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PRELIMINARY SOILS AND GEOLOGY REPORT

PROPOSED S.C.R.T.D. HEADQUARTERS PROJECT AND GATEWAY CENTER AT UNION STATION LOS ANGELES, CALIFORNIA

CONDUCTED FOR

Southern California Rapid Transit District
425 South Main Street
Los Angeles, CA 90013

CCW Project No. 91-31-261-01

June 26, 1992

A Wholly Owned Subsidiary of
The Converse Professional Group

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June 26, 1992

Southern California Rapid Transit District
425 South Main Street
Los Angeles, California 90013

Attention: Mr. Robert Yates
Project Manager

Subject: PRELIMINARY SOILS AND GEOLOGY REPORT
Proposed S.C.R.T.D. Headquarters Project
and Gateway Center at Union Station
Los Angeles, California
CCW Project No. 91-31-261-01

Ladies/Gentlemen:

This report presents results of our Preliminary Soils and Geology Report for the proposed Southern California Rapid Transit District (S.C.R.T.D.) Headquarters Project and Gateway Center at Union Station in downtown, Los Angeles. This report was prepared as part of the Environmental Analysis (EA) and Environmental Impact Report (EIR) for the proposed Union Station Headquarters Project. S.C.R.T.D. requested this report stand alone and be submitted very early in the EA/EIR process in order to flag fatal flaws. In our opinion, there are no fatal flaws to the proposed development, although proposed site development will be complicated by shallow groundwater conditions, evidence of soil and groundwater contamination within the project vicinity, and presence of existing structures and improvements.

This report summarizes preliminary information, findings and conclusions developed during our geologic and geotechnical assessment of the project site. The findings and conclusions presented in this report will later be integrated into the EIR documents where appropriate at the completion of the project study.

This report was prepared in accordance with S.C.R.T.D. Contract No. 5632, P.R. No.:1-4200, R.F.P. No.:91-80.

We welcome the opportunity to discuss our findings and provide additional studies or services should they be desired.

Respectfully submitted,

CONVERSE CONSULTANTS WEST

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Attention: Mr. Fred Y. M. Chen

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EXECUTIVE SUMMARY

This report presents results of a preliminary soils and geology study by Converse Consultants West (CCW) and MAA Engineering Consultants, Inc. for the proposed Southern California Rapid Transit District Headquarters Project site in downtown, Los Angeles. This report was prepared as of the Environmental Analysis (EA) and Environmental Impact Report (EIR) for the proposed Union Station Headquarters Project. The purposes of this study were to (1) update, evaluate and better define soils and groundwater conditions at the Project site, (2) assess geologic and geotechnical design considerations for the proposed development, and (3) to flag serious flaws of the proposed development early on in the EA/EIR process.

This report was written for planning of the proposed Headquarters Project described herein and does not include all the Project information and construction details at the EA/EIR level of investigation. This is a preliminary report and detailed geotechnical and environmental investigations of the Project site are recommended.

In our opinion, there are no serious flaws to the proposed development, although proposed site development will be complicated by shallow groundwater conditions, evidence of localized soil and groundwater contamination within the project vicinity, and the presence of exiting structures and improvements.

In general, the subsurface conditions consists of undocumented fill soils and natural alluvial sediments overlying siltstone and claystone of the Puente Formation. Depth to the Puente Formation ranged from about 85 to 108 feet beneath the existing surface of the site. The groundwater table occurs within the alluvial sediments about 30 feet below surface. Groundwater levels have been subject to seasonal and long term fluctuations ranging between elevations 250 to 257 feet above sea level.

Our preliminary study included research and review of available geotechnical information and reports, interpretation of aerial photos, drilling seven shallow soil borings to assess

potential toxicity of the site "B" study area, laboratory testing, geologic research, and engineering evaluation. Preliminary findings of our study are summarized below:

Site Conditions

- The general project vicinity has been industrialized for more than 100 years. Former land uses and industrial plants have contributed to soil and groundwater near the Project site. Soil and groundwater contamination have been reported by Caltrans during construction of the El Monte Busway in 1986 about 300 feet east of the Project site.

- Seven shallow soil borings were drilled to evaluate general site conditions and potential toxicity of the site "B" parcel study area. Borings 1 through 6 were drilled within the study area and Boring 7 was drilled off-site on the RTD parcel. Laboratory analysis of the soil samples from six of the seven soil borings revealed non-detectable concentrations of volatile and semi-volatile organic compounds for the depth intervals tested. Boring 4, located along the east central portion of the site detected low concentrations of semi-volatile organic compounds.

Groundwater Conditions

- Groundwater data obtained from the seven exploratory borings drilled for this study indicate that current groundwater levels beneath the site occurs at approximate elevations between 246.5 to 251 feet above sea level.

- Groundwater samples recovered from monitoring well MW-5 on December 19, 1991 were analyzed. In general, laboratory data indicate the groundwater in vicinity of monitoring well MW-5 is affected by low concentrations of volatile organic compounds. The water samples had a moderate to strong "rotten-egg" odor of hydrogen sulfide. The hydrogen sulfide in the groundwater forms a weak acid and can be potentially corrosive.

- Phase I of the proposed Project is planned with four levels of subterranean parking. Level P-4 of the subterranean parking would be founded at about Elevation 240 to 245 feet. Construction at this level, 35 to 40 feet below surface, would require construction dewatering.

Seismicity

- The site is situated within the seismically-active Los Angeles Basin in Southern California. There are a number of active (movement in the last 11,000 years) regional faults near the Project site. The nearest surface trace of an active fault is the Raymond Fault located 4.4 miles north of the site. Strong groundshaking can be expected to occur in the Project vicinity as a result of future seismic activity in the surrounding region.

Loss of Mineral Resources

- The Project site is located about 1,200 feet north of the Union Station Oil Field. Most of the economically recoverable oil reserves have been mined and loss of oil resources is considered negligible.

- The Project site is not within an area of historic aggregate production and loss of aggregate mineral resources is considered negligible.

Flooding

- Review of the Preliminary Flood Insurance Study Work Map (FEMA, 1989) indicates that the proposed Project site is located in an area of minimal flooding (Zone C). The Zone C area has been identified in the community flood insurance study as an area of moderate or minimal hazard from the principal source of flood in an area. However, buildings in this zone could be flooded by severe, concentrated rainfall coupled with inadequate local drainage systems.

- The proposed Project site is located within a 100-year flood inundation zone as designated in an unofficial draft feasibility report by the U.S. Army Corps of Engineers. This report reviewed the adequacy of flood control along main stream systems of the Los Angeles River. The report concluded that Reach 3 of the Los Angeles River has inadequate capacity to protect the basin communities in the future. The primary cause of the existing system inadequacies is a substantial increase in local runoff resulting from developed/paved areas. This draft feasibility study is considered to be less detailed than the FEMA flood hazard studies.

Slope/Foundation Stability

- Four levels of subterranean parking are planned for the proposed development. Temporary slopes or shoring will be required for the proposed construction. Shoring design must consider support to the adjacent structures or underground utilities.

- Undocumented fill soils up to 22 feet in depth were encountered below existing ground surface. These undocumented fill soils are considered unsuitable for support of the proposed structures. Most of these undocumented fill soils will be removed during excavation of the four levels of subterranean parking. Undocumented fill soils beneath proposed structures or improvements should be removed and recompacted in accordance with project specifications and City of Los Angeles Building Codes.

1.0 INTRODUCTION

This report presents results of a preliminary soils and geology study by Converse Consultants West (CCW) and MAA Engineering Consultants, Inc. at the site of the proposed S.C.R.T.D. Headquarters Project and Gateway Center at Union Station. The purposes of this study were to update, evaluate and better define soils and groundwater conditions at the project site and assess geologic and geotechnical design considerations for the proposed development.

This report was written for planning of the proposed S.C.R.T.D. Headquarters and Gateway Center described herein, and is intended for use by the Southern California Rapid Transit District, and associated project professionals in developing plans and project designs. Since this report is intended for use in project planning, it should be recognized that it is impossible to include all project information and construction details at the EA/EIR level of investigation. This is a preliminary report and detailed geotechnical and environmental investigations of the project site are recommended.

2.0 PROJECT DESCRIPTION

2.1 Site Description

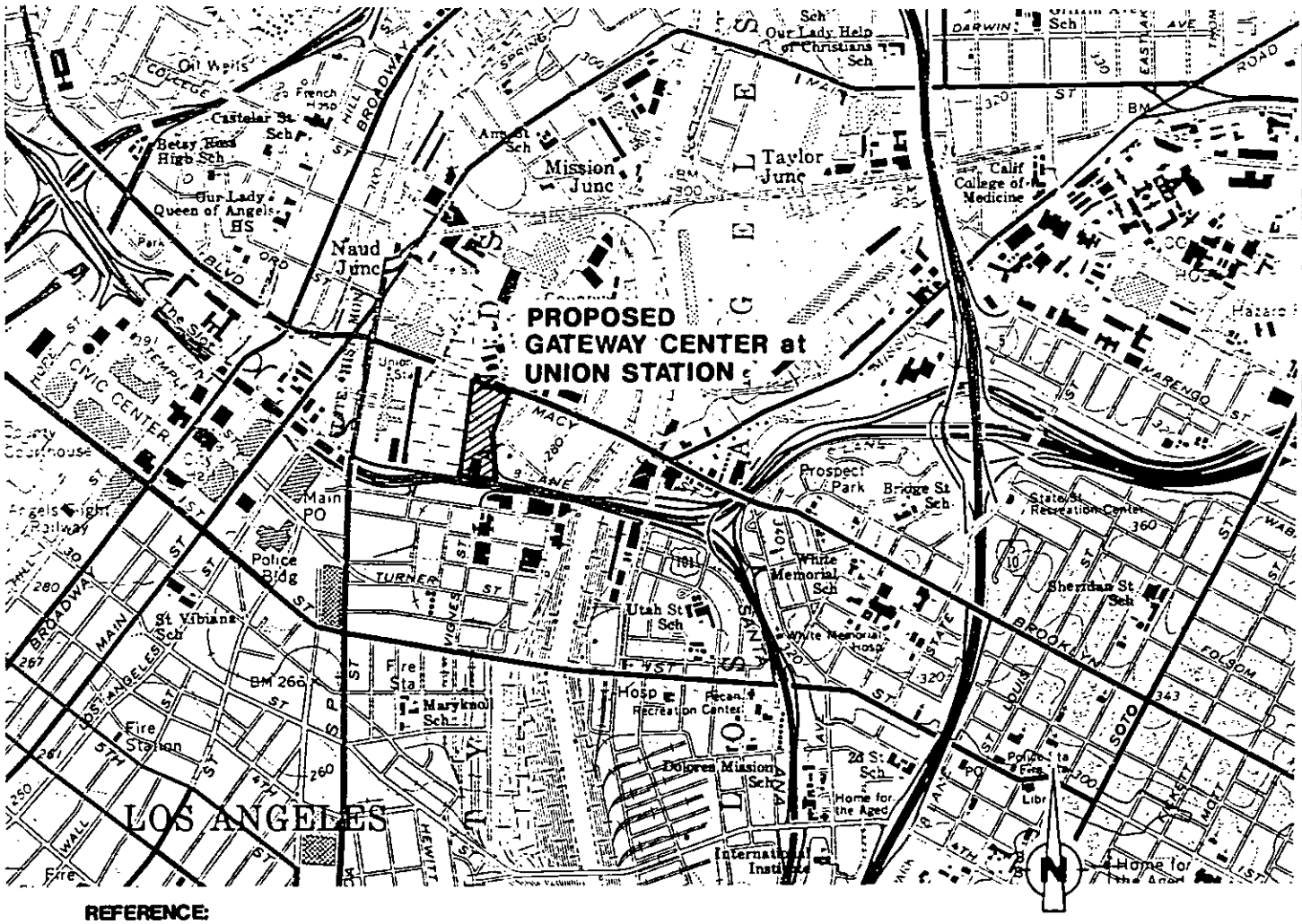
The project site consists of an approximately 6.8-acre rectilinear-shaped parcel located east of the Union Station Passenger Terminal Facility in downtown Los Angeles. As shown on Figure 2.1.1, "Site Location Map," the site is located east of the Los Angeles civic center just north of the Hollywood Freeway and El Monte Busway. The site is about 1,200 feet west of the Los Angeles river channel.

An aerial photograph depicting the site and general project vicinity in February of 1990 is shown on Figure 2.1.2. This photograph shows the diversity and high concentration of mixed-use development within the project vicinity including commercial, industrial, transportation and public service facilities.

The site's topography is relatively level with the exception of a large stockpile of excavated soils located on the central portion of the site (Figure 2.1.3). Portions of this stockpile have been removed since November 1990 and after the completion of our field exploration in December 1991. The stockpile has become smaller as the soils have been used as backfill for the Metro Rail subway or exported off the site.

As shown on Drawing 1, "Site Plan and Location of Borings," the project site is bounded by Macy Street to the north, Vignes Street to the east, the El Monte Busway and Hollywood Freeway to the south, and the Union Station Passenger Terminal raised track platform area to the west.

The Metro Rail subway corridor crosses diagonally across the southern portion of the project site. This portion of the subway consists of the Metro Union Station platform and track cross-overs. Major work on the subway tunnel structure was completed in 1990 and 1991 and is presently buried beneath the existing surface along the south end of the site.



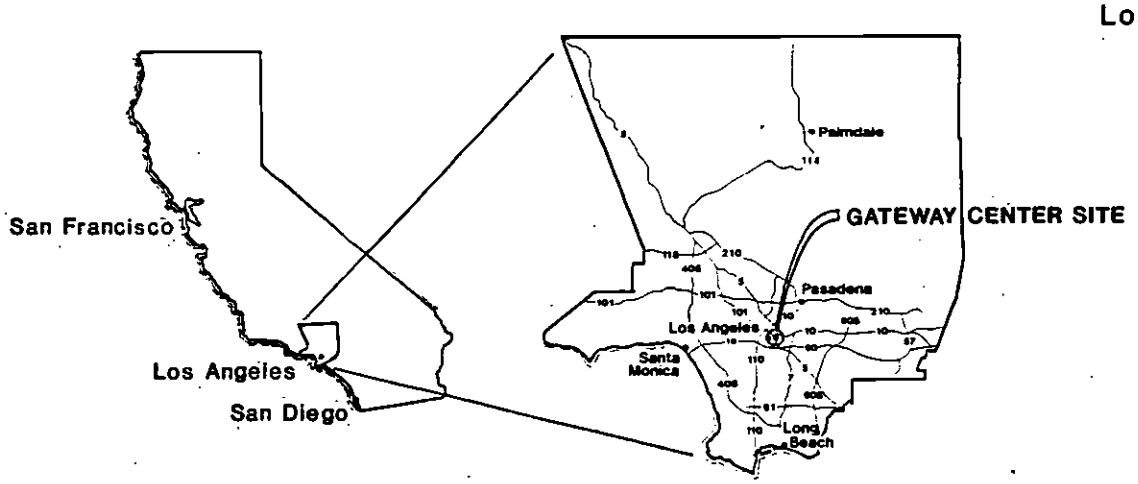
REFERENCE:

Portion of USGS Los Angeles
7.5-minute Quadrangle,
1966, Photorevised 1981

0 1000 2000 4000

SCALE IN FEET

Los Angeles County



SITE LOCATION MAP

GATEWAY CENTER at UNION STATION
S.C.R.T.D. Union Station Headquarters Project

Project No.
91-31-261-01

Figure No.
2.1.1

Converse Consultants West

REFERENCE:
Brewster Pacific Corporation
Portion of Exposure No. L-86
Flown-February 10, 1990
Project No. 91267

EXPLANATION

PROPOSED GATEWAY CENTER SITE at UNION STATION

AERIAL PHOTOGRAPH OF SITE VICINITY (February 10, 1990)

GATEWAY CENTER at UNION STATION
S.C.R.T.D. Union Station Headquarters Project

Project No.
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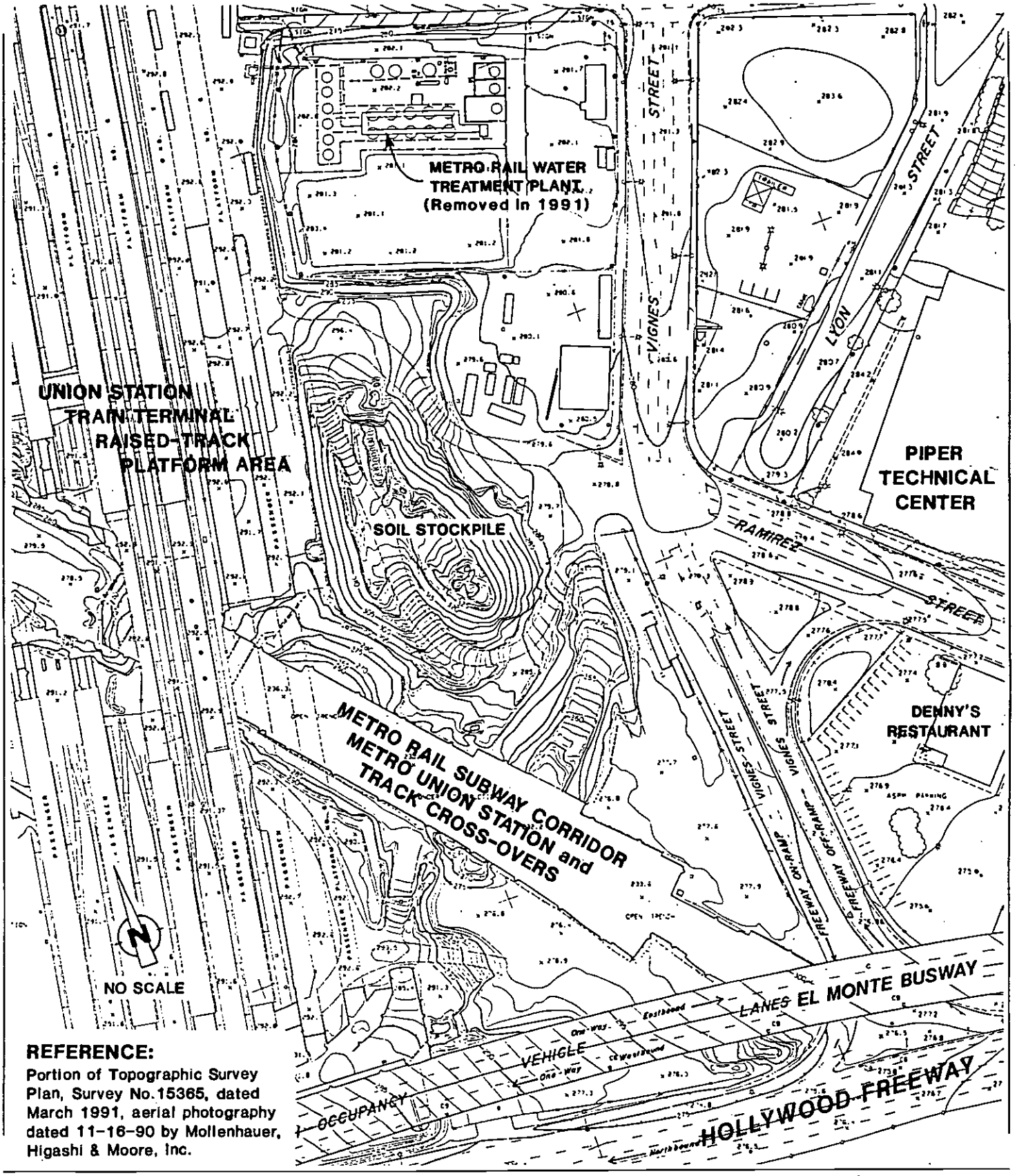
Converse Consultants West

Figure No.
2.1.2



REFERENCE:
Portion of Topographic Survey Plan, Survey No.15365, dated March 1991, aerial photography dated 11-16-90 by Mollenhauer, Higashi & Moore, Inc.

CONTOUR MAP OF PROJECT AREA (November 1990)

GATEWAY CENTER at UNION STATION
S.C.R.T.D. Union Station Headquarters Project

Project No.
91-31-261-01

Figure No.
2.1.3

Converse Consultants West

Approved for publication by ____

The Metro Rail subway was constructed using a cut-and-cover method. Prior to cut-and-cover construction, a 30-inch thick slurry cut-off wall was constructed along the subway alignment. This excavated slurry wall reportedly extended through the overlying alluvial sediments and into underlying bedrock. (Excavation Detail and Tieback Patterns, STS Consultants, Job No. 25569.) This cut-off wall was designed to minimize groundwater inflow during construction and provide temporary excavation support during construction. As the tunnel structure was excavated, multiple rows of the tie-back anchors were installed into the adjoining sediments to provide support for the exhumed vertical slurry walls. At the completion of the tunnel structure, the cut-off wall and tie-back anchors were left in place, and the excavation was backfilled.

As shown on Drawing No.1, the buried footprint of the subway tunnel structure is approximately 80 to 110 feet wide. Future "AR-Track" and "AL-Track" tunnel portals are located near the southeast portion of the site. These portals will connect future tunnel alignments presently planned for the Metro Rail Project. A number of service and support structures are located on the present ground surface. These structures include the station entrance, blast relief shaft, exhaust shafts, fresh air intakes, emergency exits, vents and various service manholes. The bottom of the subway tunnel structure is founded about 50 feet below existing ground surface near elevation 230 feet, (Union Station Construction Contract No. A-135, dated 1987).

The south end of the project site is bounded by the El Monte Busway. The busway consists of a 2-lane, elevated roadway bridge supported on columns and runs along the north side of the Hollywood Freeway.

The western edge of the project site is bounded by the Union Station Passenger Terminal raised track platform area. Rail lines servicing the Union Station Terminal pick-up and disembark train passengers on eight platforms along the track spurs. The raised track platforms are about 12 to 16 feet above the existing project site at about elevation 293 feet (Mollenhauer, et. al., Survey No. 15365, dated 3/91). The rail lines enter the

terminal facility across a bridge which spans Macy Street at the northwest corner of the project site.

The northern portion of the project site was fenced with a chain-like and barb wire fence. This area was formerly occupied by water treatment plant used to treat groundwater discharge from the Metro Rail Project (Figure 2.1.3).

2.2 Project Description

The proposed project action consists of a joint development of two separate contiguous properties which comprise the project site. The northerly 4.2 acre site "B" parcel is currently owned by Catellus Development Corporation (Catellus). The approximate limits of this parcel are shown on Drawing 1, "Site B Parcel Study Area." The southerly 2.6 acre site "A" parcel is currently owned by the S.C.R.T.D.. A combination land acquisition/land exchange is contemplated, along with a lot line adjustment and the creation of new permanent public transit easements for planned public transit facilities.

The proposed 12.3-acre Gateway Center development will include the proposed 4.8-acre Project (comprised of the Phase I SCRTD headquarters and the Phase II office tower) as well as previously-approved Public Transit Improvements (PTIs). Phase I of the Project and the adjacent PTIs will contain subterranean parking facilities.

The development of the Gateway Center is planned in multiple phases. Phase I development will consist of the construction of the 26-story S.C.R.T.D. Headquarters office tower at the north end of the project site and the Metro Plaza area underlain by four levels of subterranean parking. Based on present plans, level P-4 of the subterranean parking structure will be founded at about elevation 240 to 245 feet (McLarand, et.al., Building Section, Drawing A-15, December 20, 1991). The proposed Metro Plaza and subterranean parking structure is designed to straddle the existing Metro Rail Tunnel structure with lower levels of parking planned on the northeast and southwest sides of the subway alignment.

Phase II development will involve the construction of an office/commercial tower. Phase II development will start at a later date depending on market conditions.

3.0 SCOPE OF SERVICES

This preliminary investigation included an engineering and geologic reconnaissance, subsurface exploration to assess general site conditions and toxicity of the site "B" parcel study area, laboratory testing, geologic research, engineering evaluation, and preparation of this report. More specifically, the scope of work included the following tasks:

- Research and review of existing geologic and geotechnical information and documents
- Interpretation and analysis of aerial photographs dating back to the 1920's to evaluate former land uses as well as their potential for discharging hazardous wastes
- Drilling seven shallow exploratory soil borings to assess general site conditions and toxicity of the site "B" parcel study area. The borings were advanced using a CME 75 hollow-stem auger drill rig. Locations of the borings are shown on Drawing 1.
- Collection of one groundwater sample from an existing monitoring well for analysis.
- Laboratory analysis of soil samples and groundwater sample.
- Preparation of this report which presents the results of our field exploration, laboratory analysis and assessment of geologic and geotechnical considerations for the proposed development.

It our understanding that detailed geotechnical and environmental investigations of the project site are currently being performed by Law/Crandall, Inc., geotechnical consultants for the project, and Levine-Fricke, environmental consultants for the project. Geotechnical and environmental reports made available and reviewed for this study are referenced in Section 10.

4.0 FIELD EXPLORATION

4.1 Drilling and Sampling - Site "B" Parcel Study Area

Exploratory soil Borings 1 through 6 were drilled and sampled to assess general site conditions and toxicity within the site "B" parcel study area. Optional Boring 7 was drilled and sampled near the southeast portion of the project site for additional information. Locations of the exploratory borings are shown on Drawing 1, "Site Plan and Location of Borings." Field exploration was performed between December 16 and 18, 1991.

Soil Borings were drilled with a CME 75 hollow-stem auger drill rig. Sampling tools and equipment were cleaned with non-phosphate containing detergent and thoroughly rinsed between sampling intervals and between borings. Drill augers were steam cleaned on a daily basis. One hundred and twenty feet of clean hollow-stem was bought to the site by the drill rig each day. Drilling spoils were collected and stored in sealed D.O.T. approved 55-gallon steel drums.

Soil samples were collected at 5-foot intervals using a drive sampler lined with a brass sleeves. Brass sleeves containing the soil sample were removed from the sample without contact with the extruder, thereby preventing cross contamination. Soil sample sleeves were then sealed with teflon and capped with polyethylene caps, labeled and refrigerated. Caps were not sealed to the sleeves with adhesive tape due to the possibility of contamination from the tape adhesive. Hydrocarbon vapors of recovered sample were measured in the field with an organic vapor analyzer (OVA) and photoionizer detector (PID). Samples were handled in accordance with U.S. EPA and State of California protocol including chain-of-custody documentation.

Standard penetration tests (SPT) were performed at two depth intervals in the borings. The SPT sampler was driven into the bottom of the borehole with successive 30-inch drops of a 140-pound drive weight at the surface. An automatic drive hammer with a chain lift was used to provide the lifting apparatus. Blow counts were recorded for each 6-inch interval of penetration or fraction thereof up to 18 inches or refusal.

The borings were logged by an experienced MAA geologist under the direct supervision of a State of California Registered Geologist. Soils encountered were logged in accordance with the Unified Soil Classification system. Boring log summaries are presented in Appendix A.

Groundwater levels encountered during drilling were measured with an electric sounding tape and recorded on the borings logs.

The borings were backfilled with bentonite chips hydrated with clean water to within 5 feet of the ground surface. The top portion of the boring was then backfilled and tamped with soil.

The groundwater sample was collected from the existing Levine-Fricke monitoring well MW-5 on December 19, 1991. The monitoring well was approximately 60 feet deep. The static water level was 33 feet below the top of casing. This monitoring well was reported to have been recently developed and used for a multi-day pump test. Water samples were collected with a clean Teflon bailer and placed in laboratory-cleaned glass and plastic vials. The groundwater samples were refrigerated and transported to Converse Envirolab in Pasadena, in accordance with EPA protocol, including chain-of-custody documentation. Copies of the analytical results and chain-of-custody forms are presented in Appendix B.

4.2 Previous Field Tests and Exploration

In 1986, Converse Consultants, Inc. performed an 48-hour aquifer pump test on the project site to evaluate the hydraulic parameters and performance characteristics of the groundwater aquifer underlying the site. Results of the tests were presented in a report titled "Union Station Area Aquifer Pump Tests," dated November 1986. Borings drilled for this previous investigation and utilized in this report for interpretation of subsurface conditions are presented in Appendix A.

Location of the 1986 pump well and observation wells are shown on Drawing 1. These wells were buried beneath a large soil stockpile which occupied the central portion of the project site. The condition of the wells could not be determined.

The pump well was drilled with an Ingersol Rand Model TH60 direct rotary drill rig. The rotary wash well boring was advance using a combination of 10-inch, 12-inch and modified 24-inch diameter tri-cone drill bits. The boring was started with a drilled 10-inch pilot hole which was successively reamed out to a 24-inch diameter boring using repeated passes from the 12-inch and 24-inch tri-cone bits. The boring was overdrilled to a depth of 110 feet (bedrock at a depth of 84.5 feet) then flushed with clean water to dilute the Supercol® Guar Gum drilling additive used during the drilling operation.

The pump well installation consisted of a 2-inch diameter monitoring well fastened to the exterior of the 12-inch diameter pump well casing. The 2-inch pump monitoring well was machine slotted (0.02-inch slot width) schedule 40 PVC casing. The 12-inch diameter pumping well was machine slotted (0.05-inch full flow slots with 50.548 square inches of open filter area per 2 linear feet) schedule 160 PVC well casing. Metal centralizers were used to position the casings within the boring. The annulus between the well casing and the 24-inch well bore was backfilled with design filter sand mix and sealed with 7 feet of bentonite and concrete above the perforations. A cast-iron well cover was installed over the completed well installation. The pump well was developed using "air-lift" methods to initially clean the well followed by pumping to ensure good hydraulic communication with the aquifer. During this development operation, a preliminary pump test was performed to evaluate well performance and determine pumping rates for the actual pump test.

Observation Wells Nos. 1, 2, and 3 were drilled and installed during the 1986 investigation. A Failing 1500 drill rig was used to drill and sample each observation well. The borings were drilled to depths ranging between 84 feet and 94 feet below existing ground surface as shown on Table B. Each well boring was then flushed with clean water to dilute the Revert® drilling additive used during the drilling operation. A 2-inch machine slotted PVC casing was then installed to intervals shown on Table 4.1. The annulus

between the 2-inch casings and the 6-inch well bore of each well was backfilled with No. 3 Monterey Sand and sealed with bentonite and concrete. The wells were again flushed with clean water to dilute any remaining Revert® drilling additive and establish good hydraulic communication with the aquifer.

Observation Well No. 4 was drilled and installed during the 1983 geotechnical investigation (1983 observation well No. 5-5). This observation well, constructed of thermoplastic material (PVC), was "air-lifted" to remove accumulated sediments and develop the well for re-use during this investigation. Approximately 1300 to 1600 gallons of water were removed from this well during development.

A summary of the pump well and monitoring well information is presented in Table 4-2.

TABLE 4.2

1986 PUMP TEST WELL INFORMATION

1986 Pump Test Well Number	Depth to Aquiclude (feet) (Bedrock Puente Formation)	Depth to Static Groundwater Date (feet)	Saturated Thickness of Aquifer b (feet)	Static Groundwater Elevation 6/6/86	Distance (r) from Pump Well (feet)	Surface Casing Elevation	Casing Diameter (inches)	Open Slot Interval below Surface (feet)	Total Depth Drilled below Surface (feet)
Site #2 Pump Well	84.5	24.9 (6/6/86)	59.6	254'	--	278.9'	12/2	7-87	110
Observation Well No. 1	84.5	25.0 (6/6/86)	59.5	254.1'	r_1 = 25.0	279.1'	2	10-89	94
Observation Well No. 2	84.5*	25.3 (6/6/86)	59.2	254.2'	r_2 = 52.0	279.5'	2	12-81	84
Observation Well No. 3	84	26.1 (6/6/86)	57.9	253.8'	r_3 = 99.1	279.9'	2	10-79	85
Observation Well No. 4 (1983-No. 5-5)	90	27.1 (6/6/86)	62.9	253.2'	4_r = 199.4	280.3'	2	60-100	100

* Estimated Value
Average Static Groundwater Elevation on 6/6/86: 254 feet
Weighted Average Saturated Thickness of the Aquifer on 6/6/86: 59.5 feet

4.3 Aquifer Pump Tests

The Aquifer Pump Test was conducted on the project site between June 6 and June 9, 1986. During this test operation the 15-hp submersible pump intake was positioned approximately 76 to 77 feet below the ground surface. The pump test was performed in two stages. Stage 1 was a 48-hour stepped rate pump test. Stage 2 was a 24-hour constant rate pump test. These pump test stages were followed by a 2-hour, 2-minute recovery test.

The pump test flow rates were controlled by adjusting a 4-inch diameter gate valve positioned in the discharge line near the well head. These controlled flow rates were monitored with a 4-inch diameter McCrometer® flow meter which displayed flow rate and cumulative flow volume. The 4-inch gate valve was periodically adjusted to maintain a relatively constant flow rate.

Fluctuations in groundwater levels were measured and recorded with programmable data loggers. An Enviro Lab® DL 120 data logging system, using 50 and 25 psig transducers, recorded water level fluctuations in the pumping wells and observation wells 1, 2, and 3. A Hermit® Model SE1000B environmental data logger, using a 50 psig transducer, recorded water level fluctuations in Observation Well 4. Data was processed in the field with a Compaq® computer system.

In 1983, Converse Consultants Inc., performed another pump test in a parking lot located west of the project site and north of The Union Station Passenger terminal building for the Metro Rail Project. Results of this test were presented in the report titled "Geotechnical Report, Metro Rail Project, Design Unit A-140," dated October 1983. The following description of gas problems is excerpted from the 1983 geotechnical report.

- "The pump test was performed near Union Station to provide data for construction dewatering. Two pump tests were run at the same well to determine aquifer properties and boundary conditions. Two pump tests were performed because gas, entrained in the water, caused the first test to be terminated prematurely and additional testing was needed to confirm test results."

- "A constant discharge test was planned with a test duration of 24 to 48 hours. However, because of gas problems that developed with time, two relatively short duration tests were performed."

- Rubber tubing with a metal tip, attached to the methane reading gas detector (made by Gastech, Inc), was inserted to a depth of 5 feet in the pumping well's water level measuring hole, immediately after the pump was turned off. Instantly the methane gas detector needle surged to a reading of 100% lower explosive limit (LEL) and for some unexplainable reason the gas ignited in the instrument causing a small explosion that blew the rubber tubing out of the hole. Prior to this, the gas detector indicated around 30% LEL methane gas each time gas was measured during the second pump test and did not explode."

- "It is believed that at least a portion of the groundwater underlying the site may be either saturated with gas which originated from the underlying Puente Formation and/or contain free gas in the aquifer or underlying Puente Formation that is released as hydrostatic pressures are reduced during pumping. During the pump test, there was a considerable drop in pressure head near the well as water flowed into the pump. This pressure drop would have resulted in release of the gas and into the well head. Additional data would be required to confirm these concepts and delineate the problem."

5.0 SUBSURFACE CONDITIONS

The stratigraphic sequence of earth materials underlying the proposed S.C.R.T.D. Headquarters Project and Gateway Center consists of undocumented fills and alluvial sediments overlying sedimentary bedrock of the Puente Formation. The primary focus of our study is on the thick accumulations of alluvial sediments deposited over time by the Los Angeles River. These sediments will provide support for the proposed development.

5.1 Subsoils

Evaluation of subsoil and bedrock conditions was based on information obtained from seven exploratory borings drilled for this study and review of previous borings and geologic sections.

Undocumented fill soils were encountered in each of the seven soil borings. Fill depths ranged from 9.5 feet in Boring 3 to 17 feet in Boring 7. Fill soils up to 22 feet deep were encountered during subsurface exploration by others. (Law/Crandall, Report of Geotechnical Investigation, Proposed Gateway Center, December, 13, 1991). Exploratory trenches excavated by others at the north end of the project site exposed a number of buried utility and service lines. These lines were believed to be related to the Metro Rail water treatment plant which once occupied the site. Fill depths exposed in these trenches varied from 4 to as much as 10 feet in depth. A limited amount of information exists concerning depths, extent and variability of undocumented fill, making accurate interpolation of fills beyond the immediate boring vicinity difficult.

Natural soils underlying the fills consist of alluvial sediments, composed of sands, silty sands, gravelly sands, silts, and sandy silts with cobbles and boulders. Cobble and boulder zones were encountered in most of the deeper borings drilled during the 1986 Union Station Pump Test. Difficult drilling conditions due to cobbles and boulders were encountered generally between 35 to 45 deep and at greater depths overlying the Puente Formation Bedrock.

5.2 Puente Formation Bedrock

Bedrock underlying the alluvial sediments consists of the late Miocene age Puente Formation. The Puente Formation consists of interbedded units of siltstone, claystone, sandstones and shales. The Puente Formation is believed to contain local hard, cemented units. Depths to bedrock ranged from 85 to 108 feet beneath the existing site surface.

5.3 Groundwater Conditions

The proposed Gateway Center project site is located in the northern portion of the Central Groundwater Basin of Los Angeles in an area identified as the Los Angeles Forebay. This forebay area lies in a zone of transition between the Los Angeles River Narrows to the north and the Central Groundwater Basin to the south. The area is bounded by the low-lying Elysian Park Hills to the west and the Repetto Hills to the east.

The groundwater aquifers within the Los Angeles Forebay consist predominantly of water-bearing alluvial sediments deposited over time by the Los Angeles River. These deposits have mixed with finer sediments contributed by merging local streams from the surrounding Elysian Park-Repetto Hills. These aquifer sediments which comprise the Los Angeles Forebay are considered to have a large available groundwater storage capacity (Department of Water Resources, Bulletin No. 104, Appendix A, p. 175). Bedrock of the late Miocene Puente Formation underlies these sediments in the vicinity of the Los Angeles River Narrows and is exposed at various places in the low-lying hills which surround the area.

The groundwater recharge in the Los Angeles forebay area is by surface and subsurface inflow through the Los Angeles River narrows which drains the upper Los Angeles River area, by percolation of precipitation and local runoff, and by artificial recharge of either local or imported water.

Groundwater levels beneath the project site are subject to seasonal and long term variation and fluctuations resulting from precipitation infiltration and groundwater spreading, recharge and pumping activities.

Historic groundwater records from Los Angeles County Flood Control records for Well No. 2774F, located about 1000 feet east of the project site, indicate the groundwater depth ranged from about 26 to 33 feet below ground surface between August 1934 and July 1968. These depths corresponds to elevations of about 250 to 257 feet above sea level. Historic highs were reached in January 1935 (elevation 256.8 feet), April 1937 (elevation 256.04 feet), March 1938 (elevation 256.4 feet) and March 1941 (elevation 256.0 feet). Groundwater elevations between elevations 252 and 254 feet were measured during our 1983 geotechnical investigation for the Metro Rail Project.

Monitoring well borings drilled during our 1986 pump test at the project site encountered groundwater between elevations 253 to 254 feet above sea level (Table 4.1).

Groundwater data obtained from the seven exploratory borings drilled for this study indicate that current groundwater levels beneath the site occurs at a depth of about 30 to 32.5 feet below ground surface. These depths correspond to approximate water surface elevation between 246.5 to 251 feet above sea level.

The groundwater levels beneath the project site occurs above the proposed footing elevations. Based on present plans, level P-4 of the subterranean parking structure will be founded at about elevations 240 to 245 feet (McLarand, et. al., Building Section, Drawing A-15, dated December 20, 1991).

The underlying alluvial sediments may require dewatering for this project. It is our understanding that Levine-Fricke has performed a pump test at the project site to evaluate dewatering requirements for the proposed development. Locations of the Levine-Fricke Monitoring Well MW-5 and piezometer wells P1, P2, and P3 are shown on Drawing 1.

A pump test was performed by Converse Consultants, Inc. at the project site in 1986 for the Metro Rail Project. Locations of the pump well and monitoring wells are shown on Drawing 1. Information concerning the construction of the wells is shown on Table 4.1, "1986 Pump Test Well Information." The 1986 Metro Rail pump well penetrated the full

saturated thickness of the underlying aquifer. Results of the pump test are summarized in Table 5.3. Based on the analyses and interpretation of the test data, it was an opinion that there is no single value of transmissivity that represents the aquifer characteristics for all possible periods of dewatering. Rather, there is a range of expected values which may represent the initial aquifer transmissivity at the start of dewatering followed by a different aquifer transmissivity that represents aquifer conditions after long periods of dewatering. Considerable judgment should be exercised in the interpretation and use of these results. Care should be exercised in interpolating or extrapolating aquifer properties beyond the pump test site.

TABLE 5.3

1986 Pump Test Values (Site #2 Pump Test)

Initial Transmissivity	180,000 gpd/ft	16.7 ft^2/min
Long Term Transmissivity	100,000 gpd/ft	9.3 ft^2/min
Permeability	3,000 gpd/ft^2	0.28 ft/min
Storativity	0.10 - 0.20 (dimensionless)	

6.0 ANALYTICAL TEST RESULTS

6.1 Soil Samples

A total of 41 soil samples from the 7 exploratory borings were selected for laboratory analysis. A summary of the soil samples tested and the analysis performed are presented on Table 6.1.1. Sample selection was based on visual observations, headspace OVA and PID readings, and the soil material encountered. Extractions from soil samples were composited when analytical test methods permitted to increase the interval of evaluation.

Soil samples collected during the drilling program were analyzed for total recoverable petroleum hydrocarbons (TRPH) by EPA Method 418.1, for volatile organic compounds by EPA Method 8240, and for semi-volatile organic compounds by EPA Method 8270. Detection limits for each compound tested are shown on the laboratory test reports in Appendix B.

Laboratory analysis of the soil samples collected from Boring 1, 2, 3, 5, 6 and 7 revealed non-detectable concentrations of volatile and non-volatile organic compounds for the depth intervals tested.

Analytical results indicated contamination was detected in Boring 4. The depth intervals of soil samples analyzed in Boring 4 varied from 1 to 25 feet below surface. Low concentrations of semi-volatile organic compounds were detected in a composite of soils sampled from Boring 4 at depths of 1, 10, and 20 feet. EPA Test Methods 8240 (volatile organic compounds) and 418.1 (Recoverable petroleum hydrocarbons) revealed non-detectable concentrations for the compounds and depth intervals tested.

As shown on Drawing 1, Boring 4 was located along the east side of the project study area west of Vignes Street. The area was covered by concrete and asphalt pavement and a number of abandoned floor slabs.

Table 6.1.2 summarizes the concentrations of semi-volatile organic compounds detected in Boring 4.

Additional soil sampling and analysis performed by Levine and Fricke in April 1992 near the vicinity of Boring 4 detected semi-volatile organic compounds at 1 foot depth adjacent to Boring 4. Soil samples analyzed at greater depths generally had non-detectable levels of semi-volatile compounds for the depths and intervals tested (Levine & Fricke, April 17, 1992).

An interpretative report evaluating additional data and findings by Levine & Fricke was not available at the time this report was completed.

TABLE 6.1.1

SOIL SAMPLE INTERVALS TESTED

SITE "B" PARCEL STUDY AREA

1991 Boring Number	Test Parameter		
	EPA Method 8240 Volatile Organic Compounds	EPA Method 8270 Semi-volatile Organic Compounds	EPA Method 418.1 Total Recoverable Petroleum Hydrocarbon
1	25' (discrete)	10', 20', 30' (composite)	15', 25', 30' (composite)
2	15' (discrete)	10', 20', 30' (composite)	1', 10', 20' (composite)
3	25' (discrete)	10', 20', 30' (composite)	5', 15', 25' (composite)
4	5' (discrete)	1', 10,' 20, (composite)	5', 15', 25' (composite)
5	--	--	1', 10', 20' (composite)
6	--	--	5', 15', 25' (composite)
7	15' (discrete)	10', 20', 30' (composite)	5', 15', 25' (composite)

Notes:

1. Boring locations shown on Drawing 1 - Site Plan and Location of Borings
2. Boring Log summarizes shown in Appendix A
3. Laboratory test results and chain-of-custody records shown in Appendix B
4. Optional Boring No. 7 located outside Site "B" Parcel Study Area

TABLE 6.1.2

SUMMARY OF DETECTED SOIL CONTAMINATION CONCENTRATION - BORING 4

EPA TEST METHOD 8270

SEMI-VOLATILE ORGANIC COMPOUNDS

Compound	Concentration (ug/kg)	Detection Limit (ug/kg)
Acenaphthylene	Trace	330.0
Anthracene	Trace	330.0
Benzo (a) anthracene	666.0	330.0
Benzo (b) flouranthene	1300.0	330.0
Benzo (k) fluoranthene	1000.0	330.0
Benzo (g, h, i) perylene	5000.0	330.0
Benzo (a) pyrene	1700.0	330.0
Chrysene	900.0	330.0
Fluoranthene	600.0	330.0
Indeno (1, 2, 3 -cd) Pyrene	1800.0	330.0
Napthalene	Trace	330.0
Phenanthrene	Trace	330.0
Pyrene	12,000.0	330.0

6.2 Groundwater Samples

Laboratory analysis of the groundwater samples from the Levine-Fricke monitoring well MW-5 collected on December 19, 1991 were analyzed for total recoverable petroleum hydrocarbons (TRPH) by EPA Method 418.1, for volatile organic compounds, by EPA Method 614, for semi-volatile organic compounds by EPA Method 625, and for general minerals and sulfides. Detection limits for each compound tested are shown on the laboratory test reports in Appendix B.

EPA Test Method 418.1 (TRPH) and 625 (Semi-Volatile Organic Compounds) revealed non-detectable concentrations for the compounds tested. Contamination was detected

using EPA Test Method 624 (Volatile Organic Compounds) for the compounds tested. Table 6.2 summarizes the concentrations of contamination detected in the groundwater.

TABLE 6.2

SUMMARY OF DETECTED CONTAMINATION CONCENTRATIONS IN GROUNDWATER
EPA TEST METHOD 624 (VOLATILE ORGANIC COMPOUNDS)
LEVINE-FRICKE MONITORING WELL, MW-5, SAMPLED DECEMBER 19, 1991

Compound	Concentration (ug/l)	Detection Limit (ug/l)
Benzene	Trace	5.00
1,1-Dichloroethene	31.00	5.00
1,2-Dichloraethene	660.00	5.00
Ethyl Benzene	Trace	5.00
Tetrachloroethane	18.00	5.00
Trichloroethene	60.00	5.00

Groundwater in the vicinity of Monitoring Well MW-5 has been affected by volatile organic compounds at concentrations which exceed maximum contamination levels (MCL's) for drinking water.

The water quality was generally poor when compared to drinking water standards. The water samples had a moderate to strong "rotten-egg" odor of hydrogen sulfide. The hydrogen sulfide in the groundwater forms a weak acid and can be potentially corrosive. Similar odors were reported and documented in the 1986 report by Converse Consultants, Inc. titled "Union Station Area Aquifer Pump Tests, Metro Rail Project."

Groundwater discharge from construction dewatering will be required to meet all the applicable standards, conditions and requirements imposed by the City of Los Angeles Sanitation Bureau and the California Regional Water Quality Board, Los Angeles Region.

7.0 ENVIRONMENTAL ANALYSIS

The earth resources data evaluation was performed to identify both potential project impacts on the geology of the study area and possible geologic impacts or constraints to development of the proposed project. Issues to be addressed include the following geologic/seismic considerations as recommended in the California Division of Mines and Geology (CDMG) Note 46, Guidelines for Geologic/Seismic Considerations in Environmental Impact Reports.

7.1 Seismicity - Earthquake Damage

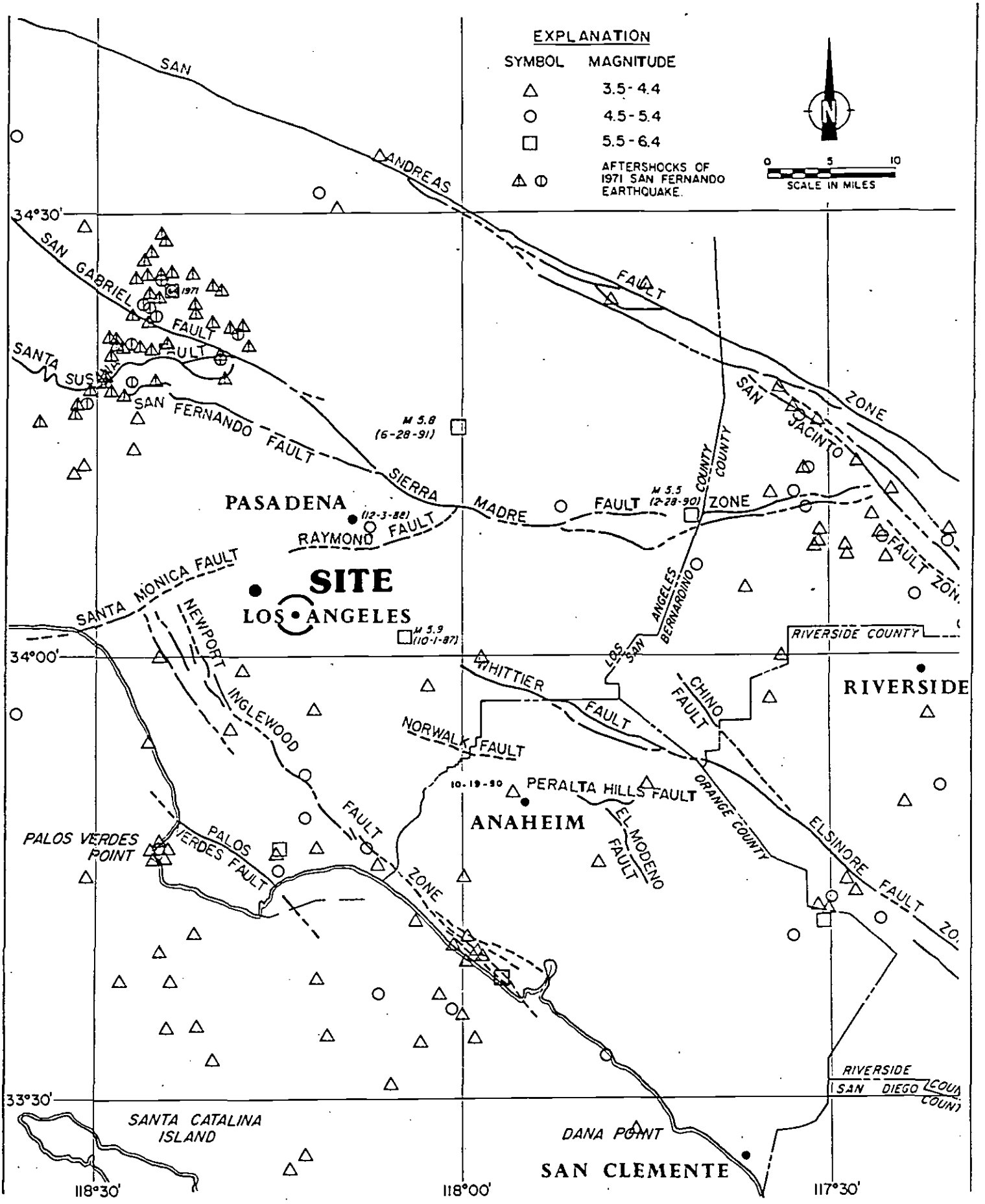
7.1.1 Regional Tectonic Setting

The site is situated within the seismically-active Los Angeles Basin in southern California. The Los Angeles Basin has experienced fourteen moderate sized (Richter Magnitude = 4.9 to 6.4) earthquakes since 1920 (Hauksson, 1990). These earthquakes have occurred on or near two primary sets of mappable faults:

- Northwest trending, right-lateral strike-slip faults such as the Newport Inglewood and,
- East trending, primarily reverse-slip faults such as the Malibu Coast and Sierra Madre.

Collectively, these two sets of faults define the structural and seismic setting of the Los Angeles Basin. Location of major faults in the Southern California area are shown on Figure 7.1.1, "Earthquake Epicenter and Fault Map."

There are a number of active (movement within the last 11,000 years) regional faults near the project site. Significant regional faults near the site are summarized in Table 7.1.1.



EARTHQUAKE EPICENTER AND FAULT MAP

Converse Consultants West

Project No. 91-31-261-01

Figure No. 7.1.1

TABLE 7.1.1

SIGNIFICANT ACTIVE REGIONAL FAULTS

Fault	Minimum Distance to Site (mi)	Total Fault Length (mi)
Raymond	4.4	12
Malibu-Santa Monica	4.9	39
Hollywood	5.5	8
Elysian Park Thrust	8.0 (vertically)	unknown
Newport-Inglewood	9.1	42
Sierra Madre (Pasadena Segment)	12.5	12
Whittier	12.0	32
San Gabriel	16.0	83
Norwalk	17.0	4
Palos Verdes	17.4	46
San Andreas (Central Segment)	32.8	220

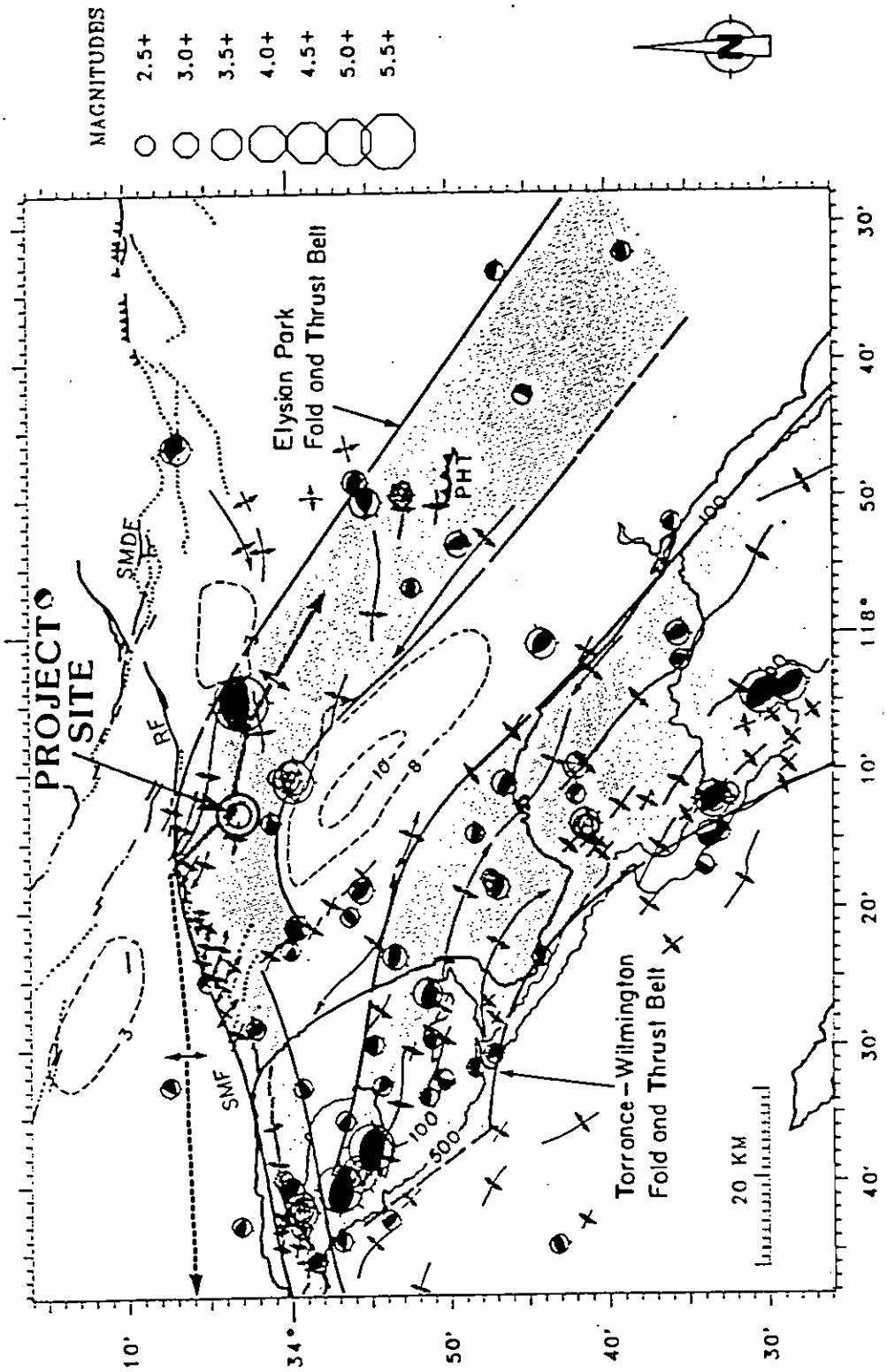
The nearest surface trace of an active fault is the Raymond Fault located 4.4 miles north of the site. The Raymond Fault is an east-northeast high-angle reverse fault with significant left-lateral displacement. The Raymond Fault has been recognized as a significant groundwater barrier in the Arcadia-Pasadena-San Marino area for a number of years (Crook et al., 1987). Past movement on the fault has created a series of fault scarps and sag ponds (Santa Anita Race Track and L. A. County Arboretum, for example) along its trace that are clearly visible on old topographic maps of the area. Based on fault trenching and radiocarbon dating of displaced soils, the Raymond Fault has been subject to recurrent seismic activity within the late Quaternary period; with one of the most recent paleoseismic earthquake events occurring between 2,160 + 105 to 1,630 + 100 years before present (Crook et al., 1987). The more recent magnitude 4.9, December 3, 1988 earthquake originated on the Raymond Fault (Jones, 1990).

The Newport-Inglewood fault zone is located about 9 miles to the southwest of the project site. This fault is a broad zone of north to northwest trending en-echelon faults and folds. This fault zone extends southeastward across the Los Angeles basin to possibly offshore beyond San Diego (Ziony, 1985). This fault zone is seismically active with at least three damaging earthquakes occurring in historic time. The largest and most destructive was the magnitude 6.3 Long Beach earthquake which occurred on March 10, 1933.

The San Andreas fault is the most prominent structural feature in California. It extends a length of about 620 miles from Point Arena in northern California to the east side of the Salton Sea where it is concealed by alluvium. This fault zone has sustained several great earthquakes including the 1857 magnitude 8.0 Fort Tejon earthquake and the 1906 magnitude 8.0 San Francisco earthquake. The 1857 earthquake is estimated to have ruptured the surface a distance of 190 miles from Cholame to south of Wrightwood (Sieh, 1978).

A recently recognized potential seismic source for the Los Angeles basin is the Elysian Park fold and thrust belt (see Figure 7.1.2, "Elysian Park Thrust Fault Zone"). This belt is seismically active as evidenced by the 1987 Magnitude 5.9 Whittier Narrows earthquake. Based on seismological evidence, this earthquake occurred on a "blind" thrust fault at a depth of about 8 miles below the surface (Hauksson and Jones, 1990). These faults are expressed at the surface as broad uplifted folds (anticlinoriums) instead of fault scarps, hence the term "blind" thrust. The exact surficial limits of this structure are still poorly resolved. If the axial trace of the Elysian Park anticline (Lamar, 1970) can be treated as the surface trace of the fold belt, the project site lies almost directly over the fold axis and in the center of the thrust zone (shaded area in Figure 7.1.2).

The geometry and location of these structures is very theoretical and is based on review of oil well data, seismic data and detailed structural analyses. Since these structures are buried and confined to relatively deep depths, they are not



DRAWING REFERENCE:
Hauksson (1990)

SCALE: 1 INCH≈20 KILOMETERS

ELYSIAN PARK THRUST FAULT ZONE

Converse Consultants West

Project No. 91-31-261-01

Figure No. 7.1.2

considered to be a hazard in terms of surface fault rupture. However, they can generate moderate to strong ground shaking and substantial damage as evidenced by the October 1, 1987 Whittier Narrows earthquake.

Furthermore, because of their low-angle geometry, they can generate ground shaking over a very broad area. Until more information is known about these deep "blind" thrusts, we assign a magnitude 6.8 event as the maximum credible earthquake originating about 8 miles deep based on strong motion records of the October 1, 1987 magnitude 5.9 Whittier Narrows blind thrust earthquake.

7.1.2 Earthquake Effects

There are two general groups of seismic hazards related to earthquakes: 1) surface fault rupture and 2) ground shaking which causes widespread damage because it propagates to considerable distance and triggers a number of secondary seismic effects (Borcherdt, 1985). Secondary seismic hazards from groundshaking include liquefaction, differential compaction, landsliding, earthquake-induced flooding, and seiches and tsunamis. The potential for earthquake damage to the proposed Union Station development from these hazards is summarized in Table 7.1.2 and discussed further below.

TABLE 7.1.2

POTENTIAL FOR DAMAGE DUE TO EARTHQUAKES

Hazard	Potential
Surface Fault Rupture	Low
Liquefaction	Low
Differential Compaction	Low
Landslides	Very Low
Earthquake-Induced Flooding	Low
Tsunamis	Nil
Seiches	Low

- Surface Fault Rupture
  The site is not located within a currently designated Alquist-Priolo Special Studies Zone. Based on review of pertinent geologic references and unpublished technical reports, no faults project towards or through the site. Consequently, the potential for surface fault rupture due to primary fault movement is considered low.

- Liquefaction
  Liquefaction is the transformation of submerged granular soils into a liquid-like mass due to excess pore pressure developed in response to earthquake ground shaking. Soils most susceptible to liquefaction are low density sands and silty sands which are submerged within 50 feet of the surface (Tinsley et al., 1985).

Regional and site specific data were reviewed to evaluate liquefaction potential at the site. Our findings are summarized in Table 7.1.3.

TABLE 7.1.3

LIQUEFACTION SUSCEPTIBILITY

Reference	Study Area		Liquefaction Susceptibility*
	Site-Specific	Regional	
Tinsley et al.		X	Moderate
Leighton & Associates		X	Liquefiable
MAA Engineering	X		Low
Law/Crandall	X		Low
Converse	X		Low

Liquefaction susceptibility terminology is not synonymous for all studies. See discussion below for further details.

The Tinsley et al. study categorizes liquefaction susceptibility as ranging from very low to very high. They report a moderate liquefaction susceptibility for the site. Their findings are interpreted as a function of the age of the saturated materials and the depth to groundwater (groundwater depths measured from 1960 to 1975).

The Leighton liquefaction categories range from very low to liquefiable. Their study reports the site to be within a liquefiable area (Appendix, Plate 4). Their conclusions are based on the distribution of susceptible alluvial sediments, known shallow and perched groundwater, areas conducive to perched groundwater conditions, and unpublished data from the Department of Public Works.

The MAA Engineering and Law/Crandall reports are site-specific investigations. Based on review of soil and groundwater data collected from these studies, the liquefaction potential for the site is considered low based on data discussed below.

Although soils are locally submerged to within 30 feet of the surface, they are considered too dense to liquefy based on SPT values and soil density data. Groundwater levels measured in late 1991 were generally about 30 to 33 feet below the ground surface (about 244 to 250 feet above mean sea level). Groundwater was measured at 25 feet below the ground surface by Converse in 1986 (approximately 255 feet above mean sea level). The highest historic groundwater level recorded in 1935 was about 25.7 feet below the ground surface (257 feet above mean sea level) (Law/Crandall, 1991). The water level fluctuations are probably primarily related to seasonal effects of precipitation.

- Differential Compaction
  Based on review of soil boring logs, the potential for differential compaction is considered low. Based on the proposed construction, the upper approximate 30 feet of site soils would be removed. Soils beneath this depth are relatively homogeneous alluvial soils consisting primarily of dense sand and silty sand mixtures with varying amounts of gravel. Although theses soils are submerged, they are considered too dense to undergo differential compaction.

- Landsliding
  Seismically induced landslides and other slope failures are common occurrences during or soon after earthquakes. The site is located in a relatively flat area along the floodplain of the Los Angeles River. Given the absence of elevated source areas for ground failures near the site, the potential for seismically induced landslides is considered very low to non-existent.

- Earthquake Induced Flooding
  Earthquake induced flooding is another potential secondary seismic hazard. Although there have been two historic dam failures in Los Angeles County (St. Francis Dam, 1928; Baldwin Hills, 1963) there have not been any seismically induced failures. There was a near failure of the Van Norman reservoir during the 1971 Magnitude 6.4 San Fernando earthquake.

  Based on review of Leighton and Associates Flood and Inundation Hazards Map (Appendix, Plate 6), the site is within the confines of the Hansen Dam inundation area. This inundation zone is also fed by a series of potential tributary inundation areas (e.g. Devil's Gate Dam) from the Verdugo and San Gabriel Mountains. It is important to note that Hansen Dam is a flood control dam and generally only has water during periods of heavy rainfall. Since the dam does not generally function as a long term water storage facility, its potential threat in terms of seismically induced flooding is considered low.

- Tsunamis
  Tsunamis are large waves generated by fault displacement within the sea floor. Given the elevated site location, and distance from the ocean, tsunamis are not considered to pose a site hazard.

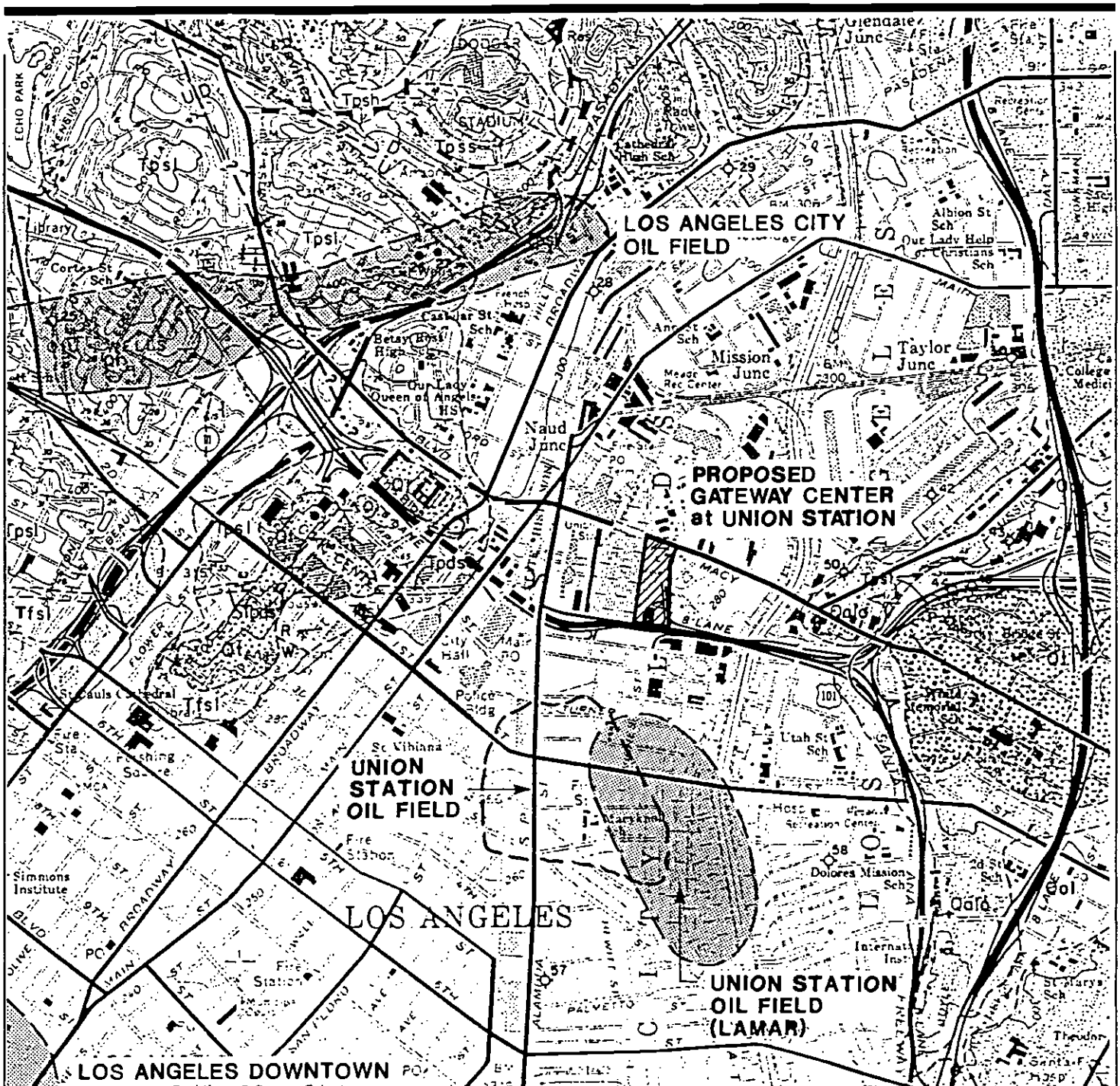
- Seiches
  Seiches are large rolling waves generated within enclosed bodies of water in response to earthquake ground shaking. These waves can potentially top dams or reservoirs and flood adjacent areas. Since there are no significant enclosed bodies of water adjacent to or immediately upstream from the site, the potential for seiches is considered low.

7.2 Loss of Mineral Resources

7.2.1 Oil Resources

As shown on Figure 7.2, the site is located near several oil fields. The closest field is the Union Station Oil Field, located about 1200 feet south of the site. These oil fields were extensively developed during the late 1800's and the early 1900's. By about the late 1930's, most of the economically recoverable reserves had been withdrawn and production was at a minimum (Jenkins, 1943).

Based on review of California Division of Oil and Gas Map Sheet 119 (1989), there are no oil wells (active or abandoned) on the site. The closest well to the site is the Southern California Rapid Transit District "Metrorail Unknown" well. This



REFERENCES

1.) Lamar, 1970, Geology of the Elysian Park - Repetto Hills, CDMG SR 101

2.) California Oil and Gas Fields, Vol. II, Publication No. TR12, Third Edition 1991

MINERAL RESOURCE MAP (ECONOMIC BOUNDARIES)

GATEWAY CENTER at UNION STATION
S.C.R.T.D. Union Station Headquarters Project

Project No.
91-31-261-01

Figure No.
7.2

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abandoned and plugged well is located about 800 feet southeast of the site. There are also a number of oil wells in the nearby Union Station Oil Field, about 2,100 feet south of the site.

Based on review of the above documents, most of the economically recoverable oil reserves have been mined. Consequently, loss of oil resources is considered negligible.

7.2.2 Aggregate Resources

The California Division of Mines and Geology "Aggregates in the Greater Los Angeles Area, California" was reviewed for nearby aggregate resources. Based on review of that document, the site is not within an area of historic aggregate production. Consequently, the loss of aggregate mineral resources is considered negligible.

7.3 Waste Disposal

The general vicinity of the proposed project site has been industrialized for more than 100 years. From 1870 to 1941, the Southern California Gas Company (SCG) and its predecessor, the Los Angeles Gas and Electric Company, operated a coal gasification plant in close proximity to the project site. In 1943 this gasification facility, known as the Aliso Street Plant, was converted and started production of butadiene gas. The conversion of the plant to production of butadiene gas involved expansion of the facility. Production ceased in about 1946 and other industries were operated on the site: (CERCLA Site Inspection Report, Southern California RTD Busway, EPA Site ID Number CAD98198941, dated April 15, 1991).

Former land uses and industrial plants have contributed to soil and groundwater contamination beneath the project vicinity. Caltrans first encountered soil contaminated with hazardous organic compounds in 1986 during excavation of soil for support of the El Monte Busway which runs along the southern boundary of the project site (Drawing 1).

All contaminated soils were disposed of at a Class 1 landfill under the observation of the California Department of Health Services.

Environmental investigations of the Metro Rail Project A-130 corridor by Earth Technology Corporation in 1986 revealed soil containing elevated concentrations of hazardous materials. The proposed subway corridor was subsequently realigned southward to avoid development in the contaminated areas.

The Regional Water Quality Control Board issued a National Pollution Discharge Elimination Systems (NPDES) permit to Southern California RTD Metro Rail for the discharge of pretreated groundwater from construction dewatering to the Los Angeles River. The water was tested for hydrogen sulfide and treated with hydrogen peroxide as necessary. The permit also required testing for toxicity on project site discharges, storm drain discharges and receiving waters. (CERCLA Site Inspection Report, dated April 15, 1991).

The proposed Gateway Center development is planned to have four levels of subterranean parking. Level P-4 of the subterranean parking will be founded at about Elevation 240 to 245 feet. Construction at this level, 35 to 40 feet below existing surface, would require excavation and disposal of excavated materials and construction dewatering. Areas of soil and groundwater contamination (Tables 6.1.2 and 6.2) exist at the project and would require appropriate mitigation measures. Any treatment or disposal for the project would require permit application and written concurrence by local, state, and federal agencies. Soil and groundwater contaminated with substances in concentrations toxic to human, animal; plant or fish life would be required to meet all current applicable standards, conditions and requirements imposed by regulatory agencies. Regulatory requirements are generally imposed on a case-by-case basis specific to conditions of each particular project site.

7.4 Slope and/or Foundation Instability

The Gateway Center site is located on a flat lying surface along the flood plain of the Los Angeles River. Given the absence of elevated source areas in close proximity to the site, the potential for landslides is considered very low to non-existent.

Four levels of subterranean parking are planned for the proposed development. Temporary slopes will be required for the proposed construction. Temporary slopes in granular fill soils are expected to slough and cave, particularly when they become dry or excessively wet. Where space is limited due to adjacent structures, improvements, and utilities, shoring will be required.

A sheet pile, soldier pile or similar shoring system which can control flowing ("running"). sands may be used to maintain temporary support of excavation. However, driven sheet piles may be impractical due to the driving difficulty in cobbles and boulders. The presence of shallow groundwater and granular soils with cobbles and boulders beneath the project site will make installation of shoring systems difficult. If a soldier pile system is used, gunite or lagging may be required to control caving in the excavation and protect workers from falling ("pop-out") gravels, cobbles and boulders between solder piles.

Shoring design must consider support of the adjacent structures or underground utilities. Underpinning may be required to support of adjacent structures. For shoring heights in excess of 15 feet, braced shoring is recommended to reduce the lateral shoring deflections to within tolerable limits. Construction instrumentation and monitoring should be performed to evaluate performance of shoring systems.

Adequate provisions should be made to protect slopes from erosion during periods of rainfall. All workers entering excavations should be protected from raveling and caving of cuts.

Undocumented fill soils are considered unsuitable for support of the proposed structures. Undocumented fill soils up to 22 feet in depth were encountered below existing ground

surface (Law/Crandall, Inc. 1991). Most of these undocumented fill soils will be removed during excavation for the four levels of subterranean parking. Undocumented fill soils beneath proposed structures or improvements should be removed and recompacted in accordance with project specifications and City of Los Angeles Building Codes.

Special shoring and foundation provisions may be required adjacent to the Metro Rail tunnel structure and slurry cut-off wall. Foundation surcharge pressures will be increased with the construction of the lower parking levels adjacent to the tunnel structure. Future tunnel additions are planned for the "AR" and "AL" Track portals. Spread footings founded in dense natural soils should provide suitable support for the proposed office building and parking structure. Construction dewatering may be required for footings founded below the groundwater surface. We recommend a detailed geotechnical investigation be performed to determine the nature and engineering properties of the earth materials and to provide geotechnical recommendations for design and construction of the proposed building.

Excavations should be made in compliance with all current CAL/OSHA safety regulations and requirements.

7.5 Erosion, Sedimentation, Flooding

The Gateway Center project site is situated about 1,200 feet west of the concrete lined Los Angeles River channel. This area is identified as the Los Angeles Forebay and lies in a zone of transition between the Los Angeles River Narrows to the north and the Central Groundwater Basin to the south.

Review of the Preliminary Flood Insurance Study Work Map, dated February 24, 1989, and prepared for the Federal Emergency Management Agency (F.E.M.A.), indicates that the proposed project site is located in an area of minimal flooding (Zone C). Areas of a 100-year flood event are primarily confined to the Los Angeles River Channel and low lying areas east of the channel. Locations the designated flood zones with respect to the project site are shown on Figure 7.5.1, "F.E.M.A. Flood Zone Map."

MAP REFERENCE:
Portion of USGS Los Angeles
7.5-minute Quadrangle,
1966, Photorevised 1981

REFERENCE:
Preliminary Flood Insurance Study Work Map,
dated February 24, 1989
F.E.M.A. Flood Insurance Maps

EXPLANATION OF ZONES

- **ZONE A:** AREAS OF 100-YEAR FLOOD
- **ZONE AE:** AREAS OF 100-YEAR FLOOD, BASE FLOOD ELEVATIONS DETERMINED
- **ZONE C:** AREAS OF MINIMAL FLOODING, UNSHADED

F.E.M.A. FLOOD ZONE MAP

GATEWAY CENTER at UNION STATION
S.C.R.T.D. Union Station Headquarters Project

Project No.
91-31-261-01

Figure No.
7.5.1

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The Zone C area has been identified in the community flood insurance study as an area of moderate or minimal hazard from the principal source of flood in the area. The FEMA flood zone designations are based on detailed overflow studies, accurate topographic control and detailed backwater analysis analyzed with a HEC-2 computer program. However, buildings in this zone could be flooded by severe, concentrated rainfall coupled with inadequate local drainage systems. Local stormwater drainage systems are not normally considered in the community's flood insurance study. The failure of a local drainage system creates areas of high flood risk within this rate zone. Flood insurance is available through FEMA but is not required by regulation in this zone. There are no regulations with respect to flood insurance for development within a Zone C area.

The proposed project site is within a 100-year flood inundation zone as designated by draft report by the U.S. Army Corps of Engineers. The U.S. Army Corps Los Angeles County Drainage Area (LACDA) Draft Feasibility Report, dated September 1991, indicated the project site is located within a 100-year, 200-year and 500-year flood plain. This report reviewed the adequacy of flood control along the main stream systems of the Los Angeles and San Gabriel rivers. This draft feasibility study is considered to be less detailed than the FEMA flood hazard studies, (personal communications, U.S. Army Corps, June 17, 1992).

The report indicated that the flood threat is greatest on the mainstream systems. The February 16, 1980 flood, considered to be a 40-year event, caused near capacity channel flows in the lower Los Angeles River that deposited debris on the top of levees which had previously been thought to have a 100-year protection. The primary cause of the existing system inadequacies is a substantial increase in local runoff from developed areas.

The project site is located along Reach 3 of the Los Angeles River. The report concluded that within Reach 3, the stream system from the Arroyo Seco to the Rio Hondo confluence, a 100-year flood would break out in an area between the Pasadena Freeway

MAP REFERENCE:
Portion of USGS Los Angeles
7.5-minute Quadrangle,
1966, Photorevised 1981

REFERENCE:
LACDA Review Study
Los Angeles County Drainage Area Feasibility Report,
dated September 1991, U.S. Army Corps of Engineers

EXPLANATION

- 100-YEAR FLOOD PLAIN
- 200-YEAR FLOOD PLAIN
- 500-YEAR FLOOD PLAIN

U.S. ARMY CORPS OF ENGINEERS 100-, 200-, and 500-YEAR FLOOD PLAINS

GATEWAY CENTER at UNION STATION
S.C.R.T.D. Union Station Headquarters Project

Project No.
91-31-261-01

Figure No.
7.5.2

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and the Santa Monica Freeway, inundating railyards, blocking major roads and freeways, and flooding major shopping, commercial and governmental building (see Figure 7.5.2). A vast majority of damages would be to commercial and industrial buildings and their contents. A 500-year flood event would break out in the same general area, flowing across much of central Los Angeles before returning to the mainstream channels down stream.

The report concluded that the LACDA system has provided protection for major flooding in the basin for the last 50 years, but has inadequate capacity to protect the LACDA basin communities in the future.

Locations of the U.S. Army Corps designated flood plains with respect to the project site are shown on Figure 7.5.2, "U.S.Army Corps of Engineers 100-, 200-, and 500-Year Flood Plains."

The proposed project development may result in alterations or changes to the course or flow of flood waters as a result of development. Development of the site may result in decreases of absorption rates, increases in surface runoff and changes to drainage patterns. Impacts related to these factors are deemed to be non-significant. Development of the site may result in changes to the amount of surface water due to discharge of potential cooling- and/or industrial-related water to local channels. Impacts related to such discharge are deemed to be non-significant.

A standard erosion control plan shall be implemented for site grading activities. The erosion control plan shall be in accordance with all City and County regulations and shall be reviewed and approved by the appropriate regulatory agencies prior to the commencement of grading.

7.6 Land Subsidence

Construction of the Gateway Center development may require a construction dewatering program which would lower the groundwater table over a relatively large area. Depending

on the construction methods and dewatering system used, it is estimated that the drawdown will be on the order of 10 to 15 feet. This drawdown will increase effective stress in the subsurface sediments and, theoretically, result in some surface settlement. Minor to negligible settlement could occur.

If required, the dewatering system should be designed and maintained to minimize loss of ground due to piping. Loss of ground due to piping could lead to ground subsidence, particularly near the wells.

Further analysis of the potential for subsidence should be performed if construction dewatering is required.

The project site is located near several oil fields (Figure 7.2). The closest field is the Union Station Oil field located about 1200 feet south of the site. These oil fields were extensively developed during the late 1800's and early 1900's. Most of the economically recoverable reserves had been withdrawn and production was at a minimum by the late 1930's (Jenkins, 1943). No subsidence has been associated with this oilfield.

Alluvial sediments underlying the proposed project site consist primarily of granular soils including sands, silty sands, gravelly sands and silts with gravels, cobbles and boulders. Groundwater water levels beneath the site vary between 25 to 35 feet beneath the existing surface. The potential for hydroconsolidation or peat oxidation of the underlying sediments is considered remote.

7.7 Environmental Concerns

A preliminary environmental site assessment search for the proposed Gateway Center at Union Station, Los Angeles, California was conducted. This assessment search was conducted to identify areas of potential environmental concern on or near the subject site.

Our study consisted of the following:

- Site History Review - Aerial photographs were reviewed to establish a site-use history for the property.

- Regulatory Agency Records Review - Available regulatory agency records and published lists were reviewed to ascertain whether violations or environmental impairments known to the agencies exist at the site or in the vicinity.

See the References Section of this report for a listing of all records reviewed in preparation of this report.

7.7.1 Historical Information

Provided below is historical information covering both the site and its general vicinity based on a review of aerial photographs at the Fairchild Aerial Photography Collection, Department of Geology, Whittier College, Whittier, California.

1928	The southern portion of the site (south of the former Lyon Street) appears to be developed with warehouses. North of Lyon Street the site appears to be partially developed with residential houses. The eastern adjacent property consists of an industrial facility with above-ground tanks. The western adjacent property consists of warehouses and vacant lots. Macy Street and the former Aliso Street bound the site on the north and south, respectively. The site vicinity is primarily industrial.
10-17-33	The site and site vicinity appear to be primarily industrial. Some residential structures appear in the northeast portion of the site.
1-26-34	Many of the structures on the western portion of the site and the western adjacent property appear to have been removed.
1937	No significant changes appear on the site. The western adjacent property appears to be under construction of railroad lines.
3-8-38	Some of the structures in the northern portion of the site appear to have been removed. Union Station and the associated railroad lines appear to be under construction.
8-14-41	The northern portion of the site is primarily vacant with some residential structures. A large warehouse and parking lot appear in the central portion of the site. West of the site, construction of Union Station and associated parking areas appear to be completed. The

Santa Ana Freeway (I-5) is under construction along the southern boundary of the site (formerly Aliso Street).

9-24-45 The site and vicinity are primarily unchanged except for the completion of the Santa Ana Freeway.

6-1947 Some of the structures in the northern portion of the site appear to have been removed. The remainder of the site and site vicinity appear unchanged.

6-2-49 The central portion of the site is primarily vacant and appears to be used for parking. The remainder of the site and site vicinity appear unchanged.

8-15-52 The majority of the site (north of the former Lyon Street) is vacant and appears to be used for parking. South of Lyon Street an additional structure appears adjacent to the formerly identified warehouse.

3-23-57 All of the structures on the site appear to have been removed, except for the structures south of Lyon Street. Many of the structures and tanks of the facility adjacent to the site to the east appear to have been removed. The extension of Vignes Street appears on the eastern boundary of the site.

7.7.2 Regulatory Agency Lists and Records Review

Regulatory agency records, published lists, and maps were consulted to determine if violations or environmental impairments were recorded for the site or within an approximate one-half mile radius study area. The sources reviewed are listed below. The locations of the violations or impairments are numbered and are plotted on Figure 7.7, "Potential Environmental Concerns Map," and described on Table 7.7, Legend to Potential Environmental Concerns Map.

- California Department of Conservation, Division of Oil and Gas (DOG), Oil and Gas Field Map 119. This map shows the locations of known oil and gas wells and fields.

  There are two oil wells located within the radius of investigation (referenced as locations 12 and 13 on Figure 7.7 and Table 7.7).

- California Department of Health Services (DOHS), 1989, Expenditure Plan for the Hazardous Substance Cleanup Bond Act of 1984 (BEP), Revision

REFERENCE:
Portion of USGS Los Angeles
7.5-minute Quadrangle
1966, Photorevised 1981

LEGEND

- ✱ APPROXIMATE DHS BEP SITE
- ◉ APPROXIMATE TANK LEAK LOCATION
- ▣ APPROXIMATE CERCLIS LOCATION
- ⚠ APPROXIMATE OIL WELL LOCATION

POTENTIAL ENVIRONMENTAL CONCERNS MAP

GATEWAY CENTER at UNION STATION
S.C.R.T.D. Union Station Headquarters Project

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No. 4; and January 10 1990, Update to BEP - A book listing hazardous waste sites targeted for State funding.

There is one location identified to be within the radius of investigation (referenced as location 14 on Figure 7.7 and Table 7.7).

- California Office of Planning and Research (OPR), 1990, Hazardous Waste and Substances Sites List - This list, also known as the Cortese List and the Governor's List, contains sites which are on any of the State of California regulatory agency lists of hazardous waste sites, landfills, polluted drinking water wells, or other environmental concerns.

  Tank leak locations found on this list were also listed on the CRWQCB tank leak list (see below). Five locations were identified to be located with the radius of investigation (referenced as locations 1 through 5 on Figure 7.7 and Table 7.7).

- California Regional Water Quality Control Board (CRWQCB), 1991, Underground Storage Tank Leak List for Region 4 (Los Angeles and Ventura Counties) and for Region 8 (Orange, Riverside, and San Bernardino Counties) - This list contains the status of all CRWQCB leaking underground storage tank (UST) investigations.

  A review of the CRWQCB list of UST leaks revealed one unauthorized releases of hazardous materials within the radius of investigation that did not appear on the above OPR listing (referenced as location 11 on Figure 7.7 and Table 7.7).

- California Waste Management Board (CWMB), 1991, List of Active and Inactive Landfills, **Solid Waste Information System (SWIS)** - This list contains information on active and inactive landfills in the state of California.

  There are no landfills located within the radius of investigation.

- United States Environmental Protection Agency, 1991, Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) List-8: Site/Event Listing - A list of potential hazardous waste sites which are currently being investigated under the EPA Superfund program or have been determined to not qualify for the NPL.

  Five CERCLIS List-8 locations were determined to be located within the radius of investigation (referenced as locations 6, 7, 8, 9, and 10 on Figure 7.7 and Table 7.7).

- United States Environmental Protection Agency (EPA), 1990, National Priorities List (NPL) Supplementary Lists and Supporting Materials - A list of sites which the EPA has determined to be a significant threat to public

health and the environment. NPL sites are high priority sites that have been targeted for cleanup under the auspices of the Superfund program. There are no current locations within the radius of investigation.

TABLE 7.7

LEGEND TO THE POTENTIAL ENVIRONMENTAL CONCERNS MAP

Map Location Number	Location	Substance	Resource Affected	Status
1	Mobil Station #11-HDH 520 North Alameda Street	Gasoline and Waste Oil	Groundwater	Pollution characterization underway Approximately 2,200 feet southwest of site
2	Los Angeles County Jail 429 Bauchet Street	Diesel	Groundwater	Pollution characterization underway Approximately 1,800 feet northeast of site
3	Friedman Bag Co. 801 Commercial Street	Gasoline	Undetermined	No action taken Approximately 1,400 southeast of site
4	Shell Station #204-4530-3405 766 North Hill Street	Gasoline	Groundwater	Remedial action underway Approximately 2,500 feet northwest of site
5	L.A.County Hall of Administration 500 West Temple Avenue	Diesel	Undetermined	Pollution characterization underway Approximately 2,200 feet southwest of the site.
6	Bauchet Partners 490 Bauchet Street	Unknown	Undetermined	Discovery site inspection in progress Approximately 1,300 feet northeast of site
7	Union Station 800 North Alameda Street	Unknown	Undetermined	Discovery site inspection in progress Located adjacent to the west of site
8	Van Der Horst Corporation of America 496 Bauchet Street	Unknown	Undetermined	Discovery site inspection in progress Approximately 2,400 feet northeast of site
9	Magnus Co. Inc. 860 North Main Street	Unknown	Undetermined	Preliminary assessment in progress Approximately 2,400 north of site
10	A & H Greenfield Sheet Metal 830 E. Commercial Street	Unknown	Undetermined	Preliminary assessment in progress Approximately 1,500 feet southeast of site
11	Veterans Administration Medical Center Alameda Street/Temple Street	Unknown	Undetermined	Preliminary assessment in progress Approximately 2,000 feet southwest of site
12	Chevron "Miller Corehole" Well			Plugged and abandoned dry hole Approximately 1,500 feet southeast of site
13	Southern California Rapid Transit District	Metrorail Unknown well		Plugged and abandoned dry hole Approximately 1,500 feet southeast of site
14	Southern California Gas Co. Aliso Street/Main Street Coal Gasification Facilities	Polynuclear or polycyclic aromatic hydrocarbons and other constituents (cyanide, lead, and semivolatile organics)	Soil contamination	Remediation action plan implemented Located adjacent to the east and northeast of the site

8.0 GEOTECHNICAL MITIGATION MEASURES

The following geotechnical mitigation measure for the proposed S.C.R.T.D. Headquarters Project and Gateway Center are recommended.

- Soils - A detailed geotechnical engineering investigation should be performed for the site, the results of which should be incorporated into the project design and plans. The investigation should address general soil, bedrock and groundwater conditions within the project site and vicinity and shall be performed by a licensed Geotechnical Engineer in the State of California.

  The potential for collapsible soils and ground subsidence within the project area shall be further evaluated as part of the geotechnical investigation. The report should provide design recommendations for seismic design, foundations, earthwork, construction dewatering, grading, subterranean walls, slabs-on-grade, paving, and protection of existing structures and improvements.

  Final approval of the geotechnical investigation report should be obtained from the appropriate regulatory agencies.

- Seismicity - All structures proposed within the project study area should be designed to withstand significant levels of ground shaking associated with seismic activity from local and regional faults. Secondary seismic hazards related to earthquake activity shall also be addressed.

  Design engineers should consider dynamic seismic analyses for all the proposed structures in addition to designing all structures to resist earthquake forces in accordance with current building codes and requirements.

  Since the proposed project will be considered as a critical and essential component of the Southern California Rapid Transit District infrastructure, the proposed project should be structurally designed such that the structures/facilities are adequate to withstand appropriate seismic ground accelerations, to remain standing and functional in the event of a major earthquake occurrence and shall be so engineered as to withstand maximum probably ground motion parameters.

- Flooding - FEMA flood zone maps indicate the Project site is located in an area of minimal flooding (Zone C). Shallow inundation of the project site by a severe concentrated rainfall coupled with inadequate local drainage systems may result in a potential impact of exposing people and property to flood waters. Through proper civil engineering studies and design, the project, with four levels of subterranean parking, would not be subject to inundation by floor waters. At least one route of ingress and egress to the proposed facility should be available at all times under all conditions.

- Waste Disposal - Areas of soil and groundwater contamination exist at the proposed project site. The existing regulatory framework provides mechanisms required for mitigation of any potentially significant soil or water quality impacts.

9.0 CLOSURE

The supplemental geologic and geotechnical information presented in this report was prepared in accordance with generally accepted professional engineering and geologic principles and practice in Los Angeles County at this time. Considerable judgement should be exercised in the interpretation and use of this information. Care should be exercised in extrapolating subsurface conditions between or beyond the boring locations.

The findings and recommendations presented in this report are based on analyses of currently available data and information. We make no other warranty, either express or implied.

Converse Consultants West is not responsible or liable for any claims or damages associated with interpretation of available information. This report should not be regarded as a guarantee that no further contamination, beyond that which was detected in our investigation, is present beneath the property. In the event that changes in the nature of the property occur or additional relevant information about the property is brought to our attention, the conclusions and recommendations contained in this report may not be valid unless these changes and additional relevant information are reviewed and the conclusions of this report are modified or verified in writing.

10.0 REFERENCES

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APPENDIX A

BORING LOG SUMMARIES

1. Boring Logs 1 through 7 drilled between December 16 and 18, 1991, by MAA Engineering Consultants, Inc. for this project study.

2. 1986 Pump Well and Observation Well Boring Logs (Union Station Site #2 - Ramirez and Vignes Streets) drilled for the Union Station Area Aquifer Pump Tests, Metro Rail Project

BORING LOGS 1 THROUGH 7

Drilled between December 16 and 18, 1991,
by MAA Engineering Consultants, Inc. for this project study.

Note: Location of borings shown on Drawing 1, "Site Plan and Location of Borings"

Explanations

Penetration resistance (Blow Count)
-Blow counts for 12" intervals except asnoted.

N/A - Not applicable ; NR - No Recovery

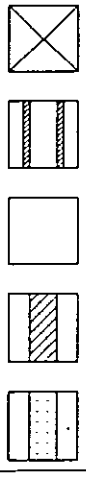
Additional Tests:

MD : Modified Proctor Compaction
SG : Specific Gravity
GS : Grain Size Distribution
HA : Hydrometer Analysis
AL : Atterberg Limits
SE : Sand Equivalent
EI : Expansion Index
UE : Undisturbed Expansion
DS : Direct Shear
CN : Consolidation
RV : R-Value

CH : Chloride Content
SC : Sulfate Content
RS : Resistivity
PH : pH (acidity)
PM : Permeability
CP : Collapse Potential
UC : Unconfined Compression

Triaxial tests ---
CU : Consolidated Undrained
CD : Consolidated Drained
UU : Unconsolidated Undrained

Sample Type



bulk sample

standard penetration test sample

2 1/2" dia.,
12" drive sample
18" long

3" dia.,
shelby tube sample

2 1/2" dia.,
plastic tube sample

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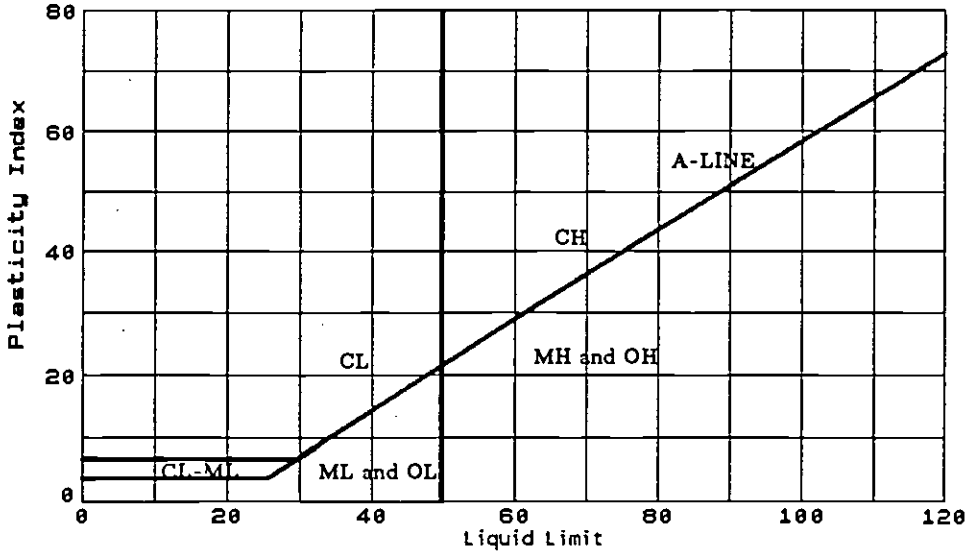
Los Angeles, CA 90012

Key for Logs of Boring

Job No.:	0007-006	Figure No.:	

MAJOR DIVISION			GROUP SYMBOL	DESCRIPTION	GRAPHIC LOG
COARSER GRAINED SOILS Over 50% By Weight Coarse Than No. 200 Sieve Size	GRAVELLY SOILS OVER 50% OF COARSE FRACTION LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELLY SOIL LITTLE OR NO FINES	GW	WELL GRADED GRAVEL OR GRAVEL - SAND MIXTURE	
			GP	POORLY GRADED GRAVEL OR POORLY GRADED GRAVEL - SAND - SILT MIXTURE	
		GRAVELLY SOIL WITH FINES OVER 12%	GM	SILTY GRAVELS OR POORLY GRADED GRAVEL - SAND - SILT MIXTURE	
			GC	CLAYEY GRAVELS OR POORLY GRADED GRAVEL - SAND - CLAY MIXTRUE	
	SANDY SOILS OVER 50% OF COARSE FRACTION SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDY SOILS LETTLE OR NO FINES	SW	WELL GRADED SAND OR GRAVELLY SAND	
			SP	POORLY GRADED SAND OR GRAVELLY SAND	
		SANDY SOIL WITH FINES OVER 12%	SM	SILTY SAND OR POORLY GRADED SAND - SILT MIXTURE	
			SC	CLAYEY SAND OR POORLY GRADED SAND - CLAY MIXTURE	
FINE GRAINED SOILS OVER 50% By Weight Finer Than No. 200 Sieve Size	SILTY AND CLAYEY SOIL LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILT, VERY FINE SAND SILTY/CLAYEY FINE SANDS, CLAYEY SILT WITH SLIGHT PLASTICITY	
			CL	INORGANIC CLAY-LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTY OR LEAN CLAY	
			OL	ORGANIC CLAY OR ORGANIC SILTY CLAY OF LOW PLASTICITY	
	SILTY AND CLAYEY SOIL LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILT, MICACEOUS OR DIATOMICEOUS FINE SANDY OR SILTY SOIL, OR ELASTIC SILT	
			CH	INORGANIC CLAY OF HIGH PLASTICITY, OR FAT CLAY	
			OH	ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY, OR FAT CLAY	
HIGHLY ORGANIC SOILS			PT	PEAT OR OTHER HIGHLY ORGANIC SOIL	



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UNIFIED SOIL CLASSIFICATION SYSTEM

Job No.:		Figure No.:	

LOG OF BORING B-1

MAA Engineering Consultants, Inc.

Project Name: GATEWAY CENTER			
Project Number: 0007-006	Borehole Number: B-1		Sheet 1 of 1
Borehole Location: As shown in Figure	Elevation and Datum: 282.0 feet; Mean Sea Level		
Borehole Coordinates:	Date Started: 12/16/91		Date Finished: 12/16/91
Drilling Equipment: CME 75	Total Depth(feet): 37.50		Depth to Groundwater(feet): 32.50
Drilling Method: HSA	Borehole Diameter: 8.0" inches		
Driller: CONVERSE - MARK/BILL	Monitoring Well: Total Depth(feet):		As-Built In Figure:
Hammer Information: Hammer: 140-lb and 30-inch drop	Logged By: ART MATULAC		Checked By: YCL

Elevation (feet)	Depth (feet)	Description	Lithology	USCS Classification	Samples: Sampler	Number	Blow Counts/Pressure	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Additional Tests
	2	SAND, medium brown, moist, dense, fine, trace fine to coarse Gravel, with miscellaneous materials (brick, wood, ceramic, plastic, charcoal fragments, etc.) - FILL		SP		R1	39					
277	6	Silty SAND, dark brown, moist, medium dense, fine. - FILL		SM		R2	10					
272	10	SAND, light-grayish brown, moist, medium dense, fine, trace Silt. - FILL		SP		R3	19					
267	16	SAND, lt-brown, moist, dense, fine to coarse, trace fine Gravel.		SW		R4	35					
262	20	Same as above, very dense.		SW		R5	48					
	22			SW		S6	97					
257	26	Same as above, more coarser Sand and a layer of 4" fine silty Sand.		SW		R7	65					
252	30	Gravelly SAND with Silt, gray, wet and very dense.		SP		R8	75					
	32	▼										
247	36	No recovery with California ring sampler (R9). Gravelly SAND, gray, wet and very dense.		SP/GP		R9	150					
				SP/GP		S10	115					

1. Boring terminated at 37.5'.
2. Groundwater at 32.5' depth.
3. No OVA/HNU readings after five minutes of open hole.
4. Borehole backfilled with bentonite pellets up to 5.0' depth.

LOG OF BORING B-2

MAA Engineering Consultants, Inc.

Project Name: GATEWAY CENTER			
Project Number: 0007-006	Borehole Number: B-2		Sheet 1 of 1
Borehole Location: As shown in Figure		Elevation and Datum: 282.0 feet; Mean Sea Level	
Borehole Coordinates:		Date Started: 12/16/91	Date Finished: 12/16/91
Drilling Equipment: CME 75		Total Depth(feet): 37.50	Depth to Groundwater(feet): 31.00
Drilling Method: HSA		Borehole Diameter: 8.0" inches	
Driller: CONVERSE - MARK/BILL		Monitoring Well : Total Depth(feet):	As-Built In Figure:
Hammer Information: Hammer: 140-lb and 30-inch drop		Logged By: ART MATULAC	Checked By: YCL

Elevation (feet)	Depth (feet)	Description	Lithology	USCS Classification	Sampler	Number	Blow Counts/ Pressure	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Additional Tests
	2	Silty SAND, grayish-brown, moist, medium dense, fine, with miscellaneous materials (brick & concrete fragments, wood chips, plastic, ceramics, etc.) - FILL		SP/SM		R1	11					
277	6	Same as above.		SP/SM		R2	15					
272	10	SAND, light-brown, moist, medium dense, fine to medium, trace brick fragments. - FILL		SP		R3	18					
267	16	SAND, light-brown, moist, dense, fine to coarse, trace medium Gravel, clean.		SW		R4	33					
262	20	SAND with Gravel, multi-colored, moist, dense, fine to coarse.		SW		R5	32					
257	26	Gravelly SAND, brown, moist, very dense, fine to coarse.		SW/GW SW/GW		R5 S7	56 38					
252 ▼	30	SAND, gray, wet, very dense, fine to medium, trace fine Gravel.		SP		R8	90					
247	36	Same as above, some fine to coarse Gravel.		SP SP		R9 S10	77 150+					

1. Borehole terminated at 37.0'.
2. Groundwater at 31.0' depth.
3. OVA readings after five minutes = 3 to 30 ppm.
4. Hole backfilled with bentonite pellets up to 5.0' depth.

LOG OF BORING B-3

MAA Engineering Consultants, Inc.

Project Name: GATEWAY CENTER			
Project Number: 0007-006	Borehole Number: B-3	Sheet 1 of 1	
Borehole Location: As shown in Figure	Elevation and Datum: 281.0 feet; Mean Sea Level		
Borehole Coordinates:	Date Started: 12/16/91	Date Finished: 12/16/91	
Drilling Equipment: CME 75	Total Depth(feet): 37.50	Depth to Groundwater(feet): 31.00	
Drilling Method: HSA	Borehole Diameter: 8.0" inches		
Driller: CONVERSE - MARK/BILL	Monitoring Well: Total Depth(feet):	As-Built In Figure:	
Hammer Information: Hammer: 140-lb and 30-inch drop	Logged By: ART MATULAC	Checked By: YCL	

Elevation (feet)	Depth (feet)	Description	Lith-ology	USCS Classi-fication	Samples: Sampler	Number	Blow Counts/ Pressure	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Additional Tests
	2	Gravelly and Silty SAND, light-brown, moist, medium dense, fine, some miscellaneous materials (brick, wood, concrete, plastic, etc.). - FILL		SM		R1	18					
276	6	Same as above, dark-brown. - FILL		SM		R2	13					
271	10	SAND, light-brown, moist dense, fine to coarse, little fine to medium Gravel, trace cobbles.		SW		R3	34					
266	16	Same as above, little fine to coarse Gravel.		SW		R4	35					
261	20	Gravelly SAND, light-brown, moist, very dense, fine to coarse, trace cobbles.		SW/GW		R5	65					
256	26	Same as above.		SW/GW		R6	83					
				SW/GW		S7	96					
251 ▼	30	SAND, gray, wet, dense, fine to medium.		SP		R8	30					
246	36	Same as above, very dense, wet, trace fine to medium Gravel.		SP		R9	120					
				SP		S10	75					

1. Borehole terminated at 37.5'.
2. Groundwater at 31.0' depth.
3. No OVA/HNU reading after five minutes of open hole.
4. Borehole backfilled with bentonite pellets up to 5.0' depth.

LOG OF BORING B-4

MAA Engineering Consultants, Inc.

Project Name: GATEWAY CENTER			
Project Number: 0007-006	Borehole Number: B-4		Sheet 1 of 1
Borehole Location: As shown in Figure		Elevation and Datum: 281.0 feet; Mean Sea Level	
Borehole Coordinates:		Date Started: 12/17/91	Date Finished: 12/17/91
Drilling Equipment: CME 75		Total Depth(feet): 37.50	Depth to Groundwater(feet): 31.00
Drilling Method: HSA		Borehole Diameter: 8.0" inches	
Driller: CONVERSE - MARK/BILL		Monitoring Well : Total Depth(feet):	As-Built In Figure:
Hammer Information: Hammer: 140-lb and 30-inch drop		Logged By: ART MATULAC	Checked By: YCL

Elevation (feet)	Depth (feet)	Description	Lithology	USCS Classification	Sampler	Number	Blow Counts/ Pressure	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Additional Tests
					Samples							
	2	Silty SAND, brown, little moist, loose, fine to medium, trace fine to medium Gravel, some miscellaneous materials (brick, wood, fragments, etc.). - FILL		SM		R1	9					
276	4											
	6	Sandy SILT, brown, moist, medium stiff.		ML		R2	6					
	8											
271	10	Same as above, stiff. - FILL		ML		R3	15					
	12											
	14											
266	16	SAND, light-brown, moist, very dense, fine to coarse, little fine to coarse Gravel.		SW		R4	60					
	18											
261	20	Same as above, very dense.		SW		R5	67					
	22											
	24											
256	26	Gravelly SAND, brown, moist, very dense, fine to coarse.		SW/GW		R6	80					
				SW/GW		S7	102					
	28											
	30											
251		Silty & gravelly SAND, light-grayish brown, moist, dense, fine to coarse.		SM/GM		R8	36					
	32 ▼											
	34											
246	36	Same as above, very dense.		SM/GM		R9	85					
				SM/GM		S10	48					

1. Borehole terminated at 37.5'.
2. Groundwater at 32.0' depth.
3. No OVA/HNU readings after five minutes of open hole.
4. Borehole backfilled with bentonite pellets up to 5.0' depth.

LOG OF BORING B-5

MAA Engineering Consultants, Inc.

Project Name: GATEWAY CENTER			
Project Number: 0007-006	Borehole Number: B-5		Sheet 1 of 1
Borehole Location: As shown in Figure	Elevation and Datum: 280.0 feet; Mean Sea Level		
Borehole Coordinates:	Date Started: 12/17/91	Date Finished: 12/17/91	
Drilling Equipment: CME 75	Total Depth(feet): 37.50	Depth to Groundwater(feet): 31.50	
Drilling Method: HSA	Borehole Diameter: 8.0" inches		
Driller: CONVERSE - MARK/BILL	Monitoring Well : Total Depth(feet):	As-Built In Figure:	
Hammer Information: Hammer: 140-lb and 30-inch drop	Logged By: ART MATULAC	Checked By: YCL	

Elevation (feet)	Depth (feet)	Description	Lithology	USCS Classification	Sampler	Number	Blow Counts/ Pressure	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Additional Tests
					Samples							
	2	Silty SAND, dark-brown, moist, dense, fine to medium, little fine to medium Gravel, with miscellaneous materials (brick, concrete, wood, glass fragments, etc.). - FILL		SM		R1	35					
275	6	Silty SAND, dark-brown, moist, medium dense, very fine. - FILL		SM		R2	11					
	10											
270	12	SAND with little fine to medium Gravel, light-brown, moist, dense, fine to coarse.		SW		R3	40					
	14											
265	16	Same as above.		SW		R4	51					
	18											
	20											
260	22	Gravelly SAND, brown, moist, very dense, fine to coarse.		SW/GW		R5	105					
	24											
255	26	Same as above.		SW/GW		R6	135+					
				SW/GW		S7	69					
	28											
250	30	Gravelly SAND, gray, wet, very dense, fine to coarse.		SW/GW		R8	142+					
	32 ▼											
	34											
245	36	Same as above.		SW/GW		R9	62					
				SW/GW		S10	90					

1. Borehole terminated at 37.5'.
2. Groundwater at 31.5' depth.
3. No OVA/HNU readings after five minutes of open hole.
4. Borehole backfilled with bentonite pellets up to 5.0' depth.

LOG OF BORING B-6

MAA Engineering Consultants, Inc.

Project Name: GATEWAY CENTER			
Project Number: 0007-006	Borehole Number: B-6		Sheet 1 of 1
Borehole Location: As shown in Figure		Elevation and Datum: 278.0 feet; Mean Sea Level	
Borehole Coordinates:		Date Started: 12/17/91	Date Finished: 12/17/91
Drilling Equipment: CME 75		Total Depth(feet): 37.50	Depth to Groundwater(feet): 31.50
Drilling Method: HSA		Borehole Diameter: 8.0" inches	
Driller: CONVERSE - MARK/BILL		Monitoring Well : Total Depth(feet):	As-Built In Figure:
Hammer Information: Hammer: 140-lb and 30-inch drop		Logged By: ART MATULAC	Checked By: YCL

Elevation (feet)	Depth (feet)	Description	Litho-logy	USCS Classi-fication	Samples: Sampler	Number	Blow Counts/ Pressure	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Additional Tests
	2	Silty SAND, dark-brown to black, moist to wet, medium dense, fine to medium, trace coarse gravel and brick fragments. No odor. No OVA/HNU readings. - FILL		SM		R1	23					
273	6	Silty SAND, light-brown, moist, medium dense, fine, trace fine Gravel. - FILL		SM		R2	11					
268	10	Same as above.		SM		R3	25					
263	16	SAND, light-brown, moist, very dense, fine to coarse, little fine to coarse Gravel, trace Cobbles.		SW		R4	56					
258	20	Same as above.		SW		R5	60					
253	26	Same as above.		SW		R6	56					
				SW		S7	63					
248	30	Same as above, more sandy.		SW		R8	92					
	32	▼										
243	36	Silty and Gravelly SAND, gray wet, very dense, fine to coarse.		SM/GM		R9	65					
				SM/GM		S10	62					

1. Borehole terminated at 37.5'.
2. Groundwater at 31.5' depth.
3. No OVA/HNU readings after five minutes of open hole.
4. Borehole backfilled with bentonite pellets up to 5.0' depth.

LOG OF BORING B-7

MAA Engineering Consultants, Inc.

Project Name: GATEWAY CENTER			
Project Number: 0007-006	Borehole Number: B-7		Sheet 1 of 1
Borehole Location: As shown in Figure		Elevation and Datum: 278.0 feet; Mean Sea Level	
Borehole Coordinates:		Date Started: 12/18/91	Date Finished: 12/18/91
Drilling Equipment: CME 75		Total Depth(feet): 37.50	Depth to Groundwater(feet): 30.00
Drilling Method: HSA		Borehole Diameter: 8.0" inches	
Driller: CONVERSE - MARK/BILL		Monitoring Well : Total Depth(feet):	As-Built In Figure:
Hammer Information: **Hammer:** 140-lb and 30-inch drop		Logged By: ART MATULAC	Checked By: YCL

Elevation (feet)	Depth (feet)	Description	Lithology	USCS Classification	Samples: Sampler	Samples: Number	Samples: Blow Counts/Pressure	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Additional Tests
	2	Silty SAND, medium to dark brown, moist, dense, fine to coarse, little fine to coarse Gravel, trace brick, wood and concrete fragments. - FILL.		SM		R1	47					
273	6	SAND, light-brown, moist, medium dense, fine, trace fine Gravel. - FILL		SP-SM		R2	20					
268	10	SAND, light-brown, moist, medium dense, fine, little Silt. - FILL		SP		R3	19					
263	16	SAND, light-brown, moist, medium dense, fine to coarse, trace fine Gravel. - FILL		SW		R4	14					
258	20	Gravelly SAND, light-brown, moist, dense, fine to coarse, trace silt.		SW/GW		R5	33					
253	26	Same as above, very dense, color grading to gray.		SW/GW		R6	51					
				SW/GW		S7	70					
248 ▼	30	Silty SAND, gray, wet, dense, fine.		SM		R8	44					
243	36	Gravelly SAND, gray, wet, very dense, fine to medium, little Silt, trace Cobbles.		SP/GP		R9	64					
				SP/GP		S10	145+					

1. Borehole terminated at 37.5'.
2. Groundwater at 30.0' depth.
3. No OVA/HNU readings after five minutes of open hole.
4. Borehole backfilled with bentonite pellets up to 5.0' depth.

1986 PUMP WELL AND OBSERVATION WELL BORING LOGS

(Union Station Site #2 -Ramirez and Vignes Streets)
Drilled for the Union Station Area Aquifer Pump Tests
Metro Rail Project

Note: Location of borings shown on Drawing 1, "Site Plan and Location of Borings"

CCW Project No. 91-31-261-01

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
MRTC PUMP TEST
Proj: UNION STATION AREA Date Drilled 3/3-6/86 Ground Elev. 279.5

Drill Rig INGERSOL 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 16"	DRILL MODE	REMARKS
0		0.0 - 9.0 FILL GRAVELLY SAND, SILT, AND SANDY SILT, TRACE AMOUNT OF DEBRI AND RUBBLE INCLUDING FRAGMENTS OF CONCRETE, BRICK, METAL	(NO SAMPLING)		AIR ROTARY	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 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)
2						
4						
6						
8						3/3/86 DRILLED TO 10', SET UP FOR 10" ROTARY WASH DRILLING
10		9.0 - 85' GRAVELLY SAND MEDIUM TO COARSE SAND, SOME GRAVELS, TRACE SILT BORING LOGGED BASED ON ROTARY WASH CUTTINGS, GRAVELS AND COBBLES BROUGHT UP DURING DRILLING.			ROTARY WASH RD	3-3-86 ATTACHED 10" TRI-CONE BIT TO 10' LONG REAMING SECTION AND STARTED ROTARY WASH DRILLING OF PILOT HOLE, DRILLED 10" PILOT HOLE TO 100' 3-3-86 ADDED SUPERCOL GUAR GUM TO DRILLING FLUID.
12						
14						
16		16' - DRILL RIG CHATTER GRAVELS AND COBBLES PROGRESS SLOWED				3/3/86 (1340) AT 16" WITH 24" MODIFIED DRILL BIT
18						
20						

83-1140-06
MRTC PUMP TEST

Project UNION STATION AREA Date Drilled 3/3-6/86 Hole No. PUMP WELL SITE #2

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	BLOWS 16")	DRILL MODE	REMARKS
20		9.0 - 85' GRAVELLY SANDS — CONTINUED —	(NO SAMPLING)		RD ↓	3/3/86 (1030) AT 20' WITH 10" TRI-CONE BIT.
22						
24						
		25' - DRILL RIG CHATTER-10" BIT COBBLES AND GRAVELS				3/3/86 (1040) AT 25' WITH 10" TRI-CONE BIT
26						
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

Project UNION STATION AREA Date Drilled 3/3-6/86 Hole No. PUMP WELL SITE #2

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', START 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						

Project 83-1140-06 MRTC PUMP TEST UNION STATION AREA Date Drilled 3/3-6/86 Hole No. SITE #2 PUMP WELL

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
68		9.0 - 85' GRAVELLY SANDS – CONTINUED –	(NO SAMPLING)			
70					RD ↓	3/4/86 (1630) AT 70' WITH MODIFIED DRILL BIT, WELDED WINGS WORN DOWN TO NUBS (14") PULLED RODS 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, PROGRESS SLOW, GRAVELS AND COBBLES ACCUMULATING IN PILOT BORING
84						
86		85' - 110' BEDROCK PUENTE FORMATION 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						

Project 83-1140-06 MRTL PUMP TEST UNION STATION AREA Date Drilled 3/3-6/86 Hole No. SITE #2 PUMP WELL

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
92		85'-110' BEDROCK PUENTE FORMATION SILTSTONE / CLAYSTONE — CONTINUED —	(NO SAMPLING)		RD ↓	
94						
96						
98						
100						-3/3/86 (1220) COMPLETED 10" PILOT HOLE TO 100', REMOVED DRILL RODS AND BIT AND STARTED REAMING 24" HOLE, USING 14.75" TRI-CONE BIT MODIFIED WITH WELDED WINGS TO 24"
102						
104						
106						
108						
110		END OF BORING 110'				3/4/86 (1100) COMPLETED PILOT HOLE CLEAN-OUT WITH 12" BIT TO 110', PULLED OUT AND ATTACHED 24" MODIFIED BIT
112		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 TAPE (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				3/5/86 (1500) AT 110' WITH WORN 20" MODIFIED BIT, HEAVY DRILL RIG CHATTER — GRAVELS & COBBLES ACCUMULATED IN PILOT HOLE, LAST 20' - EASIER DRILLING IN BEDROCK
114						
116		4/6/86 (0800) STARTED "AIR-LIFT" DEVELOPMENT OF PUMP WELL				

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 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' GRAVELLY 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'
6						
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' GRAVELLY 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 ½ SAS 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						

83-1140-06

Project MRTC PUMP TEST Date Drilled 2-24-86 Hole No. OW-1 Site #2

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	BLOWS 6"I	DRILL MODE	REMARKS
20	GP	SANDY GRAVEL – (CONTINUED) WHITE AND GRAY COBBLES WITH COARSE SAND, TRACE SILT AND CLAY	C-2		DR	
22			C-3		RD	SOFT ZONE @ 22'
24					DR	
26	GP/SP	GROUND WATER AT 25.7' LEVEL MEASURED @ 1100 A.M. ON 3/3/86			RD	VARIABLE DRILL RIG CHATTER
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				STRONG DRILL RIG CHATTER AT 36' VERY STRONG DRILL RIG CHATTER AT -37' – BOULDER?
38			NO RECOVERY		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	

83-1140-06

Project MRTC PUMP TEST Date Drilled 2-24-86 Hole No. OW-1 SITE #2

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
44	GP	SANDY GRAVEL - CONTINUED MOTTLED WHITE AND GRAY, CLASTS SUBANGULAR TO SUBROUNDED, TRACE SILT WITH CLAY			DR	
46	SP	45.5'-49.5' GRAVELLY SAND LIGHT GRAY AND WHITE, COARSE SAND, TRACE SILT, SOME GRAVEL			RD	STRONG DRILL RIG CHATTER AT 45'
48						
50	SP	49.5'-52.5' SAND GRAY, LITTLE GRAVEL, TRACE SILT, MEDIUM TO COARSE SAND	C-8		DR	
52					RD	VARIABLE DRILL RIG CHATTER AT: 52.5', 53.5', 54'
54	SP GP	52.5'-57.5' SAND SAND WITH INTERBEDDED SANDY GRAVEL LENSES MEDIUM TO COARSE SAND, CLASTS SUBANGULAR TO SUB-ROUNDED	C-9		DR	
56	SP					
58	GP	57.5'-61.5' GRAVEL GRAVELS WITH SOME MEDIUM TO COARSE SAND			RD	DRILL RIG CHATTER AT 57.5' AND 60'
60		GRADATIONAL CONTACT				DRILL RIG CHATTER AT 61'
62	SM/ML	61.5'-69.5' SAND AND SILT DARK GREEN, FINE SAND AND SILT, TRACE CLAY, TRACE SMALL GRAVEL, H_2S 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						

Project 83-1140-06 MRTC PUMP TEST Date Drilled 2/24-25/86 Hole No. SITE #2 OW-1

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
68	SP/ML	SAND AND SILT - CONTINUED			RD	
70	SP	69.5-71' SAND GRAY, MEDIUM COARSE, TRACE SMALL GRAVEL	C-11		DR	
72	GP	71'-76.5' SANDY GRAVEL			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'				
	SP	76.5'-77.5' GRAVELLY SAND				DRILL RIG CHATTER AT 77.5'
78	GP	77.5'-80.5' SANDY GRAVEL				
80		(SP) AND (GP) SAND AND GRAVEL LENSES				
82	GM/GP	80.5'-84.5' SANDY GRAVEL FINE TO COARSE SAND, SUBROUNDED 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' BEDROCK - SILTSTONE/CLAYSTONE 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	ADDED 1 SAC (25#) OF REVERT
92			C-14		DR	

Project 83-1140-06 MRTC Pump TEST Date Drilled 2/25/86 Hole No. SITE #2 OLD-1

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
92	Tp	BEDROCK - SILTSTONE / CLAYSTONE — CONTINUED — PUENTE FORMATION			RD	
94		END OF BORING 94.0' - FLUSHED BORING - INSTALLED PIEZOMETER 0'-10' NON SLOTTED 2" CASING 10'-89' MACHINE SLOTTED 2" CASING, 0.20" SLOTS, END CAPPED BACKFILLED BORING WITH #3 MONTEREY SAND; 6-100# SACS - FLUSHED PIEZOMETER WITH FRESH WATER. - INSTALLED WELL COVER AND SEALED TOP 4.5' WITH CONCRETE GROUT AND BENTONITE.				
96						
98						
100						
102						
104						
106						
108						
110						
112						
114						
116						

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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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
4	Fill (Af)	4-7' SILT - (FILL) BROWN, DRY, LOOSE SLIGHTLY DAMP LITTLE CLAY BINDER AT 7'				PIECES OF METAL, NAILS, GLASS AND SLAG-LIKE MATERIAL AT 4' LARGE BENT METAL SPIKE AT 5'
8	ML	7-8' SILT - BROWN, SLIGHTLY DAMP, TRACE CLAY, SOFT				
	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	SP	10-16' SANDY GRAVEL BROWN TO LIGHT GRAY. GRAVEL - COARSE, SUB-ROUNDED SAND - POORLY GRADED WITH LITTLE SILT LARGE GRAVEL AT 13'			RD	
16			C-2		DR	POOR RECOVERY
16	SP	16'-20.5' GRAVELLY SAND LIGHT BROWN TO SPECKLED YELLOW/GREY, WET, MEDIUM DENSE, POORLY GRADED MEDIUM TO COARSE SAND, MEDIUM GRAVEL TO 3/4", TRACE SILT			RD	
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 16"	DRILL MODE	REMARKS
20	SP	GRAVELLY SAND				
		20.5'-24' SANDY GRAVEL			RD	DRILL RIG CHATTER AT 20.5'
	GP GM	LIGHT BROWN WITH GRAY AND YELLOW, MEDIUM TO COARSE GRAVEL, POORLY GRADED SAND, LITTLE SILT				
22						
	ML	25' THIN CLAY SILT SEAM, SOME SAND				
	GP					
24		24'-26.8' SILTY SAND				
	SM	BROWN, MEDIUM DENSE, WET, SOME GRAVEL, TRACE CLAY	C-3		DR	GROUNDWATER AT 25.9'
26		26.8'-30.2' SAND				LEVEL MEASURED @ 1158 A.M. ON 3/3/86
	SP	GRAY, MEDIUM TO COARSE SAND, SOME GRAVEL, TRACE SILT, POORLY GRADED				CAVING FROM 26' TO 31'
28						
					RD	
30		SLIGHT INCREASE IN SILT				INCREASED DRILL RIG CHATTER
	GP	30.2'-30.7' GRAVEL				SMOOTH
32		30.7'-37'				
	GM					
34		SANDY GRAVEL				
		WITH SILT, GRAY, LOOSE TO MEDIUM DENSE	C-4		DR	
	GP					DRILL RIG CHATTER AT 35'
36	GM					
		37'-45' SANDY GRAVEL				
38	GP	COARSE SAND AND GRAVEL COBBLE AND BOULDER ZONES			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						

Project MRTL PUMP TEST 83-1140-06 Date Drilled 2/25-26/86 Hole No. O.W.-2 SITE #2

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
44	GP	SANDY GRAVEL			RD	
	SP	45'-46' GRAVELLY SAND				SLIGHT H_2S ODOR
46	GP	46-51.4 GRAVEL GRAY, WITH SAND AND SOME SILT, COARSE GRAVEL TO COBBLE SIZE CLASTS, COARSE SAND	C-5		DR	
48	GP/SP				RD	CAVING TO 44' STRONG DRILL RIG CHATTER, ADDED ADDITIONAL REVERT TO DRILLING FLUID, BOULDERS AND COBBLES BLOCKING BORING. 2-25-86
50		SANDY GRAVEL COARSE SAND, TRACE FINES				2-26-86
52	SP	51.4'-56' GRAVELLY SAND GRAY, COARSE SAND, POORLY GRADED, LITTLE SILT				CAVING TO 31', BORING BLOCKED, REPOSITIONED BORING ADJACENT TO CAVED HOLE, DROVE CASING TO 32' RESUMED DRILLING ADDED REVERT TO DRILLING FLUID.
54						
		H_2S ODOR IN SAMPLE				
56	SP	56'-58' SAND GRAY, MEDIUM DENSE, FINE TO MEDIUM SAND, TRACE SILT H_2S ODOR IN SAMPLE	C-6		DR	
58	GP	58'-61' SANDY GRAVEL GRAY				
60					RD	
	SM/ML	61'-70' SAND AND SILT DARK GREEN TO GRAY, LOOSE TO MEDIUM DENSE, SOME CLAY AND GRAVEL, VERY FINE SAND, TRACE ORGANICS (PLANT ROOTLETS)				
62						
64						
			C-7		DR	
66					RD	
68						

83-1140-06

Project MRTC PUMP TEST Date Drilled 2/26-27/86 Hole No. SITE #2 O.W.-2

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
68	ML	SAND AND SILT – CONTINUED –				
70	SP	70'-71' SAND MEDIUM COARSE, LITTLE GRAVEL			RD	
72	GP	71'-72' SANDY GRAVEL COARSE SAND AND GRAVEL, COBBLES AND BOULDERS				STRONG DRILL RIG CHATTER
74						
76			X		DR	NO RECOVERY
					RD	STRONG DRILL RIG CHATTER
78						LOST DRILLING FLUID CIRCULATION MIXED IN ADDITIONAL REVERT
80						CAVING UP TO 32' ADDING ADDITIONAL REVERT
	SM/GP	81'-82' SANDY GRAVEL WITH SILT, LUMPS OF DARK GRAY/GREEN SILT WITH CLAY BINDER				
82	GP	82'-84' SANDY GRAVEL COARSE SAND AND GRAVEL, LITTLE FINES				82' LOSING FLUID ADDED TOTAL 3 SACS OF REVERT, DRILLED TO 84' AND INSTALLED 2" CASING
84		END OF BORING 84.0 (BORING CLOSE TO BEDROCK)				
86		-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				
92		- INSTALLED WELL COVER AND SEALED TOP 5' WITH CONCRETE GROUT AND BETONITE,				

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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SITE#2
BORING LOG O.W.-3

83-1140-06
MRTL 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 UTUGH 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' SILTY SAND BROWN, DRY, LOOSE, BROKEN BRICK FRAGMENTS, TOP 6" ASPHALT AND BASE SUBGRADE			AD	CORED THROUGH ASPHALTIC PAVEMENT FILL
8	ML	8'-11' SANDY SILT SILT WITH VERY FINE SAND, BROWN, LOOSE, TRACE CLAY, POSSIBLE FILL?	C-1		DR RD	SET CASING AND ADDED REVERT TO DRILLING FLUID
12	GP	11'-17' SANDY GRAVEL LIGHT GRAY TO LIGHT BROWN, GRANITIC CLASTS, POORLY GRADED, CLASTS SUBANGULAR TO SUBROUNDED				DRILL RIG CHATTER
18	SP	17-18.4 SAND GRAY TO LIGHT BROWN, LOOSE, WITH SILT AND GRAVEL	C-2		DR	
	GP	INCREASING GRAVELS			RD	DRILL RIG CHATTER AT 19'
20	GM	18.4-23 SILTY GRAVEL				

Project 83-1140-06 MRTC PUMP TEST Date Drilled 2/28/86 Hole No. SITE #2 O.W.-3

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	BLOWS 16"	DRILL MODE	REMARKS
20	GM/SM	18.4'-23' **SILTY SAND AND GRAVEL** SILT WITH COARSE SAND AND GRAVEL, LUMPS OF GRAY/GREEN CLAY	C-3		RD DR	
22					RD	DRILL RIG CHATTER @ 22'
24	GP	23'-26' **SANDY GRAVEL** SAND AND GRAVEL, POORLY GRADED, COARSE, TRACE SILT	C-4		DR	
26					RD	GROUNDWATER ▼ AT 26.8' — LEVEL MEASURED AT 1050 A.M. ON 3/3/86
28	SP	26'-29' **GRAVELLY SAND** COARSE, POORLY GRADED, LITTLE SILT				
30	GP	29'-30.6' **SANDY GRAVEL** COARSE GRAVEL, SUBANGULAR TO SUBROUNDED				DRILL RIG CHATTER AT 29'
	SM	30.6'-31' SILTY GRAVEL WITH TRACE CLAY				
32	SP	31'-33.5' **SAND** GRAY, MODERATELY GRADED, MEDIUM TO COARSE SAND, SOME FINE SAND, TRACE SILT	C-5		DR	
34	GM	33.5'-43.0' **SANDY GRAVEL** 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
36						
38						DRILL RIG CHATTER
40		GRAY, COARSE GRAVEL TO 3", COARSE SAND WITH SILT, DENSE	C-6		DR RD	
42						DRILL RIG CHATTER AT 43'
44	GP	43'-47' **SANDY GRAVEL** SOME SILT, COARSE GRAVEL				

83-1140-06
Project MRTC PUMP TEST Date Drilled 2/28/86 Hole No. SITE #2 O.W.-3

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
44	GP	43'-47' SANDY GRAVEL SOME SILT, COARSE GRAVEL			RD	DRILL RIG CHATTER
46						
48	GM	47'-49' SANDY GRAVEL WITH SILT, GREEN CLAYEY SILT				
50	SP/SM	49'-52' SAND GRAY, DENSE, SOME SILT AND GRAVEL, COARSE TO MEDIUM COARSE SAND, POORLY GRADED.	C-7		DR	
52	GP/SP	52'-61' SANDY GRAVEL MIXTURE OF SAND AND GRAVEL, TRACES FINES, OCCASSIONAL LENSES OF GRAVELS AND COBBLES			RD	OCCASSIONAL DRILL RIG CHATTER 54'- STRONG DRILL RIG CHATTER
54						
56						
58						VARIABLE DRILL RIG CHATTER
60						
62	SP	61'-64' SAND GRAY, MEDIUM COARSE SAND, SOME GRAVEL, TRACE FINES	C-8		DR	LOOSE SAMPLE
	GP	OCCASSIONAL GRAVEL/COBBLE LENSES			RD	
64	SM/ML	64'-69' SAND AND SILT DARK GRAYISH GREEN, FINE SAND AND SILT, POORLY GRADED, TRACE ORGANICS (PLANT ROOTLETS), TRACE GRAVEL.	C-9		DR	
66					RD	
68						

OBSERVATION WELL #4

Converse Consultants

Boring Log 5-5 (1983)

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

PROJECT SCRTD - UNION ST. DATE DRILLED 2/1/83 HOLE NO. 5-5
LOCATION LOADING DOCK AT INT: VIGNES & RAILROAD STS GROUND ELEV. 20.8'
DRILLING CONTRACTOR CONVERSE - LAS VEGAS LOGGED BY B. INGHRAM DEPTH TO GROUND WATER 27.9
TYPE OF RIG _____ HOLE DIAMETER 4¾" HAMMER WEIGHT AND FALL 320#, 36" (2-8-2)
SURFACE CONDITIONS A.C. PARKING AREA TOTAL DEPTH 100.0 NO. CORE BOXES _____

DEPTH	CLASS.	FIELD DESCRIPTION	SAMPLE	SPT (6")	DRILL MODE	RUN NO.	CORE REC. %	REMARKS
0.0	ML & SM	0.0 - 0.3 · ASPHALT PAVEMENT 0.3 - 5.5 - FILL - SANDY SILT & SILTY SAND MOTTLED & INTERMIXED MOIST, STIFF / M. DENSE w/ BRICK DEBRIS		16 25 57	RD SPT RD			SET UP 2:45 PM 1/31 BEGIN DRILLING 7:15 AM 2/1/83 WEATHER: CLEAR, WARM DRILLED TO 5' WITH 7" BIT FOR PIEZO INSTALLATION. 4¾" BIT BELOW
6.0	SM	YOUNG ALLUVIUM 5.5 - 11.0 . SILTY SAND GRAY-BRN., MOIST, MED. DENSE FINE TO V. FINE SAND - 70% 30% SILT	5-1 3K		CCI DR RD			CONTACT CONTAINED WITHIN SAMPLE
10.0	SP	11.0 - 14.0 . SAND GRAY-BRN, MOIST, M. DENSE TO DENSE POORLY GRADED FINE SAND w/ TRACE SILT		10 12 25	SPT RD			
14.0	SW	14.0 - 62.0 GRAVELLY SAND BROWN, DENSE WELL GRADED - MED TO COARSE CLEAN SAND - 70%, GRAVEL TO 2" - 30% SUBANGULAR TO SUBROUNDED GRAINS, GRANITIC COMP.	5-2 50K		CCI DR RD			GRAVELLY - DISTURBED SAMPLE
20.0								

SHEET 1 OF 6

OBSERVATION WELL #4

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	14.0-62.0 GRAVELLY SAND (CONTINUED)	5" RECOVERY	110	SPT RD			
22.0								
24.0								
		25.5-26.0 - LENSE OF FINE SAND IN SAMPLE	S-3 36K		CCI DR RD			
26.0								
28.0								
30.0		30.0 COLOR CHANGE TO DK. GRAY INCREASED MAFIC CONTENT: GRANITIC/DIORITIC COMP.	3" RECOVERY	75 100	SPT RD			SLIGHT GAS ODOR
32.0								
34.0								
			S-4 40K		CCI DR RD			SLIGHT GAS ODOR GRAVELLY SAMPLE - ONLY 5 GOOD RINGS
36.0								
38.0								
40.0			J-1 4" RECOVERY	25 75 100	SPT RD			
42.0								
44.0								

Project MRTC PUMP TEST 83-1140-06 Date Drilled 2/28 - 3/1/86 Hole No. O.W.-3 SITE #2

DEPTH	USCS	MATERIAL CLASSIFICATION	SAMPLE	RUN NO.	DRILL MODE	REMARKS
68	SM/ML	64'-69' SAND AND SILT DARK GREEN TO GRAY, FINE SAND, LITTLE GRAVEL				
70	GP	69'-71' SANDY GRAVEL			RD	DRILL RIG CHATTER
72	SP	71'-74' SAND GRAY, COARSE SAND LITTLE GRAVEL				
74	GP	74'-84' GRAVEL COARSE GRAVEL TO 2", WITH MEDIUM TO COARSE SAND, TRACE SILT, GRAY COLOR	C-10		DR	DRILL RIG CHATTER ↓ STARTED LOSING DRILLING FLUID TO FORMATION, MIXING IN ADDITIONAL REVERT
76						
78					RD	2/28/86 3/1/86 CAVING TO 72', MIXED ADDITIONAL REVERT, BOTTOM OF BORING CAVING
80		SANDY GRAVEL SUBROUNDED TO WELL ROUNDED PEBBLES				
82						DRILLED TO 85' AND INSTALLED CASING
84	TP	84-85' BEDROCK-PUENTE FORMATION OLIVE GRAY SILTSTONE/CLAYSTONE				
86		END OF BORING 85' -INSTALLED PIEZOMETER 0-10' NON SLOTTED 2" PVC CASING 10'-78.5' MACHINE SLOTTED 2" CASING 0.20" SLOTS, END CAPPED -FLUSHED CASING AND BORING WITH CLEAN WATER (±1800 GALLONS WITH ±650 GALLONS RETURNING) RETURN FLUID REDUCED AS BORING WAS FLUSHED. ADDED ½ QUART BLEACH. -BACKFILLED BORING WITH #3 MONTEREY SAND -INSTALLED WELL COVER AND CASING TOP 2.5', SEALED TOP 5' WITH CONCRETE GROUT AND BENTONITE				
88						
90						
92						

OBSERVATION WELL #4

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 GRAVELLY SAND (CONTINUED)			RD			
46.0								
48.0								
50.0					CCI DR			SULPHUR ODOR
			7SK		RD			POOR SAMPLE RECOVERY - REMAINING SAMPLE DESTROYED IN HANDLING
52.0								
54.0		GRAD. DECREASING GRAVEL CONTENT						
56.0								
58.0								
60.0			5-5		CCI DR			SLIGHT SULPHUR ODOR
			50K		RD			
62.0	SP	62.0 - 78.0 SAND						
		DARK GRAY, DENSE POORLY GRADED UNIFORM FINE TO VERY FINE GRAINED MICACEOUS						
64.0								
66.0								
68.0								

OBSERVATION WELL #4

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
65.0	SP	62.0-78.0 SAND (CONTINUED)			RD			
70.0			5-6		CCI DR			STRONGER SULPHUR ODOR
			5DK		RD			POOR SAMPLE RECOVERY: 4½ 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 (10 TON) ON BIT. TOO HARD TO SAMPLE TO 90.0'
		CUTTINGS: MED. TO COARSE SUBANGULAR GRAINS GRANITIC COMPOSITION						
80.0			60K-1" REFUSAL		CCI DR RD			NO SAMPLE RECOVERY
82.0								
84.0								
			100K-0" REFUSAL		RD			ATTEMPTED TO SAMPLE - UNSUCCESSFUL
86.0								
			J-2 CUTTINGS					JAR SAMPLE OF CUTTINGS TAKEN
88.0								
90.0	CL	PUENTE FORMATION 90.0-100.0 CLAYSTONE						EASY DRILLING FROM 90.0' CLAYSTONE CUTTINGS OBTAINED
		(SEE NEXT PAGE)						
92.0								

OBSERVATION WELL #1

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
92.0	CL	90.0-100.0 CLAYSTONE (CONTINUED)			RD			
		OLIVE-GRAY COLOR, MOIST.						
94.0		PLASTIC TO FRIABLE STRENGTH;						
		SOFT FRIABLE HARDNESS,						
96.0		THINLY LAMINATED W/						
		SILTY CLAYSTONE - 20%.						
		SANDSTONE BLEBS.						
98.0		TENDS TO FRACTURE						
		ALONG LAMINATIONS						
			S-7 SDK		CCI DR			
100.0		END BORING 100.0 FT						
		PIEZOMETER SET TO 100'						
		PERFORATED IN LOWEST 40'						

APPENDIX B

Converse Envirolab
169 North Halstead Street, Pasadena, California 91107-3127

Telephone (818) 351-2330
FAX (818) 568-9165

Envirolab No. : 91-71-12-156
Project No. : 91-31-2161-01
Project/Client : S.C.R.T.D.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 16, 1991
Date Received : Dec 16, 1991
Report Date : Jan 06, 1992

Sample ID:	156-31	156-33	156-35	DL
Hexachlorobutadiene	N.D.	N.D.	N.D.	330.0
Hexachlorocyclopentadiene	N.D.	N.D.	N.D.	330.0
Hexachloroethane	N.D.	N.D.	N.D.	330.0
Indeno(1,2,3-cd) Pyrene	N.D.	N.D.	N.D.	330.0
Isophorone	N.D.	N.D.	N.D.	330.0
2-Methylnaphthalene	N.D.	N.D.	N.D.	330.0
2-Methylphenol	N.D.	N.D.	N.D.	330.0
4-Methylphenol	N.D.	N.D.	N.D.	330.0
Naphthalene	N.D.	N.D.	N.D.	330.0
2-Nitroaniline	N.D.	N.D.	N.D.	1600.0
3-Nitroaniline	N.D.	N.D.	N.D.	1600.0
4-Nitroaniline	N.D.	N.D.	N.D.	1600.0
Nitrobenzene	N.D.	N.D.	N.D.	330.0
2-Nitrophenol	N.D.	N.D.	N.D.	330.0
4-Nitrophenol	N.D.	N.D.	N.D.	1600.00
N-Nitroso-di-n-propylamine	N.D.	N.D.	N.D.	330.0
N-Nitrosodiphenylamine	N.D.	N.D.	N.D.	330.0
Pentachlorophenol	N.D.	N.D.	N.D.	1600.0
Phenanthrene	N.D.	N.D.	N.D.	330.0
Phenol	N.D.	N.D.	N.D.	330.D
Pyrene	N.D.	N.D.	N.D.	330.0
1,2,4-Trichlorobenzene	N.D.	N.D.	N.D.	330.D
2,4,5-Trichlorophenol	N.D.	N.D.	N.D.	1600.0

Units: ug/kg
DL : Detection Limits
N.D. : Not Detected

Reviewed by:

Approved by:

George Colovos, Ph.D
Laboratory Director

Converse Envirolab
169 North Halstead Street, Pasadena, California 91107-3127

Telephone (818) 351-2330
FAX (818) 568-9165

Jan. 06, 1992

PROJECT/CLIENT : S.C.R.T.D
PROJECT ENG/MGR: Mark Schluter

PROJECT NO. : 91-31-261-01
ENVIROLAB NO. : 91-71-12-167

Subject : Analysis of Samples

On Dec. 18, 1991, 3 soil sample(s) was/were delivered to the laboratory for analysis. The soil sample(s) was/were analyzed using the following methods:

8240
8270
418.1

The results which were obtained are listed in the attached table(s).

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Laboratory Director

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Telephone (818) 351-2330
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Envirolab No. : 91-71-12-167
Project No. : 91-31-261-01
Project/Client : S.C.R.T.D
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 18, 1991
Date Received : Dec 18, 1991
Report Date : Jan 06, 1992

Analysis Method: 418.1

Sample ID:	167-12	DL
Client Sample ID	COMP.#2-B7	
Batch Number	Q365R021	
Date Analyzed	12/31/91	
Petrol Hydrocarbons	N.D.	10.0

Units: mg/kg
DL : Detection Limits
N.D. : Not Detected

Converse Envirolab
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Telephone (818) 351-2330
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Envirolab No. : 91-71-12-167
Project No. : 91-31-261-01
Project/Client : S.C.R.T.D
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 18, 1991
Date Received : Dec 18, 1991
Report Date : Jan 06, 1992

Analysis Method: 8240

Sample ID:	167-04	DL
Client Sample ID	B7-S4	
Batch Number	Q364C031	
Date Analyzed	12/30/91	
Acetone	N.D.	10.0
Benzene	N.D.	5.0
Bromodichloromethane	N.D.	5.0
Bromoform	N.D.	5.0
Bromomethane	N.D.	10.0
2-Butanone	N.D.	10.0
Carbon Disulfide	N.D.	5.0
Carbon Tetrachloride	N.D.	5.0
Chlorobenzene	N.D.	5.0
Chloroethane	N.D.	10.0
Chloroform	N.D.	5.0
Chloromethane	N.D.	10.0
Dibromochloromethane	N.D.	5.0
1,1-Dichloroethane	N.D.	5.0
1,2-Dichloroethane	N.D.	5.0
1,1-Dichloroethene	N.D.	5.0
1,2-Dichloroethene	N.D.	5.0
Dichlorofluoromethane	N.D.	10.0
1,2-Dichloropropane	N.D.	5.0
cis-1,3-Dichloropropene	N.D.	5.0
trans-1,3-Dichloropropene	N.D.	5.0
Ethyl Benzene	N.D.	5.0
2-Hexanone	N.D.	10.0
4-Methyl-2-Pentanone	N.D.	10.0
Methylene Chloride	N.D.	5.0
Styrene	N.D.	5.0
1,1,2,2-Tetrachloroethane	N.D.	5.0
Tetrachloroethene	N.D.	5.0
1,1,1-Trichloroethane	N.D.	5.0
Trichloroethene	N.D.	5.0
1,1,2-Trichloroethane	N.D.	5.0
Trichlorofluoromethane	N.D.	10.0
Freon-113	N.D.	10.0
Toluene	N.D.	5.0
Vinyl Acetate	N.D.	10.0
Vinyl Chloride	N.D.	10.0
Xylenes	N.D.	5.0

Units: ug/kg
DL : Detection Limits
N.D. : Not Detected

Converse Envirolab
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Telephone (818) 351-2330
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Envirolab No. : 91-71-12-167
Project No. : 91-31-261-01
Project/Client : S.C.R.T.D
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 18, 1991
Date Received : Dec 18, 1991
Report Date : Jan 06, 1992

Analysis Method: 8270

Sample ID:	167-11	DL
Client Sample ID	COMP.#1-B7	
Batch Number	Q004C041	
Oate Analyzed	01/04/92	
Acenaphthylene	N.D.	330.0
Acenaphthene	N.D.	330.0
Anthracene	N.D.	330.0
Benzo(a)anthracene	N.D.	330.0
Benzo(b)fluoranthene	N.D.	330.0
Benzo(k)fluoranthene	N.D.	330.0
Benzoic Acid	N.D.	1600.0
Benzo(g,h,i)perylene	N.D.	330.0
Benzo(a)pyrene	N.D.	330.0
Benzyl Alcohol	N.D.	330.0
4-Bromophenyl-Phenylether	N.D.	330.0
Butylbenzylphthalate	N.D.	330.0
bis(2-Chloroisopropyl) Ether	N.D.	330.0
4-Chloroaniline	N.D.	330.0
bis(2-Chloroethoxy) Methane	N.D.	330.0
bis(2-Chloroethyl)Ether	N.D.	330.0
4-Chloro-3-Methylphenol	N.D.	330.0
2-Chloronaphthalene	N.D.	330.0
2-Chlorophenol	N.D.	330.0
4-Chlorophenyl-Phenyl Ether	N.D.	330.0
Chrysene	N.O.	330.0
Dibenzo(ah)anthracene	N.O.	330.0
Dibenzofuran	N.O.	330.0
1,2-Dichlorobenzene	N.D.	330.0
1,3-Dichlorobenzene	N.D.	33D.0
1,4-Dichlorobenzene	N.D.	330.0
3,3-Dichlorobenzidine	N.D.	66D.0
2,4-Dichlorophenol	N.D.	1600.0
Diethylphthalate	N.D.	330.0
2,4-Dimethylphenol	N.D.	330.0
2,4,6-Trichlorophenol	N.D.	330.0
Dimethylphthalate	N.D.	330.0
Di-n-Butylphthalate	N.D.	330.0
Di-n-Dctyl Phthalate	N.D.	330.0
4,6-Dinitro-2-Methylphenol	N.D.	1600.0
2,4-Dinitrophenol	N.D.	1600.0
2,4-Dinitrotoluene	N.D.	330.0
2,6-Oinitrotoluene	N.D.	330.0
bis(2-Ethylhexyl)Phthalate	N.D.	330.0
Fluoranthene	N.D.	33D.D
Fluorene	N.D.	33D.0
Hexachlorobenzene	N.D.	330.0

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Envirolab No. : 91-71-12-167
Project No. : 91-31-261-01
Project/Client : S.C.R.T.D
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 18, 1991
Date Received : Dec 18, 1991
Report Date : Jan 06, 1992

Sample ID:	167-11	DL
Hexachlorobutadiene	N.D.	330.0
Hexachlorocyclopentadiene	N.D.	330.0
Hexachloroethane	N.D.	330.0
Indeno(1,2,3-cd) Pyrene	N.D.	330.0
Isophorone	N.D.	330.0
2-Methylnaphthalene	N.D.	330.0
2-Methylphenol	N.D.	330.0
4-Methylphenol	N.D.	330.0
Naphthalene	N.D.	330.0
2-Nitroaniline	N.D.	1600.0
3-Nitroaniline	N.D.	1600.0
4-Nitroaniline	N.D.	1600.0
Nitrobenzene	N.D.	330.0
2-Nitrophenol	N.D.	330.0
4-Nitrophenol	N.D.	1600.00
N-Nitroso-di-n-propylamine	N.D.	330.0
N-Nitrosodiphenylamine	N.D.	330.0
Pentachlorophenol	N.D.	1600.0
Phenanthrene	N.D.	330.0
Phenol	N.D.	330.0
Pyrene	N.D.	330.0
1,2,4-Trichlorobenzene	N.D.	330.0
2,4,5-Trichlorophenol	N.D.	1600.0

Units: ug/kg
DL : Detection Limits
N.D. : Not Detected

Reviewed by:

Approved by:

George Colovos, Ph.D
Laboratory Director

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Jan. 06, 1992

PROJECT/CLIENT : S.C.R.T.D.
PROJECT ENG/MGR: Mark Schluter

PROJECT NO. : 91-31-261-01
ENVIROLAB NO. : 91-71-12-163

Subject : Analysis of Samples

On Dec. 17, 1991, 5 soil sample(s) was/were delivered to the laboratory for analysis. The soil sample(s) was/were analyzed using the following methods:

8240
8270
418.1

The results which were obtained are listed in the attached table(s).

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Laboratory Director

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Telephone (818) 351-2330
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Envirolab No. : 91-71-12-163
Project No. : 91-31-261-01
Project/Client : S.C.R.T.D.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 17, 1991
Date Received : Dec 17, 1991
Report Date : Jan 06, 1992

Analysis Method: 418.1

Sample ID:	163-32	163-33	163-34	DL
Client Sample ID	COMP.#2-B4	COMP.#3-B5	COMP.#4-B6	
Batch Number	Q365R021	Q365R021	Q365R021	
Date Analyzed	12/31/91	12/31/91	12/31/91	
Petrol Hydrocarbons	N.D.	N.D.	N.D.	1D.D

Units: mg/kg
DL : Detection Limits
N.D. : Not Detected

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Envirolab No. : 91-71-12-163
Project No. : 91-31-261-01
Project/Client : S.C.R.T.D.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 17, 1991
Date Received : Dec 17, 1991
Report Date : Jan 06, 1992

Analysis Method: 8240

Sample ID:	163-02	DL
Client Sample ID	B4-S2	
Batch Number	Q364C031	
Date Analyzed	12/30/91	
Acetone	N.D.	10.0
Benzene	N.D.	5.0
Bromodichloromethane	N.D.	5.0
Bromoform	N.D.	5.0
Bromomethane	N.D.	10.0
2-Butanone	N.D.	10.0
Carbon Disulfide	N.D.	5.0
Carbon Tetrachloride	N.D.	5.0
Chlorobenzene	N.D.	5.0
Chloroethane	N.D.	10.0
Chloroform	N.D.	5.0
Chloromethane	N.D.	10.0
Dibromochloromethane	N.D.	5.0
1,1-Dichloroethane	N.D.	5.0
1,2-Dichloroethane	N.D.	5.0
1,1-Dichloroethene	N.D.	5.0
1,2-Dichloroethene	N.D.	5.0
Dichlorofluoromethane	N.D.	10.0
1,2-Dichloropropane	N.D.	5.0
cis-1,3-Dichloropropene	N.D.	5.0
trans-1,3-Dichloropropene	N.D.	5.0
Ethyl Benzene	N.D.	5.0
2-Hexanone	N.D.	10.0
4-Methyl-2-Pentanone	N.D.	10.0
Methylene Chloride	N.D.	5.0
Styrene	N.D.	5.0
1,1,2,2-Tetrachloroethane	N.D.	5.0
Tetrachloroethene	N.D.	5.0
1,1,1-Trichloroethane	N.D.	5.0
Trichloroethene	N.D.	5.0
1,1,2-Trichloroethane	N.D.	5.0
Trichlorofluoromethane	N.D.	10.0
Freon-113	N.D.	10.0
Toluene	N.D.	5.0
Vinyl Acetate	N.D.	10.0
Vinyl Chloride	N.D.	10.0
Xylenes	N.D.	5.0

Units: ug/kg
DL : Detection Limits
N.D. : Not Detected

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Envirolab No. : 91-71-12-163
Project No. : 91-31-261-01
Project/Client : S.C.R.T.D.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 17, 1991
Date Received : Dec 17, 1991
Report Date : Jan 06, 1992

Analysis Method: 8270

Sample ID:	163-31	DL
Client Sample ID	COMP.#1-B4	
Batch Number	Q004CD41	
Date Analyzed	01/04/92	
Acenaphthylene	Trace	330.D
Acenaphthene	N.D.	330.0
Anthracene	Trace	330.0
Benzo(a)anthracene	666.0	330.0
Benzo(b)fluoranthene	1300.0	330.0
Benzo(k)fluoranthene	1000.0	330.0
Benzoic Acid	N.D.	1600.0
Benzo(g,h,i)perylene	5000.0	330.0
Benzo(a)pyrene	1700.0	330.0
Benzyl Alcohol	N.D.	330.0
4-Bromophenyl-Phenylether	N.D.	330.0
Butylbenzylphthalate	N.D.	330.0
bis(2-Chloroisopropyl) Ether	N.D.	330.0
4-Chloroaniline	N.D.	330.0
bis(2-Chloroethoxy) Methane	N.D.	330.0
bis(2-Chloroethyl)Ether	N.D.	330.0
4-Chloro-3-Methylphenol	N.D.	330.0
2-Chloronaphthalene	N.D.	330.0
2-Chlorophenol	N.D.	330.0
4-Chlorophenyl-Phenyl Ether	N.D.	330.0
Chrysene	900.0	330.0
Dibenzo(ah)anthracene	N.D.	330.0
Dibenzofuran	N.D.	330.0
1,2-Dichlorobenzene	N.D.	330.0
1,3-Dichlorobenzene	N.D.	330.0
1,4-Dichlorobenzene	N.D.	330.0
3,3-Dichlorobenzidine	N.D.	660.0
2,4-Dichlorophenol	N.D.	1600.0
Diethylphthalate	N.D.	330.0
2,4-Dimethylphenol	N.D.	330.0
2,4,6-Trichlorophenol	N.D.	330.D
Dimethylphthalate	N.D.	330.D
Di-n-Butylphthalate	N.D.	330.0
Di-n-Octyl Phthalate	N.D.	330.0
4,6-Dinitro-2-Methylphenol	N.D.	1600.0
2,4-Dinitrophenol	N.D.	16D0.0
2,4-Dinitrotoluene	N.D.	330.0
2,6-Dinitrotoluene	N.D.	330.0
bis(2-Ethylhexyl)Phthalate	N.D.	330.0
Fluoranthene	600.0	330.0
Fluorene	N.D.	330.0
Hexachlorobenzene	N.D.	330.0

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Envirolab No. : 91-71-12-163
Project No. : 91-31-261-01
Project/Client : S.C.R.T.D.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 17, 1991
Date Received : Dec 17, 1991
Report Date : Jan 06, 1992

Sample ID:	163-31	DL
Hexachlorobutadiene	N.D.	330.0
Hexachlorocyclopentadiene	N.D.	330.0
Hexachloroethane	N.D.	330.0
Indeno(1,2,3-cd) Pyrene	1800.0	330.0
Isophorone	N.D.	330.0
2-Methylnaphthalene	N.D.	330.0
2-Methylphenol	N.D.	330.0
4-Methylphenol	N.D.	330.0
Naphthalene	Trace	330.0
2-Nitroaniline	N.D.	1600.0
3-Nitroaniline	N.D.	1600.0
4-Nitroaniline	N.D.	1600.0
Nitrobenzene	N.D.	330.0
2-Nitrophenol	N.D.	330.0
4-Nitrophenol	N.D.	1600.00
N-Nitroso-di-n-propylamine	N.D.	330.0
N-Nitrosodiphenylamine	N.D.	330.0
Pentachlorophenol	N.D.	1600.0
Phenanthrene	Trace	330.0
Phenol	N.D.	330.0
Pyrene	12000.0	330.0
1,2,4-Trichlorobenzene	N.D.	330.0
2,4,5-Trichlorophenol	N.D.	1600.0

Units: ug/kg
DL : Detection Limits
N.D. : Not Detected

Reviewed by:

Approved by:

George Colovos, Ph.D
Laboratory Director

Converse Envirolab
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Jan. 08, 1992

PROJECT/CLIENT : SCRTD/UNION ST.
PROJECT ENG/MGR: Mark Schluter

PROJECT NO. : 91-31-261-01
ENVIROLAB NO. : 91-71-12-176

Subject : Analysis of Samples

On Dec. 19, 1991, 1 water sample(s) was/were delivered to the laboratory for analysis. The water sample(s) was/were analyzed using the following methods:

418.1
624
625
General Minerals
Sulfide

The results which were obtained are listed in the attached table(s).

George Colovos, Ph.D.
Laboratory Director

APPENDIX B

CHEMICAL ANALYSIS OF SOIL AND GROUNDWATER

1. Report and Lab Analysis of Soil and Groundwater Samples performed for this study.

2. 1986 Analytical Results of "Untreated" Groundwater Discharge Sampled after 48 Hours of Pumping Operation, Union Station Site #2 - Ramirez and Vignes Streets, Metro Rail Project

REPORT AND LAB ANALYSIS OF SOIL AND GROUNDWATER SAMPLES

Performed for this study.

CCW Project No. 91-31-261-01

Converse Envirolab
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Jan. 06, 1992

PROJECT/CLIENT : S.C.R.T.D.
PROJECT ENG/MGR: Mark Schluter

PROJECT NO. : 91-31-2161-01
ENVIROLAB NO. : 91-71-12-156

Subject : Analysis of Samples

On Dec. 16, 1991, 9 soil sample(s) was/were delivered to the laboratory for analysis. The soil sample(s) was/were analyzed using the following methods:

8240
418.1
8270

The results which were obtained are listed in the attached table(s).

George Colovos, Ph.D.
Laboratory Director

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Telephone (818) 351-2330
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Envirolab No. : 91-71-12-156
Project No. : 91-31-2161-01
Project/Client : S.C.R.T.D.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 16, 1991
Date Received : Dec 16, 1991
Report Date : Jan 06, 1992

Analysis Method: 418.1

Sample ID:	156-30	156-32	156-34	DL
Client Sample ID	COMP.#1-B1	COMP.#3-B2	COMP.#5-B3	
Batch Number	Q365R021	Q365R021	Q365R021	
Date Analyzed	12/31/91	12/31/91	12/31/91	
Petrol Hydrocarbons	N.D.	N.D.	N.D.	10.0

Units: mg/kg
DL : Detection Limits
N.D. : Not Detected

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Telephone (818) 351-2330
FAX (818) 568-9165

Envirolab No. : 91-71-12-156
Project No. : 91-31-2161-01
Project/Client : S.C.R.T.D.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 16, 1991
Date Received : Dec 16, 1991
Report Date : Jan 06, 1992

Analysis Method: 8240

Sample ID:	156-06	156-13	156-25	DL
Client Sample ID	B1-S6	B2-S4	B3-S6	
Batch Number	Q364C031	Q364C031	Q364C031	
Date Analyzed	12/30/91	12/30/91	12/30/91	
Acetone	N.D.	N.D.	N.D.	10.0
Benzene	N.D.	N.D.	N.D.	5.0
Bromodichloromethane	N.D.	N.D.	N.D.	5.0
Bromoform	N.D.	N.D.	N.D.	5.0
Bromomethane	N.D.	N.D.	N.D.	10.0
2-Butanone	N.D.	N.D.	N.D.	10.0
Carbon Disulfide	N.D.	N.D.	N.D.	5.0
Carbon Tetrachloride	N.D.	N.D.	N.D.	5.0
Chlorobenzene	N.D.	N.D.	N.D.	5.0
Chloroethane	N.D.	N.D.	N.D.	10.0
Chloroform	N.D.	N.D.	N.D.	5.0
Chloromethane	N.D.	N.D.	N.D.	10.0
Dibromochloromethane	N.D.	N.D.	N.D.	5.0
1,1-Dichloroethane	N.D.	N.D.	N.D.	5.0
1,2-Dichloroethane	N.D.	N.D.	N.D.	5.0
1,1-Dichloroethene	N.D.	N.D.	N.D.	5.0
1,2-Dichloroethene	N.D.	N.D.	N.D.	5.0
Dichlorofluoromethane	N.D.	N.D.	N.D.	10.0
1,2-Dichloropropane	N.D.	N.D.	N.D.	5.0
cis-1,3-Dichloropropene	N.D.	N.D.	N.D.	5.0
trans-1,3-Dichloropropene	N.D.	N.D.	N.D.	5.0
Ethyl Benzene	N.D.	N.D.	N.D.	5.0
2-Hexanone	N.D.	N.D.	N.D.	10.0
4-Methyl-2-Pentanone	N.D.	N.D.	N.D.	10.0
Methylene Chloride	N.D.	N.D.	N.D.	5.0
Styrene	N.D.	N.D.	N.D.	5.0
1,1,2,2-Tetrachloroethane	N.D.	N.D.	N.D.	5.0
Tetrachloroethene	N.D.	N.D.	N.D.	5.0
1,1,1-Trichloroethane	N.D.	N.D.	N.D.	5.0
Trichloroethene	N.D.	N.D.	N.D.	5.0
1,1,2-Trichloroethane	N.D.	N.D.	N.D.	5.0
Trichlorofluoromethane	N.D.	N.D.	N.D.	10.0
Freon-113	N.D.	N.D.	N.D.	10.0
Toluene	N.D.	N.D.	N.D.	5.0
Vinyl Acetate	N.D.	N.D.	N.D.	10.0
Vinyl Chloride	N.D.	N.D.	N.D.	10.0
Xylenes	N.D.	N.D.	N.D.	5.0

Units: ug/kg
DL : Detection Limits
N.D. : Not Detected

Converse Envirolab
169 North Halstead Street, Pasadena, California 91107-3127

Telephone (818) 351-2330
FAX (818) 568-9165

Envirolab No. : 91-71-12-156
Project No. : 91-31-2161-01
Project/Client : S.C.R.T.D.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 16, 1991
Date Received : Dec 16, 1991
Report Date : Jan 06, 1992

Analysis Method: 8270

Sample ID:	156-31	156-33	156-35	DL
Client Sample IO	COMP.#2-B1	COMP.#4-B2	COMP.#6-B3	
Batch Number	Q004C041	Q004C041	Q004C041	
Date Analyzed	01/04/92	01/04/92	01/04/92	
Acenaphthylene	N.D.	N.D.	N.D.	330.0
Acenaphthene	N.D.	N.D.	N.D.	330.0
Anthracene	N.D.	N.D.	N.D.	330.0
Benzo(a)anthracene	N.D.	N.D.	N.D.	330.0
Benzo(b)fluoranthene	N.D.	N.D.	N.D.	330.0
Benzo(k)fluoranthene	N.D.	N.D.	N.D.	330.0
Benzoic Acid	N.D.	N.D.	N.D.	1600.0
Benzo(g,h,i)perylene	N.D.	N.D.	N.D.	330.0
Benzo(a)pyrene	N.D.	N.D.	N.D.	330.0
Benzyl Alcohol	N.D.	N.D.	N.D.	330.0
4-Bromophenyl-Phenylether	N.D.	N.D.	N.D.	330.0
Butylbenzylphthalate	N.D.	N.D.	N.D.	330.0
bis(2-Chloroisopropyl) Ether	N.D.	N.D.	N.D.	330.0
4-Chloroaniline	N.D.	N.D.	N.D.	330.0
bis(2-Chloroethoxy) Methane	N.D.	N.D.	N.D.	330.0
bis(2-Chloroethyl)Ether	N.D.	N.D.	N.D.	330.0
4-Chloro-3-Methylphenol	N.D.	N.D.	N.D.	330.0
2-Chloronaphthalene	N.D.	N.D.	N.D.	330.0
2-Chlorophenol	N.D.	N.D.	N.D.	330.0
4-Chlorophenyl-Phenyl Ether	N.D.	N.D.	N.D.	330.0
Chrysene	N.D.	N.D.	N.D.	330.0
Dibenzo(ah)anthracene	N.D.	N.D.	N.D.	330.0
Dibenzofuran	N.D.	N.D.	N.D.	330.0
1,2-Dichlorobenzene	N.D.	N.D.	N.D.	330.0
1,3-Dichlorobenzene	N.D.	N.D.	N.D.	330.0
1,4-Dichlorobenzene	N.D.	N.D.	N.D.	330.0
3,3-Dichlorobenzidine	N.D.	N.D.	N.D.	660.0
2,4-Dichlorophenol	N.D.	N.D.	N.D.	1600.0
Diethylphthalate	N.D.	N.D.	N.D.	330.0
2,4-Dimethylphenol	N.D.	N.D.	N.D.	330.0
2,4,6-Trichlorophenol	N.D.	N.D.	N.D.	330.0
Dimethylphthalate	N.D.	N.D.	N.D.	330.0
Di-n-Butylphthalate	N.D.	N.D.	N.D.	330.0
Di-n-Octyl Phthalate	N.D.	N.D.	N.D.	330.0
4,6-Dinitro-2-Methylphenol	N.D.	N.D.	N.D.	1600.0
2,4-Dinitrophenol	N.D.	N.D.	N.D.	1600.0
2,4-Dinitrotoluene	N.D.	N.D.	N.D.	330.0
2,6-Dinitrotoluene	N.D.	N.D.	N.D.	330.0
bis(2-Ethylhexyl)Phthalate	N.D.	N.D.	N.D.	330.0
Fluoranthene	N.D.	N.D.	N.D.	330.0
Fluorene	N.D.	N.D.	N.D.	330.0
Hexachlorobenzene	N.D.	N.D.	N.D.	330.0

Converse Envirolab
169 North Halstead Street, Pasadena, California 91107-3127

Telephone (818) 351-2330
FAX (818) 568-9165

Envirolab No. : 91-71-12-176
Project No. : 91-31-261-01
Project/Client : SCRTD/UNION ST.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 19, 1991
Date Received : Dec 19, 1991
Report Date : Jan 08, 1992

Analysis Method: 418.1

Sample ID:	176-D1	DL
Client Sample ID	PUMP WELL	
Batch Number	Q360R021	
Date Analyzed	12/26/91	
Petrol Hydrocarbons	N.D.	0.2

Units: mg/L
DL : Detection Limits
N.D. : Not Detected

Converse Envirolab
169 North Halstead Street, Pasadena, California 91107-3127

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FAX (818) 568-9165

Envirolab No. : 91-71-12-176
Project No. : 91-31-261-01
Project/Client : SCRTD/UNION ST.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 19, 1991
Date Received : Dec 19, 1991
Report Date : Jan 08, 1992

Analysis Method: 624

Sample ID:	176-01	DL
Client Sample ID	PUMP WELL	
Batch Number	Q364C031	
Date Analyzed	12/30/91	
Benzene	Trace	5.00
Bromodichloromethane	N.D.	5.00
Bromoform	N.D.	5.00
Bromomethane	N.D.	10.00
Carbon Tetrachloride	N.D.	5.00
Chlorobenzene	N.D.	5.00
Chloroethane	N.D.	10.00
2-Chloroethylvinyl Ether	N.D.	5.00
Chloroform	N.D.	5.00
Chloromethane	N.D.	10.00
Dibromochloromethane	N.D.	5.00
1,2-Dichlorobenzene	N.D.	5.00
1,3-Dichlorobenzene	N.D.	5.00
1,4-Dichlorobenzene	N.D.	5.00
1,1-Dichloroethane	N.D.	5.00
1,2-Dichloroethane	N.D.	5.00
1,1-Dichloroethene	31.00	5.00
1,2-Dichloroethene	660.00	5.00
1,2-Dichloropropane	N.D.	5.00
cis-1,3-Dichloropropene	N.D.	5.00
trans-1,2-Dichloropropene	N.D.	5.00
Ethyl Benzene	Trace	5.00
Methylene Chloride	N.D.	5.00
1,1,2,2-Tetrachloroethane	N.D.	5.00
Tetrachloroethene	18.00	5.00
1,1,1-Trichloroethane	N.D.	5.00
Trichloroethene	60.00	5.00
Trichlorofluoromethane	N.D.	5.00
1,1,2-Trichloroethane	N.D.	5.00
Toluene	N.D.	5.00
Vinyl Chloride	N.D.	10.00

Units: ug/l
DL : Detection Limits
N.D. : Not Detected

Converse Envirolab
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FAX (818) 568-9165

Envirolab No. : 91-71-12-176
Project No. : 91-31-261-01
Project/Client : SCRTD/UNION ST.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 19, 1991
Date Received : Dec 19, 1991
Report Date : Jan 08, 1992

Analysis Method: 625

Sample ID:	176-01	DL
Client Sample ID	PUMP WELL	
Batch Number	Q004C041	
Date Analyzed	01/04/92	
Acenaphthene	N.D.	10.00
Acenaphthylene	N.D.	10.00
Anthracene	N.D.	10.00
Benzo(a)anthracene	N.D.	10.00
Benzo(b)fluoranthene	N.D.	10.00
Benzo(k)fluoranthene	N.D.	10.00
Benzo(g,h,i)perylene	N.D.	10.00
Benzo(a)pyrene	N.D.	10.00
Benzoic Acid	N.D.	50.00
Benzyl Alcohol	N.D.	10.00
4-Bromophenyl-Phenylether	N.D.	10.00
Butylbenzylphthalate	N.D.	10.00
4-Chloroaniline	N.D.	10.00
bis(2-Chloroethoxy) Methane	N.D.	10.00
bis(2-Chloroethyl) Ether	N.D.	10.00
bis(2-Chloroispropyl) Ether	N.D.	10.00
4-Chloro-3-Methylphenol	N.D.	10.00
2-Chloronaphthalene	N.D.	10.00
2-Chlorophenol	N.D.	10.00
4-Chlorophenyl Phenyl Ether	N.D.	10.00
Chrysene	N.D.	10.00
Dibenz(a,h)anthracene	N.D.	10.00
Oibenzofuran	N.D.	10.00
Di-n-Butylphthalate	N.D.	10.00
1,2-Oichlorobenzene	N.D.	10.00
1,3-Dichlorobenzene	N.D.	10.00
1,4-Oichlorobenzene	N.D.	10.00
3,3-Dichlorobenzidine	N.D.	20.00
2,4-Oichlorophenol	N.D.	10.00
Diethylphthalate	N.D.	10.00
2,4-Dimethylphenol	N.D.	10.00
Dimethylphthalate	N.D.	10.00
4,6-Dinitro-2-Methylphenol	N.D.	50.00
2,4-Dinitrophenol	N.D.	50.00
2,4-Dinitrotoluene	N.D.	10.00
2,6-Dinitrotoluene	N.D.	10.00
Di-n-Octylphthalate	N.D.	10.00
bis(2-Ethylhexyl)Phthalate	N.D.	10.00
Fluoranthene	N.D.	10.00
Fluorene	N.D.	10.00
Hexachlorobenzene	N.D.	10.00
Hexachlorobutadiene	N.D.	10.00

Converse Envirolab
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Telephone (818) 351-2330
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Envirolab No. : 91-71-12-176
Project No. : 91-31-261-01
Project/Client : SCRTD/UNION ST.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 19, 1991
Date Received : Dec 19, 1991
Report Date : Jan 08, 1992

Sample ID:	176-01	DL
Hexachlorocyclopentadiene	N.D.	10.00
Hexachloroethane	N.D.	10.00
Indeno(1,2,3-cd) Pyrene	N.D.	10.00
Isophorone	N.D.	10.00
2-Methylnaphthalene	N.D.	10.00
2-Methylphenol	N.D.	10.00
4-Methylphenol	N.D.	10.00
1,2,4-Trichlorobenzene	N.D.	10.00
2,4,5-Trichlorophenol	N.D.	50.00
2,4,6-Trichlorophenol	N.D.	10.00
Naphthalene	N.D.	10.00
2-Nitroaniline	N.D.	50.00
3-Nitroaniline	N.D.	50.00
4-Nitroaniline	N.D.	50.00
2-Nitrophenol	N.D.	10.00
4-Nitrophenol	N.D.	50.00
Nitrobenzene	N.D.	10.00
N-Nitroso-di-n-Propylamine	N.D.	10.00
N-Nitrosodiphenylamine	N.D.	10.00
Pentachlorophenol	N.D.	50.00
Phenol	N.D.	10.00
Phenanthrene	N.D.	10.00
Pyrene	N.D.	10.00

Units: ug/l
DL : Detection Limits
N.D. : Not Detected

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Envirolab No. : 91-71-12-176
Project No. : 91-31-261-01
Project/Client : SCRTD/UNION ST.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 19, 1991
Date Received : Dec 19, 1991
Report Date : Jan 08, 1992

Analysis Method: General Minerals

Sample ID:	176-01	DL
Client Sample ID	PUMP WELL	
Batch Number	Q3561211	
Date Analyzed	12/23/91	
pH	6.88	
TDS	1500.00	1.00
Aluminum	3.10	1.00
Bicarbonate Alk.	460.00	1.00
Ca Hardness as CaCO3	550.00	2.50
Calcium	220.00	1.00
Carbonate Alk.	N.D.	1.00
Chloride	200.00	1.00
Copper	N.D.	1.00
Hydroxide Alk.	N.D.	1.00
Iron	9.30	1.00
Magnesium	70.00	1.00
Manganese	2.20	1.00
MBAS	0.06	0.01
Mg Hardness as CaCO3	290.00	2.50
Nitrate (as N)	N.D.	1.00
Nitrate (as NO3)	N.D.	1.00
Potassium	71.00	1.00
Sulfate	490.00	1.00
Sodium	150.00	1.00
Sp.Conduct.(umho/cm)	1800.00	
Total Alk.(as CaCO3)	460.00	1.00
Total Hardness	840.00	
Zinc	N.D.	1.00

Units: mg/L
DL : Detection Limits
N.D. : Not Detected

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Envirolab No. : 91-71-12-176
Project No. : 91-31-261-01
Project/Client : SCRTD/UNION ST.
Project Eng/Mgr: Mark Schluter

Date Sampled : Dec 19, 1991
Date Received : Dec 19, 1991
Report Date : Jan 08, 1992

Analysis Method: Sulfide

Sample ID:	176-01	DL
Client Sample ID	PUMP WELL	
Batch Number	Q357I231	
Date Analyzed	12/23/91	
Sulfide	0.30	0.10

Units: mg/l
DL : Detection Limits
N.D. : Not Detected

Reviewed by:

Approved by:

George Kolovos, Ph.D
Laboratory Director

Converse Envirolab
169 North Halstead Street, Pasadena, California 91107-3127
Telephone (818) 568-2807

CHAIN OF CUSTODY RECORD

Envirolab Log Number 91-71-12-176

Project Name	SCRTD / UNION STATION EIR	Project Number	91-31-261-01
Project Location	UNION STATION, LOS ANGELES	Phone Number	
Project Manager	MARK SCHLUTER	Sample Collector	MARK SCHLUTER

Analyses Required: EPA 625; EPA 624; SULFIDES; GENERAL MINERALS; 418.1 TRPH

Turn Around: ✓ Normal - 10 working days; 1 week RUSH; 24-48 hour RUSH; < 24 hour RUSH

Lab sample number	Date sampled	Time sampled	Matrix	Sample identification	Comp. Instr.	EPA 625	EPA 624	SULFIDES	GENERAL MINERALS	418.1 TRPH			Remarks
1	12/19/91	1500	LIQUID	GROUNDWATER SAMPLE –		X	X	X	X	X			*CHECK CHEMICAL PRECIPITATE
				EXISTING PUMP WELL –									IN SULFIDE BOTTLE – DOES
				SCRTD HEADQUARTERS SITE									THIS GET BLENDED PRIOR
													TO ANALYSIS?

	Signature	Print Name	Company	Date	Time
Relinquished by		MARK SCHLUTER	CONVERSE	12/19/91	1635
Received by		ROAN MCRAE	CONVERSE ENVIROLAB	12/19/91	1635
Relinquished by					
Received by					
Relinquished by					
Received by					

CAB # 91-71-12-156

CHAIN OF CUSTODY RECORD

P.g. 1 of 3

Client: CONVERSE WEST — 91-31-261-01

Project Name: Southern California Rapid Transit Headquarters

Project No: 0007-006

Location: UNION STATION

Sampler's Signature: Art Matulac

Turn Around Requested:
--- Immediate Attention
--- Rush 24-48 Hours
--- Rush 72-96 Hours
--- Mobile Lab
✓ Normal TAT

Analysis Required: -30 (HOLD; 418.1 (Comp. #1, 2, 3, 4, 5, 6, 58); 8240 ⊗; 8270 (Comp. #1, 2, 3, 4, 5, 55, 58)) -31

Date:

Page of

Boring ID	Sample ID/ Depth	Date	Time	Sample Description: Soil	Water	Other	HOLD	418.1	8240	8270	Number of Containers	# Comments
B-1	S1, 1.0'	12-16-91		✓			X				1	RUN 8240 AS
	S2, 5.0'	12-16-91		✓			X				1	DISCRETE,
	S3, 10.0'			—						X	1	B1-56,
	S4, 15.0'			—				X			1	
	S5, 20.0'			—						X	1	
	S6, 25.0'			—				X	⊗		1	
	S7, 26.0' (SPT) bag			—			X				1	
	S-8, 30.0'			✓				X		X	1	
	S-10, 36.0' (SPT) bag			✓			X				1	

Relinquished by: (Signature) Art Matulac	Date 12-16-91	Received by: (Signature) W.C. Mayfield	Date 12.16.91		Total No. of Containers 9
Company: MAA Engineering	Time 1410	Company: CEW			
Relinquished by: (Signature) W.C. Mayfield	Date 12-16-91	Received by: (Signature) Robert McLean	Date 12/16/91		
Company: CEW	Time	Company: CONVERSE ENVIROLABS	Time 3:15 PM		

MAA ENGINEERING CONSULTANTS, INC.
201 S. Santa Fe #103
Los Angeles
CA 90012
Phone: (213) 680 4000
Fax: (213) 680 3726

LAB #91-71-12-156

CHAIN OF CUSTODY RECORD

Client: CONVERSE WEST

91-31-261-01

Project Name: Southern California Rapid Transit Headquarters

Project No: 0007-006

Location: UNION STATION

Sampler's Signature: Art Matuba

Turn Around Requested:
--- Immediate Attention
--- Rush 24-48 Hours
--- Rush 72-96 Hours
--- Mobile Lab
✓ Normal TAT

Analysis Required

Boring ID	Sample ID/ Depth	Date	Time	Sample Description: Soil	Water	Other	HOLD	418.1 (Comp, B2-51,53 #3 55)	8240	8270 (Comp, B2-53,55 #4 58)	Number of Containers	Comments
B-2	S-1, 1.0'	12-16-91		✓				X			1	RUN 8240 AS
	S-2, 5.0'			✓			X				1	DISCRETE,
	S-3, 10.0'			✓				X		X	1	B2-S4.
	S-4, 15.0'			✓					X		1	
	S-5, 20.0'			✓				X		X	1	
	S-6, 25.0'			✓			X				1	
	S-7, 26.0' (SPT) bag			✓			X				1	
	S-8, 30.0'			✓						X	1	
	S-9, 35.0'			✓			X				1	
	S-10, 36.0' (SPT) bag			✓			X				1	

Relinquished by: (Signature) Art Matuba	Date 12-16-91	Received by: (Signature) W.C. Murphy	Date 12.16.91		Total No. of Containers 10
Company: MAA Engineering	Time 1410	Company: CEW			
Relinquished by: (Signature) W.C. Murphy	Date 12-16-91	Received by: (Signature) Lorri McLea	Date 12/16/91		
Company: CEW	Time	Company: CONVERSE ENVIROLAB	Time 3:00 PM		

MAA ENGINEERING CONSULTANTS, INC.
201 S. Santa Fe #103
Los Angeles
CA 90012
Phone: (213) 680 4000
Fax: (213) 680 3726

LAB # 91-71-12-156

CHAIN OF CUSTODY RECORD

Client: CONVERSE WEST — 91-31-261-01

Project Name: Southern California Rapid Transit Headquarters

Project No: 0007-006

Location: UNION STATION

Sampler's Signature: Art Matulac

Turn Around Requested:
--- Immediate Attention
--- Rush 24-48 Hours
--- Rush 72-96 Hours
--- Mobile Lab
--- Normal TAT

Analysis Required: HOLD | 418.1 (Comp. B3 - S2, S4, S6) #34 | 8240 | 8270 (Comp. B3 - S3, S5, S8) #36

Date:

Page of

Boring ID	Sample ID / Depth	Date	Time	Sample Description: Soil	Water	Other	Number of Containers	Comments
B-3	S-1, 1.0'	12-16-91		/			1	RUN 8240 AS
	S-2, 5.0'			/			1	DISCRETE
	S-3, 10.0'			/			1	B3 - S6
	S-4, 15.0'			/			1	
	S-5, 20.0'			/			1	
	S-6, 25.0'			/			1	
	S-7, 26.0' (SPT) bag			/			1	
	S-8, 30.0'			/			1	
	S-9, 35.0'			/			1	
	S-10, 36.0' (SPT) bag			/			1	

Relinquished by: (Signature) Art Matulac — Date 12-16-91 — Time 1410 — Company: MAA Engineering

Relinquished by: (Signature) W. C. Mayfield — Date 12-16-91 — Time — Company: CEW

Received by: (Signature) W. C. Mayfield — Date 12-16-91 — Company: CEW

Received by: (Signature) Roger McClure — Date 12/16/91 — Time 3:15 PM — Company: CONVERSE ENVIROLABS

Total No. of Containers: 10

MAA ENGINEERING CONSULTANTS, INC.
201 S. Santa Fe #103
Los Angeles
CA 90012
Phone: (213) 680 4000
Fax: (213) 680 3726

Converse Envirolab
169 North Halstead Street, Pasadena, California 91107-3127
Telephone (818) 568-2807

CHAIN OF CUSTODY RECORD

Envirolab Log Number 91-71-12-163

Project Name UNION STA. EIR	Project Number 91-31-261-01		
Project Location LOS ANGELES	Phone Number		
Project Manager M Schlueter	Sample Collector Art Matulac		

Lab sample number	Date sampled	Time sampled	Matrix	Sample identification	Comp. Instr.	HOLD	8240 ⓐ	8270 (comp. B4-S1, S3, S5 #1) (comp. B4-S2, S4, S6 #2)	AB.	ⓐ Remarks
1	12-17-91		Soil	B-4, S1 (1.0')	Comp.		X			RUN 8240 AB DISCRETE
2				S2 (5.0')		(X)		X		B4-S2.
3				S3 (10.0')			X			Composite B4-S1, S3, S5
4				S4 (15.0')				X		for 8270. (#1) -31
5				S5 (20.0')			X			
6				S6 (25.0')				X		Composite B4-S2, S4, S6
7				S7 (26.0') SPT	DISC.	X				for 418.1. (#2) -32
8				S8 (30.0')		X				
9				S9 (35.0')		X				
10				S10 (36.0') SPT		X				

	Signature	Print Name	Company	Date	Time
Relinquished by	Art Matulac	ART MATULAC	MAA ENGINEERING	12-17-91	1400
Received by	Mark Schlueter	MARK SCHLUETER	CONVERSE	12-17-91	1400
Relinquished by	Mark Schlueter	MARK SCHLUETER	CONVERSE	12-17-91	1500
Received by	Roan McRae	ROAN MCRAE	CONVERSE ENVIROLAB	12/17/91	1500
Relinquished by					
Received by					

Converse Envirolab
169 North Halstead Street, Pasadena, California 91107-3127
Telephone (818) 568-2807

2 OF 3

CHAIN OF CUSTODY RECORD

Envirolab Log Number 91-71-12-163

Project Name	UNION STA EIR	Project Number	
Project Location	L.A., LOS ANGELES	Phone Number	
Project Manager	Mark Schlutter	Sample Collector	Art Matulac

Analyses Required: HOLD; 418.1 (comp. B5-1, B5-3, B5-5)

Turn Around: X Normal - 10 working days; 1 week RUSH; 24-48 hour RUSH; < 24 hour RUSH

Lab sample number	Date sampled	Time sampled	Matrix	Sample identification	Comp. Instr.	HOLD	418.1	Remarks
11	12/17-91		SOIL	B-5, S1 (1.0')	Comp.		X	Composite B5-S1,S3
12				S2 (5.0')	DISC.	X		S5 for 418.1 (#3)
13				S3 (10.0')	Comp.		X	-33
14				S4 (15.0')	DISC.	X		
15				S5 (20.0')	Comp.		X	
16				S6 (25.0')	DISC.	X		
17				S7 (26.0') SPT		X		
18				S8 (30.0')		X		
19				S9 (35.0')		X		
20				S10 (36.0') SPT		X		

	Signature	Print Name	Company	Date	Time
Relinquished by	Art Matulac	ART MATULAC	MAA Engineering	12-17-91	1400
Received by	Mark Schlutter	MARK SCHLUTER	CONVERSE	12-17-91	1900
Relinquished by	Mark Schlutter	MARK SCHLUTER	CONVERSE	12-17-91	1500
Received by	Roan McRae	ROAN MCRAE	CONVERSE ENVIROLAB	12-17-91	15[illegible]
Relinquished by					
Received by					

Converse Envirolab
169 North Halstead Street, Pasadena, California 91107-3127
Telephone (818) 568-2807

3 of 3

CHAIN OF CUSTODY RECORD

Envirolab Log Number 91-71-12-163

Project Name	UNION STA EIR	Project Number	
Project Location	L.A., Los Angeles	Phone Number	
Project Manager	Mark Schluter	Sample Collector	Art Matulac

Lab sample number	Date sampled	Time sampled	Matrix	Sample identification	Comp. Instr.	HOLD	418.1 (comp. #6 - S2, S4, S6)	Remarks
21	12-17-91		SOIL	B-6 S1 (1.0')	DISC.	X		Composite B-6, S2, S4, S6 for 418.1 (#4) -34
22				S2 (5.0')	comp.		X	
23				S3 (10.0')	DISC.	X		
24				S4 (15.0')	comp.		X	
25				S5 (20.0')	DISC.	X		
26				S6 (25.0')	comp.	X	X	
27				S7 (26.0') SPT	DISC.	X		
28				S8 (30.0')		X		
29				S9 (35.0')		X		
30				S10 (36.0') SPT		X		

Analyses Required

Turn Around
- X Normal - 10 working days
- 1 week RUSH
- 24-48 hour RUSH
- < 24 hour RUSH

	Signature	Print Name	Company	Date	Time
Relinquished by	Art Matulac	ART MATULAC	MAA Engineering	12-17-91	1400
Received by		MARK SCHLUTER	CONVERSE	12-17-91	1400
Relinquished by		MARK SCHLUTER	CONVERSE	12-17-91	1500
Received by		ROAN MCRAE	CONVERSE ENVIROLAB	12/17/91	15[illegible]
Relinquished by					
Received by					

LOG NO: P86-06-123

Received: 09 JUN 86
Reported: 03 JUL 86

Mark Schluter
Converse Consultants
126 W. Del Mar Avenue
Pasadena, California 91105

Project: 83-1140-06 MRTC Pump

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , WASTEWATER SAMPLES	DATE SAMPLED
06-123-1	Site #2 Untreated	08 JUN 86

PARAMETER	06-123-1
Arsenic, mg/L	<0.012
Barium, mg/L	0.36
Cadmium, mg/L	<0.02
Chromium, mg/L	<0.05
Iron, mg/L	<0.2
Lead, mg/L	<0.5
Manganese, mg/L	2.6
Mercury, mg/L	0.0036
Selenium, mg/L	<0.016
Silver, mg/L	<0.02
Nitric Acid Digestion, Date	06/13/86
Total Coliform, MPN/0.1L	<2.2

Edward Wilson, Laboratory Director

CHAIN OF CUSTODY RECORD

※ 91-71-12-167

Client	CONVERSE WEST 91-31-261-01	Date:	12-18-91
Project Name	Southern California Rapid Transit Headquarters	Page of	
Project No:	0007-006	Turn Around Requested: --- Immediate Attention --- Rush 24-48 Hours --- Rush 72-96 Hours --- Mobile Lab ✓ Normal TAT	
Location:	UNION STATION		
Sampler's Signature	Art Matulac		

Analysis Required: HOLD; 8240 (*); 8270 -11 (COMP. B7-S3,S5,S8 #1); 418.1 -12 (COMP. B7-S2,S4,S6 #2)

#	Boring ID	Sample ID/ Depth	Date	Time	Soil	Water	Other	HOLD	8240 (*)	8270	418.1		Number of Containers	(*) Comments
1	B-7	S1 (1.0')	12-18-91		✓			X						RUN 8240 AS
2		S2 (5.0')			✓						X			DISCRETE
3		S3 (10.0')			✓					X				B7-S4
4		S4 (15.0')			✓				(X)		X			
5		S5 (20.0')			✓					X				
6		S6 (25.0')			✓						X			
7		S7 (26.0') SPT			✓			X						
8		S8 (30.0')			✓					X				
9		S9 (35.0')			✓			X						
10		S10 (36.0') SPT			✓			X						

Relinquished by: (Signature) Art Matulac	Date 12-18-91	Received by: (Signature) [signature]	Date 12/18/91	Total No. of Containers 10	
Company: MAA	Time 9:40	Company:	9:40		
Relinquished by: (Signature) [signature]	Date 12-18-91	Received by: (Signature) Andre H. Al-Islani	Date 12/18/91		
Company: CONVERSE	Time 1210	Company: Converse Envirolab	Time 12:10		

MAA ENGINEERING CONSULTANTS, INC.
201 S. Santa Fe #103
Los Angeles
CA 90012
Phone: (213) 680 4000
Fax: (213) 680 3726

1986 ANALYTICAL RESULTS OF "UNTREATED" GROUNDWATER DISCHARGE

Sampled after 48 Hours of Pumping Operation
Union Station Site #2 - Ramirez and Vignes Streets
Metro Rail Project

CCW Project No. 91-31-261-01

Converse Consultants West

BROWN AND CALDWELL
ANALYTICAL LABORATORIES

LOG NO: P86-03-112

Received: 07 MAR 86
Reported: 17 MAR 86

Mark Schluter
Converse Consultants
126 W. Del Mar Avenue
Pasadena, California 91105

Project: 83-1140-06 MRTC PUMP

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , GROUND WATER SAMPLES	DATE SAMPLED
03-112-1	Groundwater Site #2, Pump Well (UNTREATED*)	07 MAR 86

PARAMETER	03-112-1
Filterable Residue (TDS), mg/L	1900
Oil and Grease, mg/L	1.4
Fuel Aromatics/Hydrocarbons	
Benzene, mg/L	<1
Toluene, mg/L	<1
Total Xylene Isomers, mg/L	<1
Total Fuel Hydrocarbons, mg/L	<1

Edward Wilson, Laboratory Director

*Analytical Results of groundwater sampled prior to Site#2 pump test operations on March 7, 1986.

BROWN AND CALDWELL
ANALYTICAL LABORATORIES

LOG NO: P86-04-497

Received: 24 APR 86
Reported: 13 MAY 86

Mark Schluter
Converse Consultants
126 W. Del Mar Avenue
Pasadena, California 91105

Project: 83-1140-06 MRTC Pump

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , WATER SAMPLES	DATE SAMPLED
04-497-1	Site #2 (UNTREATED*)	24 APR 86

PARAMETER	04-497-1
Total Coliform, MPN/0.1L	2.2
Aquatic Bioassay, LC-50, Percent	NONE
Arsenic, mg/L	<0.0075
Barium, mg/L	0.08
Cadmium, mg/L	<0.009
Chromium, mg/L	<0.03
Lead, mg/L	<0.012
Mercury, mg/L	0.001
Selenium, mg/L	<0.0056
Silver, mg/L	<0.02
Dissolved Digestion, Date	04/28/86
Fluoride, mg/L	1.0
Non-filterable Residue (TSS), mg/L	230
Volatile Suspended Solids, mg/L	21
Filterable Residue (TDS), mg/L	2000
Hardness, Total (as CaCO3), mg/L	1300
Biochemical Oxygen Demand, mg/L	10
Sulfide, mg/L	3.2
Sulfate, mg/L	480
Salinity, mg/L	330
Oil and Grease, mg/L	44
Chloride, mg/L	100
Nitrate (as NO3), mg/L	<4

* Analytical results of groundwater sampled prior to Site #2 pump test operations.

LOG NO: P86-04-497

Received: 24 APR 86
Reported: 13 MAY 86

Mark Schluter
Converse Consultants
126 W. Del Mar Avenue
Pasadena, California 91105

Project: 83-1140-06 MRTC Pump

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , WATER SAMPLES	DATE SAMPLED
04-497-1	Site #2 (UNTREATED*)	24 APR 86

PARAMETER	04-497-1
Phenolics, mg/L	<0.02
Color, APHA U	5
Floatable Oil and Grease, mg/L	<5
Alkalinity	
Carbonate Alk (as CaCO3), mg/L	0
Bicarb Alk (as CaCO3), mg/L	230
Hydroxide Alk (as CaCO3), mg/L	0
Total Alkalinity (as CaCO3), mg/L	230

Edward Wilson, Laboratory Director

*Analytical results of groundwater sampled prior to Site #2 pump test operations.

TOXICITY BIOASSAY

BROWN AND CALDWELL
CONSULTING ENGINEERS
ANALYTICAL SERVICES DIVISION
373 SOUTH FAIR OAKS AVE.
PASADENA, CA 91105
PHONE (818) 795-7553

Log No. P86-04-497
Date Sampled 04-24-86
Date Received 04-24-86
Date Reported 05-13-86

Project No. 83-1140-06 MRTC Pump

Report To: Converse Consultants
126 West Del Mar Boulevard
Pasadena, California 91105

Attention: Mark Schluter

Laboratory Director

cc.

Sample Description Site #2 (UNTREATED*)
Test Organism Gasterosteus aculeatus Source San Mateo
Dilution Water Fresh Source Emeryville Dechlorinated Tap Water Temperature Range 15.0 - 18.0 °C

Aeration: Air X Oxygen ___ None ___

Bioassay Conditions	Time, hrs	Control		Dilution 10%		18%		32%		56%		100%					
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Organisms Surviving	Start	10	100	10	100	10	100	10	100	10	100	10	100				
	24	10	100	10	100	10	100	10	100	10	100	10	100				
	48	10	100	10	100	10	100	10	100	10	100	10	100				
	72	10	100	10	100	10	100	10	100	10	100	10	100				
	96	10	100	10	100	10	100	10	100	10	100	10	100				
Dissolved Oxygen, mg/l	Start	10.0		9.0		7.2		6.0		6.0		6.0					
	24	9.2		8.7		8.4		7.5		7.4		7.3					
	48	10.0		9.4		9.6		8.5		8.8		9.2					
	72	9.3		8.1		7.9		8.7		8.3		7.5					
	96	8.9		8.3		7.4		8.9		8.0		7.3					
pH	Start	8.0		8.0		8.0		8.0		8.0		8.1					
	24	8.1		7.8		7.8		8.2		8.2		8.0					
	48	7.6		7.4		7.4		7.7		7.7		7.9					
	72	7.7		7.6		7.6		7.8		7.7		7.8					
	96	7.8		7.7		7.7		7.7		7.6		7.6					

RESULTS 96 hr TL_m* none Toxicity Units <0.59 Percent survival in undiluted sample 100

*In cases where 96 hour mortality does not equal exceed 50% in at least one dilution of the sample no TL_m value is established.

*Analytical results of groundwater sampled prior to Site #2 pump test operations.

Analyst C. Cox

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BROWN AND CALDWELL
ANALYTICAL LABORATORIES

LOG NO: P86-06-123

Received: 09 JUN 86
Reported: 03 JUL 86

Mark Schluter
Converse Consultants
126 W. Del Mar Avenue
Pasadena, California 91105

Project: 83-1140-06 MRTC Pump

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , WASTEWATER SAMPLES	DATE SAMPLED
06-123-1	Site #2 Untreated	08 JUN 86

PARAMETER	06-123-1
Aquatic Bioassay, LC-50, Percent	6.5
Nitrate Nitrogen	
Nitrate (as NO3), mg/L	<4
Nitrate (as N), mg/L	<1
Phenolics, mg/L	<0.05
Sulfide, mg/L	<0.1
Biochemical Oxygen Demand, mg/L	70
Color, APHA U	<5
Salinity, mg/L	900
Filterable Residue (TDS), mg/L	2090
Floatable Oil and Grease, mg/L	<5
Non-filterable Residue (TSS), mg/L	16
Oil and Grease, mg/L	<5
Volatile Suspended Solids, mg/L	16
Alkalinity	
Carbonate Alk (as CaCO3), mg/L	0.0
Bicarb Alk (as CaCO3), mg/L	410
Hydroxide Alk (as CaCO3), mg/L	0.0
Total Alkalinity (as CaCO3), mg/L	410
Chloride, mg/L	470
Fluoride, mg/L	0.8
Hardness, Total (as CaCO3), mg/L	1000
Sulfate, mg/L	530

BROWN AND CALDWELL
CONSULTING ENGINEERS
ANALYTICAL SERVICES DIVISION
1255 POWELL STREET
EMERYVILLE, CA 94608
PHONE (415) 428-2300

Log No. E86-06-171-1

Date Sampled 6/08/86
Date Received 6/10/86
Date Reported 6/20/86

Report To: Mr. Joe Coporon
Converse Consultants
126 W. Del Mar Avenue
Pasadena, California 91105

cc.

Laboratory Director

Sample Description P86-06-123-1, Site #2 Untreated
Test Organism Gasterosteus aculeatus, threespine stickleback Source San Mateo
Dilution Water Fresh Source Emeryville Temperature Range 14.9-15.0 °C
Dechlorinated Tap Water
Aeration: Air X Oxygen ___ None ___

Bioassay Conditions	Time, hrs	Control		Dilution 10%		18%		32%									
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Organisms Surviving	Start	10	100	10	100	10	100	10	100								
	24	10	100	5	50	0	0	0	0								
	48	10	100	5	50	-	-	-	-								
	72	10	100	4	40	-	-	-	-								
	96	10	100	3	30	-	-	-	-								
Dissolved Oxygen, mg/l	Start	8.9		8.6		7.9		7.0									
	24	8.6		8.0		8.2		7.3									
	48	8.3		7.6		-		-									
	72	7.2		7.4		-		-									
	96	7.4		7.5		-		-									
pH	Start	8.3		8.2		7.9		7.5									
	24	7.8		7.8		7.8		7.1									
	48	8.0		8.2		-		-									
	72	8.1		8.3		-		-									
	96	7.9		8.2		-		-									

RESULTS 96 hr TL_m* 6.5% Toxicity Units 15.4 Percent survival in undiluted sample 0

Length of fish, cm: Max. 3.8, Min. 3.1, Mean 3.4
Weight of fish, g: Max. 0.63, Min. 0.44, Mean 0.52

* In cases where 96 hour mortality does not equal exceed 50% in at least one dilution of the sampl no TL_m value is established.

Analyst C. Cox

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