THE J. BYER GROUP, INC.
A GEOTECHNICAL CONSULTING FIRM
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TRANSMITTAL

August 5, 1998
JB 17776-B

Catellus Development Corporation
304 South Broadway, 4th Floor
Los Angeles, California 90013

Attention: Mr. Brad Dickason

Subject

Geotechnical Engineering and Groundwater Study
Proposed Two Level, Subterranean Parking Garage
and Four Story Office
Lot 2, Tentative Tract 52095
Union Station - 800 North Alameda Street
Los Angeles, California

Dear Mr. Dickason:

Transmitted herewith is our geotechnical and groundwater report which discusses the findings of our exploration performed at Union Station. Our study confirmed that the groundwater levels are relatively high, especially along Alameda Street, and will affect the construction of the proposed two level, subterranean parking garage. Our measurements indicate that the groundwater levels are as high as elevation 260.4 which is 4½ feet above the proposed finished floor of elevation 255. Groundwater levels measured from other borings and wells indicate the surface elevation to be approximately elevation 256. These levels are at historic highs.

The J. Byer Group has retrieved documents from the Southern California Rapid Transit District with respect to tunnels below the proposed project. The plans indicate that the top of the tunnel is at elevation 250, which is only five feet below the proposed garage floor elevation. Deepened foundations may be required to avoid surcharge of the existing tunnels.

The reviewing agency for this document is the City of Los Angeles Building Department. Ten copies of this report are being transmitted to you for your use and distribution to your design professionals. It is suggested that you read the report carefully prior to submitting to any governmental agency. Any questions concerning the data or interpretation of this report should be directed to the undersigned.

Very truly yours,
THE J. BYER GROUP, INC.

John W. Byer
President

xc: (1) Addressee

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GEOTECHNICAL ENGINEERING AND GROUNDWATER STUDY
PROPOSED TWO LEVEL SUBTERRANEAN GARAGE AND FOUR STORY OFFICE

LOT 2, TENTATIVE TRACT 52095

UNION STATION, 800 NORTH ALAMEDA STREET

LOS ANGELES, CALIFORNIA

FOR CATELLUS DEVELOPMENT CORPORATION

THE J. BYER GROUP, INC. PROJECT NUMBER JB 17776-B

AUGUST 5, 1998

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PROPOSED TWO LEVEL SUBTERRANEAN GARAGE AND FOUR STORY OFFICE
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INTRODUCTION

The following report summarizes findings of The J. Byer Group, Inc. geotechnical engineering and groundwater study performed at Union Station. The purpose of this study was to evaluate the nature, distribution, engineering properties, and groundwater levels affecting the earth materials underlying the property with respect to construction of a two story subterranean parking garage and a four story office.

INTENT

It is the intent of this report to assist in the design of the project. The recommendations are intended to reduce geotechnical risks affecting the project. The professional opinions and advice presented in this report are based upon commonly accepted standards and are subject to the general conditions described in the NOTICE section of this report.

EXPLORATION

The scope of the field exploration was determined from our initial site visit, consultation with the client, and review of previous geotechnical and groundwater studies for the property. Exploration was performed on June 4, 1998, during which time two borings were excavated within the south end of the proposed parking structure. Boring 1 was excavated to a depth of 50 feet with samples taken every 2½ feet. The boring was then developed as a groundwater monitoring well. Boring 2 was excavated as a monitoring well and not sampled from a geotechnical standpoint. Periodic readings of these wells was performed. The soil samples obtained from the borings were delivered to our engineering laboratory for testing and analysis.

Office tasks included laboratory testing of selected soil samples, review of the previous geotechnical report, preparation of the Site Plan, preparation of Sections A and B, and preparation of this report. The earth materials encountered in the borings are described on the enclosed Log of Borings. Appendix I contains a discussion of the laboratory testing procedures and results.

The proposed project and the location of the borings are shown on the Site Plan. Subsurface distribution of the earth materials and the proposed project are shown on Sections A and B.

RESEARCH - PRIOR WORK

The area of the proposed parking garage was explored by the firm Law/Crandall with the results presented in their February 3, 1998 report. Ten borings were excavated around the parking area as part of the exploration. The location of the borings, at the parking structure, are shown on the enclosed Site Plan. Geotechnical and groundwater conditions, as described in the Law/Crandall report, are similar to those encountered during our exploration. The data contained in the Law/Crandall report was reviewed and considered as part of our work at this project. The J. Byer Group accepts geotechnical responsibility for use of the Law/Crandall exploration data and laboratory test results in design of the current project.

The J. Byer Group received and reviewed plans for the Metro Rail project from Union Station to North Hollywood. The plans indicate the location and elevation of the existing Metro Rail tunnels, which cross below the north corner of the Union Station parking lot. The top of the existing Metro tunnels is at elevation 250, which is five feet below the proposed finished floor elevation of the two story subterranean garage. The approximate location of the Metro Rail tunnels is shown on the enclosed Site Plan and Section B.

PROPOSED DEVELOPMENT

Information concerning the proposed project was provided by Mr. Brad Dickason with Catellus Development Corporation. It is proposed to construct a two level, subterranean parking structure below the north half of the existing parking lot at Union Station. The proposed finished floor elevation of 255 is approximately one to four feet below the groundwater surface. Grading will consist of excavating for the proposed garage. Shoring or temporary slopes and temporary dewatering will be necessary to allow construction of the lower floor.

It also proposed to construct a combination of three and four story office buildings over the north portion of the proposed garage. These structures are shown on the enclosed Site Plan. Formal plans have not been prepared and await the conclusions and recommendations of this report.

SITE DESCRIPTION

The subject property consists of the parking lot, west of the main Union Station Terminal building. The lot is currently paved with asphalt and has numerous curbs, planters and dividers. The lot surface slopes gently from north to south. The existing Metro Rail tunnels cross the Union Station parking lot at the north end as shown on the Site Plan. The top of the 20 foot diameter tunnels is at elevation 250, as shown on Section B. The tunnels were bored through the alluvium, using the tunnel boring machine.

HYDROGEOLOGY

The project site is located at the Forebay Area of the Central Groundwater Basin. Alluvial sediments associated with the ancestral range of the Los Angeles River underlie the property.

Regional groundwater studies prepared by the Department of Water Resources, Converse West, Levine-Fricke, Law/Crandall, and gauging of monitoring wells were used to evaluate groundwater conditions beneath the site. The ground surface elevation in the project area is approximately 277 feet (reference Psomas Survey dated September, 1997).

Two borings were excavated at the south end of the proposed parking structure during this exploration. Both borings were converted into groundwater monitor wells. The location of the groundwater monitor wells used during this study are shown on the attached Plot Plan. The Plot Plan also depicts recent groundwater elevation data.

Historic groundwater elevation data was obtained from the referenced reports. Levine-Fricke conducted a regional groundwater study in 1991. Groundwater elevation data for the subject site and various sites to the east and south were developed for the Levine-Fricke study. Onsite groundwater elevation data developed by Levine-Fricke (LF) depict groundwater elevations 10 feet lower (approximate elevation 249) than found during June of 1998 (approximate elevation 260). Levine-Fricke calculated a groundwater gradient which slopes to the southeast. Testing for organic chemicals in an onsite well was also performed by LF. No detectible volatile and/or halogenated organic chemicals was found in an onsite well sampled in September, 1990.

Law/Crandall prepared a report of geotechnical investigation for the proposed project site. Ten borings, three of which were converted into groundwater monitor wells, were used to evaluate the groundwater conditions beneath the property. Borings drilled in August, 1997 beneath the site encountered groundwater from 14 to 26 feet below the ground surface. The depths correspond to elevations of 252 to 262 feet above mean sea level.

The groundwater chemistry was also evaluated by Law/Crandall. Groundwater samples were obtained from Crandall wells no. 2 and 6 and analyzed for NPDES discharge limitations. The discharge limitations for total dissolved solids (TDS) was slightly exceeded in water obtained from well 2 (1660 mg/L exceed discharge limitation of 1,500 mg/L). Well 2 had a chloride level of

654 mg/L which exceeds the NPDES discharge limitations (190 mg/L). It should be noted that well 2 is 340 feet south of the project area. Crandall well 6 is located upgradient immediately adjacent to the proposed project area. Groundwater from that well has TDS and chloride levels within NPDES discharge limitations. The gasoline additive MTBE was detected in well No. 6. MTBE was reported at 48mg/L which exceeds the NPDES discharge limitation of 35 mg/L.

Samples of groundwater were obtained and transmitted to a State certified laboratory for analysis. Two samples of groundwater were obtained and tested using EPA method 624 for volatile organics for total dissolved solids (TDS) and for chloride. The laboratory test report is attached. The tests on groundwater are summarized on Table II. No volatile organics (including MTBE) were detected in groundwater obtained from wells CMW6 and HMW1. The levels of TDS and chloride found in both wells are below the NPDES discharge limitations.

The onsite groundwater monitor wells were screened for the presence of volatile organic gases using a combustible gas detector (Gastech Model No. 1238). No detectible levels of combustible gas were found in wells DMW6, JMW1 and CMW3. Trace levels of combustible levels were detected in wells HMW1 and JMW2. High levels of combustible gas (100 % LEL) were detected in well CMW2. Crandall also monitored for the presence of combustible gases during the drilling of onsite borings and installation of wells. Moderate levels of combustible gases were detected in soil samples from borings 3, 4, and 5. High combustible gas readings (greater than 1,000ppm) were found in bedrock obtained from Boring 1. Crandall reports that methane and hydrogen sulfide are common in this area. Methane and hydrogen sulfide monitoring and mitigation measures should be developed and implemented as part of an overall site health and safety plan during construction.

CONSTRUCTION DEWATERING

The project site is underlain by a relatively thin alluvial aquifer which thickens to the north, east, and south. This alluvial aquifer represents sediments deposited during the ancestral range of the

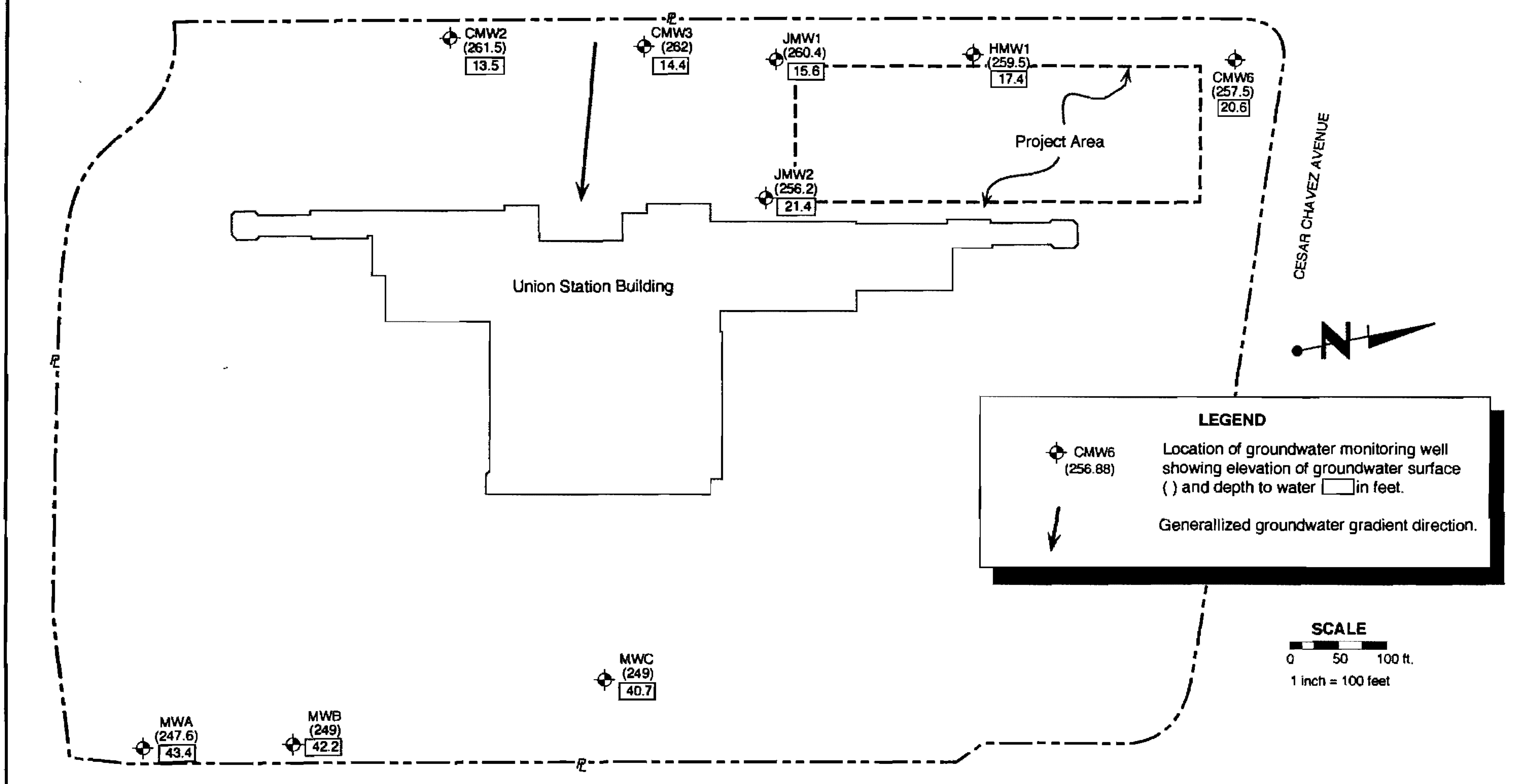
TABLE I
Groundwater Data

Well No.	Depth to Water	Estimated Groundwater Elevation
CMW2	13.5	261.5
CMW3	14.5	262.0
CMW6	20.6	257.5
JMW1	15.6	260.4
JMW2	21.4	256.2
HMW1	17.4	256.6
MWA	43.4	247.6
MWB	42.2	248.0
MWC	40.7	249.0

TABLE II
Groundwater Chemistry

Well No.	Volatile Organics Method 624	Chloride	TDS
CMW6	ND	100	1200
HMW1	ND	110	320

ND = Non Detect for all compounds including MTBE



PLOT PLAN

Client: Catellus		Job #:	
Site Name: Union Station		Date: July 1998	
Location:		By: JLW	Checked By: CIB

REFERENCE: Survey by Mollenhauer, Higashi & Moore, Inc. (7-30-96)

Los Angeles River. These deposits vary from alluvial channel deposits consisting of coarse sands and gravels to fine sands and silts representing overbank deposits. These sediments rest unconformably upon the eroded and weathered bedrock surface. The bedrock consists of siltstone of the Puente Formation. Very fine sand interbeds on the order of a few millimeters to a half inch in thickness were observed within the siltstone. The sandy interbeds are typically wavy, deformed and discontinuous. Typically bedrock which contains sandy interbeds would allow for infiltration and recharge of groundwater into the underlying bedrock from the alluvial aquifer which overlies it. This is especially true where sandstone beds are inclined at high angles allowing intersection of the beds with saturated alluvial sediment. The exploratory borings onsite had non-saturated conditions in the underlying bedrock. The overlying groundwater probably does not penetrate into the underlying bedrock for several reasons. The first is the presence of a clayey weathered bedrock zone which is generally impermeable to groundwater (the lateral extent of the weathered zone is unknown). The second factor which limits infiltration into the underlying bedrock is the general clayey nature of the bedrock and the discontinuous and shattered nature of the sandy lenses. For these reasons the bedrock which underlies the saturated alluvial sediment is considered an aquitard.

A groundwater pump out test was conducted onsite by Hydroquip Pump and Dewatering Corporation during October, 1997. Hydroquip installed well HMW1 on the west side of the project area. The well extends to depths of over 70 feet and is constructed of four inch diameter PVC casing. The well was stressed using a submersible pump powered by a diesel generator. The groundwater level in the Crandall well CMW3 was used as an observation well. No effect on the groundwater level was noted on the well CMW3 during the pumping of the test well HMW1. This is not surprising considering the fact that those wells are separated by over 250 feet and the aquifer being stressed was an unconfined alluvial zone with a saturated thickness on the order of 10 to 15 feet. The test well was continuously pumped and over pumped on a 24-hour basis. This pump test probably measured the permeability of the test well filter pack.

Fully penetrating aquifer pump tests were performed by Converse as part of the dewatering evaluation for the Metro Rail tunnel. Groundwater pump tests were performed in 1983 and 1986. The saturated thickness of the aquifer stressed during the 1986 pump test was approximately 60 feet. A transmissivity on the order of 100,000 gpd/ft. was calculated by Converse for their pump test. In 1983 Converse also performed a pump test near the project site. That test reportedly had gas (methane?) entrained in the water which caused problems with the pump test. Converse concluded that a portion of the groundwater underlying Union Station may be saturated with gas or may be recharged with gas (methane) which is released from the underlying Puente Formation. It is believed much of the gas detected during 1983 Converse pump test was released during the construction dewatering system installed and operated by MTA during construction of the tunnel which traverses the north portion of the project area. Gas may be developed during groundwater pumping onsite.

Dewatering of the proposed excavation area can be accomplished using conventional dewatering techniques developed for unconfined alluvial aquifers. The underlying Puente Formation bedrock can be considered an aquitard which will not transmit nor develop appreciable quantities of groundwater. Construction dewatering wells or well points socketed five feet into the underlying bedrock at the south end of the proposed structure will provide for optimal extraction and control of groundwater. Dewatering wells and well points located on the north end of the proposed garage will probably not encounter bedrock. The alluvial aquifer thickens towards the north and east. Highly transmissive pockets of coarse sand and gravel with cobbles will be encountered. Removal of groundwater from the highly productive zones will require more closely spaced wells or wells supplemented with trench and sump pumps. The range of hydraulic conductivity in the alluvial aquifer is estimated to be 1,000-10,000 gpd/ft^2.

As an option to conventional pump and discharge groundwater control systems, a groundwater barrier system could be employed where the depth to bedrock is favorable for use of a cutoff wall. A grout curtain wall or sheet piling system could be utilized to divert groundwater flow around the proposed excavation. Sheet piling and/or the grout curtain should be socketed a minimum of five feet into the underlying Puente Formation bedrock. The utilization of a groundwater barrier and diversion control measure has the benefit of eliminating surface discharge of developed groundwater. Recent tests indicate that the groundwater is in compliance with NPDES discharge requirements. Groundwater impacted with volatile organic chemicals may occur during construction dewatering operations. A groundwater treatment system may need to be designed and installed as part of any construction dewatering system which develops groundwater unfit for discharge under NPDES permit requirements.

GEOTECHNICAL CONDITIONS

The subject property is underlain by a surface layer of fill approximately three to four feet thick. The fill consists of clayey sand that is dark brown, moist, dense, and contains some construction debris. Below the surface layer of fill is alluvial deposits consisting mostly of silty sand, gravelly sand, and sandy gravel. Some silt layers were found within the sand and gravel and contained peat. The alluvium is light brown to gray, moist to saturated and medium dense to dense. The gravel consists of rounded granite clasts up to three inches in diameter.

Boring 1 encountered siltstone bedrock at a depth of 26 feet below the parking lot surface. The siltstone is bluish gray with layers of light gray fine grained sandstone. The upper portion of the siltstone bedrock, just below the alluvium, was found to be saturated and weathered to a clayey silt. Below the weathered zone, the bedrock was found to be moderately hard and moist, but not saturated. Hydrogen sulfide gas was detected from the bedrock samples by its distinctive odor. The bedrock surface slopes down from west to east as well as from south to north.

GENERAL SEISMIC CONSIDERATIONS

Southern California is located in an active seismic region. Moderate to strong earthquakes can occur on numerous local faults. The United States Geological Survey, California Division of

Mines and Geology, private consultants, and universities have been studying earthquakes in southern California for several decades. Early studies were directed toward earthquake prediction and estimation of the effects of strong ground shaking. Studies indicate that earthquake prediction is not practical and not sufficiently accurate to benefit the general public. Governmental agencies are shifting their focus to earthquake resistant structures as opposed to prediction. The purpose of the code seismic design parameters is to prevent collapse during strong ground shaking. Cosmetic damage should be expected.

Within the past 25 years, southern California and vicinity have experienced an increase in seismic activity beginning with the San Fernando earthquake in 1971. In 1987, a moderate earthquake struck the Whittier area and was located on a previously unknown fault. Ground shaking from this event caused substantial damage to the City of Whittier, and surrounding cities.

The January 17, 1994, Northridge earthquake was initiated along a previously unrecognized fault below the San Fernando Valley. The energy released by the earthquake propagated to the southeast, northwest, and northeast in the form of shear and compression waves, which caused the strong ground shaking in portions of the San Fernando Valley, Simi Valley, City of Santa Clarita, and City of Santa Monica.

Southern California faults are classified as: active, potentially active, or inactive. Faults from past geologic periods of mountain building, but do not display any evidence of recent offset, are considered "potentially active". Faults that have historically produced earthquakes or show evidence of movement within the past 11,000 years are known as "active faults". There are no known active faults within close vicinity of the subject property.

The principal seismic hazard to the subject property and proposed project is strong ground shaking from earthquakes produced by local faults. Modern, well-constructed buildings are designed to resist ground shaking through the use of shear panels and reinforcement. Additional precautions may be taken to protect personal property and reduce the chance of injury, including strapping water heaters and securing furniture. It is likely that the subject property will be shaken by future earthquakes produced in southern California. However, secondary effects such as surface rupture, liquefaction, and consolidation should not occur at the subject property.

LIQUEFACTION

Groundwater was measured at 14 feet below the existing grade. The natural soils are recent alluvial deposits consisting of dense sand with gravel and cobbles. The recent alluvial materials are underlain by Puente Formation siltstone. The siltstone is not considered susceptible to liquefaction. The sand, gravel and soils underlying the site have a high relative density and are coarse grained. The potential for liquefaction of the soils underlying the site is considered to be very low.

CONCLUSIONS AND RECOMMENDATIONS

General Findings

The conclusions and recommendations of this exploration are based upon two borings, research of available records, review of previous geotechnical reports for the area, and years of experience providing similar studies for similar properties. It is the finding of The J. Byer Group, Inc. that groundwater levels in this area are similar to those reported by the previous consultant in 1997. Groundwater data is summarized on the enclosed Plot Plan prepared by California Environmental. It is the finding of The J. Byer Group that the area is underlain by alluvium and siltstone bedrock typical for this area of Los Angeles. The bedrock surface slopes from west to east and south to north and will be below the finished floor elevation of the proposed parking garage. The recommended bearing materials for the proposed garage and office buildings is the saturated alluvium. Conventional spread footings may be used to support the garage and office buildings provided they do not surcharge the existing Metro Rail tunnels. Cast-in-place concrete friction piles are recommended for support of the garage and office buildings where the Metro Rail tunnels will be surcharged. For preliminary design, and to avoid surcharging of the existing tunnels, piles should extend below a 1:1 plane projected up from the base of the tunnels.

FOUNDATION DESIGN

General Conditions

The following foundation recommendations are minimum requirements. The structural engineer may require footings that are deeper, wider, or larger in diameter, depending on the final loads.

Spread Footings

Continuous and/or pad footings may be used to support the proposed garage and office structures provided they are founded in dense alluvial soils. Continuous footings should be a minimum of 12 inches in width. Pad footings should be a minimum of 24 inches square. The following chart contains the recommended design parameters.

Bearing Material	Minimum Embedment Depth of Footing (Inches)	Vertical Bearing (psf)	Coefficient of Friction	Passive Earth Pressure (pcf)	Maximum Earth Pressure (psf)
Alluvial Soil	18	4,000	0.5	300	6,000

Increases in the bearing value are allowable at a rate of 500 pounds per square foot for each additional foot of footing width or depth to a maximum of 6,000 pounds per square foot. For bearing calculations, the weight of the concrete in the footing may be neglected.

The bearing value shown above is for the total of dead and frequently applied live loads and may be increased by one third for short duration loading, which includes the effects of wind or seismic forces. When combining passive and friction for lateral resistance, the passive component should be reduced by one third.

All continuous footings should be reinforced with a minimum of two #4 steel bars; one placed near the top and one near the bottom of the footings. Footings should be cleaned of all loose soil, moistened, free of shrinkage cracks and approved by the soils engineer prior to placing forms, steel or concrete.

Deepened Foundations - Friction Piles

Drilled, cast in place concrete friction piles are recommended to support portions of the garage and office building which surcharge the existing tunnels. The piles should be placed a minimum of eight feet below a 45 degree plane projected upward from the base of the tunnels. A minimum of eight feet into the alluvium below the 1:1 plane is recommended. The allowable skin friction resistance can be found on the enclosed Skin Friction Analysis contained in the back of this report. For uplift pressures, piles in tension may assume 50 percent of the friction value.

Lateral Design

The friction values are for the total of dead and frequently applied live loads and may be increased by one third for short duration loading, which includes the effects of wind or seismic forces. Resistance to lateral loading may be provided by passive earth pressure within the alluvium. For piles within the influence of the Metro Rail tunnel, passive earth pressure can be computed starting below the 1:1 setback plane.

Passive earth pressure may be computed as an equivalent fluid having a density of 300 pounds per cubic foot for the alluvium. The maximum allowable earth pressure is 4,000 pounds per square foot. For design of isolated piles, the allowable passive and maximum earth pressures may be increased by 100 percent. Piles spaced more than 2½ pile diameters on center may be considered isolated.

Foundation Settlement

Settlement of the foundation system is expected to occur on initial application of loading. A total settlement of ½ inch may be anticipated. Differential settlement should not exceed ¼ inch.

SITE COEFFICIENT

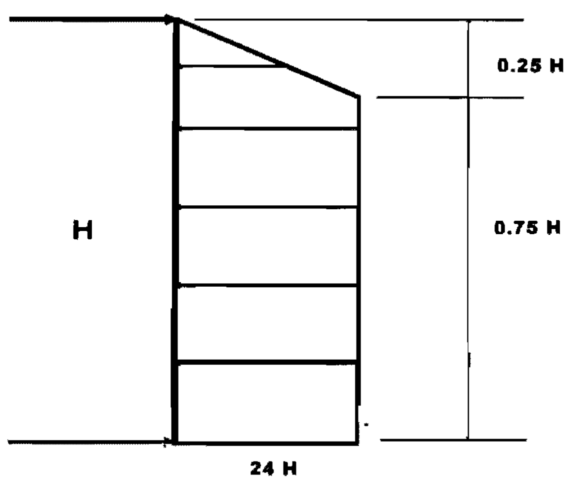
The seismic coefficient per the Uniform Building Code Section 1628 (1994) is S_2. Per Section 1629 of the 1997 UBC, the soil profile type is S_D. The site is located in Seismic Zone 4.

GARAGE WALLS

Water was encountered slightly above the proposed lower garage floor level, and the water level could rise in the future. The water condition should be taken into consideration in design of basement walls. For design of cantilevered retaining walls, an equivalent fluid pressure of 43 pounds per cubic foot may be used.

Restrained basement retaining walls up to 23 feet high should be designed to resist a trapezoidal distribution of lateral earth pressure of 24H as shown on the diagram below plus the surcharge loading from traffic and adjacent structures.

TRAPEZOIDAL DISTRIBUTION OF PRESSURE



In addition to the recommended earth pressure, the upper 10 feet of the basement walls adjacent to traffic areas should be designed to resist a uniform lateral pressure of 100 pounds per square foot, which is a result of an assumed 300 pounds per square foot surcharge behind the walls due to normal street traffic. If the traffic is kept at least 10 feet from the basement walls, the traffic surcharge may be neglected. Basement walls adjacent to the existing buildings should be designed to resist surcharge pressures.

The pressures assume a free draining backfill and a subdrain. If a subdrainage system will not be provided, the walls should also be designed to resist hydrostatic pressure. A permanent subdrain system should be installed beneath the lower floor and behind the garage walls to maintain the water level below the floor. The subdrain should flow to a sump pump for discharge to a storm drain. The slab and garage walls could be waterproofed and designed for the hydrostatic pressure if the sump is not installed.

For a subdrain system, the lower floor should be underlain by a layer of ¾ inch rock approximately one foot thick, and drained by subdrain pipes leading to sump areas equipped with automatic pumping units. The drain lines should consist of perforated pipe placed, with the perforations down, in trenches extending at least one foot below the filter material. The drain lines should extend around the perimeter of the development and should be spaced approximately 40 feet apart within the interior of the building. The drain lines should be sloped at least two inches per 100 feet for proper drainage.

A permit from the State of California Regional Water Quality Control Board will be required to discharge water from the subdrain system into the storm drain.

TEMPORARY EXCAVATIONS

Based on current development plans, an excavation ranging up to 23 feet deep will be required for the subterranean garage (elevation 255 feet above sea level). Water was recently measured in JMW1 and JMW2 at elevations 260.4 and 256.2 feet above sea level. These levels are ten feet higher than those measured 10 years ago. Temporary dewatering of the garage excavation to allow construction will be necessary. The groundwater level should be lowered to least two feet below the excavated level. The dewatering could be done by means of wells with supplementary pumping from sumps located within the excavation. A discharge permit will be required for the disposal of groundwater from the site in accordance with current water quality control regulations. The subgrade at the sub-basement level may become wet and soft. To provide a firm base for workers and equipment, a layer of ¾ inch crushed rock up to about one foot thick may be necessary.

Temporary excavations for portions of the garage may be sloped at 1:1 where feasible. Shoring will be required for most of the basement excavation. Shoring may consist of soldier piles, restrained with anchors or rakers. Some difficulty may be experienced in the drilling of the soldier piles and anchors due to water. Also, caving and sloughing may occur during the drilling of the soldier piles and the anchors through sand and gravel. Casing may be necessary.

Soldier Piles

Soldier piles may be utilized to support temporary excavations. Soldier piles should be a minimum of 24 inches in diameter an a minimum of 10 feet below the excavation. Piles may be assumed fixed at five feet below the excavation. The piles may be designed for skin friction per the Skin Friction Analysis sheet at the back of this report. Soldier piles should be spaced a maximum of eight feet on center. Shoring piles should be designed to resist a trapezoidal distribution of pressure of 24H.

Lateral Design - Soldier Piles

The friction value is for the total of dead and frequently applied live loads and may be increased by one third for short duration loading, which includes the effects of wind or seismic forces. Resistance to lateral loading may be provided by passive earth pressure below the temporary excavation.

Passive earth pressure may be computed as an equivalent fluid having a density of 300 pounds per cubic foot. The maximum allowable earth pressure is 4,000 pounds per square foot. For design of isolated piles, the allowable passive and maximum earth pressures may be increased by 100 percent. Piles spaced more than 2½ pile diameters on center may be considered isolated.

Lagging

Lagging will be required the full height of the shored excavation. The solider piles and anchors should be designed for the full anticipated lateral pressure. However, the pressure on the lagging will be less due to arching in the soils. Lagging should be designed for the recommended earth pressure, but limited to a maximum value of 400 pounds per square foot.

Tie Back Anchors

Tie-back anchors may be used to resist lateral loads. Either friction anchors or belled anchors may be used. For design purposes, it may be assumed that the active wedge adjacent to the shoring is defined by a plane drawn at 55 degrees up from the bottom of the excavation. Friction anchors should extend at least 15 feet beyond the potential active wedge.

The capacities of the anchors should be determined by testing of the initial anchors as outlined in a following section. For preliminary design purposes, it may be estimated that drilled friction anchors will develop an average value of 600 pounds per square foot. Only the frictional resistance developed beyond the active wedge will be effective in resisting lateral loads. If the anchors are spaced at least six feet on centers, no reduction in the capacity of the anchors need be considered due to group action. The anchors may be installed at angles of 20 to 40 degrees below the horizontal.

At least eight of the initial anchors should be selected for a 24-hour 200% test and eight additional anchors for quick 200% tests. The purpose of the 200% tests is to verify the friction value assumed in design. Where satisfactory tests are not achieved on the initial anchors, the anchor diameter and/or length should be increased until satisfactory test results are obtained. The total deflection during the 24-hour 200% test should not exceed 12 inches. During the 24-hour test, the anchor deflection should not exceed 0.75 inch measured after the 200% test load is applied. If the anchor movement after the 200% load has been applied for 12 hours is less than 0.5 inch, and the movement over the previous four hours has been less than 0.1 inch, the 24-hour test may be terminated.

For the quick 200% tests, the 200% test load should be maintained for 30 minutes. The total deflection of the anchor during the 200% quick tests should not exceed 12 inches; the deflection after the 200% test load has been applied should not exceed 0.25 inch during the 30-minute period.

All of the anchors should be tested to at least 150% of the design load; the total deflection during the test should not exceed 12 inches. The rate of creep under the 150% test should not exceed 0.1 inch over a 15-minute period for the anchor to be approved for the design loading.

After a satisfactory test, each anchor should be locked-off at the design load. The locked-off load should be verified by rechecking the load in the anchor. If the locked-off load varies by more than 10% from the design load, the load should be reset until the anchor is locked-off within 10% of the design load. The installation of the anchors and the testing of the completed anchors should be observed by the geotechnical engineer.

Rakers may be used to internally brace the soldier piles. The rakers may be supported by temporary concrete footings or by the permanent interior footings. For design of temporary footings poured with the bearing surface normal to rakers inclined at 45 degrees, a bearing value of 4,000 pounds per square foot may be used, provided the shallowest point of the footing is at least one foot below the lowest adjacent grade.

WATERPROOFING

The lower floor of the proposed garage will be two to five feet below the current groundwater surface. The permanent retaining walls and floor should be waterproofed to prevent seepage into the parking structure. A sump pump system should be installed in the event that the waterproofing allows seepage into the lower floor.

FLOOR SLABS

The lower floor slab will be cast over gravel supported by undisturbed natural alluvium. The lower floor elevation is two to five feet below the groundwater level. The floor slab should be designed to resist uplift forces as a result of the groundwater condition. These forces can be calculated by multiplying the weight of water (62.4 pounds per cubic foot) by the height of the water table above the finished floor elevation. Floor slabs should be reinforced and stiffened with grade beams to resist the pressure of uplift.

SITE OBSERVATIONS DURING CONSTRUCTION

The Building Department requires that the geotechnical company provide site observations during construction. The observations include soldier piles, tie back anchors, temporary slopes and foundation excavations. All fill that is placed should be tested for compaction and approved by the soils engineer prior to use for support of engineered structures.

Please advise The J. Byer Group, Inc. at least 24 hours prior to any required site visit. The agency approved plans and permits should be at the jobsite and available to our representative. The project consultant will perform the observation and post a notice at the jobsite of his visit and findings. This notice should be given to the agency inspector.

CONSTRUCTION SITE MAINTENANCE

It is the responsibility of the contractor to maintain a safe construction site. When excavations exist on a site, the area should be fenced and warning signs posted. All pile excavations must be properly covered and secured. Soil generated by foundation and subgrade excavations should be either removed from the site or properly placed as a certified compacted fill. Soil must not be spilled over any descending slope. Workers should not be allowed to enter any unshored trench excavations over five feet deep.

GENERAL CONDITIONS

This report and the exploration are subject to the following NOTICE. Please read the NOTICE carefully, it limits our liability.

NOTICE

In the event of any changes in the design or location of any structure, as outlined in this report, the conclusions and recommendations contained herein may not be considered valid unless the changes are reviewed by us and the conclusions and recommendations are modified or reaffirmed after such review.

The subsurface conditions, excavation characteristics, and geologic structure described herein and shown on the enclosed cross section have been projected from excavations on the site as indicated and should in no way be construed to reflect any variations that may occur between these excavations or that may result from changes in subsurface conditions.

Fluctuations in the level of groundwater may occur due to variations in rainfall, temperature, irrigation, and other factors not evident at the time of the measurements reported herein. Fluctuations also may occur across the site. High groundwater levels can be extremely hazardous. Saturation of earth materials can cause subsidence or slippage of the site.

If conditions encountered during construction appear to differ from those disclosed herein, notify us immediately so we may consider the need for modifications. Compliance with the design concepts, specifications or recommendations during construction requires the review of the engineering geologist and geotechnical engineer during the course of construction.

THE EXPLORATION WAS PERFORMED ONLY ON A PORTION OF THE SITE, AND CANNOT BE CONSIDERED AS INDICATIVE OF THE PORTIONS OF THE SITE NOT EXPLORED.

This report is issued and made for the sole use and benefit of the client, is not transferable and is as of the exploration date. Any liability in connection herewith shall not exceed the fee for the exploration. No warranty, expressed or implied, is made or intended in connection with the above exploration or by the furnishing of this report or by any other oral or written statement.

THIS REPORT WAS PREPARED ON THE BASIS OF THE PRELIMINARY DEVELOPMENT PLAN FURNISHED. FINAL PLANS SHOULD BE REVIEWED BY THIS OFFICE AS ADDITIONAL GEOTECHNICAL WORK MAY BE REQUIRED.

The J. Byer Group appreciates the opportunity to provide our service on this project. Any questions concerning the data or interpretation of this report should be directed to the undersigned.

Very Truly Yours,
THE J. BYER GROUP, INC.

John W. Byer
E.G. 883

Robert I. Zweigler
E.G. 1210/G.E. 2120

REGISTERED PROFESSIONAL ENGINEER
ROBERT I. ZWEIGLER
No. 2120
Exp. 6-30-02
GEOTECHNICAL
STATE OF CALIFORNIA

JWB:RIZ:flh
G:\FINAL\REPORTS\17776-B1.RPT

Enc: Appendix I - Laboratory Testing
Appendix II - Water Quality Tests
Shear Test Diagrams (2)
Log of Borings (4 Pages)
Calculation Sheets - Skin Friction Analysis (2)
Retaining Wall Calculations
Well Details (2)
Law/Crandall Borings 3,4,5,6,8,9,10

In Pocket: Site Plan
Sections A and B

xc: (10) Addressee
(1) California Environmental, Attention: Charles Buckley

APPENDIX I

LABORATORY TESTING

Undisturbed samples of the alluvium and bedrock were obtained from the borings and transported to the laboratory for testing and analysis. The samples were obtained by driving a ring lined barrel sampler conforming to ASTM D-3550. Experience has shown that sampling causes some disturbance of the sample, however the test results remain within a reasonable range. The samples were retained in brass rings of 2.50 inches outside diameter and 1.00 inches in height. The central portions of the samples were stored in close fitting, waterproof containers for transportation to the laboratory.

Moisture-Density

The dry density of the samples was determined using the procedures outlined in ASTM D-2937. The moisture content of the samples was determined using the procedures outlined in ASTM D-2216. The results are shown on the Log of Boring 1.

Shear-Tests

Shear tests were performed on samples of alluvium and bedrock using the procedures outlined in ASTM D-3080 and a strain controlled, direct shear machine manufactured by Soil Test, Inc. The rate of deformation was 0.025 inches per minute. The samples were tested in an artificially saturated condition. Following the shear test, the moisture content of the samples was determined to verify saturation. The results are plotted on the "Shear Test Diagrams".

APPENDIX II

WATER QUALITY TESTS

July 16, 1998

Charles Buckley
California Environmental
31320 Via Colinas
Suite 104
Westlake Village, CA 91362

Re: J. Byer Group/Project #GE598-1736

Dear Charles :

Enclosed are the results of the samples submitted to our laboratory on July 8, 1998. For your reference, these analyses have been assigned our service request number L9802226.

All analyses were performed in accordance with our laboratory's quality assurance program. Results are intended to be considered in their entirety and apply only to the samples analyzed. Columbia Analytical Services is not responsible for use of less than the complete report.

Columbia Analytical Services is certified for environmental analyses by the California Department of Health Services (certificate number: 1296, expiration August 1998), and approved by the County Sanitation Districts of Los Angeles County (laboratory ID number: 10151).

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

For

L. Ross Fenstermaker
Project Chemist

LRF/ls

Columbia Analytical Services, Inc.

Acronyms

8015M	California DHS LUFT Method
A2LA	American Association for Laboratory Accreditation
ASTM	American Society for Testing and Materials
BOD	Biochemical Oxygen Demand
BTEX	Benzene/Toluene/Ethylbenzene/Xylenes
CAM	California Assessment Metals
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service Registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
COD	Chemical Oxygen Demand
CRDL	Contract Required Detection Limit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOE	Department of Ecology
DOH or DHS	Department of Health Services
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank sample
ICP	Inductively Coupled Plasma atomic emission spectrometry
ICV	Initial Calibration Verification sample
J	Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding.
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified
MBAS	Methylene Blue Active Substances
MCL	Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U.S. EPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl-*tert*-Butyl Ether
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the paper industry for Air and Stream Improvement
ND	None Detected at or above the Method Reporting/Detection Limit (MRL/MDL)
NIOSH	National Institute for Occupational Safety and Health
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	*Standard Methods for the Examination of Water and Wastewater*, 18th Ed., 1992.
STLC	Solubility Threshold Limit Concentration
SW	*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, 1986 and as amended by Updates I, II, IIA, and IIB.
TCLP	Toxicity Characteristics Leaching Procedure
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding.
TRPH	Total Recoverable Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: California Environmental
Project: JBG/Cateilus/1736
Sample Matrix: Water
Service Request: L9802226
Date Collected: 7/8/98
Date Received: 7/8/98

Volatile Organic Compounds

Sample Name: HMW1
Lab Code: L9802226-002
Test Notes:
Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Chloromethane	METHOD	624	5	1	NA	7/8/98	ND	
Vinyl Chloride	METHOD	624	5	1	NA	7/8/98	ND	
Bromomethane	METHOD	624	5	1	NA	7/8/98	ND	
Chloroethane	METHOD	624	5	1	NA	7/8/98	ND	
Trichlorofluoromethane (CFC 11)	METHOD	624	5	1	NA	7/8/98	ND	
1,1-Dichloroethene	METHOD	624	5	1	NA	7/8/98	ND	
Acetone	METHOD	624	50	1	NA	7/8/98	ND	
Carbon Disulfide	METHOD	624	5	1	NA	7/8/98	ND	
Methylene Chloride	METHOD	624	10	1	NA	7/8/98	ND	
trans-1,2-Dichloroethene	METHOD	624	5	1	NA	7/8/98	ND	
cis-1,2-Dichloroethene	METHOD	624	5	1	NA	7/8/98	ND	
2-Butanone (MEK)	METHOD	624	10	1	NA	7/8/98	ND	
1,1-Dichloroethane	METHOD	624	5	1	NA	7/8/98	ND	
Chloroform	METHOD	624	5	1	NA	7/8/98	ND	
1,1,1-Trichloroethane (TCA)	METHOD	624	5	1	NA	7/8/98	ND	
Carbon Tetrachloride	METHOD	624	5	1	NA	7/8/98	ND	
Benzene	METHOD	624	5	1	NA	7/8/98	ND	
1,2-Dichloroethane	METHOD	624	5	1	NA	7/8/98	ND	
Vinyl Acetate	METHOD	624	10	1	NA	7/8/98	ND	
Trichloroethene (TCE)	METHOD	624	5	1	NA	7/8/98	ND	
1,2-Dichloropropane	METHOD	624	5	1	NA	7/8/98	ND	
Bromodichloromethane	METHOD	624	5	1	NA	7/8/98	ND	
2-Chloroethyl Vinyl Ether	METHOD	624	10	1	NA	7/8/98	ND	
trans-1,3-Dichloropropene	METHOD	624	5	1	NA	7/8/98	ND	
2-Hexanone	METHOD	624	10	1	NA	7/8/98	ND	
4-Methyl-2-pentanone (MIBK)	METHOD	624	10	1	NA	7/8/98	ND	
Toluene	METHOD	624	5	1	NA	7/8/98	ND	
cis-1,3-Dichloropropene	METHOD	624	5	1	NA	7/8/98	ND	
1,1,2-Trichloroethane	METHOD	624	5	1	NA	7/8/98	ND	
Tetrachloroethene (PCE)	METHOD	624	5	1	NA	7/8/98	ND	
Dibromochloromethane	METHOD	624	5	1	NA	7/8/98	ND	
Chlorobenzene	METHOD	624	5	1	NA	7/8/98	ND	
Ethylbenzene	METHOD	624	5	1	NA	7/8/98	ND	
Styrene	METHOD	624	5	1	NA	7/8/98	ND	
Total Xylenes	METHOD	624	5	1	NA	7/8/98	ND	
Bromoform	METHOD	624	5	1	NA	7/8/98	ND	
1,1,2,2-Tetrachloroethane	METHOD	624	5	1	NA	7/8/98	ND	
1,3-Dichlorobenzene	METHOD	624	5	1	NA	7/8/98	ND	
1,4-Dichlorobenzene	METHOD	624	5	1	NA	7/8/98	ND	
1,2-Dichlorobenzene	METHOD	624	5	1	NA	7/8/98	ND	
Acrolein	METHOD	624	100	1	NA	7/8/98	ND	
Acrylonitrile	METHOD	624	100	1	NA	7/8/98	ND	
Methyl *tert*-Butyl Ether	METHOD	624	10	1	NA	7/8/98	ND	

Approved By: [signature] Date: 8-4-98
1S44/021397p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	California Environmental	**Service Request:**	L9802226
Project:	JBG/Cateilus/1736	**Date Collected:**	7/8/98
Sample Matrix:	Water	**Date Received:**	7/8/98

Volatile Organic Compounds

Sample Name:	CMW6	**Units:**	ug/L (ppb)
Lab Code:	L9802226-001	**Basis:**	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Chloromethane	METHOD	624	5	1	NA	7/8/98	ND	
Vinyl Chloride	METHOD	624	5	1	NA	7/8/98	ND	
Bromomethane	METHOD	624	5	1	NA	7/8/98	ND	
Chloroethane	METHOD	624	5	1	NA	7/8/98	ND	
Trichlorofluoromethane (CFC 11)	METHOD	624	5	1	NA	7/8/98	ND	
1,1-Dichloroethene	METHOD	624	5	1	NA	7/8/98	ND	
Acetone	METHOD	624	50	1	NA	7/8/98	ND	
Carbon Disulfide	METHOD	624	5	1	NA	7/8/98	ND	
Methylene Chloride	METHOD	624	10	1	NA	7/8/98	ND	
trans-1,2-Dichloroethene	METHOD	624	5	1	NA	7/8/98	ND	
cis-1,2-Dichloroethene	METHOD	624	5	1	NA	7/8/98	ND	
2-Butanone (MEK)	METHOD	624	10	1	NA	7/8/98	ND	
1,1-Dichloroethane	METHOD	624	5	1	NA	7/8/98	ND	
Chloroform	METHOD	624	5	1	NA	7/8/98	ND	
1,1,1-Trichloroethane (TCA)	METHOD	624	5	1	NA	7/8/98	ND	
Carbon Tetrachloride	METHOD	624	5	1	NA	7/8/98	ND	
Benzene	METHOD	624	5	1	NA	7/8/98	ND	
1,2-Dichloroethane	METHOD	624	5	1	NA	7/8/98	ND	
Vinyl Acetate	METHOD	624	10	1	NA	7/8/98	ND	
Trichloroethene (TCE)	METHOD	624	5	1	NA	7/8/98	ND	
1,2-Dichloropropane	METHOD	624	5	1	NA	7/8/98	ND	
Bromodichloromethane	METHOD	624	5	1	NA	7/8/98	ND	
2-Chloroethyl Vinyl Ether	METHOD	624	10	1	NA	7/8/98	ND	
trans-1,3-Dichloropropene	METHOD	624	5	1	NA	7/8/98	ND	
2-Hexanone	METHOD	624	10	1	NA	7/8/98	ND	
4-Methyl-2-pentanone (MIBK)	METHOD	624	10	1	NA	7/8/98	ND	
Toluene	METHOD	624	5	1	NA	7/8/98	ND	
cis-1,3-Dichloropropene	METHOD	624	5	1	NA	7/8/98	ND	
1,1,2-Trichloroethane	METHOD	624	5	1	NA	7/8/98	ND	
Tetrachloroethene (PCE)	METHOD	624	5	1	NA	7/8/98	ND	
Dibromochloromethane	METHOD	624	5	1	NA	7/8/98	ND	
Chlorobenzene	METHOD	624	5	1	NA	7/8/98	ND	
Ethylbenzene	METHOD	624	5	1	NA	7/8/98	ND	
Styrene	METHOD	624	5	1	NA	7/8/98	ND	
Total Xylenes	METHOD	624	5	1	NA	7/8/98	ND	
Bromoform	METHOD	624	5	1	NA	7/8/98	ND	
1,1,2,2-Tetrachloroethane	METHOD	624	5	1	NA	7/8/98	ND	
1,3-Dichlorobenzene	METHOD	624	5	1	NA	7/8/98	ND	
1,4-Dichlorobenzene	METHOD	624	5	1	NA	7/8/98	ND	
1,2-Dichlorobenzene	METHOD	624	5	1	NA	7/8/98	ND	
Acrolein	METHOD	624	100	1	NA	7/8/98	ND	
Acrylonitrile	METHOD	624	100	1	NA	7/8/98	ND	
Methyl *tert*-Butyl Ether	METHOD	624	10	1	NA	7/8/98	ND	

Approved By: *[signature]* Date: 8-4-98

1S44/021397p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: California Environmental
Project: JBG/Cateilus/1736
Sample Matrix: Water

Service Request: L9802226
Date Collected: NA
Date Received: NA

Volatile Organic Compounds

Sample Name: Method Blank
Lab Code: L980708-MB
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Chloromethane	METHOD	624	5	1	NA	7/8/98	ND	
Vinyl Chloride	METHOD	624	5	1	NA	7/8/98	ND	
Bromomethane	METHOD	624	5	1	NA	7/8/98	ND	
Chloroethane	METHOD	624	5	1	NA	7/8/98	ND	
Trichlorofluoromethane (CFC 11)	METHOD	624	5	1	NA	7/8/98	ND	
1,1-Dichloroethene	METHOD	624	5	1	NA	7/8/98	ND	
Acetone	METHOD	624	50	1	NA	7/8/98	ND	
Carbon Disulfide	METHOD	624	5	1	NA	7/8/98	ND	
Methylene Chloride	METHOD	624	10	1	NA	7/8/98	ND	
trans-1,2-Dichloroethene	METHOD	624	5	1	NA	7/8/98	ND	
cis-1,2-Dichloroethene	METHOD	624	5	1	NA	7/8/98	ND	
2-Butanone (MEK)	METHOD	624	10	1	NA	7/8/98	ND	
1,1-Dichloroethane	METHOD	624	5	1	NA	7/8/98	ND	
Chloroform	METHOD	624	5	1	NA	7/8/98	ND	
1,1,1-Trichloroethane (TCA)	METHOD	624	5	1	NA	7/8/98	ND	
Carbon Tetrachloride	METHOD	624	5	1	NA	7/8/98	ND	
Benzene	METHOD	624	5	1	NA	7/8/98	ND	
1,2-Dichloroethane	METHOD	624	5	1	NA	7/8/98	ND	
Vinyl Acetate	METHOD	624	10	1	NA	7/8/98	ND	
Trichloroethene (TCE)	METHOD	624	5	1	NA	7/8/98	ND	
1,2-Dichloropropane	METHOD	624	5	1	NA	7/8/98	ND	
Bromodichloromethane	METHOD	624	5	1	NA	7/8/98	ND	
2-Chloroethyl Vinyl Ether	METHOD	624	10	1	NA	7/8/98	ND	
trans-1,3-Dichloropropene	METHOD	624	5	1	NA	7/8/98	ND	
2-Hexanone	METHOD	624	10	1	NA	7/8/98	ND	
4-Methyl-2-pentanone (MIBK)	METHOD	624	10	1	NA	7/8/98	ND	
Toluene	METHOD	624	5	1	NA	7/8/98	ND	
cis-1,3-Dichloropropene	METHOD	624	5	1	NA	7/8/98	ND	
1,1,2-Trichloroethane	METHOD	624	5	1	NA	7/8/98	ND	
Tetrachloroethene (PCE)	METHOD	624	5	1	NA	7/8/98	ND	
Dibromochloromethane	METHOD	624	5	1	NA	7/8/98	ND	
Chlorobenzene	METHOD	624	5	1	NA	7/8/98	ND	
Ethylbenzene	METHOD	624	5	1	NA	7/8/98	ND	
Styrene	METHOD	624	5	1	NA	7/8/98	ND	
Total Xylenes	METHOD	624	5	1	NA	7/8/98	ND	
Bromoform	METHOD	624	5	1	NA	7/8/98	ND	
1,1,2,2-Tetrachloroethane	METHOD	624	5	1	NA	7/8/98	ND	
1,3-Dichlorobenzene	METHOD	624	5	1	NA	7/8/98	ND	
1,4-Dichlorobenzene	METHOD	624	5	1	NA	7/8/98	ND	
1,2-Dichlorobenzene	METHOD	624	5	1	NA	7/8/98	ND	
Acrolein	METHOD	624	100	1	NA	7/8/98	ND	
Acrylonitrile	METHOD	624	100	1	NA	7/8/98	ND	
Methyl *tert*-Butyl Ether	METHOD	624	10	1	NA	7/8/98	ND	

Approved By: *[signature]* Date: 8-4-98

1S22/021397p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	California Environmental	**Service Request:**	L9802226
Project:	JBG/Cateilus/1736	**Date Collected:**	7/8/98
Sample Matrix:	Water	**Date Received:**	7/8/98

Inorganic Parameters

Sample Name: CMW6

Lab Code: L9802226-001 Basis: NA

Test Notes:

Analyte	**Units**	**Analysis Method**	**MRL**	**Dilution Factor**	**Date Extracted**	**Date Analyzed**	**Result**	**Result Notes**
Chloride	mg/L (ppm)	300.0	0.5	20	NA	7/8/98	100	
Solids, Total Dissolved (TDS)	mg/L (ppm)	160.1	10	1	NA	7/9/98	1200	

Approved By: Pahn Aem Date: 7-16-98

1S44/021397p

0003

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	California Environmental	**Service Request:**	L9802226
Project:	JBG/Cateilus/1736	**Date Collected:**	7/8/98
Sample Matrix:	Water	**Date Received:**	7/8/98

Inorganic Parameters

Sample Name: HMW1
Lab Code: L9802226-002 Basis: NA
Test Notes:

Analyte	Units	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Chloride	mg/L (ppm)	300.0	0.5	20	NA	7/8/98	110	
Solids, Total Dissolved (TDS)	mg/L (ppm)	160.1	10	1	NA	7/9/98	320	

Approved By: Date: 7-16-98
1S44/021397p

0004

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: California Environmental		**Service Request:** L9802226
Project: JBG/Cateilus/1736		**Date Collected:** NA
Sample Matrix: Water		**Date Received:** NA

Inorganic Parameters

Sample Name: Method Blank
Lab Code: L980708-MB
Test Notes:

Basis: NA

Analyte	Units	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Chloride	mg/L (ppm)	300.0	0.5	1	NA	7/8/98	ND	
Solids, Total Dissolved (TDS)	mg/L (ppm)	160.1	10	1	NA	7/9/98	ND	

Approved By: [signature] Date: 7-16-98
1S44/021397p

0005

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	California Environmental	**Service Request:**	L9802226
Project:	JBG/Cateilus/1736	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	NA

Surrogate Recovery Summary
Volatile Organic Compounds

Prep Method:	METHOD	Units:	PERCENT
Analysis Method:	624	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery Dibromofluoromethane	Toluene-D_8	4-Bromofluorobenzene
CMW6	L9802226-001		102	100	102
HMW1	L9802226-002		105	100	100
Method Blank	L980708-MB		105	100	98
Batch QC	L9802088-009MS		89	100	91
Batch QC	L9802088-009DMS		92	99	94
		CAS Acceptance Limits:	70-130	88-110	86-115

Approved By: Ralph Pen___ Date: 7-16-98

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	California Environmental	**Service Request:**	L9802226
Project:	JBG/Cateilus/1736	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	7/2/98

Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds

Sample Name:	Batch QC	Units:	ug/L (ppb)
Lab Code:	L9802088-009MS, L9802088-009DMS	Basis:	NA
Test Notes:			

									Percent Recovery				
											CAS	Relative	
	Prep	Analysis		Spike Level		Sample	Spike Result				Acceptance	Percent	Result
Analyte	**Method**	**Method**	**MRL**	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**	**Notes**
1,1-Dichloroethene (1,1-DCE)	METHOD	624	5	5.00	5.00	ND	4.54	4.92	91	98	61-145	8	
Trichloroethene (TCE)	METHOD	624	5	5.00	5.00	ND	4.44	4.63	89	93	71-120	4	
Benzene	METHOD	624	5	5.00	5.00	ND	4.73	4.92	95	98	76-127	4	
Toluene	METHOD	624	5	5.00	5.00	ND	4.67	4.84	93	97	76-125	4	
Chlorobenzene	METHOD	624	5	5.00	5.00	ND	4.40	4.82	88	96	75-130	9	

Approved By: [signature] Date: 7-16-91

0007

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: California Environmental
Project: JBG/Cateilus/1736
Sample Matrix: Water

Service Request: L9802226
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 7/8/98

Matrix Spike/Duplicate Matrix Spike Summary
Inorganic Parameters

Sample Name: Batch QC
Lab Code: L9802206-001MS, L9802206-001DMS
Basis: NA
Test Notes:

										Percent Recovery				
												CAS	Relative	
		Analysis		Spike Level		Sample	Spike Result					Accept.	Percent	Result
Analyte	**Units**	**Method**	**MRL**	**MS**	**DMS**	**Result**	**MS**	**DMS**		**MS**	**DMS**	**Limits**	**Difference**	**Notes**
Chloride	mg/L (ppm)	300.0	0.5	5.00	5.00	8.13	13.5	13.5		107	107	80-120	<1	

Approved By: _Dalla Dennes_ Date: 7-16-98

DMS/020597p
02226WET.SA1 - DMS 7/16/98

Columbia Analytical Services inc.

L9802226

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

6925 Canoga Avenue • Canoga Park, CA 91303 • (818) 587-5550 • Fax (818) 587-5555

DATE 7/18/98 PAGE 1 OF 1

PROJECT NAME JBG / CATE1/45 # 1736

PROJECT MANAGER CEB

COMPANY/ADDRESS CE

WILKE Village CA

PHONE

SAMPLERS SIGNATURE [signature]

ANALYSIS REQUESTED

	SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	TPH Gas/BTEX 8015/8020/602	TPH/8015 Modified Diesel ☐ FC ☐ Gasoline ☐	BTEX 602/8020	Total Petroleum Hydrocarbons EPA 418.1	Halogenated Volatiles 601/8010	Volatile Organics GC/MS 624/8240/8260	Base Neutral Acid Organic GC/MS 625/8270	CAM Metals 6010/7000	TDS	Chloride							REMARKS
-1	CMW6	7/8/98	1:30	#1,2,3	WATER							X			X	X							
-2	HMW1	"	2:00	#4,5,6	"							X			X	X							

RELINQUISHED BY:

Signature [signature]

Printed Name WILLIAM D. EDWARDS III

Firm CALIFORNIA ENVIRONMENTAL

Date/Time 7-8-98 /

RECEIVED BY:

Signature Sharon Malone

Printed Name Sharon Malone

Firm CAS

Date/Time 7/8/98 1605

TURNAROUND REQUIREMENTS

✓ 24 hr ___ 48 hr. ___ 5 day

___ Standard

___ Other (Specify)

___ Provide Verbal Preliminary Results

Requested Report Date ______

REPORT REQUIREMENTS

___ I. Routine Report

___ II. Report (includes DUP.MS. MSD, as required, may be charged as samples)

___ III. Data Validation Report (includes All Raw Data)

___ RWQCB

INVOICE INFORMATION:

P.O.# ______

Bill To ______

SAMPLE RECEIPT:

Shipping VIA: ______

Shipping #: ______

Condition: ______

Lab No: ______

RELINQUISHED BY:

Signature

Printed Name

Firm

Date/Time

RECEIVED BY:

Signature

Printed Name

Firm

Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:

24 hr

P/U DECALS

THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

512 E. WILSON AVENUE SUITE 201, GLENDALE, CA 91206
818•549•9959 Tel 818•543•3747 Fax

SHEAR TEST DIAGRAM #1

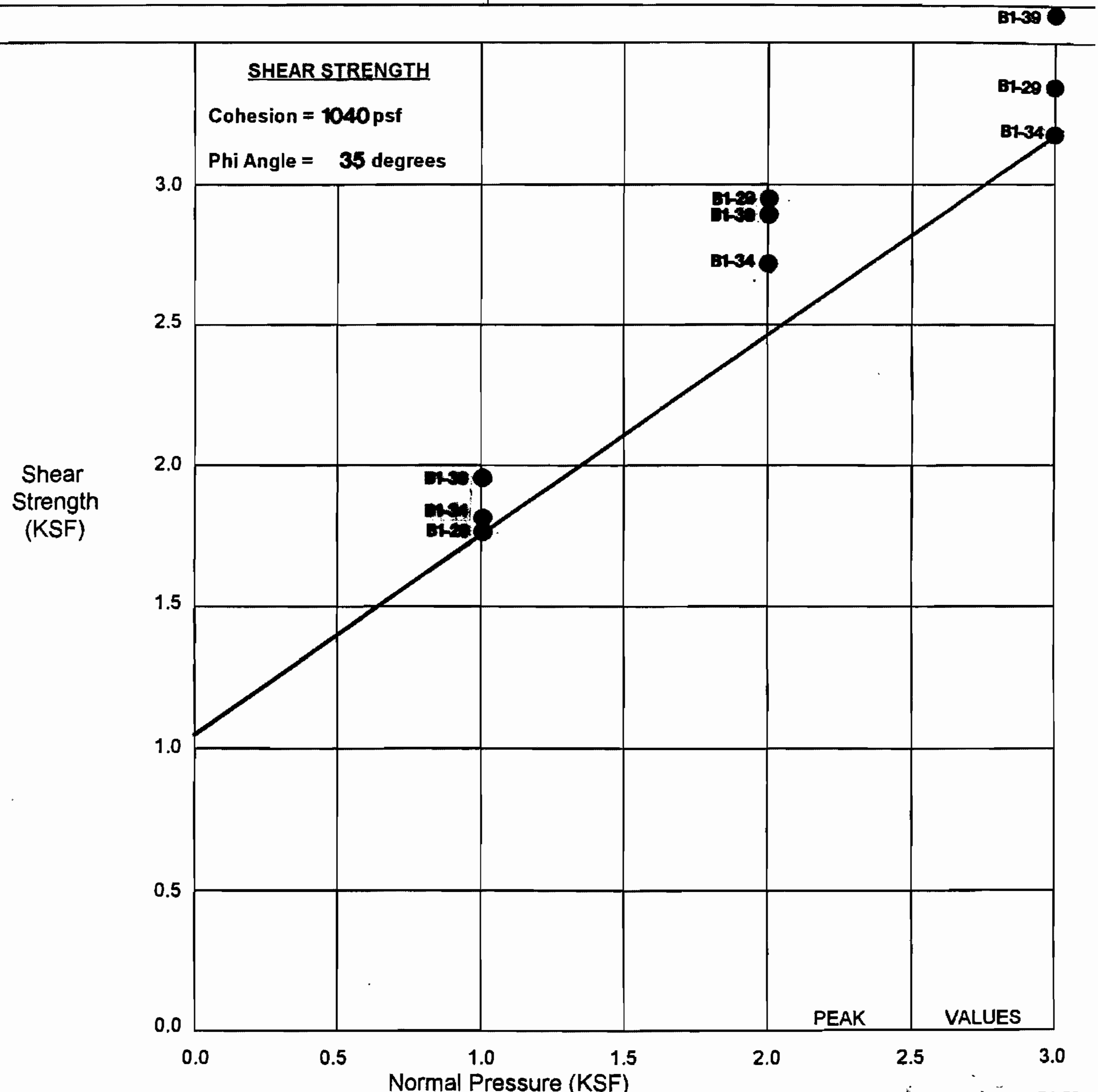
JB: 17776-B CATELLUS

SAMPLE: BEDROCK

SHEAR STRENGTH

Cohesion = 1040 psf

Phi Angle = 35 degrees



		B1-29	B1-34	B1-39
○ Direct Shear (Field Moisture)	Ave. Moisture Content (%) =	[illegible]	[illegible]	31.9
● Direct Shear (Saturated)	Ave. Dry Density (pcf) =	[illegible]	[illegible]	87.1

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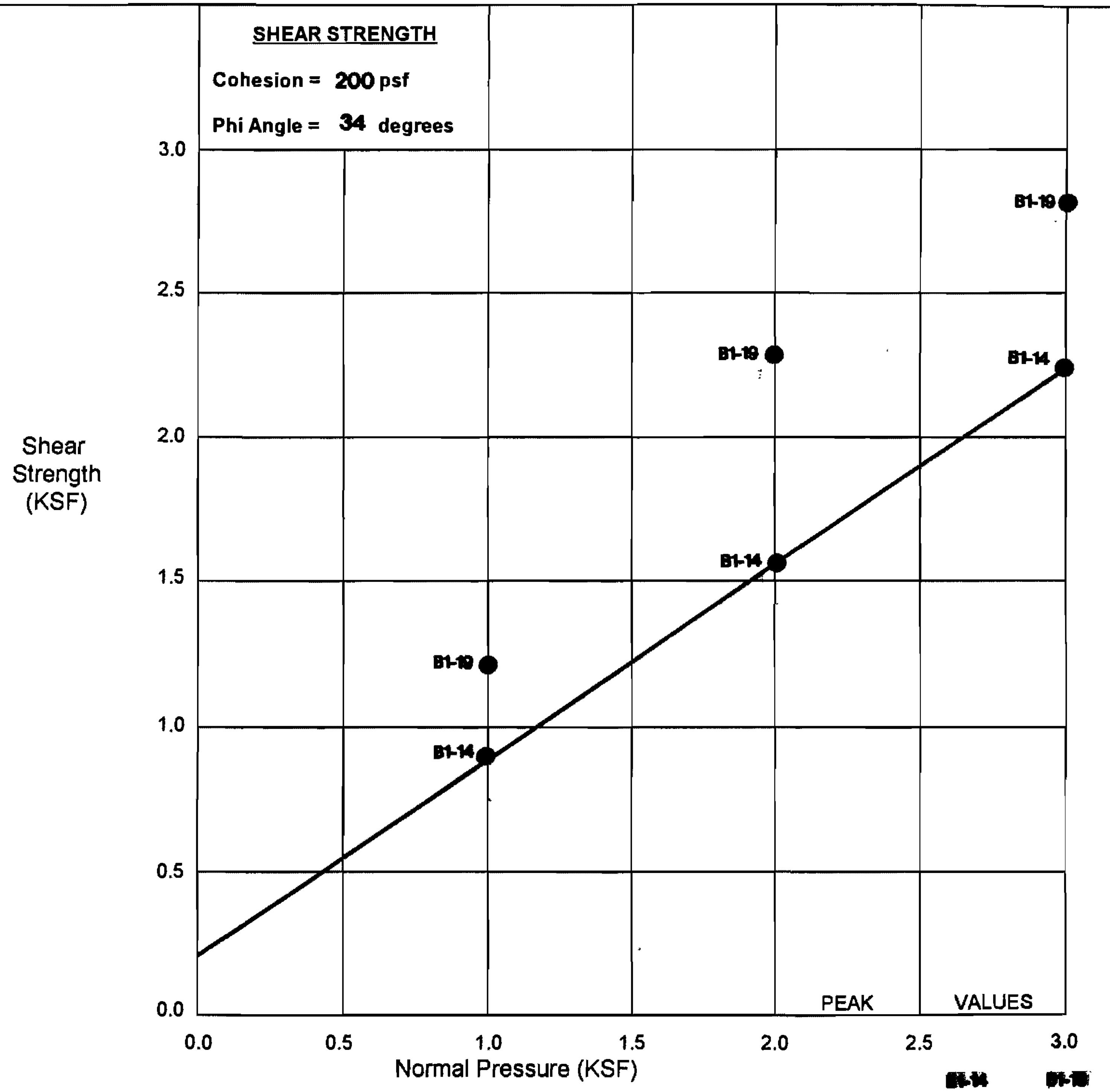
SHEAR TEST DIAGRAM #2

JB: 17776-B CATELLUS

SAMPLE: ALLUVIUM



○ Direct Shear (Field Moisture)

● Direct Shear (Saturated)

	B1-14	B1-19
Ave. Moisture Content (%) =	[illegible]	[illegible]
Ave. Dry Density (pcf) =	112.3	[illegible]

LOG OF BORING 1

PROJECT: JB:17776-B CATELLUS

DATE LOGGED: 6/4/98 BY: JWB

BORING TYPE: 8 Inch Hollow-Stem

SURFACE: 5 Inch AC Pavement

REPORT DATE: 7/9/98 ELEVATION: 276.4

Elevation (feet)	Depth (feet)	Moisture Content %	Dry Density (pcf)	Blow Count	Sample Type	Symbol USCS	Description
276	0						4 Inches Asphalt
		26.0	96.9	15*	R	SC	**FILL:** Clayey Sand, dark brown, moist, dense, some debris, asphalt, concrete, brick
	3						
						SC	**ALLUVIUM:** Clayey Sand, dark brown, moist, medium dense, porous, grades to sand, light brown, moist, dense
271	5						
		6.2	119.5	43	R	SM	Silty Sand, light and dark brown, moist, medium dense with round granite cobbles
		3.1	---	43	R		Silty Sand, light brown, moist, dense
266	10						Gravelly layers with coarse sand
		33.6	80.9	9	R		Sandy Silt, gray green, moist, firm, some peat
		4.6	112.3	40	R	SG	Gravelly Sand, light brown, moist, dense
261	15						
		36.7	83.5	25	R		Water at 16 Feet
						ML	Clayey Silt, light bluish gray, saturated, soft
						SG	Gravelly Sand, gray, saturated, dense
		9.8	118.4	50	R		
256	20						
		10.6	114.7	43	R	GW	Sandy Gravel, gray, saturated, dense, rounded granite clasts
							*140 Pound hammer, 30 Inch drop
		12.0	125.9	45	R		
	25						

LOG OF BORING 1 (Continued)

PROJECT: JB: 17776-B CATELLUS

DATE LOGGED: 6/4/98 BY: JWB

BORING TYPE: 8 Inch Hollow-Stem

SURFACE: Asphalt Parking Lot

REPORT DATE: 7/9/98 ELEVATION: 276.4

Elevation (feet)	Depth (feet)	Moisture Content %	Dry Density (pcf)	Blow Count	Sample Type	Symbol USCS	Description
	26	31.2	93.0	50	R		**BEDROCK:** Siltstone, blue gray, saturated, bedded, with layers of fine grained sandstone, soft to very firm
		28.2	96.4	50/9	R		Hydrogen Sulfide odor
246	30						
							Siltstone with sandstone interbeds, firmer
		29.9	94.3	50/11	R		
241	35						
							slow drilling
		34.6	87.1	50/9	R		
236	40						Siltstone continues
231	45						
	50						*End at 50 Feet; Water at 16 Feet.* Boring developed as 2 inch diameter monitoring well, sand to 15 feet, bentonite plug to top.

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LOG OF BORING 2

PROJECT: JB:17776-B CATELLUS

DATE LOGGED: 6/4/98 BY: JWB

BORING TYPE: 8 Inch Hollow-Stem

SURFACE: 5 Inch AC Pavement

REPORT DATE: 7/9/98 ELEVATION: 276.4

Elevation (feet)	Depth (feet)	Moisture Content %	Dry Density (pcf)	Blow Count	Sample Type	Symbol USCS	Description
276	0					SM	**FILL:** Silty Sand, dark brown, moist, dense, with rock fragments and brick
271	5						
						SG	**ALLUVIUM:** Gravelly Sand, light brown, moist, dense
266	10						
	12					SW	grades to fine grained sand with gravel
261	15					GW	Gravel and Cobble layer, 4 feet thick, hard drilling
256	20					SW	
	23						Water at 23 Feet
251	25						

LOG OF BORING 2 (Continued)

PROJECT: JB17776-B CATELLUS

DATE LOGGED: 6/4/98 BY: JWB

BORING TYPE: 8 Inch Hollow-Stem

SURFACE: 5 Inch AC Pavement

REPORT DATE: 7/9/98 ELEVATION: 276.4

Elevation (feet)	Depth (feet)	Moisture Content %	Dry Density (pcf)	Blow Count	Sample Type	Symbol USCS	Description
	26						
246	30						
	32					ML	**WEATHERED BEDROCK:** Clayey Silt, greenish gray, saturated, soft to firm
241	35						
	36						**BEDROCK:** Siltstone, blue gray, very moist, bedded, fine sandstone layers
	38						*End at 38 Feet; Water at 23 Feet; Fill to 6 Feet.*

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SKIN FRICTION ANALYSIS
JB 17776-B CATELLUS

CALCULATE THE ALLOWABLE SKIN FRICTION RESISTANCE FOR DRILLED, POURED IN PLACE CONCRETE PILES IN COMPRESSION AND EMBEDDED IN BEDROCK. SKIN FRICTION IS TABULATED AS A FUNCTION OF EMBEDMENT DEPTH. THE METHOD IS DESCRIBED ON PAGES 193-196 OF NAVFAC DM-7.2, *"Deep Foundations"*, 1982, AND PAGES 745-751 OF J. E. BOWLES, *"Foundation Analysis and Design"*, 1988

BEDROCK PROPERTIES (Saturated) REFERENCE: SHEAR DIAGRAM 1

COHESION	1040 psf	PILE DIAMETER	2 feet
PHI ANGLE	35 degrees	FACTOR OF SAFETY	1.5
DENSITY	125 pcf	DEPTH TO WATER TABLE	.1 feet

CALCULATION PARAMETERS:

THE FRICTION ANGLE BETWEEN THE CONCRETE PILE AND THE BEDROCK IS 0.75 * Phi = 26.25 degrees.

THE COEFFICIENT OF LATERAL EARTH PRESSURE (K) = 0.43

ADHESION VALUE BETWEEN THE CONCRETE PILE AND THE BEDROCK = 1.00

PILE EMBEDMENT DEPTH (feet)	CALCULATED SKIN FRICTION COMPRESSION (psf)	PILE EMBEDMENT DEPTH (feet)	CALCULATED SKIN FRICTION COMPRESSION (psf)
8.0	764.4	19.0	861.0
9.0	773.2	20.0	869.7
10.0	782.0	21.0	878.5
11.0	790.7	22.0	887.3
12.0	799.5	23.0	896.1
13.0	808.3	24.0	904.8
14.0	817.1	25.0	913.6
15.0	825.8	26.0	922.4
16.0	834.6	27.0	931.2
17.0	843.4	28.0	939.9
18.0	852.2	29.0	948.7
19.0	861.0	30.0	957.5

CONCLUSIONS
THE SKIN FRICTION RESISTANCE FOR POURED CONCRETE PILES IN COMPRESSION AND EMBEDDED IN BEDROCK IS SHOWN ABOVE.

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SKIN FRICTION ANALYSIS
JB 17776-B   CATELLUS

CALCULATE THE ALLOWABLE SKIN FRICTION RESISTANCE FOR DRILLED, POURED IN PLACE CONCRETE PILES IN COMPRESSION AND EMBEDDED IN ALLUVIUM. SKIN FRICTION IS TABULATED AS A FUNCTION OF EMBEDMENT DEPTH. THE METHOD IS DESCRIBED ON PAGES 193-196 OF NAVFAC DM-7.2, *"Deep Foundations"*, 1982, AND PAGES 745-751 OF J. E. BOWLES, *"Foundation Analysis and Design"*, 1988

ALLUVIUM PROPERTIES (Saturated) REFERENCE: SHEAR DIAGRAM 2

COHESION	200 psf	PILE DIAMETER	2 feet
PHI ANGLE	34 degrees	FACTOR OF SAFETY	1.5
DENSITY	130 pcf	DEPTH TO WATER TABLE	.1 feet

CALCULATION PARAMETERS:

THE FRICTION ANGLE BETWEEN THE CONCRETE PILE AND THE ALLUVIUM IS 0.75 * Phi = 25.50 degrees.

THE COEFFICIENT OF LATERAL EARTH PRESSURE (K) = 0.44

ADHESION VALUE BETWEEN THE CONCRETE PILE AND THE ALLUVIUM = 1.00

PILE EMBEDMENT DEPTH (feet)	CALCULATED SKIN FRICTION COMPRESSION (psf)	PILE EMBEDMENT DEPTH (feet)	CALCULATED SKIN FRICTION COMPRESSION (psf)
8.0	210.0	19.0	314.2
9.0	219.5	20.0	323.7
10.0	229.0	21.0	333.2
11.0	238.4	22.0	342.7
12.0	247.9	23.0	352.1
13.0	257.4	24.0	361.6
14.0	266.9	25.0	371.1
15.0	276.3	26.0	380.6
16.0	285.8	27.0	390.0
17.0	295.3	28.0	399.5
18.0	304.8	29.0	409.0
19.0	314.2	30.0	418.5

CONCLUSIONS
THE SKIN FRICTION RESISTANCE FOR POURED CONCRETE PILES IN COMPRESSION AND EMBEDDED IN ALLUVIUM IS SHOWN ABOVE.

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RETAINING WALL ANALYSIS
JB 17776-B CATTELUS

CALCULATE THE DESIGN MINIMUM EQUIVALENT FLUID PRESSURE (EFP) FOR PROPOSED RETAINING WALLS SUPPORTING ALLUVIUM UP TO 23 FEET HIGH, WITH A 0 DEGREE BACKSLOPE. ASSUME THE BACKFILL IS SATURATED WITH NO EXCESS HYDROSTATIC PRESSURE.

ALLUVIUM PROPERTIES (Saturated)

COHESION	200 psf	RETAINING WALL HEIGHT	23 feet
PHI ANGLE	34 degrees	BACKSLOPE ANGLE	0 degrees
DENSITY	130 pcf	UNIFORM SURCHARGE	0 pounds/foot
REF. SHEAR DIAGRAM 1		FACTOR OF SAFETY	1.5

For Factor of Safety (FS) = 1.5 : Cd = C/FS = 133.33 psf
Phid = atan(tan(Phi)/FS) = 24.21 degrees

FOR THIS CALCULATION THE ANGLE OF FRICTION BETWEEN THE WALL AND THE BACKFILL IS 0 DEGREES.

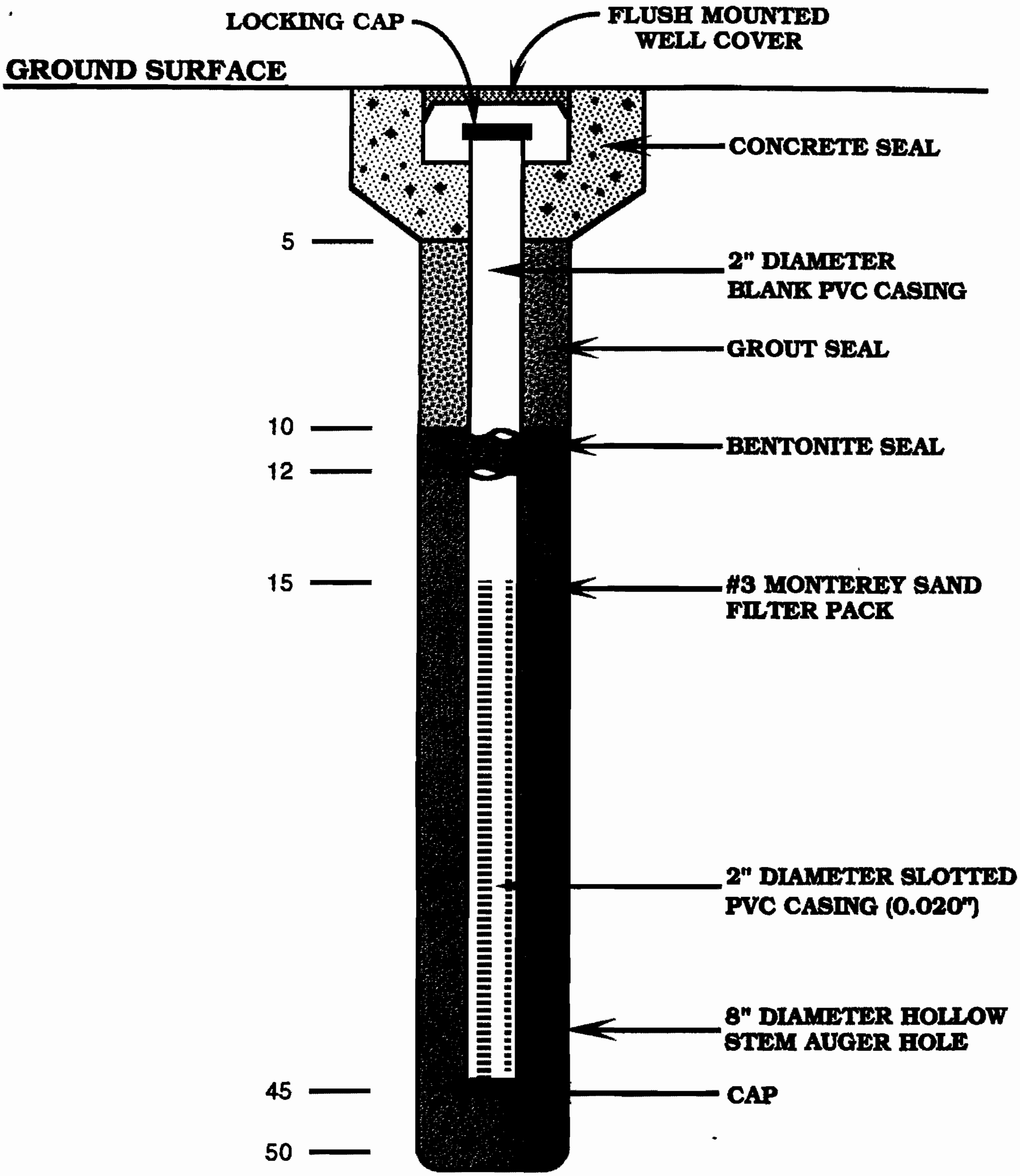
2050 TRIALS WERE ANALYZED USING ASSUMED FAILURE ANGLES VARYING FROM 30 TO 70 DEGREES AT AN INTERVAL OF 1 DEGREES, AND UPSLOPE DISTANCES TO THE TENSION CRACK FROM 1 TO 50 FEET AT AN INTERVAL OF 1 FEET.

THE HORIZONTAL UPSLOPE DISTANCE TO THE TENSION CRACK WHICH RESULTS IN THE HIGHEST HORIZONTAL THRUST ON THE RETAINING WALL IS 13 FEET. THE TOTAL EXTERNAL SURCHARGE ON THE FAILURE WEDGE IS 0 POUNDS.

DESIGN THE RETAINING WALL AS FOLLOWS:

CRITICAL FAILURE ANGLE (degrees)	AREA OF FAILURE WEDGE (sq. ft.)	TENSION CRACK DEPTH (feet)	MAXIMUM HORIZONTAL THRUST (pounds)	EQUIVALENT FLUID PRESSURE (pcf)
57.00	168.88	2.98	10689.54	40.41

CONCLUSIONS:
THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL UP TO 23 FEET HIGH SUPPORTING ALLUVIUM WITH A 0 DEGREE BACKSLOPE MAY BE DESIGNED FOR A MINIMUM EFP OF 43 PCF.

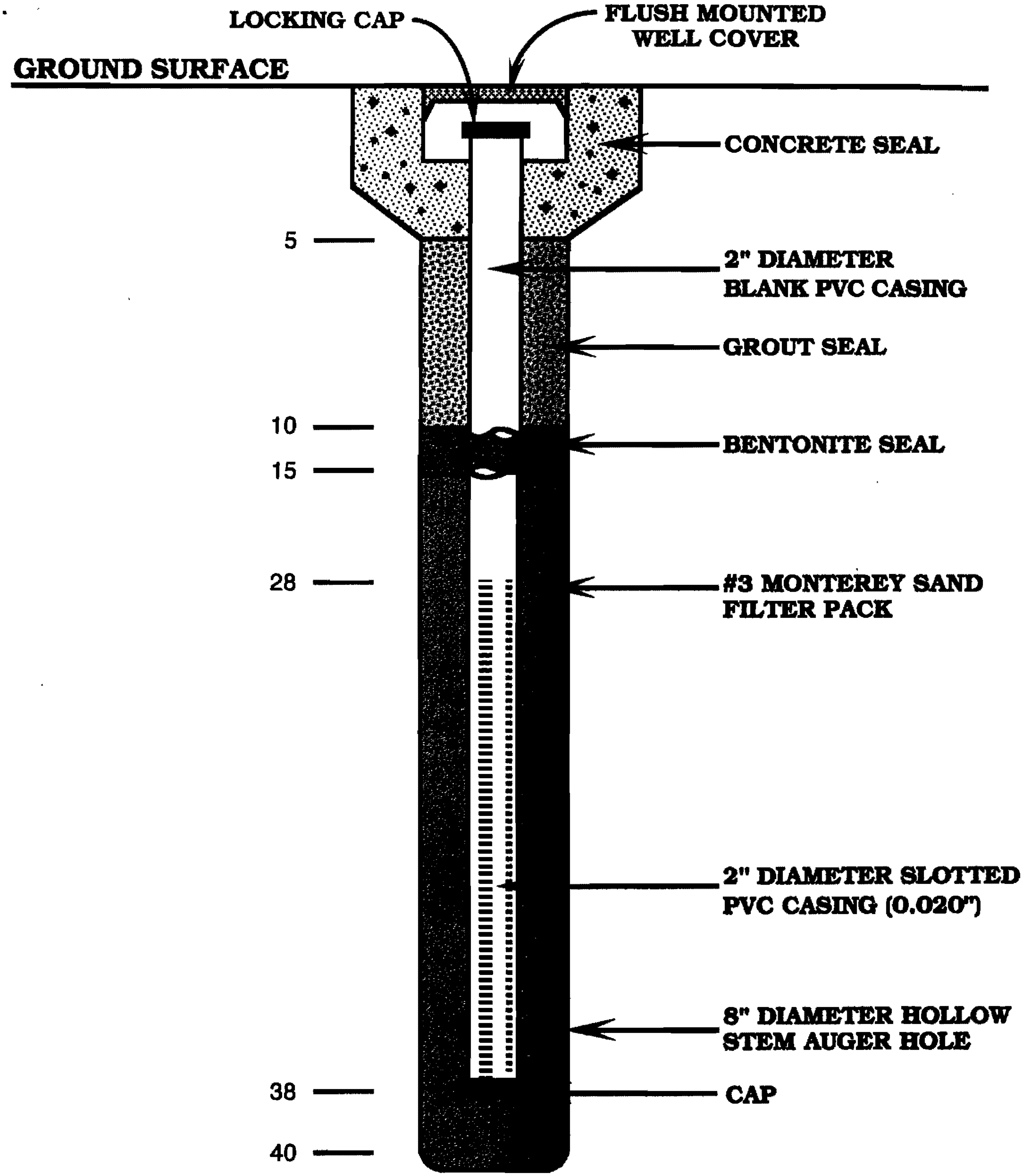


NOT TO SCALE

Catellus Monitoring well

MONITORING WELL
JMW1

Drawn By:	Job # Catellus
Checked By: CIB	Date: July 1998



NOT TO SCALE

Catellus Monitoring well 2

MONITORING WELL JMW2

Drawn By:	Job # Catellus
Checked By: CIB	Date: July 1998

BORING 3

DATE DRILLED: August 14, 1997
EQUIPMENT USED: 24"-Diameter Bucket to 17½'
10"-Dia. Hollow Stem Auger to 42'
ELEVATION: 277

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.	SOIL	DESCRIPTION
									7" Asphalt Paving
								SM	ARTIFICIAL FILL (af) SILTY SAND - fine to coarse, some Clay, some Gravel, dark grey
275		6.9	114	30		1	■		
								ML	SANDY SILT - grey
		18.6	105	0		<1	■		
	5							SM	ALLUVIUM (Qal) SILTY SAND - fine, some pieces of wood, light brown
		8.0	100	20		1	■		
270								SW	SAND - well graded, some Gravel and Cobbles (to 8" in size), light brownish grey
		2.6	122	50		5	■		
	10								
265		3.7	113	80		6	■		
	15	11.4	116	0		2	■		About 30% Gravel
260									
	20								
255		11.5	120	50		135	■		Grey
	25	33.0	90	60		75 for 10"	■	ML	CLAYEY SILT - grey to dark grey
250									
	30	27.1	96	200		70	■		SAN PEDRO FORMATION (Qsp) SILT - massive, dark grey
245									
								SM	SILTY SAND - fine, thin layers of Silty Clay, bluish grey to dark grey
	35	35.1	89	0		47	■		
240									
								SW	SAND - well graded, some lenses of Clayey Silt, dark grey
	40	15.0	111	0		65	■		

(CONTINUED ON FOLLOWING FIGURE)

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated.
It is not warranted to be representative of subsurface conditions at other locations and times.

JOB 70131.70396.0001 DATE 2/2/1998 F.T. AR DR. JB O.E. MS CHKD

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.3a

BORING 3 (Continued)

DATE DRILLED: August 14, 1997
EQUIPMENT USED: 24"-Diameter Bucket to 17½'
10"-Dia. Hollow Stem Auger to 42'
ELEVATION: 277

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.
235							

END OF BORING AT 42'.

NOTE: BUCKET BORING: Water seepage encountered during drilling at a depth of 15'. Water level measured after completion of drilling. Raveling from 6' to 15'. Bucket boring terminated at a depth of 17½' due to caving and sloughing below water.

HOLLOW STEM AUGER BORING: To obtain future water level measurement and sampling installed 4-inch-diameter PVC pipe to 42'. Pipe perforated between depths of 10' and 40'. Backfilled with sand to within 8' of ground surface and filled with concrete above 4'. A bentonite plug placed between depths of 4' and 8' of ground surface. Water level measured in the monitoring well at a depth of 15' on 8/26/97.

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB 70131.70396.0001 DATE 10/2/1997 F.T. AR DR. JB O.E. MS CHKD

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.3b

JOB 70131.70396.0001 DATE 2/2/1998 F.T. AR DR. JB O.E. MS CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated.
It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 4

DATE DRILLED: August 20, 1997
EQUIPMENT USED: 8" - Diameter Hollow Stem Auger
ELEVATION: 276

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.		
275								SM	3' Apshalt Paving ARTIFICIAL FILL (af) SILTY SAND - fine, some Gravel, brownish grey
		9.7	103	0		17	■		
				0		35	■	SW	ALLUVIUM (Qal) SAND - well graded, about 30% Gravel, light grey
	5								
270									* Number of blows required to drive the Crandall sampler 12 inches using a 140 pound hammer falling 30 inches.
		2.8	107	0		36	■		
	10								
265									Layer of Silty Clay
		42.8	79	0		10	■		Some fine Sand
	15								
260		6.2	124	5		57	■		About 40% Gravel
	20								
255		8.5	126	10		60	■		
		29.9	91	10		34	■		SAN PEDRO FORMATION (Qsp) SILT - bedded, lenses of fine Sand, dark grey
	25								
250		25.8	98	300		80	■		
	30	25.4	100	190		80	■		
245									
	35	26.0	100	250		75 for 4"	■		
240									NOTE: Water seepege encountered during drilling at depths of 18' to 20', and 30'. Water level measured at a depth of 18' at completion of drilling.
	40	25.9	97	200		80	■		END OF BORING AT 40'.

LOG OF BORING

LAW/CRANDALL

BORING 5

DATE DRILLED: August 13, 1997
EQUIPMENT USED: 24" - Diameter Bucket
ELEVATION: 278

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.	USCS	DESCRIPTION
								SM	3½" Asphalt Paving ARTIFICIAL FILL (af) - SILTY SAND - fine, light grey
		--	--	0		4		SW	ALLUVIUM (Qal) SAND - well graded, about 40% Gravel, few Cobbles (to 5" in size), light grey
275		1.4	121	0		3			
	5	1.9	128	0		7			
270	10	3.3	103	0		2			
265	15	6.3	114	0		4			
260		29.5	97	0		1		ML	CLAYEY SILT - dark grey
	20	37.4	85	0		<1			
255	25	35.1	87	0		<1			
250		14.0	109	10		9		SW	SAN PEDRO FORMATION (Qsp) SAND - well graded, lenses of Silty Sand and Clayey Silt, dark grey
	30	25.7	100	100		11			SILT - bedded, lenses of fine Sand, dark grey
245		23.0	104	175		19			

* Number of blows required to drive the Crandall sampler 12 inches using a 140 pound hammer falling 30 inches.

(BORING TERMINATED AT A DEPTH OF 33' DUE TO DIFFICULT DRILLING BELOW WATER).

NOTE: Water seepage encountered during drilling at a depth of 22'. Water level measured at a depth of 22' 30 minutes after completion of drilling. Raveling from 2' to 8' (to 3¼' in diameter) and from 8' to 17' (to 2½' in diameter).

JOB 70131.70396.0001 DATE 9/23/1997 F.T. AR DR. JB O.E. MS CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.5

BORING 6

DATE DRILLED: August 19, 1997
EQUIPMENT USED: 24"-Diameter Bucket to 30'
10"-Dia. Hollow Stem Auger to 42'
ELEVATION: 278

MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)
1.4	116	50		2
1.7	103	75		1
1.6	117	10		5
1.8	115	0		6
2.7	99	0		5
4.1	114	0		8
30.3	94	0		4
22.1	104	0		6
7.8	118	0		1
18.3	114	0		2
10.7	117	0		145 +
8.6	136	0		70

ELEVATION (ft.): 275, 270, 265, 260, 255, 250, 245, 240
DEPTH (ft.): 5, 10, 15, 20, 25, 30, 35, 40
SAMPLE LOC.

4" Asphalt Paving - 6" Brick floor
ARTIFICIAL FILL (af)
SM SILTY SAND - fine to coarse, brown
ALLUVIUM (Qal)
SW SAND - well graded, about 40% Gravel, and Cobbles (to 5" in size), light brownish grey

Thin layers of Sandy Silt

SM SILTY SAND - fine, lenses of Sandy Silt, few Gravel, grey

SW SAND - well graded, about 15% Gravel and Cobbles, grey

* Number of blows required to drive the Crandall sampler 12 inches using a 1600 pound hammer falling 12 inches.

\+ Number of blows required to drive the Crandall sampler 12 inches using a 140 pound hammer falling 30 inches.

(CONTINUED ON FOLLOWING FIGURE)

LOG OF BORING

LAW/CRANDALL

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB 70131.70396.0001 DATE 9/23/1997 F.T. AR DR. JB O.E. MS CHKD MS

BORING 6 (Continued)

DATE DRILLED: August 19, 1997
EQUIPMENT USED: 24"-Diameter Bucket to 30'
10"-Dia. Hollow Stem Auger to 42'
ELEVATION: 278

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.
					50 for 1"		

END OF BORING AT 42'.

NOTE: BUCKET BORING: Water seepage encountered during drilling at a depth of 24'. Water level measured at a depth of 24' 15 minutes after completion of drilling. Bucket boring terminated at a depth of 30' due to caving and sloughing.

HOLLOW STEM AUGER BORING: To obtain future water level measurement and sampling installed 4-inch-diameter PVC pipe to 42'. Pipe perforated between depths of 15' and 40'. Backfilled with sand to within 11' of ground surface and filled with concrete above 3'. A bentonite plug placed between depths of 3' and 11' of ground surface. Water level measured in the monitoring well at a depth of 22' on 8/26/97.

JOB 70131.70396.0001 DATE 10/2/1997 F.T. AR DR. JB O.E. MS CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.6b

JOB 70131.70396.0001 DATE 9/23/1997 F.T. AR DR. JB O.E. MS CHKD MS

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated.
It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 8

DATE DRILLED: August 18, 1997
EQUIPMENT USED: 8" - Diameter Hollow Stem Auger
ELEVATION: 278

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.	USCS	DESCRIPTION
								SM	3" Asphalt Paving ARTIFICIAL FILL (af) SILTY SAND - fine to medium, some Gravel, few Cobbles (to 6" in size), brown
275		8.2	108	0		51			
	5	--	--	0		39		SP	ALLUVIUM (Qal) SAND - fine to medium, some coarse, about 30% Gravel and Cobbles (to 6" in size), light brownish grey Sample not recovered
270		1.6	108	0		58			
	10	4.4	92	0		50 for 9"			Fine Sand, less Gravel
265				0	64 for 9"				
	15								
260		1.7	115	0		50 for 6"		SW	SAND - well graded, about 30% Gravel and Cobbles (to 6" in size), light brownish grey
	20			0	73 for 9"				
255		8.7	123	0		50 for 9"			
	25			0	50 for 4"				
250									
	30	13.3	117	0		57			
245				0	85 for 10"			ML	SANDY SILT - some Clay, light greyish green
	35	--	--			48			Sample not recovered
240				0	32				SAN PEDRO FORMATION (Qsp) SILT - bedded, lenses of fine Sand, dark grey
	40								

(CONTINUED ON FOLLOWING FIGURE)

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.8a

BORING 8 (Continued)

DATE DRILLED: August 18, 1997
EQUIPMENT USED: 8" - Diameter Hollow Stem Auger
ELEVATION: 278

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.	DESCRIPTION
		26.3	99	0		72		
235								
	45			0	54			
230		–	–	0		64		Sample not recovered
	50							
225				0	75			
	55							
		26.1	95	0		69		
220								
	60			0	50 for 6"			
								END OF BORING AT 61'.

NOTE: Water seeepage encountered during drilling at a depth of 23'. Water level measured at a depth of 38' 5 minutes after completion of drilling.

JOB 70131.70396.0001 DATE 9/23/1997 F.T. AR DR. JB O.E. MS CHKD MS

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.8b

JOB 70131.70396.0001 DATE 9/23/1997 F.T. AR DR. JB O.E. MS CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated.
It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 9

DATE DRILLED: August 18, 1997
EQUIPMENT USED: 8" - Diameter Hollow Stem Auger
ELEVATION: 278

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.		DESCRIPTION
								SM	3" Asphalt Paving ARTIFICIAL FILL (af) SILTY SAND - fine to coarse, some Gravel, grey and brown
275		12.6	106	0		34			
	5	16.4	104	0		25			
270		--	--	0		50 for 6"		SW	ALLUVIUM (Qal) SAND - well graded, some Gravel and Cobbles (to 6" in size), light brownish grey Sample not recovered
	10	2.6	--	0		75 for 11"			About 50% Gravel, some Cobbles (to 10" in size)
265		4.2	108	0		55		SP	SAND - fine, some Gravel, brown
	15								
260		--	--	0		50 for 3"			Sample not recovered
	20	--	--	0		50 for 6"		SW	SAND - well graded, about 30% Gravel and Cobbles (to 6" in size), light grey Sample not recovered
255		3.9	107	0		53			
	25	11.6	120	0		58			Layer of fine to medium Sand
250		8.2	125	0		40			
	30								
245		--	--	0		17			Sample not recovered
	35	--	--	0		29			Sample not recovered
240									
	40								

(CONTINUED ON FOLLOWING FIGURE)

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.9a

JOB 70131.70396.0001 DATE 9/23/1997 F.T. AR DR. JB O.E. MS CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 9 (Continued)

DATE DRILLED: August 18, 1997
EQUIPMENT USED: 8" - Diameter Hollow Stem Auger
ELEVATION: 278

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.
				0	77		

END OF BORING AT 41'.

NOTE: Water seepage encountered during drilling at a depth of 26'. Water level measured at a depth of 31' 10 minutes after completion of drilling.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.9b

JOB 70131.70396.0001 DATE 9/23/1997 F.T. AR DR. JB O.E. MS CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 10

DATE DRILLED: August 19, 1997
EQUIPMENT USED: 8" - Diameter Hollow Stem Auger
ELEVATION: 279

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.
		8.9	110	50		32	
275	5	2.0	86	10		16	
270		3.2	103	10		19	
	10			0	55		
265	15	4.8	121	0		55	
				0	60		
260	20	2.3	110	0		55	
255				0	50		
	25	13.4	117	0		49	
250	30			0	95		
		--	--			37	
245	35	10.7	128	0		55	
240	40			0	70		

SM — 3" Asphalt Paving
ARTIFICIAL FILL (af)
SILTY SAND - fine to coarse, some Gravel, some pieces of brick, brown

SP — ALLUVIUM (Qal)
SAND - fine to medium, about 15% Gravel, light brown

SW — SAND - well graded, about 20% Gravel and Cobbles, grey

About 40% Gravel and Cobbles (to 6" in size)

Sample not recovered

SP-SM — SAND and SILTY SAND - fine to coarse, about 10% Gravel, grey

(CONTINUED ON FOLLOWING FIGURE)

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.10a

BORING 10 (Continued)

DATE DRILLED: August 19, 1997
EQUIPMENT USED: 8" - Diameter Hollow Stem Auger
ELEVATION: 279

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	O.V.A.*** (ppm)	"N" VALUE STD.PEN.TEST	BLOW COUNT* (blows/ft.)	SAMPLE LOC.		DESCRIPTION
		18.5	110	0		75			
235	45							SW	SAND - well graded, about 10% Gravel and Cobbles, grey
				50	100 for 9"				
230	50	--	--			65			Sample not recovered
225	55			0	54				
220	60			0	97				
									END OF BORING AT 60½'.

NOTE: Water seepage encountered during drilling at a depth of 23'. Water level measured at a depth of 35½' 5 minutes after completion of drilling.

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB 70131.70396.0001 DATE 10/2/1997 F.T. AR DR. JB O.E. MS CHKD

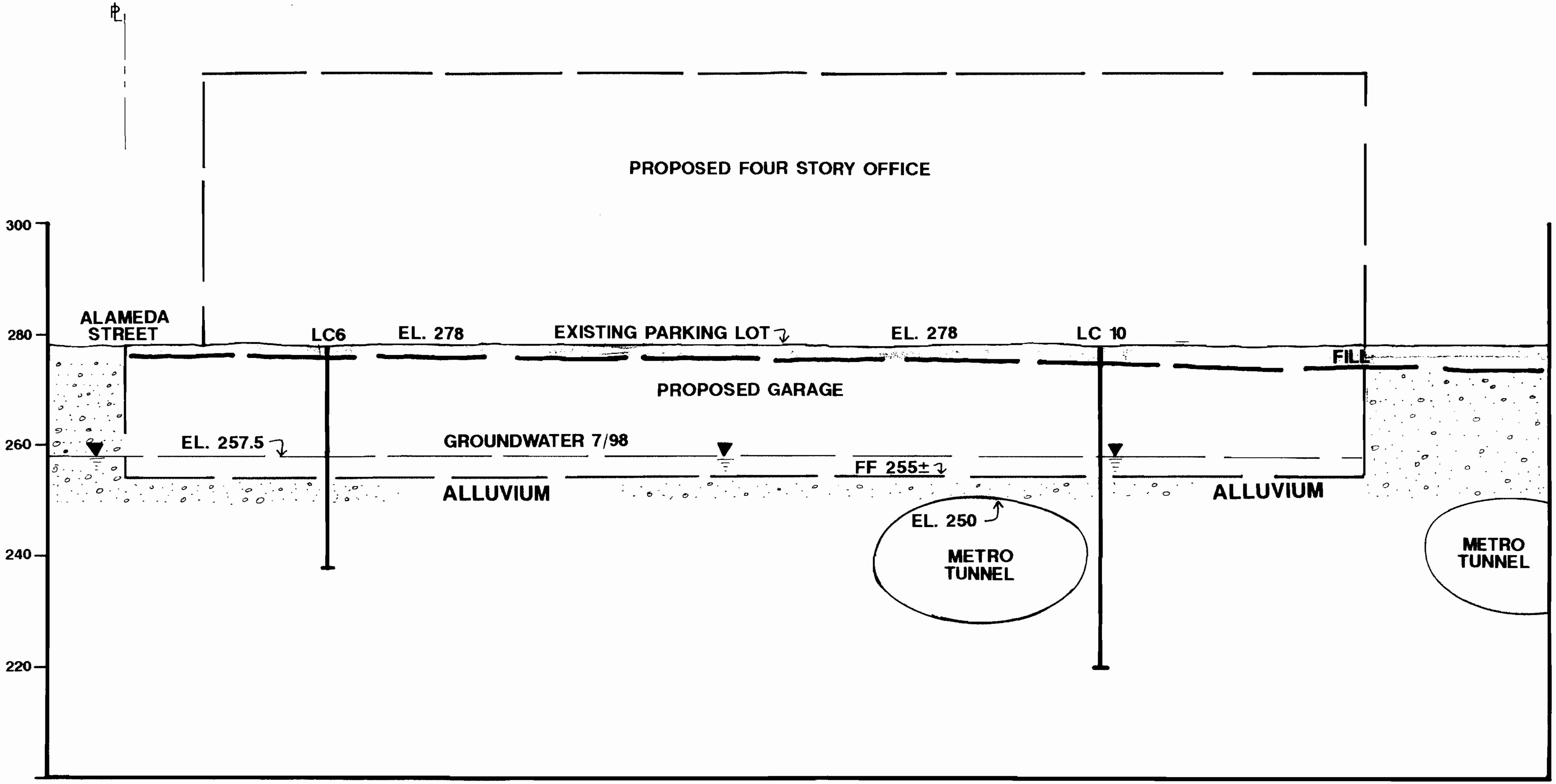
LOG OF BORING

LAW/CRANDALL

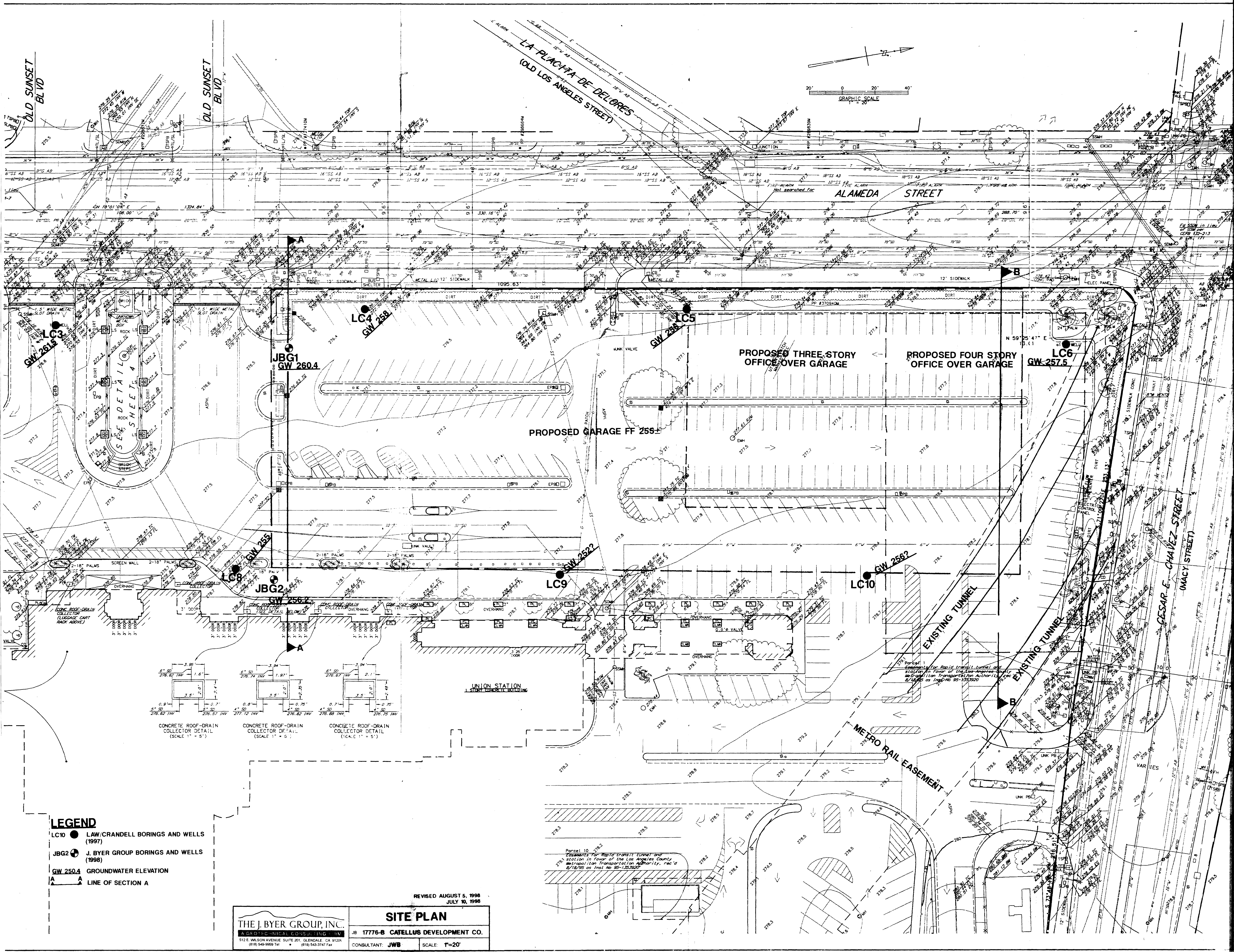
FIGURE A-1.10b

THE J. BYER GROUP, INC. A GEOTECHNICAL CONSULTING FIRM 512 E. WILSON AVENUE SUITE 201, GLENDALE, CA 91206 (818) 549-9959 Tel • (818) 543-3747 Fax	SECTION B	
	JB: 17776-B CATELLUS DEVELOPMENT	
	CONSULTANT: JWB	SCALE: 1"=20'

AUGUST 5, 1998



SECTION B



UNION STATION

PARKING STRUCTURE

LOS ANGELES, CALIFORNIA

SHEET NOTES

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PROFESSIONAL LAND SURVEYOR
ROBERT C. OLSON
No. 5490
Exp. 9-30-2000
STATE OF CALIFORNIA

NO. DATE ITEM
REVISIONS

DESIGN SURVEY FOR:
CATELLUS DEVELOPMENT CORPORATION
IN THE CITY OF LOS ANGELES
COUNTY OF LOS ANGELES
STATE OF CALIFORNIA

SHEET TITLE

September 4, 1997	1" = 20'
DATE	SCALE
JDC / GMK	RCO
DRAWN BY	CHECKED

TOPOGRAPHY

PROJECT NO. 1CAT0503 TASK 001

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SECTION A

JB: 17776-B CATELLUS DEVELOPMENT CO.

CONSULTANT: JWB | SCALE: 1"=20'

JULY 10, 1998
REVISED AUGUST 5, 1998