and times.

(CONTINUED ON FOLLOWING FIGURE)

## LOG OF BORING

LAW/CRANDALL





### BORING 3

DATE DRILLED: August 14, 1997  
 EQUIPMENT USED: 24"-Diameter Bucket to 17½'  
 10"-Dia. Hollow Stem Auger to 42'  
 ELEVATION: 277

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.	DESCRIPTION
275	0	6.9	114	30		1	SM	7" Asphalt Paving ARTIFICIAL FILL (af) SILTY SAND - fine to coarse, some Clay, some Gravel, dark grey SANDY SILT - grey
	5	18.6	105	0		< 1	ML	
270	5	8.0	100	20		1	SM	ALLUVIUM (Qa) SILTY SAND - fine, some pieces of wood, light brown SAND - well graded, some Gravel and Cobbles (to 8" in size), light brownish grey
	10	2.6	122	50		5	SW	
265	10	3.7	113	80		6		
	15	11.4	116	0		2		About 30% Gravel
260	15							
	20	11.5	120	50		135		Grey
255	20							
	25	33.0	90	60		75 for 10"	ML	CLAYEY SILT - grey to dark grey
250	25							
	30	27.1	96	200		70		SAN PEDRO FORMATION (Qsp) SILT - massive, dark grey
245	30							
	35	35.1	89	0		47	SM	SILTY SAND - fine, thin layers of Silty Clay, bluish grey to dark grey
240	35							
	40	15.0	111	0		65	SW	SAND - well graded, some lenses of Clayey Silt, dark grey

(CONTINUED ON FOLLOWING FIGURE)

### LOG OF BORING

LAW/CRANDALL



It is not warranted to be representative of subsurface conditions at other locations and times.







# BORING 4

DATE DRILLED: August 20, 1997  
 EQUIPMENT USED: 8" - Diameter Hollow Stem Auger  
 ELEVATION: 276

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.
275		9.7	103	0		17	SM
	5			0		35	SW
270		2.8	107	0		36	
	10						
265		42.8	79	0		10	
	15						
260		6.2	124	5		57	
	20						
255		8.5	126	10		60	
	25						
250		29.9	91	10		34	
	30						
245		25.8	98	300		80	
	35						
240		25.4	100	190		80	
	40						
		26.0	100	250		75 for 4"	
		25.9	97	200		80	

3' Asphalt Paving  
ARTIFICIAL FILL (af)  
 SILTY SAND - fine, some Gravel, brownish grey

---

ALLUVIUM (Qal)  
 SAND - well graded, about 30% Gravel, light grey

\* Number of blows required to drive the Crandall sampler 12 inches using a 140 pound hammer falling 30 inches.

Layer of Silty Clay  
 Some fine Sand

About 40% Gravel

---

SAN PEDRO FORMATION (Qsp)  
 SILT - bedded, lenses of fine Sand, dark grey

NOTE: Water seepage encountered during drilling at depths of 18' to 20', and 30'. Water level measured at a depth of 18' at completion of drilling.

END OF BORING AT 40'.

Note: The log of subsurface conditions is representative of subsurface conditions at other locations and times.

## LOG OF BORING

LAW/CRANDALL 

FIGURE A-1.4

# BORING 5

DATE DRILLED: August 13, 1997  
 EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION: 278

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE	STD. PEN. TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.
278	0	-	-	0			4	SM
275	3	1.4	121	0			3	SW
270	5	1.9	128	0			7	
265	10	3.3	103	0			2	
260	15	6.3	114	0			4	
255	20	29.5	97	0			1	ML
250	25	37.4	85	0			<1	
245	25	35.1	87	0			<1	
240	30	14.0	109	10			9	SW
235	30	25.7	100	100			11	
230	33	23.0	104	175			19	

3 1/2" Asphalt Paving  
 ARTIFICIAL FILL (af) - SILTY SAND - fine, light grey -  
 ALLUVIUM (Qal)  
 SAND - well graded, about 40% Gravel, few Cobbles  
 (to 5" in size), light grey

\* Number of blows required to drive the Crandall sampler 12 inches using a 140 pound hammer falling 30 inches.

CLAYEY SILT - dark grey

SAN PEDRO FORMATION (Qsp)  
 SAND - well graded, lenses of Silty Sand and Clayey Silt, dark grey  
 SILT - bedded, lenses of fine Sand, dark grey

(BORING TERMINATED AT A DEPTH OF 33' DUE TO DIFFICULT DRILLING BELOW WATER).

NOTE: Water seepage encountered during drilling at a depth of 22'. Water level measured at a depth of 22' 30 minutes after completion of drilling. Raveling from 2' to 8' (to 3 1/2" in diameter) and from 8' to 17' (to 2 1/2" in diameter).

Note: The log of subsurface conditions shown herein applies only at the specific boring location and at the time of the boring.

## LOG OF BORING

LAW/CRANDALL 



ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.
275	5	1.4	116	50		2	SM
		1.7	103	75		1	SW
270	10	1.6	117	10		5	
		1.8	115	0		6	
265	15	2.7	99	0		5	
		4.1	114	0		8	
260	20	30.3	94	0		4	
		22.1	104	0		6	
255	25	7.8	118	0		1	SM
		18.3	114	0		2	
250	30	10.7	117	0		145 +	SW
245	35						
240	40	8.6	136	0		70	

### BORING 6

DATE DRILLED: August 19, 1997  
 EQUIPMENT USED: 24"-Diameter Bucket to 30'  
 10"-Dia. Hollow Stem Auger to 42'  
 ELEVATION: 278

4" Asphalt Paving - 6" Brick floor  
 ARTIFICIAL FILL (af)  
 SILTY SAND - fine to coarse, brown  
 -----  
 ALLUVIUM (Qal)  
 SAND - well graded, about 40% Gravel, and  
 Cobbles (to 5" in size), light brownish grey

Thin layers of Sandy Silt

SILTY SAND - fine, lenses of Sandy Silt, few Gravel, grey

SAND - well graded, about 15% Gravel and Cobbles, grey

\* Number of blows required to drive the Crandall sampler 12 inches using a 1600 pound hammer falling 12 inches.  
 + Number of blows required to drive the Crandall sampler 12 inches using a 140 pound hammer falling 30 inches.

Note: The log of subsurface conditions shown herein applies only at the specific boring location and at the time of boring. It is not warranted to be representative of subsurface conditions at other locations and times.

(CONTINUED ON FOLLOWING FIGURE)

### LOG OF BORING

LAW/CRANDALL 





# BORING 7

DATE DRILLED: August 18, 1997  
 EQUIPMENT USED: 8" - Diameter Hollow Stem Auger  
 ELEVATION: 278

Note: The log of subsurface conditions shown herein represents only the specific boring location and is not warranted to be representative of subsurface conditions at other locations and times.

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD. PEN. TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.	DESCRIPTION
278	0							5" Asphalt Paving <u>ARTIFICIAL FILL (af)</u> SANDY SILT - some Clay, some pieces of brick, brown
275	5	13.4	109	0		13 for 6"	ML	Pieces of concrete Sample not recovered
270	10	--	--	0		50 for 6"		
265	15	2.9	105	0		73 for 11"	SW	<u>ALLUVIUM (Qal)</u> SAND - well graded, about 30% Gravel and Cobbles (to 6" size), light brown
260	20	3.5	110	0		75 for 11"		* Number of blows required to drive the Crandall sampler 12 inches using a 140 pound hammer falling 30 inches.
255	25	1.9	98	0		50 for 4"		
250	30	37.4	82	0		26		<u>SAN PEDRO FORMATION (Qsp)</u> SILT - bedded, lenses of Sand, dark grey
245	35	30.1	92	0		62		More Clay
240	40	24.3	97	0		69		
		26.8	97	0		73		
		29.7	94	0		75		
		21.7	99	0		32		

NOTE: Water seepage encountered during drilling at a depth of 20'. Water level measured at a depth of 36' 5 minutes after completion of drilling.

END OF BORING AT 40'.

## LOG OF BORING

LAW/CRANDALL 

FIGURE A-1.7



# BORING 8

DATE DRILLED: August 18, 1997  
 EQUIPMENT USED: 8" - Diameter Hollow Stem Auger  
 ELEVATION: 278

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD. PEN. TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.	DESCRIPTION
278	0	8.2	108	0		51	SM	3" Asphalt Paving ARTIFICIAL FILL (af) SILTY SAND - fine to medium, some Gravel, few Cobbles (to 6" in size), brown
273	5	--	--	0		39	SP	ALLUVIUM (Qal) SAND - fine to medium, some coarse, about 30% Gravel and Cobbles (to 6" in size), light brownish grey Sample not recovered
270	10	1.6	108	0		58		
265	15	4.4	92	0		50 for 9"		Fine Sand, less Gravel
260	20	1.7	115	0	64 for 9"	50 for 6"	SW	SAND - well graded, about 30% Gravel and Cobbles (to 6" in size), light brownish grey
255	25	8.7	123	0	73 for 9"	50 for 9"		
250	30	13.3	117	0	50 for 4"	57		
245	35	--	--	0	85 for 10"	48	ML	SANDY SILT - some Clay, light greyish green Sample not recovered
240	40			0		32		SAN PEDRO FORMATION (Qsp) SILT - bedded, lenses of fine Sand, dark grey

Note: The log of subsurface conditions shown here is only at the boring location and times. It is not warranted to be representative of subsurface conditions at other locations and times.

(CONTINUED ON FOLLOWING FIGURE)

## LOG OF BORING

LAW/CRANDALL 



# BORING 8 (Continued)

DATE DRILLED: August 18, 1997  
 EQUIPMENT USED: 8" - Diameter Hollow Stem Auger  
 ELEVATION: 278

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.
235		26.3	99	0		72	■
	45			0	54		▲
230		--	--	0		64	□
	50						
225				0	75		▲
	55						
220		26.1	95	0		69	■
	60			0	50 for 6"		▲



Sample not recovered

END OF BORING AT 61'.

NOTE: Water seepage encountered during drilling at a depth of 23'. Water level measured at a depth of 38' 5 minutes after completion of drilling.

Note: The log of subsurface conditions shown herein represents only the conditions encountered at the locations and times shown. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LAW/CRANDALL



FIGURE A 1.8b

# BORING 9

DATE DRILLED: August 18, 1997  
 EQUIPMENT USED: 8" - Diameter Hollow Stem Auger

ELEVATION: 278

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD. PEN. TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.	DESCRIPTION
275	5	12.6	106	0		34	SM	3" Asphalt Paving ARTIFICIAL FILL (af) SILTY SAND - fine to coarse, some Gravel, grey and brown
270	10	16.4	104	0		25	SW	ALLUVIUM (Qa) SAND - well graded, some Gravel and Cobbles (to 6" in size), light brownish grey Sample not recovered
265	15	--	--	0		50 for 6"		About 50% Gravel, some Cobbles (to 10" in size)
260	20	2.6	--	0		75 for 11"	SP	SAND - fine, some Gravel, brown
255	25	4.2	108	0		55		Sample not recovered
250	30	--	--	0		50 for 3"	SW	SAND - well graded, about 30% Gravel and Cobbles (to 6" in size), light grey Sample not recovered
245	35	--	--	0		50 for 6"		Sample not recovered
240	40	3.9	107	0		53		Sample not recovered
		11.6	120	0		58		Layer of fine to medium Sand
		8.2	125	0		40		Sample not recovered
		--	--	0		17		Sample not recovered
		--	--	0		29		Sample not recovered

Note: The log of subsurface conditions shown here is only at the location being drilled and is not warranted to be representative of subsurface conditions at other locations and times.

(CONTINUED ON FOLLOWING FIGURE)

## LOG OF BORING

LAW/CRANDALL



FIGURE A-1.9a







# BORING 10

DATE DRILLED: August 19, 1997  
 EQUIPMENT USED: 8" - Diameter Hollow Stem Auger  
 ELEVATION: 279

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.	DESCRIPTION
279	0						SM	3" Asphalt Paving ARTIFICIAL FILL (af) SILTY SAND - fine to coarse, some Gravel, some pieces of brick, brown
275	5	8.9	110	50		32	SP	ALLUVIUM (Qa) SAND - fine to medium, about 15% Gravel, light brown
270	10	2.0	86	10		16		
270	10	3.2	103	10		19		
265	15			0	55		SW	SAND - well graded, about 20% Gravel and Cobbles, grey
260	20	4.8	121	0		55		
260	20			0	60			About 40% Gravel and Cobbles (to 6" in size)
255	25	2.3	110	0		55		
255	25			0	50			
250	30	13.4	117	0		49		
250	30			0	95			
245	35	--	--			37		Sample not recovered
240	40	10.7	128	0		55		
240	40			0	70		SP-SM	SAND and SILTY SAND - fine to coarse, about 10% Gravel, grey

It is not warranted to be representative of subsurface conditions at other locations and times.

(CONTINUED ON FOLLOWING FIGURE)

## LOG OF BORING

LAW/CRANDALL 

# BORING 10 (Continued)

DATE DRILLED: August 19, 1997  
 EQUIPMENT USED: 8" - Diameter Hollow Stem Auger  
 ELEVATION: 279

It is not warranted to be representative of subsurface conditions at other locations and times.

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.
235	45	18.5	110	0		75	SW
230	50	--	--	50	100 for 9"	65	
225	55			0	54		
220	60			0	97		

SAND - well graded, about 10% Gravel and Cobbles, grey

Sample not recovered

END OF BORING AT 60 1/2'.

NOTE: Water seepage encountered during drilling at a depth of 23'. Water level measured at a depth of 35 1/2' 5 minutes after completion of drilling.

## LOG OF BORING

LAW/CRANDALL 

**Existing Geotechnical Boring Logs**  
**J Byer, 1998**



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# LOG OF BORING 1

PROJECT: JB:17776-B CATELLUS

DATE LOGGED: 6/4/98 BY: JWB

BORING TYPE: 8 Inch Hollow-Stem

SURFACE: 5 Inch AC Pavement

REPORT DATE: 7/9/98

ELEVATION: 276.4

Moisture Content %	Dry Density (pcf)	Blow Count	Sample Type	Symbol USCS	Description
					4 Inches Asphalt
26.0	96.9	15*	R	SC	<b>FILL:</b> Clayey Sand, dark brown, moist, dense, some debris, asphalt, concrete, brick
				SC	<b>ALLUVIUM:</b> Clayey Sand, dark brown, moist, medium dense, porous, grades to sand, light brown, moist, dense
6.2	119.5	43	R	SM	Silty Sand, light and dark brown, moist, medium dense with round granite cobbles
3.1	—	43	R		Silty Sand, light brown, moist, dense
					Gravelly layers with coarse sand
33.6	80.9	9	R		Sandy Silt, gray green, moist, firm, some peat
4.6	112.3	40	R	SG	Gravelly Sand, light brown, moist, dense
36.7	83.5	25	R		<u>Water at 16 Feet</u>
				ML	Clayey Silt, light bluish gray, saturated, soft
				SG	Gravelly Sand, gray, saturated, dense
9.8	118.4	50	R		
10.6	114.7	43	R	GW	Sandy Gravel, gray, saturated, dense, rounded granite clasts
					*140 Pound hammer, 30 Inch drop
12.0	125.9	45	R		

The J. Byer Group, Inc.

42 E. Wilson Avenue • Suite 201 • Glendale, California 91206 • (818) 549-9959 • Fax (818) 543-3747

"Trust the Name You Know"

# LOG OF BORING 1 (Continued)

PROJECT: JB:17776-B CATELLUS  
 DATE LOGGED: 6/4/98 BY: JWB  
 BORING TYPE: 8 Inch Hollow-Stem  
 SURFACE: Asphalt Parking Lot  
 REPORT DATE: 7/9/98 ELEVATION: 276.4

Depth (feet)	Moisture Content %	Dry Density (pcf)	Blow Count	Sample Type	Symbol USCS
26	31.2	93.0	50	R	
30	28.2	96.4	50/9	R	
35	29.9	94.3	50/11	R	
40	34.6	87.1	50/9	R	
45					
50					

**BEDROCK:** Siltstone, blue gray, saturated, bedded, with layers of fine grained sandstone, soft to very firm

Hydrogen Sulfide odor

Siltstone with sandstone interbeds, firmer

slow drilling

Siltstone continues

*End at 50 Feet; Water at 16 Feet.*  
 Boring developed as 2 inch diameter monitoring well, sand to 15 feet, bentonite plug to top.



# LOG OF BORING 2

PROJECT: JB:17776-B CATELLUS

DATE LOGGED: 6/4/98 BY: JWB

BORING TYPE: 8 Inch Hollow-Stem

SURFACE: 5 Inch AC Pavement

REPORT DATE: 7/9/98

ELEVATION: 276.4

Depth (feet)	Moisture Content %	Dry Density (pcf)	Blow Count	Sample Type	Symbol USCS	Description
0					SM	<b>FILL:</b> Silty Sand, dark brown, moist, dense, with rock fragments and brick
5					SG	<b>ALLUVIUM:</b> Gravelly Sand, light brown, moist, dense
10					SW	grades to fine grained sand with gravel
12					GW	Gravel and Cobble layer, 4 feet thick, hard drilling
15					SW	
20						
23						Water at 23 Feet
25						

# LOG OF BORING 2 (Continued)

PROJECT: JB17776-B CATELLUS

DATE LOGGED: 6/4/98 BY: JWB

BORING TYPE: 8 Inch Hollow-Stem

SURFACE: 5 Inch AC Pavement

REPORT DATE: 7/9/98 ELEVATION: 276.4

Depth (feet)	Moisture Content %	Dry Density (pcf)	Blow Count	Sample Type	Symbol USCS	
26						
30						
32					ML	WEATHERED BEDROCK: Clayey Silt, greenish gray, saturated, soft to firm
35						
36						BEDROCK: Siltstone, blue gray, very moist, bedded, fine sandstone layers
38						End at 38 Feet; Water at 23 Feet; Fill to 6 Feet.